

2019 Study of the Water Quality of 165 Metropolitan Area Lakes

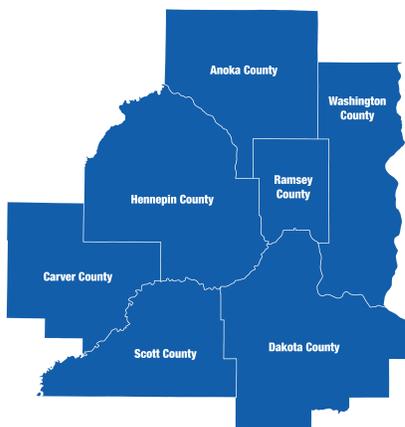


February 2021

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2019 Study of the Water Quality of 165 Metropolitan Area Lakes

Report by

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February 2021

Executive Summary

This report is the latest in a continuing series of reports summarizing results of the annual lake monitoring program of the Metropolitan Council (METC) in the Twin Cities seven-county metropolitan area (TCMA). The METC has collected water quality data on area lakes since 1980. This report contains data from a total of 180 lake sites on 165 lakes monitored in 2019. The monitoring program in 2019 included 2 lakes and 2 newly established lake sites not previously monitored by the Council. There are 950 lakes in the TCMA. The METC monitors just a subset of these lakes due to limited resources. Additional lakes are monitored by other units of government which help to further provide important regional lake water quality data, but the data collected from these other entities are not included in this report.

To date, the METC's lake monitoring program (including monitoring by METC staff and volunteers) has provided an important tool for making informed lake management decisions. Data from our regional lake monitoring program are frequently used to determine possible trends in lake water quality, estimate expected ranges in water quality of non-monitored lakes, examine intra-and inter-regional differences, determine potential water quality impairments, and investigate the relationships between land use and water quality.

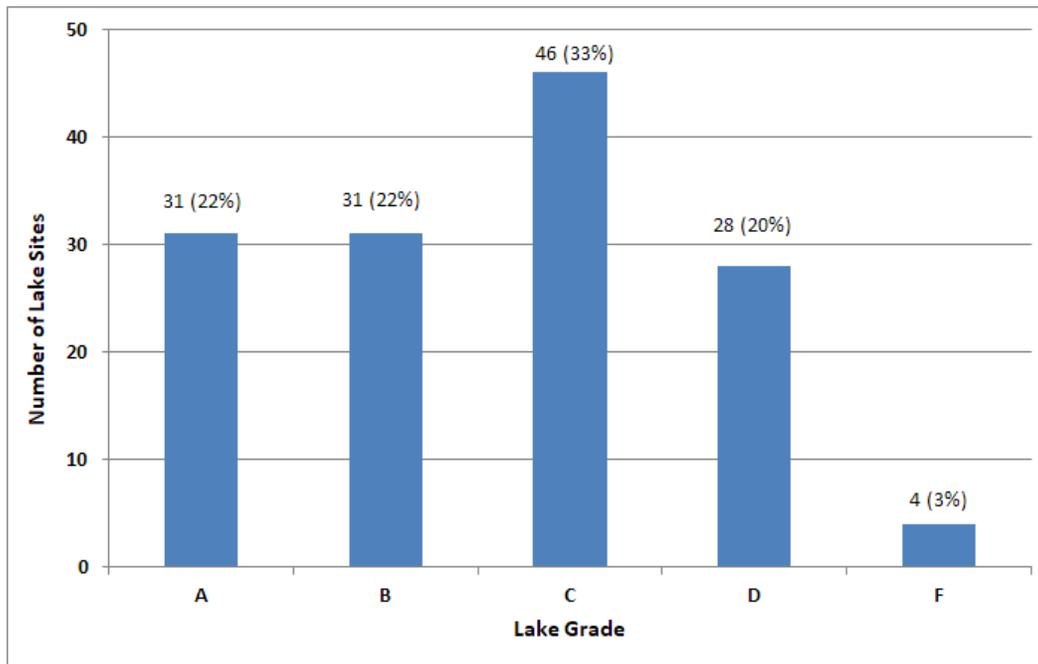
The objectives of this program are:

1. Provide lake water quality data to lake, watershed and water resource managers.
2. Advise managers of known or suspected threats to lake water quality.
3. Continue to compile a water quality database on the five area lakes that support a trout fishery.

The year 2019 marked the twenty-first year that the Citizen-Assisted Monitoring Program (CAMP) was used to increase our knowledge of the water quality of TCMA lakes. CAMP volunteers visited their assigned lake on a biweekly basis from mid April to mid October. The volunteers measured surface water temperature and water transparency, documented lake and weather conditions, and collected surface water samples. The samples were analyzed for total phosphorus, total Kjeldahl nitrogen, and chlorophyll-a by the METC's analytical laboratory located at the Metropolitan Wastewater Treatment Plant in St. Paul, MN. CAMP volunteers are sponsored by a local partner. In 2019, there were 26 sponsors who consisted of a mix of municipalities, watershed management organizations (WMOs), watershed districts (WDs), and counties.

Most lakes were given a lake grade which was calculated on the basis of three parameters: total phosphorus, chlorophyll-a (trichromatic), and Secchi depth (water clarity). Not all lake sites received a lake grade because of an insufficient quantity of data during the summer-time period of May through September. The distribution of lake grades for all the lake sites monitored in 2019 is shown in the following figure.

For those lake sites with sufficient data to calculate a lake grade, approximately one third of the lake sites (33%) received a lake grade of C. The water quality of these sites is considered average as compared to other lakes in the TCMA. Forty four percent were above average (A and B grades), and 23 percent were below average (D and F grades).



Lake Grades for the 2019 Monitoring Season

Since 1980, 399 TCMA lakes have been monitored through the METC’s lake monitoring program. Since some of these lakes have multiple monitoring sites, a total of 441 lake sites have been monitored. The data from the METC’s lake monitoring program are stored in the METC’s Environmental Information Mangement System (EIMS), the Minnesota Pollution Control Agency’s Environmental Quality Information System (EQUIS), and the U.S. EPA’s national water quality data repository, called STORET (STOrage and RETrieval). Data for all METC lake monitoring sites can be conveniently retrieved via the METC’s web-based EIMS, at: <http://es.metc.state.mn.us/eims/>. While the METC has done its best to enhance and expand the region’s lake water quality database, it is apparent that one of the most economical and efficient methods to expand knowledge of our lakes has been with the assistance of volunteers and the cooperation and financial support of local partners via the CAMP.

If you have questions pertaining to the lake data or descriptions contained in this report, inquiries about CAMP, or suggestions of lakes the METC should consider monitoring in the future, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Acknowledgments

This report represents the coordinated efforts of many individuals. The author would like to acknowledge the following people for their technical and supportive contributions to the preparation of this report:

CAMP Volunteers and Local Partners

The enthusiastic participation of local sponsors and volunteers help make the CAMP successful. A list of sponsors and volunteers is shown in Appendix C. The following volunteers and organizational staff are given added appreciation for their multiple years of service:

16 to 27 years of service

27 years of service

Diane Coderre – Sunset Lake

26 years of service

Washington CD staff – multiple lakes

24 years of service

Wargo Nature Center – George Watch Lake

22 years of service

Wally Shaver – Lac Lavon Lake

21 years of service

Lakeville staff – multiple lakes

19 years of service

Gene Berwald – Pine Tree Lake
Tom Goodwin – Orchard Lake

18 years of service

Bonnie Juran – Klawitter Lake

17 years of service

Kitty Francy-Payton – Long Lake
Jim Kellogg – Cobblecrest Lake

16 years service

Bill Feely – Long Lake
David Florenzano – Riley Lake
Sue Morgan & Linda Scott – St. Joe Lake
Gordan & Fran Warner – Mitchell Lake

11 to 15 years of service

15 years of service

Carpenter Nature Center (volunteer coordinator:
Mayme Johnson) – Lake St. Croix
Jim and Roberta Harper – Lake St. Croix
Jeff Keene – O'Connor Lake
Rick Meierotto – Lake St. Croix

14 years of service

David Bluhm – White Rock Lake
Minnesota DOT staff – Rest Area Pond

13 years of service

Sandy & Mike Boyce – Lake O'Dowd
John Burton – Wing Lake
Jim Naves – Horseshoe Lake
Steve Schreiber – Little Comfort Lake
Curt Sparks – Sylvan Lake
Dan Stanek – Scout Lake
Robert White – Northwood Lake

12 years of service

Tam and Dick McGehee – Langton Lake

11 years service

Jeff Christianson – Farquar Lake
Gary Gerding – Karth Lake
Tim and Sharon McCotter – Lucy Lake
Wally Ostlie – Comfort Lake
Joe Reithmeyer – Lake Edith
Steve Schmaltz – Forest Lake, west basin
Tim Weber – La Lake

6 to 10 years of service

10 years of service

Paul Bolstad – Oneka Lake
Fred Fox – Little Johanna Lake
David Nelson – Medicine Lake
Jeff Sluiter – Cobblestone Lake
James Stowell – Sunfish Lake
Douglas Toavs – Moody Lake

9 years service

Pat Barrett – Klawitter Lake
Paul Erdmann – Bush Lake
Lisa McIntire – Penn Lake

8 years service

Karl Nelson – Medicine Lake
Diane Stauner – Meadow Lake
Joe Tranchilla – Crystal Lake

7 years service

Thomas Chaklos – Haas Lake
Nancy Ebner – Westwood Lake
Elizabeth Erdmann – Bush Lake
Barrie Froseth – Lost Lake
Bob Kistler – Valentine Lake

6 years service

Steve Beckey – Buck Lake
Bernie DeMaster – Twin Lake
Scott Spaeth – Hornbeam Lake

3 to 5 years of service

5 years service

Steven Behnke – Sunset Pond
Holly Birkeland – Lake Minnetoga
Chanhassen staff – Susan Lake
Kristen Genet – Loch Ness
Shanna Hanson – Sweeney Lake
Hastings Environmental Protectors – Lake Rebecca
Doug Joens – Forest Lake
Hailey Jostes – Klawitter Pobnd
Joan Kettelkamp – Long Lake
Julie Morse – Bone Lake
David Parker – Parkers Lake
Mark Vierling – Thole Lake

4 years service

Tom Cook – Hafften Lake
Brian Gallagher – Lake Marion
Gabrielle Gallagher – Lake Marion
Eric Klingbeil – Twin Lake
Andrew Niemela – Medicine Lake
Anne Pfankuch – Thompson Lake
Steve Reinders – Lower Prior Lake
Matthew Zappa – Hawkes Lake

3 years service

Amy Baudler – Sweeney Lake
Jennel Bilek – Twin Lake
Sig Birkeland – Minnetoga Lake
Paul Coufal – Keller Lake
Jon Morris – Lake St. Croix
Leslie Pilgrim – Lemay Lake
Paula Thomsen – Cates Lake
David Wallace – Red Rock Lake
Robert Weierke – McMahan Lake
Julie Woolsey – Lemay Lake
Kevin Zahler – Minnewashta Lake

Metropolitan Council Staff

- The MCES Laboratory Services Section, for laboratory analysis of the lake samples.
- Shana Neumann for creation of the lake maps.
- The MCES Electronic Lake Monitoring Report Team for the continued improvement of the automation of the annual lake report.

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Introduction

This 2019 report continues a series of annual lake reports from 1980 to present. Since 1980, 399 lakes in the Twin Cities Metropolitan Area (TCMA) have been monitored through the Metropolitan Council's (METC) lake monitoring program. Since some of these lakes have multiple monitoring sites, a total of 441 lake sites have been monitored. This report contains data from 180 lake sites on 165 lakes that were monitored in 2019, including 2 lakes and 2 lake sites that have not been previously monitored by the METC lake monitoring program. Figure 1 shows the location of the lakes monitored in 2019 by MCES staff and by volunteers of the Citizen-Assisted Monitoring Program. A list of lakes that have been monitored by the METC's monitoring program is shown in Appendix A. Refer to Appendix B for morphology and other lake characteristic data.

There are 950 lakes in the TCMA. The METC monitors just a subset of these lakes due to limited resources. Additional lakes are monitored by other units of government which help to further provide important regional lake water quality data, but the data collected from these other entities are not included in this report.

METC lake monitoring data are available via:

- the METC's Environmental Information Management System (EIMS), at <http://es.metc.state.mn.us/eims/>
- the Minnesota Pollution Control Agency's (MPCA) Environmental Data Access (EDA) system, at <http://www.pca.state.mn.us/index.php/data/surface-water.html>
- the STORET Data Warehouse, which is the U.S. EPA's national water quality data repository, at <http://www.epa.gov/storet/dbtop.html>

The objectives of the METC lake monitoring program are:

1. Provide lake water quality data to lake, watershed and water resource managers.
2. Advise managers of known or suspected threats to lake water quality.
3. Continue to compile a water quality database on the five area lakes that support a trout fishery.

The long-term goal of the METC lake monitoring program is to provide a comprehensive database to enable cities, counties, watershed management organizations (WMOs), and watershed districts (WDs) to better manage TCMA lakes. The Council believes that without such comprehensive lake data, the foundation of lake and watershed management plans is weakened. While the METC has provided a commendable lake monitoring program, monitoring by other organizations is also encouraged (Osgood 1989a).

To date, the METC lake monitoring program has been an important tool for making informed lake management decisions. The majority of the lakes have been visited on a rotating schedule, so as to develop an historical database to help lake and watershed managers in decision making. Data from the METC lake monitoring program are frequently used to determine possible trends in lake water quality, estimate expected ranges in water quality of non-monitored lakes, examine intra-and interregional differences, and investigate the relationships between land use and water quality. A comprehensive regional lake monitoring program should ensure adequate spatial and temporal representation of water quality. However, due to cost and logistical problems, ground-based monitoring programs usually sacrifice spatial coverage (fewer lakes) in favor of more frequent sampling.

As is the case throughout the United States, the majority of lakes in the TCMA suffer from this lack of water quality data. Area lakes and watershed managers need a broad, comprehensive water quality database for regulatory and decision-making purposes. Because of the lack of public funding and the high ratio of area lakes to monitoring staff, very little data exist for the majority of TCMA lakes, and local decision-makers are forced to make management decisions lacking adequate information.

The METC addressed this lack of adequate lake water quality data by initiating a citizen-assisted monitoring program (CAMP) in 1993. The purpose of the CAMP is to provide a more complete and improved water quality database for TCMA lakes. This database gives local decision makers a better idea of the water quality of their lakes, thereby assisting them in decision making on water quality issues. The METC's goal for the CAMP is to provide a means to gather as much information on TCMA lakes as is economically possible.

The METC lake monitoring program, especially the use of volunteer monitors through the CAMP, has played a key role in the METC's recent efforts to use satellite images to assess annual lake water clarity for the entire TCMA. The monitoring program provides the "ground-based" measurements used to calibrate mathematical models, which in turn are used to interpret the satellite images. The use of satellite technology provides a cost-effective way to extend the analysis of the TCMA's lake water quality from just the lakes involved in our ground-based programs to all the lakes in the

region. Over time, the satellite-based information can be used to detect how lake trophic conditions (especially water clarity) have changed over time and space in relation to changes in land-use and land-cover conditions.

The METC lake monitoring program began a volunteer annual ice-monitoring program in the winter of 2009 - 2010. The purpose of this program is to monitor the duration of annual ice cover on TCMA lakes over a long time period. This information is especially useful because the duration of ice cover is a good indicator of climate change.

METC Staff Monitoring Program

A description of the methods and results of monitoring conducted by METC staff during 2019 is provided in the following section.

Methods

Metropolitan Council staff monitored 7 lake sites on 5 lakes during 2019 (Figure 1). The staff monitoring program consisted of monitoring 3 sites on Lake Byllesby and one site each on Fish Lake, Rice Lake, Pickerel Lake, and Pleasant Lake (Figure 1) in 2019. The monitoring occurred during the open water season of May through October.

The lake monitoring sites were located generally over the deepest spot of the lake basin or a central location of a sub-basin. A hand-held Global Positioning System (GPS) receiver was used to determine the coordinates of a lake site, and to aid in relocating lake sites during subsequent monitoring events. Time, water surface conditions, weather, lake depth, and water transparency were recorded on a field data sheet. Water transparency was measured using a 20 cm black-and-white Secchi disk. Temperature, dissolved oxygen (DO), pH, specific conductivity, turbidity, and oxidation reduction potential (Redox) were measured at one-meter intervals throughout the water column. For depths below 10 m, the sampling interval was increased to every 2 m. These parameters were measured using a YSI EXO2 multi-parameter sonde that was connected to a YSI EXO data logger.

The sonde probes for DO and pH were calibrated before each field trip. These probes were also calibrated again the same day after returning from the field, to check for calibration drift. The conductivity probe was calibrated on a weekly schedule. The turbidity and Redox probes were calibrated on a monthly schedule.

Water was collected from the lake surface using a two-meter or one-meter vertical integrated sampler (PVC pipe and rubber plug) with a two-liter and one-liter capacity, respectively. Two surface samples were collected and mixed together in a 4-liter plastic jug. The surface sample was then decanted into an opaque polyethylene bottle. Subsurface samples were collected using a 2-liter Van Dorn sampler. All water samples were transported on ice in a dark cooler and processed and preserved within 12 hours of collection.

The surface and subsurface samples were analyzed for the standard parameters as shown in Table 1. Chlorophyll was not analyzed in the subsurface samples. Samples that were analyzed for total dissolved phosphorus (TDP) were filtered through a 0.45 μm membrane filter and then analyzed for TP. All chemical analyses were performed at the Metropolitan Council Environmental Services - Environmental Quality Assurance Department (MCES-EQA) laboratory.

The chlorophyll analysis results are reported by the laboratory according to two different equations: the trichromatic equation and the monochromatic equation. The trichromatic equation gives the following chlorophyll parameters:

- chlorophyll-a (CLA),
- chlorophyll-b,
- chlorophyll-c.

The monochromatic equation gives the following parameters:

- chlorophyll-a corrected for pheophytin,
- pheophytin-a.

The chlorophyll data in this annual report are reported as trichromatic CLA. However all the analytical results from the trichromatic and monochromatic equations can be accessed via the monitoring data databases as provided in the Introduction section.

Table 1. Summary of Analytical Methods

Parameters	Analytical Method
Alkalinity	EPA-600/4-79-020, Method 310.2 Rev. 1974
Ammonia Nitrogen	U.S. EPA, Method 350.1, Rev. 2.0, 1993
Chloride	Standard Methods for the Examination of Water and Wastewater, Method 4500-Cl ⁻ E-2011
Chlorophyll	ASTM Method D3731-87
Hardness	EPA Method 130.1, Issued 1971
Kjeldahl Nitrogen, total (TKN)	U.S. EPA Method 351.2, Rev. 2.0

Parameters	Analytical Method
Metals: Calcium, Magnesium, and Iron	U.S. EPA, Method 200.8, Revision 5.4, 1994, as modified
Nitrate/Nitrite	Standard Methods for the Examination of Water and Wastewater, Method 4500-NO ₃ ⁻ F-2011
Organic Carbon, Total	Standard Methods for the Examination of Water and Wastewater, Method 5310 C-2011
Ortho Phosphate	Standard Methods for the Examination of Water and Wastewater, Method 4500-P F-2011
Phosphorous, total (TP) and dissolved (TDP).	U.S. EPA Method 365.4
Sulfate	U.S. EPA, Method 300.0, Rev 2.1, 1993

Results

The water quality of each staff-monitored lake is discussed in the following section. Each lake report includes a description of the lake's water quality condition and the year's water quality data shown in tables and figures. The water quality grades from 1980 through 2019 are shown for lake sites that were monitored for trophic status.

For data of samples collected at depth and of depth profile measurements, please refer to the METC's Environmental Information Management System (EIMS) at <http://es.metc.state.mn.us/eims/> to access this additional data.

Any questions about the 2019 METC lake monitoring data should be directed to Brian Johnson at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Byllesby Lake, Site 2 (19–0006) *Metropolitan Council Environmental Services*

Lake Byllesby is located in southern Dakota County along the border with Goodhue County, and is an impoundment of the Cannon River. It has a surface area of 1,369 acres. Its watershed area is 733,156 acres, giving a very high watershed to lake area ratio of 536. Site 2 is located at the downstream end of the lake near the dam, and was first monitored in 2013. This area of the lake was also monitored by the CAMP in the mid-1990s, but at a location closer to the dam (site 1). Site 2 was chosen as a more safe distance from the edge of the dam. The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value. The MN DNR designated the lake as being infested with flowering rush (*Butomus umbellatus*) in 2016. The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) and aquatic consumption (mercury in fish tissue).

On each sampling day surface samples and near-bottom samples were collected for laboratory analysis of total phosphorus, total dissolved phosphorus, total Kjeldahl nitrogen, chlorophyll, and other parameters. Secchi transparency was measured and depth profiles of dissolved oxygen, temperature, pH, specific conductivity, oxidation reduction potential, and turbidity were made during each site visit. The surface data are summarized in tables and figures on the following pages. For depth profile data and near bottom sample results, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	152	62	239	D
CLA (µg/l)	42	1.0	120	C
Secchi (m)	0.9	0.3	1.7	D
TKN (mg/l)	1.09	0.89	1.50	
			Lake Grade	D

For comparison purposes, the historical grades for site 1 are shown in the historical grade table for site 2, since these two sites are in the same general area of the reservoir. The water quality in 2019 was poor, with low Secchi depths, high TP, and average chlorophyll-a mean concentrations which was similar compared to data

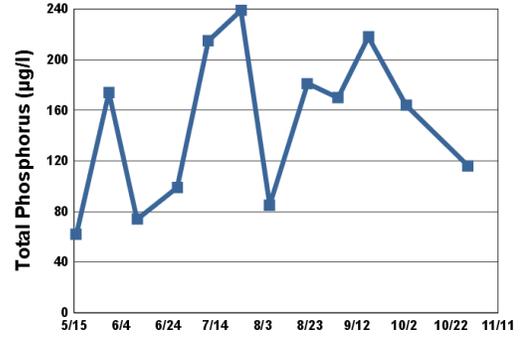
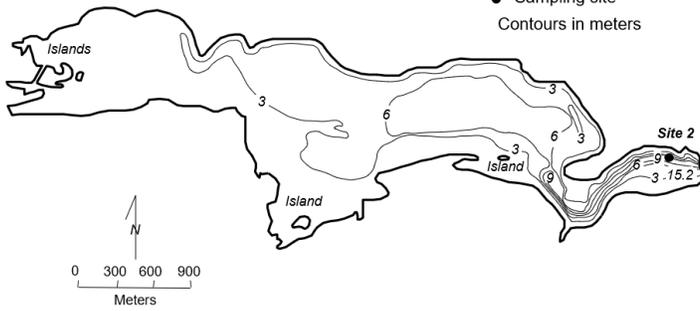
Throughout the monitoring period, METC staff ranked the lake's physical condition and recreational suitability on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

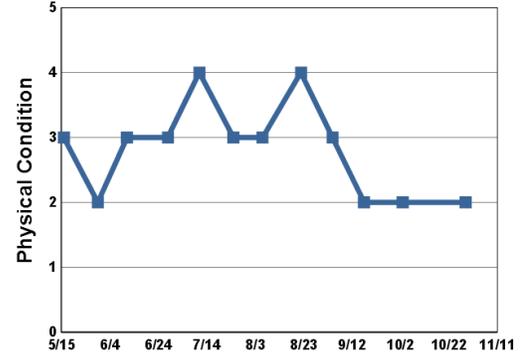
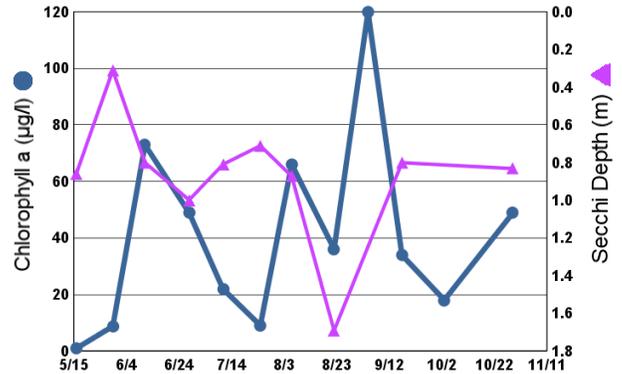
Lake Byllesby, Site 2
Randolph Twp., Dakota Co.

Lake ID: 190006-00
WMO: North Cannon River

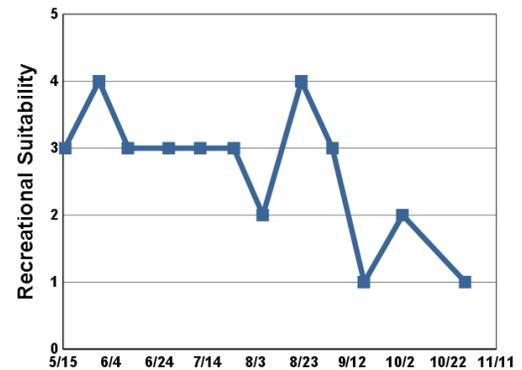


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/16/19	18.0	14.1	1.0	62	0.9	3	3
05/30/19	15.7	9.0	8.8	174	0.3	2	4
06/11/19	21.8	11.7	73	74	0.8	3	3
06/28/19	22.2	15.9	49	99	1.0	3	3
07/11/19	23.8	7.7	22	215	0.8	4	3
07/25/19	23.3	10.2	9.1	239	0.7	3	3
08/06/19			66	85	0.9	3	2
08/22/19	23.7	10.2	36	181	1.7	4	4
09/04/19	21.3	14.2	120	170		3	3
09/17/19	19.6	8.6	34	218	0.8	2	1
10/03/19	15.2	7.6	18	164		2	2
10/29/19	6.3	11.8	49	116	0.8	2	1



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP		F	F	F	F					F	F	
CLA		B	D	C	D					B	D	
Secchi		D	D	D	C	D		D	F	D	D	D
Lake Grade		D	D	D	D					D	D	

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	F		F					F		D	D	
CLA	C		C					C	C	C	C	
Secchi	F	D	D	D	D	D	D	D	D	D	D	
Lake Grade	D		D					D		D	D	

Year	2016	2017	2018	2019
TP		D	F	D
CLA		C	C	C
Secchi		D	D	D
Lake Grade		D	D	D

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Byllesby Lake, Site 3 (19–0006) Metropolitan Council Environmental Services

Lake Byllesby is located in southern Dakota County along the border with Goodhue County, and is an impoundment of the Cannon River. It has a surface area of 1,369 acres. Its watershed area is 733,156 acres, giving a very high watershed to lake area ratio of 536. Site 3 is located about midway between in the inflow of the Cannon River and the dam. The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value. The MN DNR designated the lake as being infested with flowering rush (*Butomus umbellatus*) in 2016. The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) and aquatic consumption (mercury in fish tissue).

On each sampling day surface samples were collected for laboratory analysis of total phosphorus, total dissolved phosphorus, total Kjeldahl nitrogen, chlorophyll, and other parameters. Secchi transparency was measured, and depth profiles of dissolved oxygen, temperature, pH, specific conductivity, oxidation reduction potential, and turbidity were made during each site visit. The surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	154	67	234	F
CLA (µg/l)	37	1.0	120	C
Secchi (m)	1.0	0.4	1.7	D
TKN (mg/l)	1.08	0.90	1.60	
			Lake Grade	D

The water quality in 2019 was poor, with low Secchi depths, high TP, and average chlorophyll-a mean concentrations. At a maximum depth of about 4.5 m, site 3 is the shallower site, which is shallow enough for sediments to be disturbed by mixing events, which can be strong given the reservoirs fetch aligning with the westerly prevailing winds.

Throughout the monitoring period, METC staff ranked the lake's physical condition and recreational suitability on a 1-to-5 scale. These user perception rankings are shown on the following page.

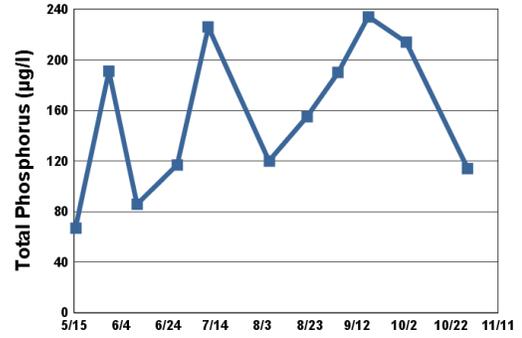
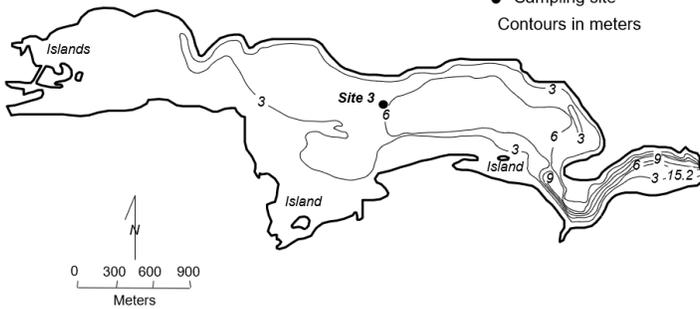
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Byllesby, Site 3
Randolph Twp., Dakota Co.

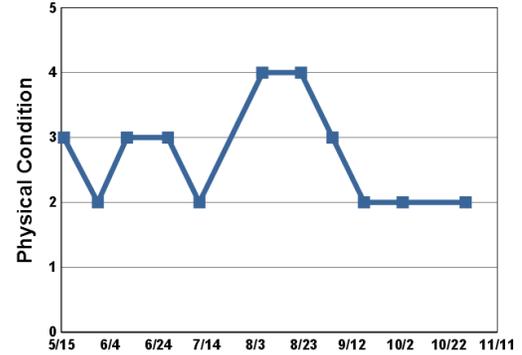
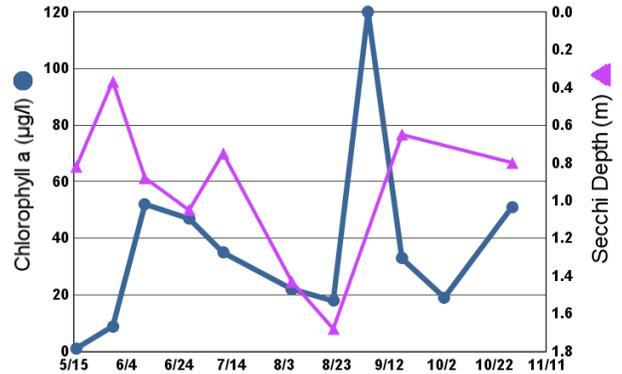
Lake ID: 190006-00
WMO: North Cannon River

● Sampling site
Contours in meters

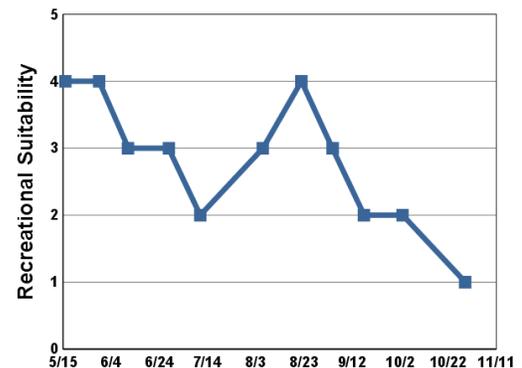


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/16/19	17.8	11.3	1.0	67	0.8	3	4
05/30/19	16.5	8.9	8.8	191	0.4	2	4
06/11/19	21.1	11.5	52	86	0.9	3	3
06/28/19	22.3	13.2	47	117	1.0	3	3
07/11/19	23.7	8.6	35	226	0.8	2	2
08/06/19	26.6	9.6	22	120	1.4	4	3
08/22/19	23.4	8.7	18	155	1.7	4	4
09/04/19	21.5	14.7	120	190		3	3
09/17/19	19.7	8.2	33	234	0.6	2	2
10/03/19	13.8	8.7	19	214		2	2
10/29/19	5.8	11.8	51	114	0.8	2	1



1 = Crystal Clear
2 = Some Algae Present
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5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP										F	F	
CLA										C	C	
Secchi										D	D	
Lake Grade										D	D	

Year	2016	2017	2018	2019
TP		D	F	F
CLA		C	C	C
Secchi		D	D	D
Lake Grade		D	D	D

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Byllesby Lake, Site 4 (19–0006) Metropolitan Council Environmental Services

Lake Byllesby is located in southern Dakota County along the border with Goodhue County, and is an impoundment of the Cannon River. It has a surface area of 1,369 acres. Its watershed area is 733,156 acres, giving a very high watershed to lake area ratio of 536. Site 4 is located at the upstream end of the lake near the delta of the Cannon River. The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value. The MN DNR designated the lake as being infested with flowering rush (*Butomus umbellatus*) in 2016. The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) and aquatic consumption (mercury in fish tissue).

On each sampling day surface samples were collected for laboratory analysis of total phosphorus, total dissolved phosphorus, total Kjeldahl nitrogen, chlorophyll, and other parameters. Secchi transparency was measured, and depth profiles of dissolved oxygen, temperature, pH, specific conductivity, oxidation reduction potential, and turbidity were made during each site visit. The surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	162	74	258	F
CLA (µg/l)	34	1.0	66	C
Secchi (m)	0.6	0.3	1.0	F
TKN (mg/l)	1.09	0.81	1.40	
			Lake Grade	D

The water quality was poor this year with low Secchi depths, high TP, and below average chlorophyll-a mean concentrations, which is typical according to the site's historical database.

Throughout the monitoring period, METC staff ranked the lake's physical condition and recreational suitability on a 1-to-5 scale. These user perception rankings are shown on the following page.

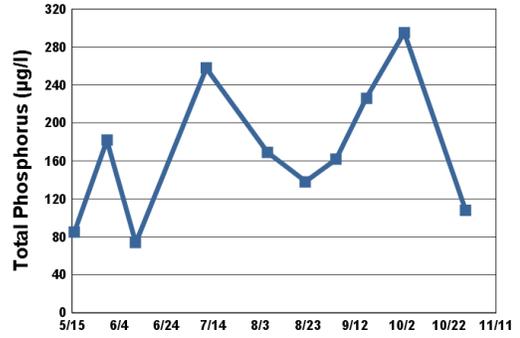
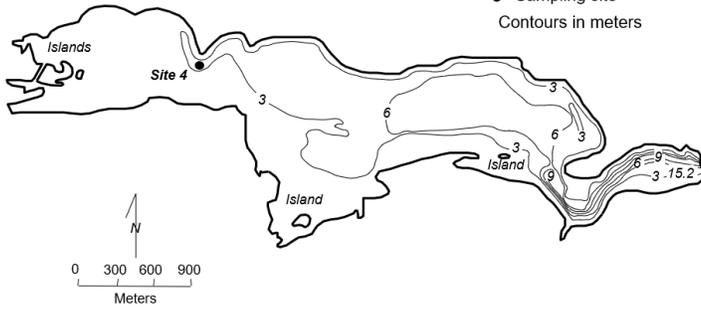
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Byllesby, Site 4
Randolph Twp., Dakota Co.

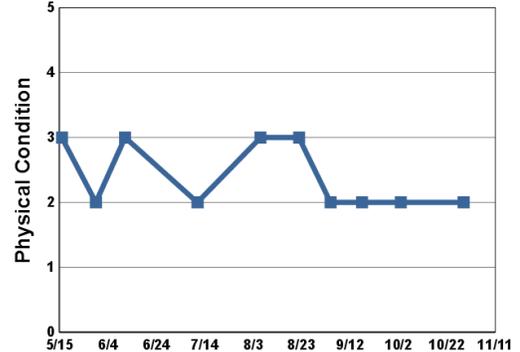
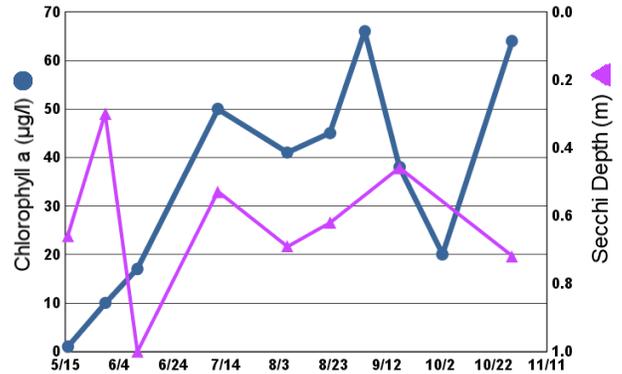
Lake ID: 190006-00
WMO: North Cannon River

● Sampling site
Contours in meters

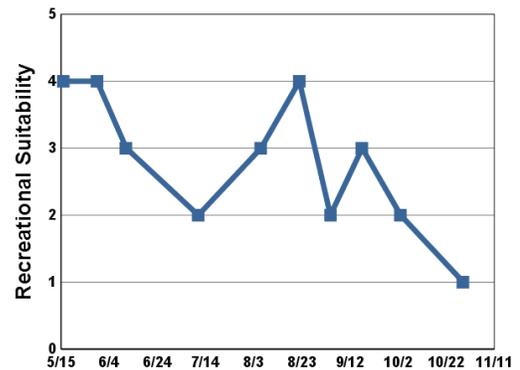


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/16/19	18.9	10.8	1.0	85	0.7	3	4
05/30/19	15.7	9.0	10	182	0.3	2	4
06/11/19	18.4	9.8	17	74	1.0	3	3
07/11/19	23.4	10.5	50	258	0.5	2	2
08/06/19	26.0	10.6	41	169	0.7	3	3
08/22/19			45	138	0.6	3	4
09/04/19	21.0	9.9	66	162		2	2
09/17/19	20.2	8.2	38	226	0.5	2	3
10/03/19	13.6	9.4	20	295		2	2
10/29/19	5.9	12.6	64	108	0.7	2	1



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP												
CLA												
Secchi												
Lake Grade												

Year	2016	2017	2018	2019
TP		F	F	F
CLA		D	C	C
Secchi		F	D	F
Lake Grade		F	D	D

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Fish Lake (02–0065) Metropolitan Council Environmental Services

Fish Lake is located in East Bethel (Anoka County). It is a shallow lake with a surface area of 334 acres with a maximum depth of about 4.5 meters. Much of the lake's shoreline is within the University of Minnesota's Cedar Creek Ecosystem Science Reserve. The lake is considered a Priority Lake by the Metropolitan Council for its wildlife significance. The lake is defined as a shallow lake because of the dominance of the littoral zone.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus, total dissolved phosphorus, total Kjeldahl nitrogen, chlorophyll, and other parameters. Secchi transparency was measured, and depth profiles of dissolved oxygen, temperature, pH, specific conductivity, oxidation reduction potential, and turbidity were made during each site visit. The surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCEC's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	21	8	69	A
CLA (µg/l)	2.7	1.9	4.0	A
Secchi (m)	+3.2	>2.3	+4.4	A
TKN (mg/l)	0.53	0.42	0.69	
			Lake Grade	A

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

The lake is clear and shallow with stands of aquatic macrophytes. The water clarity is exceptionally clear as shown by average summer-time Secchi depth of greater than 3.2 meters. Some observations showed the Secchi disk visible on the bottom of the lake at the monitoring site, at a depth of 4.8 m.

Throughout the monitoring period, METC staff ranked the lake's physical condition and recreational suitability on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP												
CLA												
Secchi												
Lake Grade												

Year	2016	2017	2018	2019
TP		A		A
CLA		A		A
Secchi		A		A
Lake Grade		A		A

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Pickerel Lake (02–0130) *Metropolitan Council Environmental Services*

Pickerel Lake is located in the city of Nowthen (Anoka County). The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column. The lake is considered a Priority Lake by the Metropolitan Council for its wildlife significance.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus, total dissolved phosphorus, total Kjeldahl nitrogen, chlorophyll, and other parameters. Secchi transparency was measured, and depth profiles of dissolved oxygen, temperature, pH, specific conductivity, oxidation reduction potential, and turbidity were made during each site visit. The surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	21	15	37	A
CLA (µg/l)	4.9	1.0	7.8	A
Secchi (m)	>1.3	>1.2	>1.6	
TKN (mg/l)	0.72	0.60	0.81	
			Lake Grade	

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

The relatively low CLA concentrations in combination with the observations of moderate to substantial macrophyte growth, indicate that the primary production of the lake is focused on production of aquatic macrophytes rather than algae. There was an insufficient quantity of valid Secchi transparency measurements to determine a Secchi grade. An invalid measurement occurred if the Secchi disk was either visible on the lake bottom or the disk's visibility was blocked by aquatic vegetation. In both of these situations the water clarity would have been greater than that indicated by the measurement. A lake grade was not given because all three parameter grades are required to issue a lake grade.

The lake received TP and CLA grades of A this year which is similar to water quality received in 2018, which is an improvement over the C and B grades received in 1980, 1995, and 2011. Continued monitoring is recommended to determine if this recent improvement in water quality is part of a longer term trend.

Throughout the monitoring period, METC staff ranked the lake's physical condition and recreational suitability on a 1-to-5 scale. These user perception rankings are shown on the following page.

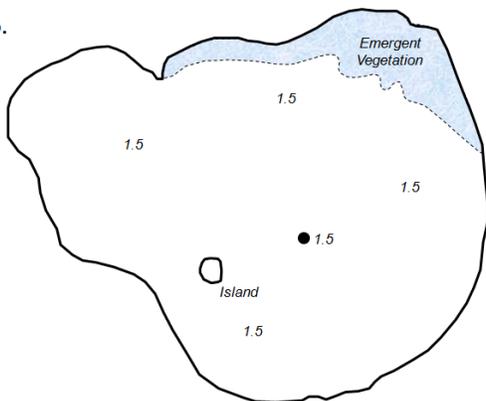
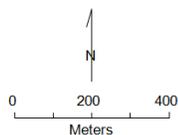
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

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Pickrel Lake
Nowthen, Anoka Co.

Lake ID: 20130-00

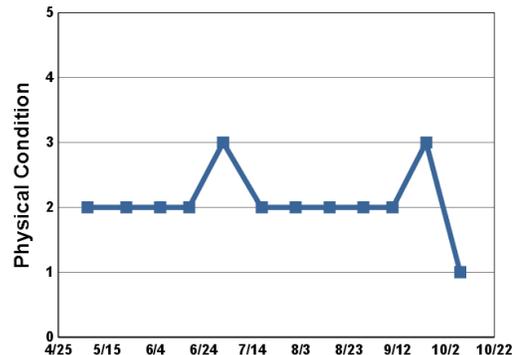
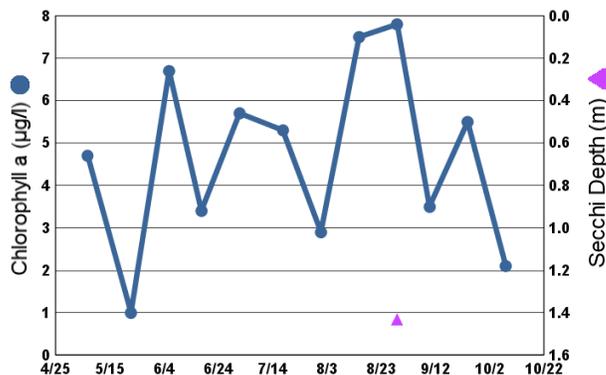
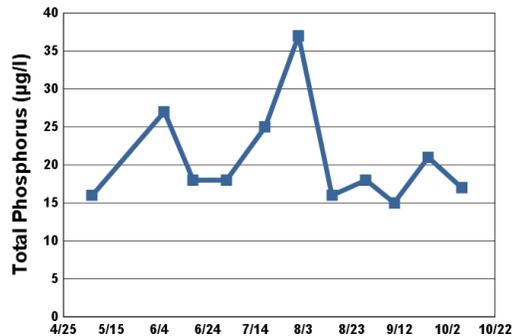
● Sampling site
Contours in meters



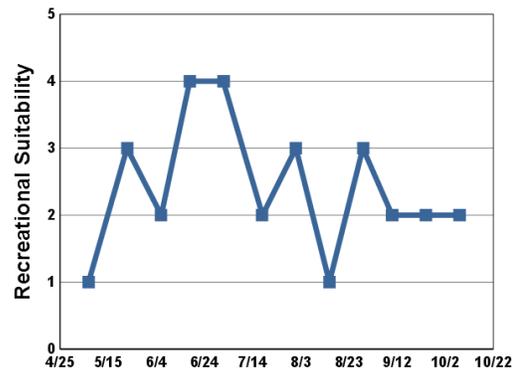
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/07/19	14.8	12.1	4.7	16	>1.3	2	1
05/23/19	12.8	10.4	1.0		>1.6	2	3
06/06/19	25.3	8.7	6.7	27	>1.4	2	2
06/18/19	22.2	9.0	3.4	18	>1.2	2	4
07/02/19			5.7	18	>1.3	3	4
07/18/19	28.7	9.4	5.3	25	>1.3	2	2
08/01/19	25.9	10.0	2.9	37	>1.4	2	3
08/15/19	25.0	9.3	7.5	16	>1.2	2	1
08/29/19	19.6	9.8	7.8	18	1.4	2	3
09/10/19	18.8	8.0	3.5	15	>1.4	2	2
09/24/19	20.4	7.5	5.5	21	>1.3	3	2
10/08/19	12.0	10.8	2.1	17	>1.4	1	2

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP	C											
CLA	C											
Secchi	D											
Lake Grade	C											

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP				B								
CLA				B								
Secchi				C								
Lake Grade				B								

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP								B				
CLA								B				
Secchi								C				
Lake Grade								B				

Year	2016	2017	2018	2019
TP			A	A
CLA			A	A
Secchi				
Lake Grade				

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Pleasant Lake (70–0098) Metropolitan Council Environmental Services

Pleasant Lake is located in Helena Township (Scott County). The lake is considered a Priority Lake by the Metropolitan Council for its wildlife significance. It is a shallow lake with a maximum depth of 1.5 meters. The lake is defined as a shallow lake because of the dominance of the littoral zone. The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators).

On each sampling day surface samples were collected for laboratory analysis of total phosphorus, total dissolved phosphorus, total Kjeldahl nitrogen, chlorophyll, and other parameters. Secchi transparency was measured, and depth profiles of dissolved oxygen, temperature, pH, specific conductivity, oxidation reduction potential, and turbidity were made during each site visit. The surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	177	78	317	F
CLA (µg/l)	111	41	200	F
Secchi (m)	0.3	0.2	0.5	F
TKN (mg/l)	2.50	1.50	3.30	
			Lake Grade	F

The lake is very eutrophic. Mean summer-time TP and CLA concentrations are very high compared to the typical metro area lake. Water clarity is poor, with Secchi disk depths ranging from 0.2 to 0.5 m. Water quality for the lake has not improved over the past 2 and a half decades based on similar historical parameter grades and lake grades.

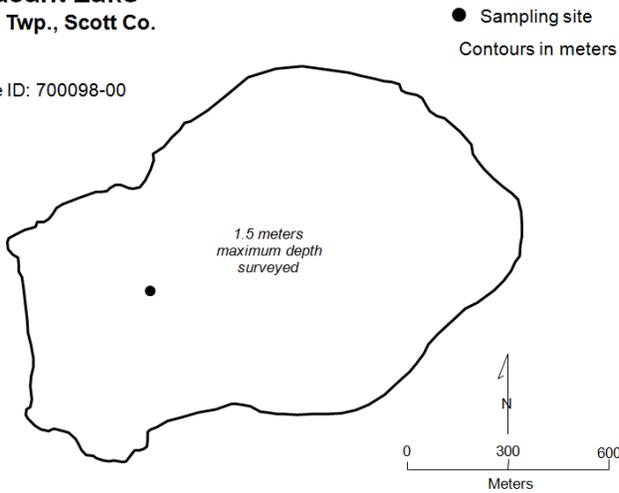
Throughout the monitoring period, METC staff ranked the lake's physical condition and recreational suitability on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

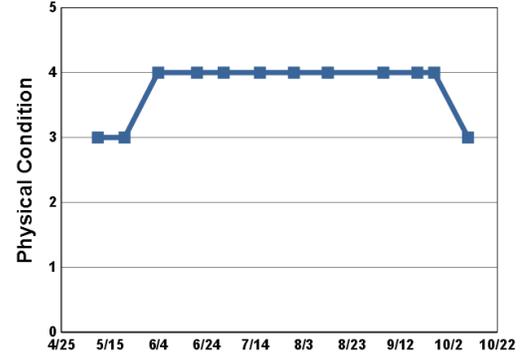
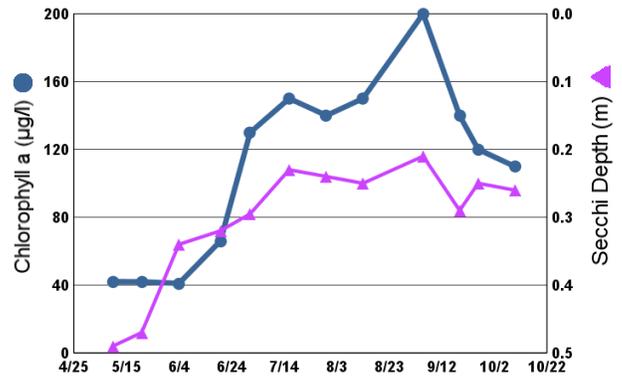
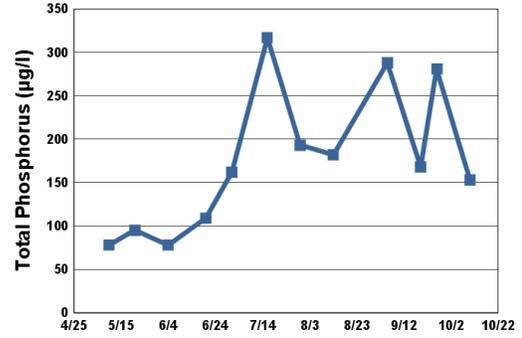
Pleasant Lake
Helena Twp., Scott Co.

Lake ID: 700098-00

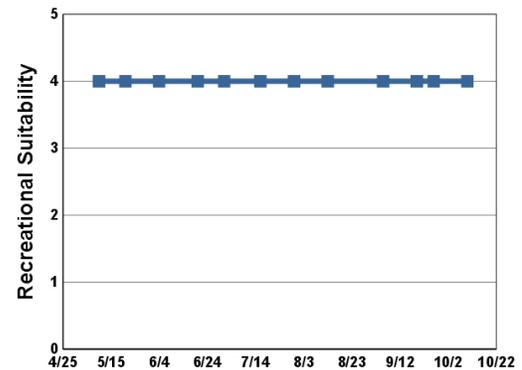


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/10/19	12.4	11.2	42	78	0.5	3	4
05/21/19	13.9	11.4	42	95	0.5	3	4
06/04/19	23.0	9.5	41	78	0.3	4	4
06/20/19	22.9	9.4	66	109	0.3	4	4
07/01/19			130	162	0.3	4	4
07/16/19	27.6	7.4	150	317	0.2	4	4
07/30/19	24.5	9.7	140	193	0.2	4	4
08/13/19	24.0	10.1	150	182	0.2	4	4
09/05/19	21.1	7.9	200	288	0.2	4	4
09/19/19	22.9	11.2	140	168	0.3	4	4
09/26/19	18.4	8.5	120	281	0.2	4	4
10/10/19	13.5	8.9	110	153	0.3	3	4



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP		D										
CLA		F										
Secchi		F										
Lake Grade		F										

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP												
CLA												
Secchi												
Lake Grade												

Year	2016	2017	2018	2019
TP		D		F
CLA		F		F
Secchi		F		F
Lake Grade		F		F

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Rice Lake (10–0078) Metropolitan Council Environmental Services

Rice Lake is located in Benton Township (Carver County). The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value. The lake is defined as a shallow lake because of the dominance of the littoral zone. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus, total dissolved phosphorus, total Kjeldahl nitrogen, chlorophyll, and other parameters. Secchi transparency was measured, and depth profiles of dissolved oxygen, temperature, pH, specific conductivity, oxidation reduction potential, and turbidity were made during each site visit. The surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

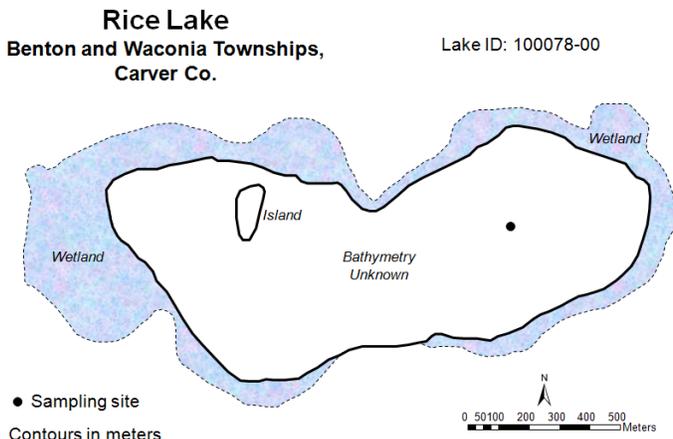
Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	120	54	192	D
CLA (µg/l)	77	1.0	140	D
Secchi (m)	0.5	0.2	1.1	F
TKN (mg/l)	2.02	1.10	3.50	
			Lake Grade	D

The lake received a lake grade of D this year which is an improvement over the F grade received in 2015. Continued monitoring is recommended to determine if this recent improvement in water quality is part of a longer term trend.

Throughout the monitoring period, METC staff ranked the lake's physical condition and recreational suitability on a 1-to-5 scale. These user perception rankings are shown on the following page.

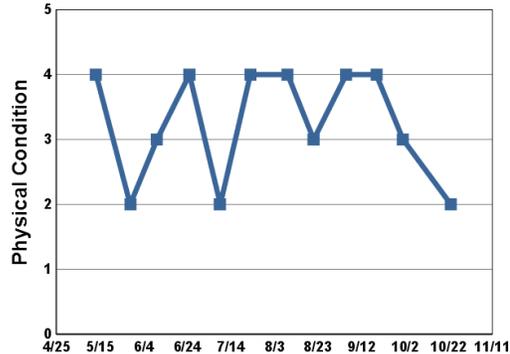
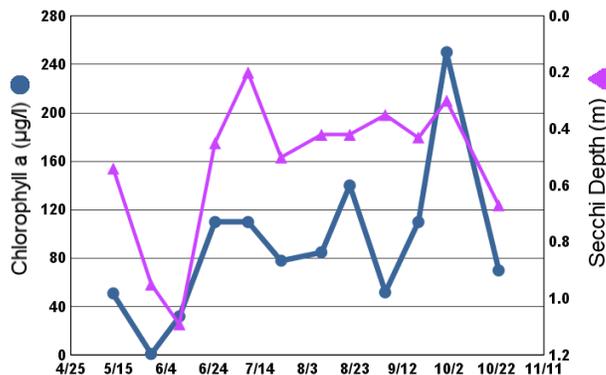
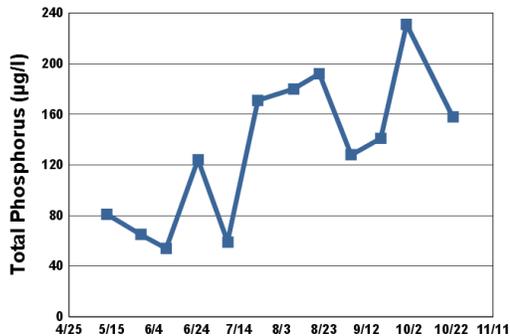
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

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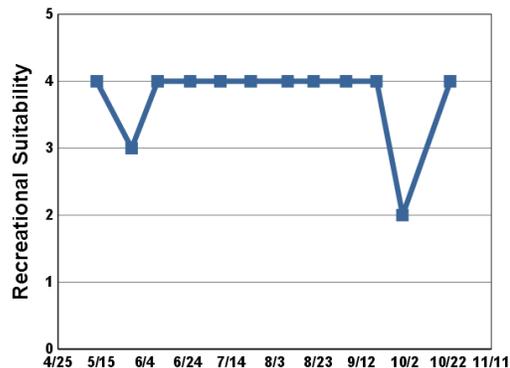


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/13/19	14.4	19.3	51	81	0.5	4	4
05/29/19	17.2	10.8	1.0	65	1.0	2	3
06/10/19	22.4	10.4	32	54	1.1	3	4
06/25/19	21.2	13.5	110	124	0.4	4	4
07/09/19	25.1	12.8	110	59	0.2	2	4
07/23/19	24.9	14.5	78	171	0.5	4	4
08/09/19	25.4	13.2	85	180	0.4	4	4
08/21/19	23.9	13.1	140	192	0.4	3	4
09/05/19	20.3	12.7	52	128	0.4	4	4
09/19/19	22.6	14.0	110	141	0.4	4	4
10/01/19	17.1	8.4	250	231	0.3	3	2
10/23/19	7.3	11.4	70	158	0.7	2	4



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3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP												F
CLA												F
Secchi												F
Lake Grade												F

Year	2016	2017	2018	2019
TP				D
CLA				D
Secchi				F
Lake Grade				D

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Citizen-Assisted Monitoring Program (CAMP)

Topics Covered in this Chapter

- ◆ [CAMP Overview](#)
- ◆ [Acknowledgments](#)
- ◆ [CAMP Methods](#)

The following section describes an overview of the CAMP, methods, and results.

CAMP Overview

The year 2019 marked the twenty-second year of the CAMP since the program began in 1993. The CAMP monitored 173 lake-sites on 160 lakes in 2019, including 7 lakes that have not been previously monitored by the METC (Figure 1). The CAMP is jointly funded by the METC and local sponsors such as WDs, WMOs, counties, and cities.

The main purpose of the CAMP is to provide lake and watershed managers with water quality data that can support them in properly managing water resources, and also provide much needed historical data to help document water quality changes and trends. Previous volunteer monitoring programs conducted throughout the United States have shown that, with proper equipment and instructions, volunteers can be trained to produce credible water quality data. Because most of the volunteers live near the lakes they are monitoring, they are very interested in determining any trends and/or changes in local water quality (Nichols 1992). An additional benefit of the monitoring program is the volunteer's increased awareness of the lake's condition and workings throughout the summer, which may foster grass-roots initiatives to protect lakes and promote support for lake management.

Prior to the inception of the CAMP in 1993, the METC conducted a pilot study in 1991 to assure that the data collection methods used by citizen volunteers would be credible. Results of the pilot study showed that the volunteer monitoring methods, as used in the CAMP, yielded results comparable to monitoring methods used by METC staff (Hartsoe and Osgood 1991).

CAMP volunteers collect surface water samples that are analyzed for total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll-a (CLA). In addition, they measure surface water temperature and water transparency, and record user perceptions. Some lakes are monitored for dissolved oxygen. Most lakes are visited biweekly from April through October (fourteen sampling dates), and are sampled over the lake's deepest open-water location. In 2019, some of the lakes were not monitored on each of the desired 14 sampling weeks. The reasons for the missed sampling dates varied. However, the majority of the lakes, even with the missed sampling dates, were sampled adequately and often enough to provide an annual overview of the water quality of each lake. Water samples were submitted to METC staff and then analyzed at the MCES-EQA laboratory in St. Paul, MN.

Acknowledgments

The successful performance of the 2019 CAMP would not have been possible without the greatly appreciated work performed by monitoring volunteers, and the support of the organizations that enrolled lakes in the program. The enrolling organizations, which included 11 cities, 12 watershed management organizations and watershed districts, 1 county, 1 basin planning team, and 1 conservation district were involved in volunteer recruitment, training, and occasional follow up on the progress of their volunteer lake monitors. Without this help, the program would not have been as successful.

Those deserving the greatest appreciation are the volunteers themselves. Their efforts have made this program successful. A list of the 2019 CAMP volunteers is shown in Appendix C. The METC and the local sponsors thank them for their sustained efforts, including their quality work.

CAMP Methods

Recruiting Volunteers

Active recruitment of lakes and interested volunteers for the CAMP began in the winter months prior to the monitoring season. Potential sponsors were solicited for their list of lakes that they wished to enroll in the CAMP. The sponsors were encouraged to recruit volunteers for each lake they enrolled in the program. If there were problems finding willing volunteers, the METC assisted with the search; however, the belief was that the supervising organization would benefit in the long run by having direct contact with the volunteers it recruited. This contact would hopefully open a two-way communication line between concerned citizens and local partners.

Training Volunteers

Volunteer training was conducted by METC staff at various locations throughout the TCMA. Volunteer training was scheduled between early March and early April. At each training session, volunteers were given a handbook describing the program, outlining the basics in the biology and ecology of lake systems, and containing detailed written instructions for the lake monitoring and data form completion procedures (Anhorn 2003a). Each volunteer was given a brief description of limnology and lake ecology as described in their handbook, instructed on the proper lake monitoring procedures, and shown how each piece of sampling equipment works. Finally, the volunteers were asked to sign a waiver of liability stating that they were not an employee of either the METC or the local partner enrolling the lake in the program.

At each training session, volunteers received the necessary equipment for lake monitoring. This equipment was purchased by the sponsor through the METC, and then loaned to the volunteers. At the end of the monitoring season, equipment was returned to the sponsor for use in future years. Each monitoring kit contains:

- Hand pump, filter holder, graduated cylinder, and filters for algal (chlorophyll) sampling
- Digital thermometer
- Map of the lake with sampling site(s)
- Field data sheets
- Sample jug
- Sample vials, Petri dishes, and labels
- Secchi disk
- Aluminum foil
- Tweezers (forceps)

Monitoring Methods

Volunteers were instructed to monitor their designated lake site(s) on a biweekly basis from mid-April to mid-October, including 14 possible sampling periods. The monitoring methods are detailed in the following paragraphs.

First, during pre-arranged sampling weeks, volunteers located and anchored their boat at pre-determined monitoring locations (typically the deep open-water area of the lake). Once at the monitoring location, lake and weather conditions were recorded on a field data sheet (Figure 2). The form also provides space to record natural and cultural observations which may have influenced what was happening in the lake (e.g. heavy rains prior to monitoring, application of herbicide, etc.), and includes an area to document general perceptions of the lake's physical condition and suitability for recreation.

The volunteers measured water transparency (also called water clarity) by lowering a Secchi disk on the shady side of the boat to the point at which it disappeared. After the disk disappeared, the disk was slowly raised until at the point where the disk reappeared. The point at which the disk reappeared was defined as the Secchi depth (also called the Secchi transparency). The Secchi depth was recorded on the field data sheet.

The next lake monitoring step involved the collection of the surface water sample. The surface water sample was collected in a clean one-gallon plastic (HDPE) jug. The volunteer pre-rinsed the jug three times with lake water. After rinsing, the jug was filled with lake water by submerging it upside down to forearm depth and turning it upright while submerged. The filled jug was returned to the boat, wherein immediately the volunteer measured the water temperature in the jug. After the temperature was measured, aliquots were poured from the jug for laboratory analysis. These aliquots were decanted either while the volunteer was in the boat, or the jug was taken to shore where the aliquots were decanted. The collection methods for each parameter are given as follows:

- **Temperature:** Surface water temperature was measured in the volunteer's sampling jug using a digital thermometer that reads to 0.1°C. The temperature was measured immediately following sample collection. Special care was taken to keep the sample out of direct sunlight in order to minimize temperature change.
- **Total Phosphorus (TP) and Total Kjeldahl Nitrogen (TKN):** Duplicate samples were decanted from the volunteer's jug into their respective triple pre-rinsed, pre-labeled 50 milliliter (ml) vials. These samples were then immediately placed in the volunteer's freezer. The samples were stored there until they were picked up and delivered to the laboratory for analysis.
- **Chlorophyll.** Chlorophyll samples from the volunteer's jug were filtered in the field, out of direct sunlight, using a field filtration apparatus (called a filter holder) and a hand pump. Water from the sampling jug was measured using a graduated cylinder, and then poured into the reservoir of the filter holder. The reservoir holds approximately 250 ml. By squeezing the handle of the pump, the sample water was forced through a 1 micrometer (μm) glass-fiber filter, and the suspended planktonic algae were trapped on the filter. The filtered water was discarded. If possible, this process was repeated until a total of 1,000 ml of sample water was allowed to pass through the filter. However, if the water sample contained much suspended material, and the filter became clogged without allowing more water to pass through, the amount of water that did pass through the filter was recorded on the field data sheet and the sample label. The filter was then removed from the filter holder with a tweezers, and placed in a Petri dish. The Petri dish was then labeled, wrapped in aluminum foil to keep the sample in the dark, and frozen until pick-up and delivery to the laboratory for analysis.

The frozen samples were typically picked up by METC staff within approximately 15-75 days from sample collection, and were delivered to the MCES laboratory for analysis. For some CAMP lakes, sub-surface samples were also collected for analysis of TP, TKN, chloride, orthophosphate, and/or total iron. These sub-surface samples were usually collected near the bottom of the lake using a Van Dorn sampler. Vertical profiles of dissolved oxygen and temperature measurements were also obtained on some lakes. However, subsurface samples and vertical profiles were done only by staff of local partner organizations, whose staff were monitoring via the CAMP.

CAMP Monitoring Form
Metropolitan Council Environmental Services

Lake Name: _____
 DNR ID#: _____

Site #: _____

Sampling Date: _____

Time: _____ (military time)
 (Use the same time on the sample labels.)

Name(s) of Volunteer(s):

Quantity of samples collected: _____
 Nutrient: _____
 CLA: _____

SECCHI DISK DEPTH: _____ meters

Check the box if the disk is visible on the bottom of the lake:

Check the circle if the visibility of the disk is completely blocked by vegetation:

SURFACE TEMPERATURE: _____ °C

VOLUME OF FILTERED LAKE WATER (CLA): _____ ml

GENERAL OBSERVATIONS
 (Circle the one best choice)

Water Color

Clear Yellow
 Green Gray
 Brown Blue-Green
 Comment:

Odor of Water

None Rotten Egg-like
 Fishy Septic-like
 Musty Other: _____
 Comment:

Wind Conditions

Calm Light Breezy Strong
 North South East West

(Choose one principal direction that the wind is mainly coming from.)

Water Surface

Calm Moderate Waves
 Ripple Whitecaps
 Small Waves
 Comment:

Cloud Cover

0% 75%
 25% 100%
 50%

Lake Level

Above Normal
 Normal
 Below Normal
 Staff Gage Reading _____

Amount of Aquatic Plants

None Moderate
 Minimal Substantial
 Slight

Air Temperature (°F)

< 40 81-90
 41-60 > 90
 61-80

Unusual Conditions

in the past week: (e.g. storms, high winds, temp. extremes, fish kills, chemical applications, harvesting of vegetation, etc.)

Physical Condition

Crystal Clear (1)
 Some Algae Present (2)
 Definite Algae Present (3)
 High Algal Color (4)
 Severe Bloom (5)
 (Odor, Scum)

Suitability for Recreation

Beautiful (1)
 Minor Aesthetic Problem (2)
 Swimming Slightly Impaired (3)
 No Swimming / Boating OK (4)
 No Aesthetics Possible (5)

Figure 2. CAMP Field Data Sheet

Laboratory Analytical Methods

The chemical analyses of CAMP water samples were performed at the MCES-EQA laboratory, according to the methods shown in Table 1. Chlorophyll samples collected by the CAMP volunteers were analyzed according to the method shown in Table 1, except that the samples were not preserved with magnesium carbonate ($MgCO_3$). The CAMP chlorophyll samples were preserved by freezing. Samples that were analyzed for TDP were filtered through a 0.45 μm membrane filter and then analyzed for TP.

Data Management

The field data from the volunteers' field data sheets and the analytical results from the MCES laboratory were entered into the Council's Environmental Information Management System (EIMS). The EIMS is a system for providing timely and reliable information for environmental planning and decision-making. The EIMS can be accessed via the internet at <http://es.metc.state.mn.us/eims/>. If there were questions concerning the data and lake observations, METC staff contacted the volunteer. The METC maintained contact with most volunteers throughout the season by telephone, in person during sample pick-up, or through their sponsor's CAMP coordinator.

Quality Assurance

CAMP uses a quality assurance (QA) program which includes quality control (QC) activities. The purpose of the QA program is to assure that CAMP produces and reports scientifically credible water quality data. The MCES laboratory follows its own internal QA program, which employs an extensive internal and external check and balance system to ensure credible data. Documentation of their QA program and QC procedures can be obtained from the laboratory.

The CAMP QA program has several components. One important component is training, which ensures that the volunteers are familiar with the CAMP monitoring methods prior to their first monitoring season. The training also ensures that the same monitoring methods are used by all the volunteers. Another component is that the volunteers' samples are checked by METC staff prior to submitting the samples to the MCES laboratory. The samples are checked for legible and correct labeling and sample integrity (e.g. cracked vials, missing caps, torn filters, etc.). Samples with poor integrity are discarded to avoid producing potentially erroneous data.

The CAMP sample data are reviewed after receipt from the MCES laboratory. The data are reviewed for outliers and other inconsistencies. Data that are determined to be suspect are flagged as such in the database. Data determined to be erroneous are censored and excluded from the database.

QC monitoring is another important component of the CAMP QA program. The purposes of QC monitoring are:

- To verify that the monitoring methods are producing reproducible data.
- To verify the monitoring performance of the volunteers with respect to professional staff.

A METC staff member performs QC monitoring throughout the monitoring season by visiting a volunteer's lake site during a scheduled monitoring week, but not necessarily on the same day as the volunteer's visit. The METC staff member monitors the lake site using the same methods and identical type of equipment as the volunteer. After the QC samples are collected, they are handled, stored, and submitted to the laboratory in the same manner as the volunteers' samples. Occasionally, an METC staff member accompanies a volunteer in the field during the monitoring season as a check on their monitoring methods. This latter method is used less commonly than the former method. Accompanying a volunteer in the field is usually prompted by noting potential problems during the sample checking process, or if the volunteer expresses that they need further assistance or explanation.

If a problem is discovered during the course of the sample checking or QC monitoring processes, the volunteer is contacted to discuss the cause of the problem. If needed, a METC staff member visits with the volunteer to observe his/her monitoring activities, in an effort to help identify the cause of the problem. Once the cause is identified, the volunteer is given instructions on how to correct the situation. If the problem resulted in erroneous data, then the data are censored and excluded from the database.

Figures 3, 4, and 5 show the QC monitoring data for TP, CLA, and Secchi depth, respectively. The QC monitoring data are also shown in Appendix D which provides additional information such as dates of collection and TKN. There were

7 QC monitoring events on 7 lake sites in 2019. QC monitoring events were typically monitored within 4 days of the CAMP volunteer monitoring event with the exception of the events for Orchard Lake and Marion Lake. These events were included in the analysis to provide for more data points and to include lakes with lower productivity. The QC monitoring event for Keller Lake was done concurrently with the volunteer.

The QC results showed good agreement between CAMP and METC staff collected samples and measurements. The TP comparison showed an R^2 value of 0.92 and a trend line close to a 1:1 relationship but with some variation at the higher productivity lakes such as McMahon and Thole lakes. The data points for the CLA comparison showed an R^2 of 0.92 and good agreement along the 1:1 relationship but with a small bias overall of higher CLA concentrations in the METC results compared to the volunteer results.. The Secchi disk depth comparison had a good R^2 value of 0.96 and a very good 1:1 relationship.

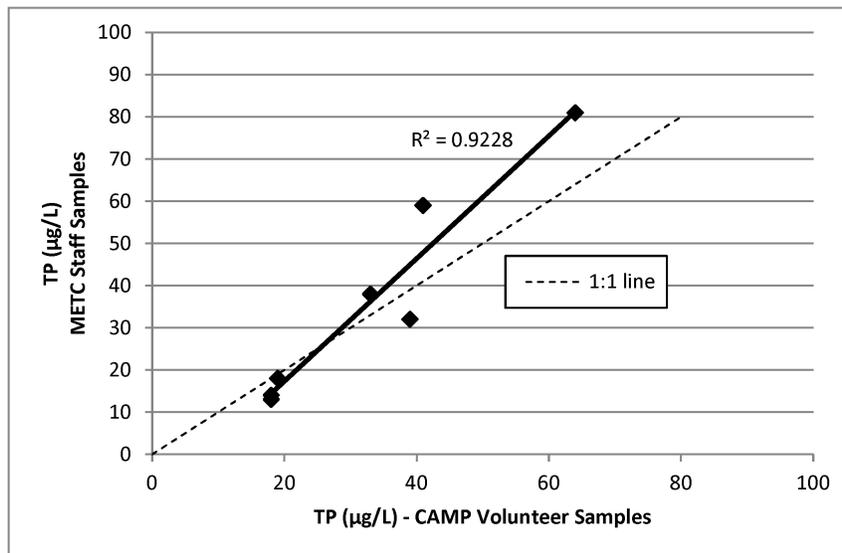


Figure 3. Total Phosphorus Quality Control Data

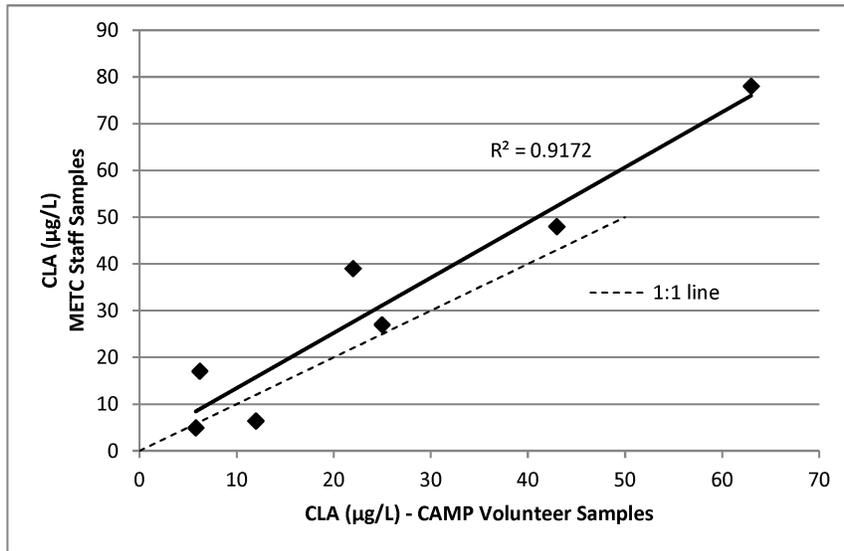


Figure 4. Chlorophyll-a Quality Control Data

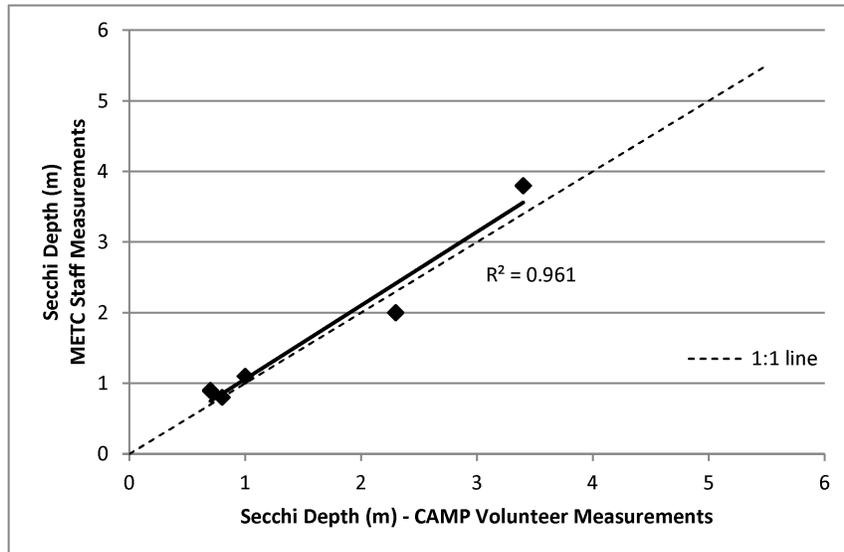


Figure 5. Secchi Depth Quality Control Data

Lake Quality Report Card

The Metropolitan Council, following its 1989 lake survey (Osgood 1989b), developed the lake quality report card. The idea is simply that lake water quality characteristics can be ranked by comparing measured values to those of other Metro Area lakes. In this way, technical information, which in the past had required professional analysis, can more easily be used by a less technical audience to visualize the water quality of their lake relative to other TCMA lakes. The lake grading curve (Table 2) represents percentile ranges for three water quality indicators: the summertime (May - September) average values for total phosphorus, chlorophyll-a, and Secchi depth. These percentiles use ranked data from 120 lakes that were monitored from 1980 – 1988:

Table 2. Lake Grading Curve

Grade	Percentile	TP ($\mu\text{g/L}$)	CLA ($\mu\text{g/L}$)	Secchi (m)
A	< 10	< 23	< 10	> 3.0
B	10 — 30	23 — 32	10 — 20	2.2 — 3.0
C	30 — 70	32 — 68	20 — 48	1.2 — 2.2
D	70 — 90	68 — 152	48 — 77	0.7 — 1.2
F	> 90	> 152	> 77	< 0.7

The three variables used in the grading system (TP, CLA, Secchi depth) give an indication of the trophic status of the lake (Carlson 1977, Osgood 1982). The trophic status is the condition of the biological productivity of the lake ecosystem. The trophic status is strongly related to open-water nuisance-aspects of a lake (e.g. algal blooms, excess vegetation growth, poor water clarity), which can indicate accelerated aging (cultural eutrophication). For example, lake phosphorus concentration has been related to increased algal abundance, increased frequency of algal blooms, and to the increased abundance of blue-green algae (Osgood 1988). Chlorophyll-a, which is a pigment in plants (including algae) essential in the photosynthesis process, is used to estimate the algal abundance of a lake. Secchi depth relates to the appearance of a lake (generally the fewer algae, the better the transparency of a lake). TKN concentration was not included in the grading process because most lake nuisances in the area are related to the phosphorus concentration of the lake (Osgood 1988).

These water quality grades, however, only characterize the open-water quality of lakes. Other nuisances, such as the abundance of aquatic macrophytes, are not indicated in these grades.

The percentile curve can be used to assign individual grades for TP, CLA and Secchi depth to the monitored lakes. For example, a lake having a mean summertime Secchi depth of 1.7 m would receive a “C” grade for Secchi depth. A grade of C is considered average for TCMA lakes. Lakes were also assigned a single, overall grade, called a lake grade. Lake grades were determined by averaging the individual parameter grades. A lake grade generally corresponds to descriptive rankings and recreational use conditions of the lake. Lakes receiving an “A” grade (upper 10 percentile) can be deemed as having full recreational use capability. A lake receiving a “B” lake grade is considered to have very good water quality and some recreational use impairment. Lakes receiving a “C” lake grade are considered to have average water quality but are recreationally impaired. A “D” grade lake translates to a very poor ranking with severely impaired recreational use. Lakes receiving an “F” lake grade have extremely poor water quality with little to no possible recreational use.

In 2000, the percentiles determined from the 1980-1988 water quality database of 120 lakes were compared to calculated percentiles from a more current and expanded 1980-1999 water quality database of 230 lakes. It was found that the percentiles from the expanded database were very similar to those determined from the 1980-1988 database. For this reason, and in an attempt to maintain consistency, the original 1980-1988 percentiles continued to be used for lake quality grading purposes (Anhorn 2003b).

2019 Lake Grades

Each lake monitoring site was given a lake grade if there were sufficient data to calculate the grade. At least 5 monitoring events are required to calculate a lake grade, and these 5 events must occur during the May-September (summer) period. Some lakes were not monitored sufficiently, so they did not receive a lake grade. Lakes that had more than one monitored lake site received a single grade based on the average of the lake site grades. The distribution of lake grades for lake sites monitored in 2019 is shown in Figure 6.

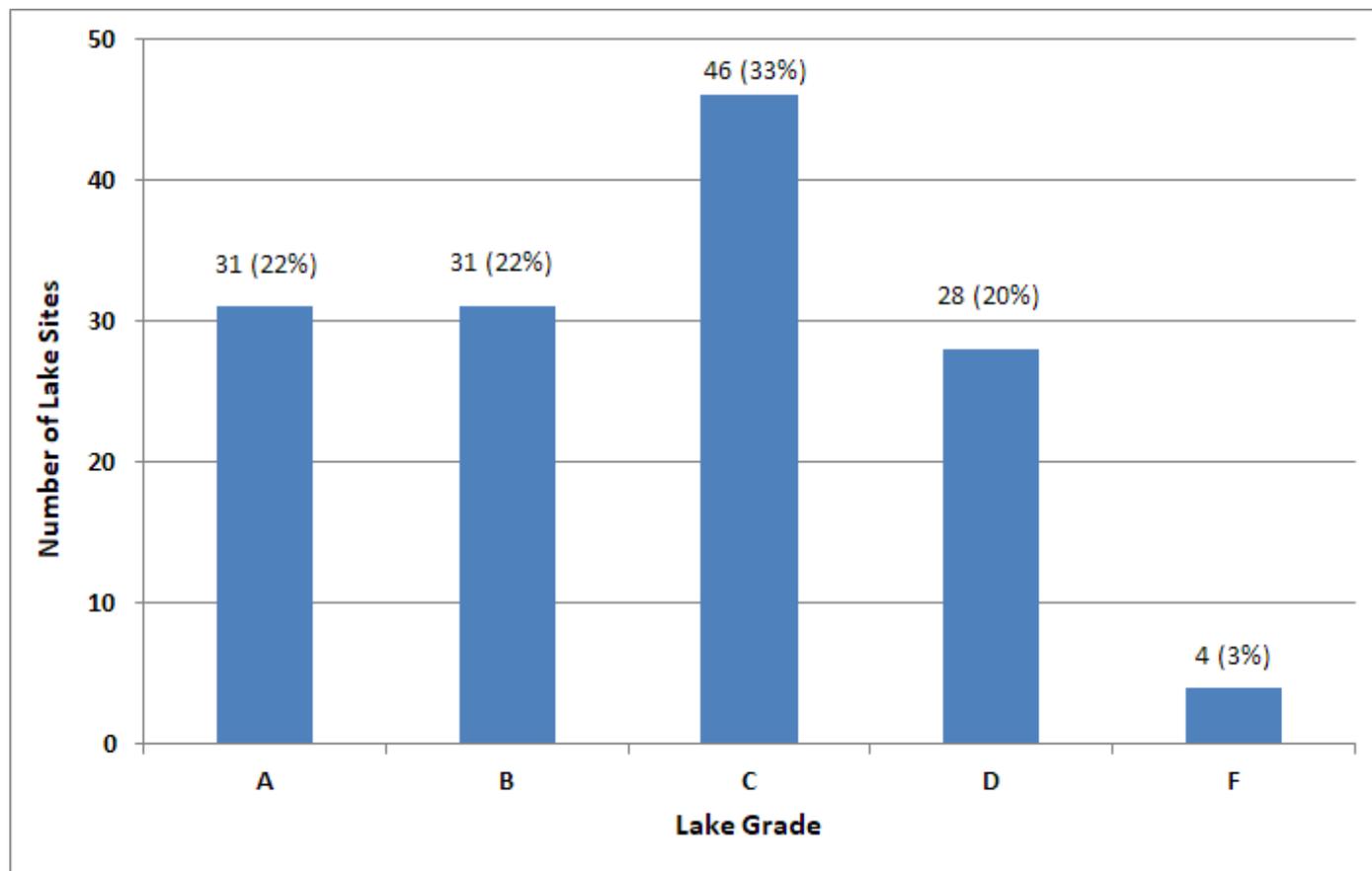


Figure 6. Distribution of 2019 Lake Grades

For those lake sites with sufficient data to calculate a lake grade, approximately one third of the lake sites (33%) received a lake grade of C. The water quality of these sites is considered average as compared to other lake sites in the TCMA. More lake sites (44%) were above average (A and B lakes) than lakes below average (D and F lakes at 23%).

Similar to past years, there is no distinct pattern as to where lakes with specific water quality were located. The lakes with below average lake grades (D's and F's) were not area specific. They were located throughout the TCMA. The majority of lakes with D and F grades are generally shallower with higher watershed-to-lake ratios. Lakes with high watershed-to-lake ratios have a more difficult time handling larger pollutant loads than larger lakes in watersheds of similar size and land-use. Shallow lakes typically do not stratify during the summer months, allowing the potential release of phosphorus from sediments to mix through the water column and become available for plant growth during the summer season.

Similarly, the lake sites with above-average grades (A's and B's) were not area specific. They were located throughout the TCMA. Common characteristics of the above-average lakes were deeper maximum and mean depths, development of a thermocline, and small contributing watersheds relative to the lake's surface area.

If there are questions pertaining to the lake data or descriptions contained in this report, inquiries about CAMP, or suggestions of lakes that the METC should consider monitoring in the future, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Monitoring Results for CAMP Lakes 2019

The water quality of each volunteer-monitored lake is discussed in the following section. Each lake report includes a description of the lake's water quality condition, the year's water quality data, shown in tables and figures, and the water quality grades from 1980 through 2019.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Acorn Lake (82–0102) Valley Branch Watershed District

Monitoring agency: Washington Conservation District staff

Acorn Lake is a 44-acre lake located within City of Oakdale (Washington County). This lake is also called Mud Lake. The mean and maximum depth of the lake is 0.7 m (roughly 2.4 feet) and 3.0 m (10 feet), respectively. Because of the shallowness of the lake, its entire area is considered littoral (the shallow [0-15 foot depth] area dominated by aquatic vegetation), and it never maintains a thermocline (a density gradient owed to changing water temperatures throughout the lake's water column) through the summer months. The lake's surface area and mean depth translate to a volume of roughly 440 ac-ft. There is no public access to the lake.

The lake's surface area and watershed size (296 acres) translates to a 7:1 watershed-to-lake size ratio. Generally the larger the ratio, the greater the potential stress on the lake from surface runoff.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

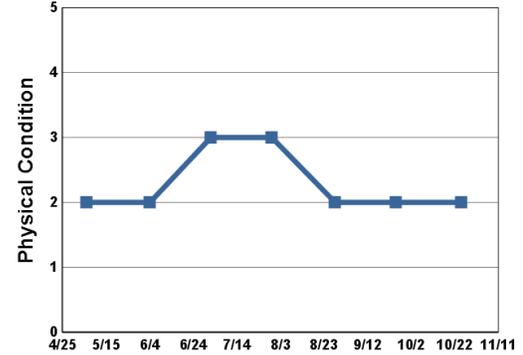
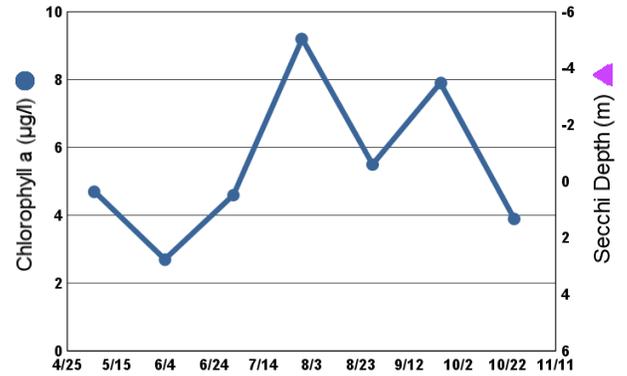
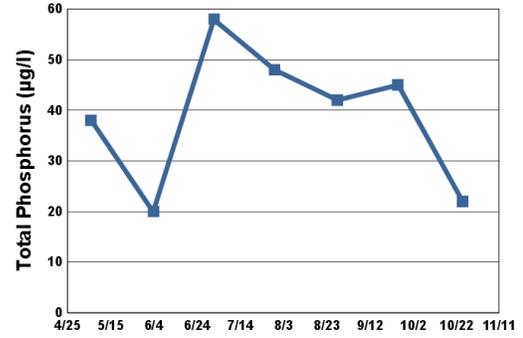
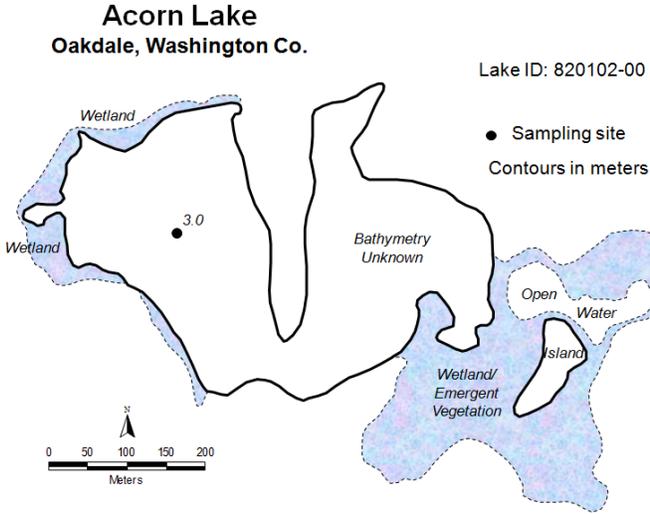
Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	42	20	58	C
CLA (µg/l)	5.8	2.7	9.2	A
Secchi (m)	>0.6	>0.5	>1.0	
TKN (mg/l)	0.88	0.80	1.00	
			Lake Grade	

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

The lake received a TP grade of C this year which is consistent with grades received in previous years. The CLA grade of A is as an improvement over the B grades received in recent years. There was an insufficient quantity of valid Secchi transparency measurements to determine a Secchi grade. An invalid measurement occurred if the Secchi disk was either visible on the lake bottom or the disk's visibility was blocked by aquatic vegetation. In both of these situations the water clarity would have been greater than that indicated by the measurement. A lake grade was not given because all three parameter grades are required to issue a lake grade.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

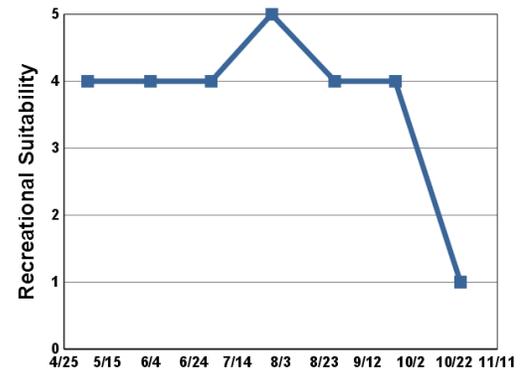


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/06/19	14.6	5.9	4.7	38	>1.0	2	4
06/04/19	20.4	5.5	2.7	20	>0.6	2	4
07/02/19	23.3	1.4	4.6	58	>0.5	3	4
07/30/19	21.4	2.9	9.2	48	>0.5	3	5
08/28/19	18.4	1.6	5.5	42	>0.8	2	4
09/25/19	18.4	4.0	7.9	45	>0.5	2	4
10/25/19	6.6	7.7	3.9	22	>0.6	2	1

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

- 1 = Crystal Clear
- 2 = Some Algae Present
- 3 = Definite Algal Presence
- 4 = High Algal Color
- 5 = Severe Algal Bloom



- 1 = Beautiful
- 2 = Minor Aesthetic Problem
- 3 = Swimming Impaired
- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP			C				C					
CLA			A				B					
Secchi			F				D					
Lake Grade			C				C					

Year	2016	2017	2018	2019
TP	C	B	C	C
CLA	B	B	B	A
Secchi				
Lake Grade				

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Alice Lake (82–0287) Washington Conservation District

Monitoring agency: Washington Conservation District staff

Alice Lake is located in Washington County in the flood plain of the St. Croix River. It has a surface area of 28 acres and a maximum depth of 2.7 m. The lake is an impoundment formed by a small dam with its outlet discharging directly to the St. Croix River. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 2013.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	23	13	34	B
CLA (µg/l))	4.4	1.8	8.8	A
Secchi (m)	+1.9	>1.7	+2.0	
TKN (mg/l)	0.42	0.35	0.52	
			Lake Grade	

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

The lake received parameter grades of A for TP and CLA. There was an insufficient quantity of valid Secchi transparency measurements to determine a Secchi grade. An invalid measurement occurred if the Secchi disk was either visible on the lake bottom or the disk's visibility was blocked by aquatic vegetation. In both of these situations the water clarity would have been greater than that indicated by the measurement. A lake grade was not given because all three parameter grades are required to issue a lake grade. The MPCA's EQUIS database was searched for additional historical monitoring data collected by agencies other than the Metropolitan Council. Additional data were not found.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

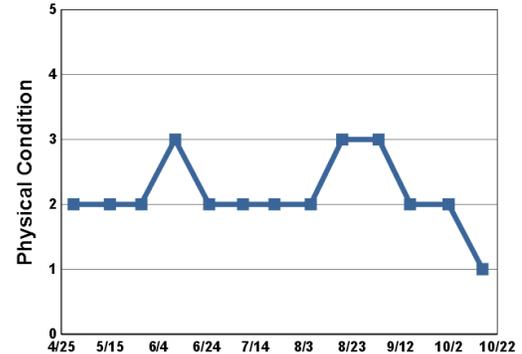
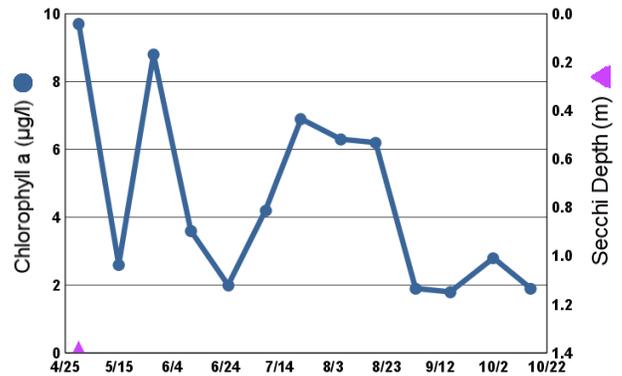
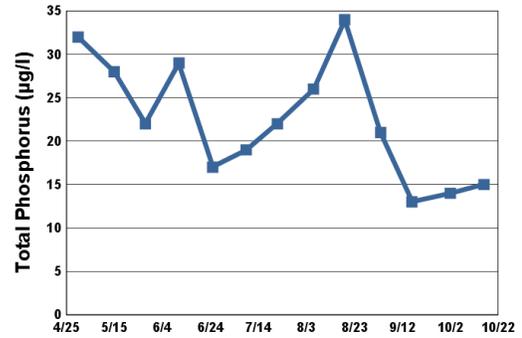
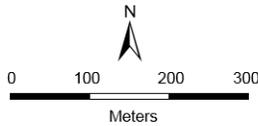
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

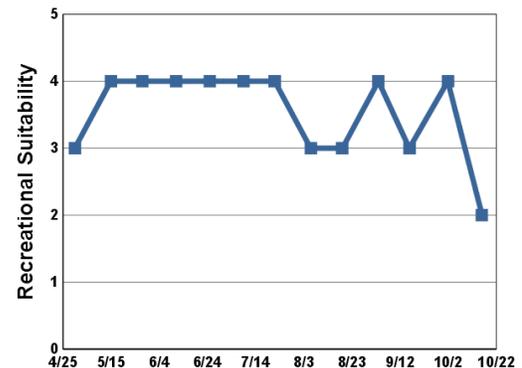
Alice Lake
Scandia, Washington Co.

Lake ID: 820287-00
WD: Carnelian-Marine-St. Croix

● Sampling site
Contours in meters



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/30/19	11.7	13.7	9.7	32	1.4	2	3
05/15/19	19.0	14.5	2.6	28	+2.0	2	4
05/28/19	17.9	10.8	8.8	22	>1.7	2	4
06/11/19	22.3	9.6	3.6	29	>1.7	3	4
06/25/19	24.5	9.2	2.0	17	+2.0	2	4
07/09/19	27.0	9.7	4.2	19	+1.8	2	4
07/22/19	26.5	6.4	6.9	22	>1.8	2	4
08/06/19	28.3	6.2	6.3	26	+2.0	2	3
08/19/19	26.1	8.6	6.2	34	+2.0	3	3
09/03/19	22.4	9.5	1.9	21	+2.0	3	4
09/16/19	20.8	10.0	1.8	13	+1.7	2	3
10/02/19	15.5	8.0	2.8	14	+2.1	2	4
10/16/19	8.6	12.1	1.9	15	+1.5	1	2

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.
> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP											A	B
CLA											A	B
Secchi												
Lake Grade												

Year	2016	2017	2018	2019
TP	A	A		B
CLA	A	A		A
Secchi				
Lake Grade				

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Alimagnet Lake (19–0021) City of Apple Valley

Volunteer: David DeKraker

Approximately half of Alimagnet Lake's 109-acre surface area is located within the City of Apple Valley, the other half in the City of Burnsville (Dakota County). The lake has maximum and mean depths of 3.0 and 1.5 m, respectively. The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. The lake is defined as a shallow lake because of the dominance of the littoral zone. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2002. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 2014.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	72	35	109	D
CLA (µg/l)	42	2.8	100	C
Secchi (m)	1.0	0.4	2.1	D
TKN (mg/l)	1.17	0.69	1.60	
			Lake Grade	D

The lake received a lake grade of D this year. The lake's historic lake grades indicate that the lake fluctuates between a C and D. More recently the lake's lake grade has consistently been a D (1999-2008 excluding 2006) with C grades received through 2012. But this year's lake grade continues the return to poorer water quality as indicated by the D grades received since 2013.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

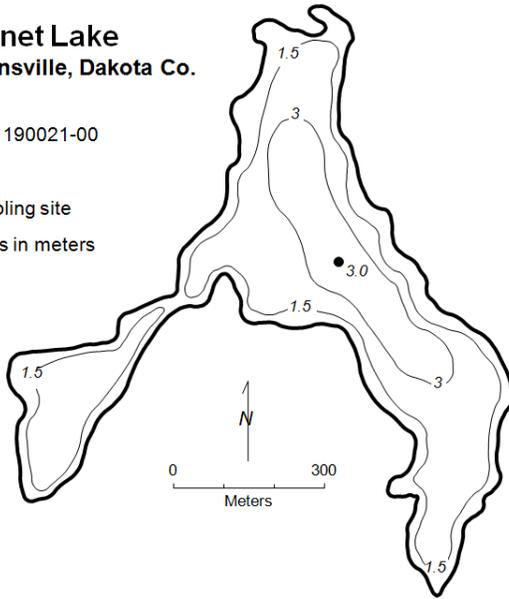
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Alimagnet Lake
Apple Valley/Burnsville, Dakota Co.

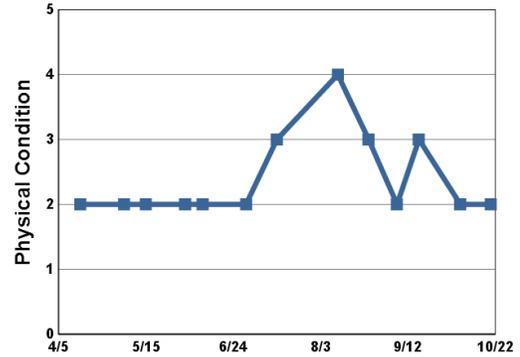
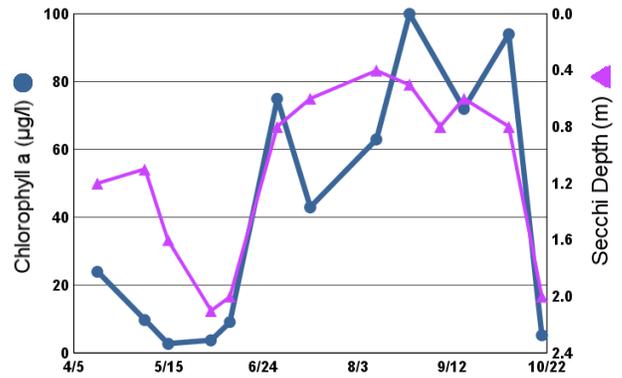
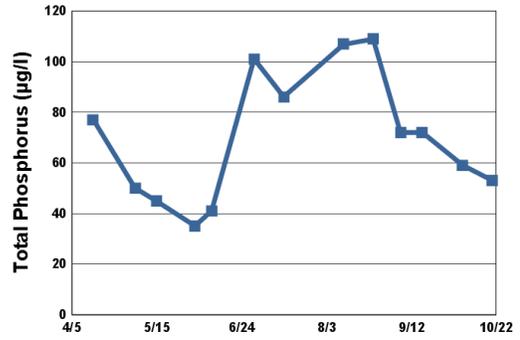
Lake ID: 190021-00

● Sampling site
Contours in meters

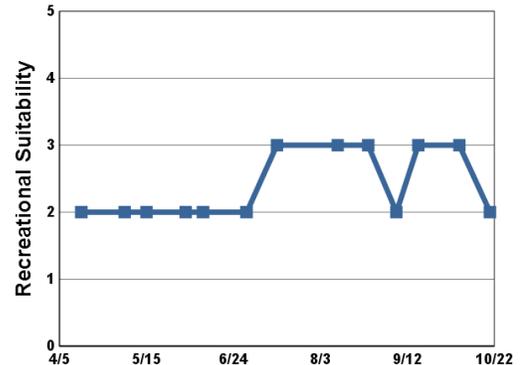


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/15/19	6.1		24	77	1.2	2	2
05/05/19	15.3		9.8	50	1.1	2	2
05/15/19	20.8		2.8	45	1.6	2	2
06/02/19	20.9		3.8	35	2.1	2	2
06/10/19	23.5		9.2	41	2.0	2	2
06/30/19	25.8		75	101	0.8	2	2
07/14/19	30.1		43	86	0.6	3	3
08/11/19	25.5		63	107	0.4	4	3
08/25/19	22.6		100	109	0.5	3	3
09/07/19	21.4			72	0.8	2	2
09/17/19	22.5		72	72	0.6	3	3
10/06/19	14.0		94	59	0.8	2	3
10/20/19			5.3	53	2.0	2	2



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP	F	D									F	
CLA											D	
Secchi	F	F	D	D	C	D	F	F	F	F	D	C
Lake Grade											D	

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP				D	D	C	D	F	D	D	D	D
CLA				B	C	C	C	D	D	C	C	C
Secchi	D	C	C	C	D	C	C	D	F	D	F	F
Lake Grade				C	D	C	C	D	D	D	D	D

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	D	D	F	D	D	D	C	C	D	D	D	D
CLA	D	D	D	D	D	C	C	C	C	D	D	D
Secchi	F	F	F	F	F	F	D	C	C	D	D	D
Lake Grade	D	D	F	D	D	D	C	C	C	D	D	D

Year	2016	2017	2018	2019
TP	D	D	D	D
CLA	F	D	D	C
Secchi	F	F	F	D
Lake Grade	F	D	D	D

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Armstrong Lake (82–0116) South Washington Watershed District

Monitoring agency: Washington Conservation District staff

The lake is located within the cities of Lake Elmo and Oakdale (Washington County). The lake has a surface area of 39 acres, and it has a mean and maximum depth of 1.0 m and 1.5 m, respectively. Because of the shallowness of the lake, its entire area is considered littoral, which is the shallow depth zone (0-15 feet) dominated by aquatic vegetation. It does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the lake's water column.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	65	25	175	C
CLA ($\mu\text{g/l}$)	22	2.3	91	C
Secchi (m)	+0.7	>0.2	+1.2	
TKN (mg/l)	1.04	0.54	2.30	
			Lake Grade	

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

There was an insufficient quantity of valid Secchi transparency measurements to determine a Secchi grade. An invalid measurement occurred if the Secchi disk was either visible on the lake bottom or the disk's visibility was blocked by aquatic vegetation. In both of these situations the water clarity would have been greater than that indicated by the measurement. The lake water quality over the past decade has fluctuated between C and D, with a C being more frequent.

According to the lake's historic database, TP and Secchi grades are typically worse than the CLA grade. This year there was an apparent algal bloom on August 12 which significantly skewed the summer-time means for TP and CLA. The relatively low CLA concentrations in combination with the observations of moderate to substantial macrophyte growth, indicate that the primary production of the lake is focused on production of aquatic macrophytes rather than algae.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP							D	F	C	D	D	D
CLA							D	C	C	C	B	B
Secchi							D	F	D	D	D	D
Lake Grade							D	D	C	D	C	C

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	C	D	D	C	C	C	C	C	C		C
CLA	A	A	B	C	A	B	A	A	A	A		B
Secchi	D	D	D	D	D	D	D	D	D			
Lake Grade	C	C	C	D	C	C	C	C	C			

Year	2016	2017	2018	2019
TP	C	D	C	C
CLA	A	A	A	C
Secchi				
Lake Grade				

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Augusta Lake (19–0081) Lower Mississippi River Watershed Management Organization

Volunteer: Steve Treichel

Augusta Lake is located in the city of Mendota Heights (Dakota County). The lake has a surface area of 38 acres and maximum depth of 10.1 m.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	125	77	317	D
CLA (µg/l)	122	87	180	F
Secchi (m)	0.3	0.2	0.6	F
TKN (mg/l)	2.39	1.60	3.80	
			Lake Grade	F

The lake received a lake grade of F, which is consistent with its historical water quality database.

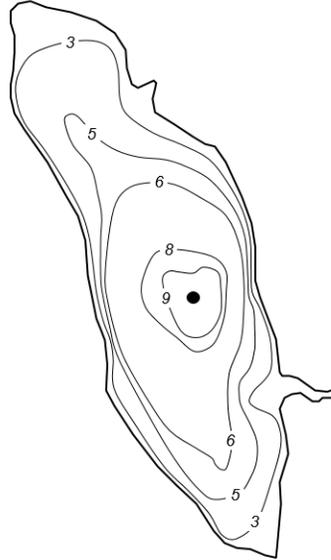
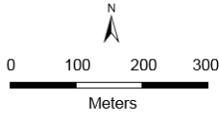
During each monitoring visit, the lake’s physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake’s data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Augusta
Mendota & Mendota Heights,
Dakota Co.

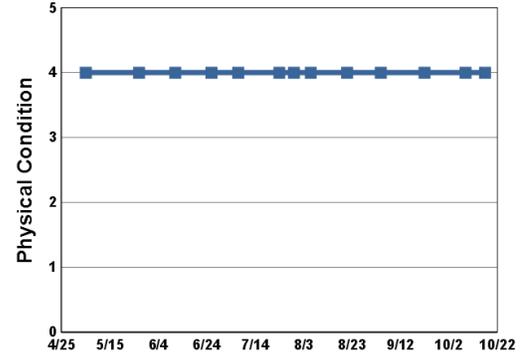
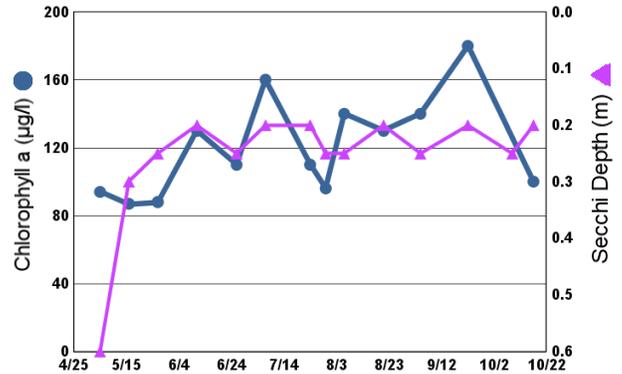
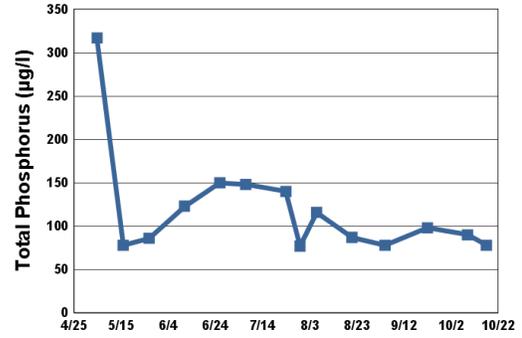
Lake ID: 190081-00
WMO: Lower Mississippi River

● Sampling site
Contours in meters

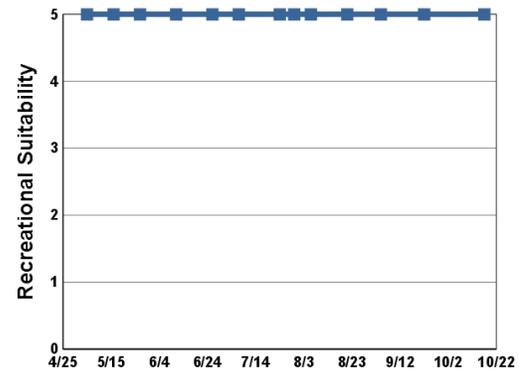


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/05/19	14.3		94	317	0.6	4	5
05/16/19	22.2		87	78	0.3		5
05/27/19	17.6		88	86	0.2	4	5
06/11/19	21.6		130	123	0.2	4	5
06/26/19	22.6		110	150	0.2	4	5
07/07/19	26.1		160	148	0.2	4	5
07/24/19	27.9		110	140	0.2	4	5
07/30/19	24.9		96	77	0.2	4	5
08/06/19	27.3		140	116	0.2	4	5
08/21/19	23.7		130	87	0.2	4	5
09/04/19	21.4		140	78	0.2	4	5
09/22/19	21.5		180	98	0.2	4	5
10/09/19	14.1			90	0.2	4	
10/17/19	10.4		100	78	0.2	4	5



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP												
CLA												
Secchi												
Lake Grade												

Year	2016	2017	2018	2019
TP	F		D	D
CLA	F		F	F
Secchi	F		F	F
Lake Grade	F		F	F

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Bailey Lake (82–0456) South Washington Watershed District

Monitoring agency: Washington Conservation District staff

Bailey Lake is located in the city of Woodbury (Washington County). Little morphological information is available for this lake.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	83	39	122	D
CLA ($\mu\text{g/l}$)	38	2.3	96	C
Secchi (m)	0.9	0.4	2.3	D
TKN (mg/l)	1.13	0.74	1.80	
			Lake Grade	D

The lake received a lake grade of D. Continued monitoring is recommended to build the water quality database.

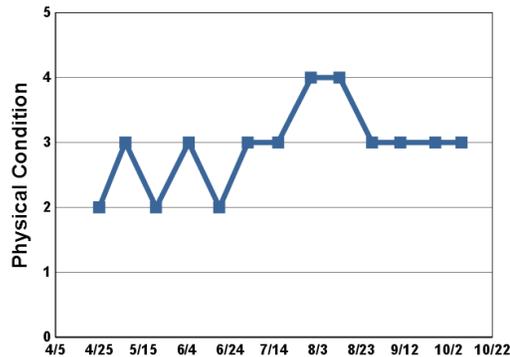
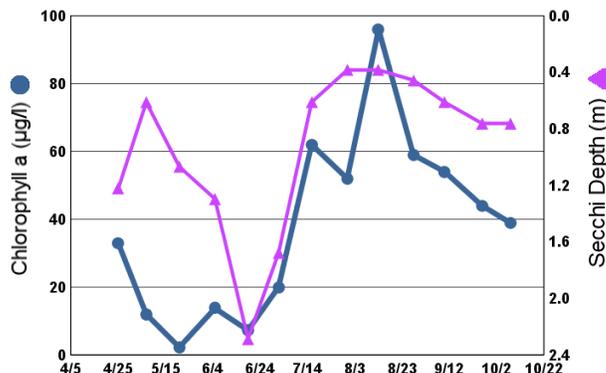
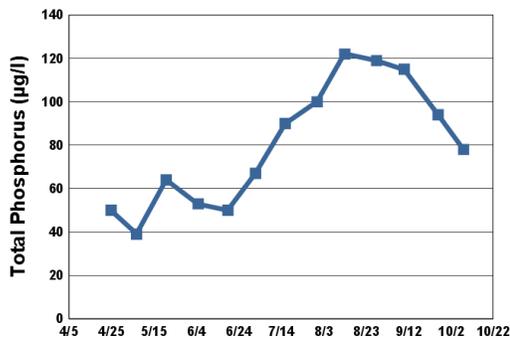
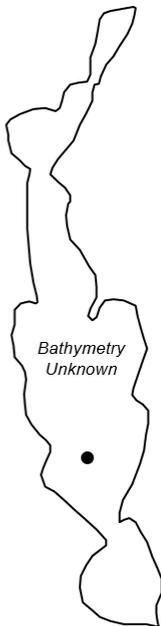
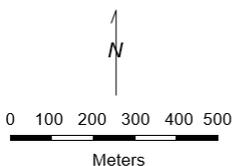
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

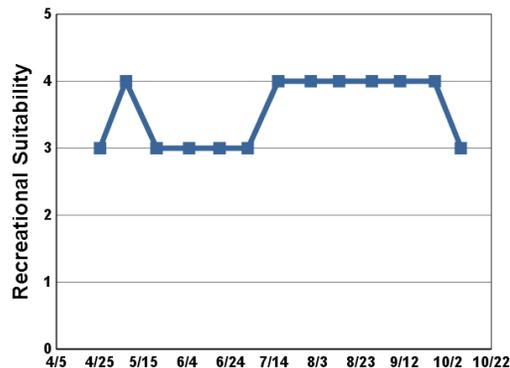
Bailey Lake
Woodbury, Washington Co.

Lake ID: 82045600

● Sampling site
Contours in meters



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/25/19	13.4	12.1	33	50	1.2	2	3
05/07/19	15.9	12.1	12	39	0.6	3	4
05/21/19	14.8	10.4	2.3	64	1.1	2	3
06/05/19	21.5	9.3	14	53	1.3	3	3
06/19/19	23.5	8.2	7.4	50	2.3	2	3
07/02/19	26.2	8.9	20	67	1.7	3	3
07/16/19	29.4	10.3	62	90	0.6	3	4
07/31/19	24.1	7.8	52	100	0.4	4	4
08/13/19	26.9	10.4	96	122	0.4	4	4
08/28/19	21.2	7.6	59	119	0.5	3	4
09/10/19	19.0	8.8	54	115	0.6	3	4
09/26/19	20.1	8.8	44	94	0.8	3	4
10/08/19	13.4	9.9	39	78	0.8	3	3

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP												
CLA												
Secchi												
Lake Grade												

Year	2016	2017	2018	2019
TP		D	D	D
CLA		D	D	C
Secchi		F	D	D
Lake Grade		D	D	D

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Barker Lake (82–0076) Carnelian-Marine-St. Croix Watershed District

Monitoring agency: Washington Conservation District staff

Barker Lake is located in May Township, and has a surface area of 45 acres. It has a maximum and mean depth of 9.0 m and 4.4 m, respectively. The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2012.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCEs's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	62	45	70	C
CLA ($\mu\text{g/l}$)	41	8.6	120	C
Secchi (m)	1.1	0.6	2.3	D
TKN (mg/l)	1.05	0.70	1.50	
			Lake Grade	C

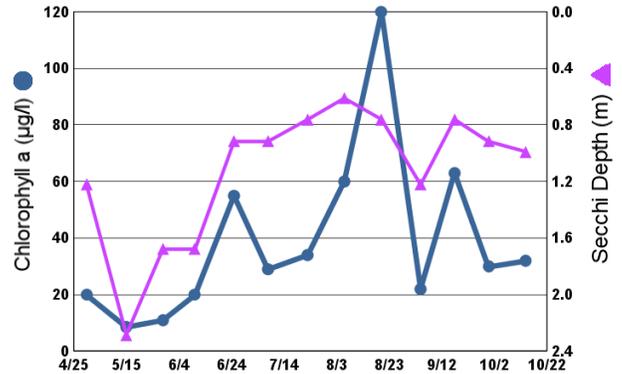
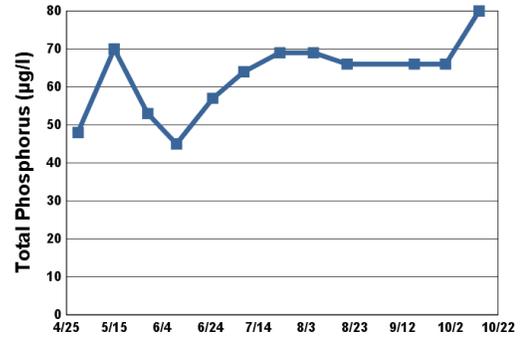
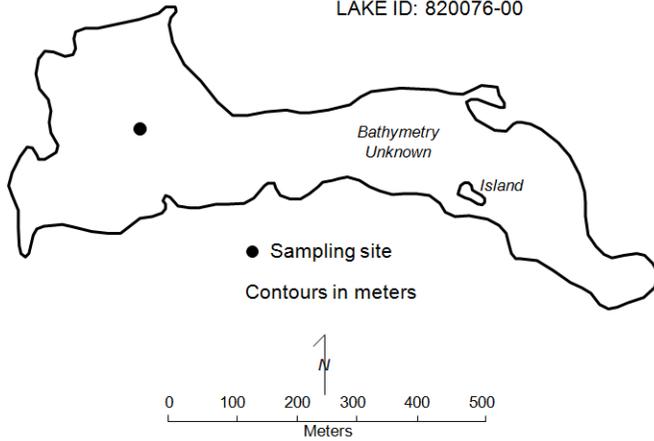
The lake received a lake grade of C this year, which is consistent with its historical database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

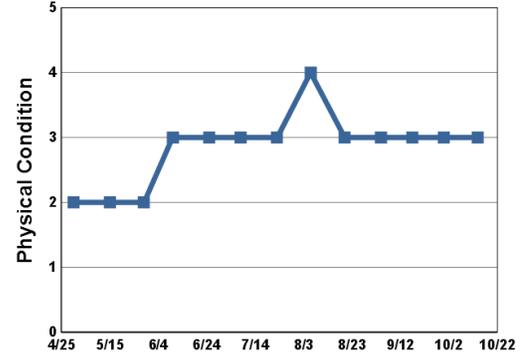
Barker Lake
Hugo, May Twp., Washington Co.

LAKE ID: 820076-00

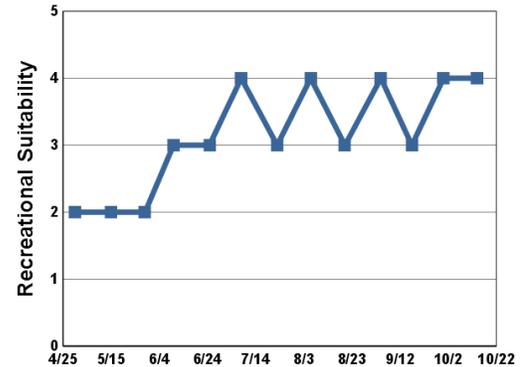


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/30/19	10.5	9.6	20	48	1.2	2	2
05/15/19	16.7	9.4	8.6	70	2.3	2	2
05/29/19	17.3	8.7	11	53	1.7	2	2
06/10/19	21.7	7.0	20	45	1.7	3	3
06/25/19	21.6	7.6	55	57	0.9	3	3
07/08/19	28.5	7.9	29	64	0.9	3	4
07/23/19	26.5	7.3	34	69	0.8	3	3
08/06/19	26.1	6.8	60	69	0.6	4	4
08/20/19	23.9	8.0	120	66	0.8	3	3
09/04/19	20.1	4.9	22		1.2	3	4
09/17/19	20.4	8.8	63	66	0.8	3	3
09/30/19	16.3	5.9	30	66	0.9	3	4
10/14/19	9.8	7.2	32	80	1.0	3	4



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP						C	D	D	C	D		
CLA						C	C	D	B	C		
Secchi						D	C	C	C	C	C	C
Lake Grade						C	C	D	C	C		

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP					D					D	D	
CLA					D					C	C	
Secchi	C	D	C	D	D	C				C	C	
Lake Grade				D	D					C	C	

Year	2016	2017	2018	2019
TP		C	C	C
CLA		C	C	C
Secchi		C	C	D
Lake Grade		C	C	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Bass Lake [May Township] (82–0035) Carnelian — Marine — St. Croix Watershed District

Monitoring agency: Washington Conservation District staff

Bass Lake is located in May Township (Washington County). The maximum depth of the lake is 4.3 m. The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. The lake is defined as a shallow lake because of the dominance of the littoral zone. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

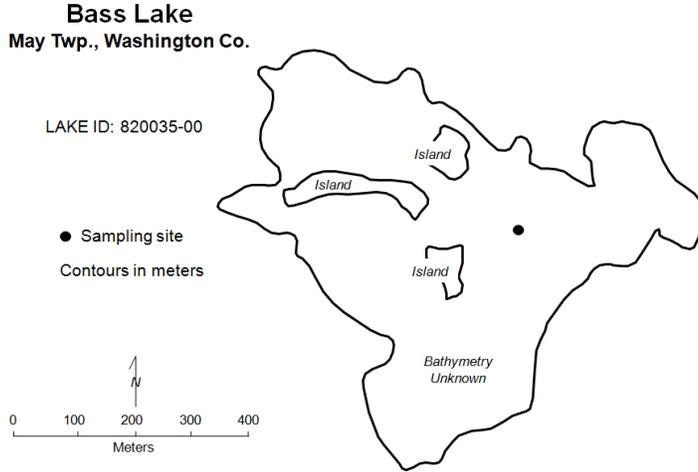
Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	25	17	41	B
CLA (µg/l)	5.7	2.6	11	A
Secchi (m)	>2.2	1.8	2.9	C
TKN (mg/l)	0.59	0.51	0.76	
			Lake Grade	B

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

The lake received a lake grade of B. The lake has typically has received Cs and Bs in the past with A's received occasionally in recent years.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

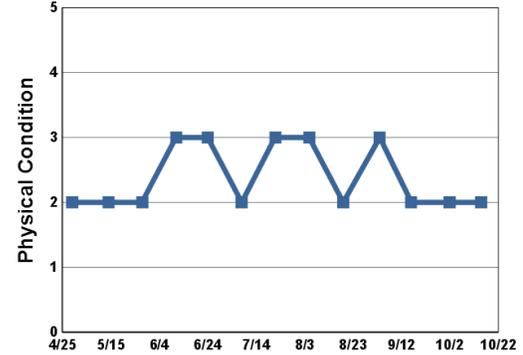
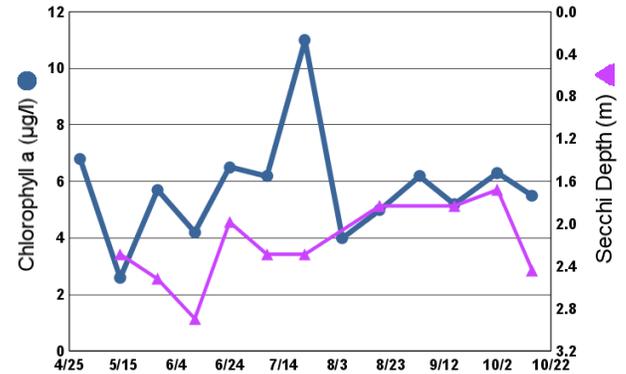
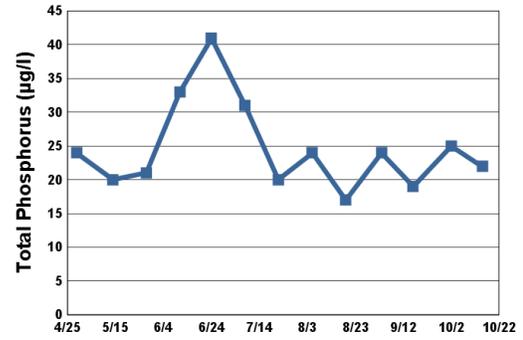
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.



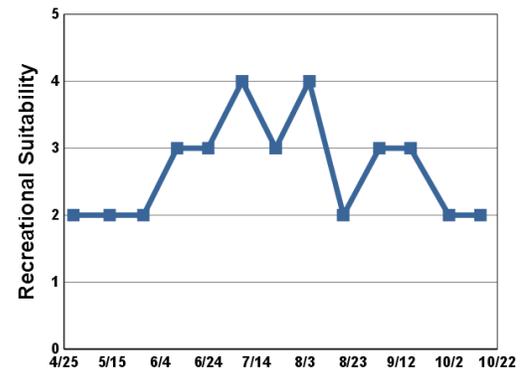
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/29/19	11.6	8.4	6.8	24	>2.0	2	2
05/14/19	15.7	8.5	2.6	20	2.3	2	2
05/28/19	15.5	8.1	5.7	21	2.5	2	2
06/11/19	21.9	6.9	4.2	33	2.9	3	3
06/24/19	21.9	7.4	6.5	41	2.0	3	3
07/08/19	26.3	7.0	6.2	31	2.3	2	4
07/22/19	24.5	7.3	11	20	2.3	3	3
08/05/19	26.3	6.8	4.0	24	>2.0	3	4
08/19/19	23.3	5.8	5.0	17	1.8	2	2
09/03/19	20.5	5.9	6.2	24	>2.1	3	3
09/16/19	19.0	5.7	5.2	19	1.8	2	3
10/02/19	15.2	3.3	6.3	25	1.7	2	2
10/15/19	8.9	9.2	5.5	22	2.4	2	2

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												C
CLA												B
Secchi												C
Lake Grade												C

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP	B				C	C	C	C	C	C		C
CLA	B				C	C	B	B	B	B		B
Secchi	C	C	C	C	C	C	C	C	C	C	B	C
Lake Grade	B					C	C	C	C	C		C

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	B	C	C	B					B	B	B	
CLA	A	B	B	B					A	A	A	
Secchi	B	B	C	B	B	B			A	B	C	
Lake Grade	B	B	C	B					A	B	B	

Year	2016	2017	2018	2019
TP		A	B	B
CLA		A	A	A
Secchi		B	B	C
Lake Grade		A	B	B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Bass Lake [West] (82–0123) Browns Creek Watershed District

Monitoring agency: Washington Conservation District staff

Bass Lake (west) is located west of Joliet Lane in Grant Township. There are few known morphological data available for the lake.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

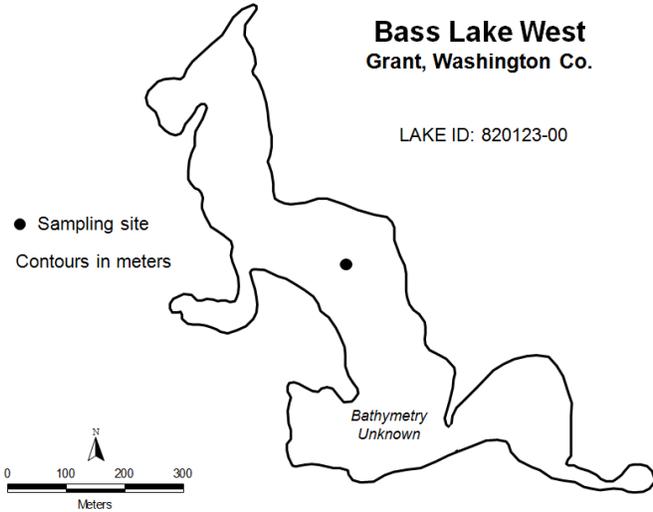
2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	30	13	52	B
CLA (µg/l))	6.7	1.7	14	A
Secchi (m)	2.7	1.5	4.3	B
TKN (mg/l)	0.72	0.57	0.86	
			Lake Grade	B

The lake received a lake grade of B. The CLA grade is consistent with the past 4 years of historical data.

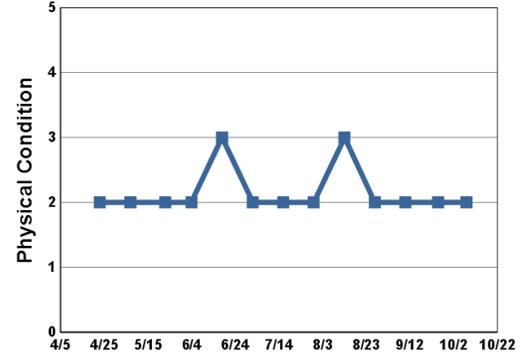
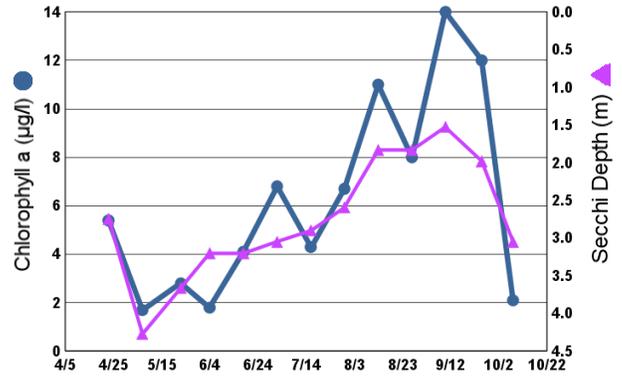
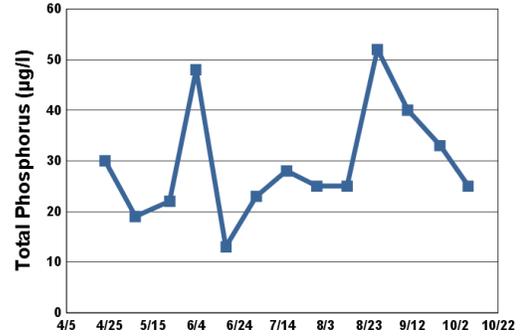
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

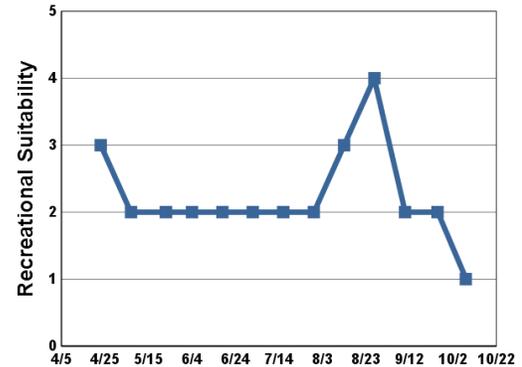


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/23/19	11.3	8.6	5.4	30	2.7	2	3
05/07/19	14.0	9.2	1.7	19	4.3	2	2
05/23/19	14.1	7.8	2.8	22	3.7	2	2
06/04/19	22.0	7.6	1.8	48	3.2	2	2
06/18/19	22.0	7.3	4.1	13	3.2	3	2
07/02/19	25.1	7.0	6.8	23	3.0	2	2
07/16/19	27.4	6.5	4.3	28	2.9	2	2
07/30/19	25.0	5.2	6.7	25	2.6	2	2
08/13/19	24.5	4.0	11	25	1.8	3	3
08/27/19	22.0	4.2	8.0	52	1.8	2	4
09/10/19	19.3	4.9	14	40	1.5	2	2
09/25/19	20.3	6.4	12	33	2.0	2	2
10/08/19	13.3	4.9	2.1	25	3.0	2	1



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- 5 = Severe Algal Bloom



- 1 = Beautiful
- 2 = Minor Aesthetic Problem
- 3 = Swimming Impaired
- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP			B	B	B	C	C	C	C	B	B	A
CLA			A	A	B	B	B	A	A	A	A	A
Secchi			A	B	B	C	C	B	C			
Lake Grade			A	B	B	C	C	B	B			

Year	2016	2017	2018	2019
TP	B	A	A	B
CLA	A	A	A	A
Secchi	B	B	A	B
Lake Grade	B	A	A	B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Bass Lake [East] (82–0124) Browns Creek Watershed District

Monitoring agency: Washington Conservation District staff

Bass Lake (east) is located east of Joliet Lane in Grant Township. There are few known morphological data available for the lake.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	25	16	34	B
CLA ($\mu\text{g/l}$)	7.0	2.1	25	A
Secchi (m)	2.8	1.7	3.7	B
TKN (mg/l)	0.66	0.47	1.30	
			Lake Grade	B

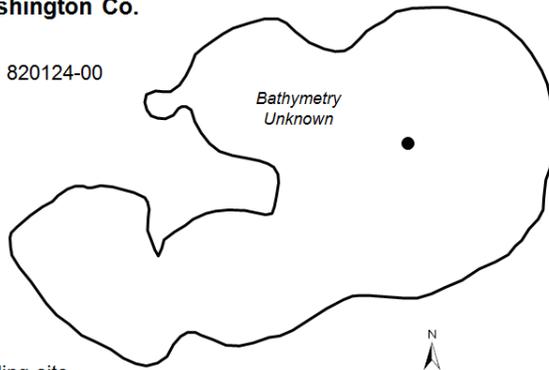
The lake received a lake grade of B. Continued monitoring is suggested to build the database for determining water quality trends.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Bass Lake East
Grant, Washington Co.

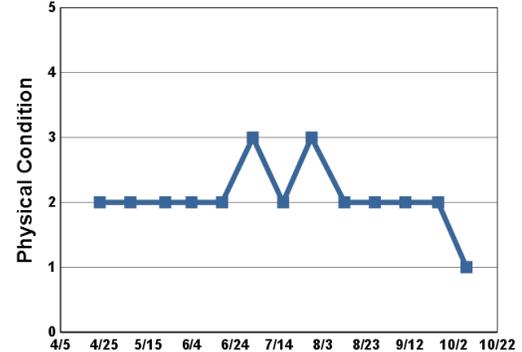
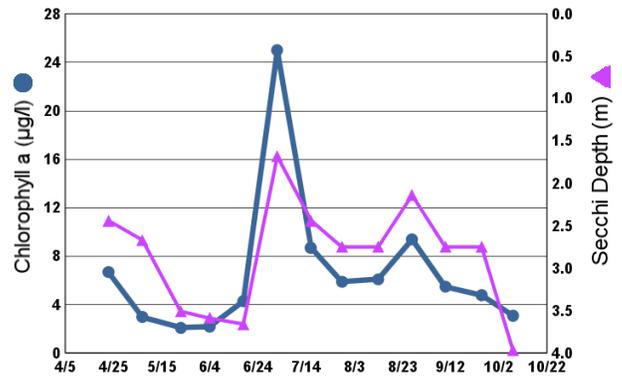
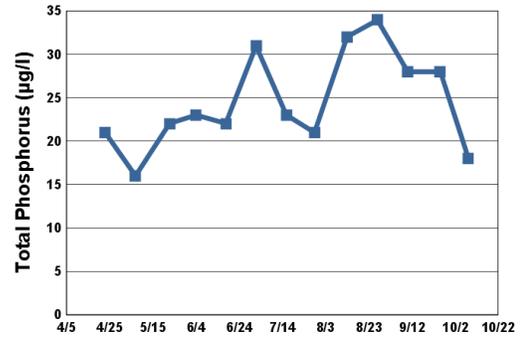
LAKE ID: 820124-00



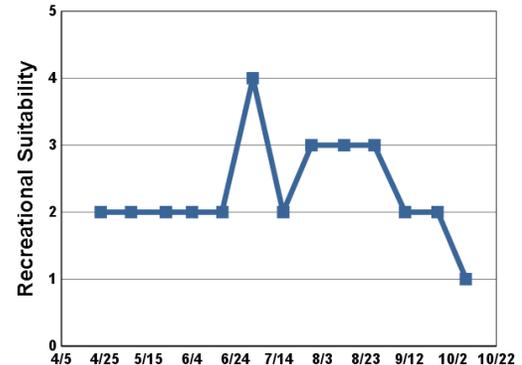
● Sampling site
Contours in meters

2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/23/19	11.1	9.9	6.7	21	2.4	2	2
05/07/19	14.5	10.1	3.0	16	2.7	2	2
05/23/19	14.3	8.4	2.1	22	3.5	2	2
06/04/19	21.9	8.8	2.2	23	3.6	2	2
06/18/19		8.4	4.3	22	3.7	2	2
07/02/19	25.4	9.8	25	31	1.7	3	4
07/16/19	27.6	7.7	8.7	23	2.4	2	2
07/29/19	25.9	6.5	5.9	21	2.7	3	3
08/13/19	24.7	5.5	6.1	32	2.7	2	3
08/27/19	22.5	6.0	9.4	34	2.1	2	3
09/10/19	19.7	4.8	5.5	28	2.7	2	2
09/25/19	20.5	8.2	4.8	28	2.7	2	2
10/08/19	13.5	7.2	3.1	18	4.0	1	1



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP			C	C	C	C	C	C	C	B	B	A
CLA			B	B	C	A	A	B	A	A	A	A
Secchi			C	B	C	B	B	B	B	B		B
Lake Grade			C	B	C	B	B	B	B	B		A

Year	2016	2017	2018	2019
TP	C	A	A	B
CLA	A	A	A	A
Secchi	B	B	B	B
Lake Grade	B	A	A	B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Bay Pond (82–0011) *Valley Branch Watershed District*

Monitoring agency: Washington Conservation District staff

Bay Pond Lake is a 10-acre landlocked lake located within Baytown Township (Washington County). The mean and maximum depth of the lake is approximately 1.0 m (roughly 3.3 feet). The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2012.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	198	123	248	F
CLA (µg/l)	48	4.5	150	C
Secchi (m)	0.7	0.3	1.4	D
TKN (mg/l)	1.53	1.00	2.10	
			Lake Grade	D

The lake received a lake grade of F this year, which is consistent with most of its historical water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

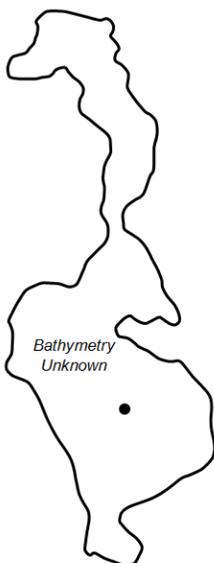
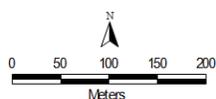
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Bay Pond (Bay Lake)

Baytown Twp.,
Washington Co.

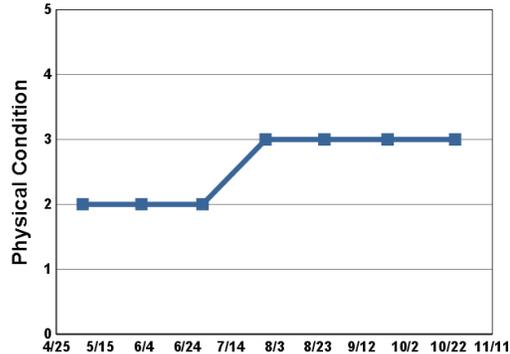
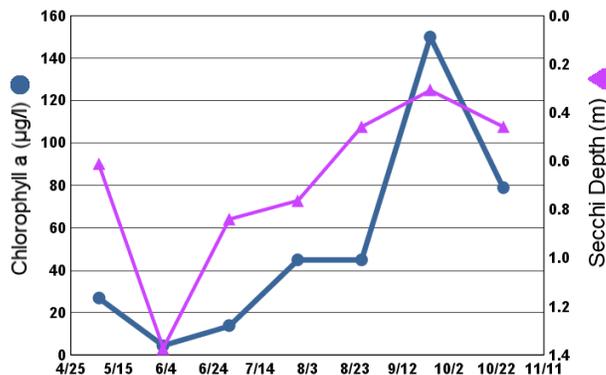
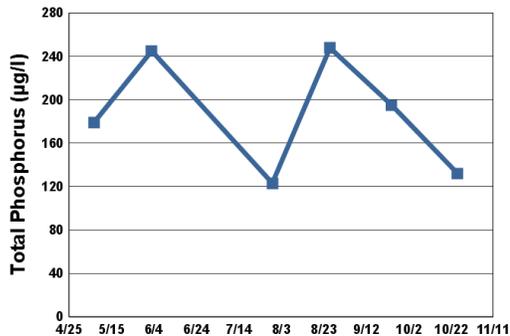
LAKE ID: 820011-00

● Sampling site
Contours in meters

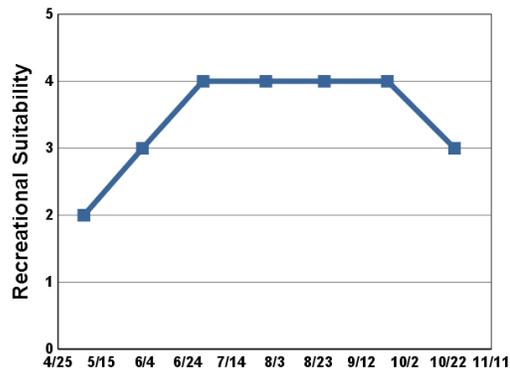


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/07/19	15.0	11.1	27	179	0.6	2	2
06/03/19	19.7	3.5	4.5	245	1.4	2	3
07/01/19	24.1	4.0	14		0.8	2	4
07/30/19	26.2	8.2	45	123	0.8	3	4
08/26/19	21.4	5.7	45	248	0.5	3	4
09/24/19	20.0	6.9	150	195	0.3	3	4
10/25/19	8.2	10.9	79	132	0.5	3	3



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP			F	F	F	F	F		F	F	F	
CLA			F	F	F	F	F		F	C	F	
Secchi			F	D	F	F	F		F	D	D	
Lake Grade			F	F	F	F	F		F	D	F	

Year	2016	2017	2018	2019
TP				F
CLA				C
Secchi				D
Lake Grade				D

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Benz Lake (82–0120) Browns Creek Watershed District

Monitoring agency: Washington Conservation District staff

Benz Lake is a 36-acre lake located in Grant Township (Washington County) with a maximum depth of approximately 2.7 m (about 9 feet). The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. The lake is defined as a shallow lake because of the dominance of the littoral zone. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators)

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	43	30	61	C
CLA (µg/l)	23	4.2	69	C
Secchi (m)	+1.4	0.5	+2.4	
TKN (mg/l)	0.84	0.53	1.50	
			Lake Grade	

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.

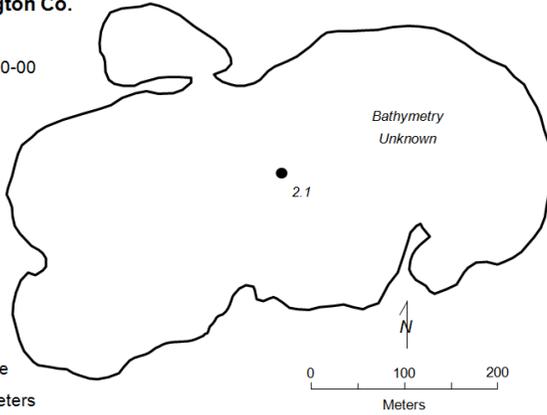
The lake received a C grade for both TP and CLA. The lake's water quality has improved from the D and F grades that were typically received in the mid 2000's.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Benz Lake
Grant, Washington Co.

Lake ID: 820120-00

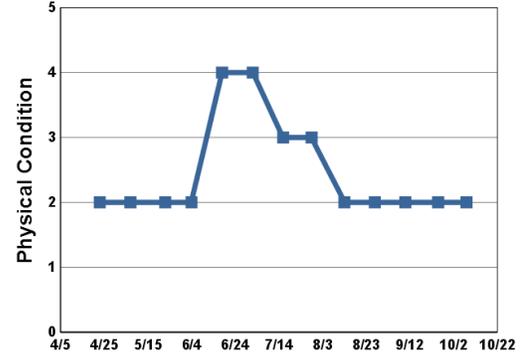
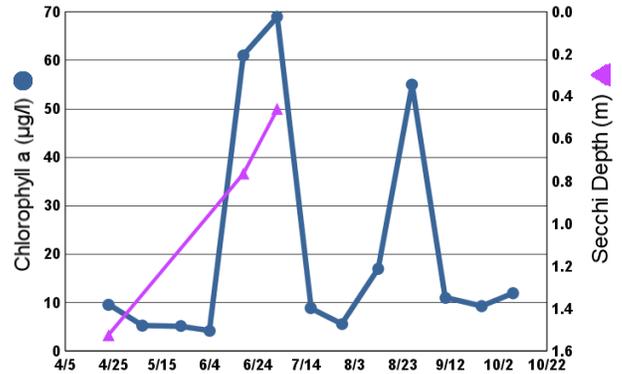
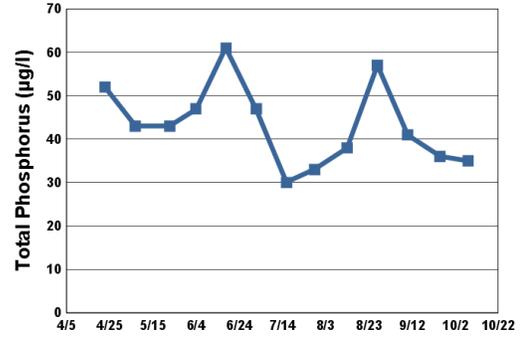


● Sampling site
Contours in meters

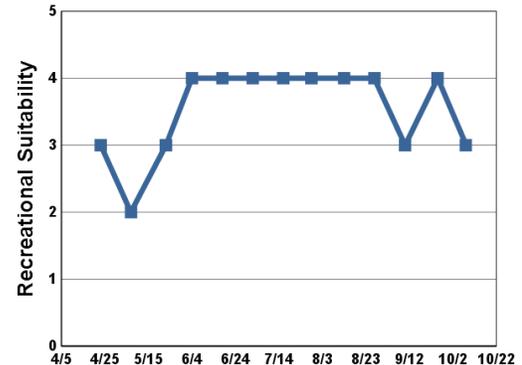
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/23/19	12.7	10.3	9.6	52	1.5	2	3
05/07/19	15.4	11.3	5.3	43	>2.0	2	2
05/23/19	13.8	8.6	5.2	43	>1.8	2	3
06/04/19	22.3	10.2	4.2	47	+2.4	2	4
06/18/19	25.4	13.7	61	61	0.8	4	4
07/02/19	25.9	9.9	69	47	0.5	4	4
07/16/19	26.7	8.1	8.9	30	>1.7	3	4
07/29/19	25.9	6.4	5.6	33	>1.5	3	4
08/13/19	24.1	7.1	17	38	>1.2	2	4
08/27/19	21.3	4.8	55	57	>1.1	2	4
09/10/19	19.1	6.0	11	41	>1.2	2	3
09/25/19	21.0	10.4	9.3	36	>1.1	2	4
10/08/19	12.9	12.4	12	35	>1.1	2	3

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.
> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
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Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi							F					
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP		F	F	F	D	D	D	C	D	C	D	D
CLA		F	D	F	B	C	D	B	C	B	B	C
Secchi		F	D	F	C	D	D	C	D			D
Lake Grade		F	D	F	C	D	D	C	D			D

Year	2016	2017	2018	2019
TP	C	C	C	C
CLA	A	A	A	C
Secchi				
Lake Grade				

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Big Carnelian Lake (82–0049) Carnelian — Marine Watershed District

Monitoring agency: Washington Conservation District staff

Big Carnelian Lake is located in May Township (Washington County). The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value and good water quality. The lake has a surface area of approximately 455 acres. The maximum and mean depth are 20.0 m and 9.8 m, respectively. Approximately, 28 percent of the lake's area is considered littoral, the shallow (0-15 foot depth) area typically dominated by aquatic vegetation.

The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue).

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCE's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	18	8	46	A
CLA (µg/l)	3.7	1.0	5.8	A
Secchi (m)	4.8	4.0	7.6	A
TKN (mg/l)	0.58	0.42	1.10	
			Lake Grade	A

The lake received a lake grade of A, which is consistent with the historical database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP	A				B					A		A
CLA	A				B					A		A
Secchi	A				B					A		B
Lake Grade	A				B					A		A

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP			A		A	A	A	A	A	A	B	A
CLA			A		A	A	A	B	A	A	A	A
Secchi	B	B	B	B	B	A	A	B	A	A	A	B
Lake Grade			A		A	A	A	B	A	A	A	B

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	A	A	B	A			A		A	A	A	A
CLA	A	A	A	A			A		A	A	A	A
Secchi	A	A	A	A	A	A	A		A	A	A	A
Lake Grade	A	A	A	A			A		A	A	A	A

Year	2016	2017	2018	2019
TP	A	B	A	A
CLA	A	A	A	A
Secchi	A	A	A	A
Lake Grade	A	A	A	A

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Big Comfort Lake (13–0053) *Comfort Lake — Forest Lake Watershed District*

Volunteer: Wally Ostlie

Big Comfort Lake is located northeast of the City of Forest Lake in Chisago County. The lake has a surface area of 219 acres, and a maximum depth of 14.3 m (47 feet). A lake assessment was performed on the lake by the MPCA in 1994, and a lake and watershed diagnostic/feasibility study was completed by BlueWater Science in the early-2000's.

The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue) and aquatic recreational use (nutrient/eutrophication biological indicators). The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) and zebra mussels (*Dreissena polymorpha*).

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

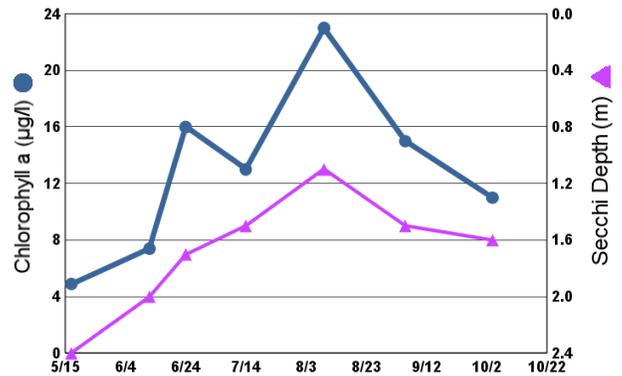
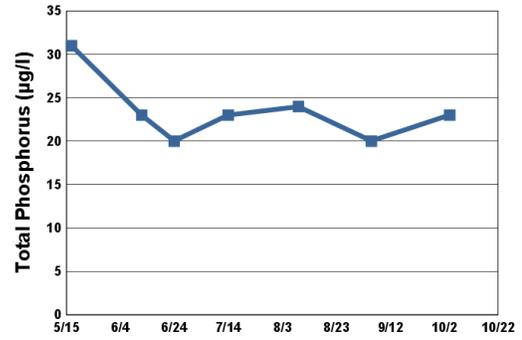
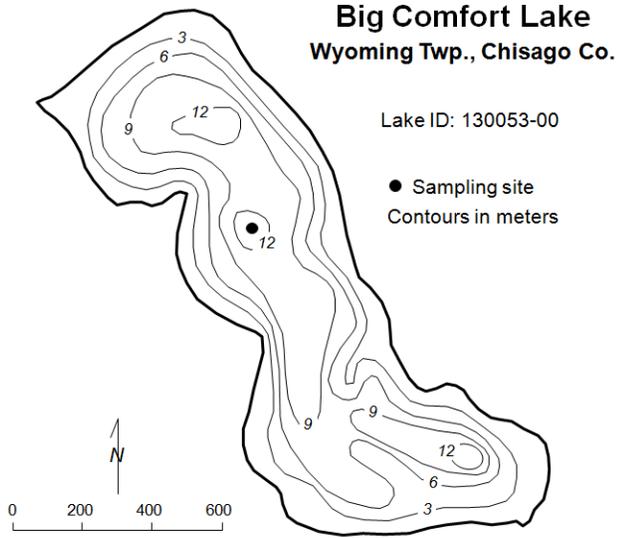
Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	24	20	31	B
CLA (µg/l)	13	4.9	23	B
Secchi (m)	1.7	1.1	2.4	C
TKN (mg/l)	0.88	0.67	1.10	
			Lake Grade	B

Note that the lake grades shown in the data summary table above were calculated from monitoring data sets from both the volunteer and Washington Conservation District staff. The mean, minimum, and maximum values shown in the above data summary table and the results in the data table on the following page are specific to the volunteer's monitoring data. The lake received a lake grade of B, which is consistent with its historical database over the past 10 years. The lake typically receives a lake grade of B or C and a Secchi grade of C. Additional monitoring is recommended to determine the direction of potential trends in the water quality of the lake.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

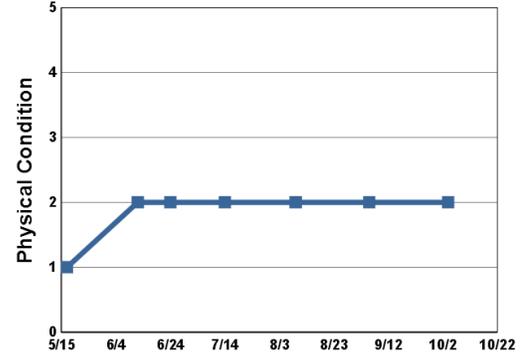
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

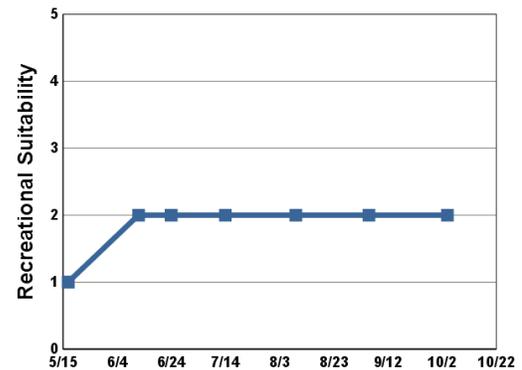


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/17/19	19.3		4.9	31	2.4	1	1
06/12/19	20.8		7.4	23	2.0	2	2
06/24/19	21.7		16	20	1.7	2	2
07/14/19	28.3		13	23	1.5	2	2
08/09/19	25.6		23	24	1.1	2	2
09/05/19	20.4		15	20	1.5	2	2
10/04/19	14.6		11	23	1.6	2	2



- 1 = Crystal Clear
- 2 = Some Algae Present
- 3 = Definite Algal Presence
- 4 = High Algal Color
- 5 = Severe Algal Bloom



- 1 = Beautiful
- 2 = Minor Aesthetic Problem
- 3 = Swimming Impaired
- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi								B	B	B		
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP			D						C	B	C	C
CLA			B						C	B	C	C
Secchi			C	C		C	C		C	C	C	C
Lake Grade			C						C	B	C	C

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	B	C	A	B	B	B	C	C	B	C	B
CLA	B	B	B	A	A	B	B	B	B	B	B	B
Secchi	C	C	C	C	C	C	C	C	C	C	C	C
Lake Grade	C	B	C	B	B	B	B	C	C	B	C	B

Year	2016	2017	2018	2019
TP	B	C	B	B
CLA	B	B	B	B
Secchi	C	C	C	C
Lake Grade	B	C	B	B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Big Comfort Lake (13–0053) *Comfort Lake — Forest Lake Watershed District*

Monitoring agency: Washington Conservation District staff

Big Comfort Lake is located northeast of the City of Forest Lake in Chisago County. The lake has a surface area of 219 acres, and a maximum depth of 14.3 m (47 feet). A lake assessment was performed on the lake by the MPCA in 1994, and a lake and watershed diagnostic/feasibility study was completed by BlueWater Science in the early-2000's.

The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue) and aquatic recreational use (nutrient/eutrophication biological indicators). The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) and zebra mussels (*Dreissena polymorpha*).

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made by Washington Conservation District staff during their monitoring visits. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	29	19	57	B
CLA (µg/l)	17	5.2	28	B
Secchi (m)	2.0	1.2	3.4	C
TKN (mg/l)	0.98	0.77	1.10	
			Lake Grade	B

Note that the lake grades shown in the data summary table above were calculated from monitoring data sets from both the volunteer and Washington Conservation District (WCD) staff. The mean, minimum, and maximum values shown in the above data summary table and the results in the data table on the following page are specific to WCD staff monitoring data. The lake received a lake grade of B, which is consistent with its historical database over the past 10 years. The lake typically receives a lake grade of B or C and a Secchi grade of C. Additional monitoring is recommended to determine the direction of potential trends in the water quality of the lake.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi								B	B	B		
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP			D						C	B	C	C
CLA			B						C	B	C	C
Secchi			C	C		C	C		C	C	C	C
Lake Grade			C						C	B	C	C

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	B	C	A	B	B	B	C	C	B	C	B
CLA	B	B	B	A	A	B	B	B	B	B	B	B
Secchi	C	C	C	C	C	C	C	C	C	C	C	C
Lake Grade	C	B	C	B	B	B	B	C	C	B	C	B

Year	2016	2017	2018	2019
TP	B	C	B	B
CLA	B	B	B	B
Secchi	C	C	C	C
Lake Grade	B	C	B	B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Big Marine Lake (82–0052) Carnelian — Marine — St. Croix Watershed District

Monitoring agency: Washington Conservation District staff

Big Marine Lake is located in City of Scandia (Washington County). The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreation value. The lake covers an area of 1,706 acres and has a maximum and mean depth of 15.2 m (roughly 50 feet) and 7.6 m (25 feet). Roughly 67 percent of the lake's area is considered littoral, the shallow (0-15 foot depth) area dominated by aquatic vegetation. The approximate volume of the lake is 42,527 acre-feet (ac-ft). The lake's watershed of 2,659 acres translates to a small watershed-to-lake size ratio of 1.5:1. The larger the ratio the greater the potential stress put on the lake from surface runoff.

The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue). The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*).

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

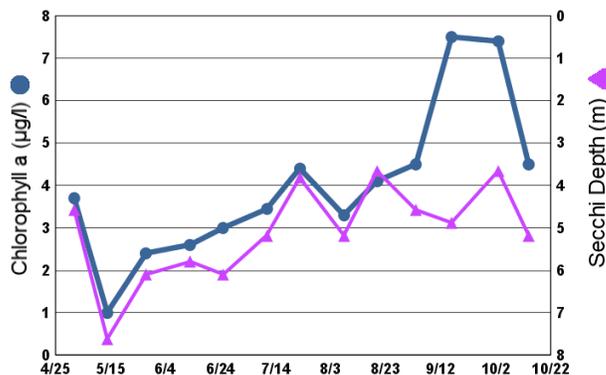
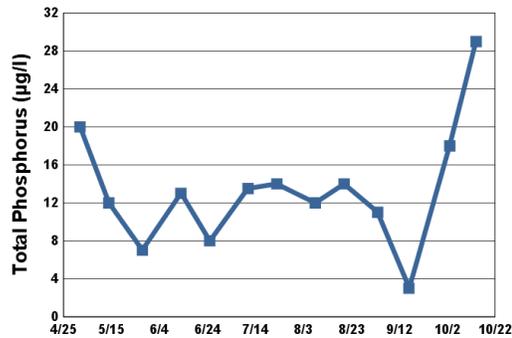
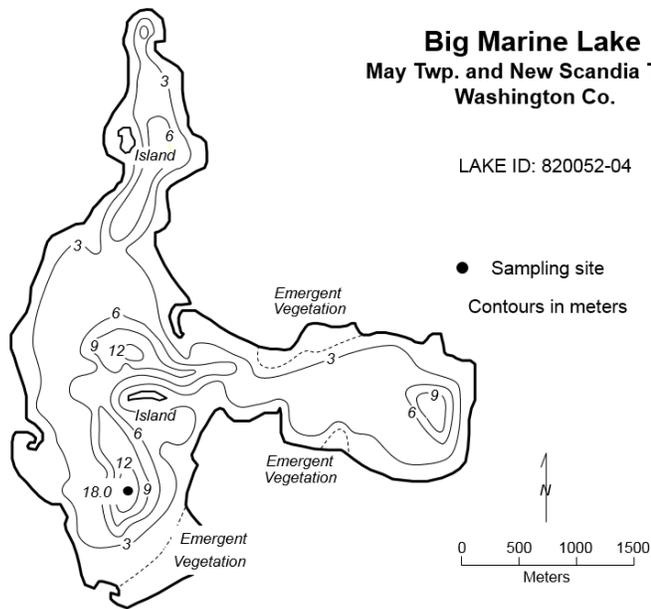
Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	12	3	20	A
CLA (µg/l)	3.6	1.0	7.5	A
Secchi (m)	5.2	3.7	7.6	A
TKN (mg/l)	0.56	0.43	0.74	
			Lake Grade	A

The lake received a lake grade of A which is consistent with its historical water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

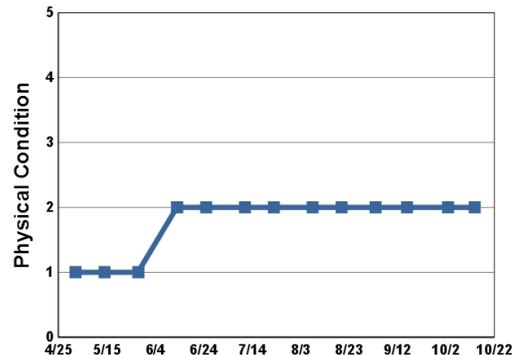
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

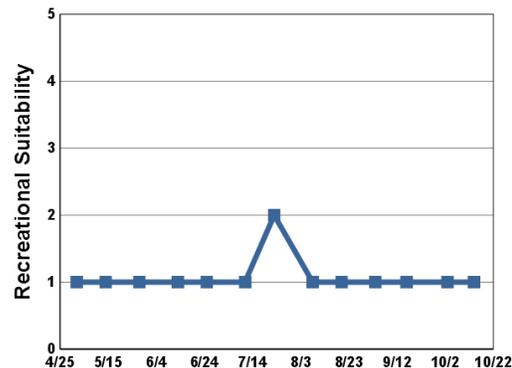


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/02/19	9.3	11.5	3.7	20	4.6	1	1
05/14/19	13.0	10.4	1.0	12	7.6	1	1
05/28/19	14.5	9.4	2.4	7	6.1	1	1
06/13/19	20.2	9.9	2.6	13	5.8	2	1
06/25/19	21.1	8.5	3.0	8	6.1	2	1
07/11/19	24.7	10.1	3.4	14	5.2	2	1
07/23/19	24.9	7.5	4.4	14	3.8	2	2
08/08/19	25.6	7.8	3.3	12	5.2	2	1
08/20/19	23.4		4.1	14	3.7	2	1
09/03/19	20.6	8.8	4.5	11	4.6	2	1
09/16/19	18.8	9.5	7.5	3	4.9	2	1
10/03/19	16.2	8.3	7.4	18	3.7	2	1
10/14/19	11.1	9.3	4.5	29	5.2	2	1



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP	B	B			B					A		B
CLA	B	B			B					A		A
Secchi	B	B			B	B	B	B	C	A	C	B
Lake Grade	B	B			B					A		B

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP			A		B	A	A	A	A	A	B	A
CLA			A		A	A	A	B	A	A	B	A
Secchi	A	A	B		A	B	A	B	A	A	B	B
Lake Grade			A		A	A	A	B	A	A	B	A

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	A	A	C	A				A		A	A	A
CLA	A	A	A	A				A		A	A	A
Secchi	A	A	A	A	A	A	A	A		A	A	A
Lake Grade	A	A	B	A				A		A	A	A

Year	2016	2017	2018	2019
TP	A	A	A	A
CLA	A	A	A	A
Secchi	A	A	A	A
Lake Grade	A	A	A	A

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Bone Lake (82–0054) *Comfort Lake-Forest Lake Watershed District*

Volunteer: Julie Morse

Bone Lake is located in the City of Scandia (Washington County). The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value. The lake has a maximum and mean depth of 9.8 m and 3.7 m (32 ft and 12 ft), respectively.

The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue) and aquatic recreational use (nutrient/eutrophication biological indicators). The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) and zebra mussels (*Dreissena polymorpha*).

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	25	15	36	B
CLA (µg/l)	15	7.1	25	B
Secchi (m)	1.6	1.1	2.3	C
TKN (mg/l)	0.87	0.71	1.00	
			Lake Grade	B

Note that the lake grades shown in the data summary table above were calculated from monitoring data sets from both the volunteer and Washington Conservation District staff. The mean, minimum, and maximum values shown in the above data summary table and the results in the data table on the following page are specific to the volunteer's monitoring data. The lake received a lake grade of B this year, which is a continuing recent improvement in the lake's water quality. Continued monitoring is recommended to determine if this recent improvement in water quality is part of a longer term trend.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

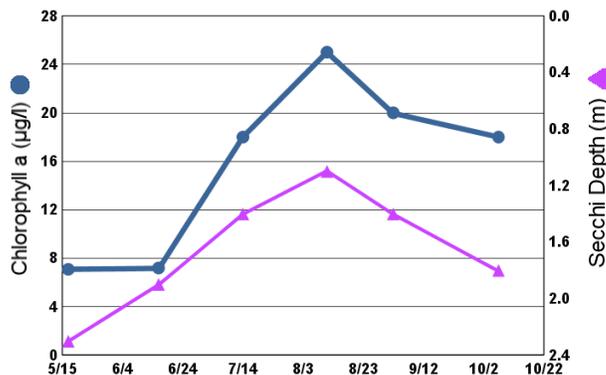
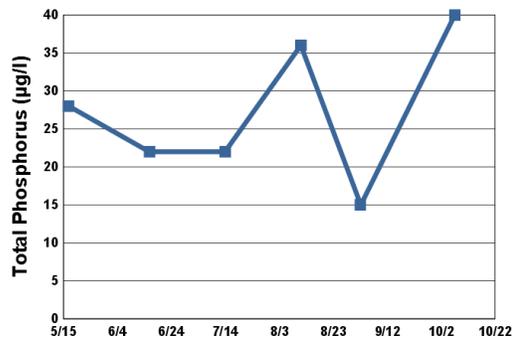
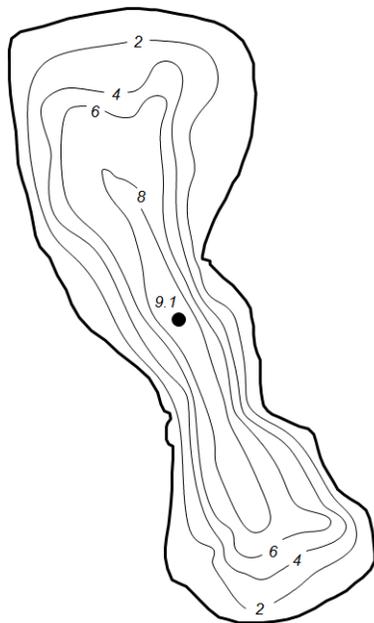
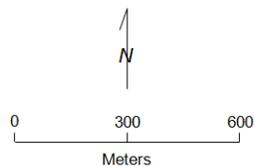
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Bone Lake
Scandia, Washington Co.

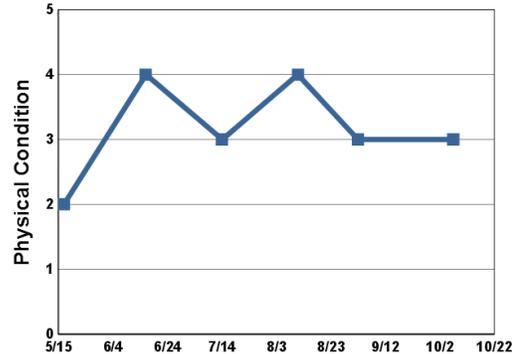
Lake ID: 820054-00

● Sampling site
Contours in meters

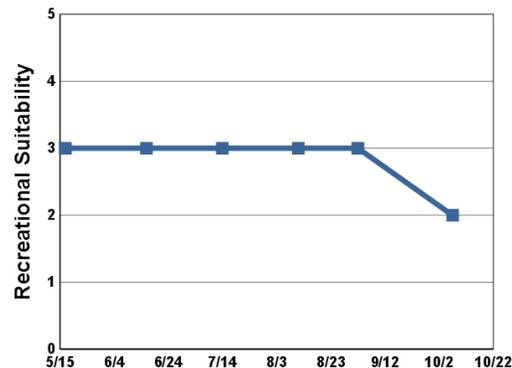


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/17/19	18.0		7.1	28	2.3	2	3
06/16/19	23.0		7.2	22	1.9	4	3
07/14/19	28.0		18	22	1.4	3	3
08/11/19	26.0		25	36	1.1	4	3
09/02/19	21.0		20	15	1.4	3	3
10/07/19	15.0		18	40	1.8	3	2



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP					D			C	C	C		D
CLA					C			B	C	C		C
Secchi					C		D	C	D	C	C	C
Lake Grade					C			C	C	C		C

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP		C				C	C	C		C	C	D
CLA		C				B	B	C		C	C	C
Secchi		C	D	C		C	C	D		C	D	C
Lake Grade		C				C	C	C		C	C	C

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	C	C	C	C	C	C	B	C	C	C	C
CLA	C	B	B	B	B	B	B	A	B	B	C	C
Secchi	C	C	C	C	C	C	C	C	C	C	C	D
Lake Grade	C	B	C	C	C	C						

Year	2016	2017	2018	2019
TP	C	C	B	B
CLA	C	B	B	B
Secchi	C	C	C	C
Lake Grade	C	C	B	B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Bone Lake (82–0054) *Comfort Lake-Forest Lake Watershed District*

Monitoring agency: Washington Conservation District staff

Bone Lake is located in the City of Scandia (Washington County). The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value. The lake has a maximum and mean depth of 9.8 m and 3.7 m (32 ft and 12 ft), respectively.

The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue) and aquatic recreational use (nutrient/eutrophication biological indicators). The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) and zebra mussels (*Dreissena polymorpha*).

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made by Washington Conservation District staff during their monitoring visits. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	31	23	42	B
CLA (µg/l)	19	1.0	41	B
Secchi (m)	1.6	0.9	2.1	C
TKN (mg/l)	1.03	0.76	1.40	
			Lake Grade	B

Note that the lake grades shown in the data summary table above were calculated from monitoring data sets from both the volunteer and Washington Conservation District (WCD) staff. The mean, minimum, and maximum values shown in the above data summary table and the results in the data table on the following page are specific to WCD staff monitoring data. The lake received a lake grade of B this year, which is a continuing recent improvement in the lake's water quality. Continued monitoring is recommended to determine if this recent improvement in water quality is part of a longer term trend.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

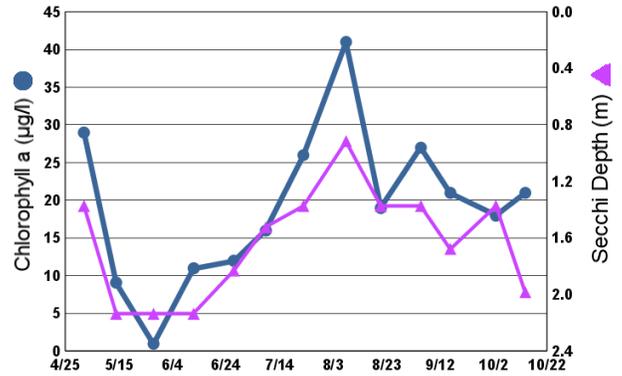
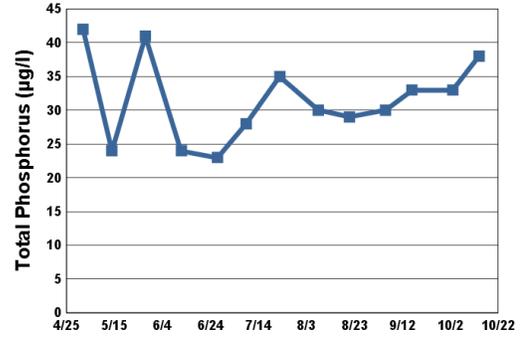
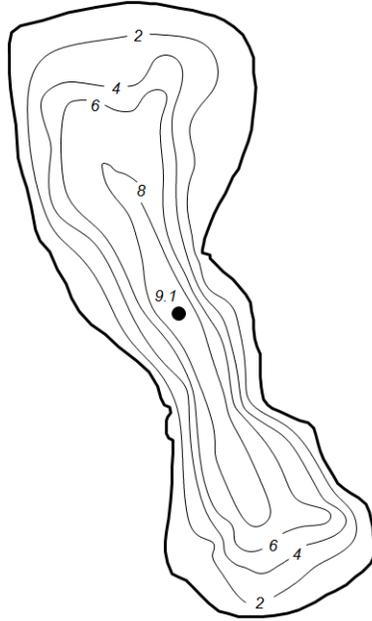
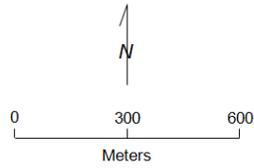
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Bone Lake
Scandia, Washington Co.

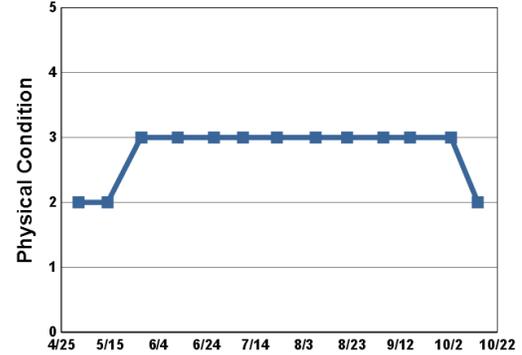
Lake ID: 820054-00

● Sampling site
Contours in meters

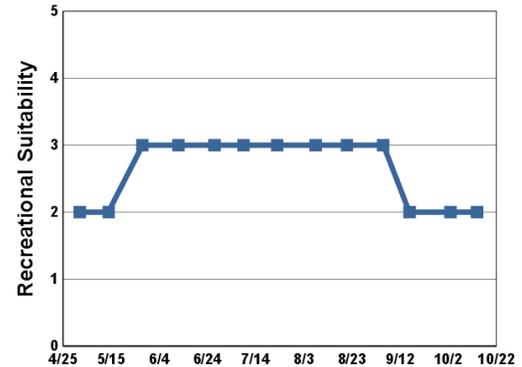


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/02/19	9.4	13.3	29	42	1.4	2	2
05/14/19	14.4	11.0	9.1	24	2.1	2	2
05/28/19	15.2	9.8	1.0	41	2.1	3	3
06/12/19	20.6	8.3	11	24	2.1	3	3
06/27/19	23.0	9.0	12	23	1.8	3	3
07/09/19	26.0	8.3	16	28	1.5	3	3
07/23/19	25.3	8.2	26	35	1.4	3	3
08/08/19	25.6	9.0	41	30	0.9	3	3
08/21/19	23.8	6.8	19	29	1.4	3	3
09/05/19	19.9	7.5	27	30	1.4	3	3
09/16/19	19.3	7.6	21	33	1.7	3	2
10/03/19	16.1	7.7	18	33	1.4	3	2
10/14/19	11.0	9.3	21	38	2.0	2	2



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP					D			C	C	C		D
CLA					C			B	C	C		C
Secchi					C		D	C	D	C	C	C
Lake Grade					C			C	C	C		C

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP		C				C	C	C		C	C	D
CLA		C				B	B	C		C	C	C
Secchi		C	D	C		C	C	D		C	D	C
Lake Grade		C				C	C	C		C	C	C

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	C	C	C	C	C	C	B	C	C	C	C
CLA	C	B	B	B	B	B	B	A	B	B	C	C
Secchi	C	C	C	C	C	C	C	C	C	C	C	D
Lake Grade	C	B	C	C	C	C						

Year	2016	2017	2018	2019
TP	C	C	B	B
CLA	C	B	B	B
Secchi	C	C	C	C
Lake Grade	C	C	B	B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Brewers Pond (82–0022) Browns Creek Watershed District

Volunteer: Karen Richtman, Paul Richtman

Brewers Pond is located in the city of Stillwater. Few morphological data are available for the pond.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	61	41	75	C
CLA ($\mu\text{g/l}$)	33	16	47	C
Secchi (m)	0.5	0.3	0.7	F
TKN (mg/l)	1.70	1.40	2.00	
			Lake Grade	D

Note that the lake grades shown in the data summary table above were calculated from monitoring data sets from both the volunteer and Washington Conservation District staff. The mean, minimum, and maximum values shown in the above data summary table and the results in the data table on the following page are specific to the volunteer's monitoring data. The pond received a lake grade of D this year. Continued monitoring is recommended to continue to build the water quality database.

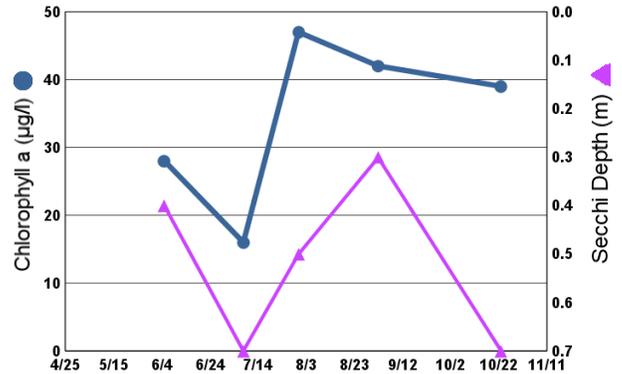
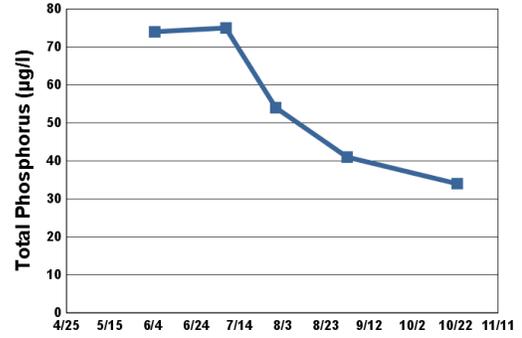
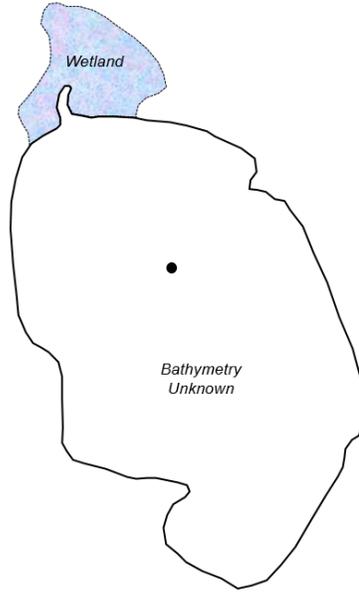
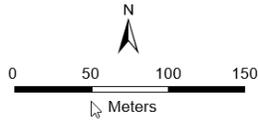
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Brewer's Pond
Stillwater, Washington Co.

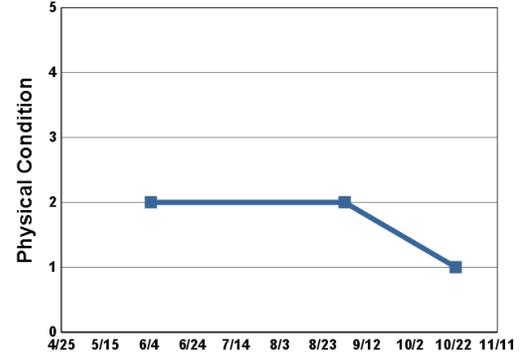
Lake ID: 82002200

- Sampling site
- Contours in meters

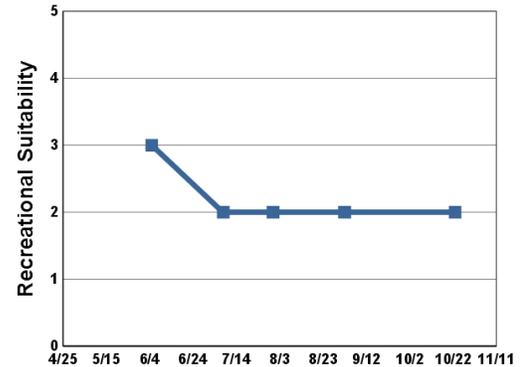


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
06/05/19	26.3		28	74	0.4	2	3
07/08/19	28.5		16	75	0.7		2
07/31/19	27.7		47	54	0.5		2
09/02/19	29.9		42	41	0.3	2	2
10/23/19	9.9		39	34	0.7	1	2



- 1 = Crystal Clear
- 2 = Some Algae Present
- 3 = Definite Algal Presence
- 4 = High Algal Color
- 5 = Severe Algal Bloom



- 1 = Beautiful
- 2 = Minor Aesthetic Problem
- 3 = Swimming Impaired
- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP												
CLA												
Secchi												
Lake Grade												

Year	2016	2017	2018	2019
TP		D	C	C
CLA		D	D	C
Secchi		F	F	F
Lake Grade		D	D	D

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Brewers Pond (82–0022) Browns Creek Watershed District

Monitoring agency: Washington Conservation District staff

Brewers Pond is located in the city of Stillwater. Few morphological data are available for the pond.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	63	44	100	C
CLA (µg/l))	42	14	72	C
Secchi (m)	0.5	0.3	0.8	F
TKN (mg/l)	1.80	1.40	2.20	
			Lake Grade	D

Note that the lake grades shown in the data summary table above were calculated from monitoring data sets from both the volunteer and Washington Conservation District (WCD) staff. The mean, minimum, and maximum values shown in the above data summary table and the results in the data table on the following page are specific to WCD staff monitoring data. The pond received a lake grade of D this year. Continued monitoring is recommended to continue to build the water quality database.

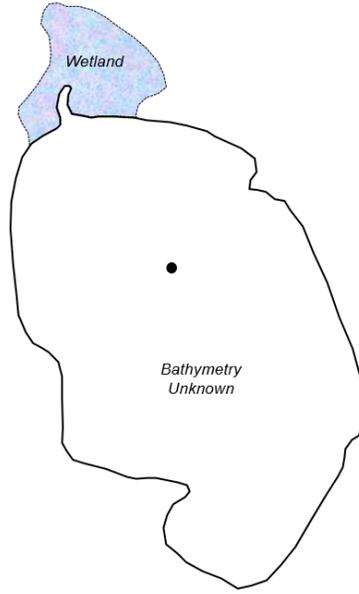
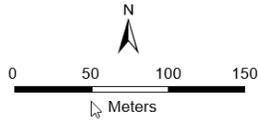
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Brewer's Pond
Stillwater, Washington Co.

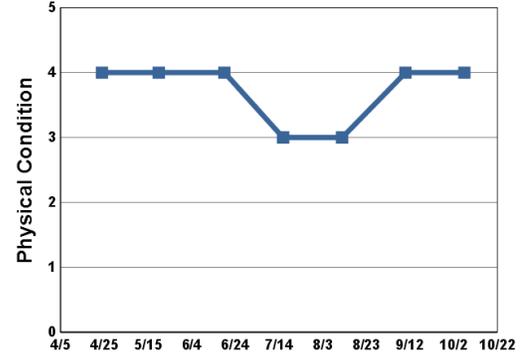
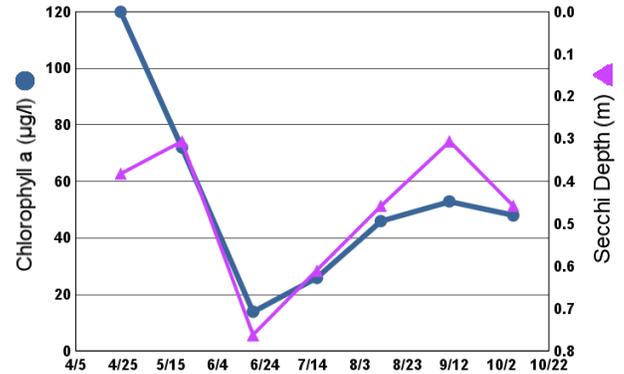
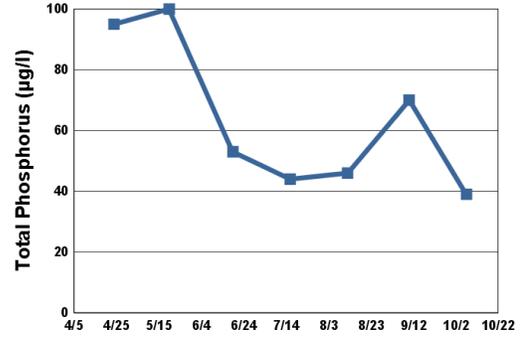
Lake ID: 82002200

- Sampling site
- Contours in meters

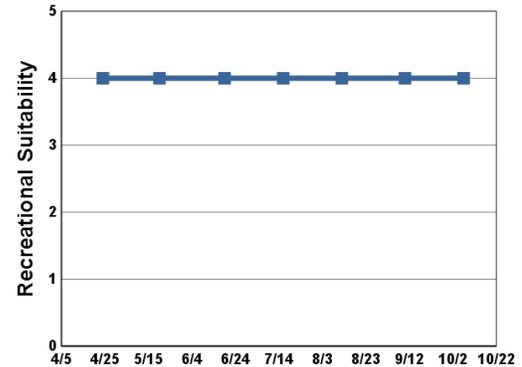


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/24/19	13.4	15.6	120	95	0.4	4	4
05/20/19	14.9	8.7	72	100	0.3	4	4
06/19/19	22.2	5.6	14	53	0.8	4	4
07/16/19	27.8	7.0	26	44	0.6	3	4
08/12/19	24.8	8.0	46	46	0.5	3	4
09/10/19	20.6	8.3	53	70	0.3	4	4
10/07/19	15.0	5.8	48	39	0.5	4	4



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- 2 = Some Algae Present
- 3 = Definite Algal Presence
- 4 = High Algal Color
- 5 = Severe Algal Bloom



- 1 = Beautiful
- 2 = Minor Aesthetic Problem
- 3 = Swimming Impaired
- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP												
CLA												
Secchi												
Lake Grade												

Year	2016	2017	2018	2019
TP		D	C	C
CLA		D	D	C
Secchi		F	F	F
Lake Grade		D	D	D

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Buck Lake (70–0065) Prior Lake — Spring Lake Watershed District

Volunteer: Steve Beckey

Buck Lake is located in Spring Lake Township (Scott County). It has a depth of approximately 3 m at the monitoring location, which is assumed to be the deepest point of the lake. No other bathymetric information is available for the lake.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	100	60	149	D
CLA ($\mu\text{g/l}$)	6.5	3.3	10	A
Secchi (m)	1.6	1.1	2.3	C
TKN (mg/l)	0.98	0.69	1.30	
			Lake Grade	C

The lake received a lake grade of C this year, which is consistent with its historical water quality database. Continued monitoring is recommended to build the water quality database for this lake.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP											D	D
CLA											A	B
Secchi												C
Lake Grade												C

Year	2016	2017	2018	2019
TP	D	D	D	D
CLA	C	A	C	A
Secchi	D	C	D	C
Lake Grade	D	C	D	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Bush Lake (27–0047) *Nine Mile Creek Watershed District*

Volunteer: Paul Erdmann, Elizabeth Erdmann

Bush Lake is located in the City of Bloomington (Hennepin County). The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value and good water quality. The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue). The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*)

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	16	10	25	A
CLA ($\mu\text{g/l}$)	2.6	1.0	6.2	A
Secchi (m)	3.3	2.1	3.7	A
TKN (mg/l)	0.48	0.44	0.53	
			Lake Grade	A

The lake received a lake grade of A this year. The lake grades fluctuate between A and B according to its historical water quality database but with A's being more frequent.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

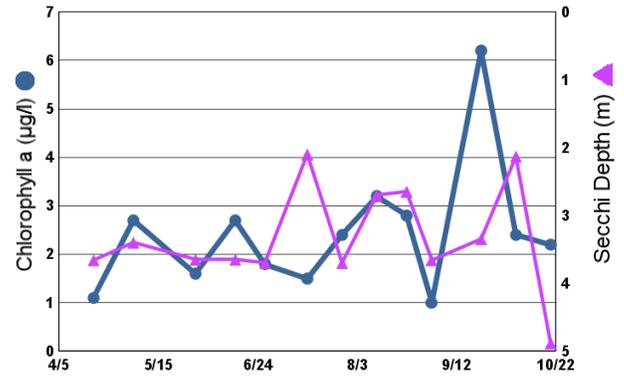
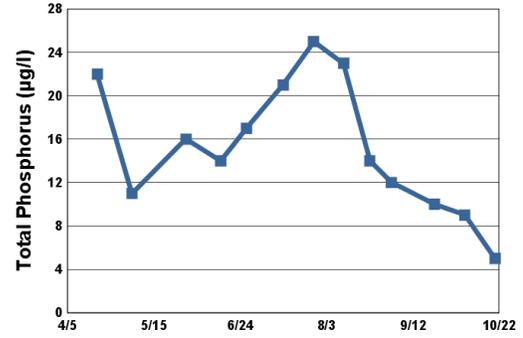
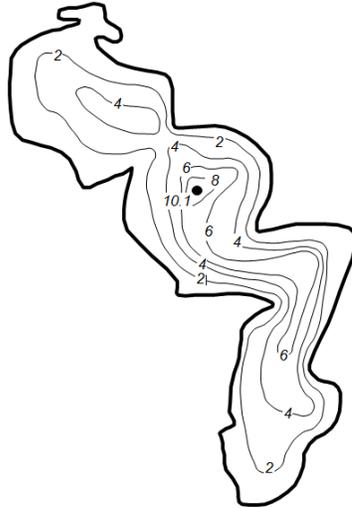
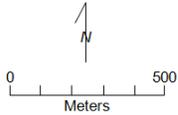
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Bush Lake
Bloomington, Hennepin Co.

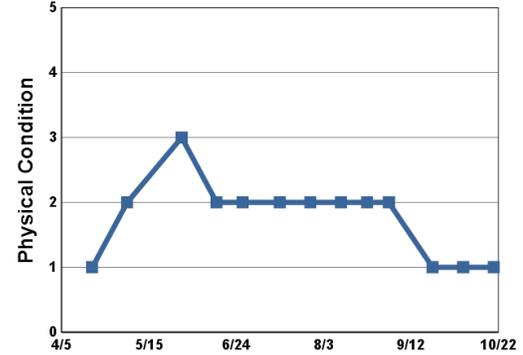
Lake ID: 270047-00

● Sampling site
Contours in meters

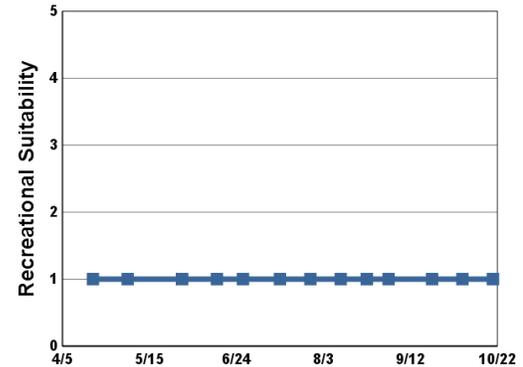


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/19/19	9.2		1.1	22	3.7	1	1
05/05/19	14.7		2.7	11	3.4	2	1
05/30/19	21.9		1.6	16	3.6	3	1
06/15/19	22.4		2.7	14	3.6	2	1
06/27/19	22.4		1.8	17	3.7	2	1
07/14/19	29.1		1.5	21	2.1	2	1
07/28/19	27.0		2.4	25	3.7	2	1
08/11/19	26.1		3.2	23	2.7	2	1
08/23/19	24.8		2.8	14	2.6	2	1
09/02/19	23.0		1.0	12	3.7	2	1
09/22/19	22.5		6.2	10	3.4	1	1
10/06/19	15.3		2.4	9	2.1	1	1
10/20/19	10.9		2.2	5	4.9	1	1



1 = Crystal Clear
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4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP				B	A							
CLA				B	A							
Secchi				B	A	B	A	B	C			
Lake Grade				B	A							

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP		A	A					B		A		
CLA		A	A					B		B		
Secchi		A	B					B		A		
Lake Grade		A	A					B		A		

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	A		A	A	A	A	A	A	C	A	A	A
CLA	B		A	B	A	A	A	A	A	A	A	A
Secchi	B		B	B	A	A	B	B	A	A	A	A
Lake Grade	B		A	B	A	A	A	A	B	A	A	A

Year	2016	2017	2018	2019
TP	A	A	A	A
CLA	A	A	A	A
Secchi	A	A	B	A
Lake Grade	A	A	A	A

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Cates Lake (70–0018) Prior Lake — Spring Lake Watershed District

Volunteer: Paula Thomsen

Cates Lake is a 27-acre lake located in the City of Savage (Scott County). The maximum depth of the lake is 4.0 m (13 feet). The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*).

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	31	19	47	B
CLA (µg/l)	6.5	3.2	16	A
Secchi (m)	>2.2	1.7	2.8	C
TKN (mg/l)	0.58	0.38	0.80	
			Lake Grade	B

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

The lake received a lake grade of B this year, which is consistent with its historical database.

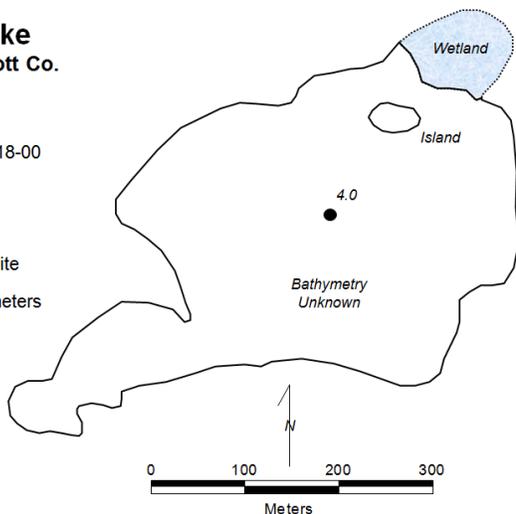
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Cates Lake
Prior Lake, Scott Co.

LAKE ID: 700018-00

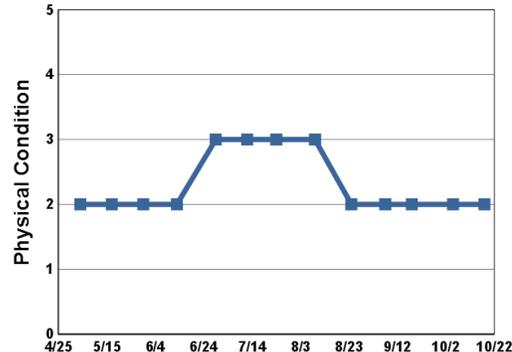
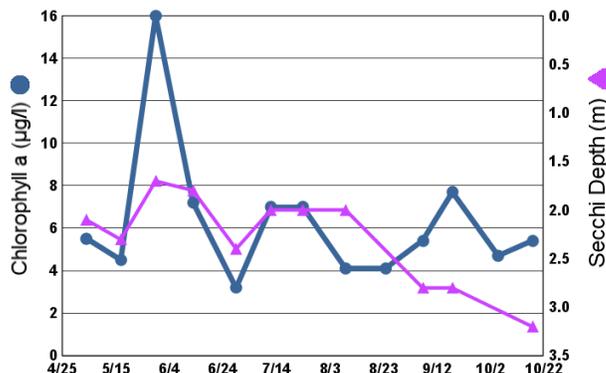
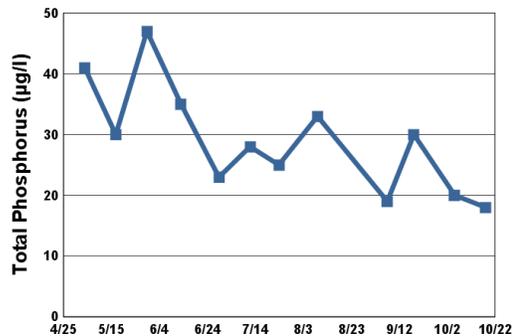
● Sampling site
Contours in meters



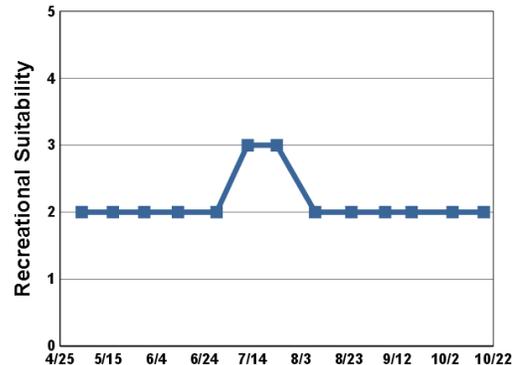
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/04/19	14.2		5.5	41	2.1	2	2
05/17/19	19.2		4.5	30	2.3	2	2
05/30/19	21.1		16	47	1.7	2	2
06/13/19	21.2		7.2	35	1.8	2	2
06/29/19	25.0		3.2	23	2.4	3	2
07/12/19	25.9		7.0	28	2.0	3	3
07/24/19	25.7		7.0	25	2.0	3	3
08/09/19	27.1		4.1	33	2.0	3	2
08/24/19	24.7		4.1		>2.3	2	2
09/07/19	22.3		5.4	19	2.8	2	2
09/18/19	22.5		7.7	30	2.8	2	2
10/05/19	13.2		4.7	20	>3.1	2	2
10/18/19	9.5		5.4	18	3.2	2	2

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP											A	B
CLA											A	A
Secchi											C	C
Lake Grade											B	B

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	B	A	B	A	A	A	A	B	C	A		
CLA	A	A	A	A	A	A	A	A	A	A		
Secchi	C	C	C	C	C	C	B	C		C		
Lake Grade	B	B	B	B	B	B	A	B		B		

Year	2016	2017	2018	2019
TP		B	B	B
CLA		A	A	A
Secchi			C	C
Lake Grade			B	B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Cedar Lake (70–0091), site 1 *Scott County Watershed Management Organization*

Volunteer: LeighAnn Singleton

Cedar Lake is located in Cedar Lake Township (Scott County). The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value. The lake has a maximum depth of 4.7 m (15 ft) and a mean depth of 2.1 m (6.9 feet). The lake has a surface area of 742 acres and watershed area of 11,104 acres, giving a watershed to lake area ratio of 15:1. The larger the ratio the greater the potential effects of runoff on the water quality of the lake. The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue) and aquatic recreational use (nutrient/eutrophication biological indicators).

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	127	38	190	D
CLA (µg/l)	96	19	180	F
Secchi (m)	0.7	0.3	1.2	F
TKN (mg/l)	1.83	0.88	2.80	
			Lake Grade	F

The lake site received a lake grade of F this year, which continues the poor water quality trend of F grades starting in 2018. Continued monitoring is recommended to determine if this recent deterioration in water quality is part of a longer term trend.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

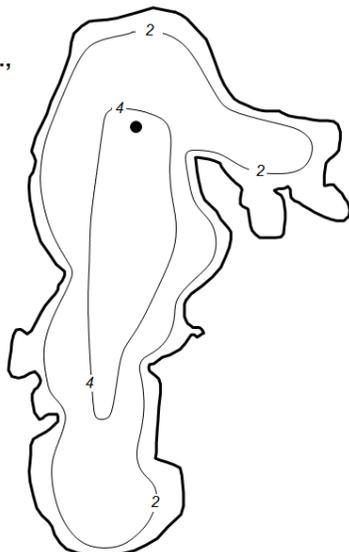
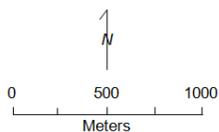
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Cedar Lake
Cedar Lake Twp./Helena Twp.,
Scott Co.

LAKE ID: 700091-00

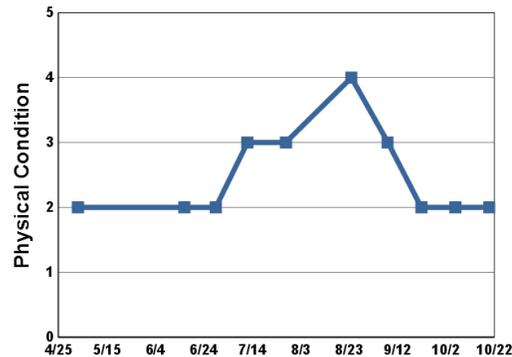
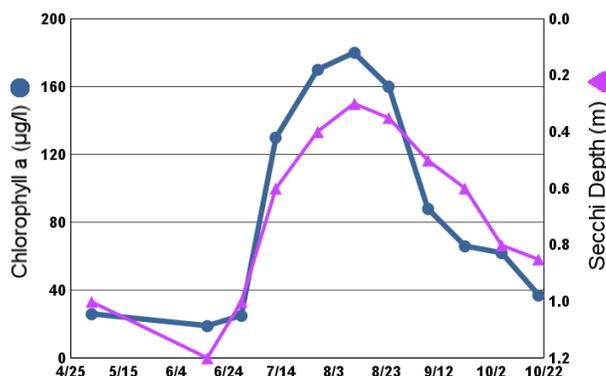
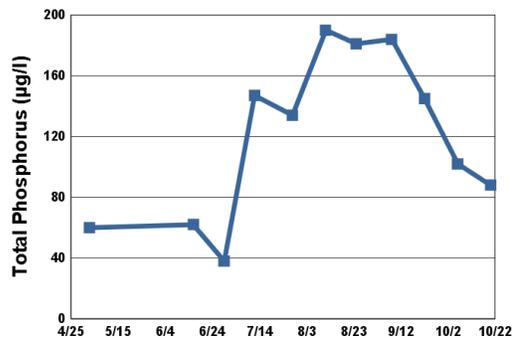
● Sampling site

Contours in meters

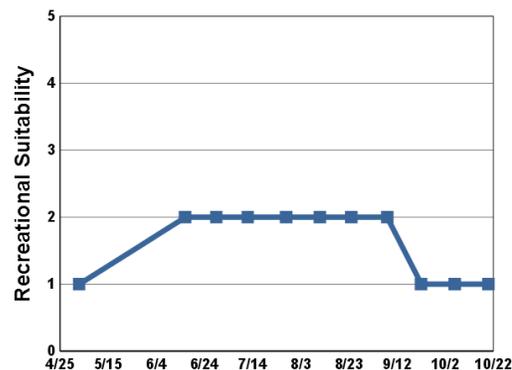


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/03/19	11.0		26	60	1.0	2	1
06/16/19	23.8		19	62	1.2	2	2
06/29/19	26.9		25	38	1.0	2	2
07/12/19	26.0		130	147	0.6	3	2
07/28/19	25.8		170	134	0.4	3	2
08/11/19	24.5		180	190	0.3		2
08/24/19	23.7		160	181	0.4	4	2
09/08/19	20.6		88	184	0.5	3	2
09/22/19	22.0		66	145	0.6	2	1
10/06/19	13.6		62	102	0.8	2	1
10/20/19	10.0		37	88	0.8	2	1



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5 = Severe Algal Bloom



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2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP	F	F			F							
CLA	F	D			D						D	
Secchi	C	C	C	C	C	C				F	D	D
Lake Grade	F	D			D							

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP		F					F			F		
CLA		C					D			F		
Secchi	D	C					D			D		
Lake Grade		D					D			F		

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP		D	F	F	F		F	F	F	F	D	D
CLA		C	D	D	D		D	D	C	C	C	D
Secchi		C	D	D	D		D	D	D	C	C	D
Lake Grade		C	D	D	D		D	D	D	D	C	D

Year	2016	2017	2018	2019
TP	D	D	F	D
CLA	C	C	F	F
Secchi	D	D	D	F
Lake Grade	D	D	F	F

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Clear Lake (82–0045) Carnelian — Marine — St. Croix Watershed District

Monitoring agency: Washington Conservation District staff

Clear Lake is located in May Township (Washington County). The lake is considered a Priority Lake by the Metropolitan Council for its good water quality. The maximum depth of the lake is 8.2 m (27 ft). Approximately 94 percent of the lake's surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. The lake is defined as a shallow lake because of the dominance of the littoral zone.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	16	12	24	A
CLA ($\mu\text{g/l}$)	6.0	2.6	18	A
Secchi (m)	3.1	2.4	4.4	A
TKN (mg/l)	0.56	0.48	0.72	
			Lake Grade	A

The lake received a Secchi grade of A this year, which is consistent with its historical water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

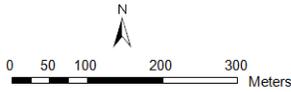
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Clear Lake
May Twp., Washington Co.

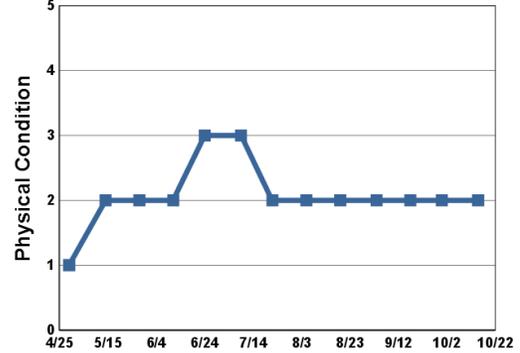
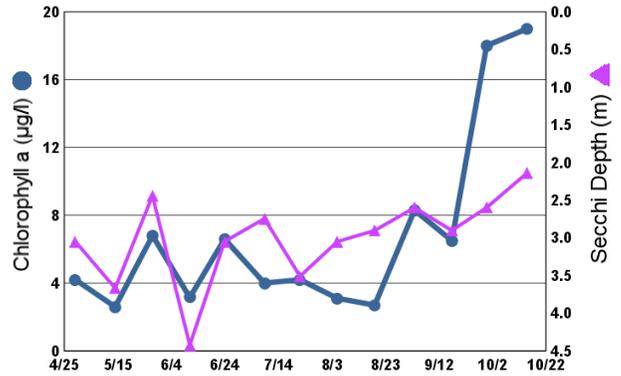
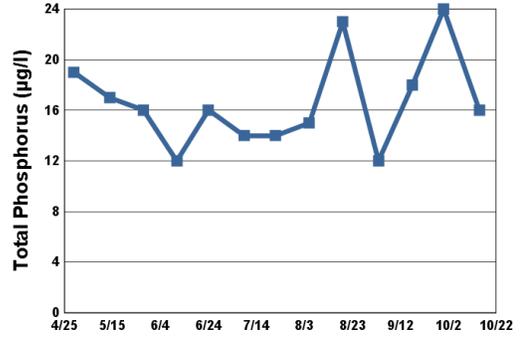
Lake ID: 820045-00

● Sampling site
Contours in meters

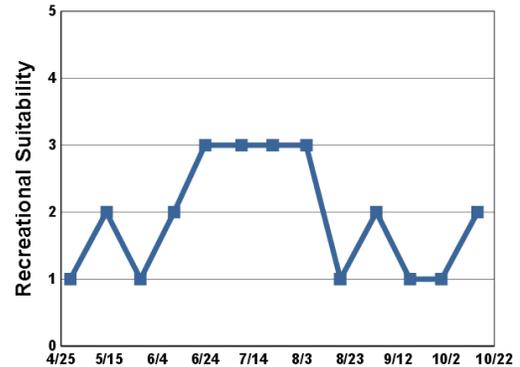


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/29/19	11.2	10.2	4.2	19	3.0	1	1
05/14/19	14.5	9.8	2.6	17	3.7	2	2
05/28/19	15.5	9.3	6.8	16	2.4	2	1
06/11/19	22.2	8.1	3.2	12	4.4	2	2
06/24/19	22.2	8.2	6.6	16	3.0	3	3
07/09/19	26.7	8.5	4.0	14	2.7	3	3
07/22/19	25.8	6.2	4.2	14	3.5	2	3
08/05/19	27.0	6.5	3.1	15	3.0	2	3
08/19/19	24.8	6.4	2.7	23	2.9	2	1
09/03/19	21.8	7.9	8.3	12	2.6	2	2
09/17/19	20.5	6.6	6.5	18	2.9	2	1
09/30/19	18.0	7.7	18	24	2.6	2	1
10/15/19	11.3	7.9	19	16	2.1	2	2



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4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP					A	A	A				A	A
CLA					A	A	A				A	A
Secchi					A	A	A	A	A	A	A	A
Lake Grade					A	A	A				A	A

Year	2016	2017	2018	2019
TP			A	A
CLA			A	A
Secchi			A	A
Lake Grade			A	A

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Clear Lake (82–0099) Valley Branch Watershed District

Monitoring agency: Washington Conservation District staff

Clear Lake is located in the city of Lake Elmo (Washington County). Little bathymetric information is available for the lake.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	243	90	358	F
CLA (µg/l))	35	8.5	61	C
Secchi (m)	0.9	0.3	1.4	D
TKN (mg/l)	1.23	0.90	1.50	
			Lake Grade	D

The lake received a lake grade of D this year. Continued monitoring is recommended to build the water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP												
CLA												
Secchi												
Lake Grade												

Year	2016	2017	2018	2019
TP				F
CLA				C
Secchi				D
Lake Grade				D

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Cloverdale Lake (82–0009) Valley Branch Watershed District

Monitoring agency: Washington Conservation District staff

Cloverdale Lake is located in Baytown Township (Washington County). The mean and maximum depth of the lake is 3.0 m (10 ft) and 8.5 m (28 ft), respectively. The lake has a surface area of 45 acres, and a watershed area of 819 acres, giving a large watershed to lake area ratio of 18:1. Generally the larger the ratio, the greater the potential stress on the lake from surface runoff.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	29	25	38	B
CLA ($\mu\text{g/l}$)	11	5.2	16	B
Secchi (m)	2.4	1.7	4.1	B
TKN (mg/l)	0.77	0.68	0.90	
			Lake Grade	B

The lake received a lake grade of B this year, which is consistent with its historical database. According to its historical database, the lake has received mainly lake grades of B with the occasional A.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

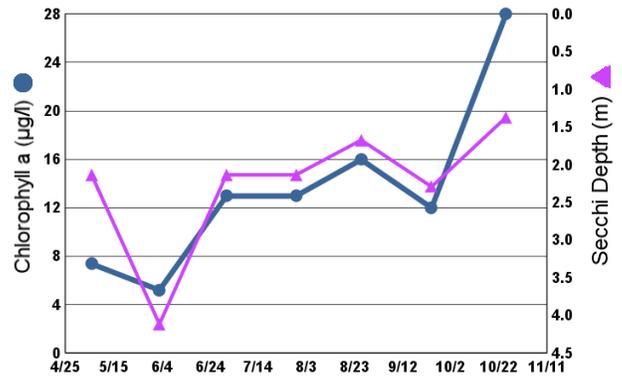
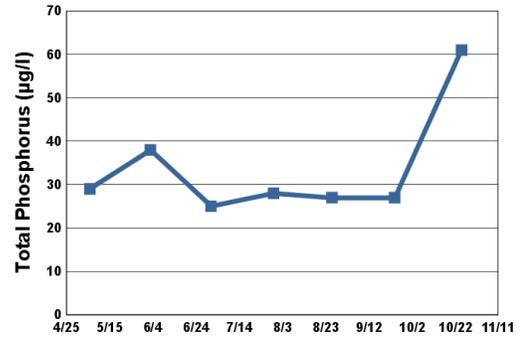
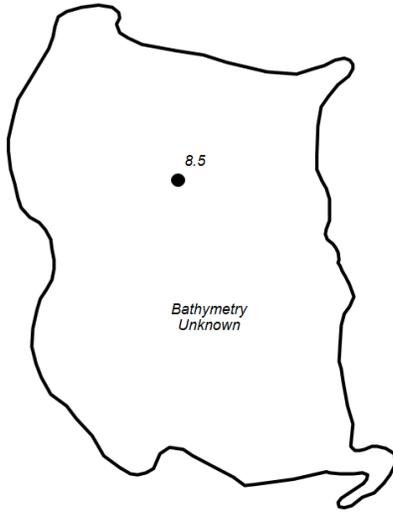
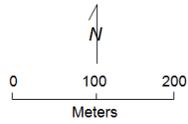
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Cloverdale Lake
Lake Elmo, Washington Co.

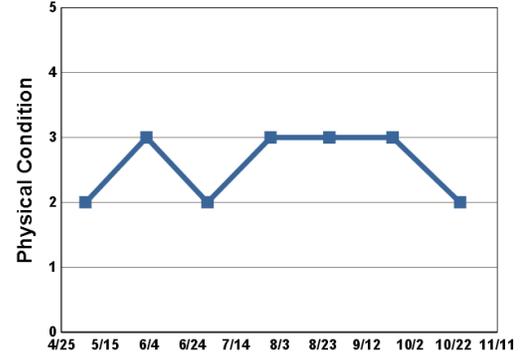
Lake ID: 820009-00

● Sampling site
Contours in meters

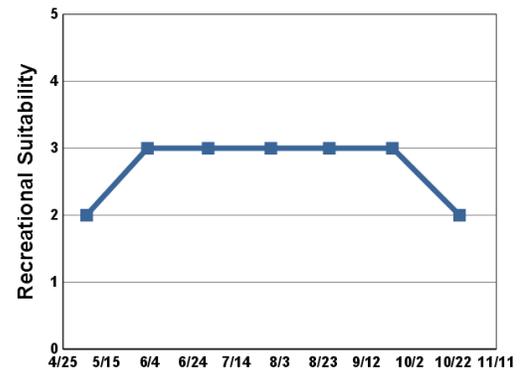


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/06/19	13.7	10.9	7.4	29	2.1	2	2
06/03/19	19.8	9.0	5.2	38	4.1	3	3
07/01/19	24.8	9.3	13	25	2.1	2	3
07/30/19	25.8	7.3	13	28	2.1	3	3
08/26/19	22.7	7.3	16	27	1.7	3	3
09/24/19	21.3	7.8	12	27	2.3	3	3
10/25/19	10.0	8.9	28	61	1.4	2	2



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4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
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3 = Swimming Impaired
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5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP										C	C	C
CLA										B	B	B
Secchi										C	B	B
Lake Grade										C	B	B

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	B	B	B	B	C	C	B	C	A		
CLA	B	A	B	A	B	A	B	A	A	A		
Secchi	A	A	A	B	B	B	B	A	B	A		
Lake Grade	B	A	B	B	B	B	B	A	B	A		

Year	2016	2017	2018	2019
TP	C			B
CLA	B			B
Secchi	A			B
Lake Grade	B			B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Cobblecrest Lake (27–0053) *City of St. Louis Park*

Volunteer: Jim Kellogg

Cobblecrest Lake is a small shallow lake located within City of St. Louis Park (Hennepin County). There is little known morphological data available for the lake.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators).

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	106	78	123	
CLA (µg/l)	76	26	130	
Secchi (m)	0.5	0.4	0.5	
TKN (mg/l)	1.22	1.10	1.40	
			Lake Grade	

There were less than 5 monitoring events during the summer-time period (May — September). At least 5 monitoring events are required during the summer-time period to determine a parameter grade. A lake grade was not given because all three parameter grades are required to issue a lake grade.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP											C	
CLA											C	
Secchi											C	
Lake Grade											C	

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	D	F	D	F	F	F	D	D		C		
CLA	F	F	F	F	F	F	F	C		C		
Secchi	F	F	F	F	F	F	F	F		F		
Lake Grade	F	D		D								

Year	2016	2017	2018	2019
TP				
CLA				
Secchi				
Lake Grade				

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Cobblestone Lake (19–0456) City of Apple Valley

Volunteer: Jeff Sluiter

Cobblestone Lake is located in the City of Apple Valley (Dakota County). The lake has a surface area of 37 acres, and a maximum depth of 6 meters. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 2012.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

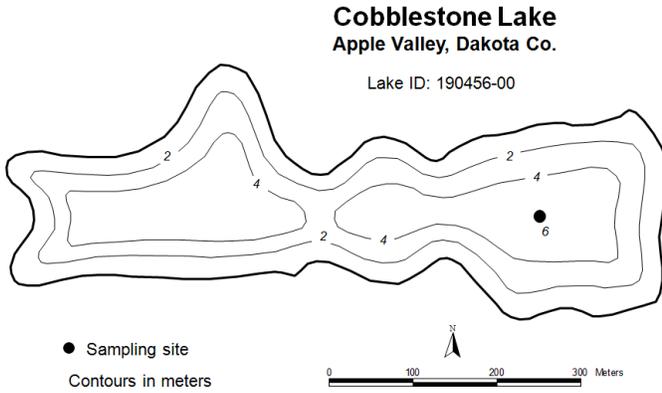
Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	49	32	86	C
CLA (µg/l))	15	8.1	31	B
Secchi (m)	1.0	0.7	1.2	D
TKN (mg/l)	1.12	0.77	1.40	
			Lake Grade	C

The lake received a lake grade of C which is consistent with its historical water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

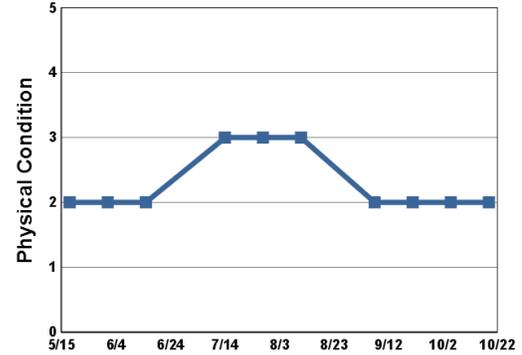
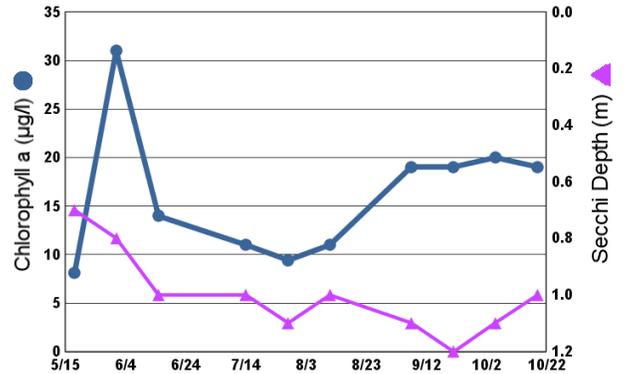
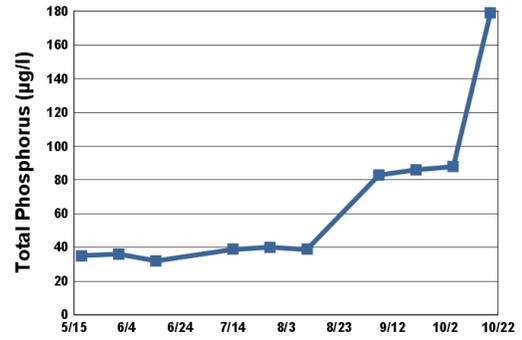
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

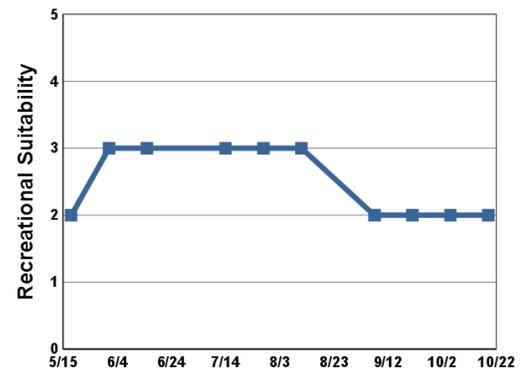


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/18/19	21.1		8.1	35	0.7	2	2
06/01/19	21.6		31	36	0.8	2	3
06/15/19	21.9		14	32	1.0	2	3
07/14/19	23.2		11	39	1.0	3	3
07/28/19	23.1		9.4	40	1.1	3	3
08/11/19	23.4		11	39	1.0	3	3
09/07/19			19	83	1.1	2	2
09/21/19			19	86	1.2	2	2
10/05/19	10.3		20	88	1.1	2	2
10/19/19	10.3		19	179	1.0	2	2



- 1 = Crystal Clear
- 2 = Some Algae Present
- 3 = Definite Algal Presence
- 4 = High Algal Color
- 5 = Severe Algal Bloom



- 1 = Beautiful
- 2 = Minor Aesthetic Problem
- 3 = Swimming Impaired
- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP		D	C	C	C	C	C	C	C	C	C	C
CLA		D	C	C	C	B	C	C	C	B	C	D
Secchi		F	D	D	D	D	D	D	D	C	D	D
Lake Grade		D	C	D								

Year	2016	2017	2018	2019
TP		C	C	C
CLA		C	C	B
Secchi		D	D	D
Lake Grade		C	C	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQUIS database(s)

Colby Lake (82–0094) *City of Woodbury*

Monitoring agency: Washington Conservation District staff

Colby Lake is located in the City of Woodbury in Washington County. The lake has a surface area of 71 acres and a maximum depth of 3.4 m (11 ft). The lake has a watershed area of 8,088 acres which gives a large watershed to lake area ratio of 114:1. Generally the larger the ratio, the greater the potential stress on the lake from surface runoff. The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2006. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 2012.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	92	42	166	D
CLA (µg/l)	36	9.5	85	C
Secchi (m)	1.2	0.5	2.0	C
TKN (mg/l)	1.04	0.70	1.50	
			Lake Grade	C

The lake received a water quality lake grade of C this year, which is an improvement over the Ds and Fs this lake has received in the past. Continued monitoring is recommended to determine if this recent improvement in water quality is part of a longer term trend.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP			D	D	F	F	F	D	D	F	F	F
CLA			D	F	F	C	F	F	D	F	C	D
Secchi			F	F	F	F	F	D	D	D	F	F
Lake Grade			D	F	F	D	F	D	D	F	D	F

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	D	D	F	D	F		D	D	D	F	D	D
CLA	C	F	F	D	D		C	C	D	C	D	C
Secchi	F	D	F	F	F		D	D	D	D	D	F
Lake Grade	D	D	F	D	F		D	D	D	D	D	D

Year	2016	2017	2018	2019
TP	D	D	D	D
CLA	C	C	D	C
Secchi	D	D	D	C
Lake Grade	D	D	D	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Crystal Lake [Burnsville] (19–0027) *Black Dog Watershed Management Commission*

Volunteer: Joe Tranchilla

Crystal Lake is located mainly in the City of Burnsville (Dakota County). The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value. The lake has a surface area of 292 acres.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2002 and aquatic consumption (mercury in fish tissue) in 1998. However the lake was delisted for aquatic recreational use (nutrient/eutrophication biological indicators) in 2018. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 2007.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	33	18	89	C
CLA (µg/l)	12	1.8	22	B
Secchi (m)	2.2	1.2	4.0	C
TKN (mg/l)	0.62	0.39	0.81	
			Lake Grade	C

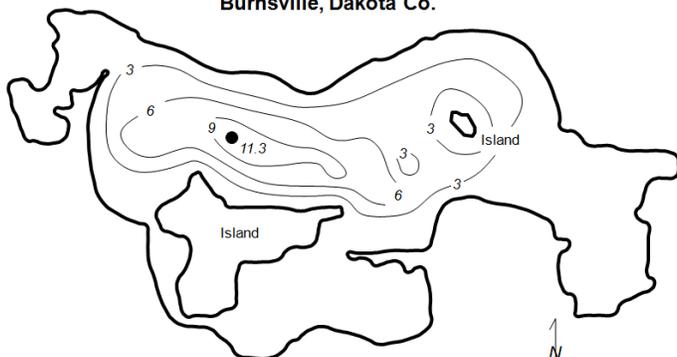
This year the lake received a lake grade of C which is a return to similar water quality observed in the 2000s.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

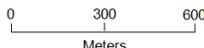
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

**Crystal Lake,
Burnsville, Dakota Co.**



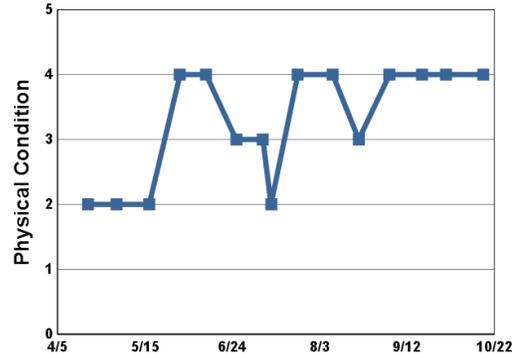
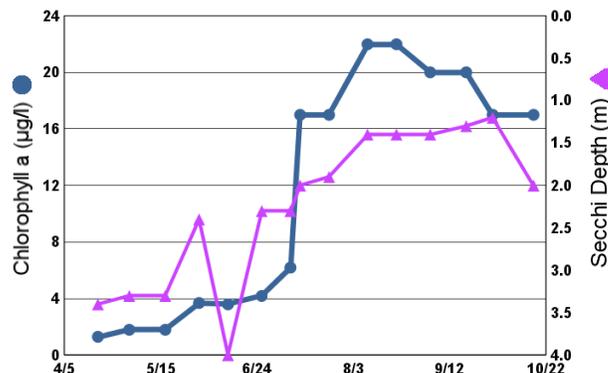
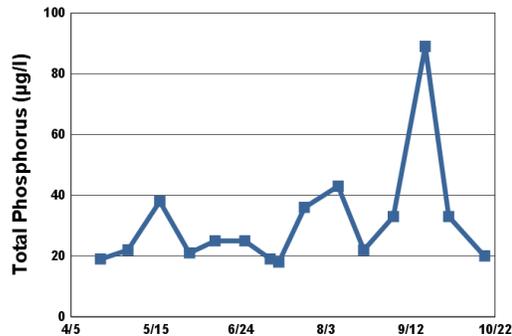
● Sampling site
Contours in meters

Lake ID: 190027-00

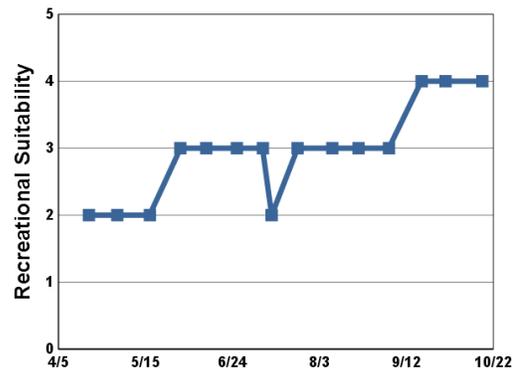


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/19/19	18.0		1.3	19	3.4	2	2
05/02/19	18.5		1.8	22	3.3	2	2
05/17/19	18.9		1.8	38	3.3	2	2
05/31/19	18.9		3.7	21	2.4	4	3
06/12/19	21.6		3.6	25	4.0	4	3
06/26/19	21.9		4.2	25	2.3	3	3
07/08/19	27.3		6.2	19	2.3	3	3
07/12/19	26.2		17	18	2.0	2	2
07/24/19	26.0		17	36	1.9	4	3
08/09/19	25.4		22	43	1.4	4	3
08/21/19	24.4		22	22	1.4	3	3
09/04/19	21.2		20	33	1.4	4	3
09/19/19	21.7		20	89	1.3	4	4
09/30/19	18.1		17	33	1.2	4	4
10/17/19	9.8		17	20	2.0	4	4



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP	C	C		C						B		
CLA	C			B				C		B		
Secchi	C	C	C	B	C	B	B	C	C	B	C	B
Lake Grade	C			B						B		

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP			C	C	C	C	C	C	C	B	C	C
CLA			B	C	C	C	C	B	C	B	B	C
Secchi	B		C	C	C	C	C	C	C	C	C	C
Lake Grade			C	B	C	C						

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	C	C	C	C	B	B	A	C	B	A	A
CLA	B	C	C	C	C	B	C	B	B	B	A	B
Secchi	C	C	C	C	C	C	C	C	C	C	B	C
Lake Grade	C	C	C	C	C	B	C	B	C	B	A	B

Year	2016	2017	2018	2019
TP	B	B	B	C
CLA	B	B	A	B
Secchi	C	B	B	C
Lake Grade	B	B	B	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

DeMontreville Lake (82–0101) Valley Branch Watershed District

Volunteer: Tom Bucher, Gary Fields

Lake DeMontreville is located in Lake Elmo (Washington County). The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value and good water quality.

The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 2009.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

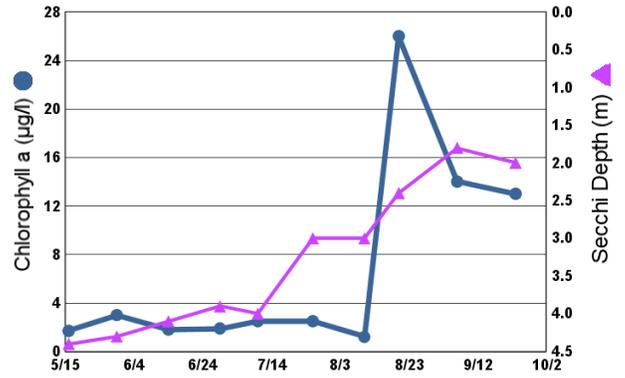
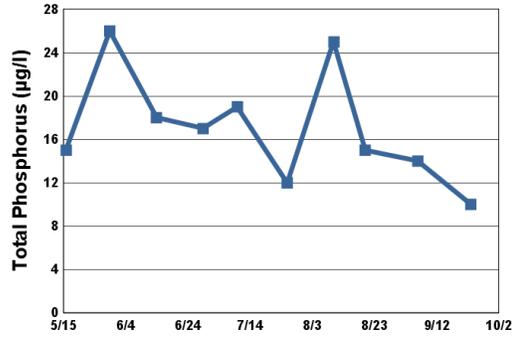
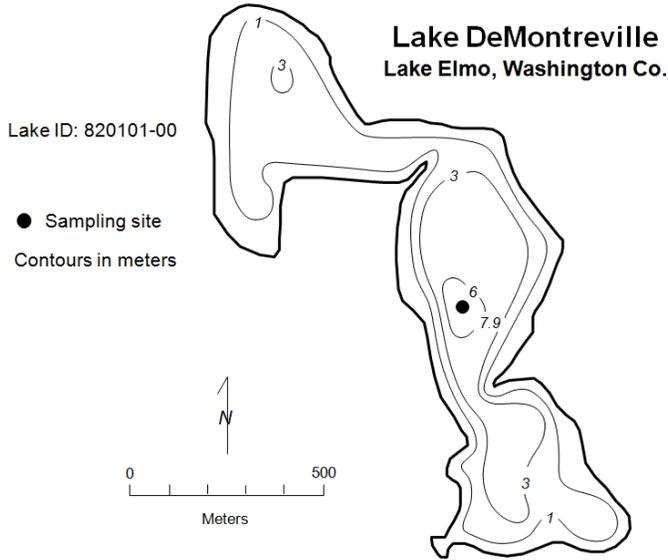
Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	17	10	26	A
CLA (µg/l)	6.8	1.2	26	A
Secchi (m)	3.3	1.8	4.4	A
TKN (mg/l)	0.54	0.29	0.68	
			Lake Grade	A

The lake received a lake grade of A this year, which is an improvement over the B received in 2018. The lake grades for the years 1980 through 2019 show that the quality of the lake has improved over the past nearly 40 years. Continued monitoring is recommended to determine if this recent improvement in water quality is part of a longer term trend.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

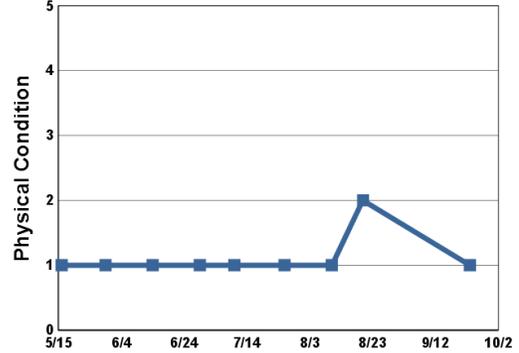
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

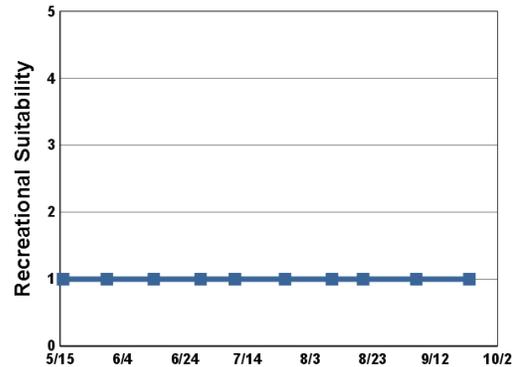


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/16/19	21.2		1.7	15	4.4	1	1
05/30/19	21.8		3.0	26	4.3	1	1
06/14/19	21.8		1.8	18	4.1	1	1
06/29/19	25.0		1.9	17	3.9	1	1
07/10/19	26.4		2.5	19	4.0	1	1
07/26/19	27.0		2.5	12	3.0	1	1
08/10/19	25.7		1.2	25	3.0	1	1
08/20/19	24.0		26	15	2.4	2	1
09/06/19	22.2		14	14	1.8		1
09/23/19	22.1		13	10	2.0	1	1



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP	C				C							B
CLA	C				C							C
Secchi	C				C	C	C		C	D		C
Lake Grade	C				C							C

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP		B		C					A			A
CLA		A		B					A			B
Secchi		B		B					A			A
Lake Grade		B		B					A			A

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	A	B	C	B	A	B	C	A	B	A	A	A
CLA	A	B	B	C	A	A	B	A	A	A	A	A
Secchi	B	A	B	C	A	B	A	A	A	A	B	A
Lake Grade	A	B	B	C	A	B	B	A	A	A	A	A

Year	2016	2017	2018	2019
TP	A	A	A	A
CLA	A	A	B	A
Secchi	A	A	B	A
Lake Grade	A	A	B	A

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Downs Lake (82–0110) Valley Branch Watershed District

Monitoring agency: Washington Conservation District staff

Downs Lake is located in Lake Elmo (Washington County). The mean and maximum depths of the 35-acre lake are 1.5 m (5 feet) and 2.1 m (7 feet), respectively. The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column. The lake's 2,400-acre watershed translates to a large watershed-to-lake size ratio of 69:1. The greater the ratio, the greater the potential stress on the lake from surface runoff.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2012.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	121	29	199	D
CLA (µg/l)	56	18	120	D
Secchi (m)	0.7	0.2	1.1	F
TKN (mg/l)	1.40	0.92	2.30	
			Lake Grade	D

The lake received a lake grade of D this year, which is consistent with its historical database. The lake grades vary historically in the D to F range with F's being more predominant.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP								D		D	F	D
CLA								D		F	F	C
Secchi								D		F	F	F
Lake Grade								D		F	F	D

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	F	D	F	F		F			F	F	D	F
CLA	D	D	F	F		D			F	F	F	F
Secchi	F	F	F	F		F			F	F	D	F
Lake Grade	F	D	F	F		F			F	F	D	F

Year	2016	2017	2018	2019
TP	F	D	F	D
CLA	F	F	D	D
Secchi	F	F	F	F
Lake Grade	F	F	F	D

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Duck Lake (27–0069) City of Eden Prairie

Volunteer: Erik Campbell

Duck Lake is located in the city of Eden Prairie (Hennepin County). The lake has a surface area of 46 acres, and a maximum depth of about 2.6 m. The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column. The lake's watershed has an area of 200 acres, giving a relatively small watershed to lake surface area ratio of 4.4. The higher the ratio, the greater the influence that the watershed has on the lake's water quality.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	23	14	35	B
CLA ($\mu\text{g/l}$)	6.6	2.4	27	A
Secchi (m)	>1.6	>1.0	>2.4	
TKN (mg/l)	0.56	0.44	0.65	
			Lake Grade	

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

There was an insufficient quantity of valid Secchi transparency measurements to determine a Secchi grade. An invalid measurement occurred if the Secchi disk was either visible on the lake bottom or the disk's visibility was blocked by aquatic vegetation. In both of these situations the water clarity would have been greater than that indicated by the measurement. A lake grade was not given because all three parameter grades are required to issue a lake grade. The lake has been receiving A and B grades for TP and A grades for CLA since CAMP monitoring began in 2014. Continued monitoring is recommended to continue to build the water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The lake has been occasionally stocked with various panfish and bass. Information on the stocking can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP											A	B
CLA											A	A
Secchi												
Lake Grade												

Year	2016	2017	2018	2019
TP	A	A	A	B
CLA	A	A	A	A
Secchi				
Lake Grade				

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Eagle Point Lake (82–0109) Valley Branch Watershed District

Monitoring agency: Washington Conservation District staff

Eagle Point Lake is located within the City of Lake Elmo (Washington County). It has a surface area of approximately 120-acres. The mean and maximum depths of the lake are 0.9 m (3 feet) and 1.8 m (roughly 6 feet), respectively. The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column. The lake's 11,502-acre watershed translates to a relatively large watershed-to-lake size ratio of 96:1. The greater the ratio, the greater the potential stress on the lake from surface runoff.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	42	35	55	C
CLA ($\mu\text{g/l}$)	11	4.8	26	B
Secchi (m)	+1.2	>0.9	+1.6	
TKN (mg/l)	0.83	0.67	1.00	
			Lake Grade	

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

This year saw the continued improvement in water quality compared to 10 years ago. There was an insufficient quantity of valid Secchi transparency measurements to determine a Secchi grade. An invalid measurement occurred if the Secchi disk was either visible on the lake bottom or the disk's visibility was blocked by aquatic vegetation. In both of these situations the water clarity would have been greater than that indicated by the measurement. A lake grade was not given because all three parameter grades are required to issue a lake grade. The relatively low CLA concentrations in combination with the observations of moderate to substantial macrophyte growth, indicate that the primary production of the lake is focused on production of aquatic macrophytes rather than algae. Continued monitoring is recommended to determine if this recent improvement in water quality is part of a longer term trend.

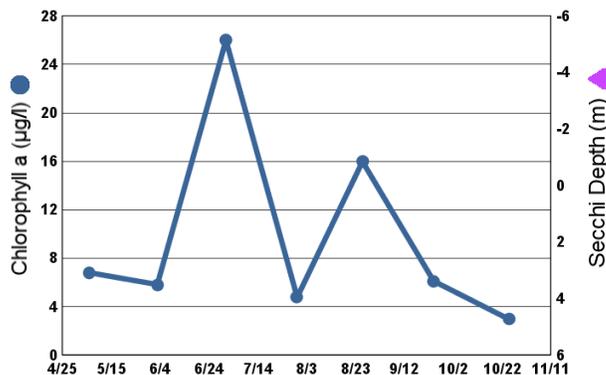
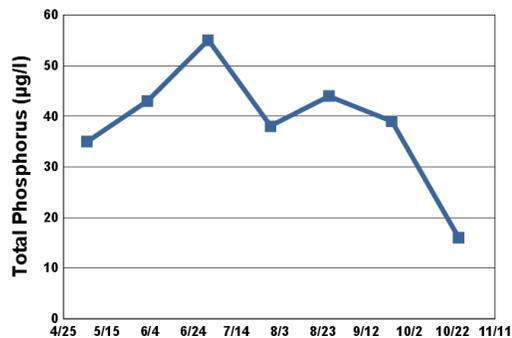
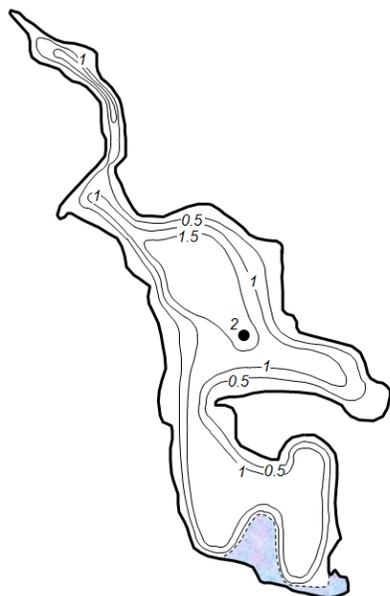
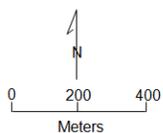
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Eagle Point Lake
Lake Elmo, Washington Co.

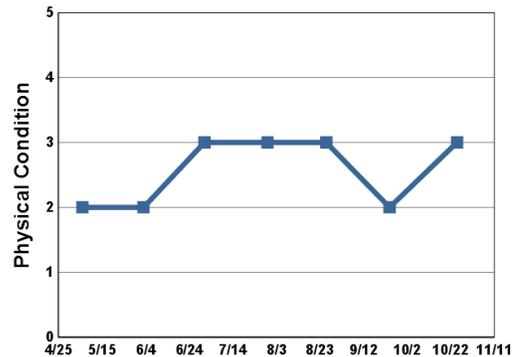
Lake ID: 820109
WD: Valley Branch

● Sampling station
Contours in meters



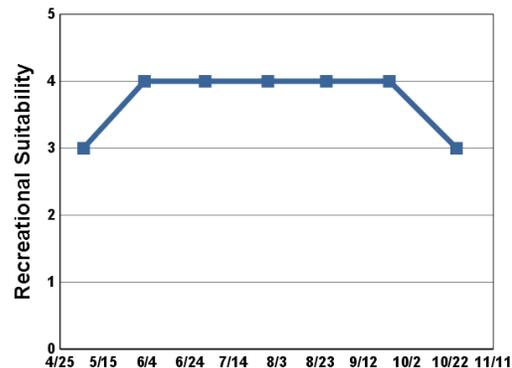
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/06/19	15.1	8.5	6.8	35	+1.4	2	3
06/03/19	20.3	6.4	5.8	43	+1.6	2	4
07/01/19	23.9	5.9	26	55	>1.0	3	4
07/30/19	23.8	6.5	4.8	38	+1.2	3	4
08/26/19	20.9	2.4	16	44	>1.2	3	4
09/24/19	19.7	5.3	6.1	39	>0.9	2	4
10/25/19	8.3	11.4	3.0	16	+1.5	3	3



+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.
> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

- 1 = Crystal Clear
- 2 = Some Algae Present
- 3 = Definite Algal Presence
- 4 = High Algal Color
- 5 = Severe Algal Bloom



- 1 = Beautiful
- 2 = Minor Aesthetic Problem
- 3 = Swimming Impaired
- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP		F										
CLA												
Secchi		F										
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP			F	F				D	F	D	C	D
CLA			F	A				D	F	C	B	C
Secchi			F	D				D	F			
Lake Grade			F	C				D	F			

Year	2016	2017	2018	2019
TP	D	D	C	C
CLA	B	C	A	B
Secchi		F		
Lake Grade		D		

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Earley Lake (19–0033) *Black Dog Watershed Management Commission*

Volunteer: Nancy Norlen, Jim Norlen

Earley Lake is located within the City of Burnsville in Dakota County. The 29-acre lake receives flow from Crystal Lake (Burnsville) and the Earley Lake watershed. Most of its 1,629-acre watershed is either parkland or open space. The watershed-to-lake size ratio is a rather large 56:1. The greater the ratio, the greater the potential stress on the lake from surface runoff. Earley Lake drains at its west end to Sunset Pond.

The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 2007.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	46	28	65	C
CLA (µg/l)	9.7	2.1	23	A
Secchi (m)	2.0	1.5	2.7	C
TKN (mg/l)	0.52	0.36	0.65	
			Lake Grade	B

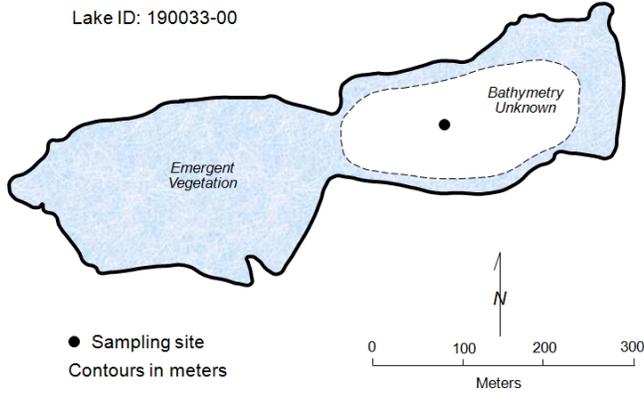
The lake received a lake grade of B this year, which is consistent with its historical water quality database. The relatively low CLA concentrations in combination with the observations of moderate to substantial macrophyte growth, indicate that the primary production of the lake is focused on production of aquatic macrophytes rather than algae.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Earley Lake
Burnsville, Dakota Co.

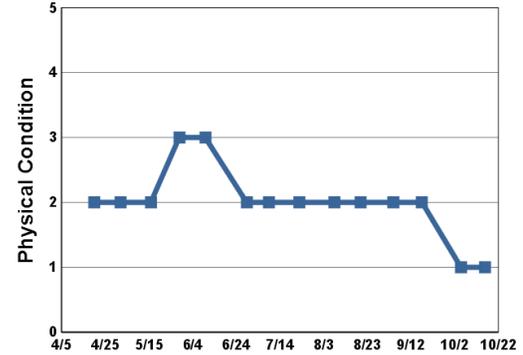
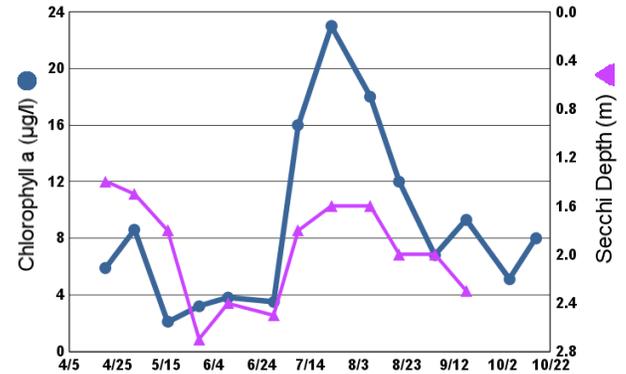
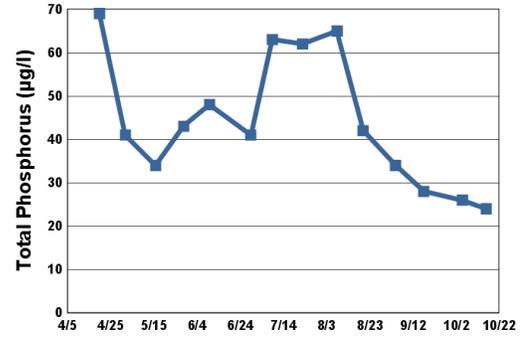
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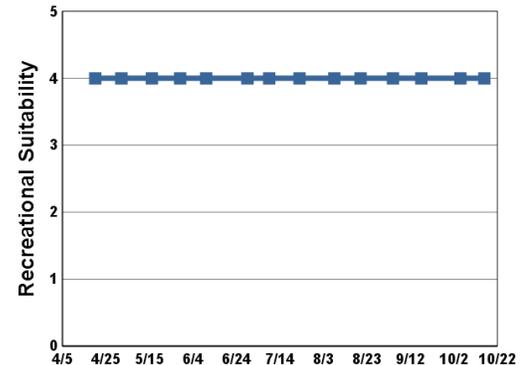
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/20/19	14.6		5.9	69	1.4	2	4
05/02/19	10.0		8.6	41	1.5	2	4
05/16/19	22.0		2.1	34	1.8	2	4
05/29/19	17.0		3.2	43	2.7	3	4
06/10/19	22.0		3.8	48	2.4	3	4
06/29/19	24.0		3.5	41	2.5	2	4
07/09/19	25.5		16	63	1.8	2	4
07/23/19	23.5		23	62	1.6	2	4
08/08/19	25.0		18	65	1.6	2	4
08/20/19	23.5		12	42	2.0	2	4
09/04/19	23.0		6.8	34	2.0	2	4
09/17/19	29.0		9.3	28	2.3	2	4
10/05/19	13.0		5.1	26	+3.1	1	4
10/16/19	8.0		8.0	24	+2.8	1	4

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP			C	C	C	C	C	C	C	C	C	C
CLA			B	B	B	B	B	B	B	B	B	B
Secchi			C	C	C	C	C	C	C	C	C	C
Lake Grade			C	C	C	C	C	C	C	C	C	C

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	C	C	C	C	C	C	B	C	C	C	B
CLA	B	B	A	B	A	A	B	A	A	B	A	A
Secchi	C	C	C	C	C	C	C	C	C	C	C	C
Lake Grade	C	C	B	C	B	B	C	B	B	C	B	B

Year	2016	2017	2018	2019
TP	B	D	C	C
CLA	A	B	A	A
Secchi	C			C
Lake Grade	B			B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

East Lake (19–0349) *City of Lakeville*

Monitoring agency: City of Lakeville staff

East Lake is a small lake located in Lakeville (Dakota County). The lake is shallow, with a maximum depth of about 3.0 m. The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2012.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

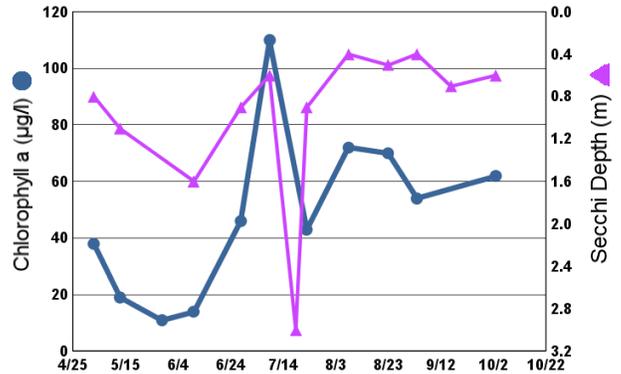
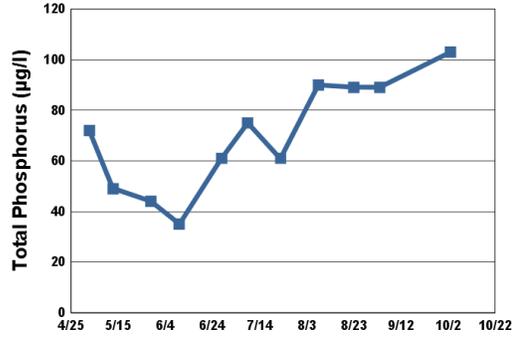
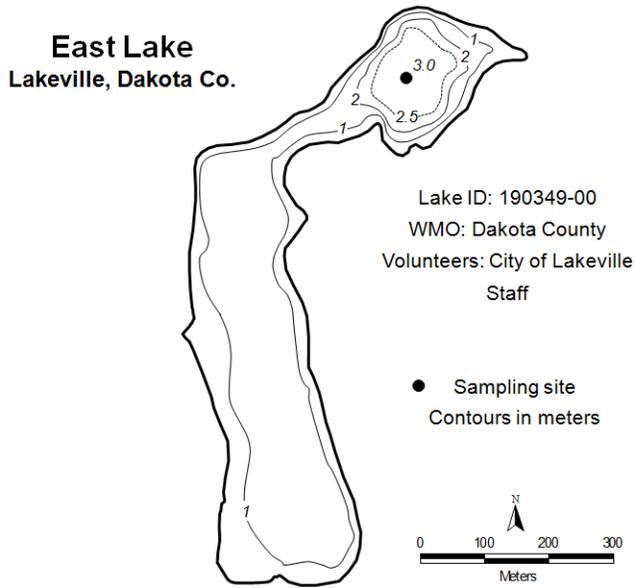
2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	66	35	90	C
CLA (µg/l)	48	11	110	C
Secchi (m)	1.0	0.4	3.0	D
TKN (mg/l)	1.09	0.76	1.50	
			Lake Grade	C

The lake received a lake grade of F this year. The lake grades typically fluctuate between D and F. Continued monitoring is recommended to continue to build the water quality database for this lake.

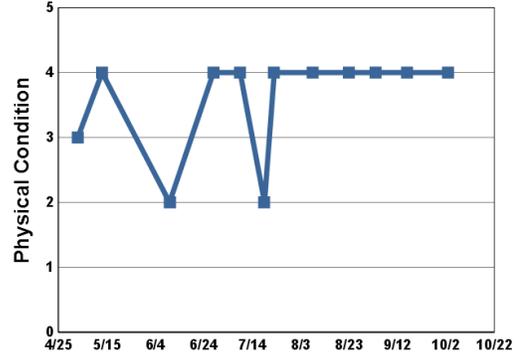
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

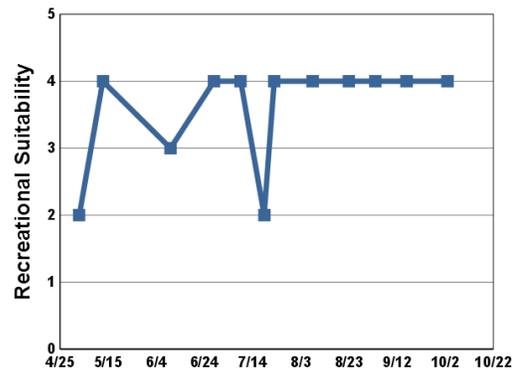


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/03/19	10.9		38	72	0.8	3	2
05/13/19	17.6		19	49	1.1	4	4
05/29/19	19.1		11	44			
06/10/19	24.2		14	35	1.6	2	3
06/28/19	24.3		46	61	0.9	4	4
07/09/19	26.4		110	75	0.6	4	4
07/19/19					3.0	2	2
07/23/19	26.4		43	61	0.9	4	4
08/08/19	27.4		72	90	0.4	4	4
08/23/19	24.4		70	89	0.5	4	4
09/03/19	22.9		54	89	0.4	4	4
09/16/19	20.9				0.7	4	4
10/03/19	14.1		62	103	0.6	4	4



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP		F		F	D		D	F	D	D	C	D
CLA		F		F	F		D	F	F	C	C	D
Secchi		F		F	D		F	F	F	D	D	F
Lake Grade		F		F	D		D	F	F	D	C	D

Year	2016	2017	2018	2019
TP	D	D	D	C
CLA	D	D	F	C
Secchi	F	D	F	D
Lake Grade	D	D	F	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

East Boot Lake (82–0034) *Carnelian — Marine — St. Croix Watershed District*

Monitoring agency: Washington Conservation District staff

East Boot Lake is located in May Township (Washington County). The maximum and mean depths of the 47-acre lake are 8.2 m (27 feet) and 0.9 m (3 feet), respectively. More than 80 percent of the surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. The lake is defined as a shallow lake because of the dominance of the littoral zone. The lake's watershed area is approximately 93 acres which gives a relatively lower watershed to lake area ratio of 2.0. The greater the ratio, the greater the potential stress on the lake from surface runoff.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2004.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	20	13	34	A
CLA (µg/l)	4.5	1.6	6.5	A
Secchi (m)	3.7	2.4	5.6	A
TKN (mg/l)	0.62	0.44	1.30	
			Lake Grade	A

The lake received a lake grade of A this year, which is consistent with recent years in its historical database. The lake continues to achieve better water quality than it used to receive in the period from the mid 1990s and early 2000s. Additional monitoring is suggested to help determine if the lake continues to improve.

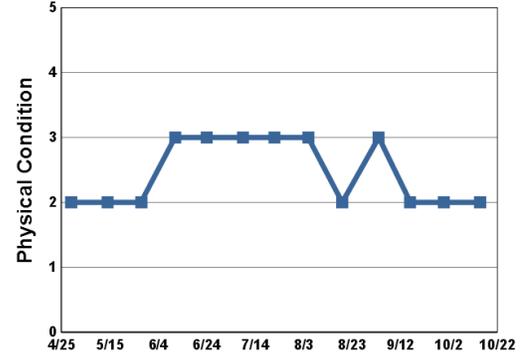
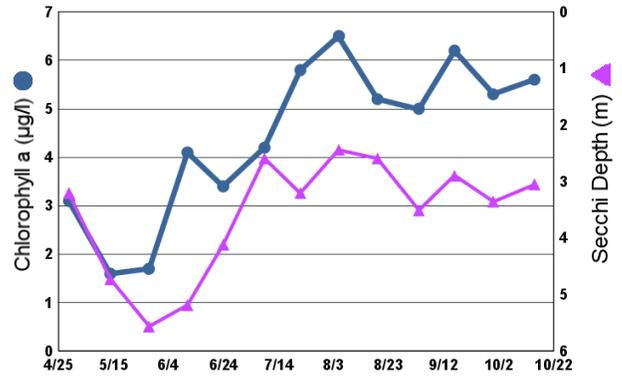
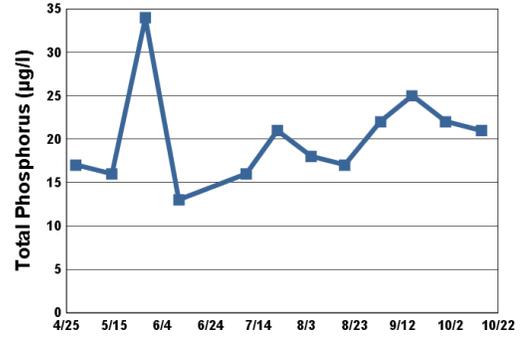
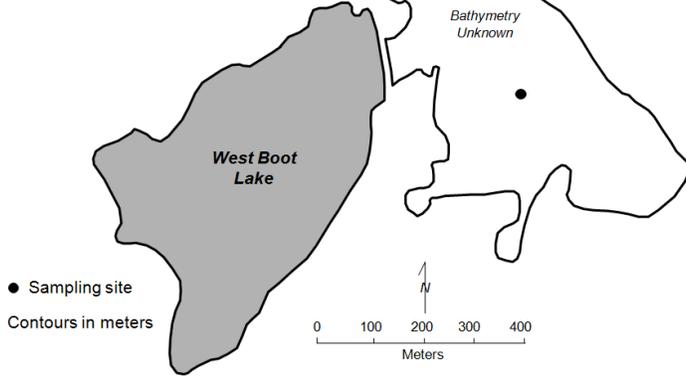
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

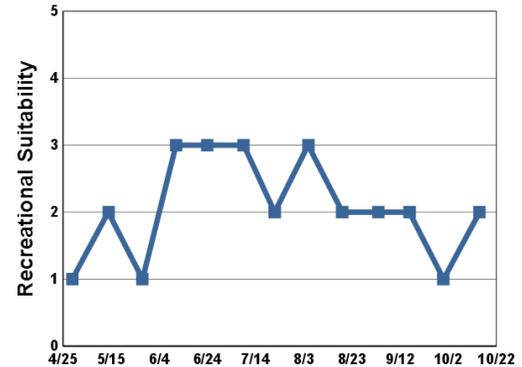
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

East Boot Lake
May Twp., Washington Co.

LAKE ID: 820034-00



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/29/19	11.4	10.1	3.1	17	3.2	2	1
05/14/19	14.8	9.7	1.6	16	4.7	2	2
05/28/19	15.5	8.8	1.7	34	5.6	2	1
06/11/19	22.3	8.4	4.1	13	5.2	3	3
06/24/19	22.2	7.3	3.4		4.1	3	3
07/09/19	26.8	8.6	4.2	16	2.6	3	3
07/22/19	25.9	6.2	5.8	21	3.2	3	2
08/05/19	27.2	6.8	6.5	18	2.4	3	3
08/19/19	24.4	6.2	5.2	17	2.6	2	2
09/03/19	21.6	7.1	5.0	22	3.5	3	2
09/16/19	19.7	7.0	6.2	25	2.9	2	2
09/30/19	17.7	10.2	5.3	22	3.4	2	1
10/15/19	10.8	8.3	5.6	21	3.0	2	2

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP					B	B	B	C	C	C	C	C
CLA					B	C	C	C	C	C	C	C
Secchi					B	A	B	C	C	C	B	B
Lake Grade					B	B	B	C	C	C	C	C

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	C	C	C	C	B	B	C	C	B	A	A
CLA	B	B	C	B	B	A	A	A	A	A	A	A
Secchi	A	A	A	A	A	A	A	A	A	A	A	A
Lake Grade	B	B	B	B	B	A	A	B	B	A	A	A

Year	2016	2017	2018	2019
TP		A	A	A
CLA		A	A	A
Secchi		A	A	A
Lake Grade		A	A	A

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Echo Lake (82–0135) Valley Branch Watershed District

Monitoring agency: Washington Conservation District staff

Echo Lake is a 41-acre lake located within the City of Mahtomedi (Washington County). The mean and maximum depth of the lake is 0.8 m (2.6 feet) and 1.8 m (6 feet), respectively. The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column. There is no public access to the lake. The lake's watershed area is 194 acres which gives watershed-to-lake area ratio of 4.7. The greater the ratio, the greater the potential stress on the lake from surface runoff.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2012.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	37	28	53	C
CLA (µg/l)	13	4.8	29	B
Secchi (m)	+1.7	1.2	+2.3	
TKN (mg/l)	0.70	0.64	0.78	
			Lake Grade	

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.

There was an insufficient quantity of valid Secchi transparency measurements to determine a Secchi grade. An invalid measurement occurred if the Secchi disk was either visible on the lake bottom or the disk's visibility was blocked by aquatic vegetation. In both of these situations the water clarity would have been greater than that indicated by the measurement. A lake grade was not given because all three parameter grades are required to issue a lake grade.

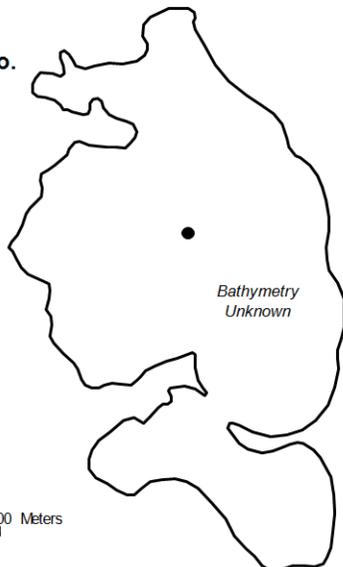
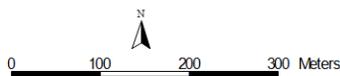
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Echo Lake
Mahtomedi, Washington Co.

LAKE ID: 820135-00

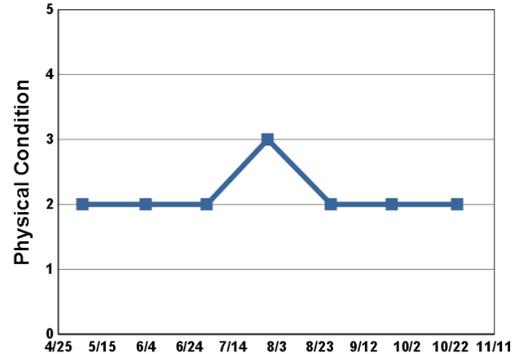
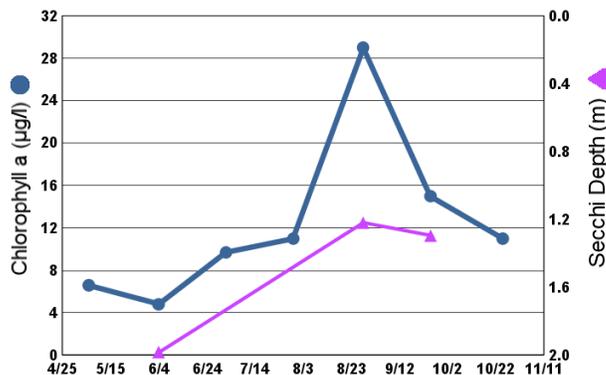
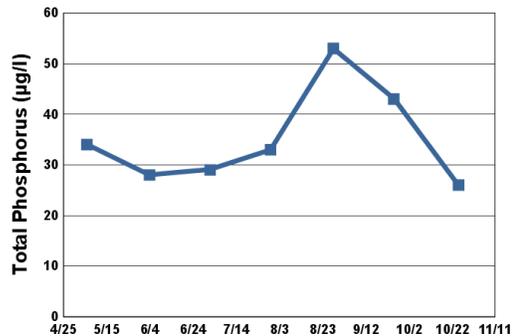
● Sampling site
Contours in meters



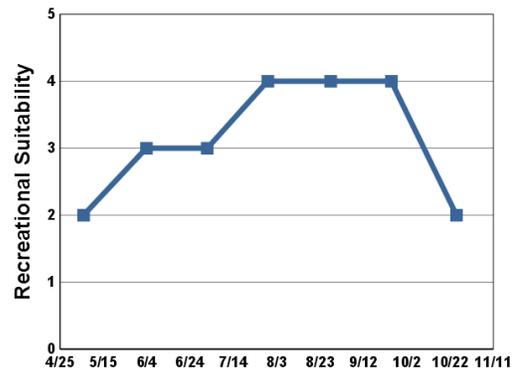
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/06/19	14.2	9.2	6.6	34	>1.8	2	2
06/04/19	20.5	9.1	4.8	28	2.0	2	3
07/02/19	24.8	9.8	9.7	29	>1.7	2	3
07/30/19	23.7	4.3	11	33	+2.3	3	4
08/28/19	20.2	4.6	29	53	1.2	2	4
09/25/19	20.2	5.6	15	43	1.3	2	4
10/25/19	7.6	10.8	11	26	>2.0	2	2

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.
> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP			D	D			D		D	B	C	B
CLA			C	F			C		B	A	B	B
Secchi		F	F	D			D					
Lake Grade			D	D			D					

Year	2016	2017	2018	2019
TP	B	B	B	C
CLA	A	A	A	B
Secchi				
Lake Grade				

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Edith Lake (82–0004) Valley Branch Watershed District

Volunteer: Joseph Reithmeyer

Edith Lake is a 81-acre lake located within Afton (Washington County). The lake has a maximum depth of approximately 13.0 m (43 feet).

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

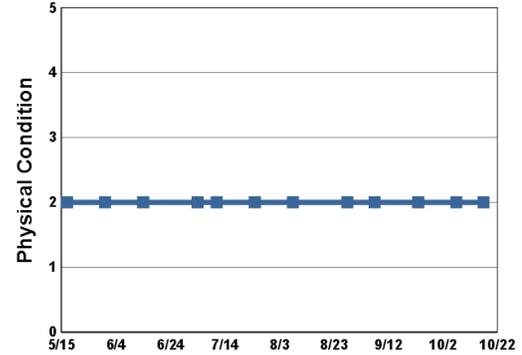
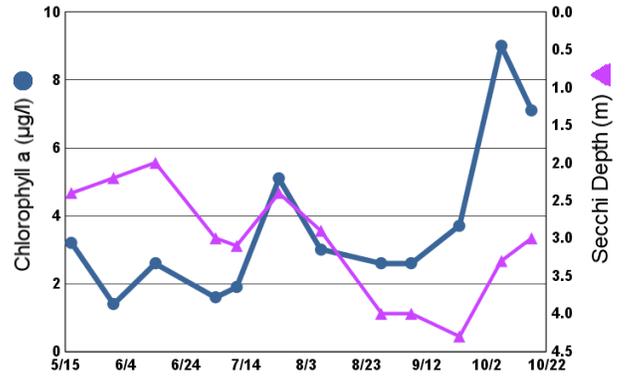
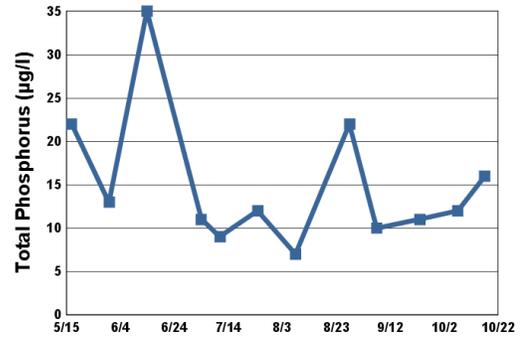
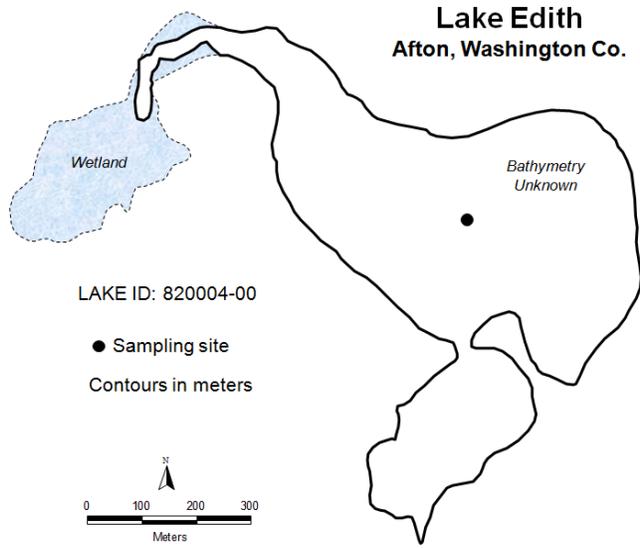
Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	15	7	35	A
CLA ($\mu\text{g/l}$)	2.8	1.4	5.1	A
Secchi (m)	3.0	2.0	4.3	A
TKN (mg/l)	0.48	0.44	0.56	
			Lake Grade	A

The lake received a lake grade of A this year, which is consistent with its limited historical database. For the years that the lake has been monitored via the CAMP, the lake has fluctuated between a lake grade of A and B. Continued monitoring is recommended to continue to build the water quality database.

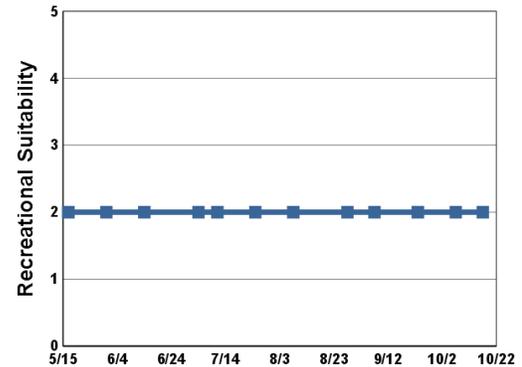
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.



1 = Crystal Clear
 2 = Some Algae Present
 3 = Definite Algal Presence
 4 = High Algal Color
 5 = Severe Algal Bloom



1 = Beautiful
 2 = Minor Aesthetic Problem
 3 = Swimming Impaired
 4 = No Swimming; Boating OK
 5 = No Aesthetics Possible

2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/17/19	18.6		3.2	22	2.4	2	2
05/31/19	21.6		1.4	13	2.2	2	2
06/14/19	20.9		2.6	35	2.0	2	2
07/04/19	20.9		1.6	11	3.0	2	2
07/11/19	27.3		1.9	9	3.1	2	2
07/25/19	25.5		5.1	12	2.4	2	2
08/08/19	25.1		3.0	7	2.9	2	2
08/28/19	20.2		2.6	22	4.0	2	2
09/07/19	20.9		2.6	10	4.0	2	2
09/23/19	21.5		3.7	11	4.3	2	2
10/07/19	15.7		9.0	12	3.3	2	2
10/17/19	12.8		7.1	16	3.0	2	2

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP		A	B	A	B	B		B	B	A	A	A
CLA		A	A	A	A	A		A	A	A	A	A
Secchi		B	C	B	C	C		B	B	B	B	B
Lake Grade		A	B	A	B	B		B	B	A	A	A

Year	2016	2017	2018	2019
TP	A	A	A	A
CLA	A	A	A	A
Secchi	B	A	B	A
Lake Grade	A	A	A	A

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Elwell Lake (82–0079) Comfort Lake — Forest Lake Watershed District

Monitoring agency: Washington Conservation District staff

Elwell Lake is located near the city of Forest Lake (Washington County). The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. The lake is defined as a shallow lake because of the dominance of the littoral zone.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	45	26	110	C
CLA (µg/l)	12	3.1	57	B
Secchi (m)	>0.9	>0.2	>2.0	
TKN (mg/l)	0.70	0.50	1.20	
			Lake Grade	

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

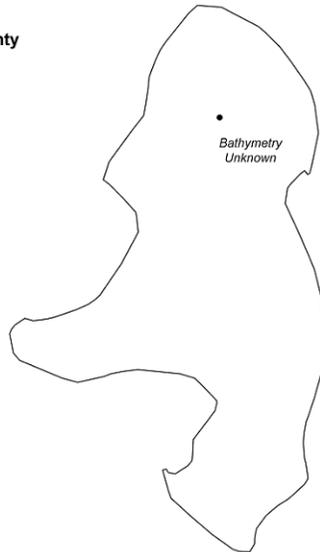
There was an insufficient quantity of valid Secchi transparency measurements to determine a Secchi grade. An invalid measurement occurred if the Secchi disk was either visible on the lake bottom or the disk's visibility was blocked by aquatic vegetation. In both of these situations the water clarity would have been greater than that indicated by the measurement. A lake grade was not given because all three parameter grades are required to issue a lake grade. Continued monitoring is recommended to build the water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

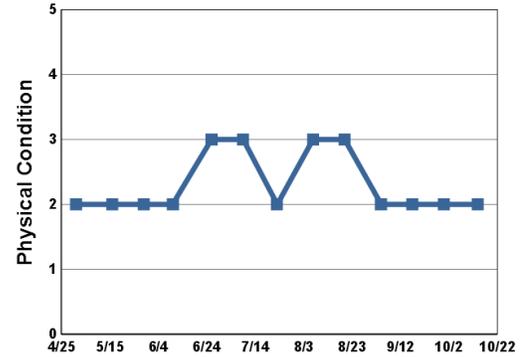
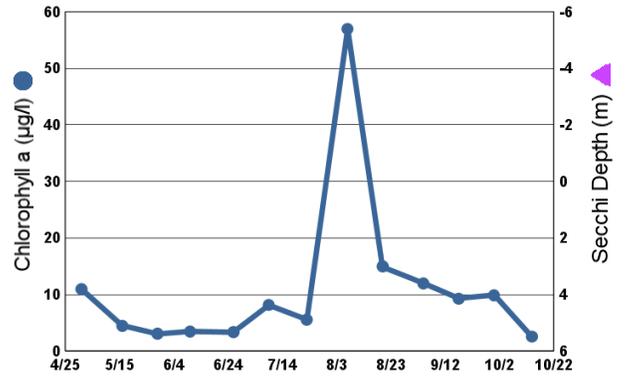
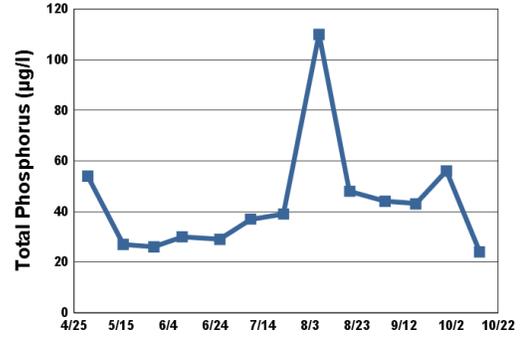
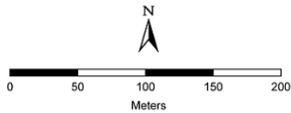
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Elwell Lake
Forest Lake, Washington County

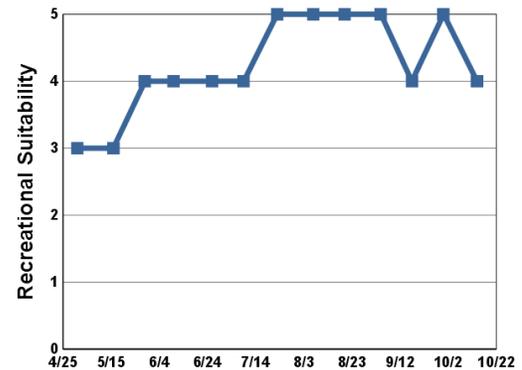
Lake ID: 8200790



• Sampling site contours in meters



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/01/19	10.7	5.6	11	54	>1.1	2	3
05/16/19	18.8	7.0	4.5	27	>2.0	2	3
05/29/19	17.7	7.7	3.1	26	>1.7	2	4
06/10/19	21.0	8.7	3.5	30	>1.5	2	4
06/26/19	21.6	5.7	3.4	29	>1.1	3	4
07/09/19	24.1	3.6	8.2	37	>0.3	3	4
07/23/19	24.9	3.9	5.6	39	>0.5	2	5
08/07/19	22.8	3.4	57	110	>0.2	3	5
08/20/19	20.1	1.5	15	48	>0.6	3	5
09/04/19	17.9	2.2	12	44	>0.8	2	5
09/17/19	17.2	1.2	9.3	43	>0.6	2	4
09/30/19	14.9	0.9	9.9	56	>0.6	2	5
10/14/19	7.6	1.7	2.6	24	>1.5	2	4

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP												
CLA												
Secchi												
Lake Grade												

Year	2016	2017	2018	2019
TP				C
CLA				B
Secchi				
Lake Grade				

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Fahlstrom Pond [East Basin] (82–0005) Valley Branch Watershed District

Monitoring agency: Washington Conservation District staff

Fahlstrom Pond (east basin) is located in Afton (Washington County). There is very little morphological information available for this water body. There is no public access.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

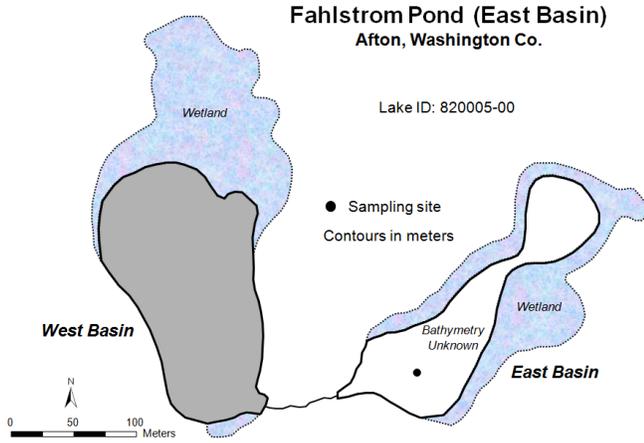
Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	115	85	131	D
CLA (µg/l))	38	8.9	87	C
Secchi (m)	>1.1	>0.8	1.5	D
TKN (mg/l)	1.25	0.79	1.70	
			Lake Grade	D

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

Continued monitoring is recommended to build the water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

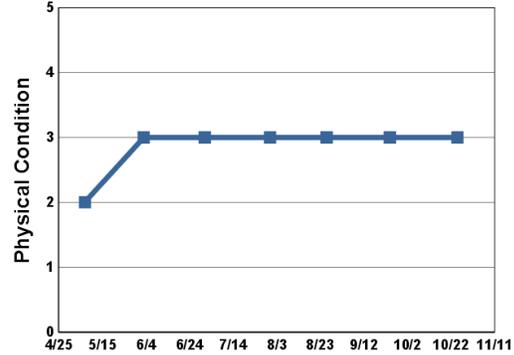
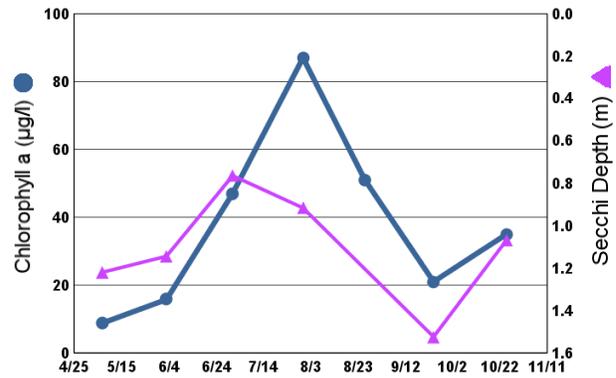
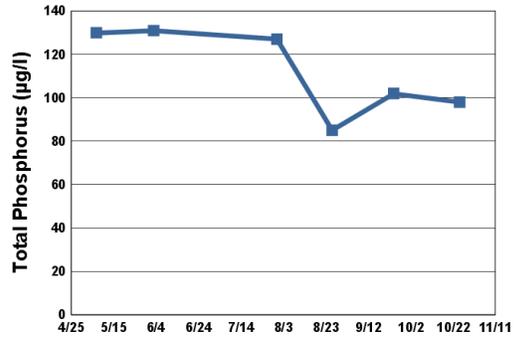
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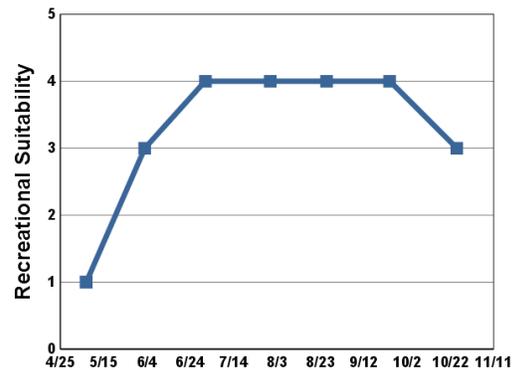
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/07/19	15.3	9.6	8.9	130	1.2	2	1
06/03/19	19.8	7.6	16	131	1.1	3	3
07/01/19	24.0	4.3	47		0.8	3	4
07/31/19	24.8	3.8	87	127	0.9	3	4
08/26/19	21.8	4.2	51	85	>0.8	3	4
09/24/19	19.5	3.6	21	102	1.5	3	4
10/25/19	8.0	10.0	35	98	1.1	3	3

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.



- 1 = Crystal Clear
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- 4 = High Algal Color
- 5 = Severe Algal Bloom



- 1 = Beautiful
- 2 = Minor Aesthetic Problem
- 3 = Swimming Impaired
- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP						F						
CLA						C						
Secchi						D						
Lake Grade						D						

Year	2016	2017	2018	2019
TP				D
CLA				C
Secchi				D
Lake Grade				D

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Fahlstrom Pond [West Basin] (82–0005) *Valley Branch Watershed District*

Monitoring agency: Washington Conservation District staff

Fahlstrom Pond (west basin) is located in Afton (Washington County). There is very little morphological information available for this water body. There is no public access.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

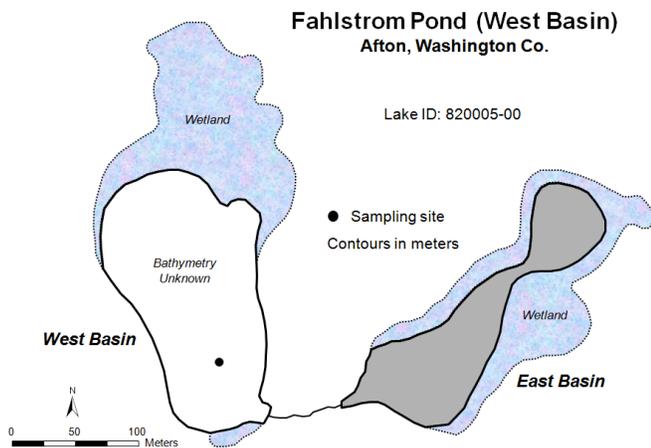
Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	143	76	241	D
CLA (µg/l))	16	5.1	29	B
Secchi (m)	>0.8	>0.6	1.1	
TKN (mg/l)	0.93	0.76	1.20	
			Lake Grade	

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

Continued monitoring is recommended to build the water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

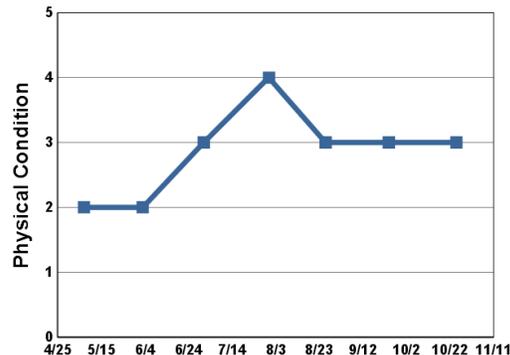
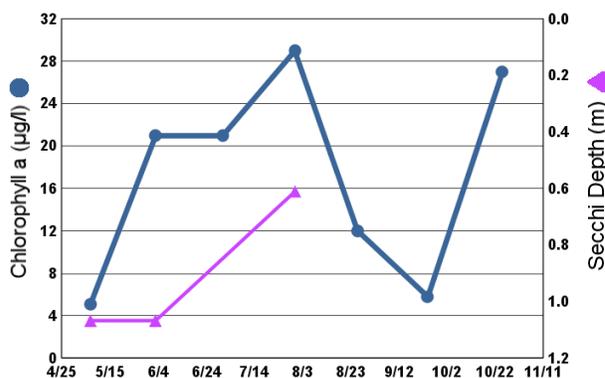
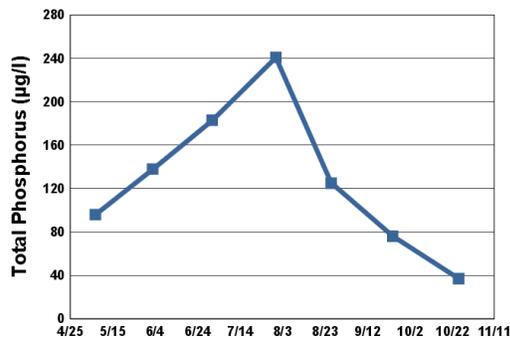
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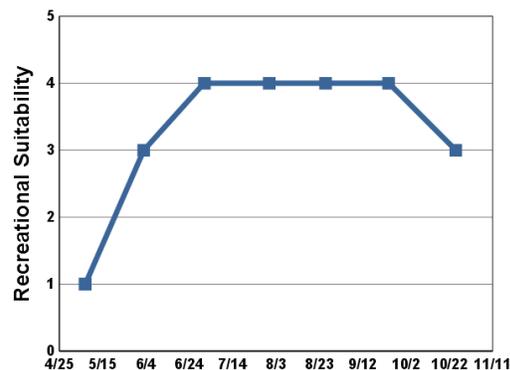
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/07/19	15.5	9.6	5.1	96	1.1	2	1
06/03/19		5.9	21	138	1.1	2	3
07/01/19	23.9	2.9	21	183	>0.9	3	4
07/31/19	24.3	4.4	29	241	0.6	4	4
08/26/19	21.3	4.7	12	125	>0.8	3	4
09/24/19	18.5	4.6	5.8	76	>0.6	3	4
10/25/19	7.9	13.4	27	37	>0.9	3	3

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.



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- 2 = Some Algae Present
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- 4 = High Algal Color
- 5 = Severe Algal Bloom



- 1 = Beautiful
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- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP												
CLA												
Secchi												
Lake Grade												

Year	2016	2017	2018	2019
TP				D
CLA				B
Secchi				
Lake Grade				

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Farquar Lake (19–0023) City of Apple Valley

Volunteer: Jeff Christianson

Farquar Lake is located in the City of Apple Valley (Dakota County). The lake covers an area of 67 acres and has a maximum depth of 3.0 m (10 feet). The lake's mean depth of 1.4 m (4.6 feet) and surface area translates to an approximate lake volume of 290 ac-ft. The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2002.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	79	45	140	D
CLA (µg/l)	45	5.7	110	C
Secchi (m)	1.2	0.6	2.4	C
TKN (mg/l)	1.48	0.70	2.40	
			Lake Grade	C

The lake received a lake grade of C this year, which is consistent with the recent improvement in water quality. Continued monitoring is recommended to determine if this recent improvement in water quality is part of a longer term trend.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP			C	D	D	D		F	F	F	F	D
CLA			B	C	C	D		F	F	F	F	F
Secchi			C	D	C	D		F	F	F	F	F
Lake Grade			C	D	C	D		F	F	F	F	F

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	F	F	F	F	D	F	D	D	F	D	D	D
CLA	F	D	C	D	F	F	D	F	F	C	F	D
Secchi	F	F	F	F	D	F	F	F	F	D	D	D
Lake Grade	F	F	D	F	D	F	D	F	F	D	D	D

Year	2016	2017	2018	2019
TP	D	C	D	D
CLA	D	C	C	C
Secchi	D	C	D	C
Lake Grade	D	C	D	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Fish Lake [Washington County] (82–0064) *Carnelian — Marine — St. Croix Watershed District*

Monitoring agency: Washington Conservation District staff

Fish Lake is located in City of Scandia in Washington County. The lake has a surface area of 72 acres, and a maximum and mean depth of 3.0 m (10 feet) and 1.5 m (5 feet), respectively. The entire lake is considered littoral zone, which is the shallow 0 – 15 feet depth zone that is typically dominated by aquatic plants. Since the lake is relatively shallow, it does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the water column.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators)

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	72	52	110	D
CLA (µg/l)	27	3.0	64	C
Secchi (m)	>1.4	0.5	>2.3	C
TKN (mg/l)	1.16	0.71	2.00	
			Lake Grade	C

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

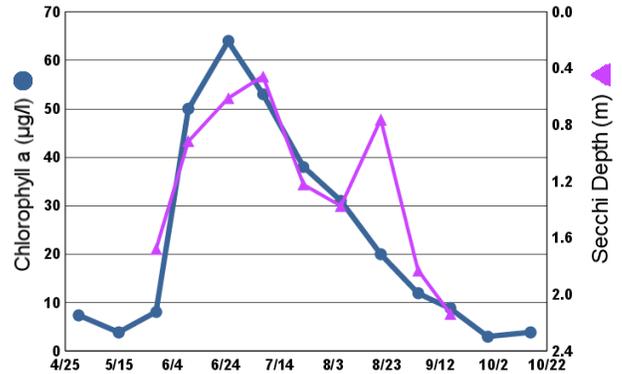
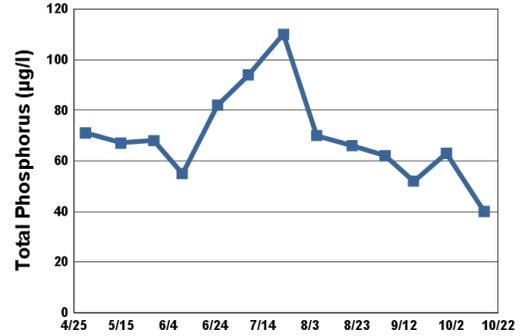
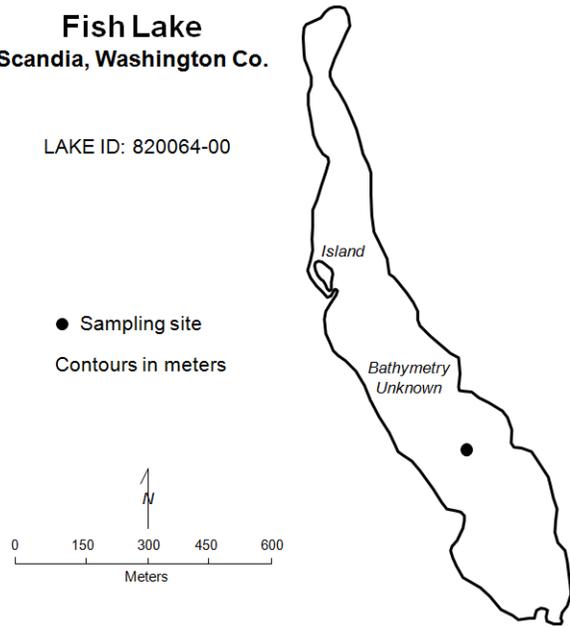
The lake received a lake grade of C this year which indicates similar water quality to that observed in the late 2000s.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

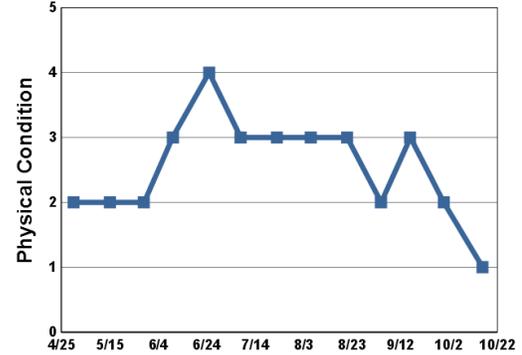
Fish Lake
Scandia, Washington Co.

LAKE ID: 820064-00

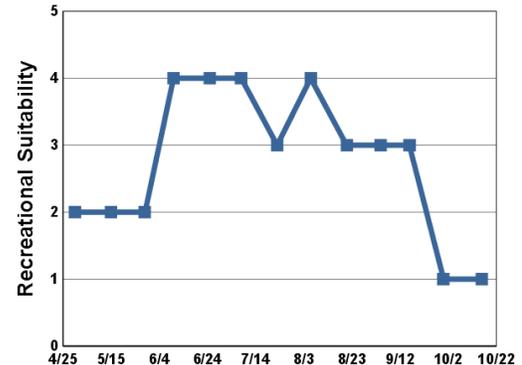


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/30/19	11.5	9.3	7.4	71	>1.5	2	2
05/15/19	17.9	9.3	3.9	67	>1.6	2	2
05/29/19	17.8	8.2	8.1	68	1.7	2	2
06/10/19	23.0	10.2	50	55	0.9	3	4
06/25/19	22.2	6.7	64	82	0.6	4	4
07/08/19	27.7	10.5	53	94	0.5	3	4
07/23/19	25.0	7.4	38	110	1.2	3	3
08/06/19	26.8	7.0	31	70	1.4	3	4
08/21/19	23.7	5.0	20	66	0.8	3	3
09/04/19	20.7	6.9	12	62	1.8	2	3
09/16/19	19.6	7.6	8.9	52	2.1	3	3
09/30/19	17.6	8.7	3.0	63	>2.3	2	1
10/16/19	8.9	9.4	3.9	40	>2.4	1	1



1 = Crystal Clear
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3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP							F	F	D	D	D	D
CLA							D	D	F	F	D	F
Secchi							F	F	F	F	D	F
Lake Grade							F	F	F	F	D	F

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	D	D	D	D	D	D	D	C				C
CLA	F	C	D	C	C	C	C	C				B
Secchi	D	D	D	C	C	C	C	C				
Lake Grade	D	D	D	C	C	C	C	C				

Year	2016	2017	2018	2019
TP	C	D		D
CLA	A	C		C
Secchi				C
Lake Grade				C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Fish Lake [Woodbury] (82–0093) *City of Woodbury*

Monitoring agency: Washington Conservation District staff

Fish Lake is located in the City of Woodbury (Washington County). It has a surface area of approximately 5 acres. Little morphological information is available for the lake.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	84	47	194	D
CLA ($\mu\text{g/l}$)	12	1.9	43	B
Secchi (m)	+0.8	>0.3	+1.4	
TKN (mg/l)	0.89	0.69	1.60	
			Lake Grade	

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.

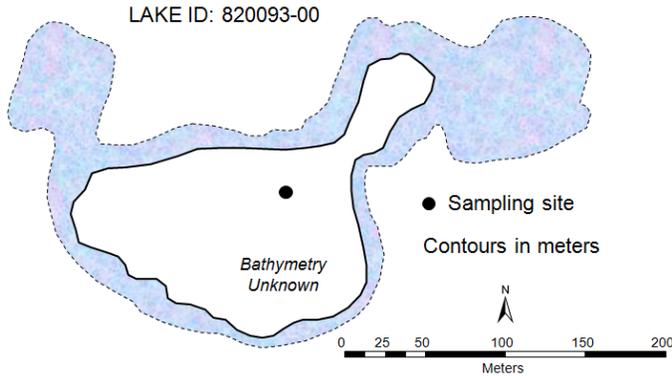
> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

There was an insufficient quantity of valid Secchi transparency measurements to determine a Secchi grade. An invalid measurement occurred if the Secchi disk was either visible on the lake bottom or the disk's visibility was blocked by aquatic vegetation. In both of these situations the water clarity would have been greater than that indicated by the measurement. A lake grade was not given because all three parameter grades are required to issue a lake grade. Additional monitoring is suggested to build the water quality database of this lake.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

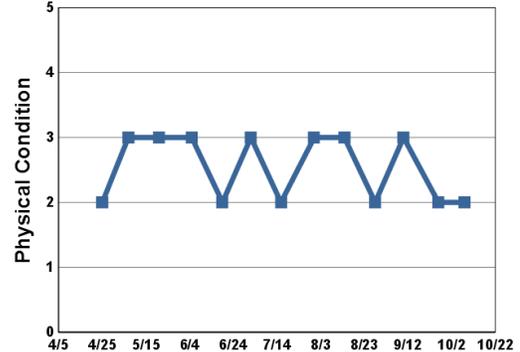
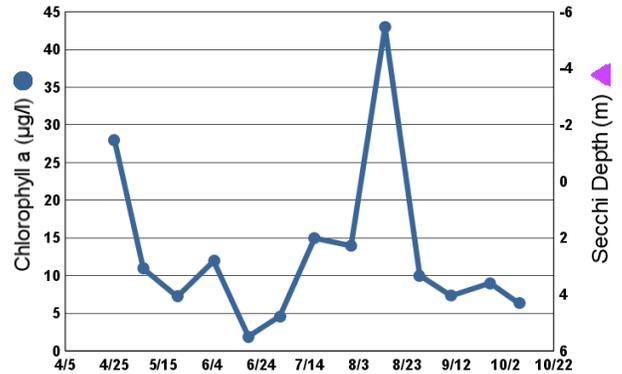
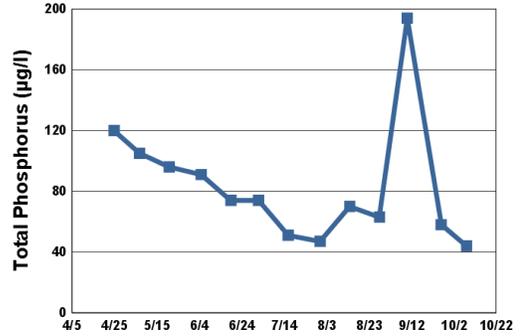
Fish Lake Woodbury, Washington Co.



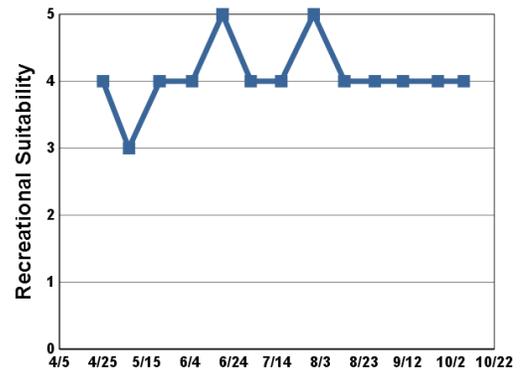
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/25/19	14.8	8.4	28	120	>1.0	2	4
05/07/19	16.5	8.6	11	105	+1.4	3	3
05/21/19	14.2	8.1	7.3	96	+1.2	3	4
06/05/19	23.3	8.9	12	91	>0.9	3	4
06/19/19	24.6	11.0	1.9	74	>0.9	2	5
07/02/19	23.5	5.8	4.6	74	>0.9	3	4
07/16/19	29.5	12.1	15	51	>0.5	2	4
07/31/19	22.5	6.9	14	47	>0.6	3	5
08/14/19	21.7	3.3	43	70	>0.4	3	4
08/28/19	19.9	7.7	10	63	>0.3	2	4
09/10/19	17.8	2.9	7.4	194	>0.6	3	4
09/26/19	17.3	1.7	9.0	58	+0.9	2	4
10/08/19	13.4	9.7	6.4	44	>0.8	2	4

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.
> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.



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4 = High Algal Color
5 = Severe Algal Bloom



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3 = Swimming Impaired
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5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP							F	D	F	D	D	D
CLA							F	D	F	B	D	D
Secchi							F	D	D	D		
Lake Grade							F	D	F	C		

Year	2016	2017	2018	2019
TP	C	C	D	D
CLA	B	B	B	B
Secchi				
Lake Grade				

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Forest Lake [West Basin] (82–0159) Comfort Lake — Forest Lake Watershed District

Volunteer: Steve Schmaltz

Forest Lake is located in the City of Forest Lake (Washington County). The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value. The lake is divided into three distinct basins. The entire lake has a surface area of 2,249 acres. The mean and maximum depths are 3.4 m and 11.5 m, respectively. The lake's watershed area is 4,285 acres, which gives a relatively low watershed-to-lake area ratio of 1.9. The greater the ratio, the greater the potential stress on the lake from surface runoff.

The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue) in 1998 and aquatic consumption (PCBs in fish tissue) in 2002. The MN DNR designated the lake as being infested with flowering rush (*Butomus umbellatus*) in 2007, Eurasian water milfoil (*Myriophyllum spicatum*) in 2015, and zebra mussels (*Dreissena polymorpha*) in 2015.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

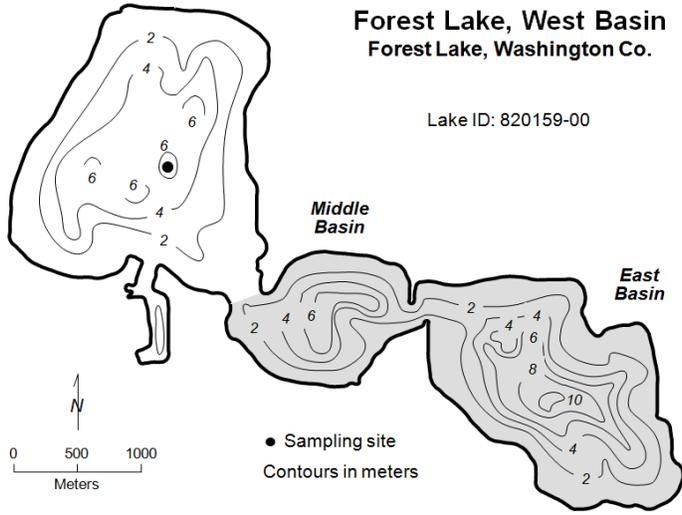
Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	19	13	22	A
CLA (µg/l)	6.5	2.2	12	A
Secchi (m)	2.3	1.4	3.0	B
TKN (mg/l)	0.64	0.53	0.87	
			Lake Grade	A

Note that the lake grades shown in the data summary table above were calculated from monitoring data sets from both the volunteer and Washington Conservation District staff. The mean, minimum, and maximum values shown in the above data summary table and the results in the data table on the following page are specific to the volunteer's monitoring data. The west basin received a lake grade of A this year which is the first time for this basin. The water quality of the west basin has fluctuated between lake grades of B and C according to its historical water quality database. Continued monitoring is recommended to determine if this recent improvement in water quality is part of a longer term trend.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

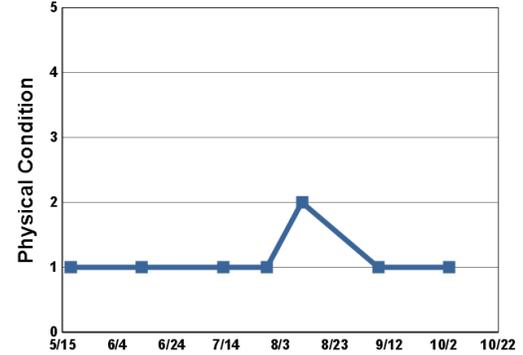
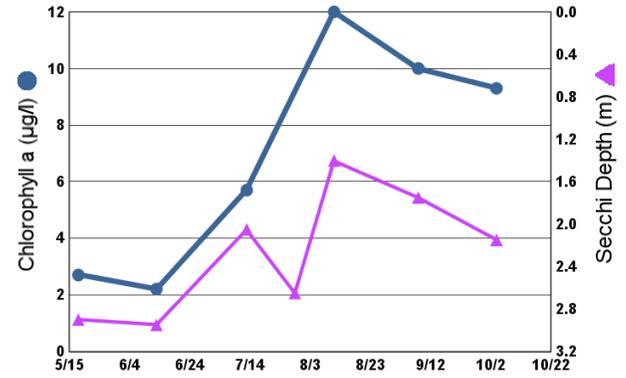
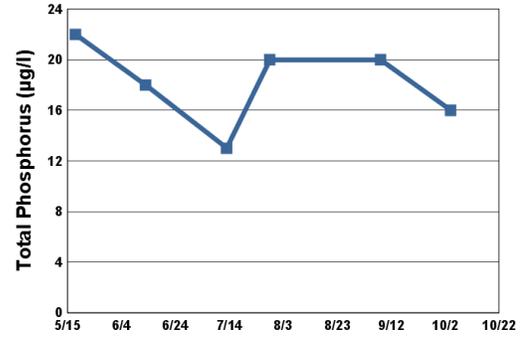
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

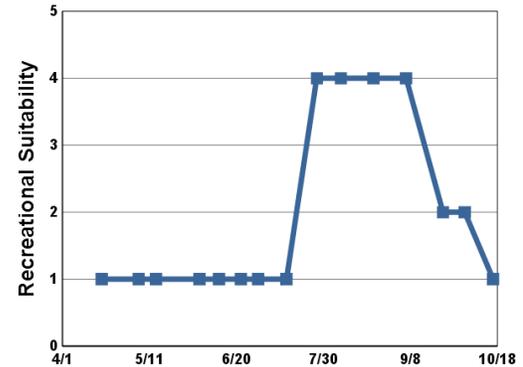


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/18/19	13.5		2.7	22	2.9	1	1
06/13/19	22.0		2.2	18	3.0	1	1
07/13/19	26.0		5.7	13	2.0	1	1
07/29/19	11.9			20	2.6	1	1
08/11/19	23.9		12		1.4	2	1
09/08/19	19.1		10	20	1.8	1	1
10/04/19	14.3		9.3	16	2.2	1	1



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- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP					C		C	C	C	B		C
CLA					C		C		C	B	C	B
Secchi					C		C	C	C	C	C	C
Lake Grade					C		C		C	B		C

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP		C			C	B	B	C	C	B	C	C
CLA		B			B	B	B	B	B	B	B	B
Secchi		C			C	C	C	C	C	C	C	C
Lake Grade		C			C	B	B	C	C	B	C	C

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	B	C	C	C	C	B	B	C	C	C	B	B
CLA	A	C	B	C	A	A	B	B	B	B	B	B
Secchi	B	C	C	C	C	C	C	C	C	C	D	C
Lake Grade	B	C	C	C	B	B	B	C	C	C	C	B

Year	2016	2017	2018	2019
TP	C	B	C	A
CLA	B	A	B	A
Secchi	C	C	C	B
Lake Grade	C	B	C	A

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Forest Lake [West Basin] (82–0159) Comfort Lake — Forest Lake Watershed District

Monitoring agency: Washington Conservation District staff

Forest Lake is located in the City of Forest Lake (Washington County). The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value. The lake is divided into three distinct basins. The entire lake has a surface area of 2,249 acres. The mean and maximum depths are 3.4 m and 11.5 m, respectively. The lake's watershed area is 4,285 acres, which gives a relatively low watershed-to-lake area ratio of 1.9. The greater the ratio, the greater the potential stress on the lake from surface runoff.

The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue) in 1998 and aquatic consumption (PCBs in fish tissue) in 2002. The MN DNR designated the lake as being infested with flowering rush (*Butomus umbellatus*) in 2007, Eurasian water milfoil (*Myriophyllum spicatum*) in 2015, and zebra mussels (*Dreissena polymorpha*) in 2015.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made by Washington Conservation District staff during their monitoring visits. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

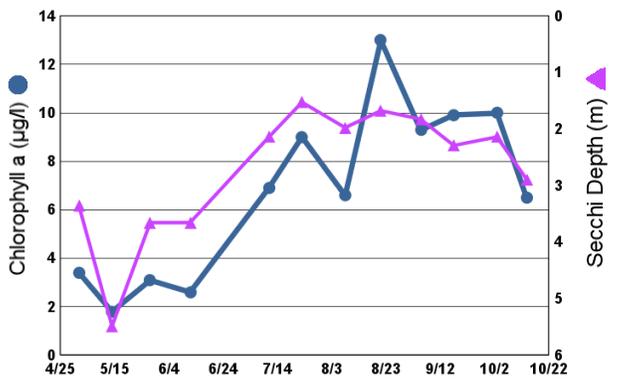
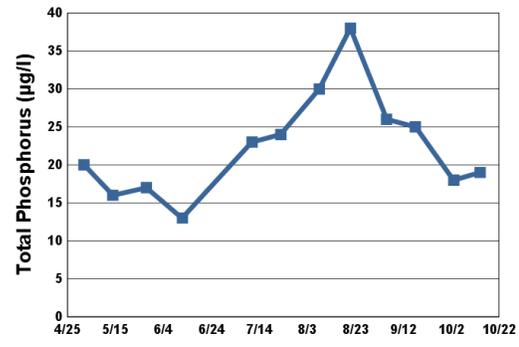
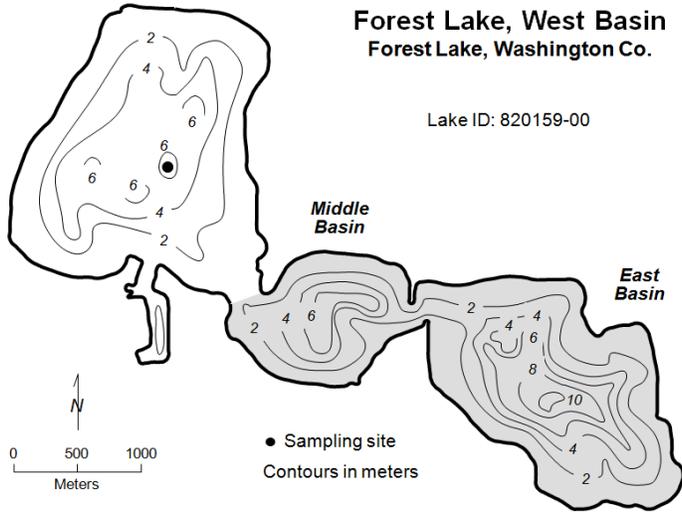
Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	23	13	38	A
CLA (µg/l)	6.6	1.8	13	A
Secchi (m)	2.8	1.5	5.5	B
TKN (mg/l)	0.69	0.55	0.81	
			Lake Grade	A

Note that the lake grades shown in the data summary table above were calculated from monitoring data sets from both the volunteer and Washington Conservation District (WCD) staff. The mean, minimum, and maximum values shown in the above data summary table and the results in the data table on the following page are specific to WCD staff monitoring data. The west basin received a lake grade of A this year which is the first time for this basin. The water quality of the west basin has fluctuated between lake grades of B and C according to its historical water quality database. Continued monitoring is recommended to determine if this recent improvement in water quality is part of a longer term trend.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

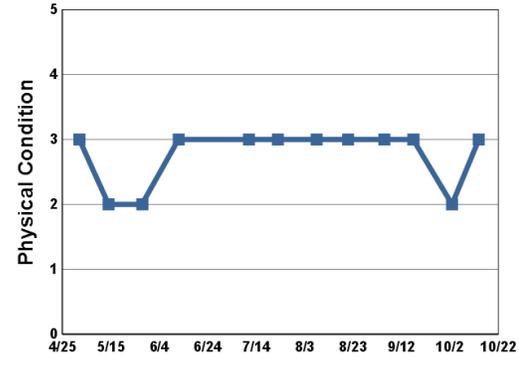
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

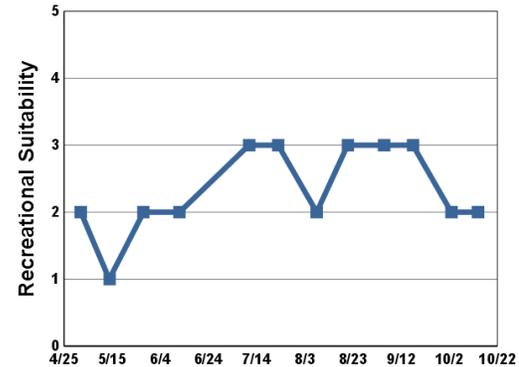


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/02/19	10.0	11.1	3.4	20	3.4	3	2
05/14/19	15.1	10.7	1.8	16	5.5	2	1
05/28/19	15.1	9.7	3.1	17	3.7	2	2
06/12/19	20.5	8.2	2.6	13	3.7	3	2
07/11/19	25.1	8.5	6.9	23	2.1	3	3
07/23/19	25.7	7.5	9.0	24	1.5	3	3
08/08/19	25.5	7.7	6.6	30	2.0	3	2
08/21/19	23.6	7.5	13	38	1.7	3	3
09/05/19	20.0	7.7	9.3	26	1.8	3	3
09/17/19	18.6	8.4	9.9	25	2.3	3	3
10/03/19	15.0	9.1	10	18	2.1	2	2
10/14/19	9.2	10.5	6.5	19	2.9	3	2



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- 1 = Beautiful
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Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP					C		C	C	C	B		C
CLA					C		C		C	B	C	B
Secchi					C		C	C	C	C	C	C
Lake Grade					C		C		C	B		C

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP		C			C	B	B	C	C	B	C	C
CLA		B			B	B	B	B	B	B	B	B
Secchi		C			C	C	C	C	C	C	C	C
Lake Grade		C			C	B	B	C	C	B	C	C

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	B	C	C	C	C	B	B	C	C	C	B	B
CLA	A	C	B	C	A	A	B	B	B	B	B	B
Secchi	B	C	C	C	C	C	C	C	C	C	D	C
Lake Grade	B	C	C	C	B	B	B	C	C	C	C	B

Year	2016	2017	2018	2019
TP	C	B	C	A
CLA	B	A	B	A
Secchi	C	C	C	B
Lake Grade	C	B	C	A

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Forest Lake [Middle Basin] (82–0159) Comfort Lake — Forest Lake Watershed District

Volunteer: Doug Joens

Forest Lake is located in the City of Forest Lake (Washington County). The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value. The lake is divided into three distinct basins. The entire lake has a surface area of 2,249 acres. The mean and maximum depths are 3.4 m and 11.5 m, respectively. The lake's watershed area is 4,285 acres, which gives a relatively low watershed-to-lake area ratio of 1.9. The greater the ratio, the greater the potential stress on the lake from surface runoff.

The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue) in 1998 and aquatic consumption (PCBs in fish tissue) in 2002. The MN DNR designated the lake as being infested with flowering rush (*Butomus umbellatus*) in 2007, Eurasian water milfoil (*Myriophyllum spicatum*) in 2015, and zebra mussels (*Dreissena polymorpha*) in 2015.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

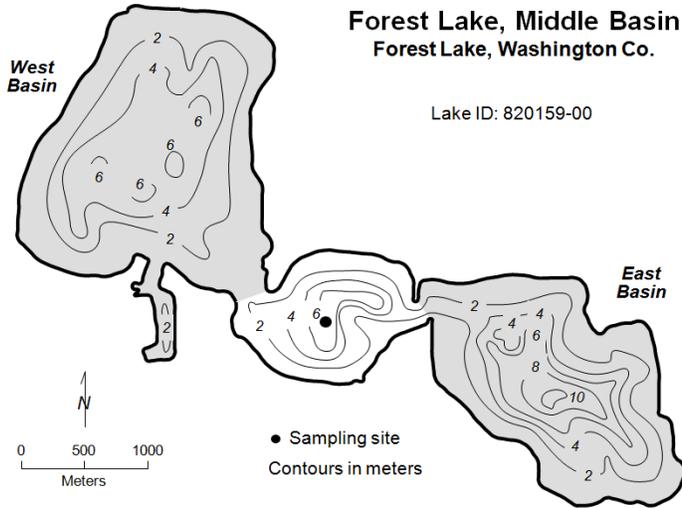
Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	30	17	42	C
CLA (µg/l)	17	2.2	36	B
Secchi (m)	2.4	1.1	4.0	B
TKN (mg/l)	0.77	0.56	1.00	
			Lake Grade	B

Note that the lake grades shown in the data summary table above were calculated from monitoring data sets from both the volunteer and Washington Conservation District staff. The mean, minimum, and maximum values shown in the above data summary table and the results in the data table on the following page are specific to the volunteer's monitoring data. The middle basin received a lake grade of B this year, similar to last year's grade. The middle basin typically receives B and C grades according to its historical water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

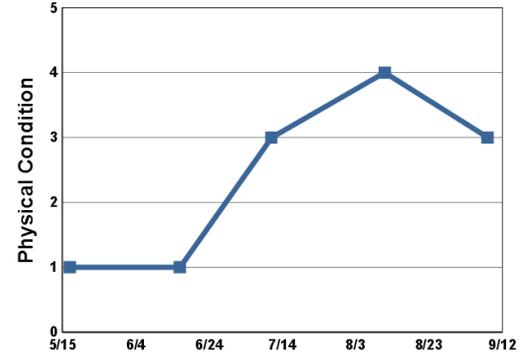
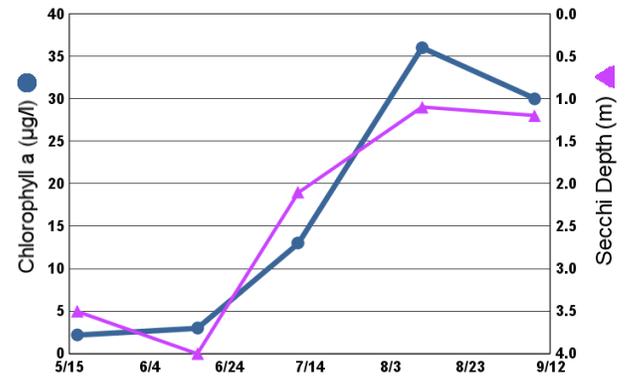
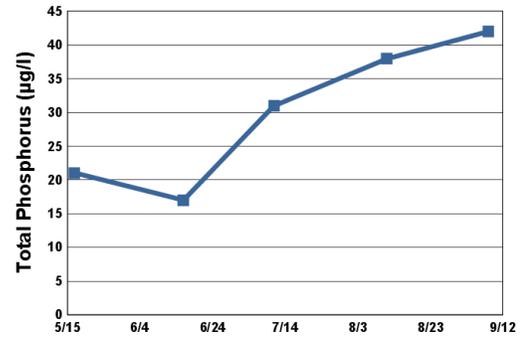
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

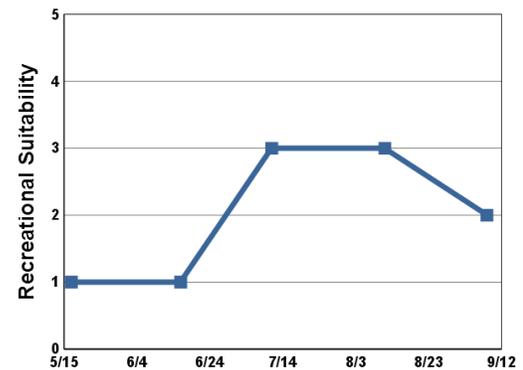


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/17/19	17.5		2.2	21	3.5	1	1
06/16/19	22.2		3.0	17	4.0	1	1
07/11/19	26.4		13	31	2.1	3	3
08/11/19	24.8		36	38	1.1	4	3
09/08/19	19.5		30	42	1.2	3	2



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP					C		C	C	C	B		C
CLA					C		C		C	B	B	B
Secchi					C		C	C	C	C	C	C
Lake Grade					C		C		C	B		C

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP		C		B							A	
CLA		B		B							B	
Secchi		C		C							C	
Lake Grade		C		B							B	

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP		C	C					C	C	B	B	B
CLA		C	B					B	B	B	B	B
Secchi		C	C			B		C	C	C	C	C
Lake Grade		C	C					C	C	B	B	B

Year	2016	2017	2018	2019
TP	C	C	B	C
CLA	B	B	B	B
Secchi	C	B	B	B
Lake Grade	C	B	B	B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Forest Lake [Middle Basin] (82–0159) Comfort Lake — Forest Lake Watershed District

Monitoring agency: Washington Conservation District staff

Forest Lake is located in the City of Forest Lake (Washington County). The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value. The lake is divided into three distinct basins. The entire lake has a surface area of 2,249 acres. The mean and maximum depths are 3.4 m and 11.5 m, respectively. The lake's watershed area is 4,285 acres, which gives a relatively low watershed-to-lake area ratio of 1.9. The greater the ratio, the greater the potential stress on the lake from surface runoff.

The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue) in 1998 and aquatic consumption (PCBs in fish tissue) in 2002. The MN DNR designated the lake as being infested with flowering rush (*Butomus umbellatus*) in 2007, Eurasian water milfoil (*Myriophyllum spicatum*) in 2015, and zebra mussels (*Dreissena polymorpha*) in 2015.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made by Washington Conservation District staff during their monitoring visits. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCE's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

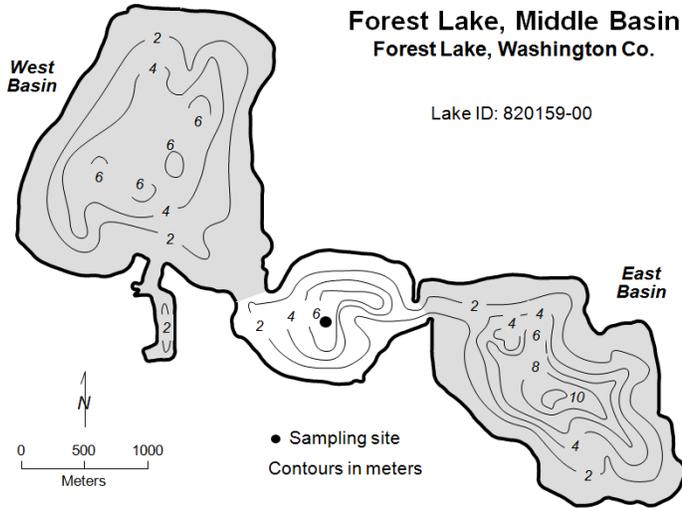
Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	49	16	103	C
CLA (µg/l)	16	1.6	35	B
Secchi (m)	2.6	1.2	5.0	B
TKN (mg/l)	0.86	0.56	1.60	
			Lake Grade	B

Note that the lake grades shown in the data summary table above were calculated from monitoring data sets from both the volunteer and Washington Conservation District (WCD) staff. The mean, minimum, and maximum values shown in the above data summary table and the results in the data table on the following page are specific to WCD staff monitoring data. The middle basin received a lake grade of B this year, similar to last year's grade. The middle basin typically receives B and C grades according to its historical water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

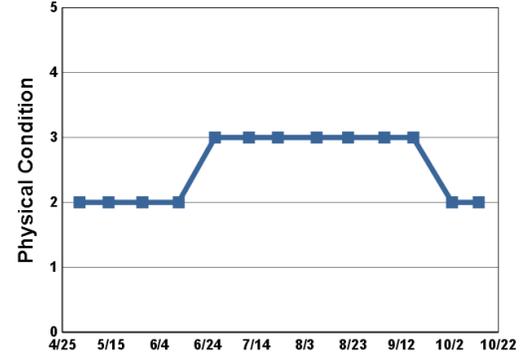
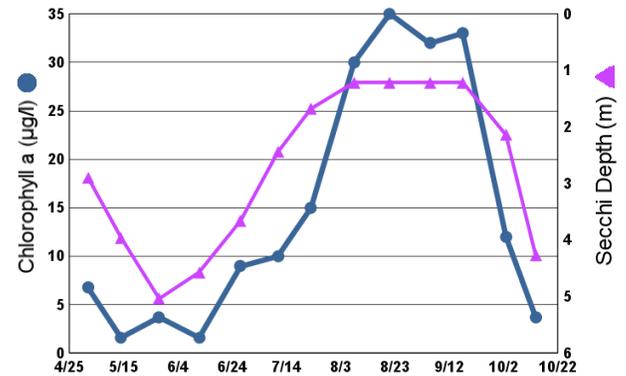
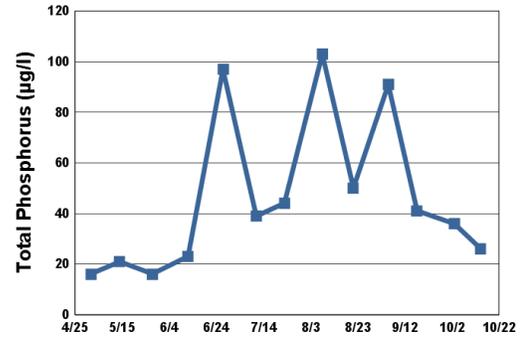
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

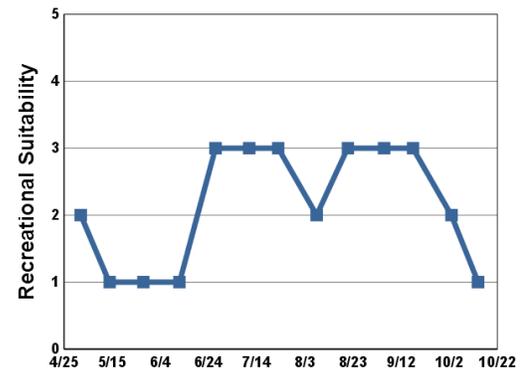


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/02/19	9.9	11.6	6.8	16	2.9	2	2
05/14/19	15.2	10.5	1.6	21	4.0	2	1
05/28/19	15.6	9.1	3.7	16	5.0	2	1
06/12/19	20.6	7.6	1.6	23	4.6	2	1
06/27/19	22.9		9.0	97	3.7	3	3
07/11/19	25.4	8.3	10	39	2.4	3	3
07/23/19	25.8	8.8	15	44	1.7	3	3
08/08/19	25.2	8.3	30	103	1.2	3	2
08/21/19	23.5	7.3	35	50	1.2	3	3
09/05/19	19.7	7.4	32	91	1.2	3	3
09/17/19	18.9	9.8	33	41	1.2	3	3
10/03/19	15.2	8.0	12	36	2.1	2	2
10/14/19	9.9	9.5	3.7	26	4.3	2	1



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- 4 = High Algal Color
- 5 = Severe Algal Bloom



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- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP					C		C	C	C	B		C
CLA					C		C		C	B	B	B
Secchi					C		C	C	C	C	C	C
Lake Grade					C		C		C	B		C

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP		C		B							A	
CLA		B		B							B	
Secchi		C		C							C	
Lake Grade		C		B							B	

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP		C	C					C	C	B	B	B
CLA		C	B					B	B	B	B	B
Secchi		C	C			B		C	C	C	C	C
Lake Grade		C	C					C	C	B	B	B

Year	2016	2017	2018	2019
TP	C	C	B	C
CLA	B	B	B	B
Secchi	C	B	B	B
Lake Grade	C	B	B	B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Forest Lake [East Basin, Site 3] (82–0159) Comfort Lake — Forest Lake Watershed District

Volunteer: Jim Dibble

Forest Lake is located in the City of Forest Lake (Washington County). The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value. The lake is divided into three distinct basins. The entire lake has a surface area of 2,249 acres. The mean and maximum depths are 3.4 m and 11.5 m, respectively. The east basin is the deepest of the three basins. The lake's watershed area is 4,285 acres, which gives a relatively low watershed-to-lake area ratio of 1.9. The greater the ratio, the greater the potential stress on the lake from surface runoff.

The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue) in 1998 and aquatic consumption (PCBs in fish tissue) in 2002. The MN DNR designated the lake as being infested with flowering rush (*Butomus umbellatus*) in 2007, Eurasian water milfoil (*Myriophyllum spicatum*) in 2015, and zebra mussels (*Dreissena polymorpha*) in 2015.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

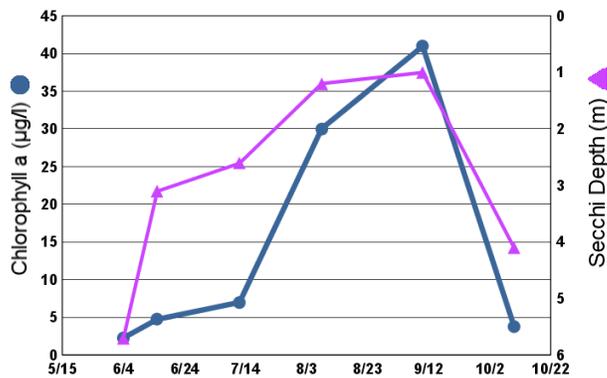
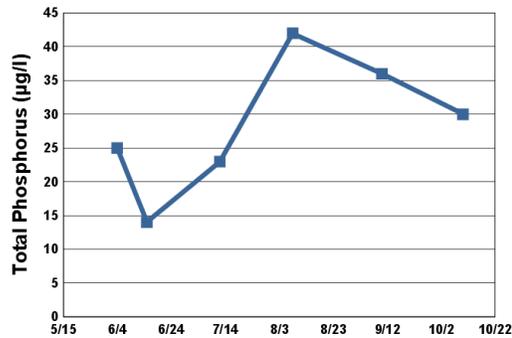
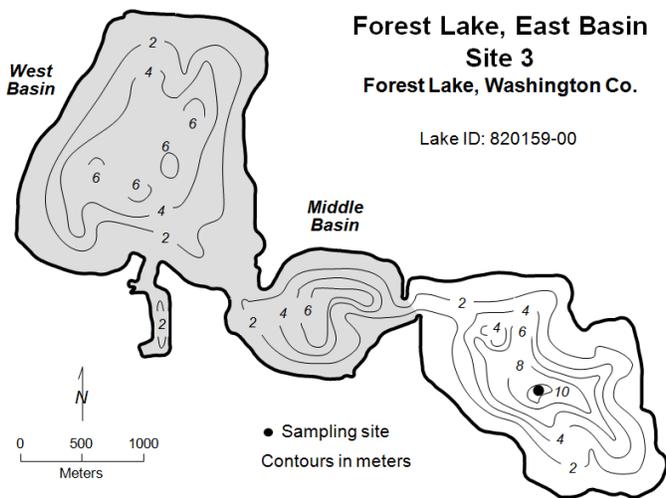
Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	28	14	42	B
CLA (µg/l)	17	2.3	41	B
Secchi (m)	2.7	1.0	5.7	B
TKN (mg/l)	0.62	0.52	0.82	
			Lake Grade	B

Note that the lake grades shown in the data summary table above were calculated from monitoring data sets from both the volunteer and Washington Conservation District staff. The mean, minimum, and maximum values shown in the above data summary table and the results in the data table on the following page are specific to the volunteer's monitoring data. The east basin (site 3) received a lake grade of B this year. The east typically basin has received a C grade since 1980 although there have been more Bs than Cs since 2012. Continued monitoring is recommended to determine if this recent improvement in water quality is part of a longer term trend.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

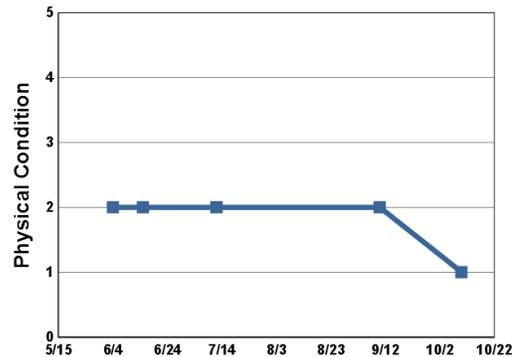
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

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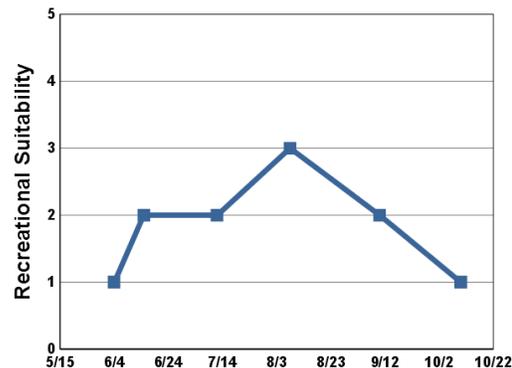


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
06/04/19	21.3		2.3	25	5.7	2	1
06/15/19	21.1		4.8	14	3.1	2	2
07/12/19	25.8		7.0	23	2.6	2	2
08/08/19	26.5		30	42	1.2		3
09/10/19			41	36	1.0	2	2
10/10/19	14.1		3.8	30	4.1	1	1



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Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP	C				C		D	C		B		B
CLA	D				C		C			B	B	C
Secchi	C				C		C	C	C	C	C	C
Lake Grade	C				C		C			B		C

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP		C			C						B	
CLA		B			B						B	
Secchi		C			C						C	
Lake Grade		C			C						B	

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP		C	C					C	C	B	B	B
CLA		C	B					C	B	B	A	B
Secchi		C	C			C	C	D	B	C	C	B
Lake Grade		C	C					C	B	B	B	B

Year	2016	2017	2018	2019
TP	C	C	C	B
CLA	C	B	B	B
Secchi	C	B	C	B
Lake Grade	C	B	C	B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Forest Lake [East Basin, Site 3] (82–0159) Comfort Lake — Forest Lake Watershed District

Monitoring agency: Washington Conservation District staff

Forest Lake is located in the City of Forest Lake (Washington County). The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value. The lake is divided into three distinct basins. The entire lake has a surface area of 2,249 acres. The mean and maximum depths are 3.4 m and 11.5 m, respectively. The east basin is the deepest of the three basins. The lake's watershed area is 4,285 acres, which gives a relatively low watershed-to-lake area ratio of 1.9. The greater the ratio, the greater the potential stress on the lake from surface runoff.

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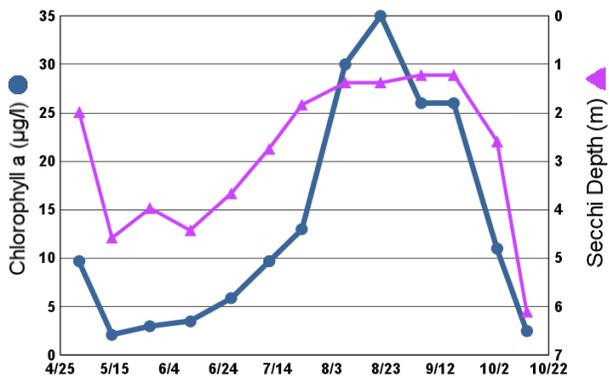
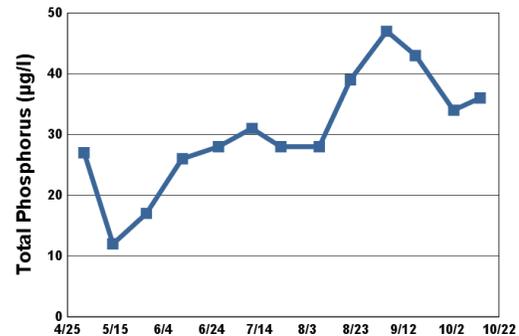
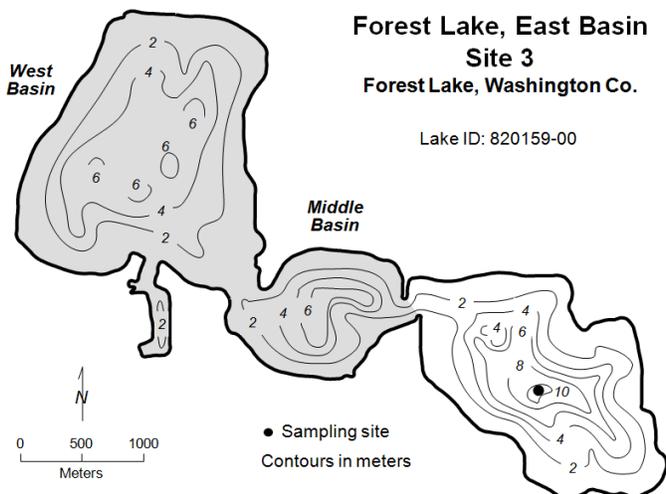
Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	30	12	47	B
CLA (µg/l)	15	2.1	35	B
Secchi (m)	2.6	1.2	4.6	B
TKN (mg/l)	0.73	0.50	0.90	
			Lake Grade	B

Note that the lake grades shown in the data summary table above were calculated from monitoring data sets from both the volunteer and Washington Conservation District (WCD) staff. The mean, minimum, and maximum values shown in the above data summary table and the results in the data table on the following page are specific to WCD staff monitoring data. The east basin (site 3) received a lake grade of B this year. The east typically basin has received a C grade since 1980 although there have been more Bs than Cs since 2012. Continued monitoring is recommended to determine if this recent improvement in water quality is part of a longer term trend.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

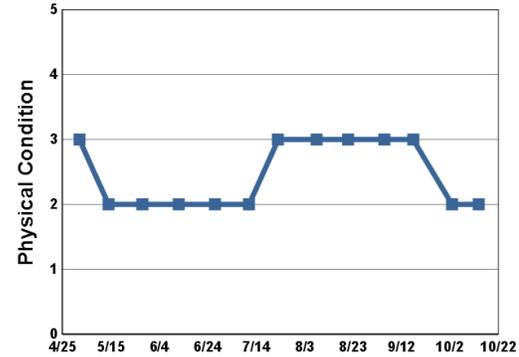
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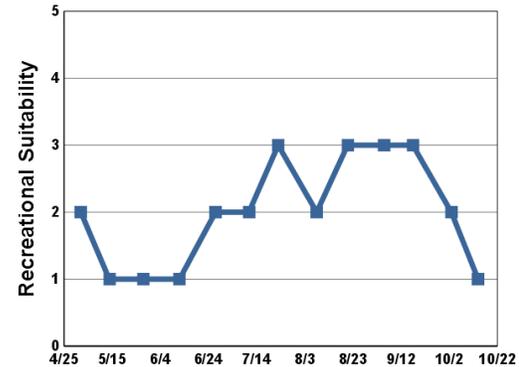


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/02/19	9.8	11.6	9.7	27	2.0	3	2
05/14/19	14.7	10.1	2.1	12	4.6	2	1
05/28/19	15.5	9.6	3.0	17	4.0	2	1
06/12/19	20.5	8.0	3.5	26	4.4	2	1
06/27/19	22.1	8.6	5.9	28	3.7	2	2
07/11/19	25.2	10.0	9.7	31	2.7	2	2
07/23/19	25.8	8.1	13	28	1.8	3	3
08/08/19	25.2	8.5	30	28	1.4	3	2
08/21/19	23.4	7.1	35	39	1.4	3	3
09/05/19	19.7	6.8	26	47	1.2	3	3
09/17/19	19.0	10.0	26	43	1.2	3	3
10/03/19	15.8	7.7	11	34	2.6	2	2
10/14/19	10.4	9.3	2.5	36	6.1	2	1



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Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP	C				C		D	C		B		B
CLA	D				C		C			B	B	C
Secchi	C				C		C	C	C	C	C	C
Lake Grade	C				C		C			B		C

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP		C			C						B	
CLA		B			B						B	
Secchi		C			C						C	
Lake Grade		C			C						B	

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP		C	C					C	C	B	B	B
CLA		C	B					C	B	B	A	B
Secchi		C	C			C	C	D	B	C	C	B
Lake Grade		C	C					C	B	B	B	B

Year	2016	2017	2018	2019
TP	C	C	C	B
CLA	C	B	B	B
Secchi	C	B	C	B
Lake Grade	C	B	C	B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Fourth Lake (13–0022) *Comfort Lake — Forest Lake Watershed District*

Monitoring agency: Washington Conservation District staff

Fourth Lake is located in Chisago Lake Township (Chisago County). It has a surface area of 33 acres, and a maximum depth of about 2.0 m. The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	79	31	203	D
CLA ($\mu\text{g/l}$)	11	1.8	34	B
Secchi (m)	+0.9	>0.2	+1.8	
TKN (mg/l)	0.93	0.50	1.50	
			Lake Grade	

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

There was an insufficient quantity of valid Secchi transparency measurements to determine a Secchi grade. An invalid measurement occurred if the Secchi disk was either visible on the lake bottom or the disk's visibility was blocked by aquatic vegetation. In both of these situations the water clarity would have been greater than that indicated by the measurement. A lake grade was not given because all three parameter grades are required to issue a lake grade. This was the first year that Fourth Lake has been part of the Metropolitan Council's lake monitoring program. The MPCA's EQuIS database was searched for additional historical monitoring data collected by agencies other than the Metropolitan Council. Additional data were not found.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

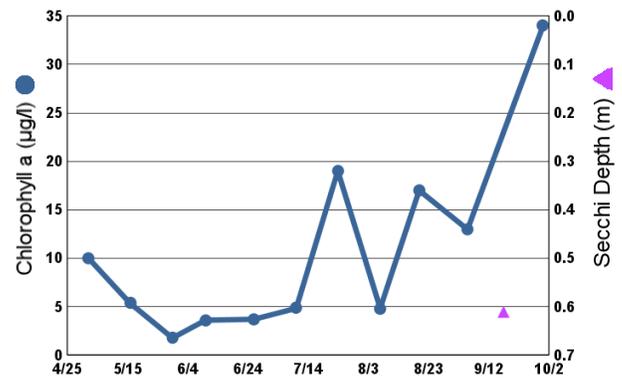
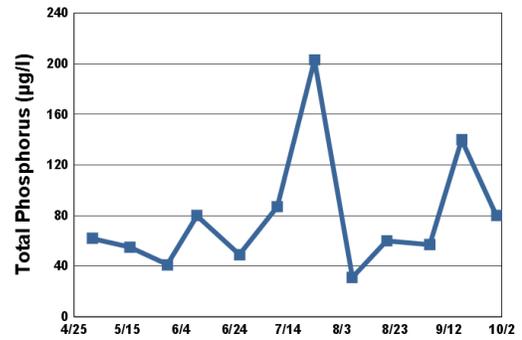
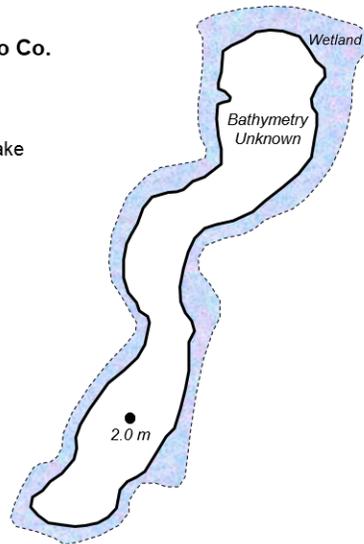
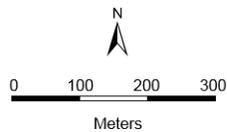
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Fourth Lake
Chisago Lake Twp., Chisago Co.

Lake ID: 130022-00

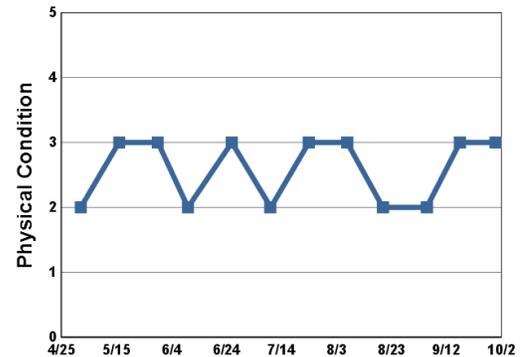
WD: Comfort Lake – Forest Lake

- Sampling site
- Contours in meters

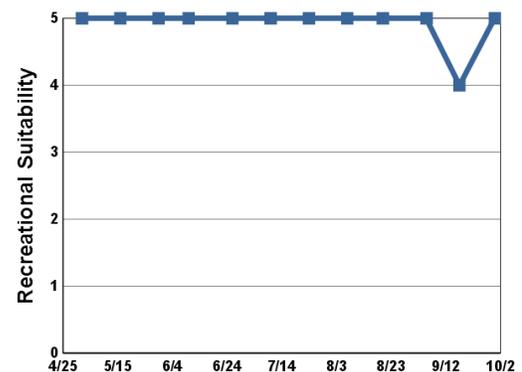


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/02/19	9.1	5.4	10	62	+1.2	2	5
05/16/19	19.0	5.7	5.4	55	+1.8	3	5
05/30/19	15.9	4.3	1.8	41	+1.5	3	5
06/10/19	22.1	2.6	3.6	80	+1.2	2	5
06/26/19	21.1	4.7	3.7	49	>1.1	3	5
07/10/19	23.5	0.6	4.9	87	>0.8	2	5
07/24/19	22.6	0.3	19	203	>0.2	3	5
08/07/19	25.7	6.2	4.8	31	>0.5	3	5
08/20/19	20.9	1.6	17	60	>0.8	2	5
09/05/19	18.2	1.5	13	57	>0.5	2	5
09/17/19	19.2	1.3		140	0.6	3	4
09/30/19	16.9	1.4	34	80	>0.8	3	5



- 1 = Crystal Clear
- 2 = Some Algae Present
- 3 = Definite Algal Presence
- 4 = High Algal Color
- 5 = Severe Algal Bloom



- 1 = Beautiful
- 2 = Minor Aesthetic Problem
- 3 = Swimming Impaired
- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.
> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP											D	C
CLA											B	B
Secchi												
Lake Grade												

Year	2016	2017	2018	2019
TP				D
CLA				B
Secchi				
Lake Grade				

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

German Lake (82–0056) Carnelian — Marine — St. Croix Watershed District

Monitoring agency: Washington Conservation District staff

German Lake is located in the city of Scandi (Washington County). It has an area of 109 acres. There is little known morphological data available for the lake.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

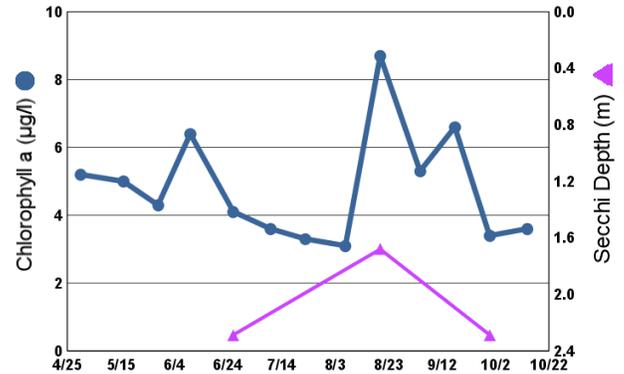
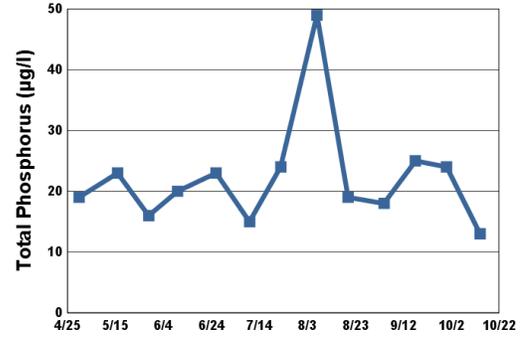
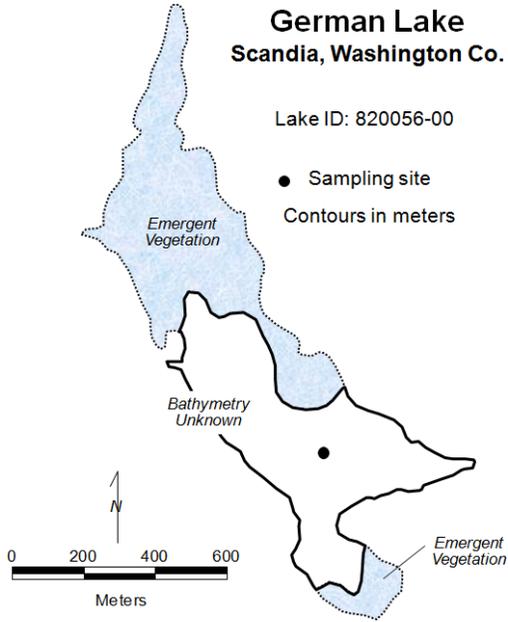
Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	23	15	49	B
CLA (µg/l))	4.9	3.1	8.7	A
Secchi (m)	>2.3	>1.7	>2.9	
TKN (mg/l)	0.57	0.47	0.84	
			Lake Grade	

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

There was an insufficient quantity of valid Secchi transparency measurements to determine a Secchi grade. An invalid measurement occurred if the Secchi disk was either visible on the lake bottom or the disk's visibility was blocked by aquatic vegetation. In both of these situations the water clarity would have been greater than that indicated by the measurement. A lake grade was not given because all three parameter grades are required to issue a lake grade. The TP and CLA grades were typical of those received in its historical database.

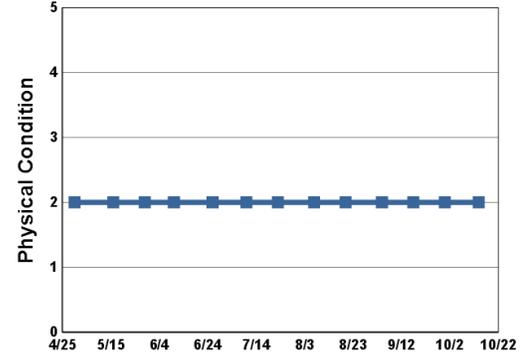
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

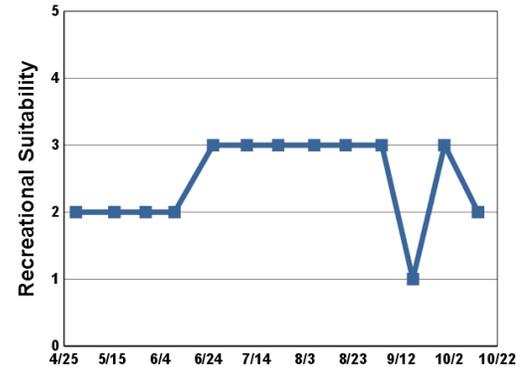


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/30/19	11.0	8.9	5.2	19	>2.6	2	2
05/16/19	17.6	8.4	5.0	23	>2.9	2	2
05/29/19	17.3	8.5	4.3	16	>2.7	2	2
06/10/19	21.7	6.7	6.4	20	>1.8	2	2
06/26/19	22.0	8.7	4.1	23	2.3	2	3
07/10/19	24.9	8.0	3.6	15	>2.4	2	3
07/23/19	25.6	7.2	3.3	24	>1.7	2	3
08/07/19	26.1	6.5	3.1	49	>2.0	2	3
08/20/19	23.3	4.1	8.7	19	1.7	2	3
09/04/19	20.3	5.7	5.3	18	>2.7	2	3
09/17/19	20.1	6.7	6.6	25	>2.7	2	1
09/30/19	16.5	5.6	3.4	24	2.3	2	3
10/14/19	8.7	9.8	3.6	13	+2.9	2	2



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.
> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP											B	B
CLA											A	A
Secchi											C	B
Lake Grade											B	B

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	B	B	C	A					B		A	A
CLA	A	A	A	A					A		A	A
Secchi	B	B	B	C	C	C						
Lake Grade	B	B	B	B								

Year	2016	2017	2018	2019
TP	A	A		B
CLA	A	A		A
Secchi				
Lake Grade				

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Goetschel Pond (82–0313) Valley Branch Watershed District

Monitoring agency: Washington Conservation District staff

Goetschel Lake is located in Grant Township (Washington County). The lake has a surface area of 22-acres. The lake's mean and maximum depth of 1.2 m (4 feet) and 4.2 m (14 feet) translates to an approximate volume of 88 ac-ft. Because of the shallowness of the lake, its entire surface area is considered littoral zone, which is the 0-15 feet depth zone of the lake dominated by aquatic vegetation. The lake has a 2,812-acre watershed which yields a watershed-to-lake area ratio of 122:1. The larger the ratio the greater the potential stress on the lake from surface runoff.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

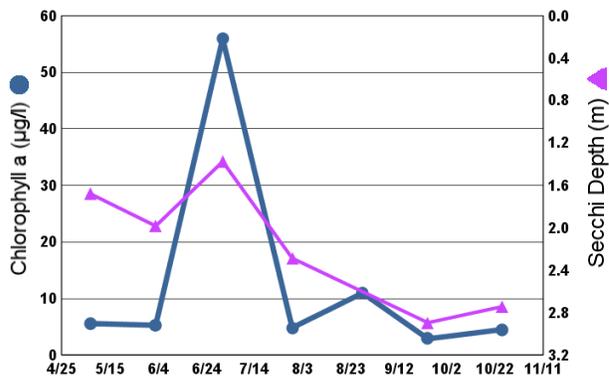
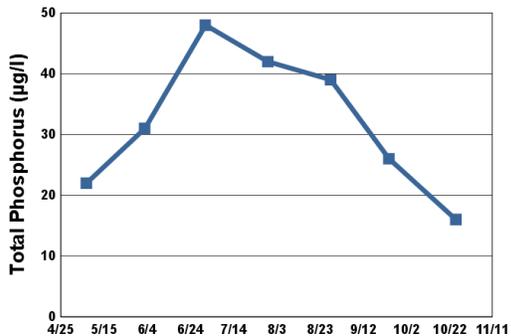
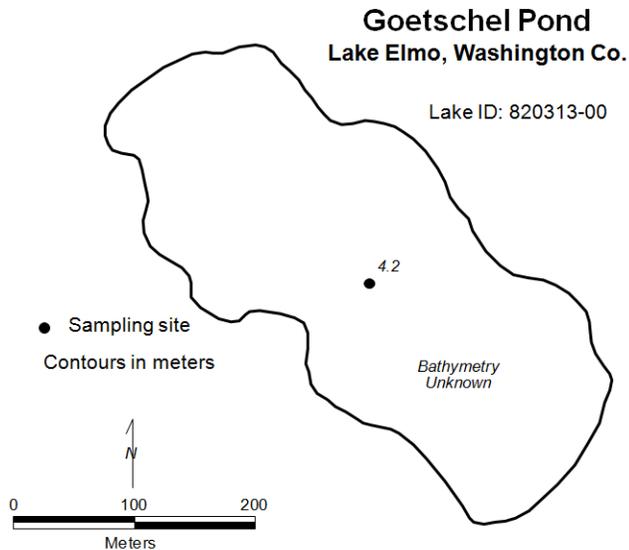
Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	35	22	48	C
CLA ($\mu\text{g/l}$)	14	3.0	56	B
Secchi (m)	>2.0	1.4	2.9	C
TKN (mg/l)	0.70	0.53	1.00	
			Lake Grade	C

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

The lake received a lake grade of C this year which is a lower water quality compared to the B grades received in the 2000s. Continued monitoring is recommended to determine if this recent deterioration in water quality is part of a longer term trend.

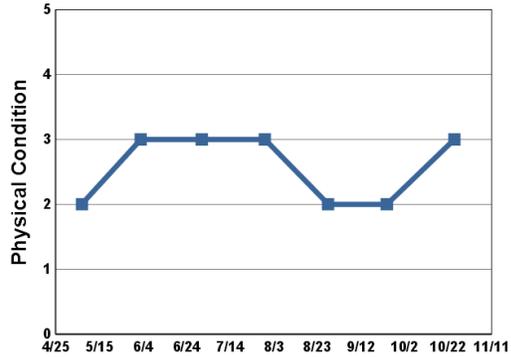
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.



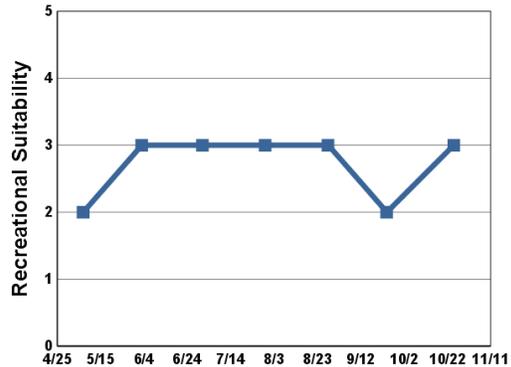
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/07/19	14.6	9.8	5.6	22	1.7	2	2
06/03/19	20.5	8.8	5.3	31	2.0	3	3
07/01/19	24.9	10.5	56	48	1.4	3	3
07/30/19	26.6	5.8	4.8	42	2.3	3	3
08/28/19	21.0	4.7	11	39	>1.8	2	3
09/24/19	21.2	7.7	3.0	26	2.9	2	2
10/25/19	8.7	10.1	4.5	16	2.7	3	3



> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

- 1 = Crystal Clear
- 2 = Some Algae Present
- 3 = Definite Algal Presence
- 4 = High Algal Color
- 5 = Severe Algal Bloom



- 1 = Beautiful
- 2 = Minor Aesthetic Problem
- 3 = Swimming Impaired
- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP											C	C
CLA											A	A
Secchi											C	B
Lake Grade											B	B

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	B	C	C	B	B	C	C					
CLA	B	A	A	A	A	A	A					
Secchi	C	C	B	C	C	D	C					
Lake Grade	B	B	B	B	B	C	B					

Year	2016	2017	2018	2019
TP				C
CLA				B
Secchi				C
Lake Grade				C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Goggins Lake (82–0077) Browns Creek Watershed District

Monitoring agency: Washington Conservation District staff

Goggins Lake is located within May Township (Washington County). It has a surface area of a 11 acres. Little bathymetric information is available for the lake. The maximum depth is approximately 4.0 m (13 feet). The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2006.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	54	41	75	C
CLA (µg/l)	30	3.6	42	C
Secchi (m)	1.5	0.8	3.8	C
TKN (mg/l)	1.20	0.74	1.50	
			Lake Grade	C

The lake received a lake grade of C for this year which is consistent with those received in some previous years. The lake's water quality seems to be represented by a lake grade of C or D, depending on the year.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP								D	D	D	D	C
CLA								C	C	C	C	C
Secchi								C	D	D	D	C
Lake Grade								C	D	D	D	C

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	D	D	D	D	D	D	D	D	C	D	C
CLA	C	C	C	D	C	C	D	C	C	C	C	C
Secchi	D	C	D	D	D	D	D	C	C	D	D	D
Lake Grade	C	C	D	D	D	D	D	C	C	C	D	C

Year	2016	2017	2018	2019
TP	C	C	C	C
CLA	C	C	B	C
Secchi	D	D	C	C
Lake Grade	C	C	C	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Goose Lake [Scandia] (82–0059) Carnelian — Marine — St. Croix Watershed District

Monitoring agency: Washington Conservation District staff

Goose Lake is located in the City of Scandia (Washington County). The lake has a surface area of 83 acres. The lake has a maximum and mean depth of 7.6 m (25 feet) and 2.4 m (8 feet), respectively.

The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue) in 2012 and aquatic recreational use (nutrient/eutrophication biological indicators) in 2002. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*).

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	48	32	83	C
CLA (µg/l)	27	7.6	53	C
Secchi (m)	1.9	0.8	3.0	C
TKN (mg/l)	1.12	0.82	1.40	
			Lake Grade	C

The lake received a lake grade of C this year, which is consistent with its historical water quality database.

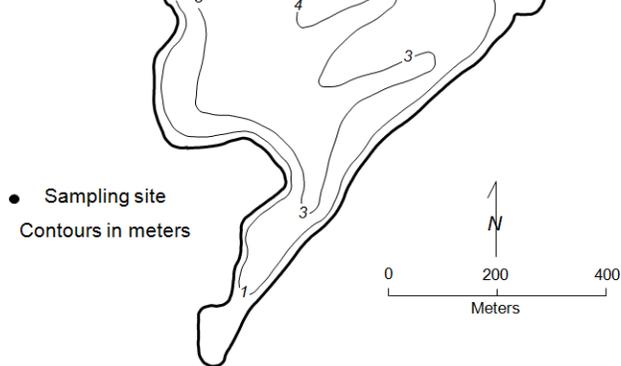
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

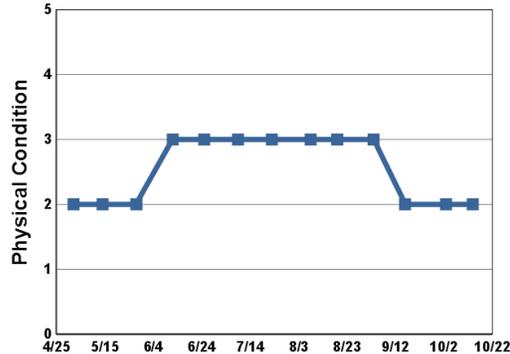
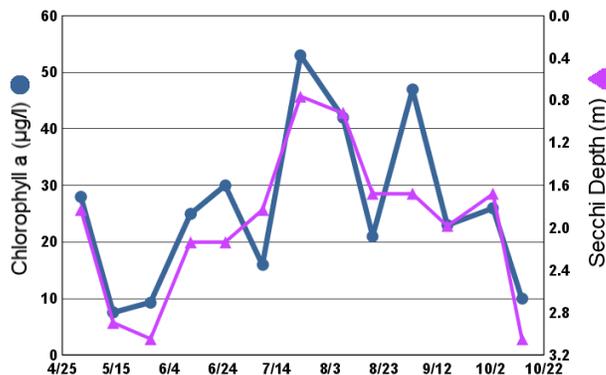
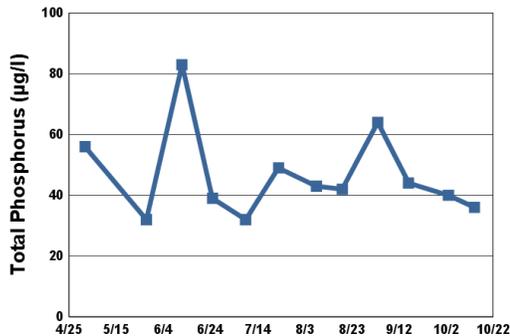
**Goose Lake,
Scandia, Washington Co.**

Lake ID: 820059-00

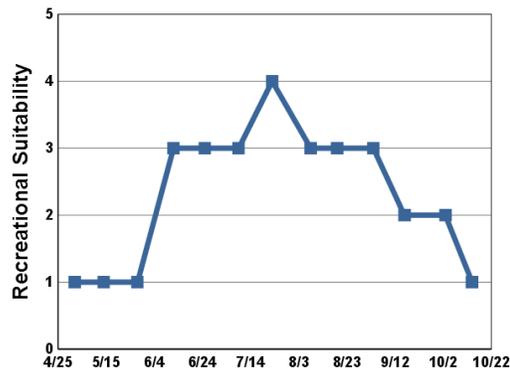


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/02/19	9.7	10.2	28	56	1.8	2	1
05/14/19	15.0	10.3	7.6		2.9	2	1
05/28/19	14.3	8.4	9.3	32	3.0	2	1
06/12/19	20.7	9.4	25	83	2.1	3	3
06/25/19	21.5	9.1	30	39	2.1	3	3
07/09/19	26.2	8.9	16	32	1.8	3	3
07/23/19	25.2	8.7	53	49	0.8	3	4
08/08/19	25.3	8.3	42	43	0.9	3	3
08/19/19	24.8	7.9	21	42	1.7	3	3
09/03/19	21.1	9.5	47	64	1.7	3	3
09/16/19	20.4	8.7	23	44	2.0	2	2
10/03/19	15.6	9.1	26	40	1.7	2	2
10/14/19	10.5	7.7	10	36	3.0	2	1



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP			C	D	C	C	C					
CLA			C	B	C	C	C					
Secchi			D	C	C	C	C					
Lake Grade			C	C	C	C	C					

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	C	D	C	C	C	C	C	C	C	B	C
CLA	C	C	C	C	C	C	B	C	C	C	B	C
Secchi	B	C	C	C	C	C	C	C	C	C	B	C
Lake Grade	C	C	C	C	C	C	C	C	C	C	B	C

Year	2016	2017	2018	2019
TP	B	B	C	C
CLA	C	C	C	C
Secchi	C	C	C	C
Lake Grade	C	C	C	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Goose Lake [North Basin] (82–0113–01) *Valley Branch Watershed District*

Monitoring agency: Washington Conservation District staff

Goose Lake is located in the City of Lake Elmo (Washington County). The lake is split into two basins by county highway 10. Site #1 is located in the north basin. The depth of the north basin at the sampling location is 1.8 m (6 ft). There is no other bathymetric information available for the lake.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

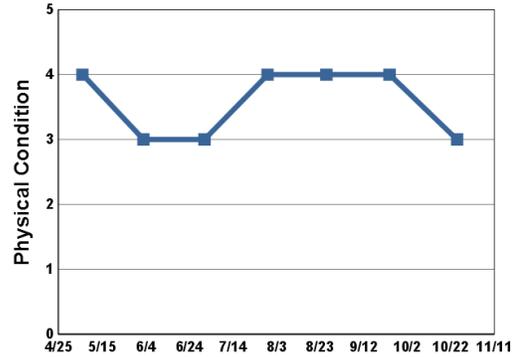
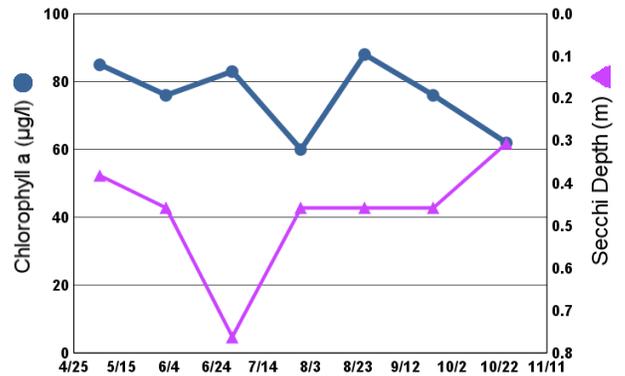
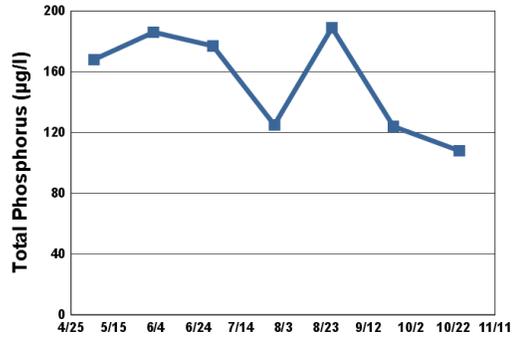
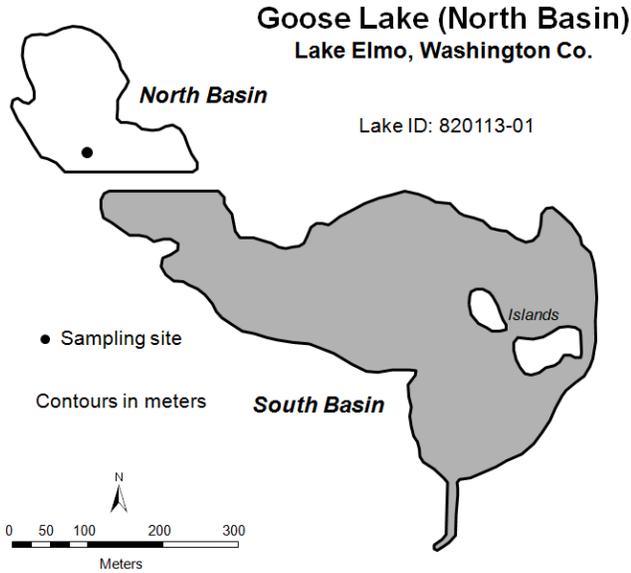
2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	162	124	189	F
CLA (µg/l))	78	60	88	F
Secchi (m)	0.5	0.4	0.8	F
TKN (mg/l)	1.75	1.50	2.00	
			Lake Grade	F

The north basin received a lake grade of F this year which is consistent with its historical water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

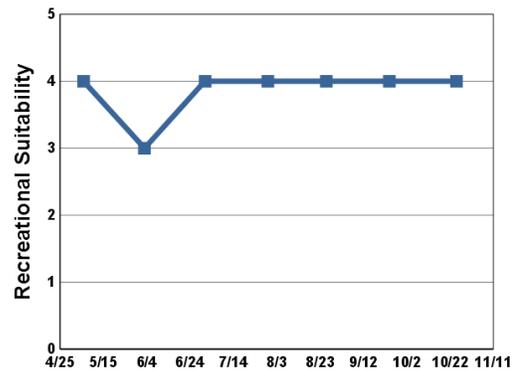
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.



2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/06/19	16.6	12.6	85	168	0.4	4	4
06/03/19	19.4	13.3	76	186	0.5	3	3
07/01/19	24.3	8.0	83	177	0.8	3	4
07/30/19	24.8	7.2	60	125	0.5	4	4
08/26/19	21.8	6.1	88	189	0.5	4	4
09/24/19	20.3	5.9	76	124	0.5	4	4
10/25/19	9.1	12.5	62	108	0.3	3	4

1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP					F	F	F		F	F	F	F
CLA					F	F	F		F	D	F	F
Secchi					F	F	F		F	F	D	F
Lake Grade					F	F	F		F	F	F	F

Year	2016	2017	2018	2019
TP	F	D	D	F
CLA	D	D	F	F
Secchi	F	F	F	F
Lake Grade	F	D	F	F

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Goose Lake [South Basin] (82–0113–02) *Valley Branch Watershed District*

Monitoring agency: Washington Conservation District staff

Goose Lake is located in the City of Lake Elmo (Washington County). The lake is split into two basins by county highway 10. Site #2 is located in the south basin. The depth of the south basin at the sampling location is 2.1 m (7 ft). There is no other bathymetric information available for the lake.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2012.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

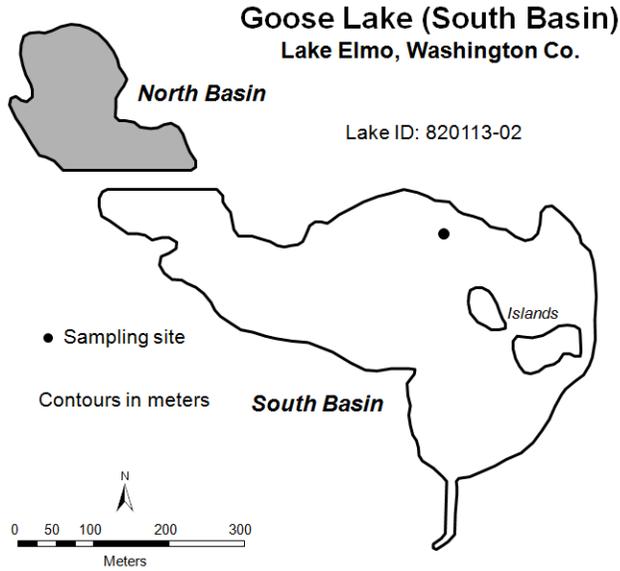
2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	70	57	83	D
CLA (µg/l)	50	15	100	D
Secchi (m)	0.7	0.3	1.5	F
TKN (mg/l)	1.57	1.20	2.00	
			Lake Grade	D

The south basin received a lake grade of D this year which is consistent with its historical water quality database. The south basin has fluctuated between D and F lake grades since 2008.

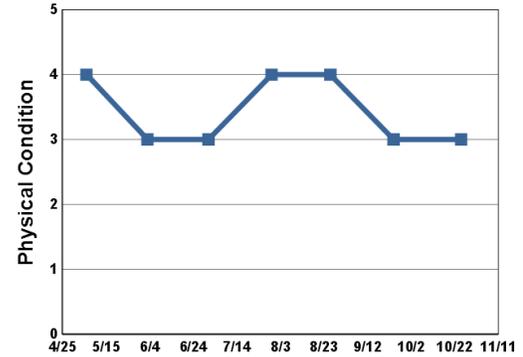
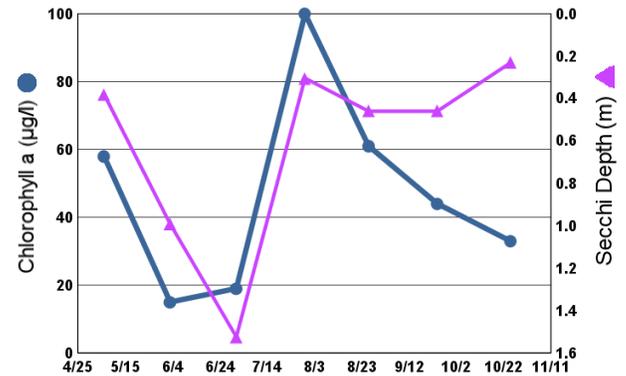
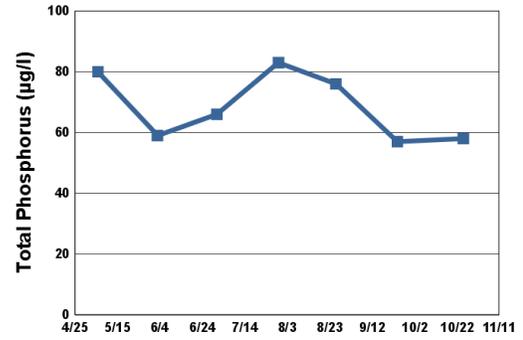
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

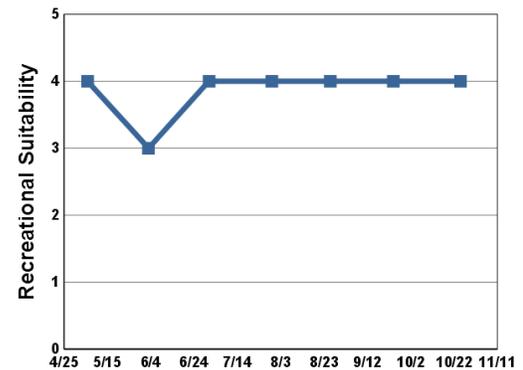


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/06/19	15.5	10.8	58	80	0.4	4	4
06/03/19	19.8	8.9	15	59	1.0	3	3
07/01/19	24.5	7.1	19	66	1.5	3	4
07/30/19	24.6	6.0	100	83	0.3	4	4
08/26/19	22.3	4.9	61	76	0.5	4	4
09/24/19	20.1	7.8	44	57	0.5	3	4
10/25/19	8.5	11.4	33	58	0.2	3	4



- 1 = Crystal Clear
- 2 = Some Algae Present
- 3 = Definite Algal Presence
- 4 = High Algal Color
- 5 = Severe Algal Bloom



- 1 = Beautiful
- 2 = Minor Aesthetic Problem
- 3 = Swimming Impaired
- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP					F	F	F		F	D	C	D
CLA					F	F	F		F	D	C	D
Secchi					F	F	F		F	F	D	F
Lake Grade					F	F	F		F	D	C	D

Year	2016	2017	2018	2019
TP	D	D	D	D
CLA	F	D	D	D
Secchi	F	F	D	F
Lake Grade	F	D	D	D

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Haas Lake (70–0078) Prior Lake — Spring Lake Watershed District

Volunteer: Thomas Chaklos

Haas Lake is located in the city of Prior Lake (Scott County). It has a surface area of 32 acres. No other morphological data are available for the lake.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	45	24	91	C
CLA ($\mu\text{g/l}$)	8.7	2.7	15	A
Secchi (m)	+1.4	>1.0	>2.0	
TKN (mg/l)	0.65	0.51	0.87	
			Lake Grade	

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

There was an insufficient quantity of valid Secchi transparency measurements to determine a Secchi grade. An invalid measurement occurred if the Secchi disk was either visible on the lake bottom or the disk's visibility was blocked by aquatic vegetation. In both of these situations the water clarity would have been greater than that indicated by the measurement. There were less than 5 monitoring events during the summer-time period (May — September). At least 5 monitoring events are required during the summer-time period to determine a parameter grade. A lake grade was not given because all three parameter grades are required to issue a lake grade. Continued monitoring is recommended to build the water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP												
CLA												
Secchi												
Lake Grade												

Year	2016	2017	2018	2019
TP	C	C	C	C
CLA	D	A	B	A
Secchi				
Lake Grade				

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Hafften Lake (27–0199) Pioneer — Sarah Watershed Management Commission

Volunteer: Tom Cook

Hafften Lake is located in Greenfield (Hennepin County).. The 43-acre lake has a maximum depth of 13.4 m (roughly 44 feet).

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2004 and aquatic consumption (mercury in fish tissue) in 2012.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	30	26	37	
CLA ($\mu\text{g/l}$)	15	13	16	
Secchi (m)	1.5	1.3	1.7	
TKN (mg/l)	1.13	1.10	1.20	
			Lake Grade	

There were less than 5 monitoring events during the summer-time period (May — September). At least 5 monitoring events are required during the summer-time period to determine a parameter grade. A lake grade was not given because all three parameter grades are required to issue a lake grade. Continued monitoring is recommended to build the water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP									C	C		
CLA									C	C		
Secchi									C	C		
Lake Grade									C	C		

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	C	D				C			C	C	
CLA	C	C	B				C			C	C	
Secchi	D	C	C				D			C	D	
Lake Grade	C	C	C				C			C	C	

Year	2016	2017	2018	2019
TP	C	C	C	
CLA	C	B	C	
Secchi	D	D	C	
Lake Grade	C	C	C	

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Hawkes (27–0056) *Nine Mile Creek Watershed District*

Volunteer: Matthew Zappa, Jim Zappa

Hawkes Lake is a small lake located in the city of Edina (Hennepin County). There is little known morphological data available for the lake.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	110	74	205	D
CLA (µg/l))	81	8.6	430	F
Secchi (m)	1.1	0.8	1.3	D
TKN (mg/l)	1.13	0.83	1.50	
			Lake Grade	D

The lake received a lake grade of D this year. Continued monitoring is recommended to build the water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP												
CLA												
Secchi												
Lake Grade												

Year	2016	2017	2018	2019
TP	D	D	D	D
CLA	D	C	C	F
Secchi	D	D	D	D
Lake Grade	D	D	D	D

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Hay Lake (82–0065) Carnelian — Marine — St. Croix Watershed District

Monitoring agency: Washington Conservation District staff

Hay lake is located in the City of Scandia (Washington County). The lake has a surface area of 33 acres. It has a maximum depth of 6.1 m (20 feet).

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2002.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	28	21	49	B
CLA (µg/l)	6.3	2.6	20	A
Secchi (m)	>1.5	>0.9	>2.0	
TKN (mg/l)	0.58	0.46	0.77	
			Lake Grade	

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

There was an insufficient quantity of valid Secchi transparency measurements to determine a Secchi grade. An invalid measurement occurred if the Secchi disk was either visible on the lake bottom or the disk's visibility was blocked by aquatic vegetation. In both of these situations the water clarity would have been greater than that indicated by the measurement. A lake grade was not given because all three parameter grades are required to issue a lake grade. The relatively low CLA concentrations in combination with the observations of moderate to substantial macrophyte growth, indicate that the primary production of the lake is focused on production of aquatic macrophytes rather than algae. Summer time mean concentrations for TP and CLA have decreased in recent years in comparison to those in the late 1990s and 2000s.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

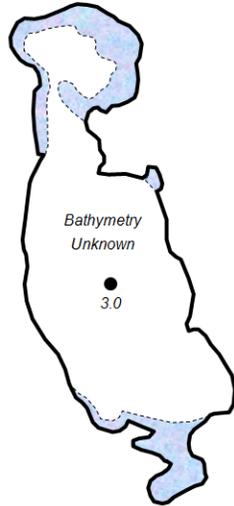
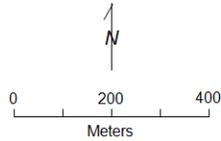
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Hay Lake
Scandia, Washington Co.

LAKE ID: 820065-00
WMO: Marine-on-St. Croix

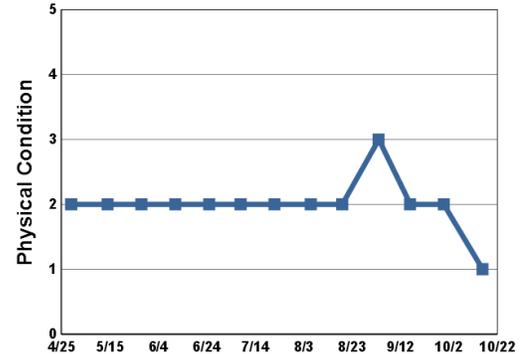
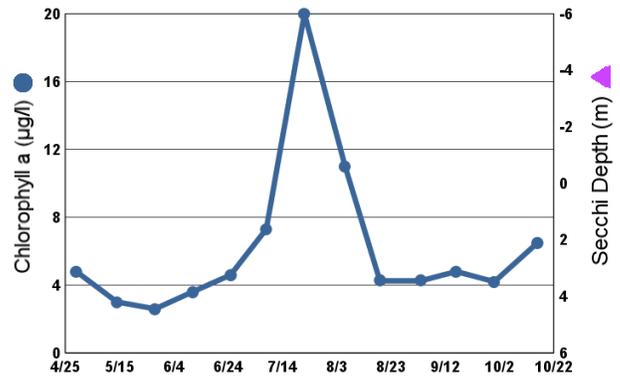
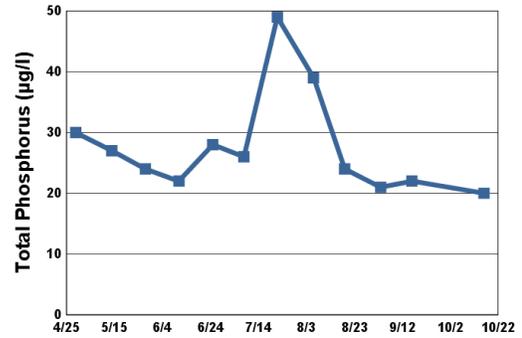
● Sampling site
Contours in meters



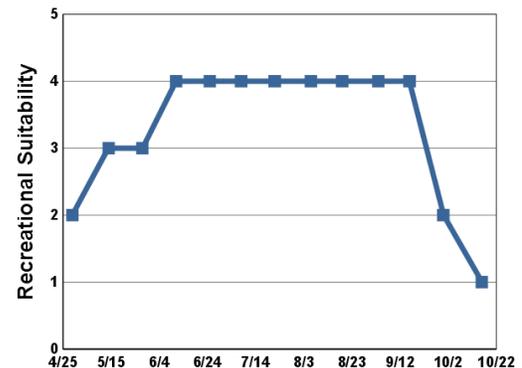
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/29/19	11.9	9.0	4.8	30	>1.4	2	2
05/14/19	17.7	8.7	3.0	27	>1.6	2	3
05/28/19	16.9	8.2	2.6	24	>1.8	2	3
06/11/19	21.8	6.4	3.6	22	>1.8	2	4
06/25/19	22.7	5.5	4.6	28	>1.5	2	4
07/08/19	26.2	5.4	7.3	26	>1.2	2	4
07/22/19	23.8	4.7	20	49	>1.4	2	4
08/06/19	24.7	4.0	11	39	>0.9	2	4
08/19/19	23.2	3.6	4.3	24	>0.9	2	4
09/03/19	21.9	4.9	4.3	21	>1.4	3	4
09/16/19	20.3	5.1	4.8	22	>1.5	2	4
09/30/19	16.9	8.4	4.2		>2.0	2	2
10/16/19	7.8	8.9	6.5	20	+2.1	1	1

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.
> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP							D	D	D	D		D
CLA							F	F	F	F		C
Secchi							D	D	D	D		C
Lake Grade							D	D	D	D		C

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	D	D	D	D	C	C	C	C		C	C	C
CLA	D	F	B	C	C	C	B	C		A	B	B
Secchi	D	D	C	C	C	C	C	C				
Lake Grade	D	D	C	C	C	C	C	C				

Year	2016	2017	2018	2019
TP	C	B	B	B
CLA	A	B	A	A
Secchi				
Lake Grade				

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Heifort's Pond (82-0485) Browns Creek Watershed District

Volunteer: George Vania

Heifort's Pond is small pond located in Stillwater Township (Washington County). Few morphological data are available for the pond.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	82	51	149	D
CLA ($\mu\text{g/l}$)	51	18	86	D
Secchi (m)	0.5	0.3	0.7	F
TKN (mg/l)	1.97	1.70	2.50	
			Lake Grade	D

Note that the lake grades shown in the data summary table above were calculated from monitoring data sets from both the volunteer and Washington Conservation District staff. The mean, minimum, and maximum values shown in the above data summary table and the results in the data table on the following page are specific to the volunteer's monitoring data. The pond received a lake grade of D this year. Continued monitoring is recommended to continue to build the water quality database.

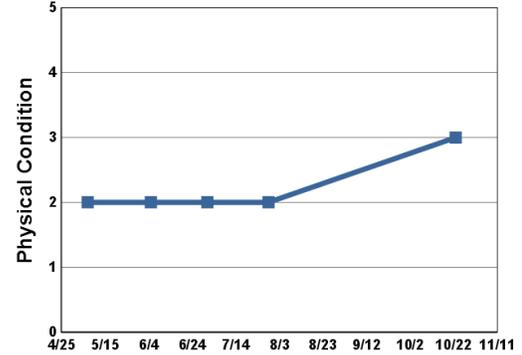
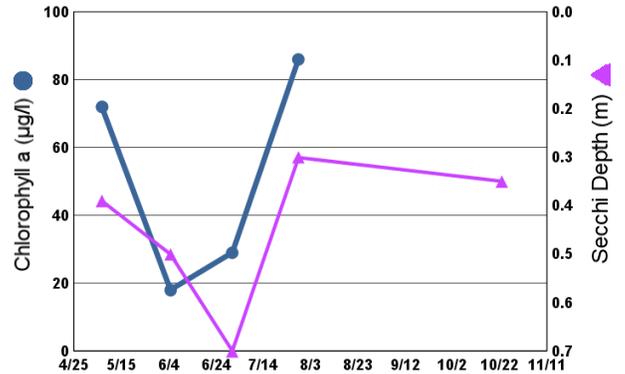
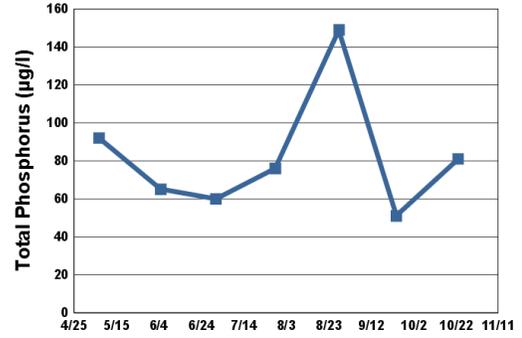
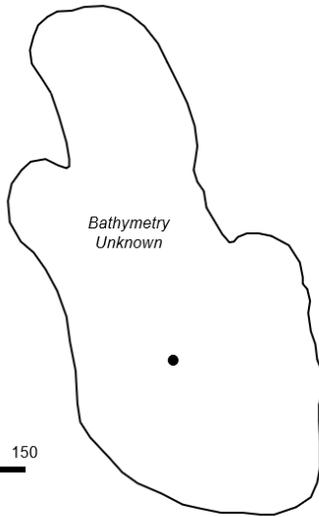
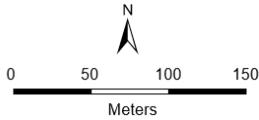
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Heifort's Pond
Stillwater, Washington Co.

Lake ID: 82048500

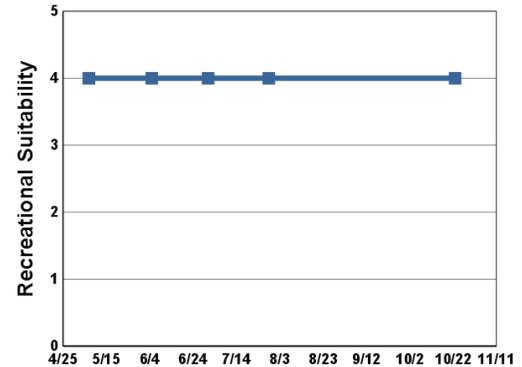
- Sampling site
- Contours in meters



2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/07/19	19.2		72	92	0.4	2	4
06/05/19			18	65	0.5	2	4
07/01/19	25.3		29	60	0.7	2	4
07/29/19	25.4		86	76	0.3	2	4
08/28/19				149			
09/24/19				51			
10/23/19	9.7			81	0.4	3	4

- 1 = Crystal Clear
- 2 = Some Algae Present
- 3 = Definite Algal Presence
- 4 = High Algal Color
- 5 = Severe Algal Bloom



- 1 = Beautiful
- 2 = Minor Aesthetic Problem
- 3 = Swimming Impaired
- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP												
CLA												
Secchi												
Lake Grade												

Year	2016	2017	2018	2019
TP		D	D	D
CLA		F	F	D
Secchi		F	F	F
Lake Grade		F	F	D

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Heifort's Pond (82–0485) Browns Creek Watershed District

Monitoring agency: Washington Conservation District staff

Heifort's Pond is small pond located in Stillwater Township (Washington County). Few morphological data are available for the pond.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCEs's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	64	36	89	D
CLA ($\mu\text{g/l}$)	68	36	100	D
Secchi (m)	0.5	0.4	0.6	F
TKN (mg/l)	1.72	1.10	2.00	
			Lake Grade	D

Note that the lake grades shown in the data summary table above were calculated from monitoring data sets from both the volunteer and Washington Conservation District (WCD) staff. The mean, minimum, and maximum values shown in the above data summary table and the results in the data table on the following page are specific to WCD staff monitoring data. The pond received a lake grade of D this year. Continued monitoring is recommended to continue to build the water quality database.

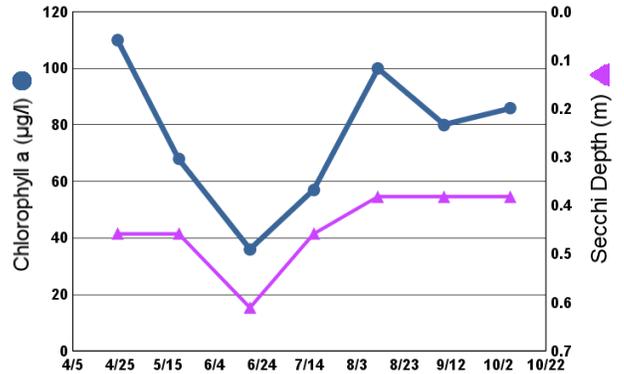
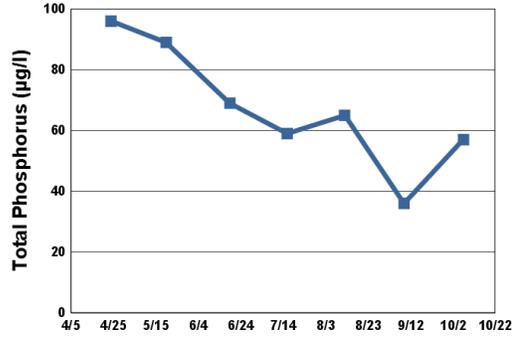
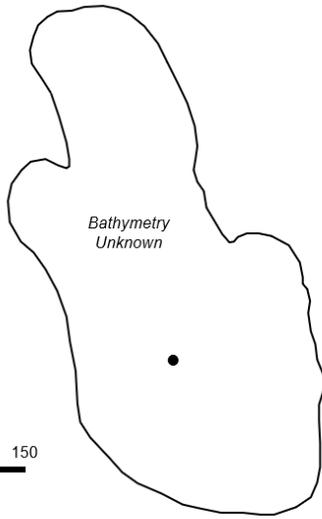
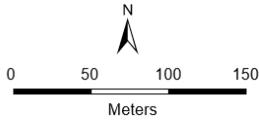
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Heifort's Pond
Stillwater, Washington Co.

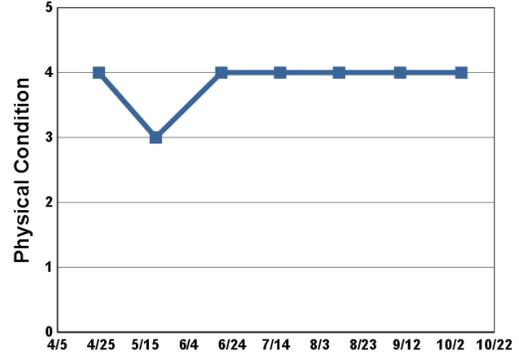
Lake ID: 82048500

- Sampling site
- Contours in meters

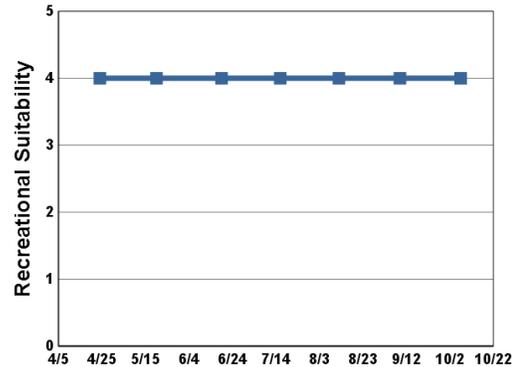


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/24/19	13.0	14.3	110	96	0.5	4	4
05/20/19	14.2	8.0	68	89	0.5	3	4
06/19/19	22.5	9.1	36	69	0.6	4	4
07/16/19	27.5	7.9	57	59	0.5	4	4
08/12/19	24.2	9.4	100	65	0.4	4	4
09/09/19	19.2	6.0	80	36	0.4	4	4
10/07/19	14.1	9.9	86	57	0.4	4	4



- 1 = Crystal Clear
- 2 = Some Algae Present
- 3 = Definite Algal Presence
- 4 = High Algal Color
- 5 = Severe Algal Bloom



- 1 = Beautiful
- 2 = Minor Aesthetic Problem
- 3 = Swimming Impaired
- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP												
CLA												
Secchi												
Lake Grade												

Year	2016	2017	2018	2019
TP		D	D	D
CLA		F	F	D
Secchi		F	F	F
Lake Grade		F	F	D

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Hornbeam Lake (19–0047) *City of Sunfish Lake*

Volunteer: Scott Spaeth

Hornbeam Lake is located within the City of Sunfish Lake (Dakota County). It has an area of approximately 22-acres. There are few morphological data available for the lake other than the depth at the sampling point is approximately 3.5 m. The lake is referred officially as Hornbeam Lake in the Minnesota Public Waters Inventory, which according to local residents and older reference documents is a typological error. The USGS performed a water quality study on the lake in 1975 and 1976.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

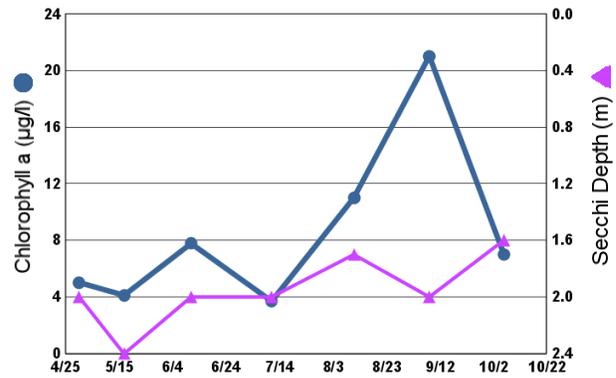
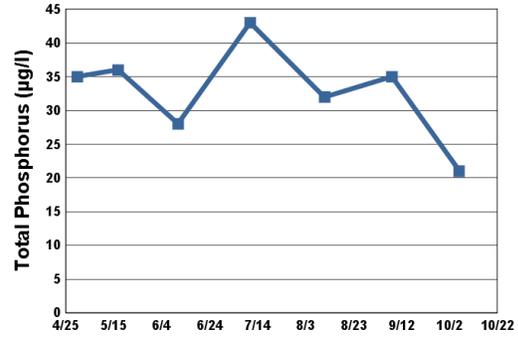
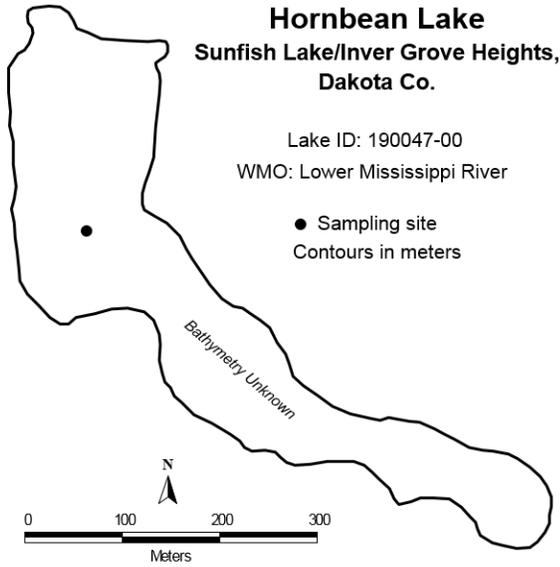
2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	35	28	43	C
CLA ($\mu\text{g/l}$)	9.5	3.7	21	A
Secchi (m)	2.0	1.7	2.4	C
TKN (mg/l)	0.80	0.67	0.93	
			Lake Grade	B

The lake received a lake grade of B this year. Continued monitoring is recommended to determine if this recent improvement in water quality is part of a longer term trend.

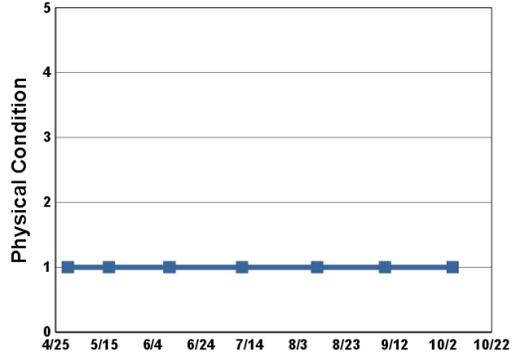
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

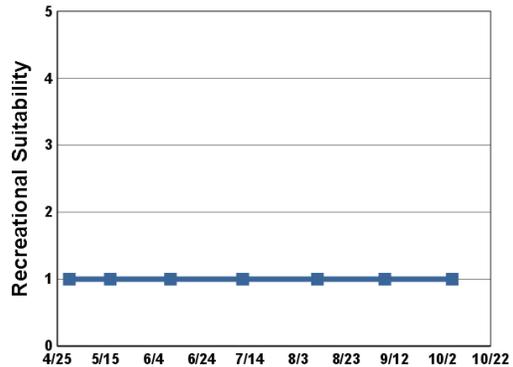


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/30/19	15.9		5.0	35	2.0	1	1
05/17/19	15.5		4.1	36	2.4	1	1
06/11/19	21.8		7.8	28	2.0	1	1
07/11/19	29.5		3.7	43	2.0	1	1
08/11/19	25.4		11	32	1.7	1	1
09/08/19	20.9		21	35	2.0	1	1
10/06/19	13.2		7.0	21	1.6	1	1



- 1 = Crystal Clear
- 2 = Some Algae Present
- 3 = Definite Algal Presence
- 4 = High Algal Color
- 5 = Severe Algal Bloom



- 1 = Beautiful
- 2 = Minor Aesthetic Problem
- 3 = Swimming Impaired
- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP			C	C	C						C	C
CLA			B	C	A						C	C
Secchi			C	C	B							D
Lake Grade			C	C	B							C

Year	2016	2017	2018	2019
TP	C	C	B	C
CLA	C	B	A	A
Secchi	D	C	B	C
Lake Grade	C	C	B	B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQGIS database(s)

Horseshoe Lake [Sunfish Lake] (19–0051) *City of Sunfish Lake*

Volunteer: Jim Naves

Horseshoe Lake is a 16-acre lake located within the City of Sunfish Lake (Dakota County). There is little morphological information available for the lake.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	37	25	44	
CLA (µg/l)	7.5	2.8	12	
Secchi (m)	>3.0	>2.9	>3.1	
TKN (mg/l)	0.55	0.43	0.62	
			Lake Grade	

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

There were less than 5 monitoring events during the summer-time period (May — September). At least 5 monitoring events are required during the summer-time period to determine a parameter grade. A lake grade was not given because all three parameter grades are required to issue a lake grade. Continued monitoring is recommended to continue to build the water quality database.

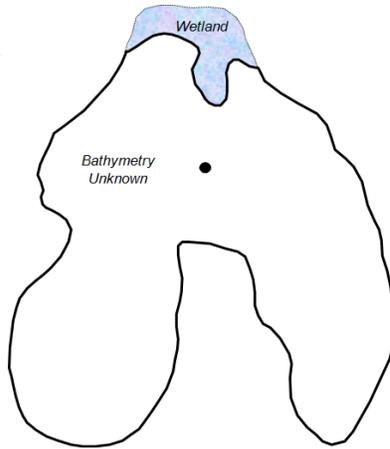
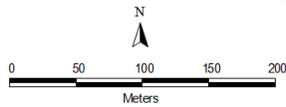
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Horseshoe Lake
Sunfish Lake, Dakota Co.

Lake ID: 190051-00

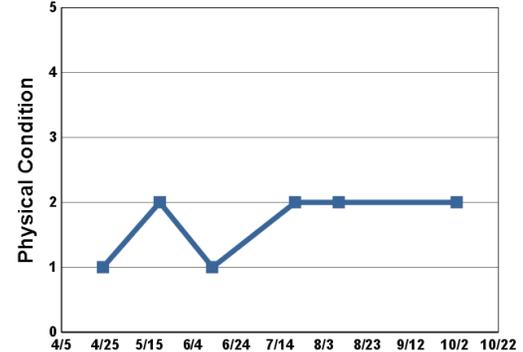
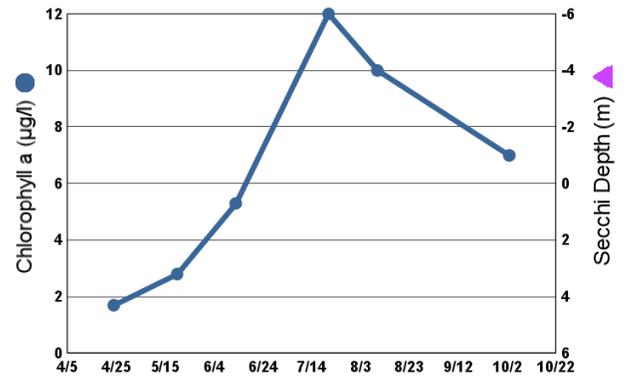
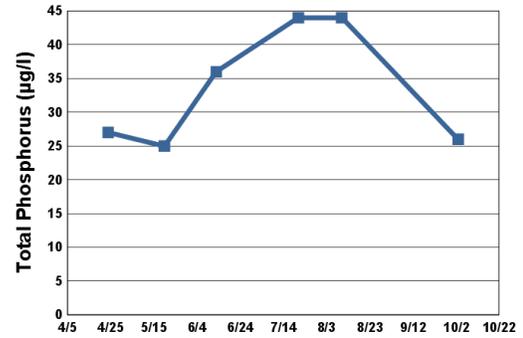
● Sampling site
Contours in meters



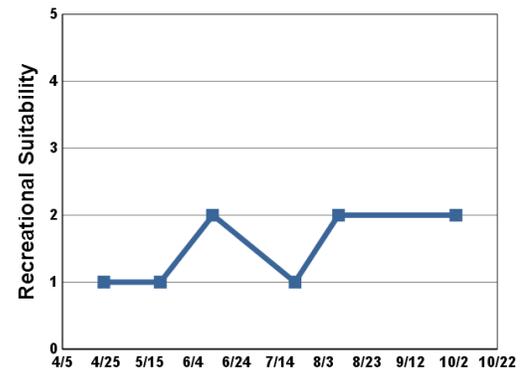
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/24/19	14.8		1.7	27	>3.0	1	1
05/20/19	18.0		2.8	25	>3.0	2	1
06/13/19	23.1		5.3	36	>3.1	1	2
07/21/19	26.0		12	44	>2.9	2	1
08/10/19	24.8		10	44	>3.1	2	2
10/03/19	14.9		7.0	26	>3.1	2	2

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP			C	C	A	B	C	A	C	B	B	C
CLA			A	A	A	A	A	A	B	A	A	B
Secchi			C	C	C	B	B	A				
Lake Grade			B	B	B	B	B	A				

Year	2016	2017	2018	2019
TP	B	C	B	
CLA	A	A	A	
Secchi	A	A	A	
Lake Grade	A	B	A	

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Horseshoe Lake [Site 3] (82–0074) Valley Branch Watershed District

Monitoring agency: Washington Conservation District staff

Horseshoe Lake is located in the City of Lake Elmo and West Lakeland Township (Washington County). The lake has a surface area of 53 acres and a maximum depth 3.4m (11 ft).

The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 2013.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

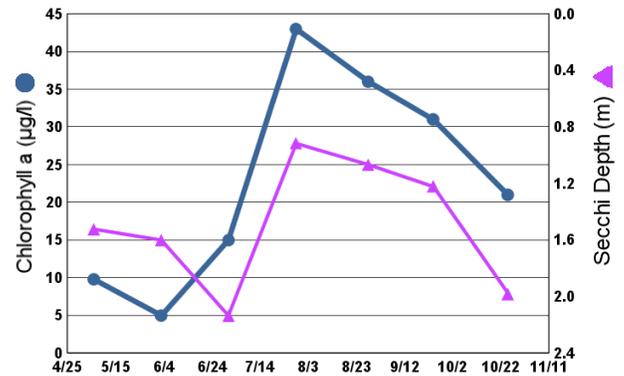
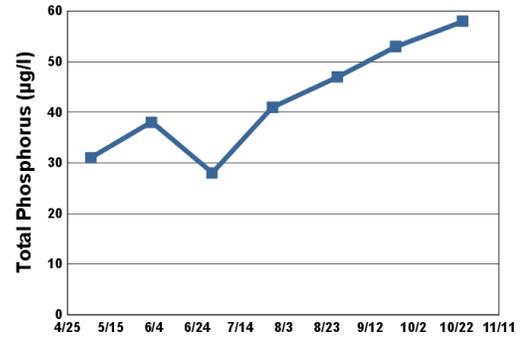
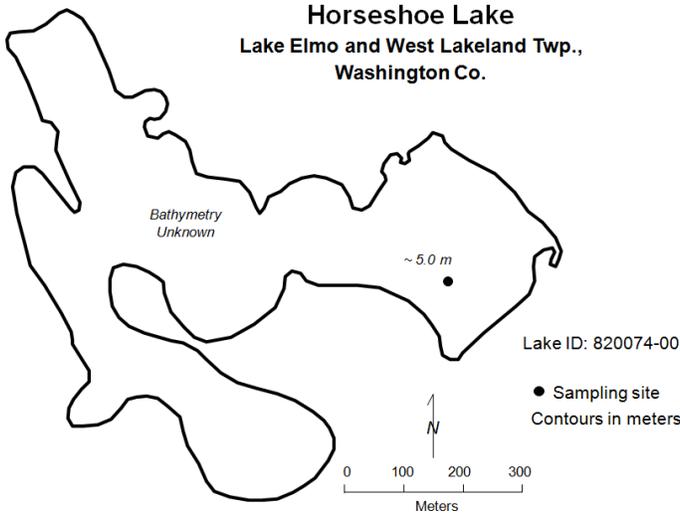
2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	40	28	53	C
CLA (µg/l)	23	5.0	43	C
Secchi (m)	1.4	0.9	2.1	C
TKN (mg/l)	0.90	0.68	1.20	
			Lake Grade	C

The lake site received a lake grade of C this year which is consistent with its historical database. Continued monitoring is recommended to build the water quality database.

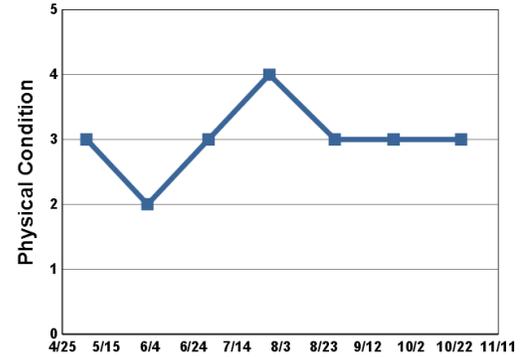
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

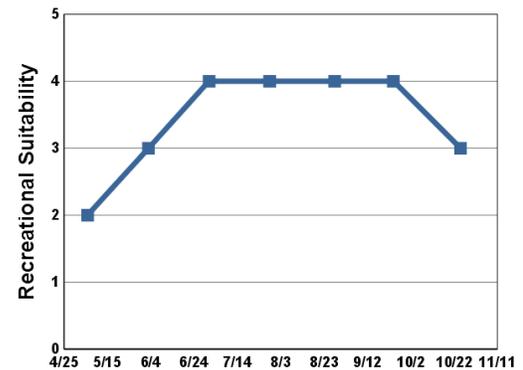


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/06/19	15.5	10.8	9.8	31	1.5	3	2
06/03/19	20.6	8.5	5.0	38	1.6	2	3
07/01/19	24.9	8.3	15	28	2.1	3	4
07/29/19	26.3	8.8	43	41	0.9	4	4
08/28/19	20.5	6.5	36	47	1.1	3	4
09/24/19	20.6	7.7	31	53	1.2	3	4
10/25/19	8.8	11.8	21	58	2.0	3	3



- 1 = Crystal Clear
- 2 = Some Algae Present
- 3 = Definite Algal Presence
- 4 = High Algal Color
- 5 = Severe Algal Bloom



- 1 = Beautiful
- 2 = Minor Aesthetic Problem
- 3 = Swimming Impaired
- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP						C	C	C	D	C	C	B
CLA						B	C	B	B	C	B	B
Secchi						C	D	C	C	D	C	D
Lake Grade						C	C	C	C	C	C	C

Year	2016	2017	2018	2019
TP	C	C	C	C
CLA	C	C	B	C
Secchi	D	D	C	C
Lake Grade	C	C	C	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Jackson Wildlife Management Area Wetland (82–0305) Browns Creek Watershed District

Monitoring agency: Washington Conservation District staff

The Jackson Wildlife Management Area (WMA) wetland is located in the City of Stillwater (Washington County). The wetland has a surface area of 14.3 acres. There are no other available bathymetric data available for the lake. The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	40	3	90	C
CLA (µg/l)	27	2.7	140	C
Secchi (m)	>1.7	>1.1	>2.1	
TKN (mg/l)	0.68	0.04	1.10	
			Lake Grade	

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

There was an insufficient quantity of valid Secchi transparency measurements to determine a Secchi grade. An invalid measurement occurred if the Secchi disk was either visible on the lake bottom or the disk's visibility was blocked by aquatic vegetation. In both of these situations the water clarity would have been greater than that indicated by the measurement. A lake grade was not given because all three parameter grades are required to issue a lake grade. Continued monitoring is recommended to build the water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

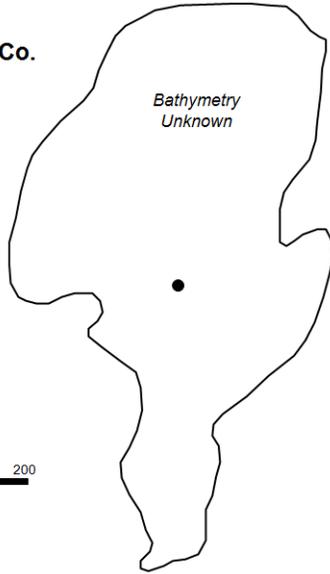
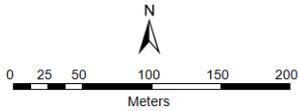
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Jackson WMA
Stillwater, Washington Co.

Lake ID: 820305-00

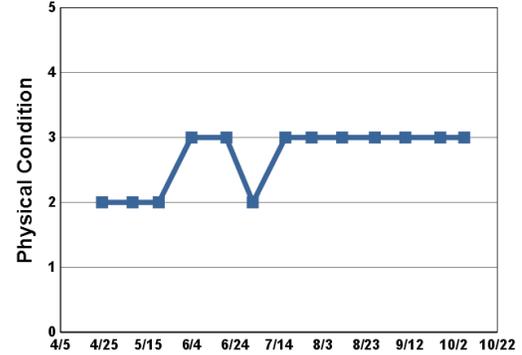
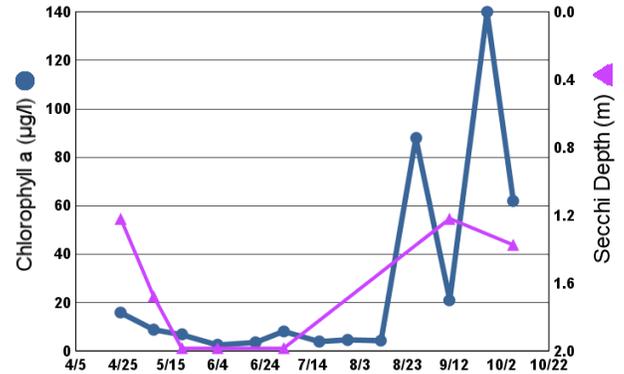
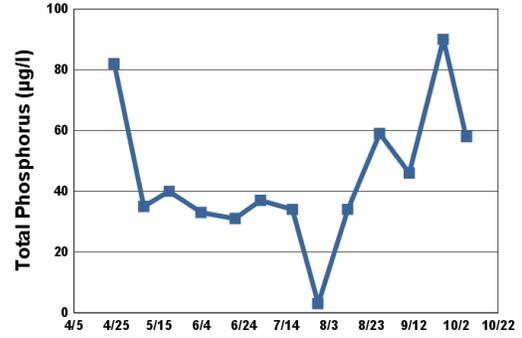
● Sampling site
Contours in meters



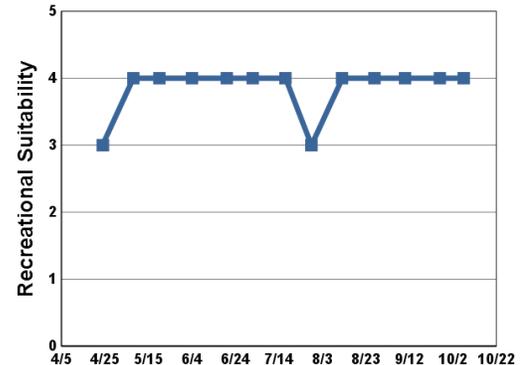
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/24/19	13.8	9.8	16	82	1.2	2	3
05/08/19	15.6	9.1	8.9	35	1.7	2	4
05/20/19	15.0	8.4	7.0	40	2.0	2	4
06/04/19	24.5	8.6	2.7	33	2.0	3	4
06/20/19	22.2	8.3	3.7	31	>2.1	3	4
07/02/19	27.1	8.2	8.2	37	2.0	2	4
07/17/19	26.8	7.8	4.0	34	>2.0	3	4
07/29/19	26.6	6.0	4.7	3	>1.7	3	3
08/12/19	24.7	5.1	4.4	34	>1.7	3	4
08/27/19	21.3	5.5	88	59	>1.1	3	4
09/10/19	18.8	3.7	21	46	1.2	3	4
09/26/19	19.2	8.3	140	90	>1.2	3	4
10/07/19	14.4	6.8	62	58	1.4	3	4

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP							C	C	D	C	C	C
CLA							B	B	B	A	D	C
Secchi							C	C	C	C	C	D
Lake Grade							C	C	C	B	C	C

Year	2016	2017	2018	2019
TP	D	C	C	C
CLA	F	B	A	C
Secchi	F	D		
Lake Grade	F	C		

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Jane Lake (82–0104) Valley Branch Watershed District

Volunteer: James Thompson

Lake Jane is located in the northwest corner of the City of Lake Elmo (Washington County). It has a surface area of 155 acres. The mean and maximum depths are 3.7 m and 12.0 m, respectively. The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value and good water quality.

The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue) in 2006. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 2012.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	14	5	31	A
CLA (µg/l)	2.8	1.1	4.5	A
Secchi (m)	4.8	4.0	7.0	A
TKN (mg/l)	0.47	0.43	0.53	
			Lake Grade	A

The lake received a lake grade of A this year, which consistent with its historical water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP	B	B			C		B	B				B
CLA					C		B	B				B
Secchi	A	A	A	A	B	B	B	B	B	B	B	B
Lake Grade					C		B	B				B

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP			A						A			
CLA			A						A			
Secchi	C	B	B						A			
Lake Grade			A						A			

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	A	A	A	A	A	A	A	A				A
CLA	A	A	A	A	A	A	A	A				A
Secchi	A	A	A	A	A	A	A	A				A
Lake Grade	A				A							

Year	2016	2017	2018	2019
TP	A	A	A	A
CLA	A	A	A	A
Secchi	A	A	A	A
Lake Grade	A	A	A	A

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Jellum's Bay [Site-1] (82-0052-02) Carnelian — Marine — St. Croix Watershed District

Monitoring agency: Washington Conservation District staff

Jellum's Bay is located in the City of Scandia in Washington County. It has a surface area of 72 acres. The maximum depth of the lake is 4.9 m (16 feet). Therefore the majority of the surface area of the lake is considered littoral zone, which is the 0-15 feet depth zone that is dominated by aquatic vegetation. The lake does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the lake's water column.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2004.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	42	34	53	C
CLA ($\mu\text{g/l}$)	13	5.9	21	B
Secchi (m)	1.6	1.2	2.0	C
TKN (mg/l)	0.87	0.67	1.00	
			Lake Grade	C

The lake received a lake grade of C this year which is consistent with its water quality database since 2015 and an improvement to water quality observed during the 1990s and 2000s. Continued monitoring is recommended to determine if this recent improvement in water quality is part of a longer term trend.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

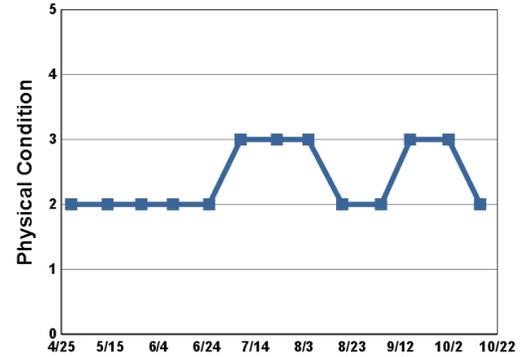
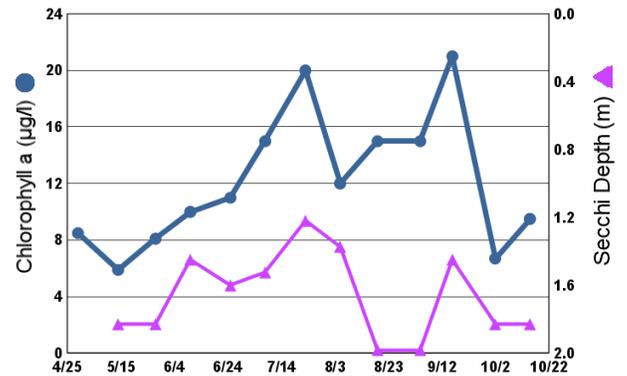
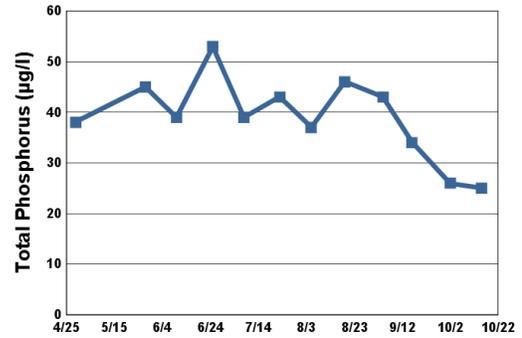
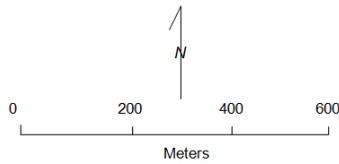
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Jellum's Lake, Site 1
Scandia, Washington Co.

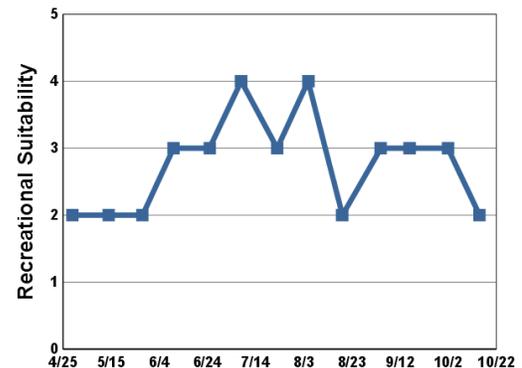
LAKE ID: 820052-02

● Sampling site

Contours in meters



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/29/19	11.3	8.7	8.5	38	>1.5	2	2
05/14/19	15.3	8.5	5.9		1.8	2	2
05/28/19	15.9	7.5	8.1	45	1.8	2	2
06/10/19	23.6	7.2	10	39	1.4	2	3
06/25/19	23.2	6.4	11	53	1.6	2	3
07/08/19	27.1	7.1	15	39	1.5	3	4
07/23/19	25.1	6.4	20	43	1.2	3	3
08/05/19	27.6	6.3	12	37	1.4	3	4
08/19/19	24.5	6.8	15	46	2.0	2	2
09/04/19	20.7	6.3	15	43	2.0	2	3
09/16/19	18.9	7.0	21	34	1.4	3	3
10/02/19	16.3	6.6	6.7	26	1.8	3	3
10/15/19	9.9	9.2	9.5	25	1.8	2	2

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP					F	D	D	D	D	D	C	D
CLA					D	D	D	D	F	D	D	F
Secchi					D	D	F	F	F	D	D	D
Lake Grade					D	D	D	D	F	D	D	D

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	D	D	D	C	C	C	C	D				C
CLA	C	D	C	C	C	A	C	C				B
Secchi	D	D	D	C	C	B	C	C				C
Lake Grade	D	D	D	C	C	B	C	C				C

Year	2016	2017	2018	2019
TP	C	B		C
CLA	B	B		B
Secchi	C	C		C
Lake Grade	C	B		C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

July Lake (82–0318) Browns Creek Watershed District

Monitoring agency: Washington Conservation District staff

July Lake is a small lake located in Washington County. There are few known morphological data available for the lake.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	76	64	87	D
CLA ($\mu\text{g/l}$)	52	11	96	D
Secchi (m)	0.8	0.5	1.2	D
TKN (mg/l)	1.33	0.96	1.70	
			Lake Grade	D

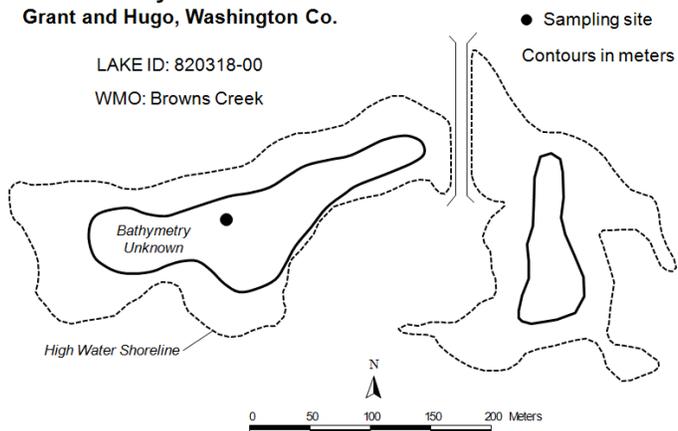
The lake received a lake grade of D this year, which is consistent with its limited database. The lake has received lake grades ranging from C to F since 2006 with Ds being more common recently. Continued monitoring is recommended to build the water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

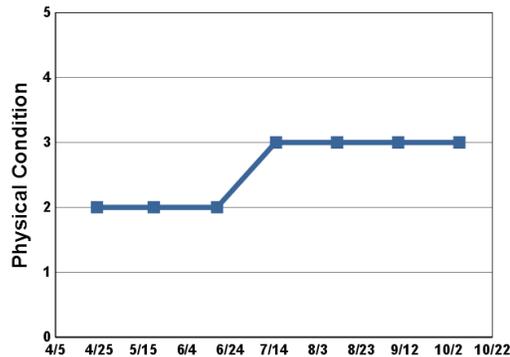
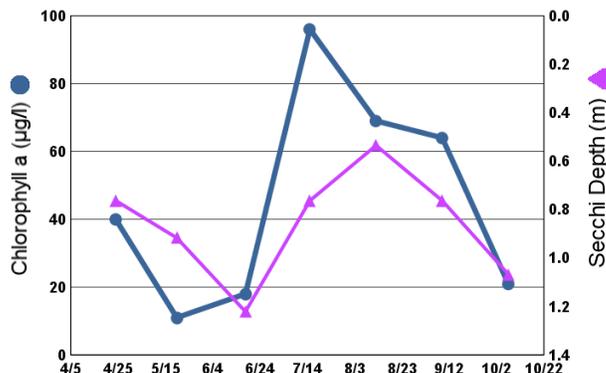
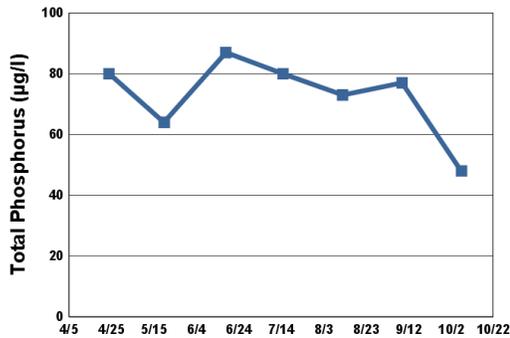
July Lake
Grant and Hugo, Washington Co.

LAKE ID: 820318-00
WMO: Browns Creek

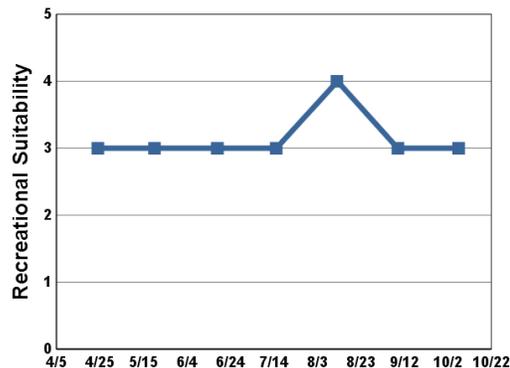


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/24/19	12.6	12.1	40	80	0.8	2	3
05/20/19	12.8	7.4	11	64	0.9	2	3
06/18/19	22.6	5.4	18	87	1.2	2	3
07/15/19	27.4	8.0	96	80	0.8	3	3
08/12/19	23.9	7.3	69	73	0.5	3	4
09/09/19	18.8	5.2	64	77	0.8	3	3
10/07/19	12.6	7.0	21	48	1.1	3	3



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP			F	F	C			D	D	D	D	D
CLA			F	F	B			D	D	C	C	D
Secchi			F	F	C			C	D	D	D	F
Lake Grade			F	F	C			D	D	D	D	D

Year	2016	2017	2018	2019
TP	D	C	D	D
CLA	D	D	D	D
Secchi	F	F	F	D
Lake Grade	D	D	D	D

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Karth Lake (62–0072) Rice Creek Watershed District

Volunteer: Gary Gerding

Karth Lake is located in the city of Arden Hills. There is little bathymetric information available for this lake.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

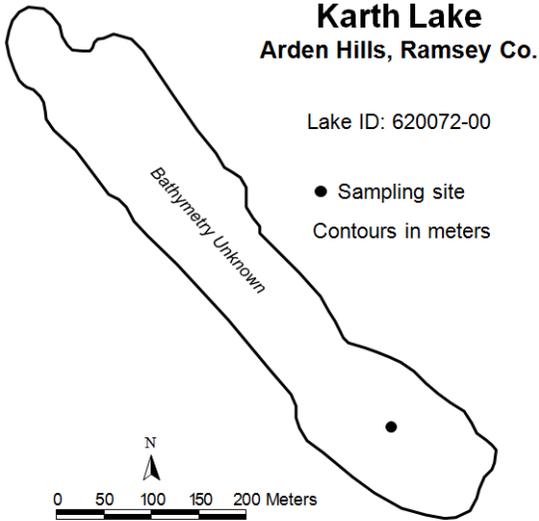
2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	32	20	64	C
CLA (µg/l))	10	1.6	35	B
Secchi (m)	2.5	2.0	2.9	B
TKN (mg/l)	0.71	0.41	1.10	
			Lake Grade	B

The lake received a lake grade of B this year which is consistent with its water quality database since 2011.

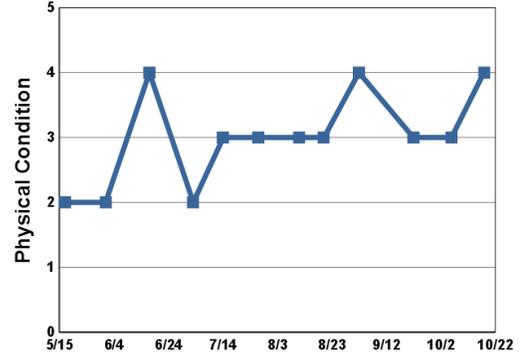
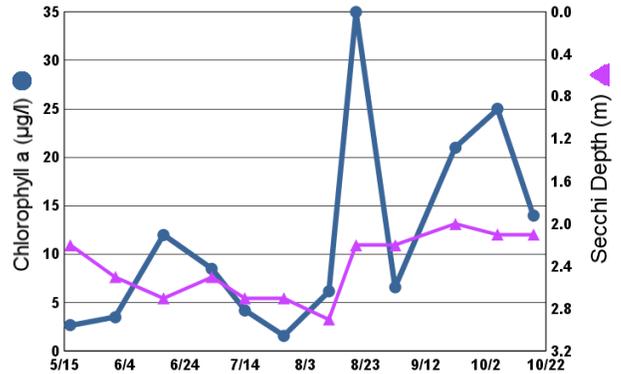
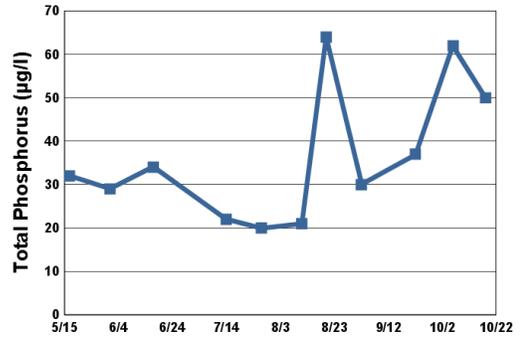
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

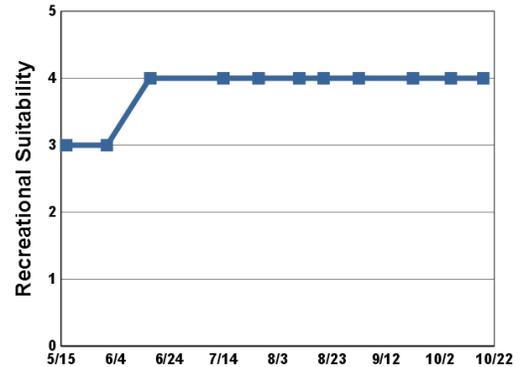


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/17/19	19.4		2.7	32	2.2	2	3
06/01/19	19.6		3.5	29	2.5	2	3
06/17/19	23.0		12	34	2.7	4	4
07/03/19	27.2		8.5		2.5	2	
07/14/19	26.1		4.2	22	2.7	3	4
07/27/19	26.0		1.6	20	2.7	3	4
08/11/19	24.6		6.2	21	2.9	3	4
08/20/19	25.3		35	64	2.2	3	4
09/02/19	22.8		6.6	30	2.2	4	4
09/22/19	22.4		21	37	2.0	3	4
10/06/19	14.9		25	62	2.1	3	4
10/18/19	10.6		14	50	2.1	4	4



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP				C	C	C	C	C	C	B	B	B
CLA				C	C	C	C	B	A	A	B	B
Secchi				D	C	D	C	B	C	B	C	C
Lake Grade				C	C	C	C	B	B	B	B	B

Year	2016	2017	2018	2019
TP	C	B	B	C
CLA	B	B	A	B
Secchi	C	B	B	B
Lake Grade	C	B	B	B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Keewahtin Lake (82—0080) Comfort Lake – Forest Lake Watershed District

Volunteer: Curt Sparks

Keewahtin Lake (formerly Sylvan Lake) is a 75-acre lake located in the city of Forest Lake (Washington County). The lake is considered a Priority Lake by the Metropolitan Council for its good water quality.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	14	10	22	A
CLA (µg/l))	2.5	1.4	4.1	A
Secchi (m)	4.7	3.7	5.2	A
TKN (mg/l)	0.47	0.37	0.54	
			Lake Grade	A

Note that the lake grades shown in the data summary table above were calculated from monitoring data sets from both the volunteer and Washington Conservation District staff. The mean, minimum, and maximum values shown in the above data summary table and the results in the data table on the following page are specific to the volunteer's monitoring data. The lake received a lake grade of A this year, which is consistent with its historical water quality database. The historic water quality database indicates that the lake has maintained its high quality over the past 20+ years.

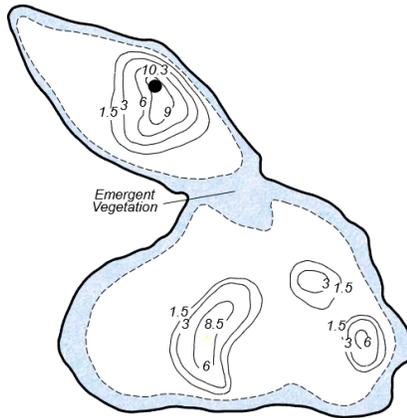
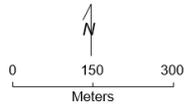
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Keewahtin Lake
Forest Lake/Scandia,
Washington Co.

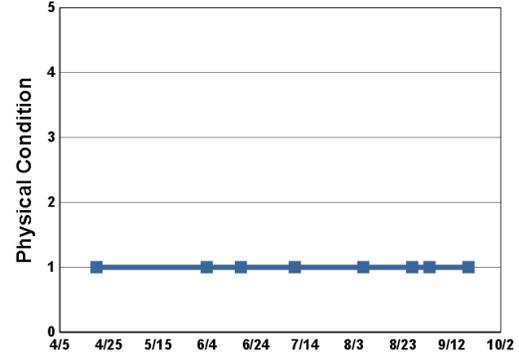
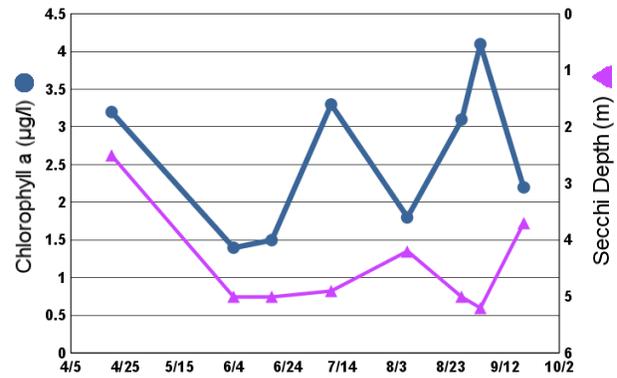
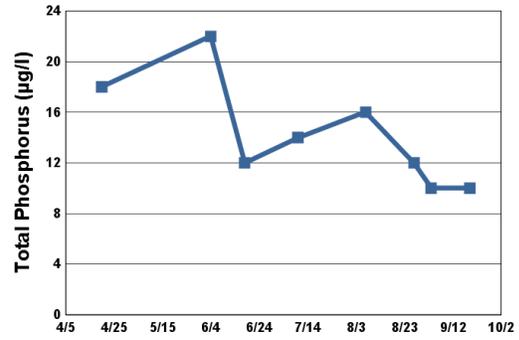
LAKE ID: 820080-00

● Sampling station
Contours in meters

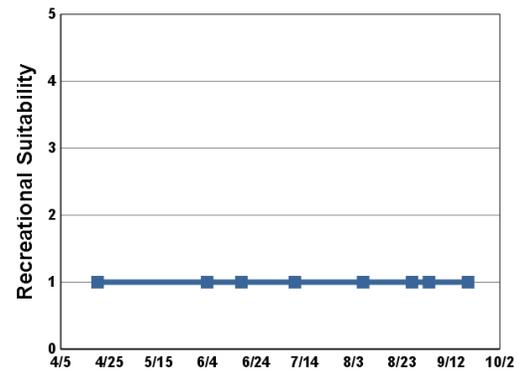


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/20/19	9.2		3.2	18	2.5	1	1
06/04/19	20.8		1.4	22	5.0	1	1
06/18/19	22.6		1.5	12	5.0	1	1
07/10/19	25.3		3.3	14	4.9	1	1
08/07/19	27.2		1.8	16	4.2	1	1
08/27/19	20.8		3.1	12	5.0	1	1
09/03/19	20.9		4.1	10	5.2	1	1
09/19/19			2.2	10	3.7	1	1



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
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3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP	B	A					C	B	A	A		A
CLA							B	A	A	A		A
Secchi	A	A	A	A	A	A	A	A	A	A	A	A
Lake Grade							B	A	A	A		A

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP		A			A		A	A	A	A	A	A
CLA		A			A		A	A	A	A	A	A
Secchi	A	A			A		A	A	A	A	A	A
Lake Grade		A			A		A	A	A	A	A	A

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	A	A		A	A	A	A	A	A	A	A	A
CLA	A	A		A	A	A	A	A	A	A	A	A
Secchi	A	A		A	A	A	A	A	A	A	A	A
Lake Grade	A	A		A								

Year	2016	2017	2018	2019
TP	A	A	A	A
CLA	A	A	A	A
Secchi	A	A	A	A
Lake Grade	A	A	A	A

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Keewahtin Lake (82—0080) *Comfort Lake – Forest Lake Watershed District*

Monitoring agency: Washington Conservation District staff

Keewahtin Lake (formerly Sylvan Lake) is a 75-acre lake located in the city of Forest Lake (Washington County). The lake is considered a Priority Lake by the Metropolitan Council for its good water quality.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made by Washington Conservation District staff during their monitoring visits. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	15	3	36	A
CLA (µg/l)	3.7	2.0	5.5	A
Secchi (m)	4.0	2.7	5.9	A
TKN (mg/l)	0.48	0.41	0.56	
			Lake Grade	A

Note that the lake grades shown in the data summary table above were calculated from monitoring data sets from both the volunteer and Washington Conservation District (WCD) staff. The mean, minimum, and maximum values shown in the above data summary table and the results in the data table on the following page are specific to WCD staff monitoring data. The lake received a lake grade of A this year, which is consistent with its historical water quality database. The historic water quality database indicates that the lake has maintained its high quality over the past 20+ years.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP	B	A					C	B	A	A		A
CLA							B	A	A	A		A
Secchi	A	A	A	A	A	A	A	A	A	A	A	A
Lake Grade							B	A	A	A		A

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP		A			A		A	A	A	A	A	A
CLA		A			A		A	A	A	A	A	A
Secchi	A	A			A		A	A	A	A	A	A
Lake Grade		A			A		A	A	A	A	A	A

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	A	A		A	A	A	A	A	A	A	A	A
CLA	A	A		A	A	A	A	A	A	A	A	A
Secchi	A	A		A	A	A	A	A	A	A	A	A
Lake Grade	A	A		A								

Year	2016	2017	2018	2019
TP	A	A	A	A
CLA	A	A	A	A
Secchi	A	A	A	A
Lake Grade	A	A	A	A

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Keller Lake [Burnsville] (19–0025) *Black Dog Watershed Management Commission*

Volunteer: Paul Coufal

Keller Lake is located in the cities of Apple Valley and Burnsville (Dakota County). The surface area of the lake is 55 acres. It has a maximum depth of 3.0 m (10 feet) and a mean depth of 1.1 m (3.7 feet). The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2002. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 2007.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	42	31	58	C
CLA (µg/l)	14	4.0	27	B
Secchi (m)	+1.3	1.0	+2.3	C
TKN (mg/l)	0.92	0.62	1.20	
			Lake Grade	C

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.

The lake received a lake grade of C this year, which is consistent with its water quality database. The water quality of the lake has varied between Bs and Ds since 1996.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

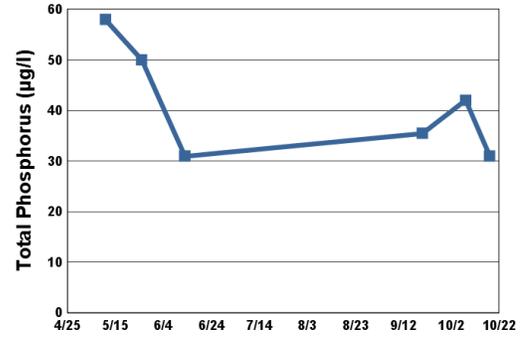
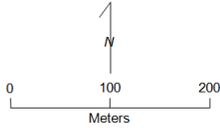
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Keller Lake
Burnsville, Dakota Co.

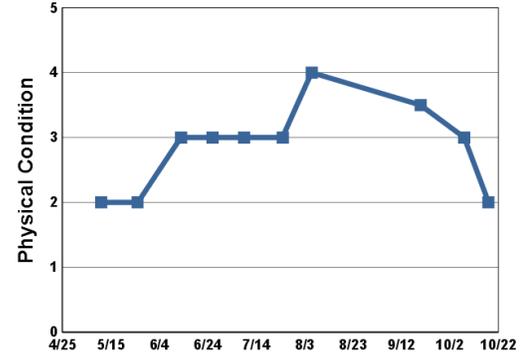
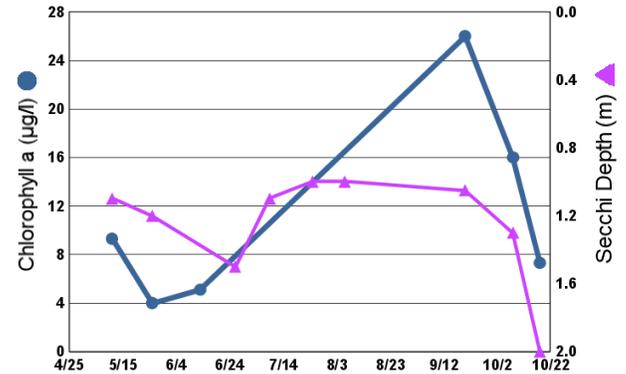
Lake ID: 190025-00

● Sampling site
Contours in meters



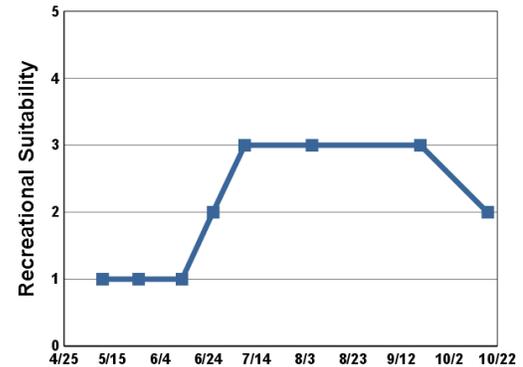
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/11/19	15.5		9.3	58	1.1	2	1
05/26/19	21.5		4.0	50	1.2	2	1
06/13/19	25.7		5.1	31	+2.3	3	1
06/26/19	26.7				1.5	3	2
07/09/19	27.0				1.1	3	3
07/25/19	27.0				1.0	3	
08/06/19	26.1				1.0	4	3
09/20/19	23.4		26	36	1.0	4	3
10/08/19	12.8		16	42	1.3	3	
10/18/19	9.1		7.3	31	2.0	2	2



+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.

- 1 = Crystal Clear
- 2 = Some Algae Present
- 3 = Definite Algal Presence
- 4 = High Algal Color
- 5 = Severe Algal Bloom



- 1 = Beautiful
- 2 = Minor Aesthetic Problem
- 3 = Swimming Impaired
- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP					D	D	C	D	D	D	C	D
CLA					F	C	A	C	C	C	B	C
Secchi					D	D	C	D	D	D	D	D
Lake Grade					D	D	B	D	D	D	C	D

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	C	D	D	C	D	D	D	D	D	D	D
CLA	B	B	D	B	A	F	D	D	D	D	D	D
Secchi	C	C	D	C	C	D	F	D	F	F	D	F
Lake Grade	C	C	D	C	B	D						

Year	2016	2017	2018	2019
TP	D	C	D	C
CLA	C	B	C	B
Secchi	D	D	F	C
Lake Grade	D	C	D	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Kingsley Lake (19–0030) *Black Dog Watershed Management Commission*

Monitoring agency: City of Lakeville staff

Kingsley Lake is located in the northwestern corner of the City of Lakeville in Dakota County. The lake has a surface area of 44 acres, and a maximum depth of 4.0 m (13 feet). The lake is considered a Priority Lake by the Metropolitan Council for its good water quality. The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	20	7	31	A
CLA (µg/l))	3.9	1.7	5.8	A
Secchi (m)	+3.4	+3.1	+3.8	A
TKN (mg/l)	0.40	0.33	0.46	
			Lake Grade	A

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.

The lake received a lake grade of A this year. Similar to past years, the lake's excessive submergent macrophyte growth obscured the Secchi disk. According to the monitoring personnel's judgement, the Secchi depths in these instances would have likely been in excess of 3 meters (if the measurement were not already in excess of 3 meters). Also, the other two water quality parameter received A grades.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP		B		B	A	A			A	A	A	B
CLA		A		A	A	A			A	A	A	A
Secchi		A		B	B	B			B	C	B	B
Lake Grade		A		B	A	A			A	B	A	B

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	A	A	B	A	A	A	A	A	A	A	A	A
CLA	A	A	A	A	A	A	A	A	A	A	A	A
Secchi	B	B	B	B	B	A	A	A			A	A
Lake Grade	A	A	B	A	A	A	A	A			A	A

Year	2016	2017	2018	2019
TP	A	A	A	A
CLA	A	A	A	A
Secchi	B	A	A	A
Lake Grade	A	A	A	A

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Kismet Lake (82–0333) Browns Creek Watershed District

Monitoring agency: Washington Conservation District staff

Kismet Lake is located in Washington County. This relatively small lake has a maximum depth of approximately 3.7 m (12 feet). The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	21	10	31	A
CLA (µg/l))	6.2	2.4	14	A
Secchi (m)	>1.8	>0.6	>2.7	
TKN (mg/l)	0.60	0.46	0.70	
			Lake Grade	

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

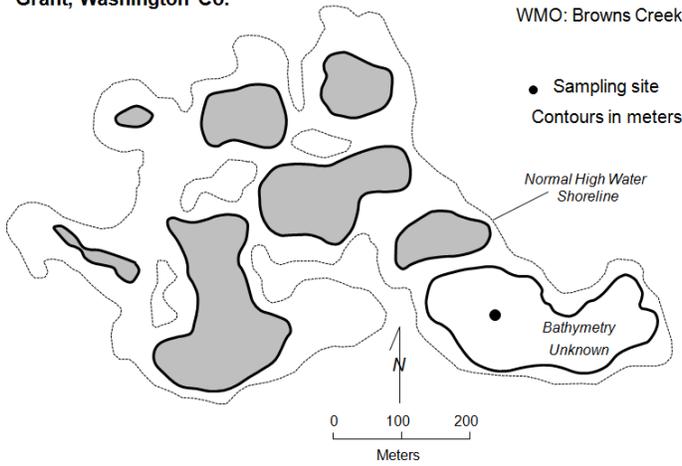
There was an insufficient quantity of valid Secchi transparency measurements to determine a Secchi grade. An invalid measurement occurred if the Secchi disk was either visible on the lake bottom or the disk's visibility was blocked by aquatic vegetation. In both of these situations the water clarity would have been greater than that indicated by the measurement. A lake grade was not given because all three parameter grades are required to issue a lake grade. The water quality with respect to TP and CLA has been better compared to years in the late 1990s and 2000s.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Kismet Lake
Grant, Washington Co.

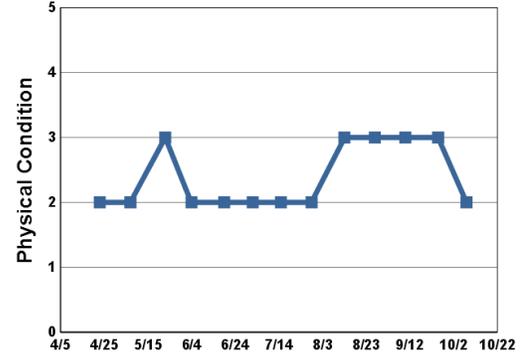
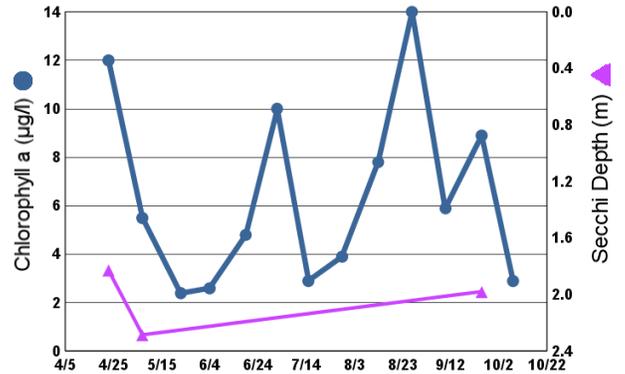
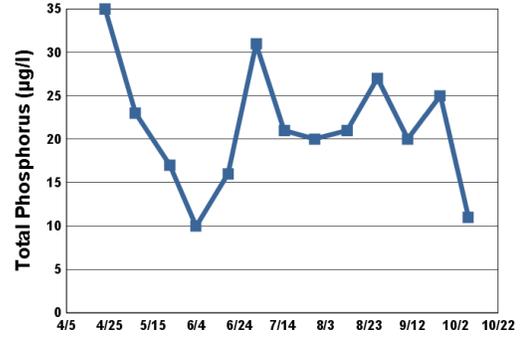
Lake ID: 820334-00
WMO: Browns Creek



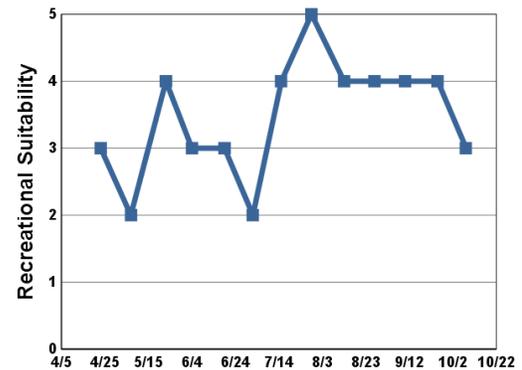
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/23/19	13.8	9.3	12	35	1.8	2	3
05/07/19	15.3	9.0	5.5	23	2.3	2	2
05/23/19	14.4	7.2	2.4	17	>2.7	3	4
06/04/19	22.1	7.9	2.6	10	>2.4	2	3
06/19/19	23.6	7.1	4.8	16	>1.7	2	3
07/02/19	25.7	7.6	10	31	>1.8	2	2
07/15/19	29.7	7.5	2.9	21	>1.4	2	4
07/29/19	25.0	5.2	3.9	20	>1.5	2	5
08/13/19	23.3	2.7	7.8	21	>0.6	3	4
08/27/19	20.7	2.4	14	27	>1.5	3	4
09/10/19	18.4	1.2	5.9	20	>1.8	3	4
09/25/19	20.1	5.7	8.9	25	2.0	3	4
10/08/19	12.7	5.4	2.9	11	>1.8	2	3

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP							C	C	D	C	C	B
CLA							C	C	C	B	B	B
Secchi							C	C	C	C	C	B
Lake Grade							C	C	C	C	C	B

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	B	C	C	C	C	C	C	C	C	A	C	A
CLA	A	B	C	C	D	A	C	B	B	A	C	A
Secchi	B	C	C	C	C	D	C	C				
Lake Grade	B	C										

Year	2016	2017	2018	2019
TP	B	A	A	A
CLA	A	A	A	A
Secchi				
Lake Grade				

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Klawitter Pond (82–0368) *Valley Branch Watershed District*

Volunteer: Bonnie Juran, Hailey Jostes, Pat Barrett

Klawitter Pond is a 4.5-acre lake located within the City of Lake Elmo (Washington County). The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column. The lake's surface area and watershed area of 168 acres translate to a 37:1 watershed-to-lake area ratio. The greater the ratio, the greater the potential stress on the lake from surface runoff.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	108	70	171	D
CLA (µg/l))	43	8.2	110	C
Secchi (m)	0.8	0.4	1.1	D
TKN (mg/l)	1.53	1.10	2.00	
			Lake Grade	D

The lake received a lake grade of D this year, which is similar to previous years' lake grades.

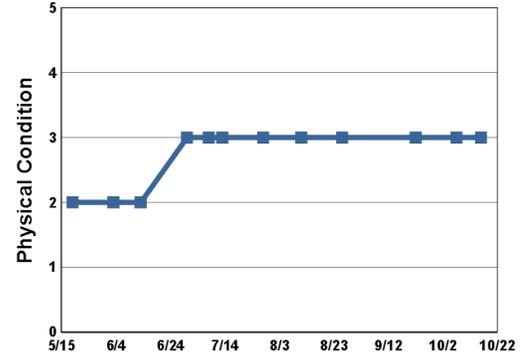
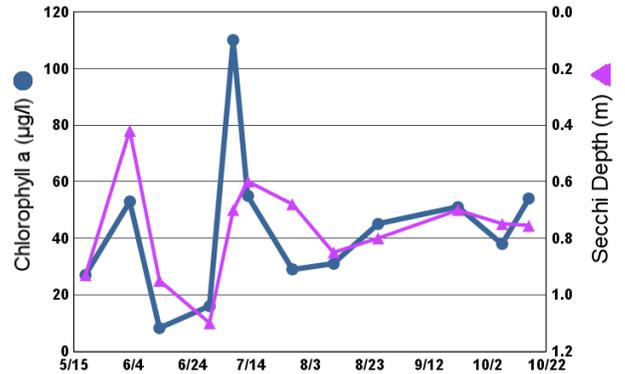
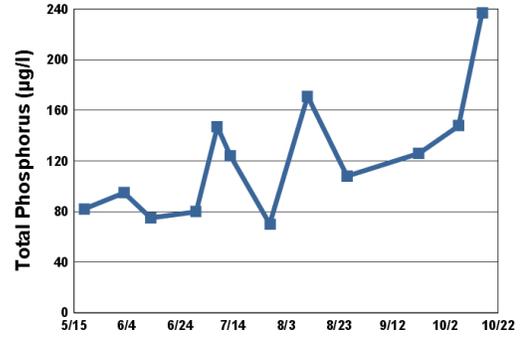
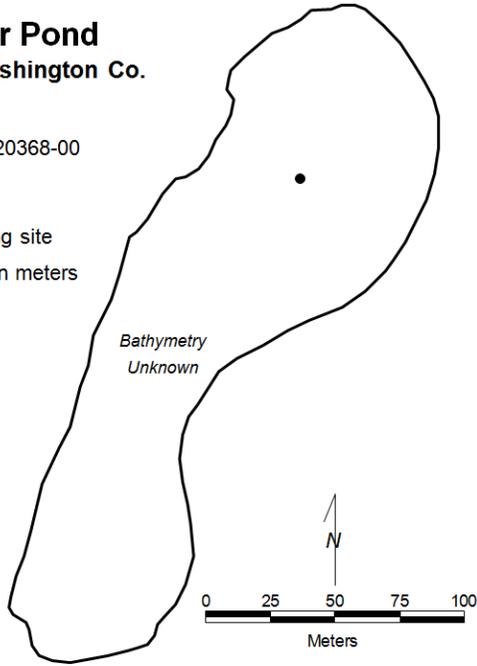
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

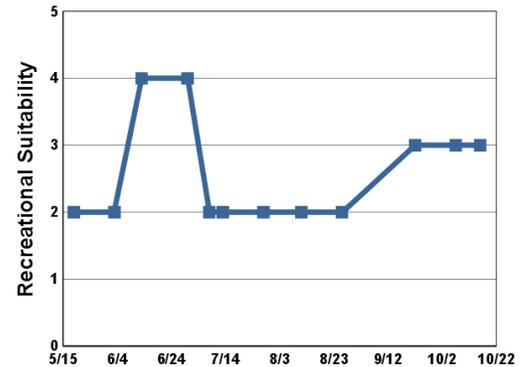
Klawitter Pond
Lake Elmo, Washington Co.

Lake ID: 820368-00

● Sampling site
Contours in meters



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/19/19	13.4		27	82	0.9	2	2
06/03/19	21.3		53	95	0.4	2	2
06/13/19	23.1		8.2	75	1.0	2	4
06/30/19	26.0		16	80	1.1	3	4
07/08/19			110	147	0.7	3	2
07/13/19	29.3		55	124	0.6	3	2
07/28/19	25.7		29	70	0.7	3	2
08/11/19	25.2		31	171	0.8	3	2
08/26/19	22.0		45	108	0.8	3	2
09/22/19	21.5		51	126	0.7	3	3
10/07/19	15.5		38	148	0.8	3	3
10/16/19	9.9		54	237	0.8	3	3

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP											D	D
CLA											B	C
Secchi											D	F
Lake Grade											C	D

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	D	D	D	D	D	D	D	D	D	C	D	D
CLA	C	C	C	C	C	D	D	C	C	C	C	D
Secchi	D	D	F	F	F	F	F	D	D	D	D	F
Lake Grade	D	C	D	D								

Year	2016	2017	2018	2019
TP	D	D	D	D
CLA	C	C	C	C
Secchi	D	D	F	D
Lake Grade	D	D	D	D

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

La Lake (82–0097) *City of Woodbury*

Volunteer: Tim Weber

La Lake is located in the City of Woodbury (Washington County). The lake has a surface area of approximately 35 acres and a maximum depth of 3.5 m (11 feet). The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2014.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

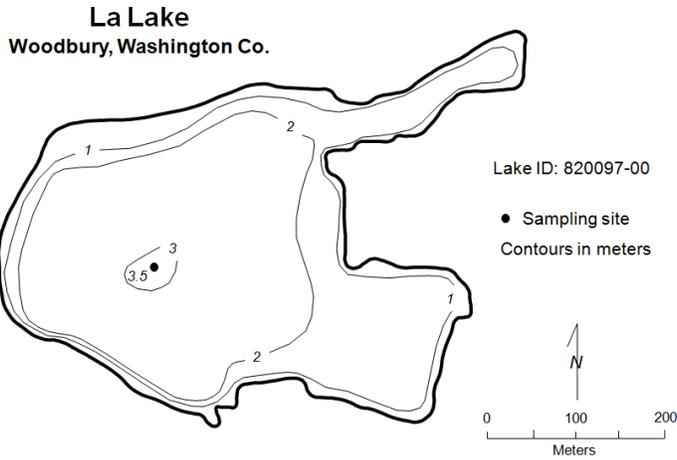
Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	30	14	45	B
CLA (µg/l)	5.1	1.4	21	A
Secchi (m)	+2.8	1.7	+3.5	B
TKN (mg/l)	0.56	0.45	0.81	
			Lake Grade	B

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.

The lake received a lake grade of B this year, which is consistent with its historical database. Water quality for the lake has experienced intra-annual variability in which the lake grades have varied from Bs and Cs. CLA concentrations were lower than usual in 2017 through 2019 compared to years since 1995. Continued monitoring is recommended to determine if this recent improvement in water quality is part of a longer term trend.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

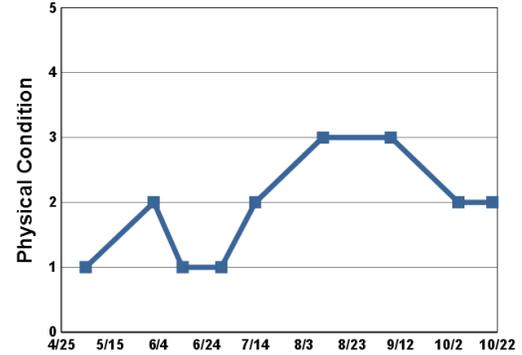
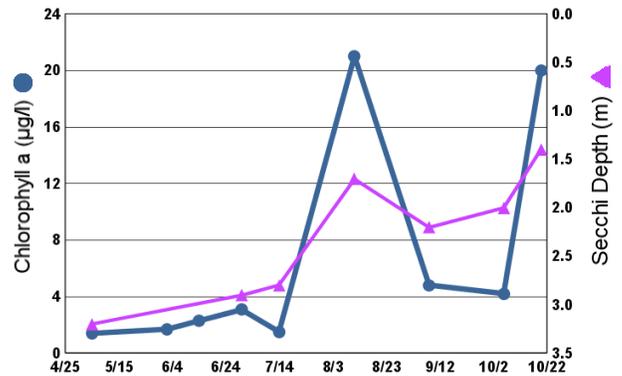
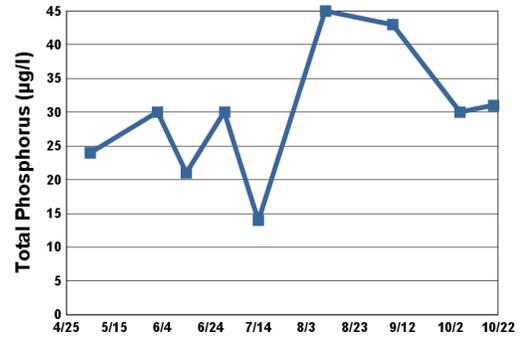
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.



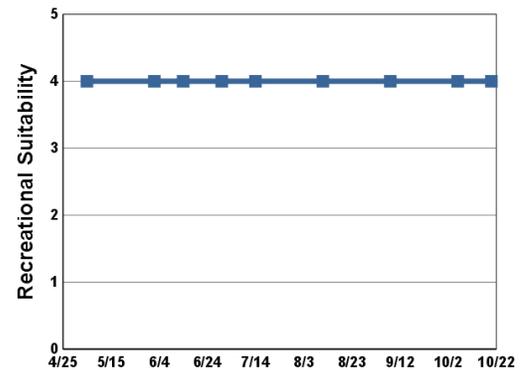
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/05/19	16.5		1.4	24	3.2	1	4
06/02/19	22.5		1.7	30	+3.5	2	4
06/14/19	23.7		2.3	21	+3.2	1	4
06/30/19	26.1		3.1	30	2.9	1	4
07/14/19	30.8		1.5	14	2.8	2	4
08/11/19	26.7		21	45	1.7	3	4
09/08/19	22.7		4.8	43	2.2	3	4
10/06/19	15.1		4.2	30	2.0	2	4
10/20/19	12.6		20	31	1.4	2	4

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.



- 1 = Crystal Clear
- 2 = Some Algae Present
- 3 = Definite Algal Presence
- 4 = High Algal Color
- 5 = Severe Algal Bloom



- 1 = Beautiful
- 2 = Minor Aesthetic Problem
- 3 = Swimming Impaired
- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP			C	C	D	D	C	D	D	D	D	C
CLA			B	A	B	C	B	C	C	C	B	C
Secchi			C	B	C	C	B	C	C	C	C	B
Lake Grade			C	B	C	C	B	C	C	C	C	C

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP		C	D	D	D	D	D	D	D	C	C	C
CLA		B	C	D	B	C	C	B	C	B	C	B
Secchi		C	C	D	C	C	C	B	C	C		C
Lake Grade		C	C	D	C	C	C	C	C	C		C

Year	2016	2017	2018	2019
TP	C	B	C	B
CLA	B	A	A	A
Secchi	C	C	C	B
Lake Grade	C	B	B	B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Lac Lavon Lake (19–0446) *Black Dog Watershed Management Commission*

Volunteer: Wally Shaver

Lac Lavon is located within the City of Apple Valley (Dakota County). The lake is considered a Priority Lake by the Metropolitan Council for its good water quality. The lake is an abandoned gravel pit maintained by groundwater (MDNR 1996).

The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue) in 1998. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 1995 and brittle naiad (*Najas minor*) in 2007.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

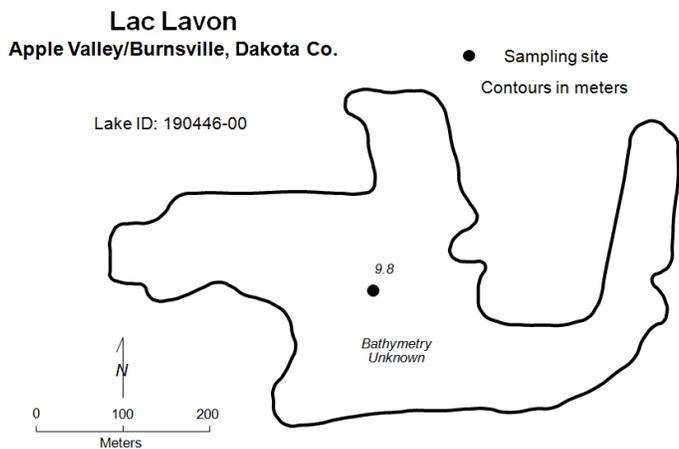
Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	11	7	18	A
CLA (µg/l)	3.2	2.1	5.6	A
Secchi (m)	4.2	3.5	4.8	A
TKN (mg/l)	0.48	0.34	0.59	
			Lake Grade	A

The lake received a lake grade of A this year which is consistent with its overall historical water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

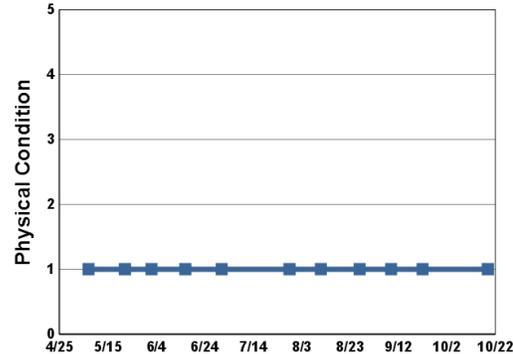
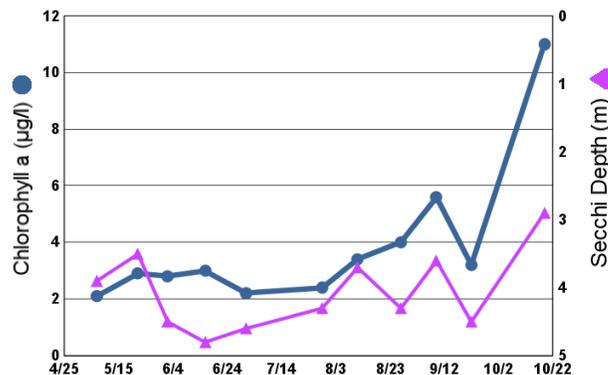
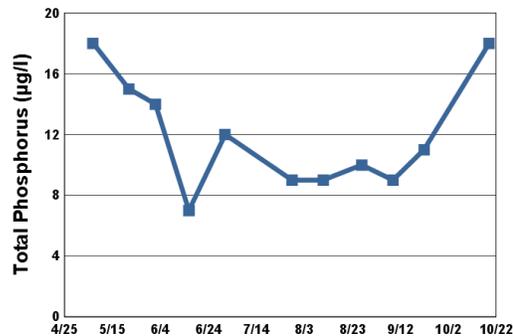
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

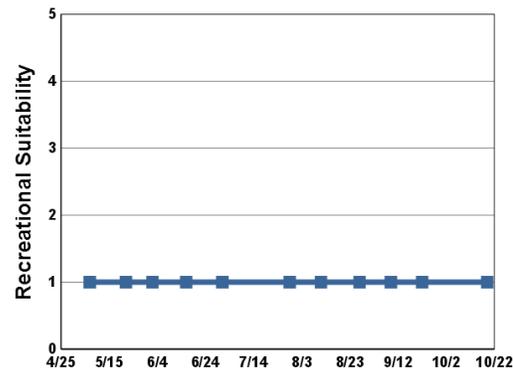


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/07/19	13.1		2.1	18	3.9	1	1
05/22/19	14.3		2.9	15	3.5	1	1
06/02/19	25.5		2.8	14	4.5	1	1
06/16/19	21.8		3.0	7	4.8	1	1
07/01/19	25.9		2.2	12	4.6	1	1
07/29/19	26.6		2.4	9	4.3	1	1
08/11/19	25.0		3.4	9	3.7	1	1
08/27/19	22.3		4.0	10	4.3	1	1
09/09/19	20.7		5.6	9	3.6	1	1
09/22/19	21.2		3.2	11	4.5	1	1
10/19/19	11.4		11	18	2.9	1	1



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4 = High Algal Color
5 = Severe Algal Bloom



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3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi										A	A	A
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP						A	A	A	A	B	A	A
CLA						A	A	A	A	A	A	A
Secchi						A	A	A	A	A	A	A
Lake Grade						A	A	A	A	A	A	A

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	A	A	A	A	C	A	A	C	A	A	A	A
CLA	A	A	A	A	A	A	A	A	A	A	A	A
Secchi	A	A	A	A	A	A	A	A	A	A	A	A
Lake Grade	A	A	A	A	B	A	A	B	A	A	A	A

Year	2016	2017	2018	2019
TP	A	A	A	A
CLA	A	A	A	A
Secchi	A	A	A	A
Lake Grade	A	A	A	A

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Langton Lake [North Basin Site-1] (62–0049–01) Rice Creek Watershed District

Volunteer: Tam McGehee, Dick McGehee

Langton Lake is divided into two basins. This report discusses the monitoring results for Site 1. The entire 30-acre lake is located within the City of Roseville (Ramsey County). The maximum depth of the lake is 1.5 m (4.9 ft). The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*)

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	40	31	46	C
CLA (µg/l)	6.6	5.1	9.2	A
Secchi (m)	>1.2	0.3	1.6	D
TKN (mg/l)	0.83	0.71	1.10	
			Lake Grade	C

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

The lake received a lake grade of C this year which is consistent with its historical water quality database.

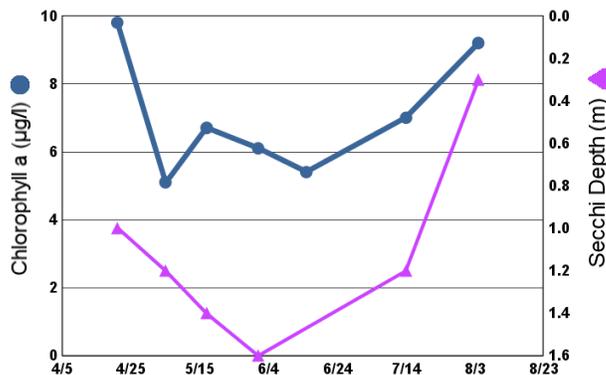
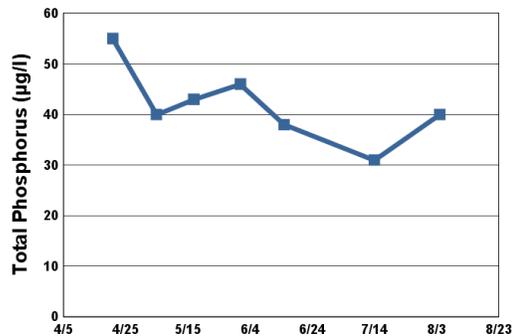
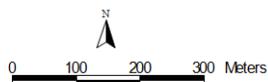
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Langton Lake, Site 1
Roseville, Ramsey Co.

Lake ID: 620049-01

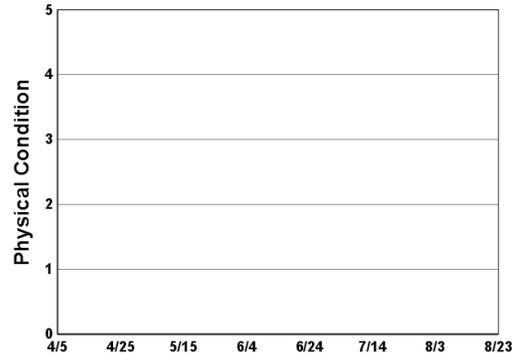
● Sampling site
Contours in meters



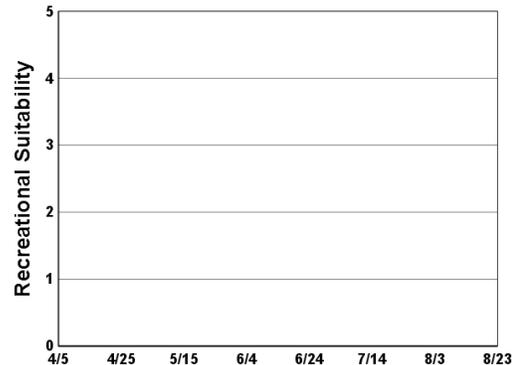
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/21/19	17.0		9.8	55	1.0		
05/05/19	18.9		5.1	40	1.2		
05/17/19	21.5		6.7	43	1.4		
06/01/19	22.7		6.1	46	1.6		
06/15/19	23.8		5.4	38	>1.3		
07/14/19	28.5		7.0	31	1.2		
08/04/19	29.9		9.2	40	0.3		

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.



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5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP		C	C	C	C	C	C	C	C	C		C
CLA		C	B	A	C	A	C	B	A	A		A
Secchi		D	D	D	D	D	D	D				
Lake Grade		C	C	C	C	C	C	C				

Year	2016	2017	2018	2019
TP	C	C	C	C
CLA	B	B	B	A
Secchi	D	D		D
Lake Grade	C	C		C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Lee Lake (19–0029) *City of Lakeville*

Monitoring agency: City of Lakeville staff

Lee Lake is located in Lakeville (Dakota County). The lake has a surface area of 25 acres with a maximum depth of 5.2 m (17 ft). The lake is landlocked with no natural outlet. Curlyleaf pond weed has been a continuing problem in the lake (McComas and Stuckert 2008). Not only is it an aesthetic and recreational problem, but the decaying of these plants in late-summer contributes to algal blooms. Barley straw has been added to this lake in the past to study the potential inhibition of algal populations within the lake (McComas and Stuckert 2009a).

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	31	12	70	B
CLA ($\mu\text{g/l}$)	8.9	3.7	15	A
Secchi (m)	+2.5	1.2	+3.6	B
TKN (mg/l)	0.56	0.44	0.72	
			Lake Grade	B

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.

The lake received a lake grade of B this year. The lake grades have varied from A to C over the past 10 years. Continued monitoring is suggested to determine the trend direction, if any, of the varying water quality of this lake.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

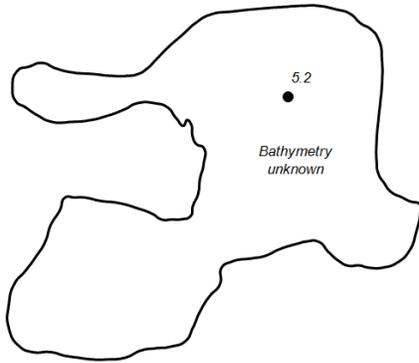
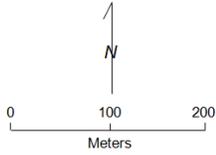
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lee Lake
Lakeville, Dakota Co.

Lake ID: 190029-00

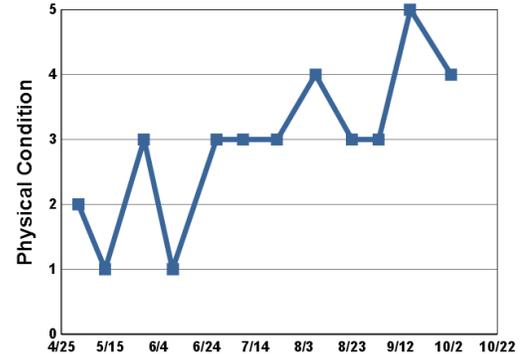
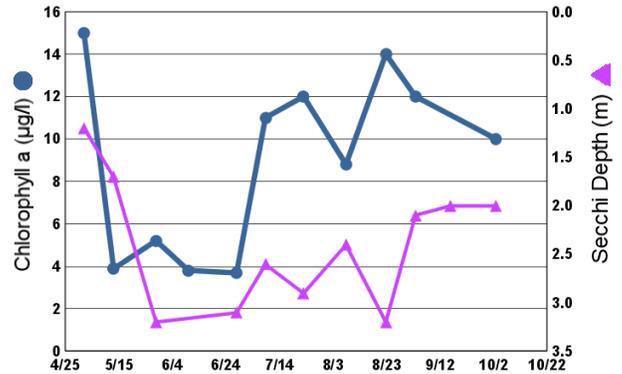
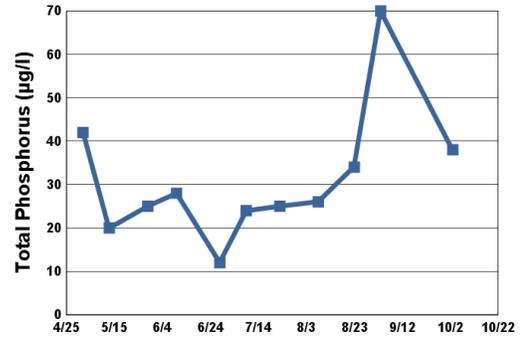
● Sampling site
Contours in meters



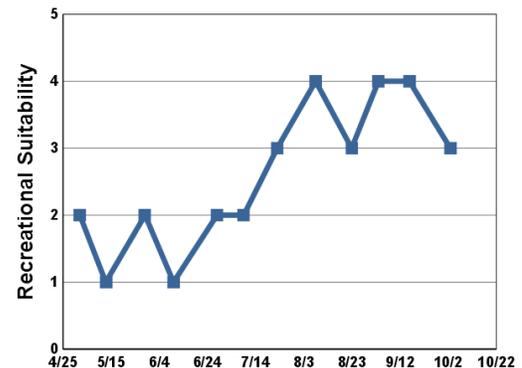
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/02/19	11.6		15	42	1.2	2	2
05/13/19	15.8		3.9	20	1.7	1	1
05/29/19	18.9		5.2	25	3.2	3	2
06/10/19	23.4		3.8	28	+3.6	1	1
06/28/19	24.0		3.7	12	3.1	3	2
07/09/19	26.6		11	24	2.6	3	2
07/23/19	26.4		12	25	2.9	3	3
08/08/19	27.1		8.8	26	2.4	4	4
08/23/19	25.4		14	34	3.2	3	3
09/03/19	22.7		12	70	2.1	3	4
09/16/19	21.3				2.0	5	4
10/03/19	15.5		10	38	2.0	4	3

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.



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Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP			C	C	C	C			D	C	C	C
CLA			C	B	B	B			C	B	B	C
Secchi			C	C	C	C			D	C	C	C
Lake Grade			C	C	C	C			D	C	C	C

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	D	D	C	C	A	B	C	C	B	A	C
CLA	C	B	B	C	B	A	A	A	B	A	A	B
Secchi	D	C	C	C	C	A	A	B	C	C		C
Lake Grade	C	C	C	C	C	A	A	B	C	B		C

Year	2016	2017	2018	2019
TP	C	C	C	B
CLA	B	B	B	A
Secchi	C	C	C	B
Lake Grade	C	C	C	B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

LeMay Lake (19–0082) *City of Mendota Heights*

Volunteer: Julie Woolsey, Leslie Pilgrim

LeMay Lake is located in the City of Mendota Heights. It has a surface area of 34 acres and an average depth of 1.6 m (5.1 ft). The maximum depth is 4.0 m (13 ft). The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

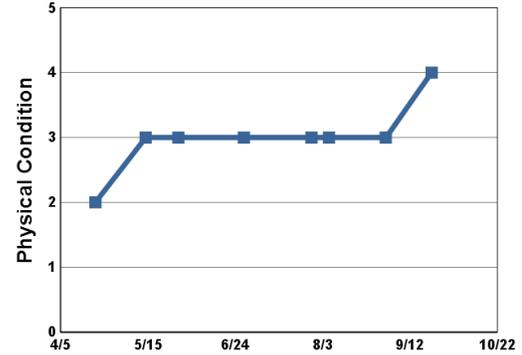
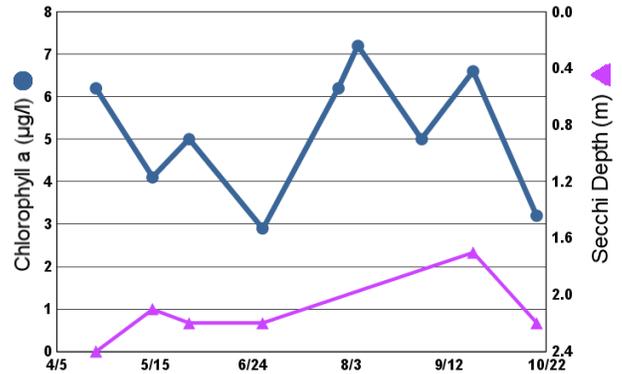
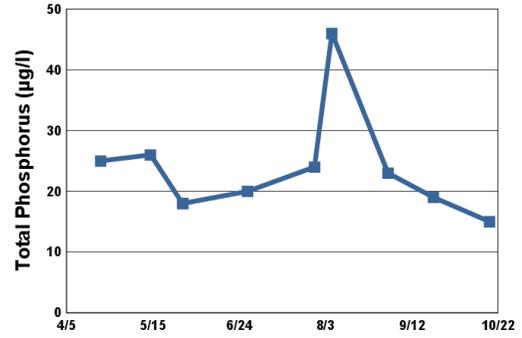
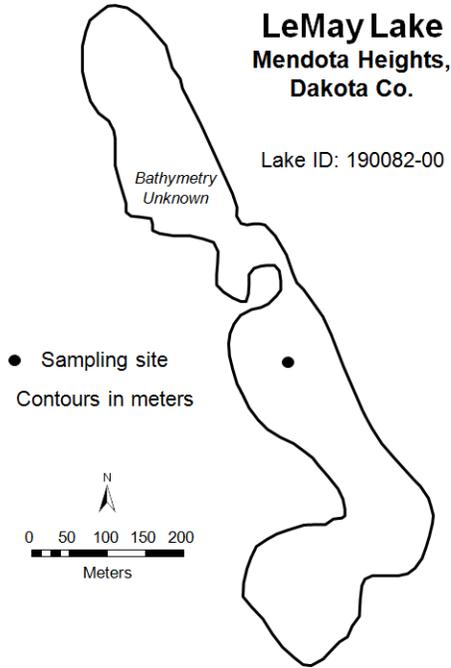
Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	25	18	46	B
CLA ($\mu\text{g/l}$)	5.3	2.9	7.2	A
Secchi (m)	>1.8	>1.2	2.2	
TKN (mg/l)	0.67	0.56	0.86	
			Lake Grade	

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

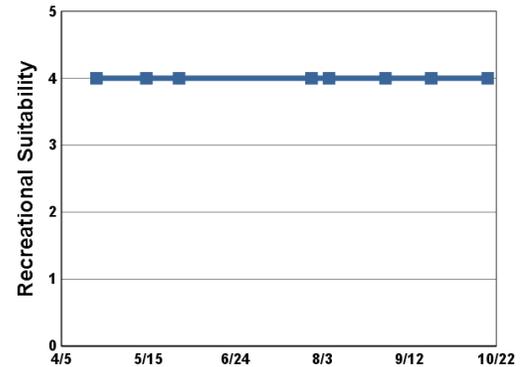
There was an insufficient quantity of valid Secchi transparency measurements to determine a Secchi grade. An invalid measurement occurred if the Secchi disk was either visible on the lake bottom or the disk's visibility was blocked by aquatic vegetation. In both of these situations the water clarity would have been greater than that indicated by the measurement. A lake grade was not given because all three parameter grades are required to issue a lake grade. The relatively low CLA concentrations in combination with the observations of moderate to substantial macrophyte growth, indicate that the primary production of the lake is focused on production of aquatic macrophytes rather than algae. The lake received TP and CLA grades of B and A, respectively this year, which is consistent with its historical water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.



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2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/21/19	17.6		6.2	25	2.4	2	4
05/14/19	18.4		4.1	26	2.1	3	4
05/29/19	21.4		5.0	18	2.2	3	4
06/28/19	26.6		2.9	20	2.2	3	
07/29/19	28.7		6.2	24	>1.2	3	4
08/06/19	28.8		7.2	46	>1.7	3	4
09/01/19	22.1		5.0	23	>1.8	3	4
09/22/19	25.2		6.6	19	1.7	4	4
10/18/19	13.1		3.2	15	2.2		4

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi							F					
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP				C	B	C	B	C	C	C		
CLA				B	A	A	A	A	A	A		
Secchi				D	C	C	C	C		C		
Lake Grade				C	B	B	B	B		B		

Year	2016	2017	2018	2019
TP		C	B	B
CLA		A	A	A
Secchi		C	C	
Lake Grade		B	B	

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Lendt Lake (13–0103) Comfort Lake — Forest Lake Watershed District

Monitoring agency: Washington Conservation District staff

Lendt Lake is located in Chisago Lake Township (Chisago County). It has a surface area of 57 acres and maximum depth of 2.5 m. The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	16	9	29	A
CLA ($\mu\text{g/l}$)	4.9	1.4	15	A
Secchi (m)	>1.4	>1.1	>1.6	
TKN (mg/l)	0.50	0.42	0.56	
			Lake Grade	

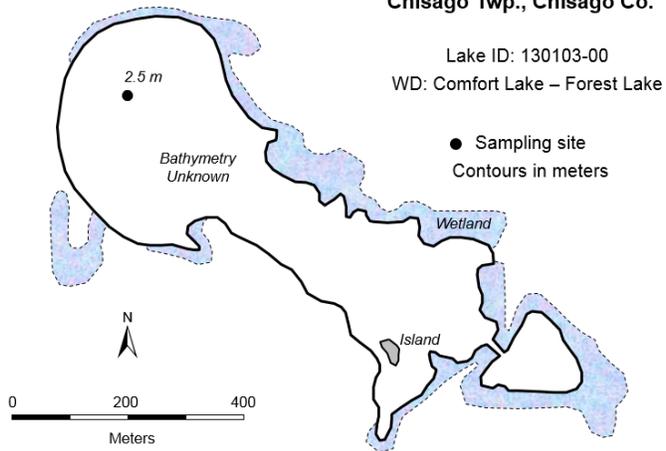
> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

There was an insufficient quantity of valid Secchi transparency measurements to determine a Secchi grade. An invalid measurement occurred if the Secchi disk was either visible on the lake bottom or the disk's visibility was blocked by aquatic vegetation. In both of these situations the water clarity would have been greater than that indicated by the measurement. A lake grade was not given because all three parameter grades are required to issue a lake grade. The relatively low CLA concentrations in combination with the observations of moderate to substantial macrophyte growth, indicate that the primary production of the lake is focused on production of aquatic macrophytes rather than algae.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lendt Lake
Chisago Twp., Chisago Co.



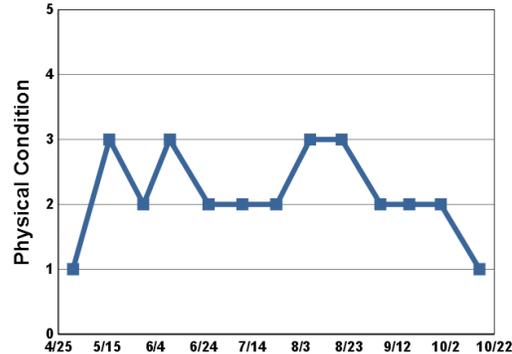
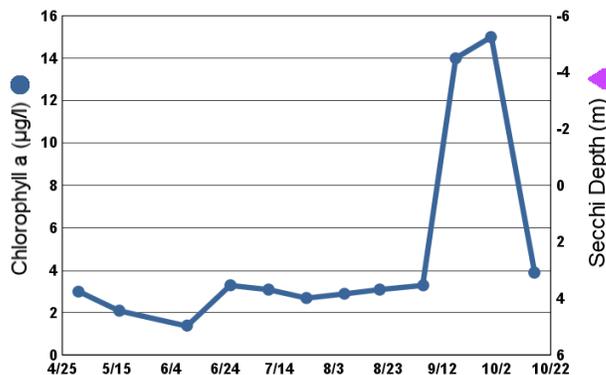
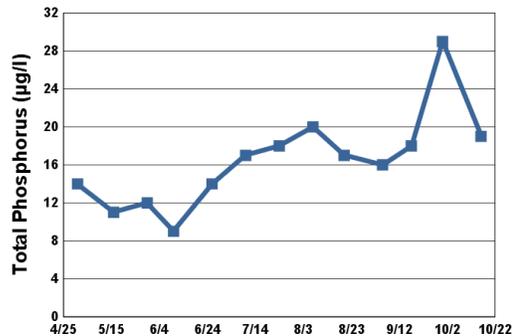
Lake ID: 130103-00
WD: Comfort Lake – Forest Lake

● Sampling site
Contours in meters

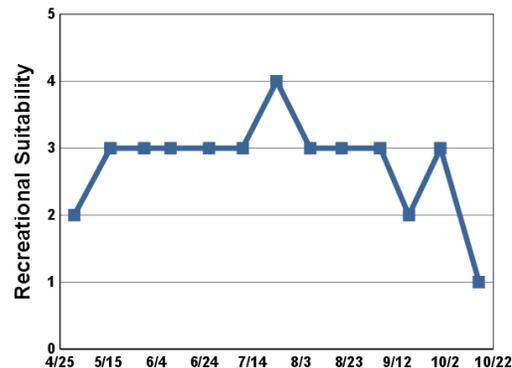
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/01/19	10.1	8.8	3.0	14	>1.5	1	2
05/16/19	19.4	9.2	2.1	11		3	3
05/30/19	17.9	8.8		12	>1.6	2	3
06/10/19	23.2	7.4	1.4	9	>1.4	3	3
06/26/19	22.4	7.4	3.3	14	>1.5	2	3
07/10/19	25.0	4.4	3.1	17	>1.4	2	3
07/24/19	25.1	3.9	2.7	18	>1.4	2	4
08/07/19	27.0	4.7	2.9	20	>1.1	3	3
08/20/19	23.1	4.4	3.1	17	>1.2	3	3
09/05/19	19.7	6.4	3.3	16	>1.4	2	3
09/17/19	20.8	8.0	14	18	>1.4	2	2
09/30/19	16.4	5.6	15	29	>1.5	2	3
10/16/19	8.1	8.6	3.9	19	>1.7	1	1

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP											A	A
CLA											A	A
Secchi												
Lake Grade												

Year	2016	2017	2018	2019
TP				A
CLA				A
Secchi				
Lake Grade				

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Lily Lake (82–0023) *Middle St. Croix Watershed Management Organization*

Monitoring agency: Washington Conservation District staff

Lily Lake is located in the City of Stillwater in Washington County. The lake has a surface area of 52 acres, and a maximum depth of 17.4 m (57 feet).

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) and aquatic consumption (mercury in fish tissue) in 2002.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCEs's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	30	20	39	B
CLA (µg/l)	19	2.6	45	B
Secchi (m)	2.2	0.8	4.0	C
TKN (mg/l)	0.86	0.53	1.20	
			Lake Grade	B

The lake received a lake grade of B this year which is consistent with its historical water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

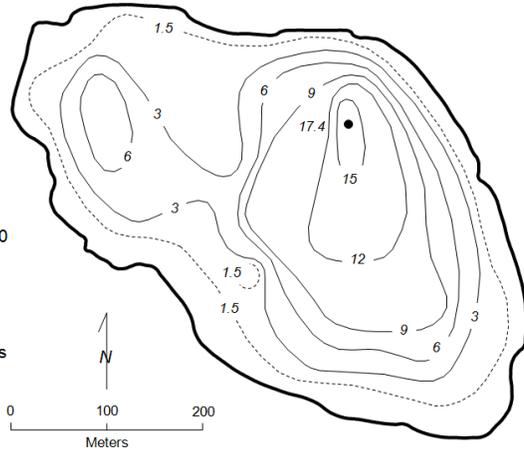
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

**Lily Lake
Stillwater,
Washington Co.**

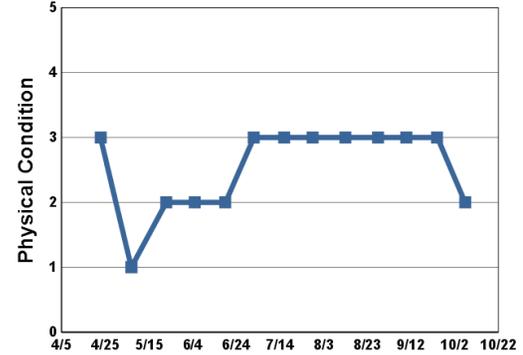
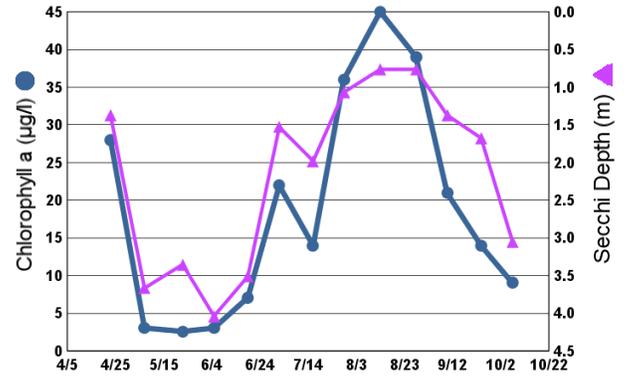
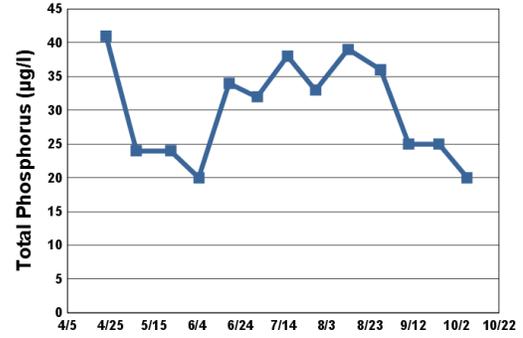
Lake ID: 820023-00

● Sampling site
Contours in meters

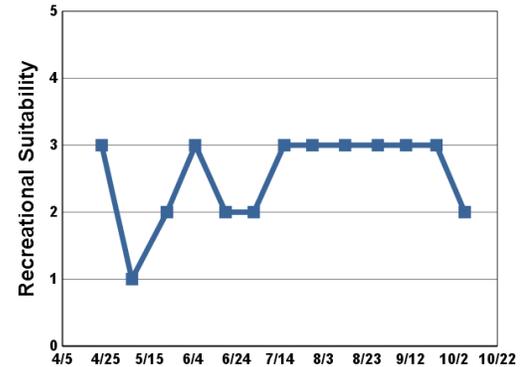


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/23/19	10.4	9.5	28	41	1.4	3	3
05/07/19	13.9	10.5	3.1	24	3.7	1	1
05/23/19	14.2	8.7	2.6	24	3.4	2	2
06/05/19	21.6	9.0	3.1	20	4.0	2	3
06/19/19	22.2	8.1	7.1	34	3.5	2	2
07/02/19	24.6	9.5	22	32	1.5	3	2
07/16/19	28.4	6.5	14	38	2.0	3	3
07/29/19	26.2	7.8	36	33	1.1	3	3
08/13/19	26.0	6.6	45	39	0.8	3	3
08/28/19	21.1	6.6	39	36	0.8	3	3
09/10/19	20.8	6.6	21	25	1.4	3	3
09/24/19	21.4	8.1	14	25	1.7	3	3
10/07/19	14.3	7.6	9.1	20	3.0	2	2



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi						D		C	C	C	C	C
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP				C	C	C	C	C	C	C	C	C
CLA				B	C	B	C	C	C	A	B	B
Secchi	B			A	B	C	C	C	C	B	C	C
Lake Grade				B	C	C	C	C	C	B	C	C

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	C	C	C	C	B	B		C	B	A	A
CLA	B	B	C	C	C	A	B		B	B	A	B
Secchi	C	C	C	C	C	B	C		C	C	B	B
Lake Grade	C	C	C	C	C	B	B		C	B	A	B

Year	2016	2017	2018	2019
TP	C	C	B	B
CLA	C	B	C	B
Secchi	B	C	C	C
Lake Grade	C	C	C	B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Little Carnelian Lake (82–0014) *Carnelian — Marine — St. Croix Watershed District*

Monitoring agency: Washington Conservation District staff

Little Carnelian Lake is located in Stillwater Township (Washington County). The lake is considered a Priority Lake by the Metropolitan Council for its good water quality. The lake has a surface area of 162 acres, and has a shoreline length of 1.7 miles. It has a mean and maximum depth of 10.7 m (35 feet) and 21.3 m (70 feet), respectively. The lake's watershed has an area of 565 acres which translates to a watershed-to-lake area ratio of 3.5:1. The greater the ratio, the greater the potential stress on the lake from surface runoff.

The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue) in 2002.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	12	7	19	A
CLA (µg/l)	2.3	1.0	3.7	A
Secchi (m)	5.5	4.4	7.9	A
TKN (mg/l)	0.46	0.36	0.88	
			Lake Grade	A

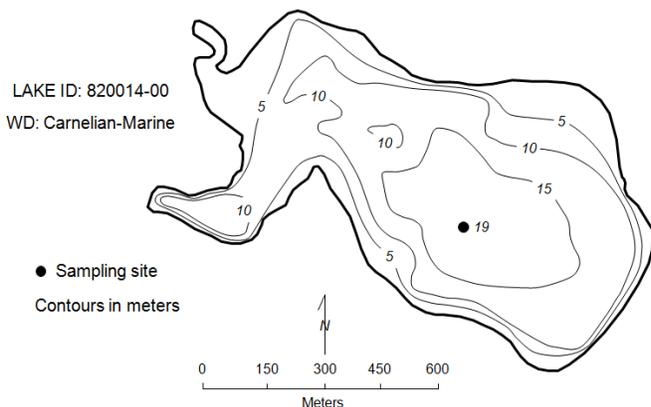
The lake received a lake grade of A this year, which is consistent with its historical database. Water clarity continues to be very good for a lake in the Twin Cities Metropolitan Area.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

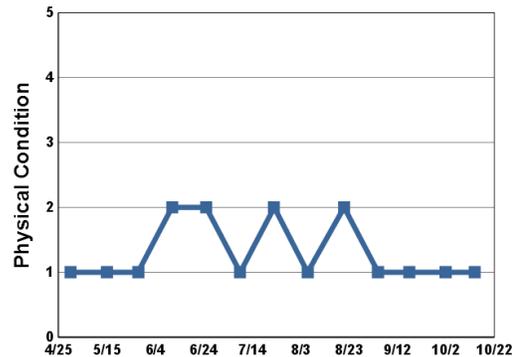
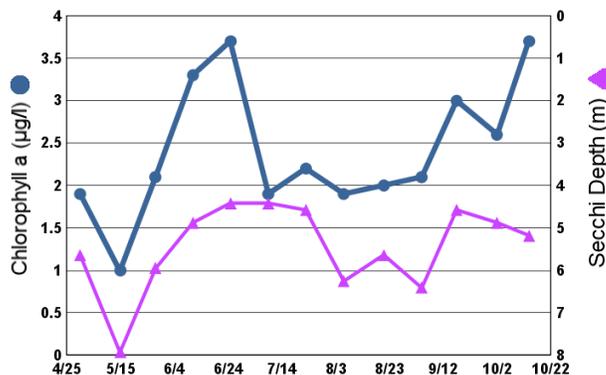
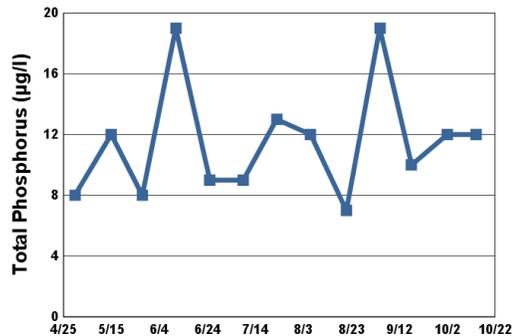
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Little Carnelian Lake
Stillwater Twp., Washington Co.

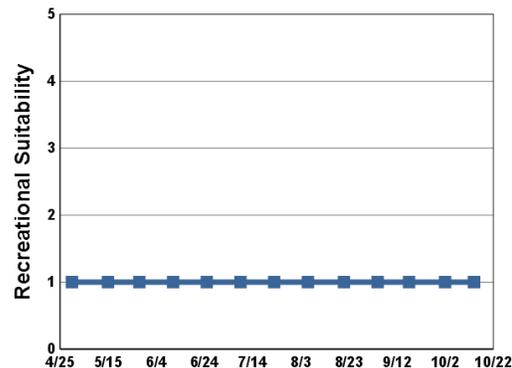


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/30/19	9.5	11.1	1.9	8	5.6	1	1
05/15/19	14.4	9.7	1.0	12	7.9	1	1
05/28/19	14.2	9.4	2.1	8	5.9	1	1
06/11/19	21.5	9.5	3.3	19	4.9	2	1
06/25/19	21.5	7.9	3.7	9	4.4	2	1
07/09/19	26.2	7.8	1.9	9	4.4	1	1
07/23/19	25.6	7.3	2.2	13	4.6	2	1
08/06/19	26.3	6.6	1.9	12	6.2	1	1
08/21/19	24.3	8.0	2.0	7	5.6	2	1
09/04/19	22.3	8.5	2.1	19	6.4	1	1
09/17/19	20.3	8.0	3.0	10	4.6	1	1
10/02/19	17.8	8.3	2.6	12	4.9	1	1
10/14/19	12.3	9.0	3.7	12	5.2	1	1



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1 = Beautiful
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5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												A
CLA												A
Secchi												A
Lake Grade												A

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP	A				A	A			A	B	A	A
CLA	A				A	A			A	A	A	A
Secchi	A	A	A	A	A	A	A		A	A	A	A
Lake Grade	A				A	A			A	A	A	A

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	A	A	A	A						A	A	A
CLA	A	A	A	A						A	A	A
Secchi	A	A	A	A	A	A	A			A	A	A
Lake Grade	A	A	A	A						A	A	A

Year	2016	2017	2018	2019
TP	A	A	A	A
CLA	A	A	A	A
Secchi	A	A	A	A
Lake Grade	A	A	A	A

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Little Comfort Lake (13–0054) *Comfort Lake* — *Forest Lake Watershed District*

Volunteer: Steve Schreiber

Little Comfort Lake is located near the city of Wyoming (Chisago County). The lake has a surface area of 36 acres and a maximum depth of 17.0 m (56 feet).

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2002. The MN DNR designated the lake as being infested with zebra mussels (*Dreissena polymorpha*) in 2017.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	56	41	73	C
CLA (µg/l)	16	2.8	35	C
Secchi (m)	1.2	0.8	2.0	C
TKN (mg/l)	1.05	0.64	1.40	
			Lake Grade	C

The lake received a lake grade of C this year which is consistent with its varying historical water quality database. Continued monitoring is recommended to continue to build the water quality database.

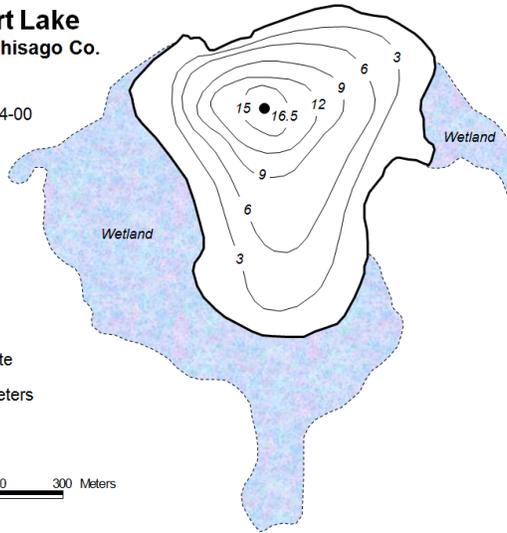
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Little Comfort Lake
City of Wyoming, Chisago Co.

LAKE ID: 130054-00

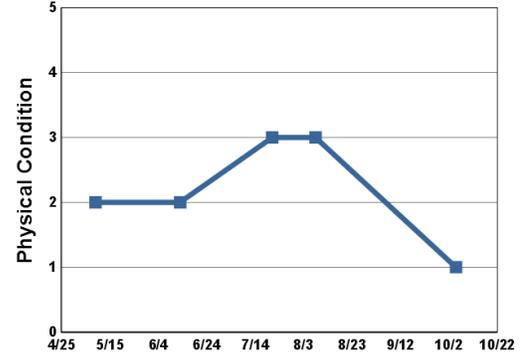
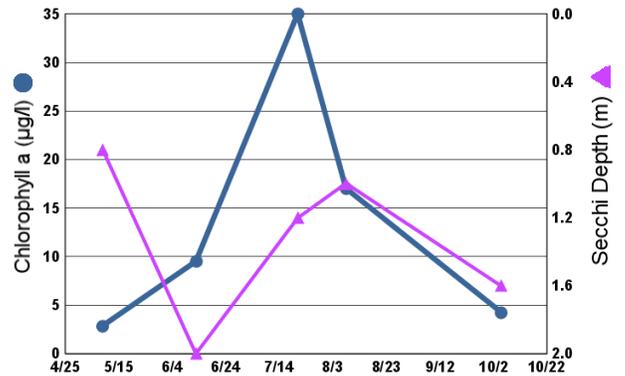
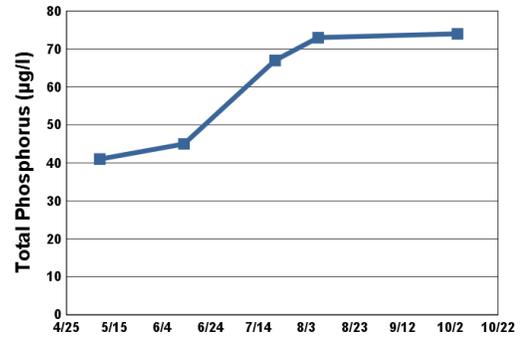


● Sampling site
Contours in meters

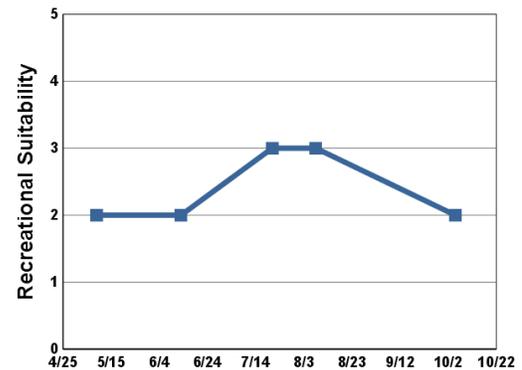


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/09/19	10.6		2.8	41	0.8	2	2
06/13/19	22.2		9.5	45	2.0	2	2
07/21/19	25.6		35	67	1.2	3	3
08/08/19	25.6		17	73	1.0	3	3
10/05/19	11.9		4.2	74	1.6	1	2



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5 = Severe Algal Bloom



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Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP			C									
CLA			C									
Secchi			C									
Lake Grade			C									

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP			D	C	C	A	B	C	C	C	C	C
CLA			C	A	B	A	B	B	B	B	B	C
Secchi			C	C	C	C	C	C	C	C	C	C
Lake Grade			C	B	C	B	B	C	C	C	C	C

Year	2016	2017	2018	2019
TP	C	C	C	C
CLA	C	B	C	C
Secchi	C	C	C	C
Lake Grade	C	C	C	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Little Comfort Lake (13–0054) *Comfort Lake* — *Forest Lake Watershed District*

Monitoring agency: Washington Conservation District staff

Little Comfort Lake is located near the city of Wyoming (Chisago County). The lake has a surface area of 36 acres and a maximum depth of 17.0 m (56 feet).

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2002. The MN DNR designated the lake as being infested with zebra mussels (*Dreissena polymorpha*) in 2017.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made by Washington Conservation District staff during their monitoring visits. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	54	29	113	C
CLA (µg/l)	23	1.0	39	C
Secchi (m)	1.4	0.6	2.3	C
TKN (mg/l)	1.02	0.78	1.40	
			Lake Grade	C

Note that the lake grades shown in the data summary table above were calculated from monitoring data sets from both the volunteer and Washington Conservation District (WCD) staff. The mean, minimum, and maximum values shown in the above data summary table and the results in the data table on the following page are specific to WCD staff monitoring data. The lake received a lake grade of C this year which is consistent with its varying historical water quality database. Continued monitoring is recommended to continue to build the water quality database.

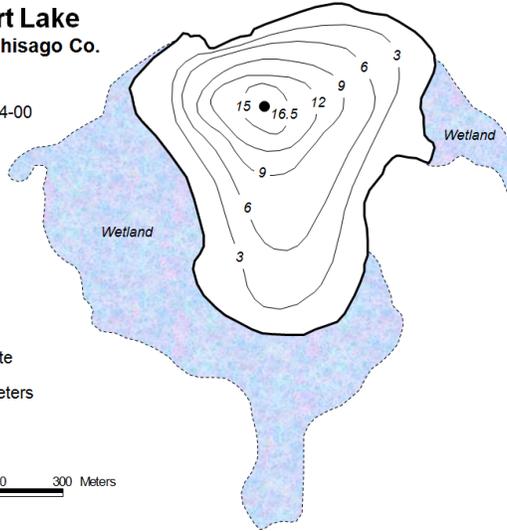
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

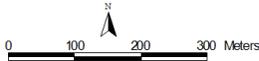
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Little Comfort Lake
City of Wyoming, Chisago Co.

LAKE ID: 130054-00

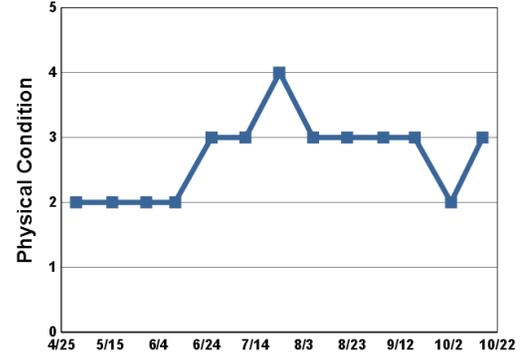
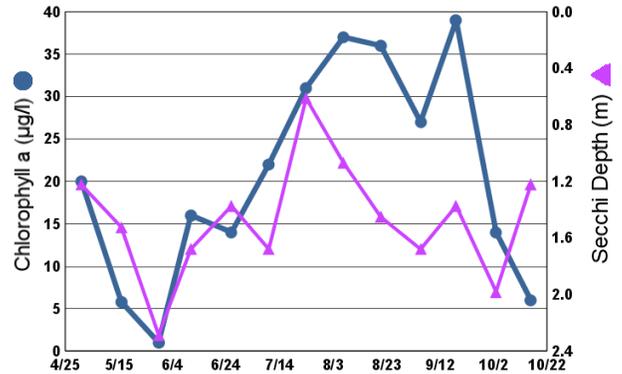
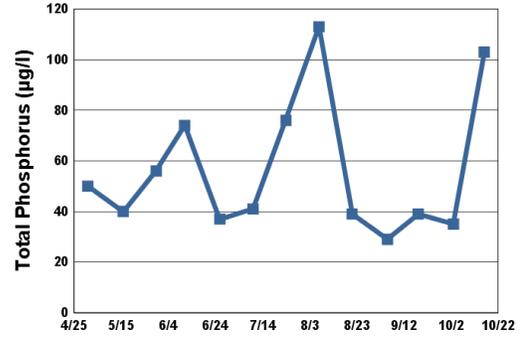


● Sampling site
Contours in meters

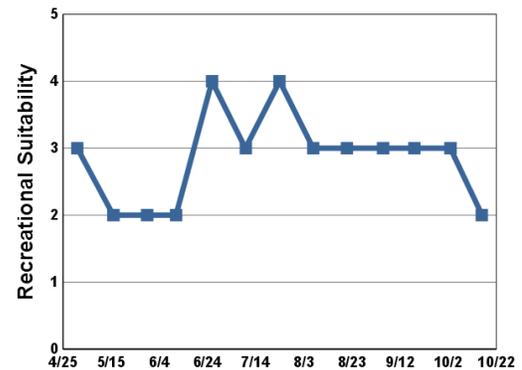


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/01/19	9.6	9.5	20	50	1.2	2	3
05/16/19	19.5	7.6	5.8	40	1.5	2	2
05/30/19	16.7	6.5	1.0	56	2.3	2	2
06/11/19	20.9	7.0	16	74	1.7	2	2
06/26/19	23.7	10.0	14	37	1.4	3	4
07/10/19	24.5	6.5	22	41	1.7	3	3
07/24/19	25.2	9.7	31	76	0.6	4	4
08/07/19	26.8	6.6	37	113	1.1	3	3
08/21/19	23.7	7.2	36	39	1.4	3	3
09/05/19	19.7	8.8	27	29	1.7	3	3
09/18/19	20.5	7.7	39	39	1.4	3	3
10/03/19	14.4	6.2	14	35	2.0	2	3
10/16/19	8.8	5.4	6.0	103	1.2	3	2



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP			C									
CLA			C									
Secchi			C									
Lake Grade			C									

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP			D	C	C	A	B	C	C	C	C	C
CLA			C	A	B	A	B	B	B	B	B	C
Secchi			C	C	C	C	C	C	C	C	C	C
Lake Grade			C	B	C	B	B	C	C	C	C	C

Year	2016	2017	2018	2019
TP	C	C	C	C
CLA	C	B	C	C
Secchi	C	C	C	C
Lake Grade	C	C	C	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Little Johanna Lake (62–0058) Rice Creek Watershed District

Volunteer: Fred Fox, Dave Short

Little Johanna Lake is located on the boundary between the cities of Arden Hills and Roseville (Ramsey County). The lake has a surface area of 18 acres and a maximum depth of 12.0 m (39 feet). The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2004, aquatic consumption (Per-fluorooctane Sulfonate (PFOS) in fish tissue) in 2012, and aquatic life (chloride) in 2014.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	53	40	74	C
CLA ($\mu\text{g/l}$)	16	2.2	51	B
Secchi (m)	1.7	1.1	2.7	C
TKN (mg/l)	0.67	0.51	0.94	
			Lake Grade	C

The lake received a lake grade of C this year, which is which is consistent with its historical water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

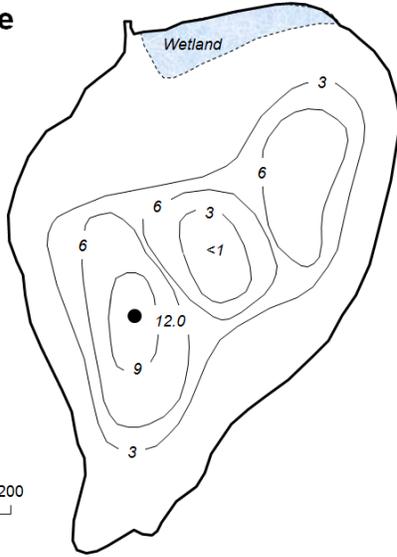
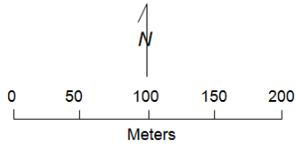
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Little Johanna Lake
Arden Hills/Roseville,
Ramsey Co.

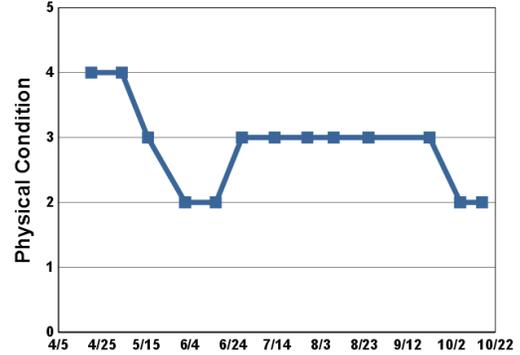
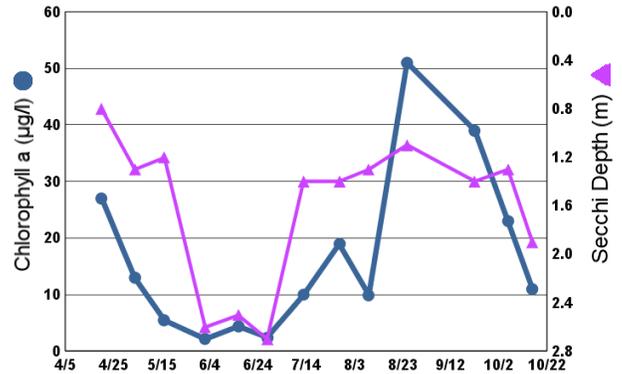
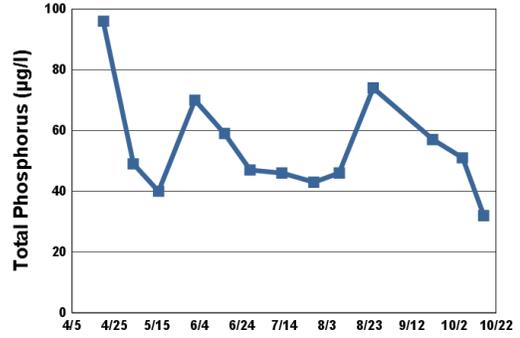
Lake ID: 620058-00

● Sampling site
Contours in meters

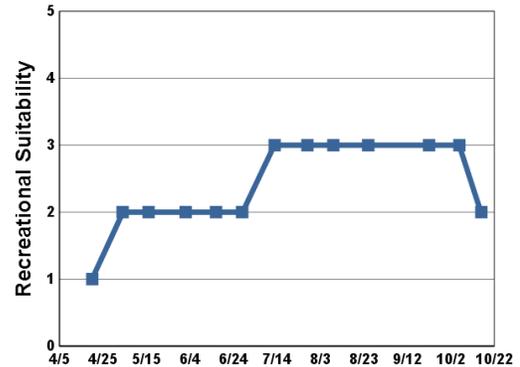


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/20/19	14.3		27	96	0.8	4	1
05/04/19	15.9		13	49	1.3	4	2
05/16/19	23.3		5.5	40	1.2	3	2
06/02/19	22.7		2.2	70	2.6	2	2
06/16/19	21.7		4.4	59	2.5	2	2
06/28/19	27.1		2.4	47	2.7	3	2
07/13/19	27.8		10	46	1.4	3	3
07/28/19	26.0		19	43	1.4	3	3
08/09/19	26.3		9.9	46	1.3	3	3
08/25/19	22.7		51	74	1.1	3	3
09/22/19	21.8		39	57	1.4	3	3
10/06/19	13.2		23	51	1.3	2	3
10/16/19	9.1		11	32	1.9	2	2



1 = Crystal Clear
2 = Some Algae Present
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4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP										C	D	D
CLA										C	C	C
Secchi										C	C	C
Lake Grade										C	C	C

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	C	D		C	C	C	C	C	C		D
CLA	B	C	C		B	B	C	B	B	B		C
Secchi	C	C	C		C	C	D	C	C	C		C
Lake Grade	C	C	C		C	C	C	C	C	C		C

Year	2016	2017	2018	2019
TP	C	C	C	C
CLA	B	A	A	B
Secchi	C	C	C	C
Lake Grade	C	B	B	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQUIS database(s)

Lochness Lake (2–0585) Rice Creek Watershed District

Volunteer: Kristen Genet

Lochness Lake is located in the City of Blaine (Anoka County). It has a surface area of 5.3 acres. There are few known morphological data available for the lake other than it has a maximum depth of 4.9 m (16ft). The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	46	21	66	C
CLA (µg/l))	9.0	4.2	16	A
Secchi (m)	1.7	1.2	2.0	C
TKN (mg/l)	1.05	0.88	1.40	
			Lake Grade	B

The lake received a lake grade of B this year which is consistent with recent years' of water quality data.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

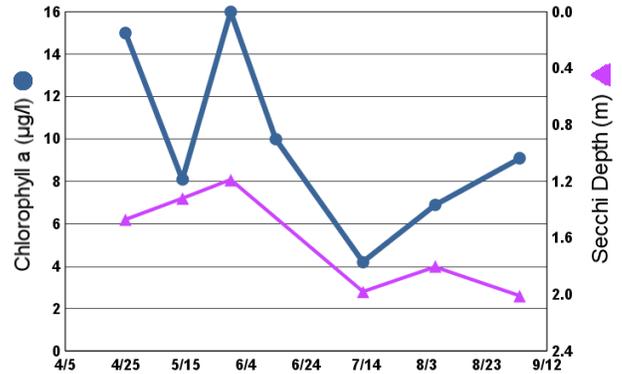
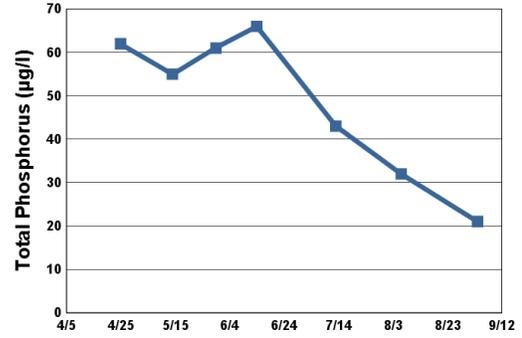
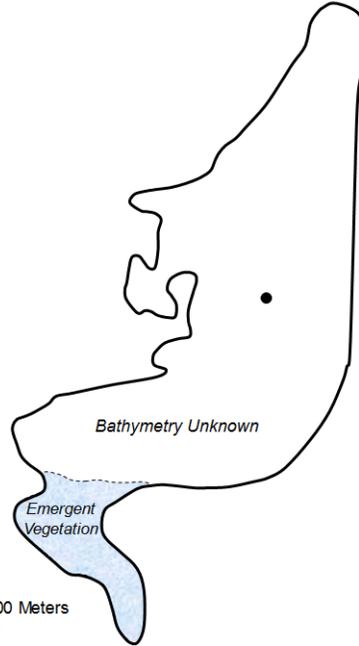
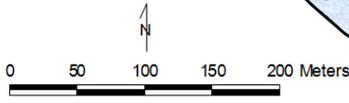
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lochness Lake
Blaine, Anoka Co.

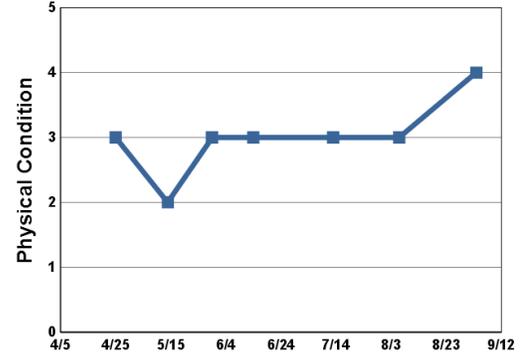
Lake ID: 20585-00

● Sampling site
Contours in meters

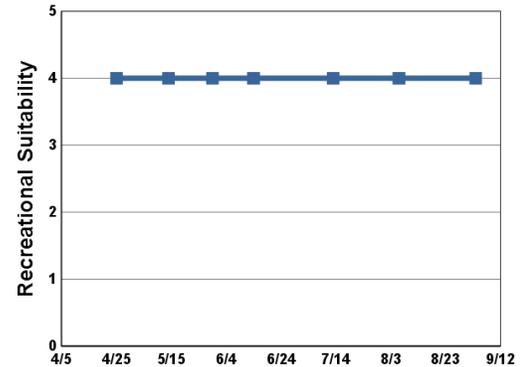


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/25/19	16		15	62	1.47	3	4
05/14/19	14.8		8.1	55	1.32	2	4
05/30/19	17.7		16	61	1.19	3	4
06/14/19	21.6		10	66		3	4
07/13/19	29.5		4.2	43	1.98	3	4
08/06/19	28.4		6.9	32	1.8	3	4
09/03/19	21.8		9.1	21	2.01	4	4



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2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP				A	B	C	B	C	D	C	C	C
CLA				A	A	B	A	B	C	C	C	B
Secchi				B	B	C	B	C	C	C	D	C
Lake Grade				A	B	C	B	C	C	C	C	C

Year	2016	2017	2018	2019
TP	B	C	C	C
CLA	B	B	A	A
Secchi	C	C	C	C
Lake Grade	B	C	B	B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Long Lake [Apple Valley] (19–0022) *City of Apple Valley*

Volunteer: Joan Kettelkamp

Long Lake is located in the City of Apple Valley (Dakota County). It has a surface area of 36 acres and a maximum depth of 1.5 m (5 feet). The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2002.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

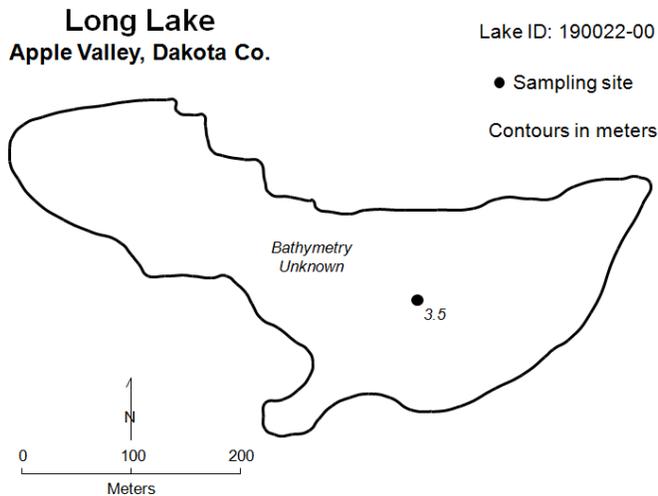
Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	133	35	240	D
CLA (µg/l)	72	1.7	200	D
Secchi (m)	+0.6	0.3	+1.0	
TKN (mg/l)	1.81	0.85	3.30	
			Lake Grade	

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.

The lake received D grades for TP and CLA indicating poor water quality. There was an insufficient quantity of valid Secchi transparency measurements to determine a Secchi grade. An invalid measurement occurred if the Secchi disk was either visible on the lake bottom or the disk's visibility was blocked by aquatic vegetation. In both of these situations the water clarity would have been greater than that indicated by the measurement. A lake grade was not given because all three parameter grades are required to issue a lake grade.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

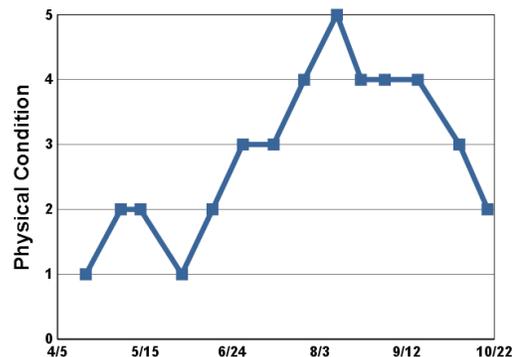
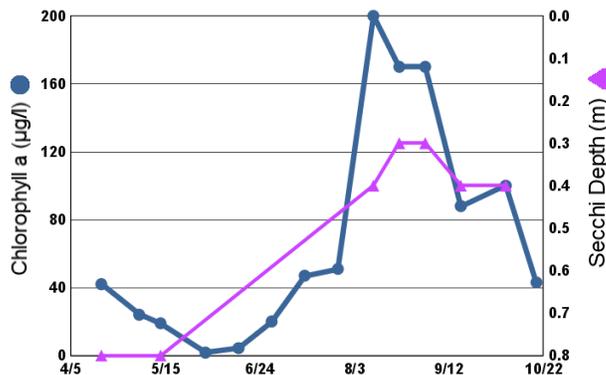
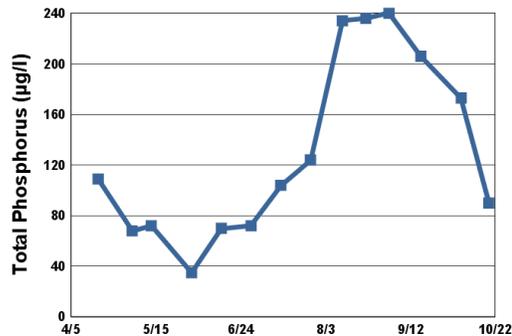
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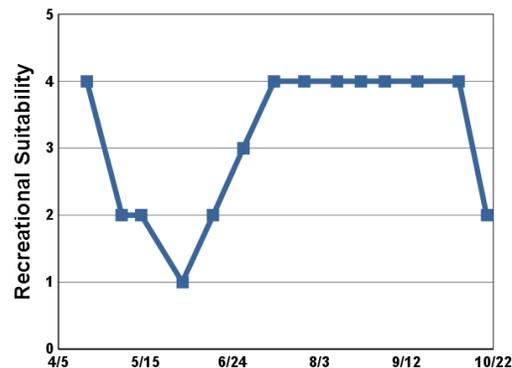
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/18/19	9.5		42	109	0.8	1	4
05/04/19	12.7		24	68	+0.9	2	2
05/13/19	14.3		19	72	0.8	2	2
06/01/19	20.3		1.7	35	+1.0	1	1
06/15/19	22.5		4.3	70	+0.6	2	2
06/29/19	25.0		20	72	+0.6	3	3
07/13/19	26.3		47	104	+0.7	3	4
07/27/19	25.7		51	124	+0.7	4	4
08/11/19	22.7		200	234	0.3	5	4
08/22/19	21.8		170	236	0.3	4	4
09/02/19	21.5		170	240	0.3	4	4
09/17/19	24.4		88	206	0.4	4	4
10/06/19	11.3		100	173	0.4	3	4
10/19/19	11.8		43	90	+0.6	2	2

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.



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1 = Beautiful
 2 = Minor Aesthetic Problem
 3 = Swimming Impaired
 4 = No Swimming; Boating OK
 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP						D					F	F
CLA						D					F	F
Secchi						F					F	F
Lake Grade						D					F	F

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	F	F	F	F	F	F	F	F	F	F	F	F
CLA	F	F	F	F	F	F	D	F	F	F	F	F
Secchi	F	F	F	F	F	F	F	F	F	F	F	F
Lake Grade	F											

Year	2016	2017	2018	2019
TP	F	D	F	D
CLA	F	F	D	D
Secchi	F	F	F	
Lake Grade	F	F	F	

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Long Lake [Site 1, North Basin] [Stillwater] (82–0021) Browns Creek Watershed District

Monitoring agency: Washington Conservation District staff

Long Lake is located on the western boundary of the City of Stillwater (Washington County). It has a surface area of 96 acres, and its maximum depth is 6.7 m (22 feet). More than 80 percent of the surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. The lake is defined as a shallow lake because of the dominance of the littoral zone.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2002. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 2009.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	53	37	111	C
CLA (µg/l)	30	5.0	120	C
Secchi (m)	1.6	0.9	2.5	C
TKN (mg/l)	0.75	0.44	0.86	
			Lake Grade	C

Lake site #1 received a lake grade of C this year. The lake has experienced varying lake grades from D to B since 2004 with water quality in the C grade range for the most recent years. Prior to 2004 the lake grades were constant Ds and Fs.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

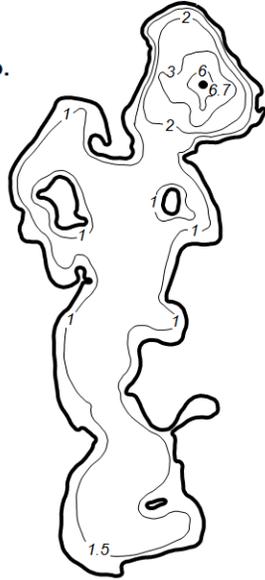
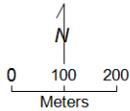
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

**Long Lake,
Stillwater, Washington Co.**

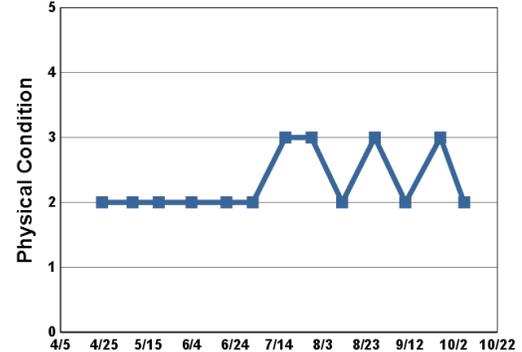
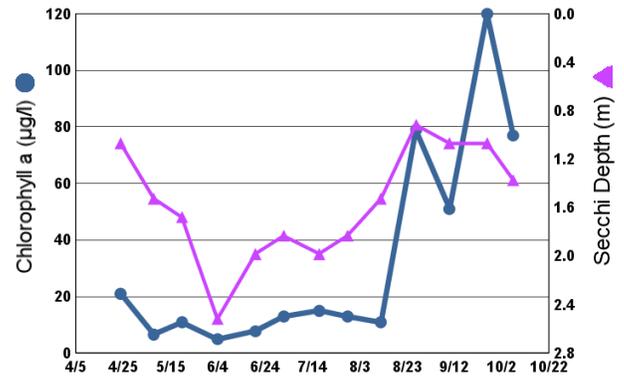
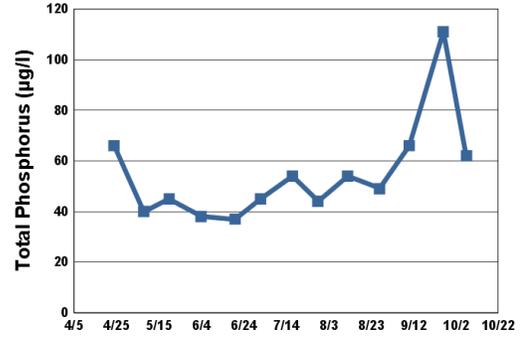
Lake ID: 820021-00

● Sampling site
Contours in meters

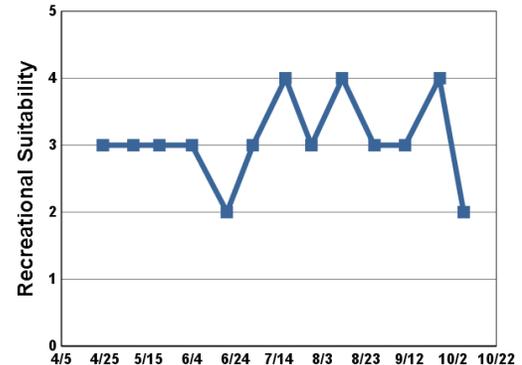


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/24/19	13.3	10.1	21	66	1.1	2	3
05/08/19	15.2	8.5	6.6	40	1.5	2	3
05/20/19	15.6	7.7	11	45	1.7	2	3
06/04/19	23.2	8.4	5.0	38	2.5	2	3
06/20/19	22.8	8.2	7.8	37	2.0	2	2
07/02/19	28.9	8.0	13	45	1.8	2	3
07/17/19	26.7	7.0	15	54	2.0	3	4
07/29/19	26.2	6.3	13	44	1.8	3	3
08/12/19	25.2	5.8	11	54	1.5	2	4
08/27/19	21.8	5.8	79	49	0.9	3	3
09/10/19	20.1	7.0	51	66	1.1	2	3
09/26/19	19.5	7.6	120	111	1.1	3	4
10/07/19	14.3	10.0	77	62	1.4	2	2



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4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi								F		D		F
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP				D	D		D	D	F	D	D	D
CLA				D	D		F	F	F	F	D	D
Secchi	F	F	F	F	D		F	F	F	F	F	F
Lake Grade				D	D		F	F	F	F	D	D

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	D	D	C	C	C	C	C	C	C	C	B
CLA	C	D	C	C	B	B	B	C	C	B	C	B
Secchi	C	D	D	D	C	C	B	C	C	C	C	C
Lake Grade	C	D	D	C	C	C	B	C	C	C	C	B

Year	2016	2017	2018	2019
TP	D	C	C	C
CLA	F	B	A	C
Secchi	F	D	B	C
Lake Grade	F	C	B	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Long Lake [May Township] (82–0030) *Carnelian — Marine — St. Croix Watershed District*

Monitoring agency: Washington Conservation District staff

Long Lake is located in May Township (Washington County). It has a surface area of 88 acres. The maximum depth is 3.7 m (12 feet). The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 2016.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	24	14	32	B
CLA (µg/l)	4.6	2.6	7.2	A
Secchi (m)	>2.3	>1.1	3.2	B
TKN (mg/l)	0.58	0.49	1.00	
			Lake Grade	B

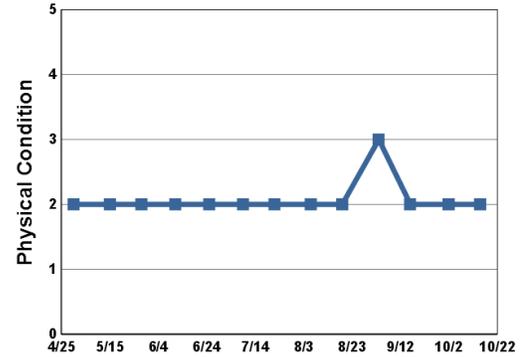
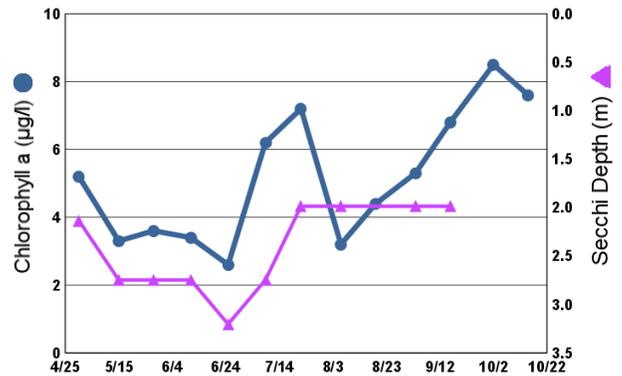
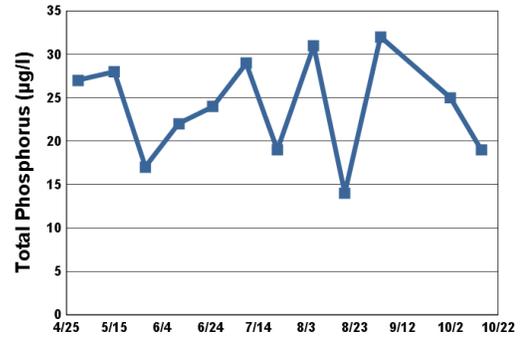
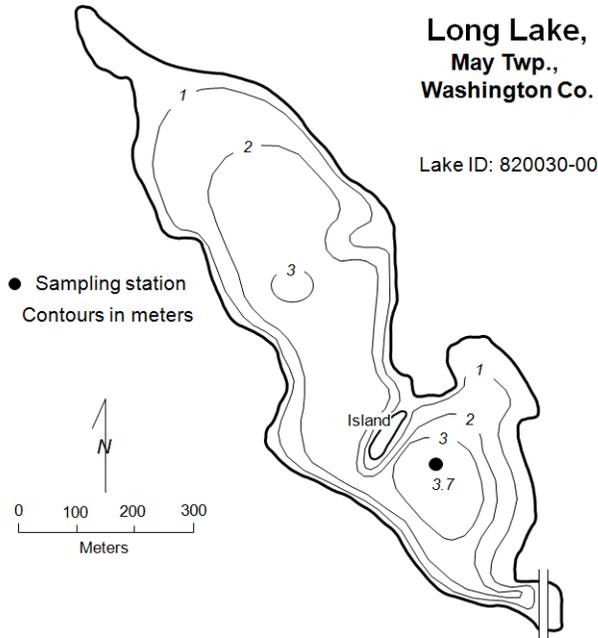
> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

The lake received a Secchi grade of B this year, which is consistent with its historical water quality database since 2004.

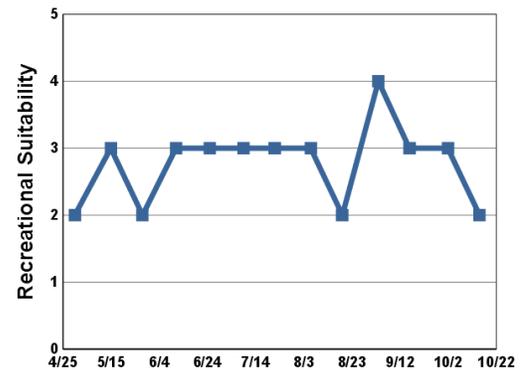
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.



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 3 = Definite Algal Presence
 4 = High Algal Color
 5 = Severe Algal Bloom



1 = Beautiful
 2 = Minor Aesthetic Problem
 3 = Swimming Impaired
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 5 = No Aesthetics Possible

2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/30/19	11.5	8.9	5.2	27	2.1	2	2
05/15/19	19.2	9.5	3.3	28	2.7	2	3
05/28/19	17.2	9.1	3.6	17	2.7	2	2
06/11/19	21.9	8.8	3.4	22	2.7	2	3
06/25/19	23.0	9.2	2.6	24	3.2	2	3
07/09/19	26.2	10.0	6.2	29	2.7	2	3
07/22/19	25.5	6.4	7.2	19	2.0	2	3
08/06/19	27.2	6.5	3.2	31	2.0	2	3
08/19/19	25.6	6.5	4.4	14	>1.1	2	2
09/03/19	21.6	7.5	5.3	32	2.0	3	4
09/16/19	18.1	5.2	6.8		2.0	2	3
10/02/19	15.4	4.4	8.5	25	>2.0	2	3
10/15/19	9.4	8.5	7.6	19	>2.4	2	2

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP		C	C	C	C	C		C	C	C	C	C
CLA		C	C	C	B	C		B	B	B	B	A
Secchi		B	C	C	C	C		C	B	B	C	B
Lake Grade		C	C	C	C	C		C	B	B	C	B

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	B	C	C	C	C	B	B	C			C	B
CLA	A	B	A	B	A	A	A	A			B	A
Secchi	B	B	B	C	B	B	B	B		B	C	C
Lake Grade	B	B	B	C	B	B	B	B			C	B

Year	2016	2017	2018	2019
TP			B	B
CLA			A	A
Secchi			B	B
Lake Grade			B	B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Long Lake [Washington County] (82–0068) *Carnelian — Marine — St. Croix Watershed District*

Monitoring agency: Washington Conservation District staff

Long Lake is located within the City of Scandia (Washington County). The lake has a surface area of 35 acres. The maximum and mean depths are 2.1 m (6.9 ft) and 1.1 m (3.6 ft), respectively. The entire lake is considered littoral zone, which is the shallow 0 – 15 feet depth zone that is typically dominated by aquatic plants. Since the lake is relatively shallow, it does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the water column.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2004.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

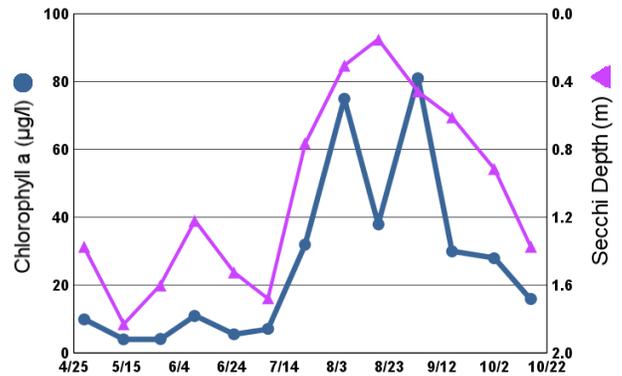
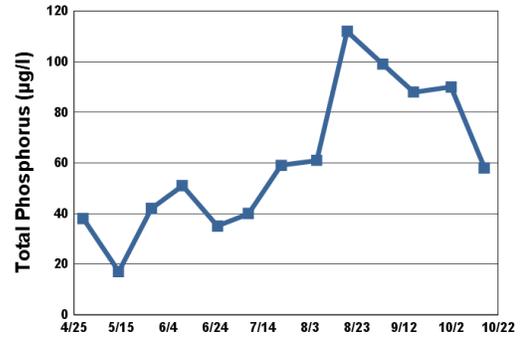
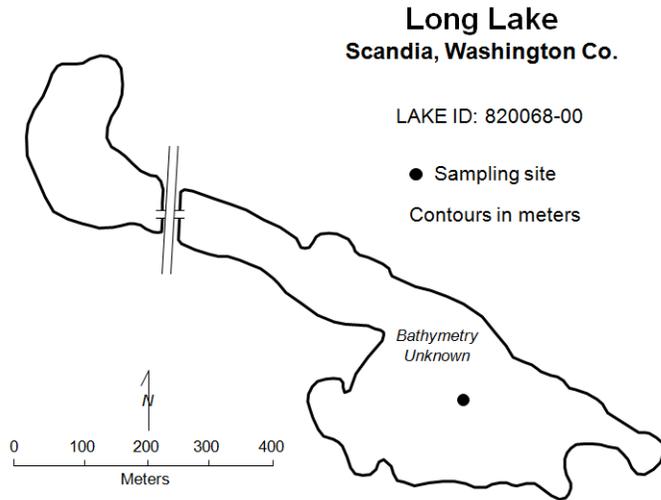
2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	60	17	112	C
CLA ($\mu\text{g/l}$)	29	4.1	81	C
Secchi (m)	1.0	0.2	1.8	D
TKN (mg/l)	1.26	0.50	2.30	
			Lake Grade	C

The lake received a lake grade of C this year. The lake grades have fluctuated in the range of F to B to D to C since 1998, which is quite variable. However, the F grades were received prior to 2004, suggesting that the lake's water quality is better than it was during the late 1990s and early 2000s.

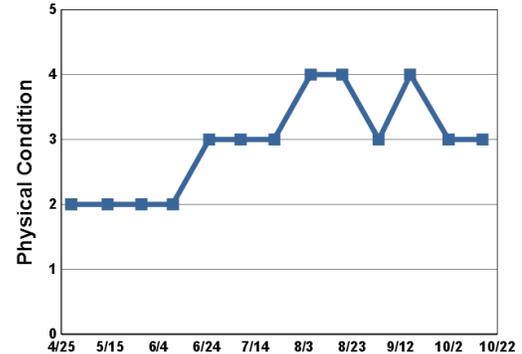
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

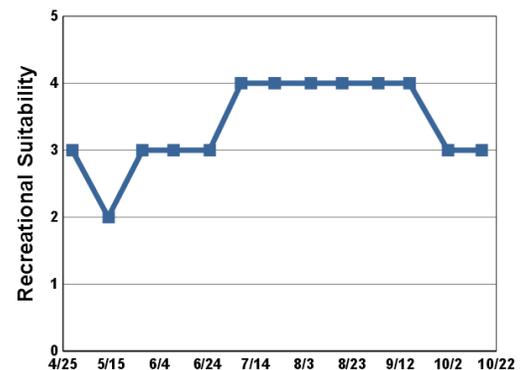


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/29/19	11.9	8.2	10	38	1.4	2	3
05/14/19	17.6	7.8	4.1	17	1.8	2	2
05/28/19	16.5	6.7	4.2	42	1.6	2	3
06/10/19	22.8	6.0	11	51	1.2	2	3
06/25/19	22.5	5.8	5.6	35	1.5	3	3
07/08/19	27.5	5.7	7.2	40	1.7	3	4
07/22/19	25.3	5.7	32	59	0.8	3	4
08/06/19	25.9	7.7	75	61	0.3	4	4
08/19/19	25.9	10.2	38	112	0.2	4	4
09/03/19	21.2	4.9	81	99	0.5	3	4
09/16/19	21.2	8.1	30	88	0.6	4	4
10/02/19	15.3	5.4	28	90	0.9	3	3
10/16/19	8.6	8.3	16	58	1.4	3	3



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Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP							D	D	D	C	C	D
CLA							F	F	F	D	C	F
Secchi							F	F	F	D	D	F
Lake Grade							F	F	F	D	C	F

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	D	D	D	C	C	D	C	D				C
CLA	D	C	B	C	A	C	C	C				D
Secchi	D	D	C	C	C	D	D	D				F
Lake Grade	D	D	C	C	B	D	C	D				D

Year	2016	2017	2018	2019
TP	D	C		C
CLA	C	B		C
Secchi	C	D		D
Lake Grade	C	C		C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Long Lake [Pine Springs] (82–0118) Valley Branch Watershed District

Volunteer: Frank Bastyr, Bill Feely

Long Lake is located in Pine Springs Township (Washington County). It has a surface area of 62 acres. The mean and maximum depths of the lake are 3.6 m (12 feet) and 10.4 m (34 feet), respectively. The lake's surface area and watershed area of 2,060 acres translates to a 33:1 watershed-to-lake area ratio. The greater the ratio, the greater the potential stress on the lake from surface runoff.

The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 2006.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	30	12	76	B
CLA (µg/l)	3.8	1.9	8.7	A
Secchi (m)	3.5	2.3	5.2	A
TKN (mg/l)	0.56	0.48	0.64	
			Lake Grade	A

The lake received a lake grade of A this year. The lake grades have fluctuated between As and Cs according to its historical water quality database but the As have been consistent since 2015. The lake received alum treatments in 2008 and 2009.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP					C							
CLA					B							
Secchi					C							
Lake Grade					C							

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP		B										B
CLA		B										A
Secchi		C										B
Lake Grade		B										B

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	C	C	B	B	A		B	B	A	A	A
CLA	B	B	C	A	A	A		A	A	A	A	A
Secchi	C	C	C	B	B	A		B	B	B	C	B
Lake Grade	C	C	C	B	B	A		B	B	A	B	A

Year	2016	2017	2018	2019
TP	A	A	A	B
CLA	A	A	A	A
Secchi	A	A	A	A
Lake Grade	A	A	A	A

Source: Metropolitan Council, EPA STORET, and/or MPCA EQUIS database(s)

Long Lake [Mahtomedi] (82–0130) Rice Creek Watershed District

Volunteer: Kitty Francy-Payton

Long Lake is located within the City of Mahtomedi (Washington County). It has a surface area of 48 acres and a maximum depth of 7.7 m (25 feet). More than 80 percent of the surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. The lake is defined as a shallow lake because of the dominance of the littoral zone.

The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 2008.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	30	23	49	B
CLA (µg/l)	4.8	2.5	6.3	A
Secchi (m)	1.9	1.8	2.0	C
TKN (mg/l)	0.57	0.35	0.70	
			Lake Grade	B

The lake received a lake grade of B this year. The lake grades for the past 14 years have varied between A's and C's.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												B
CLA												A
Secchi												B
Lake Grade												B

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	A	C	B	C	A	A	A	B	B	B	C	A
CLA	A	A	A	A	A	A	A	A	C	A	C	A
Secchi	B	B	B	B	B	A	A	B	C	C	C	B
Lake Grade	A	B	B	B	A	A	A	B	C	B	C	A

Year	2016	2017	2018	2019
TP	B	A	B	B
CLA	A	A	A	A
Secchi	A	B	C	C
Lake Grade	A	A	B	B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Lost Lake (27–0103) Bassett Creek Watershed Management Commission

Volunteer: Barrie Froseth

Lost Lake is located in the city of Plymouth (Hennepin County). The lake has a surface area of 22 acres and maximum depth of 1.8 m. The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	106	69	167	D
CLA ($\mu\text{g/l}$)	57	12	110	D
Secchi (m)	0.7	0.5	1.2	D
TKN (mg/l)	1.62	0.95	2.40	
			Lake Grade	D

The lake received a lake grade of D this year. Continued monitoring is recommended to build the water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

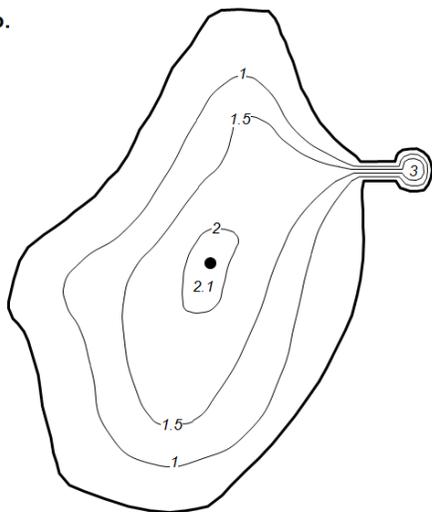
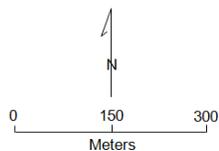
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

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Lost Lake
Plymouth, Hennepin Co.

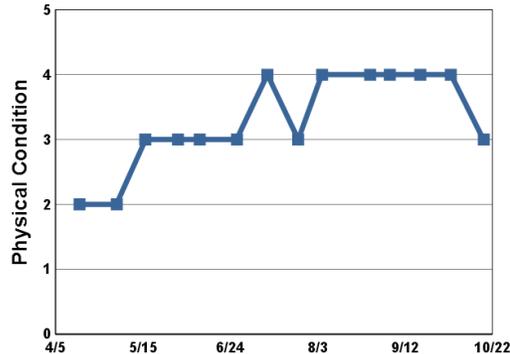
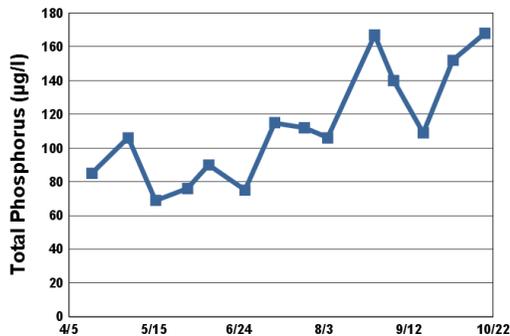
Lake ID: 270103-00

● Sampling site
Contours in meters

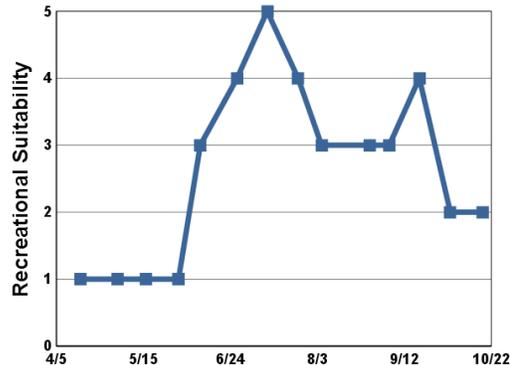


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/16/19	10.3		17	85	1.2	2	1
05/03/19	11.3		26	106	0.8	2	1
05/16/19	20.9		12	69	1.2	3	1
05/31/19	23.0		14	76	1.0	3	1
06/10/19	24.1		37	90	0.8	3	3
06/27/19	23.6		36	75	0.8	3	4
07/11/19	28.4		68	115	0.6	4	5
07/25/19	25.9		62	112	0.8	3	4
08/05/19	28.7		92	106	0.6	4	3
08/27/19	21.1			167	0.5	4	3
09/05/19	21.9		110	140	0.5	4	3
09/19/19	23.6		110	109	0.5	4	4
10/03/19	13.9		150	152	0.4	4	2
10/18/19	10.3		130	168	0.4	3	2



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Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP			F									
CLA			F									
Secchi			F									
Lake Grade			F									

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP		F										
CLA		F										
Secchi		F										
Lake Grade		F										

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP												
CLA												
Secchi												
Lake Grade												

Year	2016	2017	2018	2019
TP		D	D	D
CLA		C	D	D
Secchi		D	F	D
Lake Grade		D	D	D

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Lotus Lake (10–0006) City of Chanhassen

Volunteer: Steve Donen

Lotus Lake is located within the City of Chanhassen (Carver County). It is considered a Priority Lake by the Metropolitan Council for its high regional recreation value (METC 2007). It has a surface area of 246 acres. The MN DNR has designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*). The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue) in 2002, aquatic recreational use (nutrient/eutrophication biological indicators) in 2002, and aquatic life (fish bioassessments) in 2018. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 1995, brittle naiad (*Najas minor*) in 2017, zebra mussels (*Dreissena polymorpha*) in 2019.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	28	16	43	B
CLA (µg/l))	22	1.8	44	C
Secchi (m)	1.9	1.0	4.5	C
TKN (mg/l)	0.81	0.61	1.10	
			Lake Grade	C

The lake received a lake grade of C this year, which is consistent with its historical water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

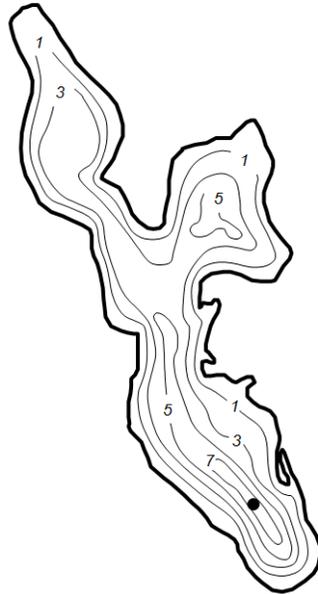
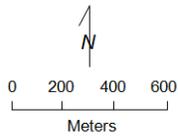
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lotus Lake
Chanhassen, Carver Co.

Lake ID: 100006-00

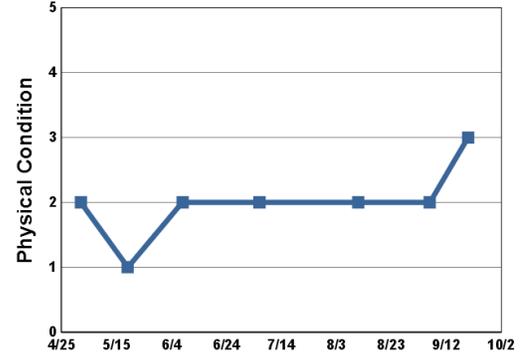
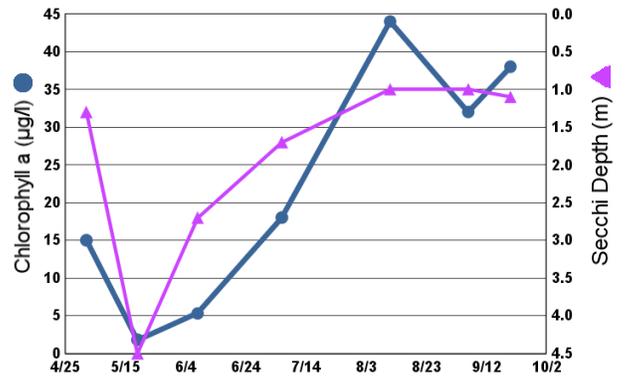
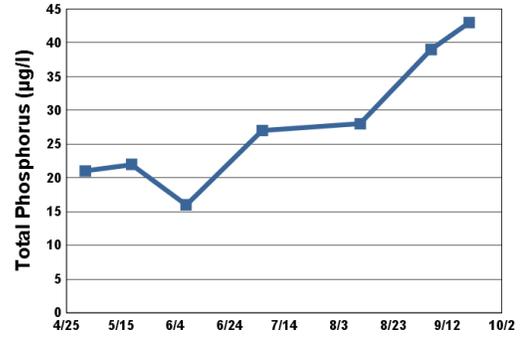
● Sampling site

Contours in meters

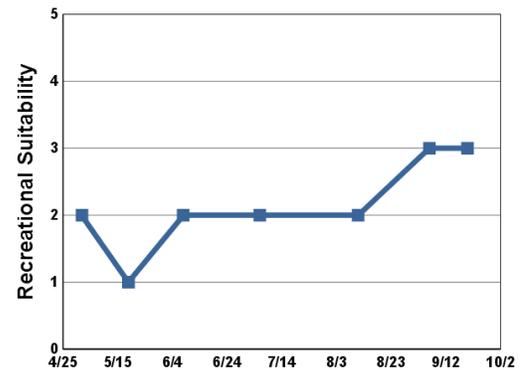


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/02/19	11.0		15	21	1.3	2	2
05/19/19	15.8		1.8	22	4.5	1	1
06/08/19	21.8		5.3	16	2.7	2	2
07/06/19	25.0		18	27	1.7	2	2
08/11/19	24.9		44	28	1.0	2	2
09/06/19	22.8		32	39	1.0	2	3
09/20/19	21.7		38	43	1.1	3	3



- 1 = Crystal Clear
- 2 = Some Algae Present
- 3 = Definite Algal Presence
- 4 = High Algal Color
- 5 = Severe Algal Bloom



- 1 = Beautiful
- 2 = Minor Aesthetic Problem
- 3 = Swimming Impaired
- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP						C						
CLA						C					C	
Secchi	D					C			D	C	C	C
Lake Grade						C						

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP								C	C			D
CLA								C	C			C
Secchi								C	C			D
Lake Grade								C	C			D

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	C	C	C	C	C	B	C				
CLA	C	C	C	C	C	B	C	C				
Secchi	C	C	C	C	C	C	C	C				
Lake Grade	C											

Year	2016	2017	2018	2019
TP	C			B
CLA	C			C
Secchi	C			C
Lake Grade	C			C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Lower Prior Lake [Site 2] (70–0026) *Prior Lake — Spring Lake Watershed District*

Volunteer: Steve Reinders

Prior Lake (lower basin) is located in the City of Prior Lake (Scott County). The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value. The lower basin has a surface area of 957 acres. The maximum and mean depths of the basin are 18.3 m and 4.1 m, respectively. The lower basin has one inlet, which is the outlet from the upper basin of Prior Lake. The lower basin has one outlet via an outlet structure located at the south-western portion of the basin. It was installed to regulate surface water elevations.

The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue) in 2002 and aquatic life (fish bioassessments) in 2018. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 1995 and zebra mussels (*Dreissena polymorpha*) in 2009.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	38	27	57	C
CLA (µg/l)	25	3.1	47	C
Secchi (m)	1.9	1.1	4.0	C
TKN (mg/l)	0.93	0.65	1.10	
			Lake Grade	C

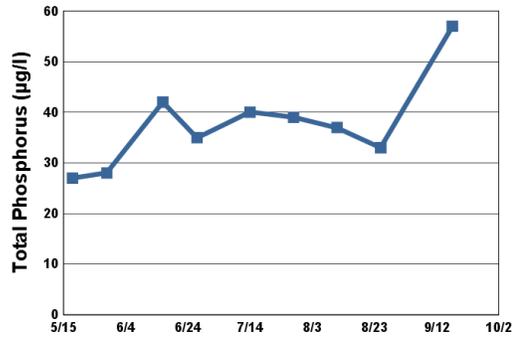
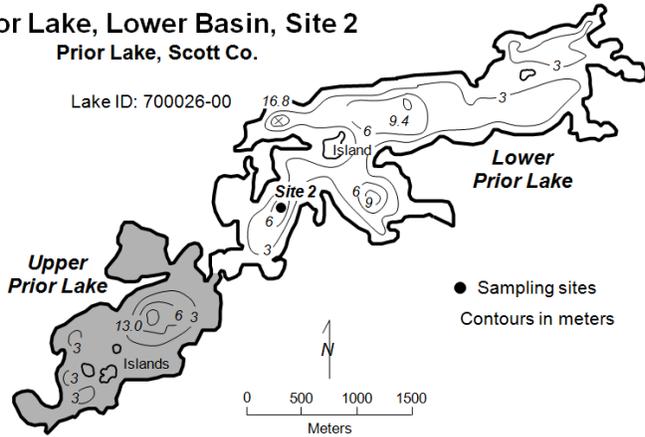
The lake site received a lake grade of C this year, which is a return to poorer water quality similar to that observed during the early 2000's. This poorer water quality stands in contrast to the recent improvements in water quality observed from 2014 through 2018. Continued monitoring is recommended to determine if this recent deterioration in water quality is part of a longer term trend.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

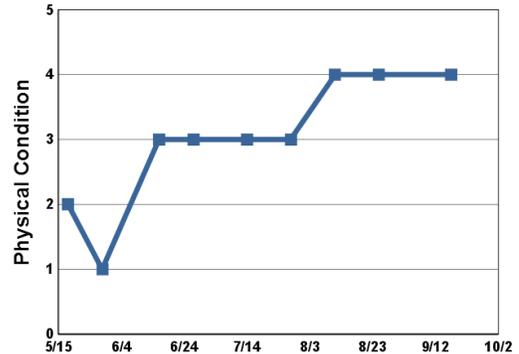
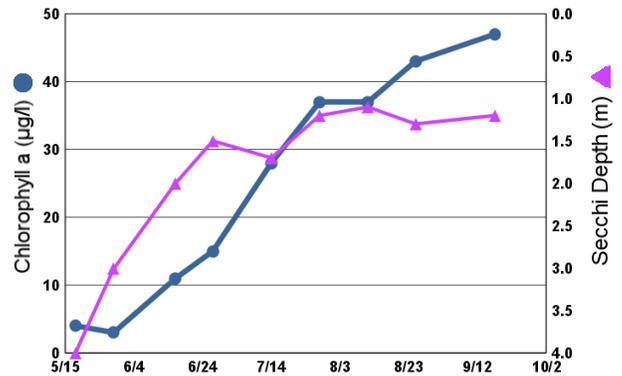
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Prior Lake, Lower Basin, Site 2
Prior Lake, Scott Co.

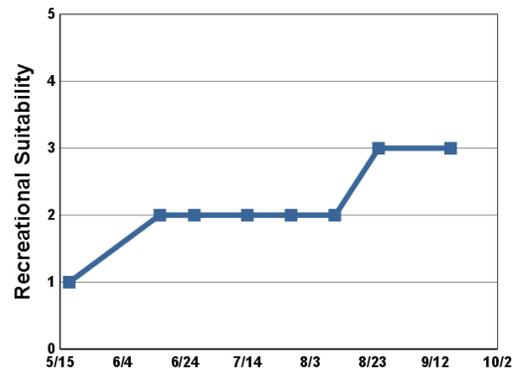


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/18/19	16.0		4.1	27	4.0	2	1
05/29/19	18.1		3.1	28	3.0	1	
06/16/19	22.3		11	42	2.0	3	2
06/27/19	23.3		15	35	1.5	3	2
07/14/19	27.8		28	40	1.7	3	2
07/28/19	28.0		37	39	1.2	3	2
08/11/19	25.4		37	37	1.1	4	2
08/25/19	22.6		43	33	1.3	4	3
09/17/19	22.3		47	57	1.2	4	3



- 1 = Crystal Clear
- 2 = Some Algae Present
- 3 = Definite Algal Presence
- 4 = High Algal Color
- 5 = Severe Algal Bloom



- 1 = Beautiful
- 2 = Minor Aesthetic Problem
- 3 = Swimming Impaired
- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP							B	C	B	B	C	
CLA							C	B	B	C	C	
Secchi							C	C	C	C	C	
Lake Grade							C	C	B	C	C	

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP											B	B
CLA											B	B
Secchi											C	B
Lake Grade											B	B

Year	2016	2017	2018	2019
TP	B	A	A	C
CLA	A	A	A	C
Secchi	A	A	B	C
Lake Grade	A	A	A	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Lucy Lake (10–0007) City of Chanhassen

Volunteer: Tim and Sharon McCotter

Lucy Lake is located within the City of Chanhassen (Carver County). It has a surface area of 87 acres and a maximum depth of 6.4 m (21 ft). More than 80 percent of the surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. The lake is defined as a shallow lake because of the dominance of the littoral zone. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue) in 2002. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 2007.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	43	22	70	C
CLA (µg/l)	17	2.9	52	B
Secchi (m)	1.5	0.7	2.7	C
TKN (mg/l)	1.10	0.78	1.50	
			Lake Grade	C

The lake received a lake grade of C this year, which is consistent with its historical water quality database. Continued monitoring is recommended to continue to build the water quality database.

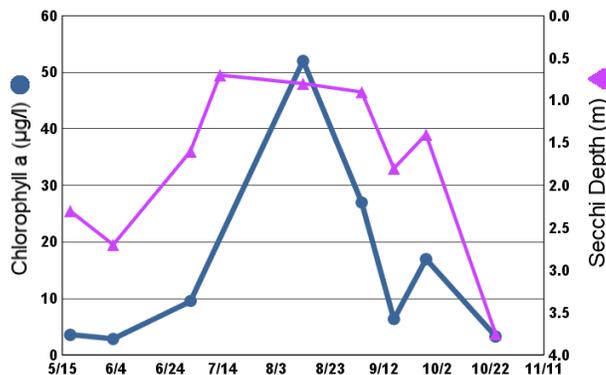
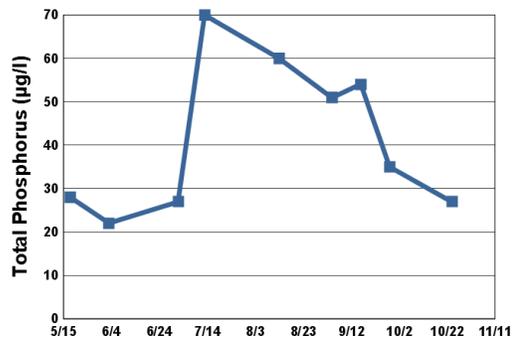
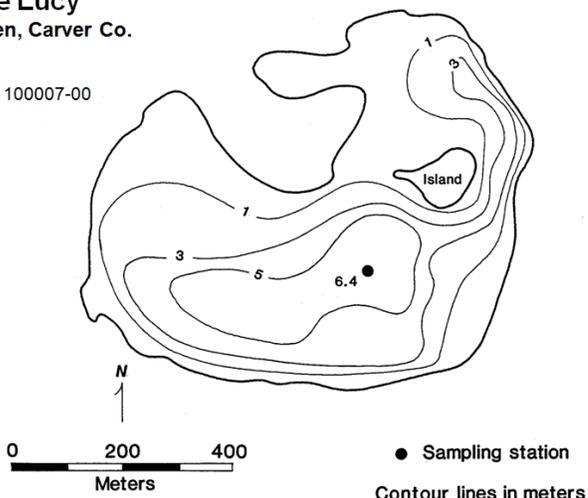
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

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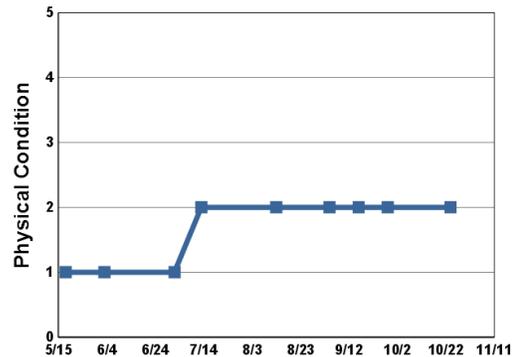
Lake Lucy
Chanhassen, Carver Co.

Lake ID: 100007-00

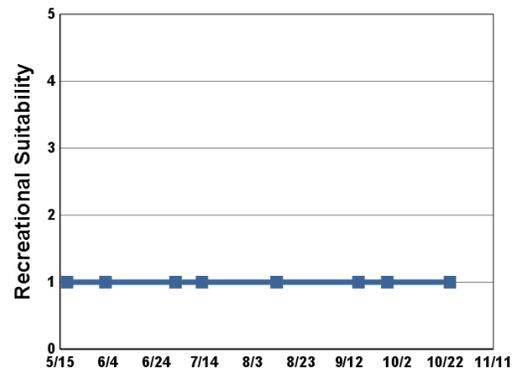


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/18/19	16.8		3.6	28	2.3	1	1
06/03/19	23.0		2.9	22	2.7	1	1
07/02/19	26.8		9.6	27	1.6	1	1
07/13/19	28.0			70	0.7	2	1
08/13/19	28.7		52	60	0.8	2	1
09/04/19	24.0		27	51	0.9	2	1
09/16/19	23.0		6.4	54	1.8	2	1
09/28/19	19.0		17	35	1.4	2	1
10/24/19	10.0		3.3	27	3.8	2	1



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- 5 = Severe Algal Bloom



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- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP						C						
CLA						C						
Secchi						C					C	C
Lake Grade						C						

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi	C	C	C	C	C	C	D	C	C	C	C	C
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP						C	C	C	D	C	C	C
CLA						C	C	B	C	C	B	C
Secchi	D	D	C	C	D	C	C	C	C	C	C	D
Lake Grade						C	C	C	C	C	C	C

Year	2016	2017	2018	2019
TP	C	C	C	C
CLA	C	C	C	B
Secchi	C	C	D	C
Lake Grade	C	C	C	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Lynch Lake [Site 1, North Basin] (82–0042) Browns Creek Watershed District

Monitoring agency: Washington Conservation District staff

Lynch Lake is located in Washington County. It has a surface area of 43 acres. The depth of the lake at the north basin site was approximately 0 – 2 m. There are few known morphological data available for the lake. Note that some previous Annual lake reports (2006 – 2009) erroneously placed site #1 in the south basin. The monitoring actually took place in the north basin during the 2006 – 2009 monitoring seasons.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2010.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCEC's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

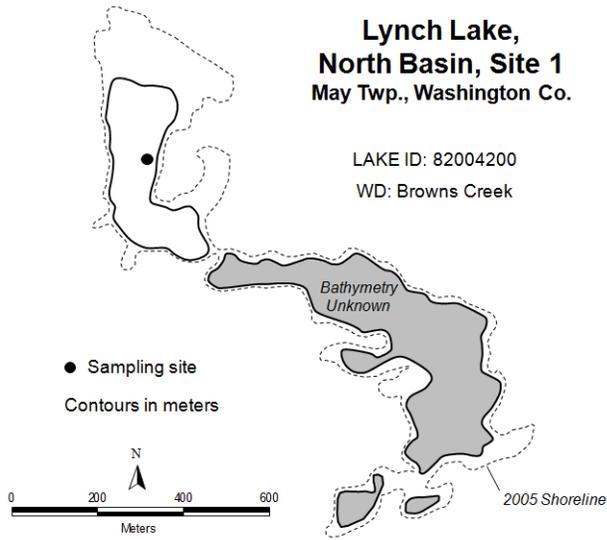
Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	101	50	169	D
CLA (µg/l)	50	4.6	92	D
Secchi (m)	+1.0	0.3	+2.4	D
TKN (mg/l)	1.37	0.65	2.20	
			Lake Grade	D

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.

The north basin received a lake grade of D this year. The lake has been in the C and D grade range since 2016. Prior to then the water quality was typically an F.. Continued monitoring is recommended to determine if this recent improvement in water quality is part of a longer term trend.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

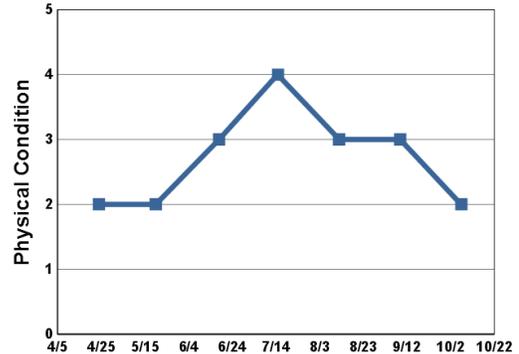
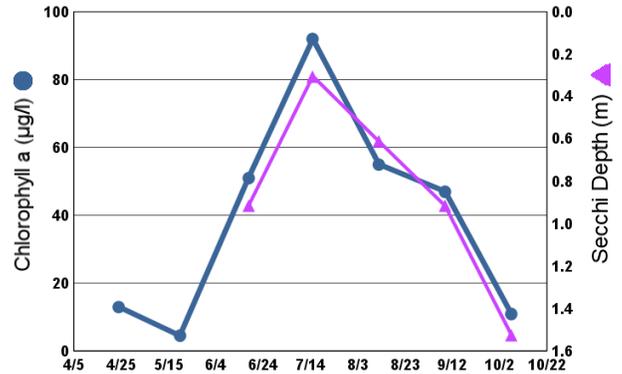
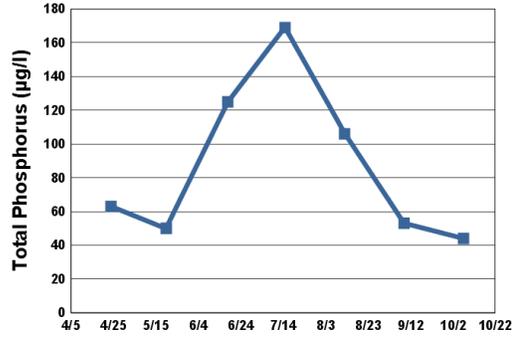
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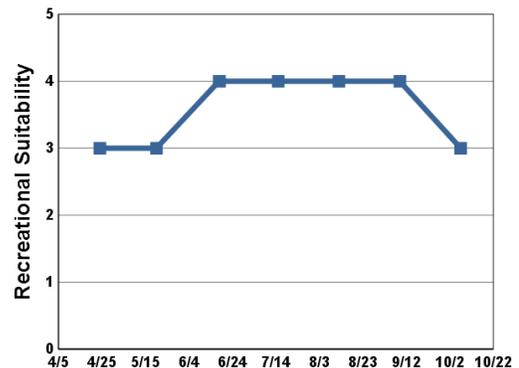
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/24/19	12.7	9.3	13	63	>1.7	2	3
05/20/19	12.9	7.2	4.6	50	+2.4	2	3
06/18/19	22.7	9.2	51	125	0.9	3	4
07/15/19	26.3	4.3	92	169	0.3	4	4
08/12/19	24.2	7.1	55	106	0.6	3	4
09/09/19	18.5	6.1	47	53	0.9	3	4
10/07/19	12.1	6.8	11	44	1.5	2	3

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.
> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.



1 = Crystal Clear
2 = Some Algae Present
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4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP			F	F	F	F	F	F	D	D	D	D
CLA			F	F	F	F	F	D	C	F	F	F
Secchi			F	F	F	F	F	F	D	F	F	F
Lake Grade			F	F	F	F	F	F	D	F	F	F

Year	2016	2017	2018	2019
TP	D	C	C	D
CLA	D	C	B	D
Secchi	F	D	C	D
Lake Grade	D	C	C	D

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Lynch Lake [Site 2, South Basin] (82–0042) Browns Creek Watershed District

Monitoring agency: Washington Conservation District staff

Lynch Lake is located in Washington County. It has a surface area of 43 acres. The depth of the lake at the south site was approximately 5 to 6 m. There are little known morphological data available for the lake.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2010.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

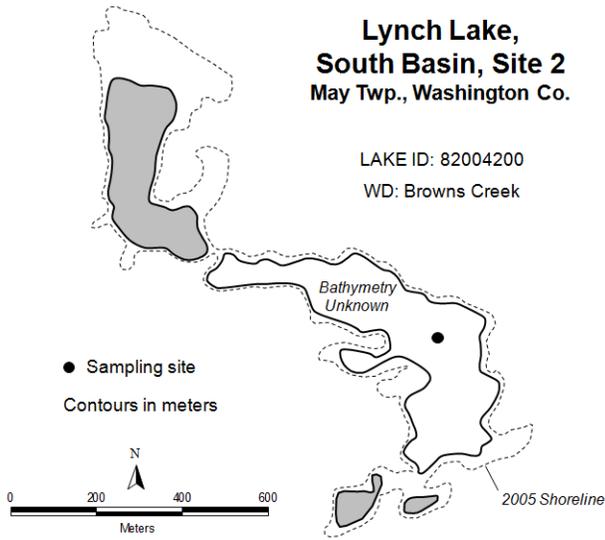
2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	43	24	56	C
CLA (µg/l)	27	5.4	57	C
Secchi (m)	1.5	0.6	3.0	C
TKN (mg/l)	0.95	0.66	1.20	
			Lake Grade	C

The south site received a lake grade of C this year. The lake grades for Site 2 have improved from Fs to Cs since 2010. Continued monitoring is recommended to determine if this recent improvement in water quality is part of a longer term trend.

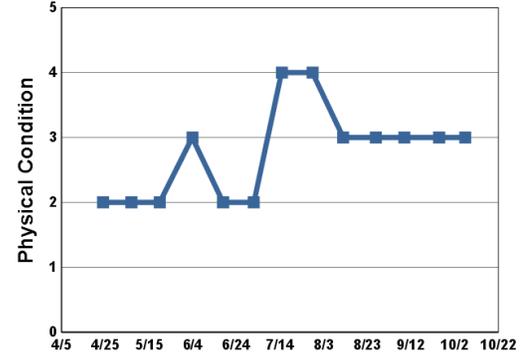
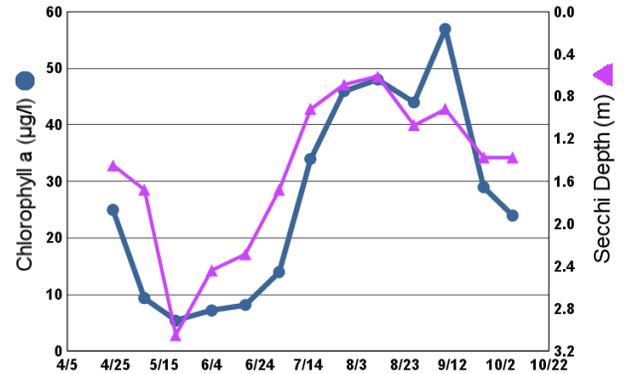
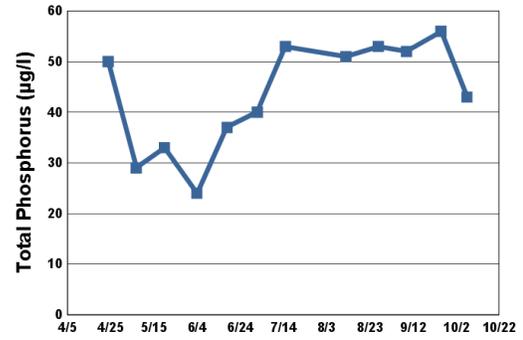
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

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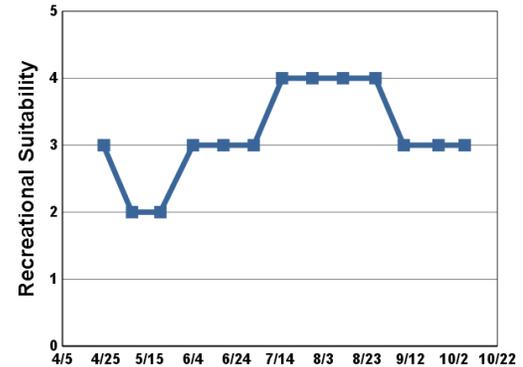


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/24/19	11.8	12.2	25	50	1.4	2	3
05/07/19	16.3	9.6	9.4	29	1.7	2	2
05/20/19	14.2	7.6	5.4	33	3.0	2	2
06/04/19	21.1	8.4	7.2	24	2.4	3	3
06/18/19	22.8	7.4	8.2	37	2.3	2	3
07/02/19	27.9	6.6	14	40	1.7	2	3
07/15/19	27.2	7.1	34	53	0.9	4	4
07/29/19	25.1	5.4	46		0.7	4	4
08/12/19	24.7	7.2	48	51	0.6	3	4
08/27/19	21.3	6.0	44	53	1.1	3	4
09/09/19	19.3	6.9	57	52	0.9	3	3
09/25/19	20.4	6.7	29	56	1.4	3	3
10/07/19	13.6	6.1	24	43	1.4	3	3



1 = Crystal Clear
 2 = Some Algae Present
 3 = Definite Algal Presence
 4 = High Algal Color
 5 = Severe Algal Bloom



1 = Beautiful
 2 = Minor Aesthetic Problem
 3 = Swimming Impaired
 4 = No Swimming; Boating OK
 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP							D	D	D	C	C	C
CLA							F	D	F	C	C	D
Secchi							F	D	D	D	D	F
Lake Grade							F	D	D	C	C	D

Year	2016	2017	2018	2019
TP	C	C	C	C
CLA	C	B	B	C
Secchi	C	D	C	C
Lake Grade	C	C	C	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Marion Lake (19–0026) City of Lakeville

Volunteer: Gabrielle and Brian Gallagher

Marion Lake is located in the City of Lakeville (Dakota County). The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value. It has a surface area of approximately 560 acres, and has a maximum depth of 6.4 m (21 feet). More than 80 percent of the surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. The lake is defined as a shallow lake because of the dominance of the littoral zone.

The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue) in 1998. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 1998 and zebra mussels (*Dreissena polymorpha*) in 2017.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

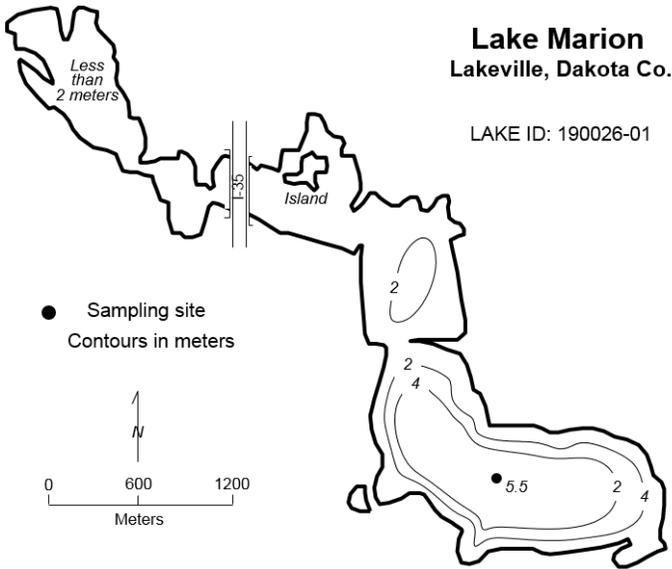
Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	28	13	39	B
CLA (µg/l)	12	2.0	32	B
Secchi (m)	2.3	1.4	3.8	B
TKN (mg/l)	0.63	0.46	0.84	
			Lake Grade	B

The lake received a lake grade of B this year. The surface water quality of the lake has varied from B to C with the occasional A for the past 10 years according to its historical water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

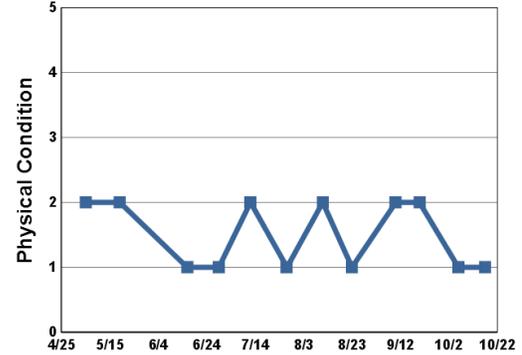
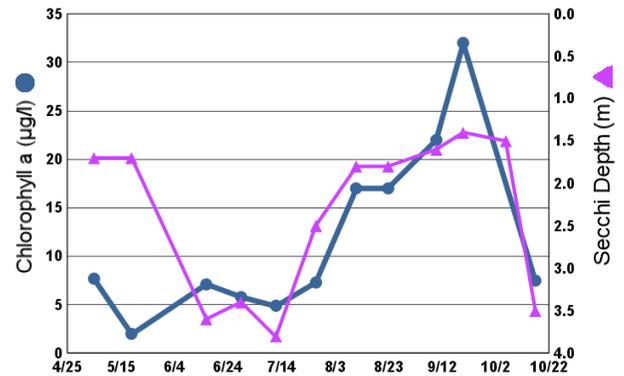
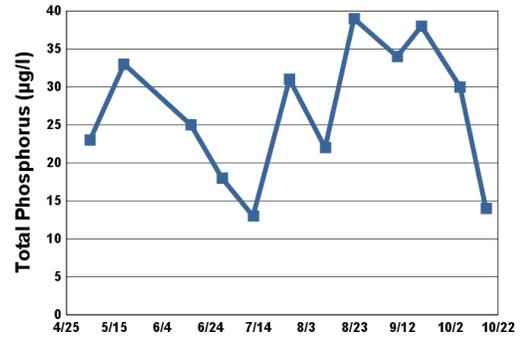
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

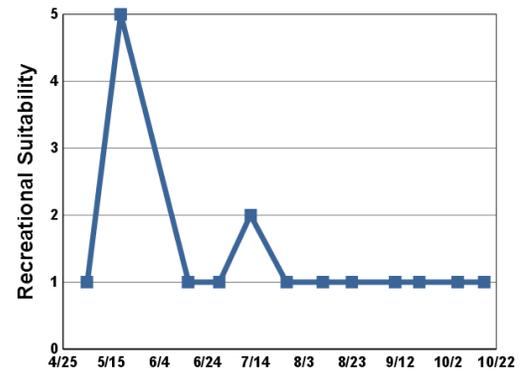


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/05/19	12.5		7.7	23	1.7	2	1
05/19/19	14.3		2.0	33	1.7	2	5
06/16/19	20.8		7.1	25	3.6	1	1
06/29/19	25.5		5.8	18	3.4	1	1
07/12/19	25.4		4.9	13	3.8	2	2
07/27/19	26.2		7.3	31	2.5	1	1
08/11/19	25.1		17	22	1.8	2	1
08/23/19	23.7		17	39	1.8	1	1
09/10/19	20.5		22	34	1.6	2	1
09/20/19	21.0		32	38	1.4	2	1
10/06/19	14.2			30	1.5	1	1
10/17/19	10.8		7.5	14	3.5	1	1



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP	C	C		C				C		C		
CLA	C	D		C				C		C		
Secchi	C	D		B				C		C	C	C
Lake Grade	C	D		C				C		C		

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP			B					B	B	B	C	B
CLA			A					B	A	B	B	C
Secchi			B					C	B	B	C	C
Lake Grade			B					B	B	B	C	C

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	C	C	C	C	C	C	B	B	A	A	B
CLA	C	C	C	C	C	C	C	B	B	B	A	B
Secchi	C	C	C	C	B	C	C	C	C	C	B	B
Lake Grade	C	B	B	B	A	B						

Year	2016	2017	2018	2019
TP	B	C	A	B
CLA	B	B	A	B
Secchi	B	B	B	B
Lake Grade	B	B	A	B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Markgrafs Lake (82–0089) *City of Woodbury*

Monitoring agency: Washington Conservation District staff

Markgrafs Lake is located within the City of Woodbury (Washington County). It has a surface area of approximately 46 acres, and a maximum depth of 2.4 m (8 feet). The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column. The lake has a piped outlet on the southern end. Downstream from the outlet is a valve that can direct the overflow to either Powers or Wilmes lakes. The lake is used by the MDNR Fisheries as a rearing pond for walleyes.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2006.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	86	53	128	D
CLA (µg/l)	27	13	44	C
Secchi (m)	1.1	0.8	1.8	D
TKN (mg/l)	1.21	0.87	1.60	
			Lake Grade	D

The lake received a lake grade of D this year. Over the past decade, the lake grades have varied back and forth in the D to F range.

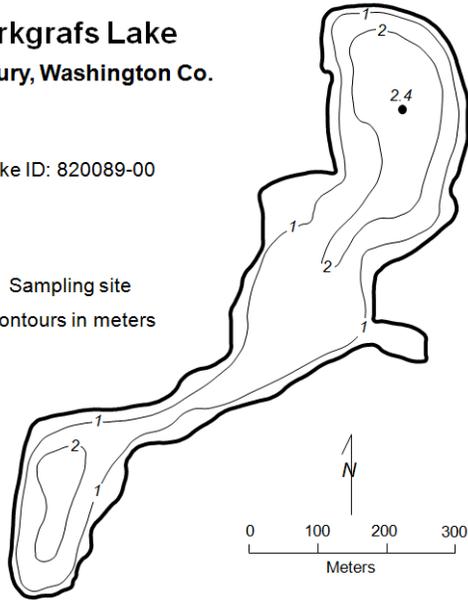
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Markgrafs Lake
Woodbury, Washington Co.

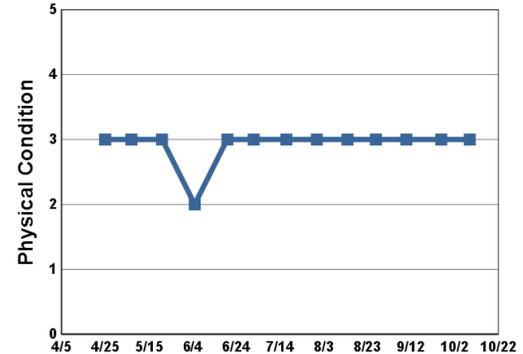
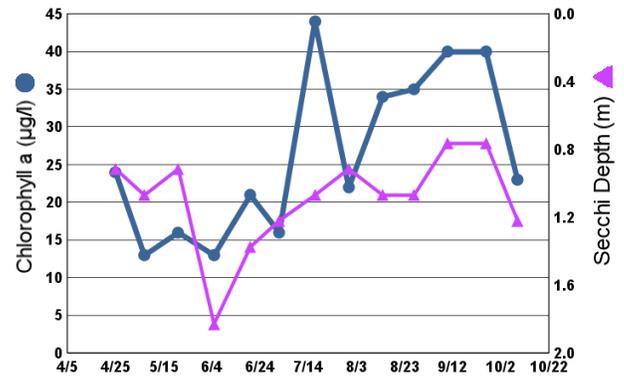
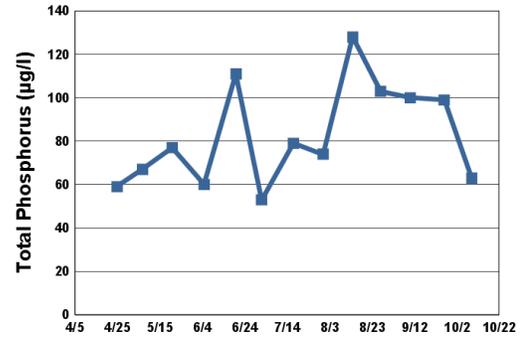
Lake ID: 820089-00

● Sampling site
Contours in meters

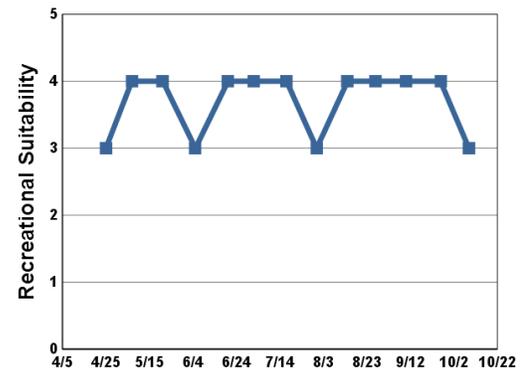


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/25/19	13.6	10.5	24	59	0.9	3	3
05/07/19	16.3	9.8	13	67	1.1	3	4
05/21/19	14.6	9.0	16	77	0.9	3	4
06/05/19	23.7	8.6	13	60	1.8	2	3
06/20/19	22.6	8.7	21	111	1.4	3	4
07/02/19	26.3	10.0	16	53	1.2	3	4
07/17/19	26.1	6.8	44	79	1.1	3	4
07/31/19	25.7	7.0	22	74	0.9	3	3
08/14/19	23.8	4.6	34	128	1.1	3	4
08/27/19	21.5	6.8	35	103	1.1	3	4
09/10/19	18.8	5.6	40	100	0.8	3	4
09/26/19	19.2	6.9	40	99	0.8	3	4
10/09/19	13.1	9.9	23	63	1.2	3	3



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP			D	C	D	D	F	D	D	F	F	D
CLA			C	B	B	C	F	C	C	C	C	C
Secchi			D	C	C	D	F	D	C	D	F	D
Lake Grade			D	C	C	D	F	D	C	D	D	D

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	D	D	F	D	D	F	F	D	F	D	D	D
CLA	D	C	D	D	D	F	F	D	F	D	C	D
Secchi	F	F	F	F	F	F	F	F	F	F	D	F
Lake Grade	D	D	F	D	D	F	F	D	F	D	D	D

Year	2016	2017	2018	2019
TP	D	D	D	D
CLA	D	C	C	C
Secchi	F	F	F	D
Lake Grade	D	D	D	D

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Masterman Lake (82–0126) Browns Creek Watershed District

Monitoring agency: Washington Conservation District staff

Masterman Lake is located in Grant Township (Washington County). It has a surface area of 45 acres. There is very little known morphological data available for the lake.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	26	14	36	B
CLA ($\mu\text{g/l}$)	7.3	3.2	24	A
Secchi (m)	>1.9	>1.1	>2.6	
TKN (mg/l)	0.57	0.47	0.74	
			Lake Grade	

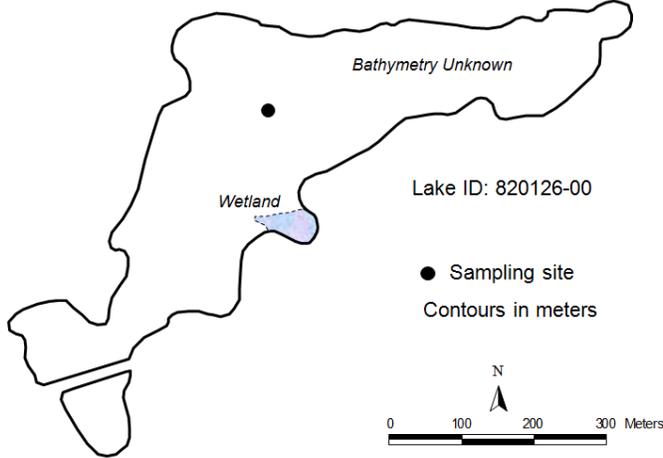
> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

There was an insufficient quantity of valid Secchi transparency measurements to determine a Secchi grade. An invalid measurement occurred if the Secchi disk was either visible on the lake bottom or the disk's visibility was blocked by aquatic vegetation. In both of these situations the water clarity would have been greater than that indicated by the measurement. A lake grade was not given because all three parameter grades are required to issue a lake grade.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

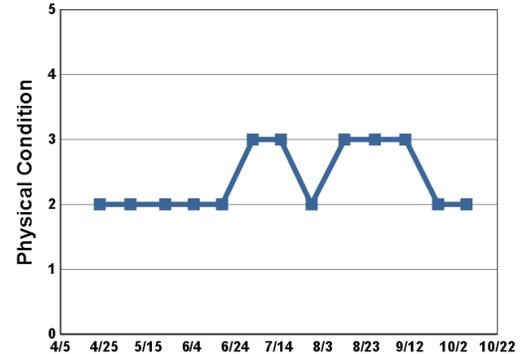
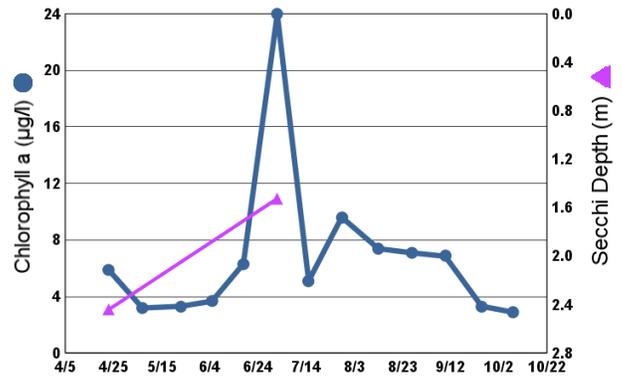
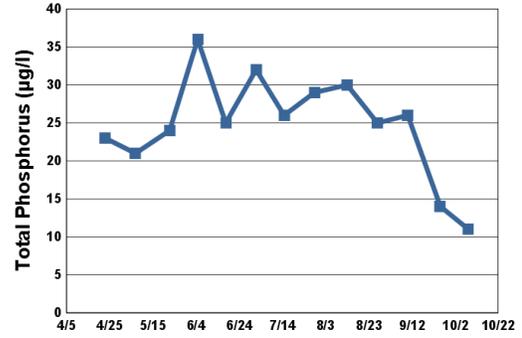
Masterman Lake
Grant, Washington Co.



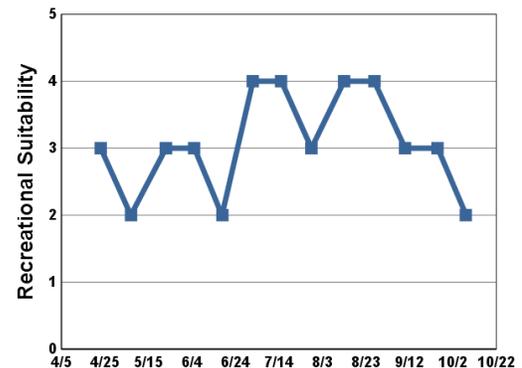
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/23/19	10.9	9.6	5.9	23	2.4	2	3
05/07/19	14.3	9.7	3.2	21	>2.4	2	2
05/23/19	13.8	8.4	3.3	24	>2.5	2	3
06/05/19	21.9	8.5	3.7	36	>2.6	2	3
06/18/19	21.8	9.2	6.3	25	>2.6	2	2
07/02/19	24.3	9.2	24	32	1.5	3	4
07/15/19	28.3	7.7	5.1	26	>1.7	3	4
07/29/19	24.3	5.2	9.6	29	>1.5	2	3
08/13/19	23.2	3.6	7.4	30	>1.5	3	4
08/27/19	21.3	4.9	7.1	25	>1.1	3	4
09/10/19	18.6	3.9	6.9	26	>1.5	3	3
09/25/19	20.3	7.7	3.3	14	>1.8	2	3
10/08/19	12.7	9.4	2.9	11	>1.7	2	2

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP			C	C	C	C	C	C	C	B	A	A
CLA			B	B	B	B	C	B	B	A	A	A
Secchi			C	C	C	C	C	C				
Lake Grade			C	C	C	C	C	C				

Year	2016	2017	2018	2019
TP	B	B	B	B
CLA	B	B	A	A
Secchi				
Lake Grade				

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Mays Lake (82–0033) Carnelian — Marine — St. Croix Watershed District

Monitoring agency: Washington Conservation District staff

Mays Lake is located in Mays Township (Washington County). The lake is considered a Priority Lake by the Metropolitan Council for its good water quality. More than 80 percent of the surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. The lake is defined as a shallow lake because of the dominance of the littoral zone.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	16	9	21	A
CLA (µg/l))	4.2	2.2	7.0	A
Secchi (m)	>3.4	2.7	>4.6	A
TKN (mg/l)	0.51	0.43	0.54	
			Lake Grade	A

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

The lake received a lake grade of A this year, which is consistent with its historical water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

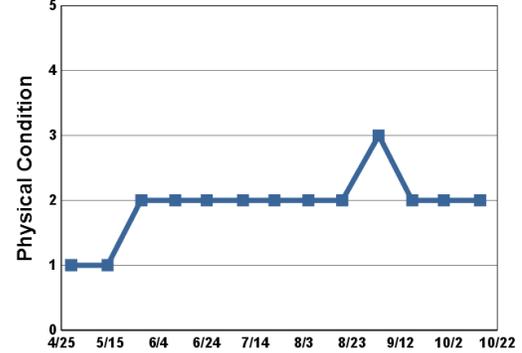
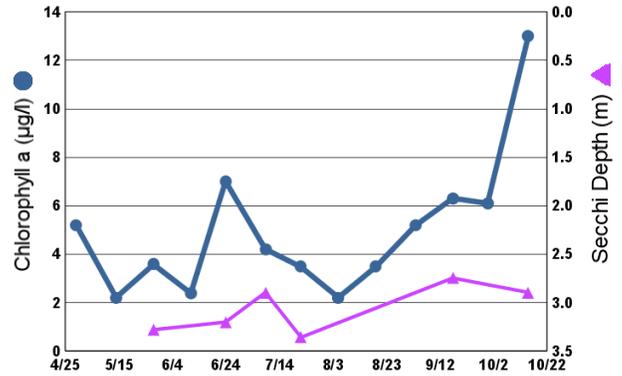
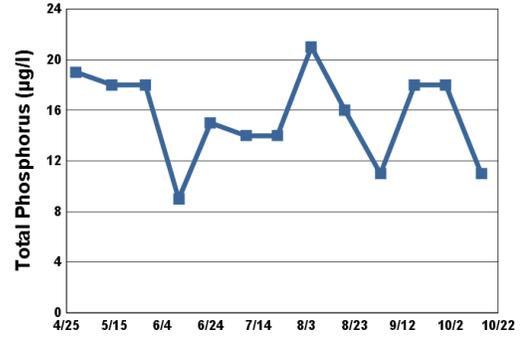
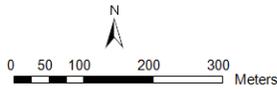
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

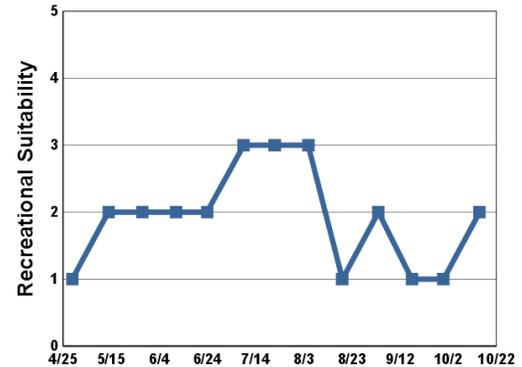
Mays Lake
May Twp., Washington Co.

Lake ID: 820033-00

● Sampling site
Contours in meters



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/29/19	11.2	9.5	5.2	19	>2.3	1	1
05/14/19	14.3	9.0	2.2	18	>4.0	1	2
05/28/19	15.9	8.4	3.6	18	3.3	2	2
06/11/19	22.5	7.3	2.4	9	>4.6	2	2
06/24/19	22.4	7.5	7.0	15	3.2	2	2
07/09/19	25.4	8.4	4.2	14	2.9	2	3
07/22/19	25.6	6.8	3.5	14	3.4	2	3
08/05/19	26.7	6.9	2.2	21	>3.0	2	3
08/19/19	24.7	7.2	3.5	16	>3.7	2	1
09/03/19	21.4	7.3	5.2	11	>3.5	3	2
09/17/19	20.2	6.6	6.3	18	2.7	2	1
09/30/19	17.9	7.6	6.1	18	>3.5	2	1
10/15/19	11.1	7.7	13	11	2.9	2	2

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP					A	A	A				A	A
CLA					A	A	A				A	A
Secchi					A	A	A	A	A	A	A	
Lake Grade					A	A	A				A	

Year	2016	2017	2018	2019
TP			A	A
CLA			A	A
Secchi			A	A
Lake Grade			A	A

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

McDonald Lake (82–0010) Valley Branch Watershed District

Monitoring agency: Washington Conservation District staff

McDonald Lake is a 54-acre land-locked (no outlet) lake located within Baytown Township (Washington County). The mean and maximum depth of the lake is 1.8 m and 3.7 m . The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	60	38	76	C
CLA ($\mu\text{g/l}$)	22	4.9	35	C
Secchi (m)	1.5	0.9	2.0	C
TKN (mg/l)	0.96	0.83	1.10	
			Lake Grade	C

The lake received a lake grade of C this year. The lake's water quality has been typically represented by a lake grade of C, with the occasional D.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP								C		C	C	C
CLA								B		C	C	C
Secchi							C	C	C	C	C	C
Lake Grade								C		C	C	C

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	C	C	C	C	C		D	D	C	C	D
CLA	B	B	C	F	C	B		C	C	C	C	C
Secchi	B	C	C	C	C	C		D	C	C	C	D
Lake Grade	B	C	C	D	C	C		D	C	C	C	D

Year	2016	2017	2018	2019
TP	C	C	C	C
CLA	D	C	C	C
Secchi	D	F	D	C
Lake Grade	D	D	C	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

McKusick Lake (82–0020) *Middle St. Croix Watershed Management Organization*

Monitoring agency: Washington Conservation District staff

McKusick Lake is located in the City of Stillwater (Washington County). The lake has surface area of 46 acres, and a maximum depth of 4.7 m (15 ft). The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

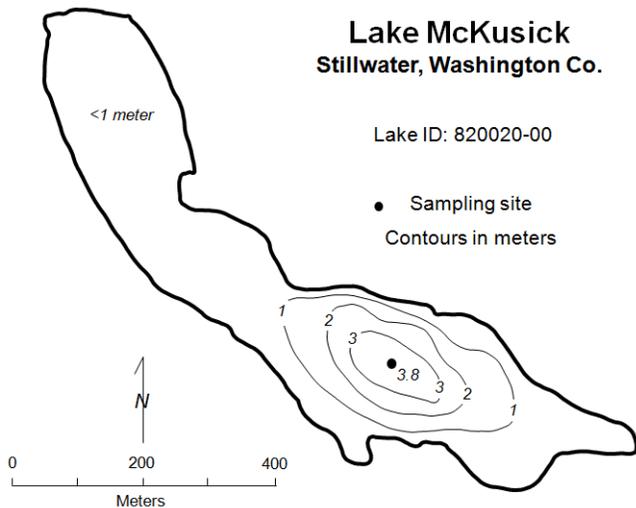
Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	54	39	72	C
CLA (µg/l)	9.5	3.3	20	A
Secchi (m)	>1.7	>0.9	>2.7	
TKN (mg/l)	0.70	0.53	0.87	
			Lake Grade	

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

There was an insufficient quantity of valid Secchi transparency measurements to determine a Secchi grade. An invalid measurement occurred if the Secchi disk was either visible on the lake bottom or the disk's visibility was blocked by aquatic vegetation. In both of these situations the water clarity would have been greater than that indicated by the measurement. A lake grade was not given because all three parameter grades are required to issue a lake grade.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

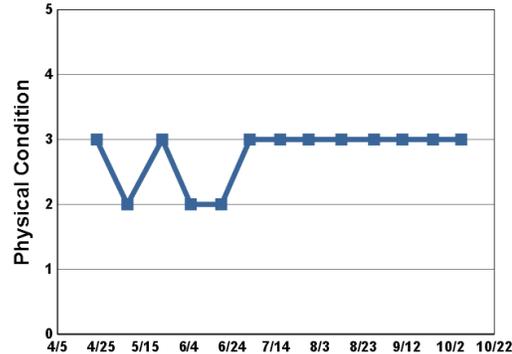
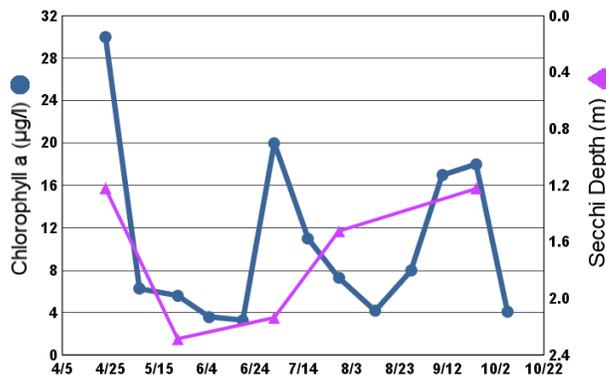
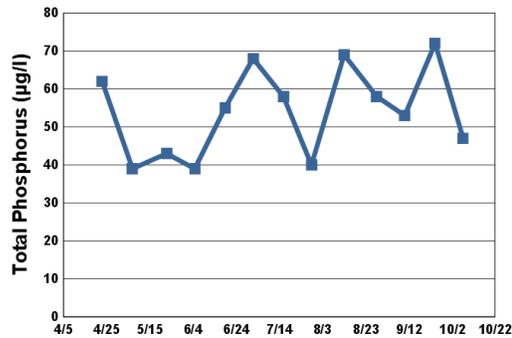
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.



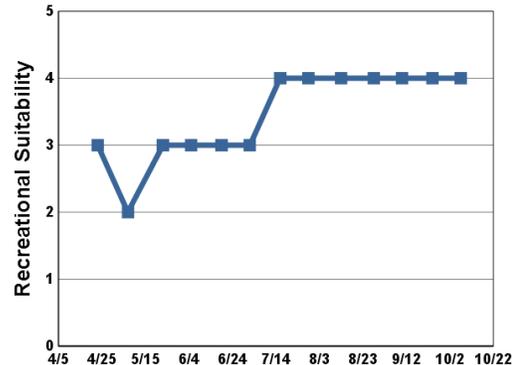
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/23/19	10.7	9.5	30	62	1.2	3	3
05/07/19	14.3	10.0	6.3	39	>1.5	2	2
05/23/19	13.9	8.8	5.6	43	2.3	3	3
06/05/19	22.2	8.9	3.6	39	>2.6	2	3
06/19/19	22.2	9.3	3.3	55	>2.7	2	3
07/02/19	23.8	8.6	20	68	2.1	3	3
07/16/19	26.7	3.4	11	58	>1.4	3	4
07/29/19	24.8	4.4	7.3	40	1.5	3	4
08/13/19	23.5	2.6	4.2	69	>1.4	3	4
08/28/19	19.3	2.9	8.0	58	>0.9	3	4
09/10/19	18.5	4.1	17	53	>1.4	3	4
09/24/19	22.3	6.8	18	72	1.2	3	4
10/07/19	13.2	6.8	4.1	47	>2.3	3	4

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP			D	D	D	C	D	D	C	C	C	C
CLA			D	C	C	C	D	D	B	B	C	B
Secchi			D	D	D	C	D	D	B	B	D	C
Lake Grade			D	D	D	C	D	D	B	B	C	C

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	C	C	C	C	C	B	C	C	C	C	C
CLA	A	B	B	B	B	A	A	C	A	B	B	C
Secchi	B	C	C	C	C	B	B	B	B	C	C	C
Lake Grade	B	C	C	C	C	B	B	C	B	C	C	C

Year	2016	2017	2018	2019
TP	C	C	C	C
CLA	B	B	B	A
Secchi	C	C	C	
Lake Grade	C	C	C	

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

McMahon Lake (70–0050) Scott County Watershed Management Organization

Volunteer: Robert Weierke, Char Jeurissen

McMahon Lake, also known as Carl's Lake, is located in Spring Lake Township (Scott County). The lake has a surface area of 110 acres and a maximum depth of 4.5 m (14 feet). The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2002 and aquatic consumption (mercury in fish tissue) in 2012. However the MPCA delisted the lake for aquatic recreational use (nutrient/eutrophication biological indicators) in 2018. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 2007.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	62	28	89	C
CLA (µg/l)	60	4.9	160	D
Secchi (m)	1.7	0.6	4.0	C
TKN (mg/l)	1.17	0.68	2.10	
			Lake Grade	C

The lake received a lake grade of C this year, which is continuation of a string of C grades. The lake historically has been characterized as a D lake. But recent monitoring has shown improvements in water quality. Continued monitoring is recommended to determine if this recent improvement in water quality is part of a longer term trend.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP	F				D							
CLA	F				D							
Secchi	C				D							
Lake Grade	D				D							

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP				D			D			D		
CLA				D			D			D		
Secchi				C			D			D		
Lake Grade				D			D			D		

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP		D	C	C	D	C	C	D	C	B	C	C
CLA		F	D	C	C	C	B	C	C	C	C	C
Secchi		D	D	D	D	D	C	C	C	C	C	C
Lake Grade		D	D	C	D	C						

Year	2016	2017	2018	2019
TP	C	C	D	C
CLA	C	C	C	D
Secchi	C	B	C	C
Lake Grade	C	C	C	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Meadow Lake (27–0057) Shingle Creek Watershed Management Commission

Volunteer: Diane Stauner

Meadow Lake is located in the City of New Hope (Hennepin County). It has a surface area of 11 acres. The lake has a maximum depth of 1.2 m. The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column. The lake's watershed area is about 440 acres which gives a watershed-to-lake area ratio is 40:1. The greater the ratio, the greater the potential stress on the lake from surface runoff.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2002.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

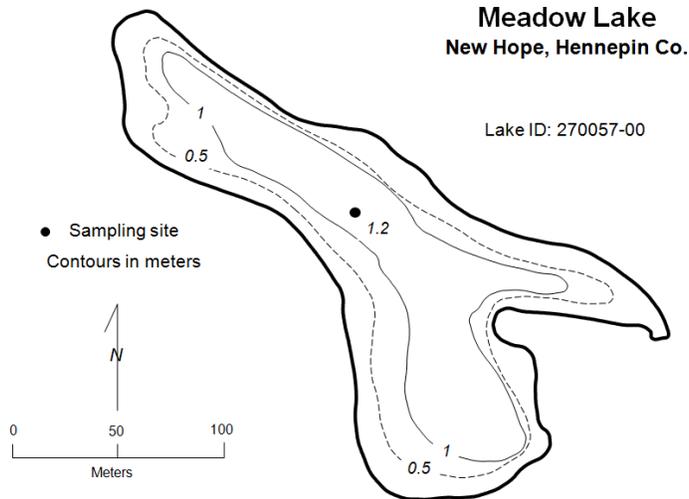
2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)				
CLA (µg/l)				
Secchi (m)				
TKN (mg/l)				
			Lake Grade	

There were less than 5 monitoring events during the summer-time period (May — September). At least 5 monitoring events are required during the summer-time period to determine a parameter grade. A lake grade was not given because all three parameter grades are required to issue a lake grade.

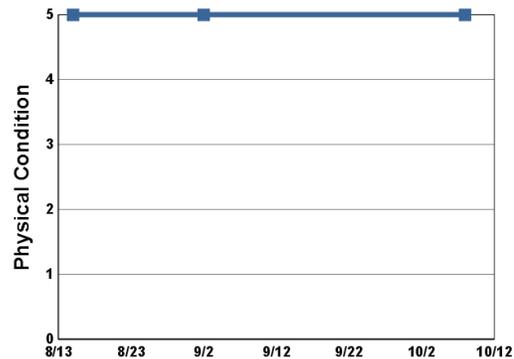
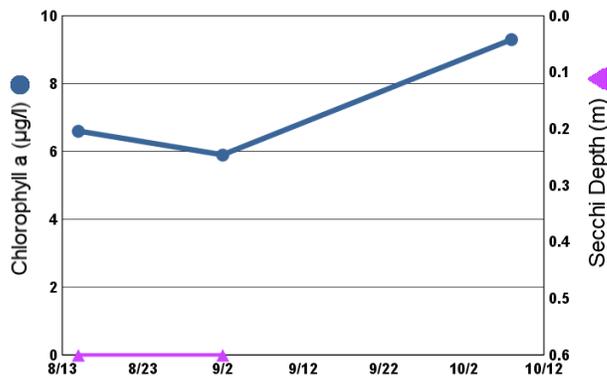
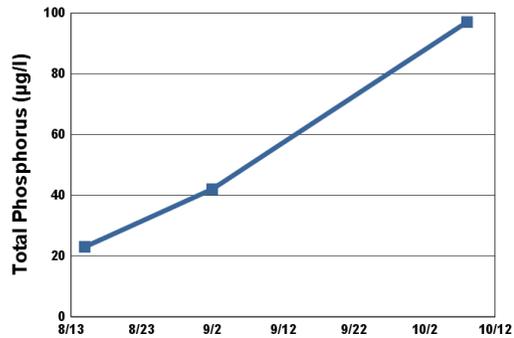
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

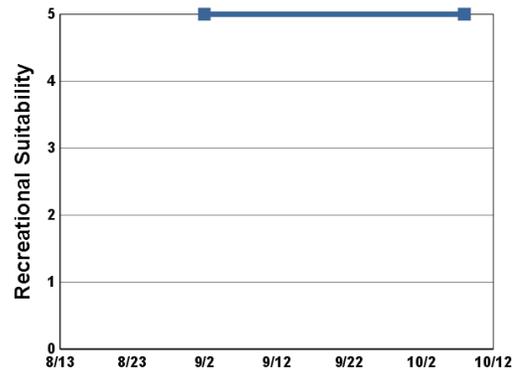


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
08/15/19	26.8		6.6	23	0.6	5	
09/02/19	23.2		5.9	42	0.6	5	5
10/08/19	15.3		9.3	97		5	5



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP					F			F			F	
CLA					F			F			F	
Secchi					F			F			F	
Lake Grade					F			F			F	

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP		F			F			F			F	
CLA		D			F			F			F	
Secchi		F			F			F				
Lake Grade		F			F			F				

Year	2016	2017	2018	2019
TP				
CLA				
Secchi				
Lake Grade				

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Medicine Lake [Site 1, Southwest Bay] (27–0104) Bassett Creek Watershed Management Commission

Volunteer: David Nelson, Karl Nelson, Kajsa Nelson

Medicine Lake is located mainly in the City of Plymouth (Hennepin County). The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value. The lake has a surface area of 886 acres. The maximum depth of the lake is 14.9 m (49 ft). Approximately 45 percent of the surface area of the lake is littoral zone, which is the shallow 0 – 15 feet depth zone that is typically dominated by aquatic plants.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2004 and aquatic consumption (mercury in fish tissue) in 2004. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 1995, zebra mussels (*Dreissena polymorpha*) in 2017, and starry stonewort (*Nitellopsis obtusa*) in 2018.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

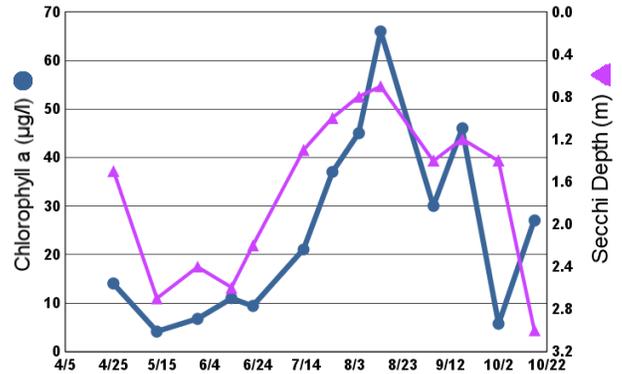
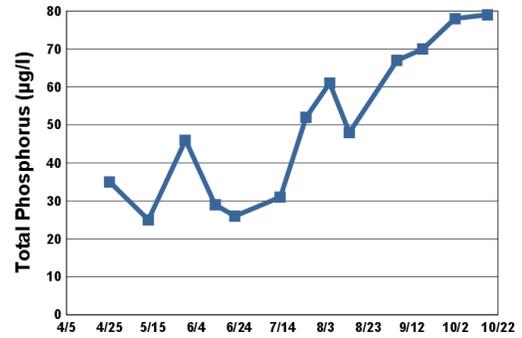
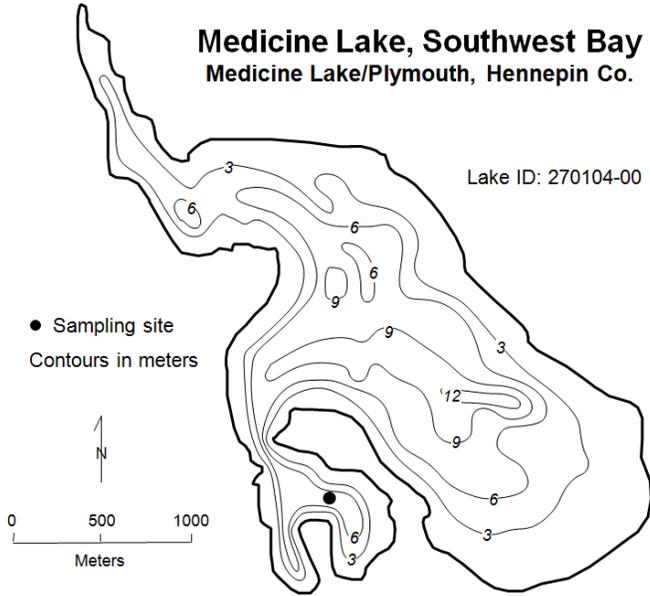
Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	46	25	70	C
CLA (µg/l)	28	4.1	66	C
Secchi (m)	1.6	0.7	2.7	C
TKN (mg/l)	0.82	0.58	1.20	
			Lake Grade	C

This lake site received a lake grade of C this year which is consistent with its historical water quality database. Continued monitoring is recommended to continue to build the water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

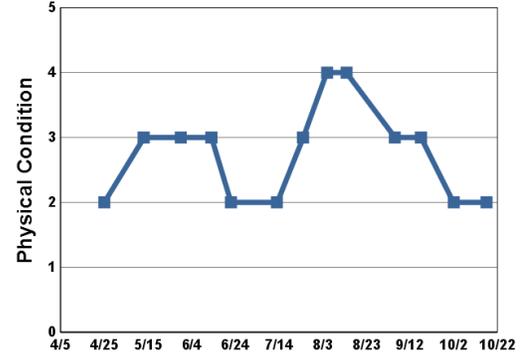
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

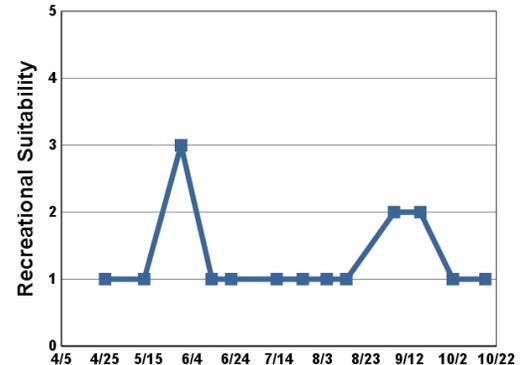


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/25/19	10.2		14	35	1.5	2	1
05/13/19	12.1		4.1	25	2.7	3	1
05/30/19	17.7		6.7	46	2.4	3	3
06/13/19	20.0		11	29	2.6	3	1
06/22/19	21.4		9.4	26	2.2	2	1
07/13/19	25.1		21	31	1.3	2	1
07/25/19	25.2		37	52	1.0	3	1
08/05/19	26.9		45	61	0.8	4	1
08/14/19	24.4		66	48	0.7	4	1
09/05/19	20.9		30	67	1.4	3	2
09/17/19	20.2		46	70	1.2	3	2
10/02/19	17.3		5.7	78	1.4	2	1
10/17/19	9.9		27	79	3.0	2	1



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- 2 = Some Algae Present
- 3 = Definite Algal Presence
- 4 = High Algal Color
- 5 = Severe Algal Bloom



- 1 = Beautiful
- 2 = Minor Aesthetic Problem
- 3 = Swimming Impaired
- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA				C								
Secchi				C								
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP			C					C				
CLA												
Secchi			C					C				
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP			C		C		C	C	C	C	C	C
CLA							C	C	C	C	C	C
Secchi			C		C		C	C	C	C	C	B
Lake Grade							C	C	C	C	C	C

Year	2016	2017	2018	2019
TP	C	C	C	C
CLA	C	C	C	C
Secchi	C	C	C	C
Lake Grade	C	C	C	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Medicine Lake [Site 2, Main Lake] (27–0104) Bassett Creek Watershed Management Commission

Volunteer: Andrew Niemela

Medicine Lake is located mainly in the City of Plymouth (Hennepin County). The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value. The lake has a surface area of 886 acres. The maximum depth of the lake is 14.9 m (49 ft). Approximately 45 percent of the surface area of the lake is littoral zone, which is the shallow 0 – 15 feet depth zone that is typically dominated by aquatic plants.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2004 and aquatic consumption (mercury in fish tissue) in 2004. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 1995, zebra mussels (*Dreissena polymorpha*) in 2017, and starry stonewort (*Nitellopsis obtusa*) in 2018.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

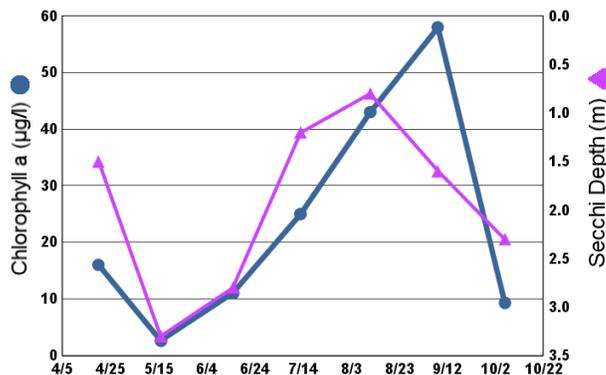
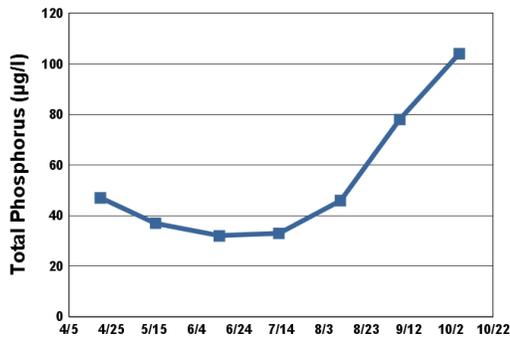
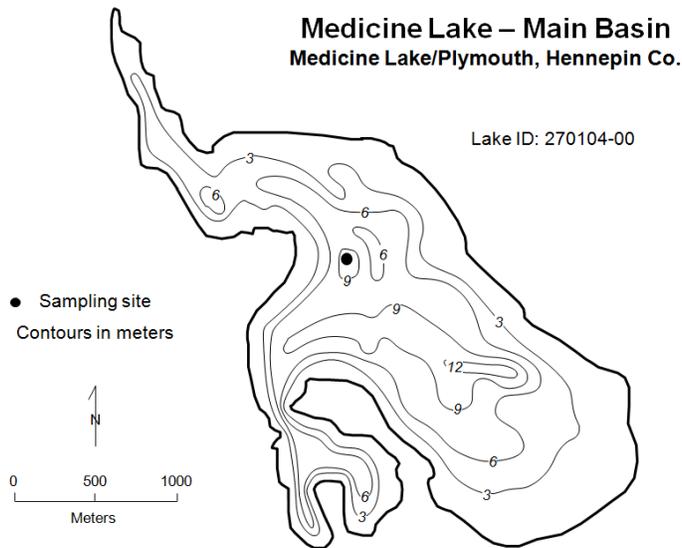
Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	45	32	78	C
CLA (µg/l)	28	2.6	58	C
Secchi (m)	1.9	0.8	3.3	C
TKN (mg/l)	0.95	0.71	1.40	
			Lake Grade	C

Site 2 received a lake grade of C this year which is consistent with its historical water quality database. Continued monitoring is recommended to continue to build the water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

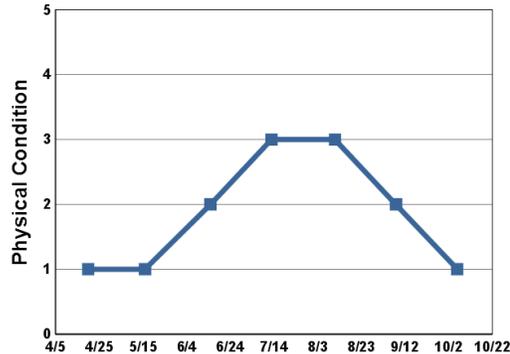
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

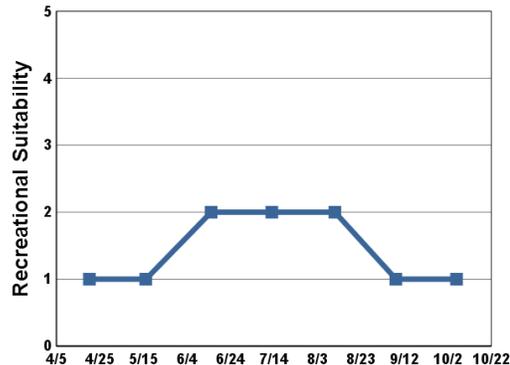


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/20/19	9.6		16	47	1.5	1	1
05/16/19	16.4		2.6	37	3.3	1	1
06/15/19	21.5		11	32	2.8	2	2
07/13/19	25.3		25	33	1.2	3	2
08/11/19	24.4		43	46	0.8	3	2
09/08/19	22.8		58	78	1.6	2	1
10/06/19	10.9		9.3	104	2.3	1	1



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- 4 = High Algal Color
- 5 = Severe Algal Bloom



- 1 = Beautiful
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- 3 = Swimming Impaired
- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP		C		C							C	C
CLA		D		C							D	C
Secchi		C		C							C	C
Lake Grade		C		C							C	C

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP			C	C				C				
CLA												
Secchi			C	C				C				
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C		C	C	C	C	C	C	C	C	C	C
CLA								C	B	C	B	
Secchi	C		C	C	C	C	C	C	C	C	C	B
Lake Grade								C	C	C	C	

Year	2016	2017	2018	2019
TP	C	C	C	C
CLA	C	C	C	C
Secchi	C	C	C	C
Lake Grade	C	C	C	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Minnetoga Lake (27–0088) *Nine Mile Creek Watershed District*

Volunteer: Holly Birkeland, Sig Birkeland

Lake Minnetoga is located in Minnetonka, Hennepin County. The lake has a surface area of 14.4 acres, and an average depth of 3.9 m. The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	56	30	91	C
CLA ($\mu\text{g/l}$)	8.4	1.9	16	A
Secchi (m)	1.5	1.0	1.9	C
TKN (mg/l)	1.10	0.95	1.40	
			Lake Grade	B

The lake received a lake grade of B this year. The lake grades have varied in the B to C range since 2007. Continued monitoring is recommended to continue to build the water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP				C	B		B	C	B	C	B	B
CLA				C	A		A	B	A	C	B	A
Secchi				C	B		B	C	B	B	C	C
Lake Grade				C	B		B	C	B	C	B	B

Year	2016	2017	2018	2019
TP	C	C	C	C
CLA	A	A	A	A
Secchi	C	C	C	C
Lake Grade	B	B	B	B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Minnewashta Lake [Site-1] (10-0009) City of Chanhassen

Volunteer: Kevin Zahler

Minnewashta Lake is located in the city of Chanhassen (Carver County). The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value. It is a relatively large lake with a surface area of 677 acres. The maximum depth of the lake is 21.3 m (70 feet).

The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue) in 2004. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 1995 and zebra mussels (*Dreissena polymorpha*) in 2016.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	21	10	43	A
CLA (µg/l)	3.7	1.0	7.7	A
Secchi (m)	2.7	1.3	4.5	B
TKN (mg/l)	0.64	0.52	0.74	
			Lake Grade	A

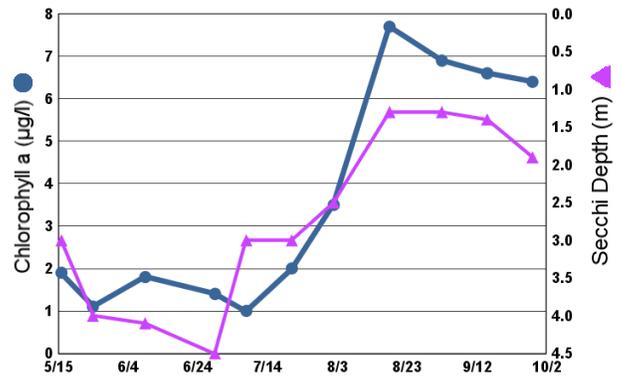
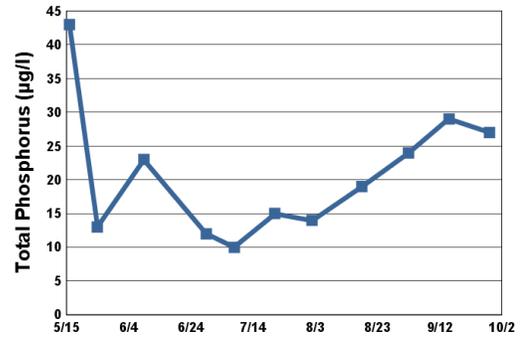
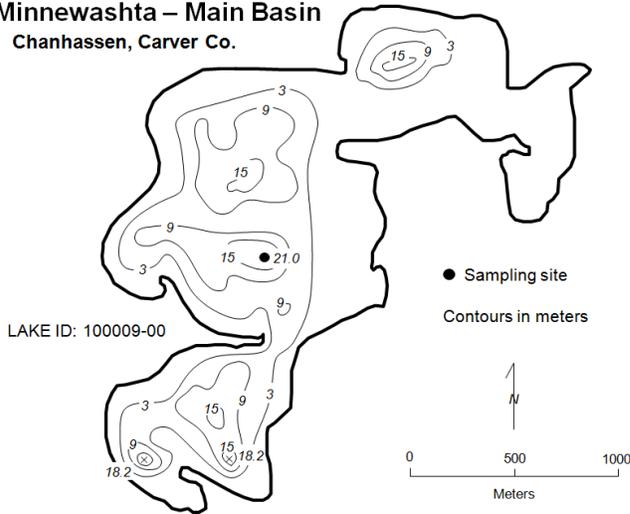
Site 1 received a lake grade of A this year which is consistent with its historical water quality database.. Continued monitoring is recommended to continue to build the water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

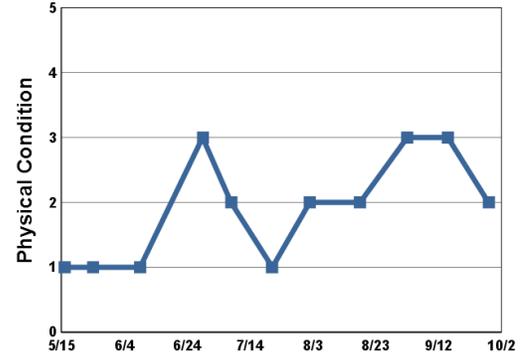
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Minnewashta – Main Basin
Chanhassen, Carver Co.

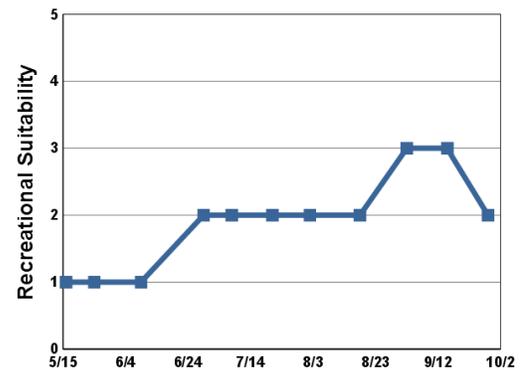


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/16/19	16.5		1.9	43	3.0	1	1
05/25/19	13.0		1.1	13	4.0	1	1
06/09/19	22.0		1.8	23	4.1	1	1
06/29/19	23.5		1.4	12	4.5	3	2
07/08/19	25.5		1.0	10	3.0	2	2
07/21/19	26.0		2.0	15	3.0	1	2
08/02/19	25.1		3.5	14	2.5	2	2
08/18/19	24.2		7.7	19	1.3	2	2
09/02/19	20.6		6.9	24	1.3	3	3
09/15/19	20.2		6.6	29	1.4	3	3
09/28/19	18.4		6.4	27	1.9	2	2



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP					A						A	
CLA					A						A	
Secchi					A						A	
Lake Grade					A						A	

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP		A				A	A	A			A	A
CLA		A				A	A	A			B	A
Secchi		A				A	A	B			B	B
Lake Grade		A				A	A	A			B	A

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP												
CLA												
Secchi												
Lake Grade												

Year	2016	2017	2018	2019
TP			A	A
CLA			A	A
Secchi			C	B
Lake Grade			B	A

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Mitchell Lake (27–0070) City of Eden Prairie

Volunteer: Gordon and Fran Warner

Mitchell Lake is located in the City of Eden Prairie (Hennepin County). The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value. It has a surface area of 112 acres. The maximum depth of the lake is 5.8 m (19 feet). More than 80 percent of the surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. The lake is defined as a shallow lake because of the dominance of the littoral zone.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2002 but delisted the lake in 2018. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 2004.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	43	14	80	C
CLA (µg/l)	26	1.6	60	C
Secchi (m)	1.5	0.8	2.8	C
TKN (mg/l)	0.86	0.49	1.10	
			Lake Grade	C

The lake received a lake grade of C which is consistent with its historical water quality database but a grade letter worse than the B grade received in 2017. Overall water quality seems improved since the late 1990s and early 2000s as shown by the change in D grades to C grades. Continued monitoring is recommended to determine if this recent improvement in water quality is part of a longer term trend.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												D
CLA												C
Secchi												C
Lake Grade												C

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP				C				D	D			D
CLA				C				D	D			D
Secchi				C				D	C			C
Lake Grade				C				D	D			D

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	D	D	C	C	C	C	C	C	C	C	C
CLA	C	C	C	C	B	C	C	B	B	B	B	C
Secchi	C	C	D	C	C	C	C	C	C	C	C	C
Lake Grade	C	C	D	C								

Year	2016	2017	2018	2019
TP	C	C	C	C
CLA	C	B	C	C
Secchi	C	B	C	C
Lake Grade	C	B	C	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Moody Lake (13–0023) Comfort Lake — Forest Lake Watershed District

Volunteer: Douglas Toavs

Moody Lake is a 35-acre lake located near Chisago City (Chisago County). The lake has a maximum depth of approximately 14.6 m (48 feet). Roughly 63 percent of the lake's surface area is considered littoral zone, which is the shallow 0 – 15 feet depth zone that is typically dominated by aquatic plants.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2008.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	50	27	90	C
CLA (µg/l)	44	20	72	C
Secchi (m)	1.0	0.6	1.6	D
TKN (mg/l)	1.35	1.00	1.80	
			Lake Grade	C

Note that the lake grades shown in the data summary table above were calculated from monitoring data sets from both the volunteer and Washington Conservation District staff. The mean, minimum, and maximum values shown in the above data summary table and the results in the data table on the following page are specific to the volunteer's monitoring data. The lake received a C grade which is the best lake grade received to date according to its historical water quality database. Continued monitoring is recommended to determine if this recent improvement in water quality is part of a longer term trend.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP		D	D				D	D	D	D	D	D
CLA		D	C				D	F	D	C	C	D
Secchi		D	D				D	D	D	D	D	D
Lake Grade		D	D				D	D	D	D	D	D

Year	2016	2017	2018	2019
TP	D	D	D	C
CLA	C	C	D	C
Secchi	D	D	D	D
Lake Grade	D	D	D	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Moody Lake (13–0023) Comfort Lake — Forest Lake Watershed District

Monitoring agency: Washington Conservation District staff

Moody Lake is a 35-acre lake located near Chisago City (Chisago County). The lake has a maximum depth of approximately 14.6 m (48 feet). Roughly 63 percent of the lake's surface area is considered littoral zone, which is the shallow 0 – 15 feet depth zone that is typically dominated by aquatic plants.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2008.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made by Washington Conservation District staff during their monitoring visits. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	66	37	109	C
CLA (µg/l)	37	1.1	67	C
Secchi (m)	0.8	0.2	2.1	D
TKN (mg/l)	1.43	0.92	1.80	
			Lake Grade	C

Note that the lake grades shown in the data summary table above were calculated from monitoring data sets from both the volunteer and Washington Conservation District (WCD) staff. The mean, minimum, and maximum values shown in the above data summary table and the results in the data table on the following page are specific to WCD staff monitoring data. The lake received a C grade which is the best lake grade received to date according to its historical water quality database. Continued monitoring is recommended to determine if this recent improvement in water quality is part of a longer term trend.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

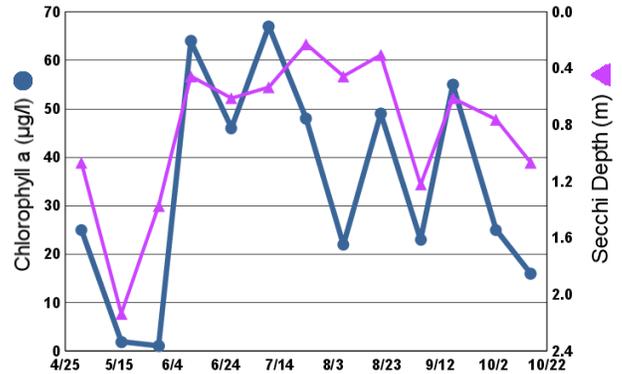
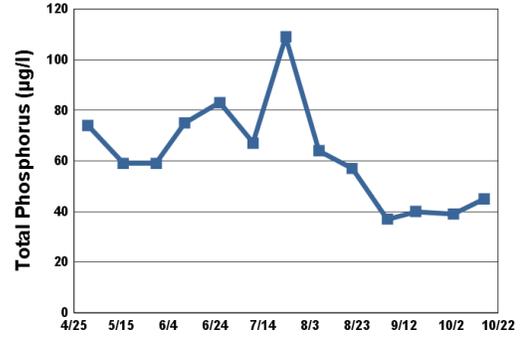
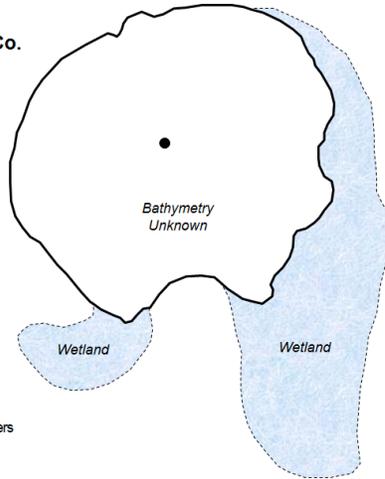
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Moody Lake
Chisago Lake Twp., Chisago Co.

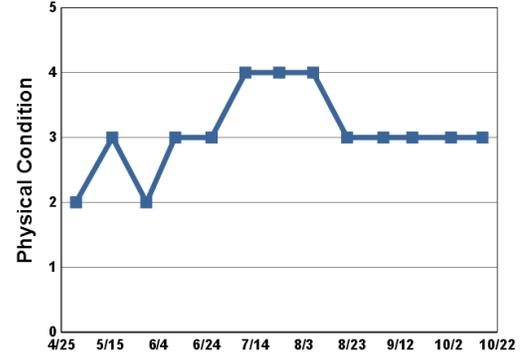
LAKE ID: 130023-00

● Sampling site
Contours in meters

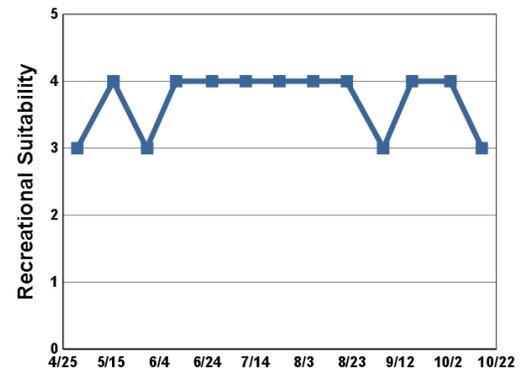


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/01/19	10.1	9.1	25	74	1.1	2	3
05/16/19	18.9	8.3	1.9	59	2.1	3	4
05/30/19	17.0	8.3	1.1	59	1.4	2	3
06/11/19	21.3	9.7	64	75	0.5	3	4
06/26/19	23.9	10.9	46	83	0.6	3	4
07/10/19	24.7	5.9	67	67	0.5	4	4
07/24/19	25.2	6.7	48	109	0.2	4	4
08/07/19	27.1	6.4	22	64	0.5	4	4
08/21/19	23.9	6.5	49	57	0.3	3	4
09/05/19	20.1	7.2	23	37	1.2	3	3
09/17/19	20.9	9.2	55	40	0.6	3	4
10/03/19	14.5	6.3	25	39	0.8	3	4
10/16/19	9.0	7.5	16	45	1.1	3	3



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP		D	D				D	D	D	D	D	D
CLA		D	C				D	F	D	C	C	D
Secchi		D	D				D	D	D	D	D	D
Lake Grade		D	D				D	D	D	D	D	D

Year	2016	2017	2018	2019
TP	D	D	D	C
CLA	C	C	D	C
Secchi	D	D	D	D
Lake Grade	D	D	D	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Mud Lake (82–0026) Carnelian — Marine — St. Croix Watershed District

Monitoring agency: Washington Conservation District staff

Mud Lake is a 62-acre lake located within May Township (Washington County). The maximum and mean depths of the lake are 2.1 m (6.9 ft) and 1.1 m (3.6 ft), respectively. The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2010.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCEC's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	73	47	95	D
CLA (µg/l)	46	18	97	C
Secchi (m)	0.4	0.2	0.7	F
TKN (mg/l)	1.38	0.96	1.70	
			Lake Grade	D

The lake received a D lake grade this year, which continues the improvement in water quality compared to the water quality of F grades in the late 1990s and early 2000s.

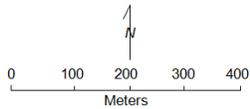
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Mud Lake
May Twp., Washington Co.

LAKE ID: 820026-00

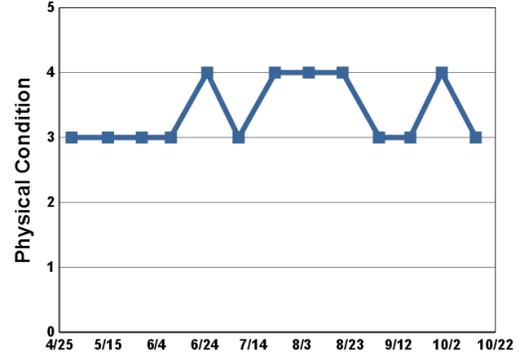
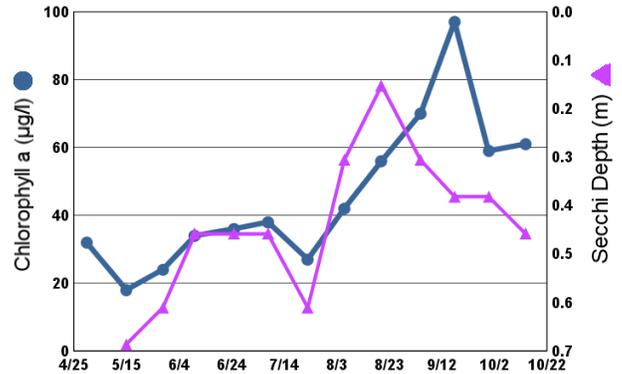
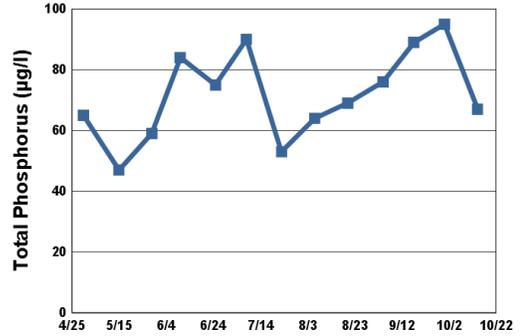
● Sampling site
Contours in meters



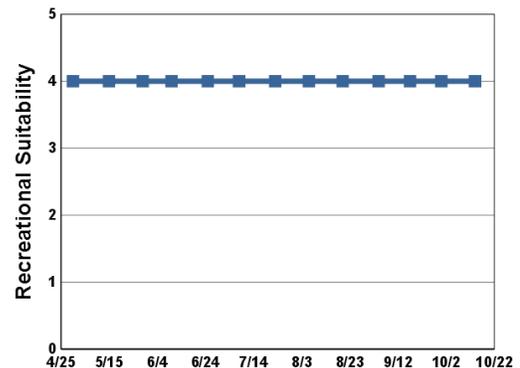
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/30/19	11.3	10.3	32	65	+1.4	3	4
05/15/19	17.2	10.2	18	47	0.7	3	4
05/29/19	17.6	9.6	24	59	0.6	3	4
06/10/19	21.0	7.1	34	84	0.5	3	4
06/25/19	21.3	6.6	36	75	0.5	4	4
07/08/19	26.3	8.9	38	90	0.5	3	4
07/23/19	27.8	8.6	27	53	0.6	4	4
08/06/19	26.3	6.1	42	64	0.3	4	4
08/20/19	23.4	8.9	56	69	0.2	4	4
09/04/19	19.8	7.4	70	76	0.3	3	4
09/17/19	19.4	8.8	97	89	0.4	3	4
09/30/19	15.4	7.3	59	95	0.4	4	4
10/14/19	6.5	11.7	61	67	0.5	3	4

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP					D	F	F	F	F	D		
CLA					D	D	F	D	F	F		
Secchi				F	F	F	F	F	F	F	D	D
Lake Grade					D	F	F	F	F	F		

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP							D	D				
CLA							C	D				
Secchi	C	D	D				D	F				
Lake Grade							D	D				

Year	2016	2017	2018	2019
TP		D	D	D
CLA		D	D	C
Secchi		F	F	F
Lake Grade		D	D	D

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

North School Section Lake (82–0149) Browns Creek Watershed District

Monitoring agency: Washington Conservation District staff

North School Section Lake is located in the city of Hugo (Washington County). There are few morphological data available for the lake.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	37	27	46	C
CLA ($\mu\text{g/l}$)	23	3.0	46	C
Secchi (m)	>2.0	0.9	>3.8	C
TKN (mg/l)	0.99	0.77	1.20	
			Lake Grade	C

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

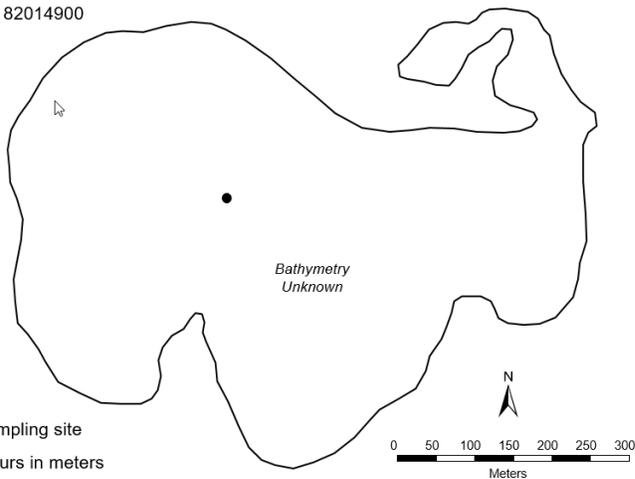
The lake received a lake grade of C this year which is consistent with its historical water quality database. Continued monitoring is recommended to build the water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

North School Section Lake
Hugo, Washington Co.

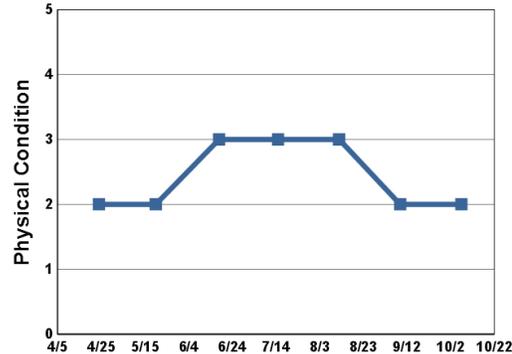
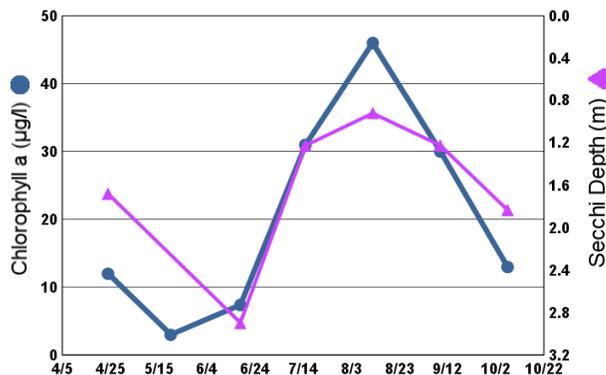
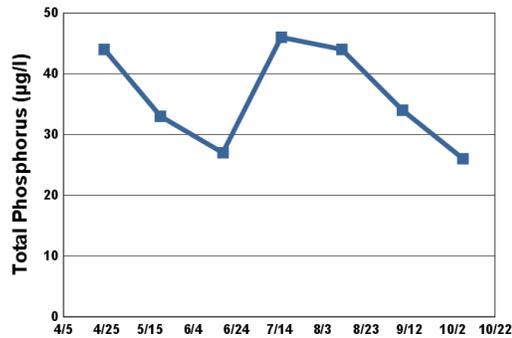
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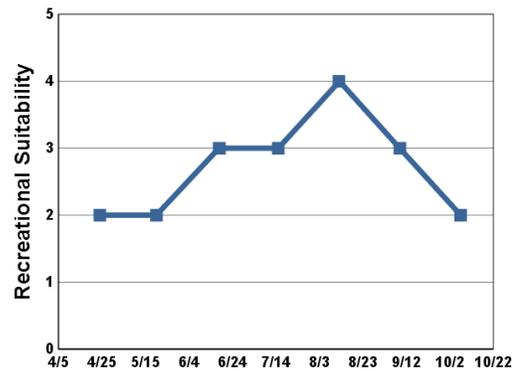
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/24/19	11.1	11.3	12	44	1.7	2	2
05/20/19	13.4	8.0	3.0	33	>3.8	2	2
06/18/19	21.8	8.4	7.4	27	2.9	3	3
07/15/19	26.2	6.6	31	46	1.2	3	3
08/12/19	24.3	4.9	46	44	0.9	3	4
09/09/19	19.2	4.4	30	34	1.2	2	3
10/07/19	13.1	6.8	13	26	1.8	2	2

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.



- 1 = Crystal Clear
- 2 = Some Algae Present
- 3 = Definite Algal Presence
- 4 = High Algal Color
- 5 = Severe Algal Bloom



- 1 = Beautiful
- 2 = Minor Aesthetic Problem
- 3 = Swimming Impaired
- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP												
CLA												
Secchi												
Lake Grade												

Year	2016	2017	2018	2019
TP		C	C	C
CLA		C	C	C
Secchi		C	C	C
Lake Grade		C	C	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Northwood Lake (27–0627) Bassett Creek Watershed Management Organization

Volunteer: Robert White

Northwood Lake is a 15-acre lake located within the City of New Hope (Hennepin County). The mean and maximum depths of the lake are 0.8 m (2.5 ft) and 1.5 m (4.9 ft), respectively. The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column. The lake's 1,341-acre immediate watershed translates to a large watershed-to-lake area ratio of 89:1. The greater the ratio, the greater the potential stress on the lake from surface runoff.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2004.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	117	67	165	D
CLA (µg/l)	28	15	55	C
Secchi (m)	>0.9	0.7	>1.1	
TKN (mg/l)	1.05	0.54	1.70	
			Lake Grade	

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

There was an insufficient quantity of valid Secchi transparency measurements to determine a Secchi grade. An invalid measurement occurred if the Secchi disk was either visible on the lake bottom or the disk's visibility was blocked by aquatic vegetation. In both of these situations the water clarity would have been greater than that indicated by the measurement. A lake grade was not given because all three parameter grades are required to issue a lake grade. The lake received a TP grade and CLA grade of D and C, respectively, this year, which is an improvement over last year's water quality indicators.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP									F	F	D	F
CLA									B	C	B	C
Secchi									D	D	D	D
Lake Grade									D	D	C	D

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	D	D	F	F	D	F	D	F	F	F	D	F
CLA	B	B	B	C	C	B	C	C	C	C	A	C
Secchi	D	D	D	D	D	D	D	D	D	D		
Lake Grade	C	C	D									

Year	2016	2017	2018	2019
TP	D	F	F	D
CLA	C	D	D	C
Secchi	D	D	F	
Lake Grade	D	D	F	

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

O'Connor Lake (82-0002) *South Washington Watershed District*

Volunteer: Jeff Keene

O'Connor Lake is a 38-acre lake located within Denmark Township (Washington County). There are few known morphological data available for the lake.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), chlorophyll including chlorophyll-a (CLA), and chloride. Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages. For the chloride data, please refer to the MCE's EIMS system at <http://es.metc.state.mn.us/eims/>.

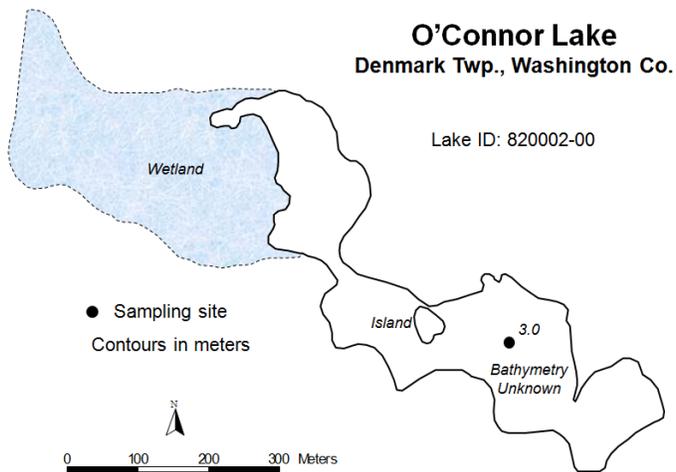
2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	27	20	31	
CLA ($\mu\text{g/l}$)	13	6.5	23	
Secchi (m)	2.0	1.5	2.4	
TKN (mg/l)	0.73	0.60	0.80	
			Lake Grade	

There were less than 5 monitoring events during the summer-time period (May — September). At least 5 monitoring events are required during the summer-time period to determine a parameter grade. A lake grade was not given because all three parameter grades are required to issue a lake grade.

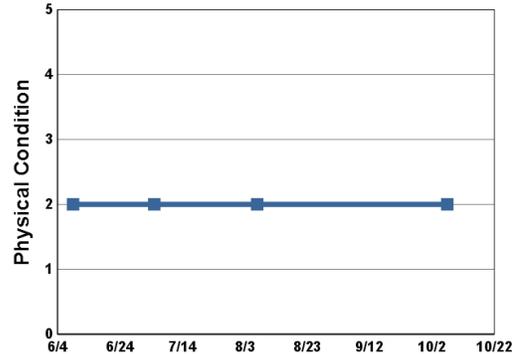
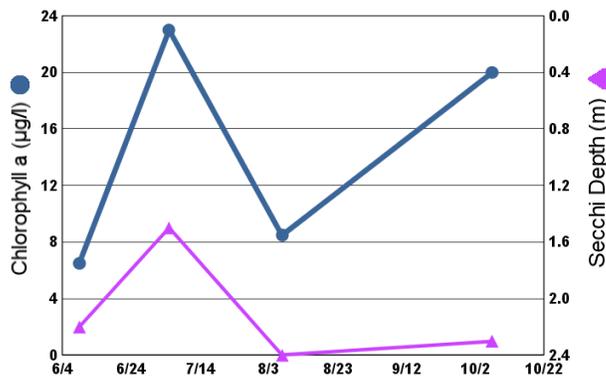
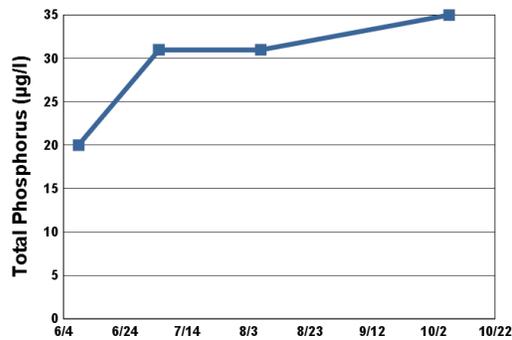
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

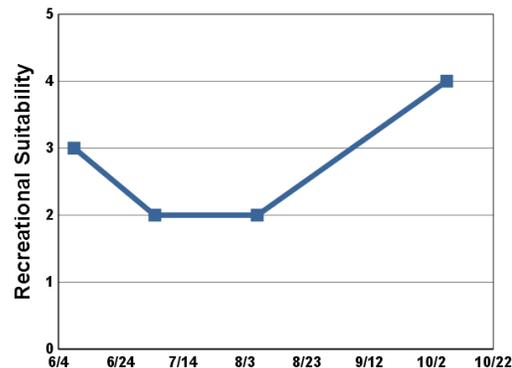


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
06/09/19	24.1		6.5	20	2.2	2	3
07/05/19	27.0		23	31	1.5	2	2
08/07/19	28.6		8.5	31	2.4	2	2
10/07/19	15.0		20	35	2.3	2	4



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- 4 = High Algal Color
- 5 = Severe Algal Bloom



- 1 = Beautiful
- 2 = Minor Aesthetic Problem
- 3 = Swimming Impaired
- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP		C	C	C	C	D	D	B		B	A	C
CLA		B	A	A	B	D	C	A		B	A	C
Secchi		C	C	F	C	D	D	C		C		C
Lake Grade		C	B	C	C	D	D	B		B		C

Year	2016	2017	2018	2019
TP	B	C	C	
CLA	C	B	C	
Secchi		C	C	
Lake Grade		C	C	

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

O’Dowd Lake (70–0095) *City of Shakopee*

Volunteer: Sandy and Mike Boyce

O’Dowd Lake is located in both Louisville Township and the City of Shakopee (Scott County). The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value. The lake’s surface area is 258 acres and has a maximum depth of 6.7 m (roughly 22 feet). More than 80 percent of the surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation.

The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue) in 1998 and aquatic life (fish bioassessments) in 2018. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 2002.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	26	17	41	B
CLA (µg/l)	22	2.0	48	C
Secchi (m)	2.1	0.9	5.0	C
TKN (mg/l)	0.83	0.60	1.20	
			Lake Grade	C

The lake received a lake grade of C this year, which is consistent with its historical water quality database.

During each monitoring visit, the lake’s physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake’s data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP					C							
CLA					C							
Secchi					C							
Lake Grade					C							

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP			C			C			C		D	
CLA			D			C			C		D	
Secchi			C			C			C		C	
Lake Grade			C			C			C		D	

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP		C	D	C	C	C	C	C	C	B	A	C
CLA		D	C	D	C	C	C	C	C	C	B	C
Secchi		C	D	C	C	C	C	C	C	C	C	C
Lake Grade		C	D	C	B	C						

Year	2016	2017	2018	2019
TP	C	B	B	B
CLA	C	C	C	C
Secchi	C	C	C	C
Lake Grade	C	C	C	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Olson Lake (82–0103) Valley Branch Watershed District

Volunteer: Tom Bucher, Gary Fields

Olson Lake is located in the City of Lake Elmo (Washington County). The lake is considered a Priority Lake by the Metropolitan Council for its good water quality. The lake has a surface area of 89 acres and a mean and maximum depth of 2.1 (6.9 feet) and 4.5 m (14.8 feet). The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 2009.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	20	12	33	A
CLA (µg/l)	4.5	1.0	10	A
Secchi (m)	3.7	2.0	5.3	A
TKN (mg/l)	0.56	0.40	0.85	
			Lake Grade	A

The lake received a lake grade of A this year. This grade is consistent with much of its recent historical water quality database. Also, the historical water quality database indicates that the lake grades have improved since the 1980's. The lake received a lake grade of C in 1984, as well as receiving Secchi grades of C in 1984-1986, and 1988-1990. Lake Grades of B were received in 1991, 1993, and 1995. Between 2000 and 2012, the lake has recorded lake grades varying between A and B. Since 2013 the lake has received A lake grades. Continued monitoring is recommended to determine if this recent improvement in water quality is part of a longer term trend.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

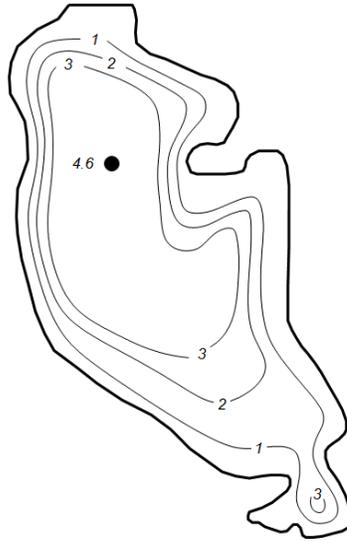
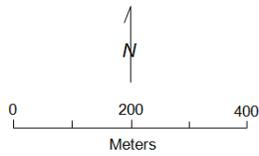
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Olson
Lake Elmo, Washington Co.

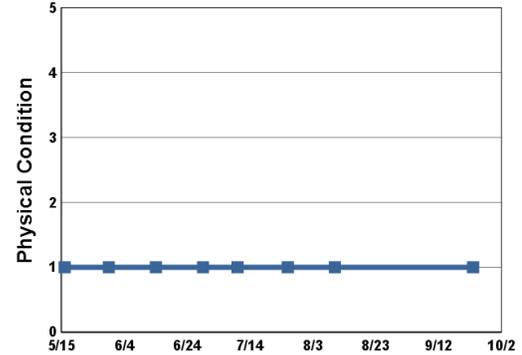
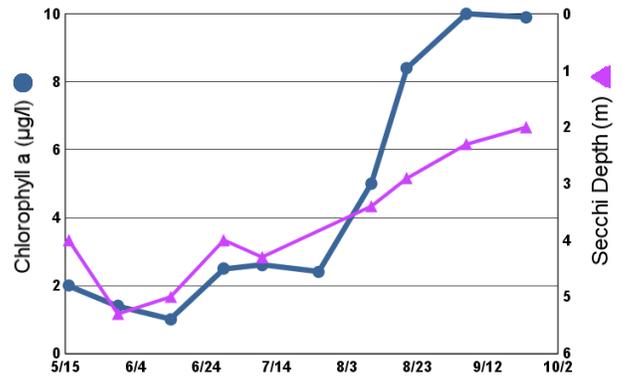
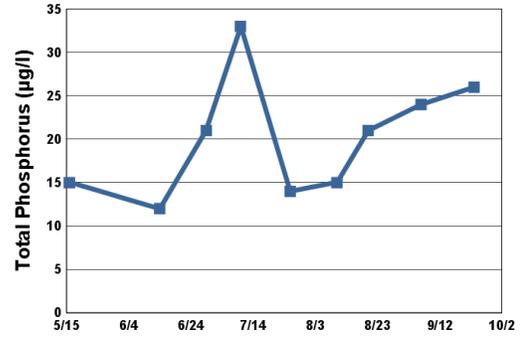
Lake ID: 820103-00

● Sampling site
Contours in meters

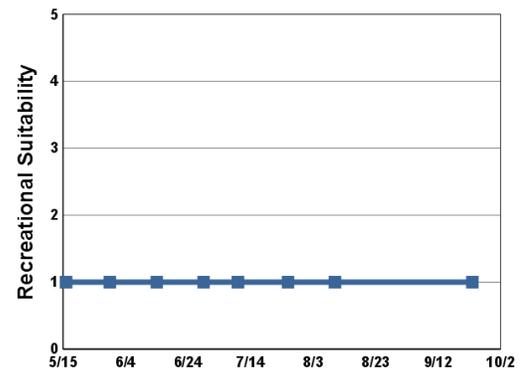


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/16/19	18.2		2.0	15	4.0	1	1
05/30/19	20.5		1.4		5.3	1	1
06/14/19	22.1		1.0	12	5.0	1	1
06/29/19	25.1		2.5	21	4.0	1	1
07/10/19	26.3		2.6	33	4.3	1	1
07/26/19	27.2		2.4	14		1	1
08/10/19	26.0		5.0	15	3.4	1	1
08/20/19	24.7		8.4	21	2.9		
09/06/19	22.4		10	24	2.3		
09/23/19	22.4		9.9	26	2.0	1	1



1 = Crystal Clear
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4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
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3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP					C							B
CLA					C							B
Secchi					C	C	C		C	C	C	B
Lake Grade					C							B

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP		B		C					A			A
CLA		A		B					A			B
Secchi		B		B					A			A
Lake Grade		B		B					A			A

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	A	B	C	B	A	A	B	A	A	A	A	A
CLA	A	B	B	A	A	A	B	A	B	A	A	A
Secchi	A	B	B	B	A	A	B	A	B	A	A	A
Lake Grade	A	B	B	B	A	A	B	A	B	A	A	A

Year	2016	2017	2018	2019
TP	A	A	A	A
CLA	A	A	A	A
Secchi	A	A	A	A
Lake Grade	A	A	A	A

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Oneka Lake (82–0140) *Rice Creek Watershed District*

Volunteer: Paul Bolstad

Oneka Lake is located in the City of Hugo (Washington County). The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value. The lake has a surface area of 381 acres, and a maximum depth of 2.1 (6.9 feet). The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	13	8	21	A
CLA ($\mu\text{g/l}$)	2.2	1.8	3.0	A
Secchi (m)				
TKN (mg/l)	0.84	0.69	0.97	
			Lake Grade	

There was an insufficient quantity of valid Secchi transparency measurements to determine a Secchi grade. An invalid measurement occurred if the Secchi disk was either visible on the lake bottom or the disk's visibility was blocked by aquatic vegetation. In both of these situations the water clarity would have been greater than that indicated by the measurement. A lake grade was not given because all three parameter grades are required to issue a lake grade. The relatively low CLA concentrations in combination with the observations of moderate to substantial macrophyte growth, indicate that the primary production of the lake is focused on production of aquatic macrophytes rather than algae.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP		C	D	D		C		B			D	D
CLA		A	A	A		A		A			B	B
Secchi		C		C		C		C			C	C
Lake Grade		B		C		B		B			C	C

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP	C							A	B	C	C	A
CLA	A							A	A	B	B	A
Secchi	C							C	C	C	C	C
Lake Grade	B							B	B	C	C	B

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	A						A	C	B			
CLA	A						A	A	A			
Secchi	C											
Lake Grade	B											

Year	2016	2017	2018	2019
TP		A	A	A
CLA		A	B	A
Secchi				
Lake Grade				

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Orchard Lake (19–0031) *Black Dog Lake Watershed Management Organization*

Volunteer: Tom Goodwin

Orchard Lake is located in the City of Lakeville (Dakota County). The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value. It has a surface area of 250 acres. Its maximum and mean depths are 10 m and 3 m respectively.

The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue) in 1998. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 2017.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	20	12	27	A
CLA (µg/l)	7.9	2.4	15	A
Secchi (m)	2.3	1.4	4.4	B
TKN (mg/l)	0.68	0.53	0.94	
			Lake Grade	A

The lake received a lake grade of A this year. The lake continues to have lower summer-time chlorophyll in comparison to the mid-2000s and earlier, as demonstrated by the more recent streak of CLA grades of A. The overall water quality has improved overall in comparison to years prior dating back to 1980, as given by the shift in lake grades from the C to A range.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP	C	B		B						B		
CLA	B	B		B						B		
Secchi	C	B		B				C	C	C	D	C
Lake Grade	C	B		B						B		

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP		C					C	C	C	B		C
CLA		B					C	C	C	B		C
Secchi		C					C	C	C	B		C
Lake Grade		C					C	C	C	B		C

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	B	C	C	A	A	B	B	B	A	A	A
CLA	B	B	B	C	B	A	A	A	A	A	A	A
Secchi	B	B	B	C	A	A	A	B	B	A	B	B
Lake Grade	B	B	B	C	A	A	A	B	B	A	A	A

Year	2016	2017	2018	2019
TP	B	A	A	A
CLA	A	A	A	A
Secchi	B	B	B	B
Lake Grade	B	A	A	A

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Parkers Lake (27–0107) Bassett Creek Watershed Management Organization

Volunteer: David Parker

Parkers Lake is located in the City of Plymouth (Hennepin County). It has a surface area of 97 acres. The mean and maximum depths of the lake are 3.7 m (12 ft) and 11.3 m (37 ft), respectively. The lake's size and mean depth result in an approximate lake volume of 1,164 ac-ft. Approximately 70 percent of the lake's surface area is considered littoral zone, which is the 0-15 feet depth zone of aquatic plant dominance. The lake's 950-acre immediate watershed translates to a moderate watershed-to-lake area ratio of 10:1. The greater the ratio, the greater the potential stress on the lake from surface runoff.

The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue) in 1998 and aquatic life (chloride) in 2014. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 1995.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	21	10	35	A
CLA (µg/l)	6.8	1.0	21	A
Secchi (m)	4.1	1.3	6.0	A
TKN (mg/l)	0.51	0.32	0.74	
			Lake Grade	A

The lake received a lake grade of A this year, which is similar to some previous years' annual lake grades. The lake has received lake grades varying from C to A to B over the past 35 years as indicated by the historical water quality database, but the lake has not experienced a C lake grade since 1999.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP	C											
CLA	C										B	
Secchi	C										B	
Lake Grade	C											

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP				C				C	A		A	B
CLA				B				B	A		A	B
Secchi				C				C	B		A	B
Lake Grade				C				C	A		A	B

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	B	C	C	B	B	C	A		C			A
CLA	A	B	A	A	A	A	A		A			B
Secchi	C	B	A	B	B	B	B		B			A
Lake Grade	B	B	B	B	B	B	A		B			A

Year	2016	2017	2018	2019
TP	B	A	B	A
CLA	B	B	A	A
Secchi	A	A	B	A
Lake Grade	B	A	B	A

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Pat Lake (82–0125) Browns Creek Watershed District

Monitoring agency: Washington Conservation District staff

Pat Lake is a small 13-acre lake located in Washington County. There are few known morphological data available for the lake.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	49	33	75	C
CLA (µg/l))	16	3.6	32	B
Secchi (m)	>2.0	1.1	3.0	C
TKN (mg/l)	0.80	0.48	1.30	
			Lake Grade	C

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

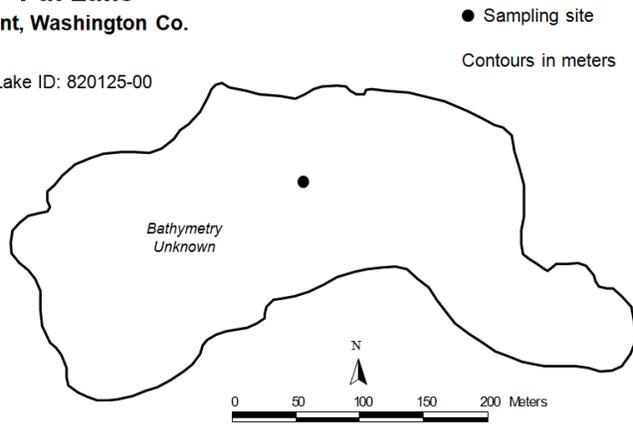
The lake received a lake grade of C this year, which is consistent with its historical water quality database. Continued monitoring is recommended to continue to build the water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Pat Lake
Grant, Washington Co.

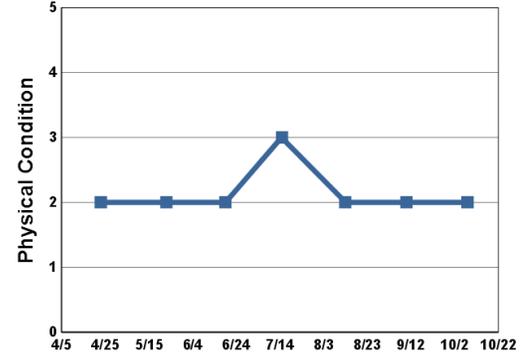
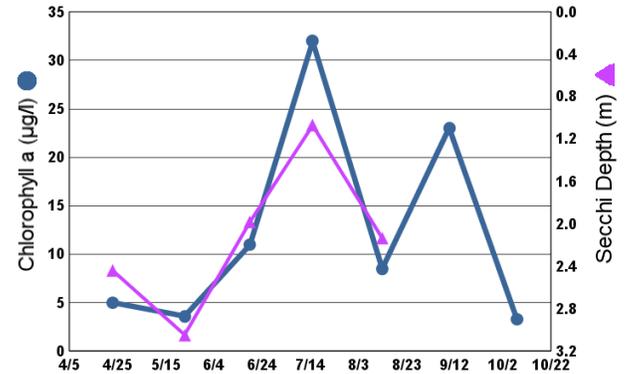
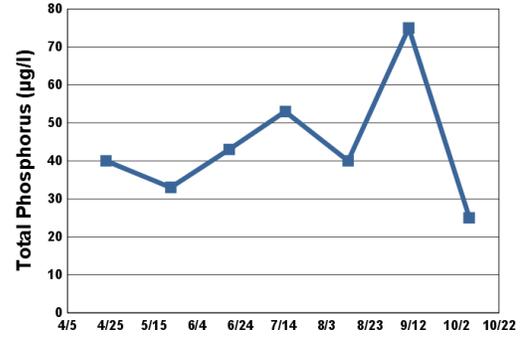
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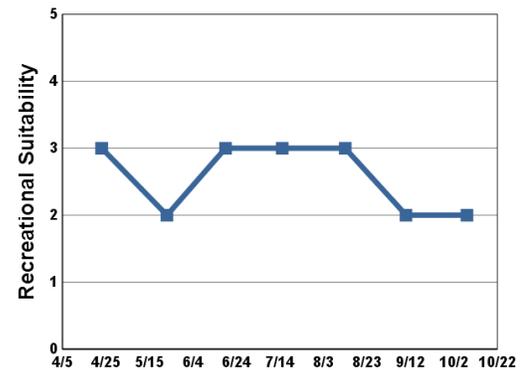
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/23/19	13.0	9.3	5.0	40	2.4	2	3
05/23/19	14.3	7.7	3.6	33	3.0	2	2
06/19/19	23.3	8.5	11	43	2.0	2	3
07/15/19	29.2	8.7	32	53	1.1	3	3
08/13/19	24.7	4.8	8.5	40	2.1	2	3
09/10/19	19.4	4.5	23	75	>1.5	2	2
10/08/19	13.1	7.6	3.3	25	>3.8	2	2

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.



- 1 = Crystal Clear
- 2 = Some Algae Present
- 3 = Definite Algal Presence
- 4 = High Algal Color
- 5 = Severe Algal Bloom



- 1 = Beautiful
- 2 = Minor Aesthetic Problem
- 3 = Swimming Impaired
- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP			D	C	C	C	C	C	C	C	C	C
CLA			C	A	B	B	B	B	B	B	B	B
Secchi			C	C	C	C	C	B	B	C	B	C
Lake Grade			C	B	C	C	C	B	B	C	B	C

Year	2016	2017	2018	2019
TP	C	B	C	C
CLA	B	A	B	B
Secchi	C	B	C	C
Lake Grade	C	B	C	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Penn Lake (27–0004) *Nine Mile Creek Watershed District*

Volunteer: Lisa McIntire

Penn Lake is located in the City of Bloomington (Hennepin County). It has a maximum depth of 2.1 m (7.0 ft). The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2018.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	114	53	221	D
CLA (µg/l)	74	14	210	D
Secchi (m)	0.4	0.2	1.1	F
TKN (mg/l)	1.50	0.65	2.90	
			Lake Grade	D

The lake received a lake grade of D this year, which is similar to water quality observed since 2013. This continues the improvement in water quality since the late 2000s when F grades were common. Continued monitoring is recommended to determine if this recent improvement in water quality is part of a longer term trend.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP						F	F	D	F	D	D	D
CLA						F	F		D	D	C	D
Secchi	F					F	F	F	F	D		F
Lake Grade						F	F		F	D		D

Year	2016	2017	2018	2019
TP	D	D	D	D
CLA	D	D	D	D
Secchi	F	F	D	F
Lake Grade	D	D	D	D

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Pickerel Lake (19–0079) Lower Mississippi River Watershed Management Organization

Volunteer: Keegan Lund

Pickerel Lake is located in the city of Lilydale (Dakota County). The lake has a surface area of 114 ac and a maximum depth of 3.4 m. The lake is located in the floodplain of the Mississippi River.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	195	94	286	
CLA (µg/l)	62	58	67	
Secchi (m)	0.7	0.5	0.8	
TKN (mg/l)	1.23	1.00	1.50	
			Lake Grade	

There were less than 5 monitoring events during the summer-time period (May — September). At least 5 monitoring events are required during the summer-time period to determine a parameter grade. A lake grade was not given because all three parameter grades are required to issue a lake grade.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

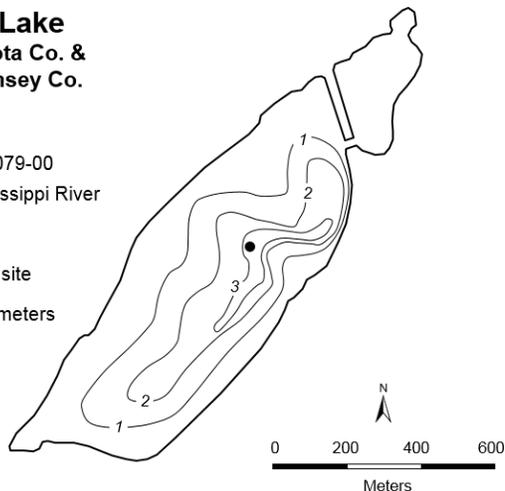
Pickerel Lake
Lilydale, Dakota Co. &
St. Paul, Ramsey Co.

Lake ID: 190079-00

WMO: Lower Mississippi River

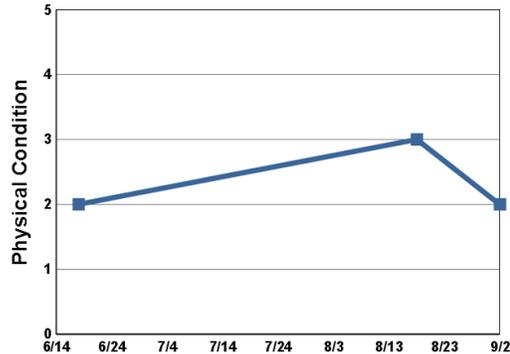
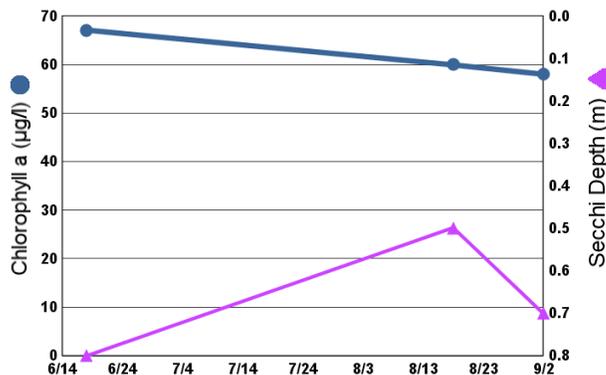
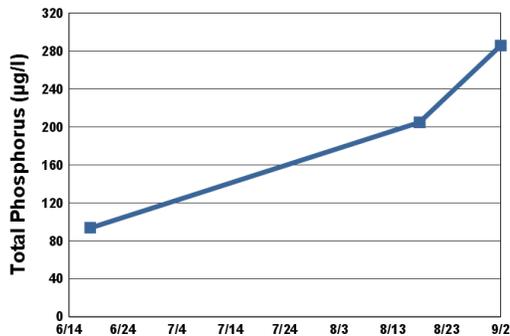
● Sampling site

Contours in meters

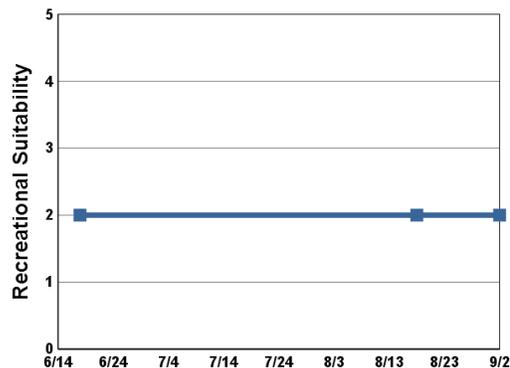


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
06/18/19	24.6		67	94	0.8	2	2
08/18/19	23.9		60	205	0.5	3	2
09/02/19	22.2		58	286	0.7	2	2



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP												C
CLA												C
Secchi												D
Lake Grade												C

Year	2016	2017	2018	2019
TP	C	C	C	
CLA	D		B	
Secchi	D	C	C	
Lake Grade	D		C	

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Pine Tree Lake (82–0122) Rice Creek Watershed District

Volunteer: Gene Berwald

Pine Tree Lake, located on the eastern edge of the City of Dellwood (Washington County), covers an area of 174 acres. It has a maximum depth of 7.9 m (26 feet), and a mean depth of 3.0 m (10 feet).

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	29	16	98	B
CLA (µg/l))	4.7	2.5	8.1	A
Secchi (m)	2.4	1.2	3.6	B
TKN (mg/l)	0.72	0.55	0.96	
			Lake Grade	B

The lake received a lake grade of B, which is consistent with its historical water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP						C						
CLA						D						
Secchi						D						
Lake Grade						D						

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP		B	B	C	C	B	B	B	C	C	C	C
CLA		A	A	C	B	A	B	B	A	A	B	C
Secchi		C	B	C	C	B	C	C	A	B	C	C
Lake Grade		B	B	C	C	B	B	B	B	B	C	C

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	B	B	C	B	B	A	A	B	A	A	C	A
CLA	A	B	A	A	B	A	A	A	A	A	A	A
Secchi	B	B	B	B	B	A	A	B	B	B	B	B
Lake Grade	B	B	B	B	B	A	A	B	A	A	B	A

Year	2016	2017	2018	2019
TP	A	A	A	B
CLA	A	A	A	A
Secchi	B	B	B	B
Lake Grade	A	A	A	B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Plaisted Lake (82–0148) South Washington Watershed District

Monitoring agency: Washington Conservation District staff

Plaisted Lake is located in the City of Hugo (Washington County). Little morphological data is available for the lake.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2012.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCEs's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	28	19	37	B
CLA (µg/l)	9.1	2.1	32	A
Secchi (m)	>2.1	1.2	>3.4	
TKN (mg/l)	0.62	0.48	0.88	
			Lake Grade	

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

The lake received parameters grades of B and A for TP and CLA, respectively. There was an insufficient quantity of valid Secchi transparency measurements to determine a Secchi grade. An invalid measurement occurred if the Secchi disk was either visible on the lake bottom or the disk's visibility was blocked by aquatic vegetation. In both of these situations the water clarity would have been greater than that indicated by the measurement. A lake grade was not given because all three parameter grades are required to issue a lake grade. The A grades for TP and CLA continue the improvement in water quality since CAMP monitoring began in 2008. Continued monitoring is recommended to determine if this recent improvement in water quality is part of a longer term trend.

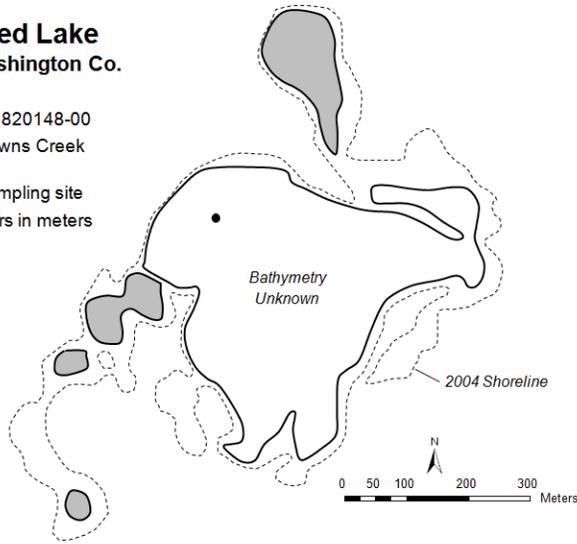
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Plaisted Lake
Hugo, Washington Co.

Lake ID: 820148-00
WD: Browns Creek

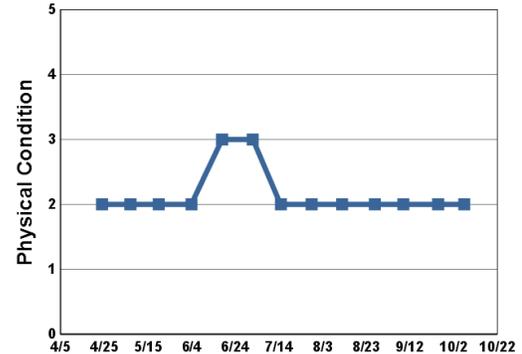
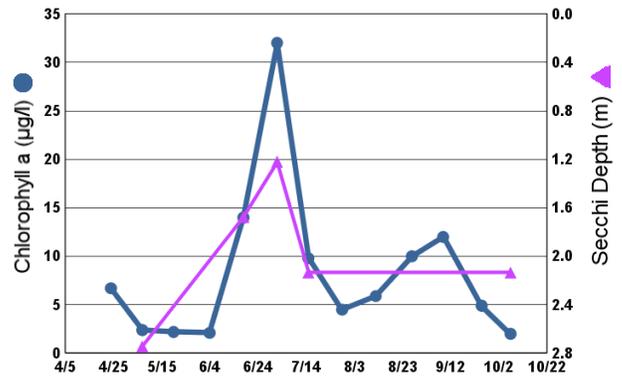
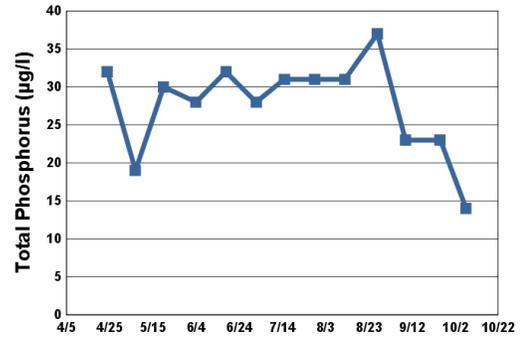
● Sampling site
Contours in meters



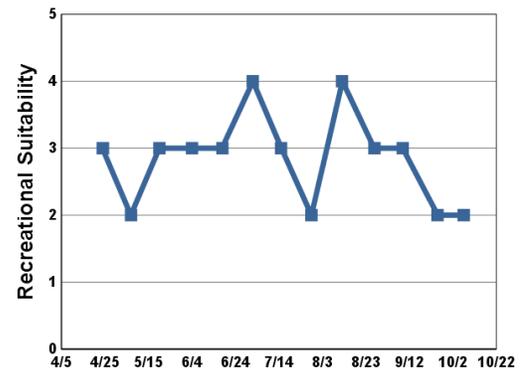
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/24/19	12.4	10.0	6.7	32	>2.1	2	3
05/07/19	15.2	9.0	2.4	19	2.7	2	2
05/20/19	13.7	8.2	2.2	30	>3.4	2	3
06/04/19	20.6	8.2	2.1	28	>2.7	2	3
06/18/19	23.1	10.4	14	32	1.7	3	3
07/02/19	28.4	8.5	32	28	1.2	3	4
07/15/19	27.5	8.6	9.8	31	2.1	2	3
07/29/19	25.1	6.8	4.5	31	>2.4	2	2
08/12/19	24.2	6.7	5.9	31	>1.7	2	4
08/27/19	21.0	5.6	10	37	>1.5	2	3
09/09/19	18.9	4.3	12	23	>1.8	2	3
09/25/19	19.7	7.3	4.9	23	>2.1	2	2
10/07/19	13.0	3.0	2.0	14	2.1	2	2

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP					D	D	D	D	D	C	B	B
CLA					C	C	C	C	C	B	A	A
Secchi					C	C	C	C	C	C		
Lake Grade					C	C	C	C	C	C		

Year	2016	2017	2018	2019
TP	B	A	A	B
CLA	B	A	A	A
Secchi				
Lake Grade				

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Powers Lake (82–0092) *City of Woodbury*

Monitoring agency: Washington Conservation District staff

Powers Lake is located within the city of Woodbury (Washington County). It has a surface area of approximately 57 acres and a maximum depth of 12.5 m (41.0 feet). The lake has no surface outlet.

The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 1998.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

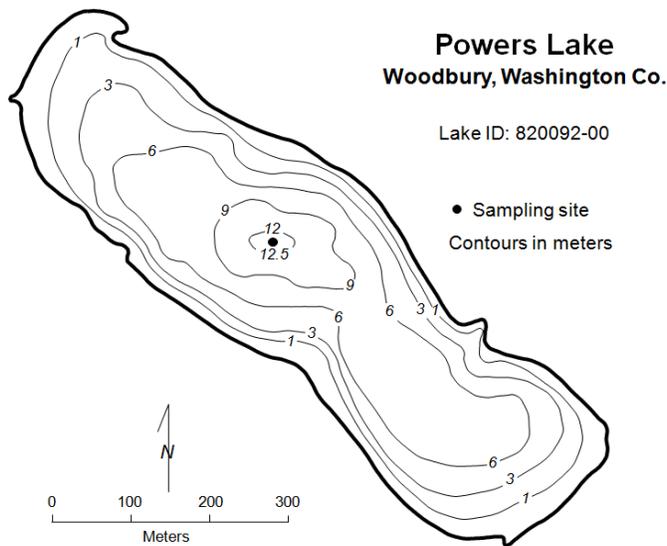
Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	30	11	84	B
CLA (µg/l)	12	2.8	30	B
Secchi (m)	3.1	2.1	5.2	A
TKN (mg/l)	0.65	0.30	0.93	
			Lake Grade	B

The lake received a lake grade of B this year which is consistent with its historical water quality database. The lake varies in the range of A to C grades.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

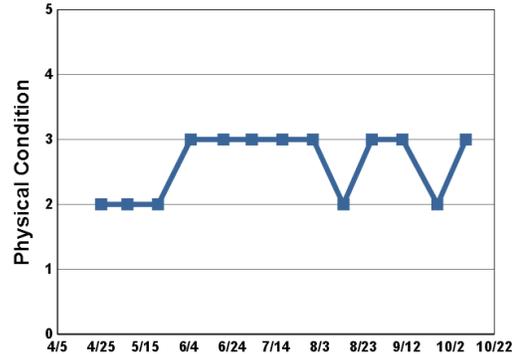
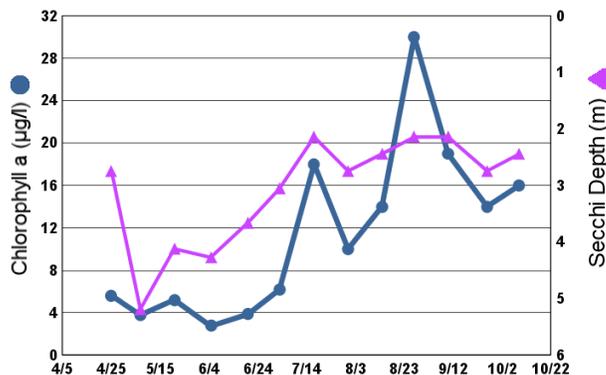
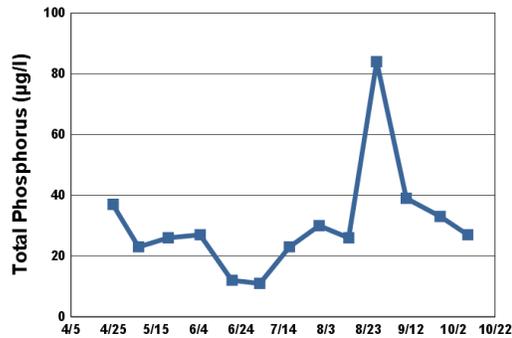
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

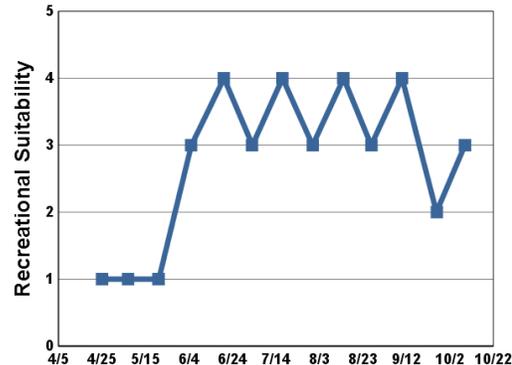


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/25/19	13.0	11.4	5.6	37	2.7	2	1
05/07/19	15.2	10.4	3.8	23	5.2	2	1
05/21/19	14.9	10.2	5.2	26	4.1	2	1
06/05/19	23.1	9.0	2.8	27	4.3	3	3
06/20/19	22.5	9.1	3.9	12	3.7	3	4
07/03/19	25.3	8.1	6.2	11	3.0	3	3
07/17/19	27.0	8.1	18	23	2.1	3	4
07/31/19	25.9	7.0	10	30	2.7	3	3
08/14/19	24.4	6.1	14	26	2.4	2	4
08/27/19	21.9	7.6	30	84	2.1	3	3
09/10/19	19.9	7.6	19	39	2.1	3	4
09/26/19	19.8	7.4	14	33	2.7	2	2
10/09/19	14.3	8.5	16	27	2.4	3	3



- 1 = Crystal Clear
- 2 = Some Algae Present
- 3 = Definite Algal Presence
- 4 = High Algal Color
- 5 = Severe Algal Bloom



- 1 = Beautiful
- 2 = Minor Aesthetic Problem
- 3 = Swimming Impaired
- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP			B	B	A	A	C	A	B	C	B	C
CLA			A	B	A	B	C	B	B	C	C	B
Secchi			A	B	A	C	C	A	B	C	C	B
Lake Grade			A	B	A	B	C	A	B	C	C	B

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	C	C	C	B	B	C	C	B	B	B	B
CLA	C	C	C	B	B	C	C	C	A	A	B	B
Secchi	C	C	C	C	B	B	C	B	A	A	B	C
Lake Grade	C	C	C	C	B	B	C	C	A	A	B	B

Year	2016	2017	2018	2019
TP	B	C	A	B
CLA	B	C	A	B
Secchi	C	C	A	A
Lake Grade	B	C	A	B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Lake Rebecca (19–0003) City of Hastings

Volunteer: Hastings Environmental Protectors

Lake Rebecca is located in the city of Hastings (Dakota County), and is in the floodplain of the Mississippi River. The lake has a surface area of 58 acres and a maximum depth of 4.6 m. The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. The lake is defined as a shallow lake because of the dominance of the littoral zone. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

The MN DNR designated the lake as being infested with zebra mussels (*Dreissena polymorpha*) in 2009. The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue) in 1998.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

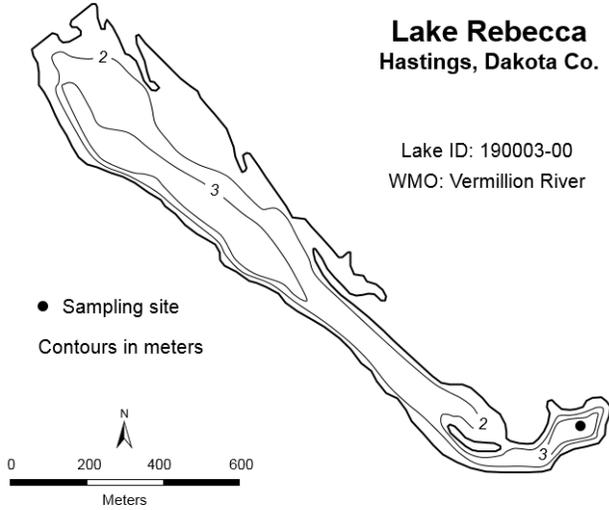
Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	102	58	168	D
CLA (µg/l)	64	12	120	D
Secchi (m)	1.0	0.5	1.8	D
TKN (mg/l)	1.21	0.85	1.70	
			Lake Grade	D

The lake received a lake grade of D in year which is consistent with its historical water quality database. Continued monitoring is recommended to continue to build the water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

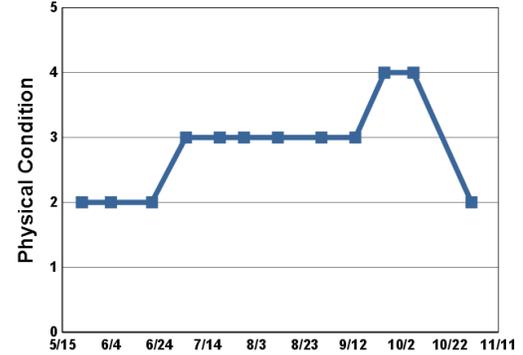
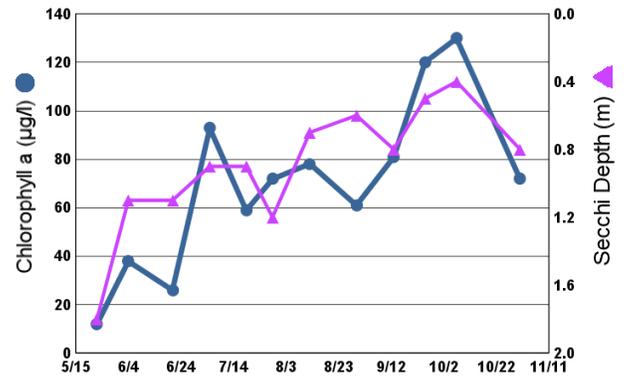
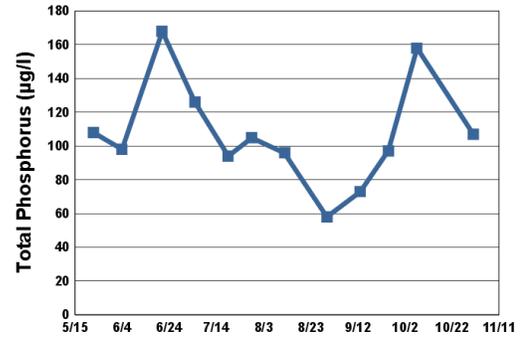
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

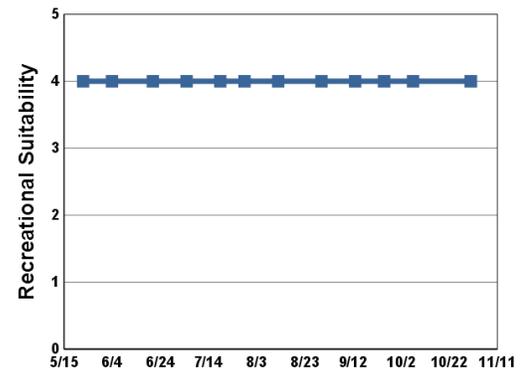


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/23/19	15.5		12	108	1.8	2	4
06/04/19	19.7		38	98	1.1	2	4
06/21/19	21.6		26	168	1.1	2	4
07/05/19	26.8		93	126	0.9	3	4
07/19/19	26.9		59	94	0.9	3	4
07/29/19	24.4		72	105	1.2	3	4
08/12/19	23.4		78	96	0.7	3	4
08/30/19	20.3		61	58	0.6	3	4
09/13/19	18.3		81	73	0.8	3	4
09/25/19	20.3		120	97	0.5	4	4
10/07/19	14.4		130	158	0.4	4	4
10/07/19	14.4		130	158	0.4	4	4
10/07/19	14.4		130	158	0.4	4	4
10/31/19	6.2		72.0	107	0.8	2	4



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP												F
CLA												D
Secchi												D
Lake Grade												D

Year	2016	2017	2018	2019
TP	D	D	D	D
CLA	D	F	D	D
Secchi	C	F	D	D
Lake Grade	D	F	D	D

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Red Rock Lake (27-0076) *City of Eden Prairie*

Volunteer: David Wallace

Red Rock Lake is located within the City of Eden Prairie (Hennepin County). The maximum depth of the lake is 4.9 m. More than 80 percent of the surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. The lake is defined as a shallow lake because of the dominance of the littoral zone. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue) in 2002.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

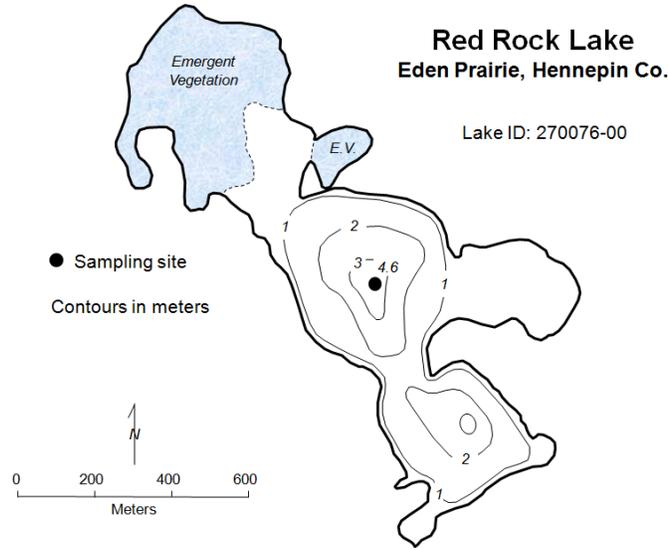
Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	62	27	112	C
CLA (µg/l)	42	2.5	94	C
Secchi (m)	1.2	0.5	2.3	D
TKN (mg/l)	1.20	0.66	1.90	
			Lake Grade	C

The lake received a lake grade of C this year which is consistent with water quality conditions since 2014. Recent water quality appears somewhat better than in the early 2000s as given by the lower TP and CLA mean summer-time concentrations. Continued monitoring is recommended to continue to build the water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

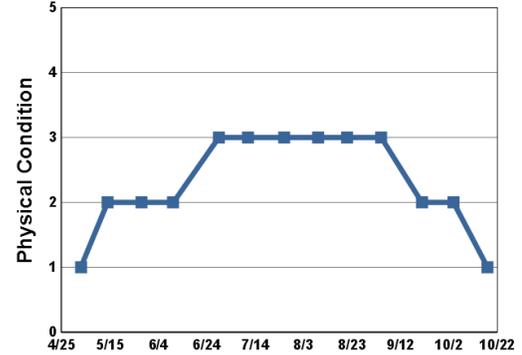
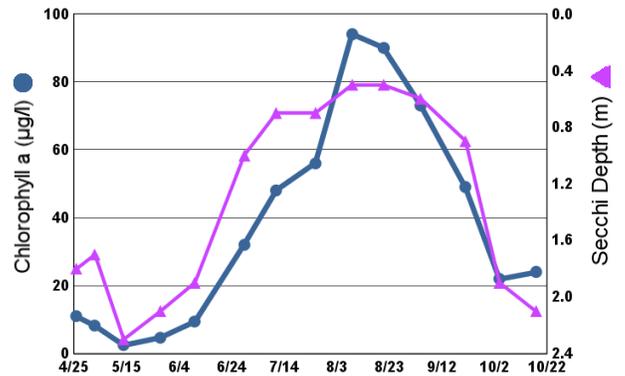
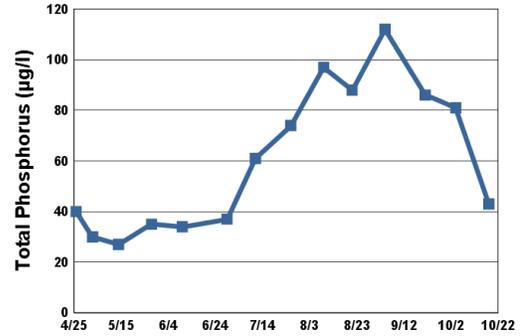
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

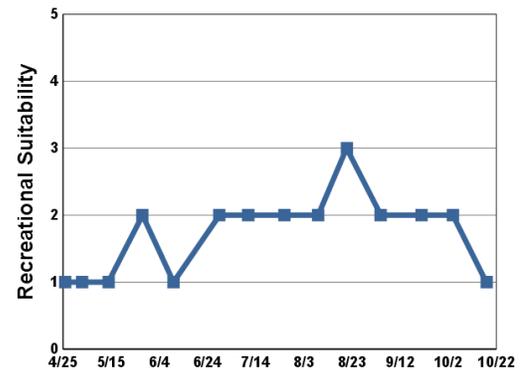


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/26/19	12.8		11	40	1.8		1
05/03/19	11.7		8.2	30	1.7	1	1
05/14/19	17.1		2.5	27	2.3	2	1
05/28/19	17.3		4.6	35	2.1	2	2
06/10/19	23.3		9.4	34	1.9	2	1
06/29/19	26.7		32	37	1.0	3	2
07/11/19	28.4		48	61	0.7	3	2
07/26/19	28.9		56	74	0.7	3	2
08/09/19	28.8		94	97	0.5	3	2
08/21/19	23.7		90	88	0.5	3	3
09/04/19	21.3		73	112	0.6	3	2
09/21/19	23.2		49	86	0.9	2	2
10/04/19	14.6		22	81	1.9	2	2
10/18/19	9.7		24	43	2.1	1	1



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- 5 = Severe Algal Bloom



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Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP								D	D			D
CLA								D	C			D
Secchi								C	C			C
Lake Grade								C	C			D

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	D		D								C	C
CLA	D		D								B	C
Secchi	C		D								C	C
Lake Grade	D		D								C	C

Year	2016	2017	2018	2019
TP	C	C	C	C
CLA	C	B	C	C
Secchi	C	C	C	D
Lake Grade	C	C	C	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Regional Park Lake (82–0087) South Washington Watershed District

Monitoring agency: Washington Conservation District staff

Regional Park Lake is a 16-acre lake located within the City of Cottage Grove (Washington County). The maximum depth of the lake is 5.8 m. More than 80 percent of the surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. The lake is defined as a shallow lake because of the dominance of the littoral zone.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2006.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	43	14	109	C
CLA (µg/l)	34	1.9	110	C
Secchi (m)	>2.1	0.8	>3.2	C
TKN (mg/l)	0.94	0.52	1.70	
			Lake Grade	C

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

The lake received a lake grade of C this year which is consistent with more recent years (since 2004).

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

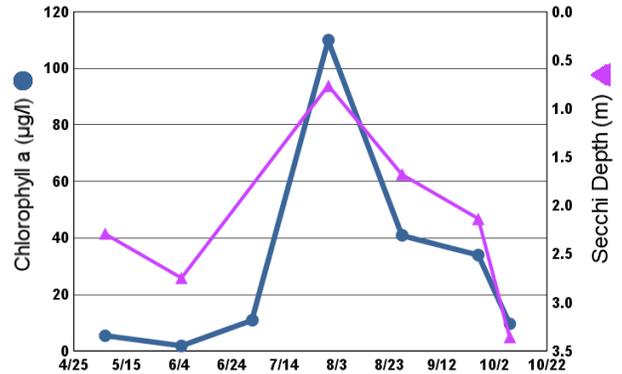
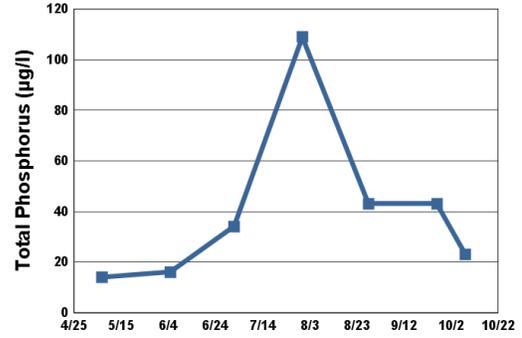
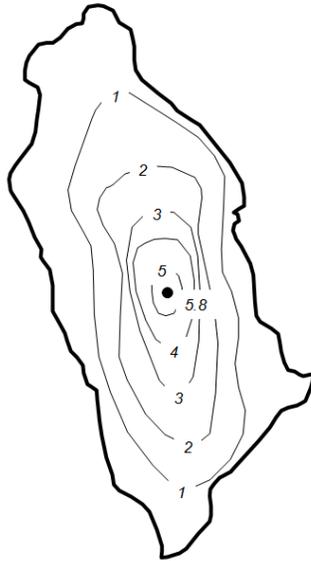
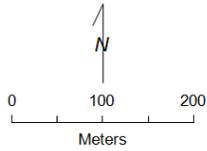
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Regional Park Lake
Cottage Grove, Washington Co.

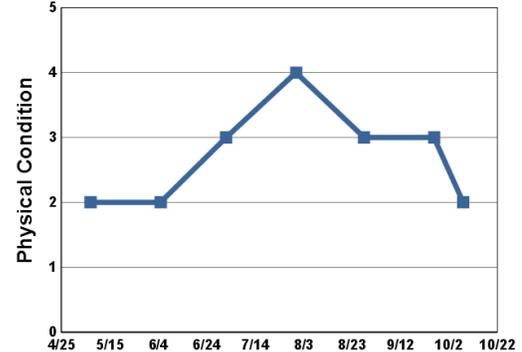
Lake ID: 820086-00

● Sampling site
Contours in meters



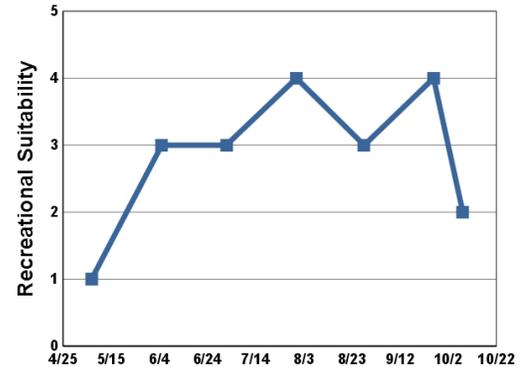
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/07/19	15.5	15.9	5.5	14	2.3	2	1
06/05/19	21.1	9.7	1.9	16	2.7	2	3
07/02/19	23.8	9.5	11	34	>3.2	3	3
07/31/19	22.8	12.8	110	109	0.8	4	4
08/28/19	20.4	9.9	41	43	1.7	3	3
09/26/19	18.4	10.3	34	43	2.1	3	4
10/08/19	13.4	11.9	9.7	23	3.4	2	2



> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

- 1 = Crystal Clear
- 2 = Some Algae Present
- 3 = Definite Algal Presence
- 4 = High Algal Color
- 5 = Severe Algal Bloom



- 1 = Beautiful
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- 3 = Swimming Impaired
- 4 = No Swimming; Boating OK
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Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP							F	C	D	D	D	D
CLA							B	B	C	C	D	C
Secchi							F	D	F	F	F	F
Lake Grade							D	C	D	D	D	D

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	C	D	C	D	C	C	C	D	C	C	C
CLA	C	C	C	B	C	B	C	C	F	C	C	C
Secchi	D	C	C	C	C	B	C	B	C	C	B	B
Lake Grade	C	C	C	C	C	B	C	C	D	C	C	C

Year	2016	2017	2018	2019
TP	C		D	C
CLA	C		C	C
Secchi	C		C	C
Lake Grade	C		C	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Rest Area Pond (82–0514) Valley Branch Watershed District

Volunteer: Minnesota Department of Transportation staff

Rest Area Pond is a 12.6-acre lake located within West Lakeland Township (Washington County). There are few morphological information for the pond. The pond's surface area and watershed area (17,781 acres) translates to a large 157:1 watershed-to-pond area ratio. The greater the ratio, the greater the potential stress on the lake from surface runoff.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	38	27	66	C
CLA ($\mu\text{g/l}$)	10	4.6	20	B
Secchi (m)	1.6	1.3	2.3	C
TKN (mg/l)	0.66	0.45	0.78	
			Lake Grade	C

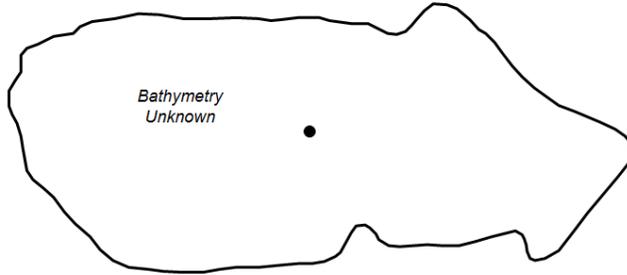
The pond received a lake grade of C which is consistent with its historical water quality database. However, the pond received a Secchi grade of C this year, which is the best Secchi grade received to date. The pond has received lake grades ranging from C to F since 2006, with Ds and Fs more prevalent. Continued monitoring is recommended to continue to build the water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

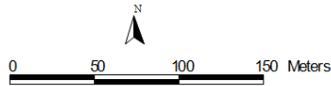
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Rest Area Pond
West Lakeland Twp., Washington Co.

Lake ID: 820514-00

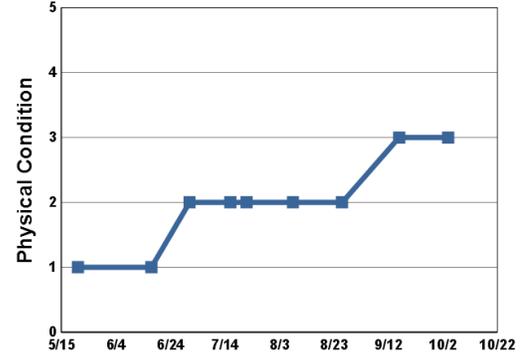
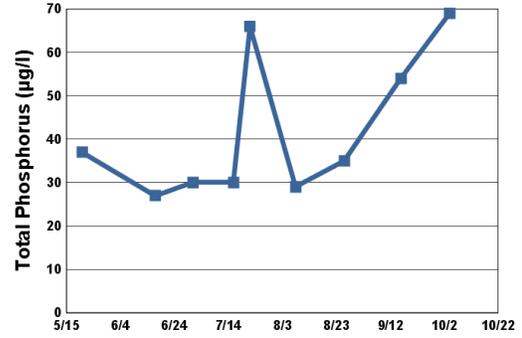


● Sampling site
Contours in meters

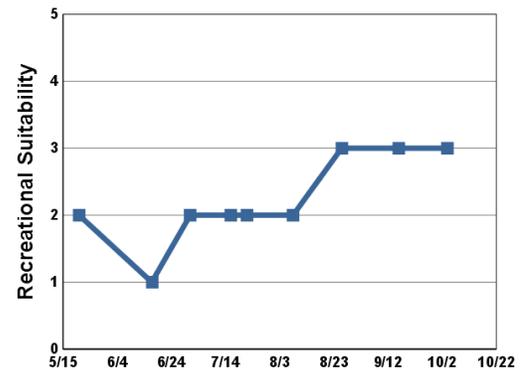


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/21/19	17.5		7.5	37	1.4	1	2
06/17/19	25.5		4.6	27	2.3	1	1
07/01/19	24.3		6.5	30	1.9	2	2
07/16/19	27.3		11	30	2.1	2	2
07/22/19	25.6		12	66	1.3	2	2
08/08/19	25.9		9.2	29	1.3	2	2
08/26/19	23.0		20	35	1.3	2	3
09/16/19	20.7		13	54	1.4	3	3
10/04/19	15.7		13	69	1.1	3	3



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP			D	F	F	F	F	D	F	D	C	F
CLA			D	C	F	F	C	B	C	C	B	F
Secchi			D	F	F	F	F	D	D	D	D	F
Lake Grade			D	D	F	F	D	C	D	D	C	F

Year	2016	2017	2018	2019
TP	D	C	D	C
CLA	C	C	C	B
Secchi	D	D	D	C
Lake Grade	D	C	D	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Riley Lake (10—0002) *City of Chanhassen/City of Eden Prairie*

David Florenzano

Riley Lake is located with the cities of Chanhassen and Eden Prairie (Carver and Hennepin counties). The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value. The maximum and mean depths are 15.0 m and 6.6 m, respectively.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2002, aquatic consumption (mercury in fish tissue) in 2002, and aquatic life (fish bioassessments) in 2018. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 1995 and zebra mussels (*Dreissena polymorpha*) in 2018.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

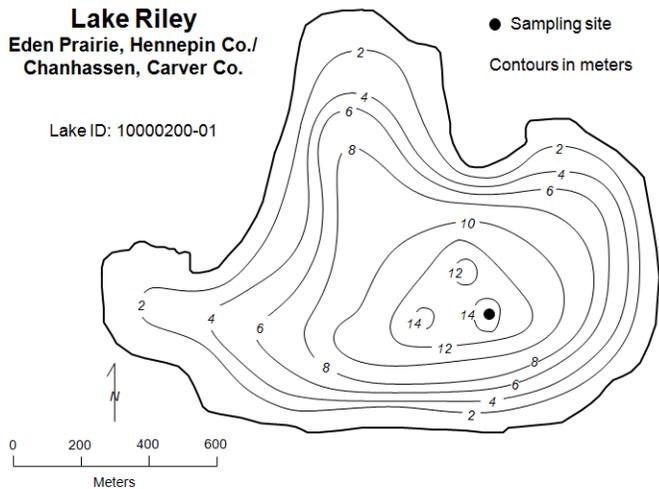
Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	26	17	55	B
CLA (µg/l)	9.0	3.4	21	A
Secchi (m)	3.2	1.4	5.4	A
TKN (mg/l)	0.81	0.67	1.10	
			Lake Grade	A

The lake received a lake grade of A this year, which is the first time according to its historical water quality database. This change in water quality may be related to the recent infestation of zebra mussels. Continued monitoring is recommended to track the water quality of this lake.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

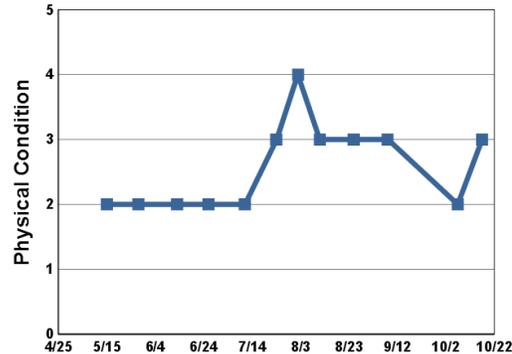
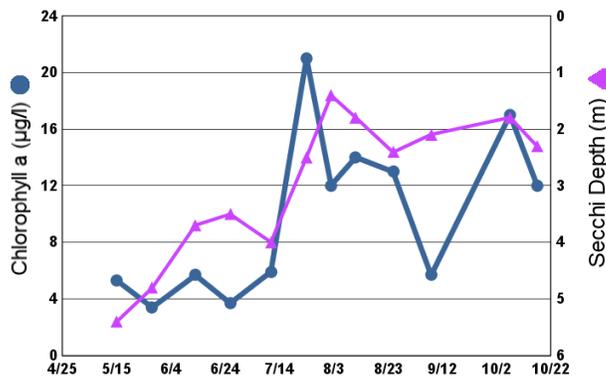
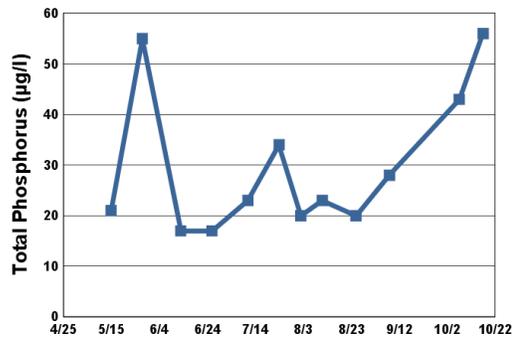
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

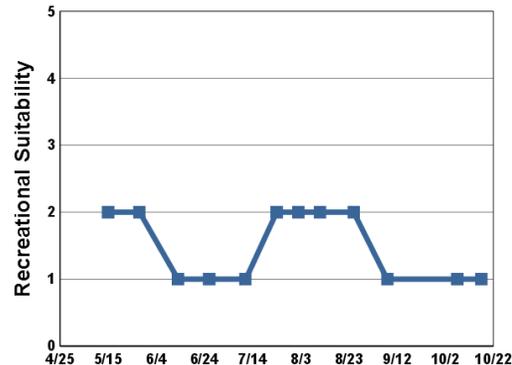


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/15/19	18.2		5.3	21	5.4	2	2
05/28/19	15.9		3.4	55	4.8	2	2
06/13/19	22.9		5.7	17	3.7	2	1
06/26/19	23.6		3.7	17	3.5	2	1
07/11/19	26.6		5.9	23	4.0	2	1
07/24/19	26.4		21	34	2.5	3	2
08/02/19	27.5		12	20	1.4	4	2
08/11/19	25.3		14	23	1.8	3	2
08/25/19	23.6		13	20	2.4	3	2
09/08/19	21.8		5.7	28	2.1	3	1
10/07/19	15.4		17	43	1.8	2	1
10/17/19	11.3		12	56	2.3	3	1



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- 4 = High Algal Color
- 5 = Severe Algal Bloom



- 1 = Beautiful
- 2 = Minor Aesthetic Problem
- 3 = Swimming Impaired
- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP	C	B	C	C	C	C	C	C				C
CLA	C	C	C	C	C	C	C	D			C	C
Secchi	C	C	C	C	C	C	C	C	C		C	C
Lake Grade	C				C							

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP		C				C			C		C	C
CLA		C				C			C		C	D
Secchi		C				C			C		C	C
Lake Grade		C				C			C		C	C

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	C	C	B	C	C	C	C	C	C	C	C
CLA	C	C	B	B	B	B	C	C	C	B	C	C
Secchi	B	C	B	C	C	C	C	B	C	C	C	B
Lake Grade	C	C	B	B	C							

Year	2016	2017	2018	2019
TP	B	C	B	B
CLA	B	B	A	A
Secchi	A	B	B	A
Lake Grade	B	B	B	A

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Rogers Lake (19–0080) *City of Mendota Heights*

Volunteer: David Rossmiller

Rogers Lake lies within the city of Mendota Heights. The lake has a surface area of 94 acres and a maximum depth of 2.4 m (7.9 ft). The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	28	16	53	B
CLA ($\mu\text{g/l}$)	4.6	1.0	16	A
Secchi (m)	>1.7	>1.2	>2.0	
TKN (mg/l)	0.75	0.61	0.94	
			Lake Grade	

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

There was an insufficient quantity of valid Secchi transparency measurements to determine a Secchi grade. An invalid measurement occurred if the Secchi disk was either visible on the lake bottom or the disk's visibility was blocked by aquatic vegetation. In both of these situations the water clarity would have been greater than that indicated by the measurement. A lake grade was not given because all three parameter grades are required to issue a lake grade. The relatively low CLA concentrations in combination with the observations of moderate to substantial macrophyte growth, indicate that the primary production of the lake is focused on production of aquatic macrophytes rather than algae.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

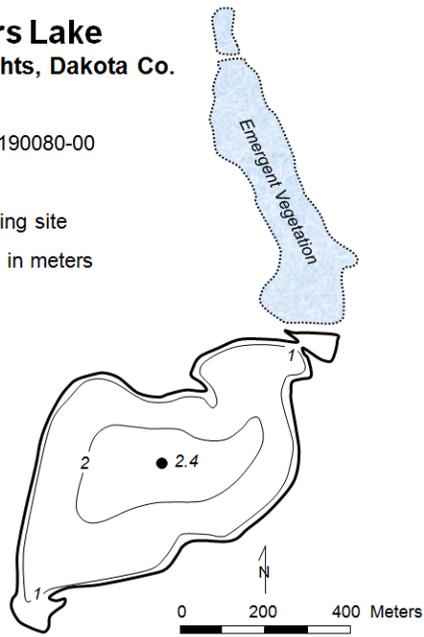
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Rogers Lake Mendota Heights, Dakota Co.

Lake ID: 190080-00

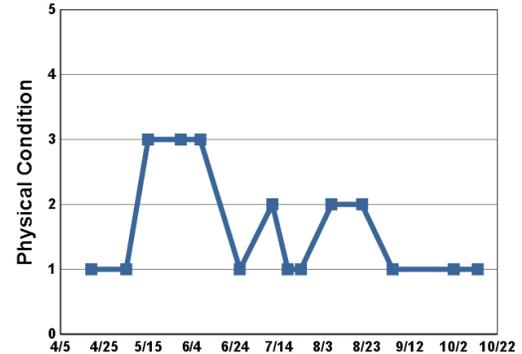
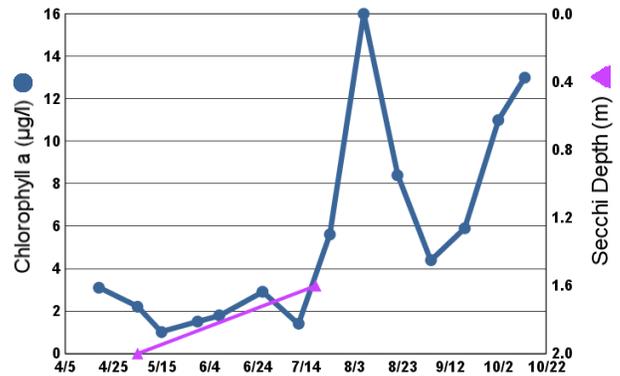
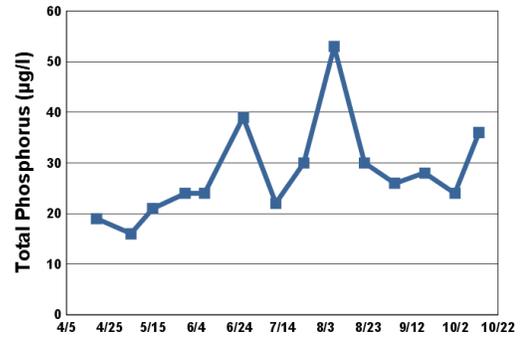
- Sampling site
- Contours in meters



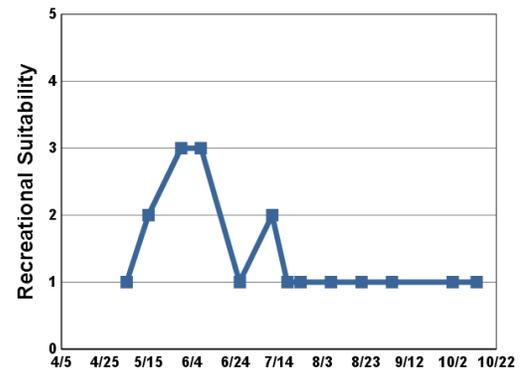
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/19/19	11.1		3.1	19	>1.9	1	
05/05/19	14.1		2.2	16	2.0	1	1
05/15/19	20.6		1.0	21	>2.0	3	2
05/30/19	21.4		1.5	24	>1.7	3	3
06/08/19	27.8		1.8	24	>1.5	3	3
06/26/19	25.7		2.9	39	>1.6	1	1
07/11/19	28.1		1.4	22	>1.8	2	2
07/18/19					1.6	1	1
07/24/19	29.1		5.6	30	>1.7	1	1
08/07/19	28.0		16	53	>1.2	2	1
08/21/19	25.8		8.4	30	>1.7	2	1
09/04/19	21.5		4.4	26	>1.8	1	1
09/18/19	23.0		5.9	28			
10/02/19	16.3		11	24	>2.0	1	1
10/13/19	7.8		13	36	>1.8	1	1

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.



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- 5 = Severe Algal Bloom



- 1 = Beautiful
- 2 = Minor Aesthetic Problem
- 3 = Swimming Impaired
- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP				C	B	C	C	C	C	A	A	B
CLA				A	A	A	A	A	A	A	A	A
Secchi				D	C	C	C	C				
Lake Grade				C	B	B	B	B				

Year	2016	2017	2018	2019
TP	B	A		B
CLA	A	A		A
Secchi				
Lake Grade				

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Sand Lake (82–0067) Carnelian — Marine — St. Croix Watershed District

Monitoring agency: Washington Conservation District staff

Sand Lake is located within the City of Scandia (Washington County). The lake has a surface area of 46 acres. It has a maximum and mean depths of 5.5 m and 2.4 m, respectively. More than 80 percent of the surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. The lake is defined as a shallow lake because of the dominance of the littoral zone.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	53	38	84	C
CLA ($\mu\text{g/l}$)	31	1.4	80	C
Secchi (m)	1.0	0.3	2.0	D
TKN (mg/l)	1.17	0.78	1.70	
			Lake Grade	C

The received a lake grade of C this year, which is consistent with its historical water quality database. Water clarity has varied between grades A and C over the past decade.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

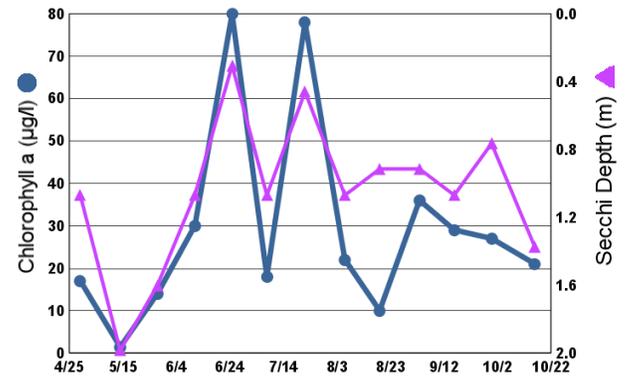
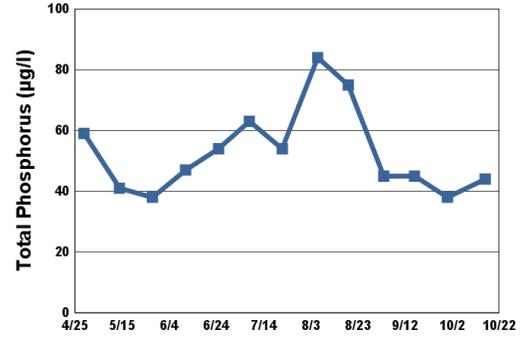
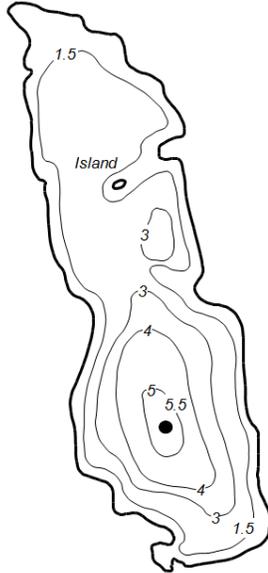
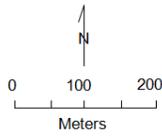
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Sand Lake
New Scandia Twp., Washington Co.

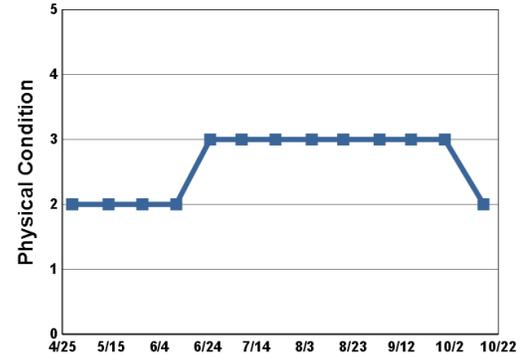
Lake ID: 820067-00

● Sampling site
Contours in meters

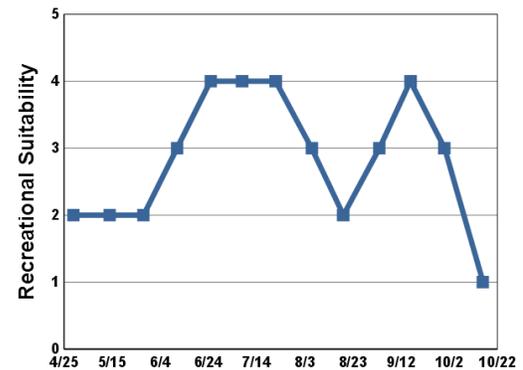


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/29/19	11.3	10.1	17	59	1.1	2	2
05/14/19	17.6	7.1	1.4	41	2.0	2	2
05/28/19	16.2	8.7	14	38	1.6	2	2
06/11/19	21.9	8.1	30	47	1.1	2	3
06/25/19	24.3	10.2	80	54	0.3	3	4
07/08/19	26.8	8.0	18	63	1.1	3	4
07/22/19	25.6	8.4	78	54	0.5	3	4
08/06/19	27.8	7.2	22	84	1.1	3	3
08/19/19	24.7	8.0	10	75	0.9	3	2
09/03/19	21.6	9.0	36	45	0.9	3	3
09/16/19	20.9	8.7	29	45	1.1	3	4
09/30/19	17.7	11.1	27	38	0.8	3	3
10/16/19	9.8	6.7	21	44	1.4	2	1



1 = Crystal Clear
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4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP		C	C	C	C						C	C
CLA		C	C	B	C						B	C
Secchi		D	D	C	C						C	C
Lake Grade		C	C	C	C						C	C

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	B	C	C	B	C	C	C	C			C	C
CLA	B	C	B	B	C	B	B				C	C
Secchi	C	C	C	B	C	A	C	C		C	C	C
Lake Grade	B	C	C	B	C	B	C				C	C

Year	2016	2017	2018	2019
TP	C	B	B	C
CLA	B	B	B	C
Secchi	C	C	C	D
Lake Grade	C	B	B	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Scout Lake (19-0198) *City of Apple Valley*

Volunteer: Dan Stanek

Scout Lake is a small lake located in Apple Valley. Little information is available on the morphology of the lake. The maximum depth of the lake is 2.9 m (9.5 feet). The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	80	63	95	D
CLA ($\mu\text{g/l}$)	67	11	120	D
Secchi (m)	0.6	0.4	1.1	F
TKN (mg/l)	1.93	0.90	2.80	
			Lake Grade	D

The lake received a lake grade of D this year. The lake grades have varied between C and F since CAMP monitoring began in 2007. Continued monitoring is recommended to continue to build the water quality database.

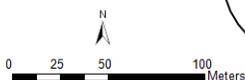
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Scout Lake
Apple Valley, Dakota Co.

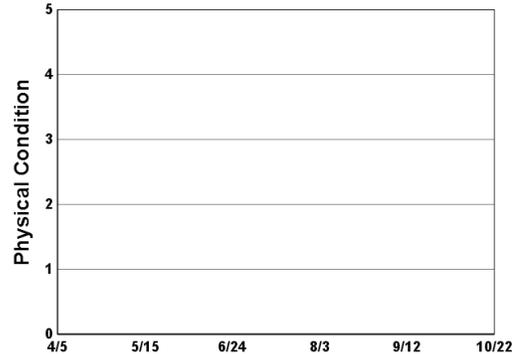
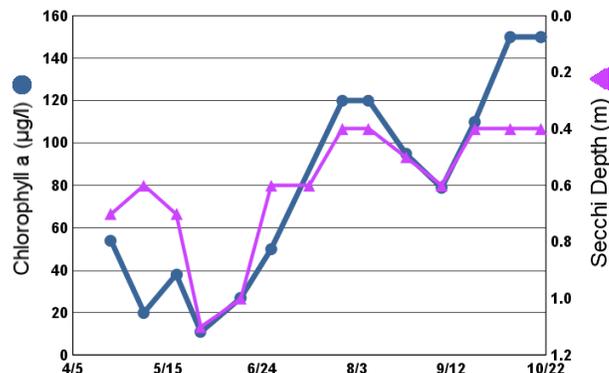
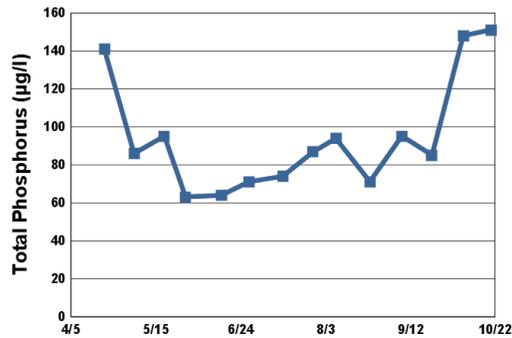
Lake ID: 190198-00

● Sampling site
Contours in meters

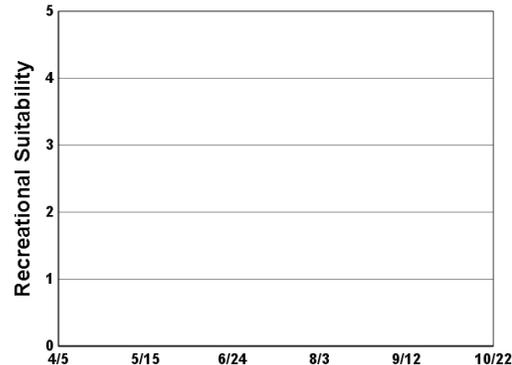


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/21/19	19.2		54	141	0.7		
05/05/19	17.6		20	86	0.6		
05/19/19	18.9		38	95	0.7		
05/29/19	19.6		11	63	1.1		
06/15/19	23.3		27	64	1.0		
06/28/19	26.7		50	71	0.6		
07/14/19	25.4			74	0.6		
07/28/19	25.6		120	87	0.4		
08/08/19	27.0		120	94	0.4		
08/24/19	20.9		95	71	0.5		
09/08/19	18.9		79	95	0.6		
09/22/19	22.8		110	85	0.4		
10/07/19	15.9		150	148	0.4		
10/20/19	12.3		150	151	0.4		



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP				D	C	D	D	F	D	C	D	D
CLA				C	C	C	D	F	D	C	F	F
Secchi				F	C	D	D	F	F	D	D	F
Lake Grade				D	C	D	D	F	D	C	D	F

Year	2016	2017	2018	2019
TP	D	D	D	D
CLA	F	F	F	D
Secchi	F	F	F	F
Lake Grade	F	F	F	D

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Second Lake (13–0025) *Comfort Lake — Forest Lake Watershed District*

Volunteer: Rod Negus

Second Lake is located in Chisago Lake Township (Chisago County). There are few morphological data available for the lake.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2012.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	25	14	31	B
CLA (µg/l)	7.6	4.4	11	A
Secchi (m)	2.6	2.3	3.0	B
TKN (mg/l)	0.67	0.56	0.75	
			Lake Grade	B

The lake received a lake grade of B this year, similar to the previous year. Continued monitoring is recommended to build the water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP												
CLA												
Secchi												
Lake Grade												

Year	2016	2017	2018	2019
TP			B	B
CLA			A	A
Secchi			C	B
Lake Grade			B	B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Seidls Lake (19-0095) Lower Mississippi River Watershed Management Organization

Volunteer: Max Wallin

Seidl Lake is a 14-acre lake located in the City of Inver Grove Heights (Dakota County). The lake receives inflow from five inlets. The maximum depth of the lake is approximately 5.0 m. Few morphological data are available. More than 80 percent of the surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. The lake is defined as a shallow lake because of the dominance of the littoral zone.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	50	40	67	C
CLA ($\mu\text{g/l}$)	13	4.8	21	B
Secchi (m)	1.5	1.1	2.3	C
TKN (mg/l)	0.65	0.60	0.79	
			Lake Grade	C

The lake received a lake grade of C this year which is consistent with its historical water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												C
CLA												C
Secchi												D
Lake Grade												C

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP				C	C	C	C	D	C	C	D	C
CLA				A	B	B	C	C	C	C	C	B
Secchi		D	D	B	B	C	D	D	C	C	D	D
Lake Grade				B	B	C	C	D	C	C	D	C

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	D	C	D	D			C	D				
CLA	B	C	C	C			C	D				
Secchi	C	D	F	F			D	D			D	
Lake Grade	C	C	D	D			C	D				

Year	2016	2017	2018	2019
TP				C
CLA				B
Secchi				C
Lake Grade				C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Shields Lake (82–0162) Comfort Lake — Forest Lake Watershed District

Monitoring agency: Washington Conservation District staff

Shields Lake is located in the city of Forest Lake (Washington County). It has a surface area of 27 acres and a maximum depth of 8.2 m.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2006.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	112	49	212	D
CLA (µg/l)	47	4.2	91	C
Secchi (m)	1.1	0.2	2.9	D
TKN (mg/l)	1.57	1.00	2.30	
			Lake Grade	D

The lake received a lake grade of D this year, which is consistent with its historical water quality database over the past decade. Continued monitoring is recommended to continue to build the water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

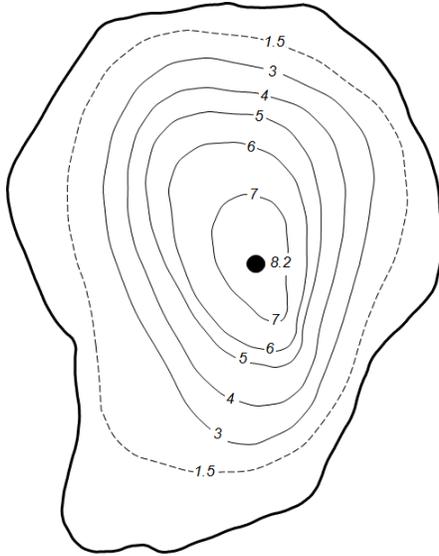
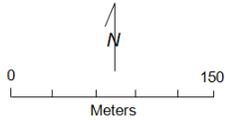
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Shields Lake
Forest Lake,
Washington Co.

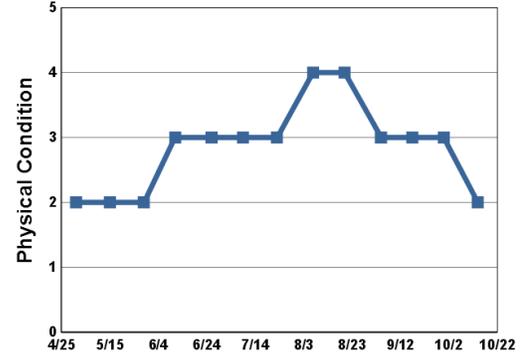
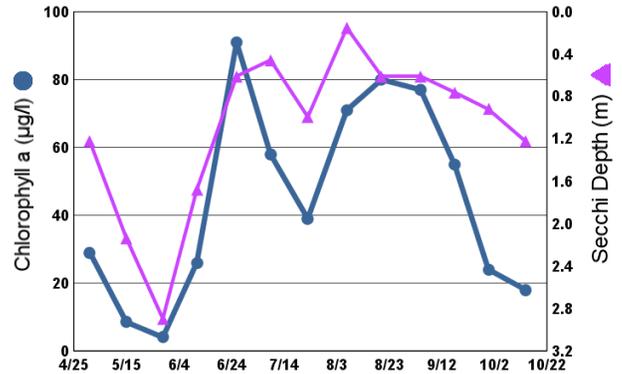
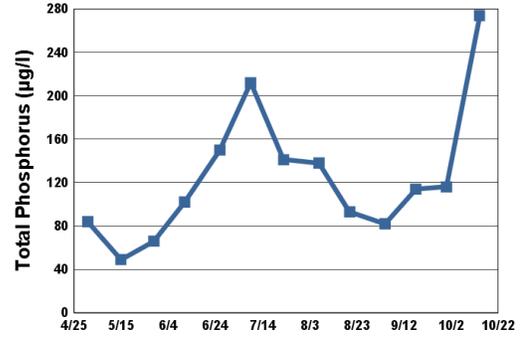
Lake ID: 820162-00

● Sampling site
Contours in meters

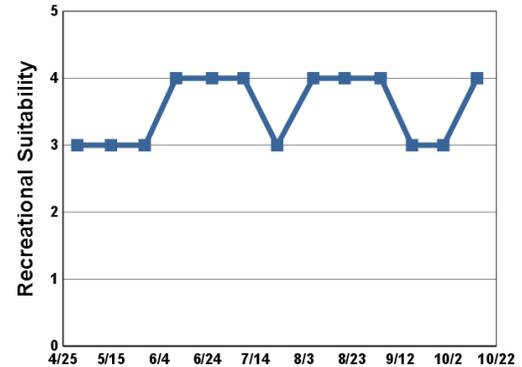


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/01/19	10.1	12.0	29	84	1.2	2	3
05/15/19	17.1	10.8	8.7	49	2.1	2	3
05/29/19	17.5	8.8	4.2	66	2.9	2	3
06/11/19	21.2	7.9	26	102	1.7	3	4
06/26/19	22.7	12.6	91	150	0.6	3	4
07/09/19	26.5	9.3	58	212	0.5	3	4
07/23/19	26.3	5.2	39	141	1.0	3	3
08/07/19	26.1	7.3	71	138	0.2	4	4
08/20/19	24.5	7.2	80	93	0.6	4	4
09/04/19	21.2	10.9	77	82	0.6	3	4
09/17/19	21.0	9.4	55	114	0.8	3	3
09/30/19	16.2	5.5	24	116	0.9	3	3
10/14/19	9.0	6.9	18	274	1.2	2	4



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP									F	D		D
CLA									D	D		C
Secchi											F	C
Lake Grade												C

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP		F	D	F	F	F	F	F	F	F	F	F
CLA		C	C	C	B	A	C	C	C	C	C	C
Secchi		C	C	B	B	B	C	C	C	C	C	C
Lake Grade		D	C	C	C	C	D	D	D	D	D	D

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	F	F	F	F					F	F	F	F
CLA	C	D	D	C					C	D	C	D
Secchi	C	D	C	C					C	D	D	D
Lake Grade	D	D	D	D					D	D	D	D

Year	2016	2017	2018	2019
TP	F	F	F	D
CLA	D	D	D	C
Secchi	D	D	D	D
Lake Grade	D	D	D	D

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

South Oak Lake (27-0661) *City of St. Louis Park*

Volunteer: Max Philbrook

South Oak is a small shallow lake located within City of St. Louis Park (Hennepin County). There are few morphological data available for the lake.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)				
CLA ($\mu\text{g/l}$)				
Secchi (m)				
TKN (mg/l)				
			Lake Grade	

There were less than 5 monitoring events during the summer-time period (May — September). At least 5 monitoring events are required during the summer-time period to determine a parameter grade. A lake grade was not given because all three parameter grades are required to issue a lake grade.

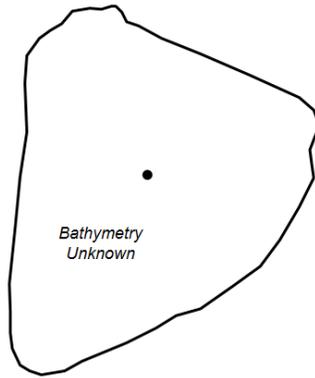
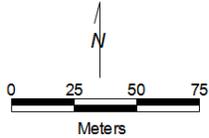
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

South Oak Lake
St. Louis Park, Hennepin Co.

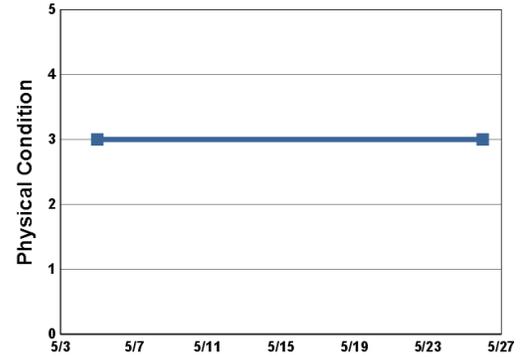
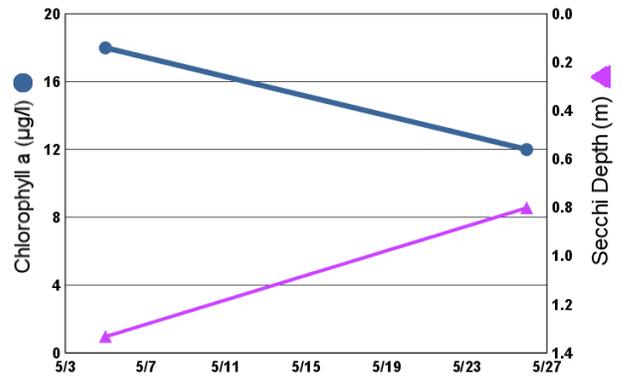
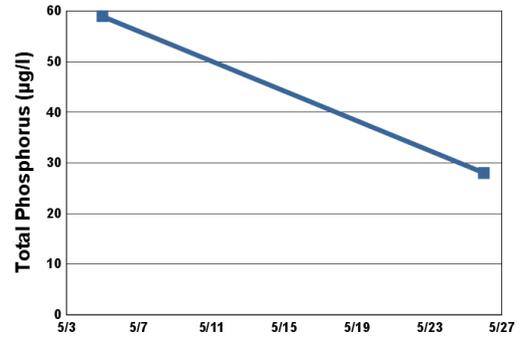
Lake ID: 270661-00

- Sampling site
- Contours in meters

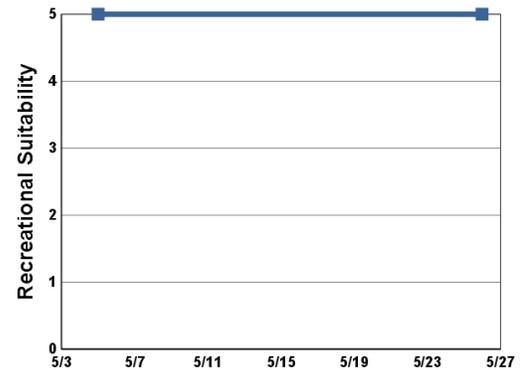


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/05/19	16.8		18	59	1.3	3	5
05/26/19	24.5		12	28	0.8	3	5



- 1 = Crystal Clear
- 2 = Some Algae Present
- 3 = Definite Algal Presence
- 4 = High Algal Color
- 5 = Severe Algal Bloom



- 1 = Beautiful
- 2 = Minor Aesthetic Problem
- 3 = Swimming Impaired
- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP											D	D
CLA											D	C
Secchi											D	F
Lake Grade											D	D

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP			D	F	F	C	C	C	D	D	C	D
CLA			C	F	F	C	B	B	C	C	C	C
Secchi			D	F	F	C		D	F	F		F
Lake Grade			D	F	F	C		C	D	D		D

Year	2016	2017	2018	2019
TP	C		D	
CLA	A		C	
Secchi				
Lake Grade				

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

South School Section Lake (82–0151) Browns Creek Watershed District

Monitoring agency: Washington Conservation District staff

South School Section Lake is located in southeastern Hugo Township in Washington County. The 125-acre lake has a maximum depth of 8.0 m (26 feet).

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2002.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCEC's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	38	22	50	C
CLA (µg/l)	26	2.7	50	C
Secchi (m)	2.0	0.7	5.5	C
TKN (mg/l)	1.11	0.78	1.40	
			Lake Grade	C

The lake received a lake grade of C this year which is a return to the more typical C grades it has received in the past.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP				C	C		C					
CLA				C	C		C					
Secchi				C	C		C					
Lake Grade				C	C		C					

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP		C	C	C	C	C	C	C	C	C	C	C
CLA		C	C	C	B	B	C	C	B	C	B	B
Secchi		B	C	C	C	B	C	C	C	C		C
Lake Grade		C	C	C	C	B	C	C	C	C		C

Year	2016	2017	2018	2019
TP	C	C	C	C
CLA	C	C	D	C
Secchi	C	D	D	C
Lake Grade	C	C	D	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Square Lake (82-0046) Carnelian — Marine — St. Croix Watershed District

Monitoring agency: Washington Conservation District staff

Square Lake is located in May Township (Washington County). The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value and its good water quality. The lake has a surface area of 193 acres, and a maximum and mean depth of 20.7 m and 9.0 m, respectively.

The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue) in 2002.

The lake is managed as a trout fishery, and it has been stocked regularly with rainbow trout by the Mn DNR (MDNR 1996). A research project was started on the lake in 2013 to study the influences of reduced trout predation on the zooplankton population, and resulting effects of potential changes of zooplankton grazing pressure upon the algal community, and the correlating effects on lake water clarity. As part of the study, a 3-year moratorium on trout stocking began in 2013; the lake was last stocked with rainbow trout prior to the study in the spring of 2012. The study continued through 2015 along with the stocking moratorium. The study was led by the Carnelian — Marine — St. Croix Watershed District in collaboration with the Mn DNR and Hamline University. The stocking moratorium continue to be in place.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	8	3	11	A
CLA (µg/l)	2.5	1.0	4.2	A
Secchi (m)	5.7	4.0	7.6	A
TKN (mg/l)	0.44	0.35	0.63	
			Lake Grade	A

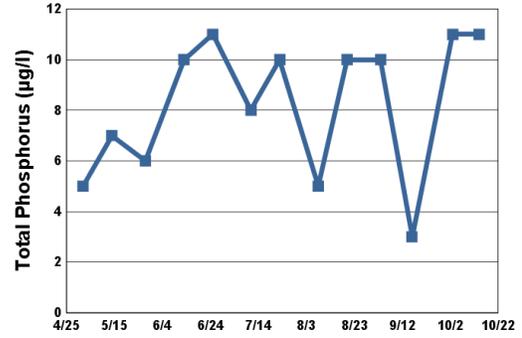
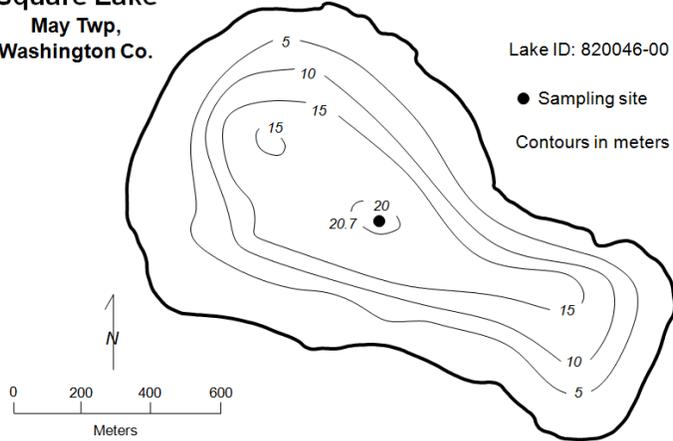
The lake continues to receive A lake grades. Continued monitoring is recommended to determine water clarity changes (or not) in response to the trout stocking moratorium. Continued lake monitoring would also provide valuable data in determining potential water quality changes if future management of the lake's fisheries changes in response to the findings of the trout moratorium study.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

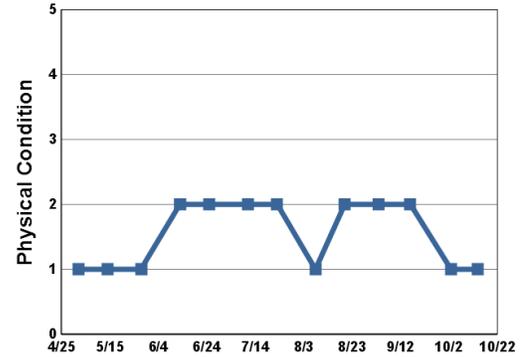
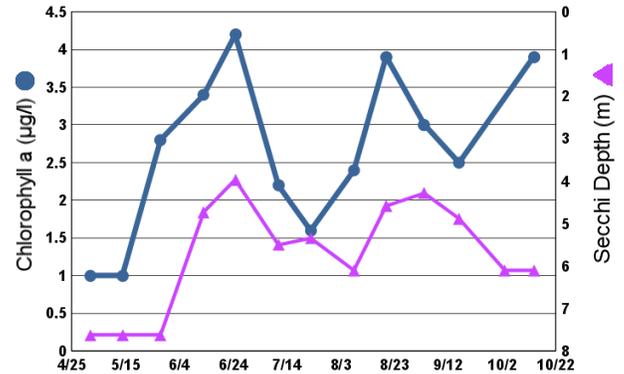
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Square Lake
May Twp,
Washington Co.

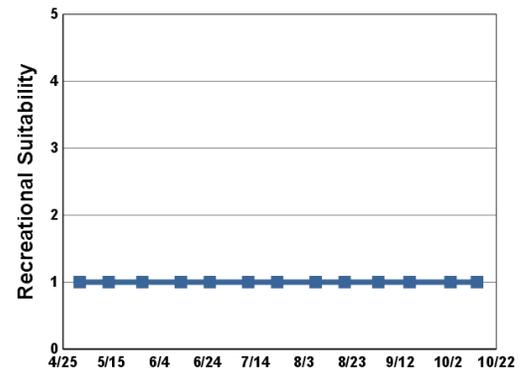


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/02/19	9.1	11.7	1.0	5	7.6	1	1
05/14/19	13.3	11.1	1.0	7	7.6	1	1
05/28/19	14.2	9.8	2.8	6	7.6	1	1
06/13/19	20.1	11.0	3.4	10	4.7	2	1
06/25/19	21.5	9.6	4.2	11	4.0	2	1
07/11/19	25.3	10.2	2.2	8	5.5	2	1
07/23/19	25.3	7.7	1.6	10	5.3	2	1
08/08/19	25.9	8.3	2.4	5	6.1	1	1
08/20/19	24.6	10.6	3.9	10	4.6	2	1
09/03/19	21.6	9.5	3.0	10	4.3	2	1
09/16/19	20.0	8.8	2.5	3	4.9	2	1
10/03/19	16.9	8.0		11	6.1	1	1
10/14/19	12.1	9.5	3.9	11	6.1	1	1



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP	B	A	A	A	A	A				A		
CLA	A	A	A	A	A	A				A		
Secchi	A	A	A	A	A	A	A	A	A	A	A	
Lake Grade	A	A	A	A	A	A				A		

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP		A	A	A	A	A	A	A	A	A	A	A
CLA		A	A	A	A	A	A	A	A	A	A	A
Secchi		A	A	A	A	A	A	A	A	A	A	A
Lake Grade		A										

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	A	A	A	A			A	A	A	A	A	A
CLA	A	A	A	A			A	A	A	A	A	A
Secchi	A	A	A	A	A	A	A	A	A	A	A	A
Lake Grade	A	A	A	A			A	A	A	A	A	A

Year	2016	2017	2018	2019
TP	A	A	A	A
CLA	A	A	A	A
Secchi	A	A	A	A
Lake Grade	A	A	A	A

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Staples Lake (82–0028) Carnelian — Marine — St. Croix Watershed District

Monitoring agency: Washington Conservation District staff

Staples Lake is located in May Township (Washington County). It has a surface area of 24 acres. It has a maximum depth of 4.3 m and a mean depth of 2.1 m. The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

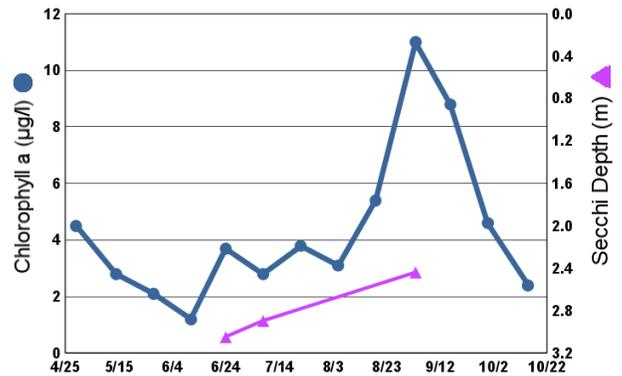
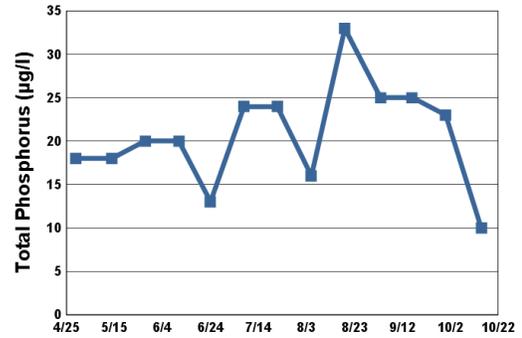
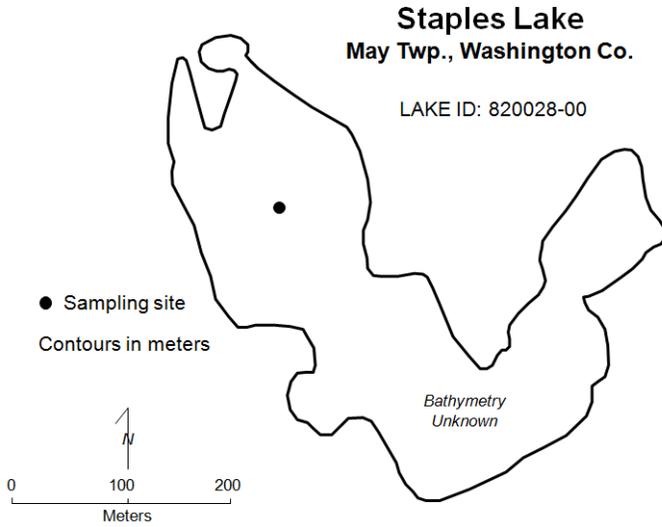
Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	22	13	33	A
CLA ($\mu\text{g/l}$)	4.5	1.2	11	A
Secchi (m)	+3.0	2.4	+3.7	A
TKN (mg/l)	0.47	0.37	0.53	
			Lake Grade	A

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.

The lake received a lake grade of A this year which is similar to the water quality received over the past five years, and better than the typical B grades received in the 1990s and early 2000s. Continued monitoring is recommended to determine if this recent improvement in water quality is part of a longer term trend.

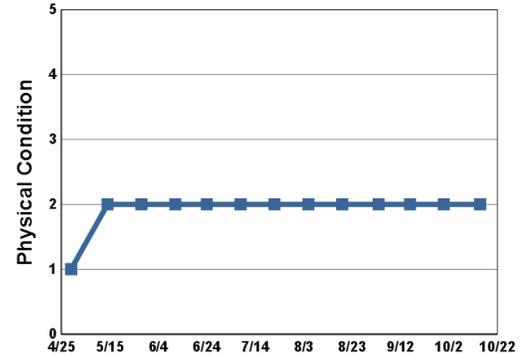
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

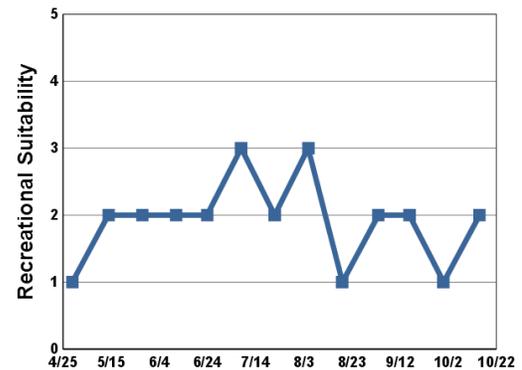


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/29/19	11.8	10.0	4.5	18	>2.6	1	1
05/14/19	15.9	9.2	2.8	18	>3.5	2	2
05/28/19	16.2	8.1	2.1	20	>3.4	2	2
06/11/19	22.1	6.7	1.2	20	+3.7	2	2
06/24/19	22.4	5.7	3.7	13	3.0	2	2
07/08/19	26.9	5.8	2.8	24	2.9	2	3
07/22/19	25.7	4.6	3.8	24	>2.9	2	2
08/05/19	27.3	5.6	3.1	16	>2.7	2	3
08/19/19	24.7	5.5	5.4	33	>2.7	2	1
09/03/19	21.7	6.7	11	25	2.4	2	2
09/16/19	19.5	7.6	8.8	25	>2.9	2	2
09/30/19	17.4	8.4	4.6	23	>2.9	2	1
10/15/19	9.9	8.7	2.4	10	>3.7	2	2



- 1 = Crystal Clear
- 2 = Some Algae Present
- 3 = Definite Algal Presence
- 4 = High Algal Color
- 5 = Severe Algal Bloom



- 1 = Beautiful
- 2 = Minor Aesthetic Problem
- 3 = Swimming Impaired
- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.
> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP						B	A	A	C	B		
CLA						C	B	B	B	B		
Secchi						B	B	B	B	B	B	C
Lake Grade						B	B	B	B	B		

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	A	C	B						B	A	A
CLA	A	A	A	A						B	A	A
Secchi	B	B	A	B	B	B						
Lake Grade	B	A	B	B								

Year	2016	2017	2018	2019
TP			A	A
CLA			A	A
Secchi			A	A
Lake Grade			A	A

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

St. Croix Lake [Bayport Pool - Site 1N] (82–0001) *St. Croix Basin Planning Team*

Volunteer: Jim and Roberta Harper

Lake St. Croix is a natural impoundment of the St. Croix River. It is located along the border with Wisconsin and borders many communities in Minnesota and Wisconsin. The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value. It has a surface area of 8,393 acres and a maximum depth of 23.7 m. The original site 1 was in the area of the construction of the new bridge spanning St. Croix Lake. Site 1N was established in 2012 as a replacement for site 1. Site 1N is just upstream of site 1.

The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue) in 1998, aquatic consumption (PCBs in fish tissue) in 2006, and aquatic recreational use (nutrient/eutrophication biological indicators) in 2008. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 1995, zebra mussels (*Dreissena polymorpha*) in 2001, bighead carp (*Hypophthalmichthys nobilis*) (2012), silver carp (*Hypophthalmichthys molitrix*) (2012), and grass carp (*Ctenopharyngodon idella*) (2015).

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	43	37	48	C
CLA (µg/l)	21	11	32	C
Secchi (m)	1.5	1.2	1.8	C
TKN (mg/l)	0.71	0.62	0.87	
			Lake Grade	C

This lake site received a lake grade of C this year, which is consistent with its historical water quality database. Continued monitoring is recommended to continue to build the water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP									C	C	C	C
CLA									C	B	C	B
Secchi									D	C	D	
Lake Grade									C	C	C	

Year	2016	2017	2018	2019
TP			C	C
CLA			C	C
Secchi			D	C
Lake Grade			C	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

St. Croix Lake [Bayport Pool-Site 2] (82–0001) *St. Croix Basin Planning Team*

Volunteer: Jim and Roberta Harper

Lake St. Croix is a natural impoundment of the St. Croix River. It is located along the border with Wisconsin and borders many communities in Minnesota and Wisconsin. The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value. It has a surface area of 8,393 acres and a maximum depth of 23.7 m.

The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue) in 1998, aquatic consumption (PCBs in fish tissue) in 2006, and aquatic recreational use (nutrient/eutrophication biological indicators) in 2008. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 1995, zebra mussels (*Dreissena polymorpha*) in 2001, bighead carp (*Hypophthalmichthys nobilis*) (2012), silver carp (*Hypophthalmichthys molitrix*) (2012), and grass carp (*Ctenopharyngodon idella*) (2015).

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	45	36	53	C
CLA (µg/l)	19	13	29	B
Secchi (m)	1.3	1.0	1.5	C
TKN (mg/l)	0.76	0.61	1.10	
			Lake Grade	C

Site 2 received a lake grade of C this year, which is similar to lake grades received in the past. Continued monitoring is recommended to continue to build the water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP											D	
CLA											C	
Secchi											D	
Lake Grade											D	

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP		C	C	C	C	C	C	C	C	C	C	C
CLA		C	C	C	B	C	B	B	C	B	C	B
Secchi		C	C	C	C	C	D	D	D	D	D	D
Lake Grade		C										

Year	2016	2017	2018	2019
TP			C	C
CLA			C	B
Secchi			C	C
Lake Grade			C	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

St. Croix Lake [Troy Beach Pool-Site 3] (82–0001) St. Croix Basin Planning Team

Volunteer: Collin Mueller, St. Croix Sailing School

Lake St. Croix is a natural impoundment of the St. Croix River. It is located along the border with Wisconsin and borders many communities in Minnesota and Wisconsin. The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value. It has a surface area of 8,393 acres and a maximum depth of 23.7 m.

The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue) in 1998, aquatic consumption (PCBs in fish tissue) in 2006, and aquatic recreational use (nutrient/eutrophication biological indicators) in 2008. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 1995, zebra mussels (*Dreissena polymorpha*) in 2001, bighead carp (*Hypophthalmichthys nobilis*) (2012), silver carp (*Hypophthalmichthys molitrix*) (2012), and grass carp (*Ctenopharyngodon idella*) (2015).

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)				
CLA (µg/l)				
Secchi (m)				
TKN (mg/l)				
			Lake Grade	

The lake site was monitored only one time this year which is insufficient to calculate parameter and lake grades.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP											D	
CLA											C	
Secchi											D	
Lake Grade											D	

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP		C	C	C	C	B	C	C	C	C	C	
CLA		B	B	C	B	C	B	B	B	B	B	
Secchi		C	C	C	C	C	C	C	C	C	C	
Lake Grade		C										

Year	2016	2017	2018	2019
TP			C	
CLA			B	
Secchi			D	
Lake Grade			C	

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

St. Croix Lake [Troy Beach Pool-Site 4] (82–0001) St. Croix Basin Planning Team

Volunteer: Collin Mueller, St. Croix Sailing School

Lake St. Croix is a natural impoundment of the St. Croix River. It is located along the border with Wisconsin and borders many communities in Minnesota and Wisconsin. The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value. It has a surface area of 8,393 acres and a maximum depth of 23.7 m.

The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue) in 1998, aquatic consumption (PCBs in fish tissue) in 2006, and aquatic recreational use (nutrient/eutrophication biological indicators) in 2008. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 1995, zebra mussels (*Dreissena polymorpha*) in 2001, bighead carp (*Hypophthalmichthys nobilis*) (2012), silver carp (*Hypophthalmichthys molitrix*) (2012), and grass carp (*Ctenopharyngodon idella*) (2015).

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)				
CLA (µg/l)				
Secchi (m)				
TKN (mg/l)				
			Lake Grade	

The lake site was monitored only twice this year which is insufficient to calculate parameter and lake grades.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP											D	
CLA											C	
Secchi											D	
Lake Grade											D	

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP		C	C	C	C	B	C	C	C	C		C
CLA		B	B	C	B	C	B	B	B	C		B
Secchi		C	C	C	C	C	C	C	C	C		C
Lake Grade		C		C								

Year	2016	2017	2018	2019
TP			C	
CLA			C	
Secchi			D	
Lake Grade			C	

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

St. Croix Lake [Troy Beach Pool-Site 5] (82–0001) St. Croix Basin Planning Team

Volunteer: Jon Morris

Lake St. Croix is a natural impoundment of the St. Croix River. It is located along the border with Wisconsin and borders many communities in Minnesota and Wisconsin. The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value. It has a surface area of 8,393 acres and a maximum depth of 23.7 m.

The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue) in 1998, aquatic consumption (PCBs in fish tissue) in 2006, and aquatic recreational use (nutrient/eutrophication biological indicators) in 2008. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 1995, zebra mussels (*Dreissena polymorpha*) in 2001, bighead carp (*Hypophthalmichthys nobilis*) (2012), silver carp (*Hypophthalmichthys molitrix*) (2012), and grass carp (*Ctenopharyngodon idella*) (2015).

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	30	23	48	B
CLA (µg/l)	15	7.2	25	B
Secchi (m)	1.5	1.2	1.8	C
TKN (mg/l)	0.69	0.54	0.94	
			Lake Grade	B

This lake site received a lake grade of B this year which is the best lake grade it has received according to its historical water quality database. Continued monitoring is recommended to determine if this recent improvement in water quality is part of a longer term trend.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP											C	
CLA											C	
Secchi											C	
Lake Grade											C	

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP		C	C	C	C	B	C	C	C	C		C
CLA		C	B	C	B	C	B	B	B	B		B
Secchi		C	C	C	C	C	C	C	C	C		C
Lake Grade		C	C	C	C	C	C	C	C	C		C

Year	2016	2017	2018	2019
TP			C	B
CLA			B	B
Secchi			C	C
Lake Grade			C	B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

St. Croix Lake [Black Bass Pool-Site 6] (82–0001) *St. Croix Basin Planning Team*

Volunteer: Rick Meierotto

Lake St. Croix is a natural impoundment of the St. Croix River. It is located along the border with Wisconsin and borders many communities in Minnesota and Wisconsin. The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value. It has a surface area of 8,393 acres and a maximum depth of 23.7 m.

The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue) in 1998, aquatic consumption (PCBs in fish tissue) in 2006, and aquatic recreational use (nutrient/eutrophication biological indicators) in 2008. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 1995, zebra mussels (*Dreissena polymorpha*) in 2001, bighead carp (*Hypophthalmichthys nobilis*) (2012), silver carp (*Hypophthalmichthys molitrix*) (2012), and grass carp (*Ctenopharyngodon idella*) (2015).

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	34	22	52	C
CLA (µg/l)	16	5.2	36	B
Secchi (m)	1.8	1.4	2.9	C
TKN (mg/l)	0.73	0.53	1.10	
			Lake Grade	C

The site received a lake grade of C this year, which is consistent with its historical water quality database. Continued monitoring is recommended to continue to build the water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP											C	
CLA											C	
Secchi											C	
Lake Grade											C	

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP		C	C	C	C	A	C	C	C	C	C	C
CLA		B	B	C	B	B	B	B	B	B	B	B
Secchi		C	C	C	C	C	C	C	C	C	C	C
Lake Grade		C	C	C	C	B	C	C	C	C	C	C

Year	2016	2017	2018	2019
TP			C	C
CLA			B	B
Secchi			C	C
Lake Grade			C	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

St. Croix Lake [Kinnickinnic Pool-Site-7] (82-0001) St. Croix Basin Planning Team

Volunteer: Carpenter Nature Center (volunteer coordinator: Mayme Johnson)

Lake St. Croix is a natural impoundment of the St. Croix River. It is located along the border with Wisconsin and borders many communities in Minnesota and Wisconsin. The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreational value. It has a surface area of 8,393 acres and a maximum depth of 23.7 m.

The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue) in 1998, aquatic consumption (PCBs in fish tissue) in 2006, and aquatic recreational use (nutrient/eutrophication biological indicators) in 2008. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 1995, zebra mussels (*Dreissena polymorpha*) in 2001, bighead carp (*Hypophthalmichthys nobilis*) (2012), silver carp (*Hypophthalmichthys molitrix*) (2012), and grass carp (*Ctenopharyngodon idella*) (2015).

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	25	16	40	B
CLA (µg/l)	19	6.9	33	B
Secchi (m)	1.7	1.4	2.1	C
TKN (mg/l)	0.66	0.45	0.96	
			Lake Grade	B

This lake site received a lake grade of B this year which is similar water quality observed in the late 2000s. Continued monitoring is recommended to continue to build the water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP		B	B	B	C	A	C		C	C	C	C
CLA		B	B	B	B	B	B	A	B	C	C	B
Secchi		C	C	C	C	C	C	C	C	C	C	C
Lake Grade		B	B	B	C	B	C		C	C	C	C

Year	2016	2017	2018	2019
TP			C	B
CLA			B	B
Secchi			C	C
Lake Grade			C	B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

St. Joe Lake (10–0011) City of Chanhassen

Volunteer: Sue Morgan, Linda Scott

St. Joe Lake is a 14-acre lake located within the City of Chanhassen (Carver County). It has a maximum depth of 15.9 m (52 ft).

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	16	12	22	A
CLA (µg/l))	4.6	3.2	6.4	A
Secchi (m)	2.4	1.3	3.5	B
TKN (mg/l)	0.72	0.68	0.76	
			Lake Grade	A

The lake received a lake grade of A this year, which is consistent with its historical water quality database. The lake has varied in the A to B lake grade range over the past decade. Continued monitoring is recommended to continue to build the water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi			C		B							
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	A	A	C	A	A	C	A	A	A		A	A
CLA	A	A	A	A	A	A	A	A	A		A	A
Secchi	B	A	B	A	B	A	B	B	B		B	B
Lake Grade	A	A	B	A	A	B	A	A	A		A	A

Year	2016	2017	2018	2019
TP	B	A	A	A
CLA	A	A	A	A
Secchi	B	B	C	B
Lake Grade	B	A	B	A

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Sunfish Lake (19–0050) *City of Sunfish Lake*

Volunteer: James Stowell

Sunfish Lake is located in the City of Sunfish Lake (Dakota County). The lake has a surface area of 49 acres and a maximum depth of 9.8 m (32 ft).

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2010.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	15	3	30	A
CLA (µg/l)	2.6	1.0	4.7	A
Secchi (m)	4.3	3.0	5.3	A
TKN (mg/l)	0.41	0.30	0.44	
			Lake Grade	A

The lake received a lake grade of A this year. The rapid improvement in water quality is attributed to the alum treatments that the lake received in 2017. Continued monitoring is recommended to monitor the lake's response to the alum treatments.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi					C	C	C					C
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP			C	C	C	B	C	B	C	B	B	C
CLA			C	C	C	B	C	B	B	C	C	C
Secchi			D	C	C	B	B	A	B	C	C	B
Lake Grade			C	C	C	B	C	B	B	C	C	C

Year	2016	2017	2018	2019
TP	C	A	A	A
CLA	C	A	A	A
Secchi	C	A	B	A
Lake Grade	C	A	A	A

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Sunfish Lake [Lake Elmo] (82–0107) Valley Branch Watershed District

Monitoring agency: Washington Conservation District staff

Sunfish Lake is a 50-acre lake located in the city of Lake Elmo (Washington County). The lake has a maximum depth of approximately 3.4 m (11 ft). The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column. The lake has a 526-acre immediate drainage area, which results in a watershed-to-lake area ratio of approximately 11:1. The greater the ratio, the greater the potential stress on the lake from surface runoff.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2008. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 2019.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

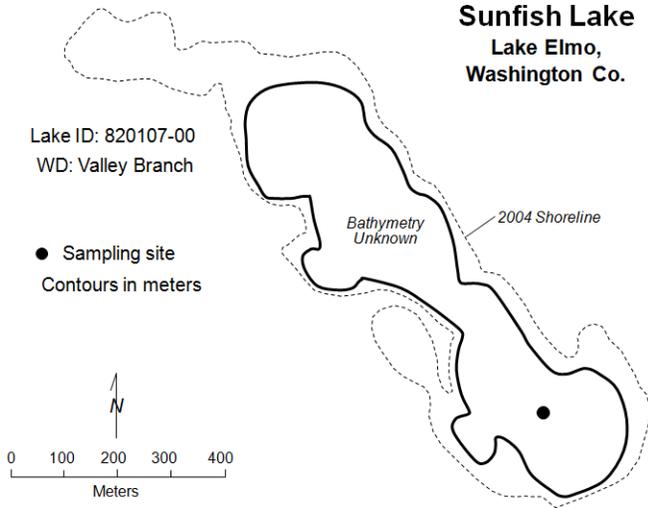
2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	46	23	105	C
CLA (µg/l)	9.3	3.6	18	A
Secchi (m)	2.1	1.2	2.9	C
TKN (mg/l)	0.91	0.72	1.20	
			Lake Grade	B

The lake received a lake grade of B this year which is the best lake grade received to date. The lake typically has received lake grades varying from C's to D's since 2000. Continued monitoring is recommended to determine if this recent improvement in water quality is part of a longer term trend.

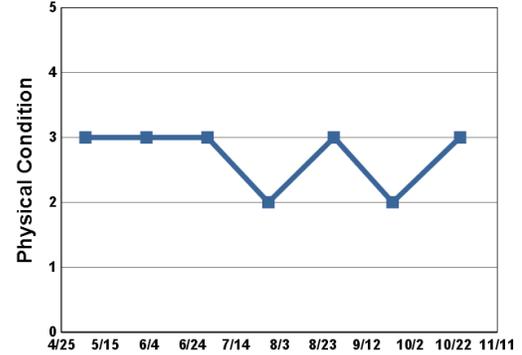
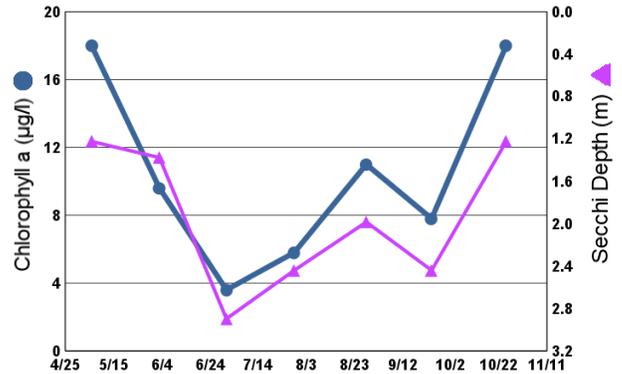
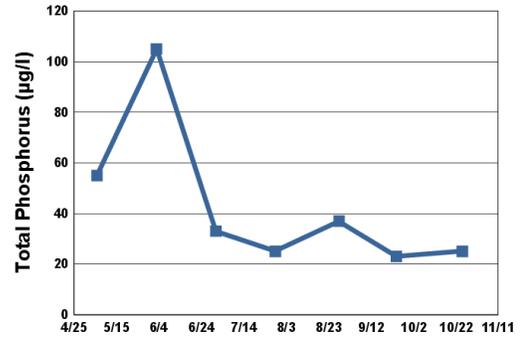
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

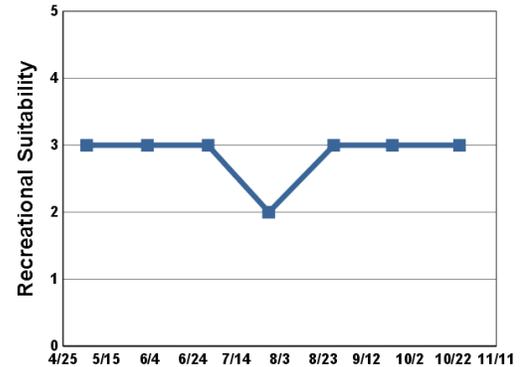


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/06/19	15.5	10.1	18	55	1.2	3	3
06/03/19	21.1	9.2	9.6	105	1.4	3	3
07/01/19	25.0	7.8	3.6	33	2.9	3	3
07/29/19	26.2	5.5	5.8	25	2.4	2	2
08/28/19	21.4	4.4	11	37	2.0	3	3
09/24/19	22.2	8.0	7.8	23	2.4	2	3
10/25/19	9.3	10.9	18	25	1.2	3	3



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP									C			
CLA									C			
Secchi									D			
Lake Grade									C			

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP		C	C		D			C	C	C	C	C
CLA		C	C		C			C	C	D	C	C
Secchi		F	F		F			C	D	F	D	D
Lake Grade		D	D		D			C	C	D	C	C

Year	2016	2017	2018	2019
TP	C	B	C	C
CLA	C	B	C	A
Secchi	D	D	D	C
Lake Grade	C	C	C	B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Sunnybrook Lake (82-0133) Valley Branch Watershed District

Monitoring agency: Washington Conservation District staff

Sunnybrook Lake is a 16-acre lake located within Grant Township (Washington County). The maximum and mean depths of the lake are 6.1 and 2.0 m (20.0 and 6.5 feet), respectively. More than 80 percent of the surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	29	23	34	B
CLA ($\mu\text{g/l}$)	9.2	5.5	13	A
Secchi (m)	>2.2	1.7	2.7	C
TKN (mg/l)	0.74	0.61	0.81	
			Lake Grade	B

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

The lake grades have varied between A and B since 2001. Continued monitoring is suggested to help determine the trend direction, if any, of the varying water quality of this lake.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

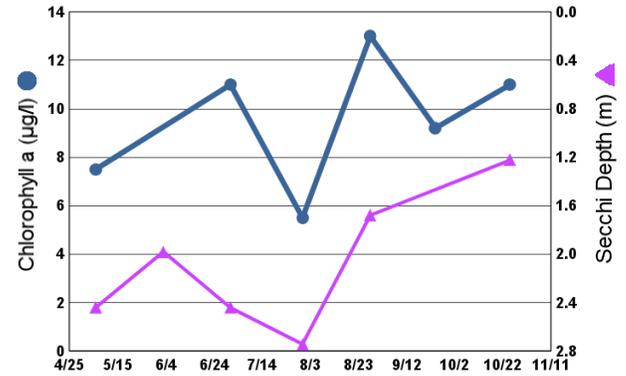
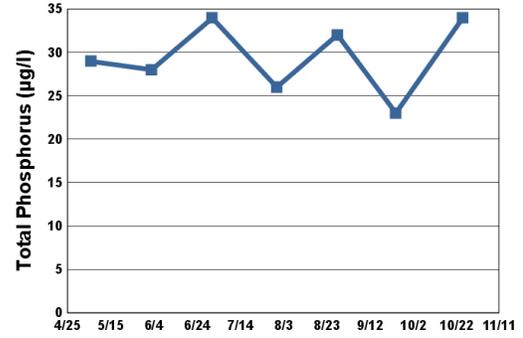
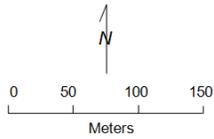
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Sunnybrook Lake
Grant, Washington Co.

Lake ID: 820133-00

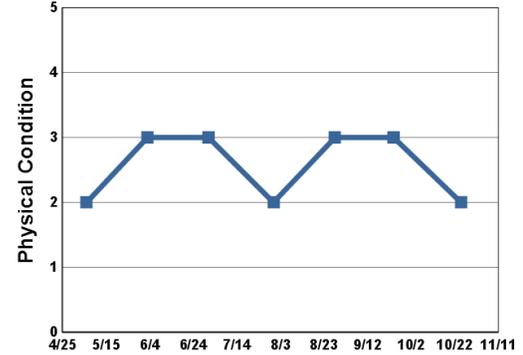
Bathymetry
Unknown

● Sampling site
Contours in meters



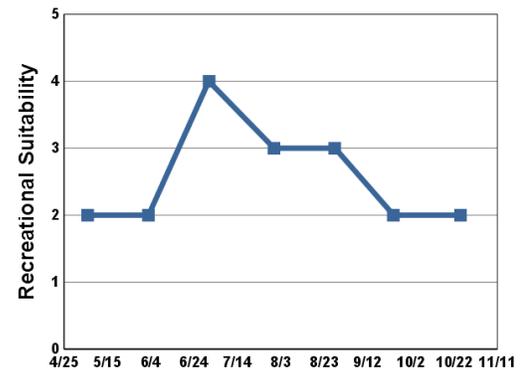
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/06/19	14.2	9.1	7.5	29	2.4	2	2
06/03/19	20.5	8.4		28	2.0	3	2
07/01/19	24.7	8.4	11	34	2.4	3	4
07/31/19	24.9	6.4	5.5	26	2.7	2	3
08/28/19	20.5	6.2	13	32	1.7	3	3
09/24/19	21.6	8.3	9.2	23	>1.8	3	2
10/25/19	8.2	7.5	11	34	1.2	2	2



> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

- 1 = Crystal Clear
- 2 = Some Algae Present
- 3 = Definite Algal Presence
- 4 = High Algal Color
- 5 = Severe Algal Bloom



- 1 = Beautiful
- 2 = Minor Aesthetic Problem
- 3 = Swimming Impaired
- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP								C		B	B	C
CLA								B		A	A	A
Secchi								C		B	B	C
Lake Grade								C		B	B	B

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	B	C	B	B	A	A	A	C	A			
CLA	A	B	A	A	A	A	A	A	A		A	A
Secchi	B	B	B	B	B	B	B	B	B		B	B
Lake Grade	B	B	B	B	A	A	A	B	A			

Year	2016	2017	2018	2019
TP	A	A	A	B
CLA	A	A	A	A
Secchi	A	B	A	C
Lake Grade	A	A	A	B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQUIS database(s)

Sunset Lake (82-0153) Rice Creek Watershed District

Volunteer: Diane Coderre

Sunset Lake is located in the southern portion of the City of Hugo (Washington County). It has a surface area of 124 acres and a maximum depth of 5.2 m (17 ft). More than 80 percent of the surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 2001.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	18	10	22	A
CLA (µg/l)	3.4	1.6	7.3	A
Secchi (m)	>3.2	2.5	3.9	A
TKN (mg/l)	0.48	0.30	0.63	
			Lake Grade	A

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

The lake received a lake grade of A this year. According to the historical water quality database, the water quality of the lake has improved over the past +30 years, as demonstrated by the shift from mostly C lake grades received in the period 1984 - 1999 to A lake grades. Water clarity has improved over this same time period as well. Secchi grades in the 1980s were in the C to D range but in recent years they have been in the A's.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

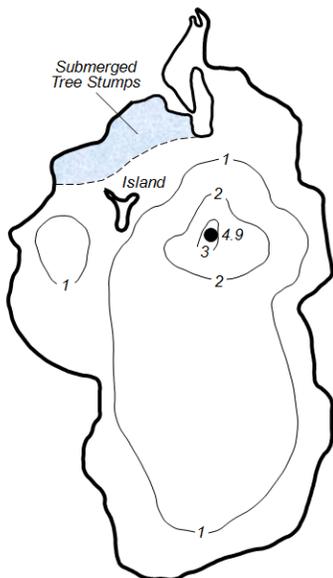
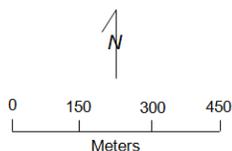
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Sunset Lake
Hugo, Washington Co.

Lake ID: 820153-00

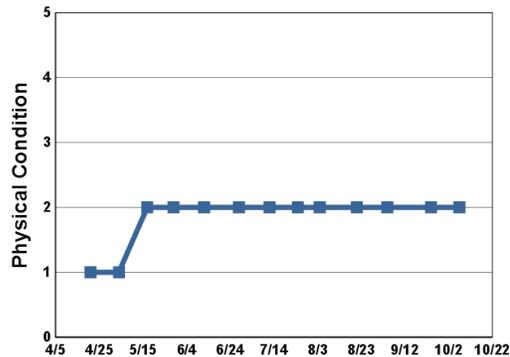
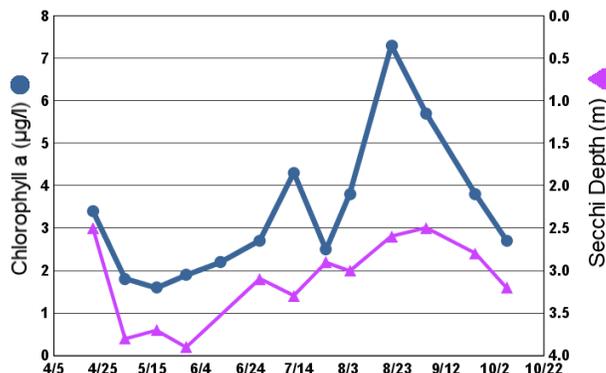
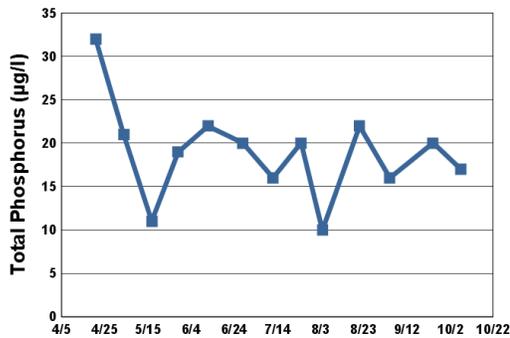
● Sampling site
Contours in meters



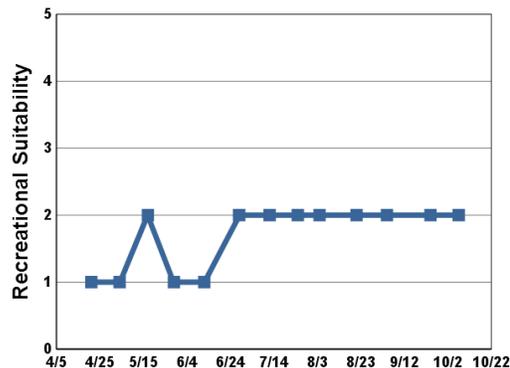
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/21/19	13.7		3.4	32	2.5	1	1
05/04/19	13.8		1.8	21	3.8	1	1
05/17/19	18.9		1.6	11	3.7	2	2
05/29/19	19.3		1.9	19	3.9	2	1
06/12/19	21.8		2.2	22	>3.2	2	1
06/28/19	26.9		2.7	20	3.1	2	2
07/12/19	27.8		4.3	16	3.3	2	2
07/25/19	26.6		2.5	20	2.9	2	2
08/04/19	29.9		3.8	10	3.0	2	2
08/21/19	25.1		7.3	22	2.6	2	2
09/04/19	22.7		5.7	16	2.5	2	2
09/24/19	22.5		3.8	20	2.8	2	2
10/07/19	14.1		2.7	17	3.2	2	2

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP					D							
CLA					C							
Secchi					C	D	C	D	D	C	C	
Lake Grade					C							

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP		C	B	C	C	C	C	C	B	A	A	A
CLA		B	B	B	C	C	B	B	A	A	A	A
Secchi		C	B	C	B	C	C	C	B	A	A	A
Lake Grade		C	B	C	C	C	C	C	B	A	A	A

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	A	A	A	A	A	A	A	B	B	A	A	A
CLA	A	A	A	A	A	A	A	A	A	A	A	A
Secchi	A	A	A	B	A	B		B	A	B	A	A
Lake Grade	A	A	A	A	A	A		B	A	A	A	A

Year	2016	2017	2018	2019
TP	A	A	A	A
CLA	A	A	A	A
Secchi	A	A	A	A
Lake Grade	A	A	A	A

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Sunset Pond (19–0451) City of Burnsville

Volunteer: Steve Behnke

Sunset Pond, a 60-acre man-made lake, is located in the City of Burnsville (Dakota County). The pond has a normal maximum depth of 3.7m (12 ft). The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column. The pond collects drainage from a portion of the cities of Burnsville's and Savage's storm water conveyance systems, including outflow from Crystal and Earley lakes. Because the lake was created to detain storm water, the pond can experience extreme bounce in its water level during runoff conditions.

The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 2007.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	54	33	75	C
CLA (µg/l)	6.2	1.4	12	A
Secchi (m)	>1.1	>0.2	>2.0	
TKN (mg/l)	0.68	0.48	0.93	
			Lake Grade	

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

There was an insufficient quantity of valid Secchi transparency measurements to determine a Secchi grade. An invalid measurement occurred if the Secchi disk was either visible on the lake bottom or the disk's visibility was blocked by aquatic vegetation. In both of these situations the water clarity would have been greater than that indicated by the measurement. A lake grade was not given because all three parameter grades are required to issue a lake grade. The relatively low CLA concentrations in combination with the observations of moderate to substantial macrophyte growth, indicate that the primary production of the lake is focused on production of aquatic macrophytes rather than algae. The received a TP and CLA grades of C and A, respectively, this year which is consistent with its historical water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

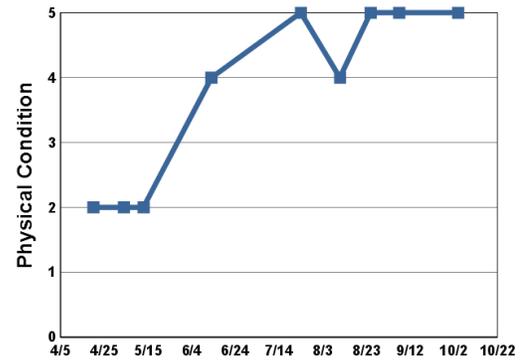
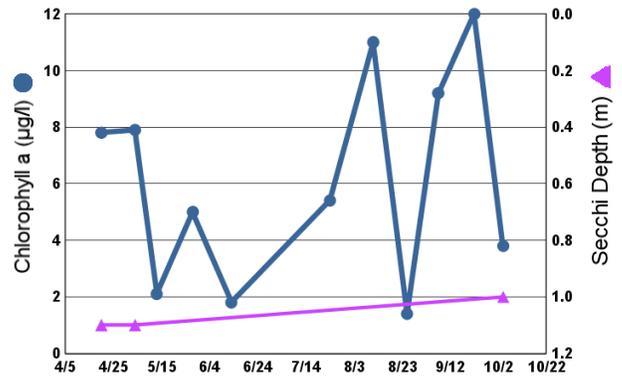
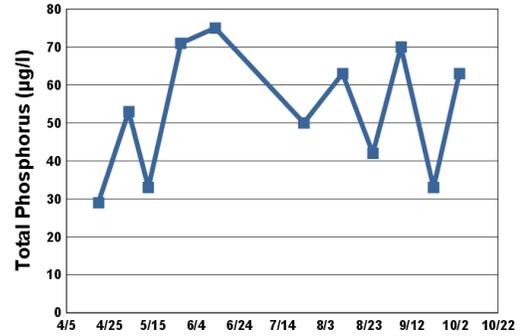
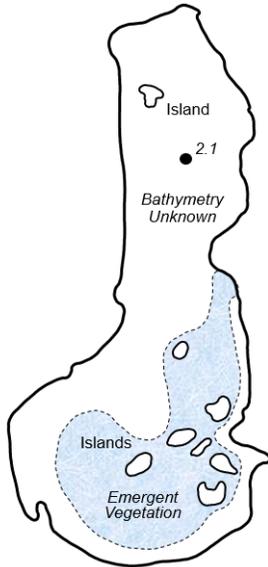
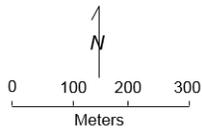
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

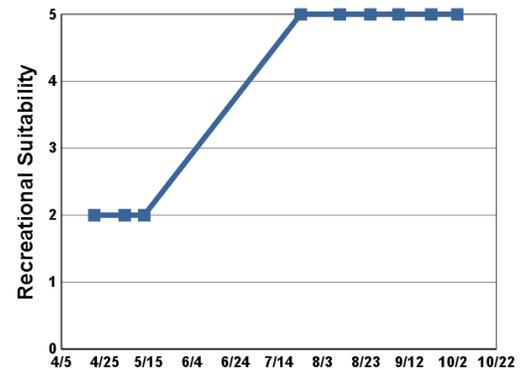
Sunset Pond
Burnsville, Dakota Co.

Lake ID: 190451-00
WMO: Black Dog Lake

● Sampling site
Contours in meters



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/20/19	14.3		7.8	29	1.1	2	2
05/04/19	16.8		7.9	53	1.1	2	2
05/13/19	18.7		2.1	33	>2.0	2	2
05/28/19	15.6		5.0	71	>1.4		
06/13/19	19.7		1.8	75	>1.4	4	
07/24/19	26.1		5.4	50	>0.5	5	5
08/11/19	25.1		11	63	>0.2	4	5
08/25/19	23.7		1.4	42	>1.0	5	5
09/07/19	22.3		9.2	70	>1.0	5	5
09/22/19	21.7		12	33	>1.1		5
10/04/19	20.0		3.8	63	1.0	5	5

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP			C	C	C	C	C		C	C	C	D
CLA			A	B	B	B	A		A	A	A	B
Secchi			C	C	C	C	C		C	B	B	C
Lake Grade			B	C	C	C	B		B	B	B	C

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	D		D	C	C	C	C	C	C	C	C	C
CLA	A		B	A	A	A	A	A	A	A	A	B
Secchi	B		C	C	C	C	C	C	C	C	B	
Lake Grade	B		C	B								

Year	2016	2017	2018	2019
TP	C	C	C	C
CLA	B	A	B	A
Secchi		B		
Lake Grade		B		

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Susan Lake (10–0013) *City of Chanhassen*

Volunteer: City of Chanhassen staff

Susan Lake, located in the City of Chanhassen (Carver County), covers an area of 93 acres and has a maximum depth of 5.2 m (17 feet). More than 80 percent of the surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation.

The MPCA listed the lake as impaired with respect to aquatic consumption (mercury in fish tissue) in 1998 aquatic recreational use (nutrient/eutrophication biological indicators) in 2010. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 2007.

Susan Lake has been involved in a study on the common carp (*Cyprinus carpio*), which is an invasive, nonnative fish species, originally from central Asia. The study is being lead by Dr. Peter Sorensen of the the University of Minnesota. The purpose of the study is to develop an integrated management plan for the Riley chain-of-lakes (including Susan Lake) so as to improve the water quality of the lake chain. The activity and feeding behavior of the common carp can wreak havoc on the water quality and ecology of lakes by causing a litany of problems including reduced water clarity, decreased abundance of rooted aquatic vegetation, increase in algal populations, resuspension of sediment, increased internal loading of phosphorus, and negative changes in native fish populations. The long-term goal of the study is to develop a carp management strategy that can be applied to other lakes beyond the study lakes. For more information on this project, please refer to Dr. Sorensen's website at: <http://sorensenlab.cfans.umn.edu/home/research/>

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

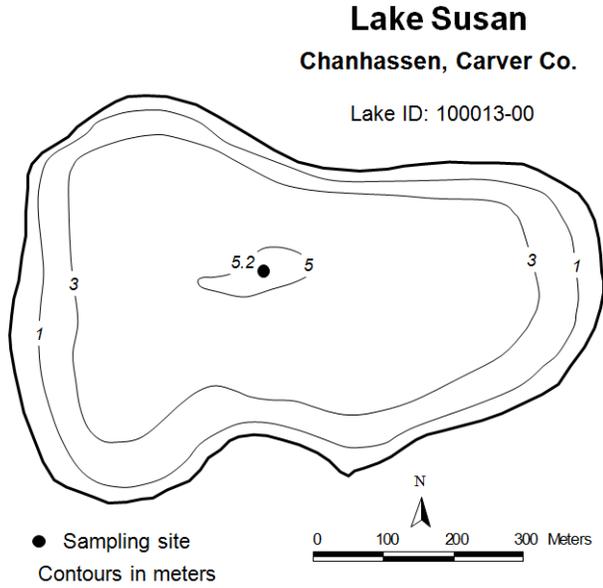
Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	43	28	66	C
CLA (µg/l))	24	4.5	59	C
Secchi (m)	2.0	0.6	3.7	C
TKN (mg/l)	1.06	0.81	1.30	
			Lake Grade	C

The lake received a lake grade of C this year which is consistent with its historical water quality database. The lake has been receiving grades in the C to D range with C grades more prevalent. Continued monitoring is recommended to continue to build the water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

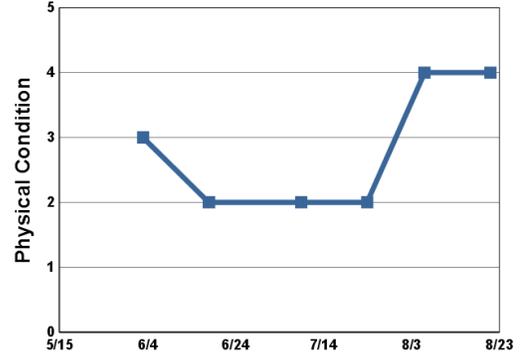
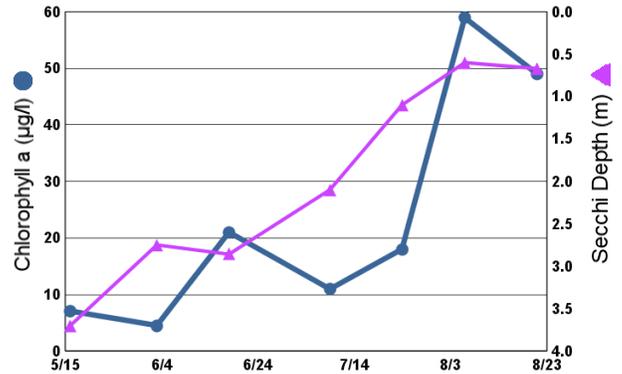
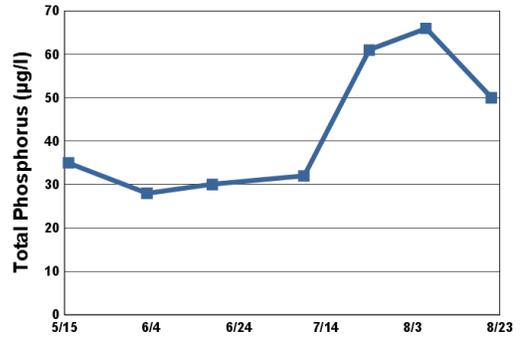
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

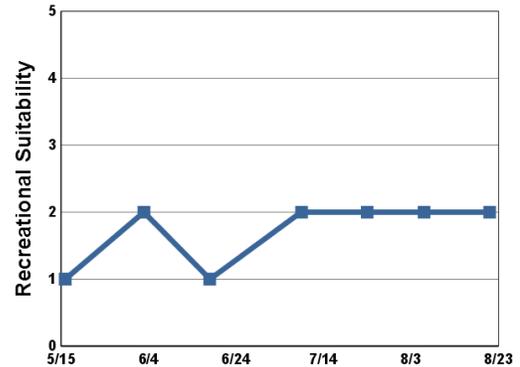


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/16/19	19.8		7.1	35	3.7		1
06/03/19	20.6		4.5	28	2.8	3	2
06/18/19	22.5		21	30	2.8	2	1
07/09/19	26.4		11	32	2.1	2	2
07/24/19	26.3		18	61	1.1	2	2
08/06/19	27.6		59	66	0.6	4	2
08/21/19	24.1		49	50	0.7	4	2



- 1 = Crystal Clear
- 2 = Some Algae Present
- 3 = Definite Algal Presence
- 4 = High Algal Color
- 5 = Severe Algal Bloom



- 1 = Beautiful
- 2 = Minor Aesthetic Problem
- 3 = Swimming Impaired
- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP			D	C	F	D	C	C	D	C	C	
CLA			C	C	D	C	C	C	C	C	C	
Secchi			C	C	D	C	C	C	D	C	C	
Lake Grade			C	C	D	C	C	C	D	C	C	

Year	2016	2017	2018	2019
TP	C	D		C
CLA	D	D		C
Secchi	C	D		C
Lake Grade	C	D		C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Sweeney Lake [Site-1, South Site] (27-0035–01) Bassett Creek Watershed Management Commission

Volunteer: Shanna Hanson

Sweeney Lake is located in the City of Golden Valley (Hennepin County). The lake has a surface area of 66 acres and mean and maximum depths of 3.6 m (12 ft) and 8.0 m (26 ft), respectively. The lake's surface area and a watershed area of 2,400 acres give a large watershed-to-lake area ratio of 36:1. The greater the ratio, the greater the potential stress on the lake from surface runoff. The Sweeney Lake branch of Bassett Creek flows into the lake on the south end and discharges at the north end over a dam. Sweeney Lake is connected to Twin Lake during periods of high water levels by a channel. The surface elevations of the two lakes are about the same.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2004 and aquatic life (chloride) in 2014.

The lake has a hypolimnetic aeration system which generally operates year round. The aeration system keeps the lake mixed, so it does not develop a thermocline when the system is operational. A thermocline is a density gradient caused by changing water temperatures throughout the water column. The aeration system was turned off during the monitoring seasons of 2007 and 2008 as part of a total maximum daily load (TMDL) study. The TMDL study was initiated in response to the lake being listed as impaired for aquatic recreational use.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	30	20	42	B
CLA (µg/l)	8.5	2.8	24	A
Secchi (m)	2.0	1.2	3.0	C
TKN (mg/l)	0.61	0.53	0.72	
			Lake Grade	B

This lake site received a lake grade of B this year which is the first B received according to its historical water quality database, indicating an improvement in water quality. Continued monitoring is recommended to determine if this recent improvement in water quality is part of a longer term trend.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP									C	C	C	C
CLA									C	B	B	B
Secchi									D	C	C	C
Lake Grade									C	C	C	C

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	C	D	C	C	C	C	C	C	C	C	C
CLA	B	C	C	B	B	C	B	B	B	B	C	C
Secchi	C	C	D	D	C	C	C	C	D	D	C	C
Lake Grade	C	C	D	C	C	C	C	C	C	C	C	C

Year	2016	2017	2018	2019
TP	C	C		B
CLA	C	B		A
Secchi	C	C		C
Lake Grade	C	C		B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Sweeney Lake [Site-2, North Site] (27-0035–01) Bassett Creek Watershed Management Commission

Volunteer: Amy Baudler

Sweeney Lake is located in the City of Golden Valley (Hennepin County). The lake has a surface area of 66 acres and mean and maximum depths of 3.6 m (12 ft) and 8.0 m (26 ft), respectively. The lake's surface area and a watershed area of 2,400 acres give a large watershed-to-lake area ratio of 36:1. The greater the ratio, the greater the potential stress on the lake from surface runoff. The Sweeney Lake branch of Bassett Creek flows into the lake on the south end and discharges at the north end over a dam. Sweeney Lake is connected to Twin Lake during periods of high water levels by a channel. The surface elevations of the two lakes are about the same.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2004 and aquatic life (chloride) in 2014.

The lake has a hypolimnetic aeration system which generally operates year round. The aeration system keeps the lake mixed, so it does not develop a thermocline when the system is operational. A thermocline is a density gradient caused by changing water temperatures throughout the water column. The aeration system was turned off during the monitoring seasons of 2007 and 2008 as part of a total maximum daily load (TMDL) study. The TMDL study was initiated in response to the lake being listed as impaired for aquatic recreational use.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	28	11	49	B
CLA (µg/l)	10	3.0	22	B
Secchi (m)	1.6	1.1	2.2	C
TKN (mg/l)	0.61	0.41	0.90	
			Lake Grade	B

This lake site received a lake grade of B this year which is the first B received according to its historical water quality database, indicating an improvement in water quality. Continued monitoring is recommended to determine if this recent improvement in water quality is part of a longer term trend.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP									C	C		
CLA									C	C		
Secchi									D	C		
Lake Grade									C	C		

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP							C					
CLA							C	B				
Secchi							C	D				
Lake Grade							C					

Year	2016	2017	2018	2019
TP			C	B
CLA		B	B	B
Secchi		C	C	C
Lake Grade			C	B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Terrapin Lake (82—0031) Carnelian — Marine — St. Croix Watershed District

Monitoring agency: Washington Conservation District staff

Terrapin Lake is located in May Township (Washington County). It has a surface area of 86 acres and a maximum depth of 4.6 m (15 ft). The lake is considered a Priority Lake by the Metropolitan Council for its good water quality. The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	20	11	26	A
CLA (µg/l)	3.0	1.2	6.7	A
Secchi (m)	>3.0	>2.3	>3.8	A
TKN (mg/l)	0.56	0.45	0.70	
			Lake Grade	A

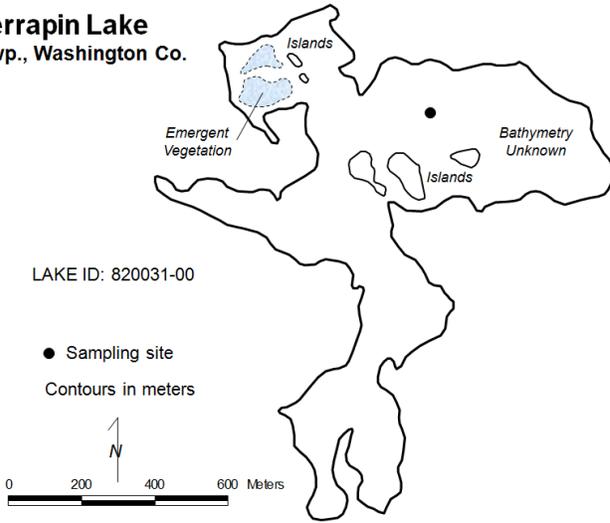
> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

The lake received a lake grade of A this year which is consistent with its historical water quality database. The relatively low CLA concentrations in combination with the observations of moderate to substantial macrophyte growth, indicate that the primary production of the lake is focused on production of aquatic macrophytes rather than algae.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Terrapin Lake
May Twp., Washington Co.



LAKE ID: 820031-00

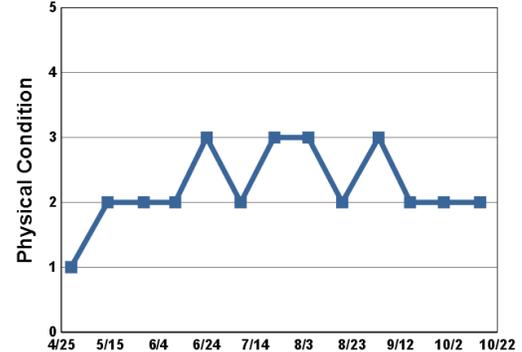
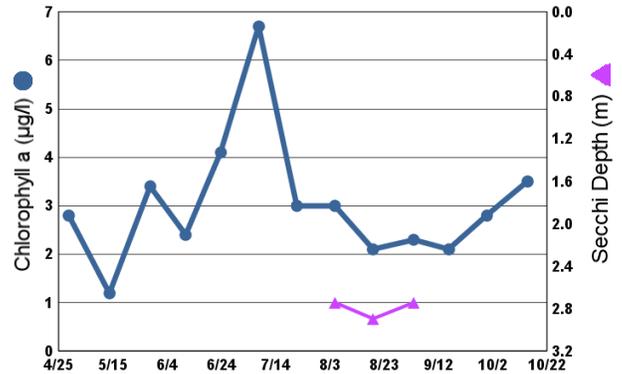
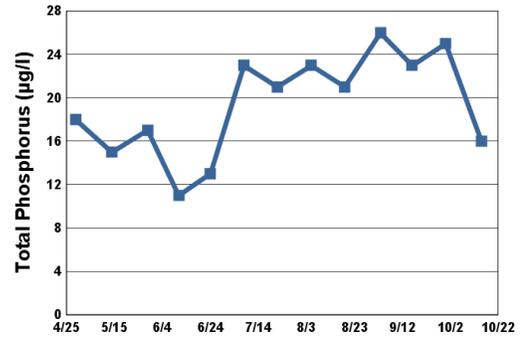
● Sampling site

Contours in meters

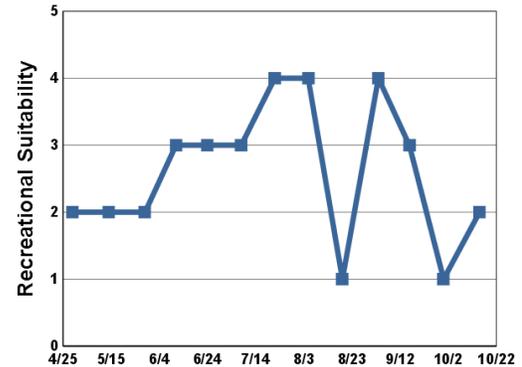
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/29/19	11.5	9.4	2.8	18	>2.9	1	2
05/14/19	14.7	9.0	1.2	15	>3.4	2	2
05/29/19	17.3	8.2	3.4	17	>3.7	2	2
06/11/19	22.3	7.0	2.4	11	>3.8	2	3
06/24/19	22.0	7.5	4.1	13	>3.0	3	3
07/08/19	26.3	8.4	6.7	23	>2.4	2	3
07/22/19	24.9	6.8	3.0	21	>2.3	3	4
08/05/19	26.4	6.5	3.0	23	2.7	3	4
08/19/19	23.4	5.7	2.1	21	2.9	2	1
09/03/19	21.0	5.3	2.3	26	2.7	3	4
09/16/19	19.4	4.7	2.1	23	>3.2	2	3
09/30/19	16.8	6.0	2.8	25	>2.4	2	1
10/15/19	10.0	7.0	3.5	16	>3.0	2	2

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	B	A	C	B			A				A	A
CLA	A	A	A	A			A				A	A
Secchi	A	A	A	B	A	A		A			A	
Lake Grade	A	A	B	B							A	

Year	2016	2017	2018	2019
TP			A	A
CLA			A	A
Secchi				A
Lake Grade				A

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Third Lake (13–0024) *Comfort Lake — Forest Lake Watershed District*

Monitoring agency: Washington Conservation District staff

Third Lake is located in Chisago Lake Township (Chisago County). It has a surface area of 62 acres and a maximum depth of 2.5 m. The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column. The lake's watershed area is approximately 197 acres giving a relatively low watershed area to lake area ratio of 3.2. The greater the ratio, the greater the potential stress on the lake from surface runoff.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

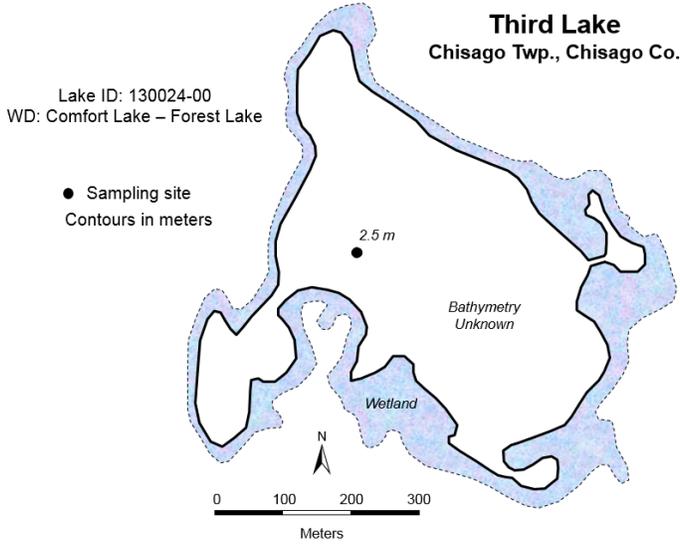
Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	19	6	35	A
CLA ($\mu\text{g/l}$)	4.7	2.7	9.9	A
Secchi (m)	>1.5	>1.4	>1.7	
TKN (mg/l)	0.67	0.52	0.77	
			Lake Grade	

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

There was an insufficient quantity of valid Secchi transparency measurements to determine a Secchi grade. An invalid measurement occurred if the Secchi disk was either visible on the lake bottom or the disk's visibility was blocked by aquatic vegetation. In both of these situations the water clarity would have been greater than that indicated by the measurement. A lake grade was not given because all three parameter grades are required to issue a lake grade. The relatively low CLA concentrations in combination with the observations of moderate to substantial macrophyte growth, indicate that the primary production of the lake is focused on production of aquatic macrophytes rather than algae.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

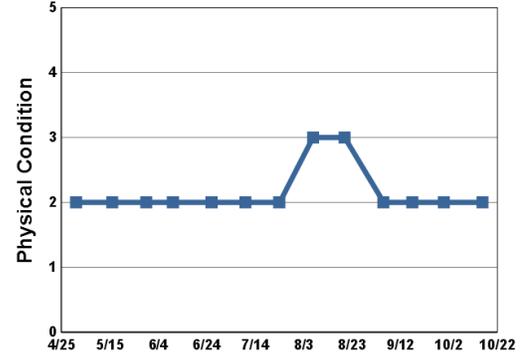
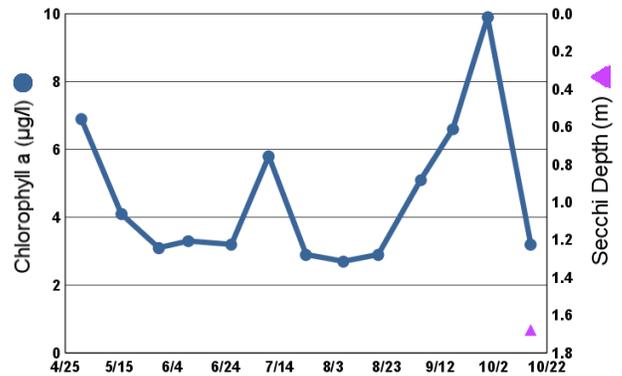
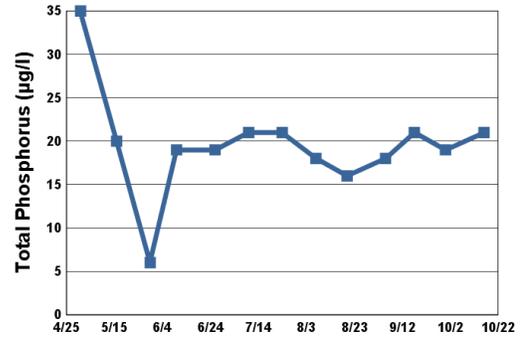
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.



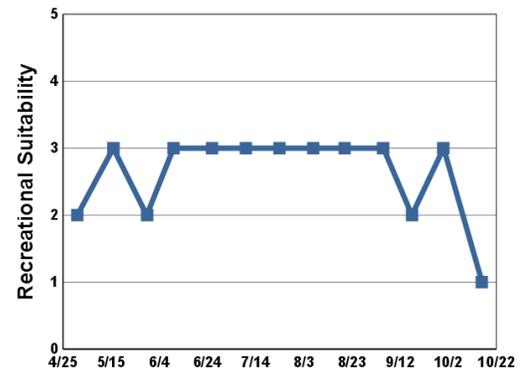
2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/01/19	10.0	8.8	6.9	35	>1.5	2	2
05/16/19	20.0	8.9	4.1	20	>1.5	2	3
05/30/19	17.7	8.0	3.1	6	>1.7	2	2
06/10/19	23.4	7.6	3.3	19	>1.4	2	3
06/26/19	22.5	7.3	3.2	19	>1.5	2	3
07/10/19	25.4	6.2	5.8	21	>1.5	2	3
07/24/19	25.4	6.8	2.9	21	>1.4	2	3
08/07/19	27.1	5.6	2.7	18	>1.7	3	3
08/20/19	23.6	6.8	2.9	16	>1.4	3	3
09/05/19	19.8	7.0	5.1	18	>1.5	2	3
09/17/19	21.0	7.9	6.6	21	>1.5	2	2
09/30/19	16.7	5.8	9.9	19	>1.5	2	3
10/16/19	8.1	9.7	3.2	21	1.7	2	1

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP											B	A
CLA											A	A
Secchi												
Lake Grade												

Year	2016	2017	2018	2019
TP				A
CLA				A
Secchi				
Lake Grade				

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Thole Lake (70–0120) Scott County Watershed Management Organization

Volunteer: Mark Vierling

Thole Lake is located in the Louisville Township (Scott County). The entire lake is considered littoral zone, which is the shallow 0 – 15 feet depth zone that is typically dominated by aquatic plants. Since the lake is relatively shallow, it does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the water column. The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreation value (METC 2007). The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2002, and aquatic consumption (mercury in fish tissue) in 2008. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 2002.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

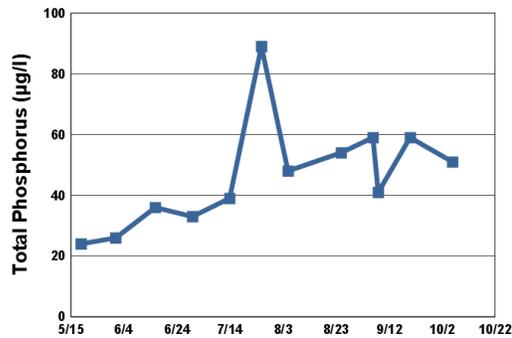
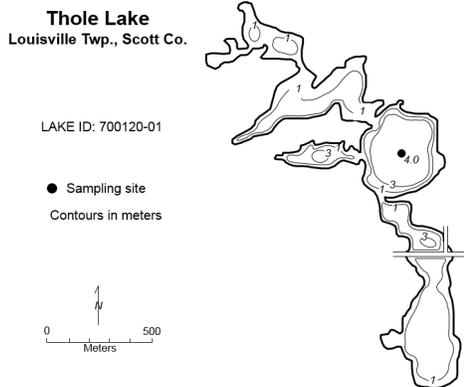
Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	46	24	89	C
CLA (µg/l))	32	3.0	63	C
Secchi (m)	1.3	0.5	2.8	C
TKN (mg/l)	1.18	0.71	1.60	
			Lake Grade	C

The lake received a lake grade of C this year. The historical water quality database shows that the lake grades for this lake vary in the C and D range.

Throughout the monitoring period, METC staff ranked the lake's physical condition and recreational suitability on a 1-to-5 scale. These user perception rankings are shown on the following page.

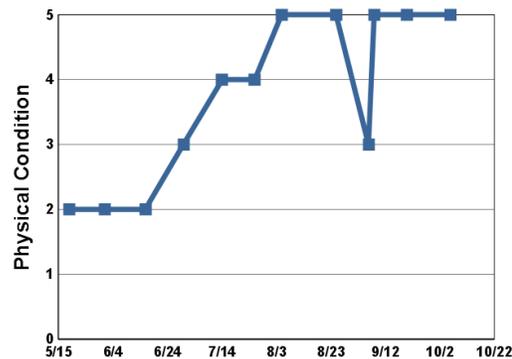
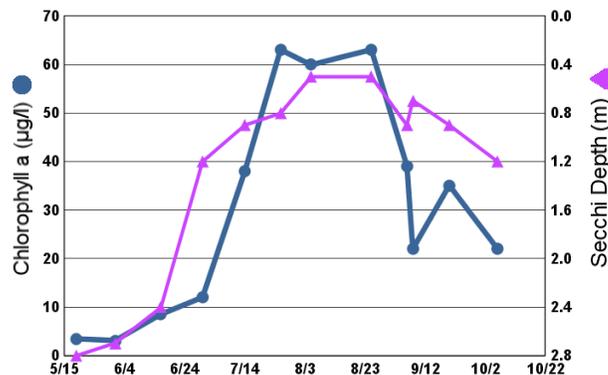
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

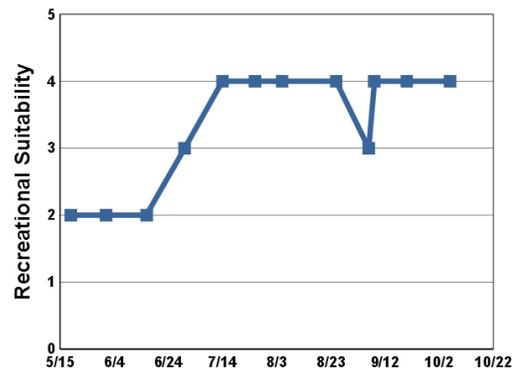


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/19/19	15.7		3.4	24	2.8	2	2
06/01/19	22.7		3.0	26	2.7	2	2
06/16/19	22.8		8.5	36	2.4	2	2
06/30/19	26.4		12	33	1.2	3	3
07/14/19	27.9		38	39	0.9	4	4
07/26/19	26.8		63	89	0.8	4	4
08/05/19	27.8		60	48	0.5	5	4
08/25/19	22.9		63	54	0.5	5	4
09/06/19	22.0		39	59	0.9	3	3
09/08/19	21.7		22	41	0.7	5	4
09/20/19	24.8		35	59	0.9	5	4
10/06/19	14.1		22	51	1.2	5	4



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 5 = Severe Algal Bloom



1 = Beautiful
 2 = Minor Aesthetic Problem
 3 = Swimming Impaired
 4 = No Swimming; Boating OK
 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP					D							
CLA					D							
Secchi					D							
Lake Grade					D							

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP			F			D			D		D	
CLA			D			C			D		D	
Secchi			D			C			C		D	
Lake Grade			D			C			D		D	

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP		D	D					D				C
CLA		F	D					C				D
Secchi		C	D					C				C
Lake Grade		D	D					C				C

Year	2016	2017	2018	2019
TP	D	C	C	C
CLA	D	C	D	C
Secchi	D	C	C	C
Lake Grade	D	C	C	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Thompson Lake (19–0048) Lower Mississippi River Watershed Management Organization

Volunteer: Anne Pfankuch

Thompson Lake is located in the city of West St. Paul (Dakota County). It is a small 8 acre lake with a maximum depth of 2.4 m.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) and aquatic life (chloride) in 2014.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	51	37	82	C
CLA (µg/l))	17	7.1	29	B
Secchi (m)	1.3	0.9	1.8	C
TKN (mg/l)	0.66	0.53	0.98	
			Lake Grade	C

The lake received a lake grade of C this year which is consistent with its historical water quality database. Continued monitoring is recommended to build the water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP												
CLA												
Secchi												
Lake Grade												

Year	2016	2017	2018	2019
TP	C	D	C	C
CLA	B	B	B	B
Secchi	D	C	C	C
Lake Grade	C	C	C	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Turtle Lake (82—0036) Carnelian — Marine — St. Croix Watershed District

Monitoring agency: Washington Conservation District staff

Turtle Lake is located in May Township (Washington County). The lake has a surface area of 44 acres, and has a maximum and mean depth of 2.4 m and 1.2 m, respectively. The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column. The lake's watershed area is approximately 699 acres giving a 16:1 watershed-to-lake area ratio. The greater the ratio, the greater the potential stress on the lake from surface runoff.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	68	29	198	D
CLA ($\mu\text{g/l}$)	7.1	3.2	15	A
Secchi (m)	+0.9	>0.6	>1.2	
TKN (mg/l)	0.62	0.50	0.90	
			Lake Grade	

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

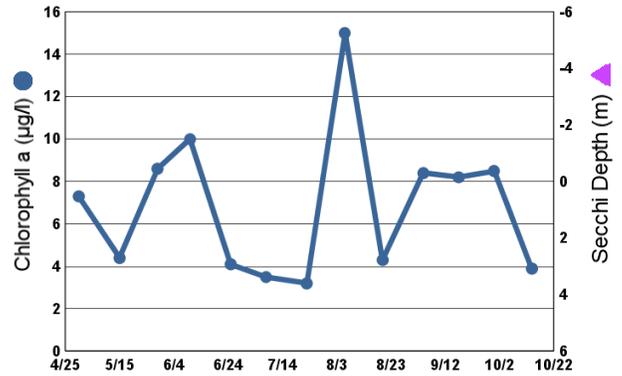
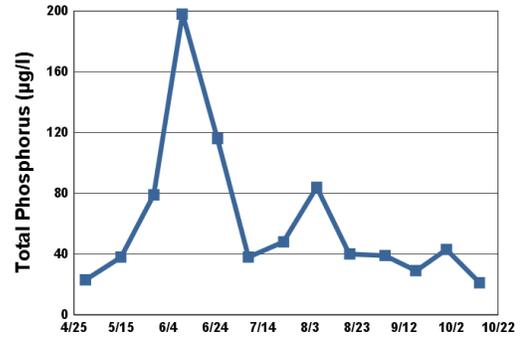
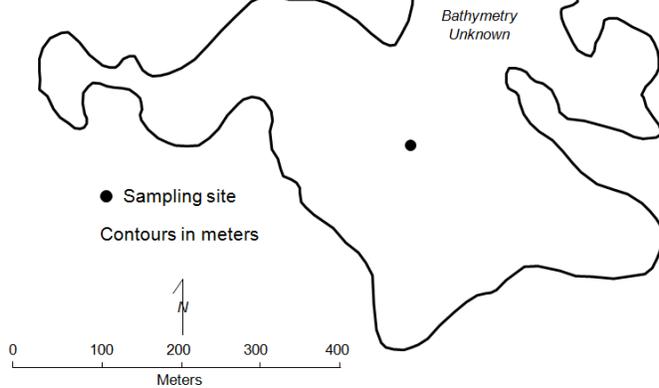
There was an insufficient quantity of valid Secchi transparency measurements to determine a Secchi grade. An invalid measurement occurred if the Secchi disk was either visible on the lake bottom or the disk's visibility was blocked by aquatic vegetation. In both of these situations the water clarity would have been greater than that indicated by the measurement. A lake grade was not given because all three parameter grades are required to issue a lake grade. The relatively low CLA concentrations in combination with the observations of moderate to substantial macrophyte growth, indicate that the primary production of the lake is focused on production of aquatic macrophytes rather than algae.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

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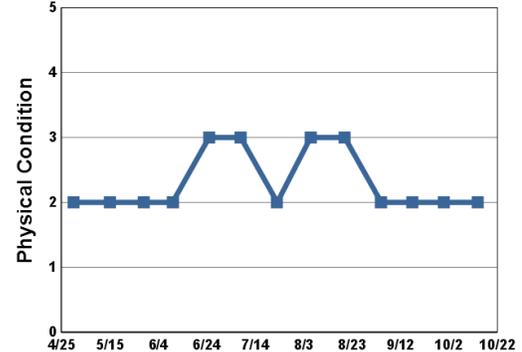
Turtle Lake
May Twp., Washington Co.

LAKE ID: 820036-00

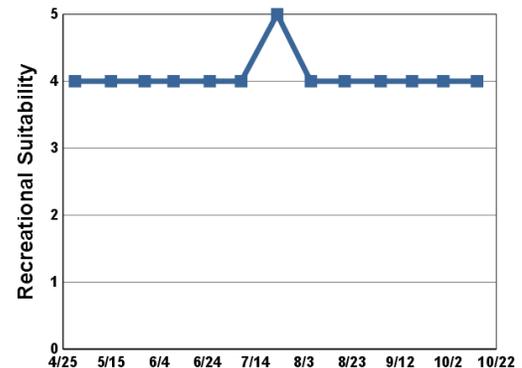


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/30/19	10.0	8.2	7.3	23	+0.9	2	4
05/15/19	18.2	8.0	4.4	38	+1.1	2	4
05/29/19	17.5	6.7	8.6	79	>0.9	2	4
06/10/19	20.9	3.8	10	198	>0.9	2	4
06/25/19	21.0	4.5	4.1	116	>0.9	3	4
07/08/19	28.0	9.7	3.5	38	>0.9	3	4
07/23/19	25.9	9.9	3.2	48	>0.9	2	5
08/06/19	24.8	2.9	15	84	>0.6	3	4
08/20/19	22.3	5.3	4.3	40	>1.2	3	4
09/04/19	18.4	4.6	8.4	39	>0.6	2	4
09/17/19	20.6	6.1	8.2	29	>0.6	2	4
09/30/19	14.8	6.5	8.5	43	>0.7	2	4
10/14/19	5.8	10.6	3.9	21	+0.9	2	4



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4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
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5 = No Aesthetics Possible

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.
> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												F
CLA												F
Secchi												F
Lake Grade												F

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP	F				C	C	C	B	D	C		D
CLA	F				D	D	D	C	B	B		B
Secchi	F	D	C	D	D	D	D	C	C	C	C	C
Lake Grade	F				D	D	D	C	C	C		C

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP									C	D	D	
CLA									B	A	C	
Secchi	C	C	C	C	C	C	C					
Lake Grade												

Year	2016	2017	2018	2019
TP		C	C	D
CLA		A	A	A
Secchi				
Lake Grade				

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Twin Lake [Burnsville] (19–0028) City of Burnsville

Volunteer: Bernie DeMaster

Twin Lake is an 11-acre lake located in the City of Burnsville (Dakota County). The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Few morphological data are available for the lake.

The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 1997.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

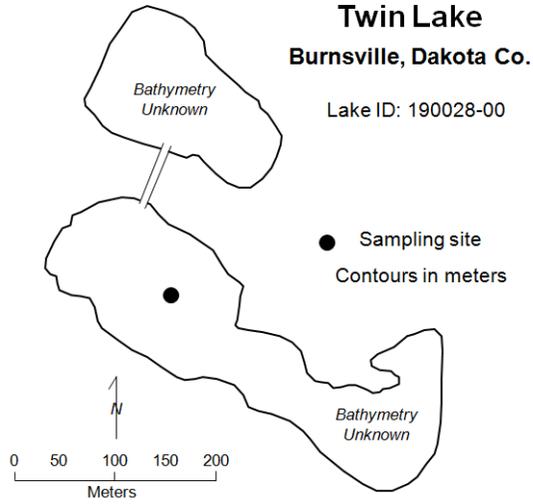
2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	28	18	39	B
CLA (µg/l)	3.6	2.0	6.6	A
Secchi (m)	1.9	1.4	2.6	C
TKN (mg/l)	0.60	0.52	0.73	
			Lake Grade	B

The lake received a lake grade of B this year. The water quality of this lake has varied in the B to C range since 1999. However, the recent TP grades of A's and B's since 2010 show an improving trend compared to the C and D grades received during the late 1990s to mid-2000s. Continued monitoring is recommended to determine if this recent improvement in water quality is part of a longer term trend.

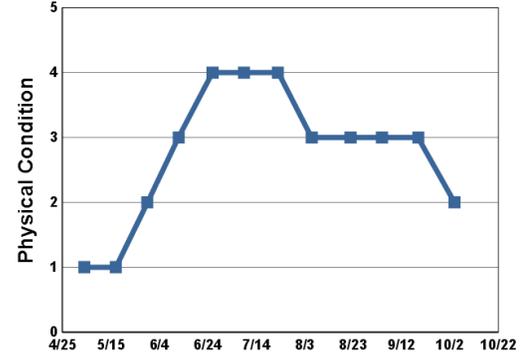
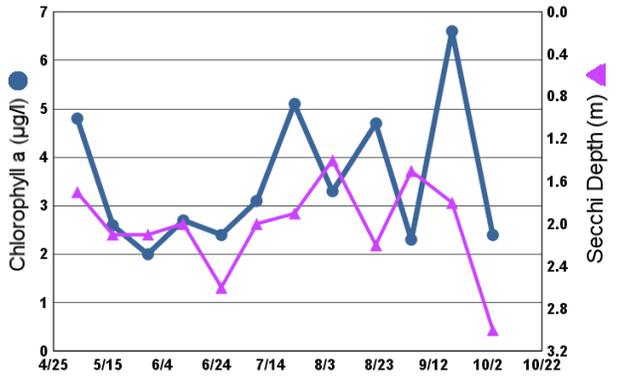
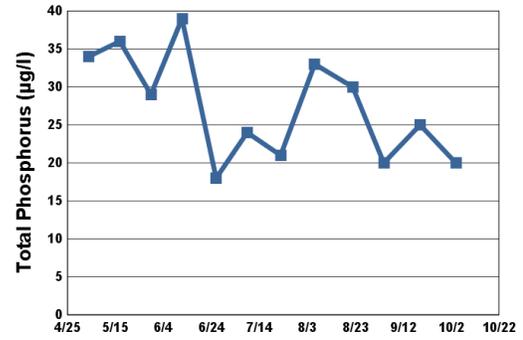
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

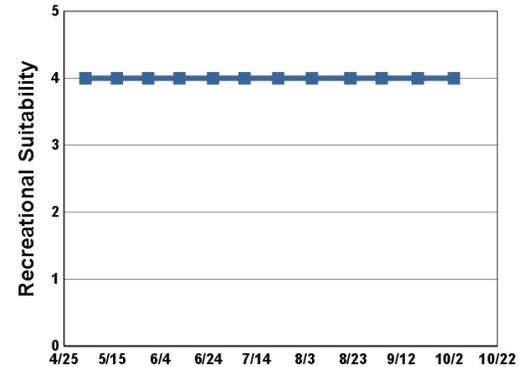


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/04/19	15.4		4.8	34	1.7	1	4
05/17/19	18.3		2.6	36	2.1	1	4
05/30/19	18.0		2.0	29	2.1	2	4
06/12/19	22.9		2.7	39	2.0	3	4
06/26/19	29.1		2.4	18	2.6	4	4
07/09/19	25.4		3.1	24	2.0	4	4
07/23/19	26.0		5.1	21	1.9	4	4
08/06/19	25.6		3.3	33	1.4	3	4
08/22/19	23.3		4.7	30	2.2	3	4
09/04/19	22.3		2.3	20	1.5	3	4
09/19/19	21.7		6.6	25	1.8	3	4
10/04/19	13.5		2.4	20	3.0	2	4



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Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP								D		C	C	C
CLA								B		A	A	A
Secchi								D		C	C	C
Lake Grade								C		B	B	B

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP		C	D	C	C	C	C	B	B	B	A	A
CLA		A	C	A	B	B	C	A	A	A	A	A
Secchi		C	C	C	C	C	C	B		C		C
Lake Grade		B	C	B	C	C	C	B		B		B

Year	2016	2017	2018	2019
TP	B	A	B	B
CLA	A	A	A	A
Secchi	C	C	C	C
Lake Grade	B	B	B	B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Twin Lake [Golden Valley] (27-0035-02) Bassett Creek Watershed Management Commission

Volunteer: Jennell Bilek

Twin Lake is located in the City of Golden Valley (Hennepin County). The surface area of the lake is 19 acres. Approximately 42 percent of the surface is considered littoral zone which is the 0-15 feet depth zone of aquatic plant dominance. The lake has a maximum depth of approximately 17 m (56 ft).

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	21	5	43	A
CLA (µg/l)	4.2	1.9	15	A
Secchi (m)	3.1	1.4	3.9	A
TKN (mg/l)	0.64	0.48	0.91	
			Lake Grade	A

The lake received a lake grade of A this year which is consistent with its historical water quality database. Continued monitoring is recommended to continue to build the water quality database.

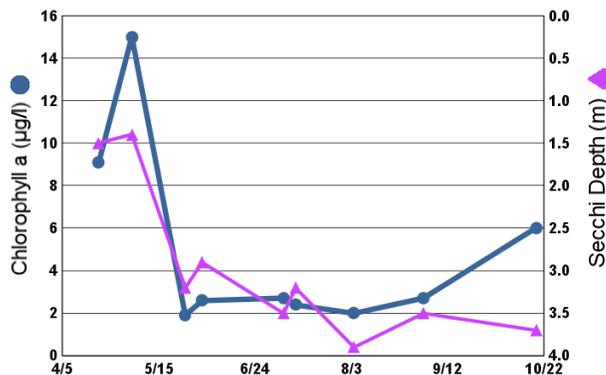
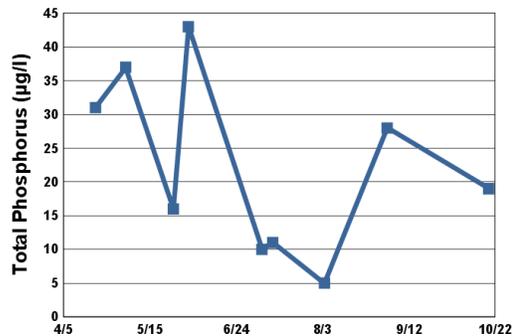
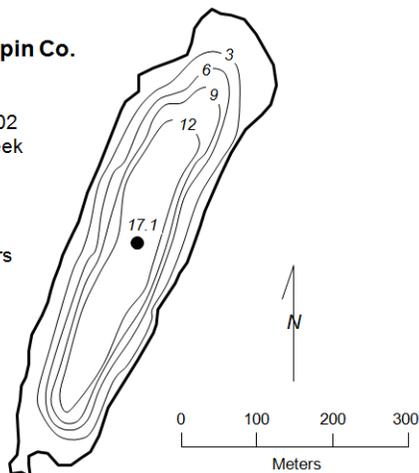
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Twin Lake
Golden Valley, Hennepin Co.

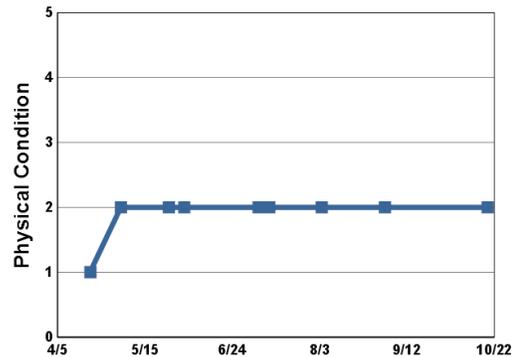
Lake ID: 270035-02
WMO: Bassett Creek

● Sampling site
Contours in meters

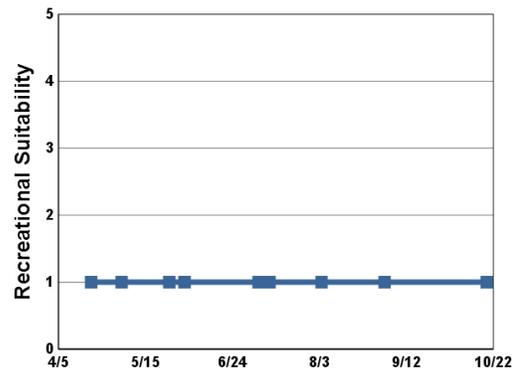


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/20/19	10.7		9.1	31	1.5	1	1
05/04/19	13.4		15	37	1.4	2	1
05/26/19	20.2		1.9	16	3.2	2	1
06/02/19	20.2		2.6	43	2.9	2	1
07/06/19	27.5		2.7	10	3.5	2	1
07/11/19	26.0		2.4	11	3.2	2	1
08/04/19	27.8		2.0	5	3.9	2	1
09/02/19	23.2		2.7	28	3.5	2	1
10/19/19	12.6		6.0	19	3.7	2	1



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP							A			A	A	A
CLA							A	A		B	A	A
Secchi							A	B		A	A	A
Lake Grade							A			A	A	A

Year	2016	2017	2018	2019
TP	B	A	B	A
CLA	A	A	A	A
Secchi	A	A	A	A
Lake Grade	A	A	A	A

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Twin Lake [St. Louis Park] (27–0656) City of St. Louis Park

Volunteer: Eric Klingbeil

Twin Lake is a small shallow lake located within the city of St. Louis Park (Hennepin County). The lake has a surface area of approximately 12.4 acres. Few morphological data are available for this lake.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2006.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

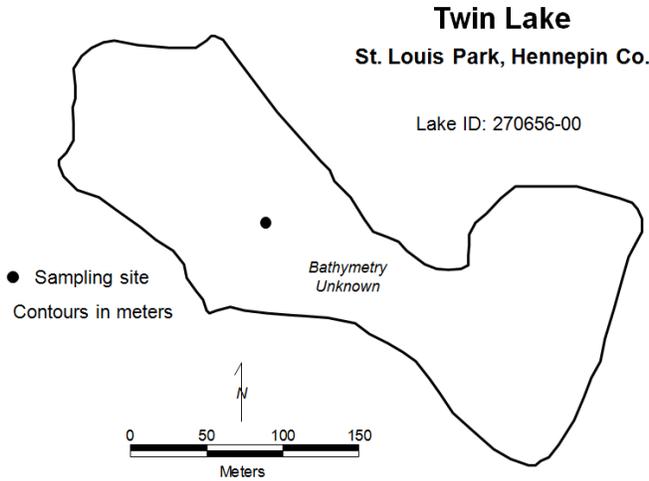
2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	97	70	140	D
CLA (µg/l)	51	20	120	D
Secchi (m)	0.8	0.5	0.9	D
TKN (mg/l)	0.88	0.47	1.30	
			Lake Grade	D

The lake received a lake grade of D this year which is consistent with its historical water quality database.

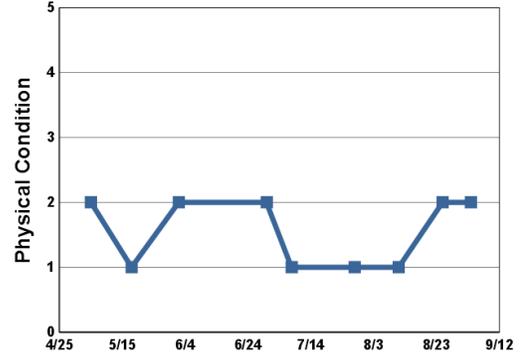
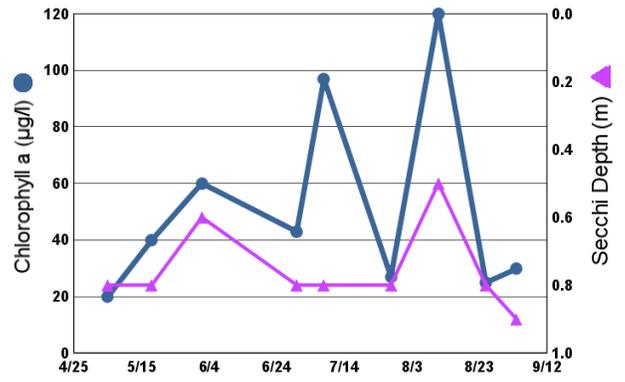
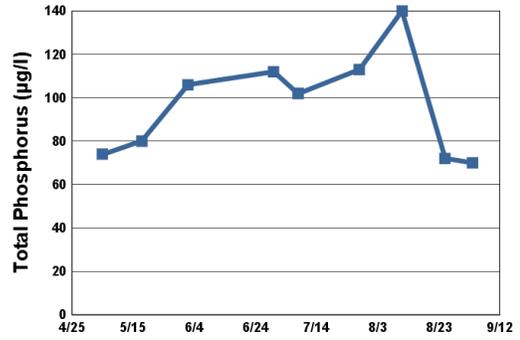
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

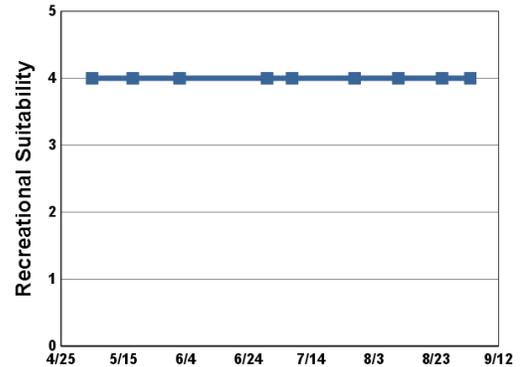


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/05/19	20.5		20	74	0.8	2	4
05/18/19	17.6		40	80	0.8	1	4
06/02/19	22.9		60	106	0.6	2	4
06/30/19	23.3		43	112	0.8	2	4
07/08/19	24.1		97	102	0.8	1	4
07/28/19	25.8		27	113	0.8	1	4
08/11/19	20.8		120	140	0.5	1	4
08/25/19	22.8		25	72	0.8	2	4
09/03/19	25.1		30	70	0.9	2	4



- 1 = Crystal Clear
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- 4 = High Algal Color
- 5 = Severe Algal Bloom



- 1 = Beautiful
- 2 = Minor Aesthetic Problem
- 3 = Swimming Impaired
- 4 = No Swimming; Boating OK
- 5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP											F	F
CLA											B	C
Secchi											D	D
Lake Grade											D	D

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	F	F	D	F	D	F	D	F	F	D	D	D
CLA	D	C	C	D	D	F	D	F	D	D	C	D
Secchi	D	F	F	F	F	F	F	F	D	F	D	D
Lake Grade	D	D	D	F	D	F	D	F	D	D	D	D

Year	2016	2017	2018	2019
TP	D	D		D
CLA	D	C		D
Secchi	D	D		D
Lake Grade	D	D		D

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Twin Lake [May Township] (82–0048) *Carnelian — Marine — St. Croix Watershed District*

Monitoring agency: Washington Conservation District staff

Twin Lake is located in May Township (Washington County). The lake is considered a Priority Lake by the Metropolitan Council for its good water quality. The south basin has a maximum depth of 10 m. Few other morphological data are available for this lake. The lake receives inflow from Square Lake.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

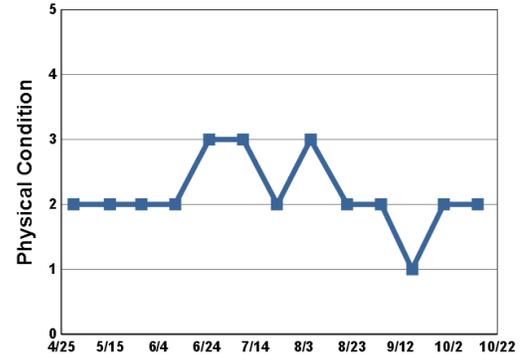
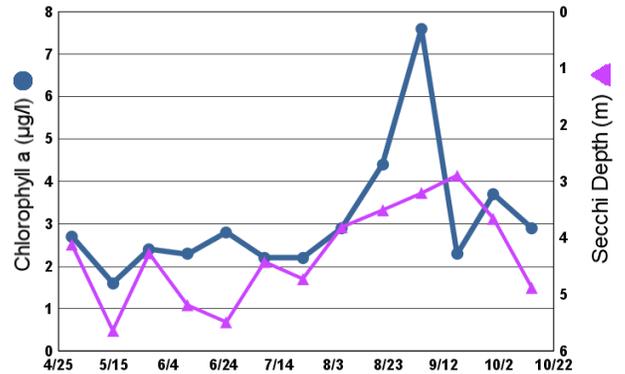
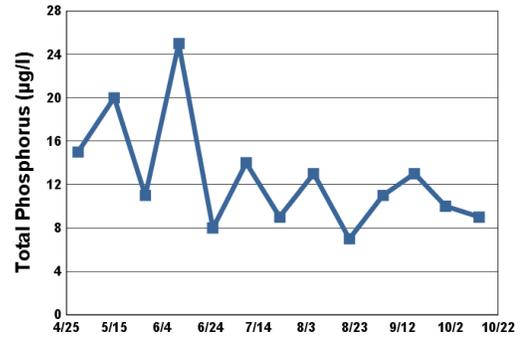
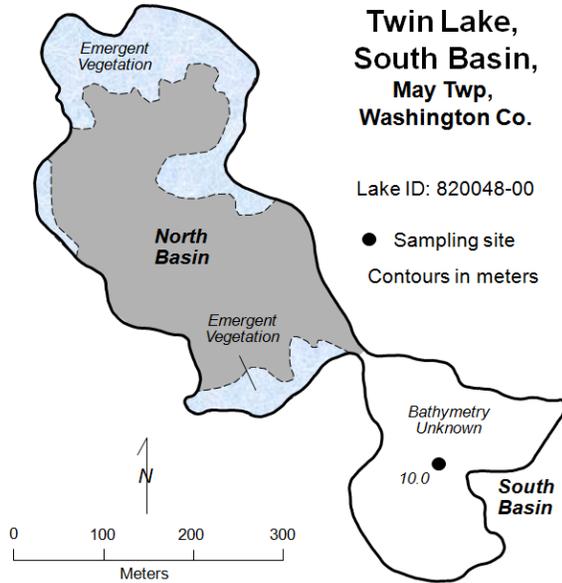
2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	13	7	25	A
CLA (µg/l)	3.1	1.6	7.6	A
Secchi (m)	4.3	2.9	5.6	A
TKN (mg/l)	0.41	0.33	0.49	
			Lake Grade	A

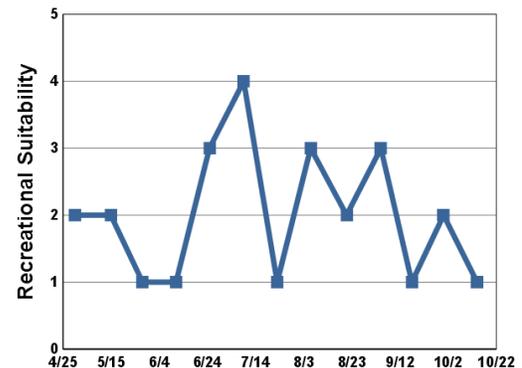
The lake received a lake grade of A this year, which is consistent with its historical database. Continued monitoring is recommended to continue to build the water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.



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4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/30/19	11.1	10.3	2.7	15	4.1	2	2
05/15/19	15.7	9.6	1.6	20	5.6	2	2
05/28/19	15.6	8.8	2.4	11	4.3	2	1
06/11/19	22.1	8.2	2.3	25	5.2	2	1
06/25/19	22.3	7.8	2.8	8	5.5	3	3
07/09/19	26.7	8.1	2.2	14	4.4	3	4
07/23/19	26.1	6.4	2.2	9	4.7	2	1
08/06/19	26.4	5.4	2.9	13	3.8	3	3
08/21/19	24.6	5.5	4.4	7	3.5	2	2
09/04/19	22.7	6.5	7.6	11	3.2	2	3
09/17/19	20.7	5.6	2.3	13	2.9	1	1
09/30/19	19.4	5.2	3.7	10	3.7	2	2
10/14/19	12.3	6.5	2.9	9	4.9	2	1

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP						A	A					
CLA						A	A					
Secchi						A	A					
Lake Grade						A	A					

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP					A	A				A	A	A
CLA					A	A				A	A	A
Secchi					A	A	A	A	A	A	A	A
Lake Grade					A	A				A	A	A

Year	2016	2017	2018	2019
TP			A	A
CLA			A	A
Secchi			A	A
Lake Grade			A	A

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Twin Lake (82–0157) Comfort Lake — Forest Lake Watershed District

Monitoring agency: Washington Conservation District staff

Twin Lake is located near the city of Forest Lake (Washington County). The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. The lake is defined as a shallow lake because of the dominance of the littoral zone. Few other morphological data are available for the lake.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

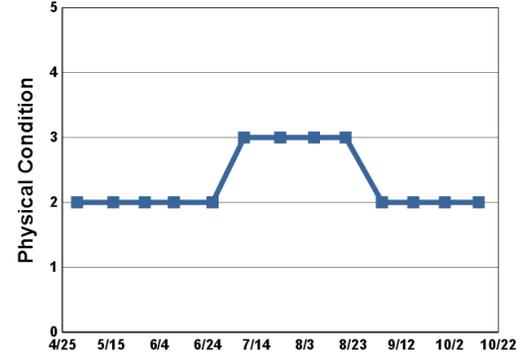
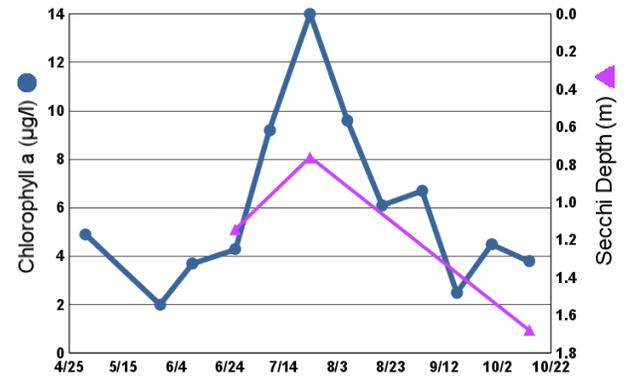
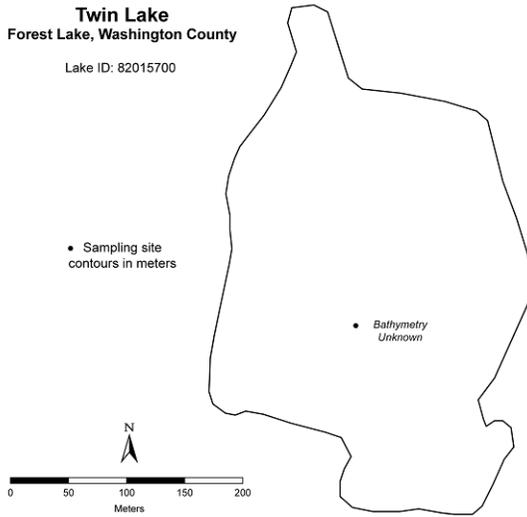
Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	25	14	36	B
CLA (µg/l))	6.1	2.0	14	A
Secchi (m)	+1.4	0.8	+2.1	
TKN (mg/l)	0.57	0.45	0.69	
			Lake Grade	

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.

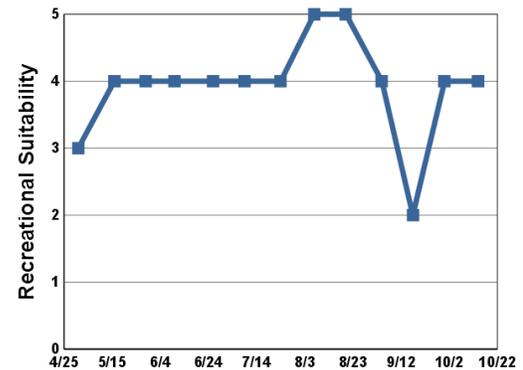
There was an insufficient quantity of valid Secchi transparency measurements to determine a Secchi grade. An invalid measurement occurred if the Secchi disk was either visible on the lake bottom or the disk's visibility was blocked by aquatic vegetation. In both of these situations the water clarity would have been greater than that indicated by the measurement. A lake grade was not given because all three parameter grades are required to issue a lake grade. Continued monitoring is recommended to build the water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.



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 3 = Definite Algal Presence
 4 = High Algal Color
 5 = Severe Algal Bloom



1 = Beautiful
 2 = Minor Aesthetic Problem
 3 = Swimming Impaired
 4 = No Swimming; Boating OK
 5 = No Aesthetics Possible

2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/01/19	10.7	6.7	4.9	18	+2.0	2	3
05/16/19	19.7	6.9		21	>1.5	2	4
05/29/19	18.6	6.8	2.0	14	+2.1	2	4
06/10/19	23.1	4.0	3.7	28	+2.1	2	4
06/26/19	21.4	1.6	4.3	26	1.1	2	4
07/09/19	24.3	2.3	9.2	29	>1.1	3	4
07/24/19	22.3	1.7	14	36	0.8	3	4
08/07/19	23.9	1.9	9.6	35	>0.9	3	5
08/20/19	22.2	2.4	6.1	20	>1.1	3	5
09/04/19	19.1	1.7	6.7	20	>1.5	2	4
09/17/19	20.9	4.0	2.5	28	>1.4	2	2
09/30/19	15.9	2.5	4.5		>1.5	2	4
10/14/19	8.4	6.9	3.8	13	1.7	2	4

+ indicates that the Secchi disk was visible on the bottom of the lake at the depth indicated.
 > indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP												
CLA												
Secchi												
Lake Grade												

Year	2016	2017	2018	2019
TP				B
CLA				A
Secchi				
Lake Grade				

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Valentine Lake (62–0071) *Rice Creek Watershed District*

Volunteer: Bob Kistler

Valentine Lake is located in the city of Arden Hills (Ramsey County). The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column. The lake is defined as a shallow lake because of the dominance of the littoral zone.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	97	53	200	D
CLA (µg/l))	41	3.4	110	C
Secchi (m)	0.9	0.5	1.6	D
TKN (mg/l)	1.26	0.67	2.30	
			Lake Grade	D

The lake received a lake grade of D this year and in 2018 which are worse than the C grades received over a decade ago. Continued monitoring is recommended to determine if this recent deterioration in water quality is part of a longer term trend.

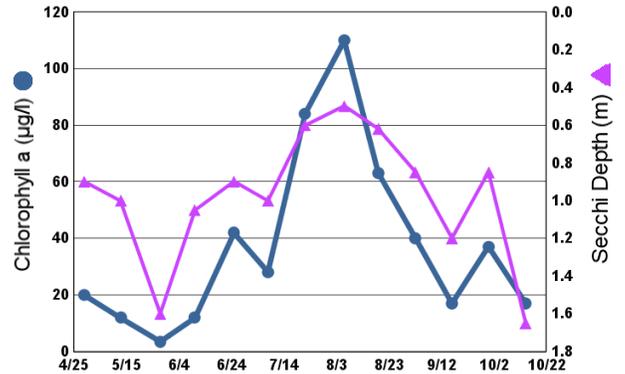
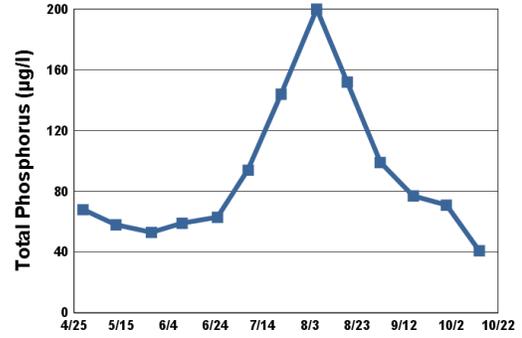
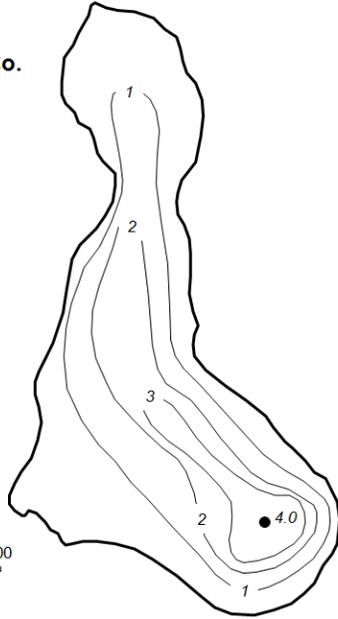
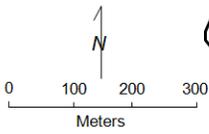
During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Valentine Lake
Arden Hills, Ramsey Co.

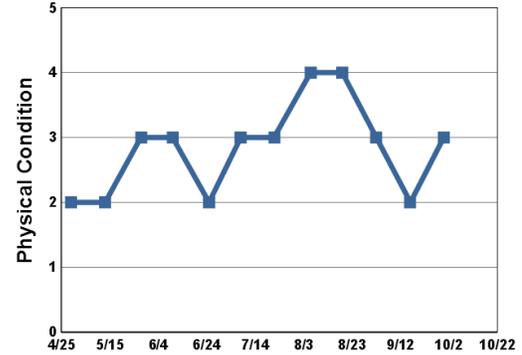
Lake ID: 620071-00

● Sampling site
Contours in meters

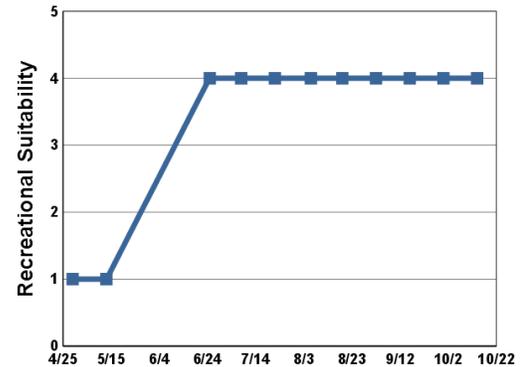


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/29/19	12.7		20	68	0.9	2	1
05/13/19	16.8		12	58	1.0	2	1
05/28/19	18.6		3.4	53	1.6	3	
06/10/19	23.1		12	59	1.0	3	
06/25/19	22.5		42	63	0.9	2	4
07/08/19	27.7		28	94	1.0	3	4
07/22/19	26.2		84	144	0.6	3	4
08/06/19	28.2		110	200	0.5	4	4
08/19/19	24.9		63	152	0.6	4	4
09/02/19	21.7		40	99	0.8	3	4
09/16/19	20.4		17	77	1.2	2	4
09/30/19	18.0		37	71	0.8	3	4
10/14/19	8.9		17	41	1.6		4



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4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
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3 = Swimming Impaired
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5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP										C	C	C
CLA										B	B	C
Secchi										C	C	D
Lake Grade										C	C	C

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	C	C	D	C							
CLA	C	C	B	C	B							
Secchi	C	C	C	C	C							
Lake Grade	C	C	C	C	C							

Year	2016	2017	2018	2019
TP			D	D
CLA			C	C
Secchi			D	D
Lake Grade			D	D

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Valley Lake (19–0348) City of Lakeville

Monitoring agency: City of Lakeville staff

Valley Lake is located in the city of Lakeville (Dakota County). The lake has a surface area of 8 acres and a maximum depth of 3.2 m (10 ft).

The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 2005.

The lake has been involved in a project in which barley straw or crushed corn was added to the lake in an attempt to inhibit algal populations. CAMP data were used to evaluate the effectiveness of these additions. Refer to McComas and Stuckert (2009b) for details on the project.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	113	43	181	D
CLA (µg/l)	65	21	110	D
Secchi (m)	0.6	0.4	1.3	F
TKN (mg/l)	1.53	0.81	2.00	
			Lake Grade	D

The lake received a lake grade of D this year. The lake grades have typically varied in the range of B to D.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP				D	D	C			C	C	C	C
CLA				C	C	C		C	B	A	A	B
Secchi				D	D	D		D	C	C	B	B
Lake Grade				D	D	C			C	B	B	B

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	C	D	D	C	C	D	D	D	F	D	D
CLA	C	C	D	C	C	A	D	C	C	F	C	D
Secchi	C	C	D	C	C	B	C	C	C	D	C	F
Lake Grade	C	C	D	C	C	B	D	C	C	F	C	D

Year	2016	2017	2018	2019
TP	C	C	D	D
CLA	C	B	D	D
Secchi	C	C	F	F
Lake Grade	C	C	D	D

Source: Metropolitan Council, EPA STORET, and/or MPCA EQUIS database(s)

West Boot Lake (82–0044) *Carnelian* — *Marine Watershed District*

Monitoring agency: Washington Conservation District staff

West Boot Lake is located in May Township (Washington County). The lake is considered a Priority Lake by the Metropolitan Council for its good water quality. The lake has a surface area of 110 acres and mean and maximum depths of 5.9 m (19 feet) and 11.9 m (39 feet), respectively. The lake's 209-acre immediate watershed translates to a 2:1 watershed-to-lake area ratio. The greater the ratio, the greater the potential stress on the lake from surface runoff.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	15	9	26	A
CLA ($\mu\text{g/l}$)	2.8	1.6	5.2	A
Secchi (m)	3.3	1.8	4.6	A
TKN (mg/l)	0.47	0.44	0.52	
			Lake Grade	A

The lake received a lake grade of A this year which is consistent with its historical database. Continued monitoring is recommended to continue to build the water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												C
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP					B	C	A	A	A	A	A	B
CLA					A	B	C	A	A	A	A	A
Secchi					B	C	B	A	A	A	A	A
Lake Grade					B	C	B	A	A	A	A	A

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	A	A	A	B					B	B	A	A
CLA	A	A	A	A					A	A	A	A
Secchi	A	A	A	A	A	A	A		A	A	A	A
Lake Grade	A	A	A	A					A	A	A	A

Year	2016		2017		2018		2019	
TP						B		A
CLA						A		A
Secchi						A		A
Lake Grade						A		A

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Westwood Lake (27–0711) Bassett Creek Watershed Management Organization

Volunteer: Nancy Ebner

Westwood Lake is located in the city of St. Louis Park (Hennepin County). The lake has a surface area of 41 acres and a maximum depth of 2.0 m (6.6 ft). The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	24	14	33	B
CLA (µg/l)	6.7	2.8	10	A
Secchi (m)	>1.4	>1.1	>2.7	
TKN (mg/l)	0.70	0.51	0.93	
			Lake Grade	

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

There was an insufficient quantity of valid Secchi transparency measurements to determine a Secchi grade. An invalid measurement occurred if the Secchi disk was either visible on the lake bottom or the disk's visibility was blocked by aquatic vegetation. In both of these situations the water clarity would have been greater than that indicated by the measurement. A lake grade was not given because all three parameter grades are required to issue a lake grade. The relatively low CLA concentrations in combination with the observations of moderate to substantial macrophyte growth, indicate that the primary production of the lake is focused on production of aquatic macrophytes rather than algae.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP			F									
CLA			C									
Secchi			D									
Lake Grade			D									

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP		C							B	B	C	C
CLA		C							B	C	B	A
Secchi		C							C	C	C	C
Lake Grade		C							B	C	C	B

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	D	D	C	B	C	A	C	D	C	B	A
CLA	A	C	B	B	A	B	A	A	A	A	A	A
Secchi	C	C	C	C	D	D	C	D	C			
Lake Grade	B	C	C	C	B	C	B	C	C			

Year	2016	2017	2018	2019
TP	B		A	B
CLA	A		A	A
Secchi				
Lake Grade				

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

White Rock Lake (82–0072) Rice Creek Watershed District

Volunteer: David Bluhm

White Rock Lake is a 65-acre lake located in Washington County. There are few other morphological data for the lake.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2010.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	38	30	61	C
CLA (µg/l)	12	3.6	26	B
Secchi (m)	2.0	1.4	2.8	C
TKN (mg/l)	0.87	0.68	1.10	
			Lake Grade	C

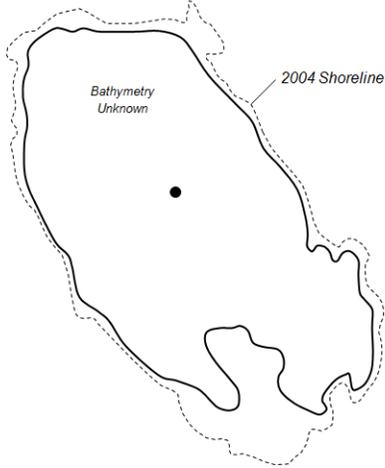
The lake received a lake grade of C this year, which is consistent with water quality observed in more recent years since 2011. Water quality in recent years appears to be improving compared to water quality observed in the mid to late 2000's. Continued monitoring is recommended to determine if this recent improvement in water quality is part of a longer term trend.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

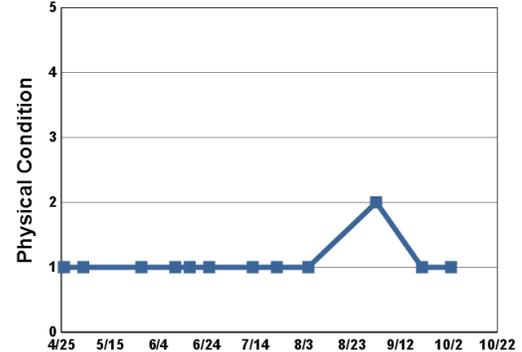
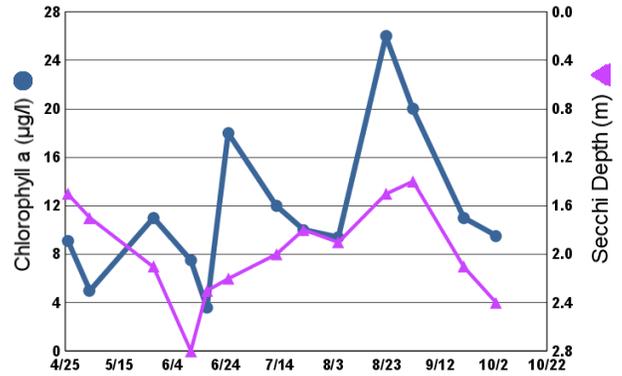
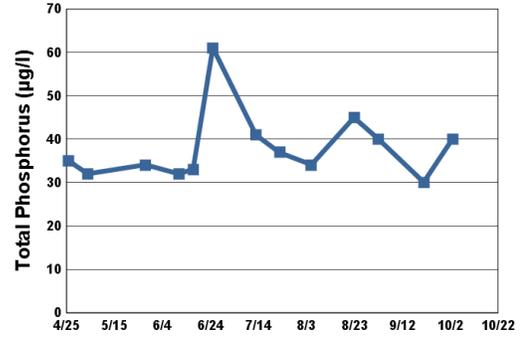
White Rock Lake,
New Scandia Twp.,
Washington Co.

Lake ID: 820072-00
WD: Rice Creek
Volunteer: David Bluhm

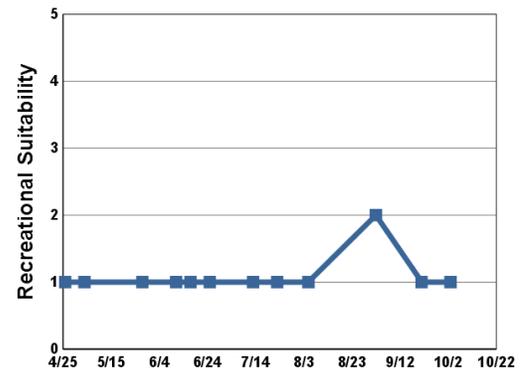


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/26/19	12.9		9.1	35	1.5	1	1
05/04/19	12.8		5.0	32	1.7	1	1
05/28/19	16.2		11	34	2.1	1	1
06/11/19	21.2		7.5	32	2.8	1	1
06/17/19	19.6		3.6	33	2.3	1	1
06/25/19	22.1		18	61	2.2	1	1
07/13/19	26.2		12	41	2.0	1	1
07/23/19	26.7		10	37	1.8	1	1
08/05/19	28.0		9.4	34	1.9	1	1
08/23/19	23.2		26	45	1.5		
09/02/19	20.7		20	40	1.4	2	2
09/21/19	22.8		11	30	2.1	1	1
10/03/19	15.3		9.5	40	2.4	1	1



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP			D	D	D	D	C	C	D	C	C	C
CLA			C	C	C	C	C	C	C	B	A	C
Secchi			F	F	D	D	D	C	C	C		C
Lake Grade			D	D	D	D	C	C	C	C		C

Year	2016	2017	2018	2019
TP	D	C	C	C
CLA	C	B	C	B
Secchi	C	C	C	C
Lake Grade	C	C	C	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Wilmes Lake (82–0090) City of Woodbury

Monitoring agency: Washington Conservation District staff

Wilmes Lake is located in the city of Woodbury (Washington County). The lake has a surface area of 41 acres and a maximum depth of 5.5 m (18 feet). The lake has a watershed area of 2,247 acres which gives a large watershed-to-lake area ratio of 55:1. The greater the ratio, the greater the potential stress on the lake from surface runoff.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2006. The MN DNR designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) in 2007.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCEs's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	58	37	86	C
CLA (µg/l)	18	4.0	35	B
Secchi (m)	1.8	1.4	2.7	C
TKN (mg/l)	0.93	0.68	1.40	
			Lake Grade	C

The lake received a lake grade of C this year. The water quality of the lake varies between a lake grade of C and D, with C's dominating since 2006.

The 1994 and 1995 CAMP monitoring was performed in the northern basin of Wilmes Lake, while the 1996-2017 monitoring was performed in the lake's south basin.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP			C	D	D	D	D	D	D	D	D	D
CLA			B	B	C	C	C	C	C	C	D	C
Secchi			B	C	C	D	D	C	C	D	D	C
Lake Grade			B	C	C	D	D	C	C	D	D	C

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	D	D	D	C	C	D	C	D	C	C	D
CLA	C	C	C	C	C	C	C	B	C	C	C	C
Secchi	C	D	C	C	D	C	C	C	C	D	D	F
Lake Grade	C	D	C	D								

Year	2016	2017	2018	2019
TP	C	C	C	C
CLA	C	C	B	B
Secchi	C	D	C	C
Lake Grade	C	C	C	C

Source: Metropolitan Council, EPA STORET, and/or MPCA EQUIS database(s)

Wing Lake (27–0091) *Nine Mile Creek Watershed District*

Volunteer: John Burton

Wing Lake is located within the City of Minnetonka (Hennepin County). It has a surface area of 11 acres. There are few known morphological data available for the lake.

The MPCA listed the lake as impaired with respect to aquatic recreational use (nutrient/eutrophication biological indicators) in 2010.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

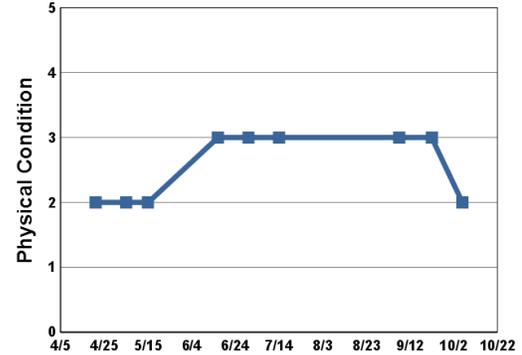
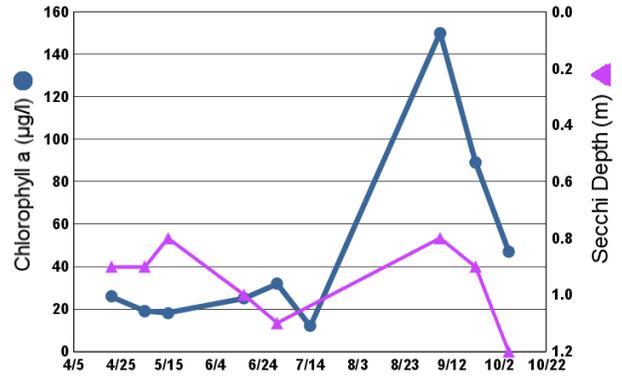
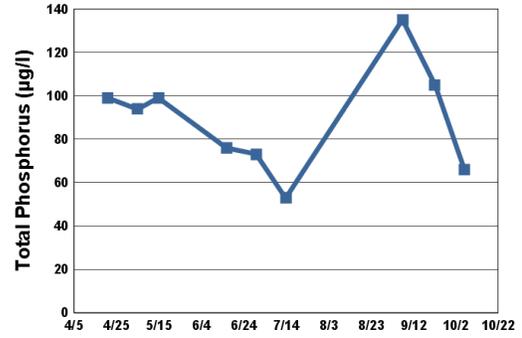
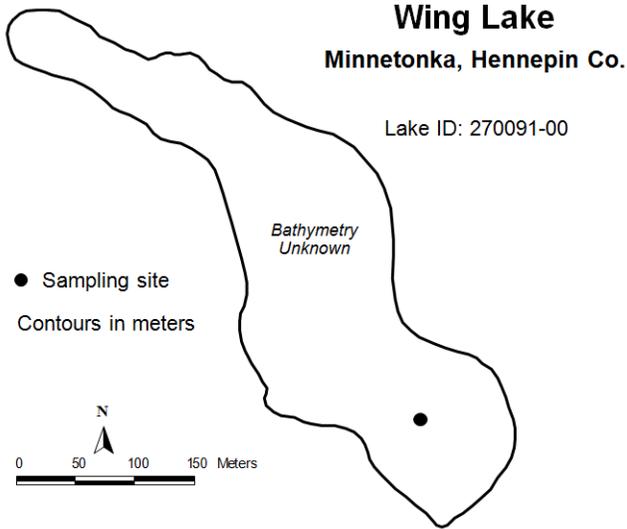
Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	91	53	135	D
CLA (µg/l)	49	12	150	D
Secchi (m)	>0.9	>0.8	1.1	D
TKN (mg/l)	1.11	0.88	1.40	
			Lake Grade	D

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

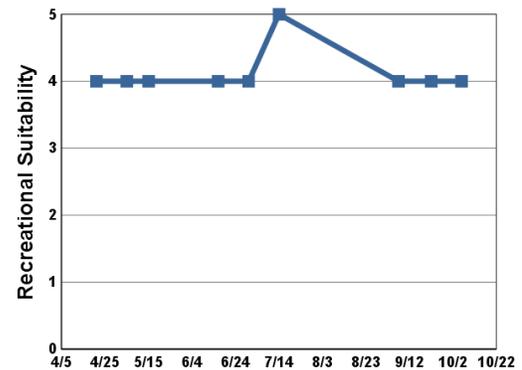
The lake received a lake grade of D this year, which is consistent with its water quality database. Continued monitoring is recommended to continue to build the water quality database.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.



1 = Crystal Clear
 2 = Some Algae Present
 3 = Definite Algal Presence
 4 = High Algal Color
 5 = Severe Algal Bloom



1 = Beautiful
 2 = Minor Aesthetic Problem
 3 = Swimming Impaired
 4 = No Swimming; Boating OK
 5 = No Aesthetics Possible

2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
04/21/19	16.0		26	99	0.9	2	4
05/05/19	17.0		19	94	0.9	2	4
05/15/19	23.0		18	99	0.8	2	4
06/16/19	23.8		25	76	1.0	3	4
06/30/19	26.6		32	73	1.1	3	4
07/14/19	30.1		12	53	>0.8	3	5
09/07/19	20.0		150	135	0.8	3	4
09/22/19	21.4		89	105	0.9	3	4
10/06/19	12.8		47	66	1.2	2	4

> indicates that the visibility of the Secchi disk was blocked by aquatic vegetation at the depth indicated.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP			D	D	D	D	D	D	F	D	D	D
CLA			C	C	C	C	D	C	C	C	C	C
Secchi			D	D	D	D	D	D	D	D		D
Lake Grade			D		D							

Year	2016	2017	2018	2019
TP	D	D	D	D
CLA	C	C	C	D
Secchi	D		D	D
Lake Grade	D		D	D

Source: Metropolitan Council, EPA STORET, and/or MPCA EQIS database(s)

Wood Lake (19–0024) City of Burnsville

Volunteer: City of Burnsville staff

Wood Lake is located in the city of Burnsville (Dakota County). The lake has a surface area of 9 acres. The maximum depth of the lake is 4.5 m (14.8 feet). The entire surface area is considered littoral zone, which is the 0 — 15 feet depth zone typically dominated by aquatic vegetation. Since the lake is relatively shallow, it does not permanently stratify and maintain a thermocline which is a density gradient caused by changing water temperatures throughout portions of the water column.

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency and surface temperature were measured during each monitoring visit. The resulting data are summarized in tables and figures on the following pages.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	19	14	24	A
CLA ($\mu\text{g/l}$)	12	1.0	36	B
Secchi (m)	2.1	1.1	3.9	C
TKN (mg/l)	0.76	0.64	0.92	
			Lake Grade	B

The lake received a lake grade of B this year, which is consistent with most of its historical water quality database. The lake typically has received a lake grade of C with the occasional B. However, the lake received a TP grade of A this year which is an improvement over the C grades the lake normally receives. Continued monitoring is recommended to determine if this recent improvement in water quality is part of a longer term trend.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

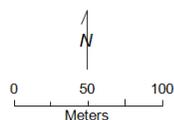
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Wood Lake
Burnsville, Dakota Co.

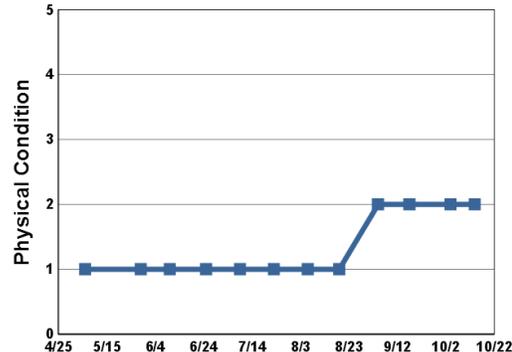
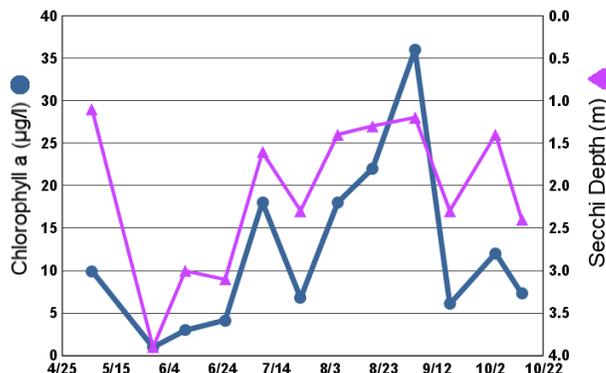
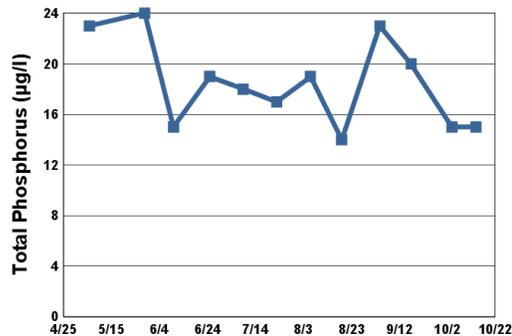
Lake ID: 190024-00

● Sampling site
Contours in meters

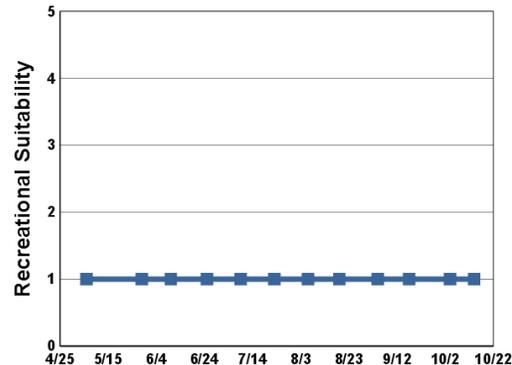


2019 Data

Date	SURF TEMP (°C)	SURF DO (mg/L)	CLA (µg/l)	SURF TP (µg/l)	Secchi (m)	PC	RS
05/06/19	16.2		9.9	23	1.1	1	1
05/29/19	17.8		1.0	24	3.9	1	1
06/10/19	22.7		3.0	15	3.0	1	1
06/25/19	22.4		4.1	19	3.1	1	1
07/09/19	26.7		18	18	1.6	1	1
07/23/19	26.1		6.8	17	2.3	1	1
08/06/19	27.6		18	19	1.4	1	1
08/19/19	25.6		22	14	1.3	1	1
09/04/19	21.5		36	23	1.2	2	1
09/17/19	24.0		6.1	20	2.3	2	1
10/04/19	15.8		12	15	1.4	2	1
10/14/19	11.5		7.3	15	2.4	2	1



1 = Crystal Clear
2 = Some Algae Present
3 = Definite Algal Presence
4 = High Algal Color
5 = Severe Algal Bloom



1 = Beautiful
2 = Minor Aesthetic Problem
3 = Swimming Impaired
4 = No Swimming; Boating OK
5 = No Aesthetics Possible

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP					C	C	B	C	C	C	C	C
CLA					B	B	B	B	B	C	C	B
Secchi					C	C	C	C	C	C	C	C
Lake Grade					C	C	B	C	C	C	C	C

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP	C	C	D	C	C	C	C	C	D	C	C	C
CLA	B	C	C	B	B	B	C	A	C	A	B	B
Secchi	C	C	C	C	C	C	B	C	D	C	C	B
Lake Grade	C	B	D	B	C	B						

Year	2016	2017	2018	2019
TP	C	C	C	A
CLA	C	D	C	B
Secchi	C	C	D	C
Lake Grade	C	C	C	B

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

Woodpile Lake (82–0123) Browns Creek Watershed District

Monitoring agency: Washington Conservation District staff

Woodpile Lake is located in Washington County. It has a surface area of 19 acres. The maximum depth of the lake is 8.2 m (27 ft).

On each sampling day surface samples were collected for laboratory analysis of total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll including chlorophyll-a (CLA). Secchi transparency was measured during each site visit. Depth profiles of dissolved oxygen and temperature were also made. The resulting surface data are summarized in tables and figures on the following pages. For depth profile data, please refer to the MCES's EIMS system at <http://es.metc.state.mn.us/eims/>.

2019 Data summer (May - September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP (µg/l)	27	15	47	B
CLA (µg/l))	5.1	1.9	8.5	A
Secchi (m)	3.0	2.4	4.0	A
TKN (mg/l)	0.66	0.55	0.73	
			Lake Grade	A

The lake received a lake grade of A this year. All three parameter grades have generally improved since 2006. TP grades have changed from D to B; CLA grades have changed from the B and C range to A; and Secchi grades have changed from the B and C range to the A and high B range. Continued monitoring is recommended to determine if this recent improvement in water quality is part of a longer term trend.

During each monitoring visit, the lake's physical condition and recreational suitability were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TP												
CLA												
Secchi												
Lake Grade												

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TP												
CLA												
Secchi												
Lake Grade												

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TP			D	C	C	C	C	C	C	B	B	B
CLA			B	B	C	B	C	C	A	A	A	A
Secchi			C	B	C	B	C	A	A	A	B	B
Lake Grade			C	B	C	B	C	B	B	A	B	B

Year	2016	2017	2018	2019
TP	C	B	B	B
CLA	A	A	A	A
Secchi	B	B	B	A
Lake Grade	B	B	B	A

Source: Metropolitan Council, EPA STORET, and/or MPCA EQuIS database(s)

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Appendix A

Lakes Sampled by Metropolitan Council Staff and the CAMP, 1980 - 2019. (Numbers indicate monitoring events per year. A "v" indicates monitoring performed through CAMP.)

Lake	DNR ID	Site	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19			
Acorn Lake	82010200	1																										v14		v6	v6	v7							v7	v7	v6	v7			
Alimagnet Lake	19002100	1																v12	v10	v10	v10	v10	v10	v8	v9	v12	v10	v10	v8	v10	v12	v10	v13	v12	v11	v10	v12	v12	v11	v13	v9	v13			
Alice Lake	82028700	1																																	v12	v14	v14	v11			v13				
Anderson Pond	19009400	1																													v12	v9	v3		v6										
Ann Lake	10001200	1						5					13																																
Ardmore Lake	27015300	1																																											
Armstrong Lake	82011602	1																		v15	v10	v13	v14	v15	v14	v14	v14	v7	v7	v7	v14	v7	v7	v7	v7	v7	v5	v8	v7	v7	v6	v7			
Assumption Lake	10006300	1																				v1																							
Auburn Lake	10004401	1			10				17	18			12			13																													
Auburn Lake	10004402	1			10																																								
Aue Lake	10002800	1																				v1																							
Augusta Lake	19008100	1																																											
Bald Eagle Lake	62000200	1	4	5		5																				13	13																		
Bald Eagle Lake	62000200	2																								13	13																		
Bailey Lake	82045600	1																																											
Baldwin Lake	2001300	1																																											
Barker Lake	82007600	1																					v5	v5	v7	v7	v7	v7	v7	v7	v7														

Appendix B

Lake Characteristics

Lake	DNR ID	Location	Surface Area (ac)	Watershed Area (ac)	Watershed to Surface Area Ratio	Max Depth (m)	Mean Depth (m)	Volume (ac-ft)	% Littoral	Shallow Lake	Public Access	DNR Classification
Acorn Lake	82010200		44	296	6.7	3.0	0.7	101.0239999999-9999	100	Y	N	
Alice Lake	82028700		28	2,806	100.2	2.7			100	Y	Y	
Alimagnet Lake	19002100		109	1,094	10.0	3.0	1.5	545	100	Y		
Anderson Pond	19009400		2									
Ann Lake	10001200		116	1,247	10.8	13.7			41		Y	
Ardmore Lake	27015300		10.1			6.1	2.4	78	89			N
Armstrong Lake	82011602		39			1.5	1	128	100	Y		N
Auburn Lake	10004400		287	8,027	28.0	25.6			56			Y
Augusta Lake	19008100		38			10.1			56			Y
Bailey Lake	82045600		51									
Baldwin Lake	2001300		220			1.5			100	Y		N
Barker Lake	82007600		45	823	18.3	9.0	4.4	648				N
Bass Lake	27001500	St. Louis Park	95									
Bass Lake	27009800	Plymouth	194	3,100	16.0	9.4	3.1	1,979	82			N
Bass Lake	82003500	May Township	81			4.3			100	Y		N
Bass Lake	82012300	Grant Township	47						100			N
Bass Lake	82012400	Grant Township	23.5						100			N

Battle Creek Lake	82009100		105	4,264	40.6	4.6			100	Y	Y	
Bavaria Lake	10001900		200	711	3.6	18.3	5.6	3,674	40		Y	Centrarchid
Bay Pond	82001100	10.199999999-999999		849	83.2	1.1				Y		
Benton Lake	10006900		115	322	2.8	2.0			100	Y	N	
Benz Lake	82012000		36			2.7			100	Y	N	
Beutel Pond	82039900		1.3			1.1				Y		
Big Carnelian Lake	82004900		455	1,900	4.2	20.0	9.8	14,560	28		Y	
Big Comfort Lake	13005300		219			14.3			41		Y	
Big Marine Lake	82005200		1,706	2,659	1.6	15.2	7.6	42,527	67		Y	
Big Woods Lake	10024900		33	1,421	43.1	2.5				Y	N	
Birch Lake	13004200		65									
Bone Lake	82005400		212	5,177	24.4	9.8	3.7	2,820	59		Y	
Brewer's Pond	82002200		13.3								N	LakesAndRivers2015.lyr
Brick Pond	82030800		10.6			1.5				Y		LakesAndRivers2015.lyr
Brickyard Clayhole Lake	10022500		17			13.1			35		N	
Bryant Lake	27006700		176			13.7			36		Y	
Buck Lake	70006500		65	3,925	60.4						N	
Burandt Lake	10008400		96			7.3			70		N	
Bush Lake	27004700		172			8.5			64		Y	
Byllesby Lake	19000600		1,368.5	733,166	535.7	15.2			71		Y	

Campbell Lake	10012700		72			2.0			100	Y	N	
Carol Lake	82001700		63	375	6.0	1.8	0.9	186	100	Y	N	
Cates Lake	70001800		27			4.0			100	Y	N	
Cedar Island Lake	27011900		80	800	10.0	2.1	1.4	368	100	Y	N	
Cedar Lake	70009100		742	11,104	15.0	4.7	2.1	5,194	100		Y	
Cenaiko Lake	2065400		29			9.1			40		N	Stocked w/Trout - Fishing Pier
Centerville Lake	2000600		473	1,640	3.5	5.8			58		Y	
Christmas Lake	27013700		268	741	2.8	26.5			29		Y	Trout Lake
Clear Lake	82004500		31			8.2			94		N	
Clear Lake	82009900		24.1								N	
Clear Lake	82016300		400			8.5	3.7	4,800	67		Y	Walleye
Cloverdale Lake	82000900		45	819	18.2	8.5	3	450	86		N	
Cobblecrest Lake	27005300		10								N	
Cobblestone Lake	19045600		37			6.0						
Cody Lake	66006100		256			3.7	2.4	78		Y		
Colby Lake	82009400		71	8,088	113.9	3.4			100	Y	N	
Cornelia Lake	27002800		52			2.0				Y	N	
Courthouse Lake	10000500		10			17.4			30		N	Stocked w/Trout
Cowley Lake	27016900		44.4									
Crane Lake	27073400		43.8			1.5			100	Y	N	

Crystal Lake	19002700	Burnsville	292	2,001	6.9	11.3	3.1	2,920	72		Y	Panfish - Fishing Pier
Crystal Lake	27003400	Robbinsdale	76	1,272	16.7	10.4	3.7	917	68		Y	Centrarchid - Fishing Pier
Dean Lake	70007400		128						100		N	
DeMontreville Lake	82010100		160	1,108	6.9	7.3	2.4	1,280	90		Y	
Downs Lake	82011000		35	2,400	68.6	2.1	1.5	175	100	Y	N	
Dubay Lake	27012900		16.600000000-000001								N	
Duck Lake	27006900		45.6	199.8	4.4	2.6			100	Y	Y	
Eagle Lake	10012100	Carver	186	1,050	5.6	4.3	2.5	1,500	100	Y	Y	
Eagle Lake	27011101	Maple Grove	291	3,220	11.1	10.4	3.8	3,667	68		Y	Centrarchid
Eagle Point Lake	82010900		120	11,502	95.9	1.8	1	360	100	Y	N	
Earley Lake	19003300		29	1,629	56.2						N	
East Boot Lake	82003400		47	93	2.0	8.2	0.9	282	84		Y	
East Lake	19034900		40									
Echo Lake	82013500		41	194	4.7	1.8	0.8	107	100	Y	N	
Edina Lake	27002900		23.9			1.0			100	Y	N	
Edith Lake	82000400		81	1,576	19.5	13.0						
Elmo Lake	82010600		284	1,191	4.2	41.7			22			
Elwell Lake	82007900		18	229	12.7	2.1					N	
Farquar Lake	19002300		63	353	5.6	3.0	1.4	290	100	Y	N	
Fireman's Clayhole Lake	10022600		8			7.0			88			

Fish Lake	2006500		334			4.4	0.91	1,000	100	Y		MnDNR fisheries survey. 1998.
Fish Lake	70006900	Scott	171	660	3.9	8.5	4.4	2,468	43		Y	Centrarchid
Fish Lake	82006400	Scandia	72	683	9.5	3.0	1.5	360	100	Y	N	
Fish Lake	82009300	Woodbury	5.2									
Fish Lake	82013700	Grant Township	21			10.4			67			
Forest Lake	82015900		2,249	4,285	1.9	11.5	3.4	24,986	68		Y	
Fourth Lake	13002200		33.299999999- 999997	1,918	57.6	2.0			100	Y	N	
French Lake	27012700		352	870	2.5	1.0				Y	Y	
Friedrich's Pond	82010800		14.5	360	24.8							
Gaystock Lake	10003100		105			5.0			100		N	
George Lake	2009100		488			9.8			80			
George Watch Lake	2000500		528			2.0	1.5	2,587	100	Y	Y	
German Lake	82005600		109									
Glen Lake	27009300		98			7.6			91		N	
Goetschel Lake	82031300		22	2,812	127.8	4.2	1.2	88	100	Y	N	
Goggins Lake	82007700		11						100		N	
Golden Lake	2004500		57	7,680	134.7	7.3	2.5	463	90		Y	
Goose Lake	10008900	Waconia	407	1,100	2.7	3.0	1.5	2,035	100	Y		Natural Environment
Goose Lake	82005900	Scandia	83			7.6	2.4	664	55		Y	
Grace Lake	10021800		22			6.7			79			

Haas Lake	70007800		32.200000000-000003									N
Hafften Lake	27019900		43						60			Y
Hart Lake	2008100		8						100			N
Harvey Lake	27067000		5.9			0.7			100	Y		N
Hawkes	27005600		6.7									
Hay Lake	82006500		33									N
Hazeltine Lake	10001400		236			2.0			100	Y		N
Heims Lake	13005600		81									
Henry Lake	10017500		77			1.5			100	Y		N
Herber's Pond	82001501	part of Loon Lake				2.0			100	Y		N
Hidden Lake	27069300		9			8.5			56			N
Heifort's Pond	82048500		11.2									
Highland Lake	2007900		22			1.0			100	Y		N
Holland Lake	19006500		38			18.8			59			Y
Hornbean Lake	19004700		22									N
Horseshoe Lake	19005100		16									N
Horseshoe Lake	82007400	West Lakeland Twp.	53			3.4				Y		
Hydes Lake	10008800		215	430	2.0	5.5	3	2,150	88			Y
Island Lake	2002200		67			6.7			87			N
Jackson WMA	82030500		14.3									

Jane Lake	82010400		155	1,402	9.0	12.0	3.7	1,860	72		Y	
Jellum's Lake	82005202		72	333	4.6	4.9	2.4	569	100		N	
Jonathon Lake	10021700		24.2								N	
Jubert Lake	27016500		93			12.5			53		N	
July Lake	82031800		14.3								N	
Karth Lake	62007200		17									
Keewahtin Lake	82008000		75	303	4.0	10.3	1.7	420	67		N	
Keller Lake	19002500	Burnsville	51	1,387	27.2	3.0	1.8	300	100	Y	N	
Kingsley Lake	19003000		44	193	4.4	4.0			100	Y	N	
Kismet Lake	82033300				39.799999999- 999997						N	
Klawitter Lake	82036800		4.5	168		37.3			100			
Kramer Lake	82011700		13									
La Lake	82009700		35			3.5			100	Y	N	
Lac Lavon	19044600		55	306	5.6	9.8			47		N	Stocked w/Trout - Fishing Pier
Lake of the Isles	27004000		114			9.5			79		Y	
Langton Lake	62004900		30	257	8.6	1.5	1.2	120	100	Y		
Laura Lake	27012300		33.4	312	9.3	2.9			100	Y	N	
Lee Lake	19002900		25	324	13.0	5.2			100		N	
Legion Pond	82046200		16	224	14.0							
LeMay Lake	27008500		34			4.0	1.6	173		Y		

Lendt Lake	13010300		57.3	456.2	8.0	2.5			100	Y	N	
Levander Pond	19008800		2.5									
Libbs Lake	27008500		23			2.1			100	Y	N	
Lilly Lake	19008400		7								N	
Lily Lake	82002300		52			17.4			73		Y	Centrarchid - Fishing Pier
Little Carnelian Lake	82001400		162	565	3.5	21.3	10.7	5,686			N	
Little Comfort Lake	13005400		36			17.0			44		N	
Little Johanna Lake	62005800		35			12.0			67		N	
Little Long Lake	27017900		108			23.2			49		Y	
Lochness Lake	2058400		5.3			4.9						
Lone Lake	27009400		22			8.2			18		Y	
Long Lake	19002200	Appley Valley	36			1.5			100	Y	N	
Long Lake	82002100	Stillwater	71			6.7			96		N	
Long Lake	82003000	May Township	88			3.7			100	Y	Y	
Long Lake	82006800	Scandia	35	381	10.9	2.1	1.1	126	100	Y	N	
Long Lake	82011800	Pine Springs	62	2,060	33.2	10.4	3.6	744	55		N	
Long Lake	82013000	Mahtomedi	48			7.7			92		N	
Loon Lake	82001502		64	407	6.4	4.9	2.4	206	100		N	
Lost Lake	27010300	Plymouth	22			1.8			100	Y	N	
Lost Lake	82013400	Mahtomedi	22			7.9			34		Y	

Lotus Lake	10000600		246	1,033	4.2	8.8	4.3	3,500	74		Y	
Louise Lake	82002500		48	616	12.8	3.7	1.8	283	100	Y	N	
Lower Prior Lake	70002600		827	19,560	23.7	18.3	4.1	11,120	46		Y	Centrarchid
Lucy Lake	10000700		87			6.4			99		N	
Lynch Lake	82004200		43									
MacDonald Pond	82006200		12			2.7			100	Y	N	
Magda Lake	27006500		15									
Maple Marsh Lake	82003800		38	148	3.9	3.4	1.7	212	100	Y	N	
Marcott Lake (Ohmans Lake)	19004200		34			10.1					N	
Marcott Lake (Rosenberg Lake)	19004100		20			8.2			90		N	
Maria Lake	10005800		169			1.0			100	Y	Y	
Marion Lake	19002600		560			6.4			81		Y	
Markgrafs Lake	82008900		46	413	9.0	2.4			100	Y	N	Rearing
Markley Lake	70002100		27			3.7			100	Y	N	
Masterman Lake	82012600		45									
McDonald Lake	82001000		54	1,051	19.5	3.7	1.8	324	100	Y	N	
McKnight Lake	10021600		29.7								N	
McKusick Lake	82002000		46			4.7			100		N	
McMahon Lake	70005000		110			4.5			100	Y	Y	
Meadow Lake	27005700		11	121	11.0	1.2			100	Y	N	

Medicine Lake	27010400		886			14.9			45		Y	
Medina Lake	27014600		28						100		N	
Mergen's Pond	82048200		12	1,383	115.3	1.3			100	Y	N	
Miller Lake	10002900		145	16,701	115.2	4.3	3.1	1,479	100	Y	N	
Minnetoga Lake	27008800		14.4			8.2	3.9	183				
Minnewashta Lake	10000900		677			21.3			55		Y	
Mitchell Lake	27007000		112			5.8			97		Y	
Moody Lake	13002300		35			14.6			63		N	
Mud Lake	82002602		62	899	14.5	2.1	1.1	224	100	Y	N	
Nielson Lake	82005500		50.4								N	
Normandale Lake	21104500		103			3.7			100	Y		
North School Section Lake	82014900		105								N	
North Twin Lake	82001800		69	187	2.7	1.8	0.9	207	100	Y	N	
Northwood Lake	27062700		15	1,341	89.4	1.5	0.8	41	100	Y	N	
O'Connor Lake	82000200		38								N	
O'Dowd Lake	70009500		258			6.7			91		Y	
Oak Lake	10009300		339			3.4			100	Y	N	
Olson Lake	82010300		89	200	2.2	4.5	2.1	623	100	Y	Y	
Oneka Lake	82014000		381			2.1	1.2	1,524	100	Y	N	Wildlife
Orchard Lake	19003100		250	2,012	8.0	10.0	3	2,500	75		Y	Centrarchid

Pamela Lake	27067500		18			1.5			100	Y	N	
Parkers Lake	27010700		97	950	9.8	11.3	3.7	1,164	70		Y	
Pat Lake	82012500		13									
Peltier Lake	2000400		174	68,082	391.3	4.9	2.1	3,255	100		Y	Gamefish
Penn Lake	27000400		31			2.1			100	Y	Y	
Pepin Lake	40002800		326			3.4	1.1	1,150		Y	Y	
Peter Lake	27014700		46			20.7			35		N	
Pickerel Lake	2013000	Nowthen	246	616	2.5	1.5	1.5	369	100	Y	Y	
Pickerel Lake	19007900	Lilydale	114			3.4			100	Y	Y	Floodplain lake
Pike Lake	27011102	Maple Grove	59	919	15.6	6.7	2	395	95		Y	Centrarchid
Pike Lake	62006900	New Brighton	35			4.9	2.1	252	100		N	Gamefish
Pike Lake	70007600	Prior Lake	57	1,991	34.9	2.7			100	Y	N	
Pine Tree Lake	82012200		174			7.9	3	1,740	91		N	Centrarchid
Pleasant Lake	70009800		300			1.5			100	Y	Y	
Pomerleau Lake	27010000		27			7.9	2.7	243	73		N	
Powers Lake	82009200		57	1,238	21.7	12.5			57		N	Centrarchid
Priebe Lake	62003600		5.7			1.5			100	Y	N	
Rebecca	19000300	Hastings	58			4.6			100	Y	Y	Floodplain lake
Red Rock Lake	27007600		96.9			4.9			94		Y	
Regional Park Lake	82008700		16	600	37.5	5.8			100		N	

Reitz Lake	10005200		79	3,711	47.0	11.0	4	1,027	58		Y	
Reshnanau Lake	2000900		330								N	
Rest Area Pond	82051400		12.6	17,781	1,411.2							
Rice Lake	27011600		252			3.4	1.9	1,570		Y	Y	
Riley Lake	10000200		297	4,796	16.1	15.0	6.6	6,429	34		Y	
Rogers Lake	19008000		94			2.4	1.3	393		Y	Y	
Rose Lake	27009200		17									
Ryan Lake	27005800		20	5,510	275.5	10.7	64.8	312	56		N	
Sanborn Lake	40002700		295			1.2	0.9			Y	Y	
Sand Lake	82006700		46			5.5	2.4	368	91		N	
Schmidt Lake	27010200		37	190	5.1	9.1	1.5	207	92		N	
School Lake	13005700		48									
Schroeder Pond	82030100		47			3.0			100	Y	N	
Schutz Lake	10001800		105	943	9.0	15.0	6	2,100	27		N	
Scout Lake	19019800	8.6999999999-999993				2.9				Y	N	
Second Lake	13002500		86								N	
Seidl's Lake	19009500		14	415	29.6	5.0			100		N	Rearing
Shady Oak Lake	27008900		85			10.7			66		Y	
Shaver Lake	27008600		11								N	
Shields Lake	82016200		27			8.2			74		N	

Silver Lake	62000100		72			5.5			99		Y	
Silver Lake	82001600		98	455	4.6	3.4	1.7	549	100	Y	N	
Simley Lake	19003700		14			5.2					Y	
Smetana Lake	27007300		48.2			3.7			90	Y	N	
South Oak Lake	27066100		3								Y	
South Rice Lake	27064500		3.2	63	19.7	2.5	0.5	5.4	100	Y	N	
South School Section Lake	82015100		125			8.0			41			
South Twin Lake	82001900		54	63	1.1666666666666667	4.0	2	356	100	Y	N	
Spring Lake	19000501	Nininger Township	1,839	23,780,000	12,930.9	5.2			100		Y	
Spring Lake	70005400	Prior Lake	630	13,500	21.4	11.3	5.6	11,500	50		Y	
Square Lake	82004600		193	782	4.1	20.7	9	5,694	65		Y	Stocked w/Trout
St. Croix Lake	82000100		8,600	4,918,790	572.0	23.8					Y	
St. Joe Lake	10001100		14			15.9			46		Y	
Staples Lake	82002800		24	127	5.3	4.3	2.1	165	100	Y	N	
Success Lake	27063400		7.7									
Sunfish Lake	19005000		49			9.8					N	
Sunfish Lake	82010700		50	526	10.5						N	
Sunnybrook Lake	82013300		16	630	39.4	6.1	2	104			N	
Sunset Lake	82015300		124			5.2			100		N	Gamefish
Sunset Pond	19045100		60			3.7			100	Y	N	

Susan Lake	10001300		93			5.2			81		Y	
Swede Lake	10009500		376			4.0			100	Y	Y	
Sweeney Lake	27003501		66	2,400	36.4	8.0	3.6	790	52		N	Panfish
Sylvan Lake	27017100		134			4.0			100	Y	N	
Tamarack Lake	10001000		24			20.0			41		N	
Terrapin Lake	82003100		86			4.6			100		N	
Third Lake	13002400		61.9	196.8	3.2	2.5			100	Y	N	
Thole Lake	70012000		105			3.7			100	Y	Y	
Thompson Lake	19004800		8.1			2.4			88	Y	Y	
Turtle Lake	82003600		44	699	15.9	2.4	1.2	172	100	Y	N	
Twin Lake	19002800	Burnsville	11						100			
Twin Lake	27003502	Golden Valley	19			17.0			42		N	
Twin Lake	27065600	St. Louis Park	12.4								N	
Twin Lake, lower	27004200	Robbinsdale	35.6	5,322	149.5	6.7	2.3	340	83		Y	Centrarchid
Twin Lake, middle	27004200	Crystal	56.9	4,053	71.2	13.4	4.9	918	57		Y	Centrarchid
Twin Lake, upper	27004200	Brooklyn Park	120.3	3,657	30.4	2.4	0.9	397	100	Y	N	Centrarchid
Twin Lake	82015700	Forest Lake	20	654	32.7	2.1					N	
Upper Prior Lake	70007200		340	16,460	48.4	15.2	3.1	3,460	93		Y	Centrarchid
Valentine Lake	62007100		60	2,237	37.3	4.0	1.5	300	100	Y		
Valley Lake	19034800		8	117	14.6	3.2			100	Y	N	

Virginia Lake	10001500		110	772	7.0	10.4	3.3	1,210	88		Y	
Waconia Lake	10005900		3,000	7,880	2.6	11.3	4	38,632	53		Y	Centrarchid
Weber Lake	82011900		7.5	1.4	0.2	1.5			100	Y	N	
West Boot Lake	82004400		110	209	1.9	11.9	5.9	2,090	56		Y	
West Lakeland Storage Site	82048800		27	1,139	42.2						N	
Westwood Lake	27071100		41			2.0			100	Y	N	
White Rock Lake	82007200		65									
Wilmes Lake	82009000		41	2,247	54.8	5.5					Y	
Windsor Lake	27008200		14								N	
Wing Lake	27009100		11									
Winkler Lake	10006600		129	2,758	21.4							
Wood Lake	19002400		9	157	17.4	4.5			100	Y	N	Panfish
Woodpile Lake	82013200		19									
Zumbra-Sunny	10004100		277			17.7	4.3	3,907	33		Y	Class 24

Appendix C

2019 CAMP Volunteers and Monitoring Organization Staff

Sponsor	LAKE	DNR ID	Volunteer / Organization Staff
Apple Valley, City of	Cobblestone Lake	19045600	Jeff Sluiter
Apple Valley, City of	Farquar Lake	19002300	Jeff Christianson
Apple Valley, City of	Long Lake	19002200	Joan Kettelkamp
Apple Valley, City of	Scout Lake	19019800	Dan Stanek
Basset Creek WMO	Lost Lake	27010300	Barrie Froseth
Basset Creek WMO	Medicine Lake, site 1	27010400	David Nelson, Karl Nelson, Kajsja Nelson
Basset Creek WMO	Medicine Lake, site 2	27010400	Andrew Niemela
Basset Creek WMO	Northwood Lake	27062700	Robert White
Basset Creek WMO	Parkers Lake	27010700	David Parker
Basset Creek WMO	Sweeney Lake, site 1	27003501	Shanna Hanson
Basset Creek WMO	Sweeney Lake, site 2	27003501	Amy Baudler
Basset Creek WMO	Twin Lake	27003502	Jennell Bilek
Basset Creek WMO	Westwood Lake	27071100	Nancy Ebner
Black Dog WMO	Crystal Lake	19002700	Joe Tranchilla
Black Dog WMO	Keller Lake	19002500	Paul Coufal
Black Dog WMO	Kingsley Lake	19003000	Lakeville staff
Black Dog WMO	Lac Lavon Lake	19044600	Wally Shaver
Black Dog WMO	Orchard Lake	19003100	Tom Goodwin
Burnsville, City of	Alimagnet Lake	19002100	David DeKraker
Burnsville, City of	Earley Lake	19003300	Nancy Norlen, Jim Norlen
Burnsville, City of	Sunset Pond	19045100	Steve Behnke
Burnsville, City of	Twin Lake	19002800	Bernie DeMaster
Burnsville, City of	Wood Lake	19002400	Burnsville staff
Chanhassen, City of	Lotus Lake	10000600	Steve Donen
Chanhassen, City of	Lucy Lake	10000700	Tim McCotter, Sharon McCotter
Chanhassen, City of	Minnewashta Lake	10000900	Kevin Zahler
Chanhassen, City of	Riley Lake	10000200	David Florenzano
Chanhassen, City of	St. Joe Lake	10001100	Sue Morgan, Linda Scott
Chanhassen, City of	Susan Lake	10001300	Chanhassen staff
Comfort Lake-Forest Lake WD	Big Comfort Lake	13005300	Wally Ostlie
Comfort Lake-Forest Lake WD	Bone Lake	82005400	Julie Morse

Sponsor	LAKE	DNR ID	Volunteer / Organization Staff
Comfort Lake-Forest Lake WD	Forest Lake, east basin	82015900	Jim Dibble
Comfort Lake-Forest Lake WD	Forest Lake, middle basin	82015900	Doug Joens
Comfort Lake-Forest Lake WD	Forest Lake, west basin	82015900	Steve Schmaltz
Comfort Lake-Forest Lake WD	Keewahtin Lake	82008000	Curt Sparks
Comfort Lake-Forest Lake WD	Little Comfort Lake	13005400	Steve Schreiber
Comfort Lake-Forest Lake WD	Moody Lake	13002300	Douglas Toavs
Comfort Lake-Forest Lake WD	Second Lake	13002500	Rod Negus
Eden Prairie, City of	Duck Lake	27006900	Eric Campbell
Eden Prairie, City of	Mitchell Lake	27007000	Gordon Warner, Fran Warner
Eden Prairie, City of	Red Rock Lake	27007600	Dave Wallace
Hastings, City of	Rebecca Lake	19000300	Hastings Environmental Protectors
Lakeville, City of	East Lake	19034900	Lakeville staff
Lakeville, City of	Lee Lake	19002900	Lakeville staff
Lakeville, City of	Marion Lake	19002601	Gabrielle Gallagher, Brian Galagher
Lakeville, City of	Valley Lake	19034800	Lakeville staff
Lower Mississippi River WMO	Augusta Lake	19008100	Steve Treichel
Lower Mississippi River WMO	Pickerel Lake	19007900	Keegan Lund
Lower Mississippi River WMO	Seidl Lake	19009500	Max Wallin
Lower Mississippi River WMO	Thompson Lake	19004800	Anne Pfankuch
Mendota Heights, City of	Lemay Lake	19008200	Julie Woolsey, Leslie Pilgrim
Mendota Heights, City of	Rogers Lake	19008000	David Rossmiller
Nine Mile Creek WD	Bush Lake	27004700	Paul Erdmann, Elizabeth Erdmann
Nine Mile Creek WD	Hawkes Lake	27005600	Mathew Zappa, Jim Zappa
Nine Mile Creek WD	Minnetoga Lake	27008800	Holly Birkeland, Sig Birkeland
Nine Mile Creek WD	Penn Lake	27000400	Lisa McIntire
Nine Mile Creek WD	Wing Lake	27009100	John Burton
Pioneer-Sarah WMC	Hafften Lake	27019900	Tom Cook

Sponsor	LAKE	DNR ID	Volunteer / Organization Staff
Prior Lake Spring Lake WD	Buck Lake	70006500	Steve Beckey
Prior Lake Spring Lake WD	Cates Lake	70001800	Paula Thomsen
Prior Lake Spring Lake WD	Haas Lake	70007800	Thomas Chaklos
Prior Lake Spring Lake WD	Lower Prior Lake, site 2	70002600	Steve Reinders
Rice Cr WD	George Watch Lake	2000500	Krista Harrington, Wargo Nature Center
Rice Cr WD	Karth Lake	62007200	Gary Gerding
Rice Cr WD	Langton Lake	62004901	Tam McGehee, Dick McGehee
Rice Cr WD	Little Johanna Lake	62005800	Fred Fox, Dave Short
Rice Cr WD	Lochness Lake	02058500	Kristen Genet
Rice Cr WD	Long Lake	82013000	Kitty Francy-Payton
Rice Cr WD	Oneka Lake	82014000	Paul Bolstad
Rice Cr WD	Pine Tree Lake	82012200	Gene Berwald
Rice Cr WD	Sunset Lake	82015300	Diane Coderre
Rice Cr WD	Valentine Lake	62007100	Bob Kistler
Rice Cr WD	White Rock Lake	82007200	David Bluhm
Saint Louis Park, City of	Cobblecrest Lake	27005300	Jim Kellogg
Saint Louis Park, City of	South Oak Lake	27066100	Max Philbrook
Saint Louis Park, City of	Twin Lake	27065600	Eric Klingbeil
Scott County	Cedar Lake	70009100	LeighAnn Singleton
Scott County	McMahon Lake	70005000	Robert Weierke, Char Jeurissen
Scott County	Thole Lake	70012001	Mark Vierling
Shakopee, City of	O'Dowd Lake	70009500	Sandy Boyce, Mike Boyce
Shingle Creek WMC	Meadow Lake	27005700	Diane Stauner
St Croix Basin Team	St. Croix Lake, site 2	82000100	Jim Harper, Roberta Harper
St Croix Basin Team	St. Croix Lake, site 3	82000100	Collin Mueller, St. Croix Sailing School
St Croix Basin Team	St. Croix Lake, site 4	82000100	Collin Mueller, St. Croix Sailing School
St Croix Basin Team	St. Croix Lake, site 5	82000100	Jon Morris
St Croix Basin Team	St. Croix Lake, site 6	82000100	Rick Meierotto
St Croix Basin Team	St. Croix Lake, site 7	82000100	Mayme Johnson, Carpenter Nature Center
St Croix Basin Team	St. Croix Lake, site 1N	82000100	Jim Harper, Roberta Harper
Sunfish Lake, City of	Hornbean Lake	19004700	Scott Spaeth
Sunfish Lake, City of	Horseshoe Lake	19005100	Jim Nayas

Sponsor	LAKE	DNR ID	Volunteer / Organization Staff
Sunfish Lake, City of	Sunfish Lake	19005000	James Stowell
Valley Branch WD	DeMontreville Lake	82010100	Tom Bucher, Gary Fields
Valley Branch WD	Edith Lake	82000400	Joseph Reithmeyer, Joel Jensen
Valley Branch WD	Jane Lake	82010400	Jim Thompson
Valley Branch WD	Klawitter Pond	82036800	Hailey Jostes, Pat Barrett, Bonnie Juran
Valley Branch WD	Long Lake	82011800	Frank Bastyr, Bill Feely
Valley Branch WD	Olson Lake	82010300	Tom Bucher, Gary Fields
Valley Branch WD	Rest Area Pond	82051400	MnDOT staff
Woodbury, City of	Colby Lake	82009400	WCD staff
Woodbury, City of	Fish Lake	82009300	WCD staff
Woodbury, City of	La Lake	82009700	Tim Weber
Woodbury, City of	Markgraf Lake	82008900	WCD staff
Woodbury, City of	Powers Lake	82009200	WCD staff
Woodbury, City of	Wilmes Lake	82009002	WCD staff
The following lakes are sponsored through a watershed district (WD) or watershed management organization (WMO) in partnership with the Washington Conservation District.			
Browns Creek WD	Benz Lake	82012000	WCD staff
Browns Creek WD	Brewer's Pond	82002200	Karen Richtman, Paul Richtman, WCD staff
Browns Creek WD	Bass Lake	82012400	WCD staff
Browns Creek WD	Bass Lake	82012300	WCD staff
Browns Creek WD	Goggins Lake	82007700	WCD staff
Browns Creek WD	Heifort's Pond	82048500	George Vania, WCD staff
Browns Creek WD	Jackson WMA	82030500	WCD staff
Browns Creek WD	July Lake	82031800	WCD staff
Browns Creek WD	Kismet Lake	82033400	WCD staff
Browns Creek WD	Long Lake	82002100	WCD staff
Browns Creek WD	Lynch Lake, site 1	82004200	WCD staff
Browns Creek WD	Lynch Lake, site 2	82004200	WCD staff
Browns Creek WD	Masterman Lake	82012600	WCD staff
Browns Creek WD	North School Section Lake	82014900	WCD staff
Browns Creek WD	Pat Lake	82012500	WCD staff
Browns Creek WD	Plaisted Lake	82014800	WCD staff
Browns Creek WD	South School Section Lake	82015100	WCD staff
Browns Creek WD	Woodpile Lake	82013200	WCD staff

Sponsor	LAKE	DNR ID	Volunteer / Organization Staff
Comfort Lake-Forest Lake WD	Big Comfort Lake	13005300	WCD staff
Comfort Lake-Forest Lake WD	Bone Lake	82005400	WCD staff
Comfort Lake-Forest Lake WD	Elwell Lake	82007900	WCD staff
Comfort Lake-Forest Lake WD	Forest Lake, east basin	82015900	WCD staff
Comfort Lake-Forest Lake WD	Forest Lake, middle basin	82015900	WCD staff
Comfort Lake-Forest Lake WD	Forest Lake, west basin	82015900	WCD staff
Comfort Lake-Forest Lake WD	Fourth Lake	13002200	WCD staff
Comfort Lake-Forest Lake WD	Keewahtin Lake	82008000	WCD staff
Comfort Lake-Forest Lake WD	Little Comfort Lake	13005400	WCD staff
Comfort Lake-Forest Lake WD	Lendt Lake	13010300	WCD staff
Comfort Lake-Forest Lake WD	Moody Lake	13002300	WCD staff
Comfort Lake-Forest Lake WD	Shields Lake	82016200	WCD staff
Comfort Lake-Forest Lake WD	Third Lake	13002400	WCD staff
Comfort Lake-Forest Lake WD	Twin Lake	82015700	WCD staff
Carnelian-Marine-St. Croix WD	Alice Lake	82028700	WCD staff
Carnelian-Marine-St. Croix WD	Barker Lake	82007600	WCD staff
Carnelian-Marine-St. Croix WD	Bass Lake	82003500	WCD staff
Carnelian-Marine-St. Croix WD	Big Carnelian Lake	82004900	WCD staff
Carnelian-Marine-St. Croix WD	Big Marine Lake	82005204	WCD staff
Carnelian-Marine-St. Croix WD	Clear Lake	82004500	WCD staff
Carnelian-Marine-St. Croix WD	East Boot Lake	82003400	WCD staff
Carnelian-Marine-St. Croix WD	Fish Lake	82006400	WCD staff
Carnelian-Marine-St. Croix WD	German Lake	82005600	WCD staff

Sponsor	LAKE	DNR ID	Volunteer / Organization Staff
Carnelian-Marine-St. Croix WD	Goose Lake	82005900	WCD staff
Carnelian-Marine-St. Croix WD	Hay Lake	82006500	WCD staff
Carnelian-Marine-St. Croix WD	Jellums Lake	82005202	WCD staff
Carnelian-Marine-St. Croix WD	Little Carnelian Lake	82001400	WCD staff
Carnelian-Marine-St. Croix WD	Long Lake	82003000	WCD staff
Carnelian-Marine-St. Croix WD	Long Lake	82006800	WCD staff
Carnelian-Marine-St. Croix WD	Mays Lake	82003300	WCD staff
Carnelian-Marine-St. Croix WD	Mud Lake	82002602	WCD staff
Carnelian-Marine-St. Croix WD	Sand Lake	82006700	WCD staff
Carnelian-Marine-St. Croix WD	Square Lake	82004600	WCD staff
Carnelian-Marine-St. Croix WD	Staples Lake	82002800	WCD staff
Carnelian-Marine-St. Croix WD	Terrapin Lake	82003100	WCD staff
Carnelian-Marine-St. Croix WD	Turtle Lake	82003600	WCD staff
Carnelian-Marine-St. Croix WD	Twin Lake	82004800	WCD staff
Carnelian-Marine-St. Croix WD	West Boot Lake	82004400	WCD staff
Middle St. Croix WMO	Lily Lake	82002300	WCD staff
Middle St. Croix WMO	McKusick Lake	82002000	WCD staff
South Washington WD	Armstrong Lake	82011602	WCD staff
South Washington WD	Bailey Lake	82045600	WCD staff
South Washington WD	O'Connors Lake	82000200	Jeff Keene
South Washington WD	Regional Park Lake	82008700	WCD staff
Valley Branch WD	Acorn Lake	82010200	WCD staff
Valley Branch WD	Bay Pond	82001100	WCD staff
Valley Branch WD	Clear Lake	82009900	WCD staff
Valley Branch WD	Cloverdale Lake	82000900	WCD staff
Valley Branch WD	Downs Lake	82011000	WCD staff
Valley Branch WD	Echo Lake	82013500	WCD staff

Sponsor	LAKE	DNR ID	Volunteer / Organization Staff
Valley Branch WD	Eagle Point Lake	82010900	WCD staff
Valley Branch WD	Fahlstrom Pond, site 1	82000500	WCD staff
Valley Branch WD	Fahlstrom Pond, site 2	82000500	WCD staff
Valley Branch WD	Goetschel Lake	82031300	WCD staff
Valley Branch WD	Goose Lake, site 1	82011301	WCD staff
Valley Branch WD	Goose Lake, site 2	82011302	WCD staff
Valley Branch WD	Horseshoe Lake, site 3	82007400	WCD staff
Valley Branch WD	McDonald Lake	82001000	WCD staff
Valley Branch WD	Sunfish Lake	82010700	WCD staff
Valley Branch WD	Sunnybrook Lake	82013300	WCD staff

Appendix D

CAMP Quality Control Data 2019

Lake Name	DNR ID#	Date	Date	TP, ug/L	TP, ug/L	CLA, ug/L	CLA, ug/L	Secchi, m	Secchi , m	TKN, mg/L	TKN, mg/L
		METC	CAMP	METC	CAMP	METC	CAMP	METC	CAMP	METC	CAMP
Crystal Lake	19002700	7/12/19	7/8/19	18	19	17	6.2	2.0	2.3	0.59	0.49
Orchard Lake	19003100	7/12/19	7/23/19	14	18	6.4	12		1.9	0.57	0.55
Marion Lake	19002601	7/12/19	6/29/19	13	18	4.9	5.8	3.8	3.4	0.46	0.56
McMahon Lake	70005000	9/6/19	9/10/19	81	64	78	63	0.8	0.8	1.20	1.10
Thole Lake	70012001	9/6/19	9/8/19	59	41	39	22	0.9	0.7	1.50	1.30
O'Dowd Lake	70009500	9/6/19	9/2/19	38	33	48	43	1.1	1.0	1.10	1.00
Keller Lake	19002500	9/20/19	9/20/19	32	39	27	25	1.1	1.0	1.20	1.20