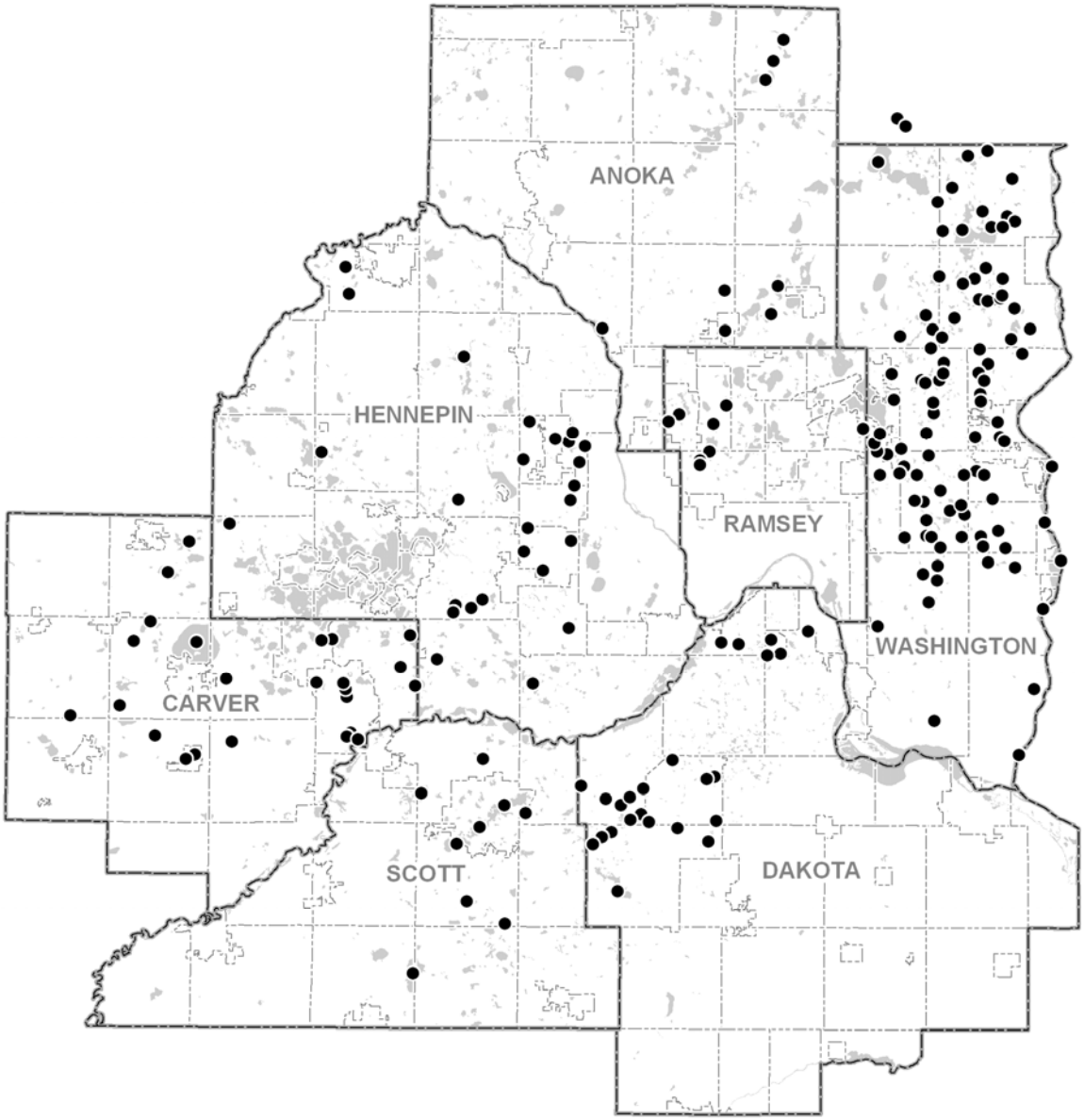
# 2008 Study of the Water Quality Of 192 Metropolitan Area Lakes




**By**
**Brian Johnson**
**Senior Environmental Scientist**
**Metropolitan Council Environmental Services**
**October 2009**

# EXECUTIVE SUMMARY

This 2008 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 202 lake sites on 192 lakes monitored in 2008. This year's monitoring program included 16 lakes never before monitored by the Council.

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 unmonitored lakes, examine intra-and inter-regional differences, determine potential impairments due to water quality, 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.

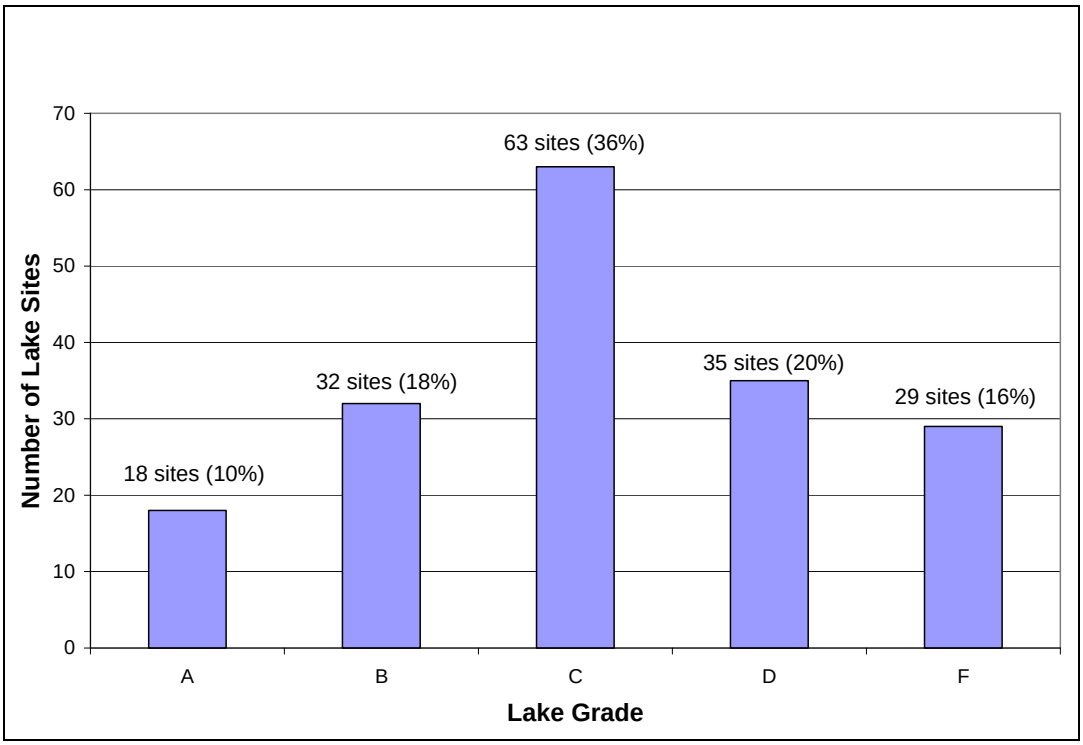
The year 2008 marked the sixteenth year that the Citizen-Assisted Monitoring Program (CAMP) was used to increase our knowledge of the water quality of area lakes. CAMP volunteers visited their assigned lake on a biweekly basis from mid April to mid October. The volunteers measured surface water temperature 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 2008, there were 35 sponsors who consisted of a mix of municipalities, watershed management organizations, watershed management districts, counties, and a basin water resources planning team.

Each lake was given a lake grade which was calculated on the basis of three parameters: total phosphorus, chlorophyll-a, and Secchi depth (water clarity). Not all lake sites received a lake grade because of 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 2008 is shown in the following figure.

The greatest percentage of the lake sites received a lake grade of C. The water quality of these lakes is considered average as compared to other lakes in the TCMA. When comparing the percentage of above-average lakes, those receiving grades of A or B (28%), to below-average lakes, those receiving D or F (36%), more lakes were below average.

The 18 lake sites that received "A" lake grades include: Brickyard, Bush, Clear (May Township), Courthouse, DeMontreville, Elmo, Fireman's, Jane, Kingsley, Long (Mahtomedi), Mays, Olson, Orchard, St. Joe's, Sunnybrook, Sunset, Sylvan (Washington County), and Twin Lake south (Washington County).

The 29 lake sites receiving the lowest water quality grade "F" include: Ardmore, Bay Pond, Benton, Cobblecrest, Colby, Eagle (Carver County), Goose (Waconia), Goose [sites 1 & 2 (Washington County)], Hyde, Jonathan, Kramer, Long (Apple Valley), Lake Forest, Loon, Lynch, Meadow, Mergen's, Meuwissen, McKnight, Priebe, Rest Area Pond, Rose [sites 1 & 2 (Lake Elmo)], Rutz, South Oak, Swede, Twin [upper (Brooklyn Park)], and Winkler.




**Lake Grades for the 2008 Monitoring Season**

Since 1980, 349 TCMA lakes have been monitored through the METC's lake monitoring program. Since some of these lakes have multiple monitoring sites, a total of 379 lake sites have been monitored. The data from the METC's lake monitoring program are permanently stored in the U.S. EPA's national water quality data repository, called STORET (STOrage and RETrieval). Data for all METC lake monitoring sites can also be conveniently obtained via the METC's web-based Environmental Information Management System (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.

The METC's lake monitoring program, especially the use of volunteer monitors through CAMP, has played a key role in the METC's recent efforts to use satellite imagery to assess annual lake water clarity for the entire region. The monitoring program provides direct field measurements that are 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 region's lake water quality beyond just the lakes involved in the METC monitoring program. The satellite–based information can be used to detect how lake water clarity conditions have changed over time and space in relation to changes in land-use and land-cover conditions.

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 are given added appreciation for their multiple years of service:

**16 years of service**
Diane and Bob Coderre – Sunset Lake

**15 years of service**
Washington CD – multiple lakes

**14 years of service**
Bill Aamodt – Wilmes Lake
Carver Co. Env. Services – multiple lakes

**13 years of service**
City of Circle Pines – Golden Lake
John Ritter – Lake Alimagnet
Wargo Nature Center – George Watch

**12 years of service**
Anoka Co. Parks – multiple lakes

**11 years of service**
Glen Gramse – Keller Lake
Wally Shaver – Lac Lavon Lake

**10 years of service**
Philip Goodrich – Pike Lake
Lakeville – Valley and Lee lakes
John Ryski – Bavaria Lake
Westwood Nature Center – Westwood Lake

**9 years of service**
Dave Hanson – Sweeney Lake

**8 years of service**
Arnett Family – Crystal Lake
Gene Berwald – Pine Tree Lake
Kevin Bjork – Cloverdale Lake
Tom/Dorothy Goodwin – Orchard Lake
Wally Potter – Marion Lake
Rice Creek WD – Multiple
Terry Riley – Markgrafs Lake
Mike Shouldice – Tamarack Lake
Sly Family – Downs Lake
Streff Family – South Rice Lake
Bob Videen – Parkers Lake

**7 years of service**
Bonnie Juran – Klawitter Lake
Al Kettlekamp – Long Lake

**7 years of service (continued)**
Kris Mann – Twin, upper
Tom Sletta – Cates Lake

**6 years of service**
Walt Burris – Lower Prior Lake
Conservation League of Edina – Cornelia Lake
Bill Feely – Long Lake
Kellogg Family – Cobblecrest Lake
Kitty Francy-Payton – Long Lake

**5 years service**
David Bess – Wood Lake
David Florenzano – Riley Lake
Wayne Hubin – Swede Lake
Bob Kistler – Valentine Lake
Sue Morgan & Linda Scott – St. Joe Lake
Diane Stauner – Meadow Lake
Shelly Strohmaier – Lotus Lake
Chuck Taylor – Jane Lake
Gordan Warner – Mitchell Lake

**4 years service**
Carpenter Nature Center – St. Croix Lake (site 7)
Marvin Groth – Bass Lake
Roberta & Jim Harper – St. Croix Lake (site 2)
Arnie Johnson – Sunnybrook Lake
Jeff Keene – O'Connor Lake
Sheryl & Rich Lindholm – St. Croix Lake (site 5)
Cecilia & Harry Martin – St. Croix Lake (site 3)
Rick Meierotto – St. Croix Lake (site 6)
Steve Pierson – Fish Lake
Stuart Rudd – Success Lake

**3 years service**
Dick Bancroft – Sunfish Lake
David Bluhm – White Rock Lake
Bruce Cornwall – Twin Lake
Jerry Edberg – Cedar Lake
Dave Johnson – Hornbean Lake
Scott Knudson – Lake Elmo
Minnesota DOT – Rest Area Pond
Dave Nimmer – Edith Lake
Martha Popp – Lost Lake
Bob Schumacher – Eagle Point Lake
Jim Serley – Echo Lake
Mark Storck – Rose Lake
Gregg Thompson – Bush Lake
Dan Wallace – Sunset Pond
Joe Williamson – McMahon Lake

**Metropolitan Council Staff**

- The MCES Laboratory Services Section, for laboratory analysis of the lake samples.
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# INTRODUCTION

This 2008 report continues a series of annual lake reports from 1980 to present. Since 1980, 349 Twin Cities Metropolitan Area (TCMA) lakes have been monitored through the Metropolitan Council's (METC) lake monitoring program. Since some of these lakes have multiple monitoring sites, a total of 379 lake sites have been monitored. This report contains data from 202 lake sites on 192 lakes monitored in 2008. There were16 lakes (20 lake sites) in the 2008 monitoring season that have not been previously monitored by the METC. The list of lakes in the METC's monitoring database is shown in Appendix A. Refer to Appendix B for morphometry and other lake characteristic data. The data from the METC lake monitoring program are permanently stored in the U.S. EPA's national water quality data repository, STORET (STOrage and RETrieval). METC lake monitoring data are readily available via the Metropolitan Council's Environmental Information Management System (EIMS), at: http://es.metc.state.mn.us/eims/.

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 1989c).

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 over the past 30 years 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 unmonitored lakes, examine intra-and inter-regional 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.

# CITIZEN-ASSISTED MONITORING PROGRAM (CAMP)

## CAMP OVERVIEW

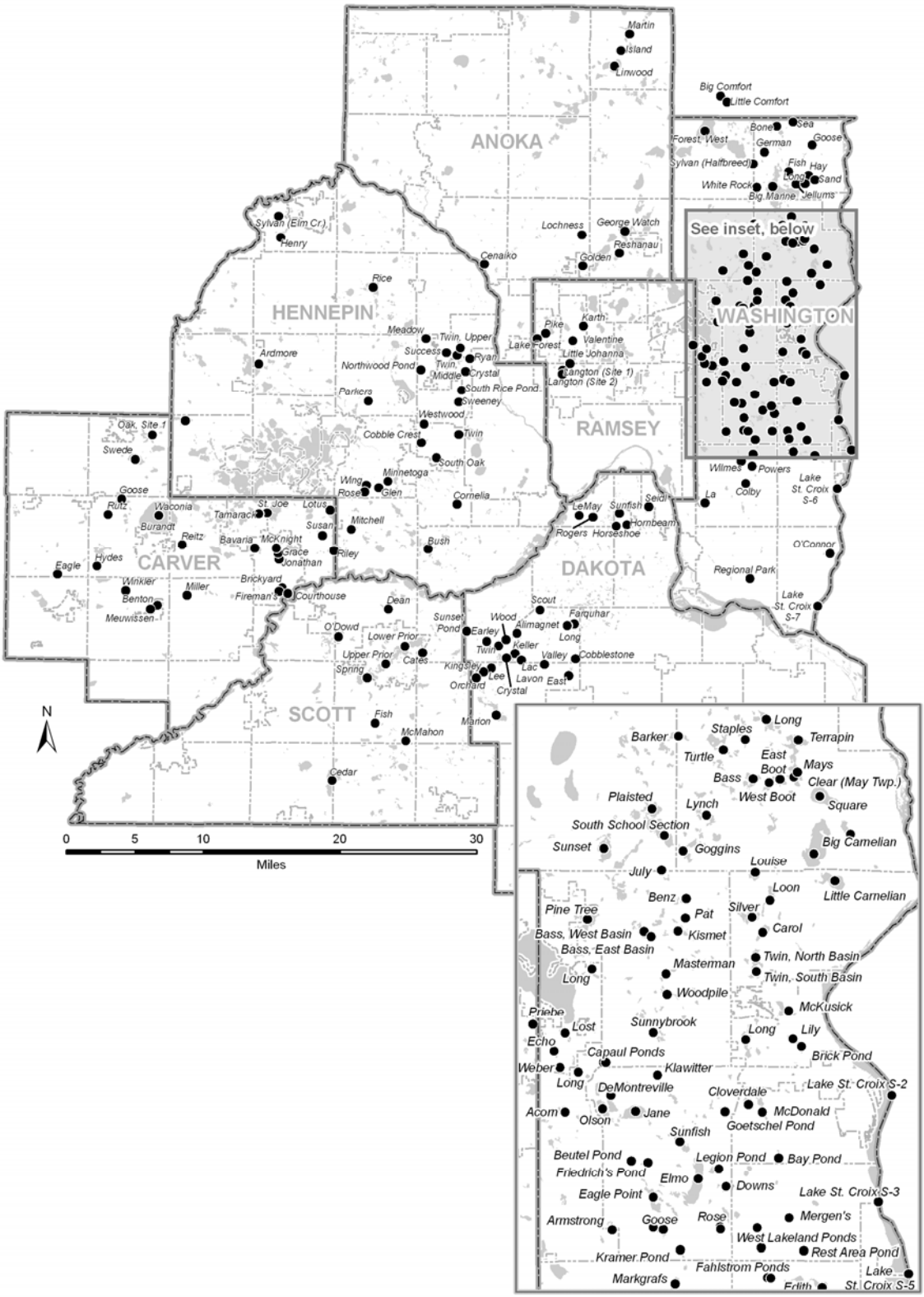
The year 2008 marked the sixteenth year of the CAMP. Figure 1 shows the location of the 2008 CAMP lakes. CAMP monitored 202 lake sites in 2008, including 20 lake sites (16 lakes) that have not been previously monitored by METC. CAMP is jointly funded by the METC and program participants such as WDs, WMOs, counties, and cities.

The main purpose of the CAMP is to provide lake and watershed managers with water quality data that will not only support them in properly managing water resources, but also provide much needed historical baseline data to help document water quality impacts 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 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 (Hartsoe and Osgood 1991). The pilot study and its results are included in the 1993 Annual Lake Report, and can be obtained by contacting Brian Johnson at (651) 602-8743 or brian.johnson@metc.state.mn.us.

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 at the lake's deepest open-water location. In 2008, quite a few 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 are submitted to METC staff and then analyzed at the Metropolitan Council Environmental Services laboratory in St. Paul, MN.

**Figure 1 – 2008 CAMP Study Lakes**



## ACKNOWLEDGMENTS

The successful performance of the 2008 CAMP would not have been possible without the greatly appreciated work performed by volunteer monitors, and the support of the organizations that enrolled lakes in the program. The enrolling organizations, which included 14 cities, 9 WDs, 8 WMOs, 2 counties, 1 conservation district, and 1 basin planning team, 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 2008 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 2008 volunteer monitoring program began in the winter months of 2007. 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 the 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 2008. At each training session, volunteers were given a handbook describing the program, outlining basics in the biology and ecology of lake systems, and containing detailed written instructions for the lake monitoring and data form completion procedures.

At each training session, volunteers received the necessary equipment for lake monitoring. This equipment was purchased by the enrolling agency through the METC and loaned to the volunteers. At the end of the monitoring season, equipment was returned to the enrolling agency to be used in future years. Each lake's volunteer received:

- Chlorophyll hand pump, flask, and filters
- LCD thermometer
- Map of lake with sampling site(s)
- Sampling observation forms
- Sample jug
- Sample vials and labels
- Secchi disk
- Aluminum foil
- Tweezers (forceps)

During the training session, volunteers were given a brief description of limnology and lake ecology as described in their handbook, instructed on proper lake monitoring procedures, and shown how each piece of sampling equipment works. After this discussion, the volunteers received a package containing the

equipment, and the proper use of each piece of equipment was again described and practiced. 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, and that they would use proper safety equipment and observe boat operating methods specified by the State of Minnesota.

## 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 methods they used were determined through a pilot study in 1991 that tested simplified methods for using volunteers to obtain credible water quality data (Anhorn 1994). 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 (the deep open-water area of the lake). Once at the monitoring location, an observation form for lake and meteorological conditions was completed. The form, shown in Figure 2, provides space to mention natural and cultural observations which may have influenced what was happening in the lake (i.e., heavy rains two days before monitoring), and an area to relate general perceptions of the lake's condition and suitability for recreation.

Next, the volunteers took a water transparency reading by lowering a Secchi disk on the shaded side of the boat to the point at which it disappeared. The point where the disk reappears is the Secchi transparency depth that was recorded on the observation form.

The next lake monitoring step involved the collection of the surface water sample. A surface water sample was collected in a clean one-gallon plastic milk jug. To begin, the volunteer pre-rinsed the jug three times with lake water. After rinsing, the jug was filled by submersing it upside down to forearm depth and turning it upright while still submersed. After filling the sample jug, volunteers obtained a temperature measurement and prepared the sample for analysis of TP, TKN, and CLA, as follows:

- **Temperature**. Surface water temperature was measured in the volunteer's sampling jug using a LCD thermometer that is readable 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)**. Two samples, one each for TP and TKN, were decanted from the volunteer's jug in the field into their respective triple pre-rinsed, pre-labeled (including lake name, date, time, and parameter) 50-milliliter (ml) vials. These samples were then placed in the cooler, taken home, and stored in the freezer until they were picked up and delivered to the laboratory for analysis.

- **Chlorophyll-a (CLA)**. CLA samples from the volunteer's jug were filtered in the field *(out of direct sunlight)* onto a 1 micrometer (µm) glass-fiber filter using a field filtration apparatus and a hand pump. Water from the sampling jug was measured and poured into the pump reservoir using a graduated cylinder. The pump reservoir holds approximately 250 ml. By squeezing the handle of the pump, the sample water was forced through the filter and the suspended planktonic algae became attached to the filter. The filtered water was then dumped back into the lake. If possible, this was repeated until a total of 1000 ml of sample water was allowed to pass through the filter. However, if the water sample was too green and the filter became clogged without allowing more water to pass through, the amount of water that did pass through the filter was calculated and recorded on the observation form. The filter was then removed from the filter holder with a tweezers, and placed in a Petri dish. The sample container was then labeled using the same methods as those for the TP and TKN sample vials (except the amount of water pumped through

the filter was also included on the label), wrapped in aluminum foil, and frozen until pick-up and delivery to the laboratory for analysis.

The frozen samples were picked up within approximately 30-90 days by METC staff and delivered to the MCES laboratory for analysis. Results of the 1991 pilot study revealed that the volunteer monitoring and handling methods chosen for use in the CAMP program yield results comparable to routine methods used by the METC (Hartsoe and Osgood 1991).

For some CAMP lakes, more samples were collected in addition to the surface samples analyzed for TP, TKN, and chlorophyll. Sub-surface samples were collected from some lakes for analysis of TP and TKN. These sub-surface samples were usually collected near the bottom of the lake. For some select lakes, samples were also collected for analysis of other parameters such as ortho-phosphate and total iron. Dissolved oxygen and temperature profile measurements were also collected on some lakes by a few volunteers.

**Figure 2: CAMP Monitoring Form (example)**

Lake Name and ID #:_____ Site #:

Sampling Date:_____ Time:_____

Name(s) of Volunteer(s):

_____

_____

SECCHI DISK DEPTH:____meters

SURFACE TEMPERATURE:____°C

VOLUME OF FILTERED LAKE WATER (CLA) ____ml

## GENERAL OBSERVATIONS

(Circle)

***** Water Color

Clear Yellow
Green Gray
Brown Blue-Green
Comment:

***** Odor of Water

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

***** Wind Conditions

Calm Strong
Breezy
Direction:

***** 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 (storms, high winds, temp. extremes):

***** Physical Condition

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

***** Suitability For Recreation

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

## Laboratory Analytical Methods

The routine chemical analyses of CAMP water samples were performed at the MCES laboratory, following U.S. EPA approved methods. Surface and subsurface water samples that were analyzed for TDP were filtered through a 0.45 µm membrane filter and analyzed for TP. Water samples analyzed for TP and TKN were digested with the sulfates of hydrogen, potassium and mercury ($H_2SO4$, $K_2SO_4$ and $HgSO_4$). Following digestion, phosphorus was analyzed using a modified ascorbic acid reduction method (APHA 1992). Samples analyzed for TKN were chemically reduced the same way as the TP samples, and then were color-intensified with sodium nitroprusside and assayed for ammonia colorimetrically. TKN and TP in surface samples were periodically analyzed in duplicate to determine accuracy, in which case their average values were reported.

Chlorophyll was extracted from the filters by homogenization in 90 percent aqueous acetone. The optical density of the extract was measured spectrophotometrically at 630, 647, 664 and 750 nm. CLA was calculated from a trichromatic equation that corrects for turbidity (APHA 1992).

## Data Management

The field data from the volunteers' sampling forms and the analytical results from the MCES laboratory were entered into the Council's Environmental Information Management System (EIMS). EIMS is a system for providing timely and reliable information for environmental planning and decision-making. The Council's EIMS can be accessed via the internet at http://es.metc.state.mn.us/eims/. This data handling system served three purposes:

1. Check-in of forms and tracking of volunteer participation;

2. Entry of nutrient, Secchi, and user perception data into a database for statistical, graphical, and tabular outputs; and

3. Storage of the CAMP data in the Metropolitan Council's EIMS, as well as in the U.S. Environmental Protection Agency's (U.S. EPA) national water quality data bank, STORET.

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 employs 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.

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. Results of the 2008 QC monitoring are discussed later in this section. 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.

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.

The 2008 CAMP QC data are provided in Appendix D. The results of the 2008 QC monitoring indicate good agreement between data from samples and measurements collected by the volunteer versus those collected by METC staff. Figures 3, 4, and 5 show the QC data for TP, CLA, and Secchi transparency, respectively. The linear regression for each parameter shows close agreement to a 1:1 relationship between data collected by the volunteers versus data collected by METC staff. The $R^2$ values for TP and Secchi transparency were >0.90, which indicates that most of the variability between the volunteer- and METC staff-collected data can be explained by a linear relationship. The 0.80 $R^2$ value for the CLA QC data indicates that the linear relationship is not as strong as those for the other two parameters, but is still robust, nonetheless. CLA is a measure of the abundance of algae at the lake surface, and several factors can affect this algal abundance. These factors, which include diel vertical migration of algal populations, development of algal blooms, and wind conditions, can influence algal populations at the water surface on a time-scale of hours to days. Considering that METC staff typically collect QC samples on a different day and time than the volunteer (although during the same week), it should be expected that there will be variation between the METC staff- and volunteer-collected CLA data. Given the inherent variability associated with algal abundance within the time frame between volunteer- and METC staff-collected samples, an $R^2$ value of 0.80 is an acceptable value.

**Figure 3. Total Phosphorus Quality Control Data 2008**

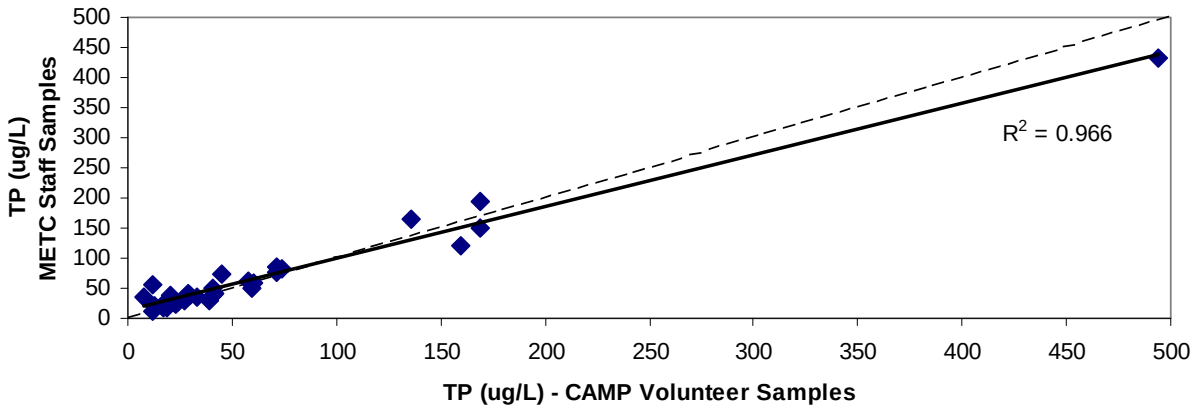



**Figure 4. Chlorophyll-a Quality Control Data 2008**

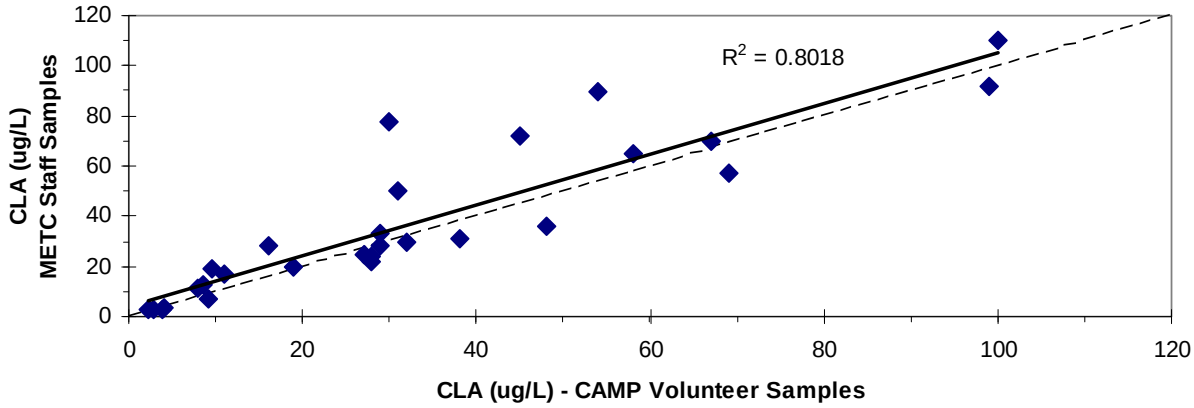
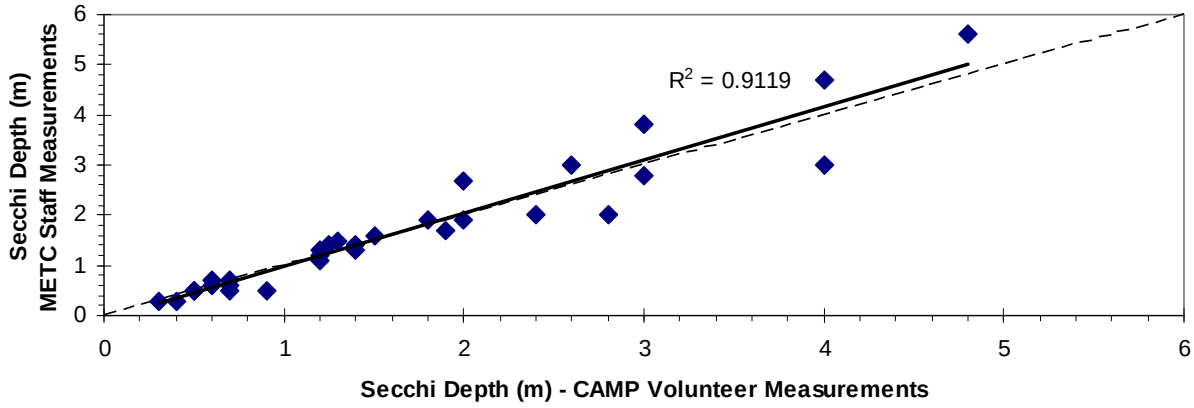



**Figure 5. Secchi Transparency Quality Control Data 2008**



# 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 area lakes. The grading curve represents percentile ranges for three water quality indicators: the summertime (May - September) average values for total phosphorus, chlorophyll-a, and Secchi transparency. These percentiles use ranked data from 120 lakes that were monitored from 1980 – 1988:

| GRADE | PERCENTILE | TP (µg/l) | CLA (µg/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 |

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.

The three variables used in the grading system strongly relate to open-water nuisance-aspects of a lake (i.e. algal blooms), 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 1988b). 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 transparency 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 1988b).

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 transparency to the monitored lakes. For example, a lake having a mean summertime Secchi transparency of 1.7 m would receive a “C” grade for Secchi transparency. A grade of C is considered average for Twin Cities Metropolitan area 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.

## 2008 LAKE GRADES

Each 2008 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. The distribution of lake grades for lake sites monitored in 2008 is shown in Figure 6.

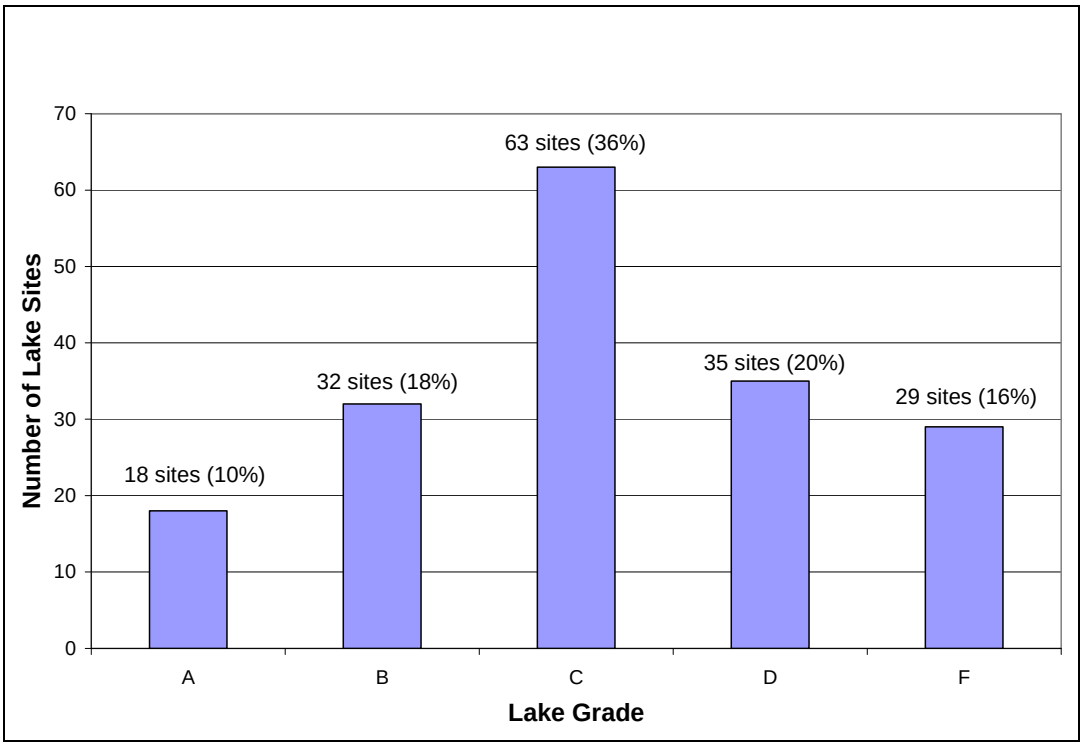



**Figure 6. Distribution of 2008 Lake Grades**

In 2008, the greatest percentage of the lake sites (36%) received a lake grade of C. The water quality of these lakes is considered average as compared to other lakes in the TCMA. More lakes were below average (36% D and F lakes) than above average (28% A and B lakes).

The 18 lake sites that received A lake grades include: Brickyard, Bush, Clear (May Township), Courthouse, DeMontreville, Elmo, Fireman's, Jane, Kingsley, Long (Mahtomedi), Mays, Olson, Orchard, St. Joe's, Sunnybrook, Sunset, Sylvan (Washington County), and Twin Lake south (Washington County).

The 29 lake sites receiving the lowest water quality grade of F include: Ardmore, Bay Pond, Benton, Cobblecrest, Colby, Eagle (Carver County), Goose (Waconia), Goose [sites 1 & 2 (Washington County)], Hyde, Jonathan, Kramer, Long (Apple Valley), Lake Forest, Loon, Lynch, Meadow, Mergen's, Meuwissen, McKnight, Priebe, Rest Area Pond, Rose [sites 1 & 2 (Lake Elmo)], Rutz, South Oak, Swede, Twin [upper (Brooklyn Park)], and Winkler.

Similar to past years, there is no distinct pattern as to where lakes with specific water quality were located. As observed in the past, common similarities between the majority of lakes with D and F

grades are their size and mean depth. These lakes are generally shallow with small surface areas. 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. Also, smaller lakes generally have higher watershed-to-lake ratios. Smaller 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.

Similarly, the lake sites with above-average grades of A and B were not area specific. They were located in six of the seven TCMA counties. Ramsey County had no A or B CAMP lakes in 2008. Lake sites receiving an A grade were found in four of the seven TCMA counties. 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.

The MPCA recently conducted a statewide statistical trend analysis on lakes with extensive Secchi transparency databases. The analysis revealed that the majority of assessed lakes showed no statistically significant trends in water clarity (either negative or improving). However, more lakes showed an improving trend than a degrading trend (MPCA 2008). The MPCA's trend analysis included 76 CAMP lakes that were monitored in 2008. According to the MPCA's analysis, the following 2008 CAMP lakes showed a statistically significant trend in water clarity:

- 25 lakes showed an improving trend in water clarity: Armstrong (south bay), Big Carnelian, Big Marine, Colby, Courthouse, DeMontreville, Earley, Elmo, Halfbreed (Sylvan), Hay, Kismet, Langton (site 2), Little Carnelian, Long (May Township), Marion, Martin, McKusick, Olson, Pine Tree, Regional Park Lake, Silver (Stillwater), Sunset, Valentine, Waconia, and West Boot.
- 8 lakes showed a negative trend: Comfort (Big), Goggins, La, Markgrafs, Powers, Seidl, Square, Twin (middle, Crystal).

The MPCA's has released its draft 2010 Minnesota Impaired Waters Inventory. The draft 2010 inventory indicated that 89 of the 192 CAMP lakes monitored in 2008 were listed as impaired. Seventy eight lakes were listed as impaired for not meeting recreational use, and 32 lakes were listed as impaired for not meeting aquatic consumption use. Some lakes had multiple impairments. The impairments for aquatic recreational use were caused by excess phosphorus and enhanced eutrophication, as measured by the presence of too much algae (chlorophyll-a) and reduced water clarity (Secchi transparency). The aquatic consumption impairments were driven by contaminants in fish tissue, such as mercury, PCBs, and/or perfluorooctane sulfonate. To learn more about the impaired lakes listings and potential next steps, refer to MPCA's webpage: http://www.pca.state.mn.us/water/tmdl/index.html.

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.

# 2008 MONITORING RESULTS FOR INDIVIDUAL CAMP LAKES

The 2008 monitoring results for CAMP lakes are discussed on a lake-by-lake basis in the following pages. *The Handbook for the Citizen-Assisted Lake Monitoring Program* (Anhorn 2003) distributed at the volunteer training sessions provides an overview of limnology and lake ecology.

The results and subsequent analysis of the water quality of each lake includes a written section describing the lake's condition in 2008 and a separate lake information sheet. Each information sheet includes the 2008 water quality data, shown in both tabular and graphic form, as well as the historical lake grades.

## Acorn Lake (82-0102) *Valley Branch Watershed District*

Acorn Lake is a 44-acre lake located within the City of Oakdale (Washington County). This lake is also called Mud Lake. The mean and maximum depths of the lake are 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 due 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 101 ac-ft. There is no public access to the lake.

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

This was the second year that Acorn Lake has been involved in CAMP. The 2006 and the 2008 CAMP data represent the only years of available nutrient data. On each sampling day, the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

The lake was monitored 6 times between late April and mid-October 2008. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

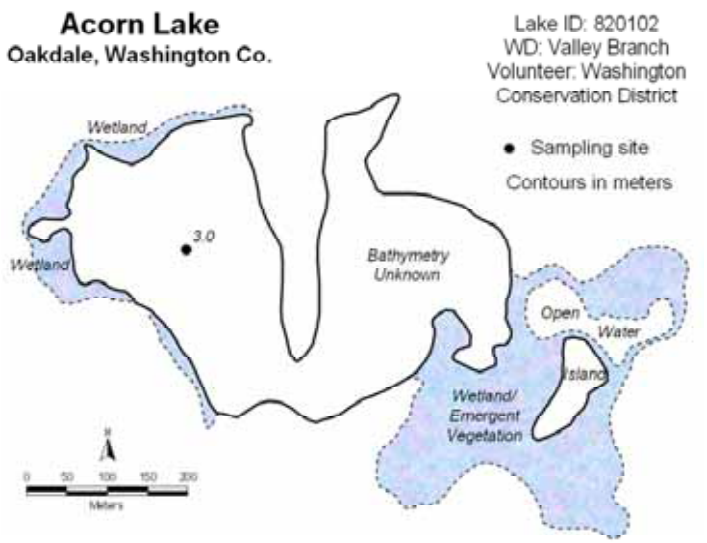
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 44.0 | 26.0 | 76.0 | NA |
| **CLA** (µg/l) | 28.5 | 4.7 | 53.0 | NA |
| **Secchi** (m) | 1.0 | 0.6 | 1.5 | NA |
| **TKN** (mg/l) | 1.48 | 1.00 | 1.80 | |
| | | | ***Lake Grade*** | NA |

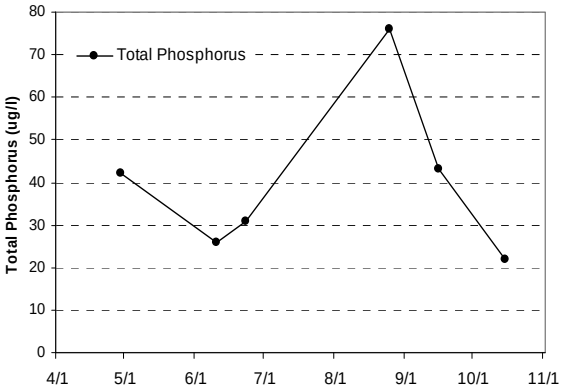
There was an insufficient quantity of data to calculate a lake grade for 2008. At least 5 dates spread throughout the summer monitoring season (May – September) are required to calculate a grade.

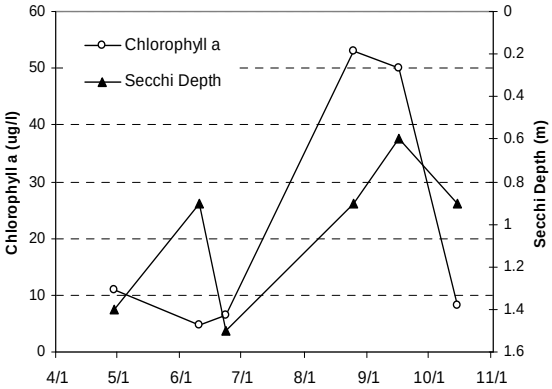
Throughout the monitoring period, the volunteers' opinions of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. These user perception rankings are shown on the lake information sheet. The summertime mean physical condition ranking was 2.0 on a 1 to 5 scale (2- "some algae present"). The mean suitability for recreation ranking was 4.0 on a 1 to 5 scale (4- "No swimming; boating ok").

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey of 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.

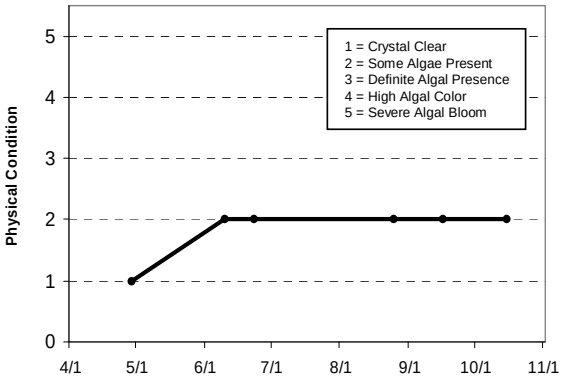



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/29 | 8.7 | 7.2 | 10.12 | 10.34 | 11 | 42 | | 1.4 | 1 | 2 |
| 6/10 | 22.4 | 20.2 | 9.97 | 3.05 | 4.7 | 26 | | 0.9 | 2 | 4 |
| 6/23 | 25.2 | 20.2 | 10.64 | 0.62 | 6.4 | 31 | | 1.5 | 2 | 4 |
| 8/25 | 21.2 | 20.2 | 4.69 | 0.22 | 53 | 76 | | 0.9 | 2 | 4 |
| 9/16 | 18.6 | 16.3 | 10.43 | 0.62 | 50 | 43 | | 0.6 | 2 | 4 |
| 10/15 | 12.2 | 12 | 4.71 | 0.99 | 8.1 | 22 | | 0.9 | 2 | 4 |



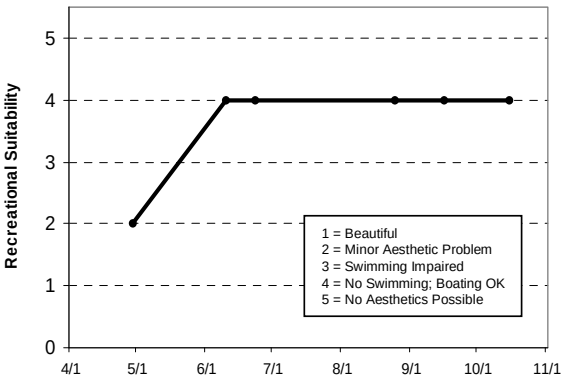

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | C | | |
| Chlorophyll a | | | A | | |
| Secchi Depth | | | F | | |
| **Lake Grade** | | | **C** | | |

Source: Metropolitan Council and STORET data



## Alimagnet Lake (19-0021) *City of Apple Valley*

Approximately half of Lake Alimagnet'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's shoreline is 3.2 miles. The lake has maximum and mean depths of 3.0 and 1.5 m (10 and five feet), respectively. Because the lake is relatively shallow, it does not develop and maintain a thermocline (a density gradient owed to changing water temperatures throughout the water column), and the entire lake is considered littoral, (the shallow [0-15 feet] area dominated by aquatic plants). The approximate lake volume is 545 acre-feet (ac-ft). The lake has a 1,094-acre watershed and a watershed-to-lake area ratio of 10:1 (Blue Water Science 2005). The greater the ratio, the greater the potential stress on the lake from surface runoff.

The lake, which has been monitored through CAMP since 1995, was sampled 8 times between late-April and mid-August 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

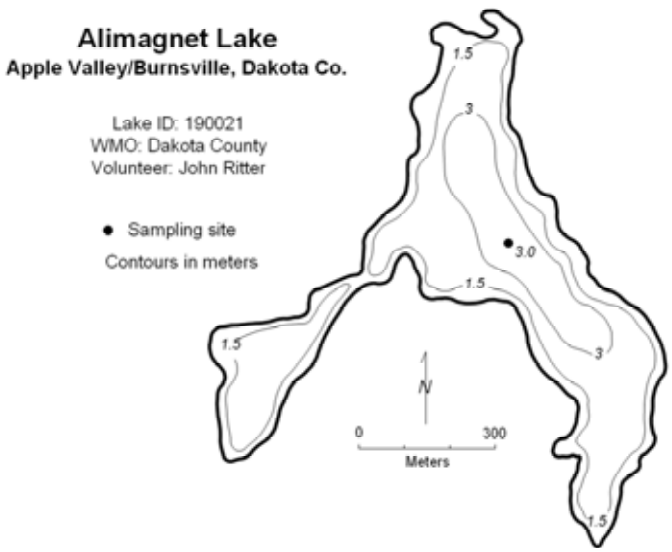
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 95.6 | 56.0 | 136.0 | D |
| **CLA** (µg/l) | 59.3 | 19.0 | 190.0 | D |
| **Secchi** (m) | 0.7 | 0.5 | 0.9 | F |
| **TKN** (mg/l) | 2.57 | 1.80 | 3.60 | |
| | | | ***Lake Grade*** | D |

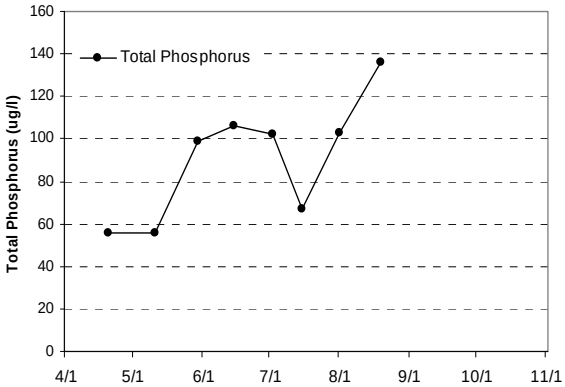
The 2008 lake grade was a D. The lake's historic lake grades indicate that the lake fluctuates between a C and D. Most recently the lake's lake grade has consistently been a D (1999-2008 excluding 2006). The mean Secchi depth continues to provide this lake with a water clarity grade of F. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008).

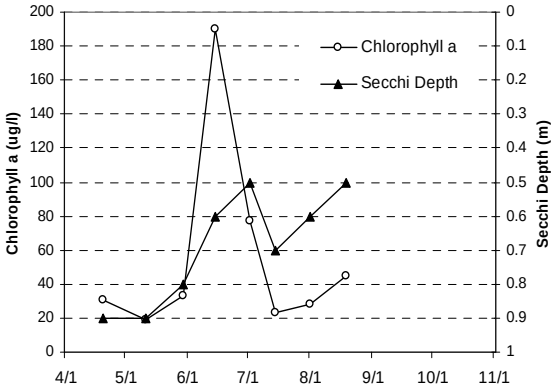
Throughout the monitoring period, the volunteers' opinions of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. These user perception rankings are shown on the lake information sheet. The summertime mean physical condition was 3.4 on a 1 to 5 scale (between 3-"definite algae present" and 4-"high algal color"). The mean suitability for recreation ranking was 3.0 on a 1 to 5 scale (3- "swimming slightly impaired").

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.

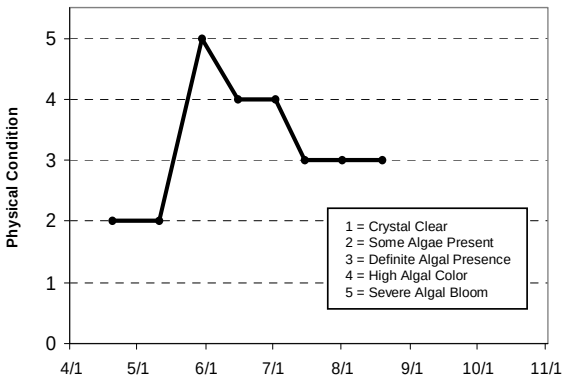



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/20 | 6.7 | | | | 31 | 56 | | 0.9 | 2 | 3 |
| 5/11 | 13 | | | | 19 | 56 | | 0.9 | 2 | 2 |
| 5/30 | 17 | | | | 33 | 99 | | 0.8 | 5 | 4 |
| 6/15 | 20 | | | | 190 | 106 | | 0.6 | 4 | 3 |
| 7/2 | 25 | | | | 77 | 102 | | 0.5 | 4 | 3 |
| 7/15 | 28 | | | | 23 | 67 | | 0.7 | 3 | 3 |
| 8/1 | 27 | | | | 28 | 103 | | 0.6 | 3 | 3 |
| 8/19 | 25 | | | | 45 | 136 | | 0.5 | 3 | 3 |



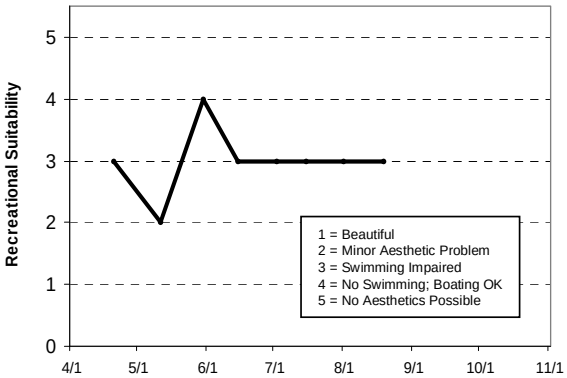

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | F | D | | | | | | | | | F | |
| Chlorophyll a | | | | | | | | | | | D | |
| Secchi Depth | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | D | D | C | D | F | D | D | D | D |
| Chlorophyll a | | | | B | C | C | C | D | D | C | C | C |
| Secchi Depth | 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 |
|---|---|---|---|---|---|
| Total Phosphorus | D | D | F | D | D |
| Chlorophyll a | D | D | D | D | D |
| Secchi Depth | F | F | F | F | F |
| **Lake Grade** | **D** | **D** | **F** | **D** | **D** |

Source: Metropolitan Council and STORET data



## Ardmore Lake (27-0153) *Pioneer-Sarah Watershed Management Commission*

Ardmore Lake is located in the City of Medina (Hennepin County). The lake has surface area of 10.1 acres and a maximum depth of 6.1 m (20 feet). Most of the lake is considered littoral (approximately 9 acres of depth 0-15 feet). The lake has an average depth of 2.4 m (7.7 feet) and a volume of 78.0 acre-feet. There is no public access to the lake. A search via STORET revealed historical Secchi depth data and CAMP data.

Ardmore Lake was monitored 11 times between mid-April and mid-October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 179.1 | 33.0 | 316.0 | F |
| **CLA** (µg/l) | 90.1 | 13.0 | 190.0 | F |
| **Secchi** (m) | 0.4 | 0.2 | 0.6 | F |
| **TKN** (mg/l) | 3.77 | 2.20 | 5.20 | |
| | | | ***Lake Grade*** | F |

The water quality lake grade was an F for 2008. The TP and chlorophyll summer-time means translate to grades of F. These are similar grades that the lake received in 2007.

Throughout the monitoring period, the volunteers' opinions of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page. The summertime mean physical condition was 2.5 on a 1 to 5 scale (between 2- "some algae present" and 3- "definite algae present"). The mean suitability for recreation ranking was 2.1 on a 1 to 5 scale (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

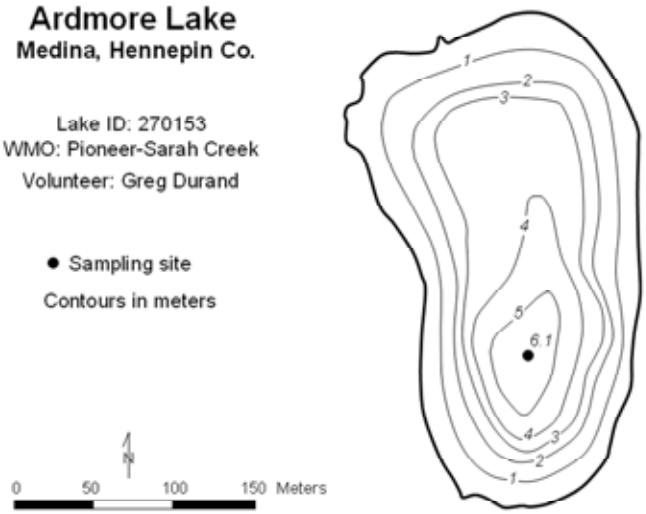
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

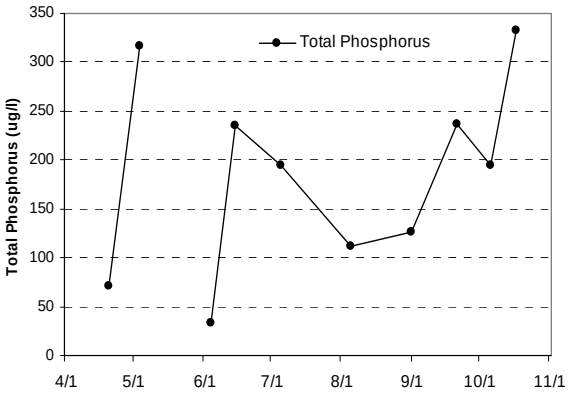
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

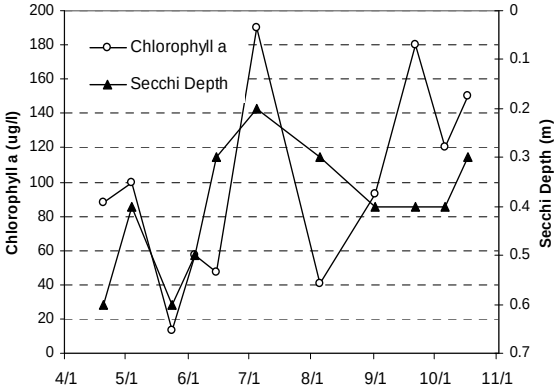
# Ardmore Lake
**Medina, Hennepin Co.**

Lake ID: 270153
WMO: Pioneer-Sarah Creek
Volunteer: Greg Durand

● Sampling site
Contours in meters

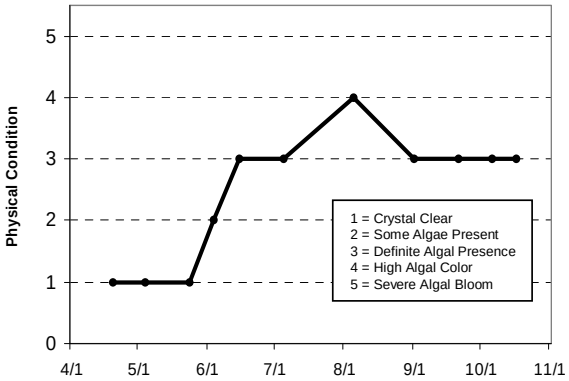



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/20 | 9.1 | | | | 88 | 71 | | 0.6 | 1 | 2 |
| 5/4 | 13.9 | | | | 100 | 316 | | 0.4 | 1 | 1 |
| 5/24 | 20.2 | | | | 13 | | | 0.6 | 1 | 1 |
| 6/4 | 20.7 | | | | 57 | 33 | | 0.5 | 2 | 2 |
| 6/15 | 24 | | | | 47 | 235 | | 0.3 | 3 | 3 |
| 7/5 | 27.1 | | | | 190 | 195 | | 0.2 | 3 | 3 |
| 8/5 | 28.5 | | | | 41 | 112 | | 0.3 | 4 | 3 |
| 9/1 | 25 | | | | 93 | 126 | | 0.4 | 3 | 2 |
| 9/21 | 22 | | | | 180 | 237 | | 0.4 | 3 | 2 |
| 10/6 | 15.1 | | | | 120 | 195 | | 0.4 | 3 | 3 |
| 10/17 | 11.9 | | | | 150 | 333 | | 0.3 | 3 | 3 |



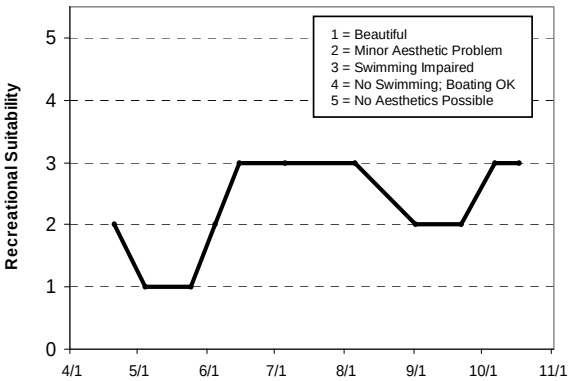

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | F |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | F | F |
| Chlorophyll a | | | | F | F |
| Secchi Depth | | | | | F |
| **Lake Grade** | | | | **F** | **F** |

Source: Metropolitan Council and STORET data



## Armstrong Lake (82-0116) *South Washington Watershed District*

Armstrong Lake has been annually monitored through CAMP since 1998. There is very little physical information available on the lake or the lake's watershed. Located partially within the cities of Lake Elmo and Oakdale (Washington County), the 39-acre lake has a mean and maximum depth of 1.0 m (3.2 feet) and 1.5 m (roughly 5 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 128 ac-ft. There is no public access to the lake.

Armstrong Lake was monitored 7 times between early-May and mid-October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

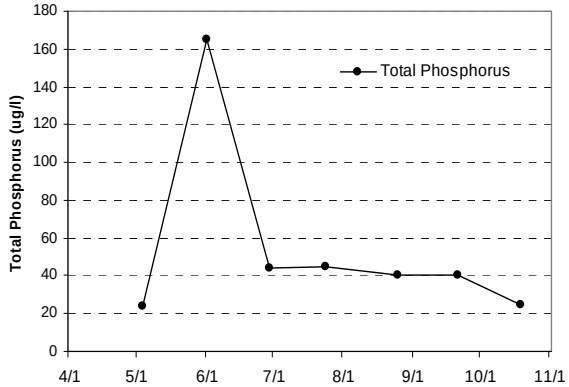
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 59.7 | 24.0 | 165.0 | C |
| **CLA** (µg/l) | 4.4 | 2.0 | 6.5 | A |
| **Secchi** (m) | 1.1 | 0.8 | 1.4 | D |
| **TKN** (mg/l) | 1.70 | 1.10 | 3.10 | |
| | | | ***Lake Grade*** | C |

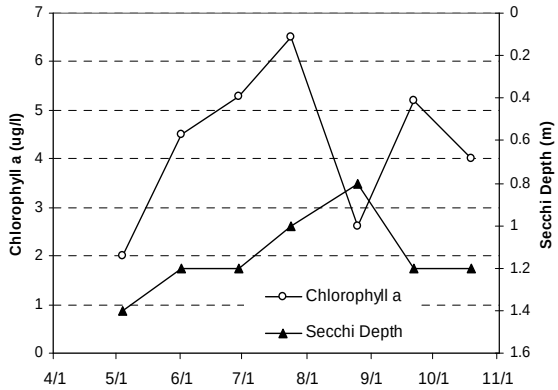
The 2008 water quality lake grade was a return to similar and relatively better water quality conditions last observed in 2004 and 2005. Although the summer-time average water clarity remains in the D category, as it has been since 2000, the average summer-time concentrations of CLA and TP improved in 2008. The lake water quality over the past decade has fluctuated between C and D, with a C being more frequent. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed a statistically significant improving trend in water clarity (MPCA 2008).

By comparing the lake's historic database of TP, CLA, and water clarity grades, it is apparent that the TP and Secchi grades are worse than the CLA grade. In most cases, the three should be fairly comparable. One possible explanation for these observations may be that the majority of the lake's TP comes from either re-suspended lake sediments or the intrusion of sediment laden runoff to the lake, which in turn lessens the clarity of the water and inhibits algal growth.

Throughout the monitoring period, the volunteers' opinions of the lake's physical condition were ranked on a 1-to-5 scale, as indicated on the following page. The mean physical condition ranking was 2.7 (ranking between 2- "some algae present" and 3- "definite algae present"). The volunteer did not record the recreational suitability ranking.

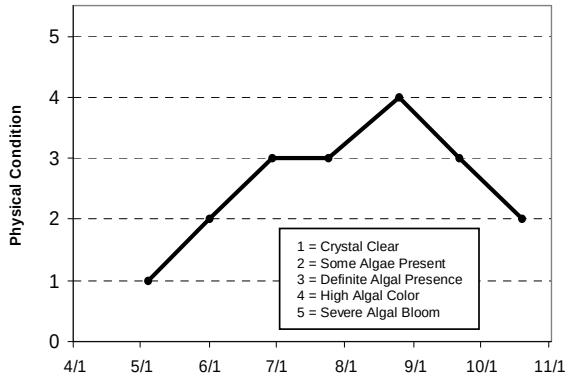
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.




## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/4 | 14.9 | | | | 2 | 24 | | 1.4 | 1 | |
| 6/1 | 23.8 | | | | 4.5 | 165 | | 1.2 | 2 | |
| 6/29 | 23.9 | | | | 5.3 | 44 | | 1.2 | 3 | |
| 7/24 | 26.8 | | | | 6.5 | 45 | | 1 | 3 | |
| 8/25 | 23.9 | | | | 2.6 | 40 | | 0.8 | 4 | |
| 9/21 | 21 | | | | 5.2 | 40 | | 1.2 | 3 | |
| 10/19 | 10.1 | | | | 4 | 25 | | 1.2 | 2 | |



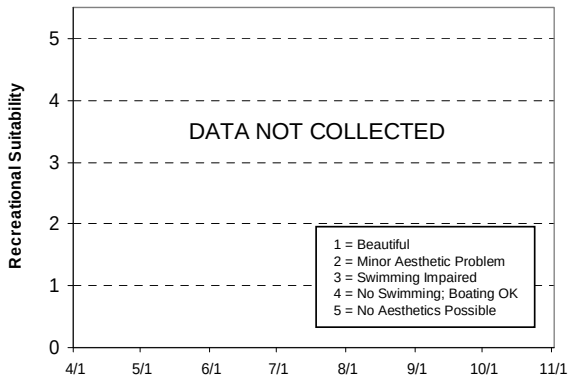

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | D | F | C | D | D | D |
| Chlorophyll a | | | | | | | D | C | C | C | B | B |
| Secchi Depth | | | | | | | D | F | D | D | D | D |
| **Lake Grade** | | | | | | | **D** | **D** | **C** | **D** | **C** | **C** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | C | C | D | D | C |
| Chlorophyll a | A | A | B | C | A |
| Secchi Depth | D | D | D | D | D |
| **Lake Grade** | **C** | **C** | **C** | **D** | **C** |

Source: Metropolitan Council and STORET data



## Barker Lake (82-0076) *Carnelian - Marine Watershed District*

Barker Lake is a 45-acre lake located within May Township (Washington County). The mean and maximum depth of the lake is 4.4 m (14 feet) and 9.0 m (roughly 29 feet), respectively. Because of the shallowness of the lake, the entire area is considered littoral zone (area of aquatic plant dominance) and it does not maintain a thermocline (a density gradient owed to changing water temperatures throughout the lake's water column). Additionally, the surface area and mean depth of the lake result in a calculated volume of 648 ac-ft.). The lake has an 823-acre watershed and a rather large watershed-to-lake area ratio of 19:1. The greater the ratio, the greater the potential stress on the lake from surface runoff.

The lake was monitored 7 times from early-May to September 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 108.6 | 66.0 | 148.0 | D |
| **CLA** (µg/l) | 55.9 | 4.5 | 100.0 | D |
| **Secchi** (m) | 1.2 | 0.6 | 2.3 | D |
| **TKN** (mg/l) | 2.19 | 1.00 | 3.70 | |
| | | | ***Lake Grade*** | D |

The 2008 water quality lake grade was a D. All three parameters were also a D. The 2008 CAMP monitoring season was the worse water quality condition for this lake since it was first enrolled in the CAMP in 1997. Continued monitoring is suggested to determine if the 2008 water quality was an anomaly or a possible indicator of worsening water quality conditions.

Throughout the monitoring period, the volunteers' opinions of the lake's physical condition were ranked on a 1-to-5 scale, as indicated on the following page. The average user perception rankings, on a 1-to-5 scale, were 3.1 for physical condition (between 3- "definite algae present" and 4-"high algal color"), and 3.6 for recreational suitability (between 3- "swimming slightly impaired" and 4-"no swimming, boating ok").

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

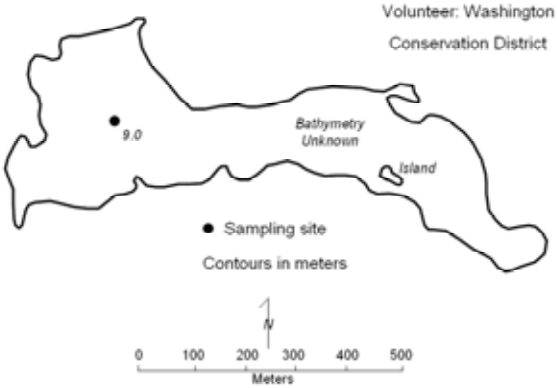
**Hugo, May Twp., Washington Co.**

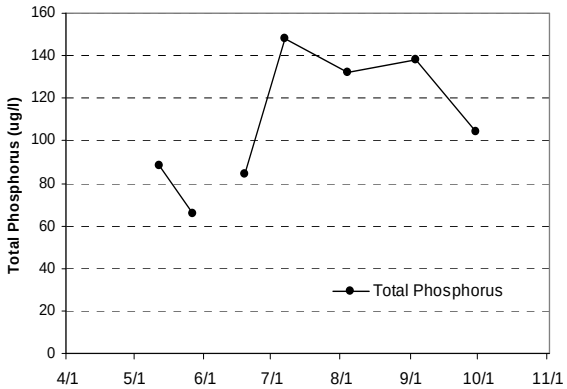
LAKE ID: 820076

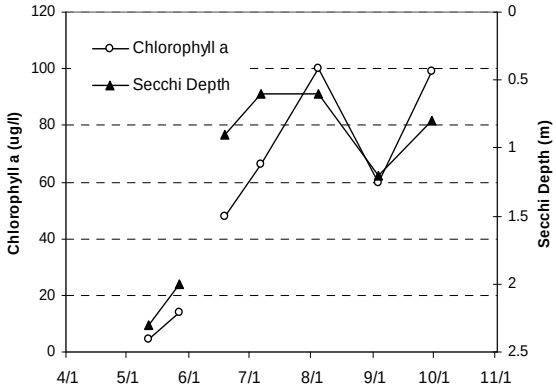
WD: Carnelian-Marine-St. Croix

Volunteer: Washington

Conservation District

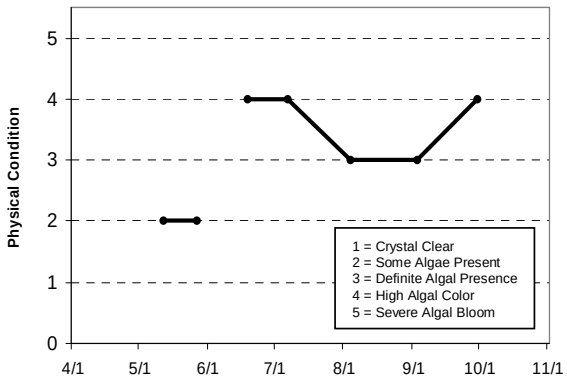



### 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/12 | 13.5 | 8.5 | 8.6 | 0.32 | 4.5 | 88 | | 2.3 | 2 | 2 |
| 5/27 | 16.3 | 8.5 | 8.16 | 0.17 | 14 | 66 | | 2 | 2 | 3 |
| 6/19 | 24.8 | 9.1 | 13.18 | 0.18 | 48 | 84 | | 0.9 | 4 | 4 |
| 7/7 | 27 | 9.7 | 10.46 | 0.39 | 66 | 148 | | 0.6 | 4 | 4 |
| 8/4 | 24.9 | 9.1 | 7.45 | 0.22 | 100 | 132 | | 0.6 | 3 | 4 |
| 9/3 | 22 | 9.4 | 6.34 | 0.18 | 60 | 138 | | 1.2 | 3 | 4 |
| 9/30 | 17.1 | 9.7 | 7.24 | 0.21 | 99 | 104 | | 0.8 | 4 | 4 |

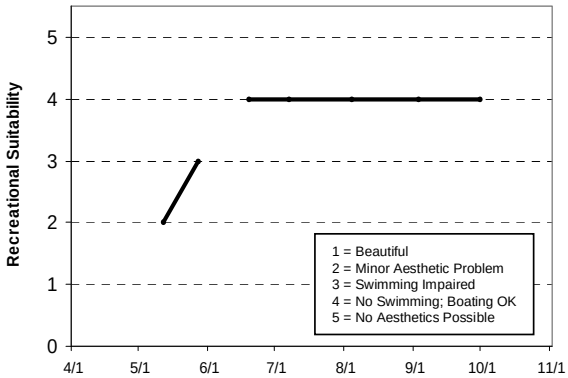



### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | C | D | D | C | D | | |
| Chlorophyll a | | | | | | C | C | D | B | C | | |
| Secchi Depth | | | | | | D | C | C | C | C | C | C |
| **Lake Grade** | | | | | | **C** | **C** | **D** | **C** | **C** | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | | D |
| Chlorophyll a | | | | | D |
| Secchi Depth | C | D | C | D | D |
| **Lake Grade** | | | | **D** | **D** |




Source: Metropolitan Council and STORET data

## Bass Lake (82-0035) *Carnelian - Marine Watershed District*

Bass Lake is an 81-acre lake located within May Township (Washington County). The maximum depth of the lake is 4.3 m (roughly 14 feet). Because of the shallowness of the lake, the entire area is considered littoral zone (area of aquatic plant dominance) and it does not maintain a thermocline (a density gradient owed to changing water temperatures throughout the lake's water column).

The lake was monitored 7 times between May and October 2008. On each sampling day the lake was monitored for Secchi transparency, and the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

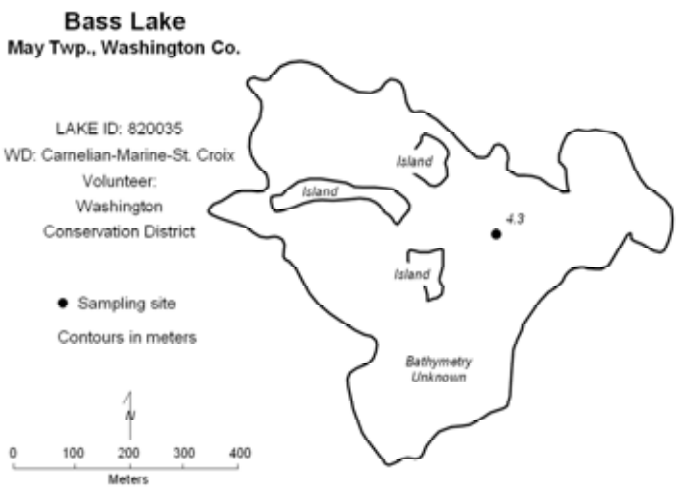
**2008 summer (May-September) data summary**

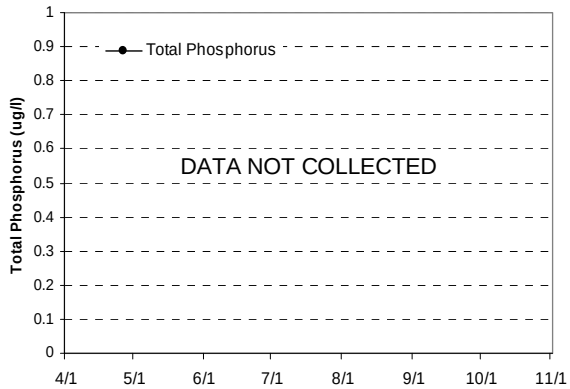
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **Secchi** (m) | 2.4 | 1.7 | 3.0 | B |

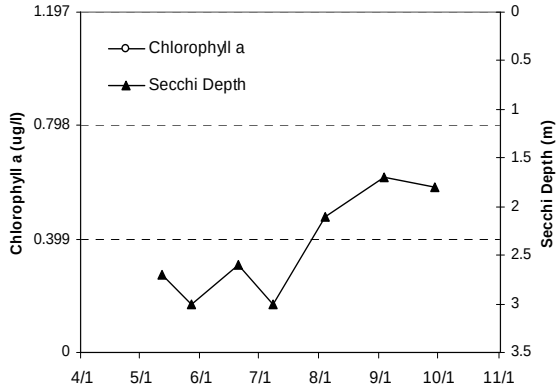
The lake did not receive a lake grade for 2008 because only Secchi depth (water clarity) data was collected. The lake's water clarity was similar in 2008 as it was in 2007. The water clarity of recent years appears to be better than it was in the 1990's. The water clarity since 2002 has been characterized by mostly B grades, whereas the water clarity of the 1990's was marked by C grades only.

Throughout the monitoring period, the volunteers' opinions of the lake's physical and recreational conditions were ranked on a 1-5-scale. The user perception rankings are shown on the lake's associated information sheet on the following page. The mean summertime physical condition was ranked 2.1 on a (between 2- "some algae present" and 3- "definite algae present"). The mean suitability for recreation ranking, also on a 1-to-5 scale, was 2.4 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

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.

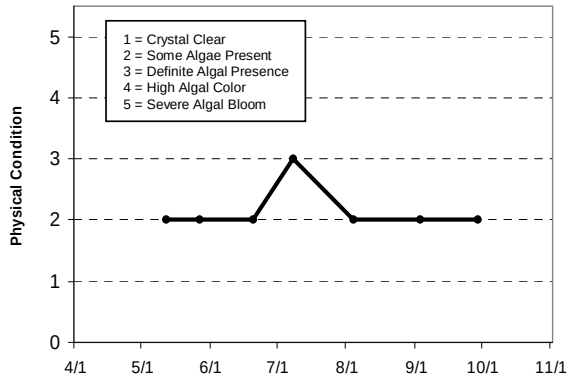



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/12 | 14.5 | 10.7 | 8.8 | 1.53 | | | | 2.7 | 2 | 3 |
| 5/27 | 16.9 | 13.5 | 7.59 | 0.19 | | | | 3 | 2 | 2 |
| 6/20 | 23.9 | 17.9 | 9.9 | 0.17 | | | | 2.6 | 2 | 3 |
| 7/8 | 25.5 | 18.5 | 8.45 | 0.27 | | | | 3 | 3 | 2 |
| 8/4 | 24.5 | 20 | 4.35 | 0.18 | | | | 2.1 | 2 | 3 |
| 9/3 | 22.6 | 19.7 | 5.09 | 0.14 | | | | 1.7 | 2 | 2 |
| 9/29 | 18.5 | 18 | 5.29 | 0.25 | | | | 1.8 | 2 | 2 |



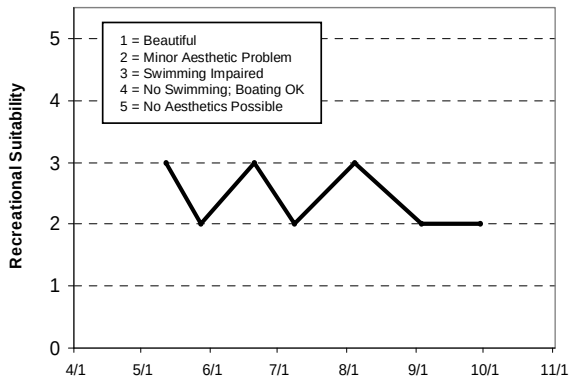

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | C |
| Chlorophyll a | | | | | | | | | | | | B |
| Secchi Depth | | | | | | | | | | | | C |
| **Lake Grade** | | | | | | | | | | | | **C** |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | B | | | | C | C | C | C | C | C | | C |
| Chlorophyll a | B | | | | C | C | B | B | B | B | | B |
| Secchi Depth | 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 |
|---|---|---|---|---|---|
| Total Phosphorus | B | C | C | B | |
| Chlorophyll a | A | B | B | B | |
| Secchi Depth | B | B | C | B | B |
| **Lake Grade** | **B** | **B** | **C** | **B** | |

Source: Metropolitan Council and STORET data



## Bass Lake [West] (82-0123) *Browns Creek Watershed District*

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

Bass Lake (west) was monitored seven times between May and September 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

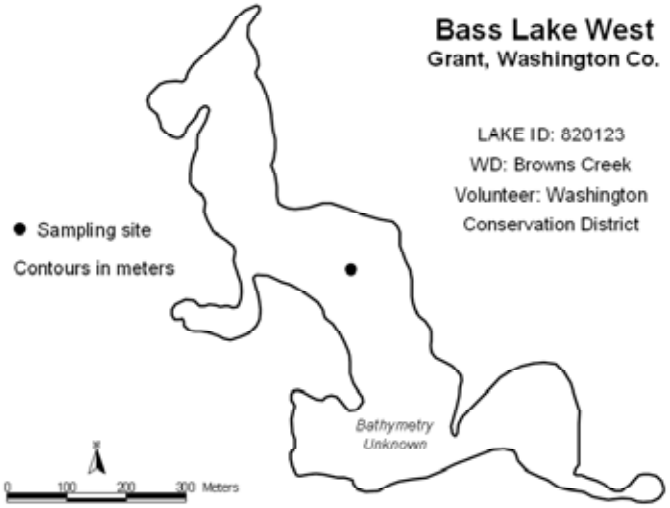
**2008 summer (May-September) data summary**

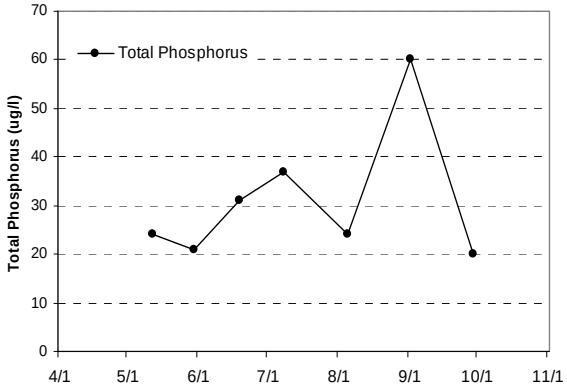
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 31.0 | 20.0 | 60.0 | B |
| **CLA** (µg/l) | 13.5 | 3.2 | 54.0 | B |
| **Secchi** (m) | 2.2 | 1.7 | 3.2 | B |
| **TKN** (mg/l) | 0.96 | 0.66 | 1.50 | |
| | | | ***Lake Grade*** | B |

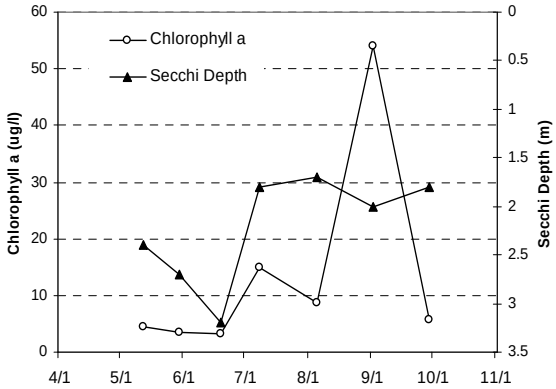
The lake received a water quality lake grade of B for 2008 which is similar to the lake grade received in 2007 but worse than the lake grade of A received in 2006. Given that there are only 3 years of water quality data available, additional monitoring is necessary to determine water quality trends.

Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The average user perception rankings were 3.0 for physical condition (3- "definite algae present"), and 3.0 for recreational suitability (3- "swimming slightly impaired").

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.

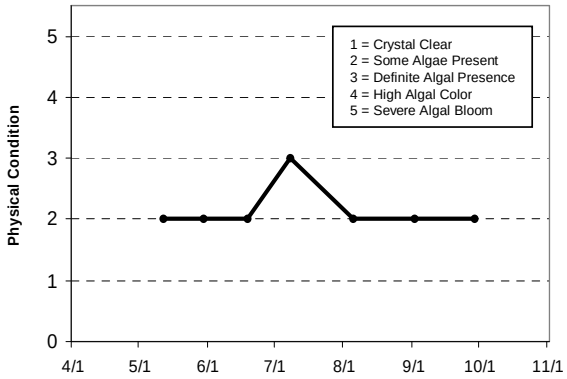



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/12 | 14.7 | 13.1 | 10.16 | 4.45 | 4.5 | 24 | | 2.4 | 2 | 3 |
| 5/30 | 17 | 15.9 | 8.01 | 4.29 | 3.4 | 21 | | 2.7 | 2 | 2 |
| 6/19 | 23.1 | 8.9 | 8.75 | 0.26 | 3.2 | 31 | | 3.2 | 2 | 2 |
| 7/8 | 25.4 | 21.6 | 7.92 | 0.25 | 15 | 37 | | 1.8 | 3 | 2 |
| 8/5 | 26.2 | 24.7 | 5.51 | 0.83 | 8.8 | 24 | | 1.7 | 2 | 3 |
| 9/2 | 23.9 | 22.2 | 6.71 | 0.47 | 54 | 60 | | 2 | 2 | 3 |
| 9/29 | 18.7 | 17.9 | 6.01 | 3.49 | 5.8 | 20 | | 1.8 | 2 | 3 |



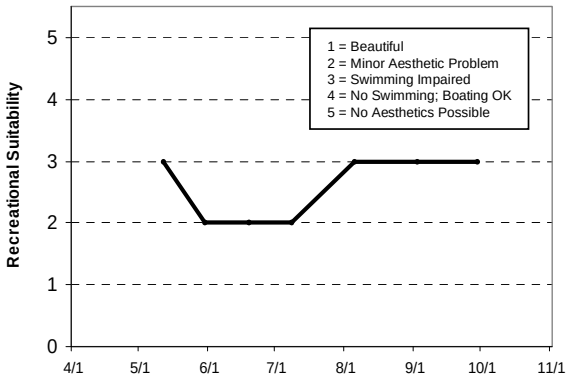

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | B | B | B |
| Chlorophyll a | | | A | A | B |
| Secchi Depth | | | A | B | B |
| **Lake Grade** | | | **A** | **B** | **B** |

Source: Metropolitan Council and STORET data



## Bass Lake [East] (82-0124) *Browns Creek Watershed District*

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

Bass Lake (east) was monitored 7 times between early-May and mid-October 2007. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

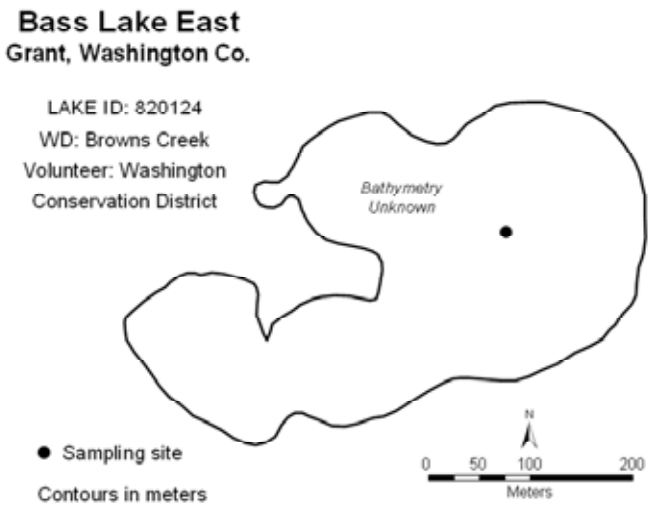
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 57.4 | 32.0 | 110.0 | C |
| **CLA** (µg/l) | 37.3 | 4.6 | 130.0 | C |
| **Secchi** (m) | 1.9 | 0.8 | 3.8 | C |
| **TKN** (mg/l) | 1.64 | 0.75 | 3.00 | |
| | | | ***Lake Grade*** | C |

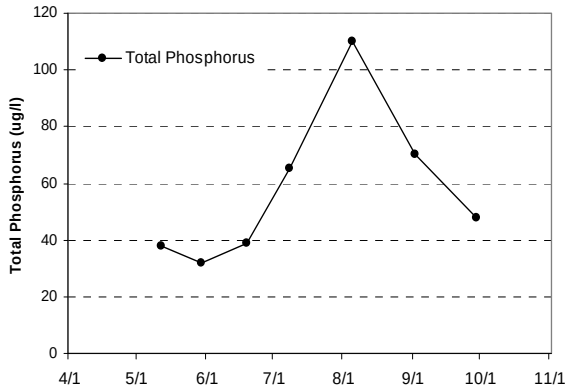
The lake received a water quality lake grade of C for 2008. The mean summer-time CLA was greater in 2008 than in 2006 and 2007; it was approximately 3 times greater in 2008. The elevated mean was driven by higher CLA concentrations in early August. Given that there are only 3 years of water quality data available, additional monitoring is necessary to determine water quality trends.

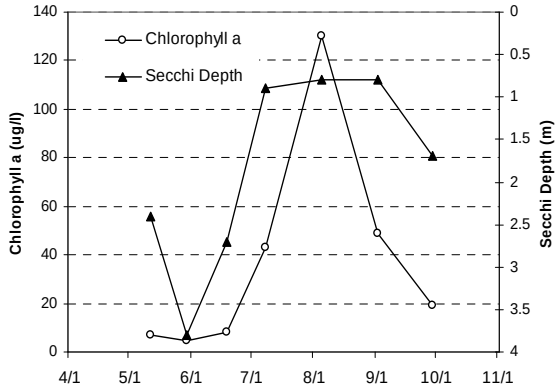
Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The average user perception rankings were 3.0 for physical condition (3- "definite algae present"), and 3.3 for recreational suitability (between 3- "swimming slightly impaired" and 4-no swimming; boating ok").

The Fisheries Section of the Minnesota Department of Natural Resources (MNDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MNDNR 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.

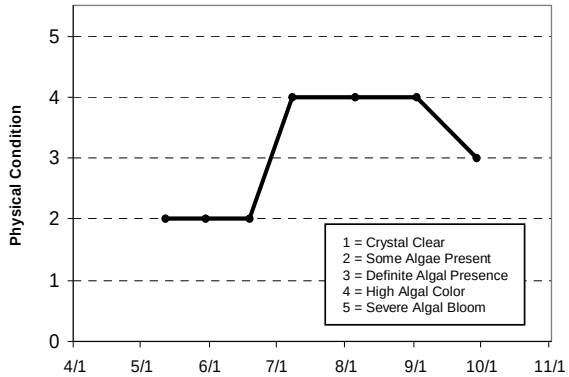



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/12 | 16 | 15.4 | 9.51 | 7.66 | 7 | 38 | | 2.4 | 2 | 2 |
| 5/30 | 17.9 | 17.1 | 7.65 | 0.62 | 4.6 | 32 | | 3.8 | 2 | 2 |
| 6/19 | 24.1 | 22.4 | 9.25 | 8.38 | 8.4 | 39 | | 2.7 | 2 | 2 |
| 7/8 | 26.1 | 22.1 | 8.29 | 0.22 | 43 | 65 | | 0.9 | 4 | 4 |
| 8/5 | 26.7 | 21.1 | 7.06 | 0.14 | 130 | 110 | | 0.8 | 4 | 4 |
| 9/2 | 24.6 | 21.5 | 8.84 | 0.37 | 49 | 70 | | 0.8 | 4 | 4 |
| 9/29 | 19 | 16.9 | 6.36 | 0.19 | 19 | 48 | | 1.7 | 3 | 3 |



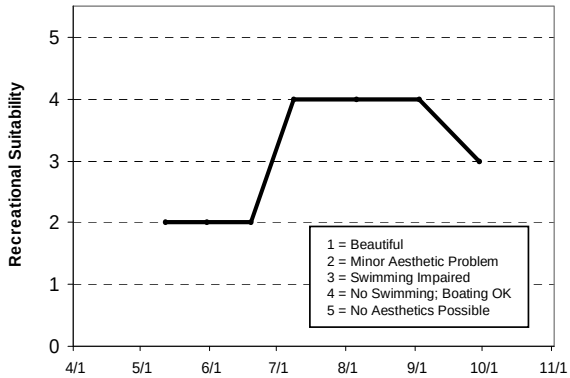

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | C | C | C |
| Chlorophyll a | | | B | B | C |
| Secchi Depth | | | C | B | C |
| **Lake Grade** | | | **C** | **B** | **C** |

Source: Metropolitan Council and STORET data



## Bavaria Lake (10-0019) *Carver County Environmental Services*

Lake Bavaria is located in the City of Chaska (Carver County). The lake is considered a "Priority Lake" in the metropolitan area because of its multi-recreational uses. The 200-acre lake has a mean and maximum depth of 5.6 m (18.4 feet) and 18.3 m (60 feet), respectively. The lake's surface area and mean depth translates to an approximate lake volume of 3,674 ac-ft. The lake has a 711-acre immediate watershed, which translates to a watershed-to-lake area ratio of 3.5:1. The larger the ratio the greater the potential stress put on the lake from surface runoff. Roughly 65 percent of the lake is considered littoral, the shallow (0-15 foot depth) area dominated by aquatic vegetation. The DNR has designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*).

While 2008 was the 13th year that Bavaria has been involved in CAMP, the lake has been monitored by Council staff in the past and has recently been involved in the MPCA's volunteer Secchi transparency program (included in the lake's report card grading system on the following page). Additionally, Lake Bavaria was included within the MPCA's Lake Assessment Program (LAP) in 2001. Through this program additional data, besides in-lake data through CAMP, was collected to help complete a more comprehensive study on the lake.

Lake Bavaria was monitored 14 times between May and October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

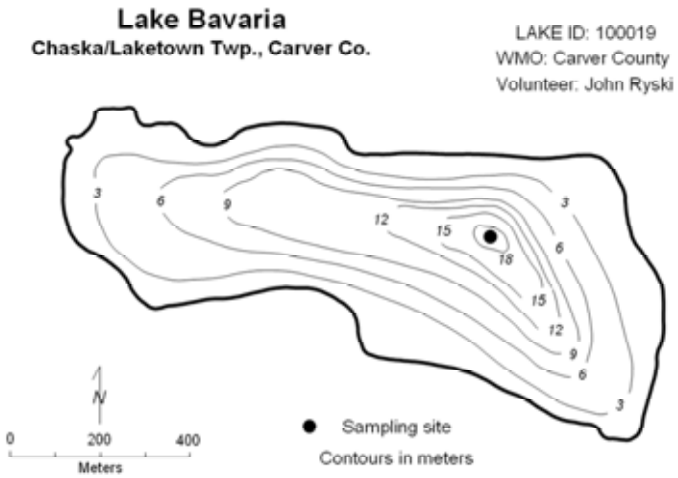
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 35.8 | 20.0 | 85.0 | C |
| **CLA** (µg/l) | 15.2 | 6.4 | 28.0 | B |
| **Secchi** (m) | 1.7 | 1.2 | 2.5 | C |
| **TKN** (mg/l) | 1.22 | 0.74 | 1.60 | |
| | | | ***Lake Grade*** | C |

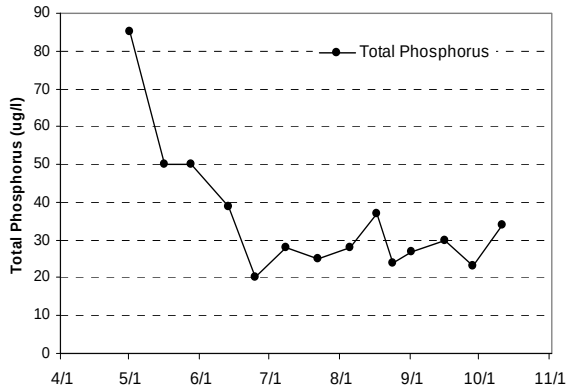
The lake received a water quality lake grade of C for 2008 which is on the low end of water quality for this particular lake. Available data for Bavaria Lake reveal that the lake water quality has fluctuated from C to B to A to B to C to B and back to C. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008).

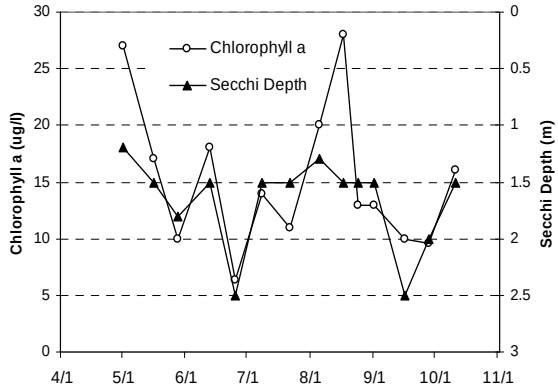
Throughout the monitoring period, the volunteers' opinions of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. These user perception rankings are shown on the lake's associated information sheet on the following page. The mean physical condition ranking was 2.6 (between 2- "some algae present and 3- "definite algae present"), while the mean recreational suitability ranking for the lake was 2.8 (between 2- "minor aesthetic problem" and 3-"Swimming Impaired").

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.

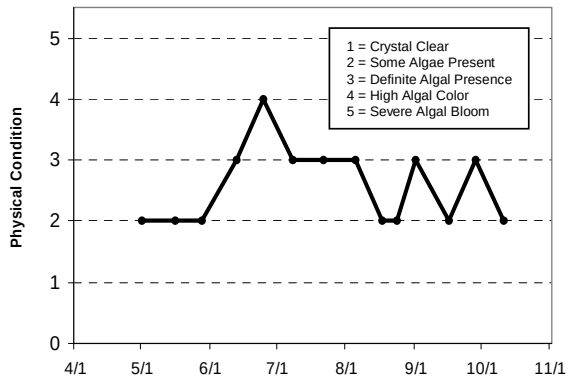



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/1 | 7.38 | | 12.89 | | 27 | 85 | | 1.2 | 2 | 4 |
| 5/16 | 14 | | | | 17 | 50 | | 1.5 | 2 | 2 |
| 5/28 | 15 | | | | 10 | 50 | | 1.8 | 2 | 2 |
| 6/13 | 17 | | | | 18 | 39 | | 1.5 | 3 | 3 |
| 6/25 | 22 | | | | 6.4 | 20 | | 2.5 | 4 | 4 |
| 7/8 | 23 | | | | 14 | 28 | | 1.5 | 3 | 3 |
| 7/22 | 24 | | | | 11 | 25 | | 1.5 | 3 | 3 |
| 8/5 | 24 | | | | 20 | 28 | | 1.3 | 3 | 3 |
| 8/17 | 23 | | | | 28 | 37 | | 1.5 | 2 | 2 |
| 8/24 | 22 | | | | 13 | 24 | | 1.5 | 2 | 3 |
| 9/1 | 22 | | | | 13 | 27 | | 1.5 | 3 | 2 |
| 9/16 | 16 | | | | 10 | 30 | | 2.5 | 2 | 3 |
| 9/28 | 16 | | | | 9.6 | 23 | | 2 | 3 | 3 |
| 10/11 | 14 | | | | 16 | 34 | | 1.5 | 2 | 3 |



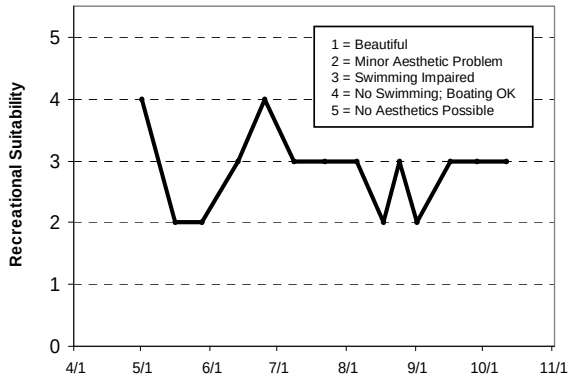

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | C | | | C | C | | | | |
| Chlorophyll a | | | | C | | | C | C | | | | |
| Secchi Depth | | | | C | | | C | C | | | | |
| **Lake Grade** | | | | **C** | | | **C** | **C** | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | B | | C | A | B | B | C | B | B | C |
| Chlorophyll a | | | A | | A | A | A | B | B | B | B | A |
| Secchi Depth | | | B | B | C | A | A | B | B | B | C | B |
| **Lake Grade** | | | **B** | | **B** | **A** | **A** | **B** | **B** | **B** | **B** | **B** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | B | C | B | C | C |
| Chlorophyll a | B | C | A | A | B |
| Secchi Depth | C | C | B | B | C |
| **Lake Grade** | **B** | **C** | **B** | **B** | **C** |

Source: Metropolitan Council and STORET data



## Bay Pond (Bay Lake) (82-0011) *Valley Branch Watershed District*

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). 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. There is no public access to the lake. The lake's surface area and watershed size (849 acres) translates to a 9:1 watershed-to-lake size ratio. Generally the larger the ratio, the greater the potential stress on the lake from surface runoff.

The 2006 CAMP data represent the first year availability of nutrient data. The lake was monitored 11 times between May and October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 312.4 | 71.0 | 529.0 | F |
| **CLA** (µg/l) | 205.5 | 6.2 | 580.0 | F |
| **Secchi** (m) | 0.5 | 0.2 | 1.1 | F |
| **TKN** (mg/l) | 3.74 | 0.92 | 7.30 | |
| | | | ***Lake Grade*** | F |

The lake received a lake grade of F for 2008 and in the previous two years. Since there are only 3 years of data, there are insufficient data to determine water quality trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

The perceived physical and recreational conditions (ranked on a 1-to-5 scale) are shown on the lake's information sheet on the next page. The average user perception rankings, were 3.1 for physical condition (3- "definite algae present"), and 3.4 for recreational suitability (between 3- "swimming slightly impaired" and 4-"no swimming; boating OK").

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.

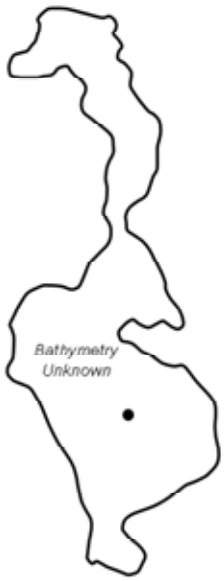
LAKE ID: 820011

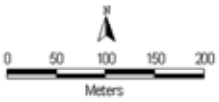
WD: Valley Branch

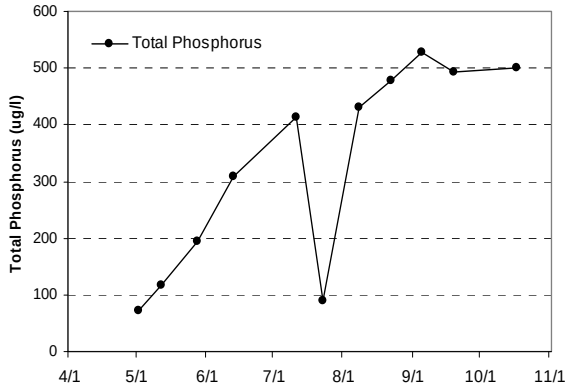
Volunteer: Folz, Freeman, Erickson, Inc.

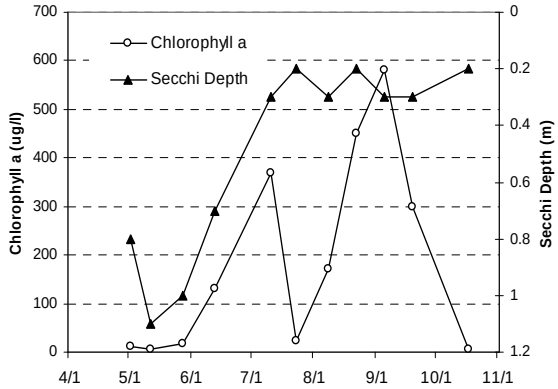
● Sampling site

Contours in meters



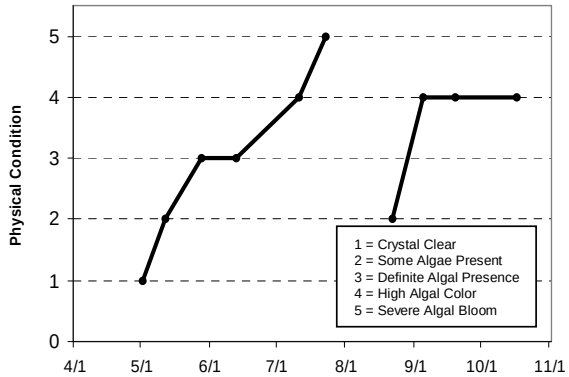




### 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/2 | 14.7 | | | | 11 | 71 | | 0.8 | 1 | 1 |
| 5/12 | 16 | | | | 6.2 | 118 | | 1.1 | 2 | 1 |
| 5/28 | 17.1 | | | | 16 | 194 | | 1 | 3 | 4 |
| 6/13 | 21.1 | | | | 130 | 309 | | 0.7 | 3 | 4 |
| 7/11 | 23.1 | | | | 370 | 414 | | 0.3 | 4 | 4 |
| 7/23 | 26.2 | | | | 22 | 89 | | 0.2 | 5 | 5 |
| 8/8 | 22.6 | | | | 170 | 431 | | 0.3 | | |
| 8/22 | 25.3 | | | | 450 | 477 | | 0.2 | 2 | 4 |
| 9/5 | 16.3 | | | | 580 | 529 | | 0.3 | 4 | 4 |
| 9/19 | 22.8 | | | | 300 | 492 | | 0.3 | 4 | 4 |
| 10/17 | 10.7 | | | | 5.1 | 501 | | 0.2 | 4 | 4 |



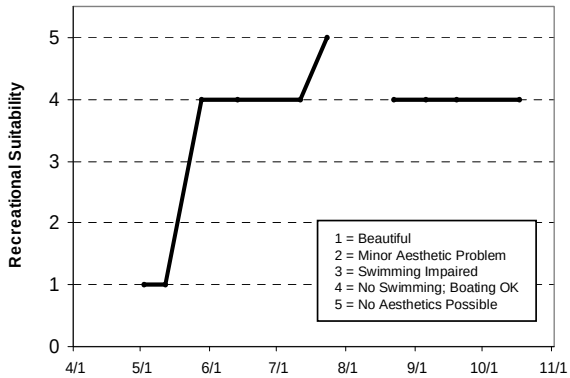

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | F | F | F |
| Chlorophyll a | | | F | F | F |
| Secchi Depth | | | F | D | F |
| **Lake Grade** | | | **F** | **F** | **F** |

Source: Metropolitan Council and STORET data



## Benton Lake (10-0069) *Carver County Environmental Services*

Benton Lake is a 115-acre lake located within Benton Township (Carver County). The maximum depth of the lake is 2.0 m (roughly 6.5 feet). Because of the shallowness of the lake, the entire area is considered littoral zone (area of aquatic plant dominance) and it does not maintain a thermocline (a density gradient owed to changing water temperatures throughout the lake's water column).

The lake has a 322-acre immediate watershed, which translates to a watershed-to-lake area ratio of 2.8:1 (the larger the ratio the greater the potential stress put on the lake from surface runoff). A 1999 water quality report on water resources in Carver County estimates land use for the watershed at: 19 percent residential, 55 percent agricultural, 16 percent commercial/industrial, and 10 percent open/undeveloped (Carver County Planning 1999).

The lake was monitored 14 times between mid-April and mid-October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

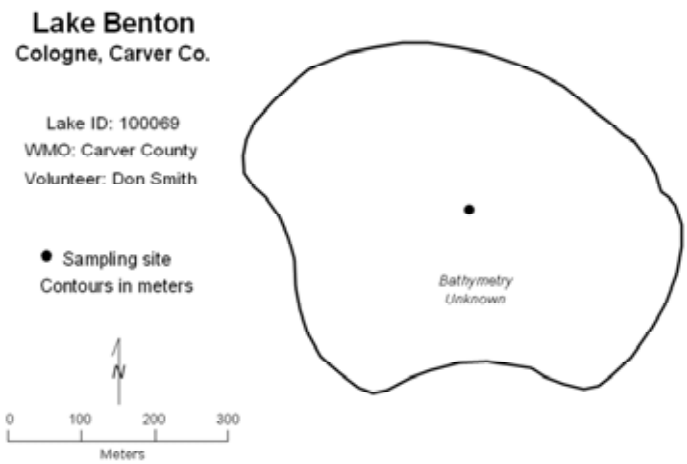
**2008 summer (May-September) data summary**

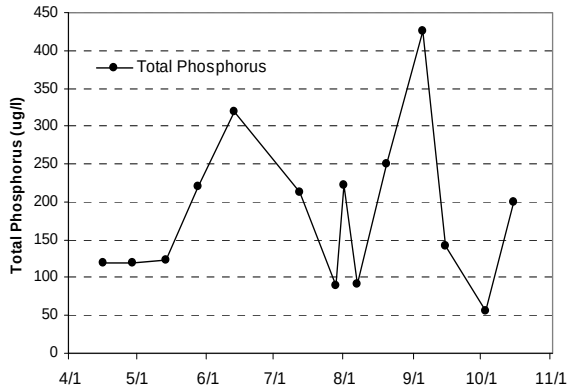
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 209.7 | 90.0 | 426.0 | F |
| **CLA** (µg/l) | 201.9 | 70.0 | 530.0 | F |
| **Secchi** (m) | 0.3 | 0.1 | 0.5 | F |
| **TKN** (mg/l) | 8.35 | 3.50 | 19.00 | |
| | | | ***Lake Grade*** | F |

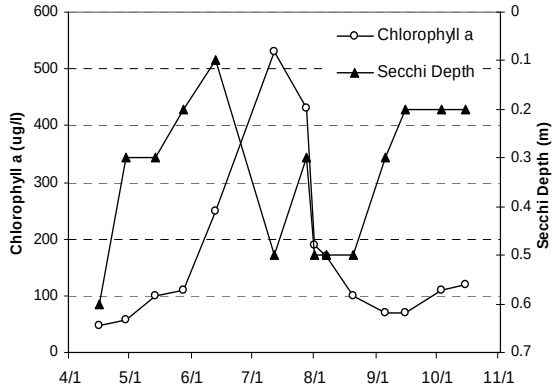
The lake received a lake grade of F for 2008, similar to lake grades received for the years 1999-2001, 2003, and 2007. The lake's water quality appears to be best represented by a lake grade of F.

Throughout the monitoring period, the volunteers' opinions of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. These user perception rankings are shown on the lake's associated information sheet on the following page. The average user perception rankings, on a 1-to-5 scale, were 4.3 for physical condition (between 4- "high algal color" and 5-"severe algal bloom"), and 4.4 for recreational suitability (4- "no swimming - boating ok" and 5-"no aesthetics possible").

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.

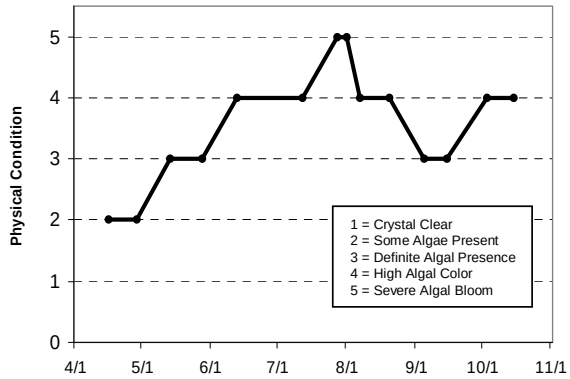



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/16 | | | | | 48 | 120 | | 0.6 | 2 | 4 |
| 4/29 | 8 | | | | 58 | 119 | | 0.3 | 2 | 4 |
| 5/14 | 16 | | | | 99 | 124 | | 0.3 | 3 | 5 |
| 5/28 | 15 | | | | 110 | 220 | | 0.2 | 3 | 5 |
| 6/13 | 19 | | | | 250 | 319 | | 0.1 | 4 | 5 |
| 7/12 | 22 | | | | 530 | 212 | | 0.5 | 4 | 5 |
| 7/28 | 21 | | | | 430 | 90 | | 0.3 | 5 | 5 |
| 8/1 | 22 | | | | 190 | 222 | | 0.5 | 5 | 5 |
| 8/7 | 27 | | | | 170 | 92 | | 0.5 | 4 | 5 |
| 8/20 | 27 | | | | 100 | 250 | | 0.5 | 4 | 5 |
| 9/5 | 18 | | | | 70 | 426 | | 0.3 | 3 | 5 |
| 9/15 | 17 | | | | 70 | 142 | | 0.2 | 3 | 5 |
| 10/3 | 14 | | | | 110 | 56 | | 0.2 | 4 | 4 |
| 10/15 | 10 | | | | 120 | 200 | | 0.2 | 4 | 5 |



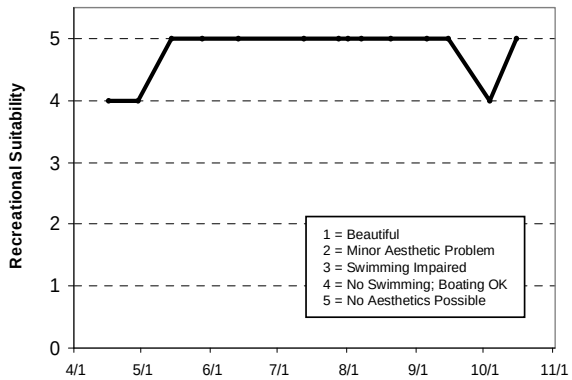

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | F | F | F | | F |
| Chlorophyll a | | | | | | | | F | F | F | | F |
| Secchi Depth | | | C | | | | | F | F | F | | F |
| **Lake Grade** | | | | | | | | **F** | **F** | **F** | | **F** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | F | | F | F |
| Chlorophyll a | | F | | F | F |
| Secchi Depth | | F | | F | F |
| **Lake Grade** | | **F** | | **F** | **F** |

Source: Metropolitan Council and STORET data



## Benz Lake (82-0120) *Browns Creek Watershed District*

Benz Lake is a 36-acre lake located in Grant Township (Washington County) with a maximum depth of approximately 2.7 m (9 feet). Because of the shallowness of the lake, its entire surface area is considered littoral (the shallow [0-15 foot depth] area dominated by aquatic vegetation).

The lake was monitored 14 times during the monitoring period. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

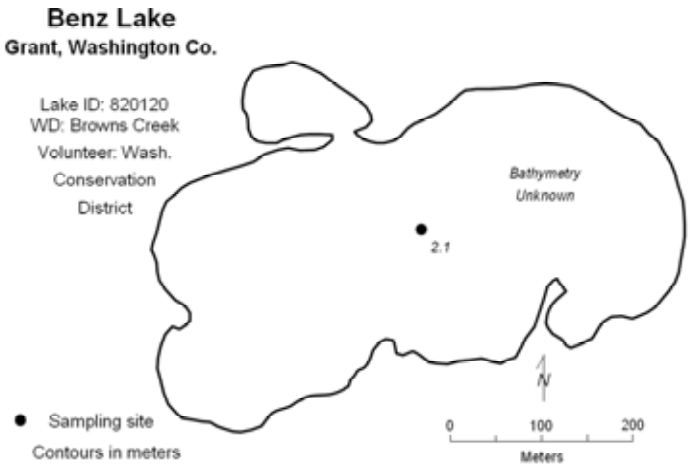
**2008 summer (May-September) data summary**

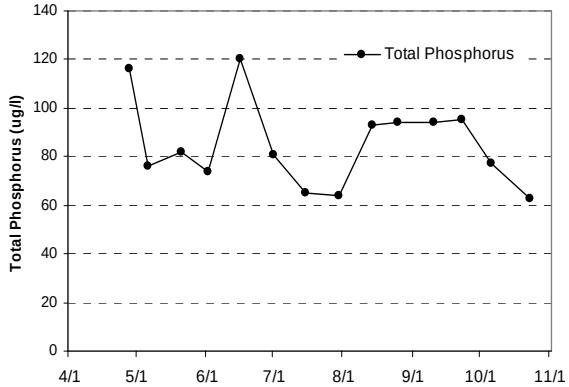
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 85.3 | 64.0 | 120.0 | D |
| **CLA** (µg/l) | 18.3 | 4.9 | 42.0 | B |
| **Secchi** (m) | 1.6 | 0.8 | 2.3 | C |
| **TKN** (mg/l) | 1.70 | 1.30 | 2.30 | |
| | | | ***Lake Grade*** | C |

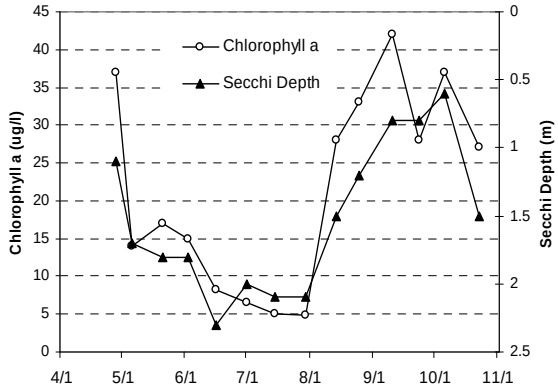
The lake received a lake grade of C in 2008 which was a significant improvement from previous monitoring years which received either an F or D lake grade. The summer-time means, maximums, and minimums for all four water quality parameters were indicative of better water quality for 2008 than in 2005 – 2007. Furthermore, mean summer-time water clarity was better for 2008 than 1998. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The average user perception rankings were 2.8 for physical condition (between 2- "Some algae present" and 3- "definite algae present"), and 3.6 for recreational suitability (between 3- "swimming slightly impaired" and 4- "No Swimming/Boating OK).

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.

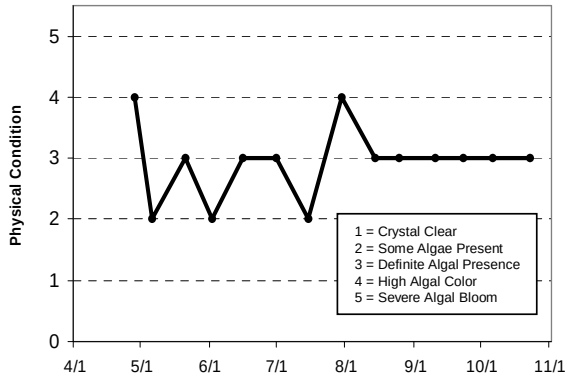



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/28 | 8.4 | 8.3 | 11.09 | 10.76 | 37 | 116 | | 1.1 | 4 | 2 |
| 5/6 | 15.3 | 12.5 | 10.35 | 0.76 | 14 | 76 | | 1.7 | 2 | 3 |
| 5/21 | 17.6 | 16.2 | 8.71 | 0.27 | 17 | 82 | | 1.8 | 3 | 4 |
| 6/2 | 21.5 | 19.1 | 8.03 | 7.78 | 15 | 74 | | 1.8 | 2 | 3 |
| 6/16 | 22.3 | 21.5 | 7.54 | 7.49 | 8.2 | 120 | | 2.3 | 3 | 4 |
| 7/1 | 26.2 | 24.8 | 10.91 | 2.24 | 6.6 | 81 | | 2 | 3 | 4 |
| 7/15 | 24.9 | 23.9 | 8.46 | 0.67 | 5.1 | 65 | | 2.1 | 2 | 3 |
| 7/30 | 28.8 | 26.8 | 8.27 | 0.48 | 4.9 | 64 | | 2.1 | 4 | 4 |
| 8/14 | 24.7 | 24.2 | 5.7 | 1.11 | 28 | 93 | | 1.5 | 3 | 3 |
| 8/25 | 24.7 | 23 | 8.04 | 0.15 | 33 | 94 | | 1.2 | 3 | 4 |
| 9/10 | 18.5 | 18.5 | 8.91 | 0.18 | 42 | 94 | | 0.8 | 3 | 4 |
| 9/23 | 20.8 | 20.7 | 6.88 | 0.35 | 28 | 95 | | 0.8 | 3 | 4 |
| 10/6 | 14.5 | 14.7 | 12.3 | 0.31 | 37 | 77 | | 0.6 | 3 | 3 |
| 10/23 | 9.7 | 9.9 | 9.75 | 0.59 | 27 | 63 | | 1.5 | 3 | 3 |



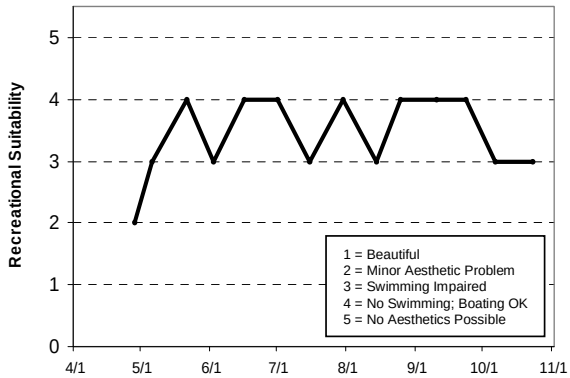

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | F | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | F | F | F | D |
| Chlorophyll a | | F | D | F | B |
| Secchi Depth | | F | D | F | C |
| **Lake Grade** | | **F** | **D** | **F** | **C** |

Source: Metropolitan Council and STORET data



## Beutel Pond (82-0399) *Valley Branch Watershed District*

Beutel Pond is located in Lake Elmo. The bathymetry of the lake is unknown other than that the maximum depth is 1.1 m (3.5 ft). The entire area of the lake is considered littoral zone which is the 0-15 feet depth zone of aquatic plant dominance. Furthermore, the lake does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the water column. A search through the STORET system provided no historical water quality data.

Beutel Pond was monitored 7 times during the monitoring period. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

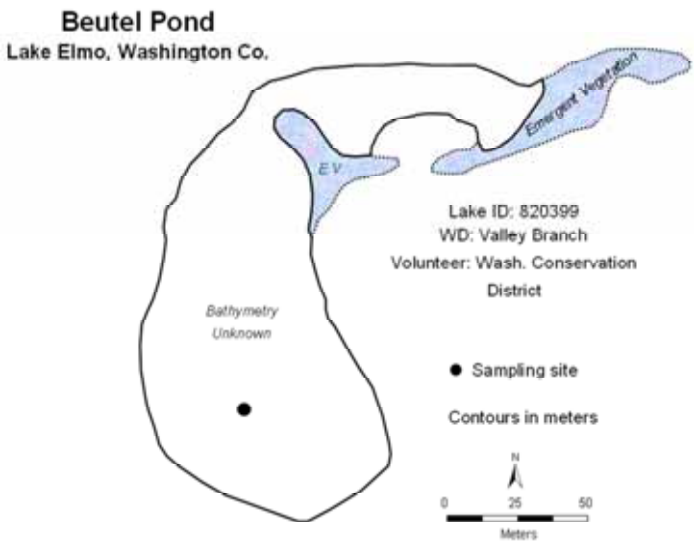
**2008 summer (May-September) data summary**

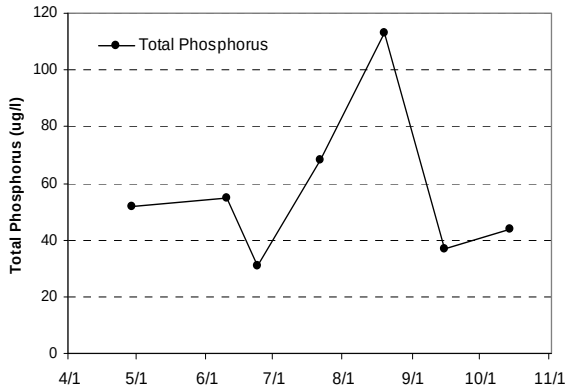
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 60.8 | 31.0 | 113.0 | C |
| **CLA** (µg/l) | 5.1 | 1.6 | 8.7 | NA |
| **Secchi** (m) | 0.7 | 0.5 | 1.1 | D |
| **TKN** (mg/l) | 1.82 | 1.10 | 2.70 | |
| | | | ***Lake Grade*** | NA |

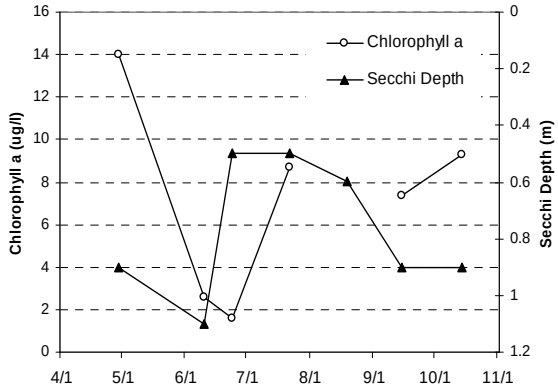
There were insufficient data to calculate a grade for CLA (at least 5 data points for the summer-time period are required). Therefore a lake grade was not determined either. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The average user perception rankings were 2.8 for physical condition (between 2- "Some algae present" and 3- "definite algae present"), and 3.6 for recreational suitability (between 3- "swimming slightly impaired" and 4- "No Swimming/Boating OK).

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.

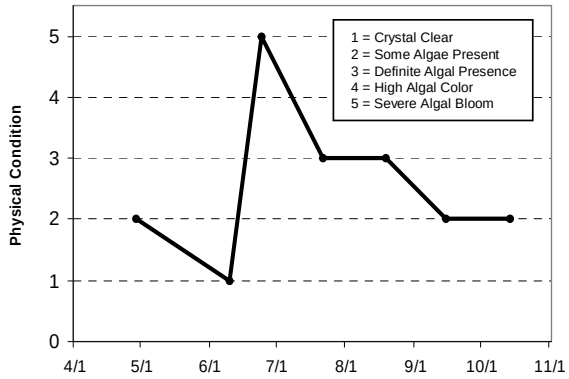



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/29 | 6.4 | 5.6 | 12.6 | 8.56 | 14 | 52 | | 0.9 | 2 | 2 |
| 6/10 | 20.4 | 20.3 | 5.16 | 5.53 | 2.6 | 55 | | 1.1 | 1 | 2 |
| 6/24 | 24.3 | 23.4 | 6.9 | 0.53 | 1.6 | 31 | | 0.5 | 5 | 4 |
| 7/22 | 23.3 | 215 | 3.76 | 0.21 | 8.7 | 68 | | 0.5 | 3 | 4 |
| 8/19 | 27.9 | 21.2 | 8.35 | 0.23 | | 113 | | 0.6 | 3 | 4 |
| 9/15 | 17 | 15.9 | 5.91 | 0.67 | 7.4 | 37 | | 0.9 | 2 | 4 |
| 10/14 | 12.6 | 12.7 | 8.43 | 8.1 | 9.3 | 44 | | 0.9 | 2 | 4 |



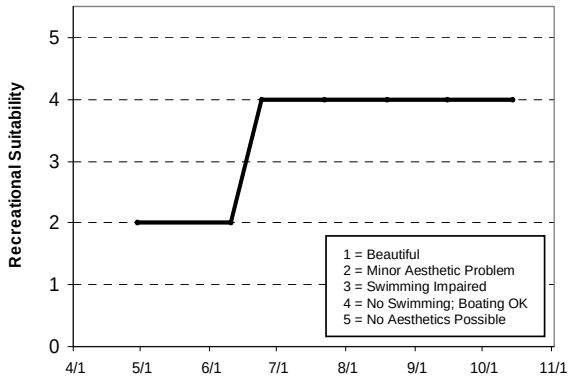

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | | C |
| Chlorophyll a | | | | | |
| Secchi Depth | | | | | D |
| **Lake Grade** | | | | | |

Source: Metropolitan Council and STORET data



## Big Carnelian Lake (82-0049) *Carnelian - Marine Watershed District*

Big Carnelian Lake is located in May Township (Washington County). It is considered a Priority Lake by the Metropolitan Council for its high regional recreation value and exceptional water clarity. The lake covers an area of 455 acres and has a maximum and mean depth of 20 m (roughly 66 feet) and 9.8 m (32 feet). Roughly 28 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 14,560 acre-feet (ac-ft). The lake's watershed of 1,900 acres translates to a rather small watershed-to-lake size ratio of 4:1. The larger the ratio the greater the potential stress put on the lake from surface.

Big Carnelian Lake was monitored 6 times between early-May and late-October 2008. On each sampling day the lake was monitored for Secchi transparency and the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

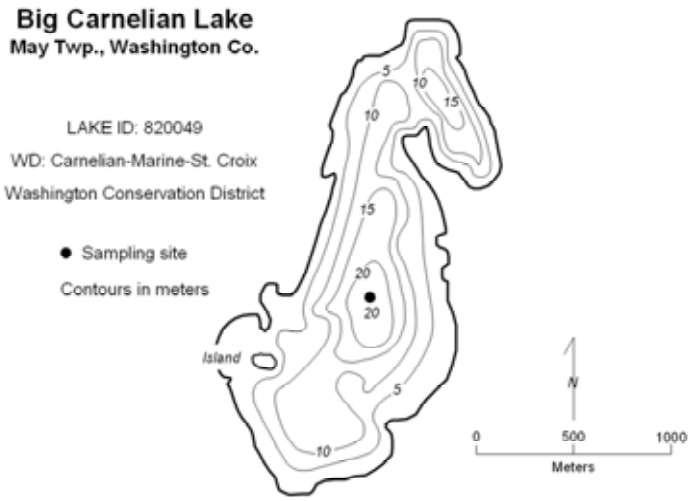
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **Secchi** (m) | 3.3 | 2.1 | 5.5 | A |

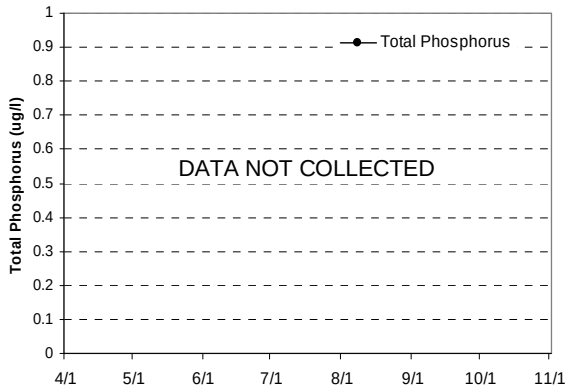
The lake received a grade of A for water clarity for 2008, which is consistent with the historical database. A lake grade was not determined because total phosphorus and chlorophyll-a were not monitored in 2008. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed a statistically significant improving trend in water clarity (MPCA 2008).

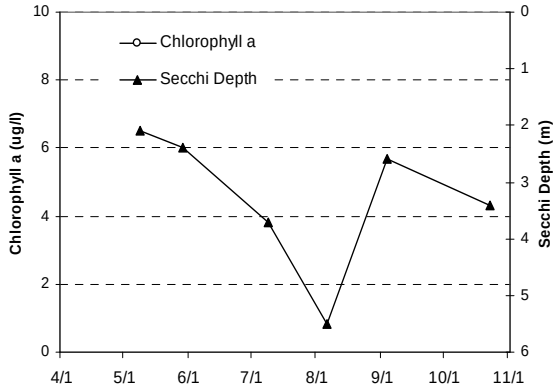
Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The resulting user perception rankings are shown on the information sheet. The mean physical condition ranking was 1.6 (between 1- "crystal clear" and 2- "some algae present"), while the mean recreational suitability ranking was 1.6 (between 1- "beautiful" and 2- "minor aesthetic problem").

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.

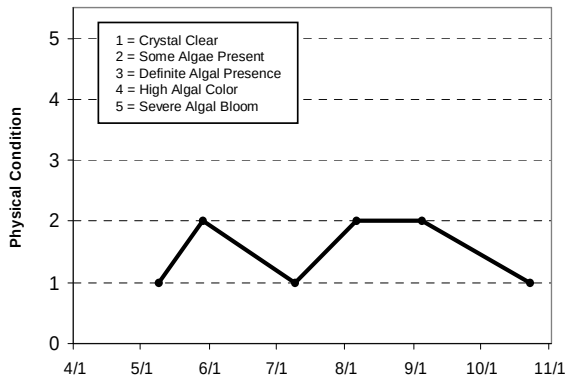



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/9 | 11.3 | 6.9 | 12.5 | 0.48 | | | | 2.1 | 1 | 1 |
| 5/29 | 16.6 | 7.4 | 11.1 | 0.14 | | | | 2.4 | 2 | 3 |
| 7/9 | 24.7 | 7.6 | 8.26 | 0.35 | | | | 3.7 | 1 | 1 |
| 8/6 | 25.8 | 7.6 | 7.31 | 0.22 | | | | 5.5 | 2 | 1 |
| 9/4 | 22.2 | 0.16 | 7.01 | 7.6 | | | | 2.6 | 2 | 2 |
| 10/23 | 12.5 | 7.9 | 7.57 | 0.32 | | | | 3.4 | 1 | 1 |



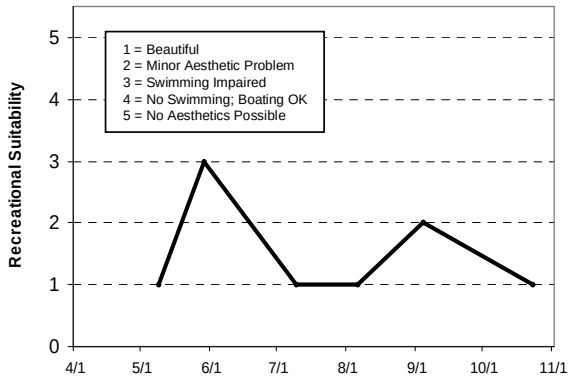

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | A | | | | B | | | | | A | | A |
| Chlorophyll a | A | | | | B | | | | | A | | A |
| Secchi Depth | A | | | | B | | | | | A | | B |
| **Lake Grade** | **A** | | | | **B** | | | | | **A** | | **A** |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | A | | A | A | A | A | A | A | B | A |
| Chlorophyll a | | | A | | A | A | A | B | A | A | A | A |
| Secchi Depth | 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 |
|---|---|---|---|---|---|
| Total Phosphorus | A | A | B | A | |
| Chlorophyll a | A | A | A | A | |
| Secchi Depth | A | A | A | A | A |
| **Lake Grade** | **A** | **A** | **A** | **A** | |

Source: Metropolitan Council and STORET data



## Big Comfort Lake (13-0053) *Comfort Lake-Forest Lake Watershed District*

Big Comfort Lake is located northeast of the City of Forest Lake in Chisago County. The lake has a maximum depth of 14.3 m (47 feet). Roughly 41 percent of the lake's area is considered littoral, the shallow (0-15 foot) depth area dominated by aquatic vegetation. An in-depth lake assessment was undertaken on the lake by the MPCA in 1994, and a lake and watershed diagnostic/feasibility study was completed by Blue Water Science in the early-2000's.

Big Comfort Lake was monitored 14 times between early May and late September 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

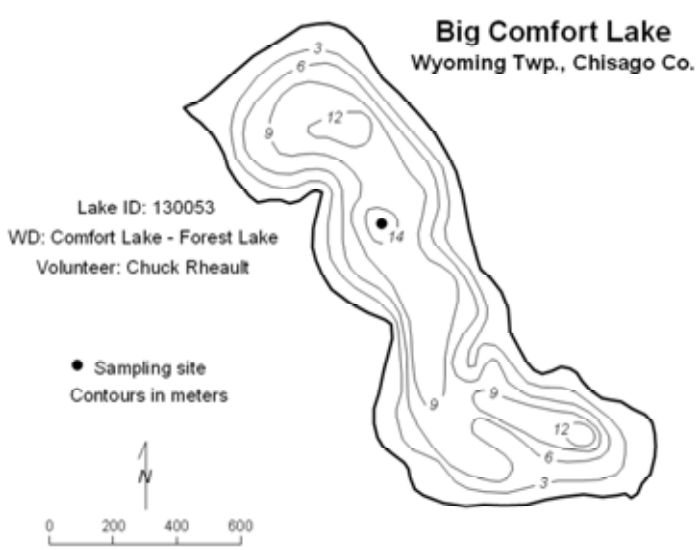
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 24.9 | 16.0 | 64.0 | B |
| **CLA** (µg/l) | 8.9 | 2.9 | 18.0 | A |
| **Secchi** (m) | 1.5 | 1.2 | 2.2 | C |
| **TKN** (mg/l) | 1.29 | 0.86 | 2.30 | |
| | | | ***Lake Grade*** | B |

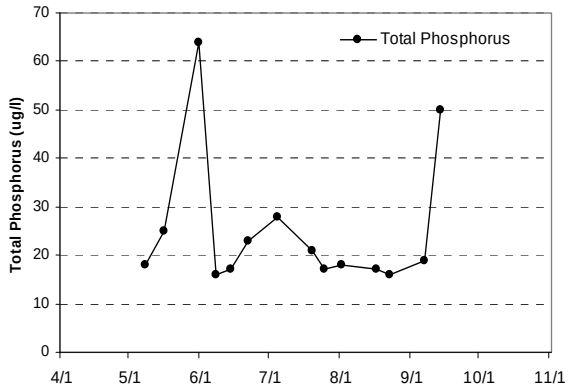
The lake received a lake grade of B for 2008. The 2008 lake grade appears to be better than most previous years because of its lower mean summer-time concentrations of CLA and TP. The water quality of 2007 still appears to be the best year so far, because of greater summer-time mean water clarity, lower summer-time mean TP concentrations, and the second lowest summer-time mean CLA concentration. The lowest summer-time mean CLA concentration observed was in 2008. The lake typically receives a grade of C for Secchi depth. However, a trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed a statistically significant strong declining trend in water clarity (MPCA 2008). Additional monitoring is recommended to determine the direction of potential trends in the water quality of the lake.

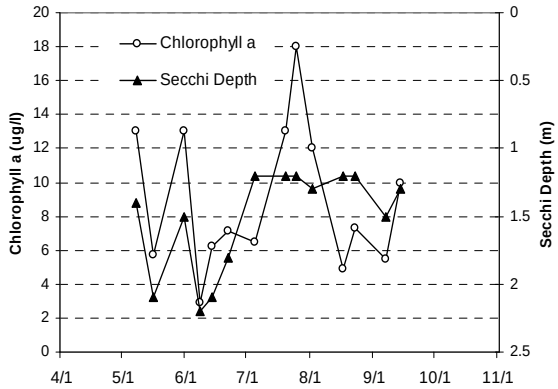
Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's recreational conditions on a 1-to-5 scale. The resulting user perception rankings are shown on the information sheet. The mean recreational suitability ranking was 1.0 (1- "beautiful"). No observations were given by the volunteer for physical condition perceptions.

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.

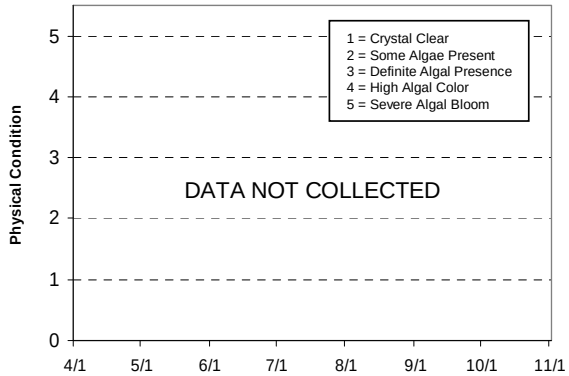



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/8 | 13.3 | | | | 13 | 18 | | 1.4 | | |
| 5/16 | 15.4 | | | | 5.7 | 25 | | 2.1 | | |
| 5/31 | 17.1 | | | | 13 | 64 | | 1.5 | | |
| 6/8 | | | | | 2.9 | 16 | | 2.2 | | 1 |
| 6/14 | 21.5 | | | | 6.2 | 17 | | 2.1 | | |
| 6/22 | 22.4 | | | | 7.1 | 23 | | 1.8 | | |
| 7/5 | 24.4 | | | | 6.5 | 28 | | 1.2 | | |
| 7/20 | 25.2 | | | | 13 | 21 | | 1.2 | | |
| 7/25 | 26.7 | | | | 18 | 17 | | 1.2 | | |
| 8/2 | 26.3 | | | | 12 | 18 | | 1.3 | | 1 |
| 8/17 | 25 | | | | 4.9 | 17 | | 1.2 | | |
| 8/23 | 23.9 | | | | 7.3 | 16 | | 1.2 | | |
| 9/7 | 20.5 | | | | 5.5 | 19 | | 1.5 | | |
| 9/14 | 18.4 | | | | 10 | 50 | | 1.3 | | |



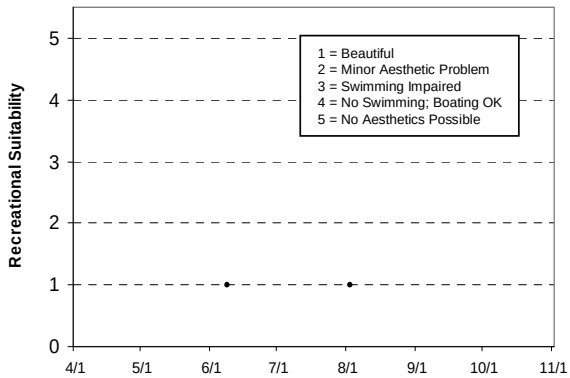

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | B | B | B | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | D | | | | | | C | B | C | C |
| Chlorophyll a | | | B | | | | | | C | B | C | C |
| Secchi Depth | | | C | C | | C | C | | C | C | C | C |
| **Lake Grade** | | | **C** | | | | | | **C** | **B** | **C** | **C** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | C | B | C | A | B |
| Chlorophyll a | B | B | B | A | A |
| Secchi Depth | C | C | C | C | C |
| **Lake Grade** | **C** | **B** | **C** | **B** | **B** |

Source: Metropolitan Council and STORET data



## Big Marine Lake (82-0052) *Carnelian - Marine Watershed District*

Big Marine Lake is located in City of Scandia (Washington County). It 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 MN DNR has designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*).

Big Marine Lake was monitored seven times between early May and late October 2008. On each sampling day the lake was monitored for Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

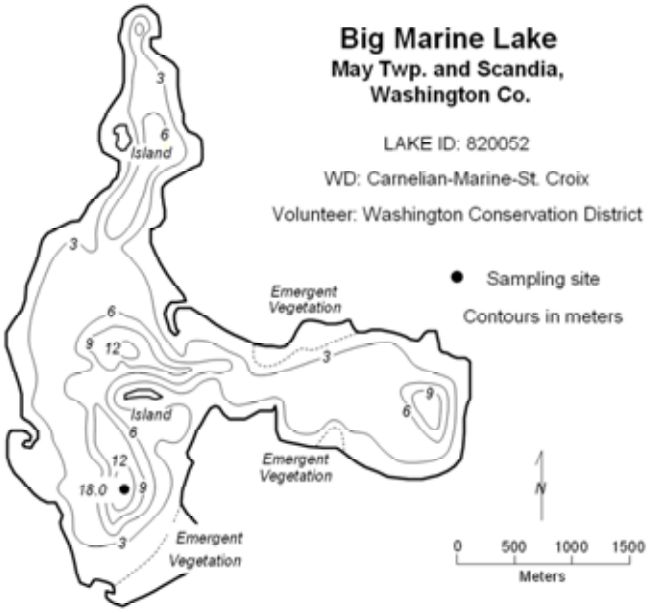
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **Secchi** (m) | 3.6 | 2.0 | 5.8 | A |

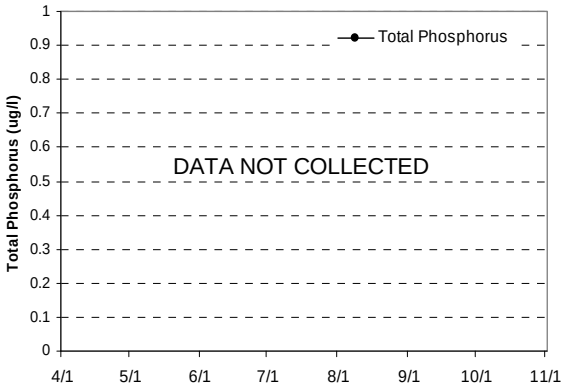
The lake received a letter grade of A for water clarity which is consistent with the historical data. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed a statistically significant improving trend in water clarity (MPCA 2008).

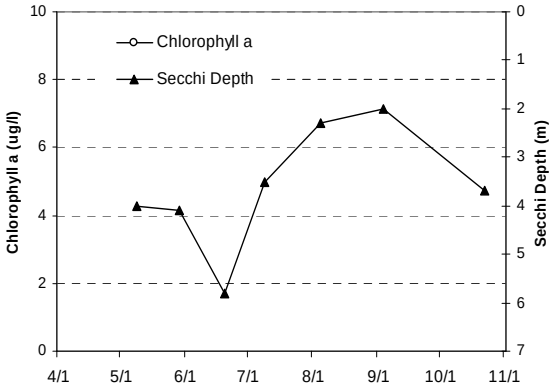
Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The resulting user perception rankings are shown on the information sheet. The mean physical condition ranking was 2.2 (between 2- "some algae present" and 3- "definite algae present"), while the mean recreational suitability ranking was 2.0 (2- "minor aesthetic problem").

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.

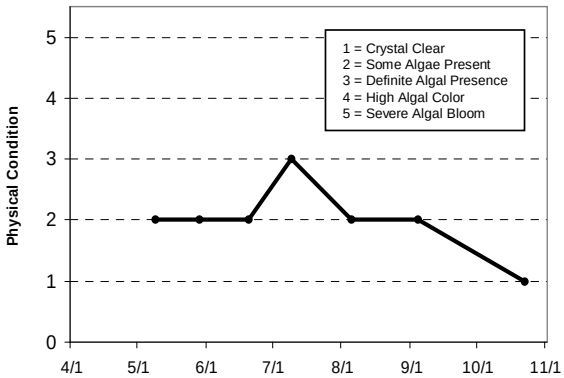



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/9 | 12.1 | 9.7 | 11.35 | 0.44 | | | | 4 | 2 | 2 |
| 5/29 | 15.8 | 13.2 | 9.61 | 0.12 | | | | 4.1 | 2 | 2 |
| 6/20 | 22.1 | 15.3 | 9.19 | 0.99 | | | | 5.8 | 2 | 1 |
| 7/9 | 23.9 | 13.9 | 7.29 | 0.31 | | | | 3.5 | 3 | 2 |
| 8/5 | 25.2 | 14.5 | 5.94 | 0.17 | | | | 2.3 | 2 | 3 |
| 9/4 | 21.6 | 14.5 | 6.73 | 0.17 | | | | 2 | 2 | 2 |
| 10/22 | 12 | 12 | 9.21 | 0.49 | | | | 3.7 | 1 | 1 |



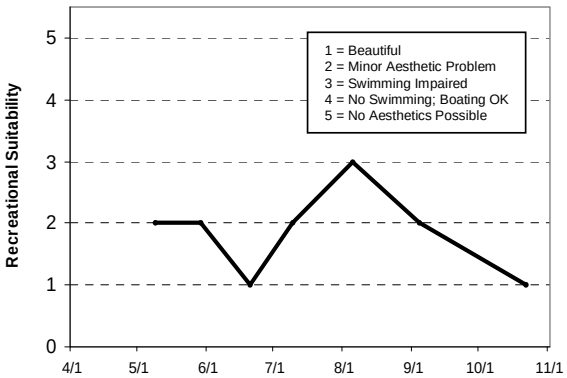

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | B | B | | | B | | | | | A | | B |
| Chlorophyll a | B | B | | | B | | | | | A | | A |
| Secchi Depth | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | A | | B | A | A | A | A | A | B | A |
| Chlorophyll a | | | A | | A | A | A | B | A | A | B | A |
| Secchi Depth | 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 |
|---|---|---|---|---|---|
| Total Phosphorus | A | A | C | A | |
| Chlorophyll a | A | A | A | A | |
| Secchi Depth | A | A | A | A | A |
| **Lake Grade** | **A** | **A** | **B** | **A** | |

Source: Metropolitan Council and STORET data



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

Bone Lake is located in New Scandia Township (Washington County). It is considered a Priority Lake by the Metropolitan Council for its high regional recreation value. The lake has a surface area of 212 acres. It receives flow through three inlets. The lake has a public access on its northwestern side and has a maximum and mean depth of 9.8 m and 3.7 m (32 and 12 feet), respectively. The approximate lake volume of Bone Lake is 2,820 ac-ft. Roughly 59 percent of the lake is considered littoral zone, that is, the area of aquatic plant dominance. The lake's 5,177-acre watershed translates to a rather large watershed-to-lake size ratio of 24:1. The greater the ratio, the greater the potential stress on the lake from surface runoff.

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

The lake was monitored 15 times between mid May and mid October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

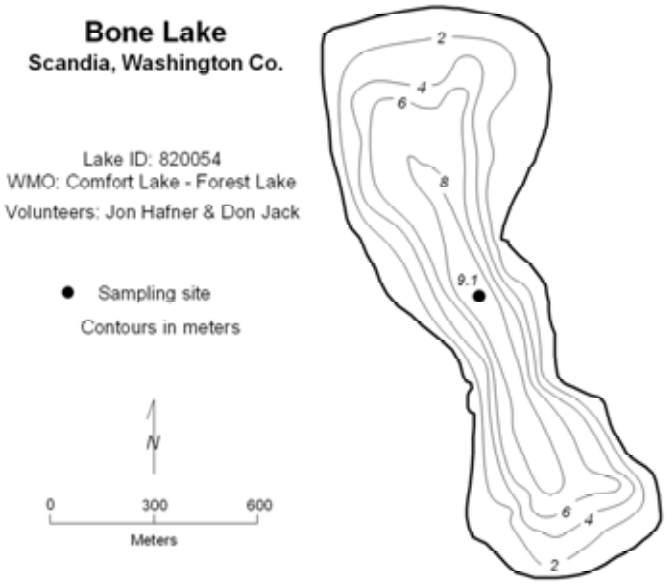
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 41.1 | 25.0 | 87.0 | C |
| **CLA** (µg/l) | 19.7 | 6.8 | 40.0 | B |
| **Secchi** (m) | 1.8 | 1.0 | 3.4 | C |
| **TKN** (mg/l) | 1.54 | 1.10 | 2.60 | |
| | | | ***Lake Grade*** | C |

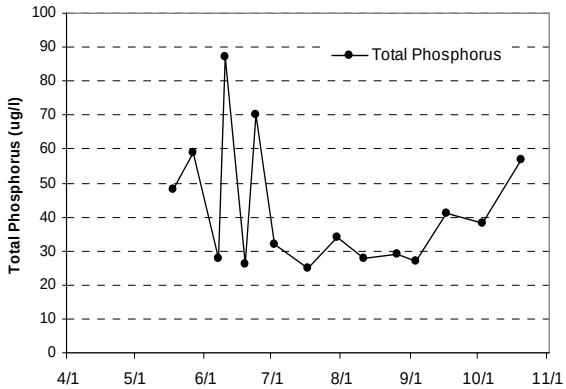
The lake received a lake grade of C for 2008 which is consistent with the historical database. The lake appears to be represented best by a lake grade of C. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008).

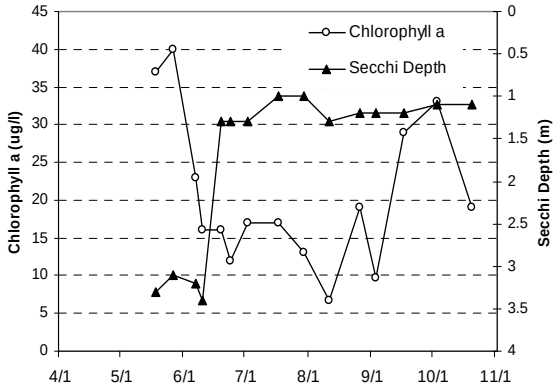
Throughout the summer, the volunteer(s) ranked the lake's perceived physical and recreational conditions on a 1-to-5 scale (see lake information sheet). The mean rankings were 2.4 for physical condition (between 2-"some algae present" and 3- "definite algae present"), and 2.2 for recreational suitability (between 2-"minor aesthetic problem" and 3- "swimming slightly impaired").

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.

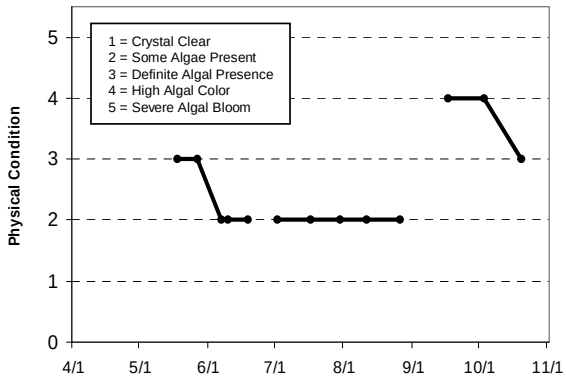



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/18 | 16 | | | | 37 | 48 | | 3.3 | 3 | 2 |
| 5/27 | 19 | | | | 40 | 59 | | 3.1 | 3 | 2 |
| 6/7 | 21 | | | | 23 | 28 | | 3.2 | 2 | 2 |
| 6/10 | 22 | | | | 16 | 87 | | 3.4 | 2 | 2 |
| 6/19 | 25.7 | | | | 16 | 26 | | 1.3 | 2 | 2 |
| 6/24 | 25.8 | | | | 12 | 70 | | 1.3 | | |
| 7/2 | 24.8 | | | | 17 | 32 | | 1.3 | 2 | 2 |
| 7/17 | 26.9 | | | | 17 | 25 | | 1 | 2 | 2 |
| 7/30 | 27.8 | | | | 13 | 34 | | 1 | 2 | 2 |
| 8/11 | 25.7 | | | | 6.8 | 28 | | 1.3 | 2 | 2 |
| 8/26 | 24 | | | | 19 | 29 | | 1.2 | 2 | 2 |
| 9/3 | 22.9 | | | | 9.7 | 27 | | 1.2 | | |
| 9/17 | 21 | | | | 29 | 41 | | 1.2 | 4 | 4 |
| 10/3 | 17.5 | | | | 33 | 38 | | 1.1 | 4 | |
| 10/20 | 14.7 | | | | 19 | 57 | | 1.1 | 3 | 3 |



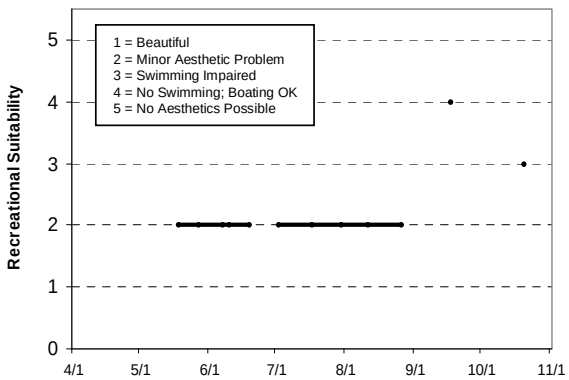

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | D | | | C | C | C | | D |
| Chlorophyll a | | | | | C | | | B | C | C | | C |
| Secchi Depth | | | | | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | C | | | | C | C | C | | C | C | D |
| Chlorophyll a | | C | | | | B | B | C | | C | C | C |
| Secchi Depth | | C | D | C | | C | C | D | | C | D | C |
| **Lake Grade** | | **C** | | | | **C** | **C** | **C** | | **C** | **C** | **C** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | C | C | C | C | C |
| Chlorophyll a | C | B | B | B | B |
| Secchi Depth | C | C | C | C | C |
| **Lake Grade** | **C** | **C** | **C** | **C** | **C** |

Source: Metropolitan Council and STORET data



## Brick Pond (82-0308) *Middle St. Croix Watershed Management Organization*

Brick Pond is located in the City of Stillwater. The morphometry of the lake is unknown. The maximum depth of the lake is 1.5 m (5.0 ft). The entire area of the lake is considered littoral zone which is the 0-15 feet depth zone of aquatic plant dominance. Furthermore, the lake does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the water column.

This was the first year that Brick Pond has been involved in the CAMP. A search through the STORET system provided no historical water quality data.

The lake was monitored 7 times between mid April and mid October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 123.6 | 58.0 | 172.0 | D |
| **CLA** (µg/l) | 7.0 | 2.9 | 13.0 | A |
| **Secchi** (m) | 1.2 | 0.9 | 1.5 | D |
| **TKN** (mg/l) | 1.33 | 0.67 | 1.80 | |
| | | | ***Lake Grade*** | C |

The lake received a lake grade of C for year 2008. Usually the letter grades for each parameter are within a letter grade of each other. The relatively low CLA summer-time mean concentration, which yielded a CLA grade of A versus the D grades for the other parameters, indicate that suspended sediment may be a possible cause of the low water clarity during 2008. The relatively high TP concentrations indicate that either sediment was being resuspended in the water column or the lake received substantial amounts of particulate-laden (e.g. sediment) runoff or both. In either case, the increase turbidity would decrease available light (i.e. reduced water clarity), and thereby suppress algal growth.

To the best of our knowledge, there are no water quality data available for Brick Pond other than the 2008 CAMP data. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

Throughout the summer, the volunteer(s) ranked the lake's perceived physical and recreational conditions on a 1-to-5 scale (see lake information sheet). The average user perception rankings, on a 1-to-5 scale, were 2.4 for physical condition (between 2-"some algae present" and 3- "definite algae present"), and 3.6 for recreational suitability (between 3- "swimming slightly impaired and 4- "no swimming/boating ok").

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.

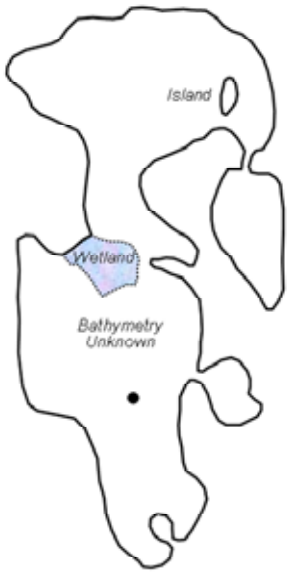
# Brick Pond

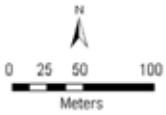
**Stillwater, Washington Co.**

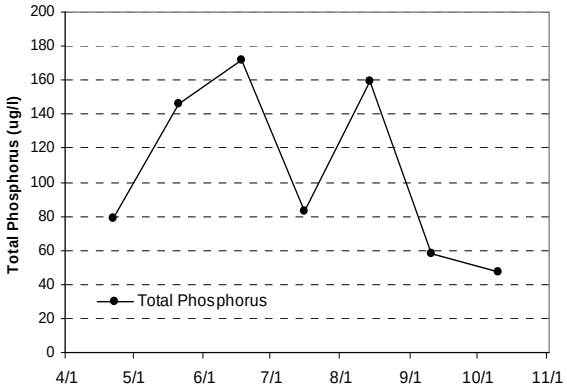
Lake ID: 820308
WMO: Middle St. Croix
Volunteer: Washington Conservation District

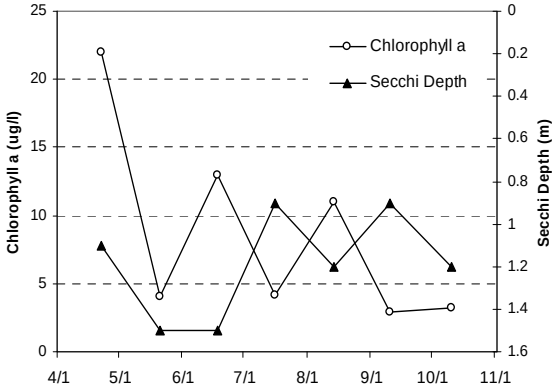
● Sampling site

Contours in meters



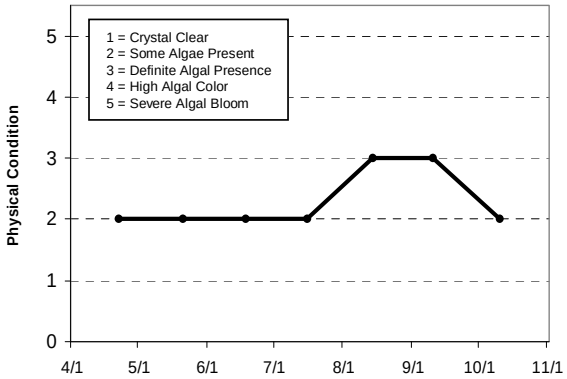




## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/22 | 15.7 | 11.1 | 11.9 | 1.8 | 22 | 79 | | 1.1 | 2 | 3 |
| 5/21 | 18.8 | 15.2 | 10.36 | 0.28 | 4 | 146 | | 1.5 | 2 | 3 |
| 6/18 | 24.5 | 19.1 | 11.32 | 2.06 | 13 | 172 | | 1.5 | 2 | 4 |
| 7/16 | 25 | 23 | 8.37 | 0.67 | 4.1 | 83 | | 0.9 | 2 | 4 |
| 8/14 | 24 | 21.8 | 7.81 | 0.98 | 11 | 159 | | 1.2 | 3 | 4 |
| 9/10 | 18 | 17.4 | 12.06 | 0.2 | 2.9 | 58 | | 0.9 | 3 | 3 |
| 10/10 | 13.3 | 12.8 | 12.02 | 7.43 | 3.2 | 47 | | 1.2 | 2 | 4 |



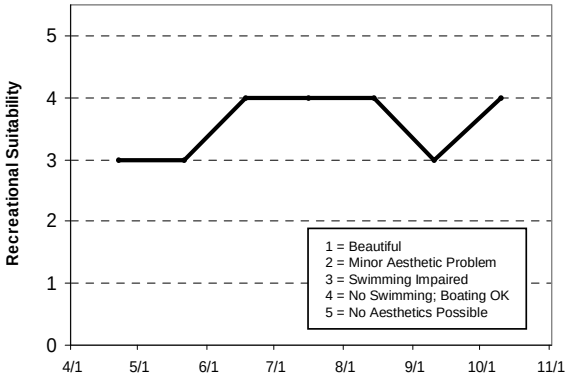

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | | D |
| Chlorophyll a | | | | | A |
| Secchi Depth | | | | | D |
| **Lake Grade** | | | | | **C** |

Source: Metropolitan Council and STORET data



## Brickyard Lake (10-0225) *Carver County Environmental Services*

Brickyard Lake is a 17-acre lake located near the City of Chaska (Carver County). The maximum depth of the lake is 13.1 m (roughly 43 feet). Thirty-five percent of the lake's surface area is considered littoral zone (area of aquatic plant dominance).

The lake was monitored 14 times between mid-April and mid-October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 29.0 | 10.0 | 106.0 | B |
| **CLA** (µg/l) | 3.5 | 1.5 | 6.7 | A |
| **Secchi** (m) | 4.5 | 1.3 | 6.5 | A |
| **TKN** (mg/l) | 0.98 | 0.60 | 1.30 | |
| | | | ***Lake Grade*** | A |

The lake received a lake grade of A for 2008. The lake's water quality is well represented by a lake grade of A in an historical context as well. The relatively higher TP summer-time mean concentration observed in 2008 was heavily influenced by a single spike in TP on September 15. Otherwise, the TP concentrations in 2008 were of similar magnitude as those in the historical database.

Throughout the summer, the volunteer(s) ranked the lake's perceived physical and recreational conditions on a 1-to-5 scale (see lake information sheet). The average user perception rankings, on a 1-to-5 scale, were 1.3 for physical condition (between 1- "crystal clear" and 2-"some algae present"), and 1.4 for recreational suitability (between 1- "beautiful" and 2-"minor aesthetic problem").

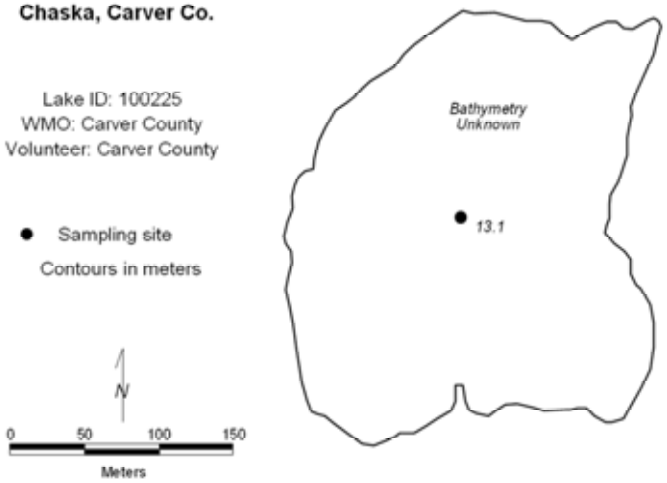
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

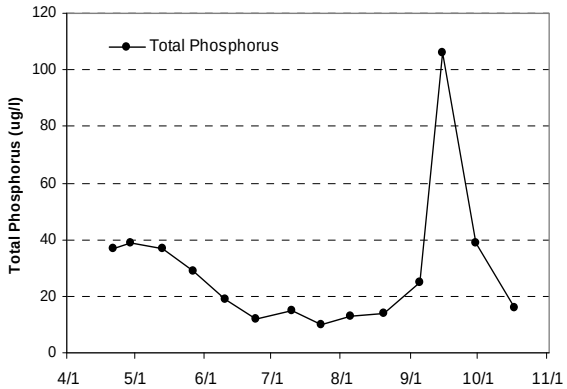
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

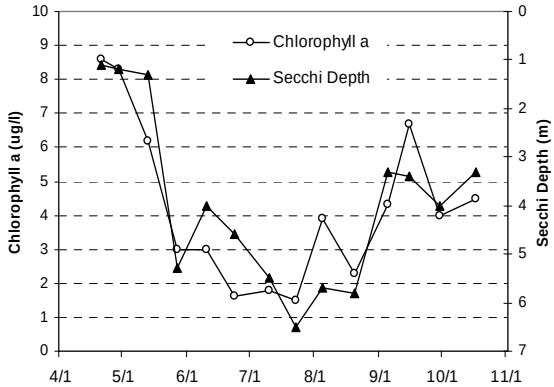
## Brickyard Lake
**Chaska, Carver Co.**

Lake ID: 100225
WMO: Carver County
Volunteer: Carver County

● Sampling site
Contours in meters

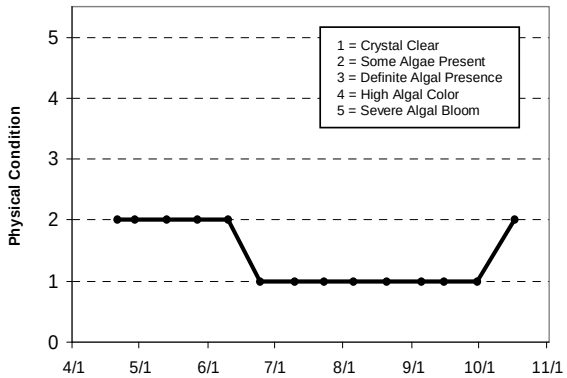



### 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/21 | 12.48 | | 14.27 | | 8.6 | 37 | | 1.1 | 2 | 4 |
| 4/29 | 8.7 | | 13.1 | | 8.3 | 39 | | 1.2 | 2 | 4 |
| 5/13 | 15.09 | | 15.02 | | 6.2 | 37 | | 1.3 | 2 | 2 |
| 5/27 | 17.95 | | 8.86 | | 3 | 29 | | 5.3 | 2 | 3 |
| 6/10 | 20.99 | | 8.08 | | 3 | 19 | | 4 | 2 | 2 |
| 6/24 | 24.43 | | 10.11 | | 1.6 | 12 | | 4.6 | 1 | 1 |
| 7/10 | 24.94 | | 8.81 | | 1.8 | 15 | | 5.5 | 1 | 1 |
| 7/23 | 26.21 | | 6.98 | | 1.5 | 10 | | 6.5 | 1 | 1 |
| 8/5 | 25.86 | | 7.41 | | 3.9 | 13 | | 5.7 | 1 | 1 |
| 8/20 | 25.76 | | 9.02 | | 2.3 | 14 | | 5.8 | 1 | 1 |
| 9/5 | 22.05 | | 8.47 | | 4.3 | 25 | | 3.3 | 1 | 1 |
| 9/15 | 19.85 | | 6.54 | | 6.7 | 106 | | 3.4 | 1 | 1 |
| 9/30 | 19.29 | | 7.27 | | 4 | 39 | | 4 | 1 | 1 |
| 10/17 | 14.45 | | 6.86 | | 4.5 | 16 | | 3.3 | 2 | 2 |



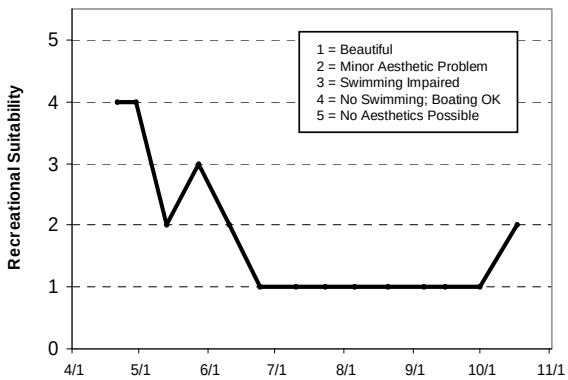

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | A | A |
| Chlorophyll a | | | | | | | | | | | A | A |
| Secchi Depth | | | | | | | | | | | A | A |
| **Lake Grade** | | | | | | | | | | | **A** | **A** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | A | A | B | A | B |
| Chlorophyll a | A | A | A | A | A |
| Secchi Depth | A | A | A | A | A |
| **Lake Grade** | **A** | **A** | **A** | **A** | **A** |

Source: Metropolitan Council and STORET data



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

Bush Lake, located in the City of Bloomington (Hennepin County). It is considered a Priority Lake by the Metropolitan Council for its high regional recreation value and exceptional water clarity. The lake has a surface area of 172 acres and has a maximum depth of 8.5 m (29 feet). Sixty-four percent of the lake's surface area is considered littoral zone (area of aquatic plant dominance). The MN DNR has designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*).

This is the third year that Bush Lake has been enrolled in the CAMP. The lake had been monitored by Council staff in the past. The lake was monitored 13 times between early May and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 15.9 | 10.0 | 25.0 | A |
| **CLA** (µg/l) | 5.4 | 1.6 | 10.0 | A |
| **Secchi** (m) | 3.1 | 2.1 | 4.6 | A |
| **TKN** (mg/l) | 0.88 | 0.55 | 1.10 | |
| | | | ***Lake Grade*** | A |

For 2008, the lake received a lake grade of A in addition to receiving letter grades of A for TP, CLA, and Secchi transparency. The lake received these same grades in 1984 and 1993. The water quality of the lake appears to fluctuate between a lake grade of A and B on the basis of the historical database. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008).

Throughout the monitoring season, the volunteer monitor ranked their perceptions of the lake's physical and recreational condition on a 1-to-5 scale. The mean perceived physical condition was 2.1 (between 2- "some algae present" and 3- "definite algae present"), while the mean recreational suitability was 1.6 (between 1- "beautiful" and 2- "minor aesthetic problem").

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.**

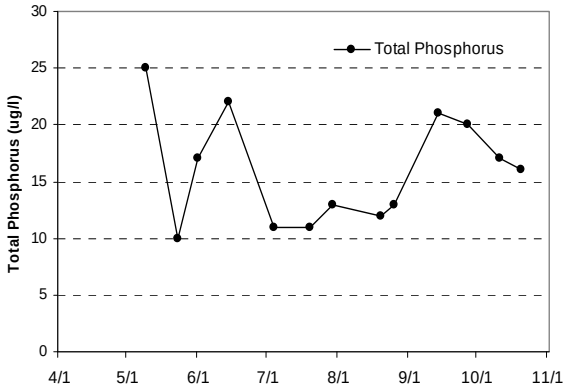
Lake ID: 270047

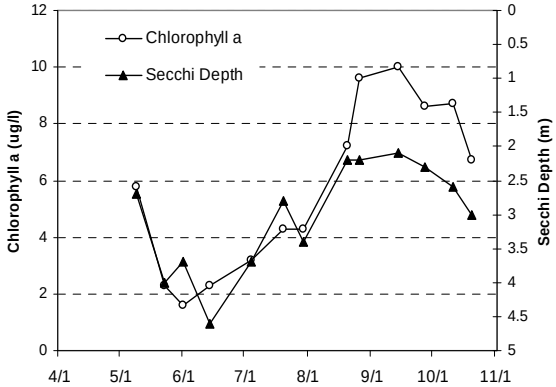
WD: Nine Mile Creek

Volunteer: Gregg Thompson

● Sampling site

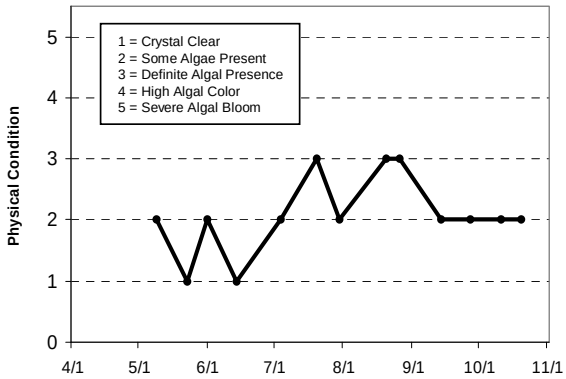
Contours in meters




## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/9 | 16 | | | | 5.8 | 25 | | 2.7 | 2 | 1 |
| 5/23 | 18 | | | | 2.3 | 10 | | 4 | 1 | 1 |
| 6/1 | 22 | | | | 1.6 | 17 | | 3.7 | 2 | 1 |
| 6/14 | 22 | | | | 2.3 | 22 | | 4.6 | 1 | 1 |
| 7/4 | 25.9 | | | | 3.2 | 11 | | 3.7 | 2 | 2 |
| 7/20 | 27.2 | | | | 4.3 | 11 | | 2.8 | 3 | 2 |
| 7/30 | 28.7 | | | | 4.3 | 13 | | 3.4 | 2 | 2 |
| 8/20 | 27.4 | | | | 7.2 | 12 | | 2.2 | 3 | |
| 8/26 | 24.6 | | | | 9.6 | 13 | | 2.2 | 3 | 2 |
| 9/14 | 19.9 | | | | 10 | 21 | | 2.1 | 2 | 2 |
| 9/27 | 20.6 | | | | 8.6 | 20 | | 2.3 | 2 | 2 |
| 10/11 | 16.4 | | | | 8.7 | 17 | | 2.6 | 2 | 2 |
| 10/20 | 14 | | | | 6.7 | 16 | | 3 | 2 | 2 |



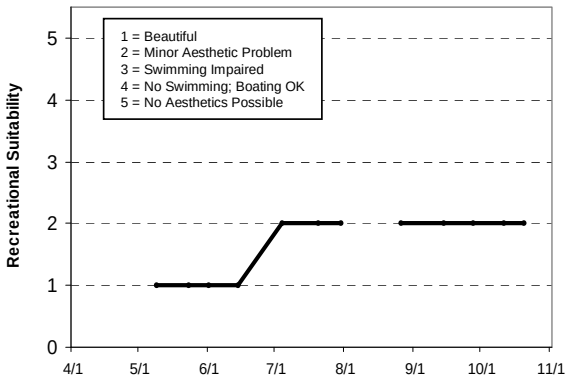

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | B | A | | | | | | | |
| Chlorophyll a | | | | B | A | | | | | | | |
| Secchi Depth | | | | B | A | B | A | B | C | | | |
| **Lake Grade** | | | | **B** | **A** | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | A | A | | | | | B | | A | | |
| Chlorophyll a | | A | A | | | | | B | | B | | |
| Secchi Depth | | A | B | | | | | B | | A | | |
| **Lake Grade** | | **A** | **A** | | | | | **B** | | **A** | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | A | | A | A | A |
| Chlorophyll a | B | | A | B | A |
| Secchi Depth | B | | B | B | A |
| **Lake Grade** | **B** | | **A** | **B** | **A** |

Source: Metropolitan Council and STORET data



## Capaul's Pond [east basin] (82-0365) *Valley Branch Watershed District*

Capaul's Pond is located in Grant Township (Washington County). There is no bathymetric information available for the east basin. The basin is to the east of the Gateway State Trail.

This is the first year that Capaul's Pond was monitored as part of the CAMP. A search through the STORET system revealed no historical water monitoring data for this water body. The basin was monitored 7 times between April and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

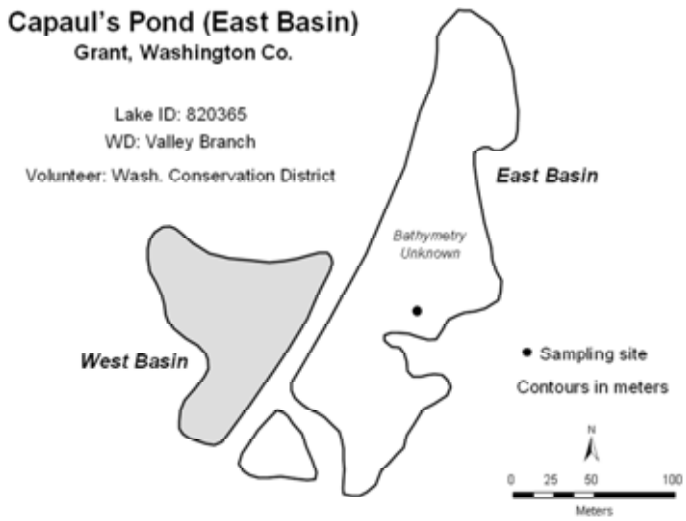
**2008 summer (May-September) data summary**

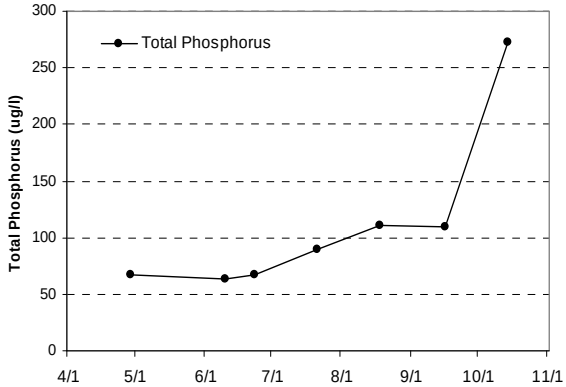
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 88.2 | 63.0 | 111.0 | D |
| **CLA** (µg/l) | 30.6 | 16.0 | 48.0 | C |
| **Secchi** (m) | 1.1 | 0.9 | 1.4 | D |
| **TKN** (mg/l) | 1.96 | 1.60 | 2.60 | |
| | | | ***Lake Grade*** | D |

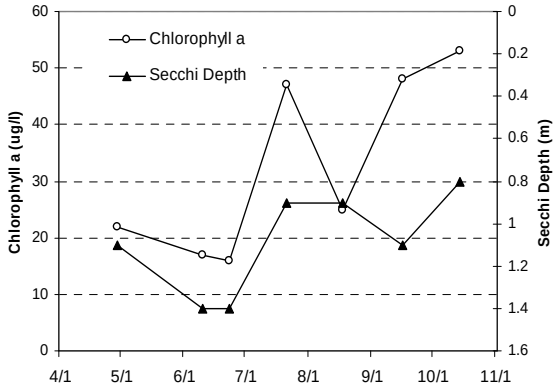
For 2008, the lake received a lake grade of D. Additional years of monitoring are suggested to build an historical water quality database for this lake.

Throughout the monitoring season, the volunteer monitor ranked their perceptions of the lake's physical and recreational condition on a 1-to-5 scale. The mean perceived physical condition was 3.0 (3- "definite algae present"), while the mean recreational suitability was 4.0 (4- "no swimming/boating ok").

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.

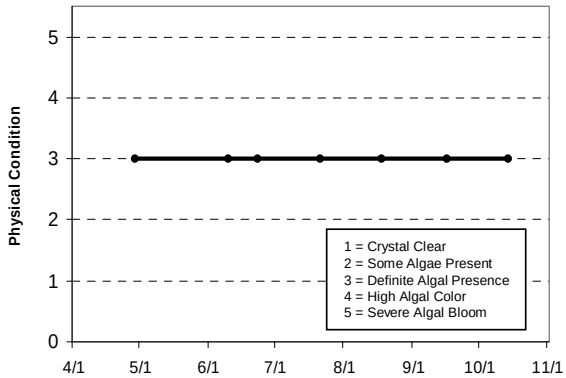



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/29 | 9.3 | 7.1 | 12.15 | 9.75 | 22 | 67 | | 1.1 | 3 | 4 |
| 6/10 | 21.4 | 18.6 | 9.38 | 0.21 | 17 | 63 | | 1.4 | 3 | 4 |
| 6/23 | 25.8 | 21.8 | 9.55 | 0.54 | 16 | 67 | | 1.4 | 3 | 4 |
| 7/21 | 27.3 | 23.5 | 8.35 | 0.25 | 47 | 90 | | 0.9 | 3 | 4 |
| 8/18 | 28.3 | 23.3 | 9.89 | 0.22 | 25 | 111 | | 0.9 | 3 | 4 |
| 9/16 | 20.2 | 17.3 | 12.54 | 0.29 | 48 | 110 | | 1.1 | 3 | 4 |
| 10/14 | 13.6 | 13.2 | 8.99 | 0.32 | 53 | 272 | | 0.8 | 3 | 4 |



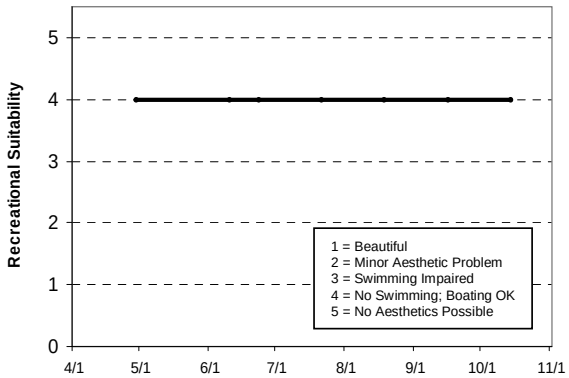

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | | D |
| Chlorophyll a | | | | | C |
| Secchi Depth | | | | | D |
| **Lake Grade** | | | | | **D** |

Source: Metropolitan Council and STORET data



## Capaul's Pond [west basin] (82-0365) *Valley Branch Watershed District*

Capaul's Pond is located in Grant Township (Washington County). There is no bathymetric information available for the west basin. The basin is to the west of the Gateway State Trail.

This is the first year that Capaul's Pond was monitored as part of the CAMP. A search through the STORET system revealed no historical water monitoring data for this water body. The basin was monitored 7 times between April and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

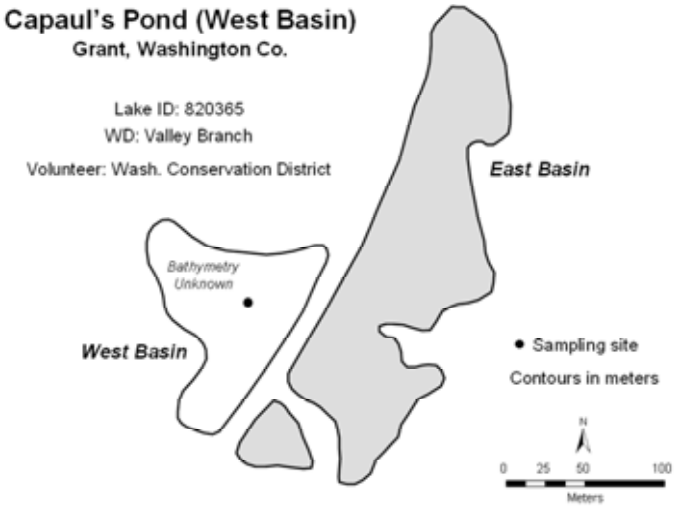
**2008 summer (May-September) data summary**

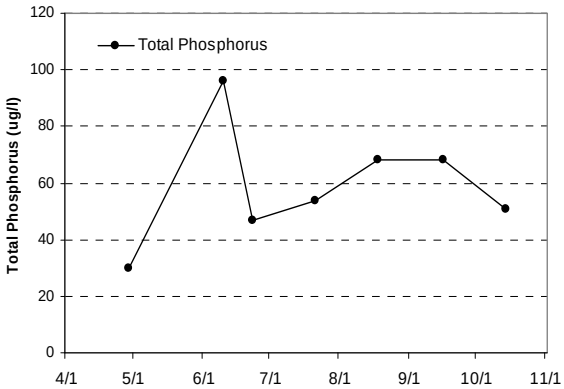
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 66.6 | 47.0 | 96.0 | C |
| **CLA** (µg/l) | 6.4 | 3.2 | 11.0 | A |
| **Secchi** (m) | 0.9 | 0.8 | 1.2 | D |
| **TKN** (mg/l) | 1.22 | 0.82 | 1.50 | |
| | | | ***Lake Grade*** | C |

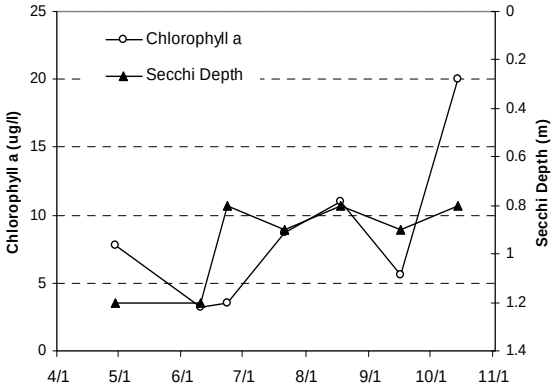
For 2008, the lake received a lake grade of C which is better water quality than the east basin. The concentration of CLA was notably less in the west basin than in the east basin but the water clarity was similar for both basins. This may indicate that the water clarity of the west basin may be more influenced by suspended solids from surface runoff or resuspension of basin sediment (as opposed to algal abundance) than in the east basin. Additional years of monitoring are suggested to determine water quality trends.

Throughout the monitoring season, the volunteer monitor ranked their perceptions of the lake's physical and recreational condition on a 1-to-5 scale. The mean perceived physical condition was 2.8 (between 2- "some algae present" and 3- "definite algae present"), while the mean recreational suitability was 4.0 (4- "no swimming/boating ok").

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.

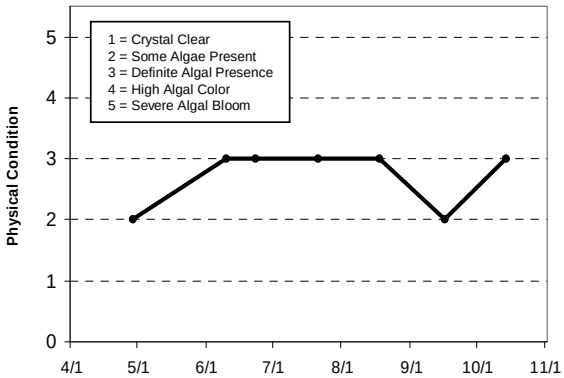



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/29 | 9 | 7.5 | 14.33 | 5.11 | 7.8 | 30 | | 1.2 | 2 | 3 |
| 6/10 | 22.1 | 19.1 | 11.93 | 0.46 | 3.2 | 96 | | 1.2 | 3 | 4 |
| 6/23 | 25.6 | 23.4 | 10.68 | 0.62 | 3.5 | 47 | | 0.8 | 3 | 4 |
| 7/21 | 25.1 | 23.5 | 3.6 | 0.31 | 8.7 | 54 | | 0.9 | 3 | 4 |
| 8/18 | 27 | 24.2 | 6.7 | 2.12 | 11 | 68 | | 0.8 | 3 | 4 |
| 9/16 | 20.7 | 17.6 | 8.56 | 10.03 | 5.6 | 68 | | 0.9 | 2 | 4 |
| 10/14 | 13.5 | 12.8 | 9.57 | 11.21 | 20 | 51 | | 0.8 | 3 | 4 |



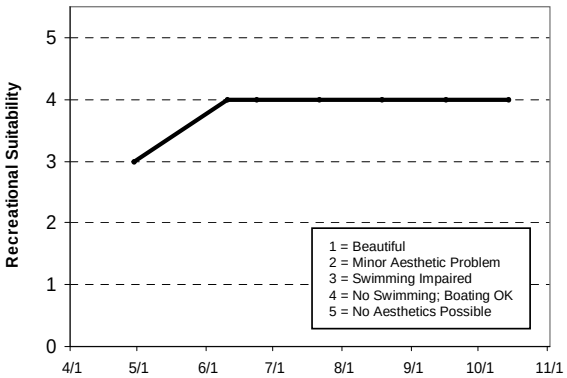

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | | C |
| Chlorophyll a | | | | | A |
| Secchi Depth | | | | | D |
| **Lake Grade** | | | | | **C** |

Source: Metropolitan Council and STORET data



## Carol Lake (82-0017) *Carnelian - Marine Watershed District*

Carol Lake is located within Stillwater Township (Washington County). The lake covers an area of 63 acres and has a maximum and mean depth of 1.8 m (roughly 6 feet) and 0.9 m (3 feet). Because of the shallowness of the lake, the entire lake is considered littoral, the shallow (0-15 foot depth) area dominated by aquatic vegetation, and it does not maintain a thermocline (a density gradient owed to changing water temperatures throughout the lake's water column). The approximate volume of the lake is 186 acre-feet (ac-ft). The lake's watershed of 375 acres translates to a watershed-to-lake size ratio of 6:1. The larger the ratio the greater the potential stress put on the lake from surface runoff.

A search through the STORET nationwide water quality database for data on the lake revealed a fair amount of historic data (1996-2007). The lake was monitored 7 times from early may to late September 2008. On each sampling day the lake was monitored for Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

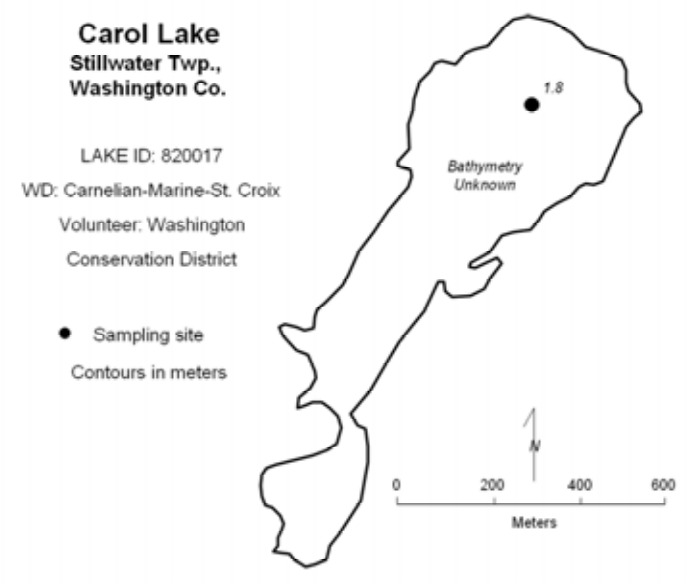
**2008 summer (May-September) data summary**

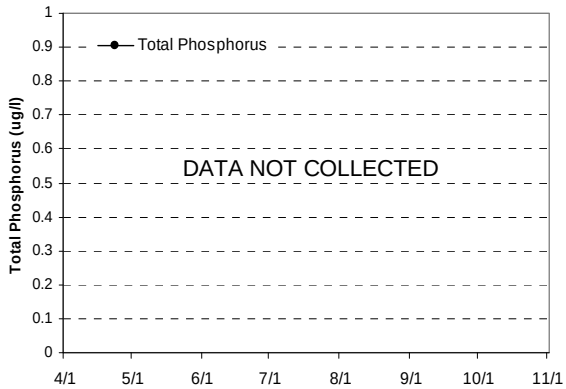
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | | | | |
| **CLA** (µg/l) | | | | |
| **Secchi** (m) | 1.1 | 0.2 | 1.7 | D |
| **TKN** (mg/l) | | | | |
| | | | ***Lake Grade*** | |

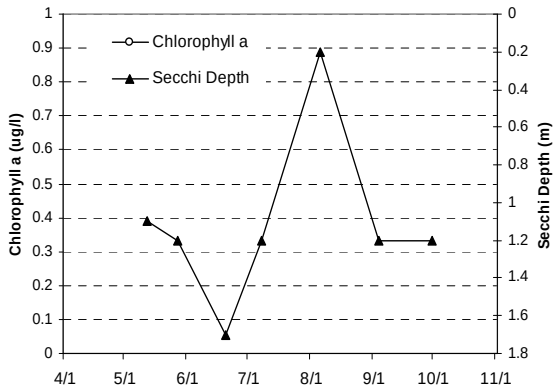
The Secchi depth grade for 2008 was a D, which is the same grade the lake has been receiving for water clarity since 2002. The water clarity of the lake has degraded since the 1990's as indicated by the drop from annual B grades to annual C grades to the recent annual D grades of the 2000's.

The last two graphs show seasonal variation in the lake's perceived physical condition and recreational suitability. The average user perception rankings, on a 1-to-5 scale, were 2.6 for physical condition (between 2- "some algae present" and 3- "definite algae present"), and 3.4 for recreational suitability (between 3- "swimming slightly impaired" and 4- "no swimming – boating ok").

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.

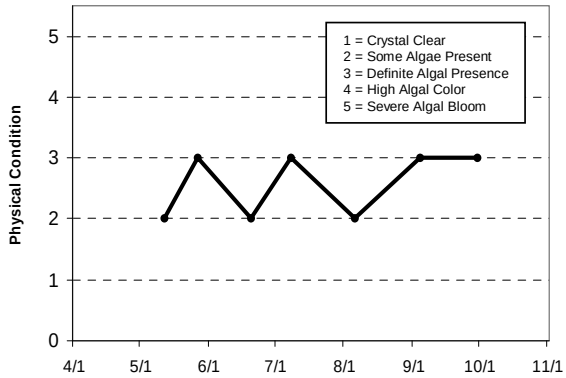



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/12 | 15.5 | 14.5 | 9.77 | 4.95 | | | | 1.1 | 2 | 2 |
| 5/27 | 18.6 | 16.6 | 8.76 | 1.43 | | | | 1.2 | 3 | 4 |
| 6/20 | 23.3 | 20.1 | 10.3 | 0.18 | | | | 1.7 | 2 | 4 |
| 7/8 | 25.3 | 22.8 | 9.23 | 0.68 | | | | 1.2 | 3 | 4 |
| 8/6 | 24.1 | 21.9 | 5.31 | 0.18 | | | | 0.2 | 2 | 4 |
| 9/4 | 18.8 | 17.9 | 2.43 | 0.23 | | | | 1.2 | 3 | 4 |
| 9/30 | 18.3 | 16.7 | 3.78 | 0.32 | | | | 1.2 | 3 | 2 |



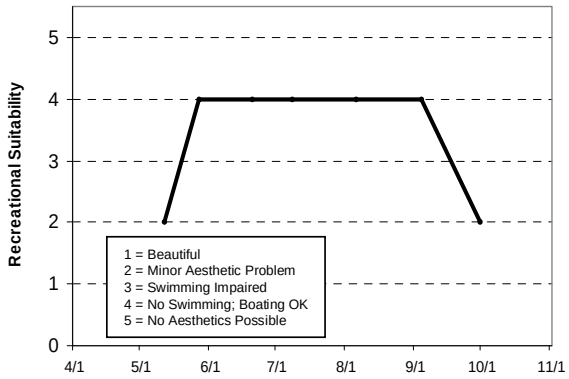

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | B | A | A | A | A | B | | C |
| Chlorophyll a | | | | | B | C | C | C | A | A | | B |
| Secchi Depth | | | | | B | B | B | B | C | C | D | D |
| **Lake Grade** | | | | | **B** | **B** | **B** | **B** | **B** | **B** | | **C** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | C | C | C | B | |
| Chlorophyll a | B | B | A | A | |
| Secchi Depth | D | D | D | D | D |
| **Lake Grade** | **C** | **C** | **C** | **B** | |

Source: Metropolitan Council and STORET data



## Cates Lake (70-0018) *Prior Lake – Spring Lake Watershed District*

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 (roughly 13 feet). Because of the shallowness of the lake, its entire area is considered littoral zone (the 0-15 foot depth area dominated by aquatic vegetation), and the lake does not maintain a thermocline (a density gradient owed to changing water temperatures throughout the lake's water column). The lake has no public access. The MN DNR has designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*).

The lake was monitored 12 times between mid-May and mid-October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

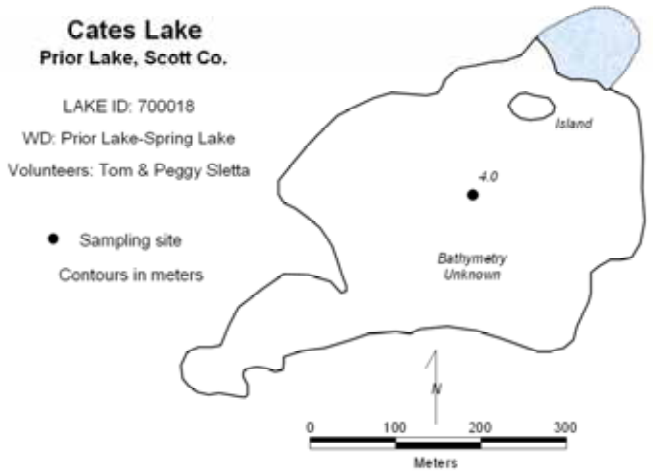
**2008 summer (May-September) data summary**

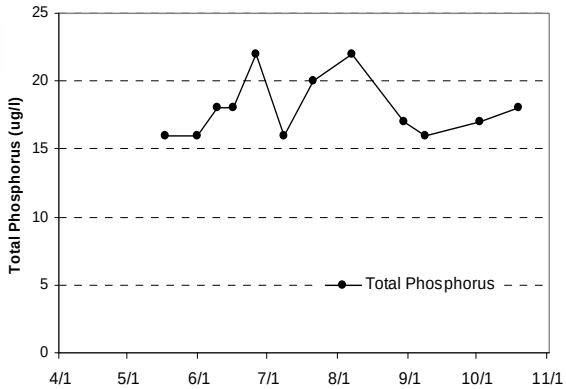
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 18.1 | 16.0 | 22.0 | A |
| **CLA** (µg/l) | 3.2 | 1.8 | 5.5 | A |
| **Secchi** (m) | 2.1 | 1.8 | 2.4 | C |
| **TKN** (mg/l) | 1.16 | 0.62 | 1.40 | |
| | | | ***Lake Grade*** | B |

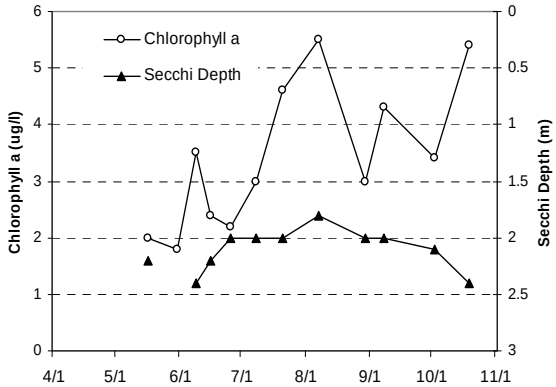
The lake received a lake grade of B for 2008, which is the same grade it has received for the previous 6 years. Given the available historical water quality data, the water quality of the lake is well represented by a lake grade of B. The individual parameter grades were similar for 2008 as for 2002, 2005, and 2007. The water quality of the lake appears to be relatively stable since 2002.

During each monitoring event, the volunteers' opinion of the lake condition was ranked on a 1-to-5 scale as shown on the lake information sheet. The average score for physical condition was 3.0 (3- "definite algae present"), and 4.0 for recreational suitability (4 - "no swimming – boating ok").

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.

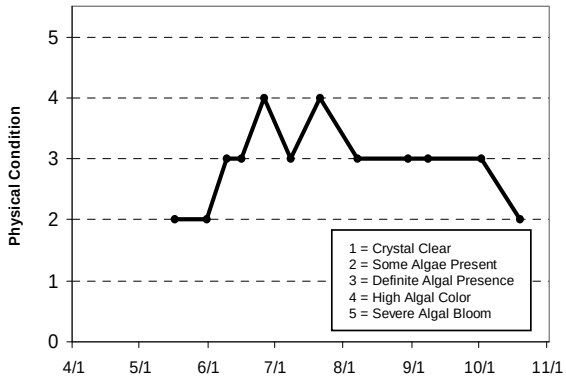



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/17 | 18.2 | | | | 2 | 16 | | 2.2 | 2 | 4 |
| 5/31 | 19 | | | | 1.8 | 16 | | | 2 | 4 |
| 6/9 | 21.2 | | | | 3.5 | 18 | | 2.4 | 3 | 4 |
| 6/16 | 21.8 | | | | 2.4 | 18 | | 2.2 | 3 | 4 |
| 6/26 | 25 | | | | 2.2 | 22 | | 2 | 4 | 4 |
| 7/8 | 25.4 | | | | 3 | 16 | | 2 | 3 | 4 |
| 7/21 | 26.5 | | | | 4.6 | 20 | | 2 | 4 | 4 |
| 8/7 | 26.1 | | | | 5.5 | 22 | | 1.8 | 3 | 4 |
| 8/30 | 22.5 | | | | 3 | 17 | | 2 | 3 | 4 |
| 9/8 | 18.9 | | | | 4.3 | 16 | | 2 | 3 | 4 |
| 10/2 | 16.5 | | | | 3.4 | 17 | | 2.1 | 3 | 4 |
| 10/19 | 13.3 | | | | 5.4 | 18 | | 2.4 | 2 | 4 |



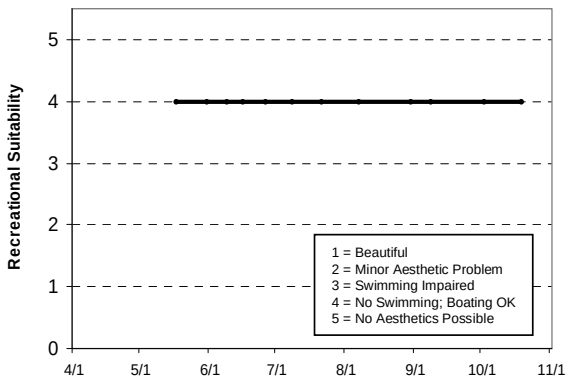

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | A | B |
| Chlorophyll a | | | | | | | | | | | A | A |
| Secchi Depth | | | | | | | | | | | C | C |
| **Lake Grade** | | | | | | | | | | | **B** | **B** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | B | A | B | A | A |
| Chlorophyll a | A | A | A | A | A |
| Secchi Depth | C | C | C | C | C |
| **Lake Grade** | **B** | **B** | **B** | **B** | **B** |

Source: Metropolitan Council and STORET data



## Cedar Lake (70-0091) *Scott County Watershed Management Organization*

Cedar Lake is located in Cedar Lake Township (Scott County). It is considered a Priority Lake by the Metropolitan Council for its high regional recreation value. The lake has a surface an area of 742 acres and has a maximum depth of 4.7 m (roughly 15 feet). The lake's mean depth of 2.1 m (6.9 feet) and surface area translates to an approximate lake volume of 5,194 ac-ft. Because the maximum depth is only 4.7 m (15 feet), the entire lake area is considered littoral (the area of aquatic plant dominance), and it does not maintain a thermocline (a density gradient owed to changing water temperatures throughout the lake's water column).

The majority land use within the 11,104-acre contributing watershed is agricultural. The watershed-to-lake size ratio is 14:1 (the greater the ratio, the greater the potential stress on the lake from surface runoff).

This is the third year that Cedar Lake has been enrolled in CAMP. The lake had been monitored by Council staff in the past. The lake was monitored 14 times between mid-April and mid-October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 196.3 | 61.0 | 315.0 | F |
| **CLA** (µg/l) | 48.8 | 22.0 | 80.0 | D |
| **Secchi** (m) | 0.8 | 0.6 | 1.2 | D |
| **TKN** (mg/l) | 2.10 | 1.60 | 2.90 | |
| | | | ***Lake Grade*** | D |

The lake received a lake grade of D for 2008 is similar to that recorded in 1981, 1984, 1993, 1998, 2006, and 2007 but better than those recorded for 1980 and 2001 (F). The 2008 water quality was worse than the C lake grade received for 2005. Because of the variability of the lake's grades, no trend is apparent from the lake's water quality database. The lake's water quality seems to be best represented by a lake grade of D. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008).

The volunteer monitor ranked their perceptions of the lake's physical and recreational condition on a 1-to-5 scale. The mean perceived physical condition was 2.4 (between 2- "some algae present" and 3- "definite algae present"), while the mean recreational suitability was 2.2 (2- "minor aesthetic problem" and 3- "swimming impaired").

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.**

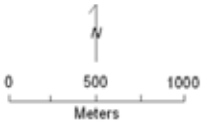
● Sampling site

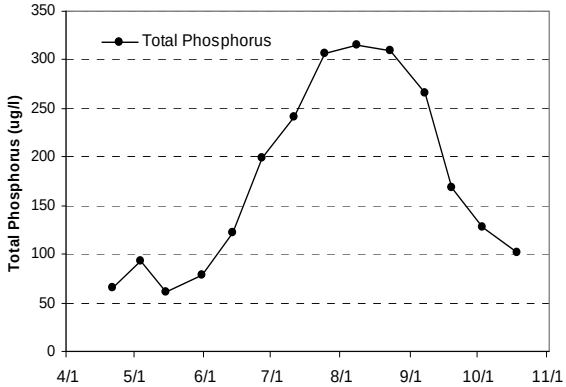
Contours in meters

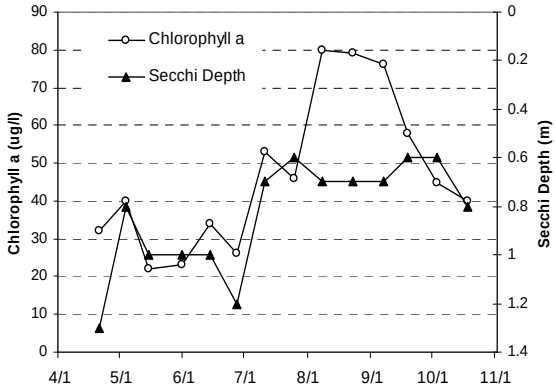
Volunteer: Jerry Edberg

LAKE ID: 700091

WMO: Scott County

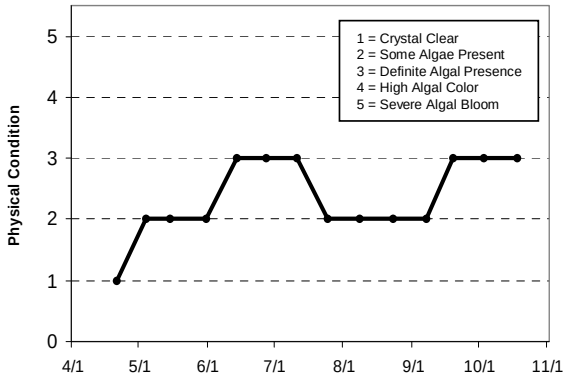





## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/21 | 8.8 | | | | 32 | 66 | 69 | 1.3 | 1 | 1 |
| 5/4 | 11.1 | | | | 40 | 93 | 84 | 0.8 | 2 | 2 |
| 5/15 | 16.4 | | | | 22 | 61 | 71 | 1 | 2 | 2 |
| 5/31 | 18.4 | | | | 23 | 78 | 108 | 1 | 2 | 2 |
| 6/14 | 19.7 | | | | 34 | 122 | 123 | 1 | 3 | 3 |
| 6/27 | 24.6 | | | | 26 | 199 | | 1.2 | 3 | 3 |
| 7/11 | 25.1 | | | | 53 | 241 | 268 | 0.7 | 3 | 2 |
| 7/25 | 26 | | | | 46 | 306 | 286 | 0.6 | 2 | 2 |
| 8/8 | 26 | | | | 80 | 315 | 325 | 0.7 | 2 | 2 |
| 8/23 | 24.6 | | | | 79 | 309 | 362 | 0.7 | 2 | 2 |
| 9/7 | 20 | | | | 76 | 266 | 263 | 0.7 | 2 | 2 |
| 9/19 | 19.1 | | | | 58 | 169 | 192 | 0.6 | 3 | 2 |
| 10/3 | 16.1 | | | | 45 | 128 | 128 | 0.6 | 3 | 2 |
| 10/18 | 12.2 | | | | 40 | 101 | 96 | 0.8 | 3 | 2 |



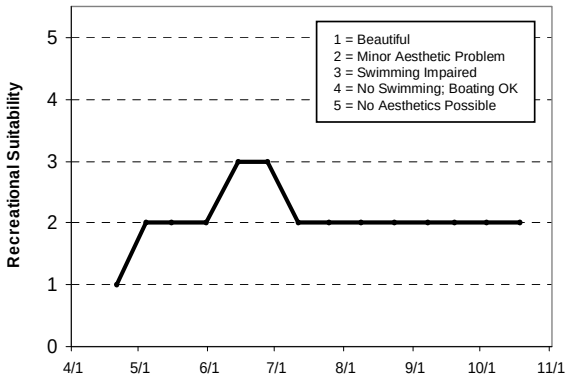

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | F | F | | | F | | | | | | | |
| Chlorophyll a | F | D | | | D | | | | | | D | |
| Secchi Depth | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | F | | | | | F | | | F | | |
| Chlorophyll a | | C | | | | | D | | | F | | |
| Secchi Depth | D | C | | | | | D | | | D | | |
| **Lake Grade** | | **D** | | | | | **D** | | | **F** | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | D | F | F | F |
| Chlorophyll a | | C | D | D | D |
| Secchi Depth | | C | D | D | D |
| **Lake Grade** | | **C** | **D** | **D** | **D** |

Source: Metropolitan Council and STORET data



## Cenaiko Lake (2-0654) *Anoka County Parks*

Cenaiko Lake is located within Coon Rapids Dam Regional Park in the City of Coon Rapids in Anoka County. The lake is maintained by groundwater and has a very small watershed that is completely publicly owned (MDNR 1996). No boats, canoes, or floatables are allowed on the 29-acre man-made lake that is one of only six lakes in the seven-county metropolitan area that are stocked with trout (brook and rainbows). The only fishing access to the lake is two fishing docks and the lake's shoreline. The lake, which is 0.6 miles in circumference, has a maximum depth of 9.1 m (30 ft). Only 12 percent of the lake is considered littoral zone (the 0-15 foot depth zone of the lake dominated by aquatic vegetation). The MN DNR has designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*).

Cenaiko Lake was monitored 13 times between late April and mid October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 13.8 | 7.0 | 25.0 | A |
| **CLA** (µg/l) | 3.1 | 1.3 | 9.1 | A |
| **Secchi** (m) | 2.0 | 1.2 | 2.9 | C |
| **TKN** (mg/l) | 0.79 | 0.44 | 1.20 | |
| | | | ***Lake Grade*** | B |

The lake received a water quality lake grade of B for 2008. The lake has received A grades for TP and CLA since 1997. The water clarity shows variation however. The annual mean summer-time water clarity grade has varied in the range of A to C. No apparent trends are evident from the lake's water quality database. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008). The lake seems well represented by a lake grade of A/B on the basis of the historical database.

At each monitoring event, the volunteers' opinion of the lake condition was ranked on a 1-to-5 scale as shown on the lake information sheet. The average score for physical condition was 2.5 (between 2- "some algae present" and 3- "definite algae present"), and 2.0 for recreational suitability (2- "minor aesthetic problem").

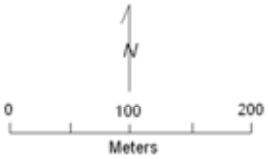
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

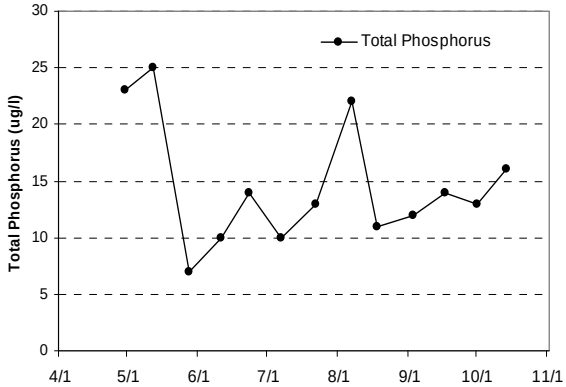
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

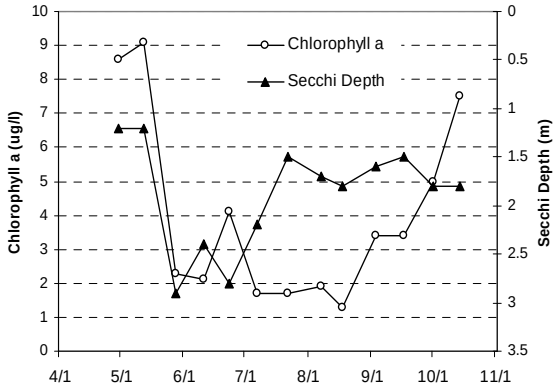
# Lake Cenaiko
## Coon Rapids, Anoka Co.

Lake ID: 20654
WD: Coon Creek
Volunteer: Anoka Co. Parks

● Sampling site
Contours in meters

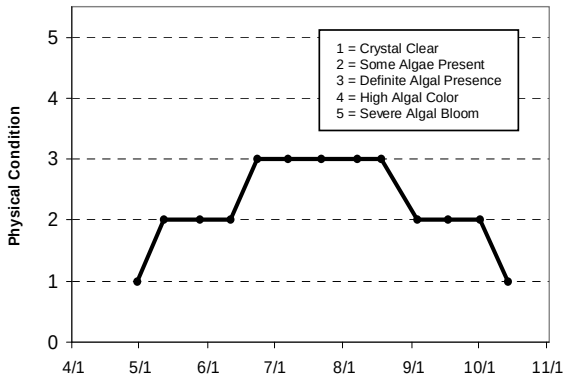





### 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/30 | 10.7 | | | | 8.6 | 23 | | 1.2 | 1 | 1 |
| 5/12 | 14.4 | | | | 9.1 | 25 | | 1.2 | 2 | |
| 5/28 | 19 | | | | 2.3 | 7 | | 2.9 | 2 | 1 |
| 6/11 | 20.1 | | | | 2.1 | 10 | | 2.4 | 2 | 1 |
| 6/23 | 24.7 | | | | 4.1 | 14 | | 2.8 | 3 | 2 |
| 7/7 | 26.8 | | | | 1.7 | 10 | | 2.2 | 3 | 3 |
| 7/22 | 28.5 | | | | 1.7 | 13 | | 1.5 | 3 | |
| 8/7 | 26.1 | | | | 1.9 | 22 | | 1.7 | 3 | |
| 8/18 | 26.3 | | | | 1.3 | 11 | | 1.8 | 3 | 3 |
| 9/3 | 22.5 | | | | 3.4 | 12 | | 1.6 | 2 | 2 |
| 9/17 | 22.7 | | | | 3.4 | 14 | | 1.5 | 2 | 2 |
| 10/1 | 16.9 | | | | 5 | 13 | | 1.8 | 2 | 1 |
| 10/14 | 14.5 | | | | 7.5 | 16 | | 1.8 | 1 | 1 |



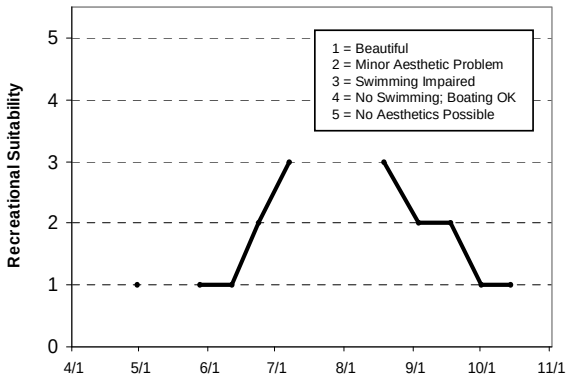

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | A | A | A | A | A | A | A |
| Chlorophyll a | | | | | | A | A | A | A | A | A | A |
| Secchi Depth | | | | | | C | A | A | B | C | A | A |
| **Lake Grade** | | | | | | **B** | **A** | **A** | **A** | **B** | **A** | **A** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | A | A | A | A | A |
| Chlorophyll a | A | A | A | A | A |
| Secchi Depth | B | B | A | B | C |
| **Lake Grade** | **A** | **A** | **A** | **A** | **B** |

Source: Metropolitan Council and STORET data



## Clear Lake (82-0045) *Carnelian-Marine Watershed District*

Clear Lake is located in May Township (Washington County). The maximum depth of the lake is 8.2 m. Approximately 94 percent of the lake's surface area is considered littoral (the 0-15 feet depth zone of aquatic vegetation dominance).

This was the first year that Clear Lake has been involved in the CAMP. A search through the STORET nationwide water quality database provided only various water quality data for one date, May 6, 1980. Thus, the 2008 CAMP data are the only substantial quantity of available water quality data.

The lake was monitored 14 times between mid April and mid October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

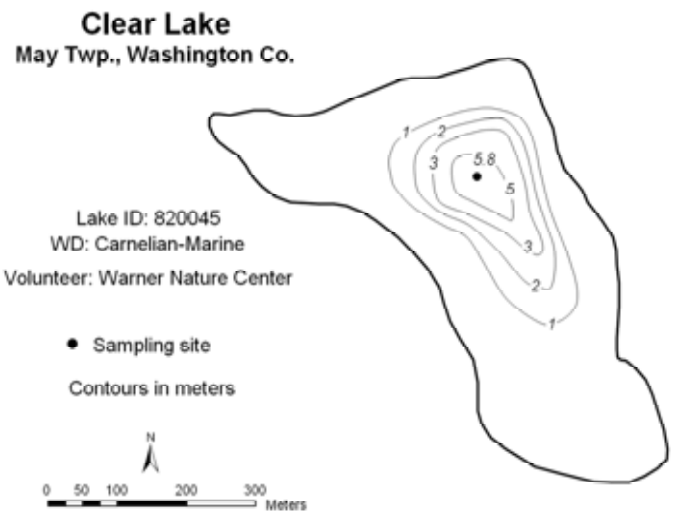
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 18.9 | 4.0 | 70.0 | A |
| **CLA** (µg/l) | 2.8 | 1.2 | 3.9 | A |
| **Secchi** (m) | 6.1 | 4.9 | 7.9 | A |
| **TKN** (mg/l) | 0.63 | 0.32 | 1.70 | |
| | | | ***Lake Grade*** | A |

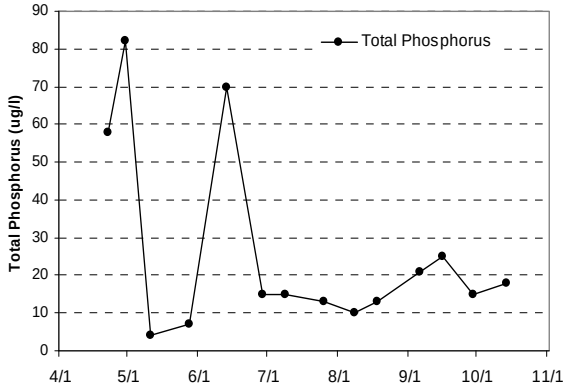
The lake received a water quality lake grade of A for 2008. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

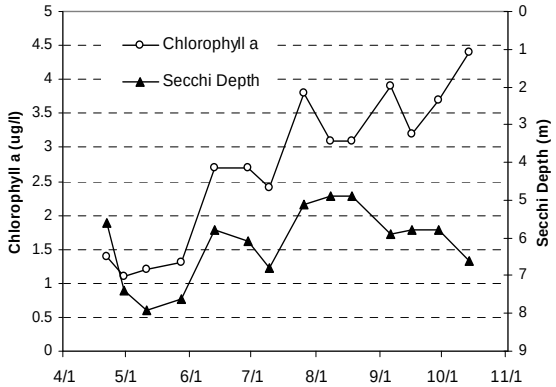
The perceived physical and recreational conditions (ranked on a 1-to-5 scale) are shown on the lake's information sheet on the next page. The average user perception rankings, were 1.8 for physical condition (between 1- "crystal clear and 2- "some algae present"), and 1.5 for recreational suitability (between 1- "beautiful" and 2- "minor aesthetic problem").

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.

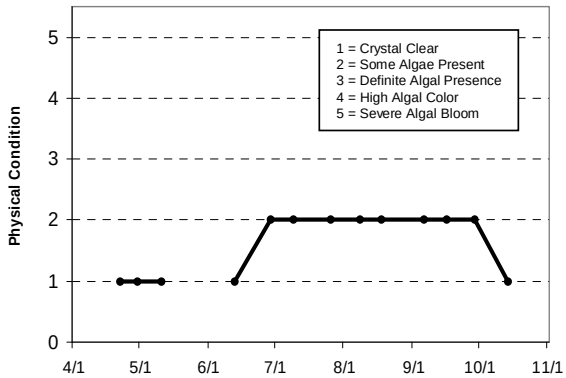



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/22 | 9.4 | | | | 1.4 | 58 | | 5.6 | 1 | 1 |
| 4/30 | 10.4 | | | | 1.1 | 82 | | 7.4 | 1 | 1 |
| 5/11 | 14.9 | | | | 1.2 | 4 | | 7.9 | 1 | 1 |
| 5/28 | 19 | | | | 1.3 | 7 | | 7.6 | | |
| 6/13 | 21 | | | | 2.7 | 70 | | 5.8 | 1 | 1 |
| 6/29 | 26.3 | | | | 2.7 | 15 | | 6.1 | 2 | 1 |
| 7/9 | 26.5 | | | | 2.4 | 15 | | 6.8 | 2 | 2 |
| 7/26 | 26.5 | | | | 3.8 | 13 | | 5.1 | 2 | 2 |
| 8/8 | 26.5 | | | | 3.1 | 10 | | 4.9 | 2 | 2 |
| 8/18 | 26.5 | | | | 3.1 | 13 | | 4.9 | 2 | 2 |
| 9/6 | 21.9 | | | | 3.9 | 21 | | 5.9 | 2 | 1 |
| 9/16 | 20.2 | | | | 3.2 | 25 | | 5.8 | 2 | 2 |
| 9/29 | 18.8 | | | | 3.7 | 15 | | 5.8 | 2 | 1 |
| 10/14 | 14.2 | | | | 4.4 | 18 | | 6.6 | 1 | 1 |



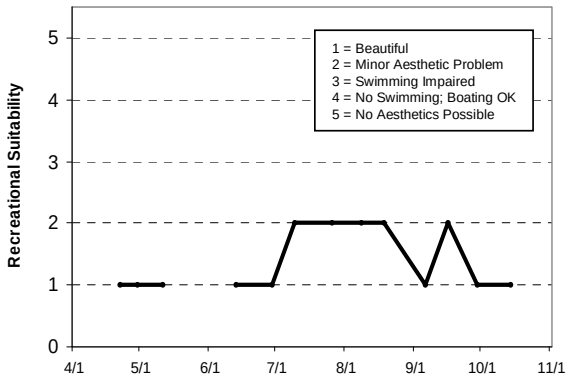

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | | A |
| Chlorophyll a | | | | | A |
| Secchi Depth | | | | | A |
| **Lake Grade** | | | | | **A** |

Source: Metropolitan Council and STORET data



## Cloverdale Lake (82-0009) *Valley Branch Watershed District*

Cloverdale Lake is a 45-acre landlocked lake located within Baytown Township (Washington County). The mean and maximum depth of the lake is 3.0 m (roughly 10 feet) and 8.5 m (almost 30 feet), respectively. Roughly 86 percent of the lake's area is considered littoral (the 0-15 foot depth area of aquatic vegetation dominance). The lake's size and mean depth results in an approximate lake volume of 450 ac-ft.

The lake's surface area and watershed size (819 acres) translates to an 18:1 watershed-to-lake size ratio. Generally the larger the ratio, the greater the potential stress on the lake from surface runoff.

The lake was monitored 9 times between early May and early October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

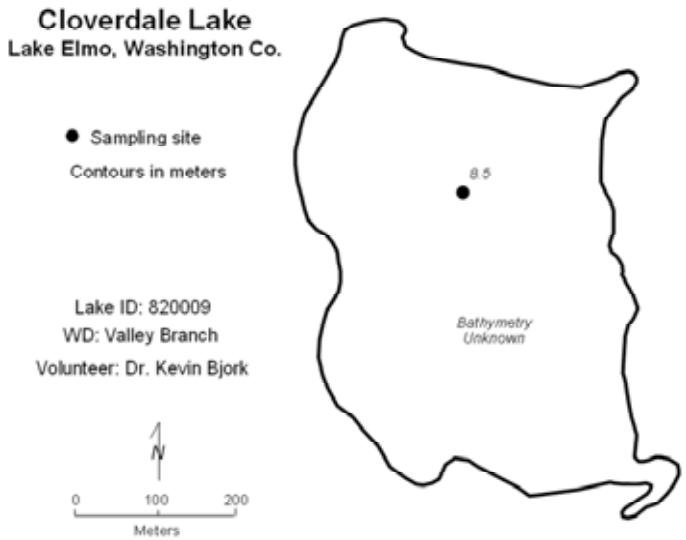
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 31.9 | 16.0 | 51.0 | B |
| **CLA** (µg/l) | 10.1 | 3.7 | 20.0 | B |
| **Secchi** (m) | 2.8 | 1.4 | 5.2 | B |
| **TKN** (mg/l) | 1.05 | 0.64 | 1.40 | |
| | | | ***Lake Grade*** | B |

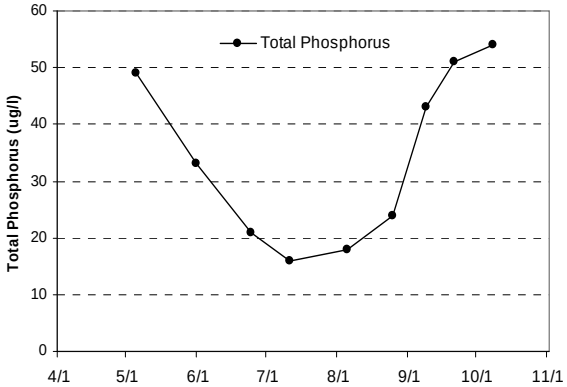
The lake received a water quality lake grade of B for 2008. For 6 of the past 8 years, the lake has received an annual lake grade of B with a C and an A received in the other two years. The historical database suggests that the lake is best represented by a lake grade of B.

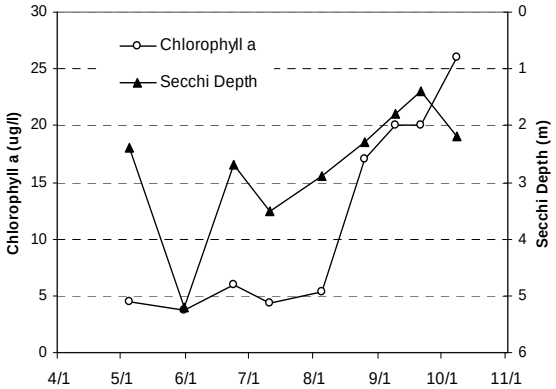
The perceived physical and recreational conditions (ranked on a 1-to-5 scale) are shown on the lake's information sheet on the next page. The average user perception rankings, were 2.3 for physical condition (between 2- "some algae present" and 3-"definite algae present), and 2.0 for recreational suitability (2- "minor aesthetic problem").

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.

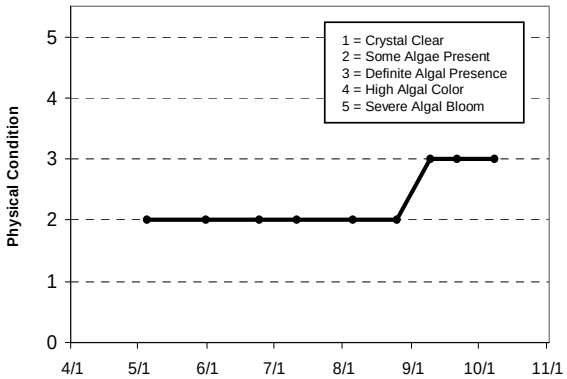



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/5 | 12.4 | | | | 4.5 | 49 | | 2.4 | 2 | 1 |
| 5/31 | 21 | | | | 3.7 | 33 | | 5.2 | 2 | 1 |
| 6/24 | 26 | | | | 6 | 21 | | 2.7 | 2 | 2 |
| 7/11 | 23.7 | | | | 4.3 | 16 | | 3.5 | 2 | 2 |
| 8/5 | 28.6 | | | | 5.4 | 18 | | 2.9 | 2 | 2 |
| 8/25 | 31.4 | | | | 17 | 24 | | 2.3 | 2 | 3 |
| 9/9 | 31.4 | | | | 20 | 43 | | 1.8 | 3 | 2 |
| 9/21 | 27.6 | | | | 20 | 51 | | 1.4 | 3 | 3 |
| 10/8 | 24.4 | | | | 26 | 54 | | 2.2 | 3 | 3 |



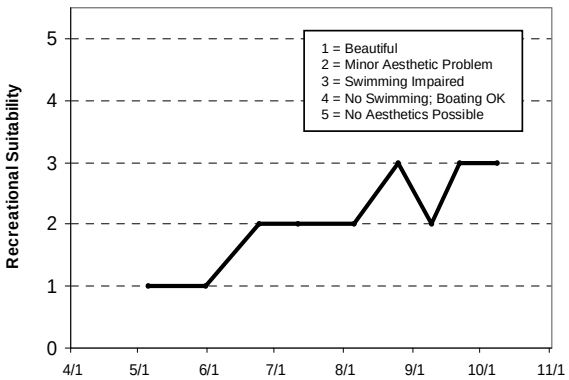

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | C | C | C |
| Chlorophyll a | | | | | | | | | | B | B | B |
| Secchi Depth | | | | | | | | | | C | B | B |
| **Lake Grade** | | | | | | | | | | **C** | **B** | **B** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | C | B | B | B | B |
| Chlorophyll a | B | A | B | A | B |
| Secchi Depth | A | A | A | B | B |
| **Lake Grade** | **B** | **A** | **B** | **B** | **B** |

Source: Metropolitan Council and STORET data



## Cobblecrest (27-0053) *City of St. Louis Park*

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

A search through the STORET nationwide water quality database for historic data revealed no data other than the CAMP data. Thus, 2002 and 2004-2008 are the only years of available data.

The lake was monitored 13 times between late April and mid October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 174.2 | 144.0 | 234.0 | F |
| **CLA** (µg/l) | 148.2 | 58.0 | 250.0 | F |
| **Secchi** (m) | 0.3 | 0.2 | 0.3 | F |
| **TKN** (mg/l) | 3.59 | 2.70 | 4.20 | |
| | | | ***Lake Grade*** | F |

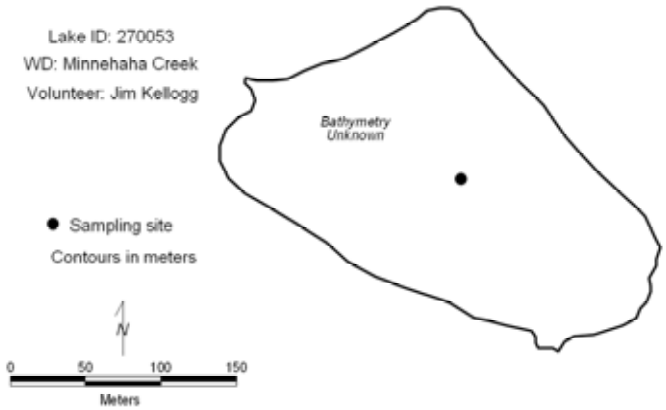
The lake's 2008 lake grade of F is consistent with the lake grades received for 2004-2007 and worse than the C received for 2002. For the past 5 years, the lake appears to be represented well by a lake grade of F.

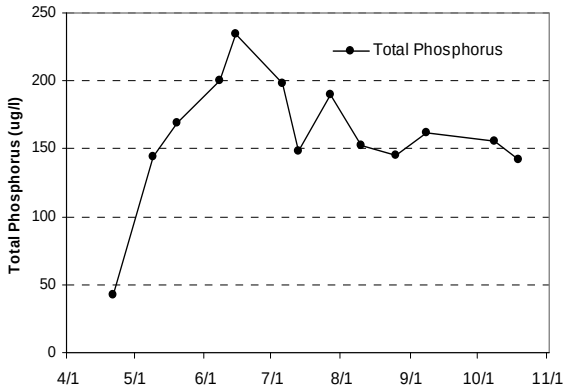
Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The average user perception rankings were 3.1 for physical condition (between 3- "definite algae present" and 4-"high algal color"), and 4.0 for recreational suitability (4- "no swimming – boating ok").

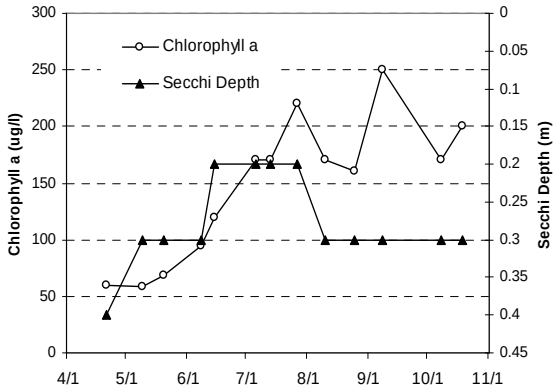
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

## Cobble Crest Lake
**St. Louis Park, Hennepin Co.**

Lake ID: 270053
WD: Minnehaha Creek
Volunteer: Jim Kellogg

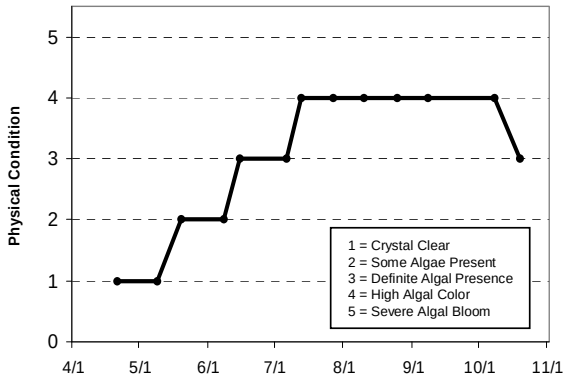



### 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/21 | 15.9 | | | | 60 | 43 | | 0.4 | 1 | 4 |
| 5/9 | 18.1 | | | | 58 | 144 | | 0.3 | 1 | 4 |
| 5/20 | 18.1 | | | | 69 | 169 | | 0.3 | 2 | 4 |
| 6/8 | 22.3 | | | | 95 | 200 | | 0.3 | 2 | 4 |
| 6/15 | 21.4 | | | | 120 | 234 | | 0.2 | 3 | 4 |
| 7/6 | 25.7 | | | | 170 | 198 | | 0.2 | 3 | 4 |
| 7/13 | 26.3 | | | | 170 | 148 | | 0.2 | 4 | 4 |
| 7/27 | 25.2 | | | | 220 | 190 | | 0.2 | 4 | |
| 8/10 | 23.5 | | | | 170 | 152 | | 0.3 | 4 | 4 |
| 8/25 | 24.5 | | | | 160 | 145 | | 0.3 | 4 | 4 |
| 9/8 | 18.7 | | | | 250 | 162 | | 0.3 | 4 | 4 |
| 10/8 | 16.5 | | | | 170 | 156 | | 0.3 | 4 | 4 |
| 10/19 | 14.4 | | | | 200 | 142 | | 0.3 | 3 | 4 |



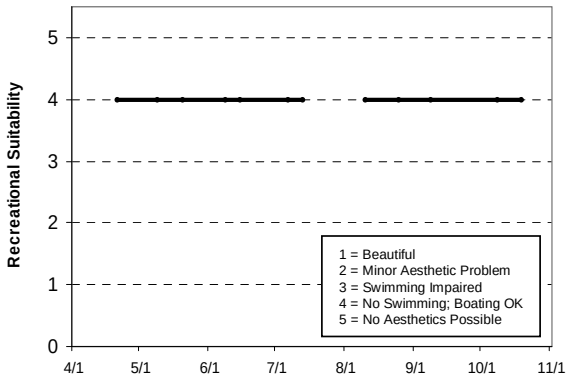

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | C | |
| Chlorophyll a | | | | | | | | | | | C | |
| Secchi Depth | | | | | | | | | | | C | |
| **Lake Grade** | | | | | | | | | | | **C** | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | D | F | D | F | F |
| Chlorophyll a | F | F | F | F | F |
| Secchi Depth | F | F | F | F | F |
| **Lake Grade** | **F** | **F** | **F** | **F** | **F** |

Source: Metropolitan Council and STORET data



## Cobblestone Lake (19-0456) *City of Apple Valley*

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.

A search through the STORET nationwide water quality database for historic data revealed no data other than the CAMP data. Therefore, 2005-2008 are the only years of water quality data available.

The lake was monitored 14 times between mid-April and mid-October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 48.7 | 19.0 | 130.0 | C |
| **CLA** (µg/l) | 27.1 | 5.6 | 56.0 | C |
| **Secchi** (m) | 0.8 | 0.7 | 1.0 | D |
| **TKN** (mg/l) | 1.50 | 0.33 | 2.60 | |
| | | | ***Lake Grade*** | C |

The lake received a lake grade of C for 2008 which is similar to the lake grades received for the previous two years. The water quality in the period from 2006-2008 was notably improved over the water quality conditions observed in 2005. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

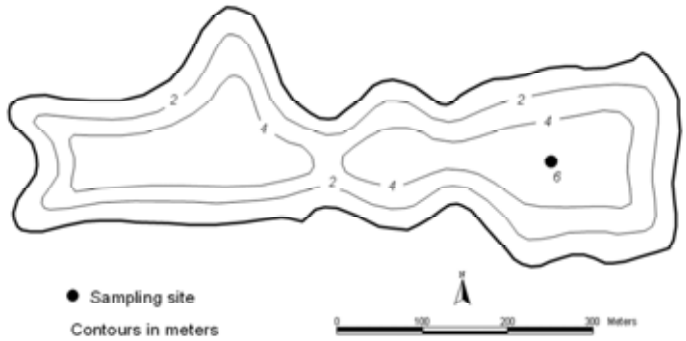
Throughout the monitoring period, the volunteers ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The resulting user perception rankings are shown on the information sheet. The mean physical condition ranking was 2.6 (between 2- "some algae present" and 3- "definite algae present"), while the mean recreational suitability ranking was 2.4 (2- "minor aesthetic problem" and 3-"swimming impaired").

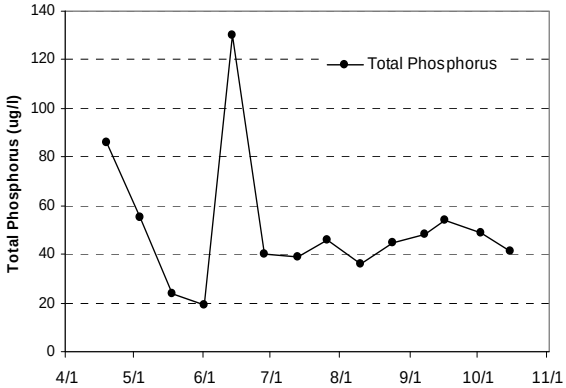
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

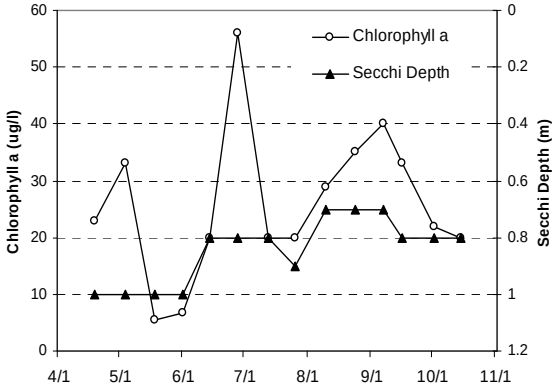
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

## Cobblestone Lake
**Apple Valley, Dakota Co.**

Lake ID: 190456
WMO: Vermillion River
Volunteer: Jeff Sluiter

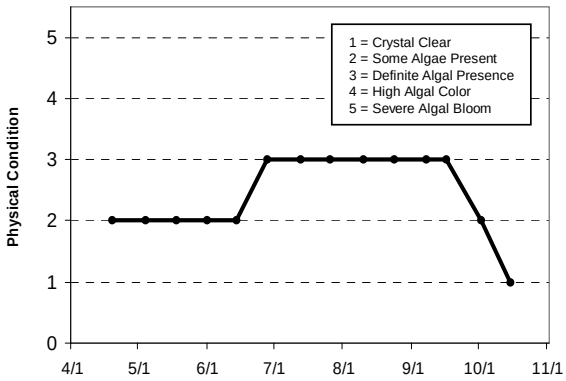



### 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/19 | 6.2 | | | | 23 | 86 | | 1 | 2 | 2 |
| 5/4 | 12.1 | | | | 33 | 55 | | 1 | 2 | 2 |
| 5/18 | 15.2 | | | | 5.6 | 24 | | 1 | 2 | 2 |
| 6/1 | 19.5 | | | | 6.6 | 19 | | 1 | 2 | 2 |
| 6/14 | 20.6 | | | | 20 | 130 | | 0.8 | 2 | 2 |
| 6/28 | 21.8 | | | | 56 | 40 | | 0.8 | 3 | 2 |
| 7/13 | 18.7 | | | | 20 | 39 | | 0.8 | 3 | |
| 7/26 | 20.3 | | | | 20 | 46 | | 0.9 | 3 | 3 |
| 8/10 | 19.6 | | | | 29 | 36 | | 0.7 | 3 | 3 |
| 8/24 | 22.2 | | | | 35 | 45 | | 0.7 | 3 | |
| 9/7 | 16 | | | | 40 | 48 | | 0.7 | 3 | 3 |
| 9/16 | 17.9 | | | | 33 | 54 | | 0.8 | 3 | 3 |
| 10/2 | 14.6 | | | | 22 | 49 | | 0.8 | 2 | |
| 10/15 | 13.5 | | | | 20 | 41 | | 0.8 | 1 | 4 |

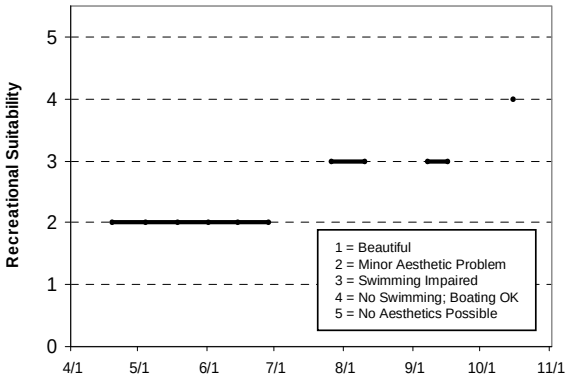



### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | D | C | C | C |
| Chlorophyll a | | D | C | C | C |
| Secchi Depth | | F | D | D | D |
| **Lake Grade** | | **D** | **C** | **C** | **C** |




Source: Metropolitan Council and STORET data

## Colby Lake (82-0094) *City of Woodbury*

Colby Lake is located in the City of Woodbury in Washington County. Information from the City of Woodbury revealed that the lake has a surface area of 71 acres and a maximum depth of 3.4 m. The lake's large 8,088-acre contributing watershed results in a large 114:1 watershed-to-lake size ratio. A larger ratio indicates a greater potential for stress on the lake from surface runoff. Because of the shallowness of the lake, its entire area is considered littoral zone (the 0-15 foot depth area dominated by aquatic vegetation), and the lake does not maintain a thermocline (a density gradient owed to changing water temperatures throughout the lake's water column). The lake has no public access.

The lake was monitored 9 times between late-April and mid September 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

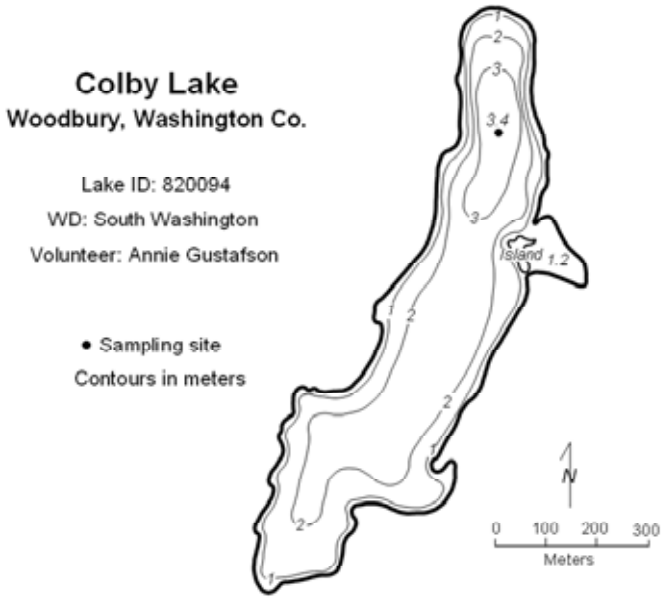
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 167.5 | 70.0 | 249.0 | F |
| **CLA** (µg/l) | 53.1 | 19.0 | 90.0 | D |
| **Secchi** (m) | 0.3 | 0.1 | 0.6 | F |
| **TKN** (mg/l) | 2.83 | 1.80 | 3.60 | |
| | | | ***Lake Grade*** | F |

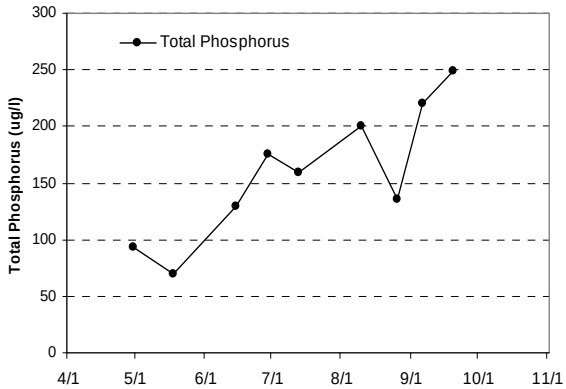
The lake received a water quality lake grade of F for 2008, which is consistent with the historical database. The lake's water quality seems well represented by an overall water quality grade of D or F, depending on the year. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed a statistically significant improving trend in water clarity (MPCA 2008).

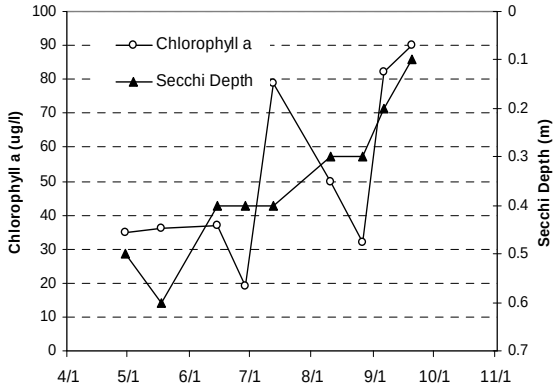
Throughout the monitoring period, the volunteer's opinions of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page. The mean physical condition ranking was 3.0 (3- "definite algae present"), while the mean recreational suitability ranking was 4.0 (4-"no swimming; boating ok").

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.

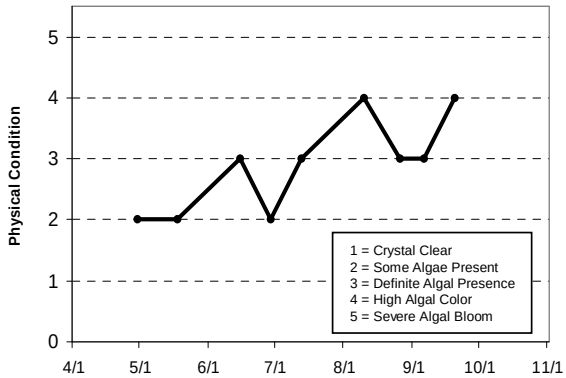



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/30 | 11.9 | | | | 35 | 93 | | 0.5 | 2 | 4 |
| 5/18 | 16.6 | | | | 36 | 70 | | 0.6 | 2 | 4 |
| 6/15 | 21.4 | | | | 37 | 130 | | 0.4 | 3 | 4 |
| 6/29 | 24.8 | | | | 19 | 175 | | 0.4 | 2 | 4 |
| 7/13 | 24.2 | | | | 79 | 159 | | 0.4 | 3 | 4 |
| 8/10 | 25.4 | | | | 50 | 201 | | 0.3 | 4 | 4 |
| 8/26 | 19.7 | | | | 32 | 136 | | 0.3 | 3 | 4 |
| 9/6 | 19.5 | | | | 82 | 220 | | 0.2 | 3 | 4 |
| 9/20 | 19.7 | | | | 90 | 249 | | 0.1 | 4 | 4 |



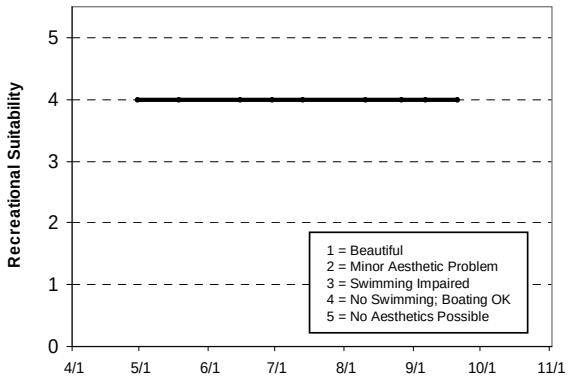

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | D | D | F | F | F | D | D | F | F | F |
| Chlorophyll a | | | D | F | F | C | F | F | D | F | C | D |
| Secchi Depth | | | 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 |
|---|---|---|---|---|---|
| Total Phosphorus | D | D | F | D | F |
| Chlorophyll a | C | F | F | D | D |
| Secchi Depth | F | D | F | F | F |
| **Lake Grade** | **D** | **D** | **F** | **D** | **F** |

Source: Metropolitan Council and STORET data



## Cornelia Lake (27-0028-01) *Nine Mile Creek Watershed District*

Lake Cornelia is located in the City of Edina (Hennepin County). The lake has a surface area of approximately 52 acres, and has a maximum depth of 2.0 meters. Given the shallow depth of the lake, the entire lake is considered littoral zone.

The lake was monitored 13 times between late April and early October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

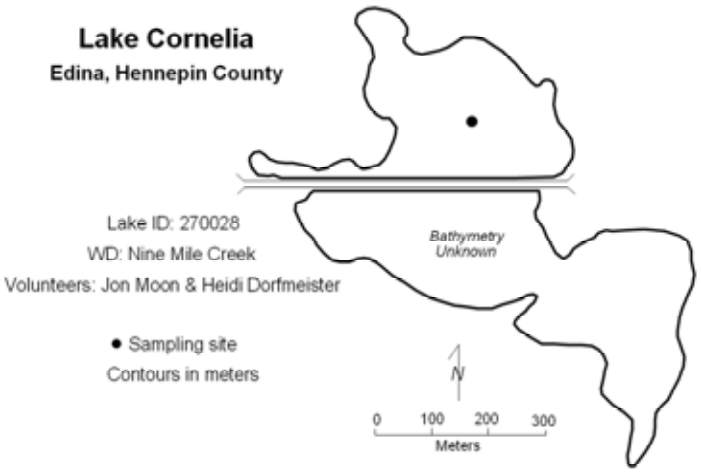
**2008 summer (May-September) data summary**

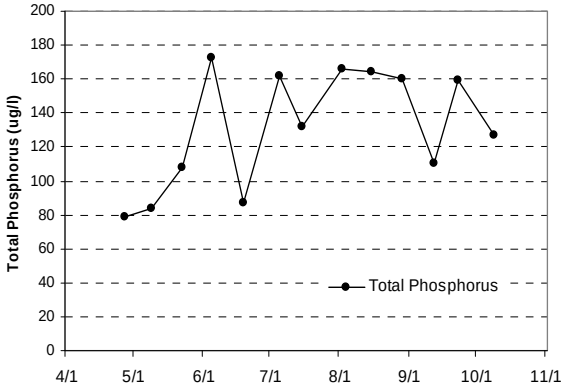
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 136.8 | 84.0 | 173.0 | D |
| **CLA** (µg/l) | 60.5 | 18.0 | 110.0 | D |
| **Secchi** (m) | 0.5 | 0.4 | 0.8 | F |
| **TKN** (mg/l) | 2.75 | 1.90 | 3.70 | |
| | | | ***Lake Grade*** | D |

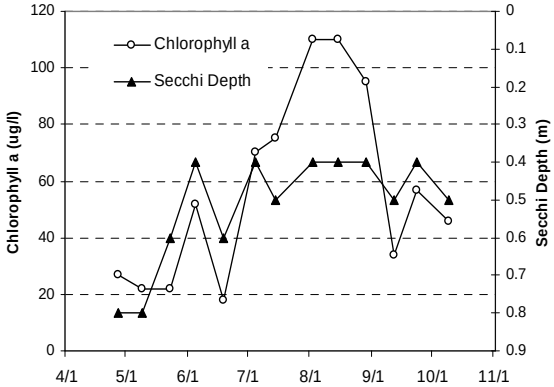
The lake received a water quality lake grade of D for 2008. Prior to 2008, the lake has received a lake grade of F every monitoring year, so the lake experienced an improvement in water quality in 2008. The 2008 summer-time means, minimums, and maximums concentrations for TP and CLA were less than those observed in 2007. In addition, water clarity was clearer in 2008 than in 2007. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The average user perception rankings were 2.6 for physical condition (between 2- "some algae present" and 3- "definite algae present"), and 4.1 for recreational suitability (between 4- "no swimming – boating ok" and 5- "no aesthetics possible").

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.

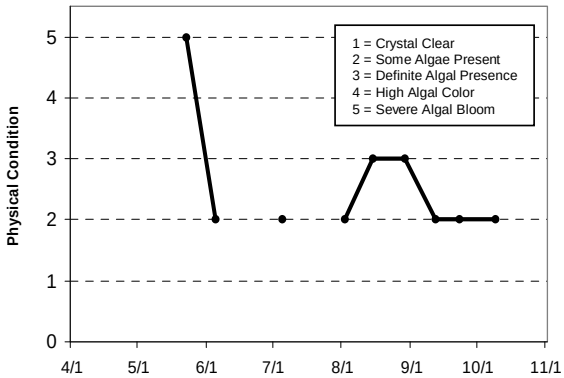



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/27 | 10 | | | | 27 | 79 | | 0.8 | | 4 |
| 5/9 | 17 | | | | 22 | 84 | | 0.8 | | 4 |
| 5/23 | 21 | | | | 22 | 108 | | 0.6 | 5 | 5 |
| 6/5 | 20 | | | | 52 | 173 | | 0.4 | 2 | 4 |
| 6/19 | 28 | | | | 18 | 87 | | 0.6 | | 4 |
| 7/5 | 20 | | | | 70 | 162 | | 0.4 | 2 | 4 |
| 7/15 | 26 | | | | 75 | 132 | | 0.5 | | 4 |
| 8/2 | 32 | | | | 110 | 166 | | 0.4 | 2 | 4 |
| 8/15 | 28 | | | | 110 | 164 | | 0.4 | 3 | 4 |
| 8/29 | 24 | | | | 95 | 160 | | 0.4 | 3 | 4 |
| 9/12 | 21 | | | | 34 | 110 | | 0.5 | 2 | 4 |
| 9/23 | 22 | | | | 57 | 159 | | 0.4 | 2 | 4 |
| 10/9 | 15 | | | | 46 | 127 | | 0.5 | 2 | 4 |



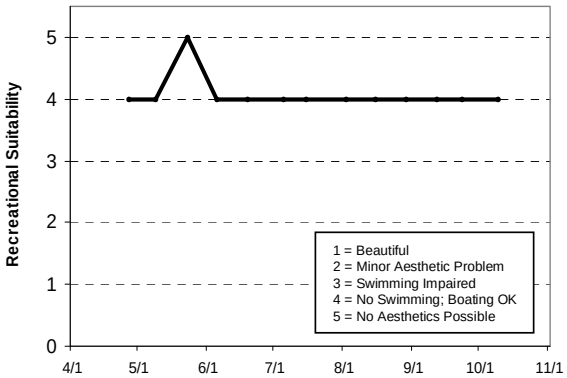

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | F |
| Chlorophyll a | | | | | | | | | | | | F |
| Secchi Depth | | | | | | | | | | | | F |
| **Lake Grade** | | | | | | | | | | | | **F** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | F | F | F | D |
| Chlorophyll a | | D | D | F | D |
| Secchi Depth | | F | F | F | F |
| **Lake Grade** | | **F** | **F** | **F** | **D** |

Source: Metropolitan Council and STORET data



## Courthouse Lake (10-0005) *Carver County Environmental Services*

Courthouse Lake, located in the City of Chaska (Carver County) is a unique resource in the Twin Cities Metropolitan Area. The lake is only one of six lakes in the seven-county metropolitan area stocked with trout (rainbows). The 10-acre lake has a maximum depth of 17.4 m (57 feet) and only three percent of the lake is considered littoral zone (the 0-15 foot depth zone of the lake dominated by aquatic vegetation). The lake's level is maintained by groundwater. It has a very small watershed that is completely publicly owned (MDNR 1996).

The only data available for Courthouse Lake are a result of CAMP monitoring from 1996-2008. Courthouse Lake was monitored 14 times between mid-April and mid-October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 19.5 | 11.0 | 45.0 | A |
| **CLA** (µg/l) | 4.1 | 1.2 | 12.0 | A |
| **Secchi** (m) | 3.9 | 1.2 | 5.1 | A |
| **TKN** (mg/l) | 0.95 | 0.55 | 2.00 | |
| | | | ***Lake Grade*** | A |

The lake received a lake grade of A for 2008, which is consistent with the historical water quality database. The lake's water quality seems well represented by a lake grade of A. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed a statistically significant improving trend in water clarity (MPCA 2008).

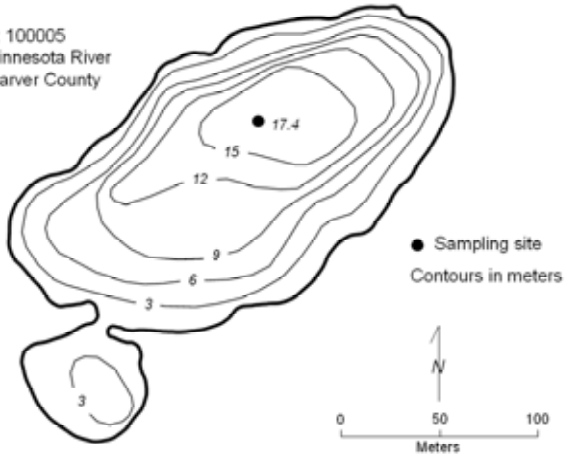
The average user perception rankings, on a 1-to-5 scale, were 1.7 for physical condition (between 1- "crystal clear" and 2- "some algae present"), and 1.8 for recreational suitability (between 1- "beautiful" and 2- "minor aesthetic problem").

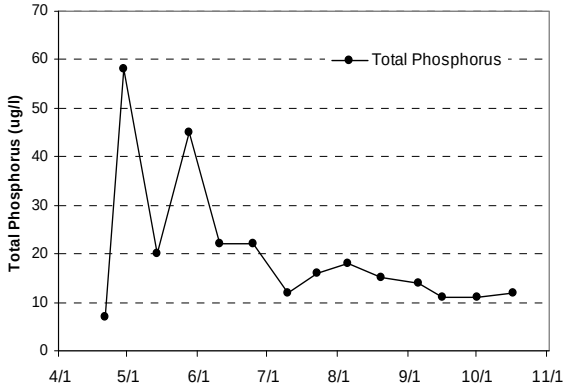
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

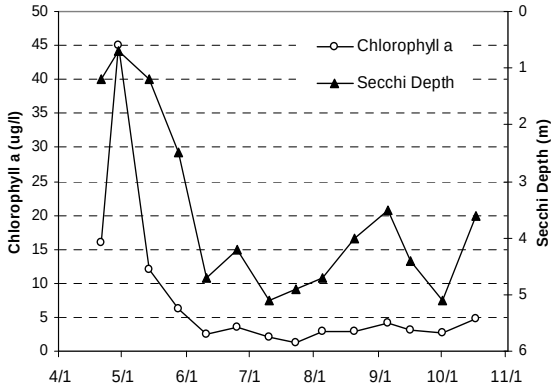
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

## Courthouse Lake
**Chaska, Carver Co.**

Lake ID: 100005
WD: Lower Minnesota River
Volunteer: Carver County

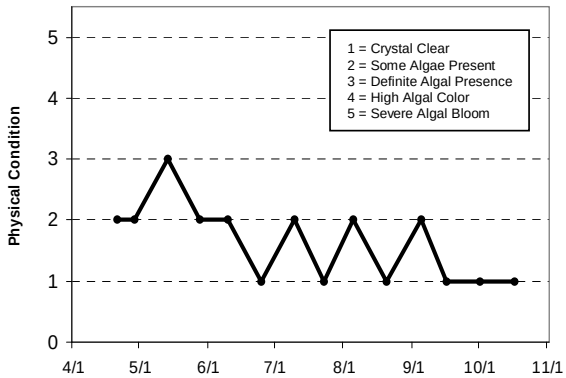



### 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/21 | 12.72 | | 13.96 | | 16 | 7 | | 1.2 | 2 | 2 |
| 4/29 | 8.73 | | 12.72 | | 45 | 58 | | 0.7 | 2 | 4 |
| 5/14 | 14.46 | | 14.25 | | 12 | 20 | | 1.2 | 3 | 4 |
| 5/28 | 17.85 | | 9.28 | | 6.3 | 45 | | 2.5 | 2 | 2 |
| 6/10 | 20.51 | | 7.94 | | 2.5 | 22 | | 4.7 | 2 | 2 |
| 6/25 | 25.13 | | 9.52 | | 3.5 | 22 | | 4.2 | 1 | 2 |
| 7/10 | 25.61 | | 8.28 | | 2 | 12 | | 5.1 | 2 | 1 |
| 7/23 | 26.64 | | 6.64 | | 1.2 | 16 | | 4.9 | 1 | 1 |
| 8/5 | 26.45 | | 6.95 | | 3 | 18 | | 4.7 | 2 | 2 |
| 8/20 | 26.38 | | 7.59 | | 3 | 15 | | 4 | 1 | 1 |
| 9/5 | 22.79 | | 9.06 | | 4.1 | 14 | | 3.5 | 2 | 2 |
| 9/16 | 19.54 | | 7.14 | | 3.1 | 11 | | 4.4 | 1 | 1 |
| 10/1 | 19 | | 7.55 | | 2.8 | 11 | | 5.1 | 1 | 1 |
| 10/17 | 14.93 | | 7.6 | | 4.7 | 12 | | 3.6 | 1 | 1 |



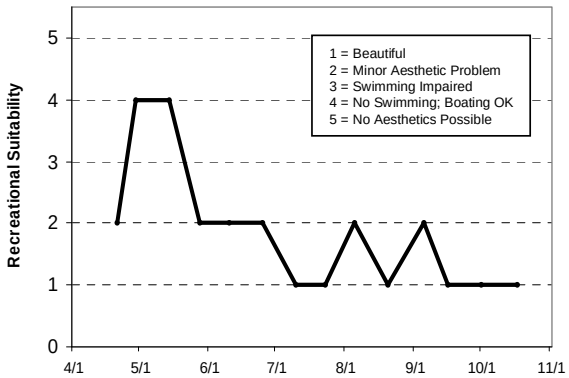

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | A | A | A | A | A | A | B | A |
| Chlorophyll a | | | | | A | A | A | A | A | A | A | A |
| Secchi Depth | | | | | A | C | A | B | A | A | B | A |
| **Lake Grade** | | | | | **A** | **B** | **A** | **A** | **A** | **A** | **B** | **A** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | A | A | A | A | A |
| Chlorophyll a | A | A | A | A | A |
| Secchi Depth | B | A | A | A | A |
| **Lake Grade** | **A** | **A** | **A** | **A** | **A** |

Source: Metropolitan Council and STORET data



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

Crystal Lake located mainly in the City of Burnsville (Dakota County). It is considered a Priority Lake by the Metropolitan Council for its high regional recreation value. The lake has a surface area of 292 acres, with 5.3 miles of shoreline. The maximum and mean depths of the lake are 11.3 m (37 feet) and 3.1 m (10 feet), respectively. The lake's surface area and mean depth translate to an approximate lake volume of 2,920 acre-feet. The lake's watershed covers approximately 2,001 acres of which roughly two-thirds is urban/developed. The watershed and lake surface areas translate to a moderate watershed-to-lake size ratio of 7:1 (the smaller the ratio the less stress on the lake from surface runoff).

Roughly 72 percent of the lake's area is considered littoral (the 0-15 foot depth area of aquatic vegetation dominance). Because of its multi-recreational uses, the lake is considered a "Priority Lake" in the Metropolitan Area. The lake, managed by the MDNR as a panfish lake and stocked with tiger muskellunge, has a public access and fishing pier on its north side and a public swimming beach on its eastern shore. The MN DNR has designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*).

A search of the STORET nationwide water quality database for data on the lake revealed an extensive database since the 1980's, with nutrient data available in 1980, 1983, 1989, and 1994-2006. Additionally, Secchi transparency data are available for all years between 1980 and 1999 except 1993.

The lake was monitored 14 times between mid-April and mid-October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 33.2 | 22.0 | 43.0 | C |
| **CLA** (µg/l) | 21.0 | 2.3 | 47.0 | C |
| **Secchi** (m) | 1.9 | 0.9 | 3.7 | C |
| **TKN** (mg/l) | 1.67 | 1.20 | 2.00 | |
| | | | ***Lake Grade*** | C |

The lake received a lake grade of C for 2008. This lake grade is similar to those recorded from 1994-2000, and 2002-2007, and worse than the B's recorded in 1983, 1989, and 2001. The lake's water quality seems well represented by a lake grade of C with the occasional B. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008).

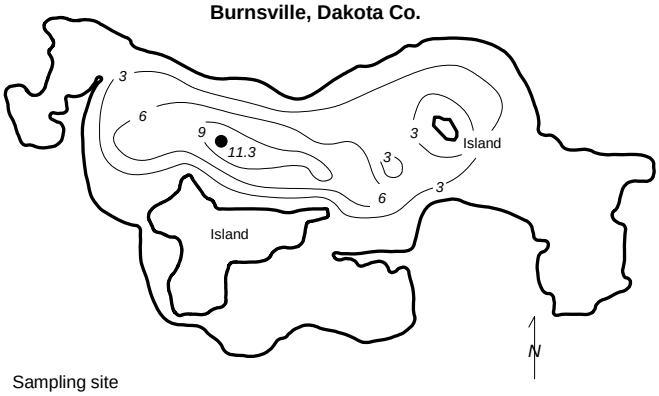
Throughout the monitoring period, the volunteer's opinions of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. These user perception rankings are shown on the lake information sheet. The average user perception rankings, were 2.7 for physical condition (between 2- "some algae present" and 3- "definite algae present"), and 2.1 for recreational suitability (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

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,

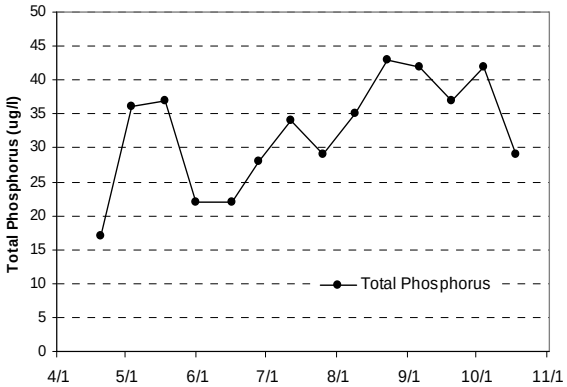
**Burnsville, Dakota Co.**

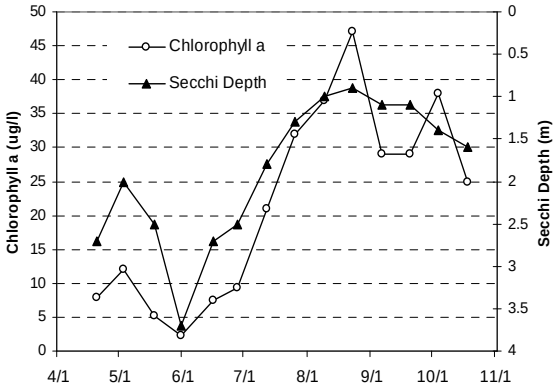



● Sampling site
Contours in meters

Lake ID: 190027
WMO: Black Dog
Volunteer: Carroll Arnett, PhD

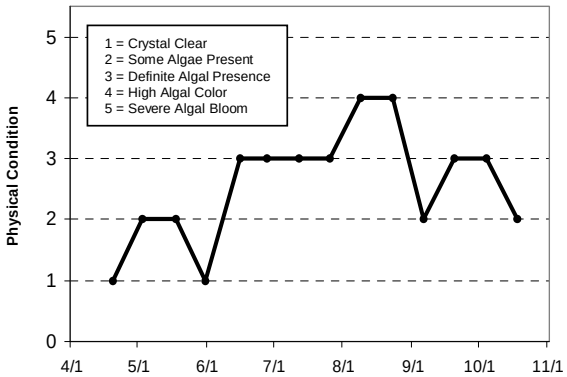
0 300 600
Meters




## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/20 | 5.9 | | | | 7.9 | 17 | | 2.7 | 1 | 1 |
| 5/3 | 10 | | | | 12 | 36 | | 2 | 2 | 2 |
| 5/18 | 16.2 | | | | 5.1 | 37 | | 2.5 | 2 | 2 |
| 5/31 | 18 | | | | 2.3 | 22 | | 3.7 | 1 | 1 |
| 6/16 | 21 | | | | 7.4 | 22 | | 2.7 | 3 | 2 |
| 6/28 | 23.8 | | | | 9.4 | 28 | | 2.5 | 3 | 2 |
| 7/12 | 24.9 | | | | 21 | 34 | | 1.8 | 3 | 2 |
| 7/26 | 26.1 | | | | 32 | 29 | | 1.3 | 3 | 2 |
| 8/9 | 26.6 | | | | 37 | 35 | | 1 | 4 | 3 |
| 8/23 | 24 | | | | 47 | 43 | | 0.9 | 4 | 3 |
| 9/6 | 21.4 | | | | 29 | 42 | | 1.1 | 2 | 2 |
| 9/20 | 21 | | | | 29 | 37 | | 1.1 | 3 | 2 |
| 10/4 | 16.8 | | | | 38 | 42 | | 1.4 | 3 | 2 |
| 10/18 | 13.3 | | | | 25 | 29 | | 1.6 | 2 | 1 |

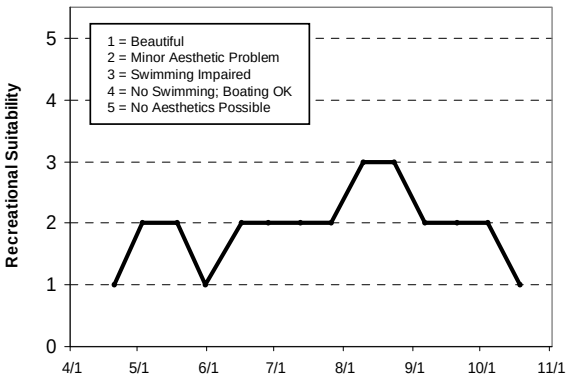



### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | C | C | | C | | | | | | B | | |
| Chlorophyll a | C | | | B | | | | C | | B | | |
| Secchi Depth | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | C | C | C | C | C | C | C | B | C | C |
| Chlorophyll a | | | B | C | C | C | C | B | C | B | B | C |
| Secchi Depth | B | | C | C | C | C | C | C | C | C | C | C |
| **Lake Grade** | | | **C** | **C** | **C** | **C** | **C** | **C** | **C** | **B** | **C** | **C** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | C | C | C | C | C |
| Chlorophyll a | B | C | C | C | C |
| Secchi Depth | C | C | C | C | C |
| **Lake Grade** | **C** | **C** | **C** | **C** | **C** |




Source: Metropolitan Council and STORET data

## Crystal Lake [Robbinsdale] (27-0034) *Shingle Creek Watershed Management Commission*

Crystal Lake is a 76-acre lake located in the City of Robbinsdale (Hennepin County). The lake has a maximum and mean depth of 10.4 meters and 3.7 meters, respectively. It has an approximate volume of 917 ac-ft (Beduhn 1993). Sixty-eight percent of the lake's surface area is considered littoral zone (the 0-15 foot depth area of aquatic vegetation dominance). The lake's fishing pier and earthen public access are located on the southeastern end of the lake.

Crystal Lake was monitored 7 times between late May and early October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 41.0 | 27.0 | 63.0 | C |
| **CLA** (µg/l) | 15.2 | 3.6 | 30.0 | B |
| **Secchi** (m) | 2.3 | 0.9 | 4.5 | B |
| **TKN** (mg/l) | 1.63 | 1.40 | 2.00 | |
| | | | ***Lake Grade*** | B |

The lake received a lake grade of B for 2008, which was a notable improvement in water quality with respect to the lake's historical database. This was the first year that the lake received a lake grade of B, which is notable since the only lake grades it has received in the past were Ds and Fs. All three water quality parameters (TP, CLA, and Secchi) saw consistent improvement over previous monitoring years. Additional monitoring is suggested to determine if this improvement may be evidence of an improving trend.

Throughout the monitoring period, the volunteer's opinions of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. These user perception rankings are shown on the lake information sheet. The average user perception rankings were 2.0 for physical condition (2- "some algae present"), and 3.0 for recreational suitability (3- "swimming slightly impaired").

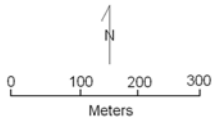
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

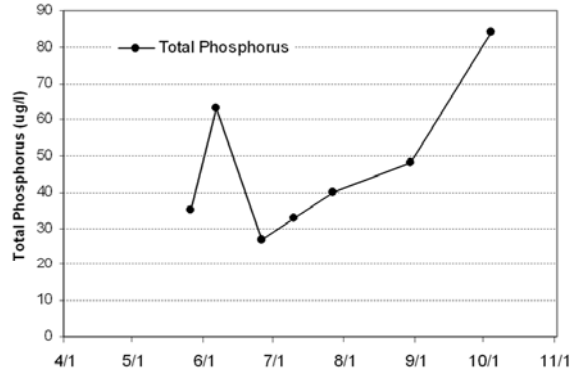
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

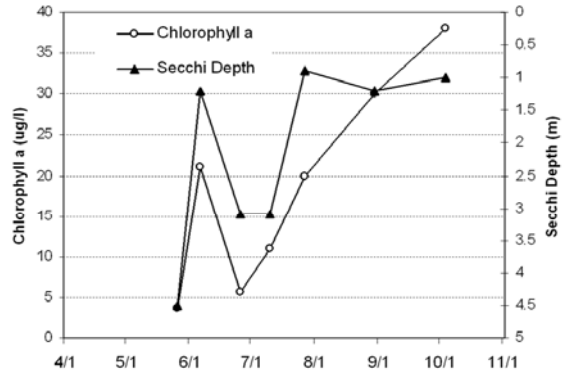
## Crystal Lake
**Robbinsdale, Hennepin Co.**

Lake ID: 270034
WMO: Shingle Creek
Volunteers: Wayne, Luke and Leif Sicora

● Sampling site
Contours in meters

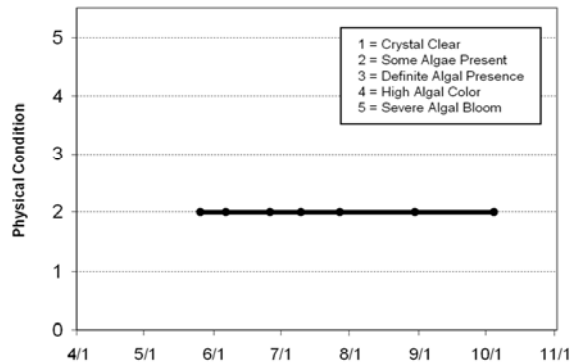



### 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/26 | 18.3 | | | | 3.6 | 35 | | 4.5 | 2 | 4 |
| 6/6 | 20.3 | | | | 21 | 63 | | 1.2 | 2 | 4 |
| 6/26 | 27.5 | | | | 5.6 | 27 | | 3.1 | 2 | 4 |
| 7/10 | 25.6 | | | | 11 | 33 | | 3.1 | 2 | 1 |
| 7/27 | 27.5 | | | | 20 | 40 | | 0.9 | 2 | 2 |
| 8/30 | 23.8 | | | | 30 | 48 | | 1.2 | 2 | 3 |
| 10/4 | 16.7 | | | | 38 | 84 | | 1 | 2 | 2 |



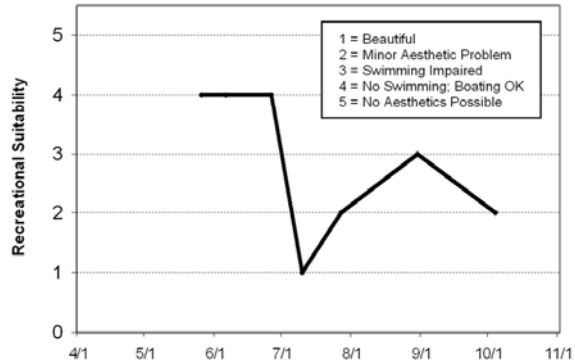

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | D | D | | | | |
| Chlorophyll a | | | | | | | D | D | | | | |
| Secchi Depth | | | | | | | D | D | | | | |
| **Lake Grade** | | | | | | | **D** | **D** | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | F | | F | | | | | | | D | | |
| Chlorophyll a | D | | C | | | | | | | C | | |
| Secchi Depth | D | | D | | | | | | | D | | |
| **Lake Grade** | **D** | | **D** | | | | | | | **D** | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | D | | | C |
| Chlorophyll a | | C | | | B |
| Secchi Depth | | D | | | B |
| **Lake Grade** | | **D** | | | **B** |

Source: Metropolitan Council and STORET data



## Dean Lake (70-0074) *City of Shakopee*

Dean Lake is a small shallow lake located within City of Shakopee (Scott County). There is very little known morphological data available for the lake. Because of the shallowness of the lake, its entire area is considered littoral zone (the 0-15 foot depth area dominated by aquatic vegetation), and the lake does not maintain a thermocline (a density gradient owed to changing water temperatures throughout the lake's water column).

The lake was monitored 10 times between mid April and early October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 198.5 | 29.0 | 914.0 | F |
| **CLA** (µg/l) | 21.9 | 5.2 | 38.0 | C |
| **Secchi** (m) | 2.0 | 0.4 | 3.1 | C |
| **TKN** (mg/l) | 3.24 | 0.91 | 11.00 | |
| | | | ***Lake Grade*** | D |

The lake received a lake grade of D for 2008. The lake has received D lake grades in the past, but the notable difference for the monitoring season of 2008 is that water clarity and CLA concentrations were much improved over previous monitoring seasons. In fact, 2008 saw the best summer-time mean water clarity. The improved water clarity is consistent with the relatively lower CLA concentrations.

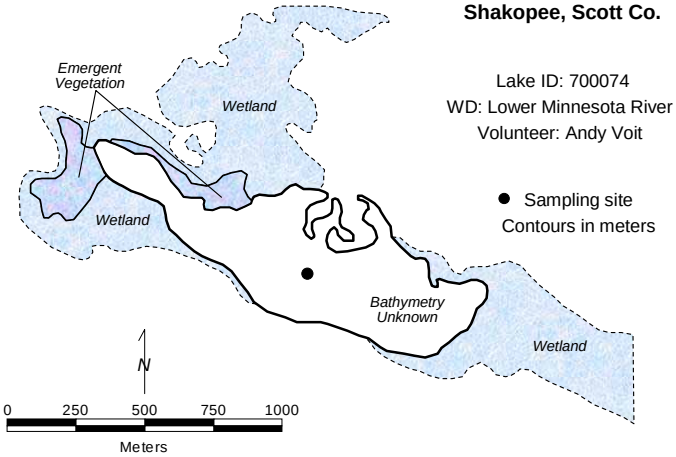
But the 2008 summer-time mean TP concentration remained high relative to CLA and water clarity. The summer-time mean TP concentration of 198.5 mg/L was heavily influenced by a single TP concentration of 914 mg/L observed on June 13. This spike of TP occurred immediately after a rain event. The spike in TP may be indicative of a surface runoff event that delivered a transient load of phosphorus to the lake. If the lone TP spike is removed from the mean calculation, the summer-time mean TP concentration becomes 104 mg/L. This revised mean would be the lowest summer-time mean TP concentration observed for Dean Lake, and this TP improvement would be consistent with the improvements seen in CLA and water clarity. Additional monitoring is suggested to determine if the improvements in water quality indicators observed in 2008 are evidence of an improving trend.

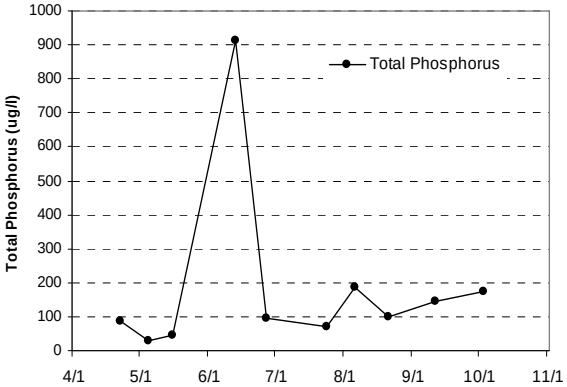
Throughout the monitoring period, the volunteer(s) ranked their opinion of the lake's physical and recreational conditions on a 1-to-5 scale. The average user perception rankings were 3.3 for physical condition (between 3- "definite algae present" and 4- "high algal color"), and 2.5 for recreational suitability (between 2- "minor aesthetic problem and 3- "swimming slightly impaired").

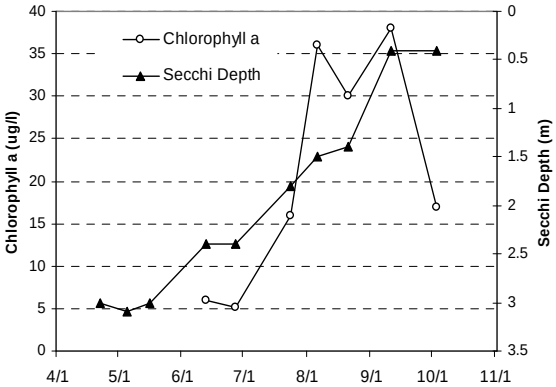
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

# Dean Lake,
**Shakopee, Scott Co.**

Lake ID: 700074
WD: Lower Minnesota River
Volunteer: Andy Voit

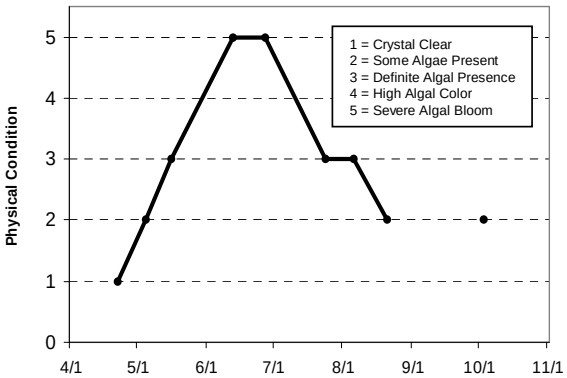



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/22 | 15.3 | | | | | 89 | | 3 | 1 | 1 |
| 5/5 | 14.5 | | | | | 29 | | 3.1 | 2 | 1 |
| 5/16 | 20.4 | | | | | 47 | | 3 | 3 | 1 |
| 6/13 | 20 | | | | 6 | 914 | | 2.4 | 5 | 4 |
| 6/27 | 26.6 | | | | 5.2 | 97 | | 2.4 | 5 | 4 |
| 7/24 | 27 | | | | 16 | 69 | | 1.8 | 3 | 4 |
| 8/6 | 28 | | | | 36 | 185 | | 1.5 | 3 | 2 |
| 8/21 | 25.7 | | | | 30 | 101 | | 1.4 | 2 | 2 |
| 9/11 | 19.7 | | | | 38 | 146 | | 0.4 | | 2 |
| 10/3 | 17.6 | | | | 17 | 174 | | 0.4 | 2 | 1 |

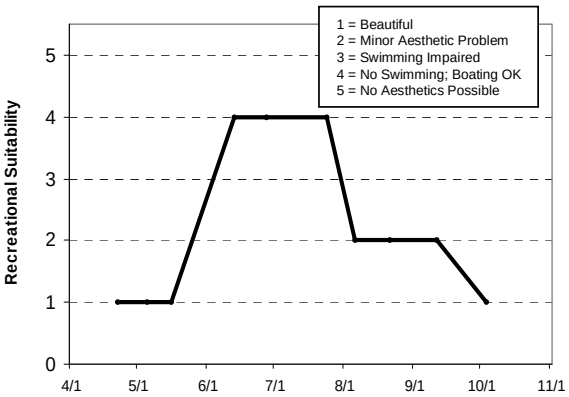



### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | F | F |
| Chlorophyll a | | | | | | | | | | | D | C |
| Secchi Depth | | | | | | | | | | | F | F |
| **Lake Grade** | | | | | | | | | | | **F** | **D** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | D | F | F | F | F |
| Chlorophyll a | B | C | D | D | C |
| Secchi Depth | F | F | F | F | C |
| **Lake Grade** | **D** | **D** | **F** | **F** | **D** |




Source: Metropolitan Council and STORET data

## DeMontreville Lake (82-0101) *Valley Branch Watershed District*

**Primary Report**

Lake DeMontreville is located in Lake Elmo (Washington County). It is considered a Priority Lake by the Metropolitan Council for its high regional recreation value and exceptional water clarity. The 160-acre lake has a mean and maximum depth of 2.4 m (~8 feet) and 7.3 m (24 feet). Roughly 90 percent of the lake's area is considered littoral zone (the 0-15 foot depth area of aquatic vegetation dominance). The lake's size and mean depth results in an approximate lake volume of 1,280 ac-ft. The lake's surface area and watershed size (1,108 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.

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

This was the sixth year that Lake DeMontreville has been involved in the CAMP. The lake has been monitored in the past by Council staff, most recently in 2003. A search of the STORET nationwide water quality database for data on the lake revealed a moderate database since the 1980's with nutrient and Secchi transparency data available in 1980, 1984, 1991, 1993, 1995, 2000 and 2003-2007. Additionally, Secchi transparency data are available for 1985-1986, and 1988-1989.

The lake was monitored 13 times between early May and mid October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 16.3 | 11.0 | 21.0 | A |
| **CLA** (µg/l) | 4.4 | 1.5 | 12.0 | A |
| **Secchi** (m) | 3.6 | 2.2 | 4.2 | A |
| **TKN** (mg/l) | 1.02 | 0.39 | 1.30 | |
| | | | ***Lake Grade*** | A |

The lake received a lake grade of A for 2008. Historically, with the exception of the year 2007, the lake grades for the years 1980 through 2008 show that the quality of the lake has improved over the past 25 years (see lake information sheet on the following page). A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed a statistically significant improving trend in water clarity (MPCA 2008).

Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The average user perception rankings were 1.8 for physical condition (between 1- "crystal clear" and 2- "some algae present"), and 1.0 for recreational suitability (1- "beautiful").

The Fisheries Section of the Minnesota Department of Natural Resources (MNDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MNDNR 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 DeMontreville

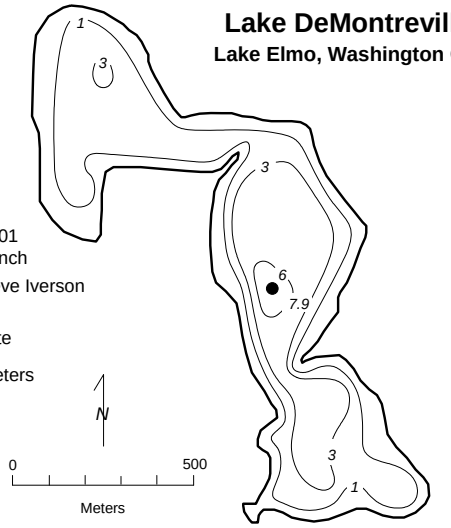
**Lake Elmo, Washington Co.**

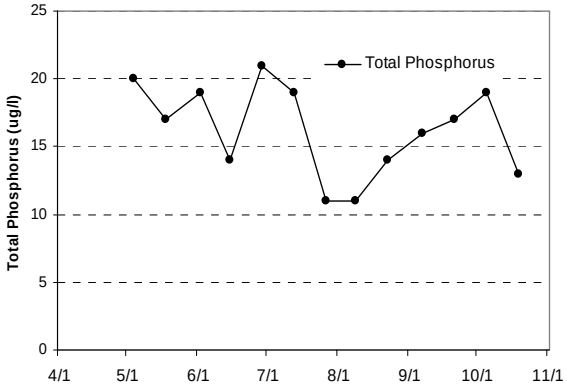
**Primary Report**

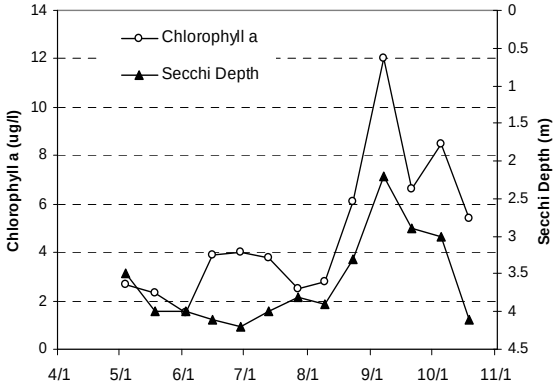
Lake ID: 820101
WD: Valley Branch
Primary Volunteer: Steve Iverson

● Sampling site

Contours in meters

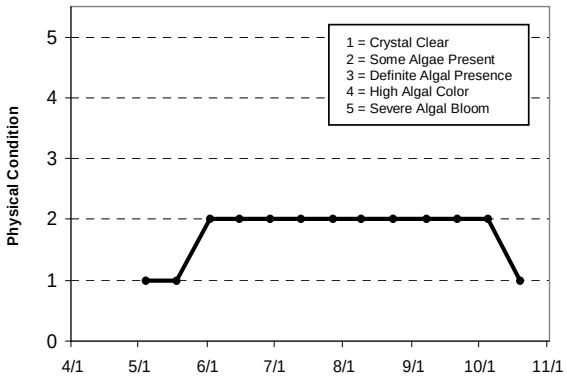



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/4 | 11.2 | | | | 2.7 | 20 | | 3.5 | 1 | 1 |
| 5/18 | 16.3 | | | | 2.3 | 17 | | 4 | 1 | 1 |
| 6/2 | 19.8 | | | | 1.5 | 19 | | 4 | 2 | 1 |
| 6/15 | 21.4 | | | | 3.9 | 14 | | 4.1 | 2 | 1 |
| 6/29 | 23.8 | | | | 4 | 21 | | 4.2 | 2 | 1 |
| 7/13 | 24.1 | | | | 3.8 | 19 | | 4 | 2 | 1 |
| 7/27 | 26.4 | | | | 2.5 | 11 | | 3.8 | 2 | 1 |
| 8/9 | 26.9 | | | | 2.8 | 11 | | 3.9 | 2 | 1 |
| 8/23 | 25.1 | | | | 6.1 | 14 | | 3.3 | 2 | 1 |
| 9/7 | 21.2 | | | | 12 | 16 | | 2.2 | 2 | 1 |
| 9/21 | 21 | | | | 6.6 | 17 | | 2.9 | 2 | 1 |
| 10/5 | 16.1 | | | | 8.5 | 19 | | 3 | 2 | 1 |
| 10/19 | 13.3 | | | | 5.4 | 13 | | 4.1 | 1 | 1 |



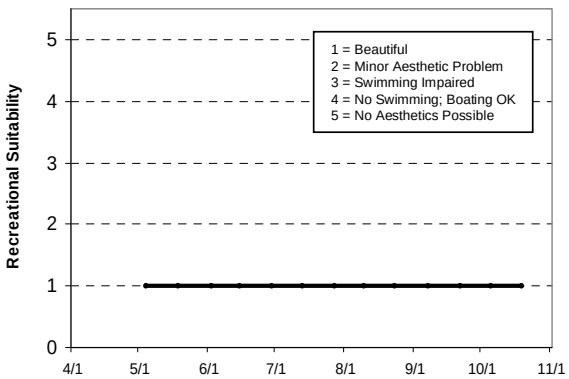

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | C | | | | C | | | | | | | B |
| Chlorophyll a | C | | | | C | | | | | | | C |
| Secchi Depth | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | B | | C | | | | | A | | | A |
| Chlorophyll a | | A | | B | | | | | A | | | B |
| Secchi Depth | | B | | B | | | | | A | | | A |
| **Lake Grade** | | **B** | | **B** | | | | | **A** | | | **A** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | A | B | C | B | A |
| Chlorophyll a | A | B | B | C | A |
| Secchi Depth | B | A | B | C | A |
| **Lake Grade** | **A** | **B** | **B** | **C** | **A** |

Source: Metropolitan Council and STORET data



## DeMontreville Lake (82-0101) *Washington Conservation District*

**Secondary Report**

Lake DeMontreville was also monitored by the Washington Conservation District (WCD) in 2008. The monitoring by WCD, therefore, provided duplicate monitoring for Demontreville Lake. For more detailed information on the lake, refer to its primary report.

The lake was monitored 7 times between late April and mid October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 22.6 | 13 | 36 | A |
| **CLA** (µg/l) | 7.18 | 3.3 | 16 | A |
| **Secchi** (m) | 4.38 | 2.7 | 5.5 | A |
| **TKN** (mg/l) | 1.44 | 1.00 | 1.70 | |
| | | | ***Lake Grade*** | A |

The lake received a lake grade of A for 2008 in addition to receiving A grades for TP, CLA, and Secchi depth, which are consistent with the grades provided in the primary report. Both the primary and secondary reports provide similar magnitudes of the individual water quality parameters. Both reports also show the elevated CLA concentrations and lowered water clarity during the autumn period. Therefore the data collected by the primary and secondary volunteers concur with each other.

Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The average user perception rankings were 1.8 for physical condition (between 1- "crystal clear" and 2- "some algae present"), and 2.0 for recreational suitability (2- "minor aesthetic problem".

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 DeMontreville

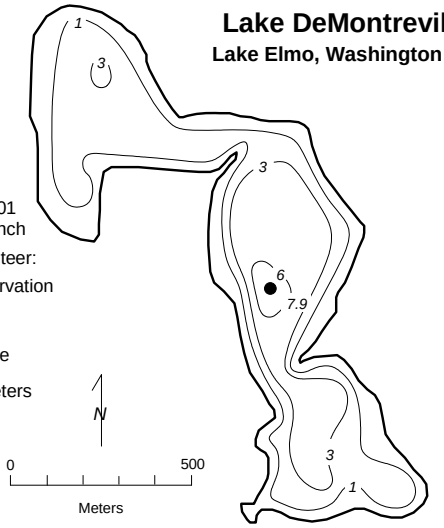
**Lake Elmo, Washington Co.**

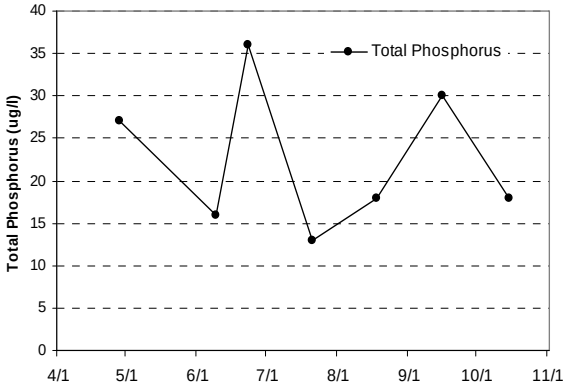
**Secondary Report**

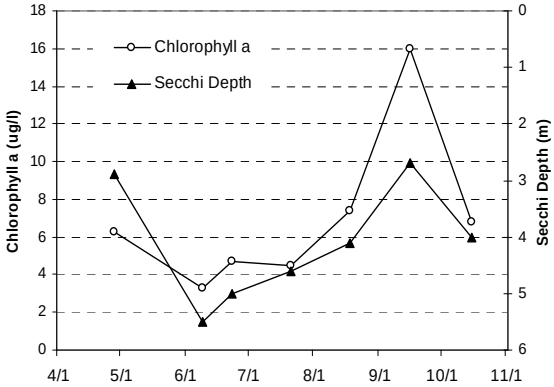
Lake ID: 820101
WD: Valley Branch
Secondary Volunteer:
Washington Conservation District

● Sampling site

Contours in meters

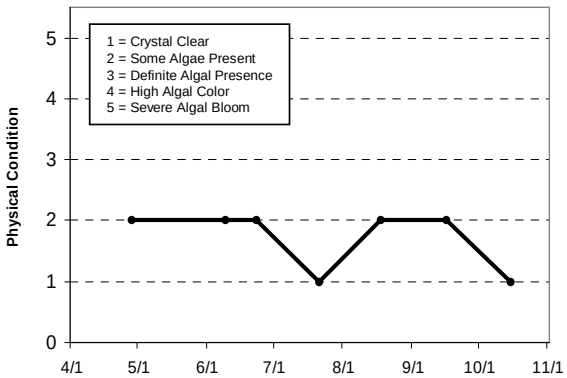



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/28 | 7.3 | 7.3 | 11.39 | 11.41 | 6.3 | 27 | | 2.9 | 2 | 1 |
| 6/9 | 20.2 | 11 | 8.08 | 0.22 | 3.3 | 16 | 50 | 5.5 | 2 | 2 |
| 6/23 | 23.2 | 11.9 | 8.46 | 0.63 | 4.7 | 36 | 52 | 5 | 2 | 2 |
| 7/21 | 25.5 | 13.2 | 6.86 | 0.32 | 4.5 | 13 | 242 | 4.6 | 1 | 1 |
| 8/18 | 25.2 | 13.9 | 7.43 | 0.31 | 7.4 | 18 | 168 | 4.1 | 2 | 2 |
| 9/16 | 18.9 | 18.2 | 8.21 | 0.28 | 16 | 30 | 18 | 2.7 | 2 | 3 |
| 10/15 | 14.6 | 14.6 | 8.08 | 0.31 | 6.8 | 18 | 16 | 4 | 1 | 1 |



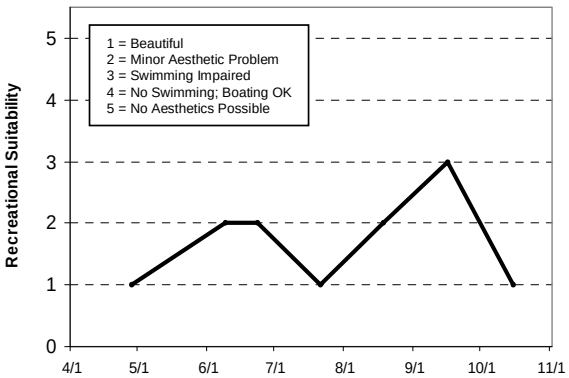

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | C | | | | C | | | | | | | B |
| Chlorophyll a | C | | | | C | | | | | | | C |
| Secchi Depth | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | B | | C | | | | | A | | | A |
| Chlorophyll a | | A | | B | | | | | A | | | B |
| Secchi Depth | | B | | B | | | | | A | | | A |
| **Lake Grade** | | **B** | | **B** | | | | | **A** | | | **A** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | A | B | C | B | A |
| Chlorophyll a | A | B | B | C | A |
| Secchi Depth | B | A | B | C | A |
| **Lake Grade** | **A** | **B** | **B** | **C** | **A** |

Source: Metropolitan Council and STORET data



## Downs Lake (82-0110) *Valley Branch Watershed District*

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 lake's size and mean depth results in an approximate lake volume of 175 ac-ft. Because of the shallowness of the lake, the entire lake is considered littoral zone (area of aquatic plant dominance) and it does not maintain a thermocline (a density gradient owed to changing water temperatures throughout the lake's 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 lake was monitored 2 times in May 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 96.0 | 30.0 | 162.0 | NA |
| **CLA** (µg/l) | 62.5 | 60.0 | 65.0 | NA |
| **Secchi** (m) | 0.5 | 0.5 | 0.5 | NA |
| **TKN** (mg/l) | 1.31 | 0.62 | 2.00 | |
| | | | ***Lake Grade*** | NA |

There were fewer than 5 monitoring events during the summer period, so there were insufficient data to calculate letter grades. Furthermore, there were insufficient data to make comparisons of 2008 data to previous monitoring years.

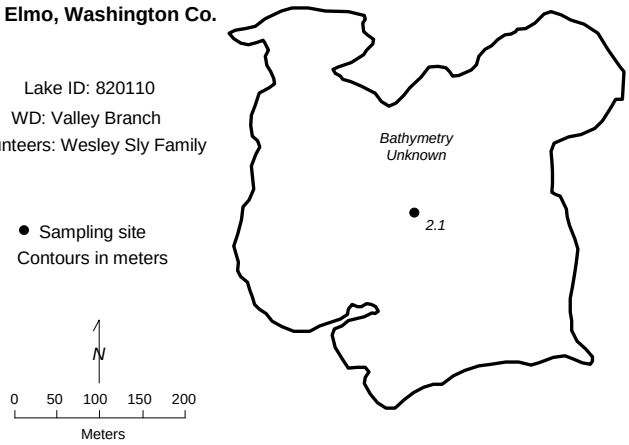
The volunteer(s) opinions of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. These user perception rankings are shown on the lake information sheet. The average user perception rankings were 2.0 for physical condition (2- "some algae present"), and 4.0 for recreational suitability (4- "no swimming - boating ok").

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.

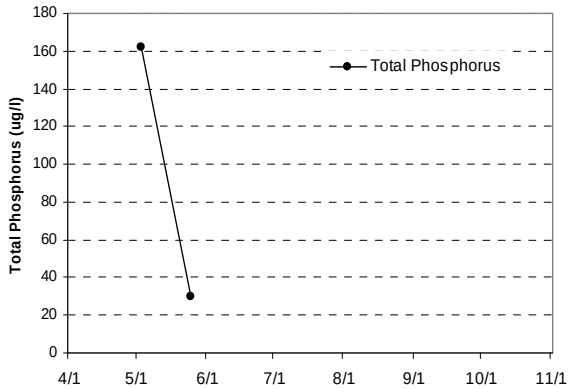
# Downs Lake

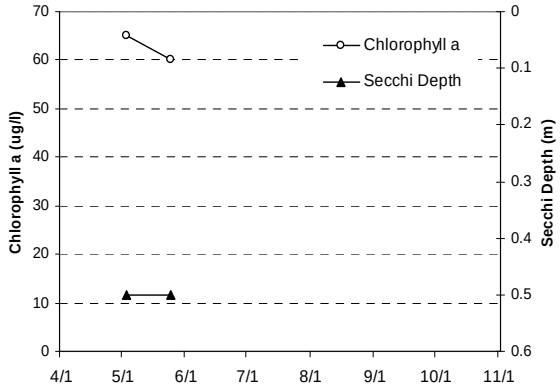
**Lake Elmo, Washington Co.**

Lake ID: 820110
WD: Valley Branch
Volunteers: Wesley Sly Family



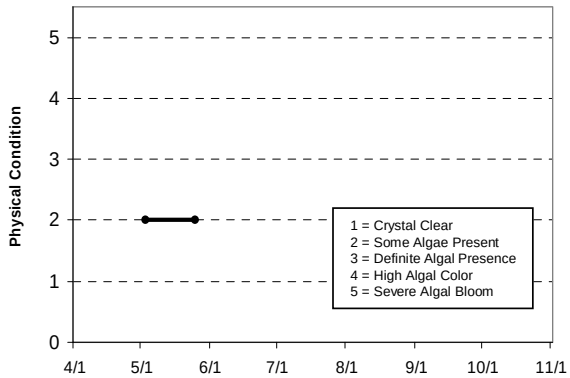

● Sampling site
Contours in meters




## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/3 | 12.3 | | | | 65 | 162 | | 0.5 | 2 | 4 |
| 5/25 | 20.6 | | | | 60 | 30 | | 0.5 | 2 | 4 |



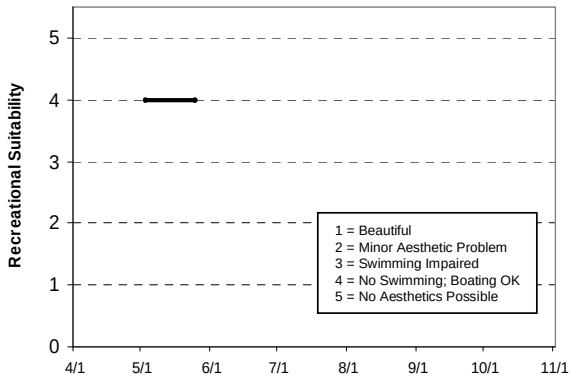

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | D | | D | F | D |
| Chlorophyll a | | | | | | | | D | | F | F | C |
| Secchi Depth | | | | | | | | D | | F | F | F |
| **Lake Grade** | | | | | | | | **D** | | **F** | **F** | **D** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | F | D | F | F | |
| Chlorophyll a | D | D | F | F | |
| Secchi Depth | F | F | F | F | |
| **Lake Grade** | **F** | **D** | **F** | **F** | |

Source: Metropolitan Council and STORET data



## Eagle Lake [Carver County] (10-0121) *Carver County Environmental Services*

Eagle Lake is located in Young America Township in Carver County. The lake is considered a Priority Lake by the Metropolitan Council for its high regional recreation value. The lake has a surface area of 233-acres and a maximum and mean depth of 7.9 m (26 feet) and 1.2 m (4 feet), respectively. Because of the shallowness of the lake, the entire area is considered littoral, (the shallow [0-15 foot depth] area dominated by aquatic vegetation) and does not maintain a thermocline (a density gradient owed to changing water temperatures throughout the lake's water column). The DNR has designated the lake as being infested with Eurasian Water Milfoil (*Myriophyllum spicatum*).

The lake has a 1,050-acre immediate watershed, which translates to a watershed-to-lake area ratio of 4.5:1 (the larger the ratio the greater the potential stress put on the lake from surface runoff).

This was the tenth year that Eagle Lake has been involved in CAMP, although it has been previously monitored by Council staff (as recently as 2004). The lake was monitored 13 times between early May and mid October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 182.8 | 93.0 | 264.0 | F |
| **CLA** (µg/l) | 82.3 | 27.0 | 160.0 | F |
| **Secchi** (m) | 0.6 | 0.3 | 1.1 | F |
| **TKN** (mg/l) | 2.84 | 2.10 | 3.80 | |
| | | | ***Lake Grade*** | F |

The lake received a lake grade of F for 2008, which is similar to that recorded in 1985, 2002, 2006, and 2007. For the other previous monitoring years, the lake received lake grades of D and one C. The lake appears to fluctuate between a lake grade of D and F, with no distinct trends in either direction. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008).

The volunteer(s) opinions of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. These user perception rankings are shown on the lake information sheet. The average user perception rankings were 3.5 for physical condition (between 3- "definite algae present" and 4- "high algal color", and 3.8 for recreational suitability (between 3- "swimming slightly impaired" and 4- "no swimming - boating ok").

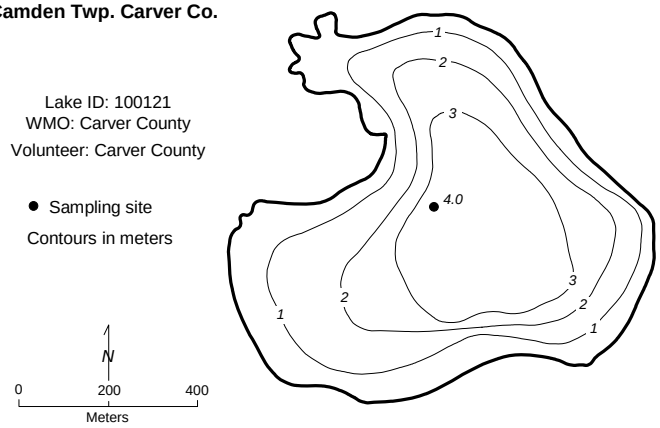
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

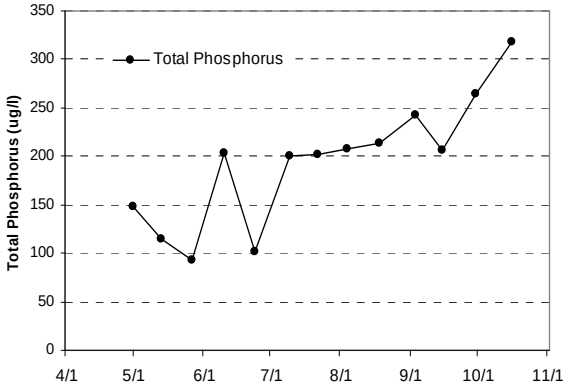
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

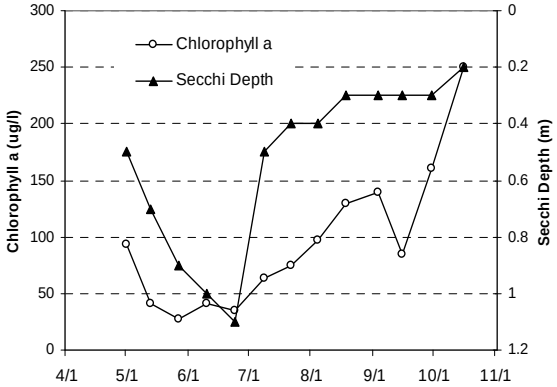
# Eagle Lake,
**Camden Twp. Carver Co.**

Lake ID: 100121
WMO: Carver County
Volunteer: Carver County

● Sampling site
Contours in meters

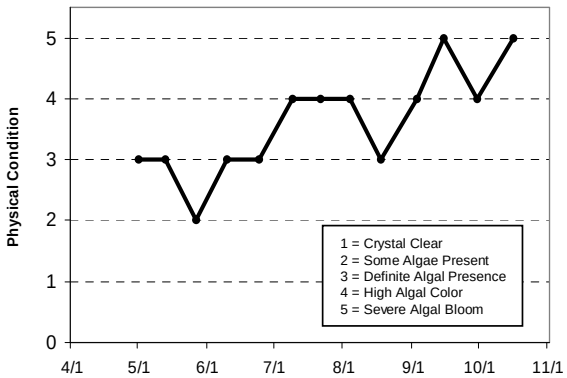



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/1 | 9.15 | | 16.12 | | 93 | 148 | | 0.5 | 3 | 4 |
| 5/13 | 13.38 | | 13.29 | | 41 | 115 | | 0.7 | 3 | 4 |
| 5/27 | 16.76 | | 8.01 | | 27 | 93 | | 0.9 | 2 | 2 |
| 6/10 | 19.25 | | 7.77 | | 41 | 203 | | 1 | 3 | 3 |
| 6/24 | 23.35 | | 15.92 | | 35 | 101 | | 1.1 | 3 | 4 |
| 7/9 | 25.17 | | 9.39 | | 64 | 200 | | 0.5 | 4 | 4 |
| 7/22 | 26.64 | | 10.89 | | 75 | 202 | | 0.4 | 4 | 4 |
| 8/4 | 25.36 | | 4.98 | | 97 | 207 | | 0.4 | 4 | 5 |
| 8/18 | 25.72 | | 13.1 | | 130 | 213 | | 0.3 | 3 | 3 |
| 9/3 | 21.64 | | 7.34 | | 140 | 242 | | 0.3 | 4 | 4 |
| 9/15 | 17.33 | | 7.1 | | 85 | 206 | | 0.3 | 5 | 4 |
| 9/30 | 17.35 | | 6.54 | | 160 | 264 | | 0.3 | 4 | 4 |
| 10/16 | 13.88 | | 9.96 | | 250 | 318 | | 0.2 | 5 | 5 |



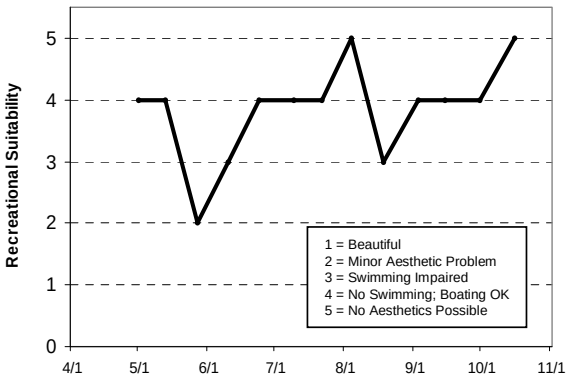

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | F | F | | | | F | | | | | | |
| Chlorophyll a | D | C | | | | F | | | | | | |
| Secchi Depth | C | C | | | | F | | | | | | |
| **Lake Grade** | **D** | **D** | | | | **F** | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | F | | F | F | F | F | F | F |
| Chlorophyll a | | | | | C | | C | C | C | D | D | C |
| Secchi Depth | | | | | B | | C | B | C | D | F | D |
| **Lake Grade** | | | | | **D** | | **D** | **D** | **D** | **D** | **F** | **D** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | F | D | F | F | F |
| Chlorophyll a | C | C | F | F | F |
| Secchi Depth | D | C | D | F | F |
| **Lake Grade** | **D** | **C** | **F** | **F** | **F** |

Source: Metropolitan Council and STORET data



## Eagle Point Lake (82-0109) *Valley Branch Watershed District*

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 lake's size and mean depth gives an approximate lake volume of 360 ac-ft. Because of the shallowness of the lake, the entire lake is considered littoral zone (area of aquatic plant dominance) and it does not maintain a thermocline (a density gradient owed to changing water temperatures throughout the lake's water column).

The lake's 11,502-acre watershed translates to a large watershed-to-lake size ratio of 96:1, which is a large ratio. The greater the ratio, the greater the potential stress on the lake from surface runoff.

The lake was monitored 2 times in 2007, once in June and once in August 2008. Low lake water levels prevented access to open water for most of the year because of drought conditions. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 215.0 | 95.0 | 335.0 | NA |
| **CLA** (µg/l) | 91.7 | 3.3 | 180.0 | NA |
| **Secchi** (m) | 0.9 | 0.3 | 1.5 | NA |
| **TKN** (mg/l) | 3.25 | 1.50 | 5.00 | |
| | | | ***Lake Grade*** | NA |

There were fewer than 5 monitoring events during the summer period, so there were insufficient data to calculate letter grades. Furthermore, there were insufficient data to make comparisons of 2008 data to previous monitoring years. There are insufficient data to determine trends in the lake's water quality. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

The perceived physical and recreational conditions (ranked on a 1-to-5 scale) are shown on the lake's information sheet on the next page. The average user perception rankings, were 3.0 for physical condition (3- "definite algae present"), and 4.0 for recreational suitability (4- "no swimming – boating ok").

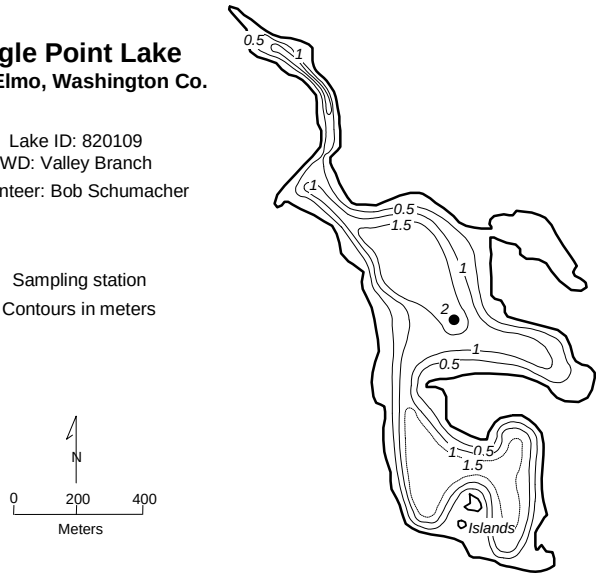
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

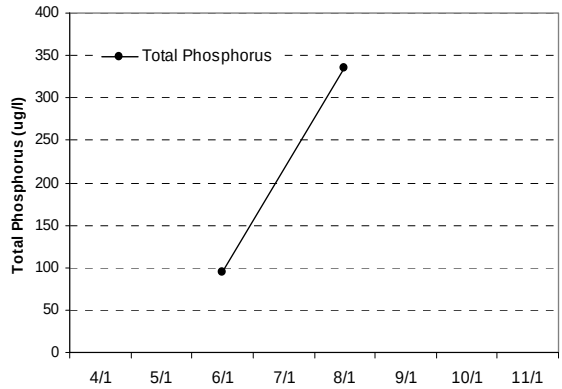
# Eagle Point Lake

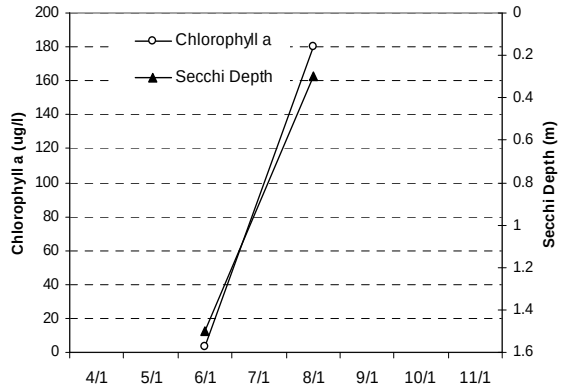
**Lake Elmo, Washington Co.**

Lake ID: 820109
WD: Valley Branch
Volunteer: Bob Schumacher

● Sampling station
Contours in meters

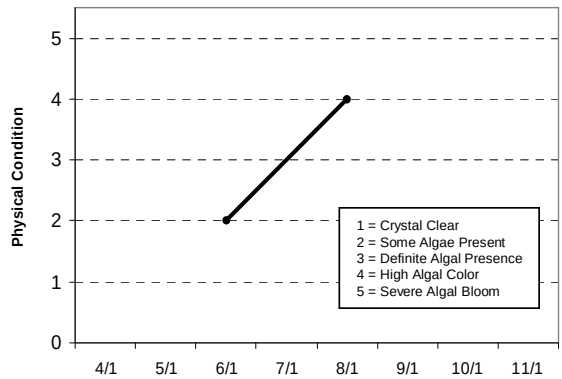



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 6/15 | 21 | | | | 3.3 | 95 | | 1.5 | 2 | 4 |
| 8/20 | 22 | | | | 180 | 335 | | 0.3 | 4 | 4 |



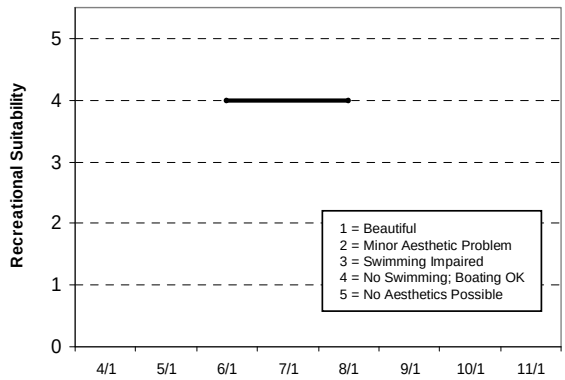

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | F | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | F | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | F | F | |
| Chlorophyll a | | | F | A | |
| Secchi Depth | | | F | D | |
| **Lake Grade** | | | **F** | **C** | |

Source: Metropolitan Council and STORET data



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

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. Generally, the larger the ratio the greater the potential stress on the lake from surface runoff. Earley Lake outlets at its west end to Sunset Pond.

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

Earley Lake has been enrolled in CAMP since 1994. The lake was monitored 9 times between early May and mid October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 35.3 | 24.0 | 50.0 | C |
| **CLA** (µg/l) | 7.6 | 4.0 | 19.0 | A |
| **Secchi** (m) | 1.9 | 1.3 | 3.0 | C |
| **TKN** (mg/l) | 1.44 | 0.79 | 2.10 | |
| | | | ***Lake Grade*** | B |

The lake received a lake grade of B for 2008, which is similar to water quality observed in 2006. The summer-time mean CLA concentration was lower in 2008 than most previous years. This lower CLA was the main reason for the improved lake grade in 2008. The lake received lake grades of C in the other years. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed a statistically significant improving trend in water clarity (MPCA 2008). Additional monitoring is suggested to determine if recent lower mean CLA concentrations are indication of improving water quality.

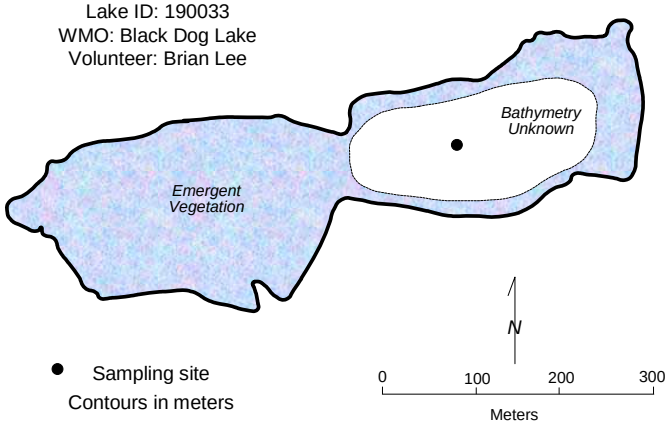
Throughout the monitoring period, the volunteers' opinions of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. The mean physical condition ranking was 3.3 (between 3- "definite algae present" and 4- "high algal color"), while the mean recreational suitability ranking was 4.1 (between 4- "no swimming – boating ok" and 5- "no aesthetics possible").

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.

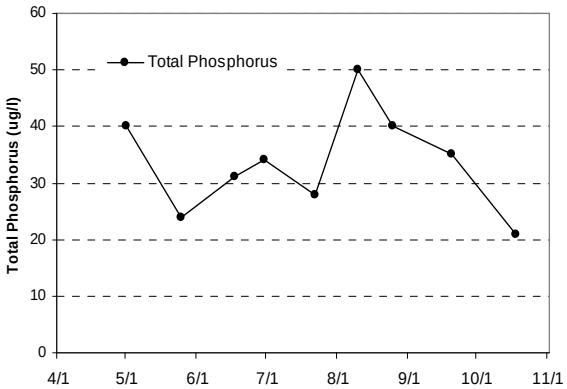
# Earley Lake

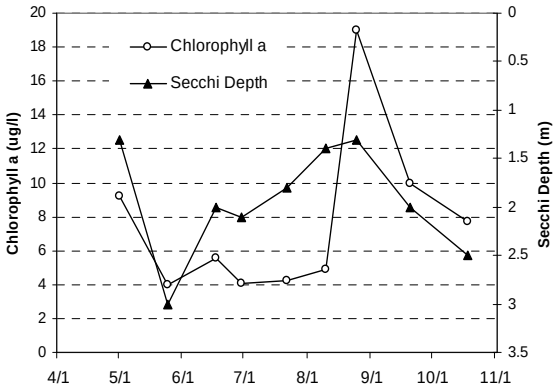
**Burnsville, Dakota Co.**

Lake ID: 190033
WMO: Black Dog Lake
Volunteer: Brian Lee



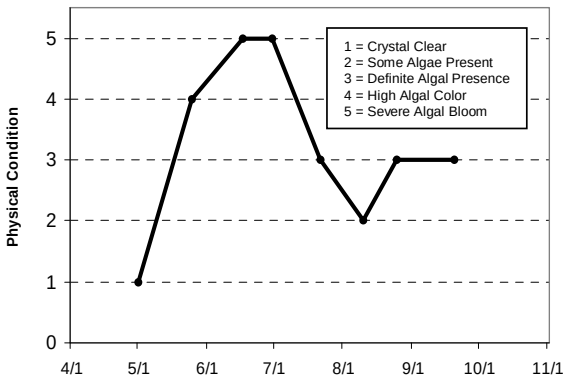

● Sampling site
Contours in meters




## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/1 | | | | | 9.2 | 40 | | 1.3 | 1 | 4 |
| 5/25 | | | | | 4 | 24 | | 3 | 4 | 4 |
| 6/17 | | | | | 5.6 | 31 | | 2 | 5 | 4 |
| 6/30 | 25.3 | | | | 4.1 | 34 | | 2.1 | 5 | 5 |
| 7/22 | | | | | 4.2 | 28 | | 1.8 | 3 | 4 |
| 8/10 | 26 | | | | 4.9 | 50 | | 1.4 | 2 | 4 |
| 8/25 | 24.9 | | | | 19 | 40 | | 1.3 | 3 | 4 |
| 9/20 | 21.6 | | | | 10 | 35 | | 2 | 3 | 4 |
| 10/18 | 11.7 | | | | 7.7 | 21 | | 2.5 | | 4 |



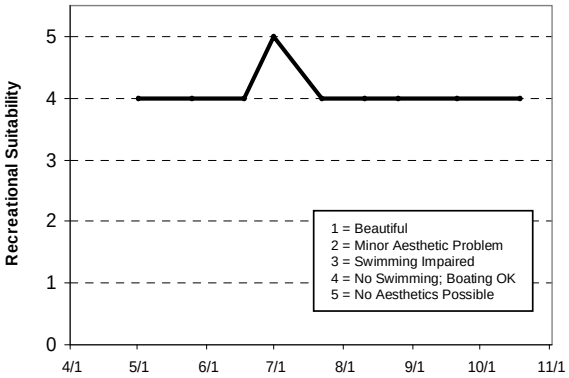

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | C | C | C | C | C | C | C | C | C | C |
| Chlorophyll a | | | B | B | B | B | B | B | B | B | B | B |
| Secchi Depth | | | 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 |
|---|---|---|---|---|---|
| Total Phosphorus | C | C | C | C | C |
| Chlorophyll a | B | B | A | B | A |
| Secchi Depth | C | C | C | C | C |
| **Lake Grade** | **C** | **C** | **B** | **C** | **B** |

Source: Metropolitan Council and STORET data



## East Lake (19-0349) *City of Lakeville*

East Lake is a small lake located in Lakeville (Dakota County). There is very little morphological data available for the lake.

The year 2008 marks the fourth year in which East Lake has been involved in the CAMP. A search through the STORET nationwide water quality database for historic data revealed only the historic CAMP data. Therefore, 2005-2008 are the only years where water quality data are available.

The lake was monitored 14 times between mid-April and late October 2007. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

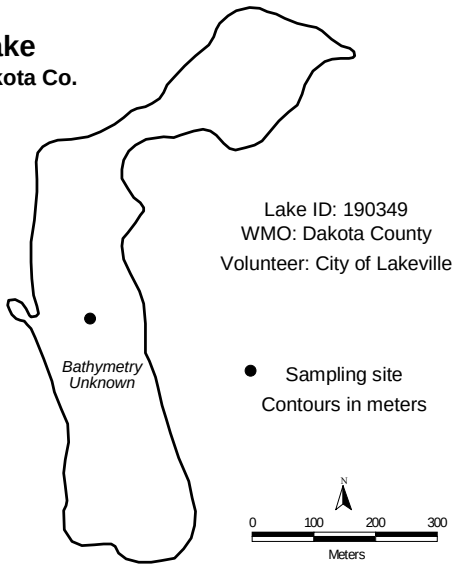
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 114.9 | 23.0 | 269.0 | D |
| **CLA** (µg/l) | 129.2 | 4.0 | 360.0 | F |
| **Secchi** (m) | 0.9 | 0.2 | 3.4 | D |
| **TKN** (mg/l) | 3.10 | 1.10 | 7.60 | |
| | | | ***Lake Grade*** | D |

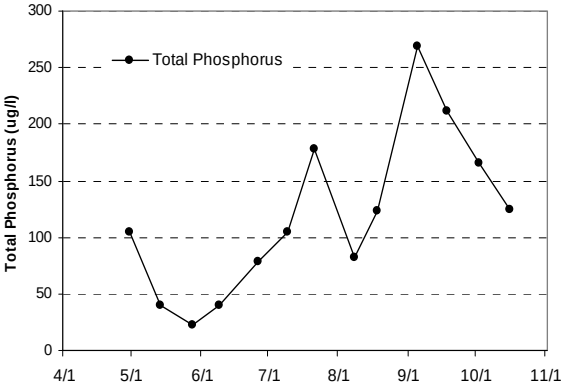
The lake received a lake grade of D for 2008. The water quality for 2008 was an improvement over the previous three years. The lake experienced clearer water and lower concentrations of CLA and TP during the spring and early summer of 2008 as compared to previous years. Further monitoring is suggested to help determine if the improved water quality seen in 2008 is evidence of an improving trend for this lake.

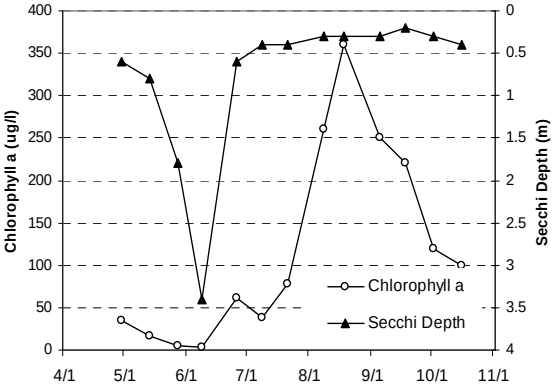
Throughout the monitoring period, the volunteers ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The resulting user perception rankings are shown on the information sheet. The mean physical condition ranking was 3.4 (between 3- "definite algae present" and 4- "high algal color"), and 4.0 for recreational suitability (4- "no swimming - boating ok").

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 Lake
**Lakeville, Dakota Co.**

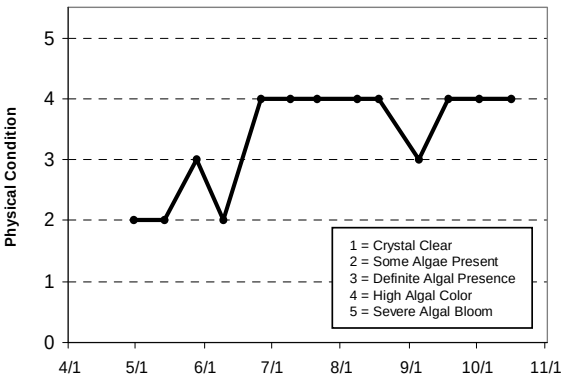



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/30 | 11.7 | | | | 35 | 105 | | 0.6 | 2 | 2 |
| 5/14 | 16.1 | | | | 16 | 40 | | 0.8 | 2 | 4 |
| 5/28 | 18.3 | | | | 5 | 23 | | 1.8 | 3 | 4 |
| 6/9 | 20.6 | | | | 4 | 40 | | 3.4 | 2 | 4 |
| 6/26 | 26.1 | | | | 61 | 78 | | 0.6 | 4 | 4 |
| 7/9 | 26.1 | | | | 38 | 104 | | 0.4 | 4 | 4 |
| 7/21 | 28.3 | | | | 78 | 178 | | 0.4 | 4 | 4 |
| 8/8 | 26.7 | | | | 260 | 82 | | 0.3 | 4 | 4 |
| 8/18 | 26.6 | | | | 360 | 123 | | 0.3 | 4 | 4 |
| 9/5 | 69 | | | | 250 | 269 | | 0.3 | 3 | 4 |
| 9/18 | 19 | | | | 220 | 212 | | 0.2 | 4 | 4 |
| 10/2 | 14 | | | | 120 | 165 | | 0.3 | 4 | 4 |
| 10/16 | 11 | | | | 99 | 124 | | 0.4 | 4 | 4 |



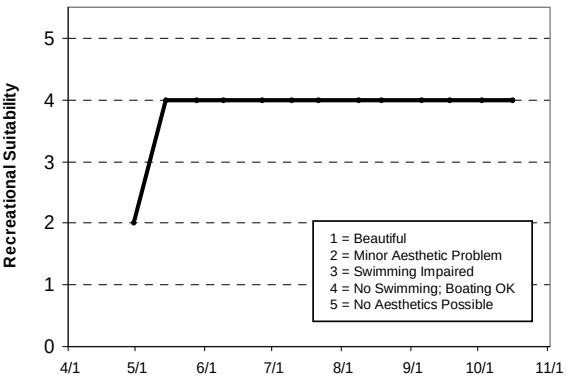

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | F | NA | F | D |
| Chlorophyll a | | F | NA | F | F |
| Secchi Depth | | F | NA | F | D |
| **Lake Grade** | | **F** | **NA** | **F** | **D** |

Source: Metropolitan Council and STORET data



## East Boot Lake (82-0034) *Carnelian - Marine Watershed District*

East Boot Lake is located in May Township (Washington County). The mean and maximum depths of the 47-acre lake are 8.2 m (27 feet) and 0.9 m (3 feet), respectively. The lake's size and mean depth results in an approximate lake volume of 282 ac-ft. Because of the overall shallowness of the lake, roughly 82 percent of the lake's surface area is considered littoral zone (area of aquatic plant dominance), the majority of the lake does not maintain a thermocline (a density gradient owed to changing water temperatures throughout the lake's water column). The lake's small 93-acre immediate watershed translates to a small watershed-to-lake size ratio of 2:1. The greater the ratio, the greater the potential stress on the lake from surface runoff.

The lake was monitored 7 times between mid-April and early-October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 37.8 | 30.0 | 51.0 | C |
| **CLA** (µg/l) | 10.9 | 2.1 | 18.0 | B |
| **Secchi** (m) | 3.6 | 1.8 | 7.3 | A |
| **TKN** (mg/l) | 1.29 | 0.85 | 2.30 | |
| | | | ***Lake Grade*** | B |

The lake received a lake grade of B for 2008. The lake grade and grades received for the individual water quality parameters were typical of those received since 2004. 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.

The last two graphs show seasonal variation in the lake's perceived physical condition and recreational suitability. The average user perception rankings, on a 1-to-5 scale, were 2.6 for physical condition (between 2- "some algae present" and 3- "definite algae present"), and 3.2 for recreational suitability (between 3- "swimming slightly impaired" and 4- "no swimming – boating ok").

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

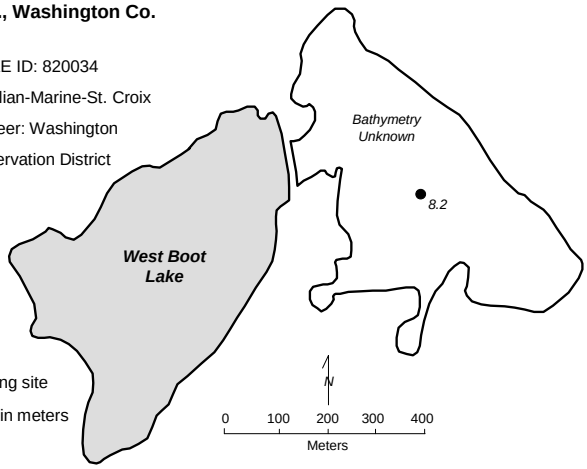
**May Twp., Washington Co.**

LAKE ID: 820034

WD: Carnelian-Marine-St. Croix

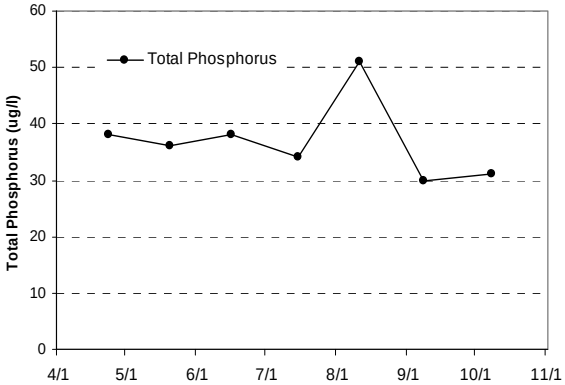
Volunteer: Washington

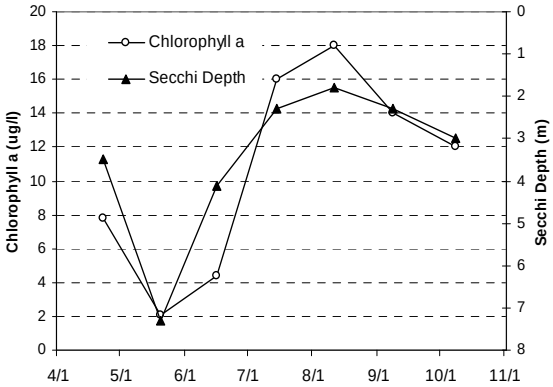
Conservation District




● Sampling site

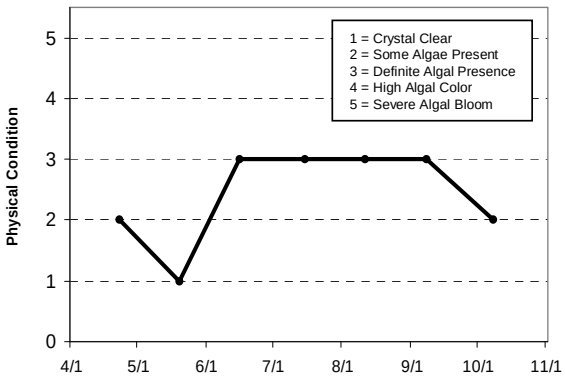
Contours in meters




## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/23 | 9 | 5.1 | 12 | 1.06 | 7.8 | 38 | | 3.5 | 2 | 2 |
| 5/20 | 15.4 | 6.3 | 9.31 | 0.24 | 2.1 | 36 | 467 | 7.3 | 1 | 1 |
| 6/16 | 20.9 | 7.1 | 8.57 | 0.26 | 4.4 | 38 | 552 | 4.1 | 3 | 4 |
| 7/15 | 24.3 | 7.6 | 7.67 | 0.56 | 16 | 34 | 1000 | 2.3 | 3 | 3 |
| 8/11 | 24.9 | 9.9 | 6.85 | 0.36 | 18 | 51 | 1400 | 1.8 | 3 | 4 |
| 9/8 | 20 | 8.2 | 6.06 | 0.28 | 14 | 30 | 1910 | 2.3 | 3 | 4 |
| 10/8 | 15.1 | 8.3 | 6.77 | 0.32 | 12 | 31 | 1910 | 3 | 2 | 2 |

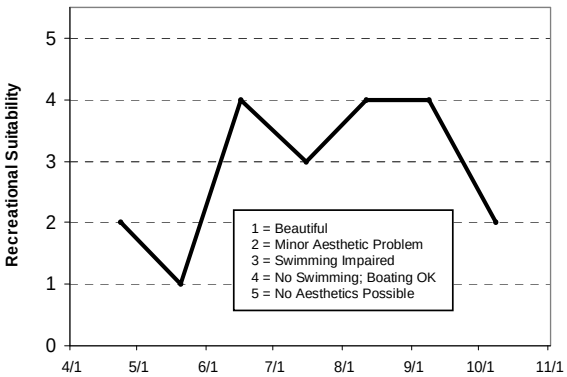



### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | B | B | B | C | C | C | C | C |
| Chlorophyll a | | | | | B | C | C | C | C | C | C | C |
| Secchi Depth | | | | | B | A | B | C | C | C | B | B |
| **Lake Grade** | | | | | **B** | **B** | **B** | **C** | **C** | **C** | **C** | **C** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | C | C | C | C | C |
| Chlorophyll a | B | B | C | B | B |
| Secchi Depth | A | A | A | A | A |
| **Lake Grade** | **B** | **B** | **B** | **B** | **B** |




Source: Metropolitan Council and STORET data

## Echo Lake (82-0135) *Valley Branch Watershed District*

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. 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 107 ac-ft. There is no public access to the lake.

The lake's surface area and watershed size (194 acres) translates to a 4.7:1 watershed-to-lake size ratio. Generally the larger the ratio, the greater the potential stress on the lake from surface runoff.

This was the third year that Echo Lake has been involved in the CAMP. A search through the STORET nationwide water quality database for historic data on the lake came up with Secchi information for 2005. Thus, the 2006 – 2008 CAMP data are the only known nutrient data available.

The lake was monitored 8 times between early-May and late-October 2007. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 38.0 | 33.0 | 43.0 | NA |
| **CLA** (µg/l) | 38.5 | 23.0 | 54.0 | NA |
| **Secchi** (m) | 0.7 | 0.5 | 0.8 | NA |
| **TKN** (mg/l) | 2.20 | 1.80 | 2.60 | |
| | | | ***Lake Grade*** | NA |

There was an insufficient quantity of data to determine water quality grades for 2008. At least 5 sampling dates are needed in within the summer-time period to calculate letter grades. There is an insufficient quantity of data to determine water quality trends for this lake, therefore, to better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

The perceived physical and recreational conditions (ranked on a 1-to-5 scale) are shown on the lake's information sheet on the next page. The average user perception rankings, were 3.0 for physical condition (3- "definite algae present"), and 4.0 for recreational suitability (4- "no swimming – boating ok").

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.**

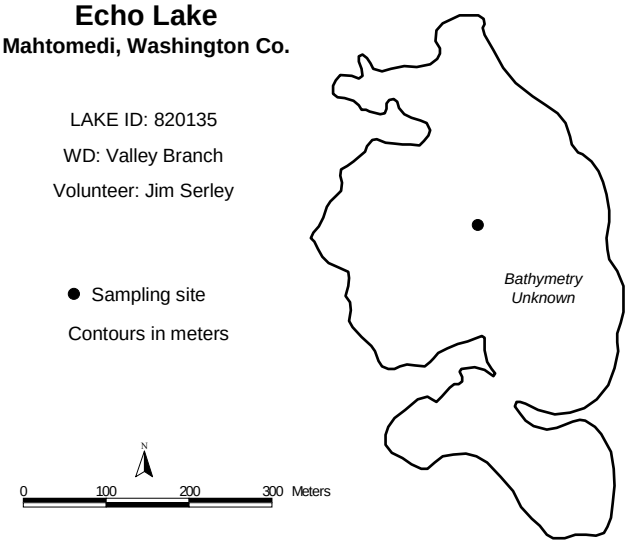
LAKE ID: 820135

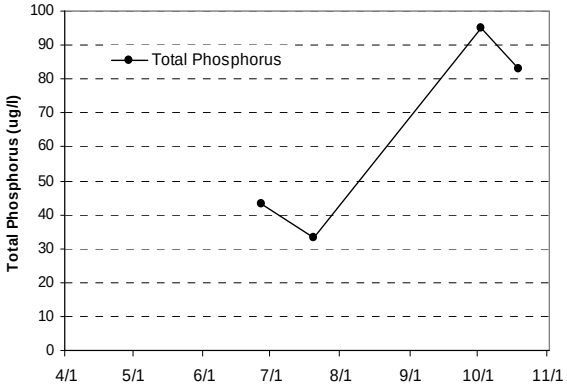
WD: Valley Branch

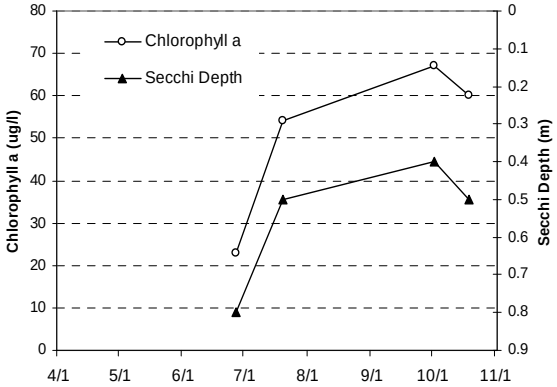
Volunteer: Jim Serley

● Sampling site

Contours in meters

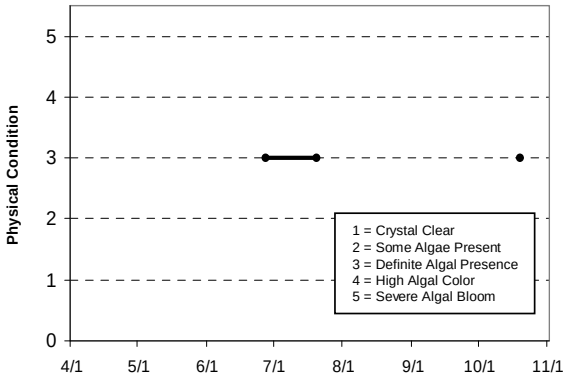



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 6/27 | 24.6 | | | | 23 | 43 | | 0.8 | 3 | 4 |
| 7/20 | 26.5 | | | | 54 | 33 | | 0.5 | 3 | 4 |
| 10/2 | 14.4 | | | | 67 | 95 | | 0.4 | | 4 |
| 10/19 | 12.3 | | | | 60 | 83 | | 0.5 | 3 | 4 |

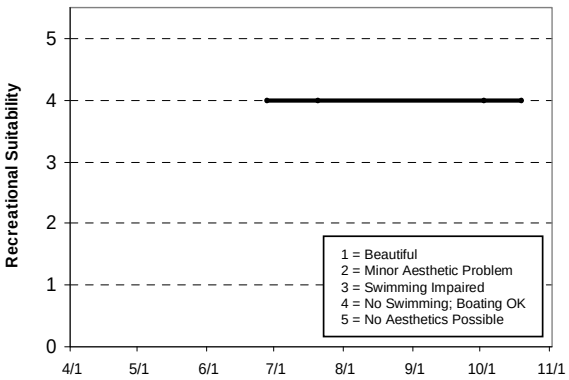



### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | D | D | |
| Chlorophyll a | | | C | F | |
| Secchi Depth | | F | F | D | |
| **Lake Grade** | | | **D** | **D** | |




Source: Metropolitan Council and STORET data

## Edith Lake (82-0004) *Valley Branch Watershed District*

**Primary Report**

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). Roughly 42 percent of the lake's surface area is considered littoral zone (the 0-15 foot depth area of aquatic plant dominance). The lake has a watershed of 1,576 acres, which gives a watershed-to-lake area ratio of 19:1. The greater the ratio, the greater the potential stress on the lake from surface runoff.

A search through the STORET nationwide water quality database for historic data on the lake revealed only the CAMP data. Therefore, 2005 – 2008 are the only known years where data are available. The lake was monitored 10 times between early May and mid October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 23.9 | 16.0 | 45.0 | B |
| **CLA** (µg/l) | 6.3 | 2.6 | 10.0 | A |
| **Secchi** (m) | 2.0 | 1.5 | 2.5 | C |
| **TKN** (mg/l) | 0.78 | 0.51 | 1.00 | |
| | | | ***Lake Grade*** | B |

The lake received a lake grade of B for 2008, which is similar to the grade it received in 2006. For the four 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 suggested to help determine the long term nature of the water quality for this lake.

The lake experienced a relatively low CLA summer-time mean concentration compared to the Secchi depth mean summer-time value (which yielded a CLA grade of A versus the C grade for water clarity). The relatively low CLA concentrations indicate that something other than algae was causing the diminished water clarity. Suspended particulates may be a possible cause of the low water clarity during 2008. Likely causes may be either that lake sediment was resuspended in the water column because of frequent mixing events, or the lake received significant quantities of suspended solids from the watershed via runoff events, or both. In either case, the increase turbidity would decrease available light via reduced water clarity, and thereby suppress algal growth.

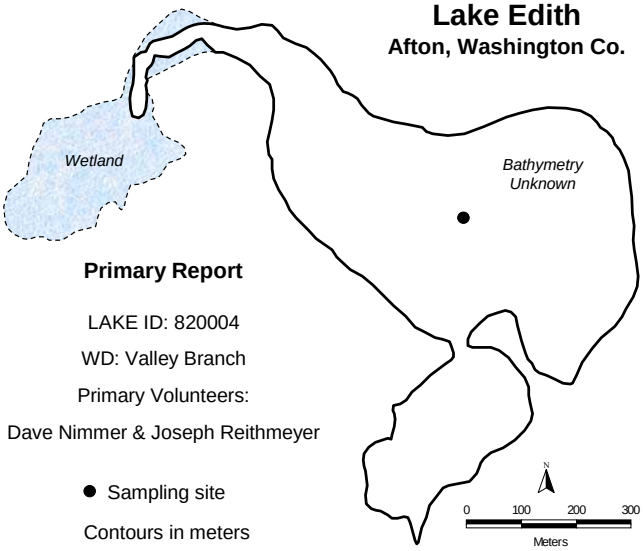
Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The average user perception rankings were 2.0 for physical condition (2- "some algae present"), and 2.0 for recreational suitability (2- "minor aesthetic problem").

The Fisheries Section of the Minnesota Department of Natural Resources (MNDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MNDNR 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 Edith

**Afton, Washington Co.**




**Primary Report**

LAKE ID: 820004

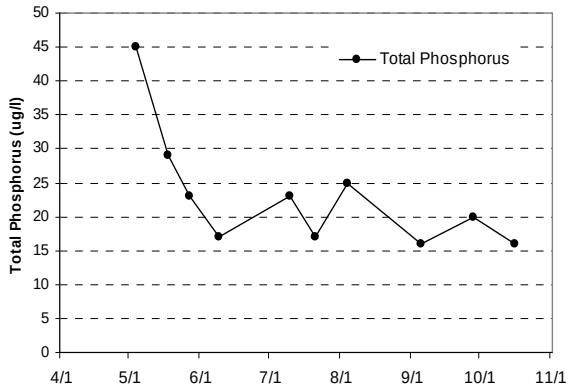
WD: Valley Branch

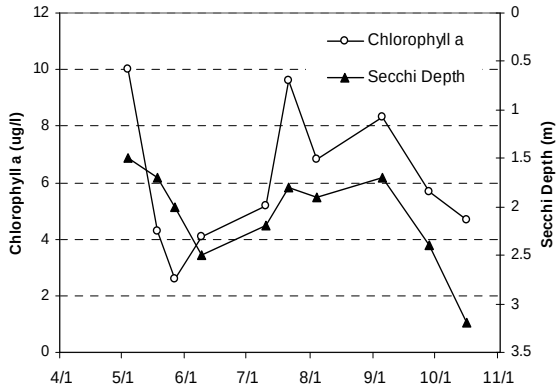
Primary Volunteers:

Dave Nimmer & Joseph Reithmeyer

● Sampling site

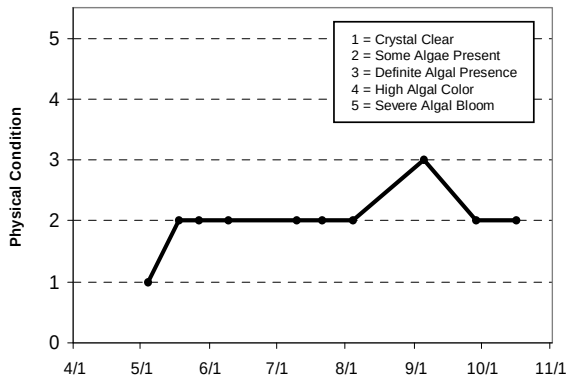
Contours in meters




## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/4 | 15.7 | | | | 10 | 45 | | 1.5 | 1 | 2 |
| 5/18 | 17.4 | | | | 4.3 | 29 | | 1.7 | 2 | 2 |
| 5/27 | 20 | | | | 2.6 | 23 | | 2 | 2 | 2 |
| 6/9 | 20.8 | | | | 4.1 | 17 | | 2.5 | 2 | 2 |
| 7/10 | 25.2 | | | | 5.2 | 23 | | 2.2 | 2 | 2 |
| 7/21 | 26.1 | | | | 9.6 | 17 | | 1.8 | 2 | 2 |
| 8/4 | 27.6 | | | | 6.8 | 25 | | 1.9 | 2 | 2 |
| 9/5 | 21.7 | | | | 8.3 | 16 | | 1.7 | 3 | 2 |
| 9/28 | 19.4 | | | | 5.7 | 20 | | 2.4 | 2 | 2 |
| 10/16 | 14 | | | | 4.7 | 16 | | 3.2 | 2 | 2 |



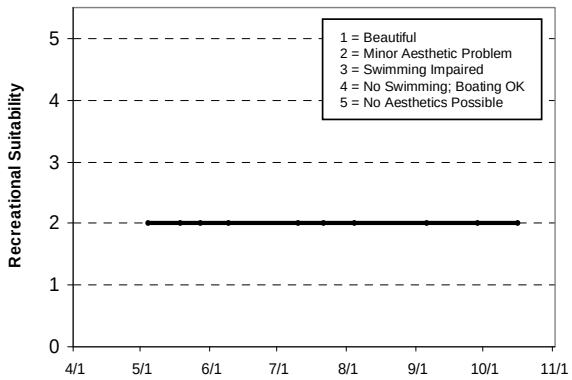

**Lake Water Quality Grades Based on Summertime Averages**

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | A | B | A | B |
| Chlorophyll a | | A | A | A | A |
| Secchi Depth | | B | C | B | C |
| **Lake Grade** | | **A** | **B** | **A** | **B** |

Source: Metropolitan Council and STORET data



## Edith Lake (82-0004) *Washington Conservation District*

**Secondary Report**

Edith Lake was also monitored by the Washington Conservation District (WCD) in 2008. The monitoring by the WCD provided duplicate monitoring for the lake. For more detailed information on the lake, refer to its primary report.

The lake was monitored 7 times between late April and mid October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. Depth profiles of temperature and dissolved oxygen were also collected. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

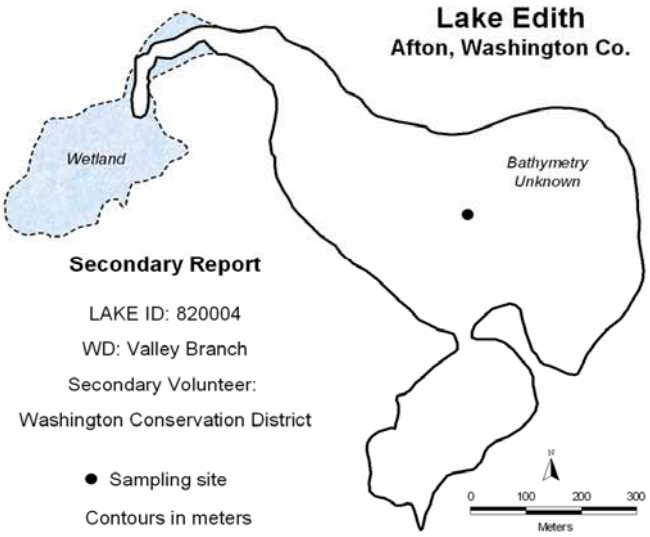
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 27.6 | 20.0 | 40.0 | B |
| **CLA** (µg/l) | 12.7 | 8.6 | 18.0 | B |
| **Secchi** (m) | 1.7 | 1.2 | 2.0 | C |
| **TKN** (mg/l) | 1.03 | 0.81 | 1.40 | |
| | | | ***Lake Grade*** | B |

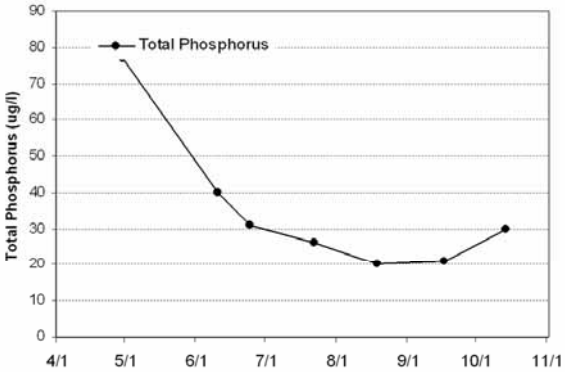
The lake received a lake grade of B for 2008, similar to the lake grade given in the primary report. TP concentrations were of similar magnitude and temporal pattern over the summer-time period as compared to those given in the primary report. CLA concentrations were in agreement with respect to magnitude and temporal pattern with respect to those given in the primary report, with the one exception of the secondary volunteer observing higher CLA concentrations in the first spring monitoring date. Similarly as the primary volunteer, the secondary volunteer observed reduced summer-time water clarity conditions in contrast to what the CLA data would suggest. Therefore, overall, the data collected by the primary and secondary volunteers concur with each other.

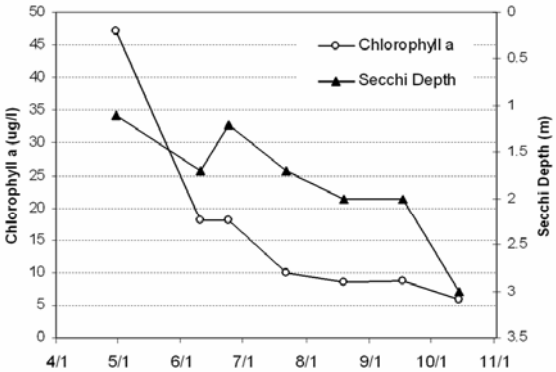
Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The average user perception rankings were 3.0 for physical condition (3- "definite algae present"), and 3.8 for recreational suitability (between 3- "swimming slightly impaired and 4- "no swimming/boating ok").

The Fisheries Section of the Minnesota Department of Natural Resources (MNDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MNDNR 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.

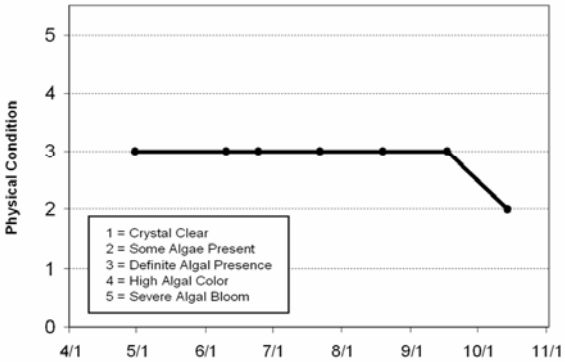



## 2008 Data

| DATE | Surf Tmp (°C) | Bot Tmp (°C) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/30 | 8.8 | 3.4 | 15.58 | 1.05 | 47 | 77 | | 1.1 | 3 | 4 |
| 6/10 | 20.8 | 3.9 | 10.18 | 0.21 | 18 | 40 | 186 | 1.7 | 3 | 4 |
| 6/24 | 24.3 | 4.1 | 12.78 | 0.86 | 18 | 31 | 203 | 1.2 | 3 | 4 |
| 7/22 | 26.1 | 4.5 | 10.04 | 0.01 | 10 | 26 | 190 | 1.7 | 3 | 4 |
| 8/19 | 25.4 | 4.7 | 9.46 | 0.28 | 8.6 | 20 | 245 | 2 | 3 | 3 |
| 9/17 | 18.9 | 5 | 10.92 | 0.2 | 8.8 | 21 | 362 | 2 | 3 | 4 |
| 10/14 | 15 | 5.4 | 9.85 | 0.23 | 5.9 | 30 | 234 | 3 | 2 | 3 |



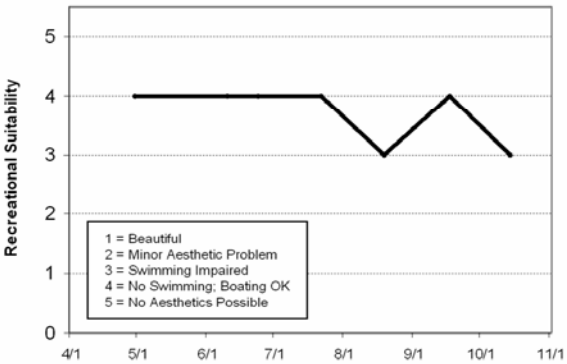

## Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | A | B | A | B |
| Chlorophyll a | | A | A | A | B |
| Secchi Depth | | B | C | B | C |
| **Lake Grade** | | A | B | A | B |

Source: Metropolitan Council and STORET data



## Lake Elmo (82-0106) *Valley Branch Watershed District*

**Primary Report**

Lake Elmo is located in Lake Elmo (Washington County). It is considered a Priority Lake by the Metropolitan Council for its high regional recreation value and exceptional water clarity. The lake has a public access associated with the Lake Elmo Regional Park located on the west side of the lake. The 284-acre lake has a maximum depth of 41.7 m (roughly 140 feet [deepest in the TCMA]). Roughly 22 percent of the lake's surface area is considered littoral zone (the 0-15 foot depth area of aquatic plant dominance).

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

This was the fifth year that Lake Elmo has been involved in the CAMP. The lake also has been monitored in the past by Council staff (most recently in 1991). A search of the STORET nationwide water quality database for data on the lake revealed a moderate database since the 1980's with nutrient and Secchi transparency data available in 1980-1982, 1984, 1988, 1991, 1994 and 2005-2006. Additionally, Secchi transparency data are available for 1985-1987, 1989-1990 and 1992-1993.

The lake was monitored 11 times from late April to mid October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 14.7 | 9.0 | 30.0 | A |
| **CLA** (µg/l) | 3.2 | 1.9 | 6.2 | A |
| **Secchi** (m) | 3.3 | 2.0 | 5.2 | A |
| **TKN** (mg/l) | 0.75 | 0.40 | 2.50 | |
| | | | ***Lake Grade*** | A |

The lake received a lake grade of A for 2008, which is similar to the lake grades it has received for the past 20 years. The lake's database indicates that the lake's recent water quality is well represented by a lake grade of A. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed a statistically significant improving trend in water clarity (MPCA 2008).

Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The summertime mean recorded physical condition was 1.0 (1-"crystal clear"). The mean suitability for recreation ranking, also on a 1-to-5 scale, was 1.0 (1-"beautiful").

The Fisheries Section of the Minnesota Department of Natural Resources (MNDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MNDNR 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.

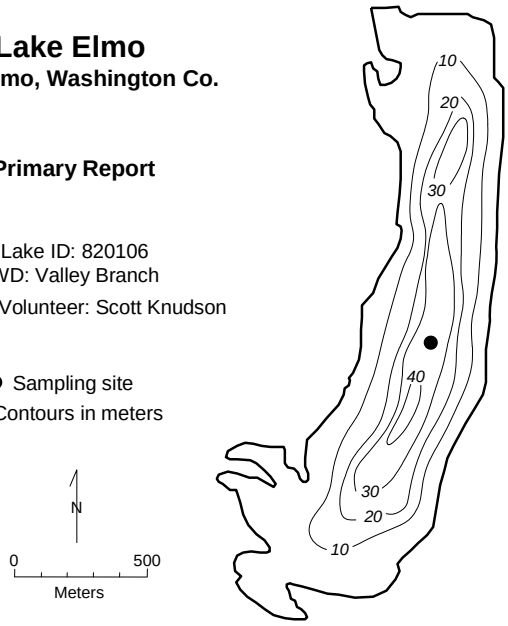
# Lake Elmo

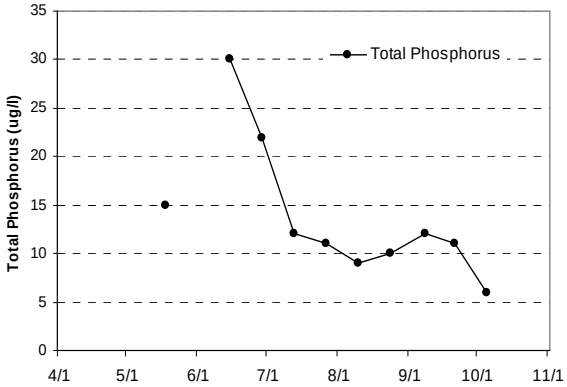
**Lake Elmo, Washington Co.**

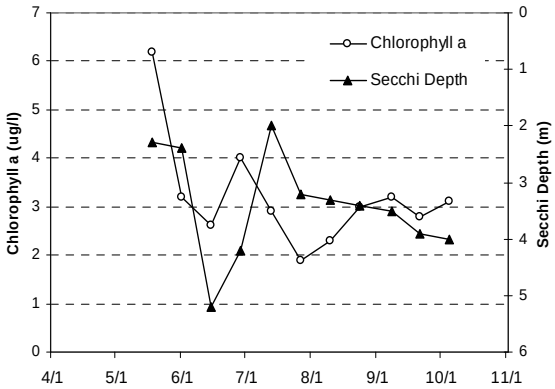
**Primary Report**

Lake ID: 820106
WD: Valley Branch
Primary Volunteer: Scott Knudson

● Sampling site
Contours in meters

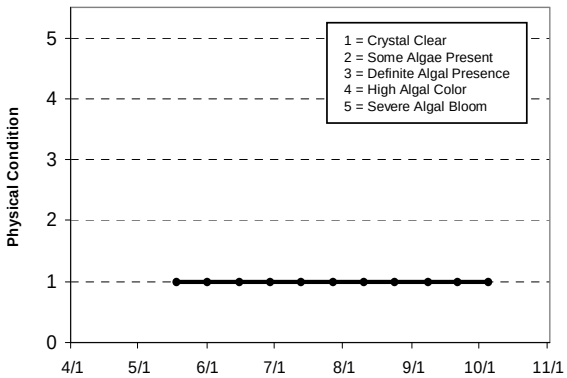



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/18 | 14.9 | | | | 6.2 | 15 | | 2.3 | 1 | 1 |
| 6/1 | 20.2 | | | | 3.2 | | | 2.4 | 1 | 1 |
| 6/15 | 20.9 | | | | 2.6 | 30 | | 5.2 | 1 | 1 |
| 6/29 | 24.1 | | | | 4 | 22 | | 4.2 | 1 | 1 |
| 7/13 | 24.2 | | | | 2.9 | 12 | | 2 | 1 | 1 |
| 7/27 | 26.5 | | | | 1.9 | 11 | | 3.2 | 1 | 1 |
| 8/10 | 26 | | | | 2.3 | 9 | | 3.3 | 1 | 1 |
| 8/24 | 25 | | | | 3 | 10 | | 3.4 | 1 | 1 |
| 9/8 | 21.4 | | | | 3.2 | 12 | | 3.5 | 1 | 1 |
| 9/21 | 21.3 | | | | 2.8 | 11 | | 3.9 | 1 | 1 |
| 10/5 | 17 | | | | 3.1 | 6 | | 4 | 1 | 1 |

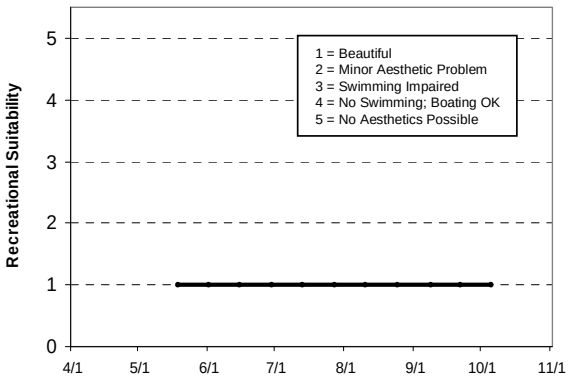



### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | B | A | B | | B | | | | B | | | A |
| Chlorophyll a | B | A | B | | A | | | | A | | | A |
| Secchi Depth | C | B | C | | B | A | B | B | A | A | A | A |
| **Lake Grade** | **B** | **A** | **B** | | **B** | | | | **A** | | | **A** |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | A | | | | | | | | | |
| Chlorophyll a | | | A | | | | | | | | | |
| Secchi Depth | A | A | A | | | | | | | | | |
| **Lake Grade** | | | **A** | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | A | A | A | A |
| Chlorophyll a | | A | A | A | A |
| Secchi Depth | | A | A | A | A |
| **Lake Grade** | | **A** | **A** | **A** | **A** |




Source: Metropolitan Council and STORET data

## Lake Elmo (82-0106) *Washington Conservation District*

**Secondary Report**

Lake Elmo was also monitored by the Washington Conservation District (WCD) in 2008. The monitoring by the WCD provided duplicate monitoring for the lake. For more detailed information on the lake, refer to its primary report.

The lake was monitored 11 times from mid May to early October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. Depth profiles of dissolved oxygen and temperature were also collected. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 17.8 | 13.0 | 24.0 | A |
| **CLA** (µg/l) | 3.4 | 2.8 | 4.1 | A |
| **Secchi** (m) | 4.3 | 3.4 | 5.0 | A |
| **TKN** (mg/l) | 0.64 | 0.48 | 0.76 | |
| | | | ***Lake Grade*** | A |

The lake received a lake grade of A for 2008, which is the same as the lake grade received in the primary report. Both the secondary and primary volunteers observed water clarities that yielded A grades. The secondary and primary volunteers observed similar Secchi depths throughout the year except for one or possibly two observations during August and September. Overall, the data from the secondary volunteer concurs with those data of the primary volunteer.

Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The summertime mean recorded physical condition was 1.8 (1- "crystal clear" and 2- "some algae present"). The mean suitability for recreation ranking, also on a 1-to-5 scale, was 1.4 (between 1-"beautiful" and 2- "minor aesthetic problem").

The Fisheries Section of the Minnesota Department of Natural Resources (MNDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MNDNR 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.

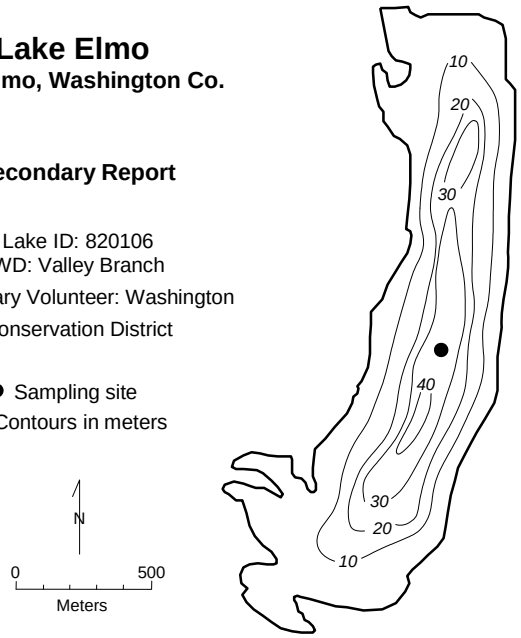
# Lake Elmo

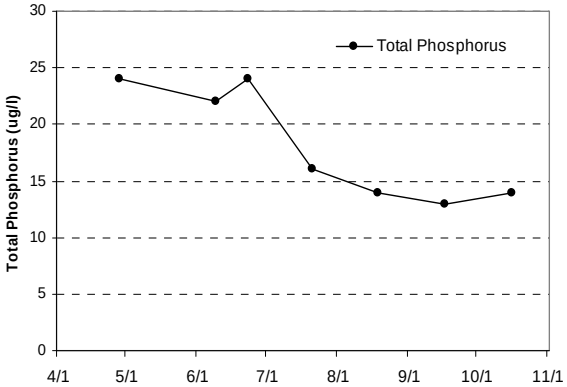
**Lake Elmo, Washington Co.**

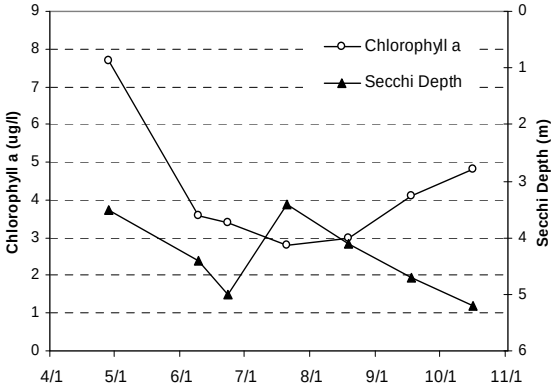
**Secondary Report**

Lake ID: 820106
WD: Valley Branch
Secondary Volunteer: Washington Conservation District

● Sampling site
Contours in meters

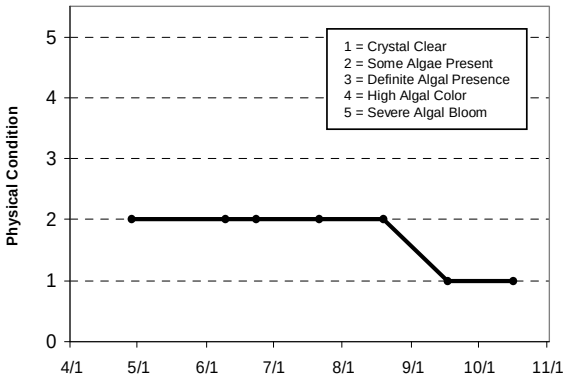



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/28 | 5.6 | 5.2 | 11.67 | 10.07 | 7.7 | 24 | | 3.5 | 2 | 1 |
| 6/9 | 18.9 | 7 | 8.82 | 0.25 | 3.6 | 22 | 12 | 4.4 | 2 | 2 |
| 6/23 | 22 | 4.7 | 9.47 | 1.49 | 3.4 | 24 | 18 | 5 | 2 | 2 |
| 7/21 | 25.2 | 4.9 | 6.86 | 0.51 | 2.8 | 16 | 10 | 3.4 | 2 | 1 |
| 8/19 | 25.2 | 5.4 | 7.88 | 0.41 | 3 | 14 | 13 | 4.1 | 2 | 1 |
| 9/17 | 19.8 | 5.6 | 9.49 | 0.25 | 4.1 | 13 | 13 | 4.7 | 1 | 1 |
| 10/16 | 14.8 | 6 | 8.22 | 0.36 | 4.8 | 14 | 14 | 5.2 | 1 | 1 |

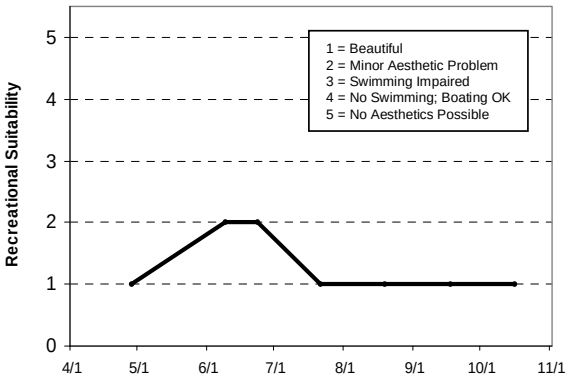



### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | B | A | B | | B | | | | B | | | A |
| Chlorophyll a | B | A | B | | A | | | | A | | | A |
| Secchi Depth | C | B | C | | B | A | B | B | A | A | A | A |
| **Lake Grade** | **B** | **A** | **B** | | **B** | | | | **A** | | | **A** |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | A | | | | | | | | | |
| Chlorophyll a | | | A | | | | | | | | | |
| Secchi Depth | A | A | A | | | | | | | | | |
| **Lake Grade** | | | **A** | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | A | A | A | A |
| Chlorophyll a | | A | A | A | A |
| Secchi Depth | | A | A | A | A |
| **Lake Grade** | | **A** | **A** | **A** | **A** |




Source: Metropolitan Council and STORET data

## Fahlstrom Pond [east basin] (82-0005) *Washington Conservation District*

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.

The year 2008 was the first year that this water body has been involved in the CAMP. A search of the STORET nationwide water quality database revealed no other historic monitoring data.

The lake was monitored 3 times from late April to late June 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. Depth profiles of dissolved oxygen and temperature were also collected. The resulting data are summarized in tables and figures on the following page.

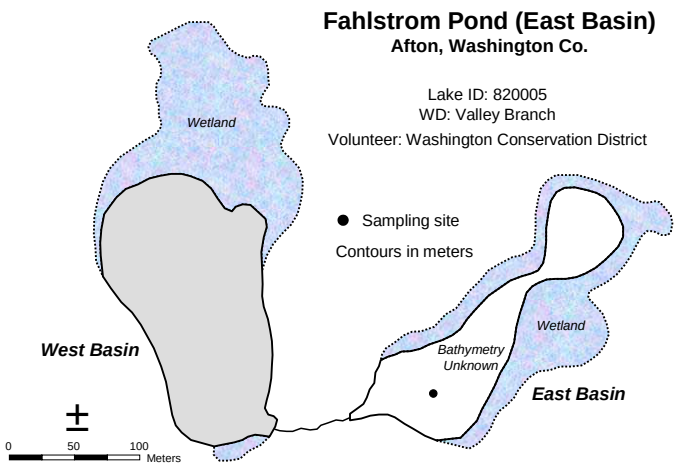
**2008 summer (May-September) data summary**

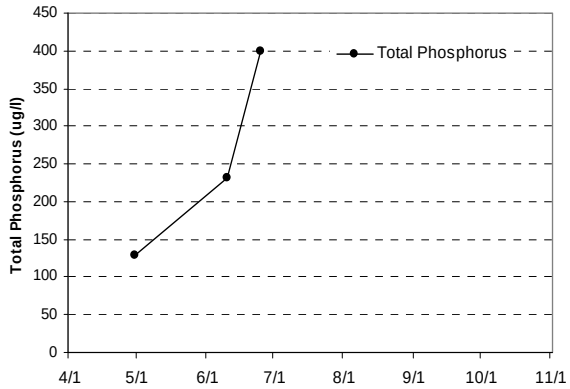
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 315.5 | 232.0 | 399.0 | NA |
| **CLA** (µg/l) | 5.6 | 5.4 | 5.8 | NA |
| **Secchi** (m) | 0.5 | 0.3 | 0.6 | NA |
| **TKN** (mg/l) | 1.60 | 1.30 | 1.90 | |
| | | | ***Lake Grade*** | NA |

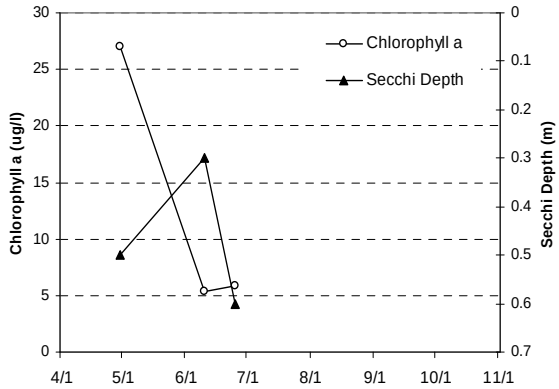
There were insufficient data to calculate a lake grade for 2008. At least 5 monitoring events are required during the summer-time period to determine water quality grades. Additional monitoring data are needed to build a water quality database for this water body.

Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The mean summertime physical condition was 2.5 (between 2- "some algae present" and 3- "definite algae present"). The mean summertime suitability for recreation, also on a 1-to-5 scale, was 4.0 ("no swimming/boating ok").

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.

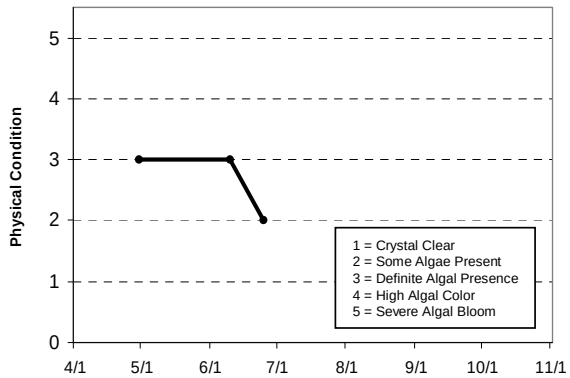



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/30 | 11.2 | | 11.89 | | 27 | 128 | | 0.5 | 3 | 4 |
| 6/10 | 22.7 | | 6.15 | | 5.4 | 232 | | 0.3 | 3 | 4 |
| 6/25 | 25.6 | | 2.4 | | 5.8 | 399 | | 0.6 | 2 | 4 |



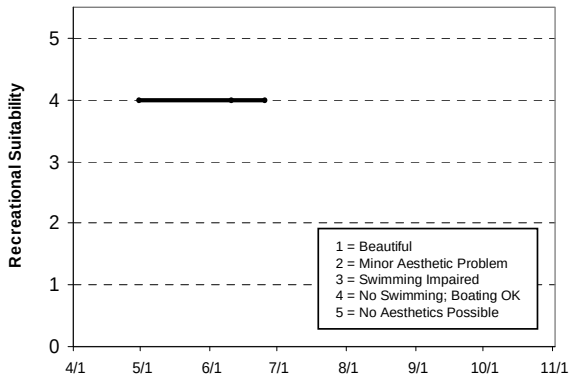

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | | |
| Chlorophyll a | | | | | |
| Secchi Depth | | | | | |
| **Lake Grade** | | | | | |

Source: Metropolitan Council and STORET data



## Fahlstrom Pond [west basin] (82-0005) *Washington Conservation District*

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.

The year 2008 was the first year that this water body has been involved in the CAMP. A search of the STORET nationwide water quality database revealed no other historic monitoring data.

The lake was monitored 5 times from late April to mid September 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. Depth profiles of dissolved oxygen and temperature were also collected. The resulting data are summarized in tables and figures on the following page.

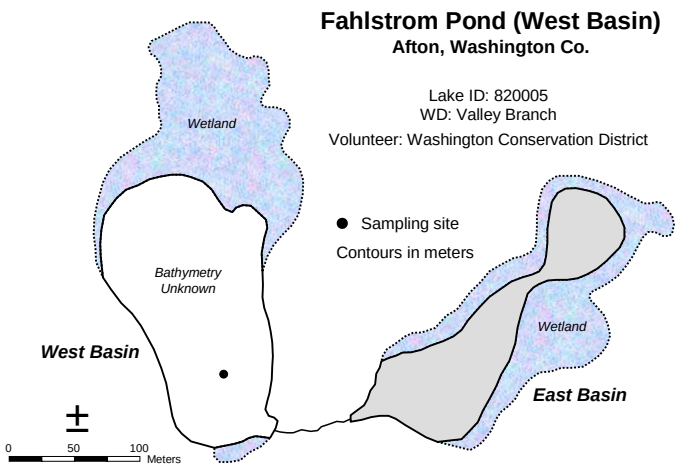
**2008 summer (May-September) data summary**

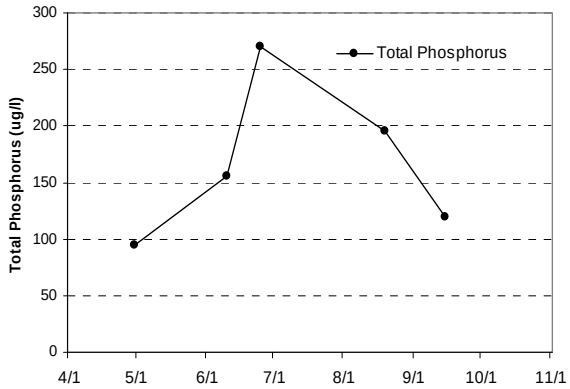
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 185.3 | 119.0 | 270.0 | NA |
| **CLA** (µg/l) | 8.0 | 4.1 | 11.0 | NA |
| **Secchi** (m) | 0.7 | 0.5 | 0.9 | NA |
| **TKN** (mg/l) | 2.05 | 1.70 | 2.30 | |
| | | | ***Lake Grade*** | NA |

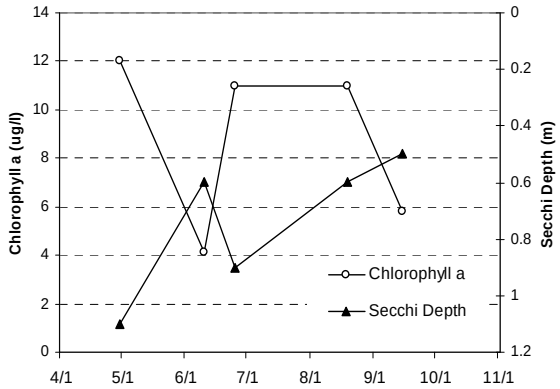
There were insufficient data to calculate a lake grade for 2008. At least 5 monitoring events are required during the summer-time period to determine water quality grades. Additional monitoring data are needed to build a water quality database for this water body.

Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The mean summertime physical condition was 3.3 (between 3- "definite algae present" and 4- "high algal color"). The mean summertime suitability for recreation, also on a 1-to-5 scale, was 3.5 (between 3- "swimming slightly impaired" and 4- "no swimming/boating ok").

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.

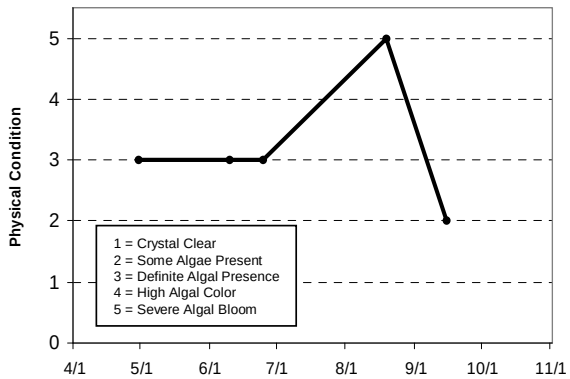



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/30 | 9.9 | 10 | 14.27 | 11.39 | 12 | 94 | | 1.1 | 3 | 4 |
| 6/10 | 23.2 | | 5.55 | | 4.1 | 156 | | 0.6 | 3 | 4 |
| 6/25 | 25.4 | 25.4 | 4.49 | 2.98 | 11 | 270 | | 0.9 | 3 | 4 |
| 8/19 | 24.9 | | 5.49 | | 11 | 196 | | 0.6 | 5 | 4 |
| 9/15 | 20.5 | 20.5 | 12.9 | 5.82 | 5.8 | 119 | | 0.5 | 2 | 2 |



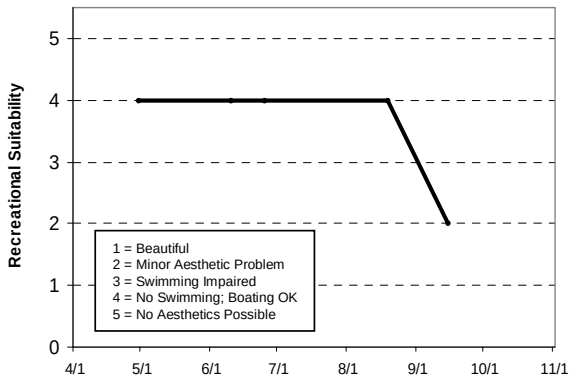

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | | |
| Chlorophyll a | | | | | |
| Secchi Depth | | | | | |
| **Lake Grade** | | | | | |

Source: Metropolitan Council and STORET data



## Farquhar Lake (19-0023) *City of Apple Valley*

Farquhar 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. Because the maximum depth is only 3.0 m, the entire lake area is considered littoral (the area of aquatic plant dominance), and it does not maintain a thermocline (a density gradient owed to changing water temperatures throughout the lake's water column). The watershed-to-lake size ratio is 6:1 (the greater the ratio, the greater the potential stress on the lake from surface runoff).

The lake was monitored 13 times between mid April and mid October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 132.3 | 41.0 | 262.0 | D |
| **CLA** (µg/l) | 125.9 | 7.2 | 350.0 | F |
| **Secchi** (m) | 0.8 | 0.2 | 2.4 | D |
| **TKN** (mg/l) | 2.63 | 1.50 | 4.00 | |
| | | | ***Lake Grade*** | D |

The lake received a lake grade of D for 2008, but received an F grade for CLA, which is the worse grade received for this parameter since 2004. The mean summer time Secchi depth raised the water clarity grade from the usual F to a D. The increase in the water clarity mean was caused mainly by two unusually clearer days in late May and early June. These two relatively clear days were associated with low CLA concentrations (<10 ug/L CLA). Otherwise the water quality for the other periods of the monitoring season appears similar to the water quality of previous recent monitoring seasons. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008).

Throughout the monitoring season, the volunteers monitor ranked their perceptions of the lake's physical and recreational condition on a 1-to-5 scale. The mean perceived physical condition was 3.2 (between 3- "definite algae present" and 4- "high algal color"), while the mean recreational suitability was 3.2 (between 3- "swimming slightly impaired" and 4- "no swimming – boating ok").

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/.

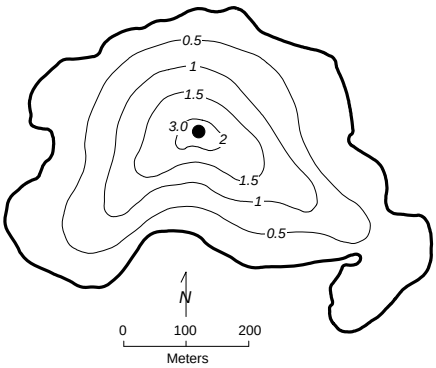
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

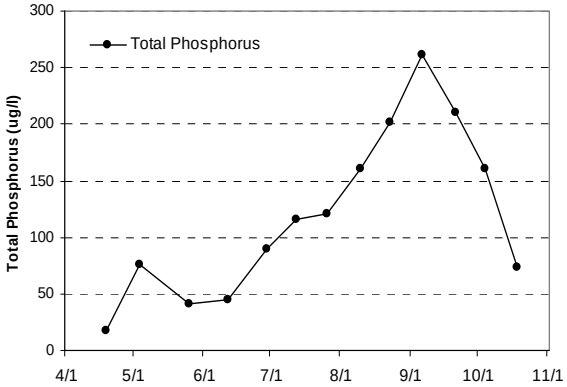
# Farquhar Lake

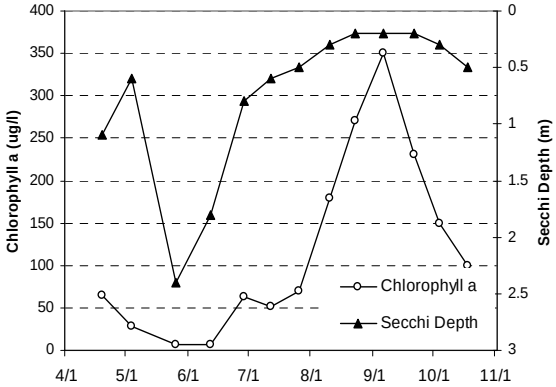
**Apple Valley, Dakota Co.**

Lake ID: 190023
WMO: Dakota County
Volunteer: Bill Sherry

● Sampling site
Contours in meters

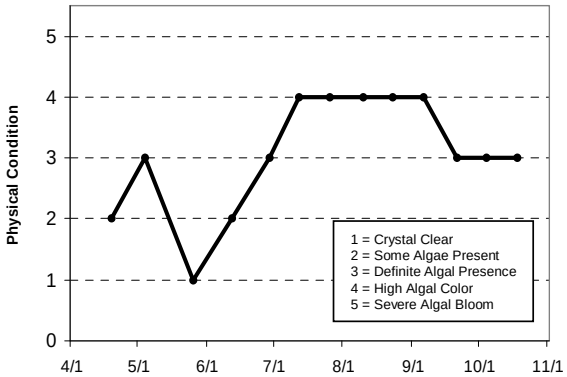



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/19 | 5.8 | | | | 65 | 17 | | 1.1 | 2 | 2 |
| 5/4 | 13.2 | | | | 29 | 76 | | 0.6 | 3 | 3 |
| 5/26 | 18.8 | | | | 7.4 | 41 | | 2.4 | 1 | 1 |
| 6/12 | 23 | | | | 7.2 | 45 | | 1.8 | 2 | 2 |
| 6/29 | 24.6 | | | | 63 | 90 | | 0.8 | 3 | 3 |
| 7/12 | 25.5 | | | | 52 | 116 | | 0.6 | 4 | 4 |
| 7/26 | 26.1 | | | | 70 | 121 | | 0.5 | 4 | 4 |
| 8/10 | 25.1 | | | | 180 | 160 | | 0.3 | 4 | 4 |
| 8/23 | 24.5 | | | | 270 | 202 | | 0.2 | 4 | 4 |
| 9/6 | 20.7 | | | | 350 | 262 | | 0.2 | 4 | 4 |
| 9/21 | 22.7 | | | | 230 | 210 | | 0.2 | 3 | 3 |
| 10/4 | 16 | | | | 150 | 160 | | 0.3 | 3 | 3 |
| 10/18 | 12.2 | | | | 100 | 73 | | 0.5 | 3 | 3 |



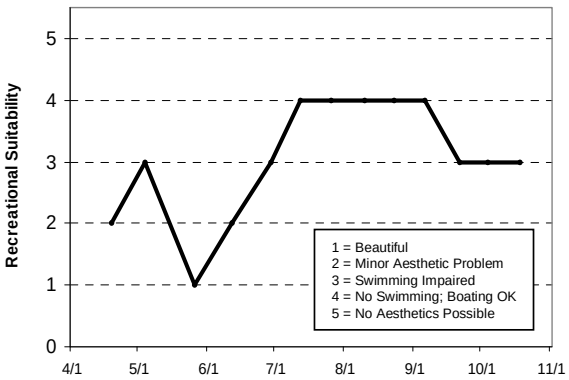

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | C | D | D | D | | F | F | F | F | D |
| Chlorophyll a | | | B | C | C | D | | F | F | F | F | F |
| Secchi Depth | | | 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 |
|---|---|---|---|---|---|
| Total Phosphorus | F | F | F | F | D |
| Chlorophyll a | F | D | C | D | F |
| Secchi Depth | F | F | F | F | D |
| **Lake Grade** | **F** | **F** | **D** | **F** | **D** |

Source: Metropolitan Council and STORET data



## Fireman's Lake (10-0226) *Carver County Environmental Services*

Fireman's Lake is located within the City of Chaska. This lake has an area of 8 acres and a maximum depth of 7.0 m (23 feet). Roughly 88 percent of the lake's surface area is considered littoral zone (area of aquatic plant dominance) and it does not maintain a thermocline (a density gradient owed to changing water temperatures throughout the lake's water column). The DNR has designated the lake as being infested with Eurasian Water Milfoil (*Myriophyllum spicatum*).

A search through the STORET nationwide water quality database determined that the 2001-2008 CAMP data are the only data available for the lake.

The lake was monitored 14 times from mid April to mid October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| ***Parameter*** | ***Mean*** | ***Minimum*** | ***Maximum*** | ***Grade*** |
|---|---|---|---|---|
| **TP** (µg/l) | 22.5 | 12.0 | 33.0 | A |
| **CLA** (µg/l) | 4.0 | 1.8 | 6.6 | A |
| **Secchi** (m) | 3.4 | 2.5 | 4.0 | A |
| **TKN** (mg/l) | 0.52 | 0.25 | 0.62 | |
| | | | ***Lake Grade*** | A |

The lake received a lake grade of A for 2008, which is similar to the A grades it has received in previous years. The lake's water quality appears well represented by a lake grade of A.

The last two graphs show seasonal variation in the lake's perceived physical condition and recreational suitability. The average user perception rankings, on a 1-to-5 scale, were 1.5 for physical condition (between 1- "crystal clear" and 2- "some algae present"), and 1.3 for recreational suitability (between 1- "beautiful" and 2- "minor aesthetic problem").

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fishery 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/.

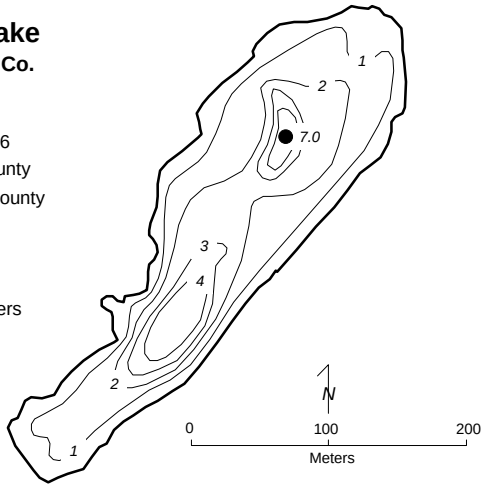
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

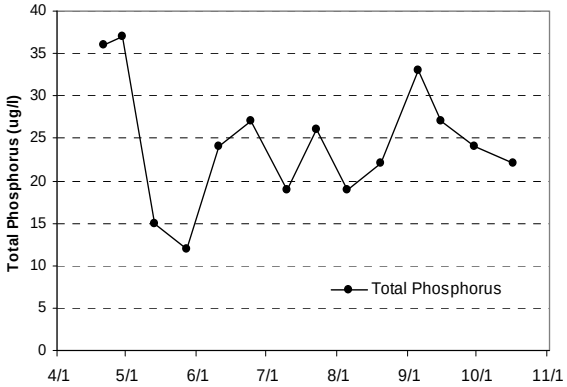
# Fireman's Lake

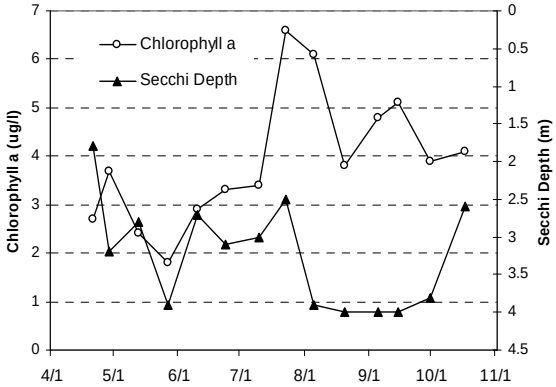
**Chaska, Carver Co.**

Lake ID: 100226
WMO: Carver County
Volunteer: Carver County

● Sampling site
Contours in meters

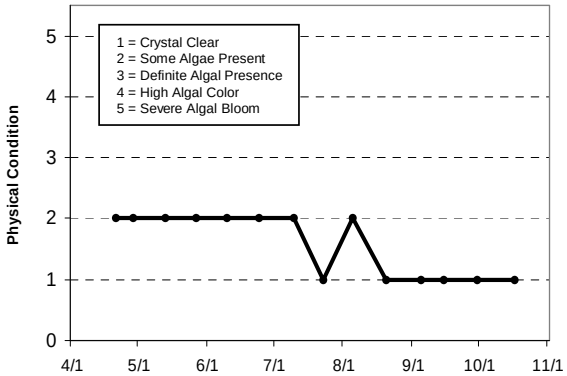



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/21 | 11.81 | | 9.44 | | 2.7 | 36 | | 1.8 | 2 | 2 |
| 4/29 | 9.25 | | 10.02 | | 3.7 | 37 | | 3.2 | 2 | 2 |
| 5/13 | 15.56 | | 13.41 | | 2.4 | 15 | | 2.8 | 2 | 1 |
| 5/27 | 18.13 | | 9.32 | | 1.8 | 12 | | 3.9 | 2 | 2 |
| 6/10 | 22.28 | | 6.7 | | 2.9 | 24 | | 2.7 | 2 | 1 |
| 6/24 | 25.52 | | 10.22 | | 3.3 | 27 | | 3.1 | 2 | 2 |
| 7/10 | 19.65 | | 10.06 | | 3.4 | 19 | | 3 | 2 | 1 |
| 7/23 | 27.07 | | 8.86 | | 6.6 | 26 | | 2.5 | 1 | 1 |
| 8/5 | 26.45 | | 10.13 | | 6.1 | 19 | | 3.9 | 2 | 2 |
| 8/20 | 26.49 | | 13.19 | | 3.8 | 22 | | 4 | 1 | 1 |
| 9/5 | 21.95 | | 7.22 | | 4.8 | 33 | | 4 | 1 | 1 |
| 9/15 | 20 | | 5.73 | | 5.1 | 27 | | 4 | 1 | 1 |
| 9/30 | 19.85 | | 6.02 | | 3.9 | 24 | | 3.8 | 1 | 1 |
| 10/17 | 13.92 | | 6.09 | | 4.1 | 22 | | 2.6 | 1 | 1 |



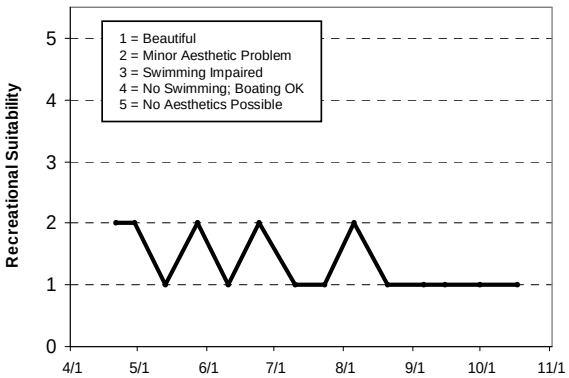

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | A | A | B |
| Chlorophyll a | | | | | | | | | | A | A | A |
| Secchi Depth | | | | | | | | | | B | A | A |
| **Lake Grade** | | | | | | | | | | **A** | **A** | **A** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | A | B | B | A | A |
| Chlorophyll a | A | A | A | A | A |
| Secchi Depth | A | A | B | B | A |
| **Lake Grade** | **A** | **A** | **B** | **A** | **A** |

Source: Metropolitan Council and STORET data



## Fish Lake [Scott County] (70-0069) *Prior Lake - Spring Lake Watershed District*

Fish Lake is located in Spring Lake Township (Scott County). It is considered a Priority Lake by the Metropolitan Council for its high regional recreation value. The lake has a surface area of 171 acres. The lake's mean and maximum depth of 4.4 m (14 feet) and 8.5 m (28 feet) translates to an approximate volume of 2,468 ac-ft. Roughly 43 percent of the lake's surface area is considered littoral. The littoral zone is the 0-15 feet deep area of the lake dominated by aquatic vegetation. The lake has a 434-acre watershed which yields a watershed-to-lake area ratio of 2.5:1 (the larger the ratio the greater the potential stress on the lake from surface runoff). The lake can be accessed on the northwestern end.

A search for historic water quality data through Council, MPCA, and STORET databases yielded in a few years of data (1980, 1984, 1990, 1995, 1997, and 1998-2007).

The lake was monitored 11 times between mid May and mid October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 42.6 | 22.0 | 120.0 | C |
| **CLA** (µg/l) | 18.8 | 12.0 | 24.0 | B |
| **Secchi** (m) | 1.3 | 1.1 | 2.3 | C |
| **TKN** (mg/l) | 1.46 | 1.20 | 1.80 | |
| | | | ***Lake Grade*** | C |

The lake received a lake grade of C for 2008 which is typical for this lake. The lake appears to be represented by a lake grade of C given the historical water quality database. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008).

During each visit, the volunteers' opinions of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. The mean physical condition ranking was 2.8 (between 2- "some algae present" and 3- "definite algae present"), while the mean recreational suitability ranking was 1.9 (between 1- "beautiful" and 2- "minor aesthetic problem").

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/.

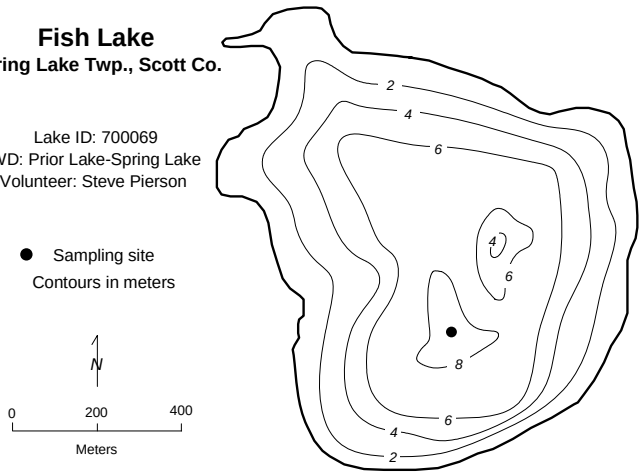
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

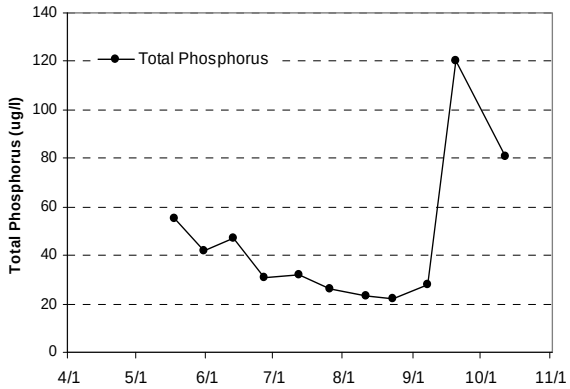
# Fish Lake

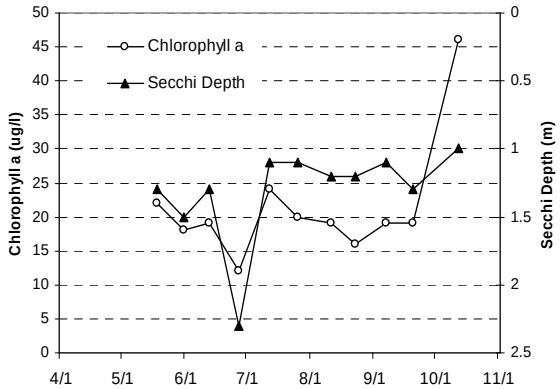
**Spring Lake Twp., Scott Co.**

Lake ID: 700069
WD: Prior Lake-Spring Lake
Volunteer: Steve Pierson

● Sampling site
Contours in meters

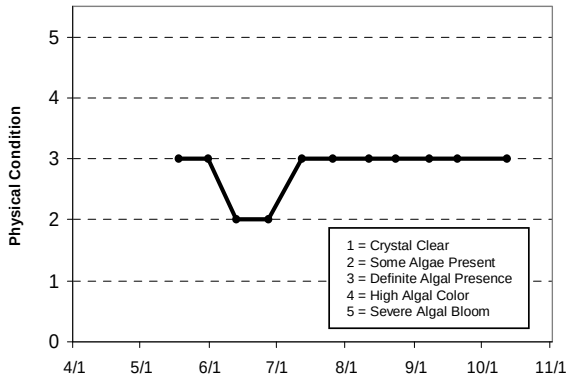



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/18 | 15.6 | | | | 22 | 55 | | 1.3 | 3 | 2 |
| 5/31 | 17.6 | | | | 18 | 42 | | 1.5 | 3 | 2 |
| 6/13 | 19.4 | | | | 19 | 47 | | 1.3 | 2 | 2 |
| 6/27 | 25.2 | | | | 12 | 31 | | 2.3 | 2 | 1 |
| 7/12 | 25 | | | | 24 | 32 | | 1.1 | 3 | 2 |
| 7/26 | 26.8 | | | | 20 | 26 | | 1.1 | 3 | 2 |
| 8/11 | 25.5 | | | | 19 | 23 | | 1.2 | 3 | 2 |
| 8/23 | 24.8 | | | | 16 | 22 | | 1.2 | 3 | 2 |
| 9/7 | 20.9 | | | | 19 | 28 | | 1.1 | 3 | 2 |
| 9/20 | 21.4 | | | | 19 | 120 | | 1.3 | 3 | 2 |
| 10/12 | 16.2 | | | | 46 | 81 | | 1 | 3 | 2 |

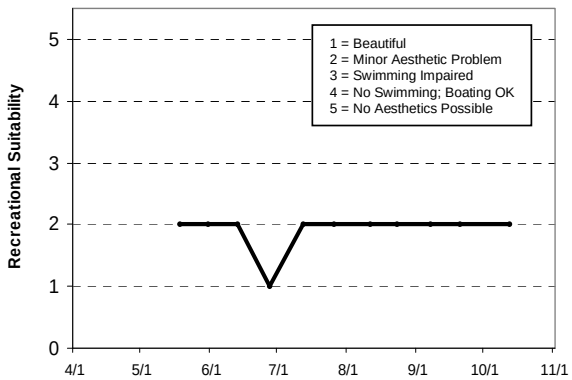



### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | C | | | | D | | | | | | | |
| Chlorophyll a | C | | | | D | | | | | | C | |
| Secchi Depth | D | | | | D | | | | | | C | |
| **Lake Grade** | **C** | | | | **D** | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | C | | C | C | C | C | C | D | C |
| Chlorophyll a | | | | C | | C | C | C | C | B | C | C |
| Secchi Depth | | | | D | | C | C | C | B | B | D | B |
| **Lake Grade** | | | | **C** | | **C** | **C** | **C** | **C** | **B** | **D** | **C** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | C | C | C | C | C |
| Chlorophyll a | C | C | B | C | B |
| Secchi Depth | C | C | C | C | C |
| **Lake Grade** | **C** | **C** | **C** | **C** | **C** |




Source: Metropolitan Council and STORET data

## Fish Lake [Washington County] (82-0064) *Carnelian - Marine Watershed District*

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. Because of the shallowness of the lake, its entire surface area is considered littoral, the shallow (0-15 foot depth) area dominated by aquatic vegetation. It does not maintain a thermocline which is a density gradient owed to changing water temperatures throughout the lake's water column. The mean depth and surface area of the lake translates to an approximate volume of 360 ac-ft. The lake's watershed area of 683 acres translates to a watershed-to-lake size ratio of 9.5:1 (the greater the ratio, the greater the potential stress on the lake from surface runoff).

The lake was monitored 7 times between early May and mid October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 83.0 | 48.0 | 144.0 | D |
| **CLA** (µg/l) | 39.3 | 5.8 | 86.0 | C |
| **Secchi** (m) | 1.7 | 0.8 | 2.7 | C |
| **TKN** (mg/l) | 1.54 | 0.93 | 2.40 | |
| | | | ***Lake Grade*** | **C** |

The lake received a lake grade of C for 2008, which continues the improvement in water quality that this lake has been experiencing over the past decade. This was the second year in a row that this lake received a lake grade of C. Continued monitoring is suggested to determine if the improvement in water quality is on-going trend.

The perceived physical and recreational conditions of the lake, recorded by the volunteers, were ranked on a 1-to-5 scale. The rankings are shown in both tabular and graphical form on the lake's associated information sheet. The mean physical condition ranking was 2.8 (between 2- "some algae present" and 3- "definite algae present"), while the mean recreational suitability ranking was 3.3 (between 3- "swimming slightly impaired" and 4- "no swimming/boating ok).

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.

# Fish Lake
**Scandia, Washington Co.**

LAKE ID: 820064

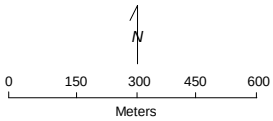
WD: Carnelian-Marine-St. Croix

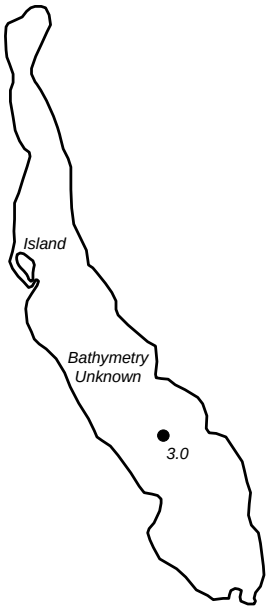
Volunteer: Washington

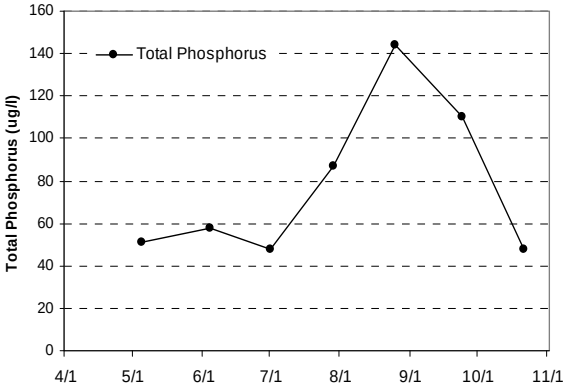
Conservation District

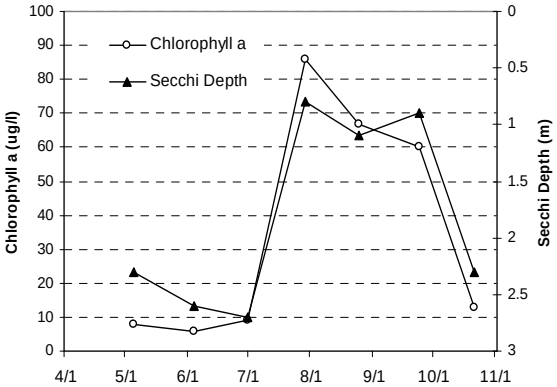
● Sampling site

Contours in meters



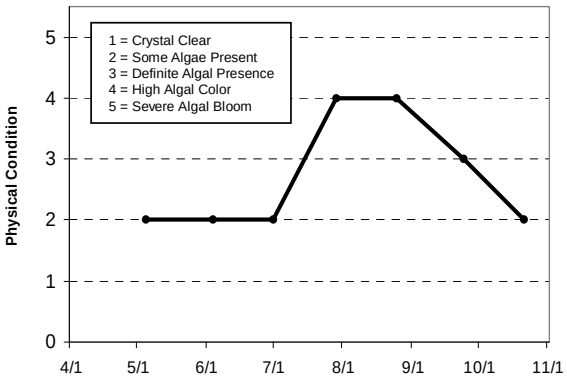




## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/5 | 11.4 | 10.7 | 9.38 | 0.64 | 7.9 | 51 | | 2.3 | 2 | 3 |
| 6/4 | 18.5 | 18.1 | 614 | 0.19 | 5.8 | 58 | 64 | 2.6 | 2 | 2 |
| 7/1 | 24.6 | 23.3 | 7 | 0.34 | 9.1 | 48 | 52 | 2.7 | 2 | 3 |
| 7/29 | 26.4 | 23.7 | 7.46 | 0.17 | 86 | 87 | 149 | 0.8 | 4 | 4 |
| 8/25 | 22.6 | 2.22 | 6.19 | 4.62 | 67 | 144 | 132 | 1.1 | 4 | 4 |
| 9/24 | 19.4 | 19.3 | 5.99 | 1.65 | 60 | 110 | 134 | 0.9 | 3 | 4 |
| 10/21 | 10.6 | 10.7 | 6.09 | 0.48 | 13 | 48 | 31 | 2.3 | 2 | 3 |



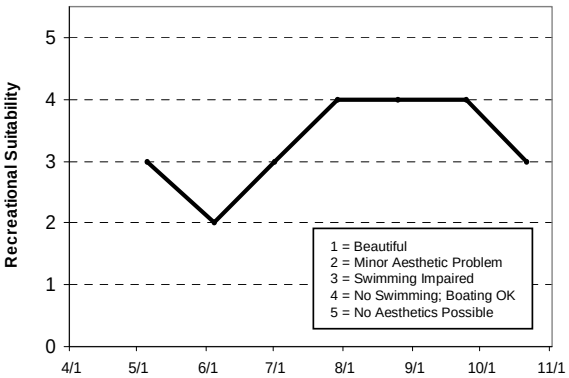

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | F | F | D | D | D | D |
| Chlorophyll a | | | | | | | D | D | F | F | D | F |
| Secchi Depth | | | | | | | F | F | F | F | D | F |
| **Lake Grade** | | | | | | | **F** | **F** | **F** | **F** | **D** | **F** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | D | D | D | D | D |
| Chlorophyll a | F | C | D | C | C |
| Secchi Depth | D | D | D | C | C |
| **Lake Grade** | **D** | **D** | **D** | **C** | **C** |

Source: Metropolitan Council and STORET data



## Forest Lake [West Basin] (82-0159) *Comfort Lake-Forest Lake Watershed District*

Forest Lake is located in the City of Forest Lake (Washington County). It is divided into three distinct basins. Only the west basin was monitored through CAMP in 2008. The entire lake is considered a Priority Lake by the Metropolitan Council for its high regional recreation value. The MN DNR has designated the lake as being infested with Flowering rush (*Butomus umbellatus*).

The lake has a surface area of 2,249 acres but the west basin has an area of 1,109 acres. The western basin has mean and maximum depths of 3.0 m and 6.7 m. The total volume of the whole lake is 24,986 ac-ft. Sixty eight percent of the lake's surface area is considered littoral, (the shallow [0-15 feet] area dominated by aquatic plants). The 4,285-acre watershed translates to a watershed-to-lake area ratio of 2:1 (the greater the ratio, the greater the potential stress on the lake from surface runoff). The lake has several public accesses.

The west basin was monitored 14 times between mid May and early October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

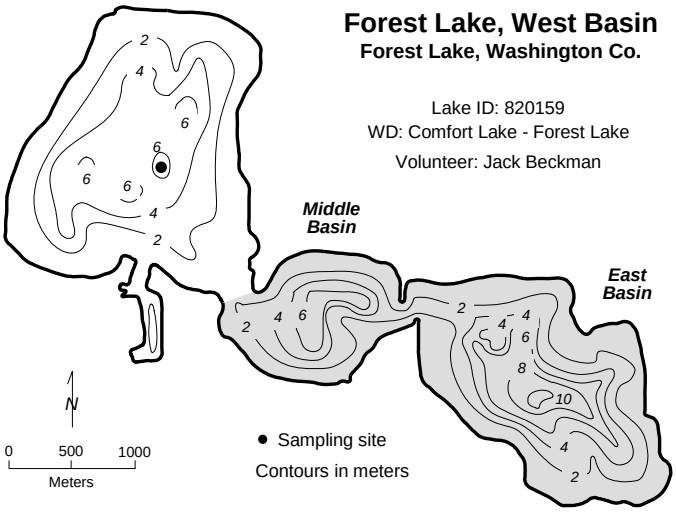
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 35.9 | 15.0 | 102.0 | C |
| **CLA** (µg/l) | 8.9 | 1.4 | 33.0 | A |
| **Secchi** (m) | 1.6 | 1.0 | 2.7 | C |
| **TKN** (mg/l) | 1.11 | 0.62 | 2.20 | |
| | | | ***Lake Grade*** | B |

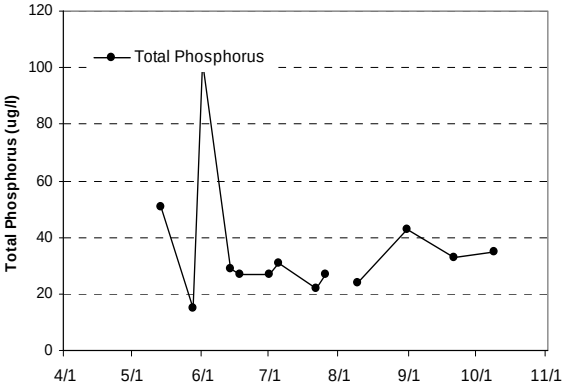
The lake received a lake grade of B for 2008. The water quality of the lake fluctuates between lake grades of B and C over the years. Of particular note for the 2008 monitoring season is that the lake experienced a relatively low CLA summer-time mean concentration compared to the summer-time means of TP concentration and Secchi depth (which yielded a CLA grade of A versus the C grades for TP and water clarity). The relatively lower CLA concentrations indicate that possibly something other than algae was causing the diminished water clarity. Suspended particulates may be a possible cause of the relatively lower water clarity and higher TP concentrations observed during 2008. Likely causes may be either that lake sediment was resuspended in the water column because of frequent mixing events, or the lake received significant quantities of suspended solids from the watershed via runoff events, or both. In either case, the increase turbidity would decrease available light via reduced water clarity, and thereby suppress algal growth.

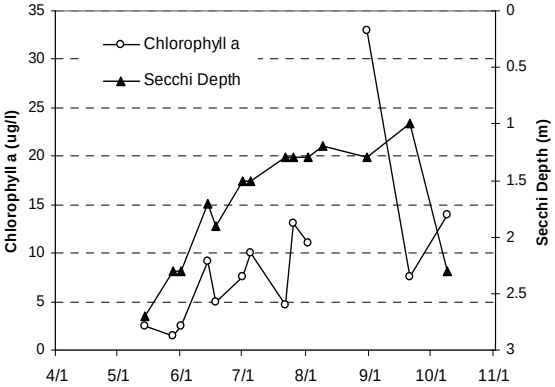
The volunteer(s) recorded their opinions of the lake's physical and recreational conditions which were ranked on a scale of 1-to-5. The mean perceived physical condition was 2.5 (between 2- "some algae present" and 3- "definite algae present"), while the mean recreational suitability was 1.0 (1- "beautiful").

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.

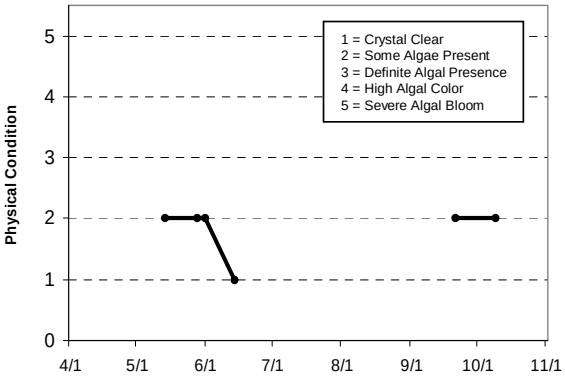



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/14 | 13.9 | | | | 2.4 | 51 | | 2.7 | 2 | 1 |
| 5/28 | 18.3 | | | | 1.4 | 15 | | 2.3 | 2 | 1 |
| 6/1 | 19.7 | | | | 2.4 | 102 | | 2.3 | 2 | 1 |
| 6/14 | 18.9 | | | | 9.1 | 29 | | 1.7 | 1 | 1 |
| 6/18 | 21.1 | | | | 4.9 | 27 | | 1.9 | | |
| 7/1 | 24.3 | | | | 7.6 | 27 | | 1.5 | | |
| 7/5 | 23.8 | | | | 10 | 31 | | 1.5 | | |
| 7/22 | 25.8 | | | | 4.7 | 22 | | 1.3 | | 1 |
| 7/26 | 25.2 | | | | 13 | 27 | | 1.3 | | 1 |
| 8/2 | 26.7 | | | | 11 | | | 1.3 | | 1 |
| 8/9 | 25.7 | | | | | 24 | | 1.2 | | |
| 8/31 | 22.2 | | | | 33 | 43 | | 1.3 | | 1 |
| 9/21 | 19.8 | | | | 7.5 | 33 | | 1 | 2 | 1 |
| 10/9 | 13.2 | | | | 14 | 35 | | 2.3 | 2 | 2 |



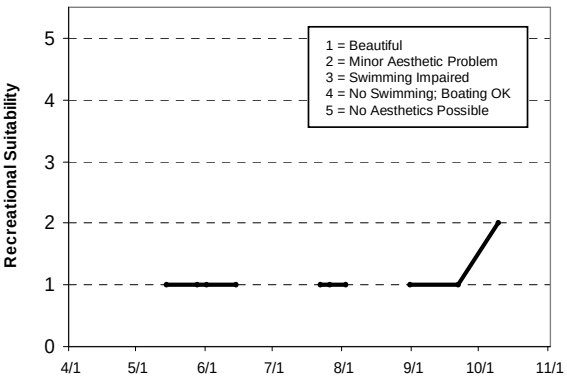

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | C | | C | C | C | B | | C |
| Chlorophyll a | | | | | C | | C | | C | B | C | B |
| Secchi Depth | | | | | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | C | | | C | B | B | C | C | B | C | C |
| Chlorophyll a | | B | | | B | B | B | B | B | B | B | B |
| Secchi Depth | | 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 |
|---|---|---|---|---|---|
| Total Phosphorus | B | C | C | C | C |
| Chlorophyll a | A | C | B | C | A |
| Secchi Depth | B | C | C | C | C |
| **Lake Grade** | **B** | **C** | **C** | **C** | **B** |

Source: Metropolitan Council and STORET data



## Friedrich's Pond Lake (82-0108) *Valley Branch Watershed District*

Friedrich's Pond is a 14.5-acre lake located within the City of Lake Elmo (Washington County). There is little morphological information available for the lake. The lake's surface area and watershed size (360 acres) translates to a 25:1 watershed-to-lake size ratio. Generally the larger the ratio, the greater the potential stress on the lake from surface runoff.

This was the third year that Friedrich's Pond has been involved in CAMP. A search of historical data via the STORET nationwide water quality database yielded only the CAMP data.

The lake was monitored 11 times between early May and mid October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 169.6 | 70.0 | 291.0 | F |
| **CLA** (µg/l) | 22.3 | 7.1 | 56.0 | C |
| **Secchi** (m) | 0.5 | 0.4 | 0.6 | F |
| **TKN** (mg/l) | 2.32 | 0.79 | 3.90 | |
| | | | ***Lake Grade*** | **D** |

The lake received a lake grade of D for 2008, but the TP and Secchi grades were both F. The CLA grade for 2008 was a C, which was an improvement over the Fs received in 2006 and 2007. It appears unusual that CLA would be significantly better in 2008 with no corresponding improvement in water clarity or TP, for the reasons that these parameters were correlated in the previous two years. Additional monitoring is suggested to determine if the relatively lower CLA concentrations as observed in 2008 continue or if they were an anomaly.

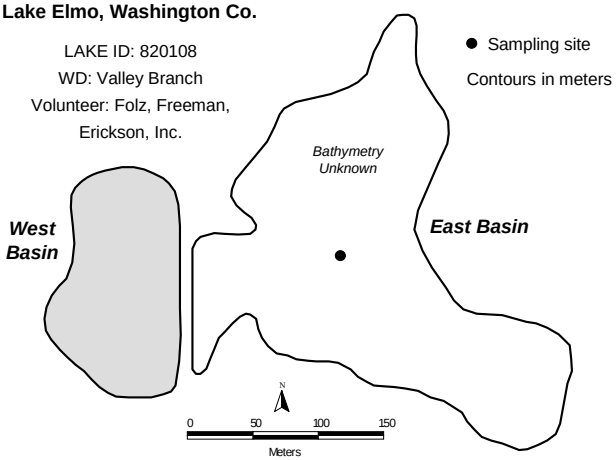
The perceived physical and recreational conditions (ranked on a 1-to-5 scale) are shown on the lake's information sheet on the next page. The average user perception rankings, were 3.8 for physical condition (between 3- "definite algae present" and 4- "high algal color"), and 4.3 for recreational suitability (between 4- "no swimming/boating ok" and 5- "no aesthetics possible").

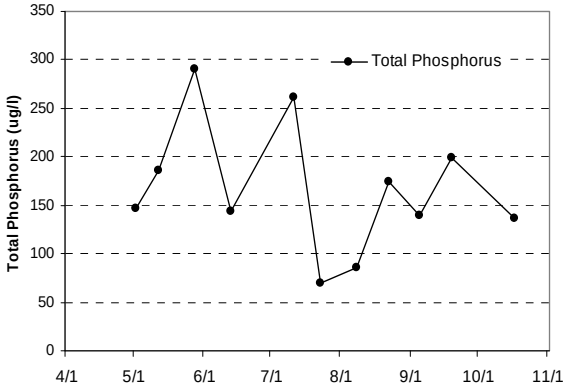
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

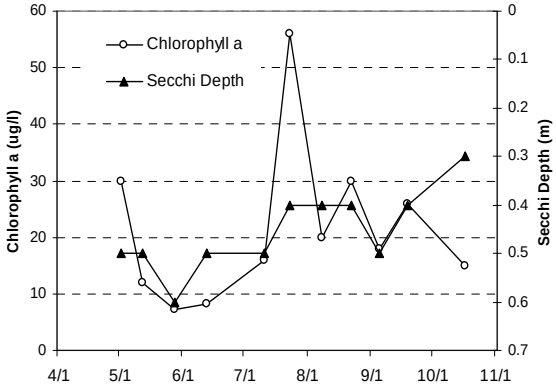
## Friedrich's Pond (East Basin)

**Lake Elmo, Washington Co.**

LAKE ID: 820108
WD: Valley Branch
Volunteer: Folz, Freeman, Erickson, Inc.

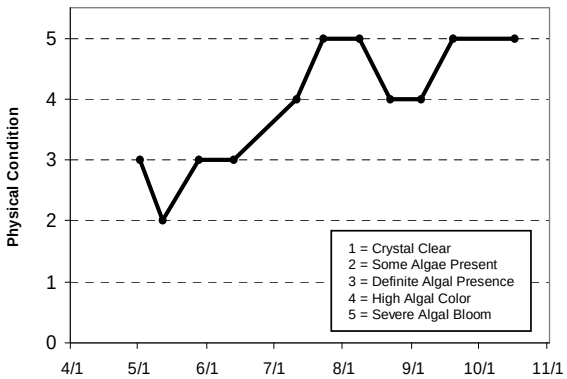



### 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/2 | 15.1 | | | | 30 | 146 | | 0.5 | 3 | 4 |
| 5/12 | 17 | | | | 12 | 186 | | 0.5 | 2 | 3 |
| 5/28 | 15.6 | | | | 7.1 | 291 | | 0.6 | 3 | 4 |
| 6/13 | 20.6 | | | | 8.3 | 144 | | 0.5 | 3 | 4 |
| 7/11 | 21.1 | | | | 16 | 262 | | 0.5 | 4 | 4 |
| 7/23 | 22.8 | | | | 56 | 70 | | 0.4 | 5 | 5 |
| 8/8 | 22.9 | | | | 20 | 85 | | 0.4 | 5 | 5 |
| 8/22 | 24 | | | | 30 | 174 | | 0.4 | 4 | 4 |
| 9/5 | 14.9 | | | | 18 | 139 | | 0.5 | 4 | 5 |
| 9/19 | 21.3 | | | | 26 | 199 | | 0.4 | 5 | 5 |
| 10/17 | 10 | | | | 15 | 137 | | 0.3 | 5 | 5 |



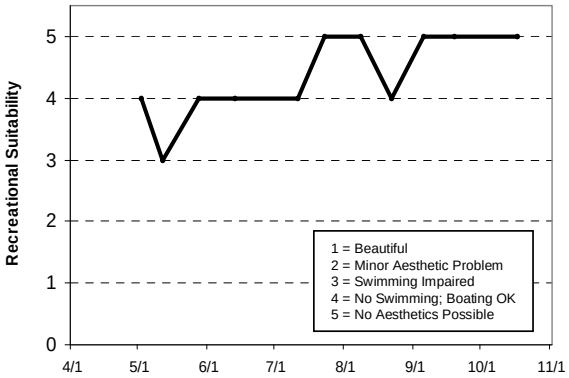

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | F | F | F |
| Chlorophyll a | | | F | F | C |
| Secchi Depth | | | F | F | F |
| **Lake Grade** | | | **F** | **F** | **D** |

Source: Metropolitan Council and STORET data



## George Watch Lake (2-0005) *Rice Creek Watershed District*

George Watch Lake is located in the City of Lino Lakes (Anoka County). The 528-acre lake has a mean and maximum depth of 1.5 m (5 feet) and 2.0 m (6.5 feet). The lake's approximate volume is 2,587 ac-ft. Because of the shallowness of the lake, it is entirely littoral zone (the area of aquatic plant dominance) and never maintains a thermocline (a density gradient owed to changing water temperatures throughout the lake's water column) through the summer months. The major land uses within the lake's immediate watershed are undeveloped and park land.

A search through the STORET database for historic data on George Watch showed that the lake has been monitored several times in the past. There are nutrient data available for 1981-1983, 1985-1991, and 1996-2007.

The lake was monitored 12 times from mid May to mid October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 157.5 | 60.0 | 236.0 | F |
| **CLA** (µg/l) | 39.4 | 4.7 | 95.0 | C |
| **Secchi** (m) | 0.5 | 0.2 | 0.9 | F |
| **TKN** (mg/l) | 2.56 | 1.20 | 4.40 | |
| | | | ***Lake Grade*** | D |

The lake received a lake grade of D for 2008, which is consistent with previous lake grades received in the past. The historical lake grades seem to indicate that the lake water quality has fluctuated between an F and D lake grade throughout the 20+ years of data. The TP and Secchi grades have remained fairly consistent throughout the monitoring years with respect to the more variable CLA grades. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008).

Throughout the monitoring period, the volunteers' opinions of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. The summertime mean physical condition was 2.7 (between 2- "some algae present" and 3- "definite algae present"). The mean suitability for recreation ranking was 3.8 (between 3- "swimming slightly impaired" and 4- "no swimming - boating ok").

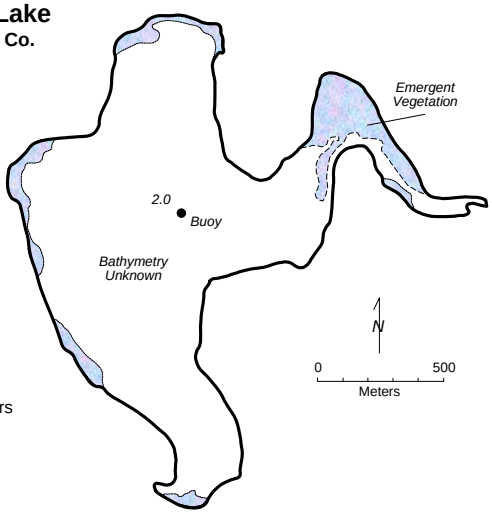
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

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.

## George Watch Lake
**Lino Lakes, Anoka Co.**

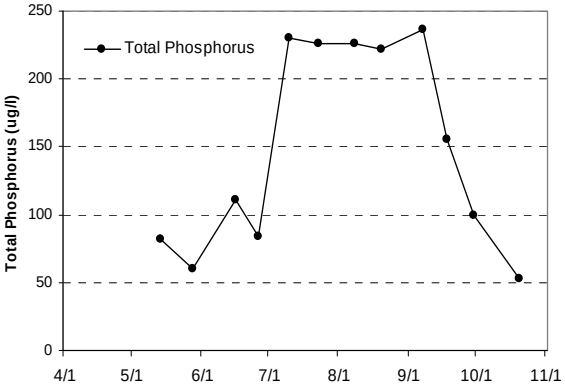
Lake ID: 20005
WD: Rice Creek

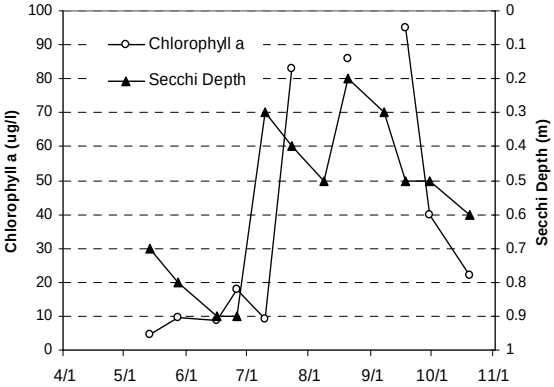
Volunteer:
Wargo Nature
Center




● Sampling site

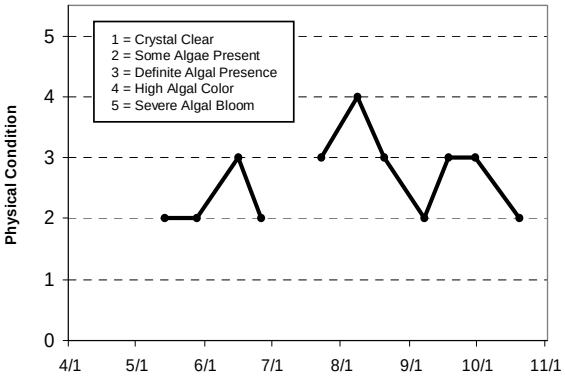
Contours in meters




### 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/14 | 17.2 | | | | 4.7 | 82 | | 0.7 | 2 | 4 |
| 5/28 | 18.4 | | | | 9.6 | 60 | | 0.8 | 2 | 4 |
| 6/16 | 21.6 | | | | 8.8 | 111 | | 0.9 | 3 | 4 |
| 6/26 | 27.2 | | | | 18 | 84 | | 0.9 | 2 | 4 |
| 7/10 | 24.6 | | | | 9.1 | 230 | | 0.3 | | 4 |
| 7/23 | 29.6 | | | | 83 | 226 | | 0.4 | 3 | 4 |
| 8/8 | 27 | | | | | 226 | | 0.5 | 4 | 4 |
| 8/20 | 24.8 | | | | 86 | 222 | | 0.2 | 3 | 4 |
| 9/7 | 19.8 | | | | | 236 | | 0.3 | 2 | 2 |
| 9/18 | 16.7 | | | | 95 | 156 | | 0.5 | 3 | 4 |
| 9/30 | 16.6 | | | | 40 | 100 | | 0.5 | 3 | 4 |
| 10/20 | 11.7 | | | | 22 | 53 | | 0.6 | 2 | 1 |



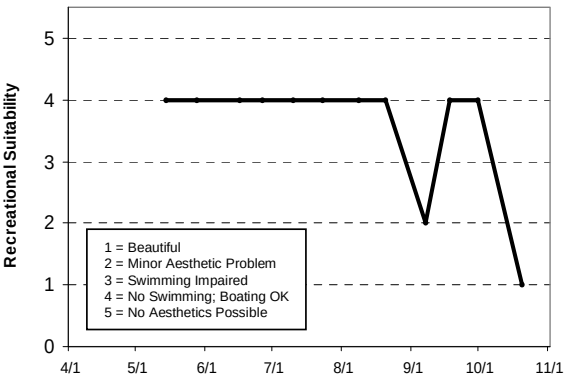

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | F | F | F | | F | | F | F | F | F | F |
| Chlorophyll a | | F | C | B | | B | | C | B | D | C | F |
| Secchi Depth | | F | D | F | | F | | F | F | F | D | F |
| **Lake Grade** | | **F** | **D** | **D** | | **D** | | **D** | **D** | **F** | **D** | **F** |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | F | D | F | D | D | F | D | F |
| Chlorophyll a | | | | | D | C | D | C | C | F | D | C |
| Secchi Depth | | | | | F | F | F | D | F | D | F | D |
| **Lake Grade** | | | | | **F** | **D** | **F** | **D** | **D** | **F** | **D** | **D** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | F | F | F | F | F |
| Chlorophyll a | D | C | F | D | C |
| Secchi Depth | F | F | F | F | F |
| **Lake Grade** | **F** | **D** | **F** | **F** | **D** |

Source: Metropolitan Council and STORET data



## German Lake (82-0056) *Carnelian – Marine Watershed District*

German Lake is located in City of Scandia (Washington County). It has an area of 109 acres. There is little known morphological data available for the lake.

This was the sixth year that German Lake has been involved in CAMP. A search through the STORET nationwide water quality database determined that the 2002 – 2008 CAMP data are the only known years of water quality data available for the lake.

The lake was monitored 7 times between early May and late September. On each sampling day the lake was monitored for Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | | | | |
| **CLA** (µg/l) | | | | |
| **Secchi** (m) | 1.9 | 1.5 | 2.4 | C |
| **TKN** (mg/l) | | | | |
| | | | ***Lake Grade*** | |

Total phosphorus and chlorophyll samples were not collected so a lake grade cannot be determined. The lake received a water clarity grade of C for 2008 which is similar to grades received in 2002 and 2007, but worse than water clarity grades received during the period 2003 - 2006. Continued monitoring is suggested to continue building the water quality database for the lake.

Throughout the monitoring period, the volunteers' opinions of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page. The mean physical condition ranking was 1.6 (between 1- "crystal clear" and 2- "some algae present"), while the mean recreational suitability ranking was 1.9 (between 1- "beautiful" and 2- "minor aesthetics").

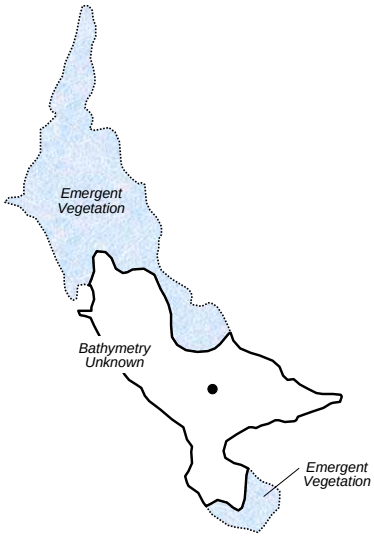
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

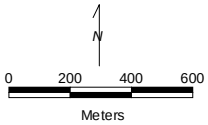
# German Lake
**Scandia, Washington Co.**

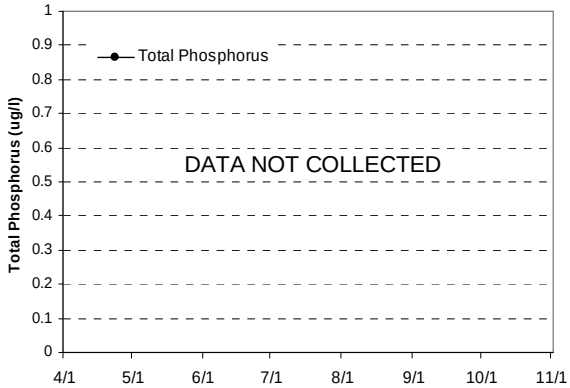
Lake ID: 820056
WD: Carnelian-Marine-St. Croix

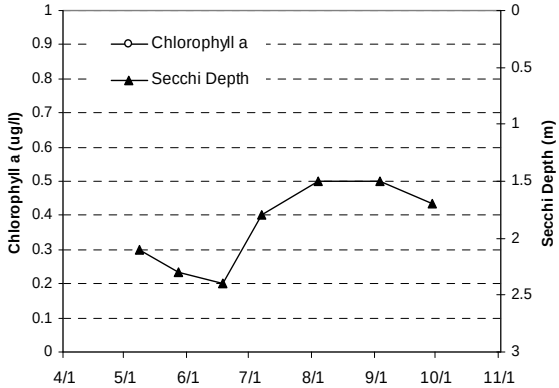
Volunteer: Washington Conservation District

● Sampling site
Contours in meters



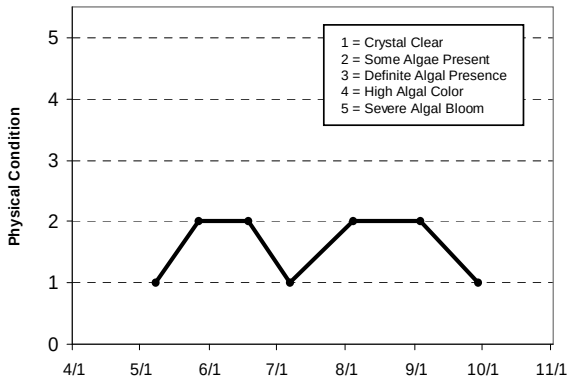




## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/8 | 15.4 | 14.8 | 9.98 | 8.48 | | | | 2.1 | 1 | 1 |
| 5/27 | 16.4 | 16.3 | 7.39 | 7.27 | | | | 2.3 | 2 | 2 |
| 6/18 | 21.5 | 20.5 | 9.09 | 2.54 | | | | 2.4 | 2 | 2 |
| 7/7 | 26.1 | 24.3 | 8.68 | 2.3 | | | | 1.8 | 1 | 2 |
| 8/4 | 25 | 23.4 | 4.92 | 0.15 | | | | 1.5 | 2 | 3 |
| 9/3 | 20.9 | 20.8 | 5.35 | 0.16 | | | | 1.5 | 2 | 2 |
| 9/29 | 17.5 | 17.2 | 5.64 | 2.01 | | | | 1.7 | 1 | 1 |



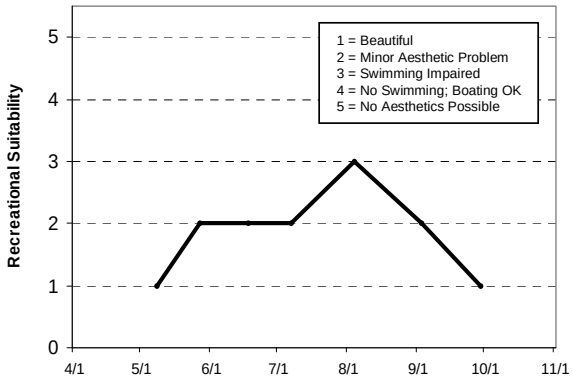

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | B | B |
| Chlorophyll a | | | | | | | | | | | A | A |
| Secchi Depth | | | | | | | | | | | C | B |
| **Lake Grade** | | | | | | | | | | | **B** | **B** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | B | B | C | A | |
| Chlorophyll a | A | A | A | A | |
| Secchi Depth | B | B | B | C | C |
| **Lake Grade** | **B** | **B** | **B** | **B** | |

Source: Metropolitan Council and STORET data



## Glen Lake (27-0093) *Nine Mile Creek Watershed District*

Glen Lake is located within the City of Minnetonka (Hennepin County). It has a surface area of a 98-acre lake. The maximum depth of the lake is 7.6 m (roughly 10 feet) and 8.5 m (almost 30 feet), respectively. Roughly 91 percent of the lake's area is considered littoral (the 0-15 foot depth area of aquatic vegetation dominance).

The 2006 – 2008 CAMP data are the only known nutrient data available. The lake was monitored 4 times between late April and early July. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 30.7 | 27.0 | 33.0 | |
| **CLA** (µg/l) | 12.6 | 5.7 | 18.0 | |
| **Secchi** (m) | 2.2 | 1.1 | 2.9 | |
| **TKN** (mg/l) | 1.07 | 1.00 | 1.20 | |
| | | | ***Lake Grade*** | |

Only three sampling events were performed during the summer-time period. Therefore calculation of grades was not performed. At least 5 monitoring events are needed during the summer-time period to calculate grades.

The perceived physical and recreational conditions (ranked on a 1-to-5 scale) are shown on the lake's information sheet on the next page. The average user perception rankings were 2.0 for physical condition (2- "some algae present"), and 1.3 for recreational suitability (between 1- "beautiful" and 2- "minor aesthetic problem").

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) 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.

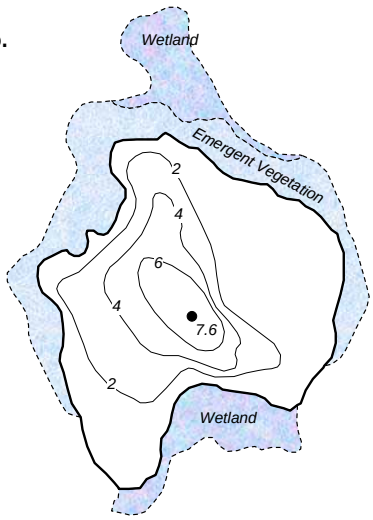
# Glen Lake

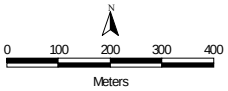
**Minnetonka, Hennepin Co.**

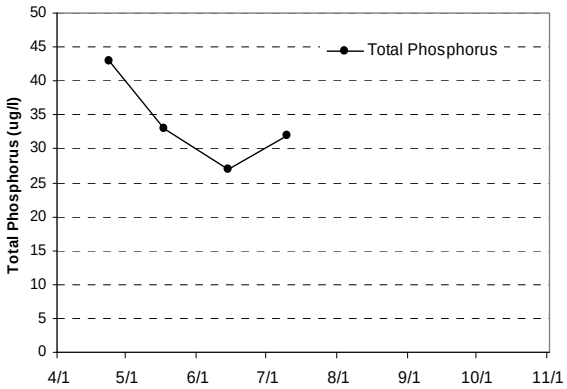
Lake ID: 270093
WD: Nine Mile Creek

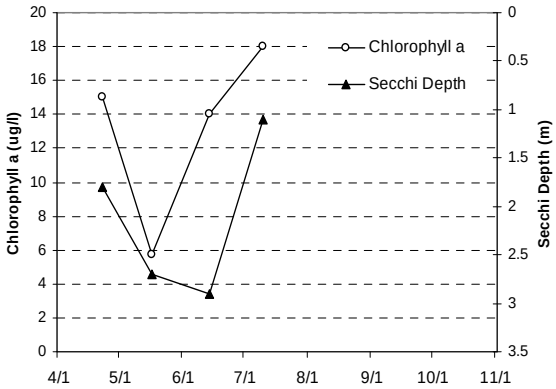
Volunteer: Christine Peterson

● Sampling site
Contours in meters



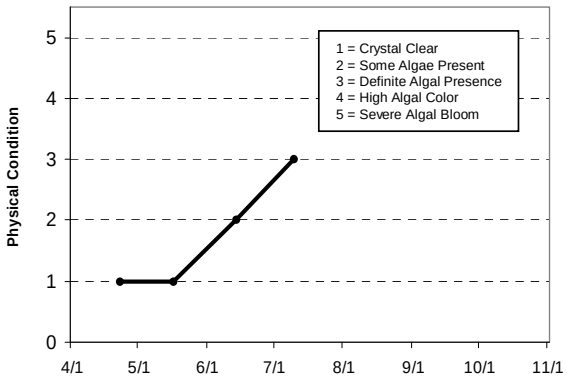




## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/23 | 12.1 | | | | 15 | 43 | | 1.8 | 1 | 1 |
| 5/17 | 18 | | | | 5.7 | 33 | | 2.7 | 1 | 1 |
| 6/14 | 21.1 | | | | 14 | 27 | | 2.9 | 2 | 1 |
| 7/10 | 25.5 | | | | 18 | 32 | | 1.1 | 3 | 2 |



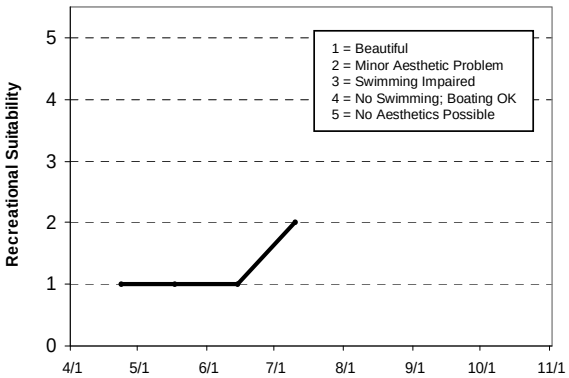

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | C | A | |
| Chlorophyll a | | | A | A | |
| Secchi Depth | | | A | A | |
| **Lake Grade** | | | **B** | **A** | |

Source: Metropolitan Council and STORET data



## Goetschel Pond (82-0313) *Valley Branch Watershed District*

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.

A search through the STORET nationwide water quality database determined that the 2002-2008 CAMP data are the only years of available water quality data for the lake. The lake was monitored 7 times between mid May and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 30.3 | 18.0 | 48.0 | B |
| **CLA** (µg/l) | 2.9 | 1.6 | 5.7 | A |
| **Secchi** (m) | 1.7 | 1.0 | 2.2 | C |
| **TKN** (mg/l) | 0.72 | 0.52 | 1.00 | |
| | | | ***Lake Grade*** | B |

The lake received a lake grade of B for 2008, which is similar to the lake grades received in the past. According to the historical water quality database, the lake appears represented by a lake grade of B.

Throughout the monitoring period, the volunteers' opinions of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page. The mean physical condition ranking was 1.8 (between 1- "crystal clear" and 2- "some algae present"), while the mean recreational suitability ranking was 2.2 (between 2- "minor aesthetic problem" and 3- "swimming impaired").

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.

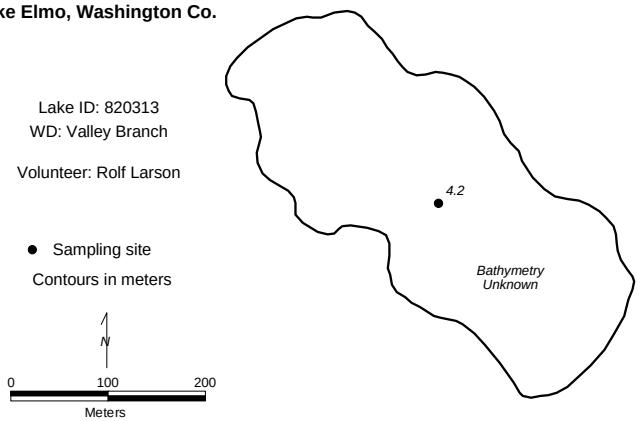
## Goetschel Pond

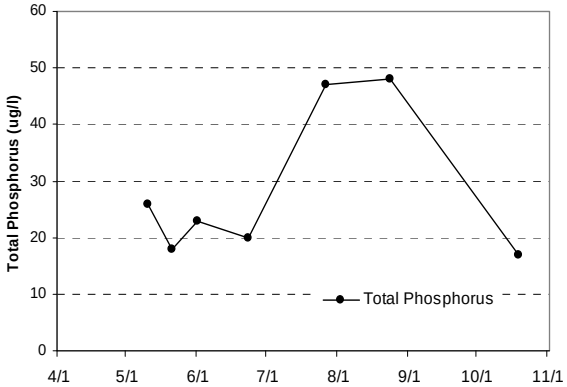
**Lake Elmo, Washington Co.**

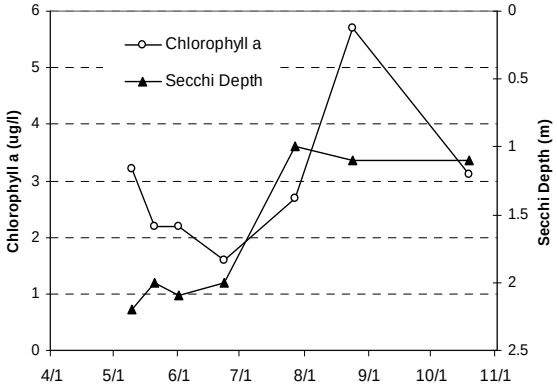
Lake ID: 820313
WD: Valley Branch

Volunteer: Rolf Larson

● Sampling site
Contours in meters

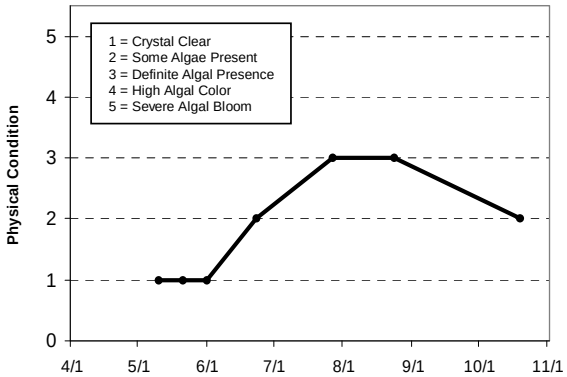



### 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/10 | 16.7 | | | | 3.2 | 26 | | 2.2 | 1 | 1 |
| 5/21 | 18.9 | | | | 2.2 | 18 | | 2 | 1 | 1 |
| 6/1 | 24 | | | | 2.2 | 23 | | 2.1 | 1 | 1 |
| 6/23 | 28.3 | | | | 1.6 | 20 | | 2 | 2 | 2 |
| 7/27 | 27.4 | | | | 2.7 | 47 | | 1 | 3 | 4 |
| 8/24 | 22.6 | | | | 5.7 | 48 | | 1.1 | 3 | 4 |
| 10/19 | 12.3 | | | | 3.1 | 17 | | 1.1 | 2 | 2 |




### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | C | C |
| Chlorophyll a | | | | | | | | | | | A | A |
| Secchi Depth | | | | | | | | | | | C | B |
| **Lake Grade** | | | | | | | | | | | **B** | **B** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | B | C | C | B | B |
| Chlorophyll a | B | A | A | A | A |
| Secchi Depth | C | C | B | C | C |
| **Lake Grade** | **B** | **B** | **B** | **B** | **B** |

Source: Metropolitan Council and STORET data

## Goggins Lake (82-0077) *Browns Creek Watershed District*

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 but the maximum depth is approximately 4.0 m (13 feet). Because of the shallowness of the lake, the entire area is considered littoral zone (area of aquatic plant dominance) and it does not maintain a thermocline a density gradient owed to changing water temperatures throughout the lake's water column).

A search through the STORET nationwide water quality database indicated that the CAMP data as being the only historical water quality data available for the lake. The lake was monitored 14 times between mid April and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

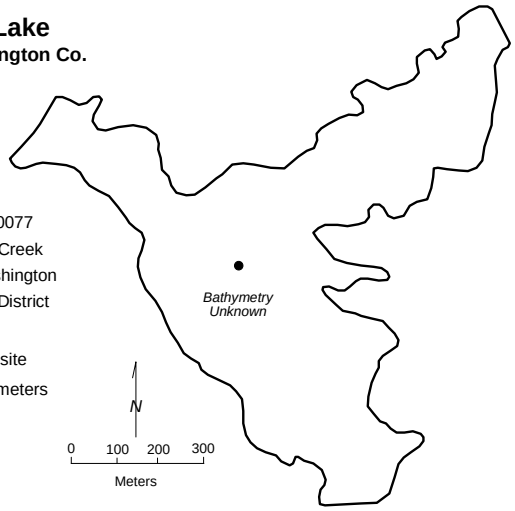
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 69.0 | 51.0 | 95.0 | D |
| **CLA** (µg/l) | 33.4 | 8.1 | 61.0 | C |
| **Secchi** (m) | 1.2 | 0.6 | 2.4 | D |
| **TKN** (mg/l) | 1.86 | 1.30 | 2.70 | |
| | | | ***Lake Grade*** | D |

The lake received a lake grade of D for 2008 which is consistent with those received in some previous years. The 2008 CLA grade of C was an improvement over last year's CLA grade of D. The lake has historically received a CLA grade of C in year's past. The lake's water quality seems to be represented by a lake grade of C or D, depending on the year. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed a statistically significant declining trend in water clarity (MPCA 2008).To better understand the quality of the lake and what direction it may be heading, continued monitoring is suggested.

The last two graphs show seasonal variation in the lake's perceived physical condition and recreational suitability. The average user perception rankings, on a 1-to-5 scale, were 3.1 for physical condition (between 3- "definite algae present" and 4- "high algal color"), and 3.9 for recreational suitability (between 3- "swimming impaired" and 4- "no swimming – boating ok").

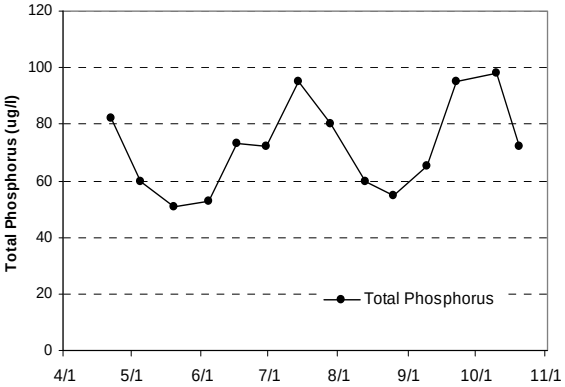
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

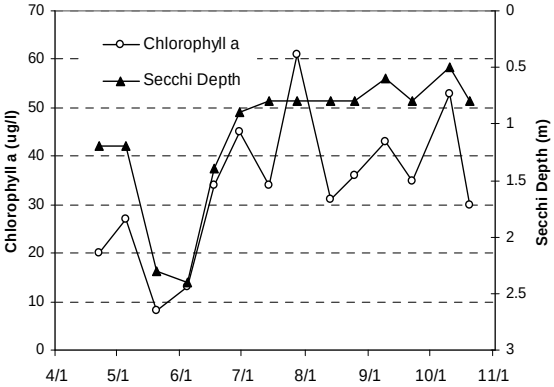
## Goggins Lake
**May Twp., Washington Co.**




Lake ID: 820077
WD: Browns Creek
Volunteer: Washington Conservation District

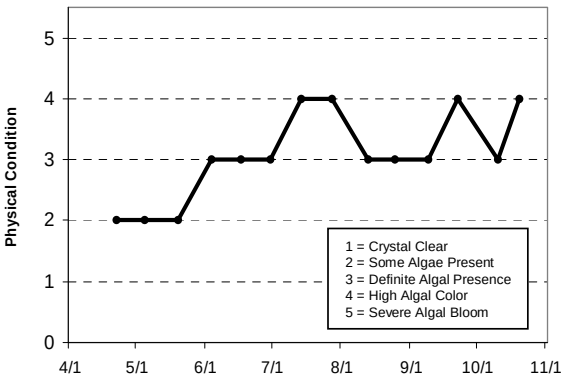
● Sampling site
Contours in meters




### 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/22 | 8.5 | 8.1 | 15.36 | 3 | 20 | 82 | | 1.2 | 2 | 4 |
| 5/5 | 12 | 9.8 | 12.46 | 0.56 | 27 | 60 | | 1.2 | 2 | 3 |
| 5/20 | 14.6 | 13.4 | 8.26 | 0.45 | 8.1 | 51 | 56 | 2.3 | 2 | 4 |
| 6/4 | 17.6 | 16.2 | 8.05 | 0.2 | 13 | 53 | 68 | 2.4 | 3 | 4 |
| 6/17 | 20.5 | 17.7 | 9.4 | 0.23 | 34 | 73 | 71 | 1.4 | 3 | 4 |
| 6/30 | 23 | 18.1 | 8.57 | 0.48 | 45 | 72 | 93 | 0.9 | 3 | 4 |
| 7/14 | 22.8 | 21.4 | 5.5 | 0.3 | 34 | 95 | 92 | 0.8 | 4 | 4 |
| 7/28 | 25.3 | 20.8 | 11.87 | 0.24 | 61 | 80 | 64 | 0.8 | 4 | 4 |
| 8/13 | 23.6 | 20.8 | 7.12 | 0.38 | 31 | 60 | 68 | 0.8 | 3 | 4 |
| 8/25 | 23.3 | 22.3 | 5.09 | 0.14 | 36 | 55 | 78 | 0.8 | 3 | 4 |
| 9/9 | 18.7 | 18.9 | 9.02 | 0.26 | 43 | 65 | 70 | 0.6 | 3 | 4 |
| 9/22 | 20.3 | 17.8 | 11.59 | 0.3 | 35 | 95 | 99 | 0.8 | 4 | 4 |
| 10/10 | 13.4 | 13.7 | 9.75 | 0.4 | 53 | 98 | 91 | 0.5 | 3 | 4 |
| 10/20 | 11.8 | 12 | 10.02 | 0.76 | 30 | 72 | 68 | 0.8 | 4 | 4 |



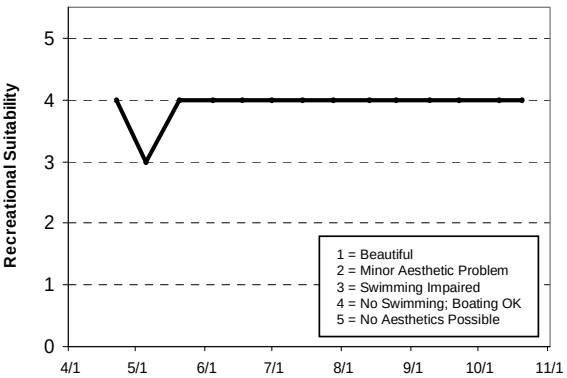

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | D | D | D | D | C |
| Chlorophyll a | | | | | | | | C | C | C | C | C |
| Secchi Depth | | | | | | | | C | D | D | D | C |
| **Lake Grade** | | | | | | | | **C** | **D** | **D** | **D** | **C** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | C | D | D | D | D |
| Chlorophyll a | C | C | C | D | C |
| Secchi Depth | D | C | D | D | D |
| **Lake Grade** | **C** | **C** | **D** | **D** | **D** |

Source: Metropolitan Council and STORET data



## Golden Lake (2-0045) *Rice Creek Watershed District*

Golden Lake is located in the City of Circle Pines (Anoka County). The mean and maximum depths of the lake are 2.5 m (8 feet) and 7.3 m (24 feet), respectively. The lake's size and mean depth results in an approximate lake volume of 460 ac-ft. Roughly 42 percent of the lake is considered littoral zone, that is, an area of aquatic plant dominance. The lake's 7,680-acre watershed translates to a watershed-to-lake size ratio of 135:1. The greater the ratio, the greater the potential stress on the lake from surface runoff. Public access to the 57-acre lake is possible for non-motorized boats through Golden Lake County Park.

The lake was monitored 9 times between mid May and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 52.8 | 35.0 | 80.0 | C |
| **CLA** (µg/l) | 16.8 | 5.8 | 27.0 | B |
| **Secchi** (m) | 1.6 | 1.3 | 2.3 | C |
| **TKN** (mg/l) | 2.72 | 2.10 | 3.20 | |
| | | | ***Lake Grade*** | C |

The lake received a lake grade of C for 2008. The year 2008 marked the first year that a letter grade of B was received for CLA, which is an indicator of improved water quality with respect to algal abundance. Golden Lake has a fairly extensive water quality database. The lake's water quality grade has fluctuated between C, D, and F throughout 20+ years of monitoring data; therefore no long-term trends are apparent. It seems that the lake has a very wide fluctuation range in its water quality. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008).

The physical and recreational conditions of Golden Lake as perceived by the volunteer(s) were ranked on a 1-to-5 scale. These rankings are shown on the lake's information sheet on the next page. The summertime mean physical condition was 1.9 (between 1- "crystal clear" and 2- "some algae present"). The mean suitability for recreation was 1.9 (between 1- "beautiful" and 2- "minor aesthetic problem").

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/.

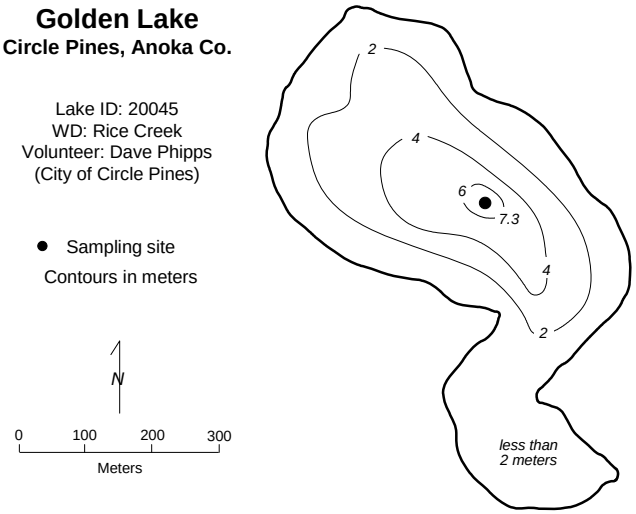
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

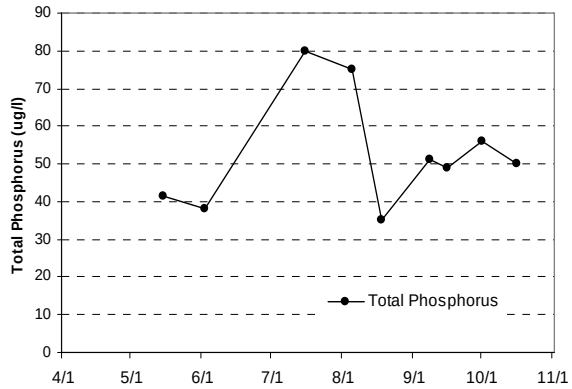
# Golden Lake

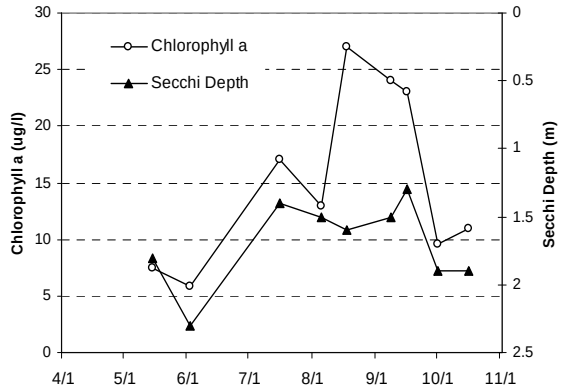
**Circle Pines, Anoka Co.**

Lake ID: 20045
WD: Rice Creek
Volunteer: Dave Phipps
(City of Circle Pines)

● Sampling site
Contours in meters

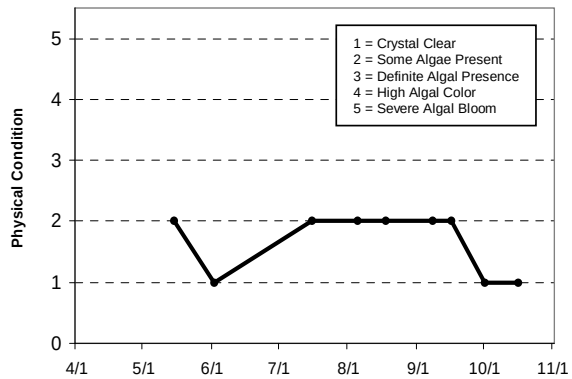



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/15 | 21.9 | | | | 7.45 | 41.5 | | 1.8 | 2 | 2 |
| 6/2 | 21.8 | | | | 5.8 | 38 | | 2.3 | 1 | 1 |
| 7/16 | 25.2 | | | | 17 | 80 | | 1.4 | 2 | 2 |
| 8/5 | 25.5 | | | | 13 | 75 | | 1.5 | 2 | 2 |
| 8/18 | 24.7 | | | | 27 | 35 | | 1.6 | 2 | 2 |
| 9/8 | 20.2 | | | | 24 | 51 | | 1.5 | 2 | 2 |
| 9/16 | 18.7 | | | | 23 | 49 | | 1.3 | 2 | 2 |
| 10/1 | 17.1 | | | | 9.6 | 56 | | 1.9 | 1 | 1 |
| 10/16 | 13.6 | | | | 11 | 50 | | 1.9 | 1 | 1 |



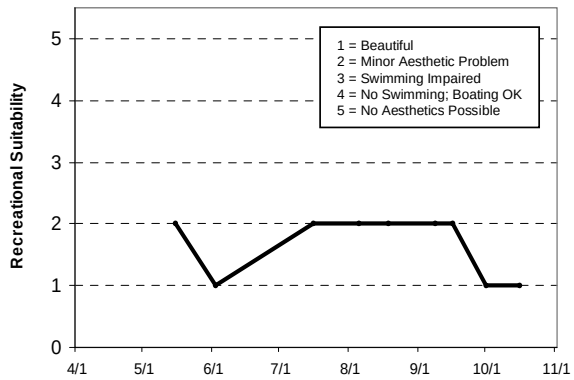

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | C | D | | | D | F | C | F | D | D | D | D |
| Chlorophyll a | D | | | | | C | C | D | F | F | F | F |
| Secchi Depth | D | D | | | | C | C | C | F | F | F | F |
| **Lake Grade** | **D** | | | | | **D** | **C** | **D** | **F** | **F** | **F** | **F** |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | D | | | C | D | C | C | C | D | D | D |
| Chlorophyll a | | D | | | C | C | C | C | C | D | D | C |
| Secchi Depth | | D | | | D | D | D | D | C | D | D | D |
| **Lake Grade** | | **D** | | | **C** | **D** | **C** | **C** | **C** | **D** | **D** | **D** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | D | C | D | C | C |
| Chlorophyll a | D | C | C | C | B |
| Secchi Depth | F | C | C | C | C |
| **Lake Grade** | **D** | **C** | **C** | **C** | **C** |

Source: Metropolitan Council and STORET data



## Goose Lake (10-0089) *Carver County Environmental Services*

Goose Lake is located in Waconia Township (Carver County). It has a surface area of 407-acres. The maximum depth of the lake is 3.0 m; therefore the entire lake area is considered littoral zone which is the 0-15 feet depth area of the lake dominated by aquatic vegetation. The lake does not maintain a thermocline because of the lake's shallowness. A thermocline is a density gradient caused by changing water temperatures throughout the lake's water column. The lake's mean depth of 1.5 m (4.9 feet) and its surface area translate to an approximate lake volume of 2,035 ac-ft. The lake has a 1,100-acre immediate watershed, which translates to a watershed-to-lake area ratio of 27:1. The larger the ratio the greater the potential stress put on the lake from surface runoff.

The lake was monitored 13 times between early May and mid October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 111.9 | 72.0 | 142.0 | D |
| **CLA** (µg/l) | 118.3 | 26.0 | 170.0 | F |
| **Secchi** (m) | 0.5 | 0.2 | 0.9 | F |
| **TKN** (mg/l) | 4.11 | 3.10 | 6.30 | |
| | | | ***Lake Grade*** | F |

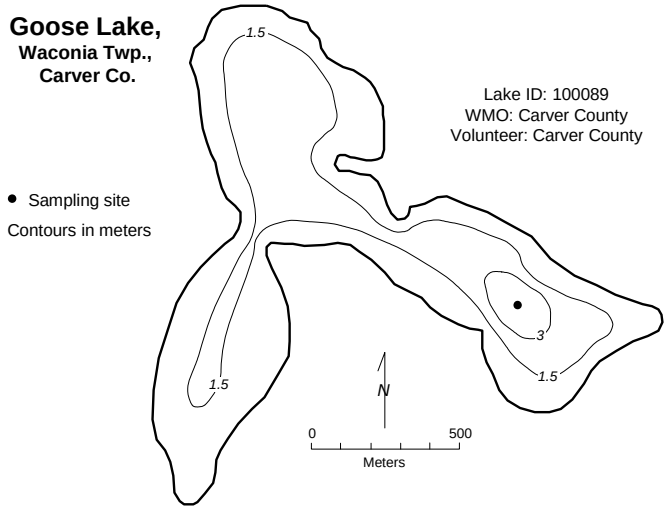
The lake received a lake grade of F for 2008 which is similar to grades received for the previous 4 years. The lake has also received similar individual water quality parameter grades for 2008 as it has for the previous 3 years. Because of the large variability in the lake's water quality data over the long term (i.e. grades ranging from C to F), no long-term trends are apparent. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008). To better understand the quality of the lake and what direction it may be heading, continued monitoring is suggested.

The physical and recreational conditions of the lake as perceived by the volunteer were ranked on a 1-to-5 scale. These rankings are shown on the lake's information sheet on the next page. The mean physical condition ranking was 2.9 (between 2- "some algae present" and 3- "definite algae present"), while the mean recreational suitability ranking was 3.4 (between 3- "swimming slightly impaired" and 4- "no swimming – boating ok").

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/.

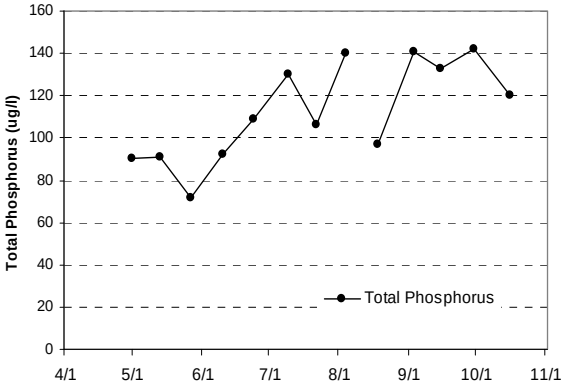
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

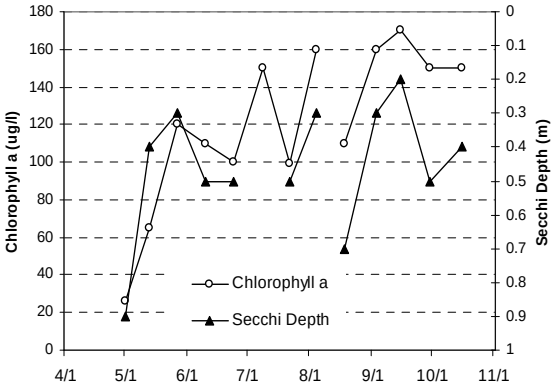
## Goose Lake,
**Waconia Twp., Carver Co.**




Lake ID: 100089
WMO: Carver County
Volunteer: Carver County

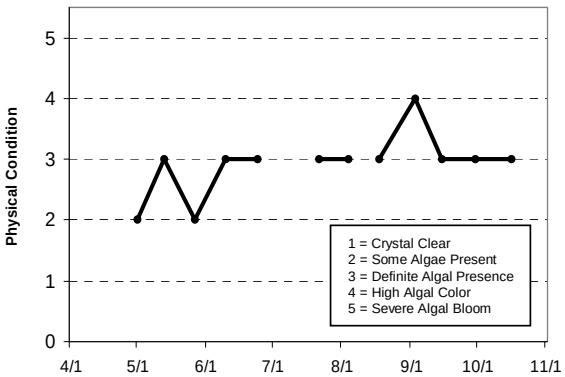
● Sampling site
Contours in meters




### 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/1 | 9.4 | | 11.94 | | 26 | 90 | | 0.9 | 2 | 4 |
| 5/13 | 14.09 | | 13.13 | | 65 | 91 | | 0.4 | 3 | 3 |
| 5/27 | 16.51 | | 8.84 | | 120 | 72 | | 0.3 | 2 | 2 |
| 6/10 | 19.78 | | 7.42 | | 110 | 92 | | 0.5 | 3 | 4 |
| 6/24 | 24.21 | | 10.97 | | 100 | 109 | | 0.5 | 3 | 3 |
| 7/9 | | | | | 150 | 130 | | | | |
| 7/22 | 26.44 | | 8.28 | | 99 | 106 | | 0.5 | 3 | 3 |
| 8/4 | 25.16 | | 6.7 | | 160 | 140 | | 0.3 | 3 | 4 |
| 8/18 | 26.86 | | 11.17 | | 110 | 97 | | 0.7 | 3 | 3 |
| 9/3 | 20.51 | | 7.12 | | 160 | 141 | | 0.3 | 4 | 3 |
| 9/15 | 16.28 | | 6.42 | | 170 | 133 | | 0.2 | 3 | 4 |
| 9/30 | 16.47 | | 7 | | 150 | 142 | | 0.5 | 3 | 4 |
| 10/16 | 11.61 | | 8.36 | | 150 | 120 | | 0.4 | 3 | 4 |



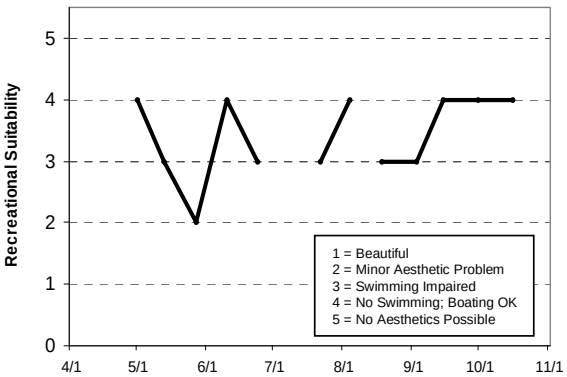

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | D | C | F | D | D | F | D | D | F |
| Chlorophyll a | | | | C | C | D | C | D | F | C | C | F |
| Secchi Depth | | | | F | C | F | C | F | F | D | F | F |
| **Lake Grade** | | | | **D** | **C** | **F** | **C** | **D** | **F** | **D** | **D** | **F** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | D | D | D | D |
| Chlorophyll a | | F | F | F | F |
| Secchi Depth | | F | F | F | F |
| **Lake Grade** | | **F** | **F** | **F** | **F** |

Source: Metropolitan Council and STORET data



## Goose Lake (82-0059) *Marine on St. Croix Watershed Management Organization*

Goose Lake is located in the City of Scandia (Washington County). The lake has a surface area of 83 acres and a circumference of 1.9 miles. The lake has a maximum and mean depth of 7.6 m (25 feet) and 2.4 m (8 feet), respectively. The lake's mean depth and size translate to a lake volume of approximately 664 ac-ft. Ninety eight percent of the surface area of the lake is considered littoral zone which is the zone of aquatic vegetation dominance. A public access is located on the western side of the lake.

The lake was monitored 14 times from mid April to mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 47.2 | 31.0 | 74.0 | C |
| **CLA** (µg/l) | 33.0 | 6.9 | 54.0 | C |
| **Secchi** (m) | 1.7 | 1.1 | 3.0 | C |
| **TKN** (mg/l) | 1.54 | 1.00 | 2.20 | |
| | | | ***Lake Grade*** | C |

The lake received a lake grade of C for 2008, which is similar to the lake grades received in the past. There is some variation in the parameters' annual means, however. The lake's overall water quality seems to be represented by a lake grade of C given the historical water quality database. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008).

Throughout the monitoring period, the volunteers' opinion of the lake's physical and recreational conditions was ranked on a 1-to-5 scale. These user perception rankings are shown on the lake information sheet. The mean physical condition ranking was 3.0 (3- "definite algae present"), while the mean recreational suitability ranking was 3.7 (between 3- "swimming slightly impaired" and 4- "no swimming/boating ok").

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.

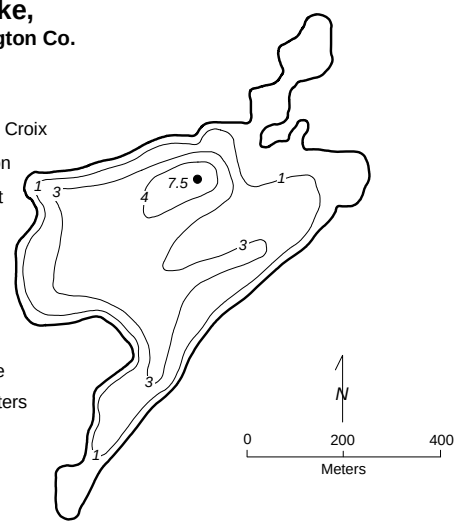
# Goose Lake,
**Scandia, Washington Co.**

Lake ID: 820059

WD: Carnelian-Marine-St. Croix

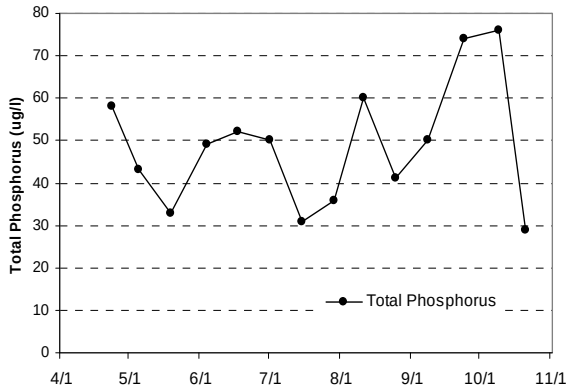
Volunteer: Washington

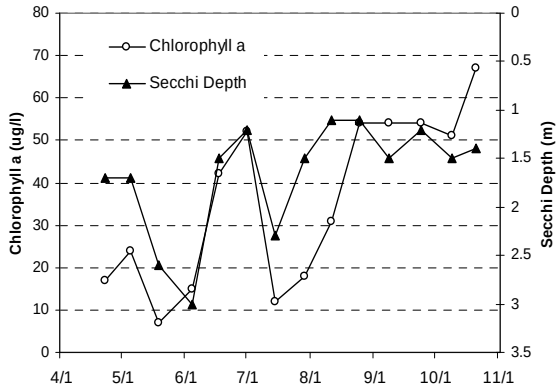
Conservation District




● Sampling site

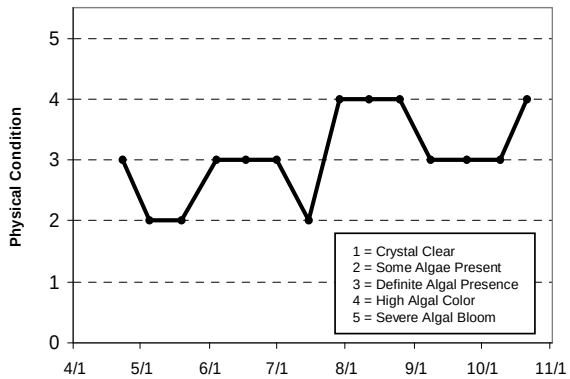
Contours in meters




## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/23 | 7.1 | 5.6 | 11.48 | 1.67 | 17 | 58 | | 1.7 | 3 | 2 |
| 5/5 | 9.9 | 9 | 11.84 | 0.7 | 24 | 43 | | 1.7 | 2 | 3 |
| 5/19 | 15.1 | 12.1 | 9.59 | 0.28 | 6.9 | 33 | | 2.6 | 2 | 3 |
| 6/4 | 17.7 | 14.6 | 8.11 | 0.11 | 15 | 49 | 94 | 3 | 3 | 4 |
| 6/17 | 19.9 | 15.8 | 10.11 | 0.17 | 42 | 52 | 136 | 1.5 | 3 | 4 |
| 7/1 | 23.6 | 15.5 | 9.22 | 0.47 | 52 | 50 | 192 | 1.2 | 3 | 4 |
| 7/15 | 23.3 | 15.5 | 6.61 | 0.36 | 12 | 31 | 228 | 2.3 | 2 | 3 |
| 7/29 | 26.1 | 168 | 9.47 | 0.27 | 18 | 36 | 175 | 1.5 | 4 | 4 |
| 8/11 | 24.6 | 16.7 | 8.14 | 0.24 | 31 | 60 | 268 | 1.1 | 4 | 4 |
| 8/25 | 22.9 | 18.4 | 6.14 | 0.28 | 54 | 41 | 41 | 1.1 | 4 | 4 |
| 9/8 | 19.5 | 18.4 | 3.88 | 0.24 | 54 | 50 | 43 | 1.5 | 3 | 4 |
| 9/24 | 19.3 | 17.9 | 6.99 | 0.24 | 54 | 74 | 278 | 1.2 | 3 | 4 |
| 10/9 | 14.5 | 14.5 | 7.84 | 0.33 | 51 | 76 | 63 | 1.5 | 3 | 4 |
| 10/21 | 12 | 12 | 9.67 | 0.37 | 67 | 29 | 59 | 1.4 | 4 | 5 |

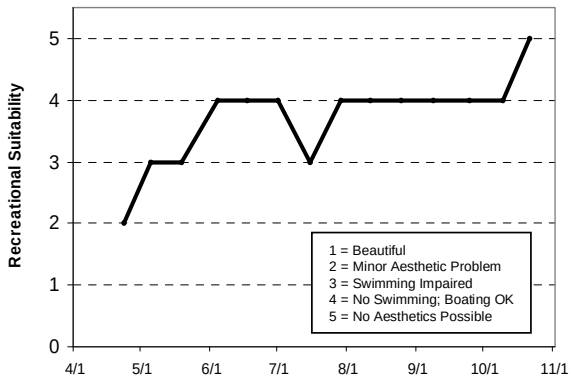



### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | C | D | C | C | C | | | | | |
| Chlorophyll a | | | C | B | C | C | C | | | | | |
| Secchi Depth | | | D | C | C | C | C | | | | | |
| **Lake Grade** | | | **C** | **C** | **C** | **C** | **C** | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | C | C | D | C | C |
| Chlorophyll a | C | C | C | C | C |
| Secchi Depth | B | C | C | C | C |
| **Lake Grade** | **C** | **C** | **C** | **C** | **C** |




Source: Metropolitan Council and STORET data

## Goose Lake [north basin] (82-0113-01) *Valley Branch Watershed District*

Goose Lake is located in the City of Lake Elmo (Washington County). The year 2008 was the first year that Goose Lake was monitored via the CAMP. The lake is split into two basins by county highway 10. The north basin is Site #1 of Goose Lake. 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. A search via STORET revealed no historical monitoring data prior to 2008 for this lake.

The north basin was monitored 7 times from late April to mid October. On each sampling day the lake site was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 325.4 | 244.0 | 412.0 | F |
| **CLA** (µg/l) | 258.0 | 110.0 | 390.0 | F |
| **Secchi** (m) | 0.3 | 0.2 | 0.5 | F |
| **TKN** (mg/l) | 4.60 | 2.80 | 6.10 | |
| | | | ***Lake Grade*** | F |

The north basin received a lake grade of F for 2008. Continued monitoring is suggested to build an historical water quality database for this lake site.

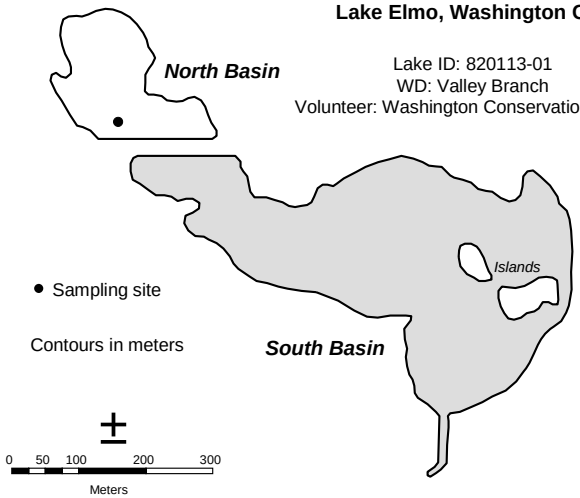
Throughout the monitoring period, the volunteer's opinion of the lake site's physical and recreational conditions was ranked on a 1-to-5 scale. These user perception rankings are shown on the lake information sheet. The mean physical condition ranking was 3.4 (between 3- "definite algae present" and 4- "high algal color"). The mean recreational suitability ranking was 4.0 (4- "no swimming/boating ok").

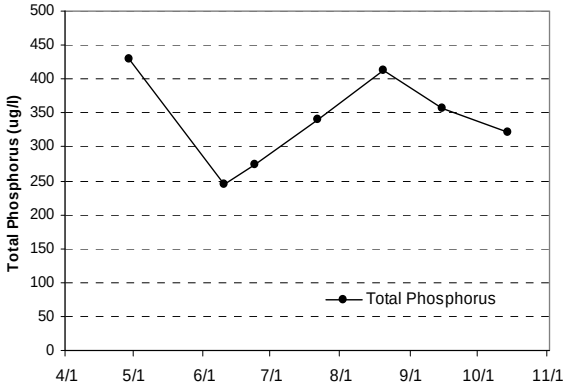
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

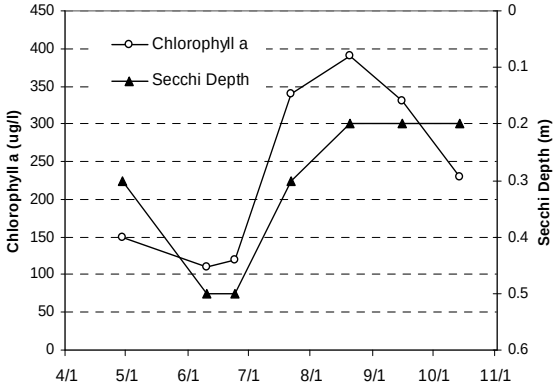
# Goose Lake (North Basin)

**Lake Elmo, Washington Co.**

Lake ID: 820113-01
WD: Valley Branch
Volunteer: Washington Conservation District

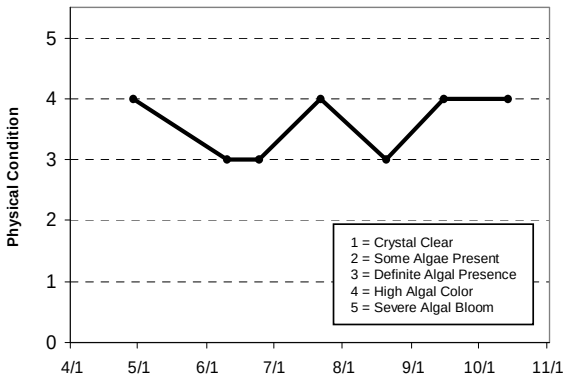



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/29 | 8.1 | 7.8 | 10.91 | 0.83 | 150 | 430 | | 0.3 | 4 | 4 |
| 6/10 | 21.2 | 17.6 | 11.9 | 0.04 | 110 | 244 | | 0.5 | 3 | 4 |
| 6/24 | 26.1 | 20.8 | 11.78 | 0.56 | 120 | 274 | | 0.5 | 3 | 4 |
| 7/22 | 25.2 | 22.7 | 6.91 | 0.16 | 340 | 340 | | 0.3 | 4 | 4 |
| 8/20 | 24.7 | 24.3 | 4.51 | 0.66 | 390 | 412 | | 0.2 | 3 | 4 |
| 9/15 | 18.2 | 16.9 | 9.16 | 0.26 | 330 | 357 | | 0.2 | 4 | 4 |
| 10/14 | 14.2 | 13.9 | 7.81 | 0.34 | 230 | 322 | | 0.2 | 4 | 4 |



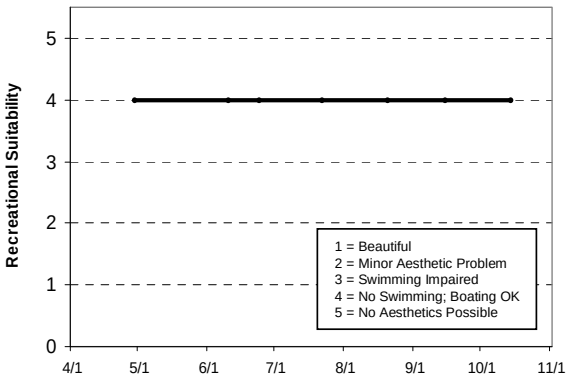

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | | F |
| Chlorophyll a | | | | | F |
| Secchi Depth | | | | | F |
| **Lake Grade** | | | | | **F** |

Source: Metropolitan Council and STORET data



## Goose Lake [south basin] (82-0113-02) *Valley Branch Watershed District*

Goose Lake is located in the City of Lake Elmo (Washington County). The year 2008 was the first year that Goose Lake was monitored via the CAMP. The lake is split into two basins by county highway 10. The south basin is Site #2 of Goose Lake. 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. A search via STORET revealed no historical monitoring data prior to 2008 for this lake.

The south basin was monitored 7 times from late April to mid October. On each sampling day the lake site was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 205.6 | 154.0 | 273.0 | F |
| **CLA** (µg/l) | 184.0 | 100.0 | 280.0 | F |
| **Secchi** (m) | 0.3 | 0.2 | 0.5 | F |
| **TKN** (mg/l) | 4.74 | 3.50 | 6.30 | |
| | | | ***Lake Grade*** | F |

The south basin received a lake grade of F for 2008. Continued monitoring is suggested to build an historical water quality database for this lake site.

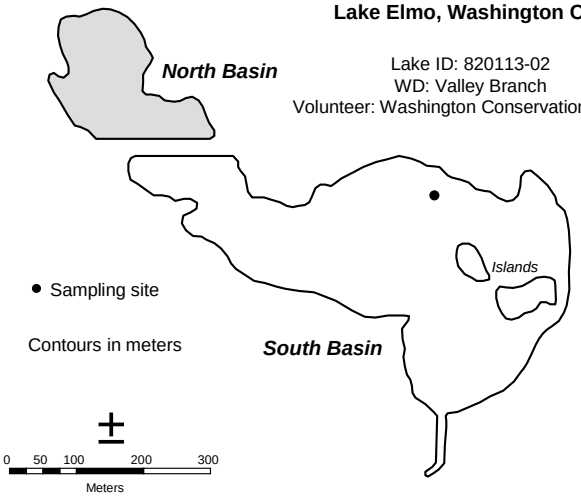
Throughout the monitoring period, the volunteers' opinion of the lake's physical and recreational conditions was ranked on a 1-to-5 scale. These user perception rankings are shown on the lake information sheet. The mean physical condition ranking was 3.6 (between 3- "definite algae present" and 4- "high algal color"). The mean recreational suitability ranking was 4.0 (4- "no swimming/boating ok").

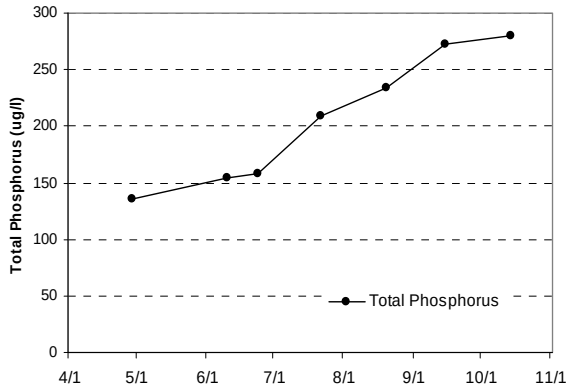
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

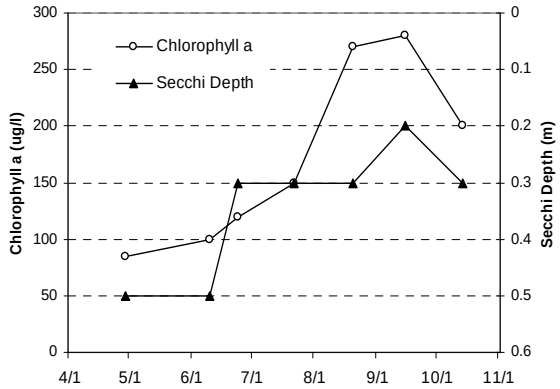
# Goose Lake (South Basin)

**Lake Elmo, Washington Co.**

Lake ID: 820113-02
WD: Valley Branch
Volunteer: Washington Conservation District

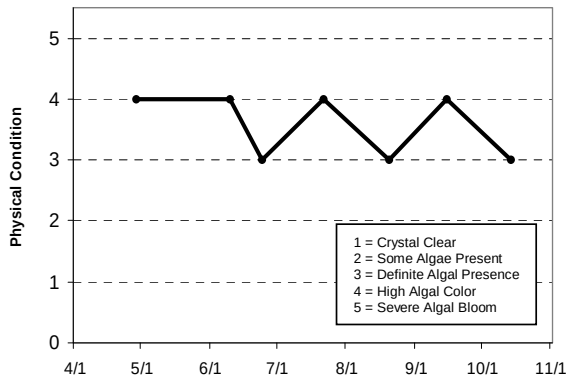



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/29 | 7.4 | 7 | 13.74 | 0.99 | 85 | 136 | | 0.5 | 4 | 4 |
| 6/10 | 21.1 | 17.9 | 10.34 | 0.09 | 100 | 154 | | 0.5 | 4 | 4 |
| 6/24 | 25.7 | 21.2 | 13.58 | 0.5 | 120 | 158 | | 0.3 | 3 | 4 |
| 7/22 | 259 | 22.2 | 8.56 | 0.18 | 150 | 209 | | 0.3 | 4 | 4 |
| 8/20 | 25.2 | 22.2 | 8.02 | 0.25 | 270 | 234 | | 0.3 | 3 | 4 |
| 9/15 | 18.2 | 16.7 | 9.71 | 0.3 | 280 | 273 | | 0.2 | 4 | 4 |
| 10/14 | 13.7 | 13.9 | 8.32 | 0.35 | 200 | 280 | | 0.3 | 3 | 4 |



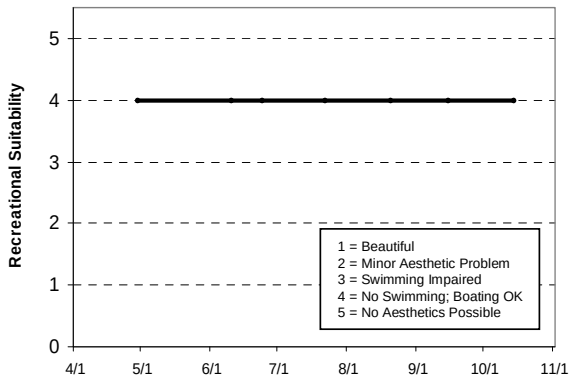

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | | F |
| Chlorophyll a | | | | | F |
| Secchi Depth | | | | | F |
| **Lake Grade** | | | | | **F** |

Source: Metropolitan Council and STORET data



## Grace Lake (10-0218) *Carver County Environmental Services*

Grace Lake is a 22-acre lake located near the City of Chaska (Carver County). The lake has a maximum depth of 6.7 m (22 feet). Roughly 79 percent of the lake's surface area is considered littoral zone (area of aquatic plant dominance) and it does not maintain a thermocline (a density gradient owed to changing water temperatures throughout the lake's water column). A search through the STORET nationwide water quality database for historical data provided no data other than CAMP data.

The lake was monitored 14 times between mid April and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 85.2 | 22.0 | 175.0 | D |
| **CLA** (µg/l) | 39.1 | 6.3 | 78.0 | C |
| **Secchi** (m) | 0.9 | 0.5 | 1.5 | D |
| **TKN** (mg/l) | 2.33 | 1.50 | 3.10 | |
| | | | ***Overall Grade*** | D |

The lake received a lake grade of D for 2008. This is a similar lake grade as received in 2006 and 2003. The lake received a lake grade of C in 2004. Further monitoring is suggested for this lake to develop an historical water quality database.

Throughout the monitoring period, the volunteers' opinions of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. The mean physical condition ranking was 3.0 (3- "high algal color"); the mean recreational suitability ranking was 3.6 (between 3- "swimming slightly impaired" and 4- "no swimming/boating ok").

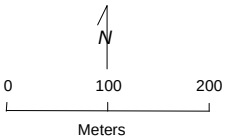
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

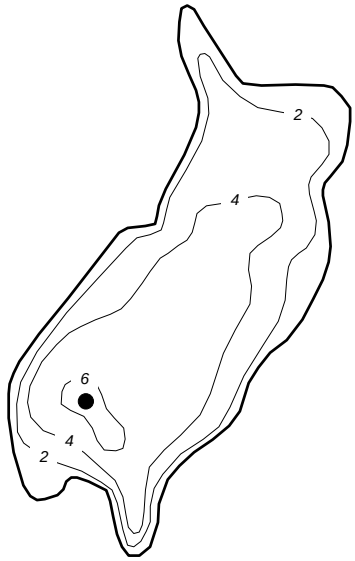
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

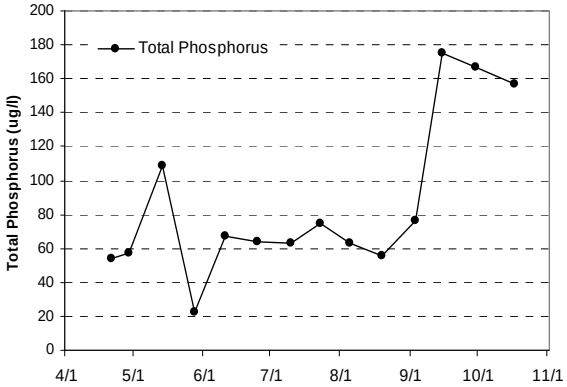
# Grace Lake
**Chaska, Carver Co.**

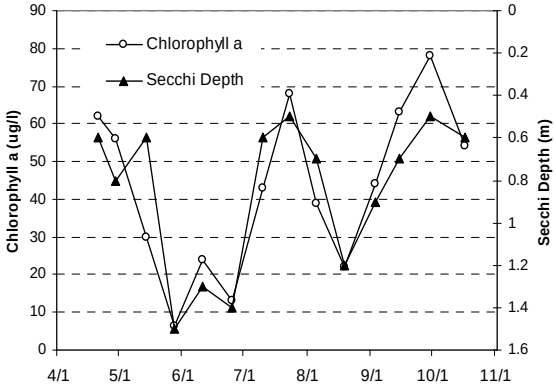
LAKE ID: 100218
WMO: Carver County
Volunteer: Carver Co.

● Sampling station
Contours in meters



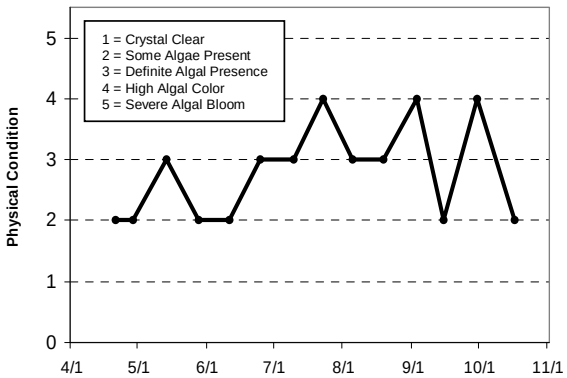




## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/21 | 10.82 | | 17.52 | | 62 | 54 | | 0.6 | 2 | 3 |
| 4/29 | 8.23 | | 13.36 | | 56 | 57 | | 0.8 | 2 | 4 |
| 5/14 | 13.77 | | 12.56 | | 30 | 109 | | 0.6 | 3 | 4 |
| 5/28 | 16.58 | | 7.96 | | 6.3 | 22 | | 1.5 | 2 | 4 |
| 6/11 | 20.48 | | 8.42 | | 24 | 67 | | 1.3 | 2 | 3 |
| 6/25 | 24.82 | | 5.9 | | 13 | 64 | | 1.4 | 3 | 4 |
| 7/10 | 22.08 | | 9.68 | | 43 | 63 | | 0.6 | 3 | 2 |
| 7/23 | 25.82 | | 7.43 | | 68 | 75 | | 0.5 | 4 | 4 |
| 8/5 | 25.44 | | 8.72 | | 39 | 63 | | 0.7 | 3 | 4 |
| 8/19 | 27.54 | | 11.2 | | 22 | 56 | | 1.2 | 3 | 4 |
| 9/3 | 22.64 | | 7.58 | | 44 | 76 | | 0.9 | 4 | 3 |
| 9/15 | 18.6 | | 5.63 | | 63 | 175 | | 0.7 | 2 | 4 |
| 9/30 | 18.1 | | 6.37 | | 78 | 167 | | 0.5 | 4 | 4 |
| 10/17 | 13.29 | | 5.52 | | 54 | 157 | | 0.6 | 2 | 2 |



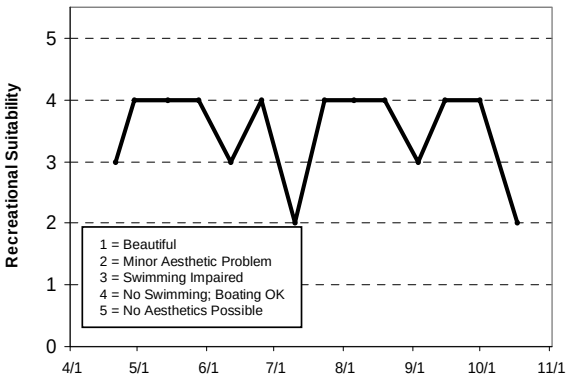

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | F |
| Chlorophyll a | | | | | | | | | | | | C |
| Secchi Depth | | | | | | | | | | | | D |
| **Lake Grade** | | | | | | | | | | | | **D** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | D | D | | D | D |
| Chlorophyll a | C | B | | C | C |
| Secchi Depth | D | D | | D | D |
| **Lake Grade** | **D** | **C** | | **D** | **D** |

Source: Metropolitan Council and STORET data



## Hay Lake (82-0065) *Marine on St. Croix Watershed Management Organization*

Hay lake is located in City of Scandia (Washington County). The lake has a surface area of 33 acres. The only other known bathymetric data is its maximum depth of 6.1 m (20 feet).

The lake was monitored 14 times between mid April and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 50.6 | 26.0 | 69.0 | C |
| **CLA** (µg/l) | 28.0 | 5.7 | 57.0 | C |
| **Secchi** (m) | 1.9 | 1.2 | 2.4 | C |
| **TKN** (mg/l) | 1.12 | 0.76 | 1.30 | |
| | | | ***Lake Grade*** | C |

The lake received a lake grade of C for 2008, which is an indication of improved water quality in comparison to most of the past decade of CAMP monitoring. The year 2008 was the first year that all of the individual water quality parameters received C grades, which is better than all other past years of monitoring. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed a statistically significant improving trend in water clarity (MPCA 2008). To better understand the quality of the lake and what direction it may be heading, continued monitoring is suggested.

Throughout the monitoring period, the volunteer(s) ranked the perceived physical condition of the lake on a 1-to-5 scale. The mean perceived physical condition of Hay Lake was 1.6 (between 1- "crystal clear" and 2- "some algae present"), while the mean recreational suitability was 2.4 (between 2- "minor aesthetic possible" and 3- "swimming slightly impaired").

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,**

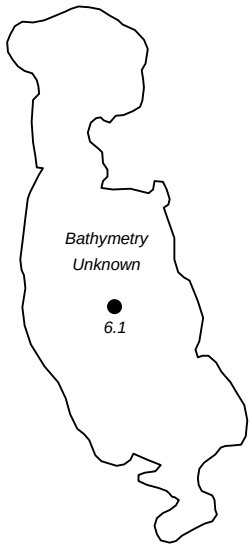
**Washington Co.**

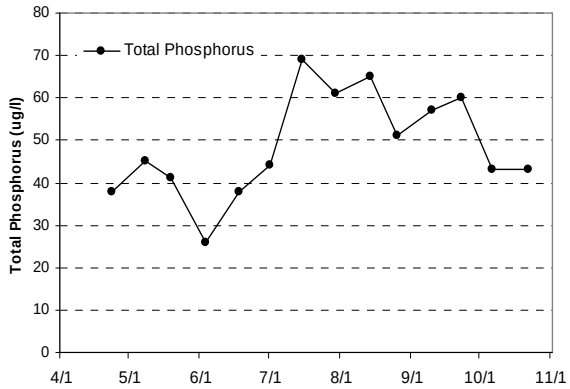
LAKE ID: 820065
WD: Carnelian-Marine-St. Croix
Volunteer: Washington Conservation District

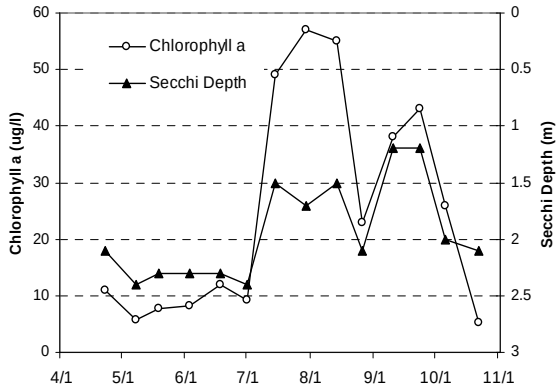
● Sampling site
Contours in meters

N

0 200 400
Meters

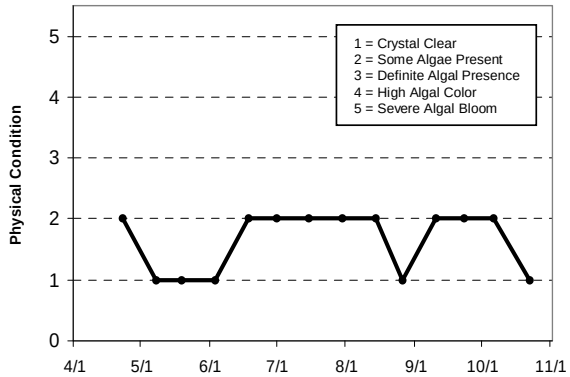



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/23 | 11.1 | 9 | 10.68 | 0.89 | 11 | 38 | | 2.1 | 2 | 2 |
| 5/8 | 15 | 13.8 | 9.22 | 0.98 | 5.7 | 45 | | 2.4 | 1 | 2 |
| 5/19 | 16 | 15.9 | 8.52 | 1.36 | 7.6 | 41 | | 2.3 | 1 | 2 |
| 6/3 | 19.7 | 18 | 7.67 | 0.55 | 8.3 | 26 | | 2.3 | 1 | 2 |
| 6/18 | 21.2 | 20.6 | 8 | 0.19 | 12 | 38 | | 2.3 | 2 | 2 |
| 7/1 | 25.4 | 22.8 | 7.36 | 2.65 | 9.2 | 44 | | 2.4 | 2 | 3 |
| 7/15 | 23.2 | 22 | 7.29 | 0.77 | 49 | 69 | | 1.5 | 2 | 3 |
| 7/30 | 26 | 22.2 | 6.54 | 0.17 | 57 | 61 | | 1.7 | 2 | 3 |
| 8/14 | 22.6 | 21.9 | 3.21 | 0.58 | 55 | 65 | | 1.5 | 2 | 2 |
| 8/26 | 22.4 | 21.4 | 4.78 | 3.48 | 23 | 51 | | 2.1 | 1 | 2 |
| 9/10 | 17.1 | 17.1 | 5.1 | 0.8 | 38 | 57 | | 1.2 | 2 | 2 |
| 9/23 | 20 | 19.7 | 7.09 | 1.25 | 43 | 60 | | 1.2 | 2 | 3 |
| 10/6 | 13.2 | 13.2 | 8.67 | 0.38 | 26 | 43 | | 2 | 2 | 2 |
| 10/22 | 9.8 | 10.1 | 7.46 | 2.65 | 5.3 | 43 | | 2.1 | 1 | 1 |



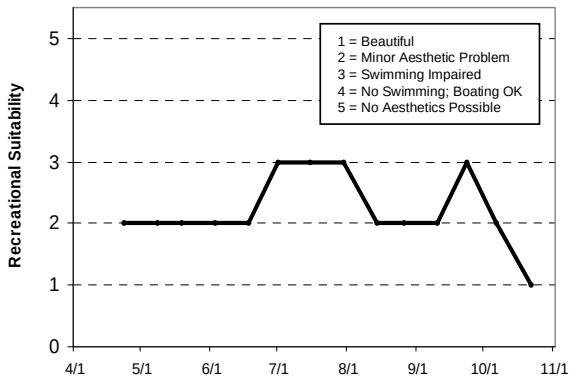

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | D | D | D | D | | D |
| Chlorophyll a | | | | | | | F | F | F | F | | C |
| Secchi Depth | | | | | | | D | D | D | D | | C |
| **Lake Grade** | | | | | | | **D** | **D** | **D** | **D** | | **C** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | D | D | D | D | C |
| Chlorophyll a | D | F | B | C | C |
| Secchi Depth | D | D | C | C | C |
| **Lake Grade** | **D** | **D** | **C** | **C** | **C** |

Source: Metropolitan Council and STORET data



## Henry Lake (27-0175) *Elm Creek Watershed Management Commission*

Henry Lake is a 77-acre lake located within Hassan Township (Hennepin County). Because the maximum depth of the lake is only 1.5 m (5 feet), the entire lake area is considered littoral zone (the 0-15 foot depth area of the lake dominated by aquatic vegetation). Additionally, because of the lake's shallowness it does not maintain a thermocline (a density gradient owed to changing water temperatures throughout the lake's water column).

This marks the fifth year that Henry Lake has been involved in CAMP. Other than for the 1995 and 2005-2008 CAMP data, a search through the STORET nationwide water quality database for historic data on the lake came up empty. Therefore, 1995, 2005-2008 are the only known years of data available.

The lake was monitored 7 times between late May and early September. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 154.3 | 103.0 | 300.0 | F |
| **CLA** (µg/l) | 45.6 | 3.8 | 180.0 | C |
| **Secchi** (m) | 0.8 | 0.5 | 1.1 | D |
| **TKN** (mg/l) | 1.56 | 1.10 | 1.90 | |
| | | | ***Lake Grade*** | D |

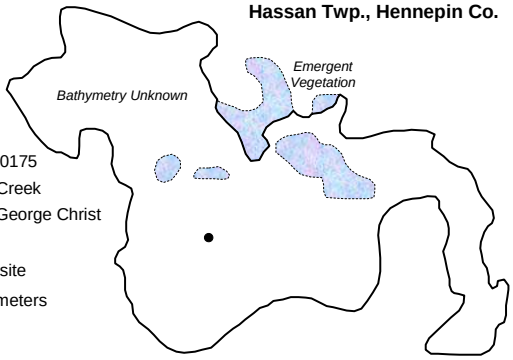
The lake received a lake grade of D for 2008 which is similar to the D lake grades received in 1995, 2005, and 2007. Additional years of data are needed to determine trends in water quality.

Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The average user perception rankings were 3.3 for physical condition (between 3- "definite algal color" and 4- "high algal color"), and 4.7 for recreational suitability (between 4- "no swimming – boating ok" and 5- "no aesthetics possible").

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.

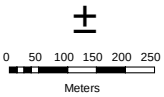
# Lake Henry

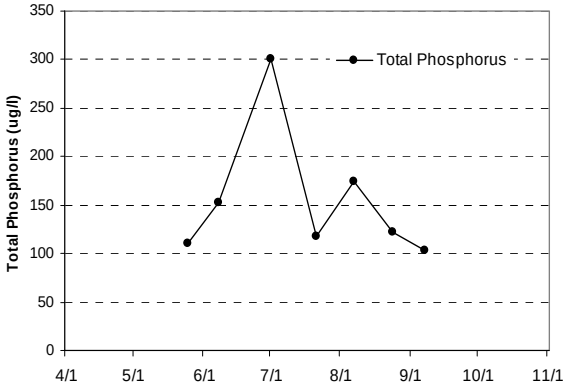
**Hassan Twp., Hennepin Co.**

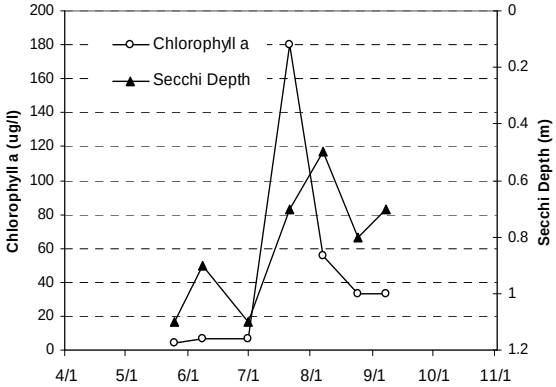



Lake ID: 270175
WMO: Elm Creek
Volunteers: Pam & George Christ

● Sampling site
Contours in meters

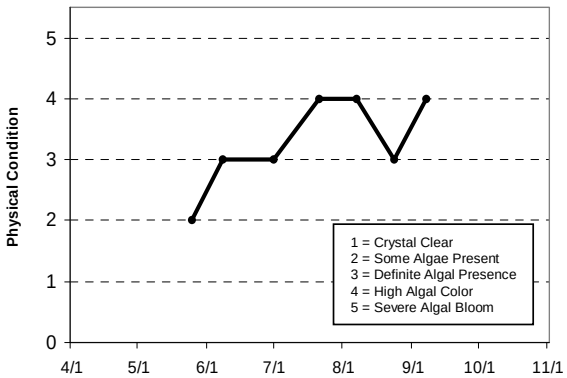



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/25 | 18.6 | | | | 3.8 | 111 | | 1.1 | 2 | 3 |
| 6/8 | 22.1 | | | | 6.7 | 153 | | 0.9 | 3 | 5 |
| 7/1 | 23.3 | | | | 6.6 | 300 | | 1.1 | 3 | 5 |
| 7/21 | 26 | | | | 180 | 117 | | 0.7 | 4 | 5 |
| 8/7 | 25.5 | | | | 56 | 174 | | 0.5 | 4 | 5 |
| 8/24 | 24.1 | | | | 33 | 122 | | 0.8 | 3 | 5 |
| 9/7 | 17.8 | | | | 33 | 103 | | 0.7 | 4 | 5 |



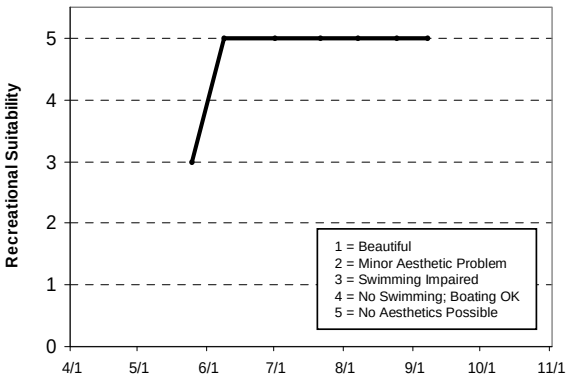

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | D | | | | | | | | |
| Chlorophyll a | | | | C | | | | | | | | |
| Secchi Depth | | | | D | | | | | | | | |
| **Lake Grade** | | | | **D** | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | D | F | C | F |
| Chlorophyll a | | C | B | D | C |
| Secchi Depth | | D | C | D | D |
| **Lake Grade** | | **D** | **C** | **D** | **D** |

Source: Metropolitan Council and STORET data



## Hornbean Lake (19-0047) *City of Sunfish Lake*

Hornbean Lake is located within the City of Sunfish Lake (Dakota County), and has an area of approximately 22-acres. There is very little morphological information available for the lake.

This was the third year that Hornbean Lake has been involved in CAMP. A search through the STORET nationwide water quality database for historic data on the lake came up empty. Thus, the 2006 through 2008 CAMP data are the only water quality data available. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

The lake was monitored 7 times between mid-May and mid-October 2008. The resulting data are summarized in the tables and figures on the next page.

**2008 summer (May-September) data summary**

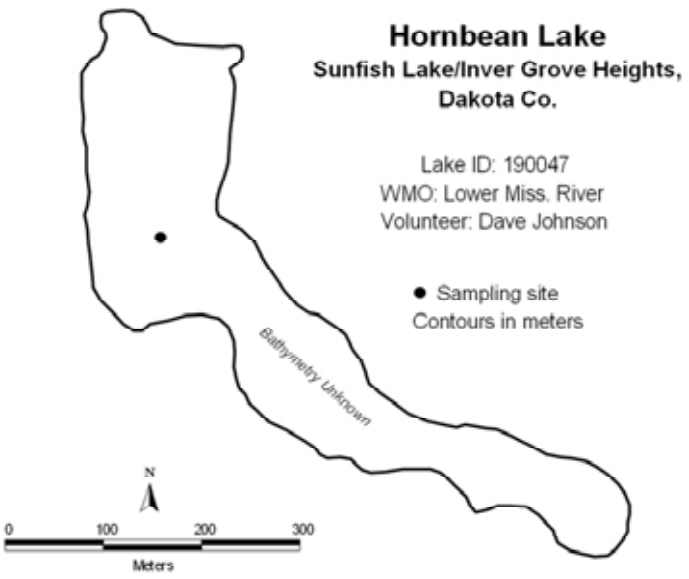
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 33.8 | 20.0 | 49.0 | C |
| **CLA** (µg/l) | 8.4 | 3.0 | 16.0 | A |
| **Secchi** (m) | 2.6 | 1.6 | 4.0 | B |
| **TKN** (mg/l) | 1.55 | 1.20 | 1.80 | |
| | | | ***Lake Grade*** | B |

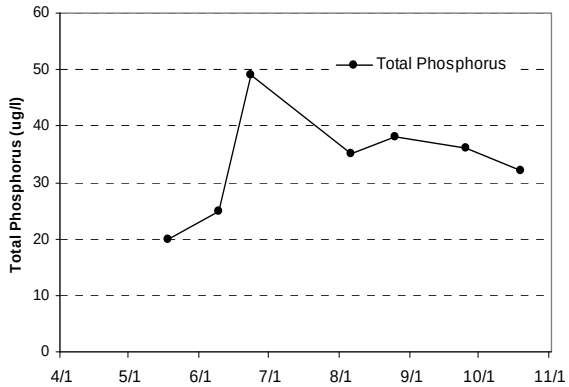
The lake's 2008 lake water quality grade was a B, which was a better grade than last year's grade of C. The CLA concentrations were lower in 2008 than those in 2007, which translated into an A grade for CLA in 2008 compared to the C grade in 2007. The lake's water clarity was clearer in 2008 than in 2007 which is consistent with the lower CLA concentration average observed in 2008.

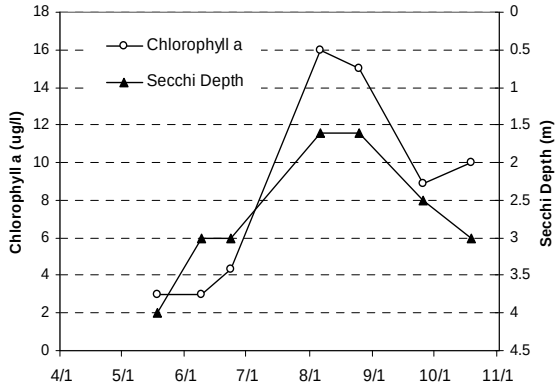
As mentioned earlier, there are no nutrient data available for Hornbean Lake other than the 2006 through 2008 CAMP data. Therefore there are not sufficient data to determine long-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

The perceived physical and recreational conditions (ranked on a 1-to-5 scale) are shown on the lake's information sheet on the next page. The average user perception rankings, were 2.2 for physical condition (between 2- "some algae present" and 3- "definite algae present"), and 2.5 for recreational suitability (between 2- "minor aesthetic problem" and 3- "swimming impaired").

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.

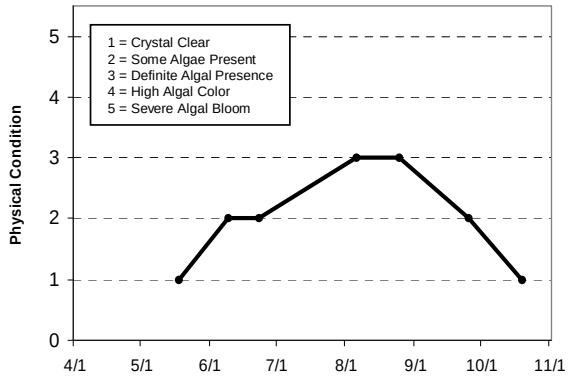



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/18 | 17.7 | | | | 3 | 20 | | 4 | 1 | 1 |
| 6/9 | 21.7 | | | | 3 | 25 | | 3 | 2 | 3 |
| 6/23 | 27 | | | | 4.3 | 49 | | 3 | 2 | 3 |
| 8/6 | 26.1 | | | | 16 | 35 | | 1.6 | 3 | 3 |
| 8/25 | 26.5 | | | | 15 | 38 | | 1.6 | 3 | 3 |
| 9/25 | 20.8 | | | | 8.9 | 36 | | 2.5 | 2 | 2 |
| 10/19 | 15.2 | | | | 10 | 32 | | 3 | 1 | 1 |



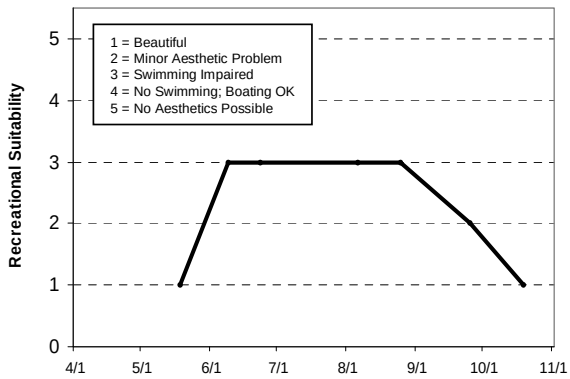

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | C | C | C |
| Chlorophyll a | | | B | C | A |
| Secchi Depth | | | C | C | B |
| **Lake Grade** | | | **C** | **C** | **B** |

Source: Metropolitan Council and STORET data



## Horseshoe Lake [Sunfish Lake] (19-0051) *City of Sunfish Lake*

Horseshoe Lake is an approximate 16-acre lake located within the City of Sunfish Lake (Dakota County). There is very little morphological information available for the lake.

This was the third year that Horseshoe Lake has been involved in CAMP. A search through the STORET nationwide water quality database for historic data on the lake came up empty. Thus, the 2006 through 2008 CAMP data are the only nutrient data available. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

The lake was monitored 9 times between mid-April and mid-October 2008. The resulting data and graphs appear on the next page.

**2008 summer (May-September) data summary**

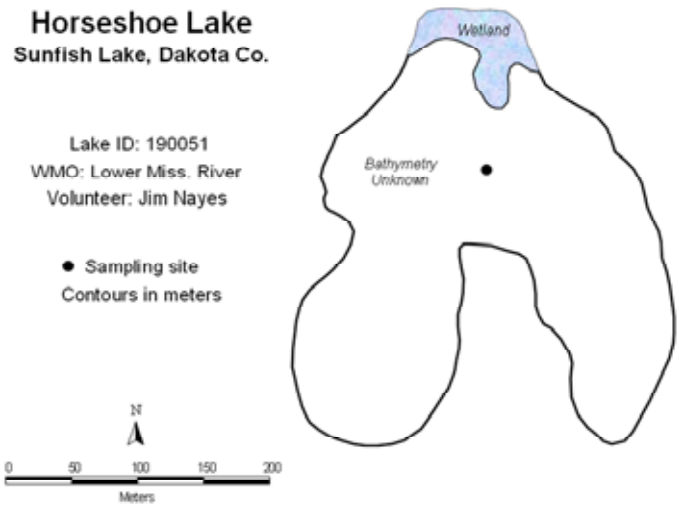
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 20.4 | 13.0 | 30.0 | A |
| **CLA** (µg/l) | 3.4 | 1.9 | 5.1 | A |
| **Secchi** (m) | 2.1 | 1.8 | 2.4 | C |
| **TKN** (mg/l) | 0.64 | 0.57 | 0.71 | |
| | | | ***Lake Grade*** | B |

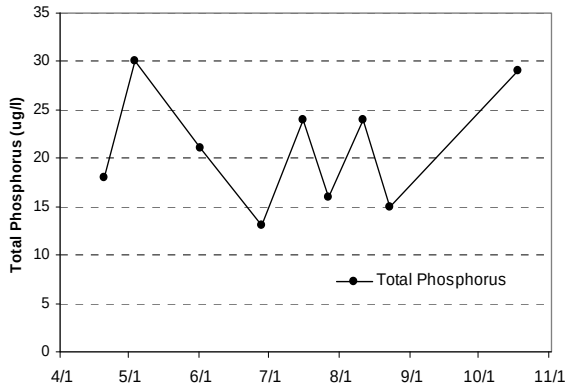
The lake's 2008 lake water quality grade was a B, which was similar to last year's lake grade. However, the water quality in 2008 appears to be a higher quality than in 2007. For example, the TP concentrations for 2008 appear to be lower overall than those observed in 2007. The average, minimum, and maximum TP concentrations for 2008 were lower than those in 2007. Furthermore, water clarity appears to have been clearer in 2008 as indicated by greater average Secchi depths in 2008 compared to 2007. The minimum and maximum Secchi depths observed in 2008 were greater than those observed in 2007 as well. For several measurements in 2008, the Secchi disk was resting on the bottom of the lake yet it was still visible. So the average and maximum Secchi depth would have been greater than what is shown in the above table. It is likely that the Secchi depth grade would be a B, and the lake grade would be an A.

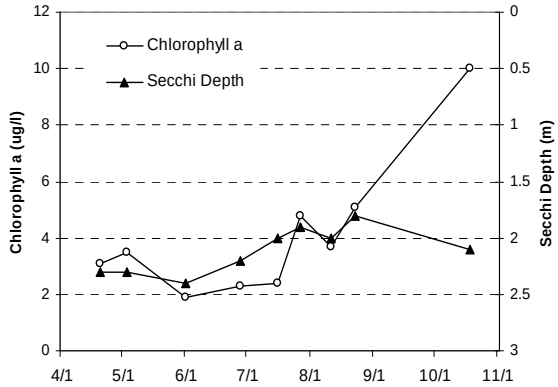
As mentioned earlier, there are no nutrient data available for Horseshoe Lake other than the 2006 through 2008 CAMP data. Therefore there are not sufficient data to determine long-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

The perceived physical and recreational conditions (ranked on a 1-to-5 scale) are shown on the lake's information sheet on the next page. The average user perception rankings were 2.0 for physical condition (2- "some algae present"), and 1.9 for recreational suitability (2- "minor aesthetic problem").

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.

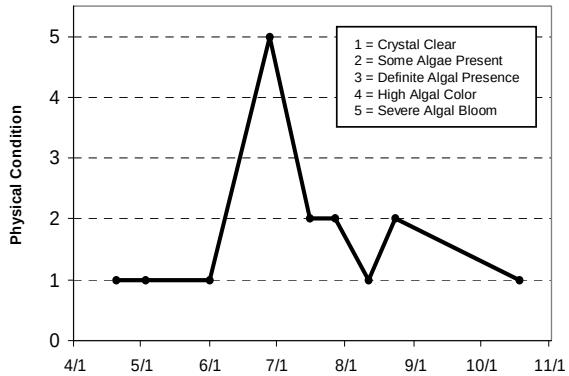



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/20 | 10 | | | | 3.1 | 18 | | 2.3 | 1 | 1 |
| 5/3 | 12.1 | | | | 3.5 | 30 | | 2.3 | 1 | 1 |
| 6/1 | 20.2 | | | | 1.9 | 21 | | 2.4 | 1 | 3 |
| 6/28 | 23.7 | | | | 2.3 | 13 | | 2.2 | 5 | 4 |
| 7/16 | 28.5 | | | | 2.4 | 24 | | 2 | 2 | 1 |
| 7/27 | 27 | | | | 4.8 | 16 | | 1.9 | 2 | 1 |
| 8/11 | 27 | | | | 3.7 | 24 | | 2 | 1 | 2 |
| 8/23 | 24.3 | | | | 5.1 | 15 | | 1.8 | 2 | 1 |
| 10/18 | 12.9 | | | | 10 | 29 | | 2.1 | 1 | 1 |



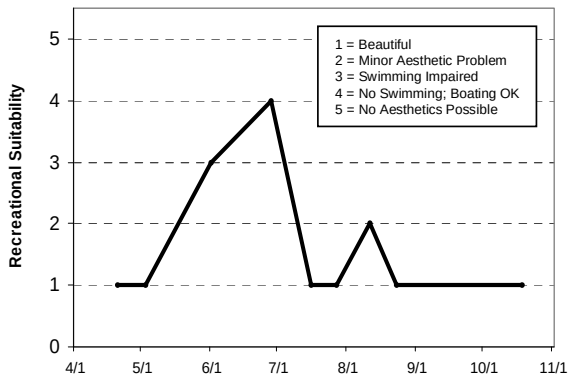

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | C | C | A |
| Chlorophyll a | | | A | A | A |
| Secchi Depth | | | C | C | C |
| **Lake Grade** | | | **B** | **B** | **B** |

Source: Metropolitan Council and STORET data



## Hydes Lake (10-0088) *Carver County Environmental Services*

Hydes Lake is located within Waconia Township (Carver County). The lake is considered a Metropolitan Area "Priority Lake" because of its multi-recreational uses. A public access is located on the lake's northeastern shore. The lake has a surface area of 215 acres. The mean and maximum depth of the lake is 3.0 (roughly 10 feet) and 5.5 m (18 feet). Because of the shallowness of the lake, 88 percent of the total lake area is considered littoral zone (area of aquatic plant dominance) and it does not maintain a thermocline (a density gradient owed to changing water temperatures throughout the lake's water column). The lake's surface area and mean depth result in an approximate lake volume of 2,150 ac-ft.

The lake has a 430-acre immediate watershed, which translates to a watershed-to-lake area ratio of 2:1 (the larger the ratio the greater the potential stress put on the lake from surface runoff).

The lake was initially enrolled the CAMP in 1999. The lake has been monitored by Council staff in the past (the last year being 1996). A search of the STORET nationwide water quality database for data on the lake revealed a moderate database throughout the 1990's with nutrient data available in 1985, 1991, 1993, 1996 and now 1999-2006.

The lake was monitored 13 times between early May and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

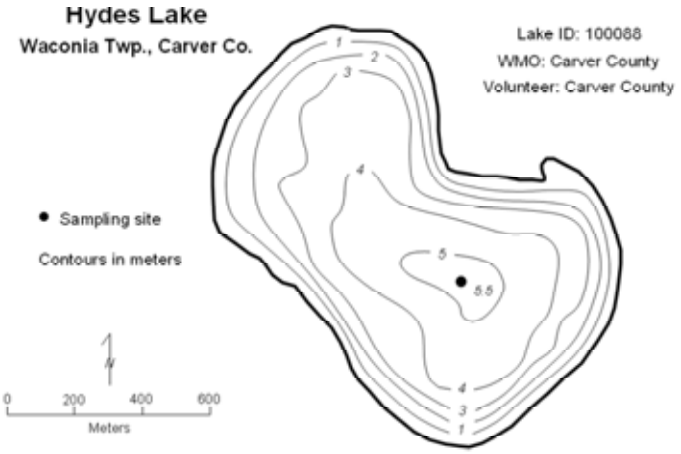
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 156.8 | 63.0 | 234.0 | F |
| **CLA** (µg/l) | 81.4 | 1.7 | 320.0 | F |
| **Secchi** (m) | 1.2 | 0.4 | 2.4 | D |
| **TKN** (mg/l) | 3.13 | 2.00 | 5.00 | |
| | | | ***Lake Grade*** | F |

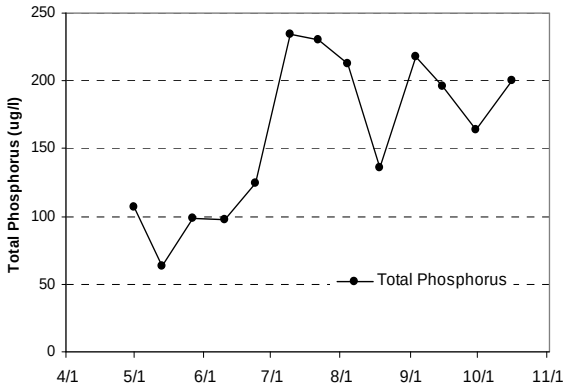
The lake received a lake grade of F for 2008. This was the worst lake grade received to date for this lake. The CLA concentrations in 2008 were higher than in previous years during the mid-summer period. The higher CLA concentrations reduced water clarity during this same period. The higher CLA concentrations combined with lower water clarity created water quality which is characteristic of F grade conditions. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008). Additional monitoring is suggested to determine if the water quality of the lake is deteriorating or if the water quality of 2008 was an anomaly.

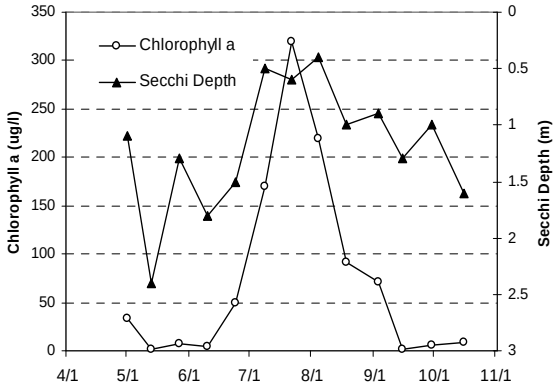
The bottom two graphs on the following page show seasonal variation in the lake's perceived physical condition and recreational suitability. The average user perception rankings, on a 1-to-5 scale, were 3.3 for physical condition (between 3- "definite algae present" and 4- "high algal color") and 3.8 for recreational suitability (between 3- "swimming slightly impaired" and 4- "no swimming/boating ok").

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.

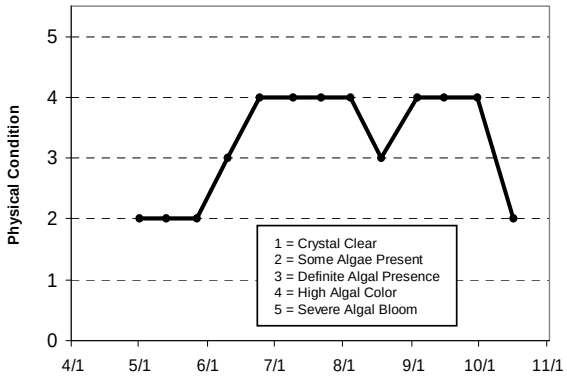



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/1 | 8.8 | | 13.24 | | 33 | 107 | | 1.1 | 2 | 4 |
| 5/13 | 13.12 | | 9.74 | | 2 | 63 | | 2.4 | 2 | 3 |
| 5/27 | 16.65 | | 9 | | 6.7 | 99 | | 1.3 | 2 | 2 |
| 6/10 | 19.13 | | 9.31 | | 5 | 98 | | 1.8 | 3 | 2 |
| 6/24 | 23.58 | | 12.07 | | 50 | 124 | | 1.5 | 4 | 5 |
| 7/9 | 25.24 | | 13.29 | | 170 | 234 | | 0.5 | 4 | 4 |
| 7/22 | 26.37 | | 12.2 | | 320 | 230 | | 0.6 | 4 | 5 |
| 8/4 | 25.81 | | 9.77 | | 220 | 213 | | 0.4 | 4 | 5 |
| 8/18 | 26 | | 10.92 | | 92 | 136 | | 1 | 3 | 4 |
| 9/3 | 21.93 | | 6.85 | | 71 | 218 | | 0.9 | 4 | 4 |
| 9/15 | 17.66 | | 3.81 | | 1.7 | 196 | | 1.3 | 4 | 4 |
| 9/30 | 17.59 | | 5.14 | | 5.3 | 164 | | 1 | 4 | 4 |
| 10/16 | 12.8 | | 7.06 | | 8.2 | 200 | | 1.6 | 2 | 4 |

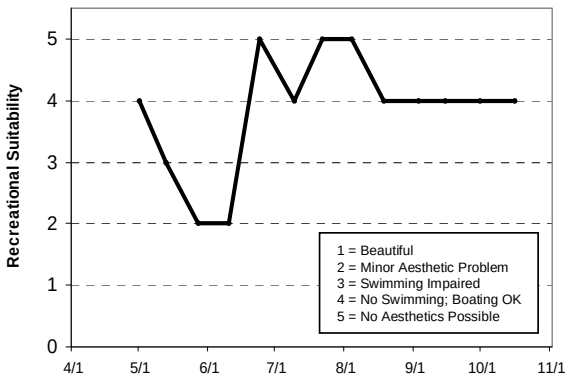



### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | F | | | | | | F |
| Chlorophyll a | | | | | | D | | | | | | D |
| Secchi Depth | | | | | | D | | | | | | D |
| **Lake Grade** | | | | | | **D** | | | | | | **D** |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | F | | | F | | | F | F | D | D | D |
| Chlorophyll a | | C | | | C | | | C | C | C | C | C |
| Secchi Depth | | C | | | C | | | C | C | C | F | C |
| **Lake Grade** | | **D** | | | **D** | | | **D** | **D** | **C** | **D** | **C** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | D | F | F | D | F |
| Chlorophyll a | D | D | C | D | F |
| Secchi Depth | D | C | C | C | D |
| **Lake Grade** | **D** | **D** | **D** | **D** | **F** |




Source: Metropolitan Council and STORET data

## Island Lake (2-0022) *Anoka County Parks*

Island Lake is located in Linwood Township (Anoka County). The lake has a surface area of 67 acres and a maximum depth of 6.7 m (22 feet). Roughly 87 percent of the lake's surface area is considered littoral zone, which is the zone of aquatic plant dominance.

A search through the STORET nationwide water quality database indicated one prior year of water quality data for the lake (1983) that was collected to the CAMP data collected in 2003 – 2008.

The lake was monitored 13 times between early May and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 27.1 | 3.0 | 50.0 | B |
| **CLA** (µg/l) | 12.8 | 7.4 | 17.0 | B |
| **Secchi** (m) | 1.4 | 0.7 | 2.5 | C |
| **TKN** (mg/l) | 1.23 | 0.94 | 2.10 | |
| | | | ***Lake Grade*** | B |

The lake received a lake grade of B for 2008, which is consistent with lake grades received in past years. On the basis of the historical water quality database, the annual lake grades have varied among B's and C's. Continued monitoring is suggested to continue to build the water quality database for determining if the lake is experiencing trends in its water quality.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the lake's information sheet on the next page (ranked on a scale of 1 to 5). The average user perception rankings were 2.4 for physical condition (between 2- "some algae present" and 3- "definite algae present"), and 2.3 for recreational suitability (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

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.

# Island Lake

**Linwood Twp., Anoka Co.**

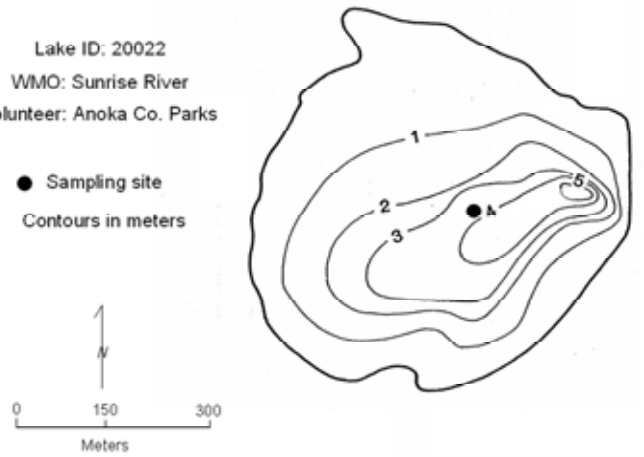
Lake ID: 20022

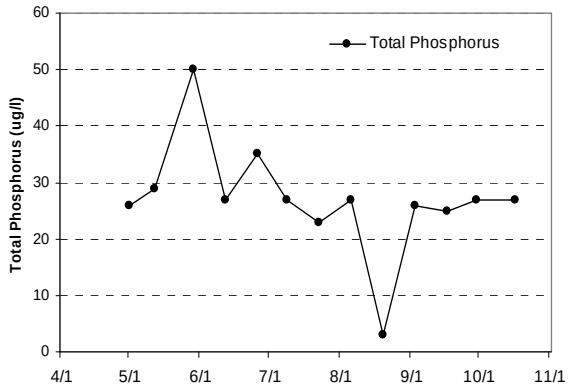
WMO: Sunrise River

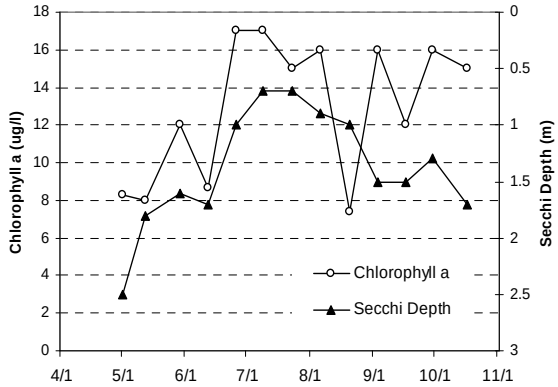
Volunteer: Anoka Co. Parks

● Sampling site

Contours in meters

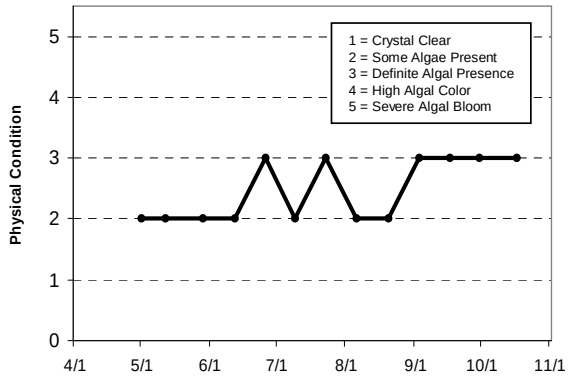



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/1 | 10.1 | | | | 8.3 | 26 | | 2.5 | 2 | |
| 5/12 | 14.1 | | | | 8 | 29 | | 1.8 | 2 | |
| 5/29 | 17.8 | | | | 12 | 50 | | 1.6 | 2 | 2 |
| 6/12 | 19.2 | | | | 8.7 | 27 | | 1.7 | 2 | 2 |
| 6/26 | 26.4 | | | | 17 | 35 | | 1 | 3 | 3 |
| 7/9 | 25.9 | | | | 17 | 27 | | 0.7 | 2 | 2 |
| 7/23 | 27.6 | | | | 15 | 23 | | 0.7 | 3 | 3 |
| 8/6 | 26.1 | | | | 16 | 27 | | 0.9 | 2 | 2 |
| 8/20 | 26.6 | | | | 7.4 | 3 | | 1 | 2 | 2 |
| 9/3 | 21.3 | | | | 16 | 26 | | 1.5 | 3 | |
| 9/17 | 18.4 | | | | 12 | 25 | | 1.5 | 3 | |
| 9/30 | 16 | | | | 16 | 27 | | 1.3 | 3 | |
| 10/17 | 11.6 | | | | 15 | 27 | | 1.7 | 3 | |

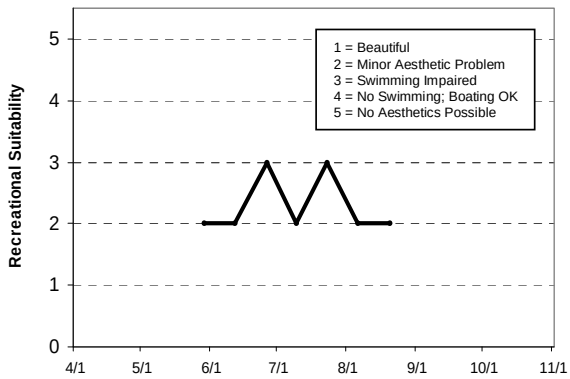



### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | C | | | | | | | | |
| Chlorophyll a | | | | C | | | | | | | | |
| Secchi Depth | | | | D | | | | | | | | |
| **Lake Grade** | | | | **C** | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | B |
| Chlorophyll a | | | | | | | | | | | | B |
| Secchi Depth | | | | | | | | | | | | C |
| **Lake Grade** | | | | | | | | | | | | **B** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | C | C | C | B | B |
| Chlorophyll a | A | B | B | B | B |
| Secchi Depth | C | C | C | C | C |
| **Lake Grade** | **B** | **C** | **C** | **B** | **B** |




Source: Metropolitan Council and STORET data

## Jane Lake (82-0104) *Valley Branch Watershed District*

**Primary Report**

Lake Jane is located in the northwest corner of the City of Lake Elmo (Washington County). It is considered a Priority Lake by the Metropolitan Council for its high regional recreation value and exceptional water clarity. The lake has a surface area of 155 acres. The maximum and mean depths of the lake are 12.0 and 3.7 m (39 and 12 feet), respectively. Approximately 72 % of the lake is considered littoral zone, which is the zone of aquatic plant dominance. The approximate volume of the lake is 1,860 acre-feet. The lake residence time is approximately 1.4 years. The size of the lake's watershed is approximately 1,402 acres.

The lake has a public access located on its south end, which gets heavy use by area fishermen. The DNR manages the lake for largemouth bass, bluegill and crappie. In addition to monitoring via the CAMP, the lake has been monitored by Council staff.

The lake was monitored 11 times from early May to early October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

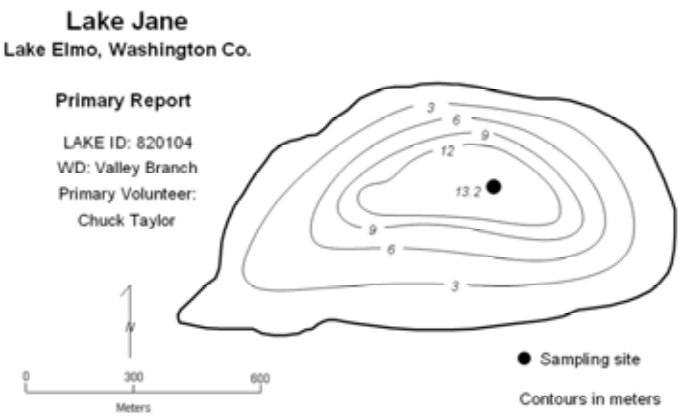
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 13.5 | 11.0 | 17.0 | A |
| **CLA** (µg/l) | 3.0 | 1.2 | 4.9 | A |
| **Secchi** (m) | 4.6 | 3.8 | 5.8 | A |
| **TKN** (mg/l) | 0.60 | 0.44 | 0.85 | |
| | | | ***Lake Grade*** | A |

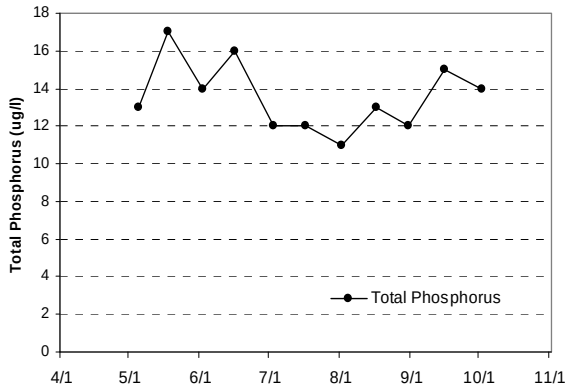
The lake received a lake grade of A for 2008, which is consistent with lake grades received since the year 2000. A trend analysis conducted by the MPCA indicated no statistically significant trend for Secchi transparency (MPCA 2008).

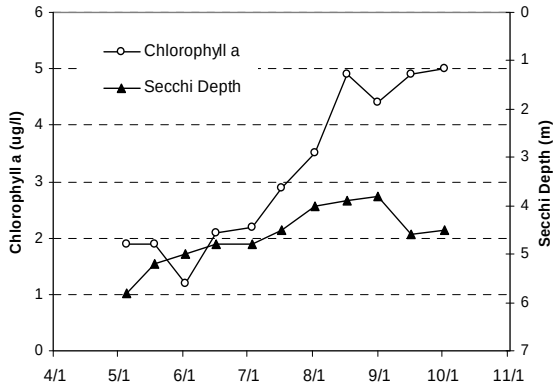
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the lake's information sheet on the next page (ranked on a scale of 1 to 5). The average user perception rankings were 1.0 for physical condition (crystal clear), and 1.0 for recreational suitability (beautiful).

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.

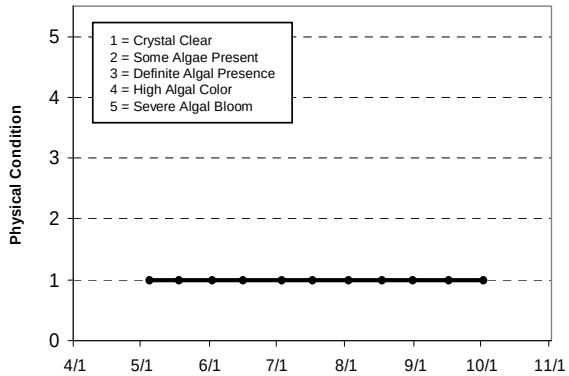



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/5 | 12 | | | | 1.9 | 13 | | 5.8 | 1 | 1 |
| 5/18 | 16.2 | | | | 1.9 | 17 | | 5.2 | 1 | 1 |
| 6/2 | 19.4 | | | | 1.2 | 14 | | 5 | 1 | |
| 6/16 | 20.8 | | | | 2.1 | 16 | | 4.8 | 1 | |
| 7/3 | 24.2 | | | | 2.2 | 12 | | 4.8 | 1 | |
| 7/17 | 25.9 | | | | 2.9 | 12 | | 4.5 | 1 | |
| 8/2 | 26.5 | | | | 3.5 | 11 | | 4 | 1 | |
| 8/17 | 25.4 | | | | 4.9 | 13 | | 3.9 | 1 | |
| 8/31 | 23.5 | | | | 4.4 | 12 | | 3.8 | 1 | |
| 9/16 | 18.4 | | | | 4.9 | 15 | | 4.6 | 1 | |
| 10/2 | 16.9 | | | | 5 | 14 | | 4.5 | 1 | 1 |



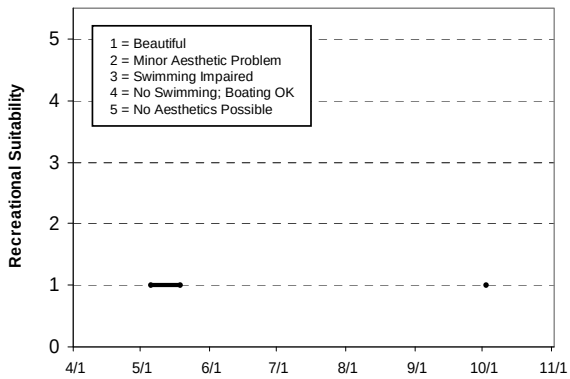

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | B | B | | | C | | B | B | | | | B |
| Chlorophyll a | | | | | C | | B | B | | | | B |
| Secchi Depth | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | A | | | | | | A | | | |
| Chlorophyll a | | | A | | | | | | A | | | |
| Secchi Depth | C | B | B | | | | | | A | | | |
| **Lake Grade** | | | **A** | | | | | | **A** | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | A | A | A | A | A |
| Chlorophyll a | A | A | A | A | A |
| Secchi Depth | A | A | A | A | A |
| **Lake Grade** | **A** | **A** | **A** | **A** | **A** |

Source: Metropolitan Council and STORET data



## Jane Lake (82-0104) *Valley Branch Watershed District*

**Secondary Report**

Jane Lake was also monitored by the Washington Conservation District (WCD) in addition to the monitoring performed by the primary volunteer. The WCD monitored the lake 7 times between late April and mid October. The resulting data are summarized in tables and figures on the next page. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

**2008 summer (May-September) data summary**

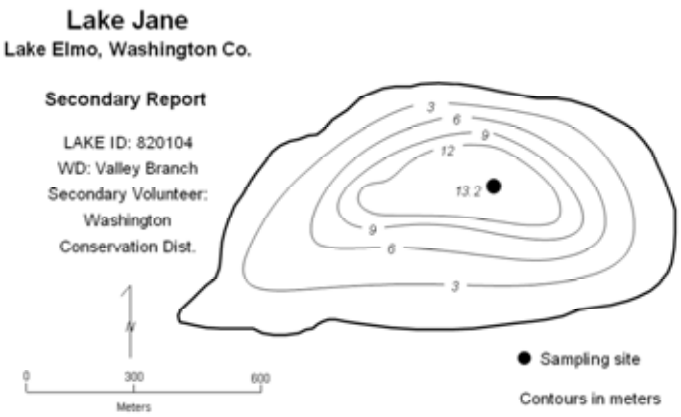
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 25.2 | 16.0 | 58.0 | B |
| **CLA** (µg/l) | 4.2 | 2.5 | 6.8 | A |
| **Secchi** (m) | 4.9 | 4.1 | 6.4 | A |
| **TKN** (mg/l) | 1.11 | 0.85 | 1.70 | |
| | | | ***Lake Grade*** | A |

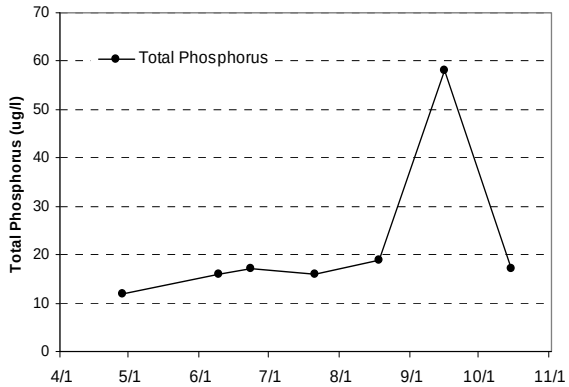
The lake received a lake grade of A for 2008 on the basis of the data collected by the secondary volunteer, which is a similar lake grade by the primary volunteer data. But there was a spike of TP on September 16 in the secondary volunteer data. The primary volunteer did not observe a TP spike. The effect of this spike was to increase the average summer-time TP concentration compared to the primary volunteer's TP average summer-time concentration. The TP spike observed in the secondary volunteer data on September 16 should be viewed as an isolated variation. A trend analysis conducted by the MPCA indicated no statistically significant trend for Secchi transparency (MPCA 2008).

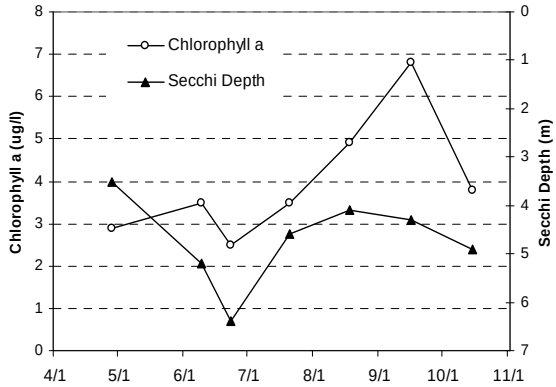
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the lake's information sheet on the next page (ranked on a scale of 1 to 5). The average user perception rankings were 1.8 for physical condition (between 1- "crystal clear" and 2- "some algae present"), and 2.0 for recreational suitability (minor aesthetic problem).

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.

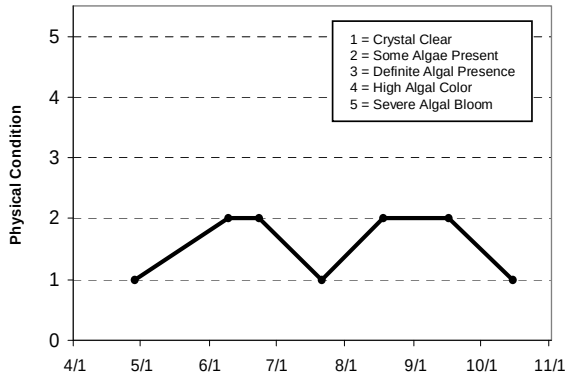



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/28 | 7 | 6.6 | 11.52 | 1.03 | 2.9 | 12 | | 3.5 | 1 | 1 |
| 6/9 | 19.8 | 11.5 | 8.55 | 0.24 | 3.5 | 16 | 18 | 5.2 | 2 | 3 |
| 6/23 | 23.3 | 9.9 | 8.46 | 0.72 | 2.5 | 17 | 23 | 6.4 | 2 | 2 |
| 7/21 | 25.7 | 1.06 | 6.82 | 0.3 | 3.5 | 16 | 30 | 4.6 | 1 | 1 |
| 8/18 | 25.2 | 10.9 | 7.63 | 0.26 | 4.9 | 19 | 48 | 4.1 | 2 | 2 |
| 9/16 | 18.8 | 11.4 | 8.57 | 0.3 | 6.8 | 58 | 18 | 4.3 | 2 | 2 |
| 10/15 | 14.2 | 14 | 7.42 | 0.33 | 3.8 | 17 | 12 | 4.9 | 1 | 1 |



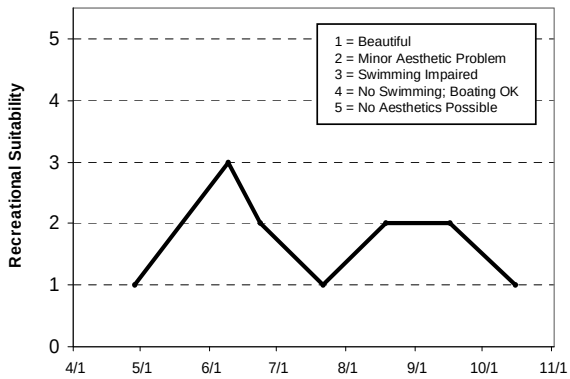

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | B | B | | | C | | B | B | | | | B |
| Chlorophyll a | | | | | C | | B | B | | | | B |
| Secchi Depth | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | A | | | | | | A | | | |
| Chlorophyll a | | | A | | | | | | A | | | |
| Secchi Depth | C | B | B | | | | | | A | | | |
| **Lake Grade** | | | **A** | | | | | | **A** | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | A | A | A | A | B |
| Chlorophyll a | A | A | A | A | A |
| Secchi Depth | A | A | A | A | A |
| **Lake Grade** | **A** | **A** | **A** | **A** | **A** |

Source: Metropolitan Council and STORET data



## Jellum's Bay [Site-1] (82-0052-02) *Carnelian - Marine Watershed District*

Jellum's Bay is located in 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 lake's mean depth of 2.4 m (roughly 8 feet) and its surface area translate to an approximate lake volume of 569 ac-ft. The lake has a 333-acre watershed, which translates to a watershed-to-lake area ratio of 4.6:1. The larger the ratio the greater the potential stress put on the lake from surface runoff.

The lake was monitored 7 times between mid April and early October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

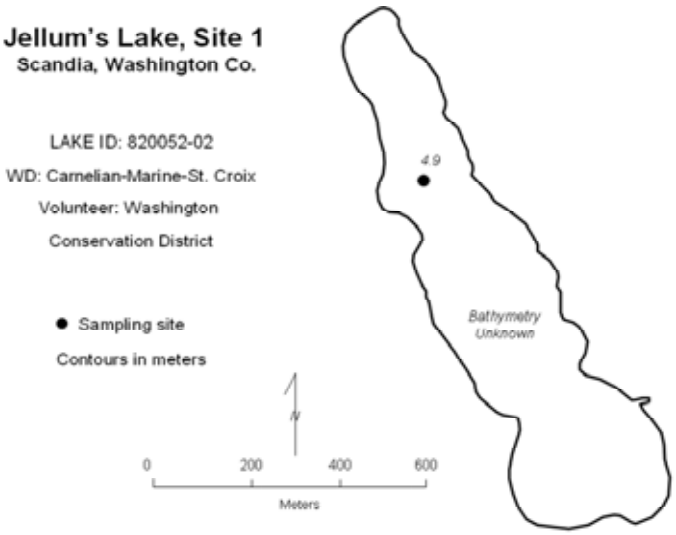
**2008 summer (May-September) data summary**

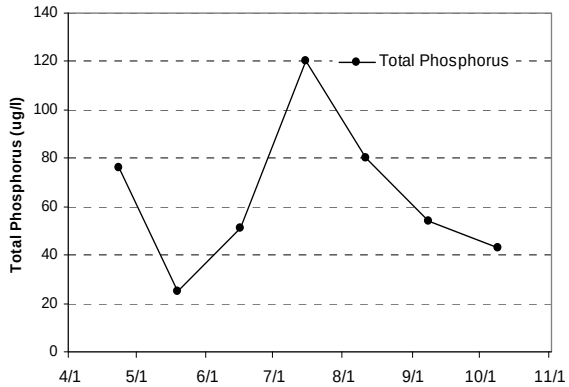
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 66.0 | 25.0 | 120.0 | C |
| **CLA** (µg/l) | 31.8 | 6.1 | 72.0 | C |
| **Secchi** (m) | 2.0 | 0.9 | 3.7 | C |
| **TKN** (mg/l) | 1.33 | 0.77 | 1.90 | |
| | | | ***Lake Grade*** | C |

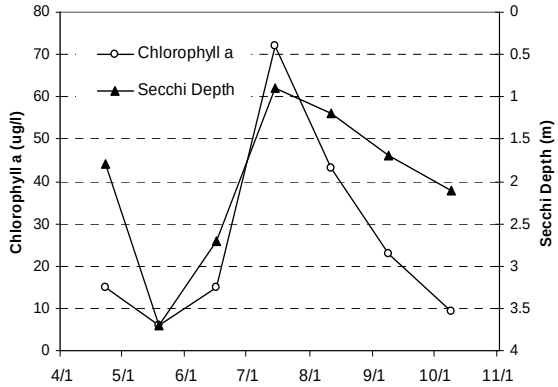
The lake received a lake grade of C for 2008, which is similar to last year's lake grade. The 2008 and 2007 lake grades are the best years of water quality for the lake yet observed. With this year's continued improvement in water quality, further monitoring is suggested to determine if the recent improvements are indication of an improving trend over the D lake grades received between 1996 and 2006.

Throughout the monitoring period, the volunteers' opinions of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. The mean perceived physical condition of Jellum's Bay was 2.8 (between 2- "some algae present" and 3- "definite algae present"), while the mean recreational suitability was 3.2 (between 3- "swimming slightly impaired" and 4- "no swimming/boating ok").

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.

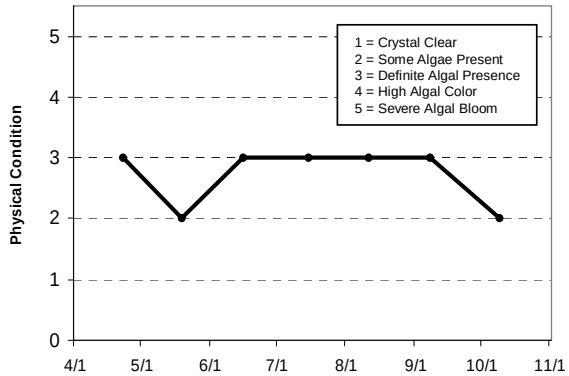



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/23 | 9.9 | 8.4 | 11.03 | 7.1 | 15 | 76 | | 1.8 | 3 | 3 |
| 5/19 | 15.7 | 14.5 | 8.56 | 4.32 | 6.1 | 25 | | 3.7 | 2 | 2 |
| 6/16 | 20.9 | 18.9 | 7.41 | 0.37 | 15 | 51 | 103 | 2.7 | 3 | 2 |
| 7/15 | 24.3 | 20.8 | 7.43 | 0.32 | 72 | 120 | 75 | 0.9 | 3 | 4 |
| 8/11 | 24.7 | 20.2 | 7.27 | 0.24 | 43 | 80 | 423 | 1.2 | 3 | 4 |
| 9/8 | 19.5 | 19.1 | 5.41 | 0.23 | 23 | 54 | 43 | 1.7 | 3 | 4 |
| 10/9 | 13.8 | 13.6 | 4.38 | 0.92 | 9.4 | 43 | 80 | 2.1 | 2 | 2 |



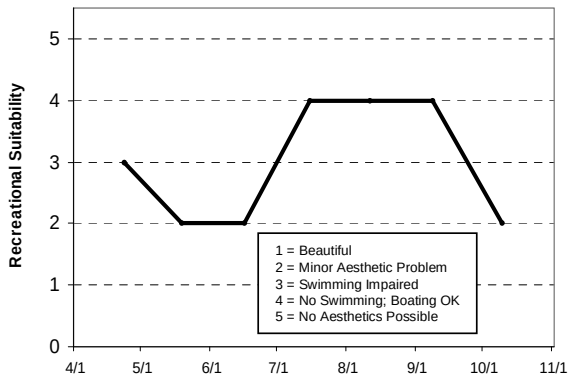

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | F | D | D | D | D | D | C | D |
| Chlorophyll a | | | | | D | D | D | D | F | D | D | F |
| Secchi Depth | | | | | D | D | F | F | F | D | D | D |
| **Lake Grade** | | | | | **D** | **D** | **D** | **D** | **F** | **D** | **D** | **D** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | D | D | D | C | C |
| Chlorophyll a | C | D | C | C | C |
| Secchi Depth | D | D | D | C | C |
| **Lake Grade** | **D** | **D** | **D** | **C** | **C** |

Source: Metropolitan Council and STORET data



## Jonathan Lake (10-0217) *Carver County Environmental Services*

Jonathan Lake is a small lake located in Carver County. There is very little known morphological data available for the lake.

This was the third year that Jonathan Lake has been involved in CAMP. A search through the STORET nationwide water quality database for data on the lake provided no data other than the CAMP data.

The lake was monitored 14 times between mid April and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

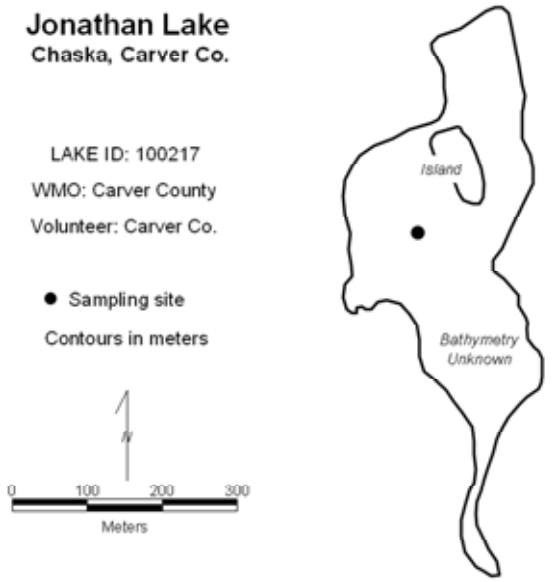
**2008 summer (May-September) data summary**

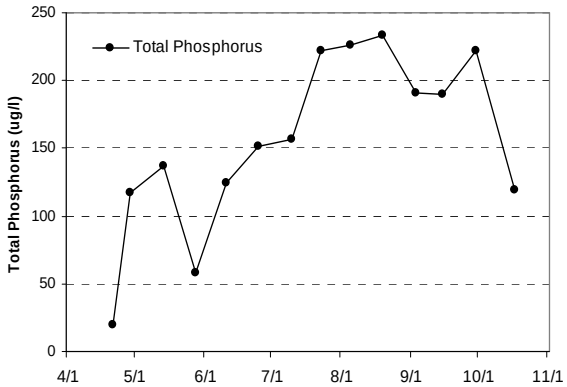
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 173.7 | 58.0 | 233.0 | F |
| **CLA** (µg/l) | 75.6 | 30.0 | 140.0 | D |
| **Secchi** (m) | 0.5 | 0.3 | 0.9 | F |
| **TKN** (mg/l) | 2.74 | 2.00 | 3.80 | |
| | | | ***Overall Grade*** | F |

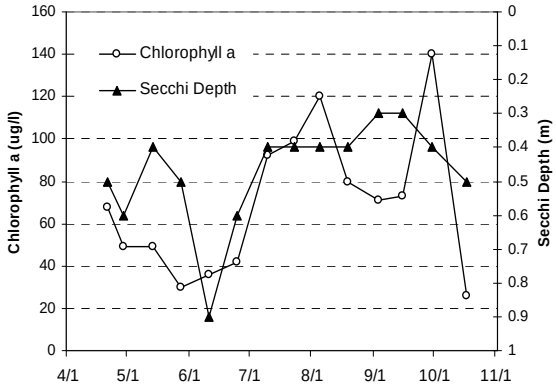
The lake received a lake grade of F for 2008, which is similar to the lake grade received in 2006, but worse than the D lake grade received in 2002. Additional monitoring is suggested to develop a historical water quality database for this lake.

Throughout the monitoring period, the volunteers' opinions of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page. The mean physical condition ranking was 3.5 (between 3- "definite algae present" and 4- "high algal color"); the mean recreational suitability ranking was 4.3 (between 4- "no swimming – boating ok" and 5- "no aesthetics possible").

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.

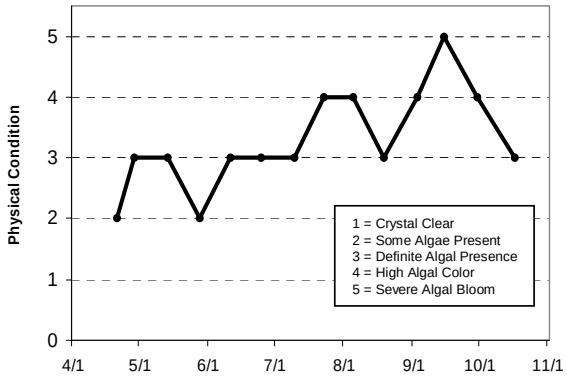



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/21 | 11.36 | | 16.68 | | 68 | 20 | | 0.5 | 2 | 4 |
| 4/29 | 7.87 | | 14.8 | | 49 | 117 | | 0.6 | 3 | 4 |
| 5/14 | 13.36 | | 11.31 | | 49 | 137 | | 0.4 | 3 | 4 |
| 5/28 | 17.01 | | 8.32 | | 30 | 58 | | 0.5 | 2 | 4 |
| 6/11 | 21.16 | | 7.95 | | 36 | 124 | | 0.9 | 3 | 4 |
| 6/25 | 24.86 | | 8.86 | | 42 | 151 | | 0.6 | 3 | 5 |
| 7/10 | 24.82 | | 9.83 | | 92 | 157 | | 0.4 | 3 | 4 |
| 7/23 | 25.45 | | 7.76 | | 99 | 222 | | 0.4 | 4 | 4 |
| 8/5 | 25.04 | | 9.04 | | 120 | 226 | | 0.4 | 4 | 4 |
| 8/19 | 27.17 | | 14.46 | | 80 | 233 | | 0.4 | 3 | 4 |
| 9/3 | 22.09 | | 9.1 | | 71 | 191 | | 0.3 | 4 | 4 |
| 9/15 | 17.37 | | 7.35 | | 73 | 190 | | 0.3 | 5 | 5 |
| 9/30 | 17.3 | | 8.2 | | 140 | 222 | | 0.4 | 4 | 5 |
| 10/17 | 12.04 | | 6.07 | | 26 | 119 | | 0.5 | 3 | 5 |



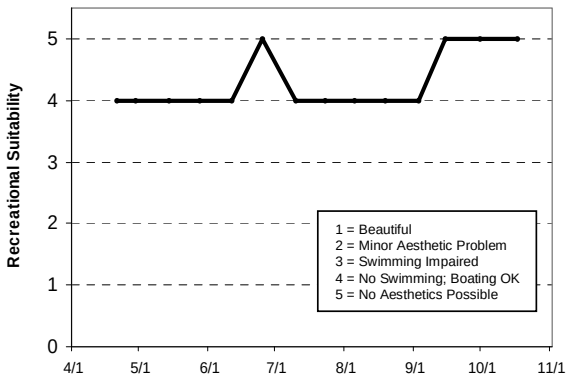

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | F | |
| Chlorophyll a | | | | | | | | | | | C | |
| Secchi Depth | | | | | | | | | | | F | |
| **Lake Grade** | | | | | | | | | | | **D** | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | F | | F |
| Chlorophyll a | | | D | | D |
| Secchi Depth | | | F | | F |
| **Lake Grade** | | | **F** | | **F** |

Source: Metropolitan Council and STORET data



## July Lake (82-0318) *Browns Creek Watershed District*

July Lake is a small lake located in Washington County. There is little known morphological data available for the lake.

This was the third year that July Lake has been involved in CAMP. 2006 – 2008 are the only years of known available water quality data for the lake.

The lake was monitored 7 times between mid April and early October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

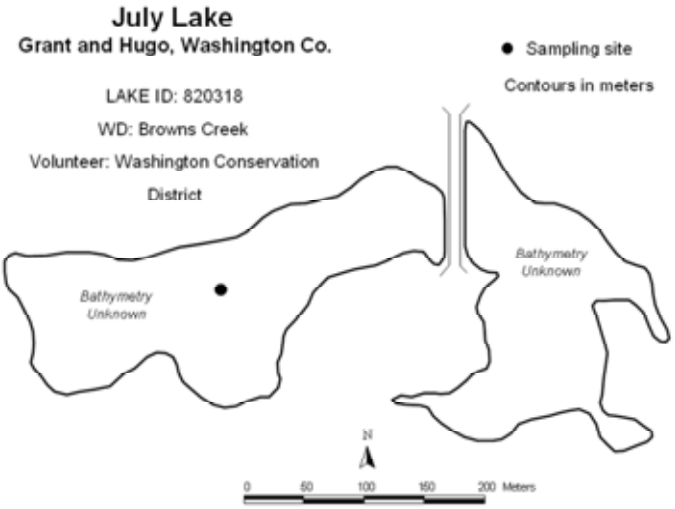
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 61.0 | 31.0 | 91.0 | C |
| **CLA** (µg/l) | 11.5 | 3.1 | 22.0 | B |
| **Secchi** (m) | 1.6 | 1.2 | 1.8 | C |
| **TKN** (mg/l) | 1.48 | 0.82 | 1.70 | |
| | | | ***Lake Grade*** | C |

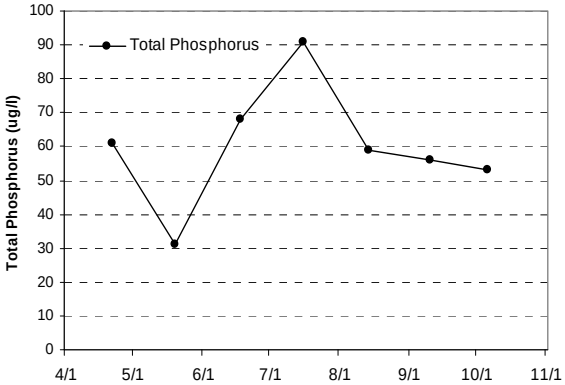
The lake received a lake grade of C for 2008. This is a marked improvement over the previous two years in which the lake received lake grades of F. The 2008 summer-time means for TP, CLA, and Secchi were much improved as well compared to those in 2006 and 2007. Abundance of macrophytes was observed to be greater in 2008 than in 2007. The water level in the lake was observed as normal in 2008 versus the below normal conditions observed in 2007, which is in contrast to most other lakes in the area.

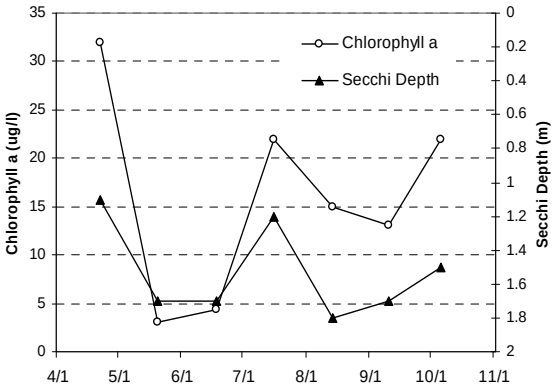
There was a fish kill of bullheads during the spring of 2008. The reduction of the bullhead population may have contributed to the improvement in water clarity via reduction of bioturbation of the bottom sediments by the bullheads. The improved water clarity and reduced sediment bioturbation may also explain the increased abundance of macrophytes observed in 2008.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the lake's information sheet on the next page (ranked on a scale of 1 to 5). The average user perception rankings were 2.0 for physical condition (2- "some algae present"), and 2.8 for recreational suitability (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired"). The 2008 mean perception rankings

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.

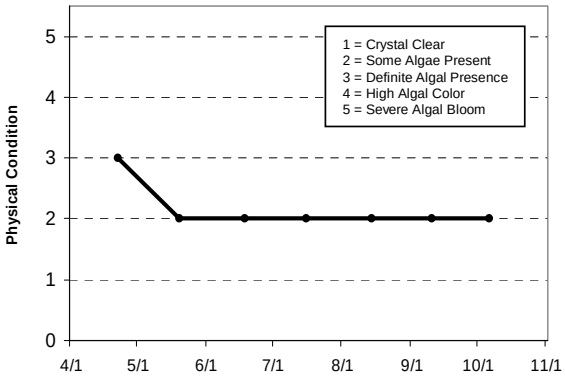



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/22 | 13.4 | 10.8 | 13.91 | 3 | 32 | 61 | | 1.1 | 3 | 4 |
| 5/20 | 17.4 | 15.2 | 6.4 | 0.66 | 3.1 | 31 | | 1.7 | 2 | 3 |
| 6/18 | 22.9 | 18.6 | 4.89 | 0.15 | 4.4 | 68 | | 1.7 | 2 | 3 |
| 7/16 | 25.3 | 21.3 | 8.58 | 0.42 | 22 | 91 | | 1.2 | 2 | 3 |
| 8/14 | 24.2 | 23.2 | 7.38 | 0.78 | 15 | 59 | | 1.8 | 2 | 3 |
| 9/10 | 18.2 | 18.2 | 7.65 | 0.16 | 13 | 56 | | 1.7 | 2 | 2 |
| 10/6 | 14.1 | 13.7 | 12.52 | 0.42 | 22 | 53 | | 1.5 | 2 | 2 |



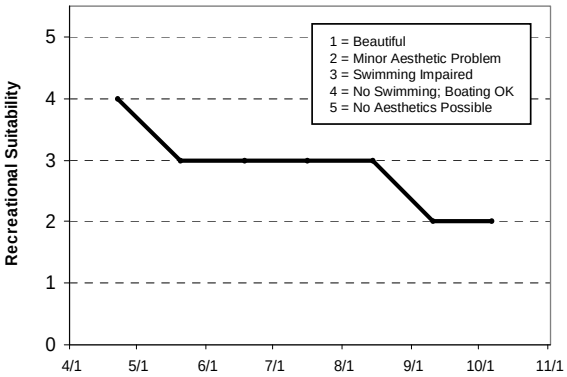

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | F | F | C |
| Chlorophyll a | | | F | F | B |
| Secchi Depth | | | F | F | C |
| **Lake Grade** | | | **F** | **F** | **C** |

Source: Metropolitan Council and STORET data



## Karth Lake (62-0072) *Rice Creek Watershed District*

Karth Lake is located in the City of Arden Hills. There is little physical information available for this lake. A search in STORET showed that the lake was monitored for a variety of parameters on three different dates. Monitoring occurred on one day in July in each of the following years: 1988, 1990, and 1991.

This was the second year that Karth Lake was monitored in the CAMP. The lake was monitored 13 times between early May and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

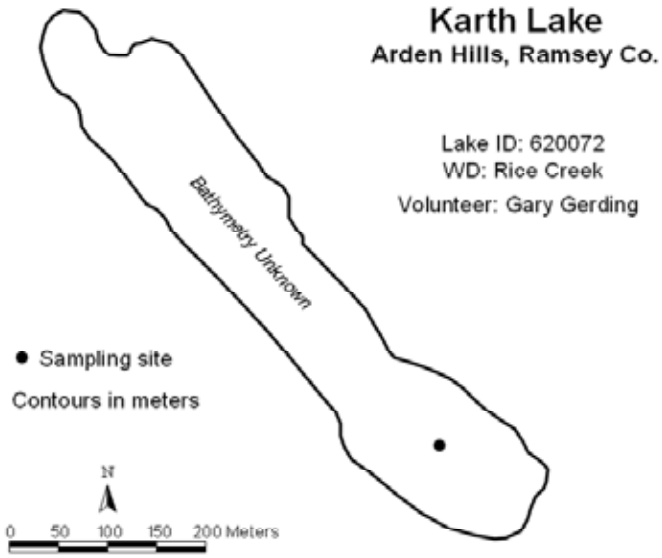
**2008 summer (May-September) data summary**

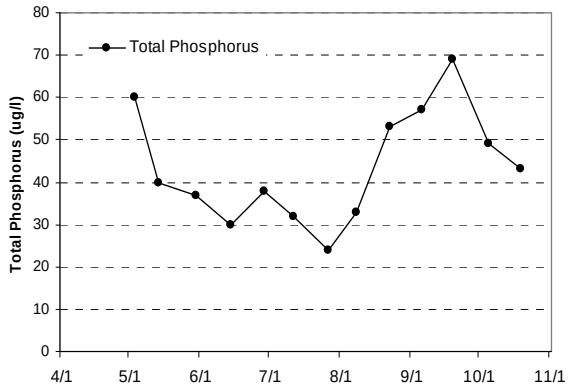
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 43.0 | 24.0 | 69.0 | C |
| **CLA** (µg/l) | 26.5 | 6.1 | 91.0 | C |
| **Secchi** (m) | 1.4 | 0.6 | 2.4 | C |
| **TKN** (mg/l) | 1.43 | 0.97 | 1.90 | |
| | | | ***Lake Grade*** | C |

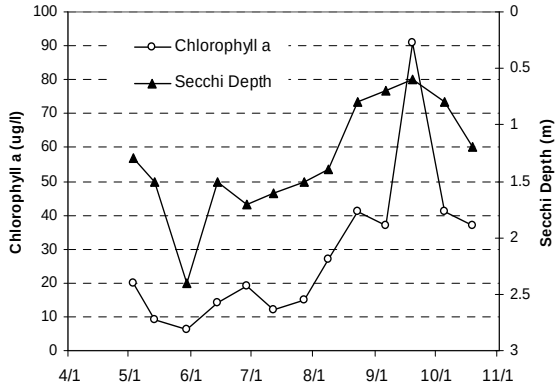
The lake received a lake grade of C for 2008. Further monitoring is suggested to develop a water quality database.

The volunteer(s) monitor ranked their perceptions of the lake's physical and recreational condition on a 1-to-5 scale. The mean perceived physical condition was 2.0 (some algae present), while the mean recreational suitability was 1.8 (between 1- "beautiful" and 2- "minor aesthetic problem").

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.

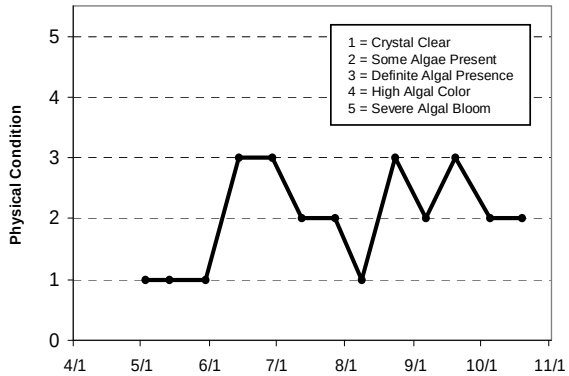



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/3 | 12 | | | | 20 | 60 | | 1.3 | 1 | 1 |
| 5/14 | 16 | | | | 9.2 | 40 | | 1.5 | 1 | |
| 5/30 | 19.7 | | | | 6.1 | 37 | | 2.4 | 1 | 1 |
| 6/14 | 22 | | | | 14 | 30 | | 1.5 | 3 | |
| 6/29 | 24 | | | | 19 | 38 | | 1.7 | 3 | 2 |
| 7/12 | 24.4 | | | | 12 | 32 | | 1.6 | 2 | 2 |
| 7/27 | 27 | | | | 15 | 24 | | 1.5 | 2 | 2 |
| 8/8 | 26 | | | | 27 | 33 | | 1.4 | 1 | 1 |
| 8/23 | 25.3 | | | | 41 | 53 | | 0.8 | 3 | 3 |
| 9/6 | 22.4 | | | | 37 | 57 | | 0.7 | 2 | 2 |
| 9/19 | 21.8 | | | | 91 | 69 | | 0.6 | 3 | 2 |
| 10/5 | 16 | | | | 41 | 49 | | 0.8 | 2 | 2 |
| 10/19 | 14.2 | | | | 37 | 43 | | 1.2 | 2 | 2 |



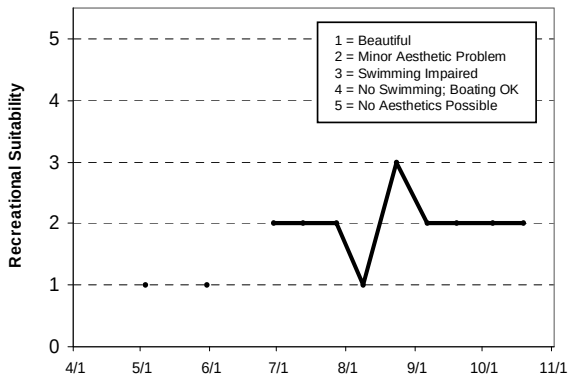

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | C | C |
| Chlorophyll a | | | | C | C |
| Secchi Depth | | | | D | C |
| **Lake Grade** | | | | **C** | **C** |

Source: Metropolitan Council and STORET data



## Keller Lake [Burnsville] (19-0025) *Black Dog Watershed Management Commission*

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). The lake's mean depth of 1.1 m (3.7 feet) and surface area translates to an approximate lake volume of 203 ac-ft. Because the maximum depth is 3.0 m, the entire lake area is considered littoral, which is the area of aquatic plant dominance. The lake does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the lake's water column. The MN DNR has designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*).

The area of the contributing watershed to the lake is 1,387 acres which excludes the surface area of the lake (BDWMO). The contributing watershed is nearly entirely developed. The watershed-to-lake size ratio is approximately 25:1. The greater the ratio, the greater the potential stress on the lake from surface runoff.

The lake was monitored in the past by Council staff as part of a study on Crystal Lake. Keller lake is tributary to Crystal Lake. Keller Lake was again monitored by Council staff in 2006.

The lake was monitored 8 times between mid May and late August. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 34.5 | 18.0 | 48.0 | C |
| **CLA** (µg/l) | 5.2 | 2.5 | 8.0 | A |
| **Secchi** (m) | 2.0 | 1.7 | 2.3 | C |
| **TKN** (mg/l) | 1.47 | 1.10 | 1.70 | |
| | | | ***Lake Grade*** | B |

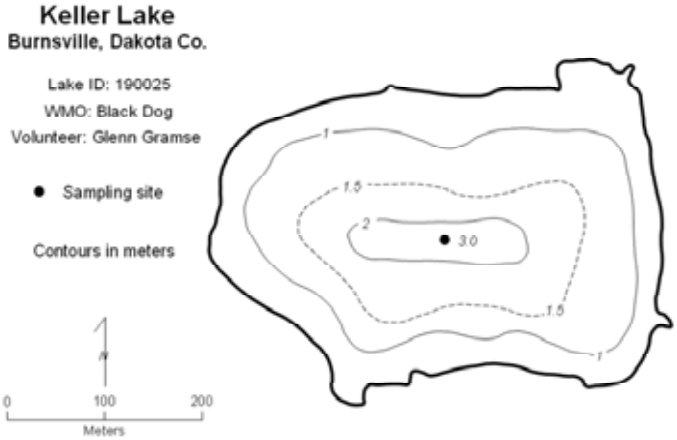
The lake received a lake grade of B for 2008. However, the 2008 lake grade does not include the entire summer time season (May – September) because the monitoring activities ceased at the end of August. Therefore, comparison of this year's lake grade with previous years' lake grades should be done with caution since the 2008 lake grade estimates water quality for a shortened monitoring season. The volunteer noted that his monitoring activities were abandoned because of the lack of access to the monitoring site as caused by a great abundance of macrophytes inhibiting the ability to paddle a canoe.

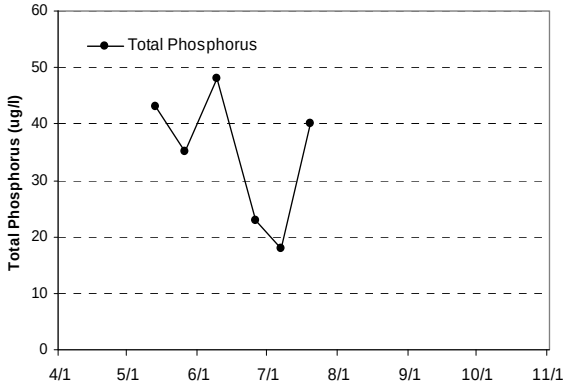
Similar to past years, the 2008 water clarity would have been greater except on many monitoring events the lake's excessive submergent macrophyte growth obscured the Secchi disk. The lake's 2008 water clarity was actually better than that represented by the summer mean and associated water clarity grade.

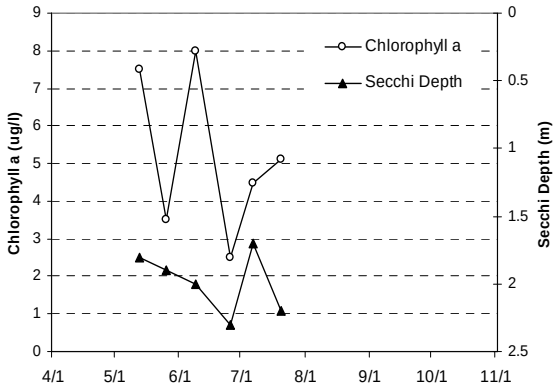
The volunteer monitor ranked their perceptions of the lake's physical and recreational condition on a 1-to-5 scale. The mean perceived physical condition was 2.7 (between 2- "some algae present" and 3- "definite algae present"), while the mean recreational suitability was 4.0 ("no swimming - boating ok").

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 Internet information 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.

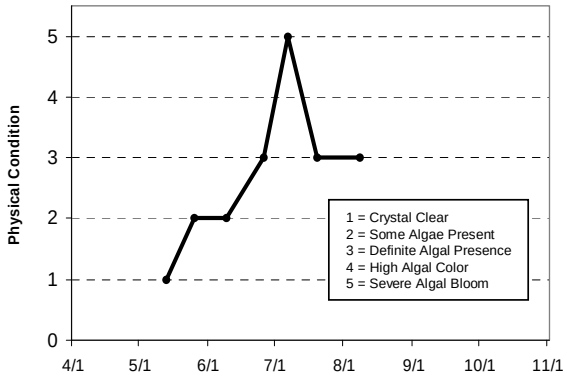



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/13 | 15.1 | | | | 7.5 | 43 | | 1.8 | 1 | 1 |
| 5/26 | 20.7 | | | | 3.5 | 35 | | 1.9 | 2 | 3 |
| 6/9 | 24.7 | | | | 8 | 48 | | 2 | 2 | 4 |
| 6/26 | 26.7 | | | | 2.5 | 23 | | 2.3 | 3 | 5 |
| 7/7 | 26.5 | | | | 4.5 | 18 | | 1.7 | 5 | 5 |
| 7/20 | 29.1 | | | | 5.1 | 40 | | 2.2 | 3 | 5 |
| 8/8 | | | | | | | | | 3 | 5 |
| 8/25 | | | | | | | | | | |



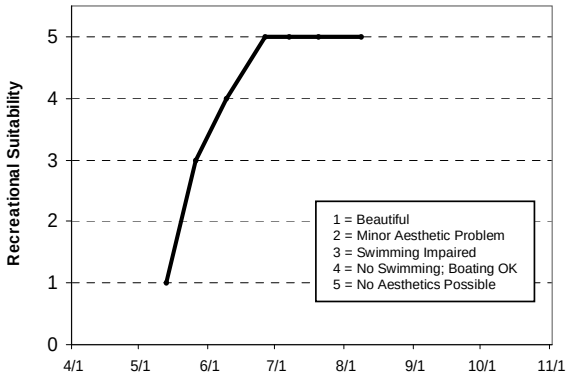

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | D | D | C | D | D | D | C | D |
| Chlorophyll a | | | | | F | C | A | C | C | C | B | C |
| Secchi Depth | | | | | D | D | C | D | D | D | D | D |
| **Lake Grade** | | | | | **D** | **D** | **B** | **D** | **D** | **D** | **C** | **D** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | C | C | D | D | C |
| Chlorophyll a | B | B | D | B | A |
| Secchi Depth | C | C | D | C | C |
| **Lake Grade** | **C** | **C** | **D** | **C** | **B** |

Source: Metropolitan Council and STORET data



## Kingsley Lake (19-0030) *Black Dog Watershed Management Commission*

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 (shoreline length of 1.7 miles), a maximum depth of 4.0 m (13 feet), and a contributing watershed of 193 acres. The resulting watershed-to-lake size ratio is a rather small at 4:1. The greater the ratio the greater affect of surface runoff has on the water quality of the lake. Because of the shallowness of the lake, the entire lake is considered littoral, which is area of aquatic vegetation dominance, and never develops and maintains a thermocline.

The lake was monitored by Council staff in 1993. Kingsley Lake was monitored 13 times between late April and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

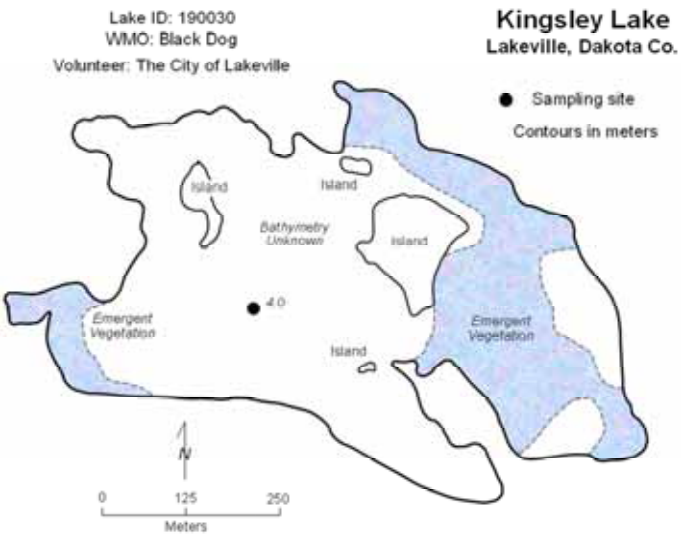
**2008 summer (May-September) data summary**

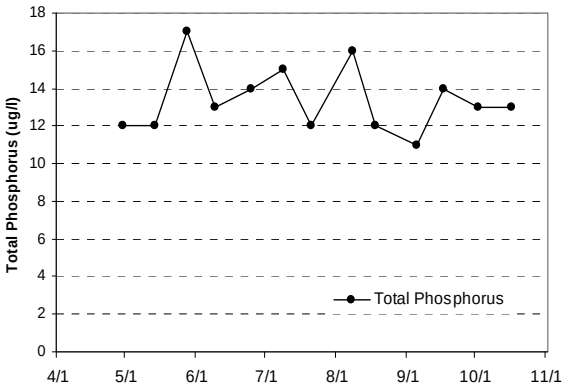
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 13.6 | 11.0 | 17.0 | A |
| **CLA** (µg/l) | 3.1 | 2.1 | 4.3 | A |
| **Secchi** (m) | 2.9 | 2.4 | 3.2 | B |
| **TKN** (mg/l) | 0.64 | 0.34 | 0.99 | |
| | | | ***Lake Grade*** | A |

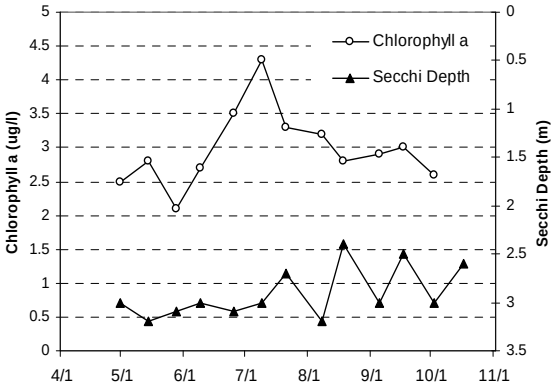
Similar to past years, the Secchi transparency in 2008 would have been greater except that on many monitoring events either the lake's excessive submergent macrophyte growth obscured the Secchi disk, or the Secchi was visible while resting on the lake bottom. For these reasons, the water clarity may have been actually that of an A grade. On the basis of the water quality database, the lake's water quality appears represented by a lake grade of A or B. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008).

The physical and recreational conditions of the lake as perceived by the volunteer(s) were ranked on a 1-to-5 scale. The mean physical condition ranking was 1.3 (between 1- "crystal clear" and 2- "some algae present"), while the mean recreational suitability ranking was 1.1 (between 1-"beautiful" and 2- "minor aesthetic problem").

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.

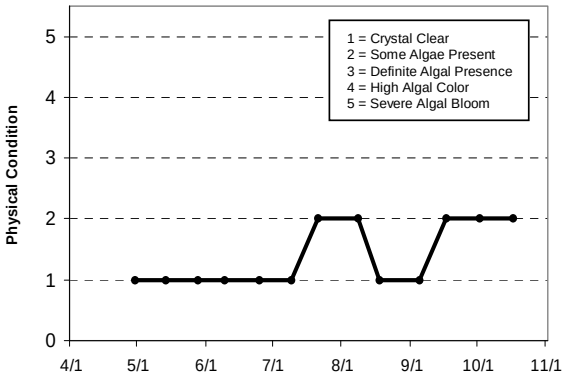



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/30 | 11.7 | | | | 2.5 | 12 | | 3 | 1 | 1 |
| 5/14 | 16.1 | | | | 2.8 | 12 | | 3.2 | 1 | 1 |
| 5/28 | 17.2 | | | | 2.1 | 17 | | 3.1 | 1 | 1 |
| 6/9 | 20.6 | | | | 2.7 | 13 | | 3 | 1 | 1 |
| 6/25 | 26.7 | | | | 3.5 | 14 | | 3.1 | 1 | 1 |
| 7/9 | 25.6 | | | | 4.3 | 15 | | 3 | 1 | 1 |
| 7/21 | 26.7 | | | | 3.3 | 12 | | 2.7 | 2 | 1 |
| 8/8 | 25.6 | | | | 3.2 | 16 | | 3.2 | 2 | 2 |
| 8/18 | 24.1 | | | | 2.8 | 12 | | 2.4 | 1 | 1 |
| 9/5 | 19 | | | | 2.9 | 11 | | 3 | 1 | 1 |
| 9/17 | 19 | | | | 3 | 14 | | 2.5 | 2 | 1 |
| 10/2 | 13 | | | | 2.6 | 13 | | 3 | 2 | 1 |
| 10/17 | 11 | | | | | 13 | | 2.6 | 2 | 1 |



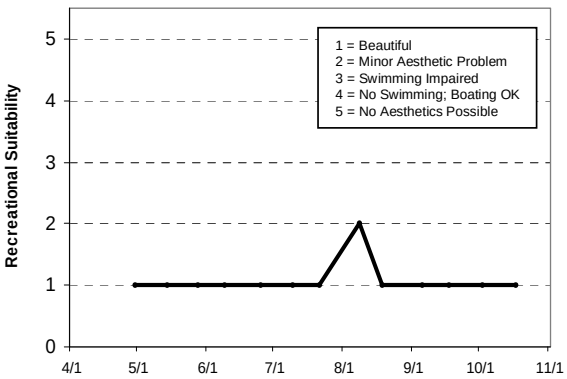

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | B | | B | A | A | | | A | A | A | B |
| Chlorophyll a | | A | | A | A | A | | | A | A | A | A |
| Secchi Depth | | A | | B | B | B | | | B | C | B | B |
| **Lake Grade** | | **A** | | **B** | **A** | **A** | | | **A** | **B** | **A** | **B** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | A | A | B | A | A |
| Chlorophyll a | A | A | A | A | A |
| Secchi Depth | B | B | B | B | B |
| **Lake Grade** | **A** | **A** | **B** | **A** | **A** |

Source: Metropolitan Council and STORET data



## Kismet Lake (82-0333) *Browns Creek Watershed District*

Kismet Lake is located in Washington County. This relatively small lake has a maximum depth of approximately 3.7 m (12 feet). Because of the shallowness of the lake the whole lake is considered littoral zone, which is the 0 – 15 feet depth zone dominated by aquatic vegetation. The known available lake data found through a search for historical water quality was the 1998-2007 CAMP data.

The lake was monitored 14 times between late April and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

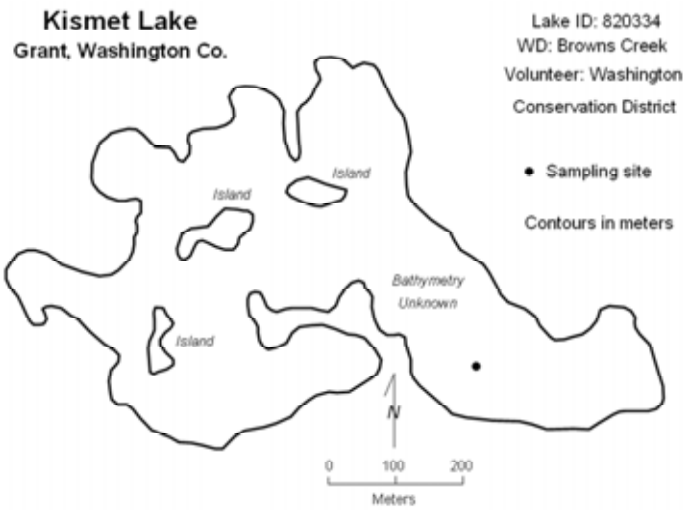
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 67.4 | 34.0 | 125.0 | C |
| **CLA** (µg/l) | 50.7 | 5.1 | 120.0 | D |
| **Secchi** (m) | 1.5 | 1.1 | 2.0 | C |
| **TKN** (mg/l) | 1.31 | 0.72 | 1.90 | |
| | | | ***Lake Grade*** | C |

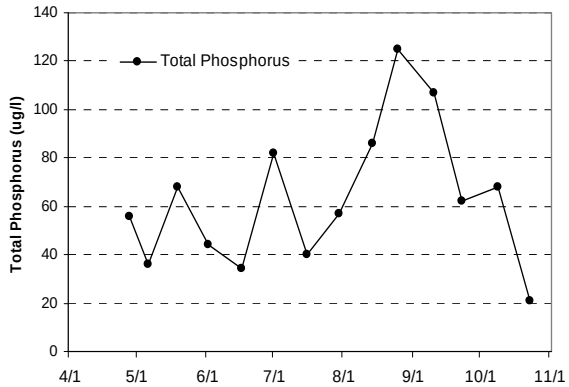
The lake received a lake grade of C for 2008, which is similar to previous years' lake grades. However the 2008 CLA grade was the worst grade (D) received for this lake since CAMP monitoring began in 1998. Continued monitoring is suggested to determine if the lower CLA grade is an anomaly or an indicator of a potential trend. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed a statistically significant improving trend in water clarity (MPCA 2008).

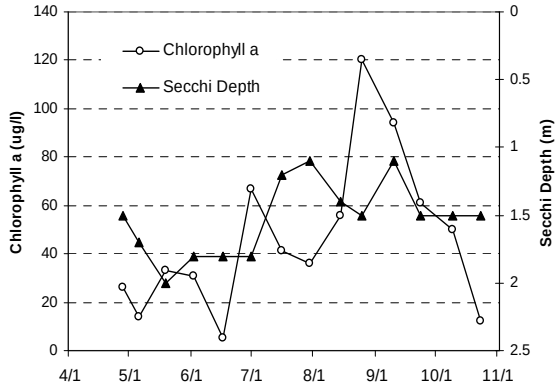
The perceived physical and recreational conditions of the lake, recorded by the volunteers, were ranked on a 1-to-5 scale. The mean physical condition ranking was 1.9 (between 1- "crystal clear" and 2- "some algae present"). The mean recreational suitability ranking was 2.2 (between 2- "minor aesthetic problem and 3- "swimming slightly impaired").

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.

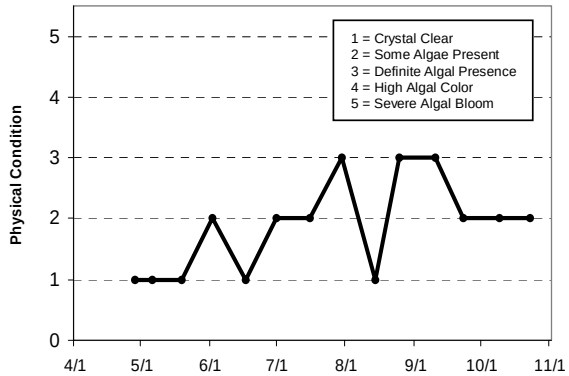



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/28 | 8 | 8 | 11.38 | 9.01 | 26 | 56 | | 1.5 | 1 | 2 |
| 5/6 | 16.5 | 10.6 | 10.7 | 0.99 | 14 | 36 | | 1.7 | 1 | 2 |
| 5/19 | 16.1 | 15.1 | 8.06 | 0.76 | 33 | 68 | | 2 | 1 | 2 |
| 6/2 | 22 | 16.8 | 8.71 | 0.28 | 31 | 44 | | 1.8 | 2 | 2 |
| 6/17 | 22.7 | 19.4 | 8.35 | 0.24 | 5.1 | 34 | | 1.8 | 1 | 2 |
| 7/1 | 27.2 | 22.9 | 7.62 | 0.9 | 67 | 82 | | 1.8 | 2 | 2 |
| 7/16 | 25 | 20 | 7.16 | 0.31 | 41 | 40 | | 1.2 | 2 | 3 |
| 7/30 | 28.3 | 20.6 | 7.32 | 0.26 | 36 | 57 | | 1.1 | 3 | 3 |
| 8/14 | 23.7 | 21.7 | 6.11 | 1.54 | 56 | 86 | | 1.4 | 1 | 1 |
| 8/25 | 24.8 | 20 | 6.59 | 0.25 | 120 | 125 | | 1.5 | 3 | 2 |
| 9/10 | 17.9 | 16.3 | 7.29 | 0.36 | 94 | 107 | | 1.1 | 3 | 3 |
| 9/23 | 20.3 | 17.7 | 7.67 | 0.33 | 61 | 62 | | 1.5 | 2 | 2 |
| 10/9 | 13.5 | 13 | 9.15 | 5.84 | 50 | 68 | | 1.5 | 2 | 3 |
| 10/23 | 8.8 | 9.1 | 9.44 | 0.71 | 12 | 21 | | 1.5 | 2 | 2 |



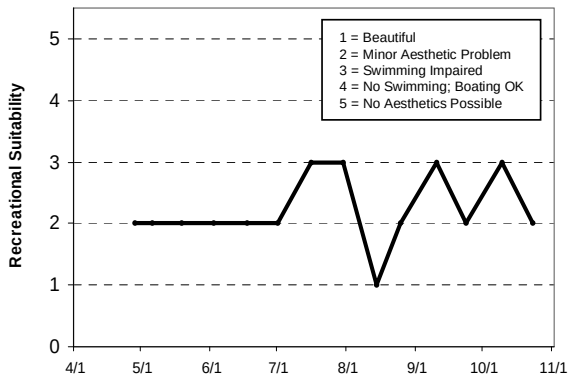

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | C | C | D | C | C | B |
| Chlorophyll a | | | | | | | C | C | C | B | B | B |
| Secchi Depth | | | | | | | C | C | C | C | C | B |
| **Lake Grade** | | | | | | | **C** | **C** | **C** | **C** | **C** | **B** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | B | C | C | C | C |
| Chlorophyll a | A | B | C | C | D |
| Secchi Depth | B | C | C | C | C |
| **Lake Grade** | **B** | **C** | **C** | **C** | **C** |

Source: Metropolitan Council and STORET data



## Klawitter Pond (82-0368) *Valley Branch Watershed District*

Klawitter Pond is a 4.5-acre lake located within the City of Lake Elmo (Washington County). Because of the shallowness of the lake, it is considered entirely littoral, which is the 0-15 feet depth zone 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 lake's surface area and watershed area of 168 acres translate to a 37:1 watershed-to-lake area ratio. Generally the larger the ratio, the greater the potential stress on the lake from surface runoff.

Other than for the 2002-2007 CAMP data, a search through the STORET nationwide water quality database for data on the lake came up empty.

The lake was monitored 13 times between mid May and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

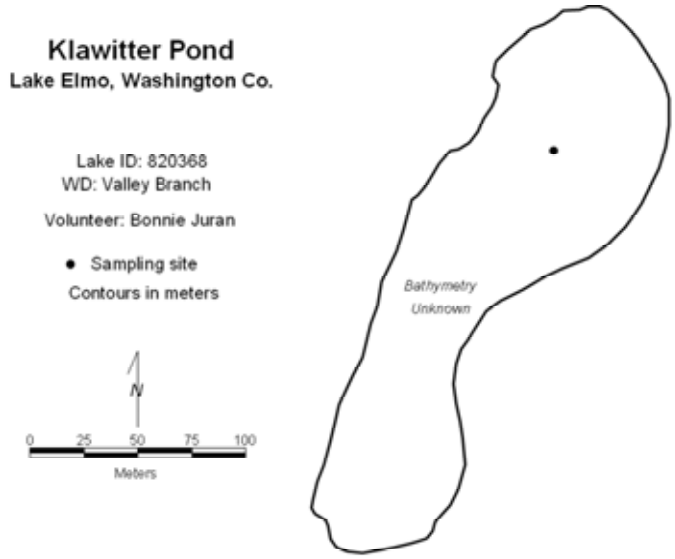
**2008 summer (May-September) data summary**

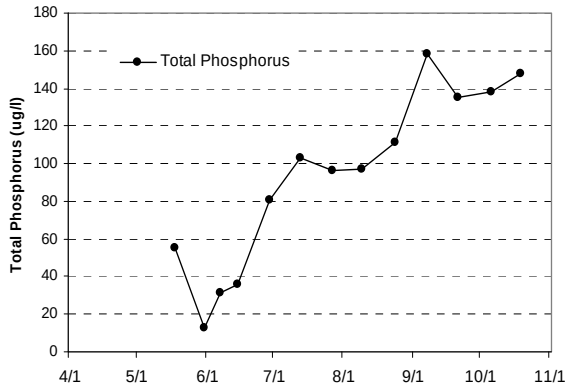
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 83.3 | 13.0 | 158.0 | D |
| **CLA** (µg/l) | 41.7 | 4.5 | 97.0 | C |
| **Secchi** (m) | 0.6 | 0.3 | 1.0 | F |
| **TKN** (mg/l) | 3.94 | 1.20 | 18.00 | |
| | | | ***Lake Grade*** | D |

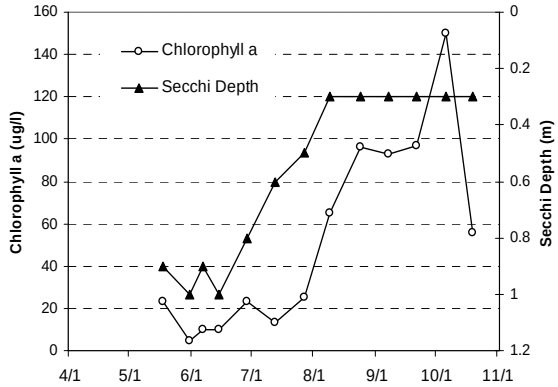
The lake received a lake grade of D for 2008, which is similar to previous years' lake grades. Based on the limited water quality database for the lake, it appears to be represented by a lake grade of D. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

Throughout the monitoring period, the volunteers' opinions of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page. The mean physical condition ranking was 3.2 (between 3- "definite algae present" and 4- "high algal color"), while the mean recreational suitability ranking was 2.5 (between 2- "minor aesthetic problem and 3- "swimming slightly impaired").

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.

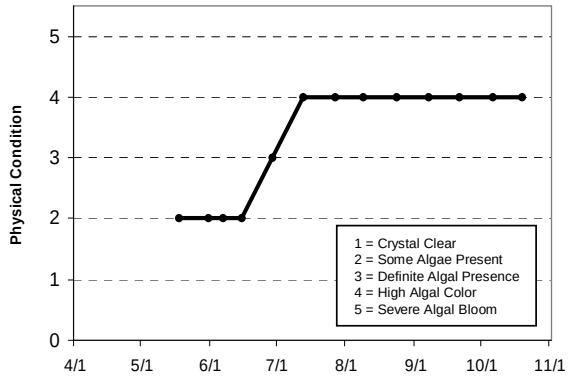



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/18 | 19.6 | | | | 23 | 55 | | 0.9 | 2 | 2 |
| 5/31 | 22.2 | | | | 4.5 | 13 | | 1 | 2 | 2 |
| 6/7 | 20.6 | | | | 9.8 | 31 | | 0.9 | 2 | 2 |
| 6/15 | 21.8 | | | | 9.9 | 36 | | 1 | 2 | 2 |
| 6/29 | 25.2 | | | | 23 | 81 | | 0.8 | 3 | 2 |
| 7/13 | 25.8 | | | | 13 | 103 | | 0.6 | 4 | 3 |
| 7/27 | 27.8 | | | | 25 | 96 | | 0.5 | 4 | 3 |
| 8/9 | 27.1 | | | | 65 | 97 | | 0.3 | 4 | 3 |
| 8/24 | 25.1 | | | | 96 | 111 | | 0.3 | 4 | 3 |
| 9/7 | 20.6 | | | | 93 | 158 | | 0.3 | 4 | 3 |
| 9/21 | 19.7 | | | | 97 | 135 | | 0.3 | 4 | 3 |
| 10/6 | 15.2 | | | | 150 | 138 | | 0.3 | 4 | 3 |
| 10/19 | 13.2 | | | | 56 | 148 | | 0.3 | 4 | 3 |



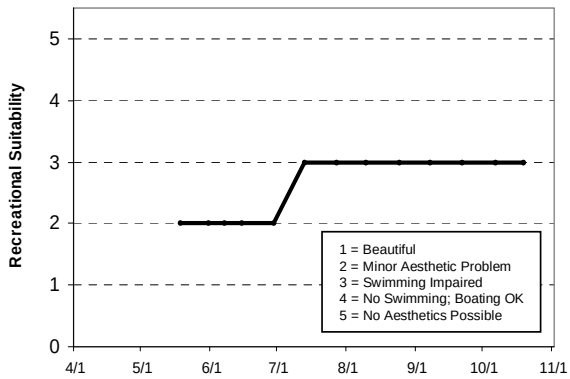

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | D | D |
| Chlorophyll a | | | | | | | | | | | B | C |
| Secchi Depth | | | | | | | | | | | D | F |
| **Lake Grade** | | | | | | | | | | | **C** | **D** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | D | D | D | D | D |
| Chlorophyll a | C | C | C | C | C |
| Secchi Depth | D | D | F | F | F |
| **Lake Grade** | **D** | **D** | **D** | **D** | **D** |

Source: Metropolitan Council and STORET data



## Kramer Pond (82-0117) *Valley Branch Watershed District*

Kramer Pond is located within the City of Lake Elmo (Washington County). Little morphological information is available for the lake. The maximum depth at the sampling point is 1.8 m (6.0 feet). Because of the shallowness of the lake, the entire surface area is considered littoral zone, which is the 0-15 feet depth zone 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.

No water quality data for the lake was available in the STORET nationwide water quality database.

The lake was monitored 7 times between late April and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

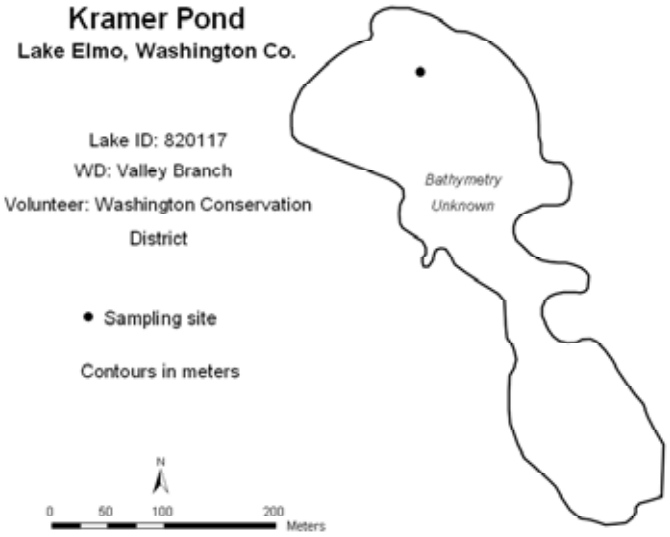
**2008 summer (May-September) data summary**

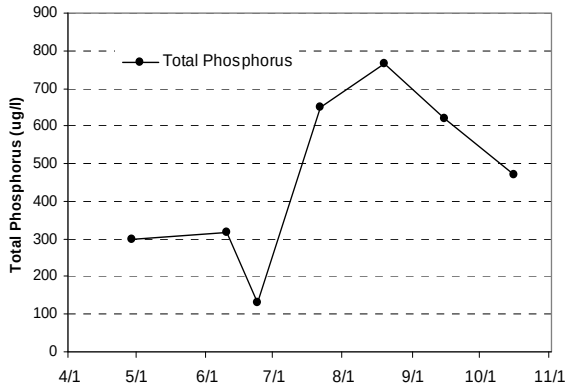
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 496.0 | 130.0 | 764.0 | F |
| **CLA** (µg/l) | 183.0 | 33.0 | 320.0 | F |
| **Secchi** (m) | 0.5 | 0.2 | 1.1 | F |
| **TKN** (mg/l) | 5.50 | 3.50 | 6.90 | |
| | | | ***Lake Grade*** | F |

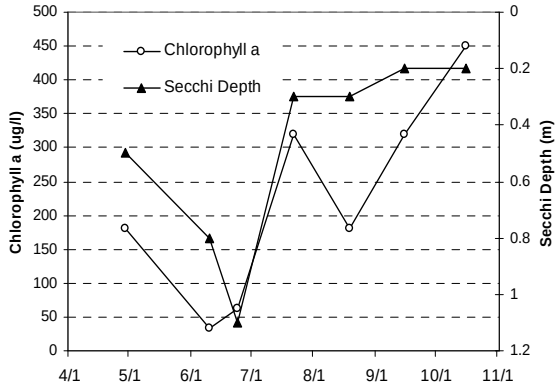
The lake received a lake grade of F for 2008. Additional years of monitoring are suggested to build a water quality database so to better understand the lake's water quality and determine potential water quality trends.

Throughout the monitoring period, the volunteers' opinions of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page. The mean physical condition ranking was 3.4 (between 3- "definite algae present" and 4- "high algal color"), while the mean recreational suitability ranking was 4.0 ("no swimming/boating ok").

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.

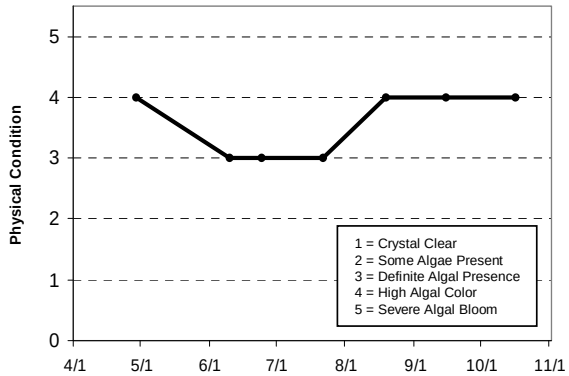



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/29 | 6.4 | 6.2 | 14.83 | 1.03 | 180 | 300 | | 0.5 | 4 | 4 |
| 6/10 | 20.8 | 20.7 | 6.19 | 6.15 | 33 | 318 | | 0.8 | 3 | 4 |
| 6/24 | 25.4 | 23.2 | 10.87 | 0.33 | 62 | 130 | | 1.1 | 3 | 4 |
| 7/22 | 25.8 | 24.3 | 9.93 | 0.16 | 320 | 648 | | 0.3 | 3 | 4 |
| 8/19 | 25 | 22.9 | 5.46 | 0.14 | 180 | 764 | | 0.3 | 4 | 4 |
| 9/15 | 17.5 | 15.9 | 10.49 | 0.26 | 320 | 620 | | 0.2 | 4 | 4 |
| 10/16 | 10.1 | 10.8 | 10.7 | 0.32 | 450 | 472 | | 0.2 | 4 | 4 |



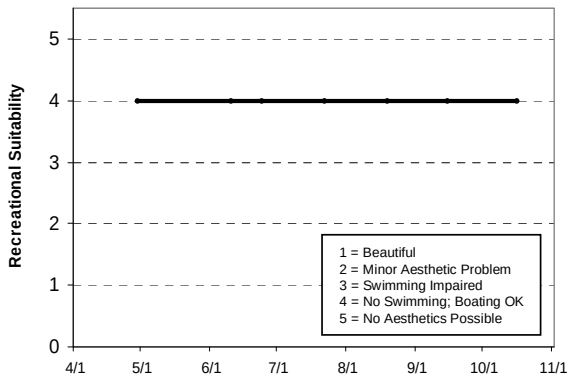

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | | F |
| Chlorophyll a | | | | | F |
| Secchi Depth | | | | | F |
| **Lake Grade** | | | | | **F** |

Source: Metropolitan Council and STORET data



## La Lake (82-0097) *City of Woodbury*

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). Because of the shallowness of the lake, it is considered littoral zone, which is the 0-15 feet depth zone of the lake dominated by aquatic vegetation. Furthermore, the lake does not maintain a thermocline which is a density gradient caused by changing water temperatures throughout the lake's water column.

The lake was monitored 11 times between mid April and early October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

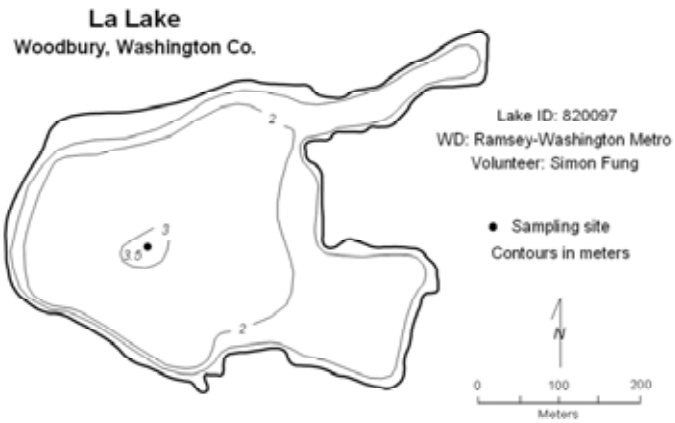
**2008 summer (May-September) data summary**

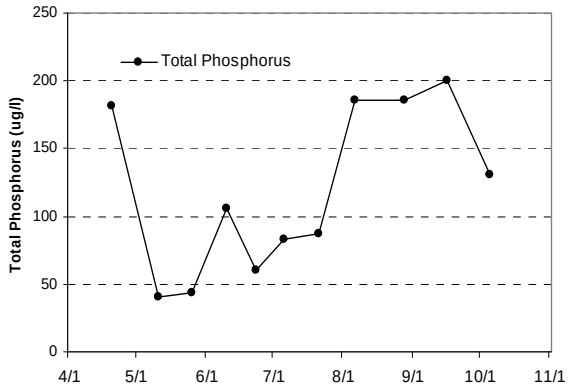
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 110.2 | 40.0 | 200.0 | D |
| **CLA** (µg/l) | 12.6 | 3.2 | 32.0 | B |
| **Secchi** (m) | 1.8 | 0.7 | 2.5 | C |
| **TKN** (mg/l) | 1.17 | 0.82 | 2.00 | |
| | | | ***Lake Grade*** | C |

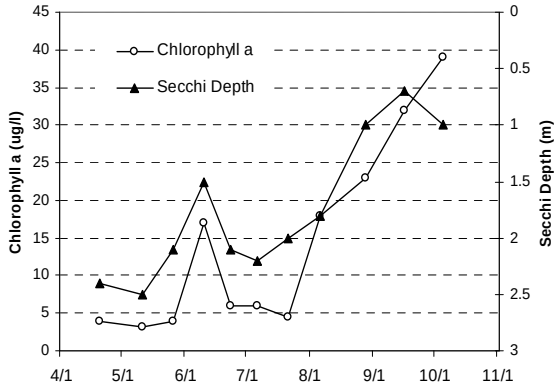
The lake received a lake grade of C for 2008. The 2008 lake grade and the parameter grades were a return to similar grades received in previous years (e.g. 2002, 1996). The water quality for 2008 appears to be an improvement over the water quality observed in 2007. Water quality for the lake has experienced annual variability as indicated by its water quality database. The lake's water quality seems to be represented by lake grades of C or B. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed a statistically significant declining trend in water clarity (MPCA 2008).

Throughout the monitoring period, the volunteers' opinions of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page. The mean physical condition ranking was 3.0 (3- "definite algae present"), while the mean recreational suitability ranking was 3.3 (between 3- "swimming slightly impaired" and 4- "no swimming; boating ok").

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.

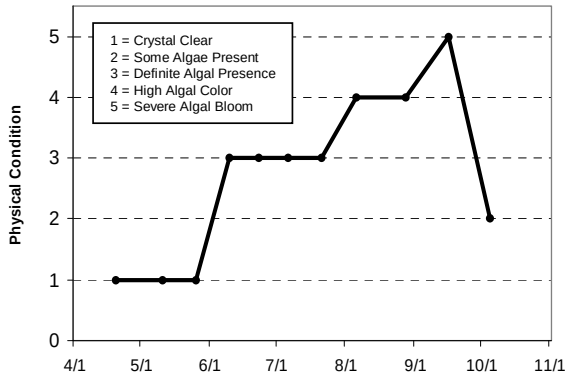



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/20 | 9.3 | | | | 4 | 182 | | 2.4 | 1 | 1 |
| 5/11 | 16.3 | | | | 3.2 | 40 | | 2.5 | 1 | 1 |
| 5/26 | 19.7 | | | | 3.9 | 44 | | 2.1 | 1 | 1 |
| 6/10 | 22.6 | | | | 17 | 106 | | 1.5 | 3 | 4 |
| 6/23 | 25 | | | | 6 | 60 | | 2.1 | 3 | 4 |
| 7/6 | 28.2 | | | | 6 | 83 | | 2.2 | 3 | 4 |
| 7/21 | 27 | | | | 4.4 | 87 | | 2 | 3 | 4 |
| 8/6 | 25.6 | | | | 18 | 186 | | 1.8 | 4 | 4 |
| 8/28 | 24 | | | | 23 | 186 | | 1 | 4 | 4 |
| 9/16 | 20.8 | | | | 32 | 200 | | 0.7 | 5 | 4 |
| 10/5 | 14.2 | | | | 39 | 131 | | 1 | 2 | 4 |



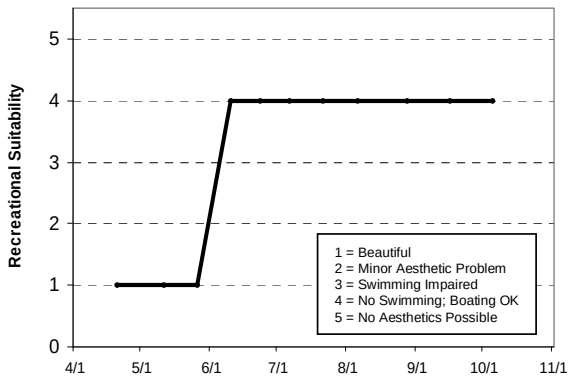

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | C | C | D | D | C | D | D | D | D | C |
| Chlorophyll a | | | B | A | B | C | B | C | C | C | B | C |
| Secchi Depth | | | 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 |
|---|---|---|---|---|---|
| Total Phosphorus | | C | D | D | D |
| Chlorophyll a | | B | C | D | B |
| Secchi Depth | | C | C | D | C |
| **Lake Grade** | | **C** | **C** | **D** | **C** |

Source: Metropolitan Council and STORET data



## Lac Lavon Lake (19-0446) *Black Dog Watershed Management Commission*

Lac Lavon is located within the City of Apple Valley (Dakota County). It is considered a Priority Lake by the Metropolitan Council for its exceptional water clarity. The lake is an abandoned gravel pit maintained by groundwater (MDNR 1996). The lake has a surface area of 55 acres and a maximum depth of 9.8 m (32 feet). Approximately 65 percent of the lake is considered littoral zone, which is the 0 – 15 feet depth zone of the lake that dominated by aquatic vegetation. The lake has been designated by the Minnesota DNR as being infested with the aquatic plants Eurasian Water Milfoil (*Myriophyllum spicatum*) and Brittle Naiad (*Najas minor*).

This was the twelfth year that Lac Lavon has been involved in the CAMP. The only other known water quality data available for the lake were Secchi transparency data collected in 1989-1991.

Lac Lavon was monitored 12 times between mid April and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

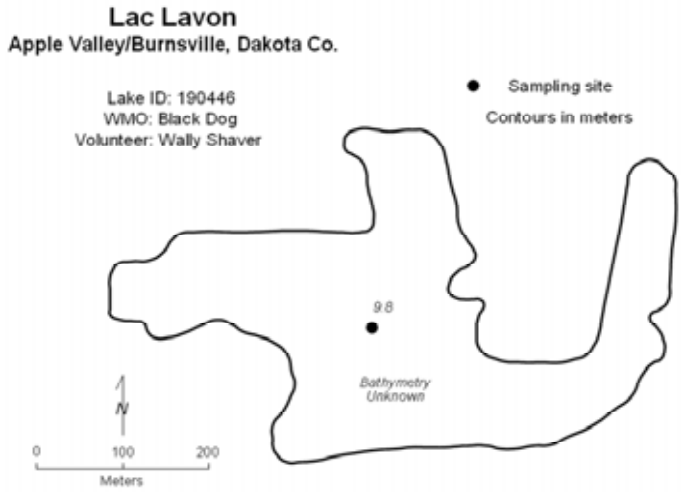
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 33.3 | 11.0 | 151.0 | C |
| **CLA** (µg/l) | 5.8 | 2.4 | 17.0 | A |
| **Secchi** (m) | 3.3 | 1.9 | 4.6 | A |
| **TKN** (mg/l) | 1.30 | 0.51 | 3.10 | |
| | | | ***Lake Grade*** | B |

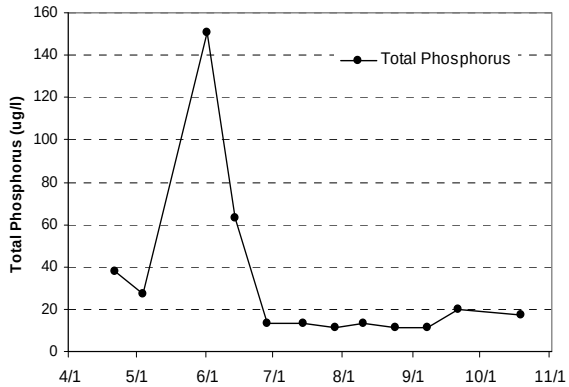
The lake received a lake grade of B for 2008, which is the first year the lake received a lake grade other than A. The main cause for the lower lake grade was the elevated concentrations of TP observed during the month of June 2008. There were two elevated TP concentrations for the sampling weeks in June. They were of sufficient magnitude to shift the TP grade from a typical A to a C. The TP concentrations for the other months in 2008, which are indicative of a TP grade of A, were similar in magnitude as the same months in previous years. It is possible that the elevated TP concentrations were caused by enhanced TP loading from one or more surface runoff events during late May or early June. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008).

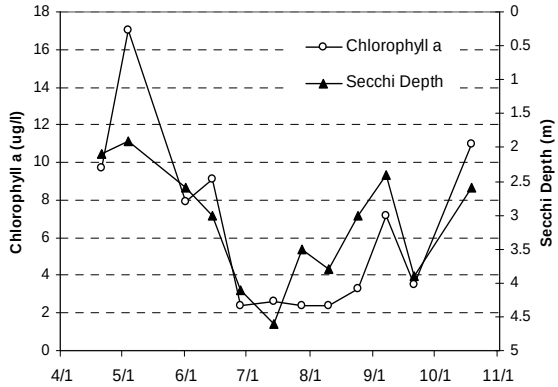
Throughout the monitoring period, the volunteers' opinions of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. These user perception rankings are shown on the lake information sheet. The mean physical condition ranking was 1.0 (1-"crystal clear"), while the mean recreational suitability ranking was 1.0 (1- "beautiful").

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.

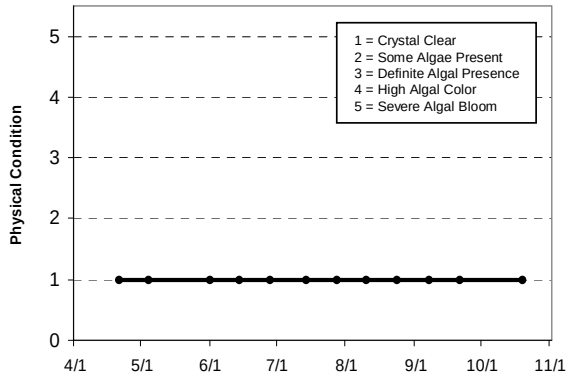



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/21 | 10.8 | | | | 9.7 | 38 | | 2.1 | 1 | 1 |
| 5/4 | 10.2 | | | | 17 | 27 | | 1.9 | 1 | 1 |
| 6/1 | 19.8 | | | | 7.9 | 151 | | 2.6 | 1 | 1 |
| 6/14 | 19.7 | | | | 9.1 | 63 | | 3 | 1 | 1 |
| 6/28 | 23.5 | | | | 2.4 | 13 | | 4.1 | 1 | 1 |
| 7/14 | 25.8 | | | | 2.6 | 13 | | 4.6 | 1 | 1 |
| 7/28 | 27 | | | | 2.4 | 11 | | 3.5 | 1 | 1 |
| 8/10 | 25.6 | | | | 2.4 | 13 | | 3.8 | 1 | 1 |
| 8/24 | 24.7 | | | | 3.3 | 11 | | 3 | 1 | 1 |
| 9/7 | 20.5 | | | | 7.2 | 11 | | 2.4 | 1 | 1 |
| 9/21 | 20.6 | | | | 3.5 | 20 | | 3.9 | 1 | 1 |
| 10/19 | 13.8 | | | | 11 | 17 | | 2.6 | 1 | 1 |



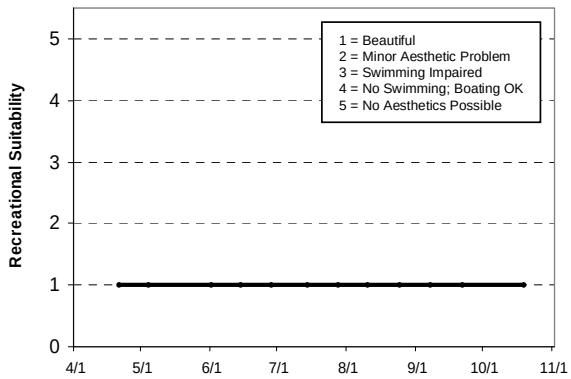

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | A | A | A |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | A | A | A | A | B | A | A |
| Chlorophyll a | | | | | | A | A | A | A | A | A | A |
| Secchi Depth | | | | | | A | A | A | A | A | A | A |
| **Lake Grade** | | | | | | **A** | **A** | **A** | **A** | **A** | **A** | **A** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | A | A | A | A | C |
| Chlorophyll a | A | A | A | A | A |
| Secchi Depth | A | A | A | A | A |
| **Lake Grade** | **A** | **A** | **A** | **A** | **B** |

Source: Metropolitan Council and STORET data



## Lake Forest (62-0187) *Rice Creek Watershed District*

Lake Forest is located within the City of New Brighton (Ramsey County). Little morphological information is available for the lake. No historical water quality data for the lake was available in the STORET nationwide water quality database.

The lake was monitored 12 times between mid May and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

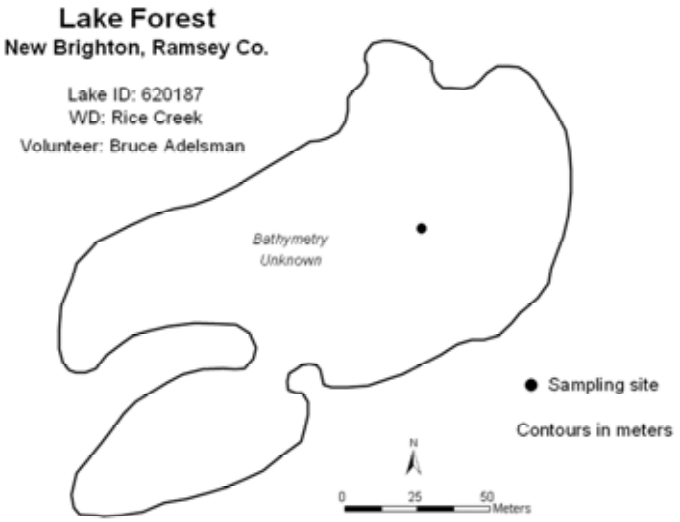
**2008 summer (May-September) data summary**

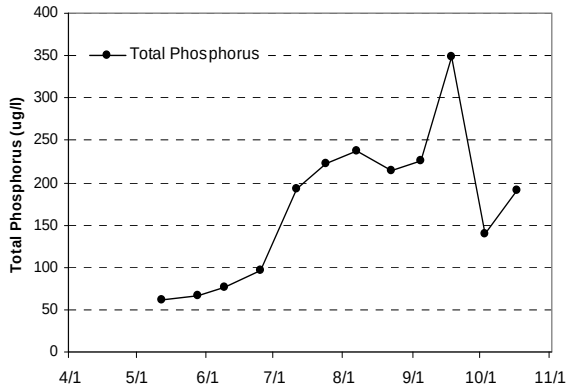
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 174.2 | 62.0 | 348.0 | F |
| **CLA** (µg/l) | 151.3 | 9.0 | 340.0 | F |
| **Secchi** (m) | 0.7 | 0.2 | 1.5 | F |
| **TKN** (mg/l) | 3.15 | 1.40 | 5.10 | |
| | | | ***Lake Grade*** | F |

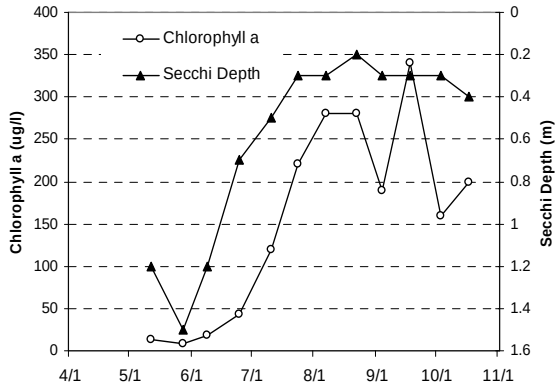
The lake received a lake grade of F for 2008. Additional years of monitoring are suggested to build a water quality database to better understand the lake's water quality and determine potential water quality trends.

Throughout the monitoring period, the volunteers' opinions of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page. The mean physical condition ranking was 3.2 (between 3- "definite algae present" and 4- "high algal color"), while the mean recreational suitability ranking was 3.2 (between 3- "swimming slightly impaired and 4- "no swimming/boating ok").

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.

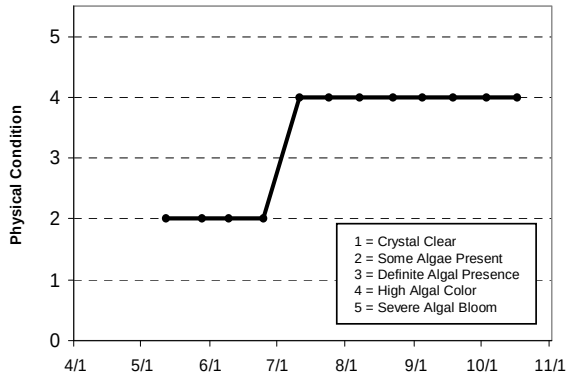



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/12 | 16 | | | | 13 | 62 | | 1.2 | 2 | 2 |
| 5/28 | 19.5 | | | | 9 | 67 | | 1.5 | 2 | 2 |
| 6/9 | 23 | | | | 18 | 76 | | 1.2 | 2 | 2 |
| 6/25 | 26.1 | | | | 43 | 96 | | 0.7 | 2 | 2 |
| 7/11 | 24 | | | | 120 | 193 | | 0.5 | 4 | 4 |
| 7/24 | 24.7 | | | | 220 | 223 | | 0.3 | 4 | 4 |
| 8/7 | 24.3 | | | | 280 | 238 | | 0.3 | 4 | 4 |
| 8/22 | 24 | | | | 280 | 214 | | 0.2 | 4 | 4 |
| 9/4 | 19.9 | | | | 190 | 225 | | 0.3 | 4 | 4 |
| 9/18 | 17.9 | | | | 340 | 348 | | 0.3 | 4 | 4 |
| 10/3 | 14.1 | | | | 160 | 139 | | 0.3 | 4 | 4 |
| 10/17 | 11.9 | | | | 200 | 191 | | 0.4 | 4 | 4 |



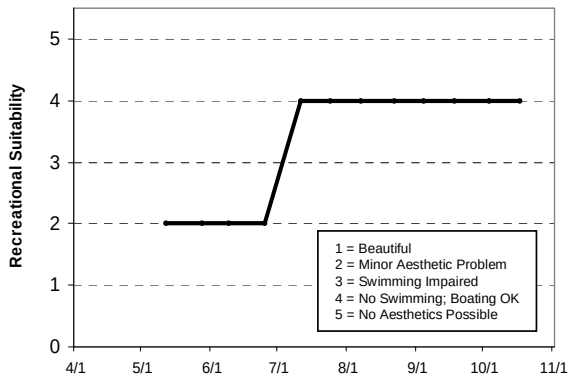

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | | F |
| Chlorophyll a | | | | | F |
| Secchi Depth | | | | | F |
| **Lake Grade** | | | | | **F** |

Source: Metropolitan Council and STORET data



## Langton Lake [north basin, site-1] (62-0049-01) *Rice Creek Watershed District*

Langton Lake is divided into two basins. The monitoring results for each of the sites will be discussed individually. 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 mean depth is 1.2 m (3.9 feet). The volume is approximately 120 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 dominated by aquatic vegetation. The lake's contributing watershed is 257 acres, which translates to a watershed-to-lake area ratio of 9:1. The greater the ratio, the greater the potential stress on the lake from surface runoff.

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

A search through the STORET nationwide water quality database for historical data provided Secchi transparency data for 1984, 1985, 1987, 1988, and 1990.

The north basin was monitored 13 times between mid May and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 66.8 | 31.0 | 131.0 | C |
| **CLA** (µg/l) | 21.3 | 4.0 | 56.0 | C |
| **Secchi** (m) | 1.2 | 0.8 | 1.6 | D |
| **TKN** (mg/l) | 1.73 | 1.20 | 2.70 | |
| | | | ***Lake Grade*** | C |

The basin received a lake grade of C for 2008, which is similar to past years of lake grades. There are no other nutrient and chlorophyll-a data available for Site-1 other than the 2005-2008 CAMP data. Additional monitoring is suggested to continue to build the water quality database for determining possible trends in water quality.

Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The average user perception rankings were 2.1 for physical condition (between 2- "some algae present" and 3- "definite algae present"). The ranking of recreational suitability was made during only one monitoring event for 2008, so the average ranking is not reported.

The Fisheries Section of the Minnesota Department of Natural Resources (MNDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MNDNR 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.

# Langton Lake, Site 1
**Roseville, Ramsey Co.**

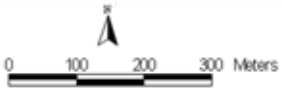
Lake ID: 620049-01

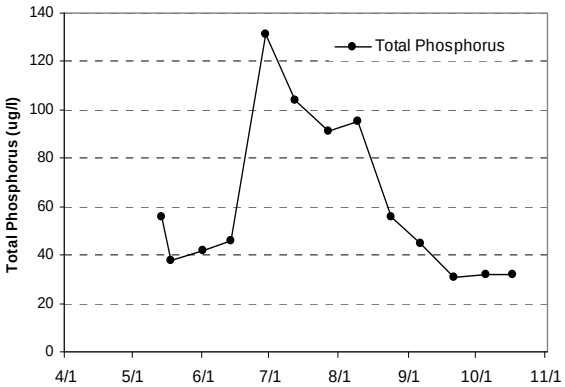
WD: Rice Creek

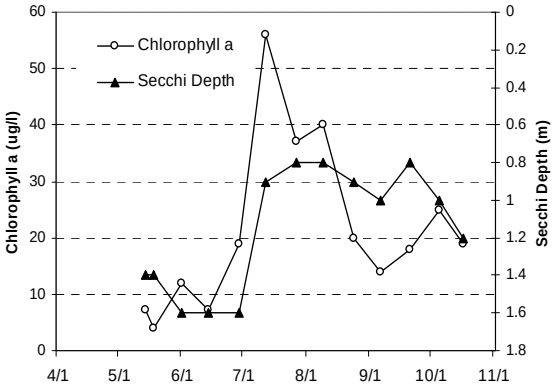
Volunteers: Tam & Dick McGehee; Yul Yost

● Sampling site

Contours in meters

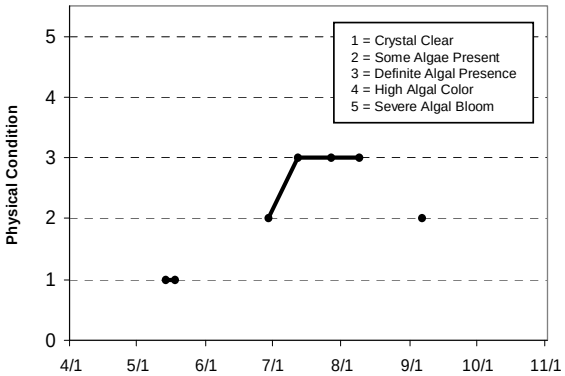



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/14 | 14.6 | | | | 7.1 | 56 | | 1.4 | 1 | |
| 5/18 | 17.5 | | | | 4 | 38 | | 1.4 | 1 | 1 |
| 6/1 | 21.9 | | | | 12 | 42 | | 1.6 | | |
| 6/14 | 23.8 | | | | 7.1 | 46 | | 1.6 | | |
| 6/29 | 25.7 | | | | 19 | 131 | | 1.6 | 2 | |
| 7/12 | 25.7 | | | | 56 | 104 | | 0.9 | 3 | |
| 7/27 | 25.9 | | | | 37 | 91 | | 0.8 | 3 | |
| 8/9 | 26.5 | | | | 40 | 95 | | 0.8 | 3 | |
| 8/24 | 23.8 | | | | 20 | 56 | | 0.9 | | |
| 9/6 | 21.1 | | | | 14 | 45 | | 1 | 2 | |
| 9/21 | 22.8 | | | | 18 | 31 | | 0.8 | | |
| 10/5 | 14.2 | | | | 25 | 32 | | 1 | | |
| 10/17 | 12.4 | | | | 19 | 32 | | 1.2 | | |



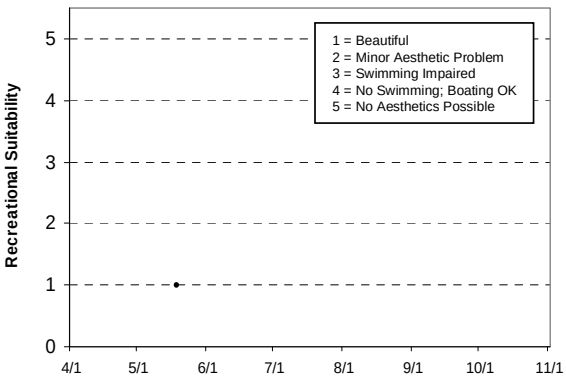

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | C | C | C | C |
| Chlorophyll a | | C | B | A | C |
| Secchi Depth | | D | D | D | D |
| **Lake Grade** | | **C** | **C** | **C** | **C** |

Source: Metropolitan Council and STORET data



## Langton Lake [south basin, site-2] (62-004-02) *Rice Creek Watershed District*

Langton Lake is divided into two distinct basins. The monitoring results will be discussed individually for each of the basins. For a description of the entire lake, refer to the discussion for Site 1 of Langton Lake.

A search through STORET revealed many years of Secchi transparency data from 1984 and 1995-2007. There are no other nutrient and chlorophyll data available for Site-2 other than the 2005-2008 CAMP data.

The south basin was monitored 13 times between early May and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 64.2 | 24.0 | 166.0 | C |
| **CLA** (µg/l) | 20.4 | 3.7 | 55.0 | C |
| **Secchi** (m) | 1.1 | 0.6 | 1.6 | D |
| **TKN** (mg/l) | 2.03 | 1.00 | 4.60 | |
| | | | ***Lake Grade*** | C |

The lake received a lake grade of C for 2008 which is similar to the two previous years. The lake site has also received identical letter grades for each of the three parameters for the years 2005-2007. A recent MPCA-conducted trend analysis on the lake's Secchi transparency data revealed a statistically significant improvement in recent water clarity (MPCA 2008). Additional monitoring is suggested to continue to build the water quality database for determining possible trends in water quality beyond just water clarity.

Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The average user perception rankings were 2.8 for physical condition (between 2- "some algae present" and 3- "definite algae present"). The ranking of recreational suitability was made during only one monitoring event for 2008, so the average ranking is not reported.

The Fisheries Section of the Minnesota Department of Natural Resources (MNDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MNDNR 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.

# Langton Lake, Site 2
## Roseville, Ramsey Co.

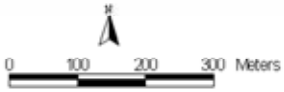
Lake ID: 620049-02

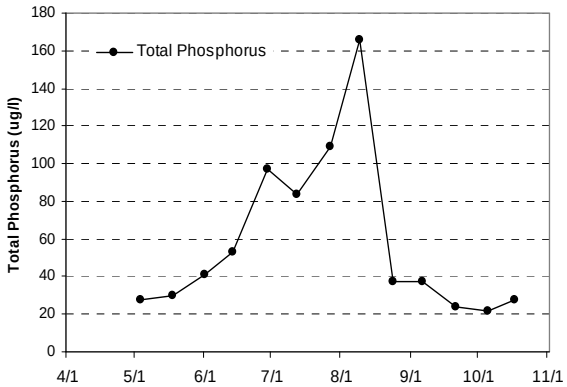
WD: Rice Creek

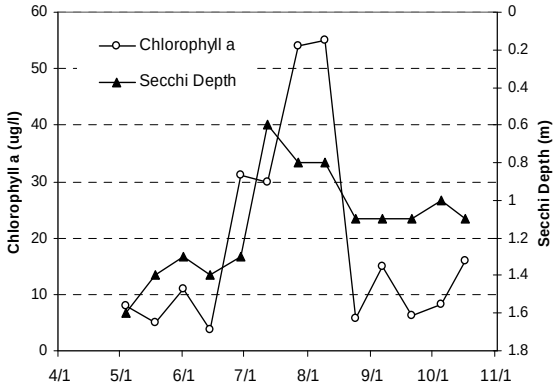
Volunteers: Tam & Dick McGehee; Yul Yost

● Sampling site

Contours in meters

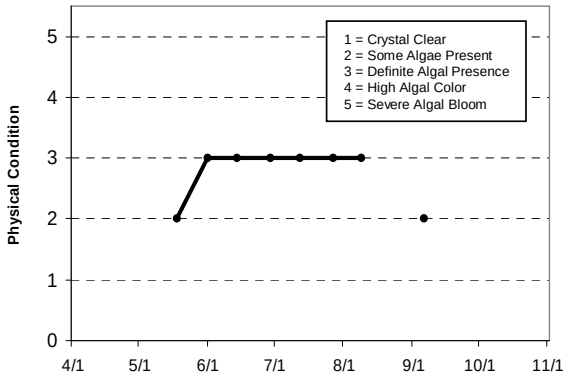



### 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/4 | 14.4 | | | | 7.9 | 28 | | 1.6 | | |
| 5/18 | 17.2 | | | | 5.1 | 30 | | 1.4 | 2 | 1 |
| 6/1 | 22.1 | | | | 11 | 41 | | 1.3 | 3 | |
| 6/14 | 23.3 | | | | 3.7 | 53 | | 1.4 | 3 | |
| 6/29 | 25.6 | | | | 31 | 97 | | 1.3 | 3 | |
| 7/12 | 25.9 | | | | 30 | 84 | | 0.6 | 3 | |
| 7/27 | 27 | | | | 54 | 109 | | 0.8 | 3 | |
| 8/9 | 27.4 | | | | 55 | 166 | | 0.8 | 3 | |
| 8/24 | 24.4 | | | | 5.7 | 37 | | 1.1 | | |
| 9/6 | 21.1 | | | | 15 | 37 | | 1.1 | 2 | |
| 9/21 | 22.8 | | | | 6.3 | 24 | | 1.1 | | |
| 10/5 | 14 | | | | 8.1 | 22 | | 1 | | |
| 10/17 | 12.2 | | | | 16 | 28 | | 1.1 | | |



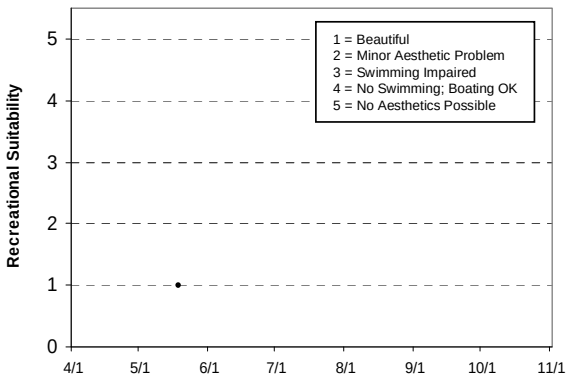

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | F | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | D | D | D | C | C | D | C | C | C |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | C | C | C | C |
| Chlorophyll a | | B | B | B | C |
| Secchi Depth | C | D | D | D | D |
| **Lake Grade** | | **C** | **C** | **C** | **C** |

Source: Metropolitan Council and STORET data



## Lee Lake (19-0029) *City of Lakeville*

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. The watershed of the lake has an area of 324 acres, and it has mostly developed as urban landuse. The watershed to lake area ratio is 13:1. The higher the ratio, the greater the potential affects of surface runoff have on the water quality of the lake. An abundance of submerged aquatic vegetation (Curlyleaf pondweed) has been a continuing problem in the lake. Not only is it an aesthetic and recreational problem, but the decaying of plants in late-summer adds to concentrations of phosphorus in the water column.

In an attempt to inhibit algal populations within the lake, barley straw has been added annually since 2003. Barley straw has been used for algal control in the United Kingdom for many years. A recent study on Valley Lake in Lakeville, Minnesota has suggested that carbon from the decaying barley straw inhibits algal populations via microbial competition for phosphorus (McComas and Anhorn 2004). The results of the report are discussed in more detail in Valley Lake section of this report.

The lake was monitored 13 times between late April and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 41.1 | 26.0 | 66.0 | C |
| **CLA** (µg/l) | 19.2 | 5.0 | 47.0 | B |
| **Secchi** (m) | 1.5 | 1.0 | 2.4 | C |
| **TKN** (mg/l) | 1.60 | 1.10 | 2.30 | |
| | | | ***Lake Grade*** | C |

The lake received a lake grade of C for 2008, which is similar to lake grades received in the past. The lake appears represented by a lake grade of C on the basis of the historical water quality database. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008).

The volunteer(s) ranked their perceptions of the lake's physical and recreational condition on a 1-to-5 scale. These rankings are shown on the lake's information sheet on the following page. The mean physical condition ranking was 2.4 (between 2- "some algae present and 3- "definite algae present"), while the mean recreational suitability ranking was 2.8 (between 2- "minor aesthetic problem" and 3- "swimming impaired").

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) 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.**

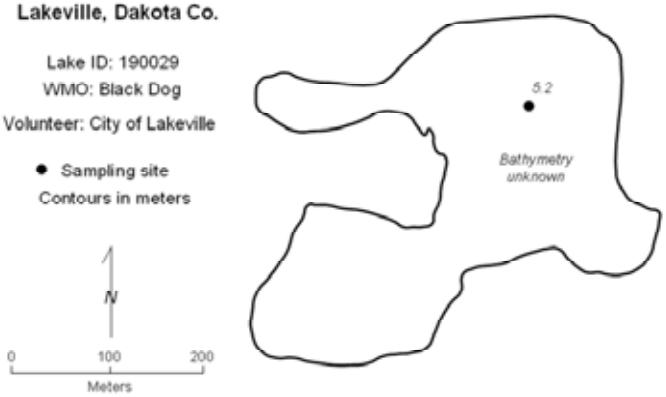
Lake ID: 190029

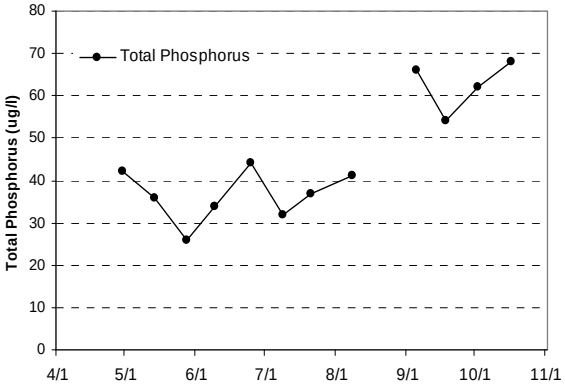
WMO: Black Dog

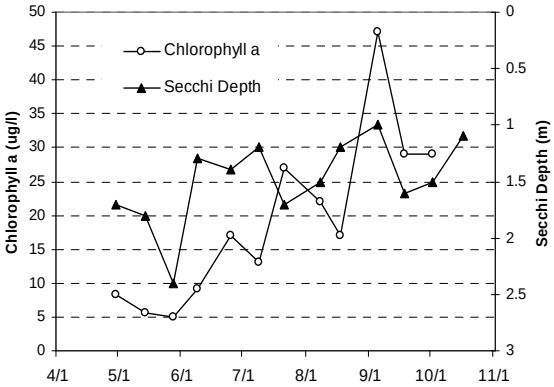
Volunteer: City of Lakeville

● Sampling site

Contours in meters

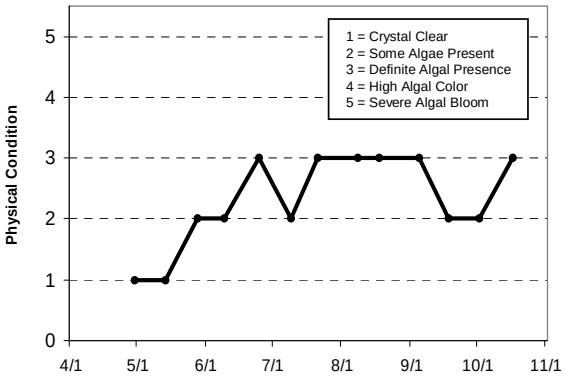



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/30 | 10 | | | | 8.4 | 42 | | 1.7 | 1 | 1 |
| 5/14 | 13.9 | | | | 5.5 | 36 | | 1.8 | 1 | 1 |
| 5/28 | 17.2 | | | | 5 | 26 | | 2.4 | 2 | 1 |
| 6/9 | 20.6 | | | | 9.1 | 34 | | 1.3 | 2 | 4 |
| 6/25 | 27.2 | | | | 17 | 44 | | 1.4 | 3 | 3 |
| 7/9 | 27.2 | | | | 13 | 32 | | 1.2 | 2 | 3 |
| 7/21 | 27.2 | | | | 27 | 37 | | 1.7 | 3 | 4 |
| 8/8 | 26.1 | | | | 22 | 41 | | 1.5 | 3 | 3 |
| 8/18 | 25.5 | | | | 17 | | | 1.2 | 3 | 2 |
| 9/5 | 20 | | | | 47 | 66 | | 1 | 3 | 4 |
| 9/18 | 20 | | | | 29 | 54 | | 1.6 | 2 | 3 |
| 10/2 | 15 | | | | 29 | 62 | | 1.5 | 2 | 1 |
| 10/17 | 11 | | | | | 68 | | 1.1 | 3 | 4 |



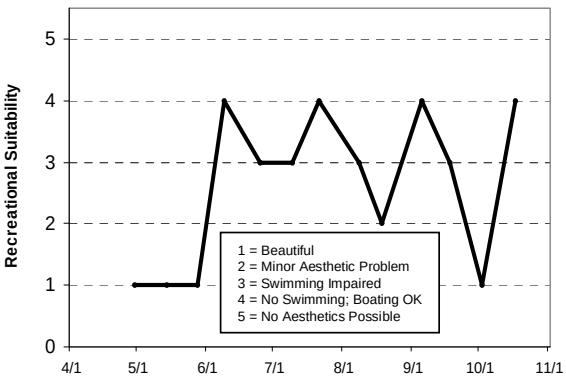

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | C | C | C | C | | | D | C | C | C |
| Chlorophyll a | | | C | B | B | B | | | C | B | B | C |
| Secchi Depth | | | C | C | C | C | | | D | C | C | C |
| **Lake Grade** | | | **C** | **C** | **C** | **C** | | | **D** | **C** | **C** | **C** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | C | D | D | C | C |
| Chlorophyll a | C | B | B | C | B |
| Secchi Depth | D | C | C | C | C |
| **Lake Grade** | **C** | **C** | **C** | **C** | **C** |

Source: Metropolitan Council and STORET data



## Legion Pond (82-0462) *Valley Branch Watershed District*

Legion Pond is located in the City of Lake Elmo (Washington County). The lake has a surface area of 16 acres. The watershed of the lake has an area of 224 acres, which results in a watershed-to-lake area ratio of 14:1. The greater the ratio, the greater the potential stress on the lake from surface runoff.

A search through the STORET nationwide database for historic water quality data showed only past CAMP data. The years 2005, 2006, and 2008 are the only known years of available data. The lake was monitored 7 times between late April and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

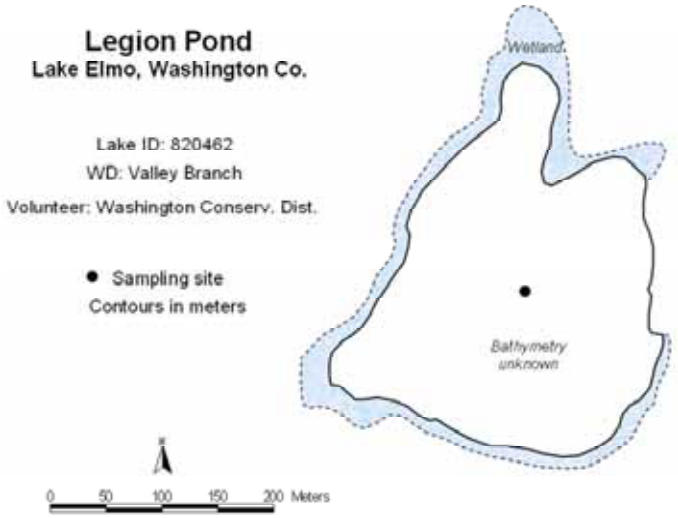
**2006 summer (May-September) data summary**

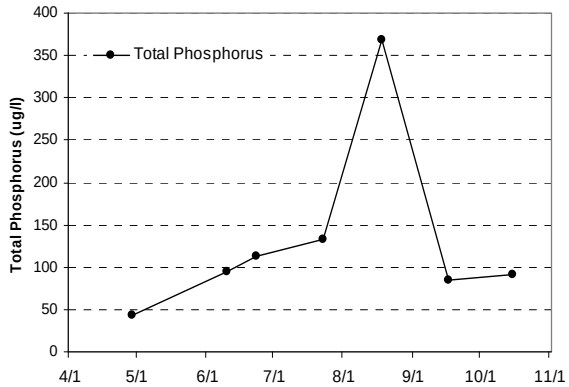
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 158.4 | 85.0 | 368.0 | F |
| **CLA** (µg/l) | 72.8 | 8.8 | 280.0 | D |
| **Secchi** (m) | 0.8 | 0.5 | 0.9 | D |
| **TKN** (mg/l) | 2.26 | 1.30 | 4.20 | |
| | | | ***Overall Grade*** | D |

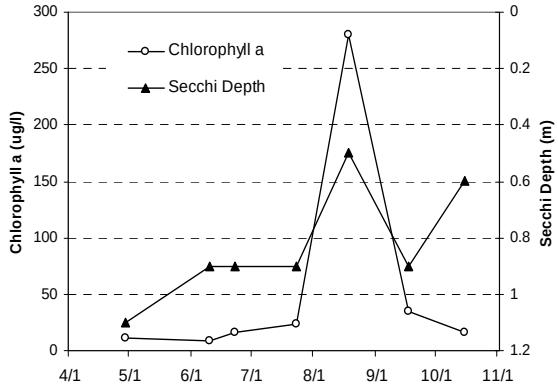
The lake received a lake grade of D for 2008. The TP grade of F and the CLA grade of D are the worst grades for these parameters that the lake received in the three years of CAMP monitoring. It appears that the 2008 water quality was less than that observed in 2005 and 2006. Continued monitoring is suggested to continue to build the water quality database to determine potential trends in the lake's water quality.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page (ranked on a scale of 1 to 5). The average user perception rankings were 2.6 for physical condition (between 2- "some algae present" and 3- "definite algae present"), and 3.2 for recreational suitability (between 3- "swimming slightly impaired" and 4- "no swimming/boating ok").

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.

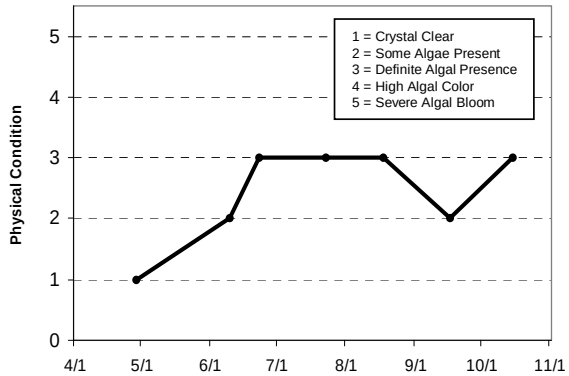



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/29 | 7.1 | | 12.7 | | 11 | 43 | | 1.1 | 1 | 2 |
| 6/10 | 22.6 | 21.9 | 7.15 | 0.97 | 8.8 | 94 | | 0.9 | 2 | 4 |
| 6/23 | 28.6 | 25.8 | 7.35 | 2.2 | 16 | 113 | | 0.9 | 3 | 3 |
| 7/23 | 25.6 | 24.9 | 3.47 | 4.3 | 24 | 132 | | 0.9 | 3 | 2 |
| 8/18 | 25.4 | 24.9 | 8.48 | 0.28 | 280 | 368 | | 0.5 | 3 | 4 |
| 9/17 | 19.8 | 19.8 | 8.9 | 0.56 | 35 | 85 | | 0.9 | 2 | 3 |
| 10/15 | 12.8 | 12.8 | 8.84 | 7.8 | 16 | 91 | | 0.6 | 3 | 4 |



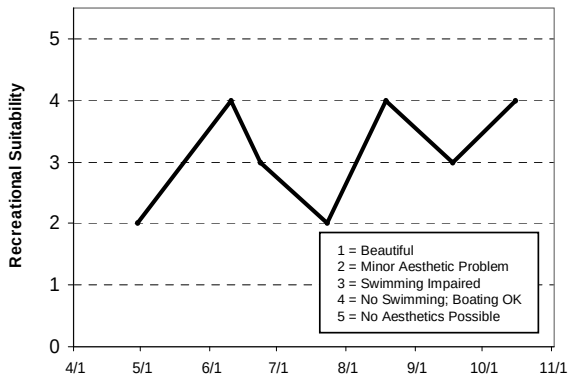

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | D | D | | F |
| Chlorophyll a | | C | C | | D |
| Secchi Depth | | D | D | | D |
| **Lake Grade** | | **D** | **D** | | **D** |

Source: Metropolitan Council and STORET data



## LeMay Lake (19-0082) *Gun Club Lake Watershed Management Organization*

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), which gives it a volume of 173 acre-feet. The maximum depth is 4.0 m (13 ft).

A search through the STORET nationwide water quality database provided Secchi transparency data for sporadic dates in 1998, 2000-2003, and 2005-2007. The 2007 CAMP data was also found in the STORET system.

The lake was monitored 11 times between mid May and early October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 31.1 | 26.0 | 40.0 | B |
| **CLA** (µg/l) | 7.0 | 2.2 | 15.0 | A |
| **Secchi** (m) | 1.8 | 1.0 | 2.3 | C |
| **TKN** (mg/l) | 1.54 | 1.20 | 1.90 | |
| | | | ***Lake Grade*** | B |

The lake received a lake grade of B for 2008, which is an improvement over last year's C lake grade. All three water quality parameters received one letter grade better for 2008 than for 2007. Continued monitoring is suggested to continue to build the historical database for determining water quality trends.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page (ranked on a scale of 1 to 5). The average user perception rankings were 2.0 for physical condition ("some algae present"), and 3.5 for recreational suitability (between 3- "swimming slightly impaired" and 4- "no swimming/boating ok").

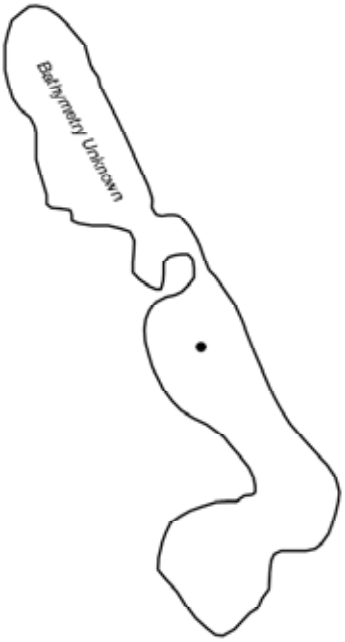
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

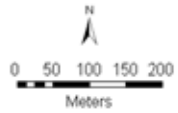
# LeMay Lake
**Mendota Heights, Dakota Co.**

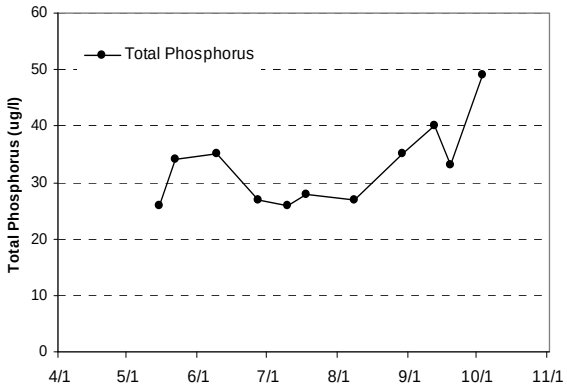
Lake ID: 190082
WMO: Gun Club Lake
Volunteer: City of Mendota Heights

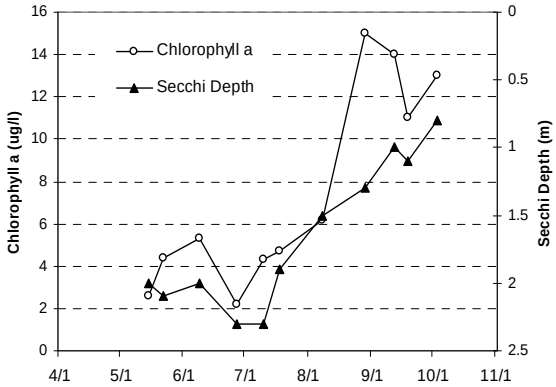
● Sampling site

Contours in meters



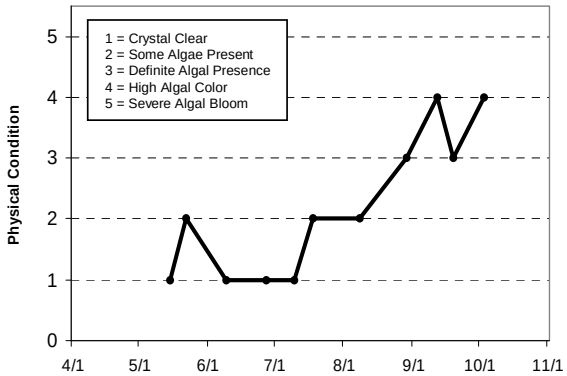




## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/15 | 19.4 | | | | 2.6 | 26 | | 2 | 1 | 1 |
| 5/22 | 20.4 | | | | 4.4 | 34 | | 2.1 | 2 | 3 |
| 6/9 | 23 | | | | 5.3 | 35 | | 2 | 1 | 3 |
| 6/27 | 26.7 | | | | 2.2 | 27 | | 2.3 | 1 | 4 |
| 7/10 | 25.8 | | | | 4.3 | 26 | | 2.3 | 1 | 4 |
| 7/18 | 29.3 | | | | 4.7 | 28 | | 1.9 | 2 | 4 |
| 8/8 | 26.8 | | | | 6.2 | 27 | | 1.5 | 2 | 4 |
| 8/29 | 24.3 | | | | 15 | 35 | | 1.3 | 3 | 4 |
| 9/12 | 21.1 | | | | 14 | 40 | | 1 | 4 | 4 |
| 9/19 | 21.8 | | | | 11 | 33 | | 1.1 | 3 | 4 |
| 10/3 | 17.4 | | | | 13 | 49 | | 0.8 | 4 | 3 |



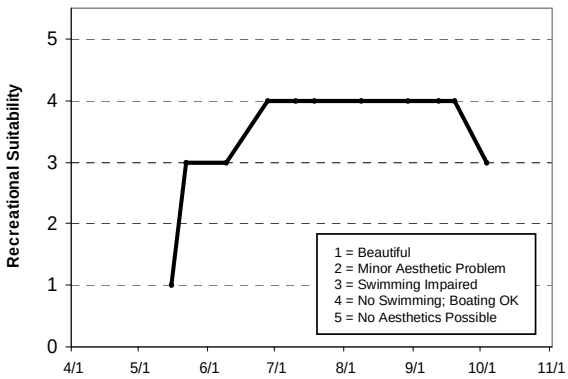

## Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | F | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | C | B |
| Chlorophyll a | | | | B | A |
| Secchi Depth | | | | D | C |
| **Lake Grade** | | | | **C** | **B** |

Source: Metropolitan Council and STORET data



## Lily Lake (82-0023) *City of Stillwater*

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). It has public access located on the lake's northern shore, and a fishing pier on its southern shore.

A search for water quality data through STORET files resulted in a moderate amount of data. While 1995-2007 are the only years for which nutrient data are available, Secchi transparencies were collected through the MPCA's Citizen Lake Monitoring Program in 1985, and 1987-1992.

Lily Lake was monitored 14 times between mid April and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

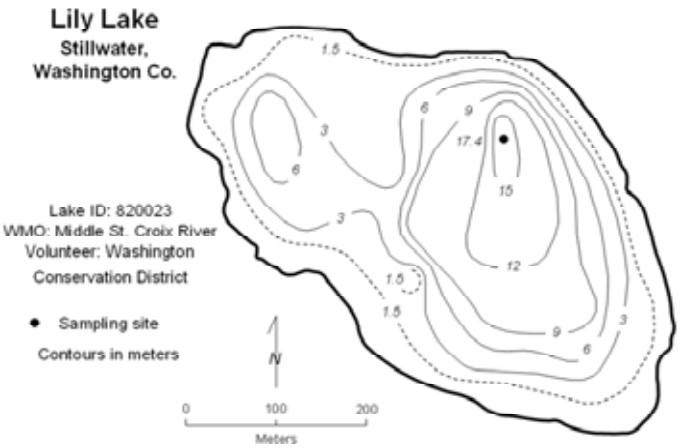
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 45.5 | 33.0 | 64.0 | C |
| **CLA** (µg/l) | 21.5 | 2.6 | 54.0 | C |
| **Secchi** (m) | 1.7 | 1.1 | 2.4 | C |
| **TKN** (mg/l) | 1.85 | 1.60 | 2.20 | |
| | | | ***Lake Grade*** | C |

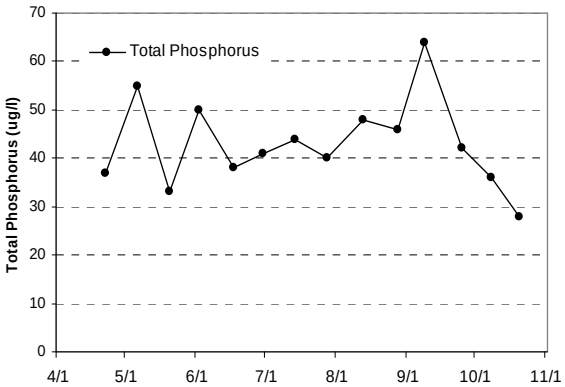
The lake received a lake grade of C for 2008, which is similar to the lake grades it has received in previous years. On the basis of the historical water quality database, the lake appears represented by a lake grade of C. However, there appears to be more variation in the historical CLA and water clarity grades. But the historical TP grades have been a constant C grade for the past 14 years. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008).

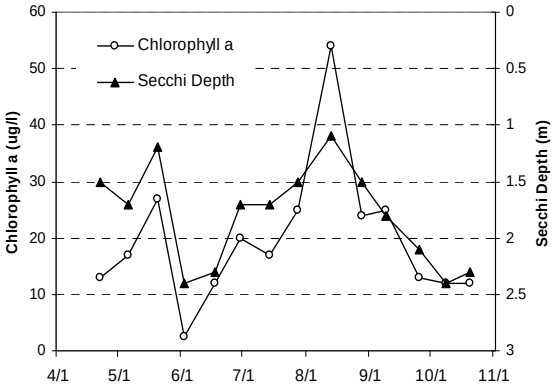
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page (ranked on a scale of 1 to 5). The average user perception rankings were 2.6 for physical condition (between 2- "some algae present" and 3- "definite algae present"), and 2.9 for recreational suitability (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

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.

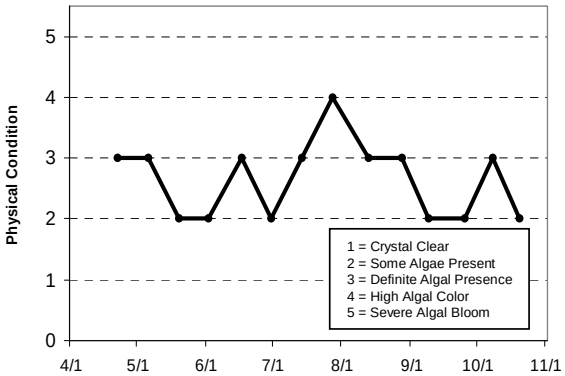



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/22 | 7.2 | 3.3 | 11.48 | 2.43 | 13 | 37 | | 1.5 | 3 | 3 |
| 5/6 | 13.8 | 3.4 | 11.73 | 1.41 | 17 | 55 | | 1.7 | 3 | 4 |
| 5/20 | 15.5 | 3.5 | 11.41 | 0.27 | 27 | 33 | 201 | 1.2 | 2 | 3 |
| 6/2 | 20.6 | 3.6 | 6.82 | 0.18 | 2.6 | 50 | 204 | 2.4 | 2 | 3 |
| 6/17 | 21.1 | 3.7 | 8.36 | 0.24 | 12 | 38 | 334 | 2.3 | 3 | 2 |
| 6/30 | 24 | 3.8 | 8.63 | 0.81 | 20 | 41 | 396 | 1.7 | 2 | 3 |
| 7/14 | 24.3 | 3.8 | 7.35 | 0.52 | 17 | 44 | 375 | 1.7 | 3 | 3 |
| 7/28 | 26.4 | 3.9 | 9.4 | 0.42 | 25 | 40 | 422 | 1.5 | 4 | 3 |
| 8/13 | 24.9 | 4.1 | 7.82 | 0.34 | 54 | 48 | 733 | 1.1 | 3 | 3 |
| 8/28 | 22.5 | 4.1 | 4.65 | 0.22 | 24 | 46 | 891 | 1.5 | 3 | 2 |
| 9/9 | 20 | 4.1 | 6.47 | 0.26 | 25 | 64 | 821 | 1.8 | 2 | 3 |
| 9/25 | 19.7 | 4.3 | 6.65 | 0.26 | 13 | 42 | 844 | 2.1 | 2 | 3 |
| 10/8 | 15.7 | 4.3 | 6.75 | 0.28 | 12 | 36 | 838 | 2.4 | 3 | 3 |
| 10/20 | 13 | 4.5 | 7.15 | 0.37 | 12 | 28 | 805 | 2.3 | 2 | 3 |



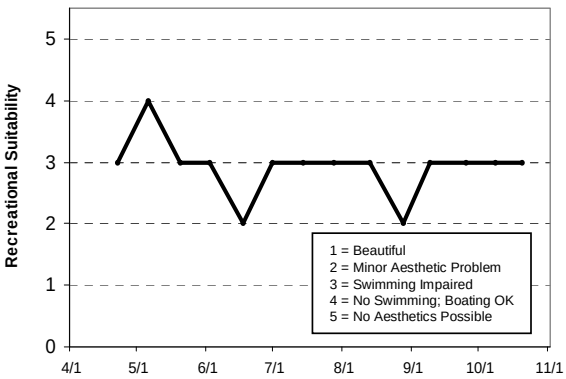

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | D | | C | C | C | C | C |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | C | C | C | C | C | C | C | C | C |
| Chlorophyll a | | | | B | C | B | C | C | C | A | B | B |
| Secchi Depth | 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 |
|---|---|---|---|---|---|
| Total Phosphorus | C | C | C | C | C |
| Chlorophyll a | B | B | C | C | C |
| Secchi Depth | C | C | C | C | C |
| **Lake Grade** | **C** | **C** | **C** | **C** | **C** |

Source: Metropolitan Council and STORET data



## Linwood Lake (2-0026) *Anoka County Parks*

Linwood Lake is located in Linwood Township (Anoka County). The lake is considered a "Priority Lake" by the Metropolitan Council because of its high regional recreation value. The lake has a surface area of 559 acres, and a maximum depth of 13 m (42 feet). Approximately 85 percent of the surface area of the lake is considered littoral zone, which is the 0-15 feet depth zone of the lake where the majority of aquatic plants are located.

The year 2008 was the first year the lake was monitored via the CAMP. A search for water quality data through STORET files resulted in an appreciable amount of data. Metropolitan Council staff monitored the lake occasionally in the 1980s and 1990s. Additional data were collected by the MPCA's volunteer lake monitoring program and Anoka County.

The lake was monitored 14 times between mid April and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

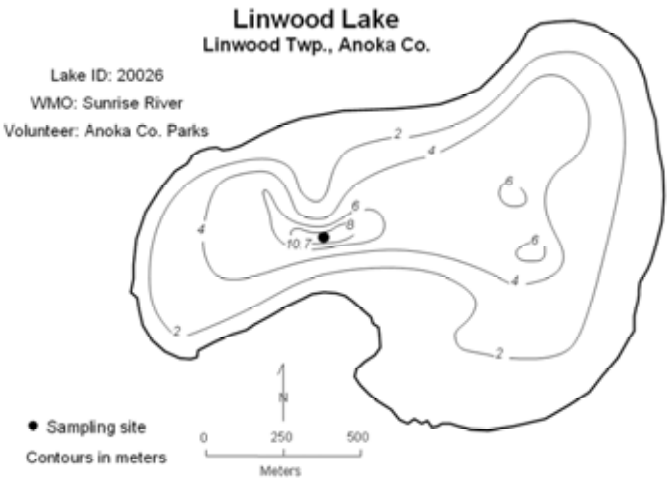
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 42.8 | 28.0 | 73.0 | C |
| **CLA** (µg/l) | 23.1 | 8.3 | 46.0 | C |
| **Secchi** (m) | 1.0 | 0.6 | 1.8 | D |
| **TKN** (mg/l) | 1.40 | 0.78 | 2.40 | |
| | | | ***Lake Grade*** | C |

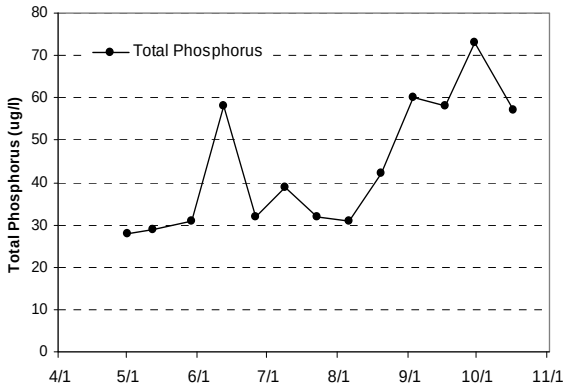
The lake received a lake grade of C for 2008, which is similar to the lake grades it has received in previous years. On the basis of the historical water quality database, the lake appears represented by a lake grade of C. Similarly, the historical TP grades have been a C grade since 1983. However, there appears to be more variation in the historical water clarity grades as it has been a C or D for a given year. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008).

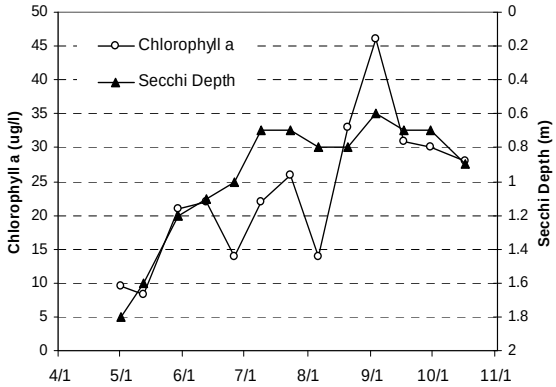
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page (ranked on a scale of 1 to 5). The average user perception rankings were 2.7 for physical condition (between 2- "some algae present" and 3- "definite algae present"), and 1.9 for recreational suitability (between 1- "beautiful" and 2- "minor aesthetic problem").

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.

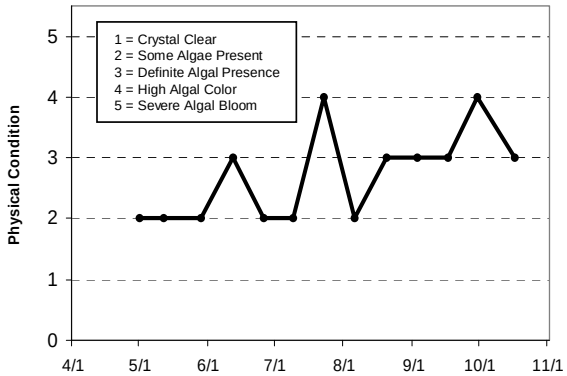



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/1 | 8.5 | | | | 9.5 | 28 | | 1.8 | 2 | |
| 5/12 | 12.9 | | | | 8.3 | 29 | | 1.6 | 2 | |
| 5/29 | 17.3 | | | | 21 | 31 | | 1.2 | 2 | 1 |
| 6/12 | 19.8 | | | | 22 | 58 | | 1.1 | 3 | 2 |
| 6/26 | 26.2 | | | | 14 | 32 | | 1 | 2 | 1 |
| 7/9 | 25.2 | | | | 22 | 39 | | 0.7 | 2 | 2 |
| 7/23 | 26.4 | | | | 26 | 32 | | 0.7 | 4 | 3 |
| 8/6 | 26.1 | | | | 14 | 31 | | 0.8 | 2 | 2 |
| 8/20 | 25.5 | | | | 33 | 42 | | 0.8 | 3 | 2 |
| 9/3 | 21.4 | | | | 46 | 60 | | 0.6 | 3 | |
| 9/17 | 17.5 | | | | 31 | 58 | | 0.7 | 3 | |
| 9/30 | 16.3 | | | | 30 | 73 | | 0.7 | 4 | |
| 10/17 | 11.7 | | | | 28 | 57 | | 0.9 | 3 | |



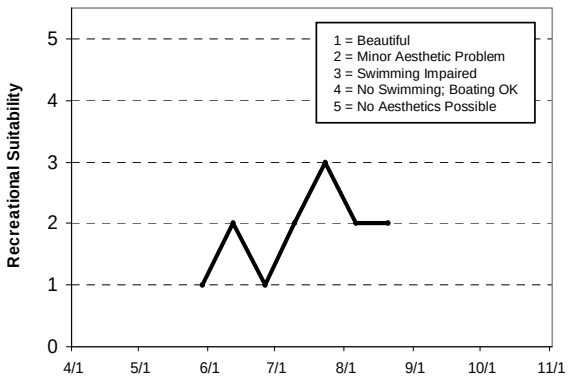

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | B | B | | C | | | | | | C | | |
| Chlorophyll a | B | C | | C | | | | | | C | | |
| Secchi Depth | C | C | | C | | D | | | D | C | | |
| **Lake Grade** | **B** | **C** | | **C** | | | | | | **C** | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | C | | | C | C | C | C | C | | C |
| Chlorophyll a | | | B | | | C | | | | | | |
| Secchi Depth | | | C | D | D | D | D | D | C | C | | C |
| **Lake Grade** | | | **C** | | | **C** | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | C | | C | C |
| Chlorophyll a | | | | | C |
| Secchi Depth | | C | | | D |
| **Lake Grade** | | | | | **C** |

Source: Metropolitan Council and STORET data



## Little Carnelian Lake (82-0014) *Carnelian - Marine Watershed District*

Little Carnelian Lake is located in Stillwater Township (Washington County). It is considered a Priority Lake by the Metropolitan Council for its exceptional water clarity. 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 mean depth of the lake and its surface area translate to an approximate lake volume of 5,686 ac-ft. The lake does not have a public access. 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.

This was the eighth year of CAMP monitoring in Little Carnelian Lake. A search of the STORET nationwide water quality database for data on the lake revealed a moderate database throughout the 1990's with nutrient data available in 1991-1996 and 1998-2007.

The lake was monitored 7 times between early May and mid October. On each sampling day the lake was monitored for Secchi transparency and dissolved oxygen as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | | | | |
| **CLA** (µg/l) | | | | |
| **Secchi** (m) | 5.6 | 2.1 | 7.9 | A |
| **TKN** (mg/l) | | | | |
| | | | ***Lake Grade*** | |

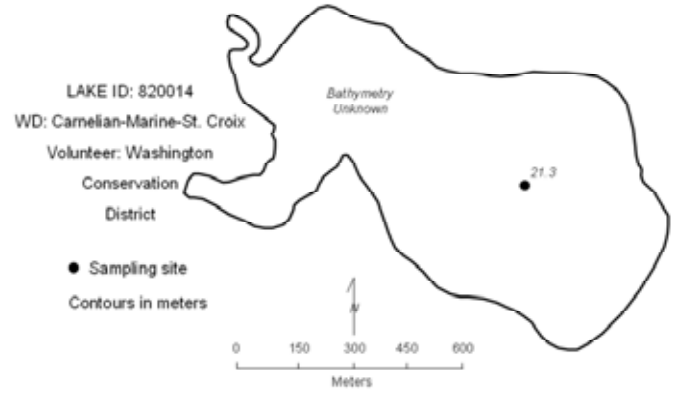
Similar to all past years of CAMP monitoring, the lake received a water clarity grade of A. TP and CLA were not monitored in 2008 so a lake grade cannot be determined. The historical water quality database indicates that the lake's water quality is well represented by a lake grade of A. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed a statistically significant improving trend in water clarity (MPCA 2008).

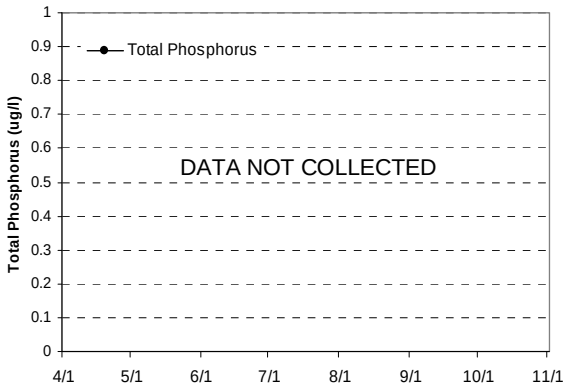
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.6 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 2.9 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

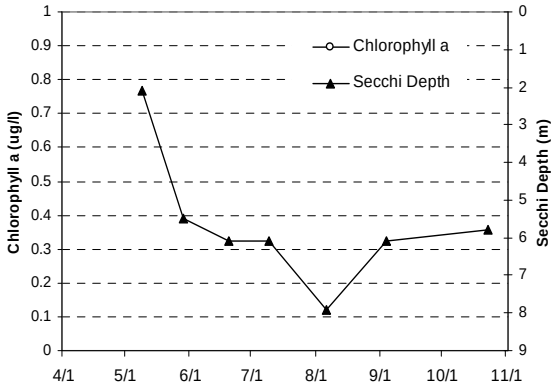
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

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.

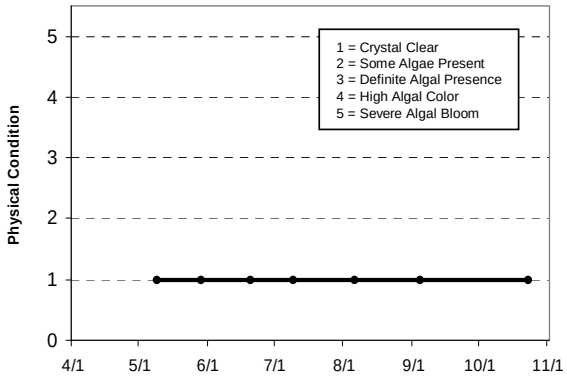



### 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/9 | 12.2 | 5.4 | 12.55 | 0.66 | | | | 2.1 | 1 | 1 |
| 5/29 | 16.6 | 5.7 | 9.57 | 0.26 | | | | 5.5 | 1 | 1 |
| 6/20 | 21.9 | 6 | 8.81 | 0.2 | | | | 6.1 | 1 | 1 |
| 7/9 | 24.8 | 6.1 | 7.91 | 0.37 | | | | 6.1 | 1 | 1 |
| 8/6 | 26 | 6.3 | 7.26 | 0.24 | | | | 7.9 | 1 | 1 |
| 9/4 | 22.5 | 6.3 | 7.37 | 0.19 | | | | 6.1 | 1 | 1 |
| 10/23 | 12.7 | 6.9 | 8.87 | 0.41 | | | | 5.8 | 1 | 1 |

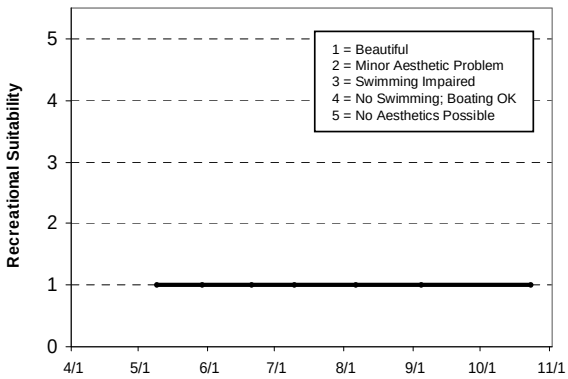



### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | A |
| Chlorophyll a | | | | | | | | | | | | A |
| Secchi Depth | | | | | | | | | | | | A |
| **Lake Grade** | | | | | | | | | | | | **A** |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | A | | | | A | A | | | A | B | A | A |
| Chlorophyll a | A | | | | A | A | | | A | A | A | A |
| Secchi Depth | 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 |
|---|---|---|---|---|---|
| Total Phosphorus | A | A | A | A | |
| Chlorophyll a | A | A | A | A | |
| Secchi Depth | A | A | A | A | A |
| **Lake Grade** | **A** | **A** | **A** | **A** | |




Source: Metropolitan Council and STORET data

## Little Comfort Lake (13-0054) *Comfort Lake - Forest Lake Watershed District*

Little Comfort Lake is located near the City of Wyoming (Chisago County). The lake has a maximum depth of 17.0 m (56 feet). Approximately 44 percent of the lake's surface area is considered littoral zone, which is the 0-15 feet depth zone of aquatic plant dominance. Furthermore, the lake does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the water column.

This was the third year that Little Comfort Lake has been involved in CAMP. A search through the STORET nationwide water quality database for data on the lake provided additional data for 1994.

The lake was monitored 12 times between early May and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

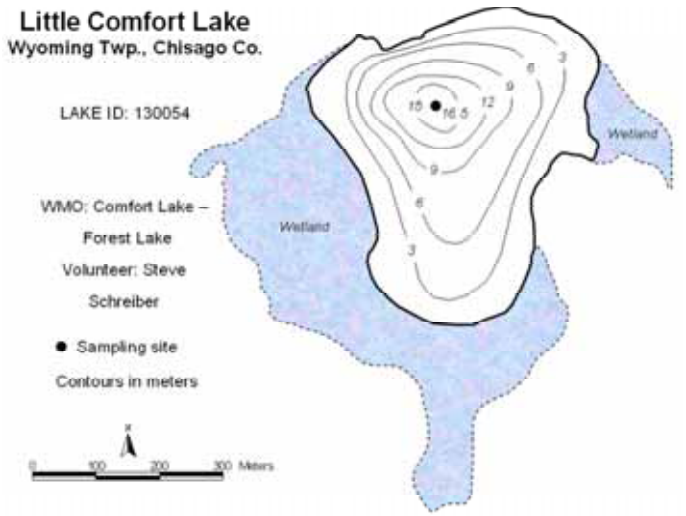
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 35.0 | 20.0 | 101.0 | C |
| **CLA** (µg/l) | 11.1 | 6.0 | 15.0 | B |
| **Secchi** (m) | 1.7 | 1.3 | 2.0 | C |
| **TKN** (mg/l) | 1.04 | 0.64 | 1.90 | |
| | | | ***Lake Grade*** | C |

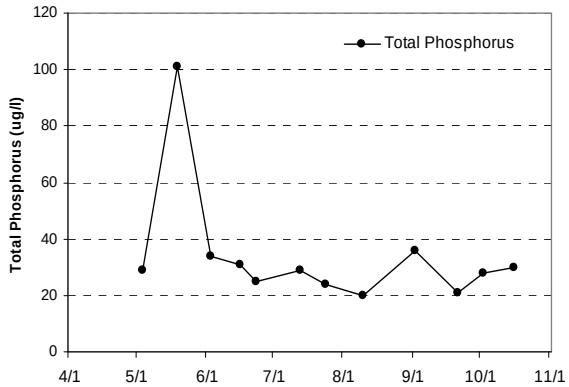
The lake received a lake grade of C for 2008. It also received C grades in 1994 and 2006.

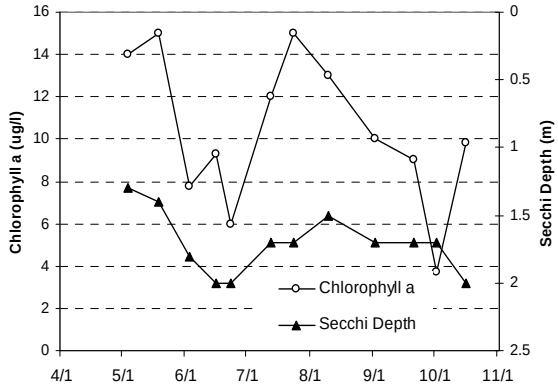
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.0 ("some algae present"). The average recreational suitability ranking was 1.9 (between 1- "beautiful" and 2- "minor aesthetic problem").

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) 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.

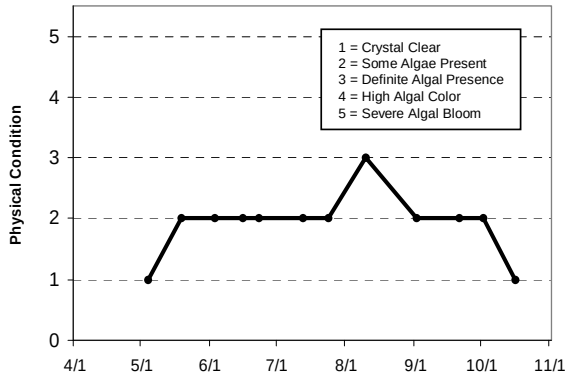



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/4 | 9.1 | | | | 14 | 29 | | 1.3 | 1 | 1 |
| 5/19 | 9.8 | | | | 15 | 101 | | 1.4 | 2 | 1 |
| 6/3 | 18.9 | | | | 7.8 | 34 | | 1.8 | 2 | 2 |
| 6/16 | 21.6 | | | | 9.3 | 31 | | 2 | 2 | 2 |
| 6/23 | 22.4 | | | | 6 | 25 | | 2 | 2 | 2 |
| 7/13 | 26.8 | | | | 12 | 29 | | 1.7 | 2 | 2 |
| 7/24 | 27.7 | | | | 15 | 24 | | 1.7 | 2 | 2 |
| 8/10 | 25.6 | | | | 13 | 20 | | 1.5 | 3 | 2 |
| 9/2 | 19.9 | | | | 10 | 36 | | 1.7 | 2 | 3 |
| 9/21 | 17.8 | | | | 9 | 21 | | 1.7 | 2 | 2 |
| 10/2 | 16.3 | | | | 3.7 | 28 | | 1.7 | 2 | |
| 10/16 | 13.2 | | | | 9.8 | 30 | | 2 | 1 | 1 |



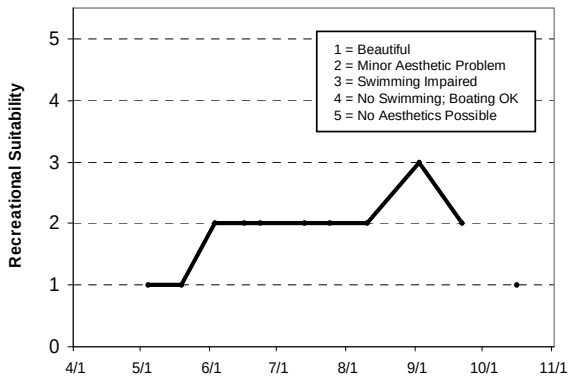

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | C | | | | | | | | | |
| Chlorophyll a | | | C | | | | | | | | | |
| Secchi Depth | | | C | | | | | | | | | |
| **Lake Grade** | | | **C** | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | D | C | C |
| Chlorophyll a | | | C | A | B |
| Secchi Depth | | | C | C | C |
| **Lake Grade** | | | **C** | **B** | **C** |

Source: Metropolitan Council and STORET data



## Little Johanna Lake (62-0058) *Rice Creek Watershed District*

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 littoral area is approximately 67 percent of the surface area. The littoral area overlies the 0-15 feet depth zone, and it is the location of the majority of the lake's aquatic plants.

A search through the STORET nationwide water quality database for historical data revealed just the historical CAMP data.

The lake was monitored 14 times from mid April to mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 44.6 | 24.0 | 78.0 | C |
| **CLA** (µg/l) | 13.2 | 4.1 | 32.0 | B |
| **Secchi** (m) | 1.5 | 0.7 | 2.3 | C |
| **TKN** (mg/l) | 1.71 | 0.76 | 3.00 | |
| | | | ***Lake Grade*** | C |

The lake received a lake grade of C for 2008, which is similar to the historical lake grades. The lake appears well represented by a lake grade of C. Further monitoring is suggested to continue to build the water quality database for increasing power to detect water quality trends.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.3 (2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 2.6 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

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.

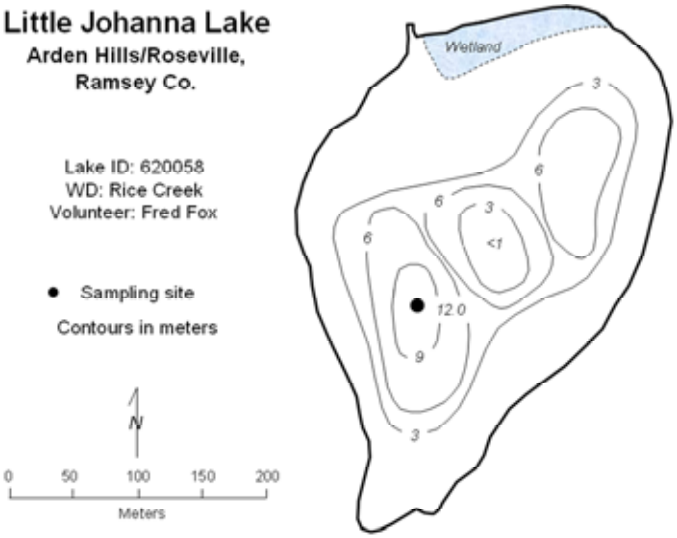
# Little Johanna Lake

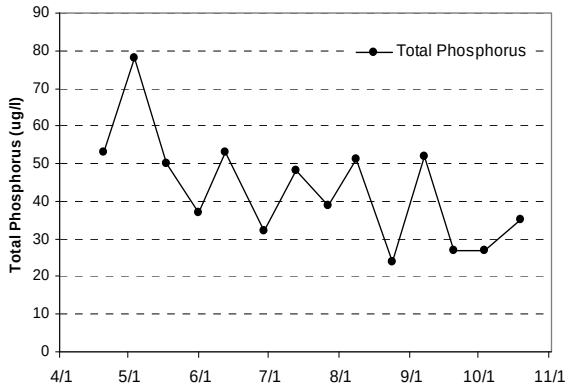
**Arden Hills/Roseville, Ramsey Co.**

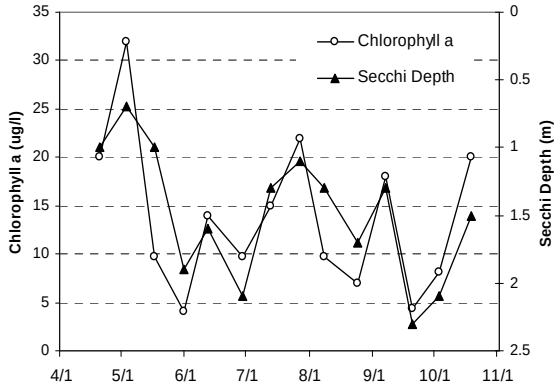
Lake ID: 620058
WD: Rice Creek
Volunteer: Fred Fox

● Sampling site

Contours in meters

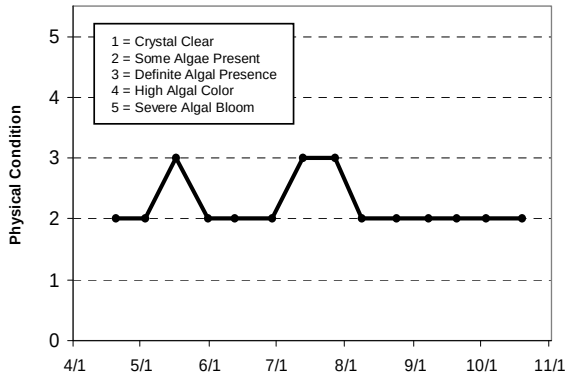



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/20 | 12.1 | | | | 20 | 53 | | 1 | 2 | 2 |
| 5/3 | 10.6 | | | | 32 | 78 | | 0.7 | 2 | 2 |
| 5/17 | 19.2 | | | | 9.8 | 50 | | 1 | 3 | 3 |
| 5/31 | 18.1 | | | | 4.1 | 37 | | 1.9 | 2 | 2 |
| 6/12 | 22 | | | | 14 | 53 | | 1.6 | 2 | 3 |
| 6/29 | 25.1 | | | | 9.8 | 32 | | 2.1 | 2 | 3 |
| 7/13 | 24.5 | | | | 15 | 48 | | 1.3 | 3 | 3 |
| 7/27 | 26.1 | | | | 22 | 39 | | 1.1 | 3 | 3 |
| 8/8 | 26.1 | | | | 9.7 | 51 | | 1.3 | 2 | 3 |
| 8/24 | 24.9 | | | | 6.9 | 24 | | 1.7 | 2 | 3 |
| 9/7 | 20.1 | | | | 18 | 52 | | 1.3 | 2 | 2 |
| 9/20 | 22.3 | | | | 4.4 | 27 | | 2.3 | 2 | 2 |
| 10/3 | 16.8 | | | | 8.1 | 27 | | 2.1 | 2 | 2 |
| 10/19 | 12.6 | | | | 20 | 35 | | 1.5 | 2 | 2 |

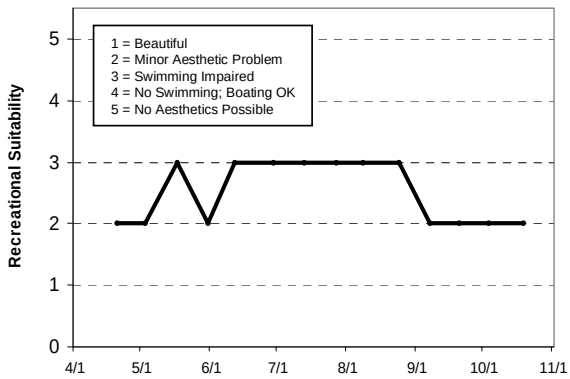



### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | C | D | D |
| Chlorophyll a | | | | | | | | | | C | C | C |
| Secchi Depth | | | | | | | | | | C | C | C |
| **Lake Grade** | | | | | | | | | | **C** | **C** | **C** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | C | C | D | | C |
| Chlorophyll a | B | C | C | | B |
| Secchi Depth | C | C | C | | C |
| **Lake Grade** | **C** | **C** | **C** | | **C** |




Source: Metropolitan Council and STORET data

## Lochness Lake (2-0585) *Rice Creek Watershed District*

Lochness Lake is located in the City of Blaine (Anoka County). It has a surface area of 5.3 acres. There is little known morphological data available for the lake other than it has a maximum depth of 4.9 m (16 ft). Because of the shallowness of the lake, the entire area is considered littoral zone, which is the 0-15 feet depth zone of aquatic plant dominance. Also the lake does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the lake's water column.

A search for historical water quality data via STORET, the nationwide water quality database, provided the historical CAMP data only. The lake was monitored 11 times between mid April and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

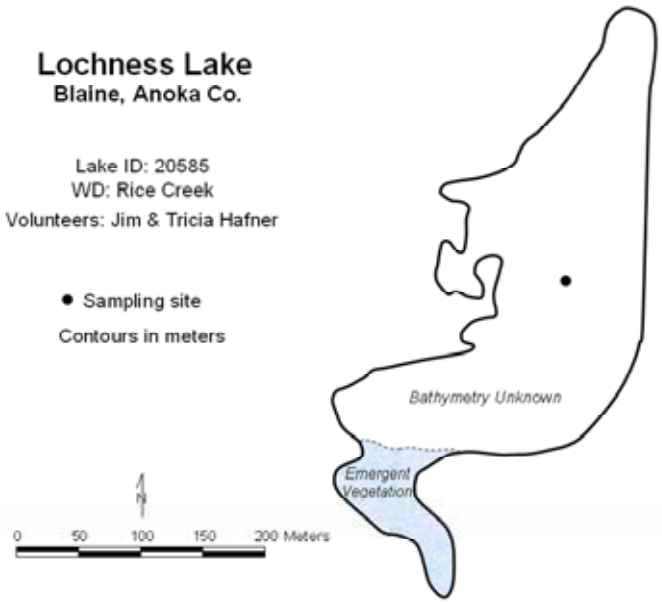
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 30.0 | 18.0 | 90.0 | B |
| **CLA** (µg/l) | 6.8 | 2.8 | 12.0 | A |
| **Secchi** (m) | 2.6 | 2.0 | 3.0 | B |
| **TKN** (mg/l) | 1.61 | 1.20 | 1.90 | |
| | | | ***Lake Grade*** | B |

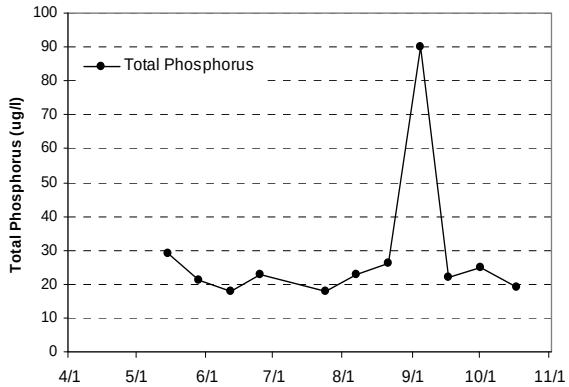
The lake received a lake grade of B for 2008, which is a reduction in water quality compared to last year's lake grade of A. Continued monitoring is suggested to build a historical water quality database for determining water quality trends.

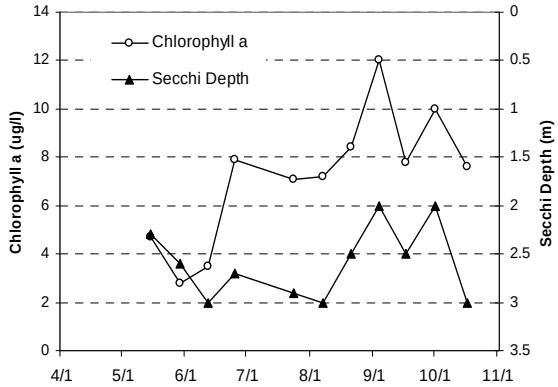
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions is ranked on a scale of 1 to 5. The average physical condition ranking was 2.3 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 4.0 ("no swimming/boating ok").

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) conducted a fisheries survey on the lake in 2005. 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.

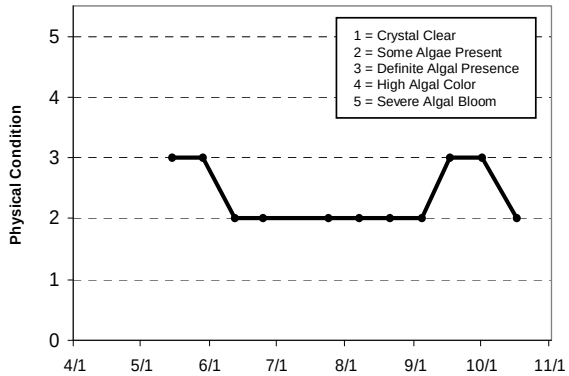



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/15 | 15.8 | | | | 4.7 | 29 | | 2.3 | 3 | 4 |
| 5/29 | 18.3 | | | | 2.8 | 21 | | 2.6 | 3 | 4 |
| 6/12 | 19.6 | | | | 3.5 | 18 | | 3 | 2 | 4 |
| 6/25 | 24.6 | | | | 7.9 | 23 | | 2.7 | 2 | 4 |
| 7/24 | 25.9 | | | | 7.1 | 18 | | 2.9 | 2 | 4 |
| 8/7 | 25.7 | | | | 7.2 | 23 | | 3 | 2 | 4 |
| 8/21 | 25.9 | | | | 8.4 | 26 | | 2.5 | 2 | 4 |
| 9/4 | 21.6 | | | | 12 | 90 | | 2 | 2 | 4 |
| 9/17 | 18.7 | | | | 7.8 | 22 | | 2.5 | 3 | 4 |
| 10/1 | 17.1 | | | | 10 | 25 | | 2 | 3 | 4 |
| 10/17 | 12.7 | | | | 7.6 | 19 | | 3 | 2 | 4 |



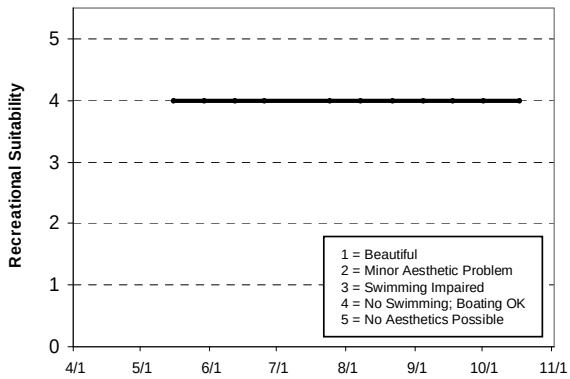

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | A | B |
| Chlorophyll a | | | | A | A |
| Secchi Depth | | | | B | B |
| **Lake Grade** | | | | **A** | **B** |

Source: Metropolitan Council and STORET data



## Long Lake [Apple Valley] (19-0022) *City of Apple Valley*

Long Lake, which has a surface area of roughly 36 acres, is located within the City of Apple Valley (Dakota County). The maximum depth of the lake is approximately 3.5 m (10 feet). There are no other known morphological data available for the lake. Because the lake is relatively shallow, it does not develop and maintain a thermocline, which is a density gradient owed to changing water temperatures throughout the water column. The entire lake is considered littoral zone, which is the shallow (0-15 feet) zone dominated by aquatic plants.

The lake was monitored 14 times from mid April to mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

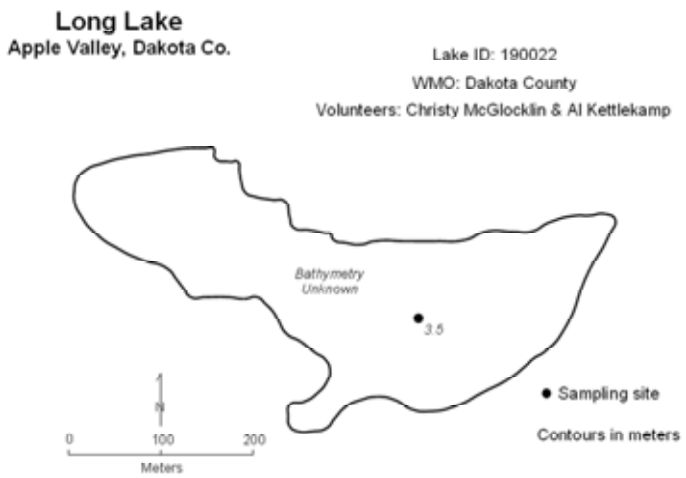
**2008 summer (May-September) data summary**

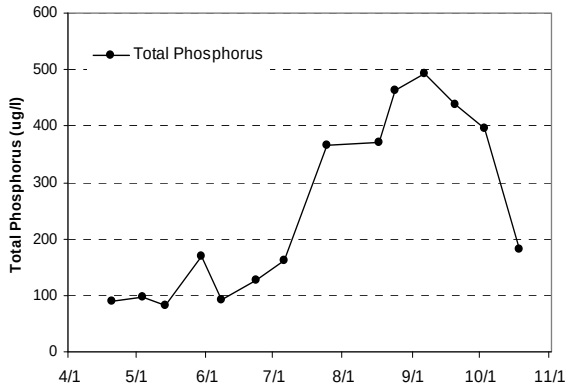
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 260.4 | 82.0 | 492.0 | F |
| **CLA** (µg/l) | 211.2 | 23.0 | 520.0 | F |
| **Secchi** (m) | 0.4 | 0.2 | 0.7 | F |
| **TKN** (mg/l) | 4.12 | 1.20 | 7.10 | |
| | | | ***Lake Grade*** | F |

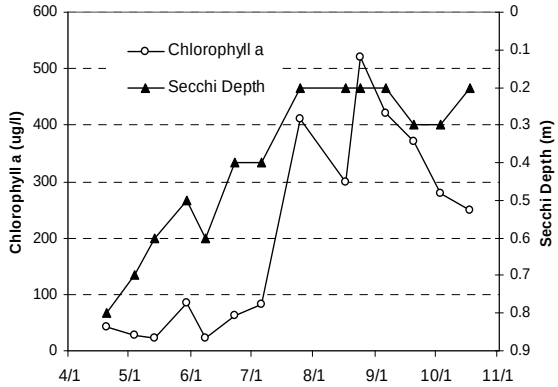
The lake received a lake grade of F for 2008, which is similar to those recorded in 2002-2007, and worse than the lake grade of D recorded in 1997. On the basis of the lake's historical water quality database, the water quality of the lake appears represented by a lake grade of F.

Throughout the course of the study, the volunteers ranked their perceptions of the lake's physical and recreational condition on a 1-to-5 scale. These user perception rankings are shown on the lake's information sheet on the following page. The mean physical condition ranking was 2.9 (between 2- "some algae present" and 3- "definite algae present"), while the mean recreational suitability was 3.8 (between 3- "swimming slightly impaired" and 4- "no swimming/boating ok").

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.

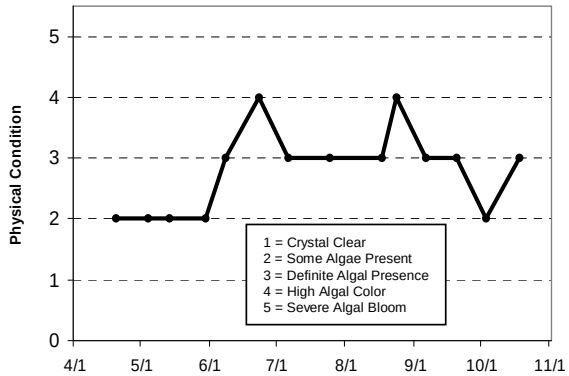



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/20 | 9.2 | | | | 42 | 90 | | 0.8 | 2 | 4 |
| 5/4 | 13.9 | | | | 28 | 98 | | 0.7 | 2 | 2 |
| 5/14 | 17.8 | | | | 23 | 82 | | 0.6 | 2 | |
| 5/30 | 20.2 | | | | 84 | 170 | | 0.5 | 2 | 2 |
| 6/8 | 22.4 | | | | 23 | 93 | | 0.6 | 3 | 4 |
| 6/23 | 28 | | | | 63 | 127 | | 0.4 | 4 | 5 |
| 7/6 | 30.5 | | | | 82 | 162 | | 0.4 | 3 | 5 |
| 7/25 | 27.2 | | | | 410 | 367 | | 0.2 | 3 | 4 |
| 8/17 | 26.2 | | | | 300 | 372 | | 0.2 | 3 | 4 |
| 8/24 | 24 | | | | 520 | 464 | | 0.2 | 4 | 4 |
| 9/6 | 18.7 | | | | 420 | 492 | | 0.2 | 3 | 4 |
| 9/20 | 21.5 | | | | 370 | 437 | | 0.3 | 3 | 4 |
| 10/3 | 17 | | | | 280 | 396 | | 0.3 | 2 | 4 |
| 10/18 | 11.4 | | | | 250 | 182 | | 0.2 | 3 | 4 |



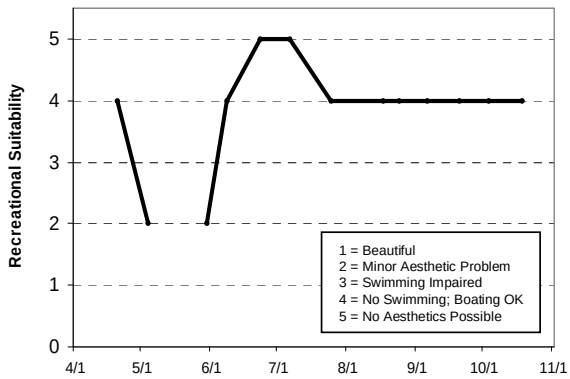

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | D | | | | | F | F |
| Chlorophyll a | | | | | | D | | | | | F | F |
| Secchi Depth | | | | | | F | | | | | F | F |
| **Lake Grade** | | | | | | **D** | | | | | **F** | **F** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | F | F | F | F | F |
| Chlorophyll a | F | F | F | F | F |
| Secchi Depth | F | F | F | F | F |
| **Lake Grade** | **F** | **F** | **F** | **F** | **F** |

Source: Metropolitan Council and STORET data



## Long Lake [Mahtomedi] (82-0130) *Rice Creek Watershed District*

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). Approximately 92 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 does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the lake's water column.

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

A search through the STORET nationwide water quality database for historic data on the lake revealed just the historical CAMP data.

The lake was monitored 10 times between mid April and mid September. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

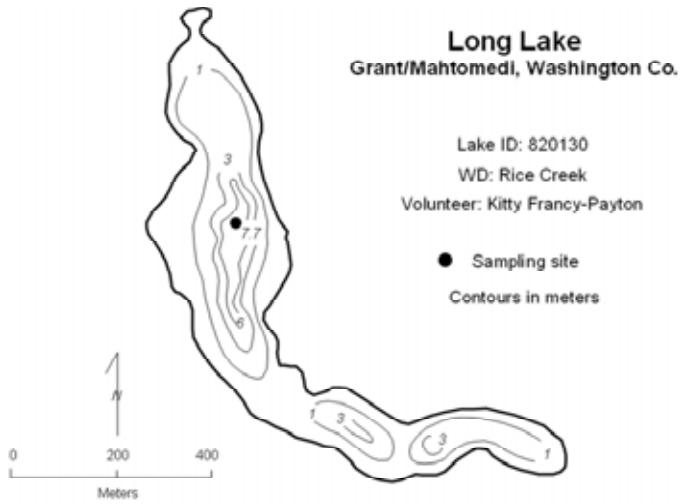
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 18.6 | 16.0 | 23.0 | A |
| **CLA** (µg/l) | 2.8 | 1.5 | 4.1 | A |
| **Secchi** (m) | 2.7 | 1.8 | 3.4 | B |
| **TKN** (mg/l) | 0.58 | 0.31 | 0.73 | |
| | | | ***Lake Grade*** | A |

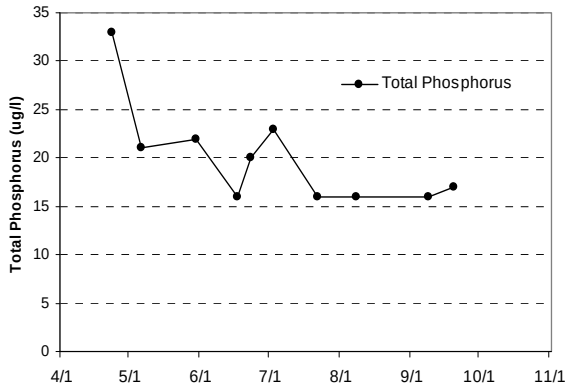
The lake received a lake grade of A for 2008, which is similar to the lake grade received in 2004, and it is an improvement over lake grades of the past 3 years. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008). To better understand the lake's water quality and where it may be heading, additional years of data collection are needed to continue to build the water quality database.

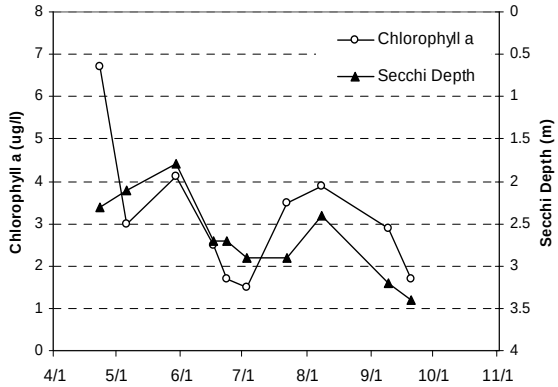
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions is ranked on a scale of 1 to 5. The average physical condition ranking was 2.2 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 2.4 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) conducted a fisheries survey on the lake in 2005. 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.

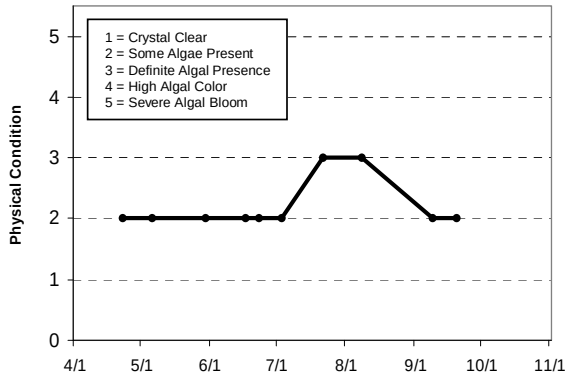



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/23 | 9.2 | | | | 6.7 | 33 | | 2.3 | 2 | 2 |
| 5/6 | 14.9 | | | | 3 | 21 | | 2.1 | 2 | 3 |
| 5/30 | 17.2 | | | | 4.1 | 22 | | 1.8 | 2 | 2 |
| 6/17 | 21.1 | | | | 2.5 | 16 | | 2.7 | 2 | 2 |
| 6/23 | 23.5 | | | | 1.7 | 20 | | 2.7 | 2 | 2 |
| 7/3 | 18.2 | | | | 1.5 | 23 | | 2.9 | 2 | 2 |
| 7/22 | 26.1 | | | | 3.5 | 16 | | 2.9 | 3 | 3 |
| 8/8 | 25.7 | | | | 3.9 | 16 | | 2.4 | 3 | 3 |
| 9/9 | 19.3 | | | | 2.9 | 16 | | 3.2 | 2 | 3 |
| 9/20 | 20.4 | | | | 1.7 | 17 | | 3.4 | 2 | 2 |



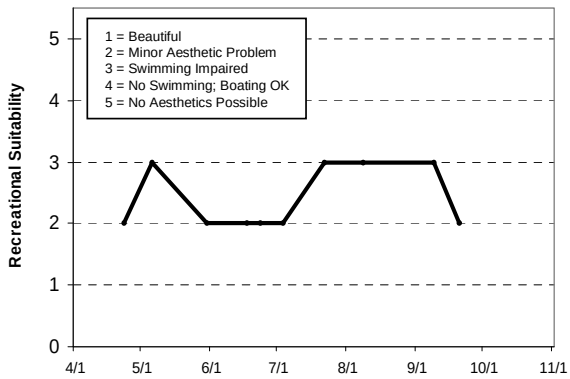

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | B |
| Chlorophyll a | | | | | | | | | | | | A |
| Secchi Depth | | | | | | | | | | | | B |
| **Lake Grade** | | | | | | | | | | | | **B** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | A | C | B | C | A |
| Chlorophyll a | A | A | A | A | A |
| Secchi Depth | B | B | B | B | B |
| **Lake Grade** | **A** | **B** | **B** | **B** | **A** |

Source: Metropolitan Council and STORET data



## Long Lake [May Township] (82-0030) *Marine on St. Croix WMO*

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). There is no other morphological data available for the lake. The entire lake area is considered littoral zone, which is the 0-15 feet depth zone of aquatic plant dominance. The lake does not maintain a thermocline which is a density gradient caused by changing water temperatures throughout the lake's water column.

The lake was sampled 7 times between mid April and early October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

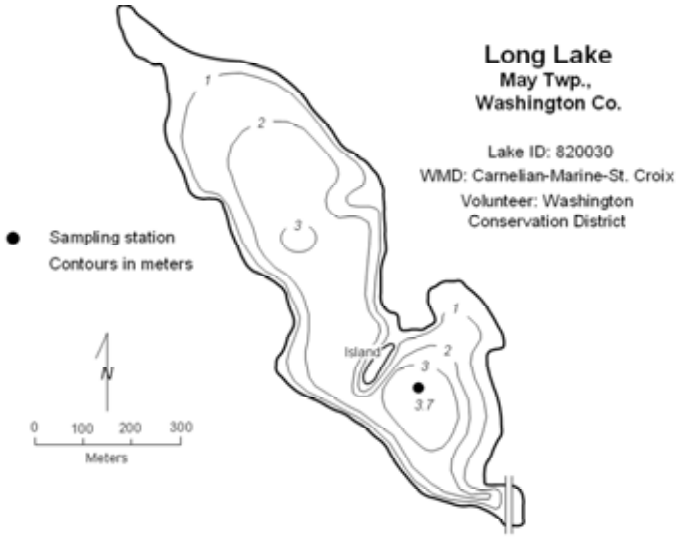
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 33.8 | 29.0 | 37.0 | C |
| **CLA** (µg/l) | 8.1 | 4.9 | 17.0 | A |
| **Secchi** (m) | 2.2 | 1.5 | 2.7 | B |
| **TKN** (mg/l) | 0.91 | 0.68 | 1.20 | |
| | | | ***Lake Grade*** | B |

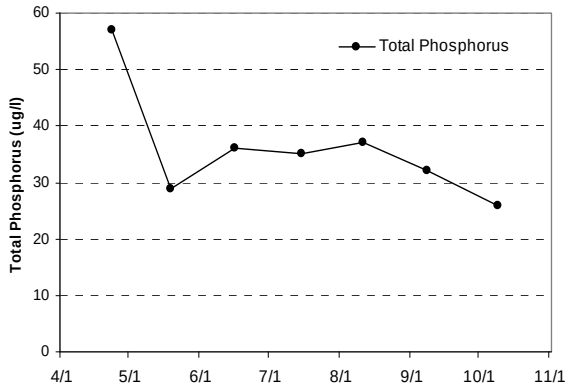
The lake received a lake grade of B for 2008, which is consistent with the lake grades the lake has received over the past eight years. The lake's water quality is representative of a C+/B lake grade for the past decade. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed a statistically significant improving trend in water clarity (MPCA 2008).

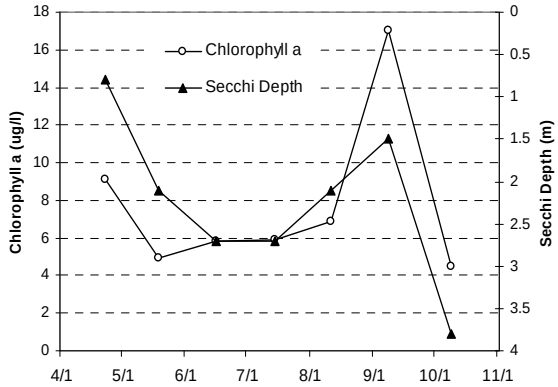
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions is ranked on a scale of 1 to 5. The average physical condition ranking was 2.2 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 2.8 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

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.

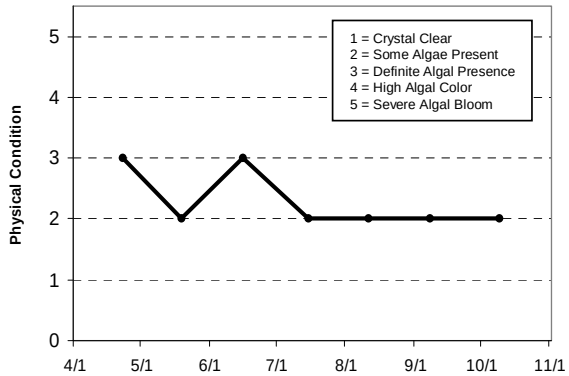



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/23 | 9.5 | 7.1 | 8.81 | 1.04 | 9.1 | 57 | | 0.8 | 3 | 3 |
| 5/19 | 16.2 | 0 | 8.28 | 0 | 4.9 | 29 | | 2.1 | 2 | 3 |
| 6/16 | 21 | 18.1 | 8.36 | 0.38 | 5.8 | 36 | 56 | 2.7 | 3 | 2 |
| 7/15 | 23.7 | 21.4 | 7.26 | 0.23 | 5.9 | 35 | 37 | 2.7 | 2 | 3 |
| 8/11 | 24.7 | 20.5 | 5 | 0.19 | 6.9 | 37 | 158 | 2.1 | 2 | 3 |
| 9/8 | 19.4 | 18.8 | 2.2 | 0.17 | 17 | 32 | 35 | 1.5 | 2 | 3 |
| 10/9 | 13.6 | 13.6 | 6.85 | 0.48 | 4.5 | 26 | 25 | 3.8 | 2 | 2 |



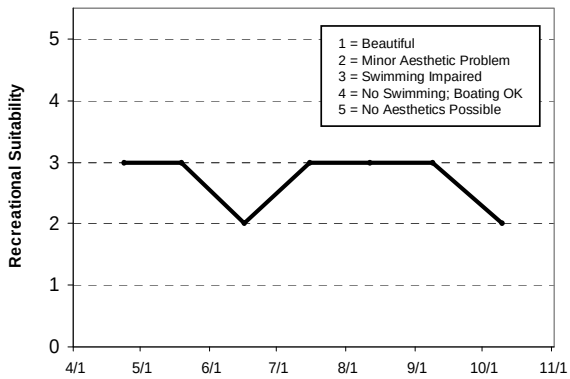

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | C | C | C | C | C | | C | C | C | C | C |
| Chlorophyll a | | C | C | C | B | C | | B | B | B | B | A |
| Secchi Depth | | 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 |
|---|---|---|---|---|---|
| Total Phosphorus | B | C | C | C | C |
| Chlorophyll a | A | B | A | B | A |
| Secchi Depth | B | B | B | C | B |
| **Lake Grade** | **B** | **B** | **B** | **C** | **B** |

Source: Metropolitan Council and STORET data



## Long Lake [Pine Springs] (82-0118) *Valley Branch Watershed District*

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. Approximately 55 percent of the lake's surface area is considered littoral zone which is the 0-15 feet depth zone of aquatic vegetation dominance. The lake's size and mean depth translate into a lake volume of 744 ac-ft. The lake's surface area and watershed area of 2,060 acres translates to a 33:1 watershed-to-lake area ratio. Generally the larger the ratio, the greater the potential stress on the lake from surface runoff.

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

The lake has been monitored in the past by Council staff (most recently in 2003).This was the sixth year that the lake has been monitored via the CAMP. A search for water quality data on Long Lake uncovered a very small database. The only other years of water quality data other than CAMP data were 1984, 1993, and 2003.

The lake was monitored 14 times between mid April and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

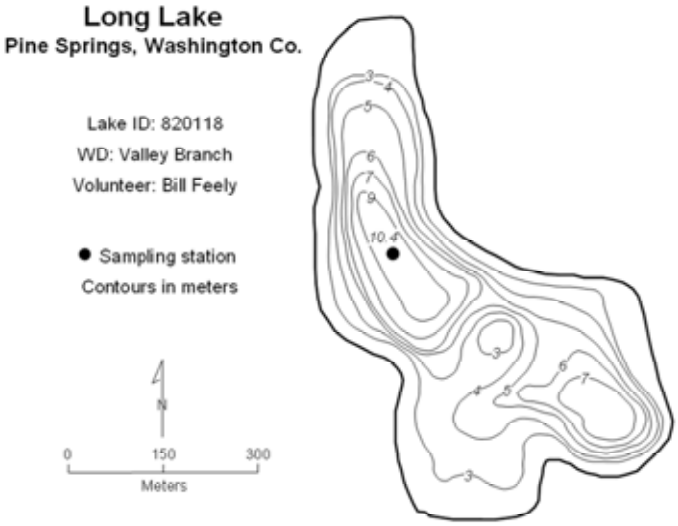
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 24.9 | 15.0 | 59.0 | B |
| **CLA** (µg/l) | 8.2 | 3.2 | 14.0 | A |
| **Secchi** (m) | 2.7 | 1.7 | 3.5 | B |
| **TKN** (mg/l) | 1.17 | 0.51 | 1.80 | |
| | | | ***Lake Grade*** | B |

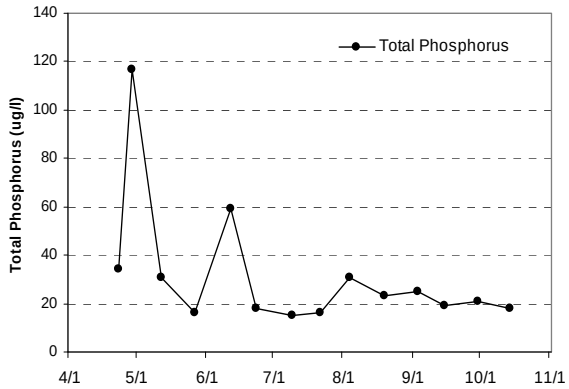
The lake received a lake grade of B for 2008. The annual lake grades appear to vary between B and C. To better understand the quality of the lake and what direction it may be heading, continued monitoring is suggested.

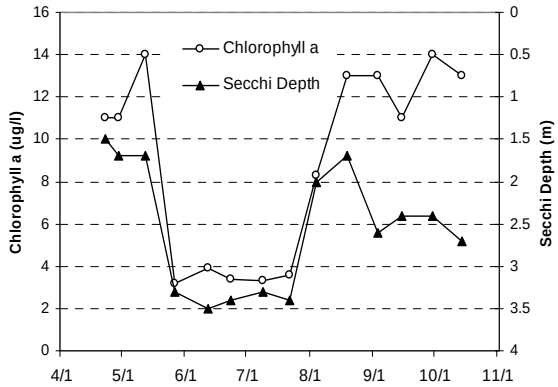
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions is ranked on a scale of 1 to 5. The average physical condition ranking was 2.6 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 2.8 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

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.

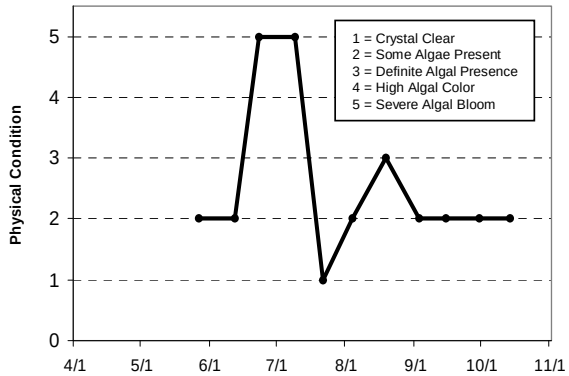



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/23 | 9.1 | | | | 11 | 34 | | 1.5 | | |
| 4/29 | 8.4 | | | | 11 | 117 | | 1.7 | | |
| 5/12 | 12.8 | | | | 14 | 31 | | 1.7 | | |
| 5/27 | 17.7 | | | | 3.2 | 16 | | 3.3 | 2 | 2 |
| 6/12 | 20.4 | | | | 3.9 | 59 | | 3.5 | 2 | 3 |
| 6/23 | 25.1 | | | | 3.4 | 18 | | 3.4 | 5 | 4 |
| 7/9 | 24.7 | | | | 3.3 | 15 | | 3.3 | 5 | 4 |
| 7/22 | 25.6 | | | | 3.6 | 16 | | 3.4 | 1 | 2 |
| 8/4 | 26.8 | | | | 8.3 | 31 | | 2 | 2 | 3 |
| 8/19 | 25.3 | | | | 13 | 23 | | 1.7 | 3 | 3 |
| 9/3 | 22.5 | | | | 13 | 25 | | 2.6 | 2 | 3 |
| 9/15 | 20 | | | | 11 | 19 | | 2.4 | 2 | 2 |
| 9/30 | 18 | | | | 14 | 21 | | 2.4 | 2 | 2 |
| 10/14 | 14.7 | | | | 13 | 18 | | 2.7 | 2 | 1 |



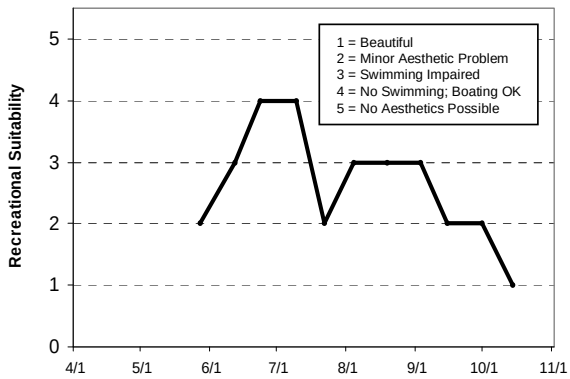

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | C | | | | | | | |
| Chlorophyll a | | | | | B | | | | | | | |
| Secchi Depth | | | | | C | | | | | | | |
| **Lake Grade** | | | | | **C** | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | B | | | | | | | | | | B |
| Chlorophyll a | | B | | | | | | | | | | A |
| Secchi Depth | | C | | | | | | | | | | B |
| **Lake Grade** | | **B** | | | | | | | | | | **B** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | C | C | C | B | B |
| Chlorophyll a | B | B | C | A | A |
| Secchi Depth | C | C | C | B | B |
| **Lake Grade** | **C** | **C** | **C** | **B** | **B** |

Source: Metropolitan Council and STORET data



## Long Lake [Stillwater] (82-0021) *Browns Creek Watershed District*

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). Approximately 95 percent of the surface area is considered littoral zone, which is the 0-15 feet depth zone dominated by aquatic vegetation.

This was the eleventh year that Long Lake has been involved in CAMP (1995-1996 and 1998-2008). Additionally, Secchi transparencies collected through the MPCA's Citizen Lake Monitoring Program are available for 1987, 1989, and 1991-1994.

The lake was monitored 14 times from mid April to mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 51.5 | 37.0 | 64.0 | C |
| **CLA** (µg/l) | 19.1 | 6.8 | 47.0 | B |
| **Secchi** (m) | 1.6 | 0.9 | 2.7 | C |
| **TKN** (mg/l) | 1.98 | 1.60 | 2.50 | |
| | | | ***Lake Grade*** | C |

The lake received a lake grade of C for 2008. On the basis of the historical water quality database, the lake's annual water clarity grades, prior to the C recorded in 2004, have been near constant Fs. The year 2008 was the first year that the lake received a B grade for CLA. This year's lake grade of C continues the improving trend since 2004. However, a recent MPCA conducted trend analysis on the lake's Secchi transparency data, revealed no statistically significant trends in recent water clarity (MPCA 2008).

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions is ranked on a scale of 1 to 5. The average physical condition ranking was 3.0 ("definite algae present"). The average recreational suitability ranking was 3.7 (between 3- "swimming slightly impaired" and 4- "no swimming/boating ok").

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.

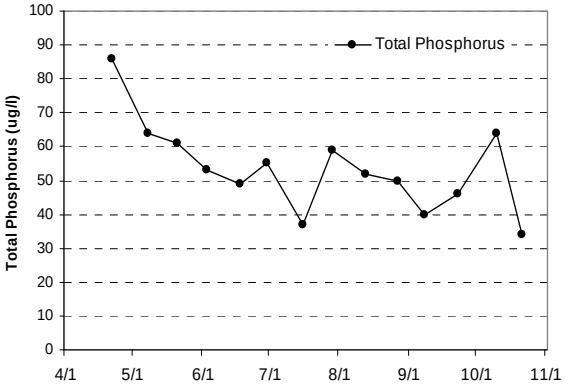
Lake ID: 820021
WD: Browns Creek
Volunteer: Washington
Conservation District

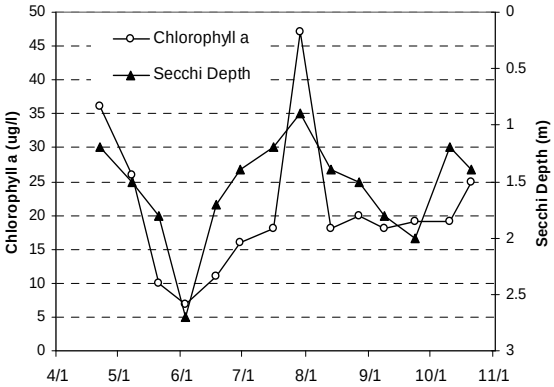
● Sampling site

Contours in meters

N

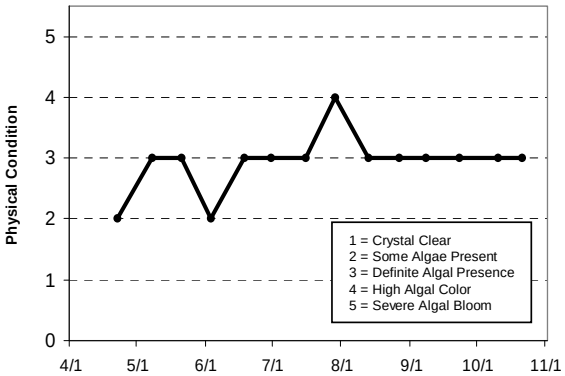
0 100 200
Meters




### 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/22 | 13.1 | 4.5 | 15 | 2.46 | 36 | 86 | | 1.2 | 2 | 3 |
| 5/8 | 14.9 | 4.9 | 9.87 | 0.69 | 26 | 64 | | 1.5 | 3 | 3 |
| 5/21 | 17.1 | 5.3 | 8.18 | 0.29 | 10 | 61 | | 1.8 | 3 | 3 |
| 6/3 | 19.7 | 5.8 | 7.58 | 0.19 | 6.8 | 53 | | 2.7 | 2 | 3 |
| 6/18 | 23.2 | 6.7 | 9.41 | 0.3 | 11 | 49 | | 1.7 | 3 | 4 |
| 6/30 | 24.4 | 7.1 | 9.37 | 0.95 | 16 | 55 | | 1.4 | 3 | 4 |
| 7/16 | 25.9 | 7.8 | 9.04 | 0.55 | 18 | 37 | | 1.2 | 3 | 4 |
| 7/29 | 29.1 | 9.4 | 11.48 | 0.31 | 47 | 59 | | 0.9 | 4 | 4 |
| 8/13 | 26.1 | 11.3 | 7.41 | 0.53 | 18 | 52 | | 1.4 | 3 | 4 |
| 8/27 | 23.2 | 9.3 | 7.88 | 0.23 | 20 | 50 | | 1.5 | 3 | 4 |
| 9/8 | 20.4 | 10.5 | 7.6 | 0.26 | 18 | 40 | | 1.8 | 3 | 4 |
| 9/23 | 20.9 | 14.7 | 8.25 | 0.22 | 19 | 46 | | 2 | 3 | 4 |
| 10/10 | 14.3 | 13.7 | 4.25 | 0.25 | 19 | 64 | | 1.2 | 3 | 4 |
| 10/21 | 12.4 | 11.7 | 9.35 | 0.25 | 25 | 34 | | 1.4 | 3 | 3 |



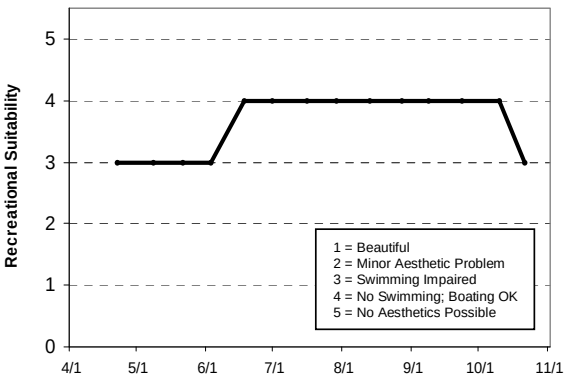

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | F | | D | | F |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | D | D | | D | D | F | D | D | D |
| Chlorophyll a | | | | D | D | | F | F | F | F | D | D |
| Secchi Depth | 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 |
|---|---|---|---|---|---|
| Total Phosphorus | C | D | D | C | C |
| Chlorophyll a | C | D | C | C | B |
| Secchi Depth | C | D | D | D | C |
| **Lake Grade** | **C** | **D** | **D** | **C** | **C** |

Source: Metropolitan Council and STORET data



## Long Lake [Washington Co.] (82-0068) *Carnelian - Marine Watershed District*

Long Lake is located within 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 lake's surface area and mean depth translates to an approximate volume of 126 ac-ft. Because of the shallowness of the lake, the entire surface area is considered littoral zone, which is the area where the majority of the lake's aquatic plants are located. Furthermore, the lake does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the water column The majority of the landuse within the lake's 381-acre watershed is undeveloped. The watershed-to-lake area ratio is 11:1. The greater the ratio, the greater the potential stress on the lake from surface runoff.

A search through the STORET nationwide water quality database revealed data for 1998-1999 and the historical CAMP data. The lake was monitored 8 times between early May and early October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

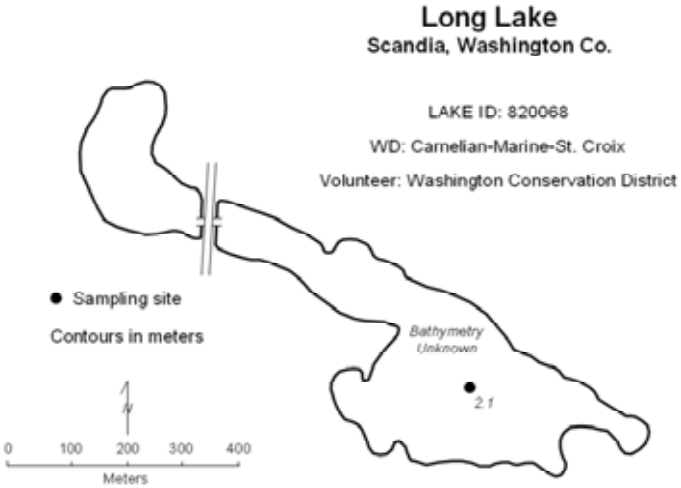
**2008 summer (May-September) data summary**

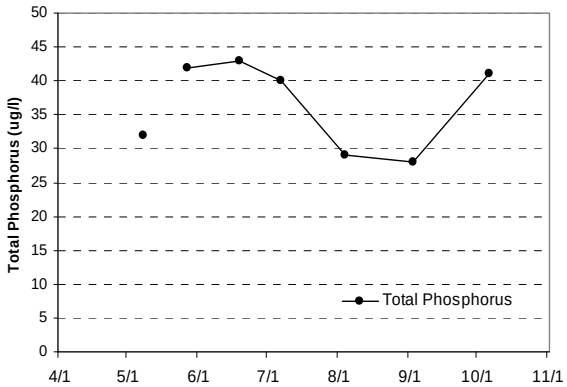
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 35.7 | 28.0 | 43.0 | C |
| **CLA** (µg/l) | 4.9 | 3.5 | 6.3 | A |
| **Secchi** (m) | 2.2 | 1.8 | 2.4 | C |
| **TKN** (mg/l) | 0.90 | 0.78 | 1.20 | |
| | | | ***Lake Grade*** | B |

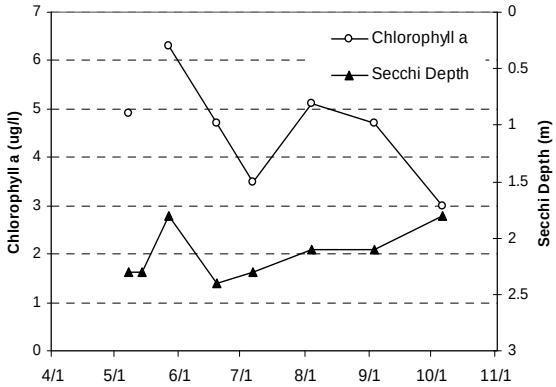
The lake received a lake grade of B for 2008, which is the best lake grade the lake has received in all the know years of monitoring for this lake. The lake received F lake grades in the late 1990s and early 2000s. The water quality of the lake has steadily improved since then, especially with respect to water clarity and CLA concentrations. Continued monitoring is suggested to determine if this trend continues.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.1 (2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 2.6 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

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.

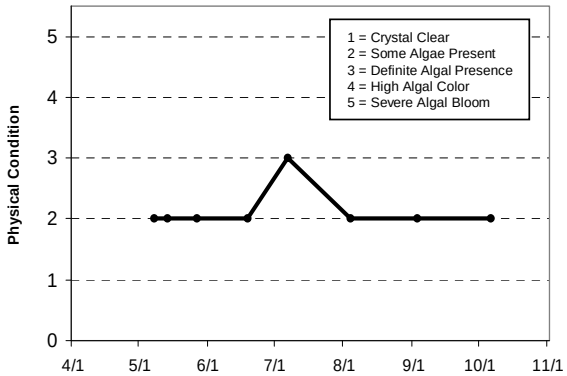



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/8 | 15.4 | 13.3 | 9.4 | 7.28 | 4.9 | 32 | | 2.3 | 2 | 2 |
| 5/14 | 14.6 | | | | | | | 2.3 | 2 | 3 |
| 5/27 | 17 | 16.8 | 7.17 | 0.21 | 6.3 | 42 | | 1.8 | 2 | 3 |
| 6/19 | 23.9 | 21.7 | 8.67 | 0.67 | 4.7 | 43 | | 2.4 | 2 | 3 |
| 7/7 | 26.4 | 25.5 | 7.28 | 4.87 | 3.5 | 40 | | 2.3 | 3 | 2 |
| 8/4 | 26.2 | 24.9 | 5.93 | 0.18 | 5.1 | 29 | | 2.1 | 2 | 3 |
| 9/3 | 21.9 | 22 | 6.52 | 5.62 | 4.7 | 28 | | 2.1 | 2 | 2 |
| 10/6 | 13.1 | 13.2 | 11.27 | 10.42 | 3 | 41 | | 1.8 | 2 | 2 |



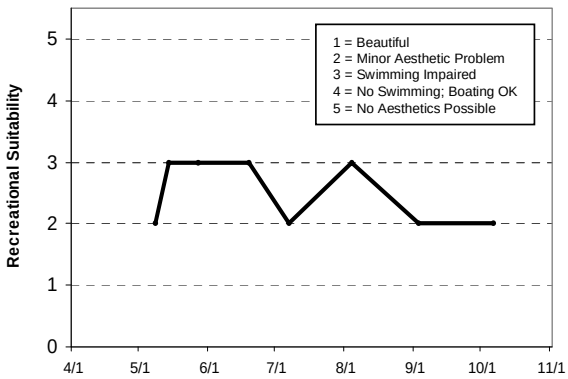

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | D | D | D | C | C | D |
| Chlorophyll a | | | | | | | F | F | F | D | C | F |
| Secchi Depth | | | | | | | F | F | F | D | D | F |
| **Lake Grade** | | | | | | | **F** | **F** | **F** | **D** | **C** | **F** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | D | D | D | C | C |
| Chlorophyll a | D | C | B | C | A |
| Secchi Depth | D | D | C | C | C |
| **Lake Grade** | **D** | **D** | **C** | **C** | **B** |

Source: Metropolitan Council and STORET data



## Loon Lake (82-0015-02) *Carnelian - Marine Watershed District*

Loon Lake is located in Stillwater Township (Washington County). The surface area of the lake is 64 acres. It has a mean and maximum depth of 2.4 m (eight feet) and 4.9 m (16 feet), respectively. The mean depth of the lake and its surface area translate to an approximate lake volume of 206 ac-ft. Because of the shallowness of the lake, the majority of its area is considered littoral zone, which is the 0-15 feet depth zone 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 lake's 407-acre watershed translates to a 6.4:1 watershed-to-lake size ratio. The greater the ratio, the greater the potential stress on the lake from surface runoff.

The lake was monitored 14 times between late April and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 149.0 | 48.0 | 206.0 | D |
| **CLA** (µg/l) | 137.5 | 37.0 | 300.0 | F |
| **Secchi** (m) | 0.4 | 0.2 | 0.8 | F |
| **TKN** (mg/l) | 4.42 | 1.30 | 6.10 | |
| | | | ***Lake Grade*** | F |

The lake received a lake grade of F for 2008, which is similar to previous years' lake grades. On the basis of the historical water quality database, this lake appears represented by a lake grade of F.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 3.9 (between 3- "definite algae present" and 4- "high algal color"). The average recreational suitability ranking was 4.1 (between 4- "no swimming/boating ok" and 5- "no aesthetics possible").

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.

# Loon Lake

**Stillwater Twp., Washington Co.**

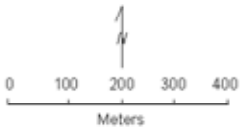
LAKE ID: 820015-02

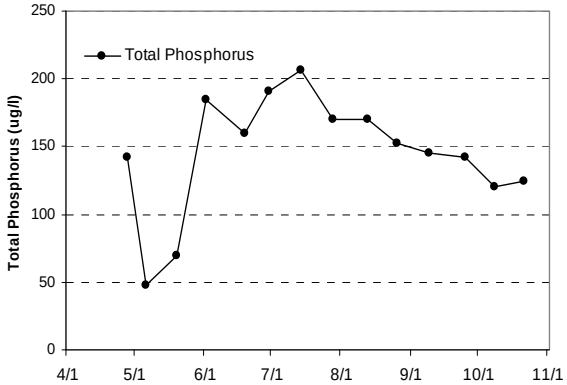
WD: Carnelian-Marine-St. Croix

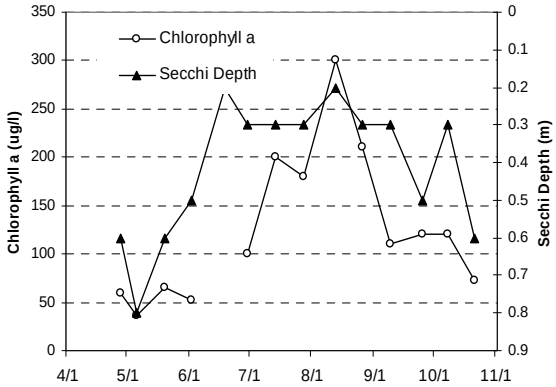
Volunteer: Washington Conservation District

● Sampling site

Contours in meters

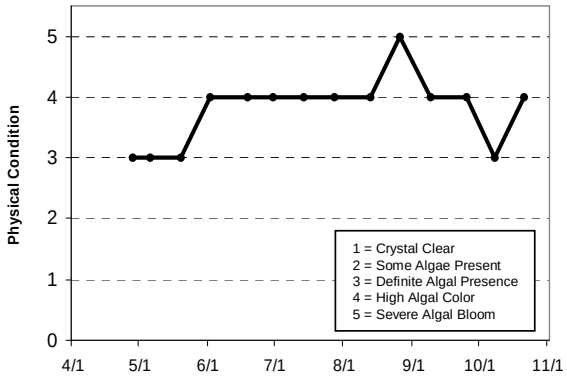





## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/28 | 8.7 | 8.7 | 11.1 | 8.78 | 59 | 142 | | 0.6 | 3 | 3 |
| 5/6 | 14.2 | 11.3 | 11.13 | 0.56 | 37 | 48 | | 0.8 | 3 | 4 |
| 5/20 | 15.7 | 14.9 | 8.81 | 6.76 | 65 | 70 | 198 | 0.6 | 3 | 4 |
| 6/2 | 20.3 | 14.1 | 9.92 | 0.12 | 53 | 185 | 108 | 0.5 | 4 | 4 |
| 6/19 | 22.2 | 16.4 | 9.42 | 0.16 | | 160 | 175 | 0.2 | 4 | 4 |
| 6/30 | 23.3 | 15.9 | 5.4 | 0.47 | 100 | 191 | 222 | 0.3 | 4 | 4 |
| 7/14 | 23.5 | 17.6 | 7.79 | 0.32 | 200 | 206 | 200 | 0.3 | 4 | 4 |
| 7/28 | 25.6 | 19 | 7.76 | 0.24 | 180 | 170 | 186 | 0.3 | 4 | 4 |
| 8/13 | 24.4 | 23 | 9.79 | 0.73 | 300 | 170 | 180 | 0.2 | 4 | 4 |
| 8/26 | 22.3 | 20.7 | 4.25 | 0.19 | 210 | 152 | 151 | 0.3 | 5 | 4 |
| 9/9 | 18.9 | 18.2 | 5.06 | 0.18 | 110 | 145 | 134 | 0.3 | 4 | 4 |
| 9/25 | 19.1 | 19.1 | 5.53 | 0.2 | 120 | 142 | 125 | 0.5 | 4 | 5 |
| 10/8 | 14.3 | 13.8 | 7.04 | 0.32 | 120 | 120 | 127 | 0.3 | 3 | 4 |
| 10/21 | 11.1 | 11 | 6.9 | 0.36 | 72 | 124 | 118 | 0.6 | 4 | 4 |

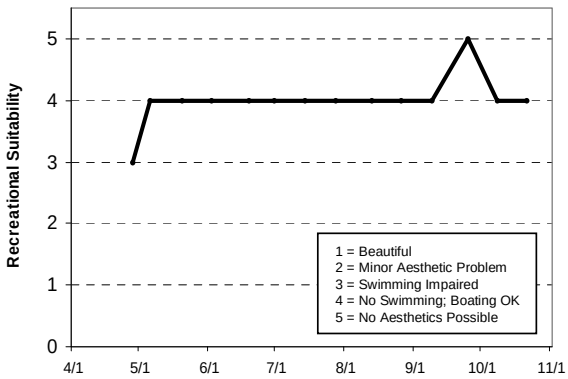



### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | F | F | F | F | D | D | D | D |
| Chlorophyll a | | | | | D | D | D | D | D | D | D | F |
| Secchi Depth | | | | | F | F | F | F | D | D | F | F |
| **Lake Grade** | | | | | **F** | **F** | **F** | **F** | **D** | **D** | **D** | **F** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | D | D | F | D | D |
| Chlorophyll a | F | F | F | F | F |
| Secchi Depth | F | F | F | F | F |
| **Lake Grade** | **F** | **F** | **F** | **F** | **F** |




Source: Metropolitan Council and STORET data

## Lost Lake (82-0134) *City of Mahtomedi*

Lost Lake is a small lake located in the City of Mahtomedi (Washington County). There is little known morphological data available for the lake.

This was the third year that this lake has been involved in CAMP. A search through the STORET nationwide water quality database for data on the lake provided no other data other than historical CAMP data.

The lake was monitored 11 times between early May and mid September. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 40.5 | 20.0 | 53.0 | C |
| **CLA** (µg/l) | 6.8 | 1.5 | 15.0 | A |
| **Secchi** (m) | 1.5 | 0.9 | 2.1 | C |
| **TKN** (mg/l) | 1.21 | 0.60 | 1.70 | |
| | | | ***Lake Grade*** | B |

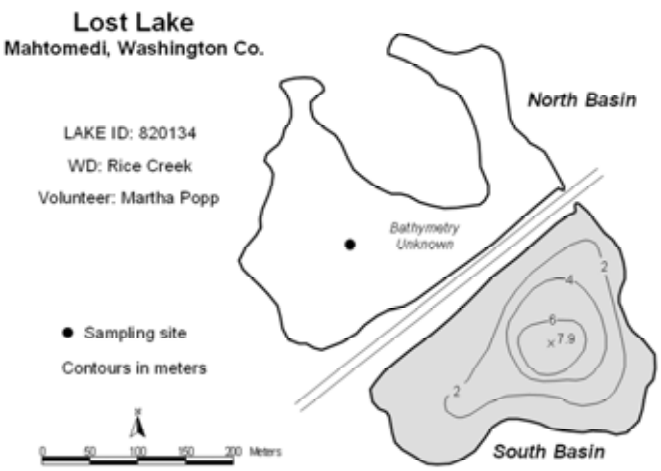
The lake received a lake grade of B for 2008, which is an improvement over the lake grades of the past two years. The main driver of the improved water quality is the relatively lower CLA concentrations observed in 2008. The CLA grade was an A for 2008, which is a two-grade jump above the previous two years' CLA grades.

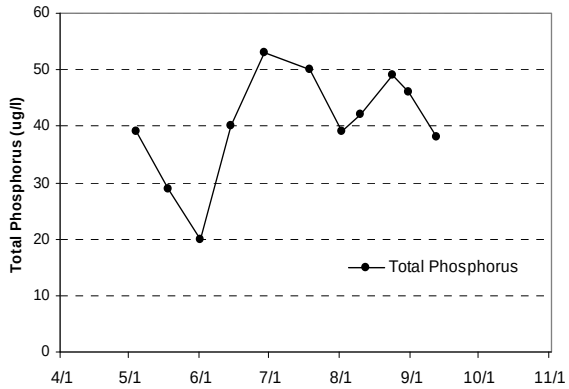
The region experienced below normal precipitation for 2008, and the lake water level was well below normal. In fact the volunteer had to end monitoring activities in September because of development of mud flats along shore which prevented access to the water. Therefore, a possible explanation for reduction in CLA may be related to the reduction of surface inflows into the lake. Less inflow could cause a reduction in external TP loading, which could limit algae growth via reduction in TP availability. Indeed, the mean, minimum, and maximum TP concentrations in 2008 were less than those observed in 2006 and 2007.

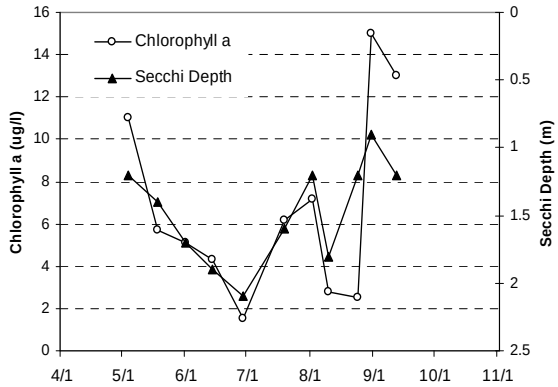
As mentioned earlier, there are no nutrient data available for the lake other than the 2006 – 2008 CAMP data. Additional data are needed to build the water quality database so as to better understand potential water quality trends.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 3.1 (between 3- "definite algae present" and 4- "high algal color"). The average recreational suitability ranking was 4.7 (between 4- "no swimming/boating ok" and 5- "no aesthetics possible").

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.

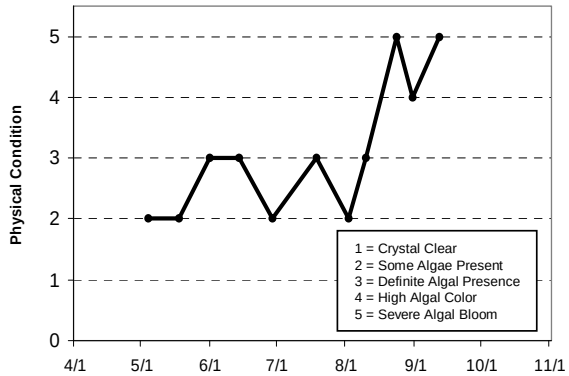



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/4 | 14.1 | | | | 11 | 39 | | 1.2 | 2 | 4 |
| 5/18 | 18.5 | | | | 5.7 | 29 | | 1.4 | 2 | 4 |
| 6/1 | 22.9 | | | | 5.1 | 20 | | 1.7 | 3 | 4 |
| 6/14 | 24.5 | | | | 4.3 | 40 | | 1.9 | 3 | 5 |
| 6/29 | 25.3 | | | | 1.5 | 53 | | 2.1 | 2 | 5 |
| 7/19 | 25.1 | | | | 6.2 | 50 | | 1.6 | 3 | 5 |
| 8/2 | 28.1 | | | | 7.2 | 39 | | 1.2 | 2 | 5 |
| 8/10 | 26.9 | | | | 2.8 | 42 | | 1.8 | 3 | 5 |
| 8/24 | 25.3 | | | | 2.5 | 49 | | 1.2 | 5 | 5 |
| 8/31 | 23.8 | | | | 15 | 46 | | 0.9 | 4 | 5 |
| 9/12 | 21.4 | | | | 13 | 38 | | 1.2 | 5 | 5 |



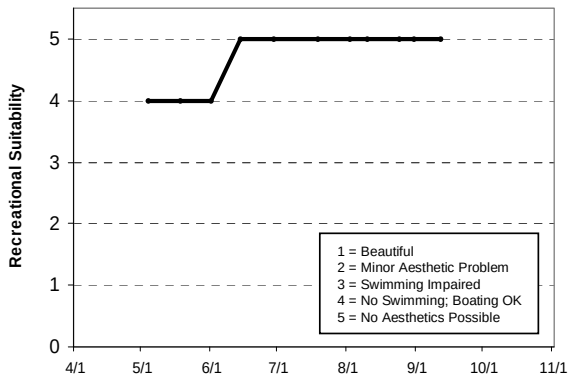

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | D | C | C |
| Chlorophyll a | | | C | C | A |
| Secchi Depth | | | C | C | C |
| **Lake Grade** | | | **C** | **C** | **B** |

Source: Metropolitan Council and STORET data



## Lotus Lake (10-0006) *City of Chanhassen*

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. It has a surface area of 246 acres and a maximum and mean depth of 8.9 m (29.2 ft) and 4.3 m (14.2 ft.), respectively. The surface area and mean depth translate into a lake volume of 3,500 ac-ft. Approximately 74 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 does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the lake's water column. The lake's surface area and its 1,033-acre watershed translate into a 4:1 watershed-to-lake area ratio. The greater the ratio, the greater the potential stress on the lake from surface runoff.

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

The lake was monitored previously by Council staff (1985, 1990 and 1999-2000) and the MPCA's volunteer Secchi program (1980, 1988-1991). The year 2008 marks the sixth year the lake has been monitored via the CAMP.

The lake was monitored 11 times between late April and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 43.9 | 23.0 | 82.0 | C |
| **CLA** (µg/l) | 23.2 | 4.4 | 60.0 | C |
| **Secchi** (m) | 1.3 | 0.8 | 2.1 | C |
| **TKN** (mg/l) | 1.83 | 0.98 | 2.40 | |
| | | | ***Lake Grade*** | C |

The lake received a lake grade of C for 2008, which is consistent with all previous years' lake grades except for the D lake grade received in 2003. On the basis of the historical water quality database, the water quality of this lake appears represented well by a lake grade of C. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008).

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.4 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 2.4 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

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.**

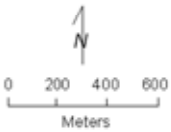
Lake ID: 100006

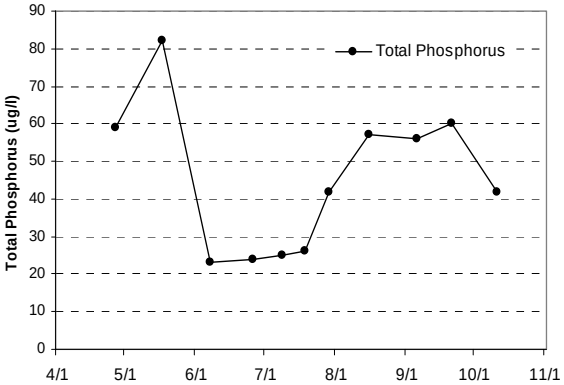
WD: Riley-Purgatory-Bluff Creek

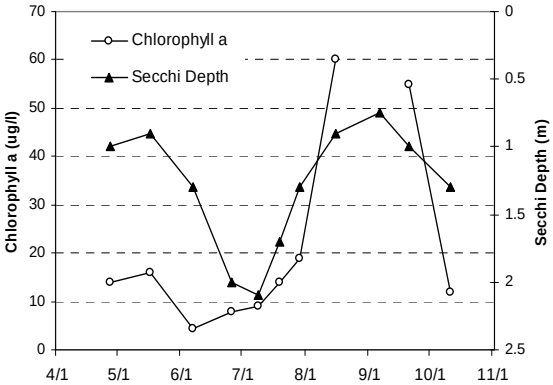
Volunteer: Shelly Strohmaier

● Sampling site

Contours in meters

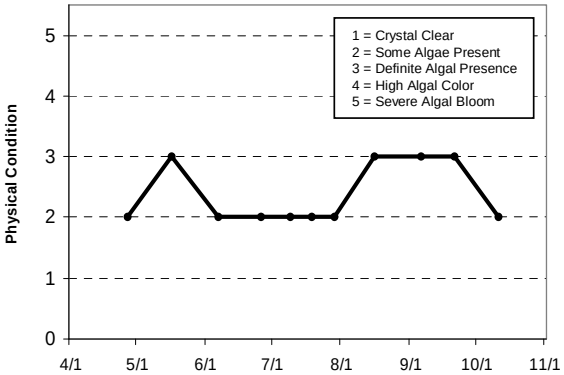





## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/27 | 8.5 | | | | 14 | 59 | | 1 | 2 | 2 |
| 5/17 | 18.3 | | | | 16 | 82 | | 0.9 | 3 | 3 |
| 6/7 | 21.2 | | | | 4.4 | 23 | | 1.3 | 2 | 2 |
| 6/26 | 25.4 | | | | 7.9 | 24 | | 2 | 2 | 2 |
| 7/9 | 25.1 | | | | 9 | 25 | | 2.1 | 2 | 2 |
| 7/19 | 26.8 | | | | 14 | 26 | | 1.7 | 2 | 2 |
| 7/29 | 27.3 | | | | 19 | 42 | | 1.3 | 2 | 2 |
| 8/16 | 25.3 | | | | 60 | 57 | | 0.9 | 3 | 3 |
| 9/6 | 21.7 | | | | | 56 | | 0.75 | 3 | 3 |
| 9/21 | 20.9 | | | | 55 | 60 | | 1 | 3 | 3 |
| 10/11 | 18 | | | | 12 | 42 | | 1.3 | 2 | 2 |



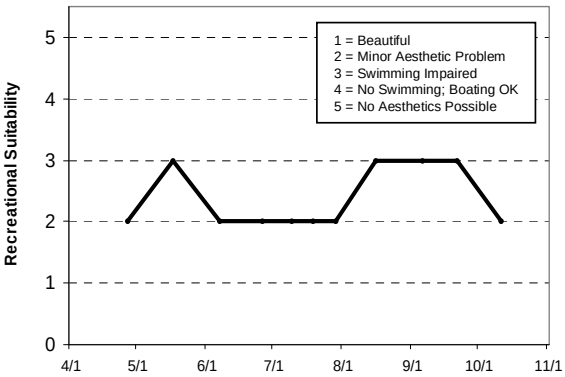

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | C | | | | | | |
| Chlorophyll a | | | | | | C | | | | | C | |
| Secchi Depth | D | | | | | C | | | D | C | C | C |
| **Lake Grade** | | | | | | **C** | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | C | C | | | D |
| Chlorophyll a | | | | | | | | C | C | | | C |
| Secchi Depth | | | | | | | | C | C | | | D |
| **Lake Grade** | | | | | | | | **C** | **C** | | | **D** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | C | C | C | C | C |
| Chlorophyll a | C | C | C | C | C |
| Secchi Depth | C | C | C | C | C |
| **Lake Grade** | **C** | **C** | **C** | **C** | **C** |

Source: Metropolitan Council and STORET data



## Louise Lake (82-0025) *Carnelian - Marine Watershed District*

Louise Lake is located in Stillwater Township (Washington County). The lake has a surface area of a 48 acres. It has a maximum and mean depth of the lake are 3.7 m (12 ft) and 1.8 m (6 ft), respectively. The mean depth of the lake and its surface area translate to a lake volume of 283 ac-ft. Because of the shallowness of the lake, the entire surface area is considered littoral zone, which is the 0-15 feet depth zone of aquatic plant dominance. The lake does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the lake's water column.

The lake's 616-acre watershed and surface area translates to a watershed-to-lake size ratio of 13:1. The greater the ratio, the greater the potential stress on the lake from surface runoff.

A search through the STORET nationwide water quality database for data on the lake provided limited information (1996-2006).

The lake's was monitored 14 times late April to mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

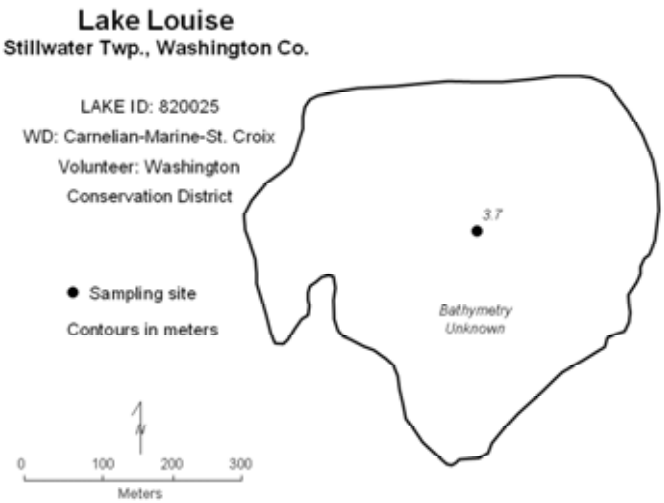
**2008 summer (May-September) data summary**

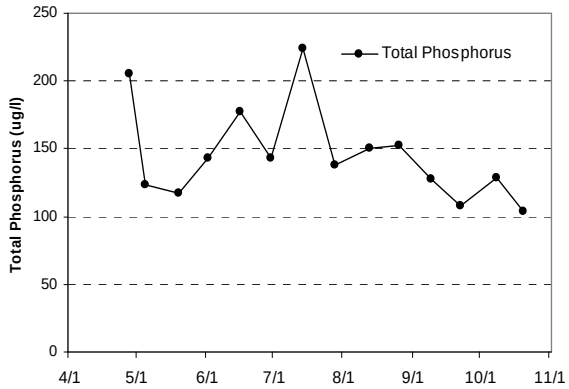
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 145.7 | 108.0 | 224.0 | D |
| **CLA** (µg/l) | 35.4 | 13.0 | 74.0 | C |
| **Secchi** (m) | 0.8 | 0.5 | 1.4 | D |
| **TKN** (mg/l) | 2.46 | 1.90 | 3.10 | |
| | | | ***Lake Grade*** | D |

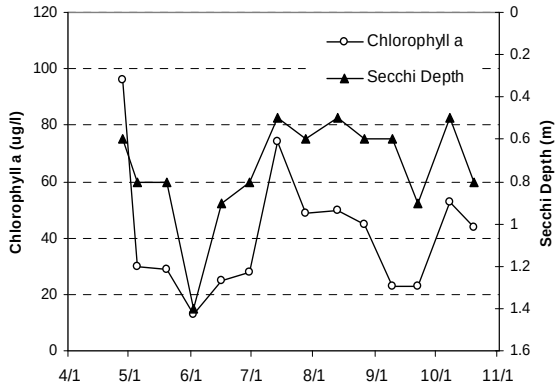
The lake received a lake grade of D for 2008. The historical water quality database shows that the annual lake grades have varied from Cs to Ds. To better understand the lake's water quality and where it may be heading, more data are needed.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 3.3 (between 3- "definite algae present" and 4- "high algal color"). The average recreational suitability ranking was 4.0 ("no swimming/boating ok").

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.

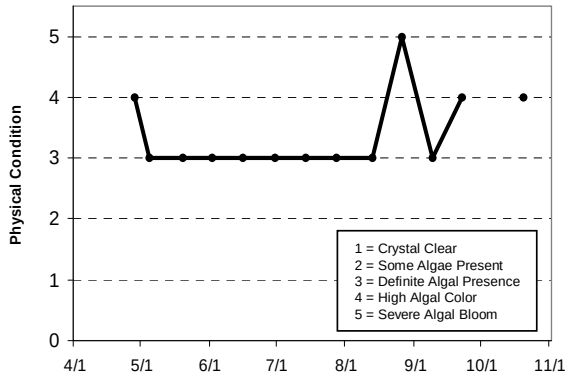



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/28 | 7.5 | 7.5 | 13.21 | 13.09 | 96 | 205 | | 0.6 | 4 | 4 |
| 5/5 | 12.4 | 11 | 11.28 | 0.59 | 30 | 123 | | 0.8 | 3 | 4 |
| 5/20 | 15.3 | 14.6 | 9.02 | 0.53 | 29 | 117 | 107 | 0.8 | 3 | 4 |
| 6/2 | 20.6 | 17.6 | 8.48 | 2.22 | 13 | 143 | 151 | 1.4 | 3 | 4 |
| 6/16 | 20.6 | 20.5 | 9.94 | 9.57 | 25 | 177 | 165 | 0.9 | 3 | 4 |
| 6/30 | 23 | 20.8 | 6.32 | 0.35 | 28 | 143 | 133 | 0.8 | 3 | 4 |
| 7/14 | 23 | 21.7 | 8.68 | 0.38 | 74 | 224 | 198 | 0.5 | 3 | 4 |
| 7/28 | 26.3 | 22.5 | 9.03 | 0.2 | 49 | 138 | 241 | 0.6 | 3 | 4 |
| 8/13 | 24.1 | 23 | 5.8 | 0.56 | 50 | 150 | 168 | 0.5 | 3 | 4 |
| 8/26 | 22.4 | 22.4 | 10.27 | 5.16 | 45 | 152 | 144 | 0.6 | 5 | 4 |
| 9/9 | 18.2 | 17.5 | 9.45 | 9.02 | 23 | 128 | 108 | 0.6 | 3 | 4 |
| 9/22 | 20.9 | 19.3 | 11.36 | 0.35 | 23 | 108 | 98 | 0.9 | 4 | 4 |
| 10/8 | 13.9 | 13.7 | 10.15 | 0.3 | 53 | 129 | 115 | 0.5 | | 4 |
| 10/20 | 11.4 | 11.2 | 9.69 | 0.39 | 44 | 104 | 124 | 0.8 | 4 | 4 |



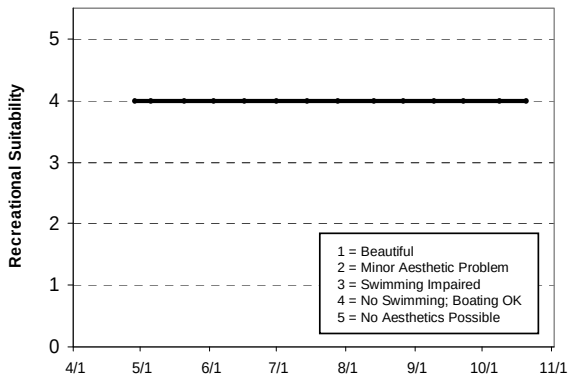

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | D | D | B | C | D | D | D | |
| Chlorophyll a | | | | | D | D | D | F | B | D | C | |
| Secchi Depth | | | | | B | C | C | C | C | D | D | B |
| **Lake Grade** | | | | | **C** | **D** | **C** | **D** | **C** | **D** | **D** | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | | D |
| Chlorophyll a | | | | | C |
| Secchi Depth | C | D | D | D | D |
| **Lake Grade** | | | | **D** | **D** |

Source: Metropolitan Council and STORET data



## Lynch Lake (82-0042) *Browns Creek Watershed District*

Lynch Lake is located in Washington County. It has a surface area of 43 acres. There is little known morphological data available for the lake.

This was the third year that Lynch Lake has been involved in CAMP. A search through the STORET nationwide water quality database for data on the lake provided no other data other than historical CAMP data.

The lake was monitored 14 times between late April and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

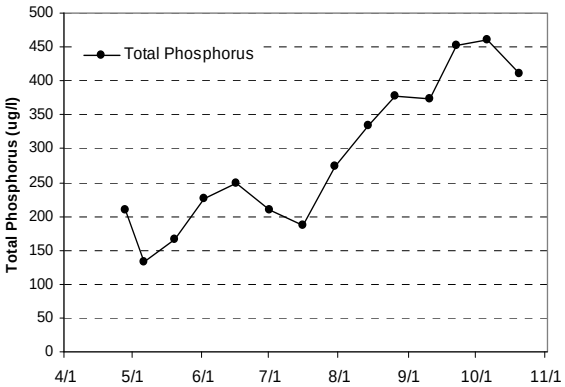
**2008 summer (May-September) data summary**

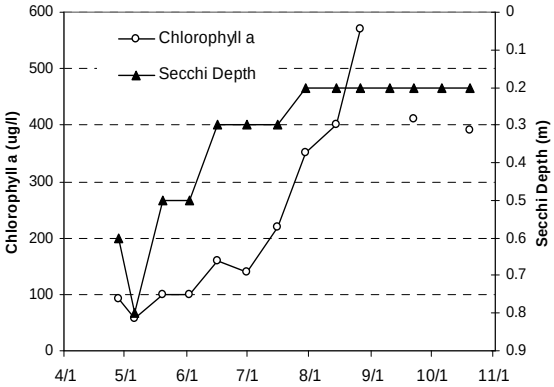
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 270.9 | 133.0 | 453.0 | F |
| **CLA** (µg/l) | 250.6 | 57.0 | 570.0 | F |
| **Secchi** (m) | 0.3 | 0.2 | 0.8 | F |
| **TKN** (mg/l) | 6.74 | 3.20 | 12.00 | |
| | | | ***Lake Grade*** | F |

The lake received a lake grade of F for 2008. The 2007 overall water quality grade was an F. This lake also received F lake grades in 2006 and 2007. To continue to build the water quality database for this lake, additional years of data collection are needed.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 3.8 (between 3- "definite algae present" and 4- "high algal color"). The average recreational suitability ranking was 4.1 (between 4- "no swimming/boating ok" and 5- "no aesthetics possible).

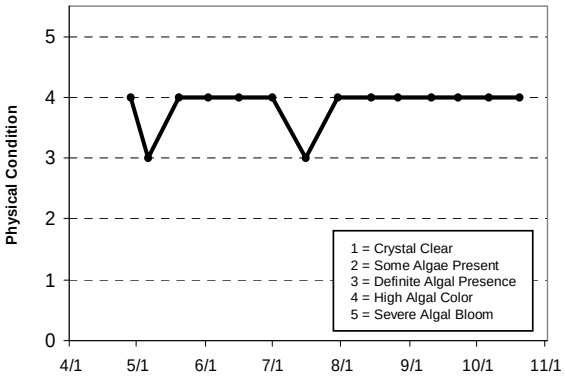
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.




## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/28 | 7 | 7 | 12.68 | 12.5 | 91 | 210 | | 0.6 | 4 | 4 |
| 5/6 | 16 | 12.8 | 13.34 | 0.61 | 57 | 133 | | 0.8 | 3 | 4 |
| 5/20 | 15.8 | 15.2 | 10.94 | 0.25 | 99 | 166 | | 0.5 | 4 | 4 |
| 6/2 | 21.5 | 18.3 | 10.39 | 0.17 | 100 | 226 | | 0.5 | 4 | 4 |
| 6/16 | 21.1 | 20.7 | 10.4 | 9.33 | 160 | 248 | | 0.3 | 4 | 4 |
| 7/1 | 26.3 | 21.7 | 13.84 | 0.29 | 140 | 209 | | 0.3 | 4 | 4 |
| 7/16 | 24.7 | 22.7 | 7.2 | 0.92 | 220 | 187 | | 0.3 | 3 | 4 |
| 7/30 | 26.4 | 23.7 | 9.84 | 0.29 | 350 | 273 | | 0.2 | 4 | 4 |
| 8/14 | 23.3 | 22.7 | 10.72 | 0.89 | 400 | 335 | | 0.2 | 4 | 4 |
| 8/26 | 24.3 | 22.4 | 13.69 | 10.35 | 570 | 377 | | 0.2 | 4 | 4 |
| 9/10 | 17.2 | 17 | 8.93 | 0.2 | | 373 | | 0.2 | 4 | 4 |
| 9/22 | 21.2 | 20.5 | 11.98 | 0.3 | 410 | 453 | | 0.2 | 4 | 5 |
| 10/6 | 12.9 | 13 | 14.22 | 0.44 | | 461 | | 0.2 | 4 | 4 |
| 10/20 | 11.6 | 11.2 | 11.52 | 0.42 | 390 | 410 | | 0.2 | 4 | 4 |



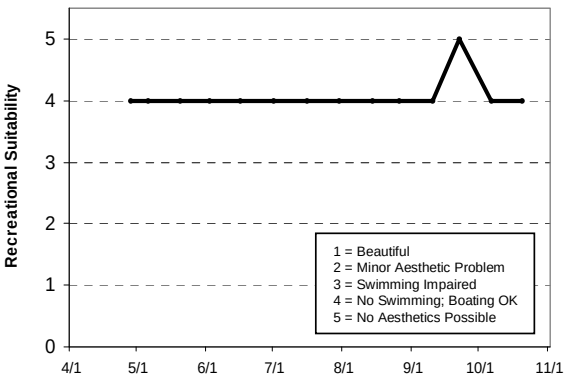

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | F | F | F |
| Chlorophyll a | | | F | F | F |
| Secchi Depth | | | F | F | F |
| **Lake Grade** | | | **F** | **F** | **F** |

Source: Metropolitan Council and STORET data



## Marion Lake (19-0026) *City of Lakeville*

Marion Lake is located in the City of Lakeville (Dakota County). It is considered a Priority Lake by the Metropolitan Council for its high regional recreation value. It has a surface area of approximately 560 acres, and has a maximum depth of 6.4 m (21 feet). The MN DNR has designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*).

The lake gets heavy use by area fishermen and other lake users during the winter and summer months. The MDNR manages the lake for northern pike-panfish, and has stocked the lake with walleye over the past decade.

The lake was monitored 13 times from late April to mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

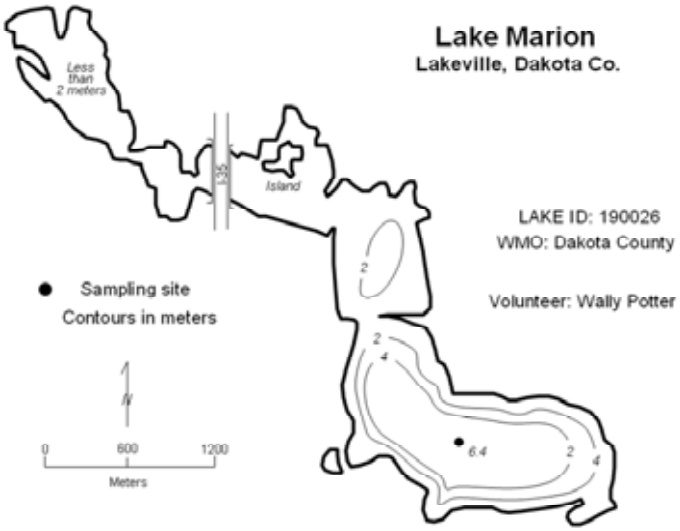
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 39.3 | 16.0 | 72.0 | C |
| **CLA** (µg/l) | 21.4 | 2.0 | 59.0 | C |
| **Secchi** (m) | 2.2 | 1.3 | 3.5 | B |
| **TKN** (mg/l) | 1.61 | 1.40 | 2.00 | |
| | | | ***Lake Grade*** | C |

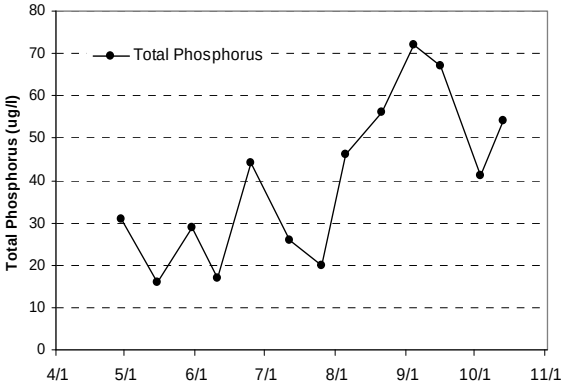
The lake received a lake grade of C for 2008, which is consistent with recent lake grades. The Secchi grade of B is a return to more clear water conditions not observed since 2001. On the basis of the historical water quality database, the surface water quality of the lake has varied from Bs to a D, with Cs being most common. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed a statistically significant improving trend in water clarity (MPCA 2008). Continued monitoring is suggested to continue to build the historical water quality database for this lake.

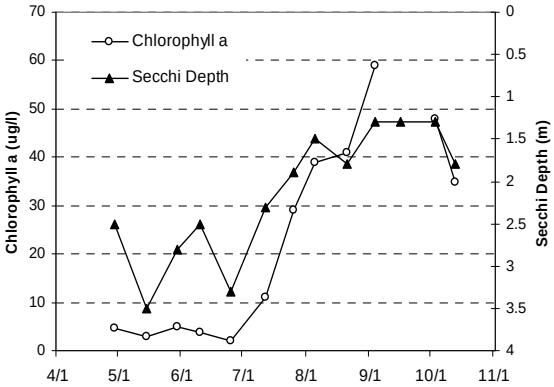
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 1.5 (between 1- "crystal clear" and 2- "some algae present"). The average recreational suitability ranking was 1.0 ("beautiful").

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.

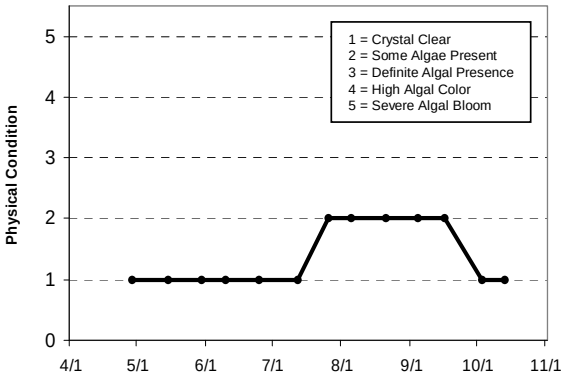



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/29 | 8.9 | | | | 4.7 | 31 | | 2.5 | 1 | 1 |
| 5/15 | 15.7 | | | | 3 | 16 | | 3.5 | 1 | 1 |
| 5/30 | 17.3 | | | | 4.8 | 29 | | 2.8 | 1 | 1 |
| 6/10 | 20.1 | | | | 3.9 | 17 | | 2.5 | 1 | 1 |
| 6/25 | 25 | | | | 2 | 44 | | 3.3 | 1 | 1 |
| 7/12 | 25 | | | | 11 | 26 | | 2.3 | 1 | 1 |
| 7/26 | 26 | | | | 29 | 20 | | 1.9 | 2 | 1 |
| 8/5 | 26.2 | | | | 39 | 46 | | 1.5 | 2 | 1 |
| 8/21 | 25.3 | | | | 41 | 56 | | 1.8 | 2 | 1 |
| 9/4 | 22.3 | | | | 59 | 72 | | 1.3 | 2 | 1 |
| 9/16 | 19.5 | | | | | 67 | | 1.3 | 2 | 1 |
| 10/3 | 18.1 | | | | 48 | 41 | | 1.3 | 1 | 1 |
| 10/13 | 16 | | | | 35 | 54 | | 1.8 | 1 | 1 |



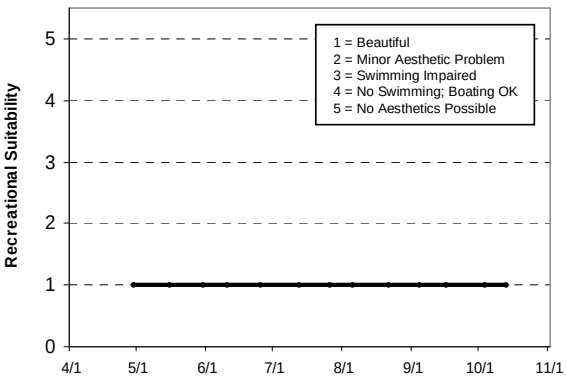

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | C | C | | C | | | | C | | C | | |
| Chlorophyll a | C | D | | C | | | | C | | C | | |
| Secchi Depth | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | B | | | | | B | B | B | C | B |
| Chlorophyll a | | | A | | | | | B | A | B | B | C |
| Secchi Depth | | | B | | | | | C | B | B | C | C |
| **Lake Grade** | | | **B** | | | | | **B** | **B** | **B** | **C** | **C** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | C | C | C | C | C |
| Chlorophyll a | C | C | C | C | C |
| Secchi Depth | C | C | C | C | B |
| **Lake Grade** | **C** | **C** | **C** | **C** | **C** |

Source: Metropolitan Council and STORET data



## Markgrafs Lake (82-0089) *City of Woodbury*

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 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 lake has a drainage area of 413 acres. The lake's watershed-to-lake area ratio is 10:1 (the greater the ratio, the greater the potential stress on the lake from surface runoff). Because of the lake's shallowness, much of the lake is considered littoral zone, which is the 0-15 feet depth zone of the lake 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.

The lake was monitored 14 times between early May and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

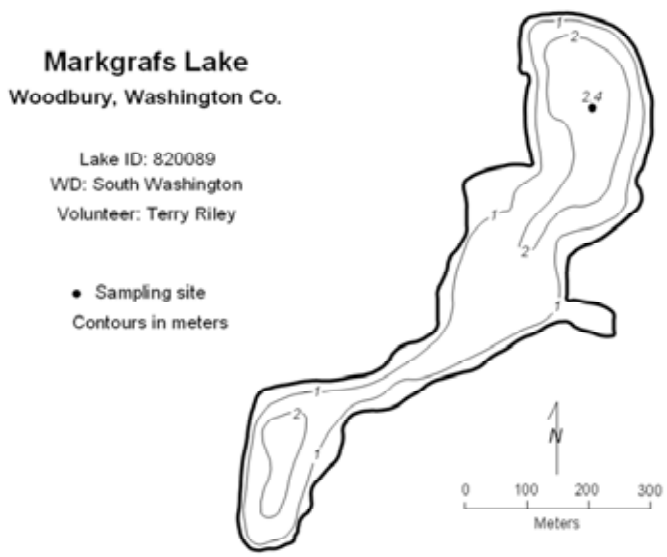
**2008 summer (May-September) data summary**

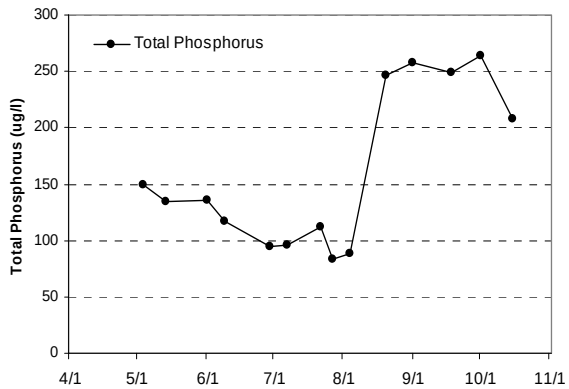
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 147.1 | 84.0 | 258.0 | D |
| **CLA** (µg/l) | 54.3 | 27.0 | 100.0 | D |
| **Secchi** (m) | 0.4 | 0.3 | 0.5 | F |
| **TKN** (mg/l) | 3.45 | 2.60 | 5.70 | |
| | | | ***Lake Grade*** | D |

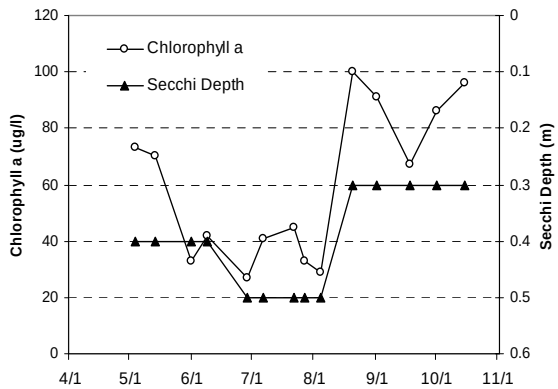
The lake received a lake grade of D for 2008. This grade is similar to those recorded in the early 2000's and 2007, but worse than the C's observed in 1995-1996. The lake experienced its worst recorded overall water quality (F) in 1998 and 2006 and its best water quality in 1995. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed a statistically significant declining trend in water clarity (MPCA 2008).

Throughout the course of the monitoring season the volunteer monitor ranked the lake's perceived physical and recreational conditions on a 1-to-5 scale. The mean physical condition was 4.0 (4- "high algal color") while the mean recreational suitability was 4.0 (4- "no swimming – boating ok").

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.

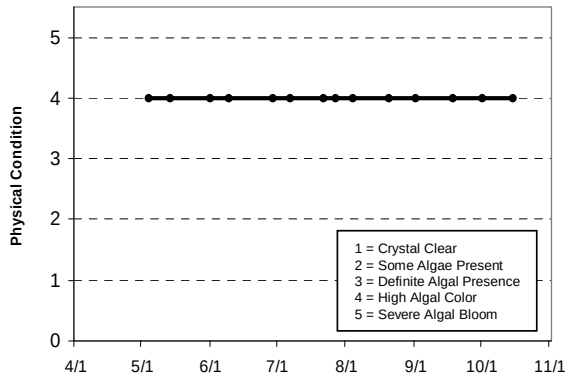



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/4 | 12.7 | | | | 73 | 150 | | 0.4 | 4 | 4 |
| 5/14 | 16.8 | | | | 70 | 135 | | 0.4 | 4 | 4 |
| 6/1 | 19.1 | | | | 33 | 136 | | 0.4 | 4 | 4 |
| 6/9 | 20.2 | | | | 42 | 117 | | 0.4 | 4 | 4 |
| 6/29 | 25.5 | | | | 27 | 94 | | 0.5 | 4 | 4 |
| 7/7 | 26.4 | | | | 41 | 96 | | 0.5 | 4 | 4 |
| 7/22 | 26.7 | | | | 45 | 112 | | 0.5 | 4 | 4 |
| 7/27 | 26.4 | | | | 33 | 84 | | 0.5 | 4 | 4 |
| 8/4 | 26.5 | | | | 29 | 88 | | 0.5 | 4 | 4 |
| 8/20 | 26.1 | | | | 100 | 246 | | 0.3 | 4 | 4 |
| 9/1 | 23.3 | | | | 91 | 258 | | 0.3 | 4 | 4 |
| 9/18 | 18.6 | | | | 67 | 249 | | 0.3 | 4 | 4 |
| 10/1 | 17.1 | | | | 86 | 264 | | 0.3 | 4 | 4 |
| 10/15 | 13.1 | | | | 96 | 208 | | 0.3 | 4 | 4 |



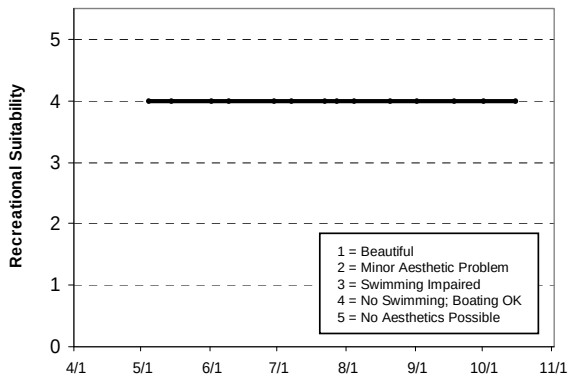

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | D | C | D | D | F | D | D | F | F | D |
| Chlorophyll a | | | C | B | B | C | F | C | C | C | C | C |
| Secchi Depth | | | 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 |
|---|---|---|---|---|---|
| Total Phosphorus | D | D | F | D | D |
| Chlorophyll a | D | C | D | D | D |
| Secchi Depth | F | F | F | F | F |
| **Lake Grade** | **D** | **D** | **F** | **D** | **D** |

Source: Metropolitan Council and STORET data



## Martin Lake (2-0034) *Anoka County Parks*

Marion Lake is located in Linwood Township (Anoka County). The lake is considered a "Priority Lake" by the Metropolitan Council because of its high regional recreation value. It has a surface area of 234 acres, and has a maximum depth of 6.1 m (20 feet). Approximately 60 percent of the lake's surface area is considered littoral zone, which is the 0-15 feet depth zone of aquatic plant dominance. The MDNR manages the lake for walleye.

The lake was monitored 13 times from early May to mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 92.0 | 21.0 | 166.0 | D |
| **CLA** (µg/l) | 44.1 | 9.6 | 100.0 | C |
| **Secchi** (m) | 0.6 | 0.4 | 1.1 | F |
| **TKN** (mg/l) | 2.04 | 1.30 | 3.80 | |
| | | | ***Lake Grade*** | D |

The lake received a lake grade of D for 2008. The lake has received D lake grades in most years since 1983, but the Secchi grade of F for 2008 was the worst Secchi grade received by the lake. On the other hand, a trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed a statistically significant improving trend in water clarity (MPCA 2008). Continued monitoring is suggested to determine if the decline in water clarity in 2008 is an anomaly or evidence of a change in trend.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 3.0 ("definite algae present"). The average recreational suitability ranking was 2.0 (2- "minor aesthetic problem").

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.

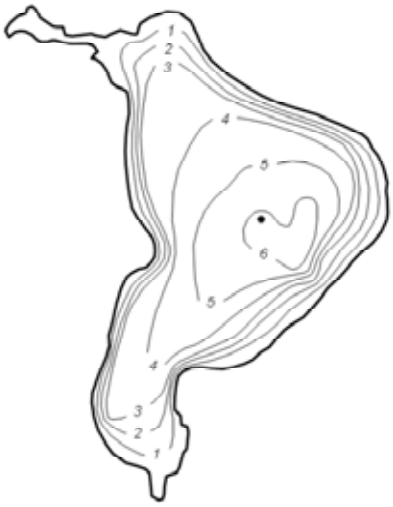
# Martin Lake

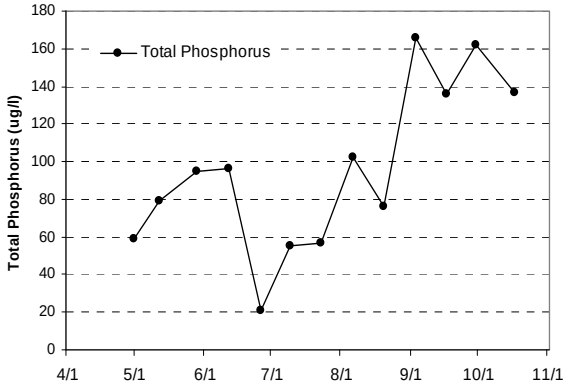
**Linwood Twp., Anoka Co.**

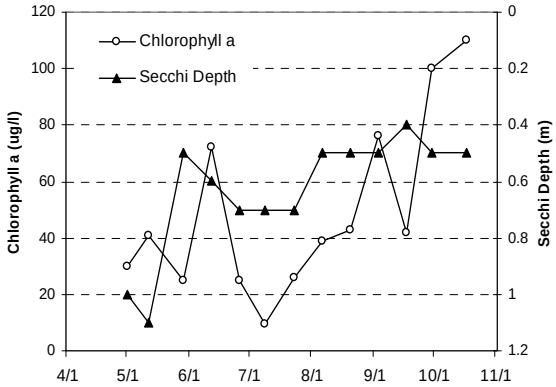
Lake ID: 20034
WMO: Sunrise River
Volunteer: Anoka Co. Parks

● Sampling site

Contours in meters

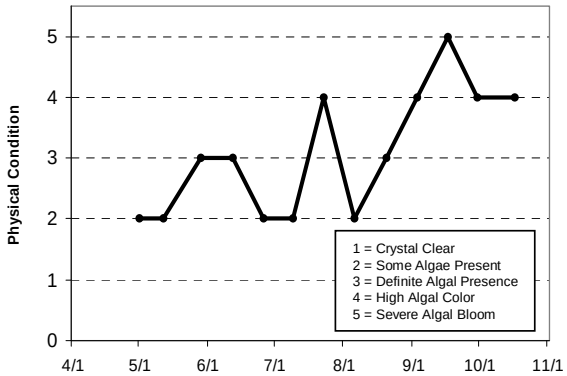



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/1 | 9.4 | | | | 30 | 59 | | 1 | 2 | |
| 5/12 | 14.1 | | | | 41 | 79 | | 1.1 | 2 | |
| 5/29 | 17.3 | | | | 25 | 95 | | 0.5 | 3 | 2 |
| 6/12 | 20.4 | | | | 72 | 96 | | 0.6 | 3 | 2 |
| 6/26 | 27.4 | | | | 25 | 21 | | 0.7 | 2 | 1 |
| 7/9 | 25.6 | | | | 9.6 | 55 | | 0.7 | 2 | 1 |
| 7/23 | 26.5 | | | | 26 | 57 | | 0.7 | 4 | 3 |
| 8/6 | 25.9 | | | | 39 | 102 | | 0.5 | 2 | 2 |
| 8/20 | 25.5 | | | | 43 | 76 | | 0.5 | 3 | 3 |
| 9/3 | 22.3 | | | | 76 | 166 | | 0.5 | 4 | |
| 9/17 | 18.2 | | | | 42 | 136 | | 0.4 | 5 | |
| 9/30 | 16.9 | | | | 100 | 162 | | 0.5 | 4 | |
| 10/17 | 11.7 | | | | 110 | 137 | | 0.5 | 4 | |

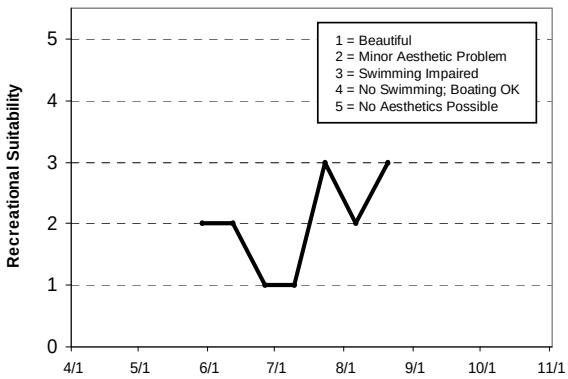



### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | D | | | | | | | | |
| Chlorophyll a | | | | D | | | | | | | | |
| Secchi Depth | | | | D | D | D | D | D | D | D | D | D |
| **Lake Grade** | | | | **D** | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | D | D | D | D | D | | D |
| Chlorophyll a | | | | | | D | D | B | D | C | | C |
| Secchi Depth | D | D | D | D | D | D | D | C | D | D | D | D |
| **Lake Grade** | | | | | | **D** | **D** | **C** | **D** | **D** | | **D** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | D | | D | D |
| Chlorophyll a | | C | | D | C |
| Secchi Depth | D | D | D | D | F |
| **Lake Grade** | | **D** | | **D** | **D** |




Source: Metropolitan Council and STORET data

## Masterman Lake (82-0126) *Browns Creek Watershed District*

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.

2008 was the third year that Masterman Lake was involved in CAMP. A search through the STORET nationwide water quality database for data on the lake provided just the historical CAMP data.

The lake was monitored 14 times between mid April and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

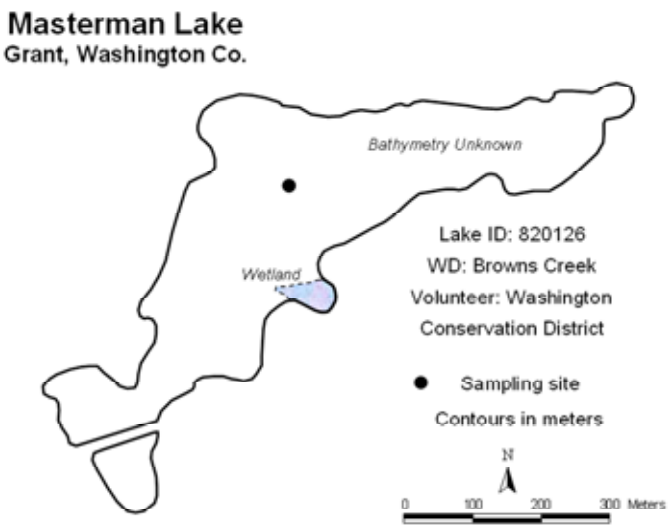
**2008 summer (May-September) data summary**

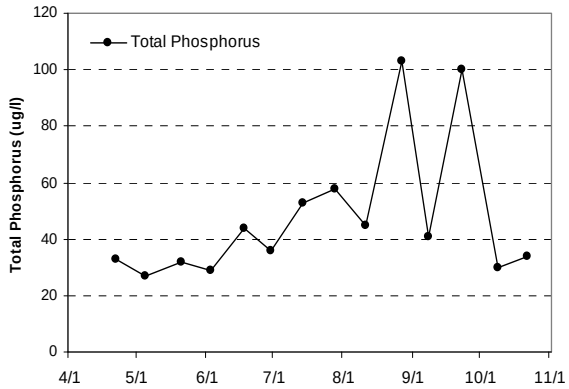
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 51.6 | 27.0 | 103.0 | C |
| **CLA** (µg/l) | 19.1 | 4.1 | 64.0 | B |
| **Secchi** (m) | 2.1 | 1.5 | 2.6 | C |
| **TKN** (mg/l) | 1.09 | 0.76 | 1.80 | |
| | | | ***Lake Grade*** | C |

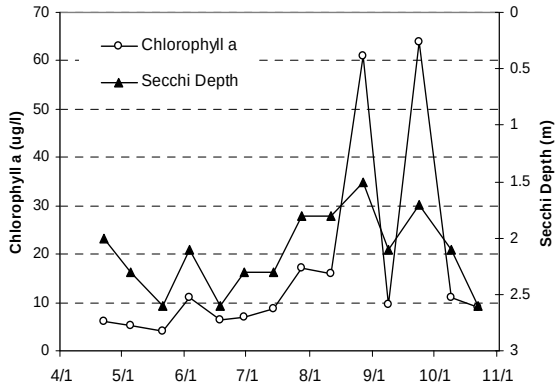
The lake received a lake grade of C for 2008, which is similar to the lake grades received in the previous two years. To better determine water quality trends, additional years of monitoring are needed.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.1 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 2.4 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

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.

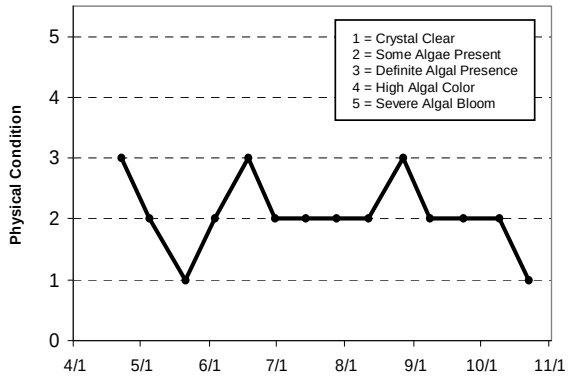



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/22 | 11.2 | 7.4 | 14.54 | 16.72 | 6.2 | 33 | | 2 | 3 | 3 |
| 5/5 | 15 | 11.3 | 10.6 | 9.87 | 5.3 | 27 | | 2.3 | 2 | 2 |
| 5/21 | 17.9 | 13.3 | 9.01 | 0.4 | 4.1 | 32 | | 2.6 | 1 | 2 |
| 6/3 | 19.8 | 17.1 | 8.75 | 0.44 | 11 | 29 | | 2.1 | 2 | 2 |
| 6/18 | 22.5 | 18.7 | 8.74 | 0.75 | 6.4 | 44 | | 2.6 | 3 | 3 |
| 6/30 | 25.8 | 20.2 | 8.14 | 0.5 | 7 | 36 | | 2.3 | 2 | 3 |
| 7/14 | 24.7 | 21.6 | 6.95 | 0.36 | 8.6 | 53 | | 2.3 | 2 | 3 |
| 7/28 | 27.9 | 22.6 | 7.71 | 0.18 | 17 | 58 | | 1.8 | 2 | 3 |
| 8/11 | 26.5 | 22.9 | 6.32 | 0.39 | 16 | 45 | | 1.8 | 2 | 2 |
| 8/27 | 23.1 | 22.6 | 6.59 | 4.84 | 61 | 103 | | 1.5 | 3 | 2 |
| 9/8 | 20.1 | 18.7 | 4.26 | 2.62 | 9.6 | 41 | | 2.1 | 2 | 2 |
| 9/23 | 21 | 19.1 | 7.16 | 0.27 | 64 | 100 | | 1.7 | 2 | 2 |
| 10/9 | 13.6 | 13.5 | 8.52 | 6.33 | 11 | 30 | | 2.1 | 2 | 3 |
| 10/22 | 10.5 | 10.7 | 8.65 | 7.08 | 9 | 34 | | 2.6 | 1 | 1 |



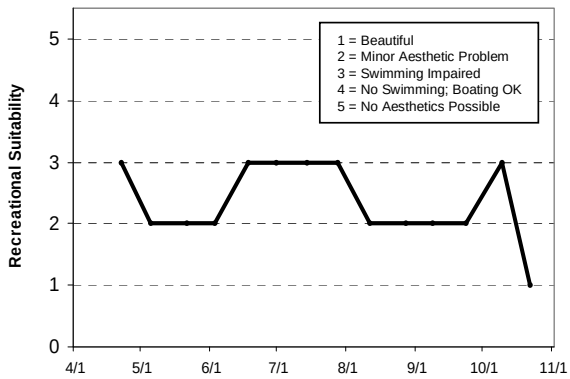

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | C | C | C |
| Chlorophyll a | | | B | B | B |
| Secchi Depth | | | C | C | C |
| **Lake Grade** | | | **C** | **C** | **C** |

Source: Metropolitan Council and STORET data



## Mays Lake (82-0033) *Carnelian-Marine Watershed District*

Mays Lake is located in Mays Township (Washington County). The lake has a surface area of 25 acres, and a maximum depth of 7.6 m (25 ft). Approximately 92 percent of the lake's surface area is considered littoral zone, which is the 0-15 feet depth zone of aquatic plant dominance.

2008 was the first year that Mays Lake was involved in the CAMP. A search through the STORET nationwide water quality database provided data only from one day in May, 1980.

The lake was monitored 14 times between mid April and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

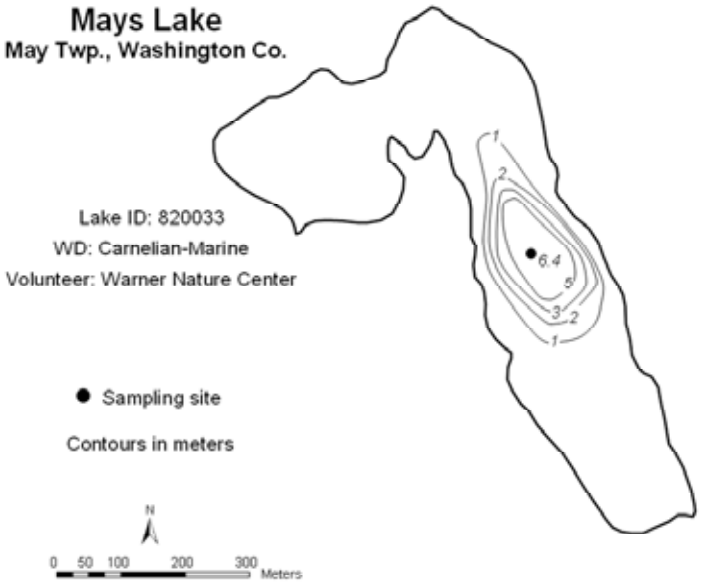
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 12.1 | 3.0 | 17.0 | A |
| **CLA** (µg/l) | 2.8 | 1.8 | 3.6 | A |
| **Secchi** (m) | 5.4 | 4.3 | 6.3 | A |
| **TKN** (mg/l) | 0.63 | 0.46 | 1.20 | |
| | | | ***Lake Grade*** | A |

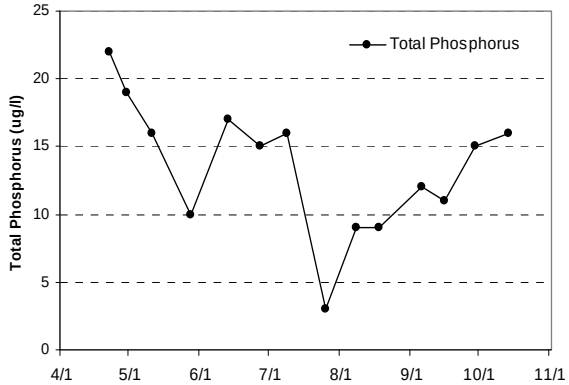
The lake received a lake grade of A for 2008. Additional years of monitoring are needed to build the historical water quality database for this lake.

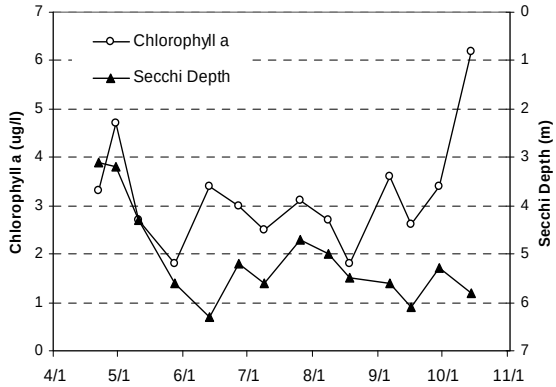
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.0 ("some algae present"). The average recreational suitability ranking was 1.7 (between 1- "beautiful and 2- "minor aesthetic problem").

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.

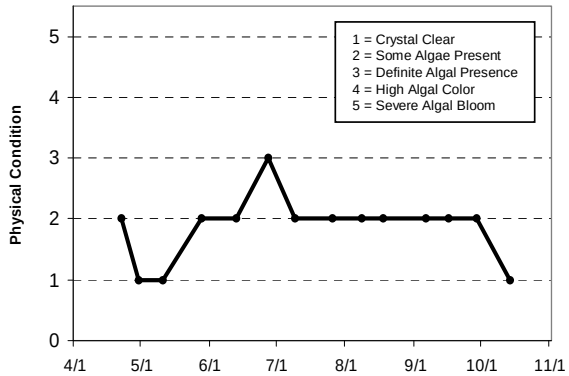



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/22 | 9.7 | | | | 3.3 | 22 | | 3.1 | 2 | 2 |
| 4/30 | 9.8 | | | | 4.7 | 19 | | 3.2 | 1 | 1 |
| 5/11 | 14.5 | | | | 2.7 | 16 | | 4.3 | 1 | 1 |
| 5/28 | 19.2 | | | | 1.8 | 10 | | 5.6 | 2 | 2 |
| 6/13 | 21.3 | | | | 3.4 | 17 | | 6.3 | 2 | 1 |
| 6/27 | 26.1 | | | | 3 | 15 | | 5.2 | 3 | 1 |
| 7/9 | 27 | | | | 2.5 | 16 | | 5.6 | 2 | 2 |
| 7/26 | 26.3 | | | | 3.1 | 3 | | 4.7 | 2 | 2 |
| 8/8 | 26.6 | | | | 2.7 | 9 | | 5 | 2 | 2 |
| 8/18 | 26.3 | | | | 1.8 | 9 | | 5.5 | 2 | 2 |
| 9/6 | 21.4 | | | | 3.6 | 12 | | 5.6 | 2 | 2 |
| 9/16 | 20.1 | | | | 2.6 | 11 | | 6.1 | 2 | 2 |
| 9/29 | 18.6 | | | | 3.4 | 15 | | 5.3 | 2 | 2 |
| 10/14 | 14.4 | | | | 6.2 | 16 | | 5.8 | 1 | 2 |

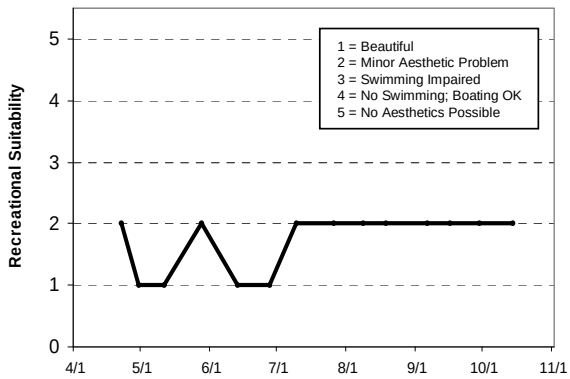



### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | | A |
| Chlorophyll a | | | | | A |
| Secchi Depth | | | | | A |
| **Lake Grade** | | | | | **A** |




Source: Metropolitan Council and STORET data

## McDonald Lake (82-0010) *Valley Branch Watershed District*

*Primary Report*

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 (nearly 6 feet) and 3.7 m (roughly 12 feet). The lake's size and mean depth results in an approximate lake volume of 324 ac-ft. Because of the shallowness of the lake, the entire area is considered littoral zone, and so the lake does not maintain a thermocline. Without a thermocline the water column is allowed to mix throughout the summer period.

The lake's surface area and watershed size (1,051 acres) translates to a 12:1 watershed-to-lake size ratio. Generally the larger the ratio, the greater the potential stress on the lake from surface runoff.

This was the ninth year in which McDonald Lake has been involved in the CAMP (the lake was enrolled in the program in 1999 and 2001-2007). The only historical water quality data found for McDonald Lake were Secchi transparency data for 1998 and 2000, and CAMP data from 1999 and 2001-2007. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

The lake was monitored 10 times between mid-April and mid-October 2008. The resulting data are summarized in tables and figures on the next page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 59 | 28 | 76 | C |
| **CLA** (µg/l) | 42 | 3.5 | 110 | C |
| **Secchi** (m) | 1.6 | 0.5 | 2.9 | C |
| **TKN** (mg/l) | 1.8 | 0.85 | 2.4 | |
| | | | ***Lake Grade*** | C |

The lake's 2008 lake grade of C and parameter grades of C are typical of the grades received in the past, such as in 2001 – 2003 and in 2006. The lake has received a lake grade of C for 7 of the 9 years that the lake has been involved in the CAMP. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008). The lake's water quality seems well represented by a lake grade of C, with some variation from year to year.

The water quality for 2008 appears to be an improvement over that observed in 2007 since higher CLA concentrations were not observed during the latter part of the monitoring season, as was seen in 2007. The CLA concentrations observed from mid-September to early October 2008 were on the order of 6 to 50 times less than the same period in 2007.

The perceived physical and recreational conditions (ranked on a 1-to-5 scale) are shown on the lake's information sheet on the next page. The average user perception rankings, were 3.4 for physical condition (3- "definite algae present" and 4- "high algal color"), and 3.7 for recreational suitability (3- "swimming slightly impaired" and 4- "no swimming; boating ok").

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.

# McDonald Lake

**Baytown Twp., Washington Co.**

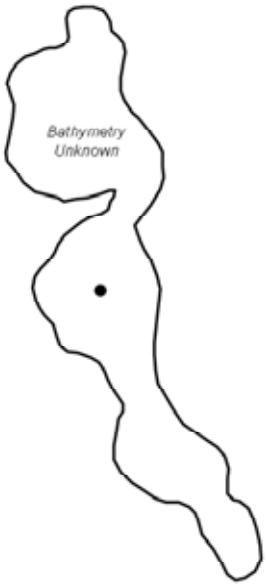
**Primary Report**

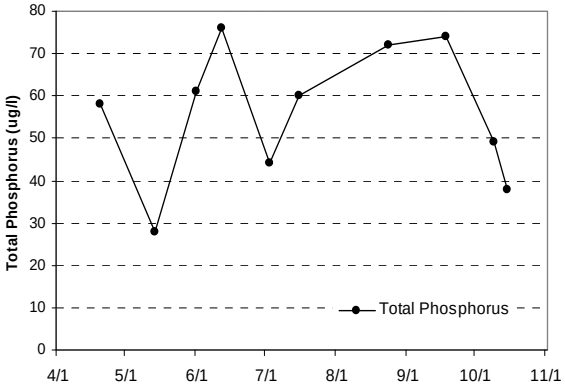
Lake ID: 820010
WD: Valley Branch
Primary Volunteer: Randy Hunt

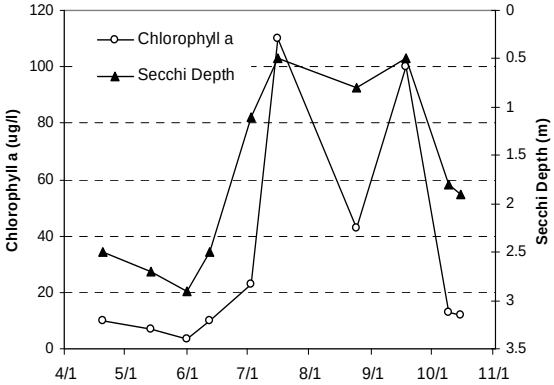
● Sampling site
Contours in meters

N

0 100 200 300
Meters

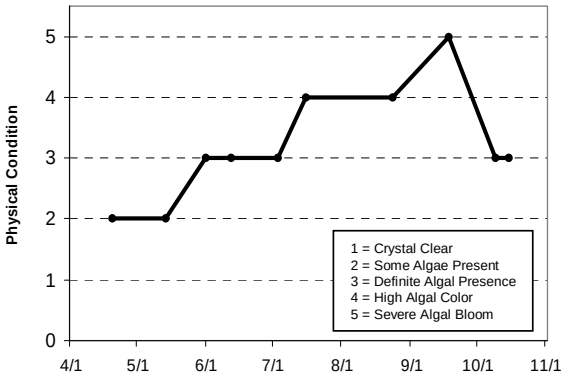



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/20 | 6.6 | | | | 10 | 58 | | 2.5 | 2 | 2 |
| 5/14 | 18.8 | | | | 6.8 | 28 | | 2.7 | 2 | 2 |
| 6/1 | 21.4 | | | | 3.5 | 61 | | 2.9 | 3 | 3 |
| 6/12 | 22.5 | | | | 9.9 | 76 | | 2.5 | 3 | 3 |
| 7/3 | 26.4 | | | | 23 | 44 | | 1.1 | 3 | 4 |
| 7/16 | 28.9 | | | | 110 | 60 | | 0.5 | 4 | 5 |
| 8/24 | 24.7 | | | | 43 | 72 | | 0.8 | 4 | 4 |
| 9/18 | 20 | | | | 100 | 74 | | 0.5 | 5 | 5 |
| 10/9 | 14.8 | | | | 13 | 49 | | 1.8 | 3 | 4 |
| 10/15 | 13.5 | | | | 12 | 38 | | 1.9 | 3 | 4 |




### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | C | | C | C | C |
| Chlorophyll a | | | | | | | | B | | C | C | C |
| Secchi Depth | | | | | | | C | C | C | C | C | C |
| **Lake Grade** | | | | | | | | **C** | | **C** | **C** | **C** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | C | C | C | C | C |
| Chlorophyll a | B | B | C | F | C |
| Secchi Depth | B | C | C | C | C |
| **Lake Grade** | **B** | **C** | **C** | **D** | **C** |

Source: Metropolitan Council and STORET data

## McDonald Lake (82-0010) *Valley Branch Watershed District*

*Secondary Report*

McDonald Lake was also monitored by the Washington Conservation District (WCD) in addition to the monitoring performed by the primary volunteer. The WCD monitored the lake 7 times between late April and mid-October 2008. The resulting data are summarized in tables and figures on the next page. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 50 | 26 | 81 | C |
| **CLA** (µg/l) | 75 | 8.6 | 140 | D |
| **Secchi** (m) | 1.4 | 0.5 | 2.9 | C |
| **TKN** (mg/l) | 1.6 | 0.56 | 2.3 | |
| | | | ***Lake Grade*** | C |

The lake's 2008 lake grade of C by the secondary volunteer (WCD) agrees with the lake grade of C by the primary volunteer. The concentrations of TP and water clarity were similar throughout the monitoring season between the primary volunteer and the secondary volunteer.

The average CLA concentration of the secondary volunteer was higher than that of the primary volunteer, but this can be explained by the difference in CLA concentrations observed during the last half of August. The CLA concentration of the secondary volunteer was approximately 3 times higher than that of the primary volunteer for the period of the last half of August. However, the lower CLA concentration (primary volunteer) is in agreement with the increase in water clarity observed during this same period, which was observed both by the primary and secondary volunteers. Otherwise, the CLA concentrations from both the primary and secondary volunteers were similar throughout the monitoring period.

The perceived physical and recreational conditions (ranked on a 1-to-5 scale) are shown on the lake's information sheet on the next page. The average user perception rankings, were 2.8 for physical condition (2- "some algae present" and 3- "definite algae present"), and 3.8 for recreational suitability (3- "swimming slightly impaired" and 4- "no swimming; boating ok").

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.

# McDonald Lake

**Baytown Twp., Washington Co.**

**Secondary Report**

Lake ID: 820010

WD: Valley Branch

Secondary Volunteer:
Washington Conservation District

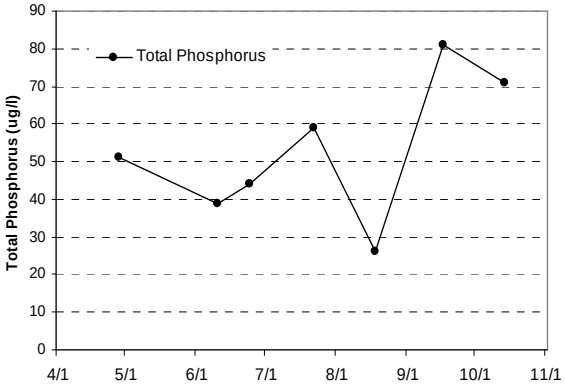
● Sampling site

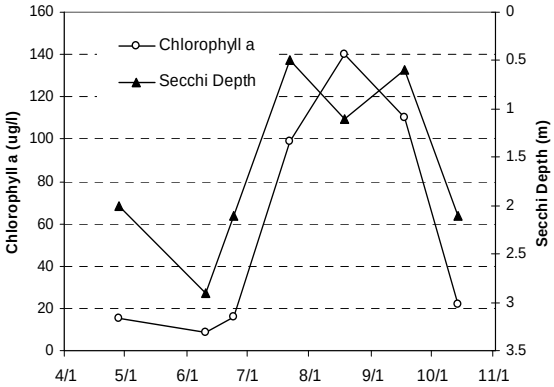
Contours in meters

N

0 100 200 300

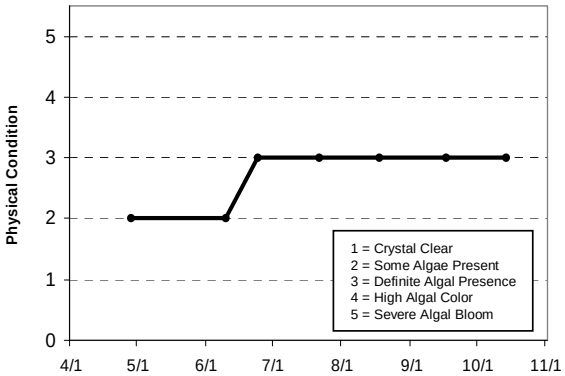
Meters




## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/28 | 9 | 8.8 | 11.68 | 9.8 | 15 | 51 | | 2 | 2 | 2 |
| 6/10 | 20.9 | 18.6 | 8.16 | 0.22 | 8.6 | 39 | 52 | 2.9 | 2 | 3 |
| 6/24 | 24.2 | 20.8 | 9.24 | 0.48 | 16 | 44 | 66 | 2.1 | 3 | 4 |
| 7/22 | 25.5 | 21.5 | 10.09 | 0.01 | 99 | 59 | 188 | 0.5 | 3 | 4 |
| 8/18 | 24.7 | 20.9 | 8.11 | 0.17 | 140 | 26 | 102 | 1.1 | 3 | 4 |
| 9/17 | 18.3 | 17.5 | 9.44 | -0.3 | 110 | 81 | 94 | 0.6 | 3 | 4 |
| 10/14 | 14.9 | 14.8 | 4.1 | 0.27 | 22 | 71 | 58 | 2.1 | 3 | 4 |



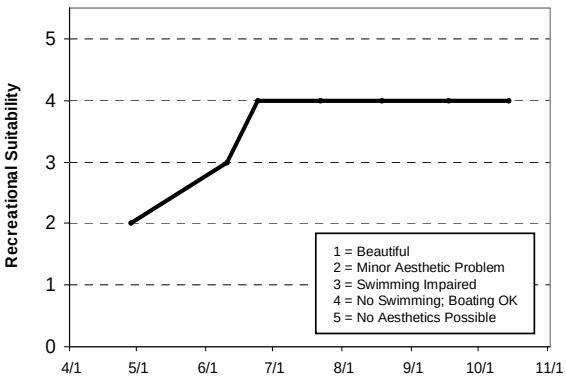

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | C | | C | C | C |
| Chlorophyll a | | | | | | | | B | | C | C | C |
| Secchi Depth | | | | | | | C | C | C | C | C | C |
| **Lake Grade** | | | | | | | | **C** | | **C** | **C** | **C** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | C | C | C | C | C |
| Chlorophyll a | B | B | C | F | D |
| Secchi Depth | B | C | C | C | C |
| **Lake Grade** | **B** | **C** | **C** | **D** | **C** |

Source: Metropolitan Council and STORET data



## McKnight Lake (10-0216) *Carver County Environmental Services*

McKnight Lake is a small lake located in Carver County. There is very little known morphological data available for the lake.

This was the second year that McKnight Lake has been involved in the CAMP. A search through the STORET nationwide water quality database for data on the lake provided no data other than the CAMP data.

The lake was monitored 14 times between mid April and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

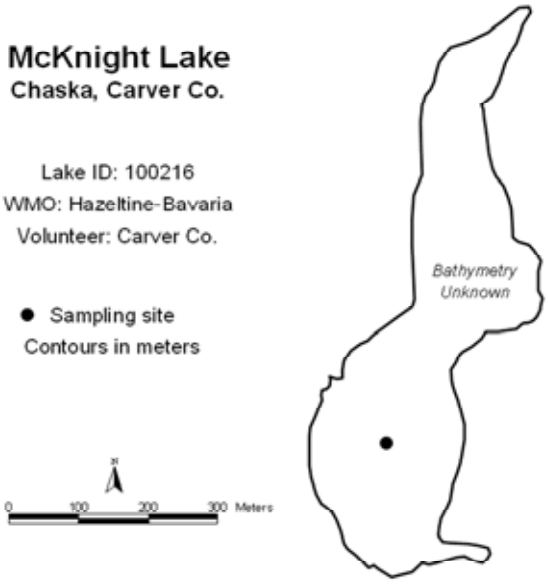
**2008 summer (May-September) data summary**

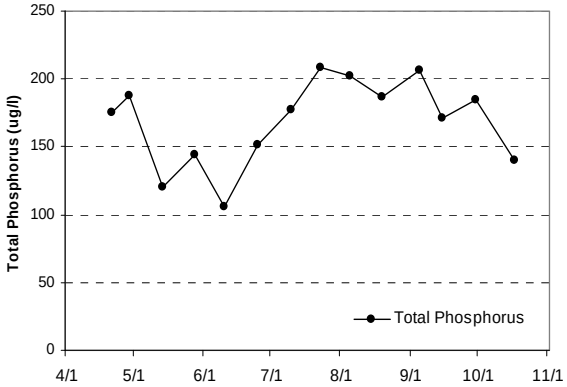
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 168.9 | 106.0 | 209.0 | F |
| **CLA** (µg/l) | 82.1 | 32.0 | 130.0 | F |
| **Secchi** (m) | 0.5 | 0.3 | 0.8 | F |
| **TKN** (mg/l) | 2.91 | 2.00 | 4.20 | |
| | | | ***Overall Grade*** | F |

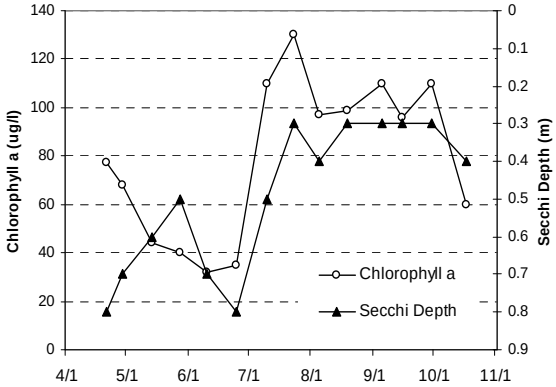
The lake received a lake grade of F for 2008, which is similar to the lake grade received in 2006. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

The perceived physical and recreational conditions (ranked on a 1-to-5 scale) are shown on the lake's information sheet on the next page. The average user perception rankings, were 3.5 for physical condition (roughly 3- "definite algae present"), and 4.3 for recreational suitability (between 4- "no swimming/boating ok" and 5- "no aesthetics possible").

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.

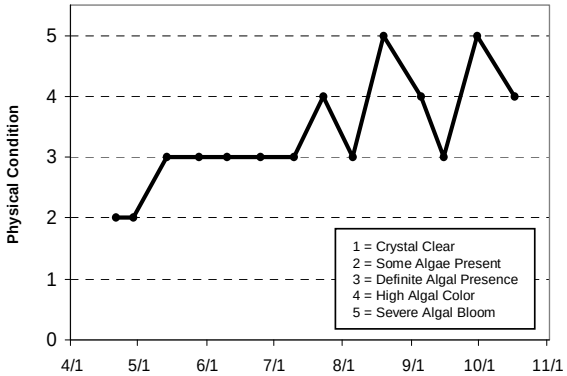



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/21 | 10.27 | | 17.63 | | 77 | 175 | | 0.8 | 2 | 3 |
| 4/29 | 7.85 | | 15.11 | | 68 | 188 | | 0.7 | 2 | 4 |
| 5/14 | | | | | 44 | 120 | | 0.6 | 3 | 4 |
| 5/28 | 17.39 | | 8.31 | | 40 | 144 | | 0.5 | 3 | 4 |
| 6/10 | 21.81 | | 7.96 | | 32 | 106 | | 0.7 | 3 | 4 |
| 6/25 | 24.96 | | 9.14 | | 35 | 151 | | 0.8 | 3 | 4 |
| 7/10 | 25.05 | | 9.41 | | 110 | 177 | | 0.5 | 3 | 4 |
| 7/23 | 26.06 | | 8.77 | | 130 | 209 | | 0.3 | 4 | 4 |
| 8/5 | 25.75 | | 6.81 | | 97 | 202 | | 0.4 | 3 | 4 |
| 8/19 | 28.19 | | 16.46 | | 99 | 187 | | 0.3 | 5 | 5 |
| 9/5 | 20.14 | | 8.85 | | 110 | 206 | | 0.3 | 4 | 4 |
| 9/15 | 18.2 | | 8.33 | | 96 | 171 | | 0.3 | 3 | 5 |
| 9/30 | | | | | 110 | 185 | | 0.3 | 5 | 5 |
| 10/17 | 12.66 | | 7.5 | | 60 | 140 | | 0.4 | 4 | 4 |



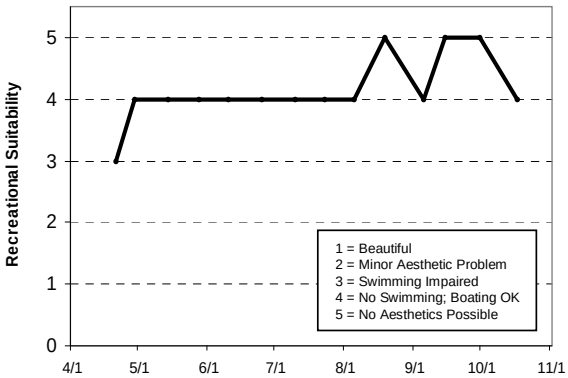

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | F | | F |
| Chlorophyll a | | | D | | F |
| Secchi Depth | | | F | | F |
| **Lake Grade** | | | **F** | | **F** |

Source: Metropolitan Council and STORET data



## McKusick Lake (82-0020) *Middle St. Croix Watershed Management Organization*

Lake McKusick is located in the City of Stillwater (Washington County). The lake has surface area of a 46 acres, and a maximum depth of 4.7 m (15 ft).

The lake has been involved in the CAMP since 1994. In 2008, the lake was monitored 15 times between mid April and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

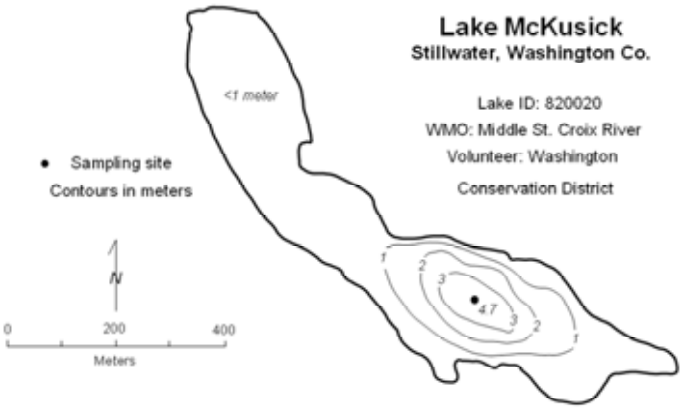
**2008 summer (May-September) data summary**

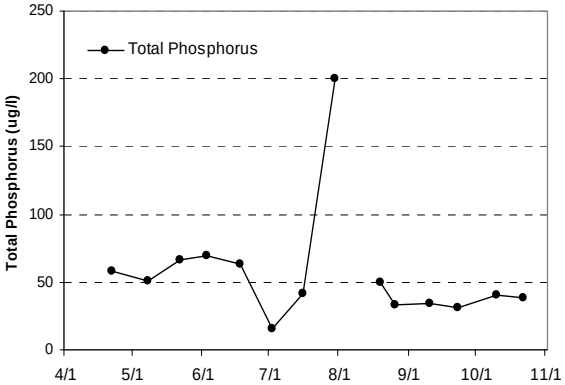
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 59.5 | 16.0 | 200.0 | C |
| **CLA** (µg/l) | 18.9 | 10.0 | 59.0 | B |
| **Secchi** (m) | 1.9 | 1.1 | 2.6 | C |
| **TKN** (mg/l) | 1.85 | 0.53 | 3.40 | |
| | | | ***Lake Grade*** | C |

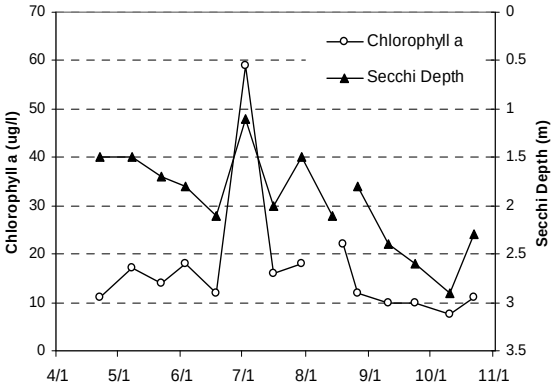
The lake received a lake grade of C for 2008, which is similar to lake grades received in some past years. The lake grades over the past 15 years have varied from D to B to C to B and back to C. The historical water quality database suggests that the lake has been represented by a lake grade of C or B for the past 9 years. The lake has not received a D lake grade since 1999. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed a statistically significant improving trend in water clarity (MPCA 2008).

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.7 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 3.5 (between 3- "swimming slightly impaired" and 4- "no swimming/boating ok").

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.

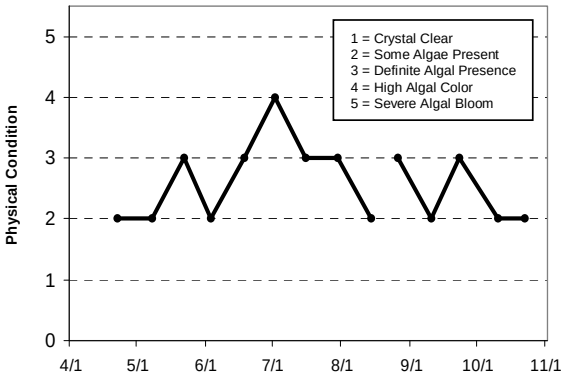



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/22 | 10.9 | 4.8 | 14.38 | 1.66 | 11 | 58 | | 1.5 | 2 | 2 |
| 5/8 | 14.9 | 11.7 | 10.23 | 0.61 | 17 | 51 | | 1.5 | 2 | 3 |
| 5/22 | 16.7 | 12.2 | 9.12 | 0.26 | 14 | 66 | | 1.7 | 3 | 3 |
| 6/3 | 20.1 | 13.6 | 8.2 | 0.12 | 18 | 69 | | 1.8 | 2 | 3 |
| 6/18 | 22.6 | 18.7 | 9.59 | 0.29 | 12 | 63 | | 2.1 | 3 | 4 |
| 7/2 | 24.6 | 15.5 | 11.15 | 0.44 | 59 | 16 | | 1.1 | 4 | 4 |
| 7/16 | 25.1 | 21.7 | 8.44 | 0.25 | 16 | 42 | | 2 | 3 | 4 |
| 7/30 | 27.6 | 20.3 | 8.45 | 0.21 | 18 | 200 | | 1.5 | 3 | 4 |
| 8/14 | 24.8 | 22.9 | 8.66 | 0.83 | | | | 2.1 | 2 | 3 |
| 8/19 | | | | | 22 | 50 | | | | |
| 8/26 | 23.9 | 22.8 | 9.35 | 8.02 | 12 | 33 | | 1.8 | 3 | 4 |
| 9/10 | 18.4 | 18.3 | 9.83 | 0.17 | 10 | 34 | | 2.4 | 2 | 3 |
| 9/23 | 21.1 | 18.1 | 8.88 | 0.26 | 10 | 31 | | 2.6 | 3 | 3 |
| 10/10 | 13.3 | 13.2 | 8.96 | 0.99 | 7.6 | 40 | | 2.9 | 2 | 3 |
| 10/22 | 10.4 | 10.5 | 10.73 | 0.58 | 11 | 38 | | 2.3 | 2 | 2 |



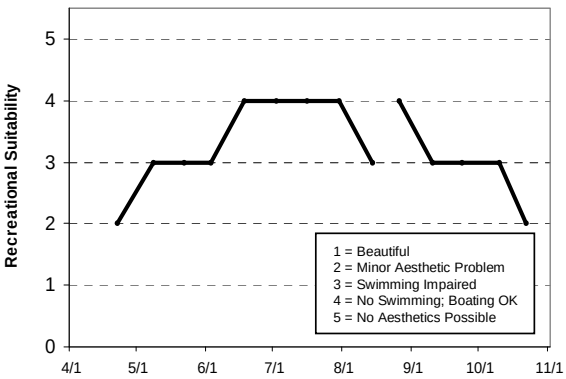

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | D | D | D | C | D | D | C | C | C | C |
| Chlorophyll a | | | D | C | C | C | D | D | B | B | C | B |
| Secchi Depth | | | 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 |
|---|---|---|---|---|---|
| Total Phosphorus | C | C | C | C | C |
| Chlorophyll a | A | B | B | B | B |
| Secchi Depth | B | C | C | C | C |
| **Lake Grade** | **B** | **C** | **C** | **C** | **C** |

Source: Metropolitan Council and STORET data



## McMahon Lake (70-0050) *Scott County Watershed Management Organization*

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). Because the maximum depth is less than 15 feet, the entire surface area is considered littoral zone, which is 0 – 15 feet depth zone of aquatic plant dominance. The lake does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the lake's water column. The MN DNR has designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*).

The year 2008 was the third year that McMahon Lake has been enrolled in the CAMP. The lake was monitored by Council staff in the past as well. In 2008, the lake was monitored 11 times between mid May and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

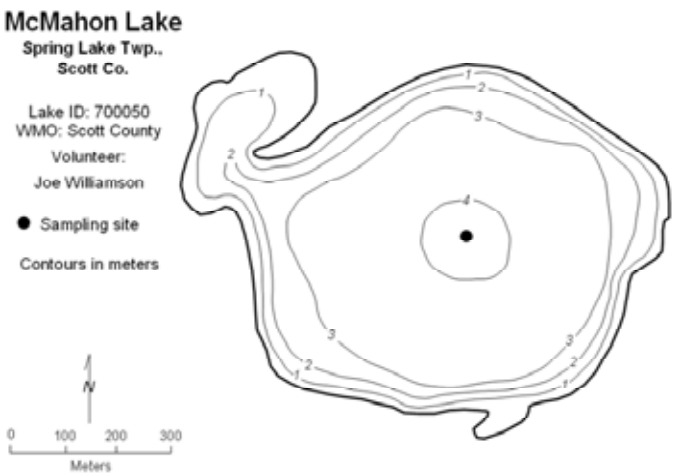
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 85.4 | 33.0 | 160.0 | D |
| **CLA** (µg/l) | 20.1 | 6.6 | 39.0 | C |
| **Secchi** (m) | 1.0 | 0.5 | 2.0 | D |
| **TKN** (mg/l) | 2.32 | 1.10 | 3.80 | |
| | | | ***Lake Grade*** | D |

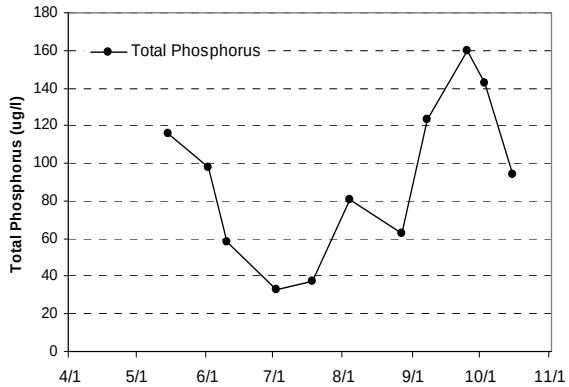
The lake received a lake grade of D for 2008, which is similar to lake grades received in previous years. The lake's Lake Grade of C in 2007 is the best overall water quality grade the lake has yet received. On the basis of the water quality database, the lake's water quality appears to be represented by a lake grade of D.

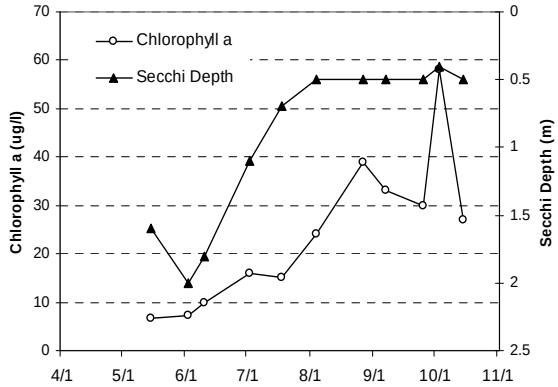
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.2 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 1.4 (between 1- "beautiful" and 2- "minor aesthetic problem").

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.

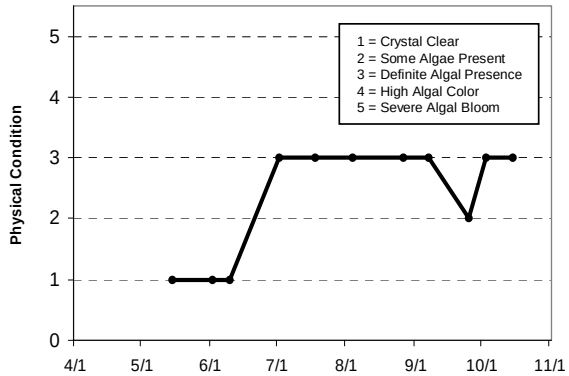



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/15 | 15.5 | | | | 6.6 | 116 | | 1.6 | 1 | 1 |
| 6/2 | 20.6 | | | | 7.4 | 98 | | 2 | 1 | 1 |
| 6/10 | 20.8 | | | | 10 | 58 | | 1.8 | 1 | 1 |
| 7/2 | 24.7 | | | | 16 | 33 | | 1.1 | 3 | 2 |
| 7/18 | 28.7 | | | | 15 | 37 | | 0.7 | 3 | 1 |
| 8/4 | 25.7 | | | | 24 | 81 | | 0.5 | 3 | 1 |
| 8/27 | 23 | | | | 39 | 63 | | 0.5 | 3 | 2 |
| 9/7 | 18.8 | | | | 33 | 123 | | 0.5 | 3 | 2 |
| 9/25 | 20.7 | | | | 30 | 160 | | 0.5 | 2 | 2 |
| 10/3 | 17.9 | | | | 58 | 143 | | 0.4 | 3 | 2 |
| 10/15 | 14.2 | | | | 27 | 94 | | 0.5 | 3 | 2 |

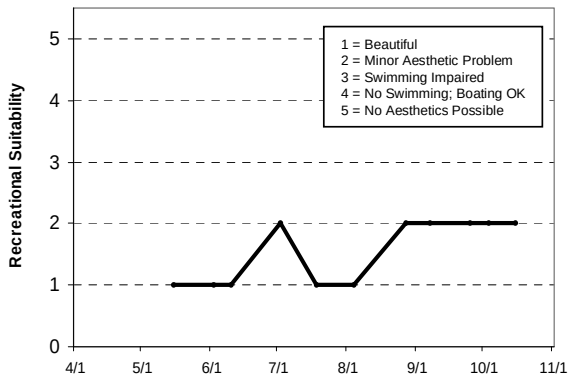



### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | F | | | | D | | | | | | | |
| Chlorophyll a | F | | | | D | | | | | | | |
| Secchi Depth | C | | | | D | | | | | | | |
| **Lake Grade** | **D** | | | | **D** | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | D | | | D | | | D | | |
| Chlorophyll a | | | | D | | | D | | | D | | |
| Secchi Depth | | | | C | | | D | | | D | | |
| **Lake Grade** | | | | **D** | | | **D** | | | **D** | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | D | C | C | D |
| Chlorophyll a | | F | D | C | C |
| Secchi Depth | | D | D | D | D |
| **Lake Grade** | | **D** | **D** | **C** | **D** |




Source: Metropolitan Council and STORET data

## Meadow Lake (27-0057) *Shingle Creek Watershed Management Commission*

Meadow Lake is located in the City of New Hope (Hennepin County). The lake has a surface area of 11 acres, and a watershed area of 440 acres. The watershed-to-lake area ratio is 40:1. The larger the ratio, the greater the potential stress on the lake from surface runoff. The lake has a maximum depth of 1.2 m (4 ft); therefore the entire surface area of the lake is considered littoral zone, which is the area of aquatic plant dominance. Furthermore the lake does not maintain a thermocline which is a density gradient caused by changing water temperatures throughout the lake's water column.

The lake was monitored 14 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

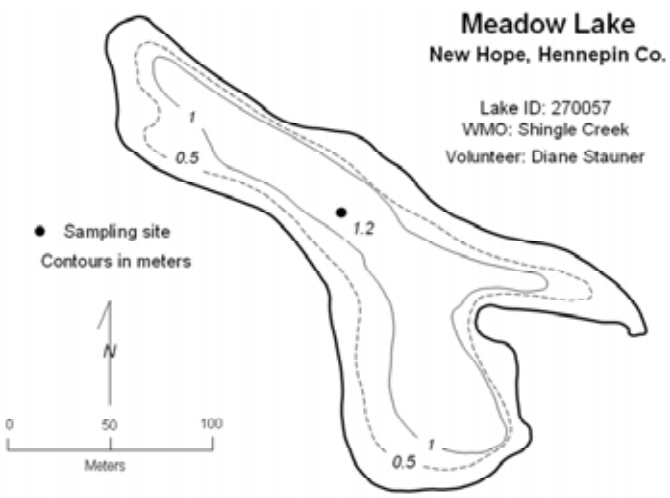
**2008 summer (May-September) data summary**

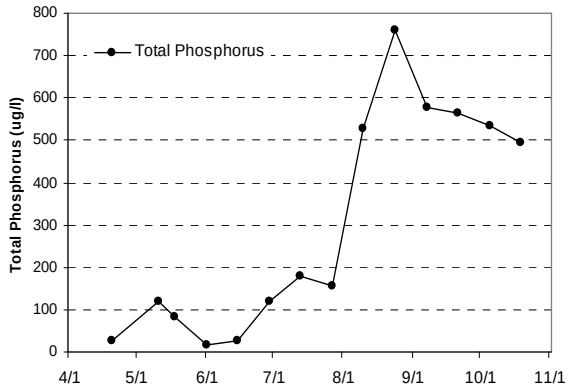
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 284.9 | 16.0 | 761.0 | F |
| **CLA** (µg/l) | 150.9 | 1.1 | 740.0 | F |
| **Secchi** (m) | 0.7 | 0.1 | 1.1 | F |
| **TKN** (mg/l) | 5.42 | 0.78 | 16.00 | |
| | | | ***Lake Grade*** | F |

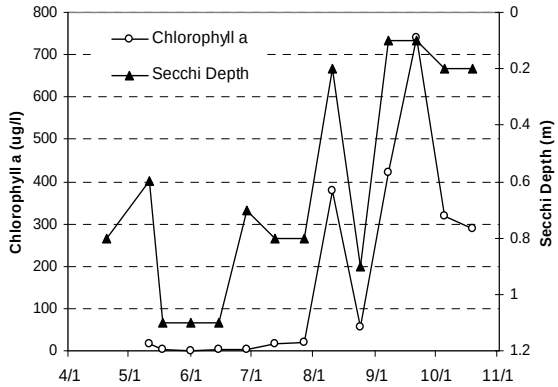
The lake received a lake grade of F for 2008, which is the same grade as the lake grades received in previous years. On the basis of the water quality database, the lake's water quality appears to be represented by a lake grade of F.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.9 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 3.0 ("no swimming/boating ok").

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.

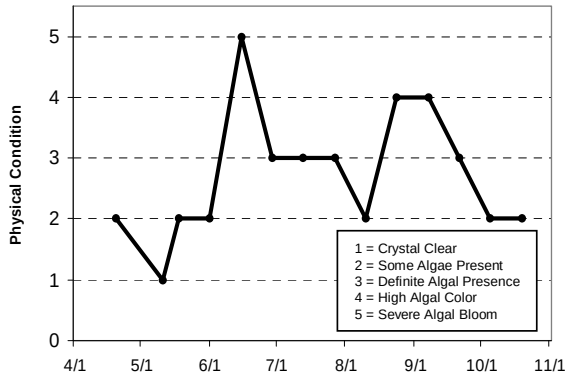



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/20 | 13.3 | | | | | 25 | | 0.8 | 2 | 2 |
| 5/11 | 16.7 | | | | 17 | 120 | | 0.6 | 1 | 4 |
| 5/18 | 17.8 | | | | 2.3 | 84 | | 1.1 | 2 | 1 |
| 6/1 | 24.4 | | | | 1.1 | 16 | | 1.1 | 2 | 4 |
| 6/15 | 22.8 | | | | 2.7 | 28 | | 1.1 | 5 | 4 |
| 6/29 | 25 | | | | 3.1 | 121 | | 0.7 | 3 | |
| 7/13 | 22.2 | | | | 17 | 178 | | 0.8 | 3 | 4 |
| 7/27 | 26.1 | | | | 19 | 157 | | 0.8 | 3 | 2 |
| 8/10 | 23.3 | | | | 380 | 527 | | 0.2 | 2 | 2 |
| 8/24 | 22.2 | | | | 58 | 761 | | 0.9 | 4 | 4 |
| 9/7 | 18 | | | | 420 | 577 | | 0.1 | 4 | 1 |
| 9/21 | 23 | | | | 740 | 565 | | 0.1 | 3 | 4 |
| 10/5 | 12 | | | | 320 | 534 | | 0.2 | 2 | 2 |
| 10/19 | 10 | | | | 290 | 494 | | 0.2 | 2 | 4 |



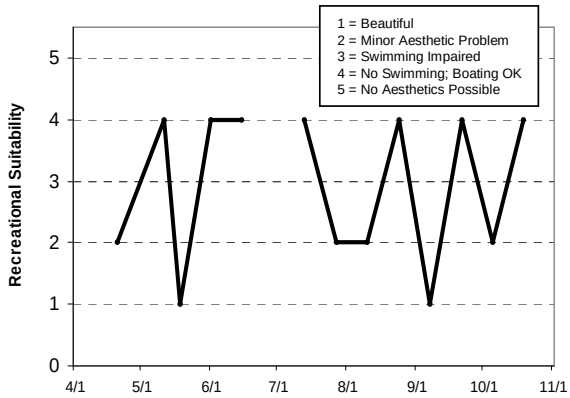

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | F | | | F | | | F | |
| Chlorophyll a | | | | | F | | | F | | | F | |
| Secchi Depth | | | | | F | | | F | | | F | |
| **Lake Grade** | | | | | **F** | | | **F** | | | **F** | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | F | | | F |
| Chlorophyll a | | D | | | F |
| Secchi Depth | | F | | | F |
| **Lake Grade** | | **F** | | | **F** |

Source: Metropolitan Council and STORET data



## Mergen's Pond (82-0482) *Washington Conservation District*

Mergen's Pond is located in the West Lakeland Township (Washington County). The lake has a surface area of 12 acres. The maximum depth of the lake is 1.3 m (4.3 ft). Because of the shallowness of the lake, the entire area is considered littoral zone which is the area of aquatic plant dominance. Furthermore, the lake does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the water column. The lake's surface area and watershed area of 1,383 acres translate to a watershed-to-lake area ratio of 115. Generally the larger the ratio, the greater the potential stress on the lake from surface runoff.

The lake was monitored 6 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

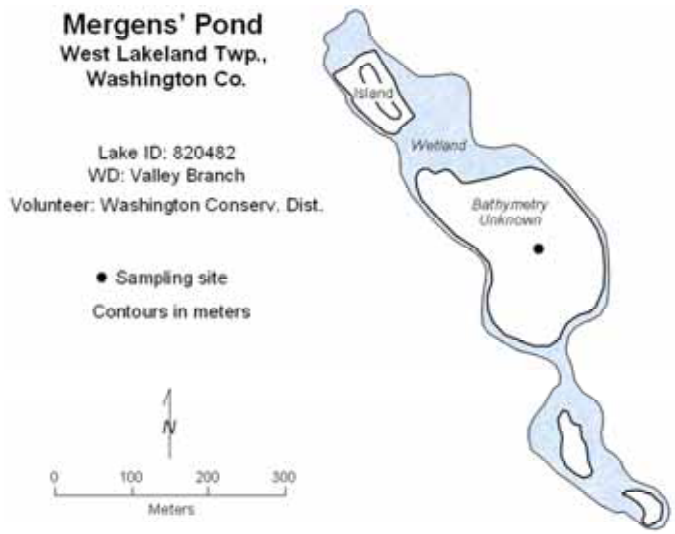
**2008 summer (May-September) data summary**

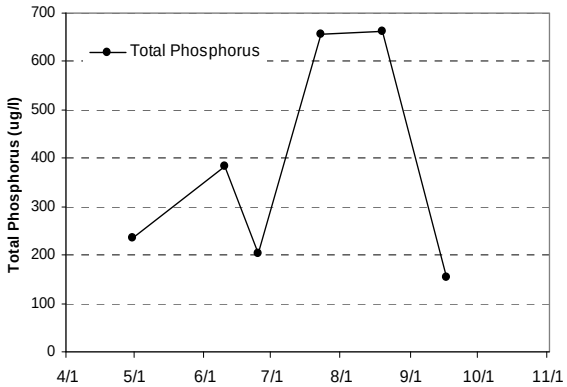
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 411.0 | 154.0 | 661.0 | F |
| **CLA** (µg/l) | 356.6 | 73.0 | 560.0 | F |
| **Secchi** (m) | 0.3 | 0.2 | 0.5 | F |
| **TKN** (mg/l) | 6.02 | 1.90 | 11.00 | |
| | | | ***Lake Grade*** | F |

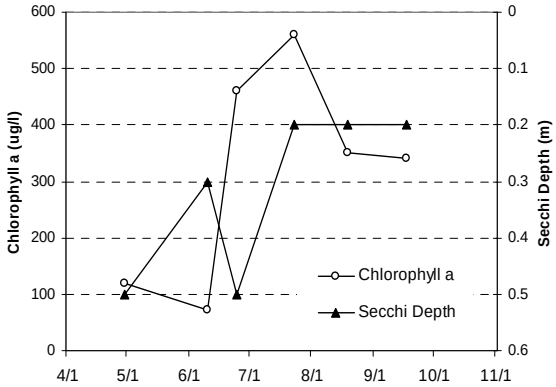
The lake received a lake grade of F for 2008, which is worse than the lake grades received in 2000 and 2005. Continued monitoring is suggested to determine if the water quality of the lake is experiencing a degrading trend.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 3.6 (between 3- "definite algae present" and 4- "high algal color"). The average recreational suitability ranking was 4.2 (between 4- "no swimming/boating ok" and 5- "no aesthetics possible).

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.

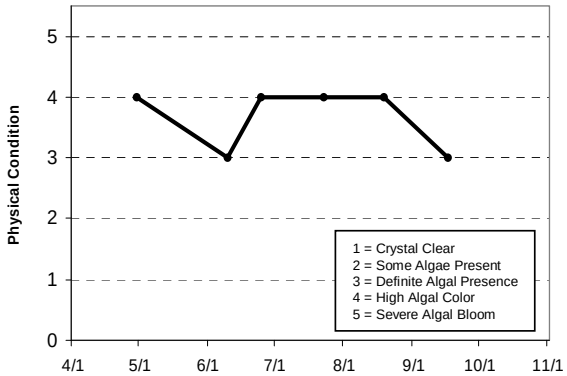



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/30 | 9.2 | 9.1 | 14.38 | 0.97 | 120 | 235 | | 0.5 | 4 | 4 |
| 6/10 | 19.1 | | 5.42 | | 73 | 382 | | 0.3 | 3 | 4 |
| 6/25 | 24.2 | 23.9 | 5.31 | 0.48 | 460 | 202 | | 0.5 | 4 | 4 |
| 7/23 | 23.9 | | 7.76 | | 560 | 656 | | 0.2 | 4 | 4 |
| 8/19 | 23.6 | | 6.77 | | 350 | 661 | | 0.2 | 4 | 4 |
| 9/17 | 19.9 | | 7.45 | | 340 | 154 | | 0.2 | 3 | 5 |



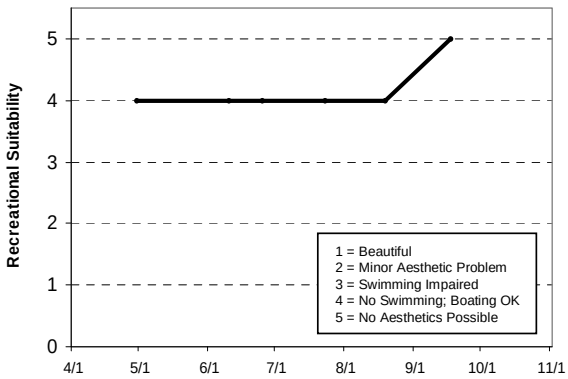

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | D | | | NA |
| Chlorophyll a | | | | | | | | | C | | | NA |
| Secchi Depth | | | | | | | | | D | | | NA |
| **Lake Grade** | | | | | | | | | **D** | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | NA | D | | | F |
| Chlorophyll a | NA | B | | | F |
| Secchi Depth | NA | D | | | F |
| **Lake Grade** | | **C** | | | **F** |

Source: Metropolitan Council and STORET data



## Meuwissen Lake (10-0070) *Carver County Environmental Services*

Meuwissen Lake is located in Benton Township (Carver County). There is no bathymetric information available for the lake. The lake was previously monitored by the Minnesota Pollution Control Agency in 1979, and it was monitored one day in 1999 via the CAMP program.

The lake was monitored 11 times between mid April and mid October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

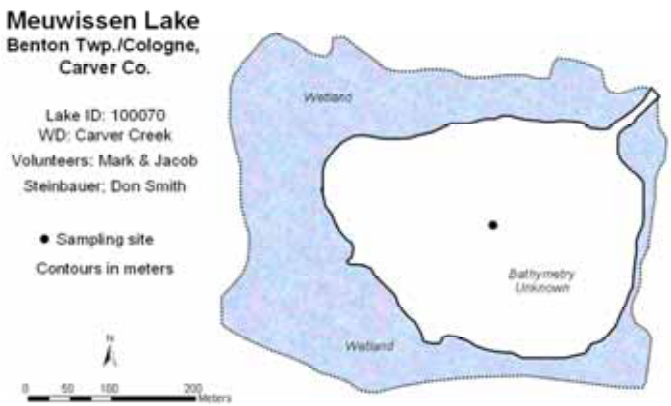
**2008 summer (May-September) data summary**

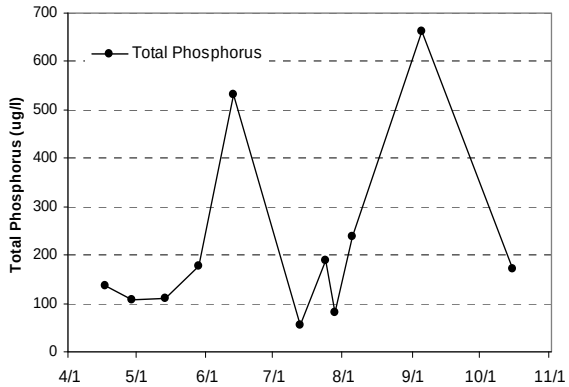
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 255.4 | 55.0 | 662.0 | F |
| **CLA** (µg/l) | 152.1 | 37.0 | 300.0 | F |
| **Secchi** (m) | 0.2 | 0.1 | 0.4 | F |
| **TKN** (mg/l) | 9.18 | 2.60 | 18.00 | |
| | | | ***Lake Grade*** | F |

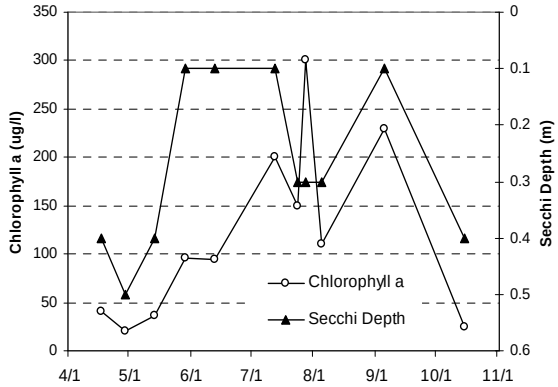
The lake received a lake grade of F in 2008. Additional years of monitoring are suggested to build an historical water quality database for this lake.

The volunteer(s) monitor ranked their perceptions of the lake's physical and recreational condition on a 1-to-5 scale. The mean perceived physical condition was 4.0 (4- "high algal color"); the mean recreational suitability was 5.0 (5- "no aesthetics possible").

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.

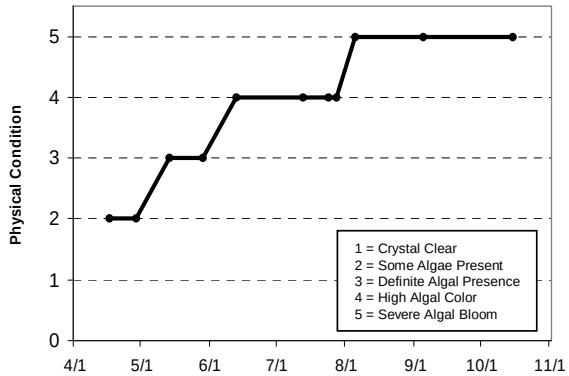



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/17 | 7 | | | | 41 | 136 | | 0.4 | 2 | 5 |
| 4/29 | 7 | | | | 21 | 107 | | 0.5 | 2 | 5 |
| 5/14 | 15 | | | | 37 | 110 | | 0.4 | 3 | 5 |
| 5/29 | 19 | | | | 96 | 177 | | 0.1 | 3 | 5 |
| 6/13 | 18 | | | | 94 | 532 | | 0.1 | 4 | 5 |
| 7/13 | 21 | | | | 200 | 55 | | 0.1 | 4 | 5 |
| 7/24 | 21 | | | | 150 | 188 | | 0.3 | 4 | 5 |
| 7/28 | 20 | | | | 300 | 81 | | 0.3 | 4 | 5 |
| 8/5 | 22 | | | | 110 | 238 | | 0.3 | 5 | 5 |
| 9/5 | 20 | | | | 230 | 662 | | 0.1 | 5 | 5 |
| 10/15 | 11 | | | | 24 | 172 | | 0.4 | 5 | 5 |



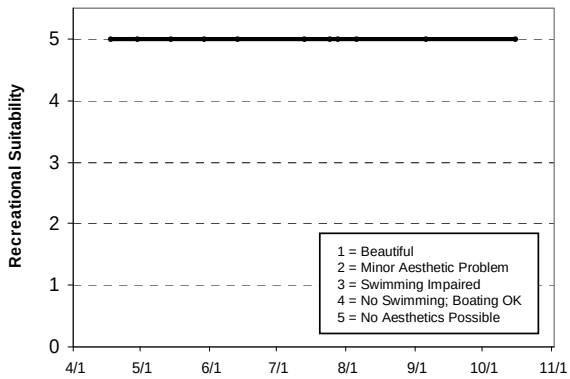

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | | F |
| Chlorophyll a | | | | | F |
| Secchi Depth | | | | | F |
| **Lake Grade** | | | | | **F** |

Source: Metropolitan Council and STORET data



## Miller Lake (10-0029) *Carver County Environmental Services*

Miller Lake, a 145-acre lake located within Dahlgren Township (Carver County) is considered a Metropolitan Area "Priority Lake" because of its multi-recreational uses. The mean and maximum depths of the lake are 3.1 m (10 feet) and 4.3 m (roughly 14 feet), respectively. The lake's mean depth and surface area translate to an approximate lake volume of 1,479 ac-ft. Because of the shallowness of the lake, the entire area is considered littoral zone (area of aquatic plant dominance) and it does not maintain a thermocline (a density gradient owed to changing water temperatures throughout the lake's water column).

The lake has a 16,701-acre immediate watershed, which translates to a watershed-to-lake area ratio of 115:1. The larger the ratio the greater the potential stress put on the lake from surface runoff (Carver County Planning 1999).

The lake was monitored 14 times between mid April and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

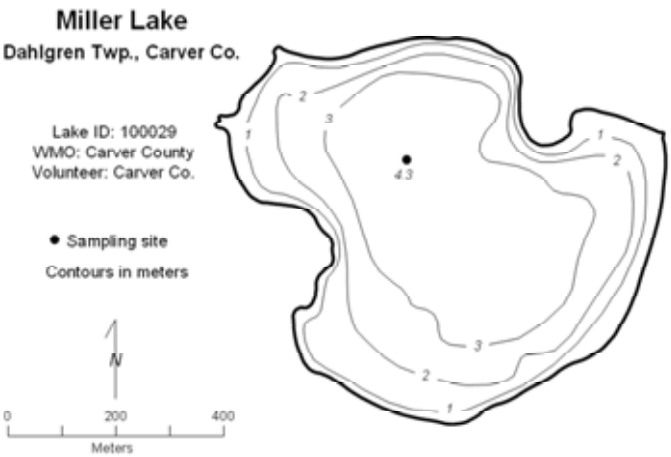
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 265.7 | 110.0 | 384.0 | F |
| **CLA** (µg/l) | 58.7 | 25.0 | 98.0 | D |
| **Secchi** (m) | 0.7 | 0.4 | 1.4 | D |
| **TKN** (mg/l) | 2.43 | 1.90 | 2.90 | |
| | | | ***Lake Grade*** | D |

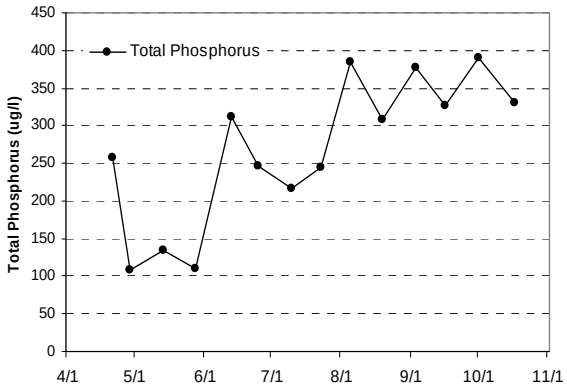
The lake received a lake grade of D for 2008, which is better than the water quality of 2007. No long-term trend is apparent from the lake's water quality database. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008). The lake is represented by a lake grade of D or F.

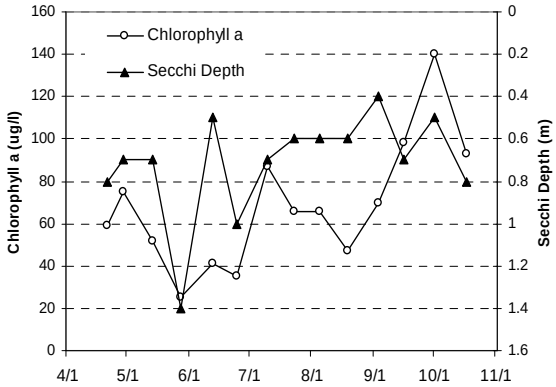
Throughout the monitoring period, the volunteer(s) ranked the perceived physical condition of the lake on a 1-to-5 scale. The mean perceived physical condition of Miller Lake was 3.6 (between 3- "definite algae present" and 4- "high algal color"), while the mean recreational suitability was 4.1 (between 4- "no swimming/boating ok" and 5- "no aesthetics possible").

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.

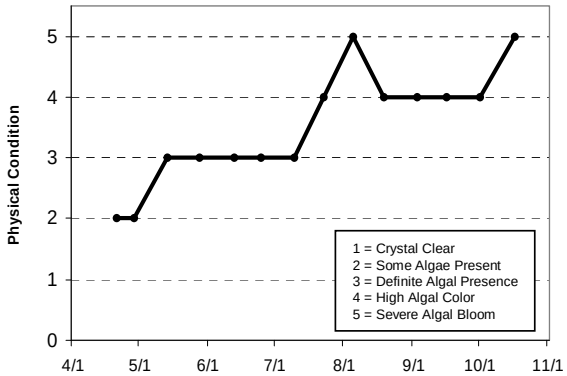



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/21 | 8 | | 14.05 | | 59 | 258 | | 0.8 | 2 | 3 |
| 4/29 | 6.53 | | 14.32 | | 75 | 109 | | 0.7 | 2 | 4 |
| 5/14 | 14.99 | | 14.99 | | 52 | 134 | | 0.7 | 3 | 4 |
| 5/28 | 17.31 | | 9.49 | | 25 | 110 | | 1.4 | 3 | 4 |
| 6/13 | 19.73 | | 7.18 | | 41 | 311 | | 0.5 | 3 | 4 |
| 6/25 | 24.3 | | 9.64 | | 35 | 246 | | 1 | 3 | 4 |
| 7/10 | 25.52 | | 13.06 | | 87 | 217 | | 0.7 | 3 | 4 |
| 7/23 | 26.45 | | 12.67 | | 66 | 244 | | 0.6 | 4 | 4 |
| 8/5 | 25.9 | | 11.27 | | 66 | 384 | | 0.6 | 5 | 5 |
| 8/19 | 25.78 | | 17.9 | | 47 | 308 | | 0.6 | 4 | 4 |
| 9/3 | 22.4 | | 8.86 | | 70 | 377 | | 0.4 | 4 | 4 |
| 9/16 | 17.73 | | 9.22 | | 98 | 326 | | 0.7 | 4 | 4 |
| 10/1 | 16.93 | | 8.82 | | 140 | 391 | | 0.5 | 4 | 4 |
| 10/17 | 12.68 | | 10.25 | | 93 | 330 | | 0.8 | 5 | 5 |



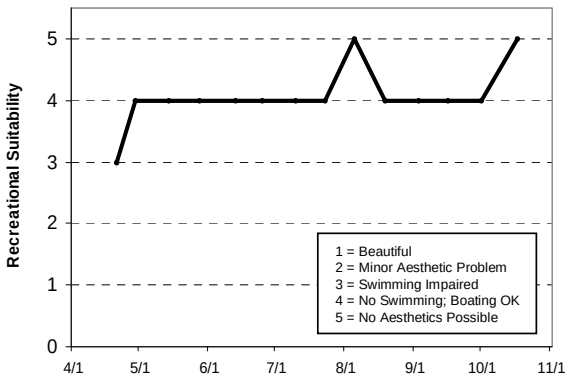

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | F | F | F | | F | F | F | F | F |
| Chlorophyll a | | | | F | F | D | | D | C | C | C | D |
| Secchi Depth | | | | F | F | D | | D | D | C | C | F |
| **Lake Grade** | | | | **F** | **F** | **D** | | **D** | **D** | **D** | **D** | **F** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | F | D | F | F | F |
| Chlorophyll a | D | D | D | F | D |
| Secchi Depth | F | D | F | F | D |
| **Lake Grade** | **F** | **D** | **F** | **F** | **D** |

Source: Metropolitan Council and STORET data



## Minnetoga Lake (27-0088) *Nine Mile Creek Watershed District*

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 (12.7 ft). The maximum depth is 8.2 m (26.9 ft). The volume of the lake is 183 acre-feet.

This was the second year that Lake Minnetoga has been involved in the CAMP. A search through the STORET nationwide water quality database revealed, other than the historical CAMP data, just two dates in 2001 with Secchi depth measurements.

The lake was monitored 12 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

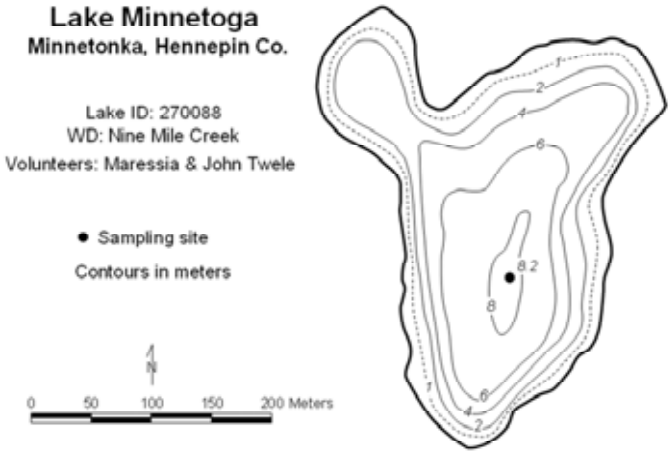
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 27.3 | 12.0 | 56.0 | B |
| **CLA** (µg/l) | 7.9 | 2.4 | 15.0 | A |
| **Secchi** (m) | 2.6 | 1.3 | 4.0 | B |
| **TKN** (mg/l) | 1.79 | 1.40 | 2.20 | |
| | | | ***Lake Grade*** | B |

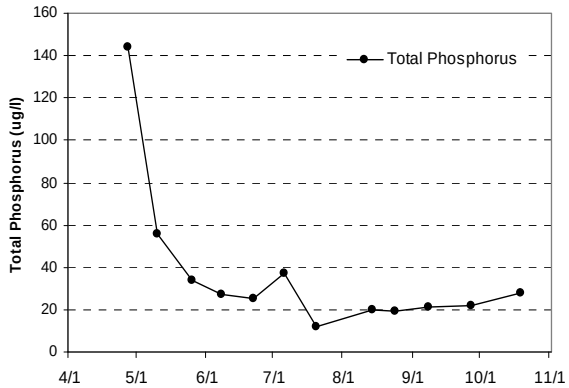
The lake received a lake grade of B for 2008, which is an improvement over last year's C lake grade. Continued monitoring is suggested to build the water quality database for determining potential trends in water quality.

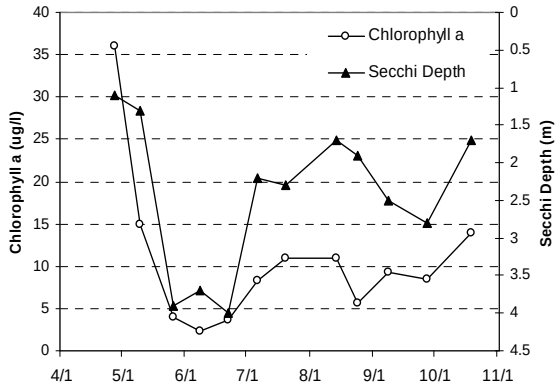
Throughout the monitoring period, the volunteer(s) ranked the perceived physical condition of the lake on a 1-to-5 scale. The mean perceived physical condition of the lake was 2.0 ("some algae present"; the mean recreational suitability was 1.5 (between 1- "beautiful" and 2- "minor aesthetic problem").

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.

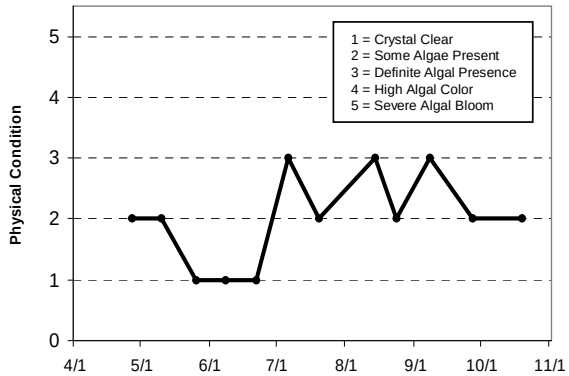



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/27 | 8.5 | | | | 36 | 144 | | 1.1 | 2 | 1 |
| 5/10 | 15.2 | | | | 15 | 56 | | 1.3 | 2 | 1 |
| 5/26 | 19 | | | | 4 | 34 | | 3.9 | 1 | 1 |
| 6/8 | 22.1 | | | | 2.4 | 27 | | 3.7 | 1 | 1 |
| 6/22 | 23.8 | | | | 3.6 | 25 | | 4 | 1 | 1 |
| 7/6 | 27.4 | | | | 8.3 | 37 | | 2.2 | 3 | 1 |
| 7/20 | 26 | | | | 11 | 12 | | 2.3 | 2 | 1 |
| 8/14 | 25.6 | | | | 11 | 20 | | 1.7 | 3 | 2 |
| 8/24 | 24.1 | | | | 5.6 | 19 | | 1.9 | 2 | 3 |
| 9/8 | 20.3 | | | | 9.3 | 21 | | 2.5 | 3 | 3 |
| 9/27 | 19.5 | | | | 8.5 | 22 | | 2.8 | 2 | 1 |
| 10/19 | 13.1 | | | | 14 | 28 | | 1.7 | 2 | |



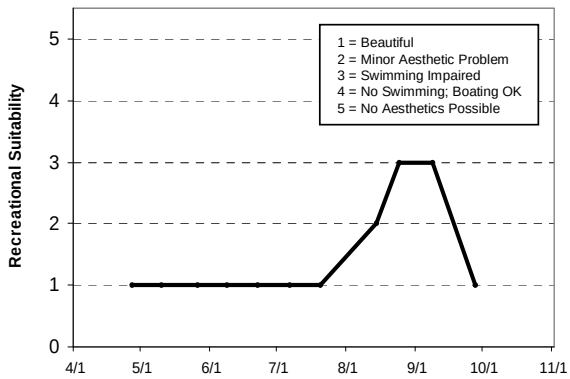

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | C | B |
| Chlorophyll a | | | | C | A |
| Secchi Depth | | | | C | B |
| **Lake Grade** | | | | **C** | **B** |

Source: Metropolitan Council and STORET data



## Mitchell Lake (27-0070) *City of Eden Prairie*

Mitchell Lake is located in the City of Eden Prairie (Hennepin County). It is considered a Priority Lake by the Metropolitan Council for its high regional recreation value. It has a surface area of 112 acres. The maximum depth of the lake is 5.8 m (19 feet). Approximately 97 percent of the lake's surface area is considered littoral zone, which is the 0-15 feet depth zone of aquatic plant dominance. Furthermore, the lake does not maintain a substantial thermocline, which is a density gradient caused by changing water temperatures throughout the water column.

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

The lake has been previously monitored by Council staff, but 2008 marks the fifth year the lake has been monitored via the CAMP (2004 being the first). The lake was monitored 13 times in 2007. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

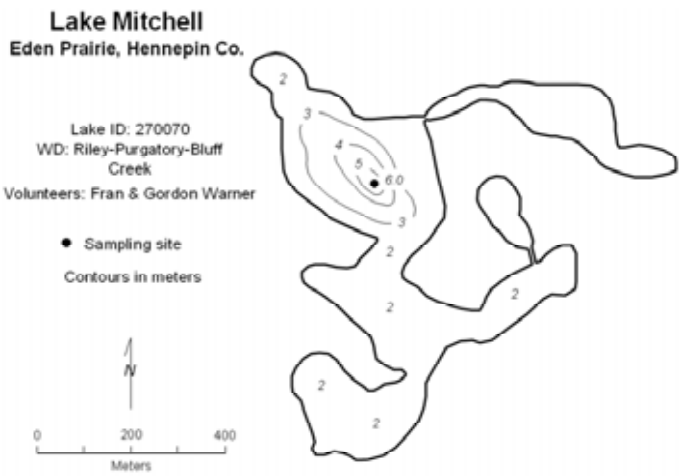
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 46.3 | 21.0 | 79.0 | C |
| **CLA** (µg/l) | 14.8 | 2.0 | 35.0 | B |
| **Secchi** (m) | 1.7 | 0.5 | 3.8 | C |
| **TKN** (mg/l) | 1.97 | 1.50 | 3.10 | |
| | | | ***Lake Grade*** | C |

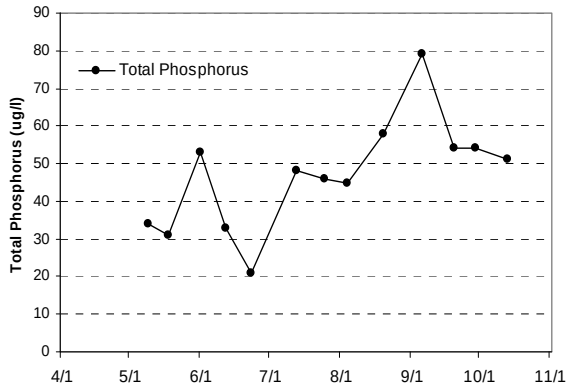
The lake received a lake grade of C which is similar to those recorded in 1991, 1995, 2004, 2005, and 2007, but better than the D's recorded in 1999-2000 and 2003. The lake's water quality seems represented by lake grades between C and D. However, the lake received a CLA grade of B this year, which is an improvement over all previous monitored years. Continued monitoring is suggested to determine if the improved CLA grade is an indicator of a potential improving trend in average CLA concentrations.

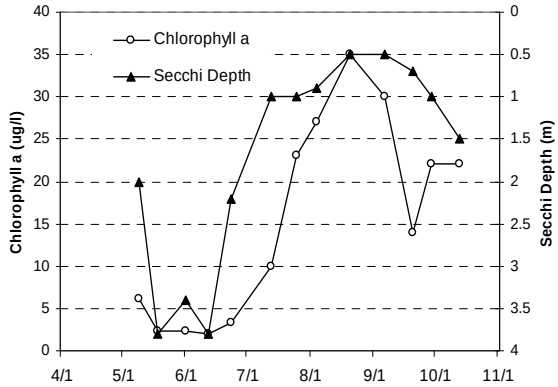
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 1.3 (between 1- "crystal clear" and 2- "some algae present"). The average recreational suitability ranking was 1.0 ("beautiful").

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.

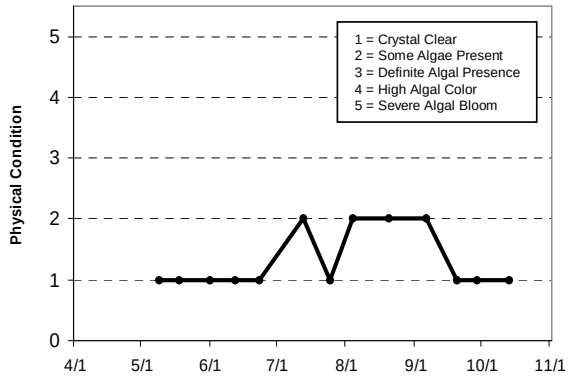



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/9 | 15.4 | | | | 6.1 | 34 | | 2 | 1 | 1 |
| 5/18 | 16.8 | | | | 2.4 | 31 | | 3.8 | 1 | 1 |
| 6/1 | 21.8 | | | | 2.3 | 53 | | 3.4 | 1 | 1 |
| 6/12 | 22 | | | | 2 | 33 | | 3.8 | 1 | 1 |
| 6/23 | 23.8 | | | | 3.4 | 21 | | 2.2 | 1 | 1 |
| 7/13 | 24.4 | | | | 10 | 48 | | 1 | 2 | 1 |
| 7/25 | 26.5 | | | | 23 | 46 | | 1 | 1 | 1 |
| 8/4 | 28.5 | | | | 27 | 45 | | 0.9 | 2 | 1 |
| 8/20 | 25.8 | | | | 35 | 58 | | 0.5 | 2 | 1 |
| 9/6 | 21.8 | | | | 30 | 79 | | 0.5 | 2 | 1 |
| 9/20 | 23.2 | | | | 14 | 54 | | 0.7 | 1 | 1 |
| 9/29 | 19.5 | | | | 22 | 54 | | 1 | 1 | 1 |
| 10/13 | 15.4 | | | | 22 | 51 | | 1.5 | 1 | 1 |



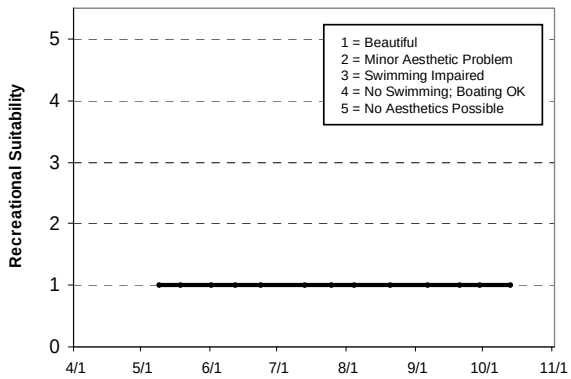

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | D |
| Chlorophyll a | | | | | | | | | | | | C |
| Secchi Depth | | | | | | | | | | | | C |
| **Lake Grade** | | | | | | | | | | | | **C** |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | C | | | | D | D | | | D |
| Chlorophyll a | | | | C | | | | D | D | | | D |
| Secchi Depth | | | | C | | | | D | C | | | C |
| **Lake Grade** | | | | **C** | | | | **D** | **D** | | | **D** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | C | D | D | C | C |
| Chlorophyll a | C | C | C | C | B |
| Secchi Depth | C | C | D | C | C |
| **Lake Grade** | **C** | **C** | **D** | **C** | **C** |

Source: Metropolitan Council and STORET data



## North Twin Lake (82-0018) *Carnelian - Marine Watershed District*

North Twin Lake is located in Stillwater Township (Washington County). It has a surface area of 69 acres. The maximum and mean depths of the lake are 1.8 m (5.9 ft) and 0.9 m (2.9 ft), respectively. The volume of the lake is approximately 207 ac-ft. The entire area of the lake is considered littoral zone which is the 0-15 feet depth zone of aquatic plant dominance. Furthermore, the lake does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the water column. The lake's 187-acre immediate watershed translates to a watershed-to-lake size ratio of 3:1. The greater the ratio, the greater the potential stress on the lake from surface runoff.

This was the eighth year that North Twin Lake has been involved in CAMP (2000-2006 being the others). A search through the STORET nationwide water quality database provided limited information other than the historical CAMP data.

The lake was monitored 7 times in 2008. On each sampling day the lake was monitored for Secchi transparency, temperature, dissolved oxygen, and the perceived physical condition and recreational suitability. The data are summarized in tables and figures on the following page.

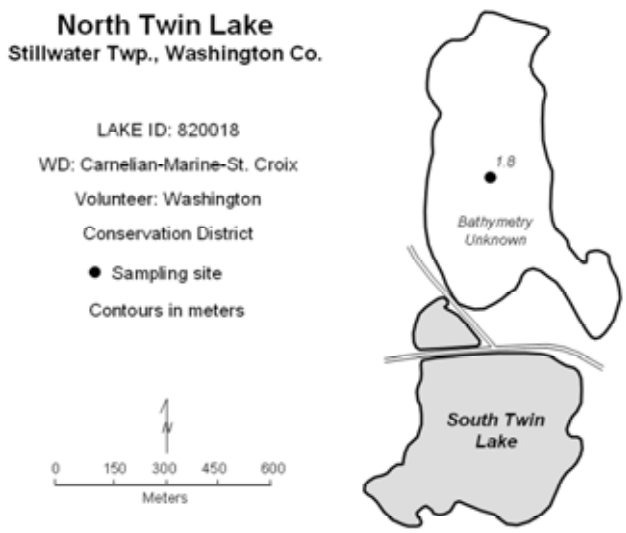
**2008 summer (May-September) data summary**

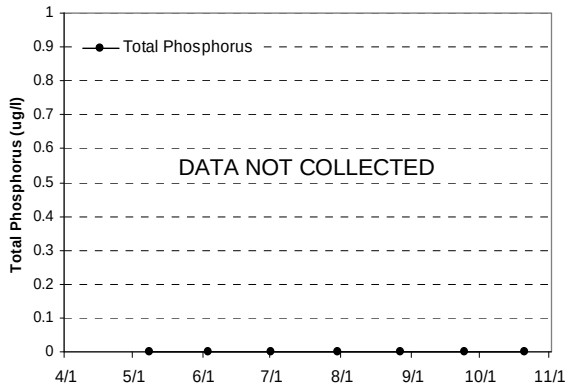
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **Secchi** (m) | 1.1 | 0.9 | 1.5 | D |

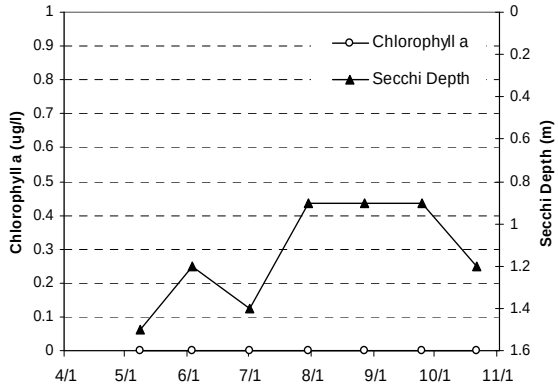
Only Secchi depth, temperature, and dissolved oxygen were monitored in 2008. Therefore no lake grade can determined for this year.

The perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 1.5 (between 1- "crystal clear" and 2- "some algae present"). The average recreational suitability ranking was 1.7 (between 1- "beautiful" and 2- "minor aesthetic problem").

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.

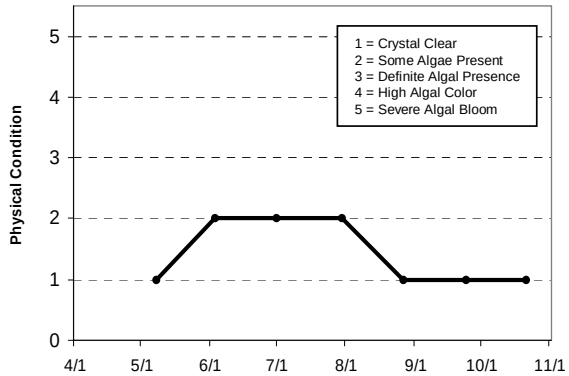



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/8 | 15.8 | 13.6 | 9.73 | 1.4 | | | | 1.5 | 1 | 1 |
| 6/3 | 20.2 | 20.2 | 6.45 | 1.62 | | | | 1.2 | 2 | 2 |
| 7/1 | 24.9 | 23.1 | 8.47 | 0.76 | | | | 1.4 | 2 | 2 |
| 7/30 | 28.9 | 25.3 | 9.1 | 0.37 | | | | 0.9 | 2 | 2 |
| 8/27 | 22.1 | 21.4 | 10.15 | 6.84 | | | | 0.9 | 1 | 2 |
| 9/24 | 21.1 | 18.7 | 10.32 | 4.88 | | | | 0.9 | 1 | 1 |
| 10/21 | 11 | 10.5 | 12.32 | 11.87 | | | | 1.2 | 1 | 1 |



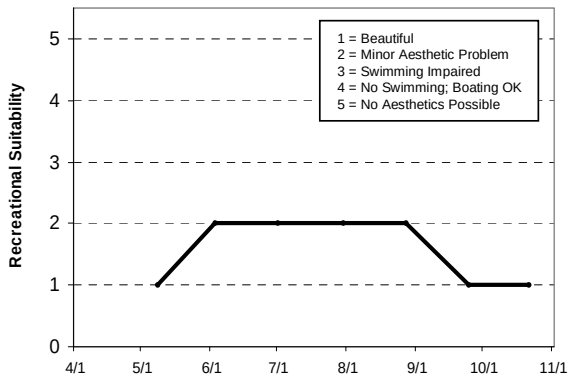

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | C | B | B | A | B | B | | B |
| Chlorophyll a | | | | | D | C | D | B | A | B | | A |
| Secchi Depth | | | | | B | B | B | B | C | C | C | C |
| **Lake Grade** | | | | | **C** | **B** | **C** | **B** | **B** | **B** | | **B** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | A | B | C | C | |
| Chlorophyll a | A | A | A | A | |
| Secchi Depth | C | D | C | D | D |
| **Lake Grade** | **B** | **B** | **B** | **C** | |

Source: Metropolitan Council and STORET data



## Northwood Lake (27-0627) *Bassett Creek Watershed Management Organization*

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 lake has an approximate volume of 41 ac-ft. The entire area of the lake is considered littoral zone which is the 0-15 feet depth zone of aquatic plant dominance. Furthermore, the lake does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the water column. The lake's 1,341-acre immediate watershed translates to a watershed-to-lake area ratio of 89:1. The greater the ratio, the greater the potential stress on the lake from surface runoff.

This was the ninth year that Northwood Lake has been involved in the CAMP. The lake was also enrolled in the program in 2000-2007. Other than the 2000-2007 CAMP data, a search through the STORET nationwide water quality database revealed no other historical data.

The lake was monitored 9 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

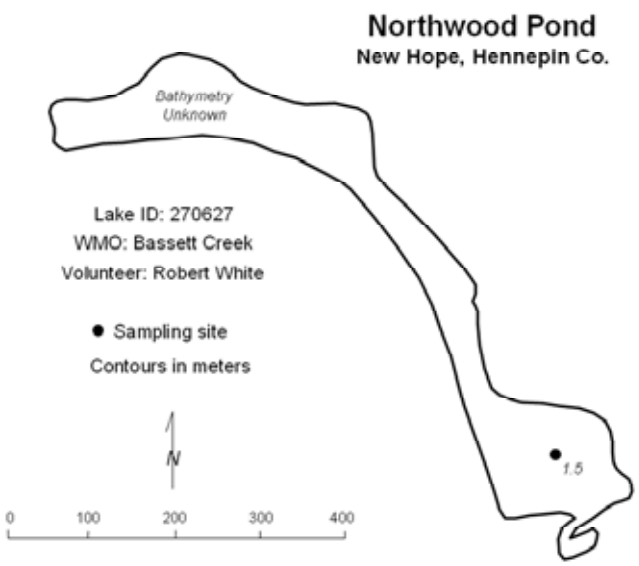
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 150.5 | 54.0 | 330.0 | D |
| **CLA** (µg/l) | 30.7 | 5.2 | 130.0 | C |
| **Secchi** (m) | 1.1 | 0.8 | 1.3 | D |
| **TKN** (mg/l) | 2.01 | 1.30 | 3.40 | |
| | | | ***Lake Grade*** | D |

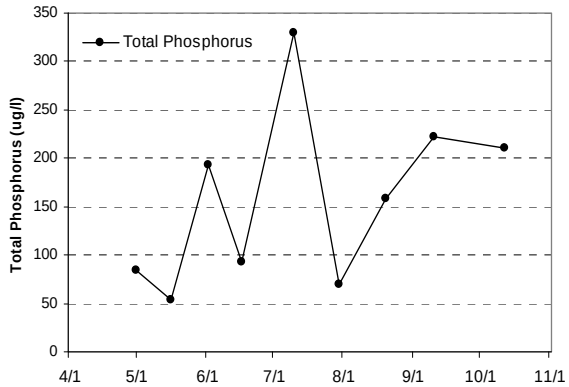
The lake received a lake grade of D in 2008 which is similar to the D lake grades received in 2000-2001, 2003, and 2006 – 2007 and worse than the C's received in 2002, and 2004-2005.

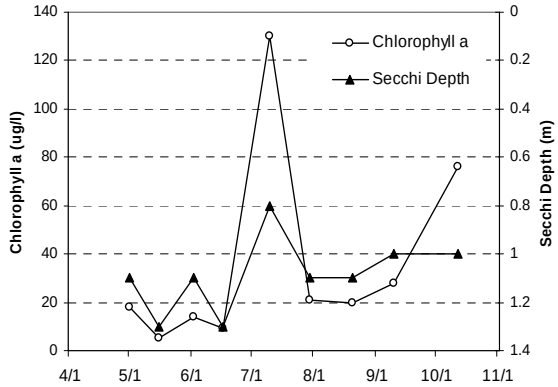
Over the past 9 years, the lake grades appear to vary in the D and C range. Continued monitoring is suggested to build the water quality database for enhancing the ability to detect potential trends in water quality.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 3.8 (between 3- "definite algae present" and 4- "high algal color"). The average recreational suitability ranking was 4.6 (between 4- "no swimming/boating ok" and 5- "no aesthetics possible")

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.

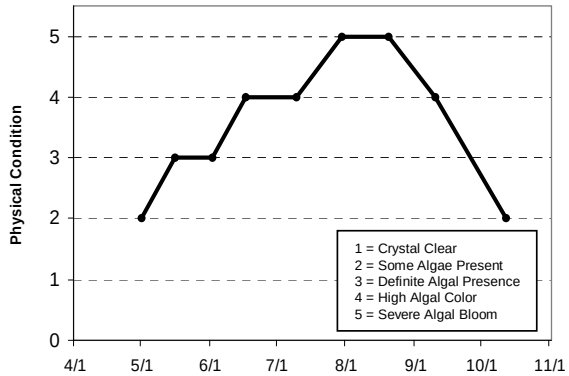



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/1 | 16 | | | | 18 | 84 | | 1.1 | 2 | 4 |
| 5/16 | 18 | | | | 5.2 | 54 | | 1.3 | 3 | 4 |
| 6/2 | 21.5 | | | | 14 | 193 | | 1.1 | 3 | 4 |
| 6/17 | 24.9 | | | | 9.1 | 93 | | 1.3 | 4 | 5 |
| 7/10 | 28 | | | | 130 | 330 | | 0.8 | 4 | 5 |
| 7/30 | 27.3 | | | | 21 | 69 | | 1.1 | 5 | 5 |
| 8/20 | 25.8 | | | | 20 | 159 | | 1.1 | 5 | 5 |
| 9/10 | 21.8 | | | | 28 | 222 | | 1 | 4 | 5 |
| 10/12 | 18 | | | | 76 | 211 | | 1 | 2 | 4 |



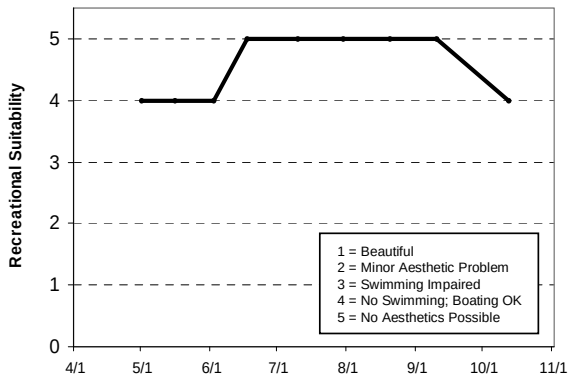

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | F | F | D | F |
| Chlorophyll a | | | | | | | | | B | C | B | C |
| Secchi Depth | | | | | | | | | D | D | D | D |
| **Lake Grade** | | | | | | | | | **D** | **D** | **C** | **D** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | D | D | F | F | D |
| Chlorophyll a | B | B | B | C | C |
| Secchi Depth | D | D | D | D | D |
| **Lake Grade** | **C** | **C** | **D** | **D** | **D** |

Source: Metropolitan Council and STORET data



## Oak Lake (Site-1) (10-0093) *Carver County Environmental Services*

The entire Oak Lake is a 339-acre lake located within Watertown Township (Carver County). The maximum depth of the lake is 3.4 m (roughly 11 feet). Because of the shallowness of the lake, the entire area is considered littoral zone (area of aquatic plant dominance) and it does not maintain a thermocline (a density gradient owed to changing water temperatures throughout the lake's water column).

This was the seventh year in which Oak Lake (Site-1) has been involved in CAMP (2001-2006 being the others). The 2001-2006 and 2008 CAMP data are the only known available data.

Oak Lake was monitored 15 times between mid April and mid October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

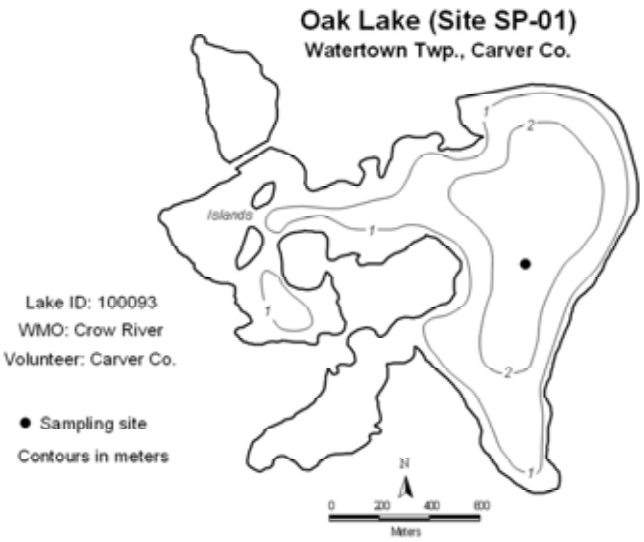
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 131.3 | 67.0 | 183.0 | D |
| **CLA** (µg/l) | 72.1 | 19.0 | 120.0 | D |
| **Secchi** (m) | 0.6 | 0.3 | 1.0 | F |
| **TKN** (mg/l) | 2.33 | 1.50 | 3.00 | |
| | | | ***Overall Grade*** | D |

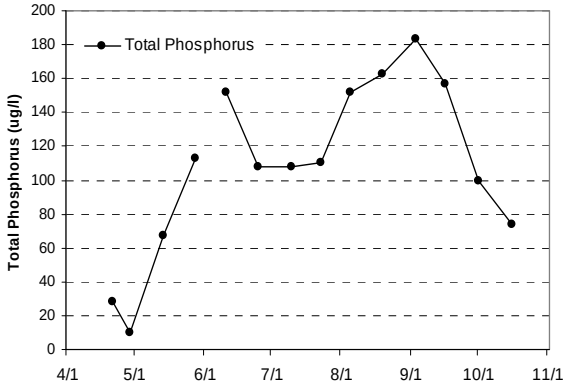
The lake received a lake grade of D for 2008. The lake has fluctuated from lake grades of C to D to F and back to D. There is no apparent trend in water quality. To better understand the lake's water quality and where it may be heading, additional years of data collection are suggested.

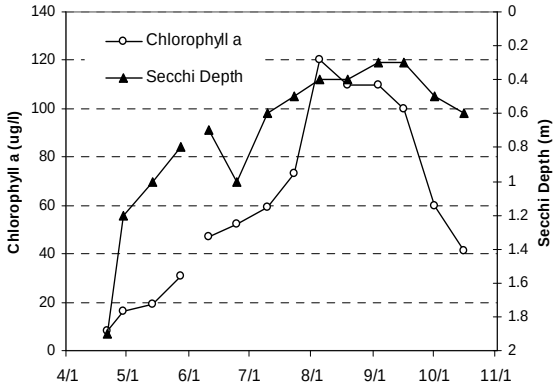
Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The average user perception rankings were 3.4 for physical condition (between 3- "definite algae present" and 4- "high algal color"), and 4.3 for recreational suitability (between 4- "no swimming – boating ok" and 5- "no aesthetics possible").

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) 297-4916 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.

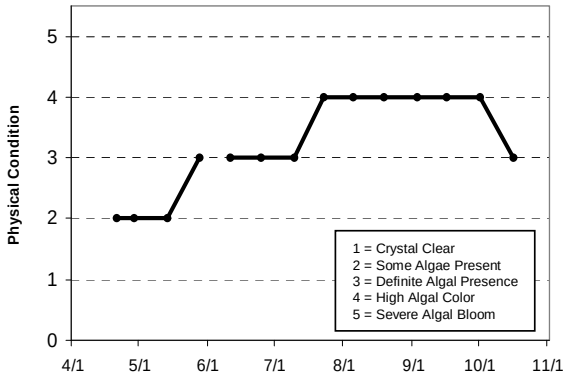



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/21 | 6.83 | | 11.76 | | 8.3 | 28 | | 1.9 | 2 | 4 |
| 4/29 | 7.08 | | 10.99 | | 16 | 10 | | 1.2 | 2 | 4 |
| 5/14 | 13.55 | | 12.67 | | 19 | 67 | | 1 | 2 | 3 |
| 5/28 | 16.72 | | 9.05 | | 31 | 113 | | 0.8 | 3 | 5 |
| 6/1 | | | | | | | | | | |
| 6/11 | 19 | | 7.89 | | 47 | 152 | | 0.7 | 3 | 4 |
| 6/25 | 23.88 | | 9.33 | | 52 | 108 | | 1 | 3 | 4 |
| 7/10 | 25.14 | | 9.87 | | 59 | 108 | | 0.6 | 3 | 4 |
| 7/23 | 26.01 | | 8.04 | | 73 | 110 | | 0.5 | 4 | 4 |
| 8/5 | 25.84 | | 9.71 | | 120 | 152 | | 0.4 | 4 | 5 |
| 8/19 | 26.24 | | 14.12 | | 110 | 163 | | 0.4 | 4 | 5 |
| 9/3 | 21.7 | | 9.08 | | 110 | 183 | | 0.3 | 4 | 5 |
| 9/16 | 16.95 | | 7.67 | | 100 | 157 | | 0.3 | 4 | 4 |
| 10/1 | 16.37 | | 6.44 | | 60 | 100 | | 0.5 | 4 | 4 |
| 10/16 | 13.2 | | 8.5 | | 41 | 74 | | 0.6 | 3 | 3 |

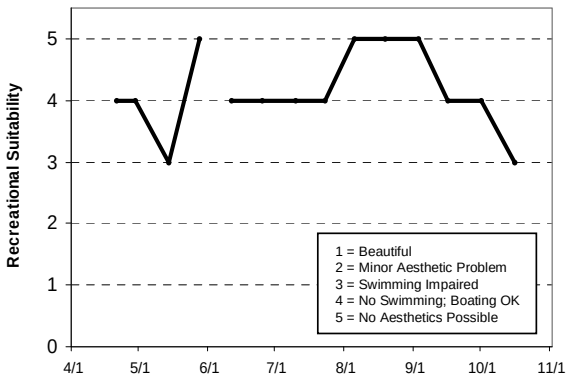



### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | D | D |
| Chlorophyll a | | | | | | | | | | | C | C |
| Secchi Depth | | | | | | | | | | | C | C |
| **Lake Grade** | | | | | | | | | | | **C** | **C** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | F | D | D | D | D |
| Chlorophyll a | C | C | D | F | D |
| Secchi Depth | C | C | C | F | F |
| **Lake Grade** | **D** | **C** | **D** | **F** | **D** |




Source: Metropolitan Council and STORET data

## O'Connor Lake (82-0002) *Lower St. Croix Valley Watershed Management Organization*

O'Connor Lake is a 38-acre lake located within Denmark Township (Washington County). There is little known morphological data available for the lake.

This marks the fourth year in which O'Connor Lake has been involved in CAMP. A search through the STORET nationwide water quality database for historic data on the lake revealed just the historical CAMP data.

The lake was monitored 15 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

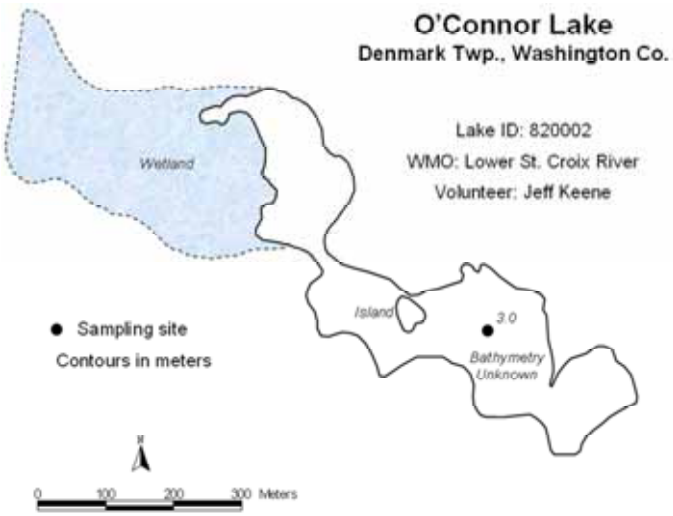
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 44.3 | 25.0 | 59.0 | C |
| **CLA** (µg/l) | 14.5 | 5.5 | 33.0 | B |
| **Secchi** (m) | 1.3 | 0.8 | 2.2 | C |
| **TKN** (mg/l) | 1.08 | 0.59 | 1.50 | |
| | | | ***Lake Grade*** | C |

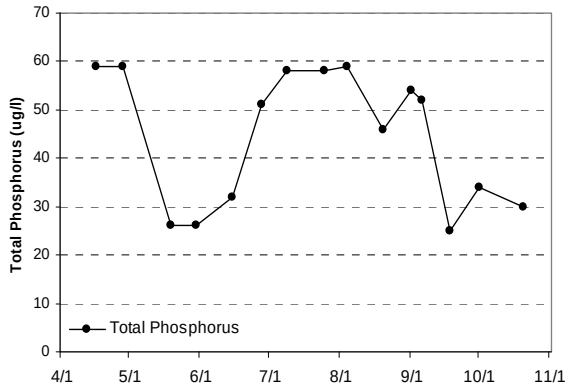
The lake received a lake grade of C for 2008, which is similar to grades received in previous years. Continued monitoring is suggested to continue to build the water quality database.

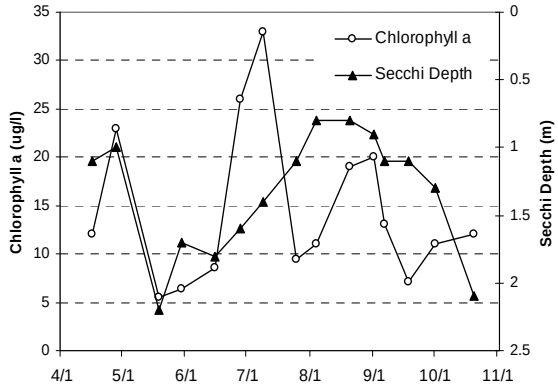
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.7 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 4.0 (4- "no swimming/boating ok").

The Fisheries Section of the Minnesota Department of Natural Resources (MNDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MNDNR 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.

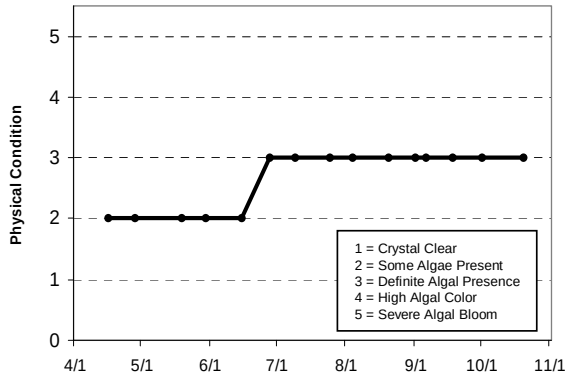



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/16 | 6.1 | | | | 12 | 59 | | 1.1 | 2 | |
| 4/28 | 14.2 | | | | 23 | 59 | | 1 | 2 | 4 |
| 5/19 | 20.2 | | | | 5.5 | 26 | | 2.2 | 2 | 4 |
| 5/30 | 20.9 | | | | 6.4 | 26 | | 1.7 | 2 | 4 |
| 6/15 | 22.8 | | | | 8.5 | 32 | | 1.8 | 2 | 4 |
| 6/28 | 24.9 | | | | 26 | 51 | | 1.6 | 3 | 4 |
| 7/9 | 25.8 | | | | 33 | 58 | | 1.4 | 3 | 4 |
| 7/25 | 25.1 | | | | 9.5 | 58 | | 1.1 | 3 | 4 |
| 8/4 | 24.6 | | | | 11 | 59 | | 0.8 | 3 | 4 |
| 8/20 | 25.1 | | | | 19 | 46 | | 0.8 | 3 | 4 |
| 9/1 | 23.2 | | | | 20 | 54 | | 0.9 | 3 | 4 |
| 9/6 | 21.2 | | | | 13 | 52 | | 1.1 | 3 | 4 |
| 9/18 | 20.7 | | | | 7.1 | 25 | | 1.1 | 3 | 4 |
| 10/1 | 17 | | | | 11 | 34 | | 1.3 | 3 | 4 |
| 10/20 | 12.5 | | | | 12 | 30 | | 2.1 | 3 | 4 |



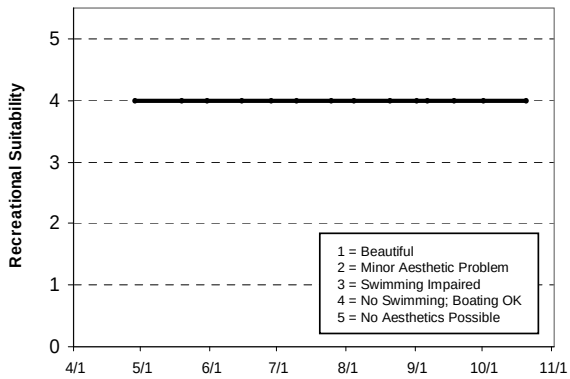

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | C | C | C | C |
| Chlorophyll a | | B | A | A | B |
| Secchi Depth | | C | C | F | C |
| **Lake Grade** | | **C** | **B** | **C** | **C** |

Source: Metropolitan Council and STORET data



## O'Dowd Lake (70-0095) *City of Shakopee*

O'Dowd Lake is located in both Louisville Township and the City of Shakopee (Scott County). It is considered a Priority Lake by the Metropolitan Council for its high regional recreation value. The lake's surface area is 258 acres and has a maximum depth of 6.7 m (roughly 22 feet). Approximately 63 percent of the lake's surface area is considered littoral zone, which is the 0-15 feet depth zone of aquatic plant dominance. The MN DNR has designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*).

Although this is the third year that O'Dowd Lake has been enrolled in the CAMP, the lake was monitored by Council staff in the past. The lake was monitored 14 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

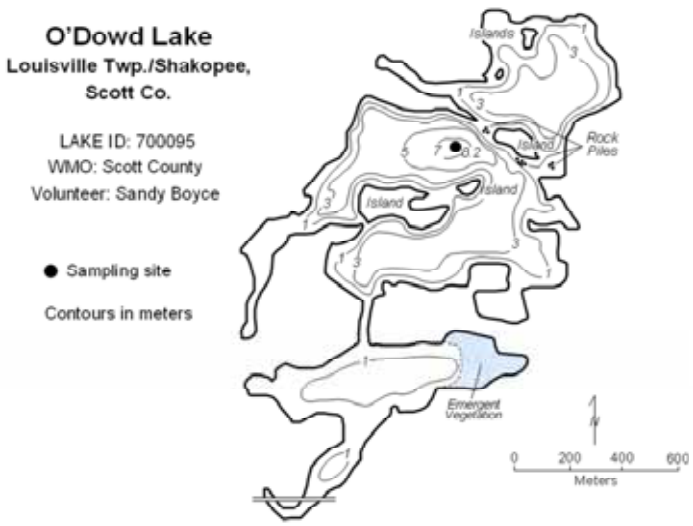
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 35.2 | 17.0 | 59.0 | C |
| **CLA** (µg/l) | 34.7 | 2.1 | 76.0 | C |
| **Secchi** (m) | 1.6 | 0.6 | 3.0 | C |
| **TKN** (mg/l) | 1.41 | 0.97 | 2.20 | |
| | | | ***Lake Grade*** | C |

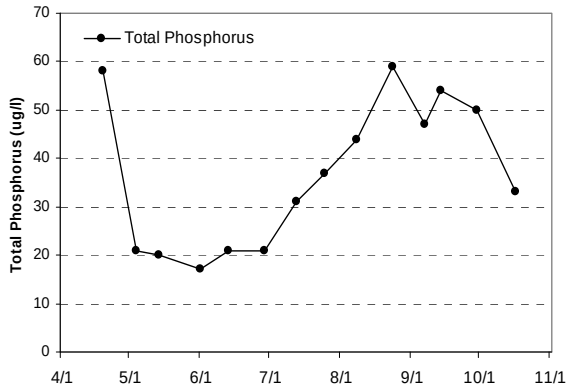
The lake received a lake grade of C for 2008. The lake's water quality seems to be represented by a lake grade of C with the occasional D. Continued monitoring is suggested to increase the ability to detect potential water quality trends.

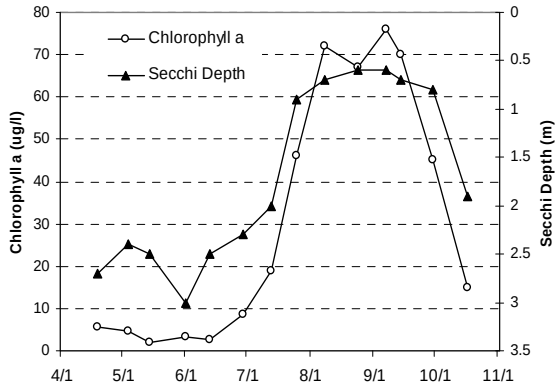
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 1.7 (between 1- "crystal clear" and 2- "some algae present"). The average recreational suitability ranking was 1.5 (between 1- "beautiful" and 2- "minor aesthetic problem").

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.

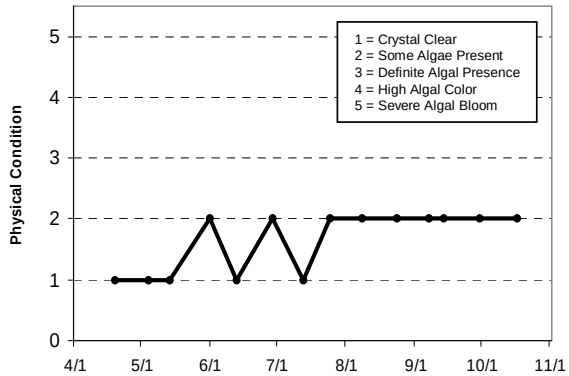



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/19 | 5.5 | | | | 5.8 | 58 | | 2.7 | 1 | 1 |
| 5/4 | 11.6 | | | | 4.7 | 21 | | 2.4 | 1 | 1 |
| 5/14 | 15.7 | | | | 2.1 | 20 | | 2.5 | 1 | |
| 6/1 | 20.8 | | | | 3.2 | 17 | | 3 | 2 | 1 |
| 6/13 | 20.5 | | | | 2.6 | 21 | | 2.5 | 1 | 1 |
| 6/29 | 24.2 | | | | 8.7 | 21 | | 2.3 | 2 | 1 |
| 7/13 | 24.3 | | | | 19 | 31 | | 2 | 1 | 1 |
| 7/25 | 26.6 | | | | 46 | 37 | | 0.9 | 2 | 2 |
| 8/8 | 27.7 | | | | 72 | 44 | | 0.7 | 2 | 2 |
| 8/24 | 24.8 | | | | 67 | 59 | | 0.6 | 2 | 2 |
| 9/7 | 20.4 | | | | 76 | 47 | | 0.6 | 2 | 2 |
| 9/14 | 18.6 | | | | 70 | 54 | | 0.7 | 2 | 2 |
| 9/30 | 18.3 | | | | 45 | 50 | | 0.8 | 2 | 2 |
| 10/17 | 13.5 | | | | 15 | 33 | | 1.9 | 2 | 2 |

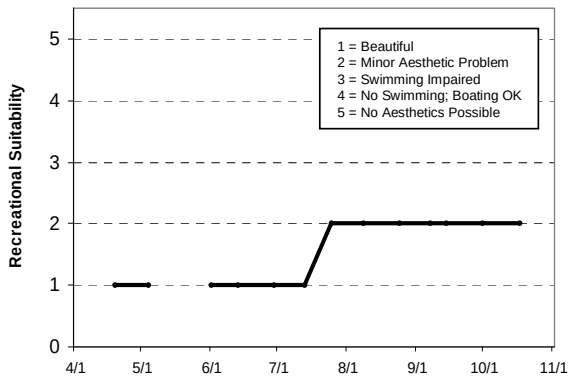



### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | C | | | | | | | |
| Chlorophyll a | | | | | C | | | | | | | |
| Secchi Depth | | | | | C | | | | | | | |
| **Lake Grade** | | | | | **C** | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | C | | | C | | | C | | D | |
| Chlorophyll a | | | D | | | C | | | C | | D | |
| Secchi Depth | | | C | | | C | | | C | | C | |
| **Lake Grade** | | | **C** | | | **C** | | | **C** | | **D** | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | C | D | C | C |
| Chlorophyll a | | D | C | D | C |
| Secchi Depth | | C | D | C | C |
| **Lake Grade** | | **C** | **D** | **C** | **C** |




Source: Metropolitan Council and STORET data

## Olson Lake (82-0103) *Valley Branch Watershed District*

**Primary Report**

Olson Lake is located in the City of Lake Elmo (Washington County). It is considered a Priority Lake by the Metropolitan Council for its exceptional water clarity. 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 area of the lake is considered littoral zone which is the 0-15 feet depth zone of aquatic plant dominance. Furthermore, the lake does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the water column. The lake's area and mean depth result in an approximate lake volume of 614 ac-ft. The lake's surface area and watershed area of 200 acres translate to a 2:1 watershed-to-lake area ratio. Generally the larger the ratio, the greater the potential stress on the lake from surface runoff.

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

The lake was monitored 13 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 18.4 | 11.0 | 27.0 | A |
| **CLA** (µg/l) | 7.0 | 1.9 | 19.0 | A |
| **Secchi** (m) | 2.9 | 1.7 | 3.7 | B |
| **TKN** (mg/l) | 1.38 | 0.84 | 1.70 | |
| | | | ***Lake Grade*** | A |

The historical water quality database for the lake 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. More recently, the lake has recorded lake grades of an A in 2000 and 2003-2004, before falling back to a lake grade of B in 2005 - 2007. This year's lake grade of A is evidence of the continued improvement in water quality. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed a statistically significant improving trend in water clarity (MPCA 2008).

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 1.7 (between 1- "crystal clear" and 2- "some algae present"). The average recreational suitability ranking was 1.2 (between 1- "beautiful" and 2- "minor aesthetic problem").

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

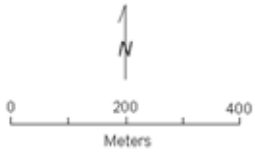
**Lake Elmo, Washington Co.**

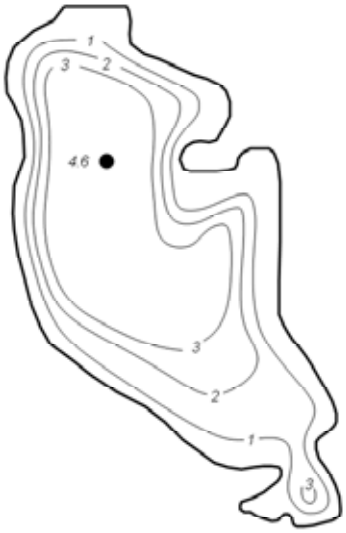
**Primary Report**

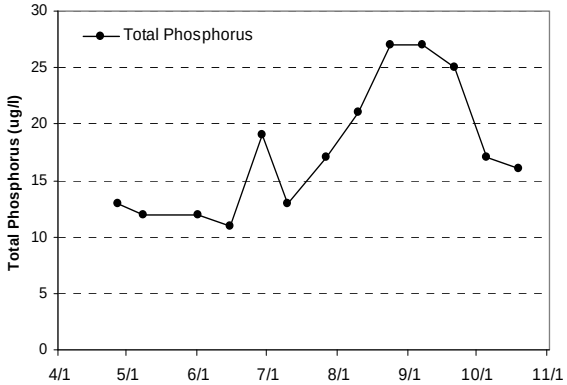
Lake ID: 820103
WD: Valley Branch
Primary Volunteer: Bob Meier

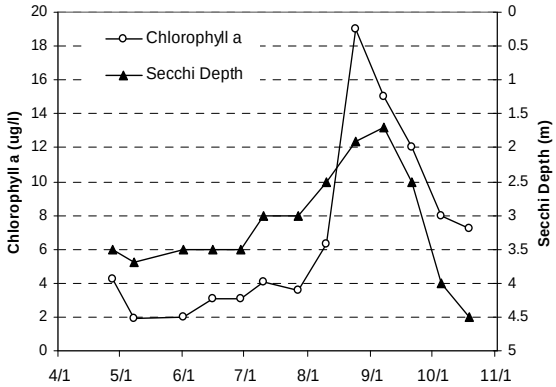
● Sampling site

Contours in meters



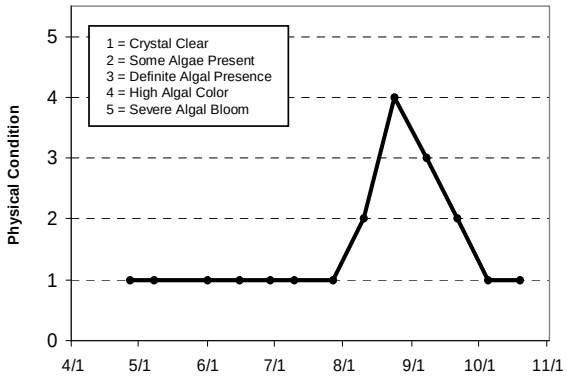




## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/27 | 8.9 | | | | 4.2 | 13 | | 3.5 | 1 | 1 |
| 5/8 | 13.9 | | | | 1.9 | 12 | | 3.7 | 1 | 1 |
| 6/1 | 20 | | | | 2 | 12 | | 3.5 | 1 | 1 |
| 6/15 | 21.4 | | | | 3.1 | 11 | | 3.5 | 1 | 1 |
| 6/29 | 24.1 | | | | 3.1 | 19 | | 3.5 | 1 | 1 |
| 7/10 | 25.2 | | | | 4.1 | 13 | | 3 | 1 | 1 |
| 7/27 | 26.1 | | | | 3.6 | 17 | | 3 | 1 | 1 |
| 8/10 | 26.3 | | | | 6.3 | 21 | | 2.5 | 2 | 1 |
| 8/24 | 24.8 | | | | 19 | 27 | | 1.9 | 4 | 2 |
| 9/7 | 19.7 | | | | 15 | 27 | | 1.7 | 3 | 2 |
| 9/21 | 19 | | | | 12 | 25 | | 2.5 | 2 | 1 |
| 10/5 | 15.7 | | | | 8 | 17 | | 4 | 1 | 1 |
| 10/19 | 13.3 | | | | 7.2 | 16 | | 4.5 | 1 | 1 |



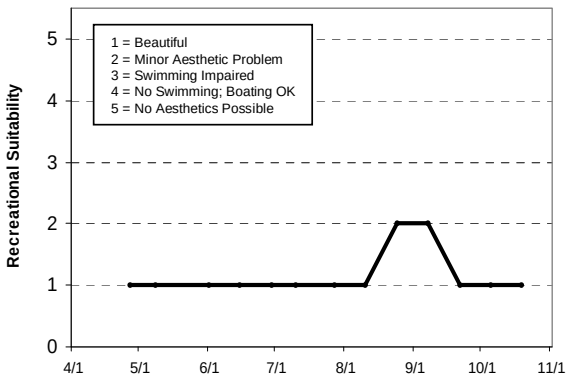

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | C | | | | | | | B |
| Chlorophyll a | | | | | C | | | | | | | B |
| Secchi Depth | | | | | C | C | C | | C | C | C | B |
| **Lake Grade** | | | | | **C** | | | | | | | **B** |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | B | | C | | | | | A | | | A |
| Chlorophyll a | | A | | B | | | | | A | | | B |
| Secchi Depth | | B | | B | | | | | A | | | A |
| **Lake Grade** | | **B** | | **B** | | | | | **A** | | | **A** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | A | B | C | B | A |
| Chlorophyll a | A | B | B | A | A |
| Secchi Depth | A | B | B | B | B |
| **Lake Grade** | **A** | **B** | **B** | **B** | **A** |

Source: Metropolitan Council and STORET data



## Olson Lake (82-0103) *Valley Branch Watershed District*

**Secondary Report**

Lake Elmo was also monitored by the Washington Conservation District (WCD) in 2008. The monitoring by the WCD provided duplicate monitoring for the lake. For more detailed information on the lake, refer to its primary report.

The lake was monitored 7 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. Depth profiles of dissolved oxygen and temperature were also collected. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 22.0 | 13.0 | 31.0 | A |
| **CLA** (µg/l) | 8.5 | 3.8 | 16.0 | A |
| **Secchi** (m) | 3.6 | 2.6 | 4.9 | A |
| **TKN** (mg/l) | 1.6 | 1.1 | 2.6 | |
| | | | ***Lake Grade*** | A |

The data from the secondary volunteer compares well with the primary volunteer. Both volunteers observed the seasonal increase in CLA concentrations at the end of the summer period, and the associated decrease in water clarity at the same time. The secondary volunteer observed slightly clearer water clarity than the primary volunteer. Regardless, both datasets provide a lake grade of A for 2008.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.2 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 2.0 ("minor aesthetic problem").

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

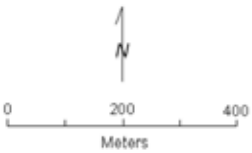
**Lake Elmo, Washington Co.**

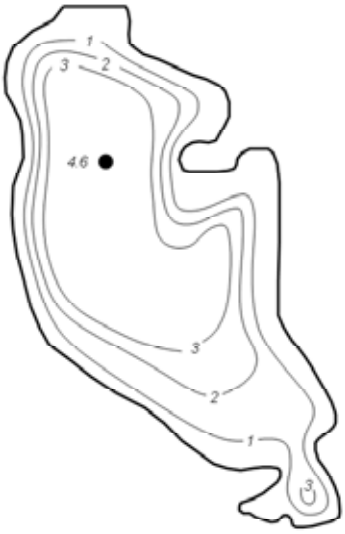
**Secondary Report**

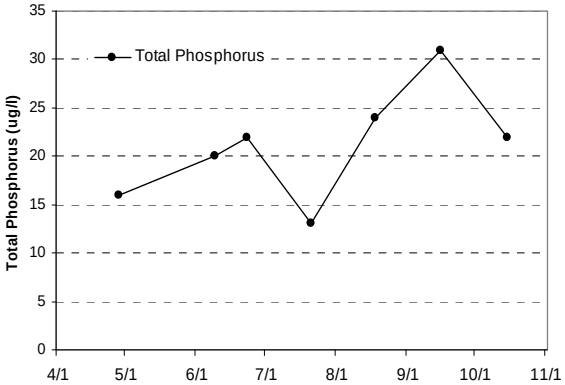
Lake ID: 820103
WD: Valley Branch
Secondary Volunteer:
Washington Conservation District

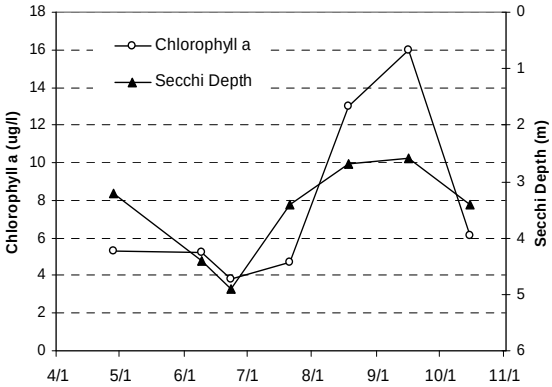
● Sampling site

Contours in meters



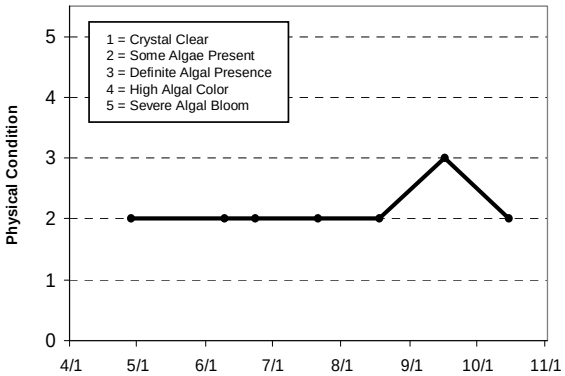




## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/28 | 8.2 | 8.3 | 11.98 | 8.88 | 5.3 | 16 | | 3.2 | 2 | 1 |
| 6/9 | 19.9 | 18.4 | 8.29 | 7.02 | 5.2 | 20 | 27 | 4.4 | 2 | 2 |
| 6/23 | 22.8 | 21.2 | 9.15 | 0.81 | 3.8 | 22 | 16 | 4.9 | 2 | 2 |
| 7/21 | 25.6 | 24.4 | 7.11 | 0.22 | 4.7 | 13 | 21 | 3.4 | 2 | 1 |
| 8/18 | 25.1 | 24.4 | 7.93 | 0.21 | 13 | 24 | 22 | 2.7 | 2 | 2 |
| 9/16 | 18.5 | 18.5 | 8.97 | 0.18 | 16 | 31 | 30 | 2.6 | 3 | 3 |
| 10/15 | 14.2 | 14.3 | 7.71 | 0.35 | 6.1 | 22 | 19 | 3.4 | 2 | 2 |

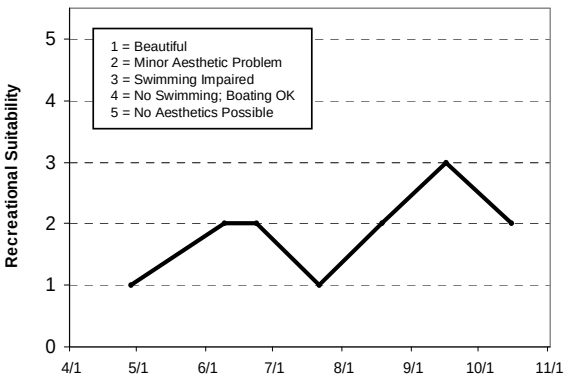



### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | C | | | | | | | B |
| Chlorophyll a | | | | | C | | | | | | | B |
| Secchi Depth | | | | | C | C | C | | C | C | C | B |
| **Lake Grade** | | | | | **C** | | | | | | | **B** |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | B | | C | | | | | A | | | A |
| Chlorophyll a | | A | | B | | | | | A | | | B |
| Secchi Depth | | B | | B | | | | | A | | | A |
| **Lake Grade** | | **B** | | **B** | | | | | **A** | | | **A** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | A | B | C | B | A |
| Chlorophyll a | A | B | B | A | A |
| Secchi Depth | A | B | B | B | A |
| **Lake Grade** | **A** | **B** | **B** | **B** | **A** |




Source: Metropolitan Council and STORET data

## Orchard Lake (19-0031) *Black Dog Lake Watershed Management Organization*

Orchard Lake is located in the City of Lakeville (Dakota County). It is considered a Priority Lake by the Metropolitan Council for its high regional recreation value. The 250-acre lake has a 2,012-acre watershed, which translates to an 8:1 watershed-to-lake size ratio. Generally the larger the ratio, the greater the potential stress on the lake from surface runoff. The maximum and mean depths of the lake are 10.0 m (33 ft) and 3.0 m (10 ft), respectively. The lake's surface area and mean depth translate to an approximate volume of 2,500 acre-feet. Approximately 75 percent of the lake's surface area is considered littoral zone, which is the 0-15 feet depth zone of aquatic plant dominance.

A search through the STORET nationwide water quality database provided data for nutrient and Secchi transparency data for 1980-1981, 1983, 1989, 1993, 1998-2001, and 2003-2007, as well as just Secchi data for 1987-1988. The lake had been monitored by Council staff prior to1999, and was again monitored by Council staff in 2006.

The lake was monitored 12 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

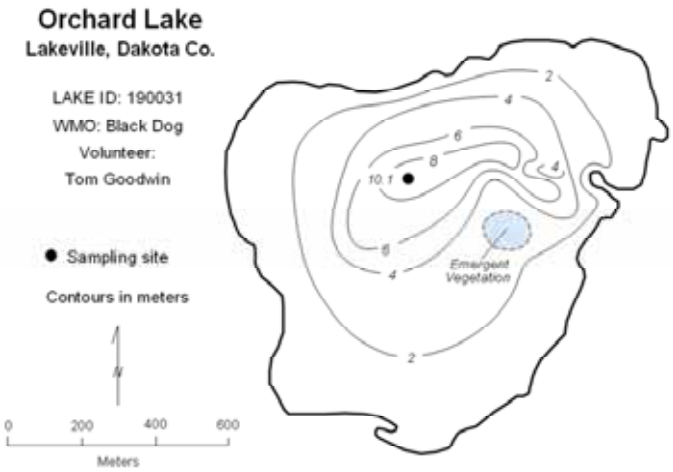
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 22.5 | 12.0 | 51.0 | A |
| **CLA** (µg/l) | 10.1 | 1.3 | 33.0 | B |
| **Secchi** (m) | 3.1 | 1.1 | 5.1 | A |
| **TKN** (mg/l) | 1.32 | 0.92 | 1.90 | |
| | | | ***Lake Grade*** | A |

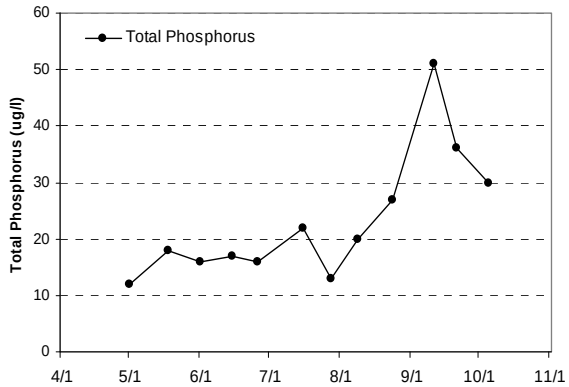
The lake received a lake grade of A for 2008, which is the first time that the lake received an A grade. All parameters notably improved in 2008. However, a trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008). Continued monitoring is suggested to determine if the water quality of 2008 is an indicator of a potential improving water quality trend.

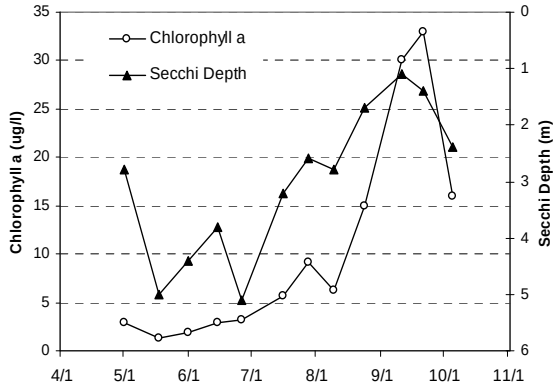
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 1.6 (between 1- "crystal clear" and 2- "some algae present"). The average recreational suitability ranking was 1.2 (between 1- "beautiful" and 2- "minor aesthetic problem").

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.

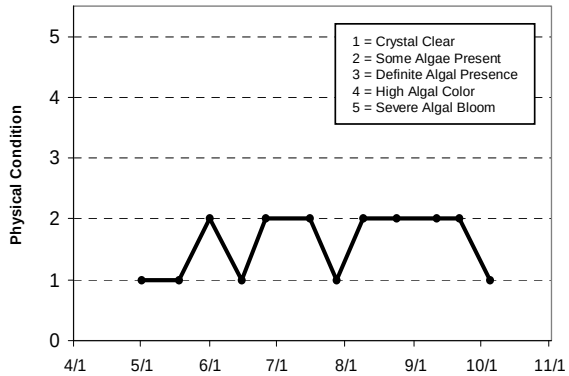



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/1 | 9.8 | | | | 2.9 | 12 | | 2.8 | 1 | 1 |
| 5/18 | 17.2 | | | | 1.3 | 18 | | 5 | 1 | 1 |
| 6/1 | 20.2 | | | | 1.9 | 16 | | 4.4 | 2 | 1 |
| 6/15 | 21.2 | | | | 2.9 | 17 | | 3.8 | 1 | 1 |
| 6/26 | 25.9 | | | | 3.2 | 16 | | 5.1 | 2 | 1 |
| 7/16 | 27.7 | | | | 5.6 | 22 | | 3.2 | 2 | 1 |
| 7/28 | 26.1 | | | | 9.2 | 13 | | 2.6 | 1 | 1 |
| 8/9 | 27.2 | | | | 6.3 | 20 | | 2.8 | 2 | 1 |
| 8/24 | 24.6 | | | | 15 | 27 | | 1.7 | 2 | 1 |
| 9/11 | 19.2 | | | | 30 | 51 | | 1.1 | 2 | 2 |
| 9/21 | 21.3 | | | | 33 | 36 | | 1.4 | 2 | 2 |
| 10/5 | 16.2 | | | | 16 | 30 | | 2.4 | 1 | 1 |



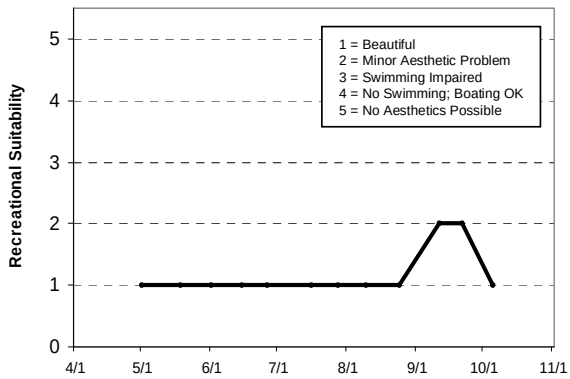

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | C | B | | B | | | | | | B | | |
| Chlorophyll a | B | B | | B | | | | | | B | | |
| Secchi Depth | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | C | | | | | C | C | C | B | | C |
| Chlorophyll a | | B | | | | | C | C | C | B | | C |
| Secchi Depth | | C | | | | | C | C | C | B | | C |
| **Lake Grade** | | **C** | | | | | **C** | **C** | **C** | **B** | | **C** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | C | B | C | C | A |
| Chlorophyll a | B | B | B | C | B |
| Secchi Depth | B | B | B | C | A |
| **Lake Grade** | **B** | **B** | **B** | **C** | **A** |

Source: Metropolitan Council and STORET data



## Ox Yoke Lake (27-0178) *Pioneer-Sarah Watershed Management Commission*

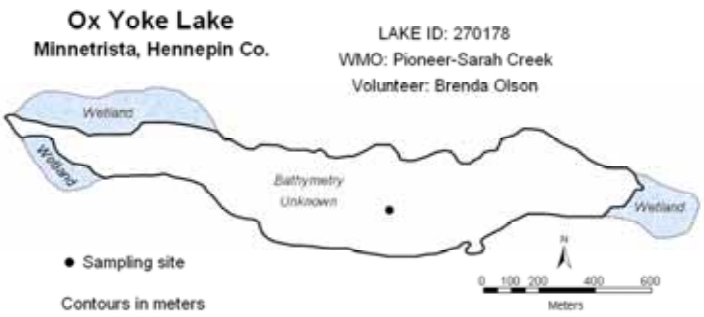
Ox Yoke Lake is located in the City of Minnestrista (Hennepin County). Little morphological data is available for the lake.

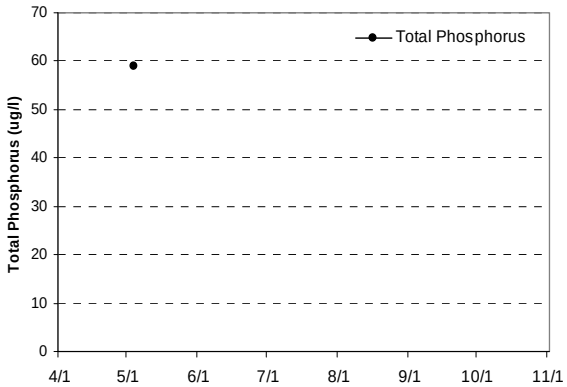
A search through the STORET nationwide water quality database provided data for Secchi transparency data for 2006 – 2008.

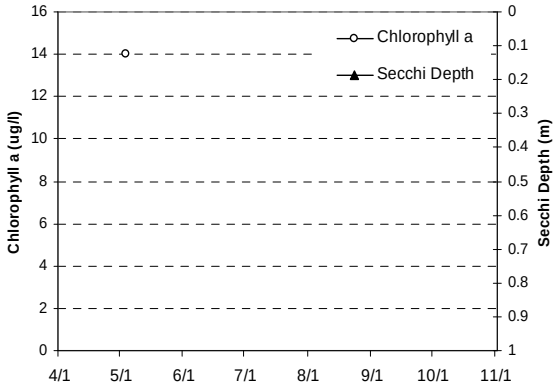
The lake was monitored once in 2008 as part of the CAMP. On that one sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), and total Kjeldahl nitrogen (TKN). The resulting data are summarized in tables and figures on the following page.

No grades were calculated on the basis of the CAMP data because only one sampling event was performed by the CAMP volunteer during 2008. However, a different volunteer measured Secchi depths in 2008 as part of the MPCA's Citizens Lake Monitoring Program (CLMP). The Secchi grade was an F for 2008, as calculated from the CLMP volunteer-collected data.

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.

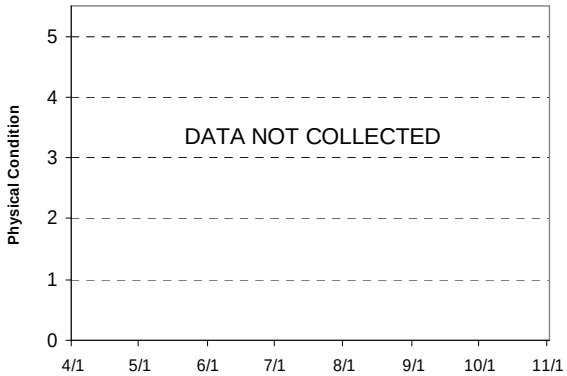



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/4 | | | | | 14 | 59 | | | | |



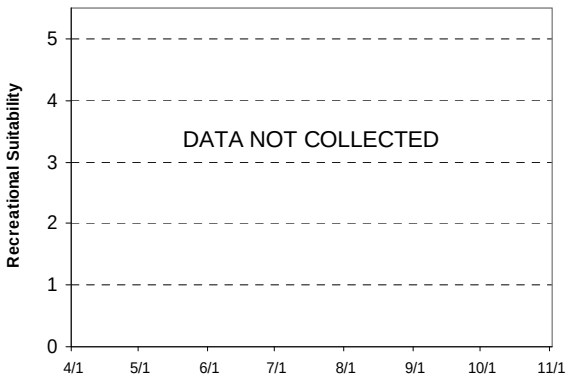

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | | |
| Chlorophyll a | | | | | |
| Secchi Depth | | | | | F |
| **Lake Grade** | | | | | |

Source: Metropolitan Council and STORET data



## Parkers Lake (27-0107) *Bassett Creek Watershed Management Organization*

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

The lake was monitored 13 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

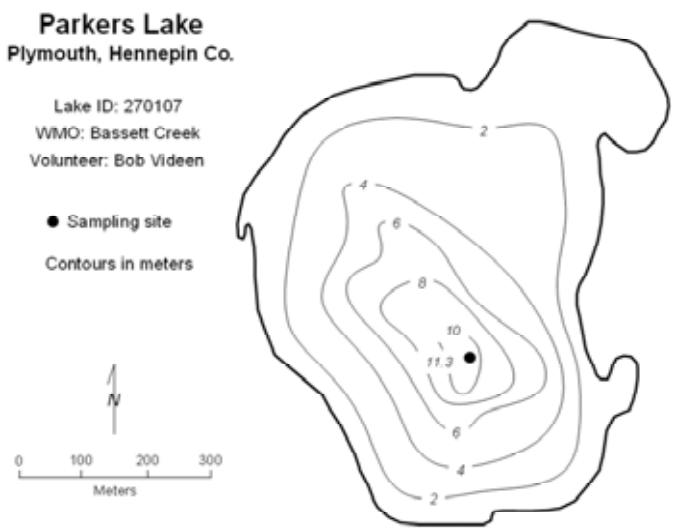
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 25.2 | 18.0 | 43.0 | B |
| **CLA** (µg/l) | 7.6 | 1.0 | 16.0 | A |
| **Secchi** (m) | 2.3 | 1.0 | 5.5 | B |
| **TKN** (mg/l) | 1.32 | 1.00 | 1.70 | |
| | | | ***Lake Grade*** | B |

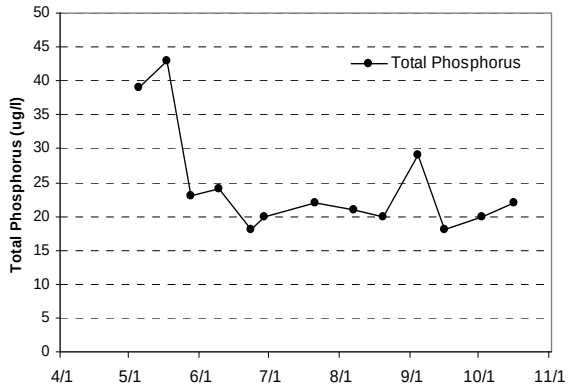
The lake received a lake grade of B for 2008, which is similar to some previous years' annual lake grades. The lake has received lake grades varying from C to A to B over the past 29 years as indicated by the historical water quality database, but the lake has not experienced a C lake grade since 1999. The lake has received only A and B lake grades from 2000 through 2008. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008). Continued monitoring is suggested to determine potential trends in the lake's water quality.

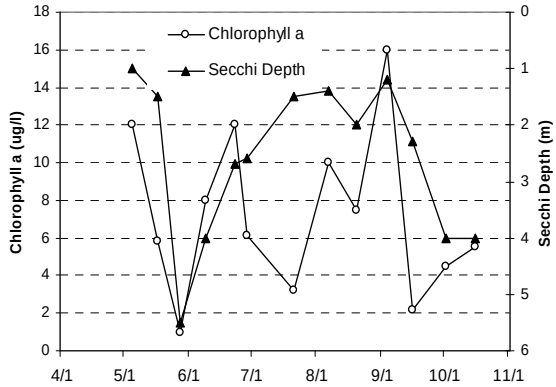
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.5 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 2.5 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

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.

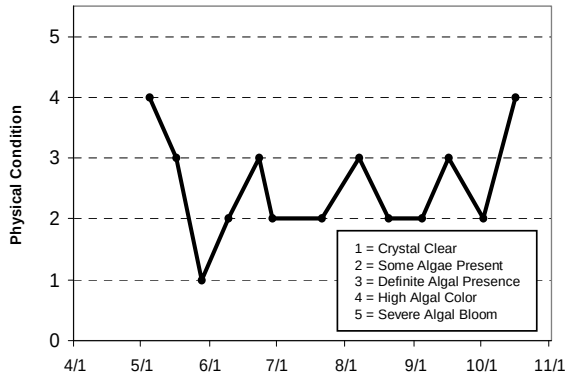



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/5 | 8 | | | | 12 | 39 | | 1 | 4 | 4 |
| 5/17 | 12 | | | | 5.8 | 43 | | 1.5 | 3 | 3 |
| 5/28 | 13 | | | | 1 | 23 | | 5.5 | 1 | 1 |
| 6/9 | 16 | | | | 8 | 24 | | 4 | 2 | 2 |
| 6/23 | 26 | | | | 12 | 18 | | 2.7 | 3 | 2 |
| 6/29 | 24 | | | | 6.1 | 20 | | 2.6 | 2 | 2 |
| 7/21 | 27 | | | | 3.2 | 22 | | 1.5 | 2 | 2 |
| 8/7 | 27 | | | | 10 | 21 | | 1.4 | 3 | 3 |
| 8/20 | 27 | | | | 7.5 | 20 | | 2 | 2 | 2 |
| 9/4 | 22 | | | | 16 | 29 | | 1.2 | 2 | 4 |
| 9/16 | 20 | | | | 2.2 | 18 | | 2.3 | 3 | 3 |
| 10/2 | 18 | | | | 4.5 | 20 | | 4 | 2 | 2 |
| 10/16 | 16 | | | | 5.5 | 22 | | 4 | 4 | 4 |



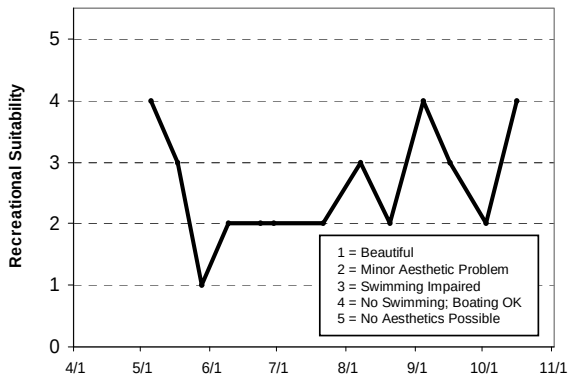

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | C | | | | | | | | | | | |
| Chlorophyll a | C | | | | | | | | | | B | |
| Secchi Depth | C | | | | | | | | | | B | |
| **Lake Grade** | **C** | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | C | | | | C | A | | A | B |
| Chlorophyll a | | | | B | | | | B | A | | A | B |
| Secchi Depth | | | | C | | | | C | B | | A | B |
| **Lake Grade** | | | | **C** | | | | **C** | **A** | | **A** | **B** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | B | C | C | B | B |
| Chlorophyll a | A | B | A | A | A |
| Secchi Depth | C | B | A | B | B |
| **Lake Grade** | **B** | **B** | **B** | **B** | **B** |

Source: Metropolitan Council and STORET data



## Pat Lake (82-0125) *Browns Creek Watershed District*

Pat Lake is a small 13-acre lake located in Washington County. There is little known morphological data available for the lake. This was the third year that Pat Lake has been involved in the CAMP. A search through the STORET nationwide water quality database for data on the lake provided no data other than the historical CAMP data.

The lake was monitored 7 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. Depth profiles for temperature and dissolved oxygen were also measured. The resulting data are summarized in tables and figures on the following page.

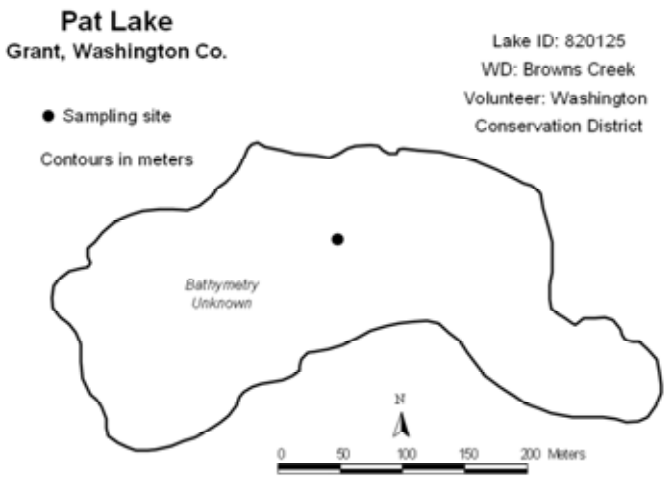
**2008 summer (May-September) data summary**

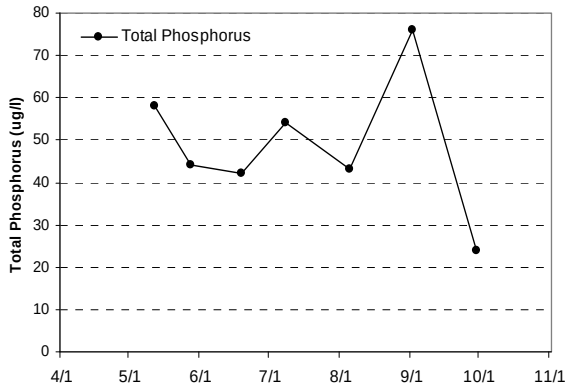
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 48.7 | 24.0 | 76.0 | C |
| **CLA** (µg/l) | 18.8 | 5.7 | 56.0 | B |
| **Secchi** (m) | 1.6 | 1.2 | 2.1 | C |
| **TKN** (mg/l) | 1.05 | 0.66 | 1.60 | |
| | | | ***Lake Grade*** | C |

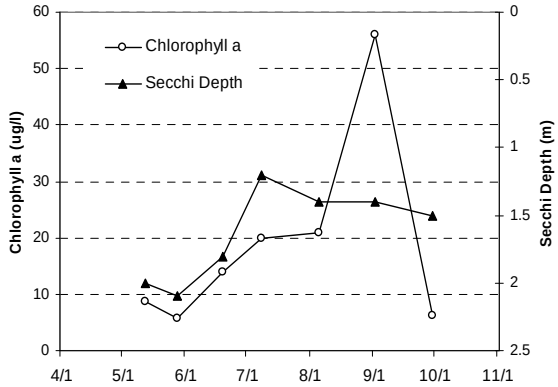
The lake received a lake grade of C for 2008, which is similar to the lake grade received in 2006. There are only 3 monitoring seasons of data, so there are insufficient quantities of data to determine trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.6 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 3.4 (between 3- "swimming slightly impaired" and 4- "no swimming/boating ok").

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.

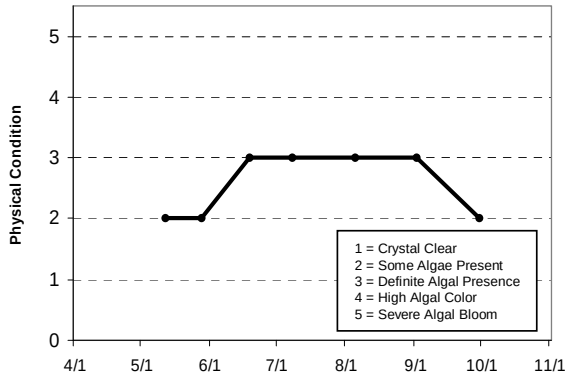



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/12 | 15.7 | 15.6 | 10 | 8.23 | 8.6 | 58 | | 2 | 2 | 3 |
| 5/28 | 20.5 | 17.8 | 8.41 | 8.15 | 5.7 | 44 | | 2.1 | 2 | 3 |
| 6/19 | 24.1 | 20.8 | 9.23 | 0.53 | 14 | 42 | | 1.8 | 3 | 4 |
| 7/8 | 26.1 | 24.4 | 8.66 | 1.02 | 20 | 54 | | 1.2 | 3 | 4 |
| 8/5 | 25.9 | 23.6 | 6.88 | 0.26 | 21 | 43 | | 1.4 | 3 | 4 |
| 9/2 | 24.7 | 21.6 | 7.94 | 0.19 | 56 | 76 | | 1.4 | 3 | 4 |
| 9/30 | 16.6 | 16.4 | 7.44 | 3.8 | 6.2 | 24 | | 1.5 | 2 | 2 |



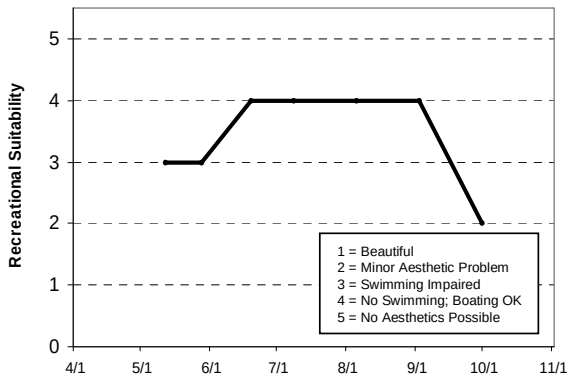

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | D | C | C |
| Chlorophyll a | | | C | A | B |
| Secchi Depth | | | C | C | C |
| **Lake Grade** | | | **C** | **B** | **C** |

Source: Metropolitan Council and STORET data



## Pike Lake [Ramsey Co.] (62-0069) *Rice Creek Watershed District*

Pike Lake is a 35-acre lake located within the City of New Brighton (Ramsey County). The mean and maximum depths of the lake are 2.1 m (6.9 ft) and 4.9 m (16 feet). The lake's mean depth and surface area translate to a lake volume of 242 ac-ft. The entire area of the lake is considered littoral zone which is the 0-15 feet depth zone of aquatic plant dominance. Furthermore, the lake does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the water column.

The lake was monitored 13 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 72.6 | 33.0 | 125.0 | D |
| **CLA** (µg/l) | 30.5 | 4.3 | 60.0 | C |
| **Secchi** (m) | 1.1 | 0.5 | 3.0 | D |
| **TKN** (mg/l) | 1.94 | 0.96 | 2.70 | |
| | | | ***Lake Grade*** | D |

The lake received a lake grade of D in 2008, which is similar to the lake grades received in most of the monitoring seasons since 1981. The lake has experienced occasional C and F lake grades in the past, but the lake has received a D lake grade every year consistently since 1999. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008).

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.9 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 2.6 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

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/.

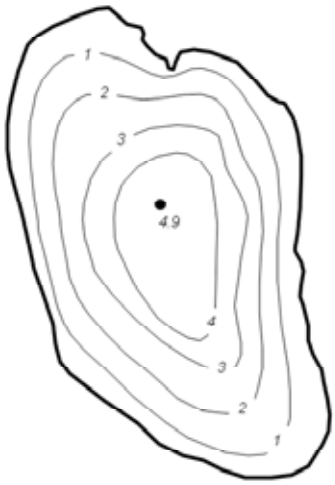
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

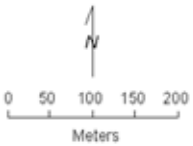
# Pike Lake

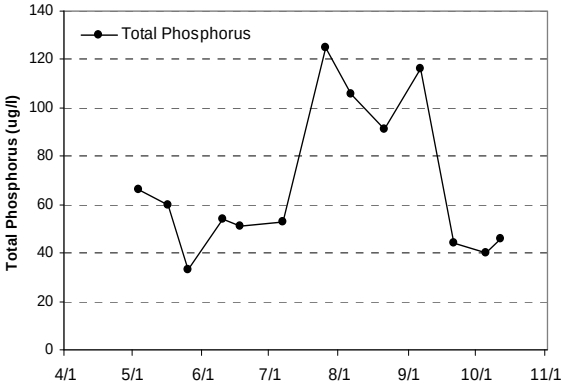
**New Brighton, Ramsey Co.**

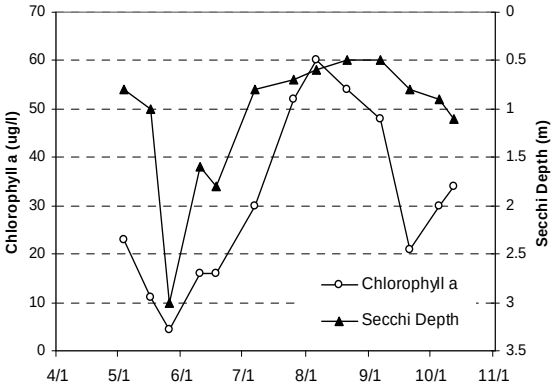
Lake ID: 620069
WD: Rice Creek
Volunteer: Phil Goodrich

● Sampling site
Contours in meters



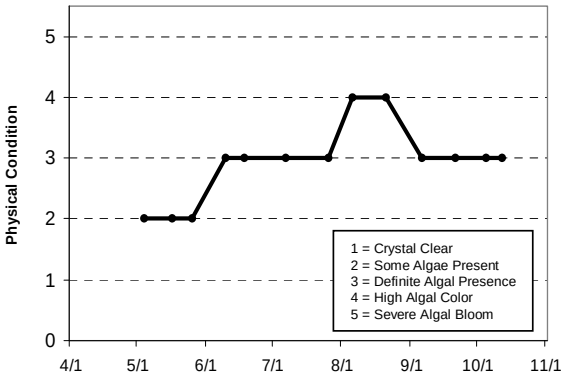




## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/4 | 13.2 | | | | 23 | 66 | | 0.8 | 2 | 2 |
| 5/17 | 18.8 | | | | 11 | 60 | | 1 | 2 | 2 |
| 5/26 | 19.6 | | | | 4.3 | 33 | | 3 | 2 | 2 |
| 6/10 | 21.6 | | | | 16 | 54 | | 1.6 | 3 | 2 |
| 6/18 | 23.6 | | | | 16 | 51 | | 1.8 | 3 | 3 |
| 7/7 | 27.4 | | | | 30 | 53 | | 0.8 | 3 | 3 |
| 7/26 | 26.4 | | | | 52 | 125 | | 0.7 | 3 | 3 |
| 8/6 | 26.6 | | | | 60 | 106 | | 0.6 | 4 | 3 |
| 8/21 | 26.2 | | | | 54 | 91 | | 0.5 | 4 | 3 |
| 9/6 | 22.1 | | | | 48 | 116 | | 0.5 | 3 | 3 |
| 9/21 | 22.5 | | | | 21 | 44 | | 0.8 | 3 | 3 |
| 10/5 | 17.3 | | | | 30 | 40 | | 0.9 | 3 | 2 |
| 10/12 | 17 | | | | 34 | 46 | | 1.1 | 3 | 3 |



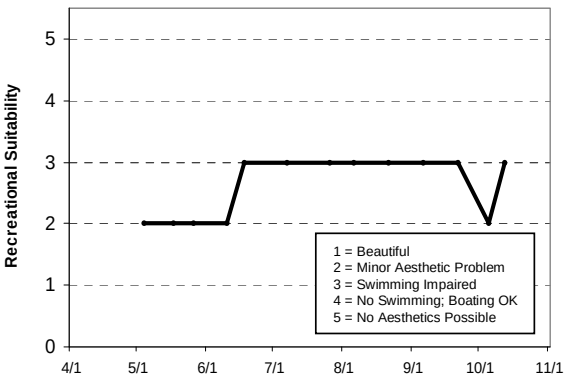

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | C | C | D | | C | C | D | D | D | D | D |
| Chlorophyll a | | C | D | A | | A | C | C | C | D | C | F |
| Secchi Depth | | F | D | D | | F | D | D | D | D | F | F |
| **Lake Grade** | | **D** | **D** | **C** | | **C** | **C** | **D** | **D** | **D** | **D** | **F** |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | D | D | D | D | D |
| Chlorophyll a | | | | | | | | C | C | D | C | D |
| Secchi Depth | D | D | | | | | | D | D | C | D | D |
| **Lake Grade** | | | | | | | | **D** | **D** | **D** | **D** | **D** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | D | D | D | D | D |
| Chlorophyll a | C | D | D | C | C |
| Secchi Depth | D | D | D | D | D |
| **Lake Grade** | **D** | **D** | **D** | **D** | **D** |

Source: Metropolitan Council and STORET data



## Pine Tree Lake (82-0122) *Rice Creek Watershed District*

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). The lake has an approximate lake volume of 1,740 ac-ft. Because of its multi-recreational uses, it is considered a "Priority Lake" in the Metropolitan Area. The lake has two aeration systems to prevent winter fish-kills. The systems are operated only during the winter period.

The lake was monitored 7 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

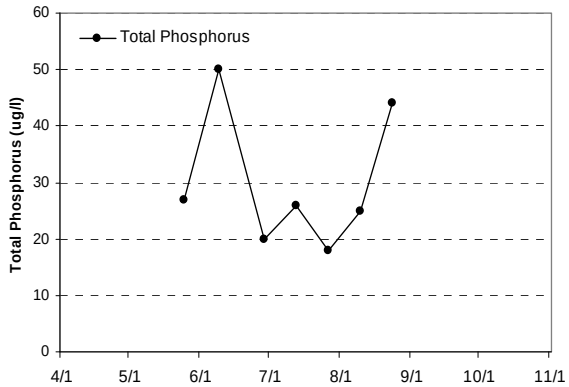
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 30.0 | 18.0 | 50.0 | B |
| **CLA** (µg/l) | 10.5 | 3.3 | 30.0 | B |
| **Secchi** (m) | 2.3 | 1.4 | 3.0 | B |
| **TKN** (mg/l) | 0.87 | 0.74 | 1.20 | |
| | | | ***Lake Grade*** | B |

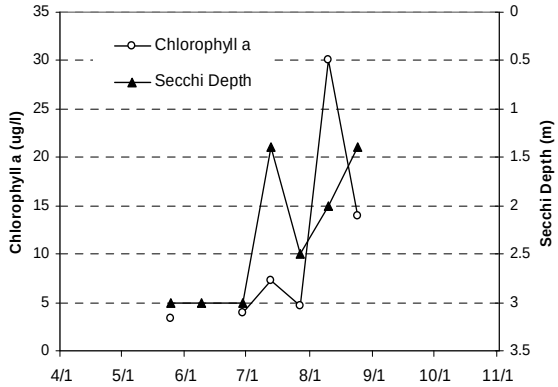
The lake received a lake grade of B in 2008, which is similar to the lake grades received since 2004. The annual lake grades have varied between B's and C's on the basis of the historical water quality database. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed a statistically significant improving trend in water clarity (MPCA 2008).

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 1.9 (between 1- "crystal clear" and 2- "some algae present"). The average recreational suitability ranking was 2.3 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

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/.

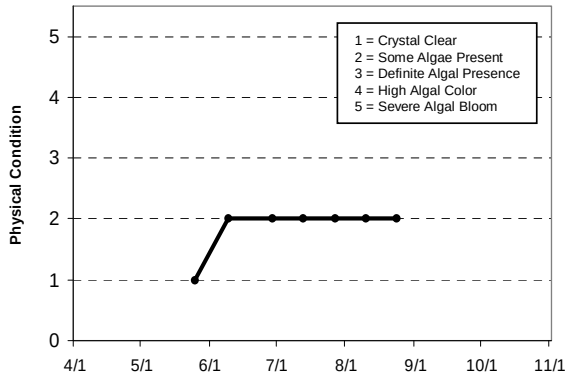
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.




## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/25 | 17.9 | | | | 3.3 | 27 | | 3 | 1 | 1 |
| 6/9 | 22 | | | | | 50 | | 3 | 2 | 3 |
| 6/29 | 24.8 | | | | 3.9 | 20 | | 3 | 2 | 1 |
| 7/13 | 24.2 | | | | 7.3 | 26 | | 1.4 | 2 | 3 |
| 7/27 | 26.9 | | | | 4.7 | 18 | | 2.5 | 2 | 3 |
| 8/10 | 26.7 | | | | 30 | 25 | | 2 | 2 | 3 |
| 8/24 | 25.1 | | | | 14 | 44 | | 1.4 | 2 | 2 |



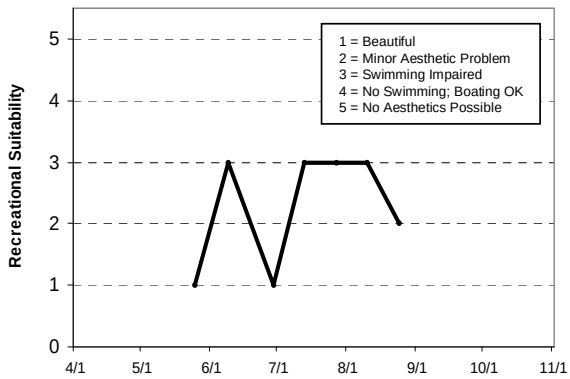

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | C | | | | | | |
| Chlorophyll a | | | | | | D | | | | | | |
| Secchi Depth | | | | | | D | | | | | | |
| **Lake Grade** | | | | | | **D** | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | B | B | C | C | B | B | B | C | C | C | C |
| Chlorophyll a | | A | A | C | B | A | B | B | A | A | B | C |
| Secchi Depth | | 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 |
|---|---|---|---|---|---|
| Total Phosphorus | B | B | C | B | B |
| Chlorophyll a | A | B | A | A | B |
| Secchi Depth | B | B | B | B | B |
| **Lake Grade** | **B** | **B** | **B** | **B** | **B** |

Source: Metropolitan Council and STORET data



## Plaisted Lake (82-0148) *Washington Conservation District*

Plaisted Lake is located in the City of Hugo (Washington County). Little morphological data is available for the lake. No historical monitoring data was provided by STORET, the national water quality database.

The lake was monitored 7 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

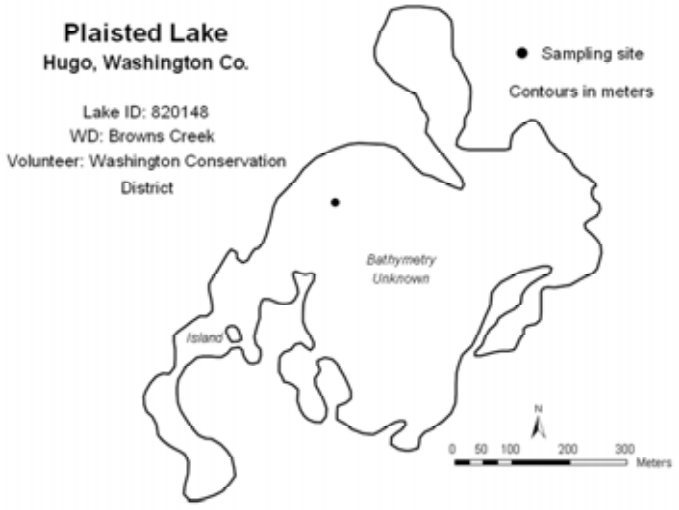
**2008 summer (May-September) data summary**

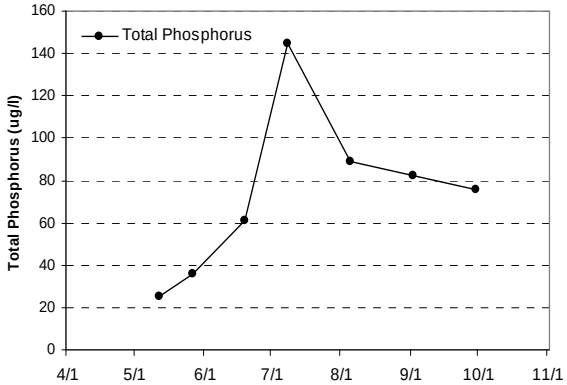
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 73.4 | 25.0 | 145.0 | D |
| **CLA** (µg/l) | 40.9 | 5.2 | 87.0 | C |
| **Secchi** (m) | 1.6 | 0.5 | 2.6 | C |
| **TKN** (mg/l) | 1.94 | 1.10 | 2.90 | |
| | | | ***Lake Grade*** | C |

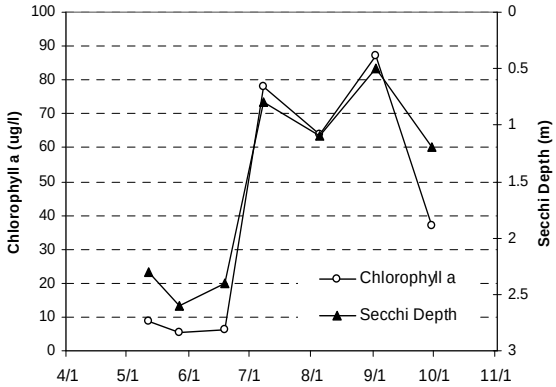
The lake received a lake grade of C in 2008. Continued monitoring is necessary to build the water quality database for this lake.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.9 (between 1- "crystal clear" and 2- "some algae present"). The average recreational suitability ranking was 3.1 (between 3- "swimming slightly impaired" and 4- "no swimming/boating ok").

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.

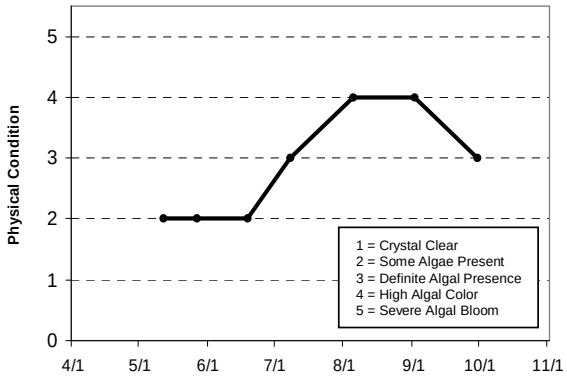



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/12 | 14.1 | 14.1 | 11.52 | 11.5 | 8.8 | 25 | | 2.3 | 2 | 3 |
| 5/27 | 17.1 | 16.8 | 8.73 | 4.58 | 5.2 | 36 | | 2.6 | 2 | 3 |
| 6/19 | 24.1 | 19.9 | 8.35 | 2.03 | 6.2 | 61 | | 2.4 | 2 | 3 |
| 7/8 | 26.5 | 20.8 | 10.79 | 0.22 | 78 | 145 | | 0.8 | 3 | 2 |
| 8/5 | 25.9 | 20.9 | 4.78 | 0.14 | 64 | 89 | | 1.1 | 4 | 4 |
| 9/2 | 23.8 | 21.8 | 7.16 | 0.17 | 87 | 82 | | 0.5 | 4 | 4 |
| 9/30 | 17.6 | 17.2 | 5.55 | 0.22 | 37 | 76 | | 1.2 | 3 | 3 |



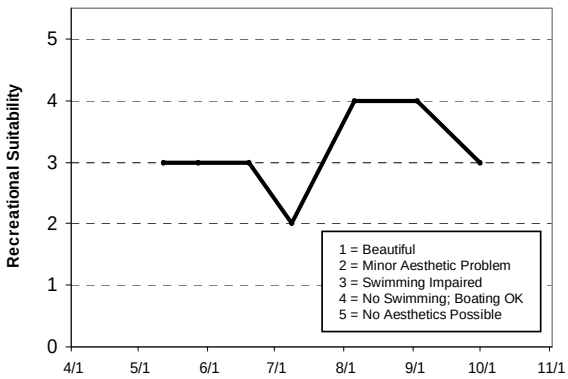

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | | D |
| Chlorophyll a | | | | | C |
| Secchi Depth | | | | | C |
| **Lake Grade** | | | | | **C** |

Source: Metropolitan Council and STORET data



## Powers Lake (82-0092) *City of Woodbury*

Powers Lake is located within the City of Woodbury (Washington County). It has a surface area of approximately 57 acres, a shoreline length of 1.75 miles, and a maximum depth of 12.5 m (41.0 feet). Approximately 50 percent of the lake's surface area is considered littoral, which is the shallow (0-15 feet) zone dominated by aquatic vegetation. There is a public access (canoe only) on the northwest end of the lake near one of its two inlets. The lake has no outlet.

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

The area of the lake's watershed is 1,238 acres. The lake's watershed-to-lake area ratio is 22:1. The greater the ratio, the greater the potential stress on the lake from surface runoff.

The lake was monitored 14 times between mid April and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

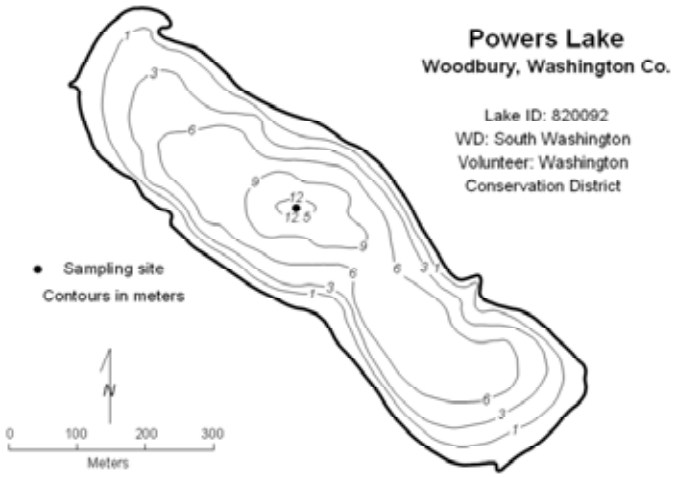
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 28.9 | 21.0 | 42.0 | B |
| **CLA** (µg/l) | 13.1 | 8.2 | 18.0 | B |
| **Secchi** (m) | 2.5 | 1.8 | 3.7 | B |
| **TKN** (mg/l) | 1.26 | 1.10 | 1.60 | |
| | | | ***Lake Grade*** | B |

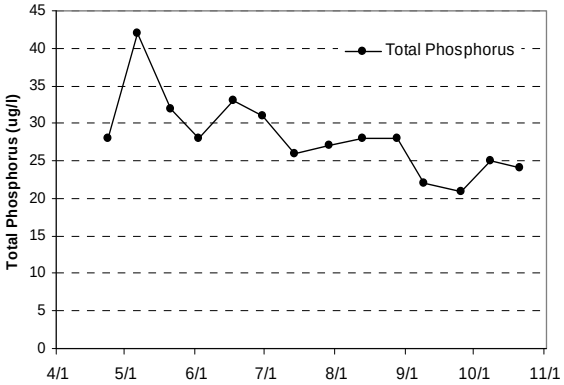
The lake received a lake grade of B for 2008. This grade is an improvement over recent years' lake grades. The water quality observed in 2008 is characteristic of the better water quality observed in the years 2000 and the 1990's. However, A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed a statistically significant declining trend in water clarity (MPCA 2008). Continued monitoring is suggested to determine if the improvement in water quality observed in 2008 is evidence of the beginning of a potential change in trend or an annual anomaly.

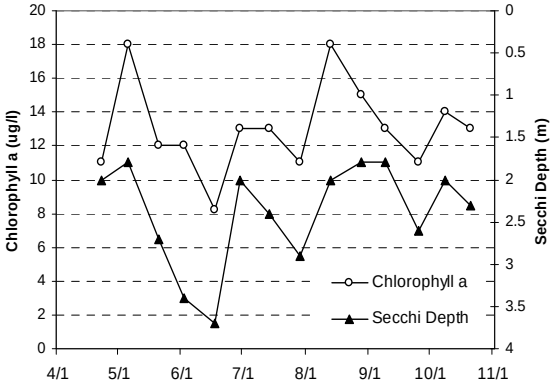
The physical and recreational conditions of the lake, as perceived by the volunteer, were ranked on a 1-to-5 scale and are displayed on the next page. The mean physical condition ranking was 3.0 (3- "definite algae present"), while the mean recreational suitability ranking was 3.6 (between 3- "swimming impaired" and 4- "no swimming – boating ok").

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.

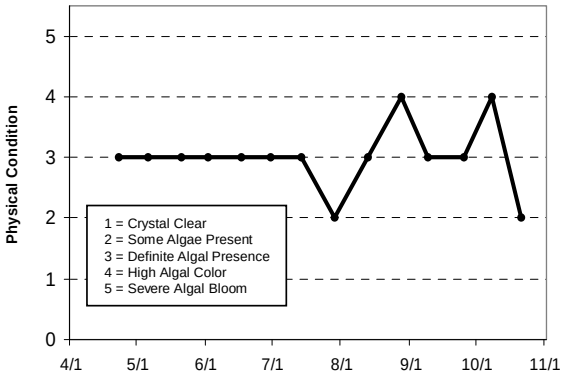



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/23 | 7.9 | 4.3 | 11.17 | 1.31 | 11 | 28 | | 2 | 3 | 3 |
| 5/6 | 13.7 | 5.5 | 11.73 | 0.75 | 18 | 42 | | 1.8 | 3 | 3 |
| 5/21 | 15.1 | 6.7 | 10.74 | 0.25 | 12 | 32 | 83 | 2.7 | 3 | 3 |
| 6/2 | 19.7 | 7.1 | 9.28 | 0.16 | 12 | 28 | 168 | 3.4 | 3 | 4 |
| 6/17 | 20.8 | 7.5 | 8.58 | 0.23 | 8.2 | 33 | 205 | 3.7 | 3 | 4 |
| 6/30 | 23.5 | 7.7 | 9.89 | 0.7 | 13 | 31 | 252 | 2 | 3 | 4 |
| 7/14 | 23.5 | 7.8 | 7.34 | 0.44 | 13 | 26 | 273 | 2.4 | 3 | 4 |
| 7/29 | 26.9 | 8.1 | 8.46 | 0.25 | 11 | 27 | 340 | 2.9 | 2 | 3 |
| 8/13 | 25.4 | 8.2 | 7.96 | 0.36 | 18 | 28 | 365 | 2 | 3 | 4 |
| 8/28 | 23 | 8.5 | 6.08 | 0.17 | 15 | 28 | 556 | 1.8 | 4 | 4 |
| 9/9 | 20.5 | 8.5 | 8.12 | 0.26 | 13 | 22 | 492 | 1.8 | 3 | 4 |
| 9/25 | 197 | 8.6 | 7.39 | 0.2 | 11 | 21 | 597 | 2.6 | 3 | 3 |
| 10/8 | 16.4 | 8.5 | 7.7 | 0.24 | 14 | 25 | 595 | 2 | 4 | 4 |
| 10/21 | 13 | 8.8 | 8.27 | 0.28 | 13 | 24 | 577 | 2.3 | 2 | 2 |



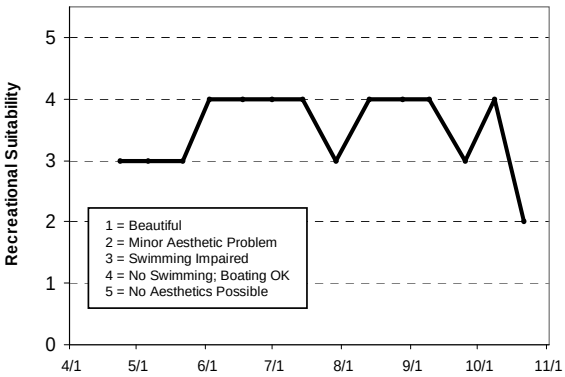

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | B | B | A | A | C | A | B | C | B | C |
| Chlorophyll a | | | A | B | A | B | C | B | B | C | C | B |
| Secchi Depth | | | 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 |
|---|---|---|---|---|---|
| Total Phosphorus | C | C | C | C | B |
| Chlorophyll a | C | C | C | B | B |
| Secchi Depth | C | C | C | C | B |
| **Lake Grade** | **C** | **C** | **C** | **C** | **B** |

Source: Metropolitan Council and STORET data



## Priebe Lake (62-0036) *Rice Creek Watershed District*

Priebe Lake is located in the City of White Bear Lake (Ramsey County). The maximum depth of the lake is 1.5 m (5.0 ft). Other morphological data is unavailable for the lake. The entire area of the lake is considered littoral zone which is the 0-15 feet depth zone of aquatic plant dominance. Furthermore, the lake does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the water column. A search trough the STORET system, the national water quality database, provided historical Secchi transparency data for 1989-1991 and 1997-1999.

This year was the first year that the lake was involved in the CAMP. The lake was monitored 13 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

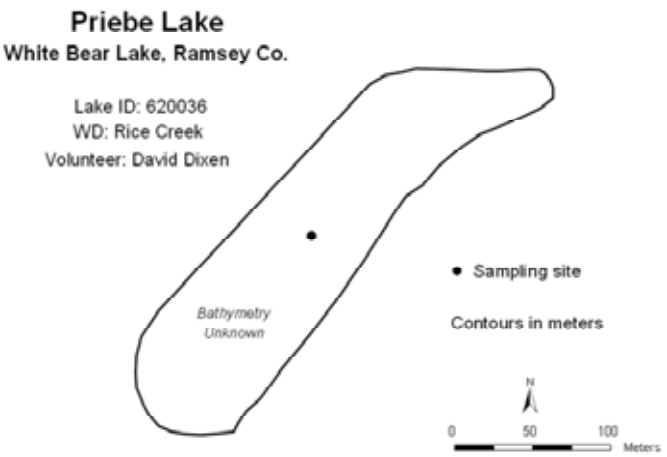
**2008 summer (May-September) data summary**

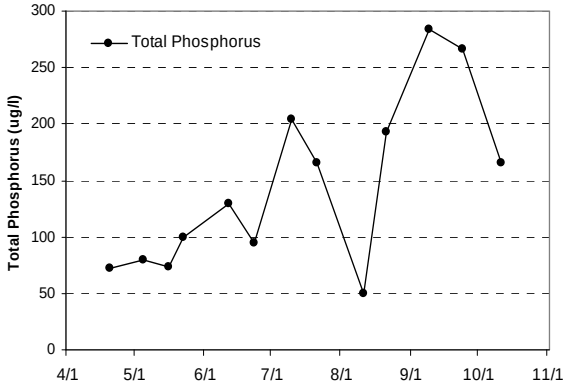
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 149.1 | 50.0 | 284.0 | D |
| **CLA** (µg/l) | 77.1 | 15.0 | 190.0 | F |
| **Secchi** (m) | 0.4 | 0.1 | 0.6 | F |
| **TKN** (mg/l) | 3.19 | 1.10 | 5.70 | |
| | | | ***Lake Grade*** | F |

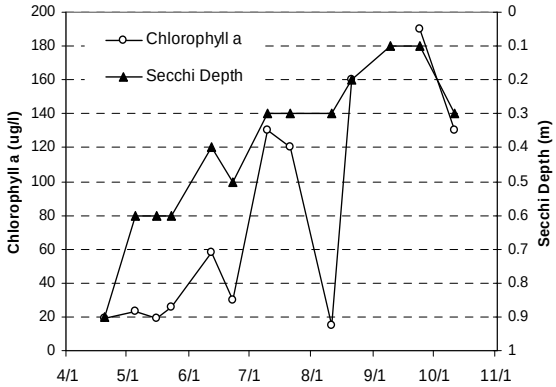
The lake received a lake grade of F for 2008. Continued monitoring is necessary to build the water quality database for this lake. The Secchi grade of F for 2008 is the same as the Secchi grades received for previous monitoring seasons dating back to 1989.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 3.0 ("definite algae present"). The average recreational suitability ranking was 3.8 (between 3- "swimming slightly impaired" and 4- "no swimming/boating ok").

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.

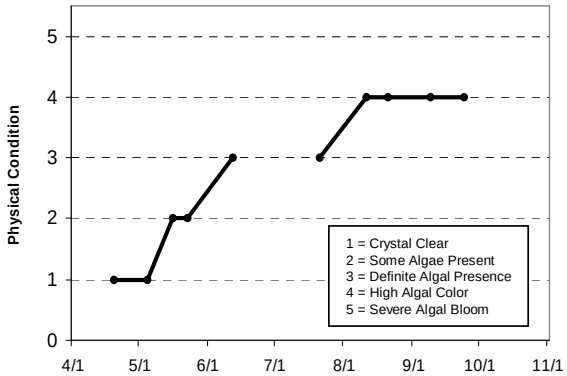



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/20 | 13 | | | | 19 | 72 | | 0.9 | 1 | |
| 5/5 | 13.8 | | | | 23 | 80 | | 0.6 | 1 | |
| 5/16 | 21.7 | | | | 19 | 74 | | 0.6 | 2 | 2 |
| 5/23 | 20.8 | | | | 26 | 99 | | 0.6 | 2 | 4 |
| 6/12 | 23.2 | | | | 58 | 129 | | 0.4 | 3 | 4 |
| 6/23 | 28.1 | | | | 30 | 94 | | 0.5 | | |
| 7/10 | 24.7 | | | | 130 | 204 | | 0.3 | | |
| 7/21 | 29.2 | | | | 120 | 166 | | 0.3 | 3 | 4 |
| 8/11 | 26.8 | | | | 15 | 50 | | 0.3 | 4 | 4 |
| 8/21 | 27.4 | | | | 160 | 193 | | 0.2 | 4 | 4 |
| 9/9 | 21.5 | | | | | 284 | | 0.1 | 4 | 4 |
| 9/24 | 20.8 | | | | 190 | 267 | | 0.1 | 4 | 4 |
| 10/11 | 17.8 | | | | 130 | 165 | | 0.3 | | |



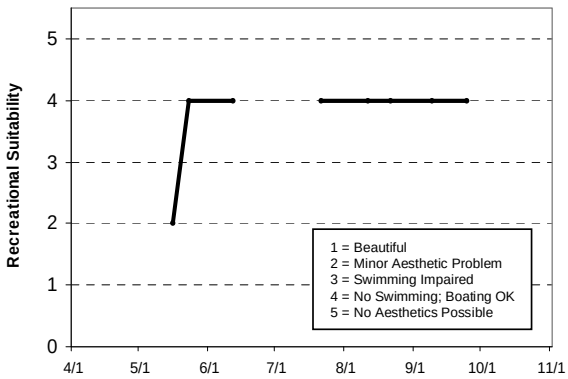

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | F | F | F |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | F | F | F | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | | D |
| Chlorophyll a | | | | | F |
| Secchi Depth | | | | | F |
| **Lake Grade** | | | | | **F** |

Source: Metropolitan Council and STORET data



## Prior Lake [lower basin, site 1] (70-0026) *Prior Lake - Spring Lake Watershed District*

Prior Lake (lower basin) is located in the City of Prior Lake (Scott County). The lower basin is considered a Priority Lake by the Metropolitan Council for its high regional recreation value.

The lower basin has a surface area of 957 acres. The maximum and mean depths of the basin are 18.3 and 4.1 m (60 and 13 feet), respectively. Approximately 39 percent of the lake's surface area is considered littoral zone, which is the 0-15 feet depth zone of aquatic plant dominance. The lower basin's 2,090-acre watershed translates to a rather small watershed-to-lake area ratio of 2.5:1. The greater the ratio, the greater the potential stress on the lake from surface runoff. The lower basin has one inlet, which is the outlet from the upper basin of Prior Lake. The lower basin has one outlet. The outlet structure, located at the southwestern portion of the basin, was installed to regulate surface water elevations.

The MN DNR has designated the lower basin as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) and Zebra mussels (*Dreissena spp.*).

While the Metropolitan Council has monitored the lower basin of Prior Lake in the past, the basin has been a part of the CAMP since 1997. Lower Prior was monitored 12 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

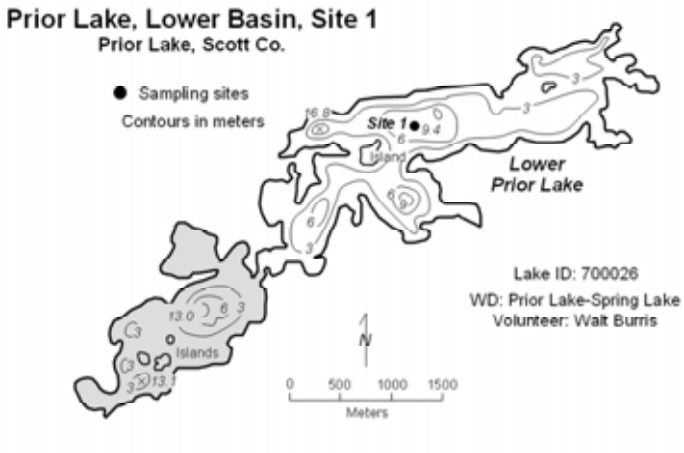
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 19.9 | 10.0 | 39.0 | A |
| **CLA** (µg/l) | 11.0 | 2.3 | 28.0 | B |
| **Secchi** (m) | 3.0 | 1.5 | 5.0 | B |
| **TKN** (mg/l) | 1.08 | 0.84 | 1.20 | |
| | | | ***Lake Grade*** | B |

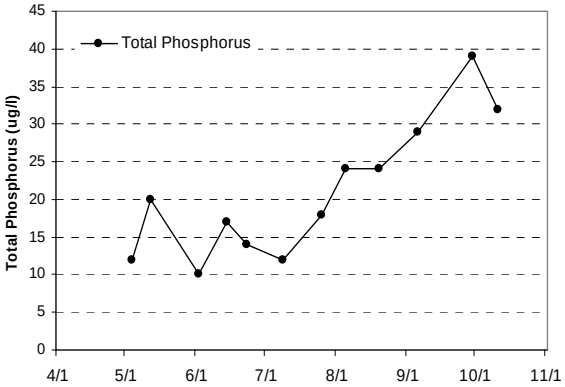
The lower basin received a lake grade of B for 2008. The historical lake grades appear to vary from A's to C's. With such variation, it is difficult to discern trends in the basin's water quality. Furthermore, A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008).

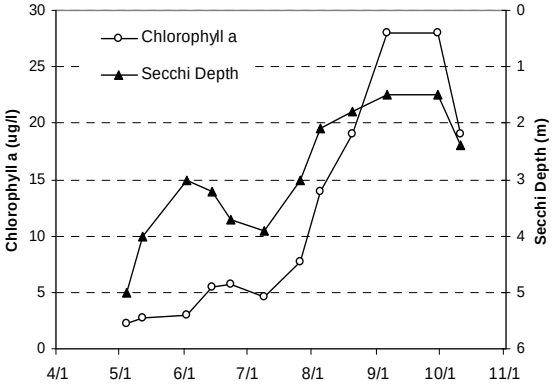
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.1 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 1.5 (between 1- "beautiful" and 2- "minor aesthetic problem").

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.

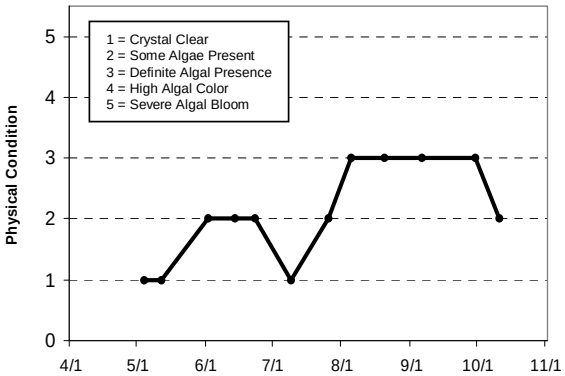



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/4 | 9.7 | | | | 2.3 | 12 | | 5 | 1 | 1 |
| 5/12 | 12.8 | | | | 2.8 | 20 | | 4 | 1 | 1 |
| 6/2 | 19.4 | | | | 3 | 10 | | 3 | 2 | 1 |
| 6/14 | 19.9 | | | | 5.5 | 17 | | 3.2 | 2 | 1 |
| 6/23 | 24.6 | | | | 5.7 | 14 | | 3.7 | 2 | 1 |
| 7/9 | 25.2 | | | | 4.6 | 12 | | 3.9 | 1 | 1 |
| 7/26 | 26 | | | | 7.7 | 18 | | 3 | 2 | 1 |
| 8/5 | 26.6 | | | | 14 | 24 | | 2.1 | 3 | 2 |
| 8/20 | 26.3 | | | | 19 | 24 | | 1.8 | 3 | 2 |
| 9/6 | 21.9 | | | | 28 | 29 | | 1.5 | 3 | 3 |
| 9/30 | 18.6 | | | | 28 | 39 | | 1.5 | 3 | 2 |
| 10/11 | 16.6 | | | | 19 | 32 | | 2.4 | 2 | 1 |



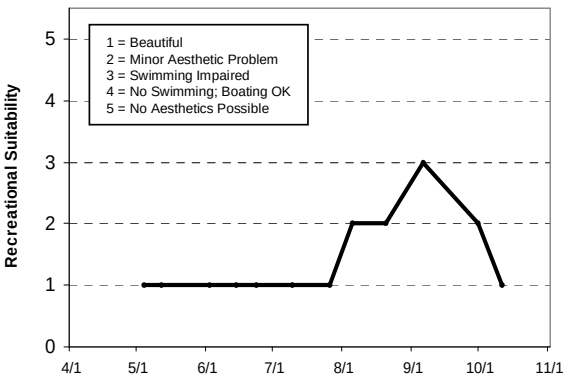

**Lake Water Quality Grades Based on Summertime Averages**

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | C | A | | | B | | | | | | | | C |
| Chlorophyll a | B | | | | B | | | | | A | B | | B |
| Secchi Depth | C | C | B | C | B | C | B | C | C | B | B | C | C |
| **Lake Grade** | **C** | | | | **B** | | | | | | | | **C** |

| Year | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 Site 1 | 1998 Site 2 | 1999 Site 1 | 1999 Site 2 | 2000 Site 1 | 2000 Site 2 | 2001 Site 1 | 2001 Site 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | C | A | A | B | A | C | B | B | A | B |
| Chlorophyll a | | | | A | A | B | C | A | B | B | B | B | C |
| Secchi Depth | B | B | B | B | B | C | C | B | C | B | C | B | C |
| **Lake Grade** | | | | **B** | **A** | **B** | **C** | **A** | **C** | **B** | **B** | **B** | **C** |

| Year | 2002 Site 1 | 2002 Site 2 | 2003 Site 1 | 2004 Site 1 | 2005 Site 1 | 2006 Site 1 | 2007 Site 1 | 2008 Site 1 |
|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | B | C | C | B | A | C | A | A |
| Chlorophyll a | B | C | A | B | A | B | B | B |
| Secchi Depth | B | C | A | B | A | B | B | B |
| **Lake Grade** | **B** | **C** | **B** | **B** | **A** | **B** | **B** | **B** |

Source: Metropolitan Council and STORET data



## Prior Lake [upper basin, site-1] (70-0072) *Prior Lake - Spring Lake Watershed District*

Prior Lake (upper basin) is located in the City of Prior Lake (Scott County). The upper basin is considered a Priority Lake by the Metropolitan Council for its high regional recreation value.

The upper basin has a surface area of 386 acres. The maximum and mean depths of the upper basin of Prior Lake are 15.2 and 3.1 m (50 and 10 feet), respectively. Approximately 85 percent of the lake's surface area is considered littoral zone, which is the 0-15 feet depth zone of aquatic plant dominance. The upper basin's 3,430-acre watershed translates to a watershed-to-lake area ratio of 10:1. The greater the ratio, the greater the potential stress on the lake from surface runoff. The upper basin of Prior Lake has two natural inlets, inflow from Spring Lake and the inlet from Rice and Crystal Lake drainage.

The MN DNR has designated the upper basin as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) and Zebra mussels (*Dreissena spp.*).

While the Metropolitan Council has monitored the upper basin of Prior Lake in the past, the basin has been a part of the CAMP since 1997. The upper basin of Prior Lake was monitored 12 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

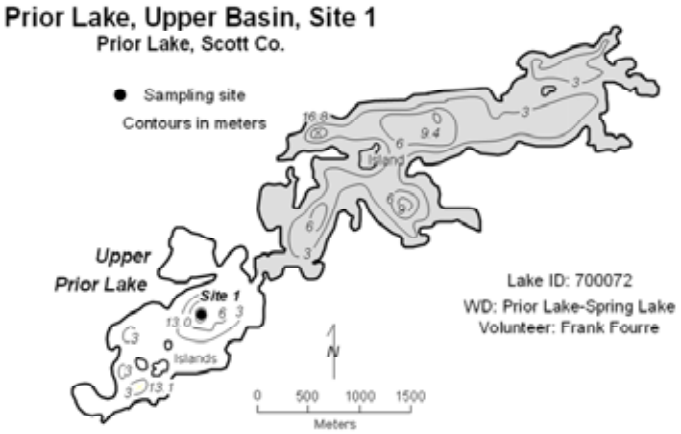
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 55.5 | 19.0 | 91.0 | C |
| **CLA** (µg/l) | 54.8 | 2.0 | 110.0 | D |
| **Secchi** (m) | 1.5 | 0.7 | 4.6 | C |
| **TKN** (mg/l) | 1.82 | 1.30 | 2.40 | |
| | | | ***Lake Grade*** | C |

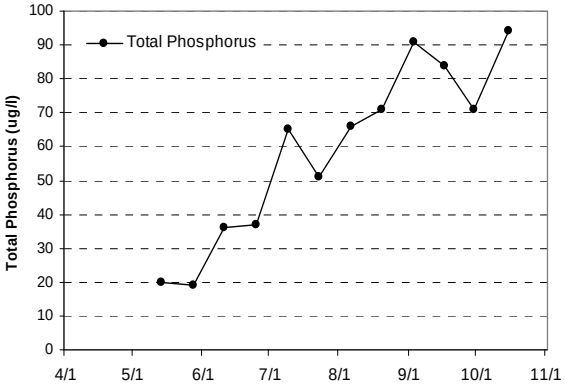
The upper basin received a lake grade of C for 2008. Historical data for the upper basin indicate that the water quality of the basin has varied between lake grades of C and D. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008).

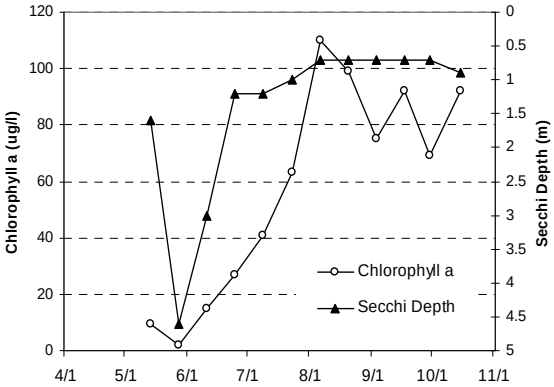
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.1 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 1.8 (between 1- "beautiful" and 2- "minor aesthetic problem").

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.

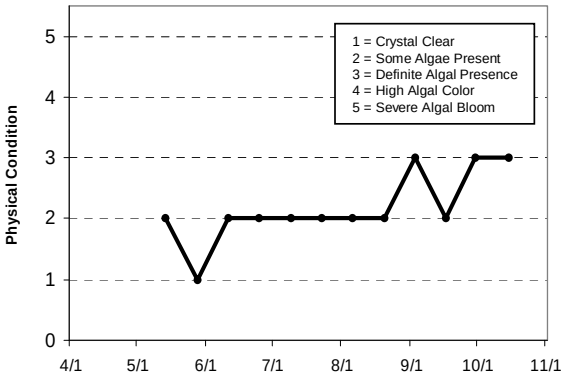



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/14 | 13 | | | | 9.5 | 20 | | 1.6 | 2 | 2 |
| 5/28 | 18 | | | | 2 | 19 | | 4.6 | 1 | 1 |
| 6/11 | 19.6 | | | | 15 | 36 | | 3 | 2 | 1 |
| 6/25 | 24.3 | | | | 27 | 37 | | 1.2 | 2 | 2 |
| 7/9 | 25 | | | | 41 | 65 | | 1.2 | 2 | 2 |
| 7/23 | 26.2 | | | | 63 | 51 | | 1 | 2 | 2 |
| 8/6 | 26.1 | | | | 110 | 66 | | 0.7 | 2 | 2 |
| 8/20 | 26 | | | | 99 | 71 | | 0.7 | 2 | 2 |
| 9/3 | 22.8 | | | | 75 | 91 | | 0.7 | 3 | 2 |
| 9/17 | 19 | | | | 92 | 84 | | 0.7 | 2 | 2 |
| 9/30 | 19.3 | | | | 69 | 71 | | 0.7 | 3 | 2 |
| 10/15 | 14.5 | | | | 92 | 94 | | 0.9 | 3 | 2 |



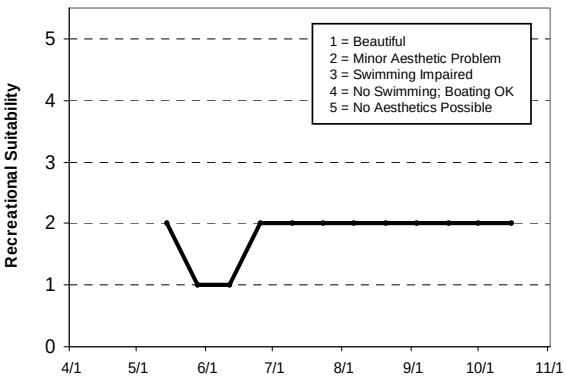

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | C | C | | | D | | | | | D | | | |
| Chlorophyll a | D | D | | | D | | | | | C | C | | |
| Secchi Depth | D | C | D | F | D | D | D | F | F | D | C | D | D |
| **Lake Grade** | **D** | **D** | | | **D** | | | | | **D** | | | |

| Year | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 Site 1 | 1998 Site 2 | 1999 Site 1 | 1999 Site 2 | 2000 Site 1 | 2000 Site 2 | 2001 Site 1 | 2001 Site 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | C | C | C | | D | | D | | D | |
| Chlorophyll a | | | | C | C | D | | D | | D | | F | |
| Secchi Depth | D | D | C | C | D | D | | D | | C | | D | |
| **Lake Grade** | | | | **C** | **C** | **D** | | **D** | | **D** | | **D** | |

| Year | 2002 Site 1 | 2002 Site 2 | 2003 Site 1 | 2004 Site 1 | 2005 Site 1 | 2006 Site 1 | 2007 Site 1 | 2008 Site 1 |
|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | D | D | C | D | C | D | C | C |
| Chlorophyll a | D | D | D | D | C | D | D | D |
| Secchi Depth | D | D | C | D | C | C | D | C |
| **Lake Grade** | **D** | **D** | **C** | **D** | **C** | **D** | **D** | **C** |

Source: Metropolitan Council and STORET data



## Regional Park Lake (82-0087) *South Washington Watershed District*

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. The entire area of the lake is considered littoral zone which is the 0-15 feet depth zone of aquatic plant dominance. Furthermore, the lake does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the water column.

The majority of the land within the 600-acre watershed is undeveloped. The watershed-to-lake size ratio is 38:1. The greater the ratio, the greater the potential stress on the lake from surface runoff.

The lake was monitored 7 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 76.1 | 54.0 | 111.0 | D |
| **CLA** (µg/l) | 25.2 | 7.4 | 47.0 | C |
| **Secchi** (m) | 2.2 | 1.2 | 2.9 | C |
| **TKN** (mg/l) | 1.25 | 0.98 | 1.60 | |
| | | | ***Lake Grade*** | C |

The lake received a lake grade of C for 2008, which is similar to lake grades received in the past 4 years, but better than the D lake grades received in 1998 and 2000-2003. This year was the was the fourth consecutive year in which water clarity received a C grade, which is an improvement over the F grades that were recorded in 1998 and 2000-2003. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed a statistically significant improving trend in water clarity (MPCA 2008).

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.9 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 3.9 (between 3- "swimming slightly impaired" and 4- "no swimming/boating ok").

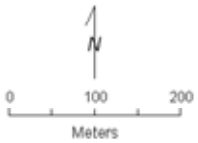
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

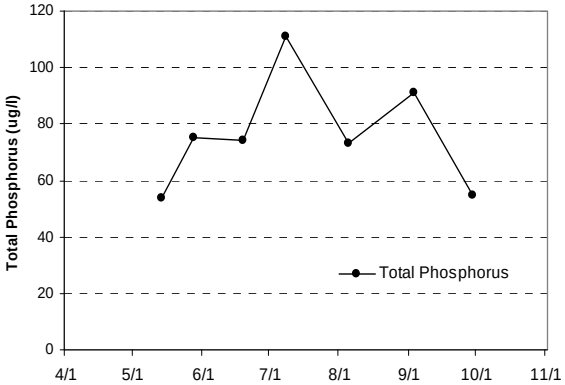
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

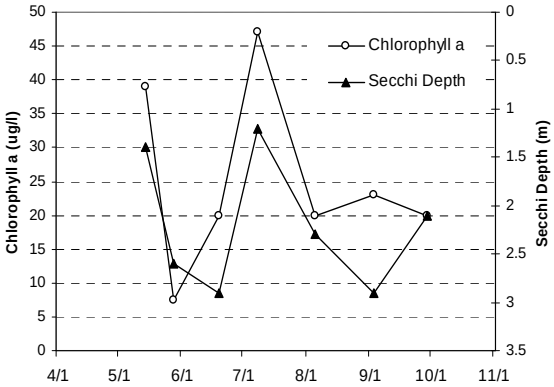
## Regional Park Lake
### Cottage Grove, Washington Co.

Lake ID: 820087
WD: South Washington
Volunteer: Washington
Conservation District

● Sampling site
Contours in meters

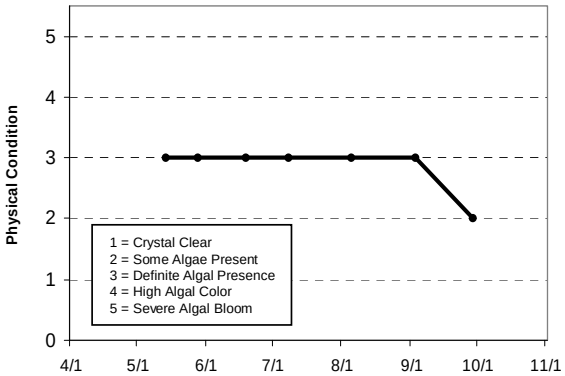





### 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/14 | 14.4 | 8.6 | 12.9 | 0.4 | 39 | 54 | | 1.4 | 3 | 4 |
| 5/28 | 18.4 | 9.2 | 8.82 | 0.2 | 7.4 | 75 | | 2.6 | 3 | 4 |
| 6/19 | 22.8 | 11.2 | 9.77 | 0.23 | 20 | 74 | | 2.9 | 3 | 4 |
| 7/8 | 25.1 | 11.6 | 10.45 | 0.49 | 47 | 111 | | 1.2 | 3 | 4 |
| 8/5 | 25.5 | 12.9 | 3.85 | 0.16 | 20 | 73 | | 2.3 | 3 | 4 |
| 9/3 | 22.2 | 13.1 | 5.71 | 0.16 | 23 | 91 | | 2.9 | 3 | 4 |
| 9/29 | 18.3 | 16.3 | 4.55 | 0.31 | 20 | 55 | | 2.1 | 2 | 3 |



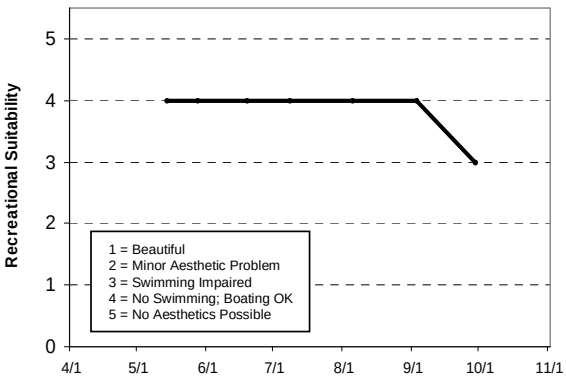

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | F | C | D | D | D | D |
| Chlorophyll a | | | | | | | B | B | C | C | D | C |
| Secchi Depth | | | | | | | F | D | F | F | F | F |
| **Lake Grade** | | | | | | | **D** | **C** | **D** | **D** | **D** | **D** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | C | C | D | C | D |
| Chlorophyll a | C | C | C | B | C |
| Secchi Depth | D | C | C | C | C |
| **Lake Grade** | **C** | **C** | **C** | **C** | **C** |

Source: Metropolitan Council and STORET data



## Reitz Lake (10-0052) *Carver County Environmental Services*

Reitz Lake, a 79-acre lake located within Laketown Township (Carver County), is considered a Metropolitan Area "Priority Lake" because of its multi-recreational uses. A public access is located on its northeastern shore. The mean and maximum depths of the lake are 4.0 m (13 feet) and 11.0 m (36 feet). Roughly 58 percent of the lake area is considered littoral zone (area of aquatic plant dominance). The lake's mean depth and surface area translate to an approximate volume of 1,027 ac-ft. The lake has a 3,711-acre immediate watershed, which translates to a watershed-to-lake area ratio of 47:1 (the larger the ratio the greater the potential stress put on the lake from surface runoff).

The DNR has designated the lake as being infested with Eurasian Water Milfoil (*Myriophyllum spicatum*).

This was the tenth year that Reitz Lake has been involved in the CAMP. Council staff, however, has monitored the lake, in the past. A search through the STORET nationwide water quality database for historical data on the lake provided three years of data (1985, 1991 and 1993) prior to the 1999-2006 CAMP data.

The lake was monitored 11 times between early May and early October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

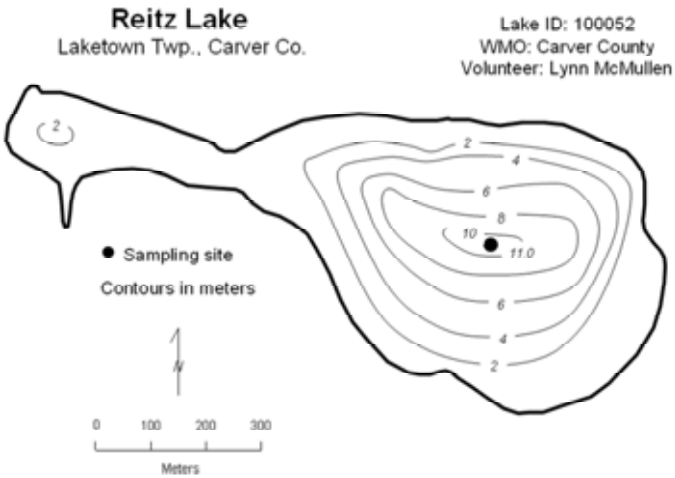
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 61.4 | 28.0 | 149.0 | C |
| **CLA** (µg/l) | 12.8 | 2.8 | 24.0 | B |
| **Secchi** (m) | 2.2 | 1.5 | 4.0 | C |
| **TKN** (mg/l) | 1.69 | 1.10 | 2.10 | |
| | | | ***Lake Grade*** | C |

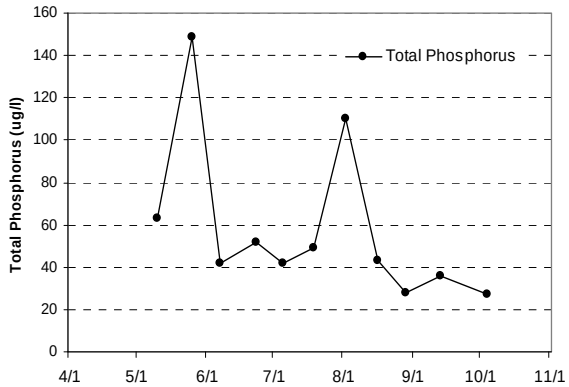
The lake received a lake grade of C for 2008, which is similar to lake grades received in previous years. The recent years' water quality is better than the water quality in the years 1985, 1991, and 1993. However, a trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008).

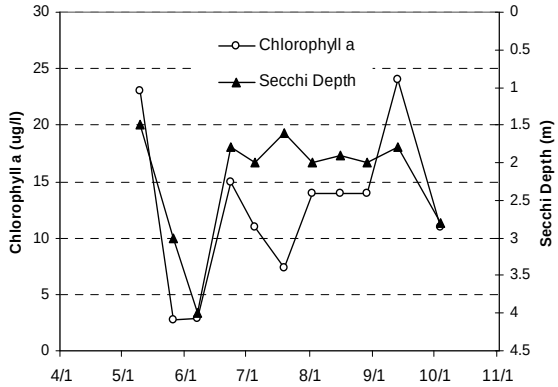
Throughout the monitoring period, the volunteers' opinions of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. The mean perceived physical condition of the lake was 1.7 (between 1- "crystal clear" and 2- "some algae present"), while the mean recreational suitability was 1.2 (between 1- "beautiful" and 2- "minor aesthetic problem").

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.

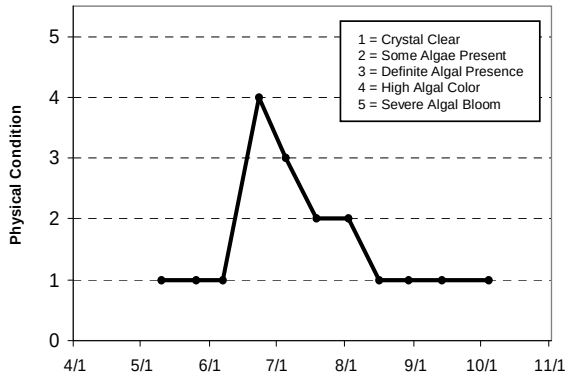



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/10 | 14 | | | | 23 | 63 | | 1.5 | 1 | 1 |
| 5/26 | 17 | | | | 2.8 | 149 | | 3 | 1 | 1 |
| 6/7 | 16 | | | | 2.9 | 42 | | 4 | 1 | 1 |
| 6/23 | 23 | | | | 15 | 52 | | 1.8 | 4 | 2 |
| 7/5 | 24 | | | | 11 | 42 | | 2 | 3 | 2 |
| 7/19 | 24 | | | | 7.3 | 49 | | 1.6 | 2 | 1 |
| 8/2 | 26 | | | | 14 | 110 | | 2 | 2 | 1 |
| 8/16 | 23 | | | | 14 | 43 | | 1.9 | 1 | 1 |
| 8/29 | 22 | | | | 14 | 28 | | 2 | 1 | 1 |
| 9/13 | 20 | | | | 24 | 36 | | 1.8 | 1 | 1 |
| 10/4 | 16 | | | | 11 | 27 | | 2.8 | 1 | 1 |



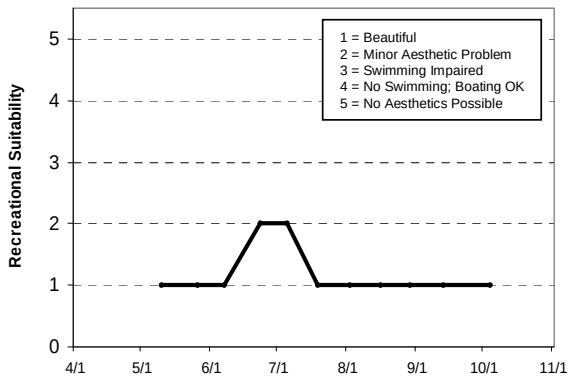

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | D | | | | | | D |
| Chlorophyll a | | | | | | F | | | | | | D |
| Secchi Depth | | | | | | D | | | | | | C |
| **Lake Grade** | | | | | | **D** | | | | | | **D** |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | D | | | | | | C | C | D | D | D |
| Chlorophyll a | | C | | | | | | B | C | D | C | D |
| Secchi Depth | | D | | | | | | C | C | F | C | B |
| **Lake Grade** | | **D** | | | | | | **C** | **C** | **D** | **C** | **C** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | D | D | D | C | C |
| Chlorophyll a | C | C | C | A | B |
| Secchi Depth | C | C | C | C | C |
| **Lake Grade** | **C** | **C** | **C** | **B** | **C** |

Source: Metropolitan Council and STORET data



## Reshanau Lake (02-0009) *Rice Creek Watershed District*

Reshanau Lake is located in the City of Lino Lakes (Anoka County). The 336-acre lake has a mean and maximum depth of 3.2 m (10.5 feet) and 4.9 m (16 feet). The lake's surface area and mean depth translates to an approximate lake volume of 3,535 ac-ft. The entire area of the lake is considered littoral zone which is the 0-15 feet depth zone of aquatic plant dominance. Furthermore, the lake does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the water column.

The lake was monitored 7 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

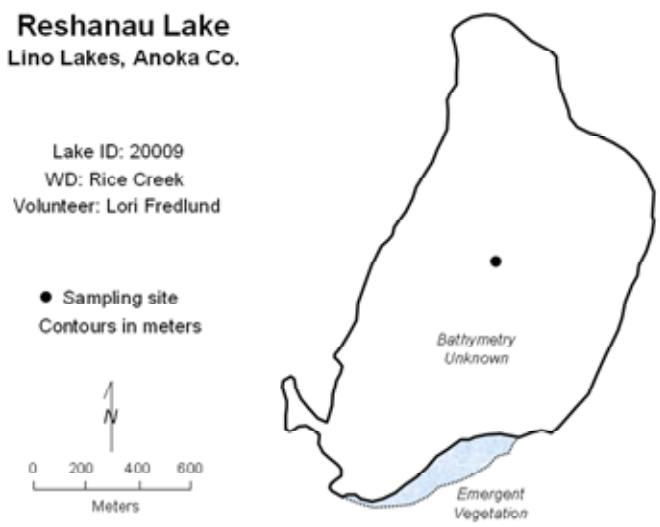
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 70.3 | 33.0 | 103.0 | D |
| **CLA** (µg/l) | 57.2 | 8.2 | 96.0 | D |
| **Secchi** (m) | 0.4 | 0.2 | 0.7 | F |
| **TKN** (mg/l) | 2.15 | 1.60 | 2.70 | |
| | | | ***Lake Grade*** | D |

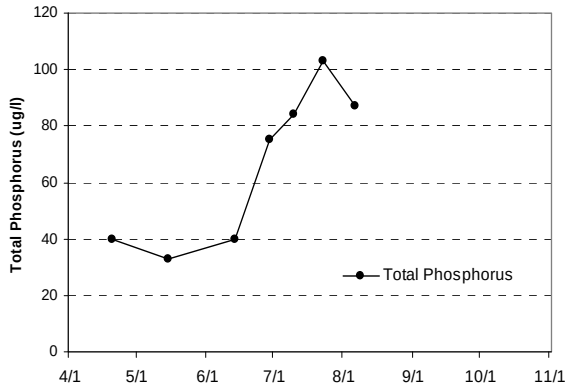
The lake received a lake grade of D for 2008, which is similar to the lake grades received in the previous two years. Continued monitoring is recommended to continue to build the water quality database for this lake.

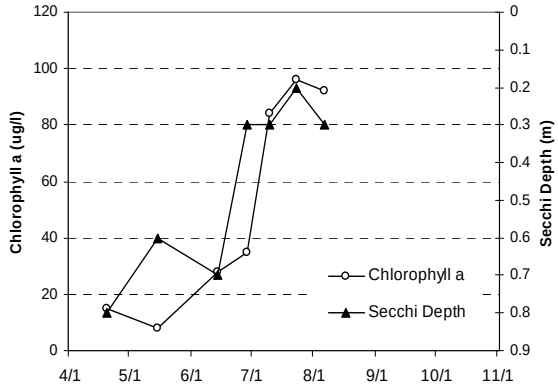
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.2 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 2.7 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

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.

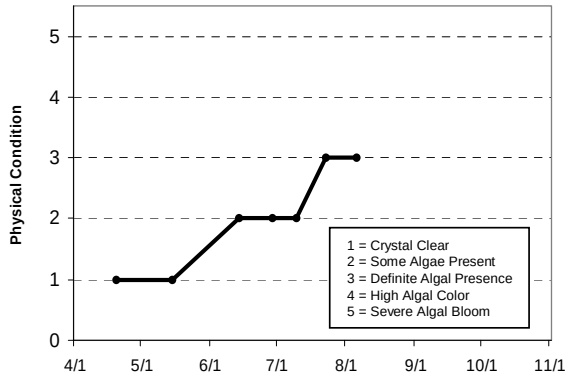



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/20 | 8.3 | | | | 15 | 40 | | 0.8 | 1 | 1 |
| 5/15 | 18.1 | | | | 8.2 | 33 | | 0.6 | 1 | 1 |
| 6/14 | 25 | | | | 28 | 40 | | 0.7 | 2 | 3 |
| 6/29 | 25 | | | | 35 | 75 | | 0.3 | 2 | 3 |
| 7/10 | 25.2 | | | | 84 | 84 | | 0.3 | 2 | 3 |
| 7/23 | 25.4 | | | | 96 | 103 | | 0.2 | 3 | 3 |
| 8/6 | 25.2 | | | | 92 | 87 | | 0.3 | 3 | 3 |



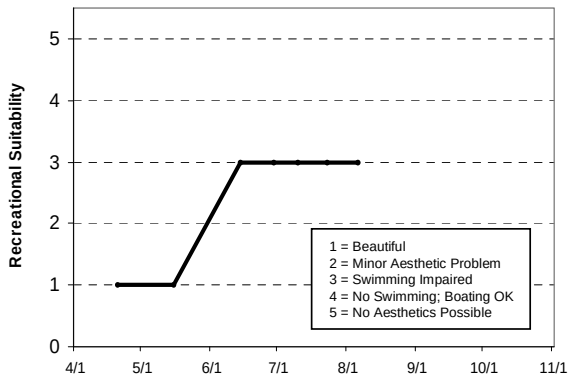

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | D | D | D |
| Chlorophyll a | | | C | C | D |
| Secchi Depth | | | F | F | F |
| **Lake Grade** | | | **D** | **D** | **D** |

Source: Metropolitan Council and STORET data



## Rest Area Pond (82-0514) - *Valley Branch Watershed District*

Rest Area Pond is a 12.6-acre lake located within West Lakeland Township (Washington County). There is little morphological information for the pond. The pond's surface area and watershed area (17,781 acres) translates to a 157:1 watershed-to-pond area ratio. Generally the larger the ratio, the greater the potential stress on the pond from surface runoff.

The pond was monitored 13 times in 2008. On each sampling day the pond was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the pond's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

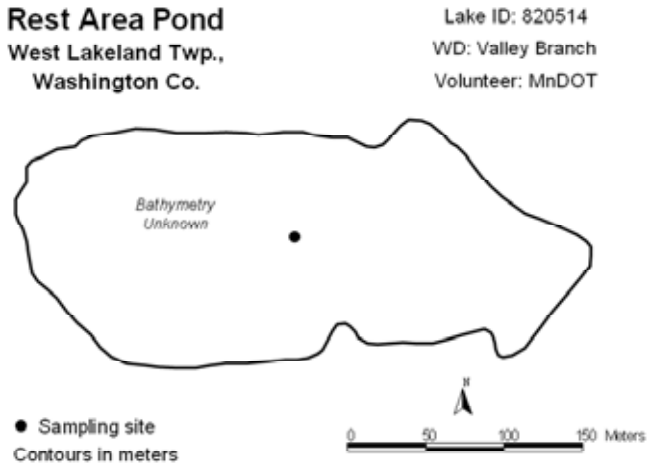
**2008 summer (May-September) data summary**

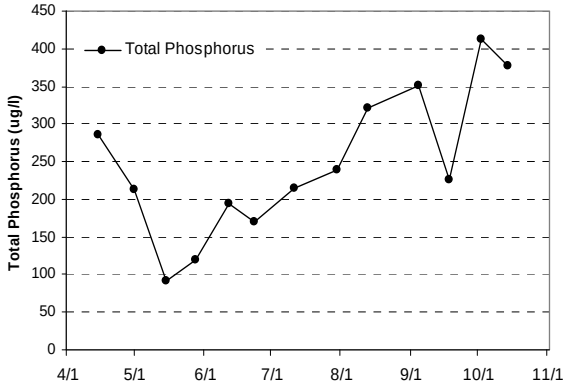
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 214.1 | 92.0 | 351.0 | F |
| **CLA** (µg/l) | 87.0 | 13.0 | 230.0 | F |
| **Secchi** (m) | 0.5 | 0.2 | 1.0 | F |
| **TKN** (mg/l) | 3.60 | 1.60 | 5.90 | |
| | | | ***Lake Grade*** | F |

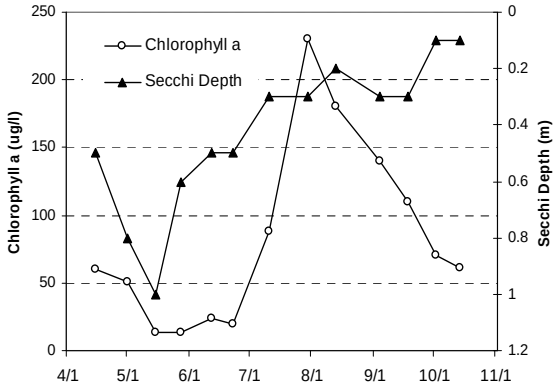
The pond received a lake grade of F for 2008, which is worse than the D lake grades received in the previous two years. The mean summer-time CLA concentration was notably higher in 2008 than the previous two years. Continued monitoring is suggested to acquire data for determining if the pond is experiencing worsening water quality conditions.

The volunteer's perceptions of the physical and recreational conditions of the pond were not recorded by the volunteer.

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.

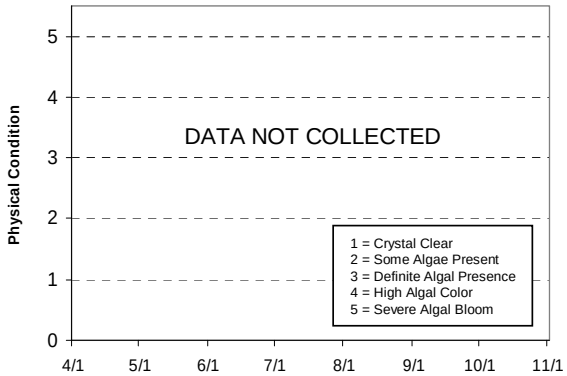



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/15 | 5.2 | | | | 60 | 286 | | 0.5 | | |
| 5/1 | 9.2 | | | | 51 | 213 | | 0.8 | | |
| 5/15 | 17.3 | | | | 13 | 92 | | 1 | | |
| 5/28 | 18.9 | | | | 14 | 120 | | 0.6 | | |
| 6/12 | 22.2 | | | | 24 | 194 | | 0.5 | | |
| 6/23 | 23.7 | | | | 20 | 170 | | 0.5 | | |
| 7/11 | 23.9 | | | | 88 | 214 | | 0.3 | | |
| 7/30 | 26.7 | | | | 230 | 239 | | 0.3 | | |
| 8/13 | 23.7 | | | | 180 | 322 | | 0.2 | | |
| 9/4 | 20.8 | | | | 140 | 351 | | 0.3 | | |
| 9/18 | 19.5 | | | | 110 | 226 | | 0.3 | | |
| 10/2 | 16.3 | | | | 71 | 413 | | 0.1 | | |
| 10/14 | 14.3 | | | | 61 | 378 | | 0.1 | | |



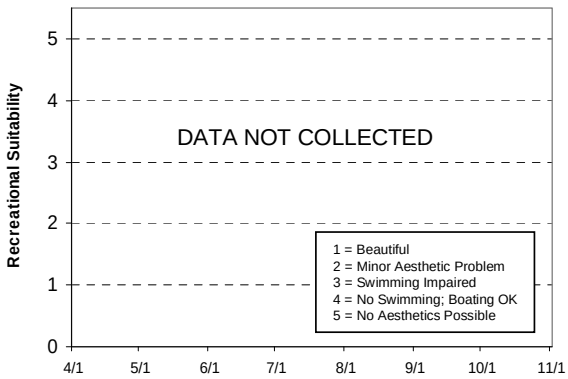

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | D | F | F |
| Chlorophyll a | | | D | C | F |
| Secchi Depth | | | D | F | F |
| **Lake Grade** | | | **D** | **D** | **F** |

Source: Metropolitan Council and STORET data



## Rice Lake [Maple Grove] (27-0116) – *Elm Creek Watershed Management Commission*

Rice Lake lies within the City of Maple Grove. The lake has a surface area of 252 acres, an average depth of 1.9 m (6.2 ft), and a volume of 1570 acre-feet. The maximum depth is 3.4 m (11 ft). Because of the shallowness of the lake, the entire area is considered littoral zone, and it does not maintain a thermocline (a density gradient owed to changing water temperatures throughout the lake's water column). The MN DNR has designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*).

This was the second year that Rice Lake has been involved in the CAMP. A search through the STORET nationwide water quality database for historic data showed that Secchi transparency measurements were collected along with user perception rankings for the years 1991, 1993, and 2002-2007. Dissolved oxygen measurements were collected in 1993. However, the CAMP 2007 and 2008 data are the only years of known data collected for nutrients and chlorophyll-a.

The lake was monitored 10 times between early May and mid-October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency (water clarity), as well as the lake's perceived physical condition and recreational suitability. The data are summarized in the figures and graphs on the following page.

**2008 summer (May-September) data summary**

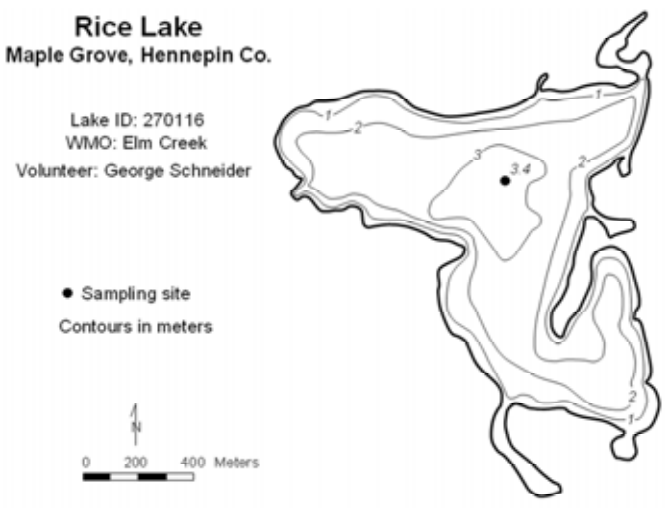
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 282.0 | 45.0 | 749.0 | F |
| **CLA** (µg/l) | 49.9 | 15.0 | 140.0 | D |
| **Secchi** (m) | 1.3 | 0.4 | 2.9 | C |
| **TKN** (mg/l) | 2.08 | 1.60 | 2.80 | |
| | | | ***Lake Grade*** | D |

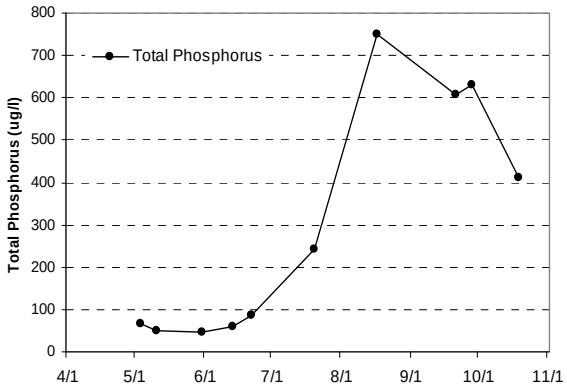
The lake received a lake grade of D for 2008 compared to last year's lake grade of F, which gives the appearance of an improvement in water quality. However, the 2008 lake grade was calculated on the basis of data collected from early May through mid-October, whereas the available 2007 data spans the period mid-June through mid-October. The 2008 data shows that the lake experienced relatively lower concentrations of TP and CLA, and greater water clarity during April, May, and early June. The 2007 data is lacking in this same time period. If the lake typically experiences better water quality during this time period every year, then the 2007 mean values would be skewed towards worse water quality because of the missing data from the earlier portion of the monitoring season. Therefore, it would be difficult to compare the overall 2008 lake water quality to that of 2007. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

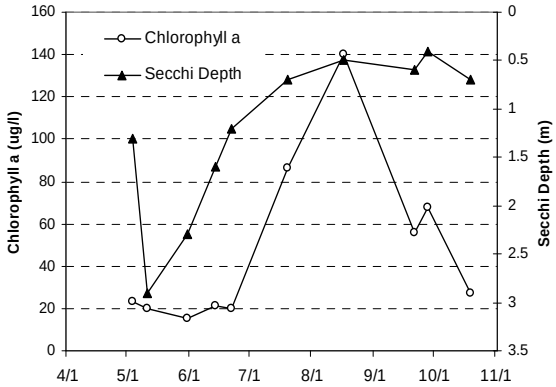
The perceived physical and recreational conditions (ranked on a 1-to-5 scale) are shown in the figures on the following page. The average user perception rankings were 3.9 for physical condition (approximately 4- "high algal color"), and 4.0 for recreational suitability (4- "no swimming – boating ok").

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.

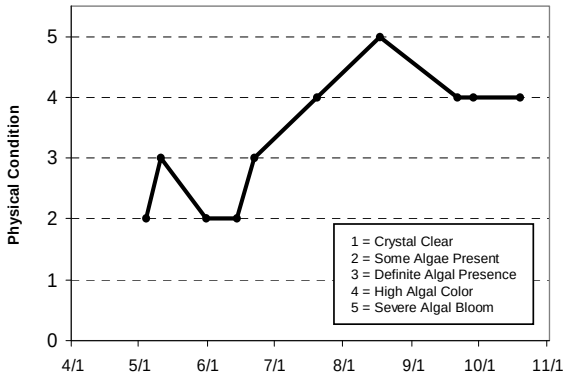



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/4 | 12 | | | | 23 | 68 | | 1.3 | 2 | 3 |
| 5/11 | 14 | | | | 20 | 49 | | 2.9 | 3 | 3 |
| 5/31 | 20 | | | | 15 | 45 | | 2.3 | 2 | 2 |
| 6/14 | 21 | | | | 21 | 60 | | 1.6 | 2 | 2 |
| 6/22 | 24 | | | | 20 | 87 | | 1.2 | 3 | 3 |
| 7/20 | 27 | | | | 86 | 243 | | 0.7 | 4 | 4 |
| 8/17 | 26 | | | | 140 | 749 | | 0.5 | 5 | 4 |
| 9/21 | 22 | | | | 56 | 607 | | 0.6 | 4 | 4 |
| 9/28 | 18 | | | | 68 | 630 | | 0.4 | 4 | 3 |
| 10/19 | 12 | | | | 27 | 411 | | 0.7 | 4 | 3 |



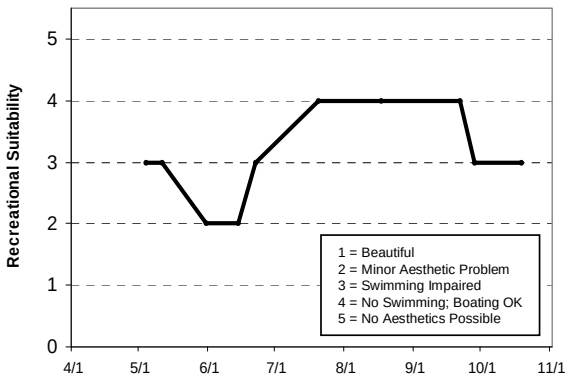

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | D |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | C | | | | | | | | | D | D |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | F | F |
| Chlorophyll a | | | | F | D |
| Secchi Depth | C | D | D | F | C |
| **Lake Grade** | | | | **F** | **D** |

Source: Metropolitan Council and STORET data



## Riley Lake (10-0002) *City of Chanhassen*

Riley Lake is located with the cities of Chanhassen and Eden Prairie (Carver and Hennepin counties). It is considered a Priority Lake by the Metropolitan Council for its high regional recreation value. It has a surface area of 297 acres. The maximum and mean depths are 15.0 m and 6.6 m, respectively. Roughly 34 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 has a 4,796-acre immediate watershed, which translates to a watershed-to-lake area ratio of 16:1. The larger the ratio the greater the potential stress put on the lake from surface runoff.

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

While Riley Lake has previously been monitored by Council staff, 2008 marks the sixth year the lake has been monitored through the CAMP. Riley Lake was monitored 12 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

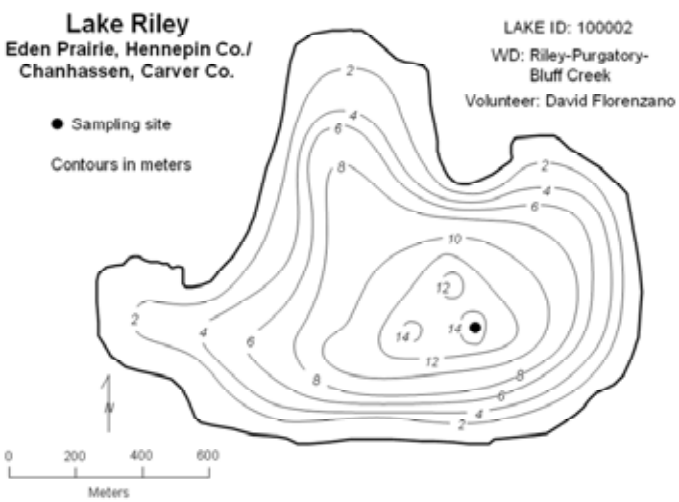
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 32.4 | 8.0 | 58.0 | C |
| **CLA** (µg/l) | 18.4 | 8.4 | 28.0 | B |
| **Secchi** (m) | 1.9 | 1.2 | 3.1 | C |
| **TKN** (mg/l) | 1.78 | 1.40 | 2.10 | |
| | | | ***Lake Grade*** | C |

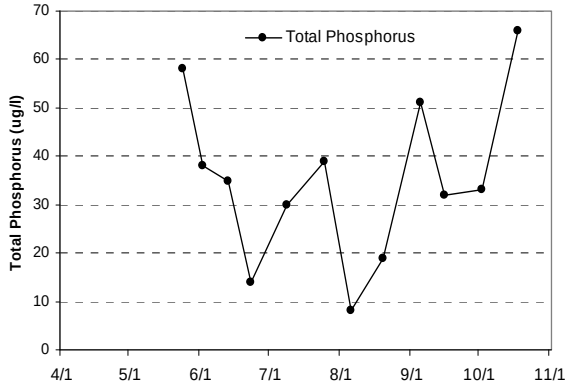
The lake received a lake grade of C for 2008, which is consistent with most years of monitoring dating back to 1980. The lake appears to be characterized as a C lake grade. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008).

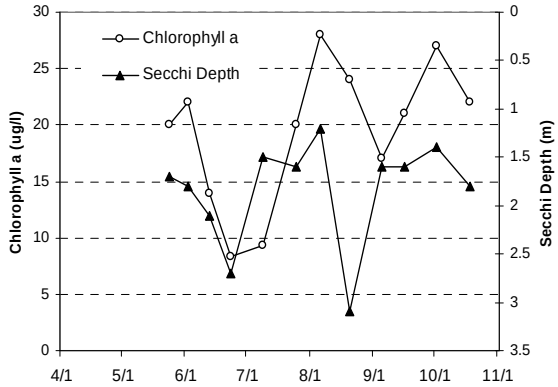
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 3.1 (between 3- "definite algae present" and 4- "high algal color"). The average recreational suitability ranking was 2.6 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

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.

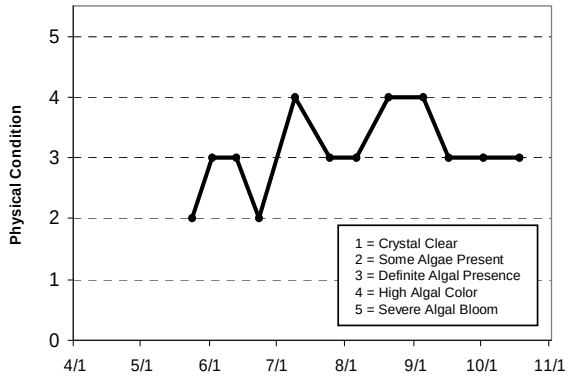



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/24 | 15.9 | | | | 20 | 58 | | 1.7 | 2 | 2 |
| 6/2 | 18.1 | | | | 22 | 38 | | 1.8 | 3 | 2 |
| 6/13 | 17.7 | | | | 14 | 35 | | 2.1 | 3 | 3 |
| 6/23 | 22.5 | | | | 8.4 | 14 | | 2.7 | 2 | 3 |
| 7/9 | 25.8 | | | | 9.3 | 30 | | 1.5 | 4 | 3 |
| 7/25 | 26.1 | | | | 20 | 39 | | 1.6 | 3 | 3 |
| 8/6 | 26 | | | | 28 | 8 | | 1.2 | 3 | 2 |
| 8/20 | 26.3 | | | | 24 | 19 | | 3.1 | 4 | 3 |
| 9/5 | 21.6 | | | | 17 | 51 | | 1.6 | 4 | 3 |
| 9/16 | 18.8 | | | | 21 | 32 | | 1.6 | 3 | 2 |
| 10/2 | 17.2 | | | | 27 | 33 | | 1.4 | 3 | 2 |
| 10/18 | 13.5 | | | | 22 | 66 | | 1.8 | 3 | 3 |



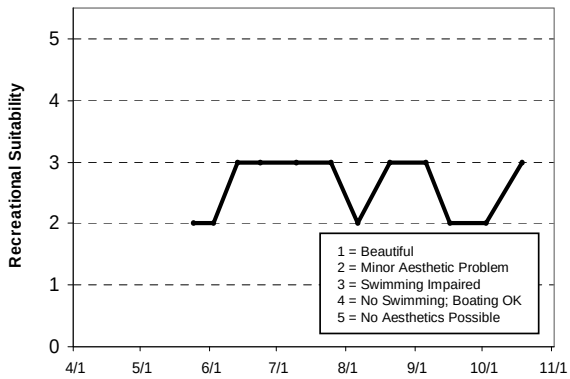

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | C | B | C | C | C | C | C | C | | | | C |
| Chlorophyll a | C | C | C | C | C | C | C | D | | | C | C |
| Secchi Depth | C | C | C | C | C | C | C | C | C | | C | C |
| **Lake Grade** | **C** | **C** | **C** | **C** | **C** | **C** | **C** | **C** | | | | **C** |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | C | | | | C | | | C | | C | C |
| Chlorophyll a | | C | | | | C | | | C | | C | D |
| Secchi Depth | | C | | | | C | | | C | | C | C |
| **Lake Grade** | | **C** | | | | **C** | | | **C** | | **C** | **C** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | C | C | C | B | C |
| Chlorophyll a | C | C | B | B | B |
| Secchi Depth | B | C | B | C | C |
| **Lake Grade** | **C** | **C** | **B** | **B** | **C** |

Source: Metropolitan Council and STORET data



## Rogers Lake (19-0080) – *Lower Mississippi River Watershed Management Organization*

Rogers Lake lies within the City of Mendota Heights. The lake has a surface area of 94 acres and an average depth of 1.3 m (4.2 ft) which would give it a volume of 393 acre-feet. The maximum depth is 2.4 m (7.9 ft). The entire area of the lake is considered littoral zone which is the 0-15 feet depth zone of aquatic plant dominance. Furthermore, the lake does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the water column.

This was the second year that Rogers Lake has been involved in the CAMP. A search through the STORET nationwide water quality database for historic data on the lake showed no monitoring data other than the historical CAMP data. The lake was monitored 9 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 27.6 | 19.0 | 50.0 | B |
| **CLA** (µg/l) | 4.9 | 1.7 | 12.0 | A |
| **Secchi** (m) | 1.4 | 1.1 | 1.9 | C |
| **TKN** (mg/l) | 1.71 | 1.40 | 2.10 | |
| | | | ***Lake Grade*** | B |

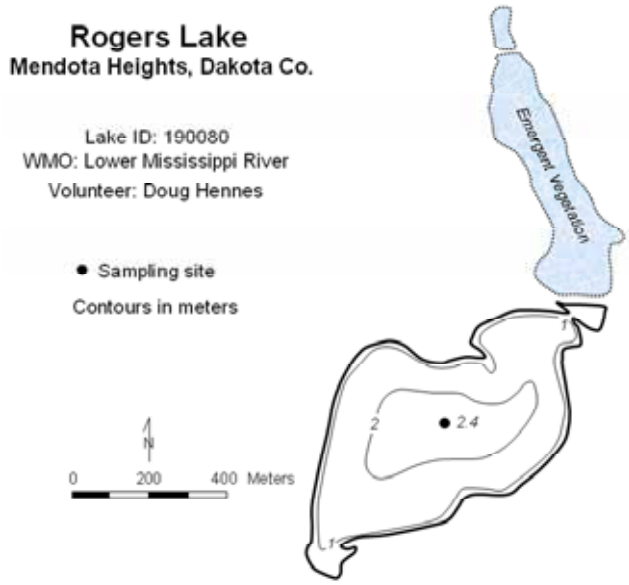
The lake received a lake grade of B for 2008. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed to build the water quality database.

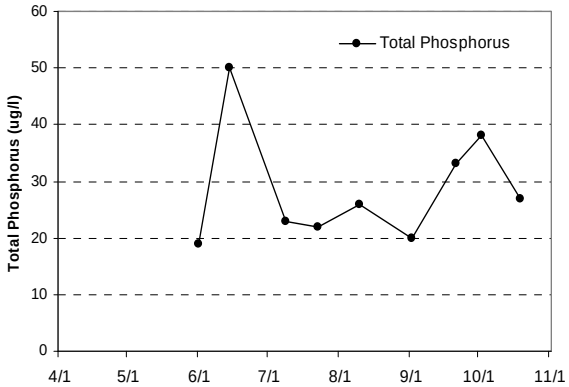
The water clarity grade of C does not correlate well with the chlorophyll-a grade of A. A possible explanation may be that the water clarity may be affected by higher levels of total suspended solids from surface runoff from storm sewers and the surrounding urbanized watershed. It is possible for higher suspend solids loadings to decrease water clarity which would decrease light penetration thereby inhibiting algal growth.

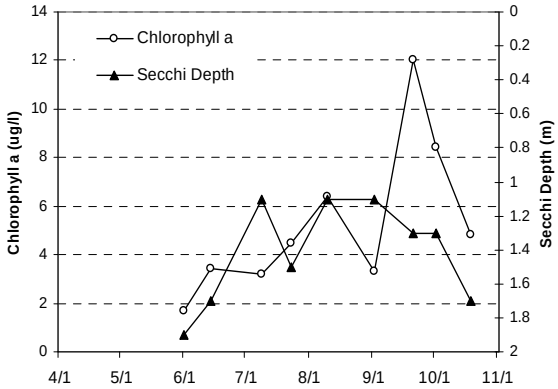
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.1 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 2.0 ("minor aesthetic problem").

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.

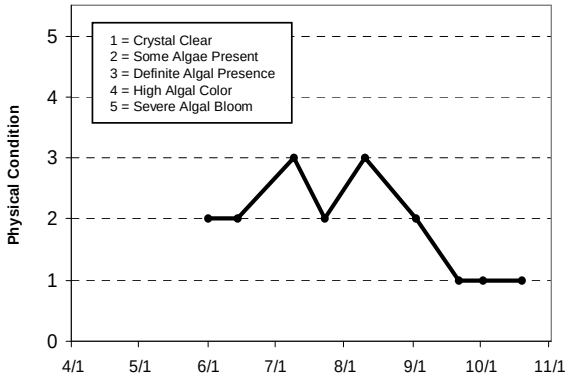



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 6/1 | 23.1 | | | | 1.7 | 19 | | 1.9 | 2 | 1 |
| 6/14 | 22.7 | | | | 3.4 | 50 | | 1.7 | 2 | 1 |
| 7/9 | 25.9 | | | | 3.2 | 23 | | 1.1 | 3 | 3 |
| 7/23 | 27.3 | | | | 4.5 | 22 | | 1.5 | 2 | 2 |
| 8/10 | 25.9 | | | | 6.4 | 26 | | 1.1 | 3 | 4 |
| 9/2 | 23 | | | | 3.3 | 20 | | 1.1 | 2 | 2 |
| 9/21 | 22.7 | | | | 12 | 33 | | 1.3 | 1 | 1 |
| 10/2 | 16.1 | | | | 8.4 | 38 | | 1.3 | 1 | 1 |
| 10/19 | 12.5 | | | | 4.8 | 27 | | 1.7 | 1 | 1 |



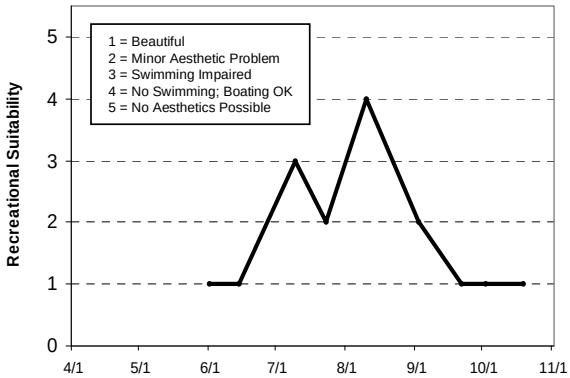

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | C | B |
| Chlorophyll a | | | | A | A |
| Secchi Depth | | | | D | C |
| **Lake Grade** | | | | **C** | **B** |

Source: Metropolitan Council and STORET data



## Rose Lake (27-0092) *City of Minnetonka*

Rose Lake is a small 17-acre lake located in the City of Minnetonka (Hennepin County). There is very little known morphological data available for the lake.

The lake was monitored 13 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

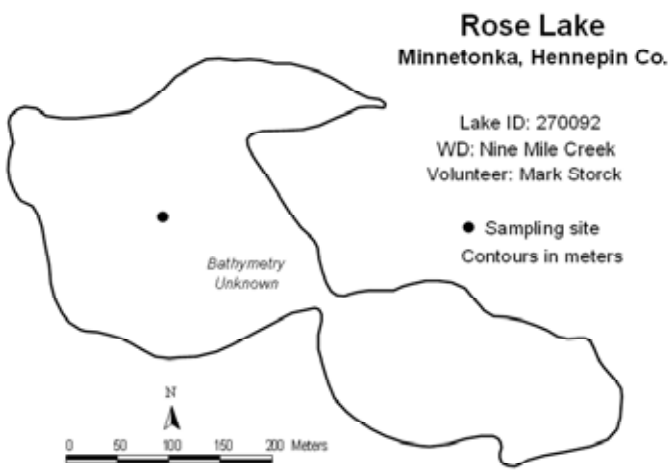
**2008 summer (May-September) data summary**

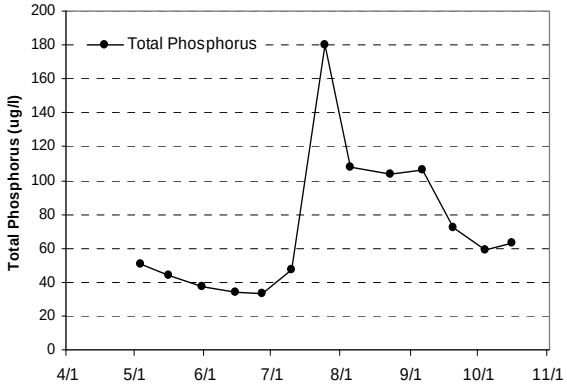
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 74.2 | 33.0 | 180.0 | D |
| **CLA** (µg/l) | 47.3 | 3.7 | 170.0 | C |
| **Secchi** (m) | 1.0 | 0.4 | 1.6 | D |
| **TKN** (mg/l) | 1.59 | 1.30 | 2.10 | |
| | | | ***Lake Grade*** | D |

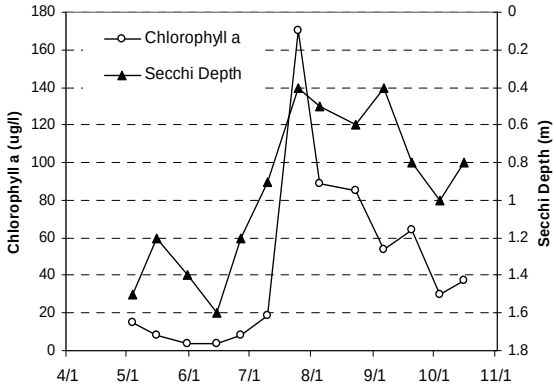
The lake received a lake grade of D for 2008, which is consistent with the previous lake grades received in the previous two years. Additional monitoring is suggested to continue to build the water quality database.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 3.6 (between 3- "definite algae present" and 4- "high algal color"). The average recreational suitability ranking was 4.5 (between 4- "no swimming/boating ok" and 5- "no aesthetics possible").

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.

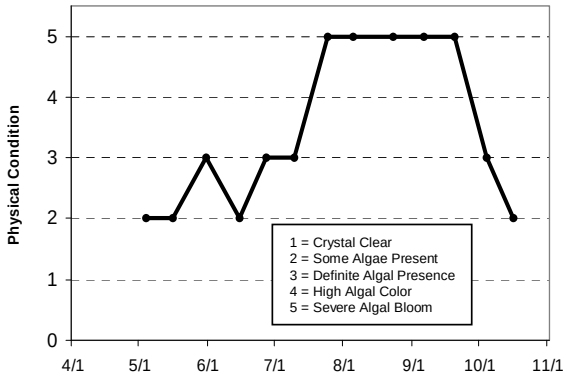



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/4 | 11.7 | | | | 15 | 51 | | 1.5 | 2 | 1 |
| 5/16 | 21.1 | | | | 8.3 | 44 | | 1.2 | 2 | 4 |
| 5/31 | 22.2 | | | | 3.7 | 37 | | 1.4 | 3 | 5 |
| 6/15 | 21.6 | | | | 4.1 | 34 | | 1.6 | 2 | 5 |
| 6/27 | 24.9 | | | | 7.9 | 33 | | 1.2 | 3 | 5 |
| 7/10 | 22 | | | | 19 | 47 | | 0.9 | 3 | 5 |
| 7/25 | 22.9 | | | | 170 | 180 | | 0.4 | 5 | |
| 8/5 | 22.3 | | | | 89 | 108 | | 0.5 | 5 | 5 |
| 8/23 | 21.9 | | | | 85 | 104 | | 0.6 | 5 | 5 |
| 9/6 | 17.8 | | | | 54 | 106 | | 0.4 | 5 | 5 |
| 9/20 | 18 | | | | 64 | 72 | | 0.8 | 5 | 5 |
| 10/4 | 14.6 | | | | 30 | 59 | | 1 | 3 | 5 |
| 10/16 | 12.7 | | | | 37 | 63 | | 0.8 | 2 | 5 |



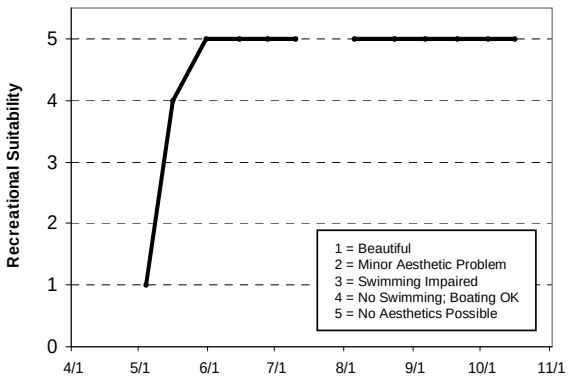

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | D | D | D |
| Chlorophyll a | | | C | D | C |
| Secchi Depth | | | D | D | D |
| **Lake Grade** | | | **D** | **D** | **D** |

Source: Metropolitan Council and STORET data



## Rose Lake [Site 1, north basin] (82-0012) *Washington Conservation District*

Rose Lake is a small lake located in the City of Lake Elmo (Washington County). There is very little known morphological data available for the lake.

This was the first year the lake was monitored via the CAMP. A search through STORET, the national water quality database, showed no historical water quality data for this lake.

Site 1 (north basin) was monitored 7 times in 2008. On each sampling day Site 1 was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. Depth profiles for temperature and dissolved oxygen were also measured. The resulting data are summarized in tables and figures on the following page.

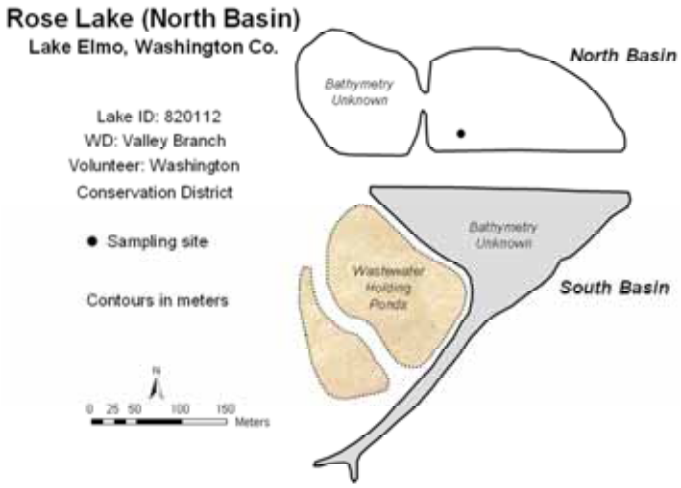
**2008 summer (May-September) data summary**

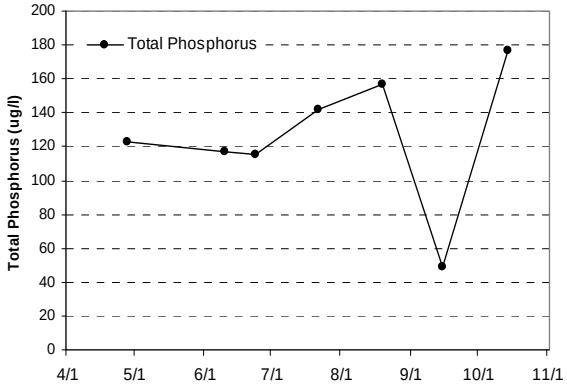
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 116.0 | 49.0 | 157.0 | D |
| **CLA** (µg/l) | 95.6 | 35.0 | 170.0 | F |
| **Secchi** (m) | 0.5 | 0.3 | 0.8 | F |
| **TKN** (mg/l) | 2.45 | 0.96 | 3.70 | |
| | | | ***Lake Grade*** | F |

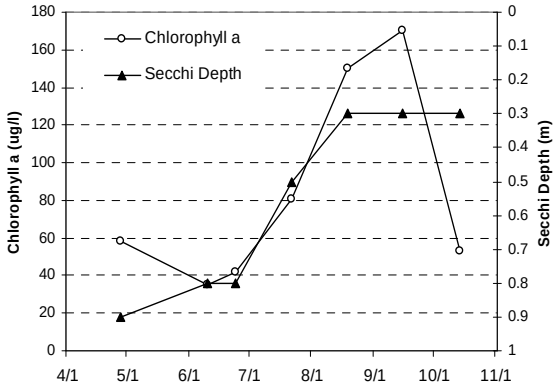
Site 1 received a lake grade of F for 2008. Additional monitoring is suggested to continue to build the water quality database.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 3.6 (between 3- "definite algae present" and 4- "high algal color"). The average recreational suitability ranking was 4.0 ("no swimming/boating ok").

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.

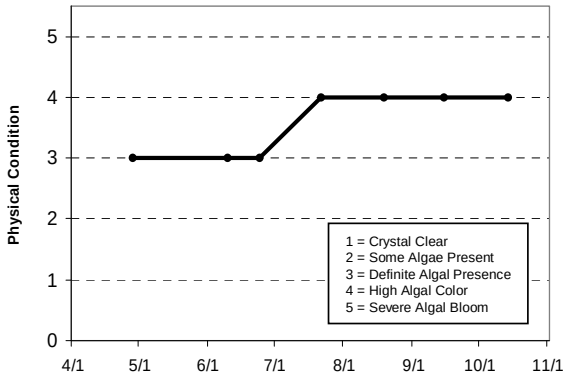



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/28 | 8.4 | 8.4 | 11.02 | 10.69 | 58 | 123 | | 0.9 | 3 | 4 |
| 6/10 | 21.5 | 18.6 | 10.18 | 0.92 | 35 | 117 | | 0.8 | 3 | 4 |
| 6/24 | 27 | 18.9 | 9.11 | 0.48 | 42 | 115 | | 0.8 | 3 | 4 |
| 7/22 | 27.5 | 18.4 | 9.72 | 0.18 | 81 | 142 | | 0.5 | 4 | 4 |
| 8/19 | 29.4 | 17.9 | 10.76 | 0.15 | 150 | 157 | | 0.3 | 4 | 4 |
| 9/15 | 18 | 16.6 | 11.27 | 0.2 | 170 | 49 | | 0.3 | 4 | 4 |
| 10/14 | 13.7 | 13.3 | 9.86 | 0.4 | 53 | 177 | | 0.3 | 4 | 4 |



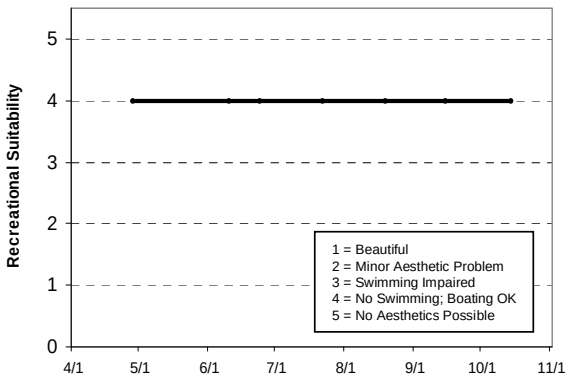

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | | D |
| Chlorophyll a | | | | | F |
| Secchi Depth | | | | | F |
| **Lake Grade** | | | | | **F** |

Source: Metropolitan Council and STORET data



## Rose Lake [Site 2, south basin] (82-0012) *Washington Conservation District*

Rose Lake is a small lake located in the City of Lake Elmo (Washington County). There is very little known morphological data available for the lake.

This was the first year the lake was monitored via the CAMP. A search through STORET, the national water quality database, showed no historical water quality data for this lake.

Site 2 (south basin) was monitored 7 times in 2008. On each sampling day Site 2 was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. Depth profiles for temperature and dissolved oxygen were also measured. The resulting data are summarized in tables and figures on the following page.

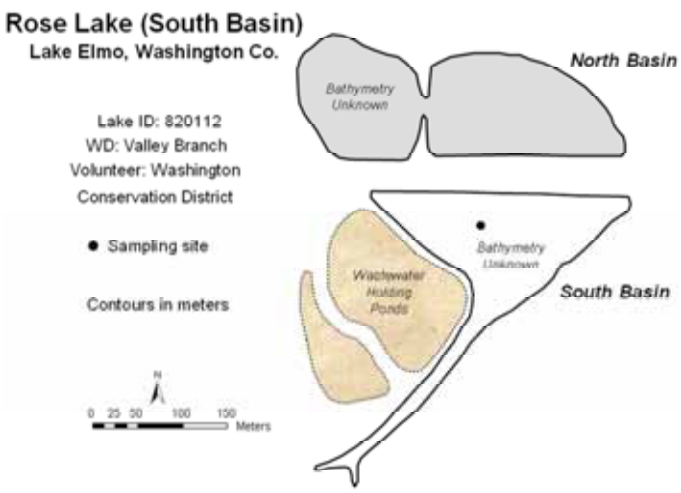
**2008 summer (May-September) data summary**

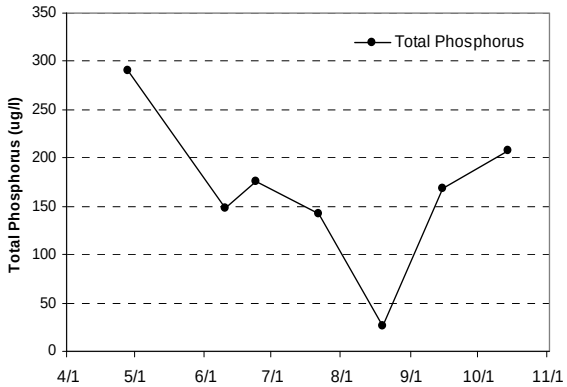
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 132.0 | 26.0 | 176.0 | D |
| **CLA** (µg/l) | 143.8 | 49.0 | 250.0 | F |
| **Secchi** (m) | 0.5 | 0.2 | 0.8 | F |
| **TKN** (mg/l) | 3.94 | 1.90 | 7.90 | |
| | | | ***Lake Grade*** | F |

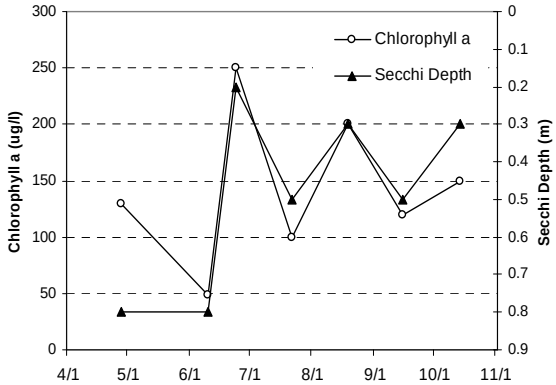
Site 2 received a lake grade of F for 2008. Additional monitoring is suggested to continue to build the water quality database.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 3.8 (between 3- "definite algae present" and 4- "high algal color"). The average recreational suitability ranking was 4.0 ("no swimming/boating ok").

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.

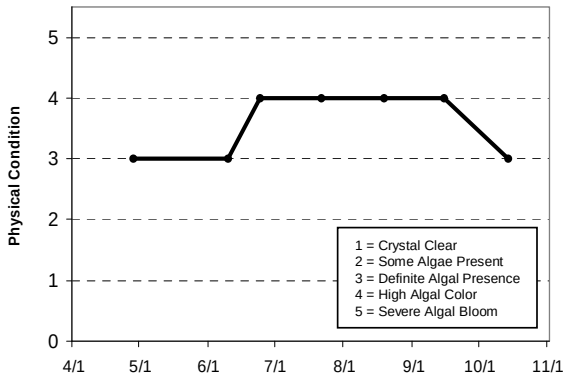



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/28 | 7.8 | 7.8 | 10.98 | 10.76 | 130 | 291 | | 0.8 | 3 | 4 |
| 6/10 | 21 | 14.5 | 11.37 | 0.01 | 49 | 148 | | 0.8 | 3 | 4 |
| 6/24 | 26.7 | 14.4 | 15.58 | 0.71 | 250 | 176 | | 0.2 | 4 | 4 |
| 7/22 | 27.1 | 14.4 | 11.44 | 0.21 | 100 | 142 | | 0.5 | 4 | 4 |
| 8/19 | 28.6 | 15.6 | 11.49 | 0.16 | 200 | 26 | | 0.3 | 4 | 4 |
| 9/15 | 19.4 | 16.1 | 12.42 | 0.2 | 120 | 168 | | 0.5 | 4 | 4 |
| 10/14 | 13.8 | 13.7 | 7.09 | 0.34 | 150 | 208 | | 0.3 | 3 | 4 |



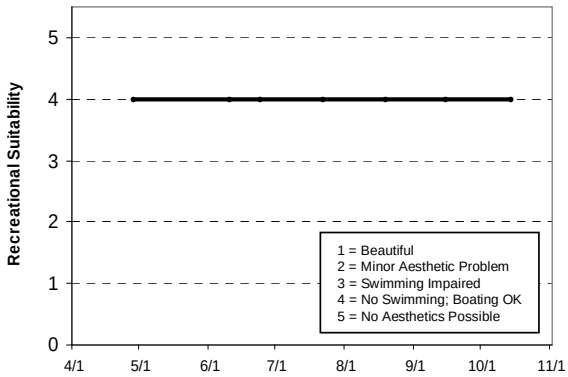

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | | D |
| Chlorophyll a | | | | | F |
| Secchi Depth | | | | | F |
| **Lake Grade** | | | | | **F** |

Source: Metropolitan Council and STORET data



## Rutz Lake (10-0080) *Carver County Environmental Services*

Rutz Lake is a 61-acre lake located within Waconia Township (Carver County). The maximum depth of the lake is 4.0 m (roughly 13 feet). Because of the shallowness of the lake, the entire area is considered littoral zone (area of aquatic plant dominance) and it does not maintain a thermocline (a density gradient owed to changing water temperatures throughout the lake's water column).

This was the fourth year that Rutz Lake has been involved in the CAMP. The four years of CAMP data are the only known water quality data available for the lake.

The lake was monitored 5 times from mid May to early August. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

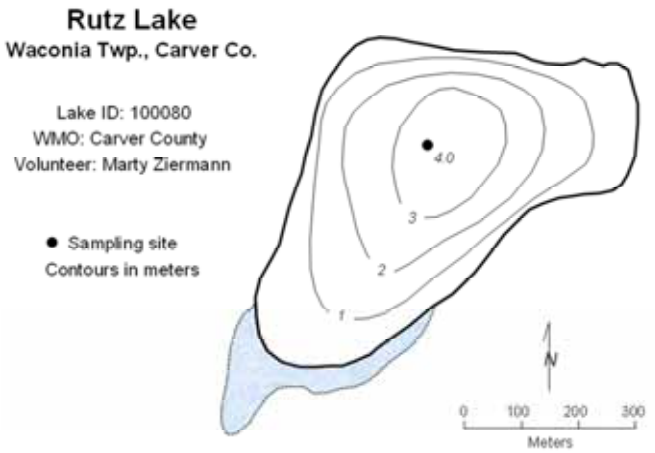
**2008 summer (May-September) data summary**

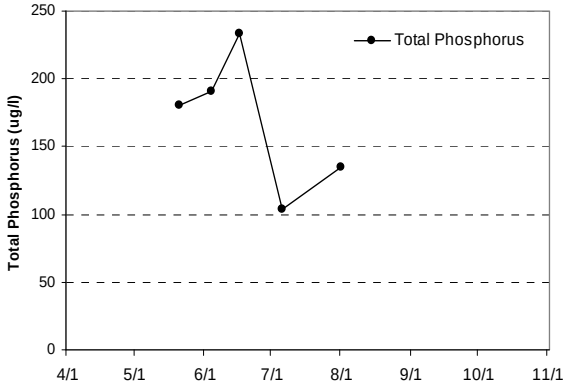
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 168.8 | 104.0 | 233.0 | F |
| **CLA** (µg/l) | 50.8 | 14.0 | 75.0 | D |
| **Secchi** (m) | 0.5 | 0.4 | 0.6 | F |
| **TKN** (mg/l) | 2.56 | 2.40 | 2.80 | |
| | | | ***Lake Grade*** | F |

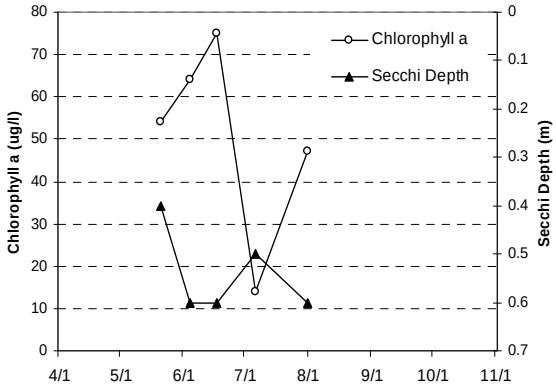
The lake received a lake grade of F for 2008, which is similar to the lake grade received for 2007, but worse than the D grades received for 2000 and 2006. Because of the limited years of data for this lake, a trend in water quality is difficult to determine with sufficient confidence. To better understand the lake's water quality and where it may be heading, more data are needed.

The perceived physical and recreational conditions (ranked on a 1-to-5 scale) are shown on the lake's information sheet on the next page. The average user perception rankings, were 2.6 for physical condition (between 2- "some algae present" and 3- "definite algae present"), and 3.2 for recreational suitability (between 3- "swimming slightly impaired" and 4- "no swimming – boating ok").

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.

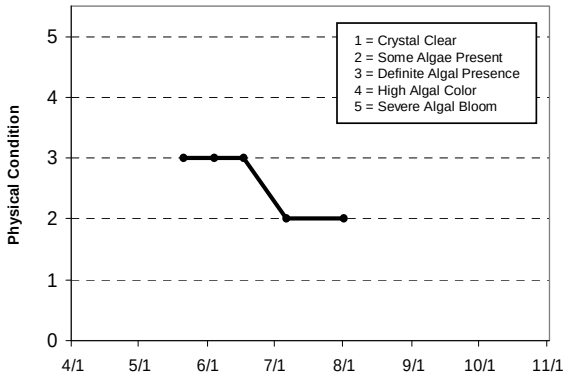



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/21 | 18 | | | | 54 | 181 | | 0.4 | 3 | 4 |
| 6/4 | 23 | | | | 64 | 191 | | 0.6 | 3 | 4 |
| 6/17 | 24 | | | | 75 | 233 | | 0.6 | 3 | 2 |
| 7/6 | 27 | | | | 14 | 104 | | 0.5 | 2 | 3 |
| 8/1 | 29.7 | | | | 47 | 135 | | 0.6 | 2 | 3 |



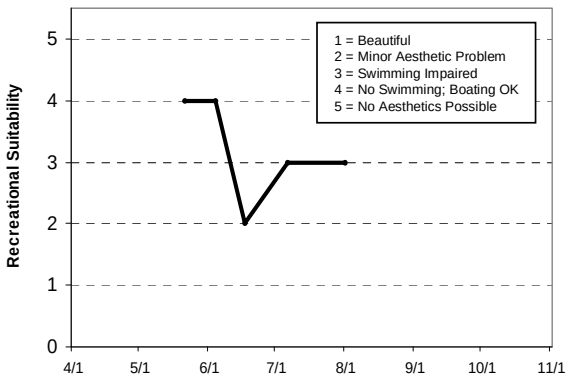

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | F | | | |
| Chlorophyll a | | | | | | | | | C | | | |
| Secchi Depth | | | | | | | | | D | | | |
| **Lake Grade** | | | | | | | | | **D** | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | F | F | F |
| Chlorophyll a | | | D | F | D |
| Secchi Depth | | | D | D | F |
| **Lake Grade** | | | **D** | **F** | **F** |

Source: Metropolitan Council and STORET data



## Ryan Lake (27-0058) *Shingle Creek Watershed Management Commission*

Ryan Lake is located in the City of Robbinsdale (Hennepin County). The 35-acre lake has a maximum depth of approximately 10.7 m (35 ft). The watershed for the lake has an area of 5,510 acres. The surface area of the watershed and lake translate to a watershed-to-lake area ratio of 157:1. The larger the ratio the greater the potential stress on the lake from surface runoff.

A search of the STORET database revealed minimal data from 1980-1981, 1994-1995 (Secchi data), 1996, 1998, 2000 and 2002. The only years of historical data for TP, CLA and Secchi data are 1996, 1998, 2000, 2002, and 2003. While studies by Dr. Joe Shapiro were thought to have been undertaken in the mid-1980's no data were found.

The lake was monitored 13 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 37.9 | 26.0 | 60.0 | C |
| **CLA** (µg/l) | 9.1 | 2.1 | 18.0 | A |
| **Secchi** (m) | 2.0 | 1.0 | 3.8 | C |
| **TKN** (mg/l) | 1.57 | 0.86 | 2.20 | |
| | | | ***Lake Grade*** | B |

The lake received a lake grade of B for 2008, which is similar to lake grades received in 2002 and 2003. The lake grades have fluctuated from C to B to D and back to B over the previous 13 years. Continued monitoring is suggested to continue to build the historical database.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page (ranked on a scale of 1 to 5). The average user perception rankings were 1.7 for physical condition (between 1- "crystal clear" and 2- "some algae present"), and 1.6 for recreational suitability (between 1- "beautiful" and 2- "minor aesthetic problem").

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/.

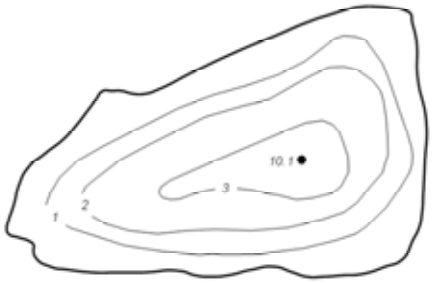
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

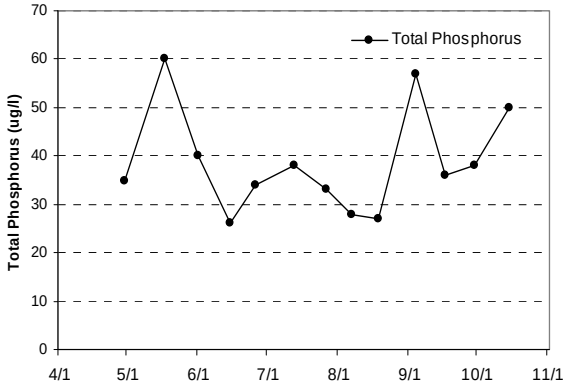
## Ryan Lake

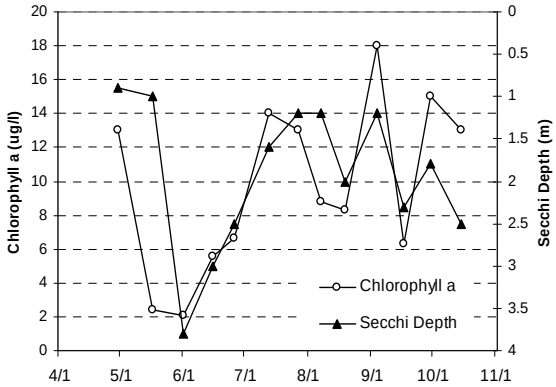
**Brooklyn Park/Robbinsdale, Hennepin Co.**

Lake ID: 270058
WMO: Shingle Creek
Volunteer: Paul Brenna

● Sampling site
Contours in meters

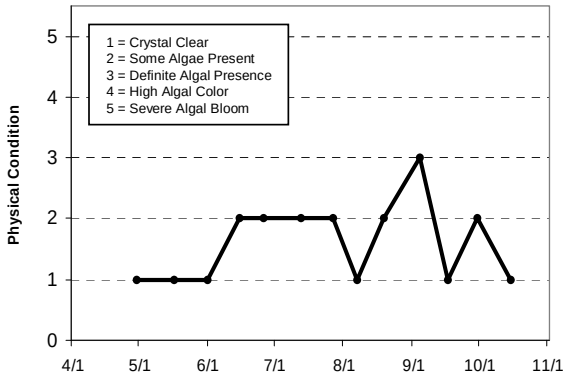



### 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/30 | 10.9 | | | | 13 | 35 | | 0.9 | 1 | |
| 5/17 | 18.8 | | | | 2.4 | 60 | | 1 | 1 | 1 |
| 6/1 | 21.7 | | | | 2.1 | 40 | | 3.8 | 1 | 1 |
| 6/15 | 22.6 | | | | 5.6 | 26 | | 3 | 2 | 1 |
| 6/26 | 26.9 | | | | 6.6 | 34 | | 2.5 | 2 | 2 |
| 7/13 | 24.8 | | | | 14 | 38 | | 1.6 | 2 | 2 |
| 7/27 | 26.3 | | | | 13 | 33 | | 1.2 | 2 | 2 |
| 8/7 | 26.8 | | | | 8.8 | 28 | | 1.2 | 1 | 1 |
| 8/19 | 28.4 | | | | 8.3 | 27 | | 2 | 2 | 2 |
| 9/4 | 21 | | | | 18 | 57 | | 1.2 | 3 | 2 |
| 9/17 | 21 | | | | 6.3 | 36 | | 2.3 | 1 | 1 |
| 9/30 | 17.1 | | | | 15 | 38 | | 1.8 | 2 | 3 |
| 10/15 | 13.5 | | | | 13 | 50 | | 2.5 | 1 | 2 |



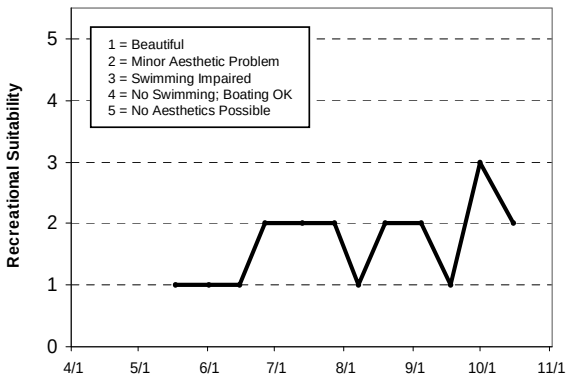

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | C | | C | | D | | C | C |
| Chlorophyll a | | | | | B | | B | | C | | A | A |
| Secchi Depth | | | C | C | C | | B | | D | | C | B |
| **Lake Grade** | | | | | **C** | | **B** | | **D** | | **B** | **B** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | | C |
| Chlorophyll a | | | | | A |
| Secchi Depth | | | | | C |
| **Lake Grade** | | | | | **B** |

Source: Metropolitan Council and STORET data



## Sand Lake (82-0067) *Marine on St. Croix Watershed Management Organization*

Sand Lake is a 46-acre lake located within City of Scandia (Washington County). The lake has a surface area of 46 acres (1.8 miles in circumference) and a mean and maximum depth of 2.4 m (8 feet) and 5.5 m (18 feet), respectively. The lake, which has two inlets has an approximate volume of 368 ac-ft. Approximately 46 percent of the lake's surface area is considered littoral, the shallow (0-15 foot) area dominated by aquatic vegetation.

In 2007, the lake was monitored 14 times. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. Depth profiles for temperature and dissolved oxygen were also measured. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 41.5 | 30.0 | 52.0 | C |
| **CLA** (µg/l) | 31.8 | 7.2 | 100.0 | C |
| **Secchi** (m) | 1.8 | 0.8 | 2.6 | C |
| **TKN** (mg/l) | 1.35 | 0.96 | 2.10 | |
| | | | ***Lake Grade*** | C |

The lake received a lake grade of C for 2008, which is similar to most lake grades received in previous years of monitoring since 1993. The lake appears to be characterized as a C lake, though it occasionally has received B lake grades. A recent trend analysis by the MPCA on the lake's Secchi depth data showed no statistically significant trend in water clarity.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.4 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 2.6 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

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/.

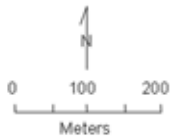
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

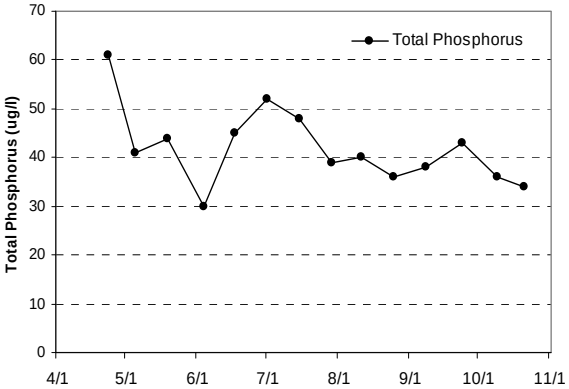
# Sand Lake

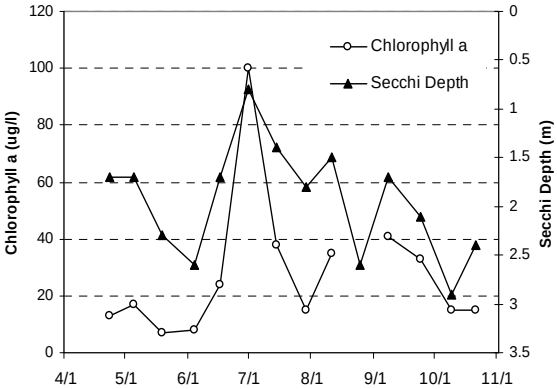
**Scandia, Washington Co.**

Lake ID: 820067
WD: Carnelian-Marine-St. Croix
Volunteer: Washington Conservation District

● Sampling site
Contours in meters

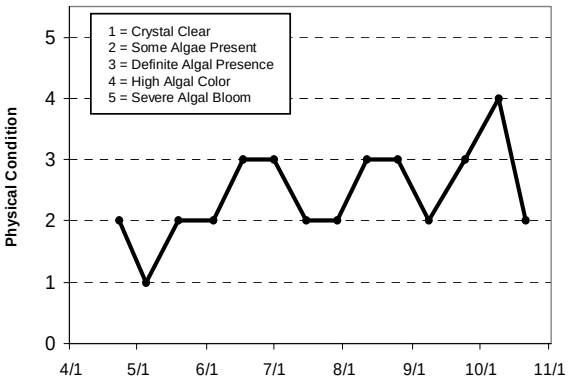





## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/23 | 9.4 | 6 | 10.67 | 1.43 | 13 | 61 | | 1.7 | 2 | 2 |
| 5/5 | 10.9 | 9.6 | 11.25 | 10.14 | 17 | 41 | | 1.7 | 1 | 2 |
| 5/19 | 16 | 11.1 | 8.32 | 0.27 | 7.2 | 44 | | 2.3 | 2 | 3 |
| 6/4 | 18.2 | 12.5 | 7.51 | 0.16 | 7.9 | 30 | 66 | 2.6 | 2 | 2 |
| 6/17 | 20.6 | 12.5 | 7.98 | 0.27 | 24 | 45 | 72 | 1.7 | 3 | 2 |
| 7/1 | 24 | 13.2 | 10.8 | 0.54 | 100 | 52 | 66 | 0.8 | 3 | 4 |
| 7/15 | 23.9 | 13.2 | 6.75 | 0.4 | 38 | 48 | 96 | 1.4 | 2 | 3 |
| 7/29 | 26.3 | 13.9 | 7.23 | 0.32 | 15 | 39 | 89 | 1.8 | 2 | 2 |
| 8/11 | 24.8 | 14.2 | 8.08 | 0.26 | 35 | 40 | 213 | 1.5 | 3 | 3 |
| 8/25 | 23.1 | 14.9 | 5.76 | 0.26 | | 36 | 124 | 2.6 | 3 | 2 |
| 9/8 | 19.6 | 15.1 | 6.38 | 0.24 | 41 | 38 | 82 | 1.7 | 2 | 3 |
| 9/24 | 19.4 | 16.1 | 6.76 | 0.24 | 33 | 43 | 75 | 2.1 | 3 | 3 |
| 10/9 | 14.2 | 14 | 5.75 | 0.3 | 15 | 36 | 34 | 2.9 | 4 | 4 |
| 10/21 | 11.8 | 11.7 | 6.78 | 0.35 | 15 | 34 | 29 | 2.4 | 2 | 2 |



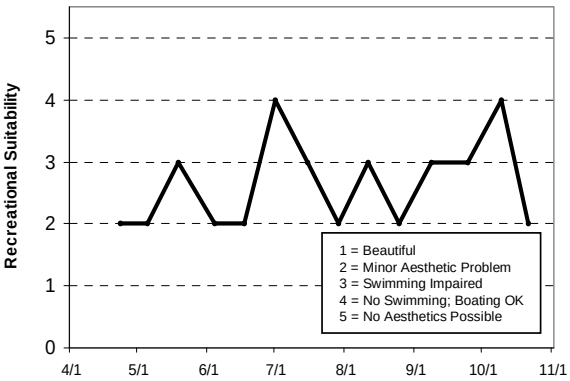

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | C | C | C | C | | | | | | C | C |
| Chlorophyll a | | C | C | B | C | | | | | | B | C |
| Secchi Depth | | D | D | C | C | | | | | | C | C |
| **Lake Grade** | | **C** | **C** | **C** | **C** | | | | | | **C** | **C** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | B | C | C | B | C |
| Chlorophyll a | B | C | B | B | C |
| Secchi Depth | C | C | C | B | C |
| **Lake Grade** | **B** | **C** | **C** | **B** | **C** |

Source: Metropolitan Council and STORET data



## Scout Lake (19-0198) *City of Apple Valley*

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 area of the lake is considered littoral zone which is the 0-15 feet depth zone of aquatic plant dominance. Furthermore, the lake does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the water column.

This was the second year that Scout Lake has been involved in the CAMP. A search through the STORET database revealed no historical water quality data other than the CAMP data.

The lake was monitored 14 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

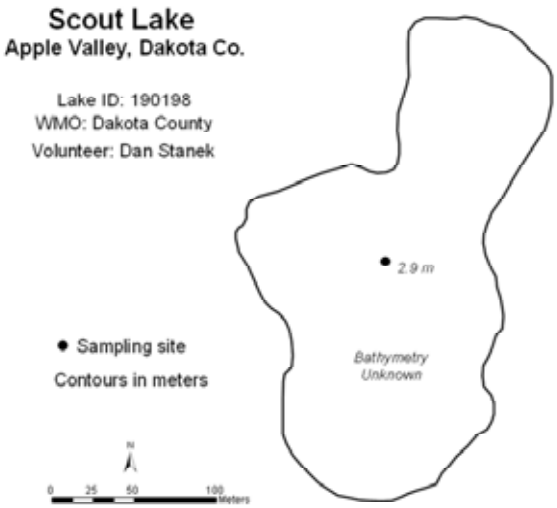
**2008 summer (May-September) data summary**

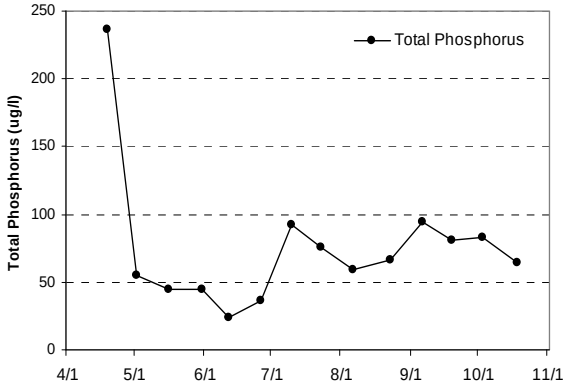
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 61.2 | 24.0 | 94.0 | C |
| **CLA** (µg/l) | 41.9 | 6.8 | 85.0 | C |
| **Secchi** (m) | 1.3 | 0.5 | 2.8 | C |
| **TKN** (mg/l) | 2.11 | 0.81 | 3.20 | |
| | | | ***Lake Grade*** | C |

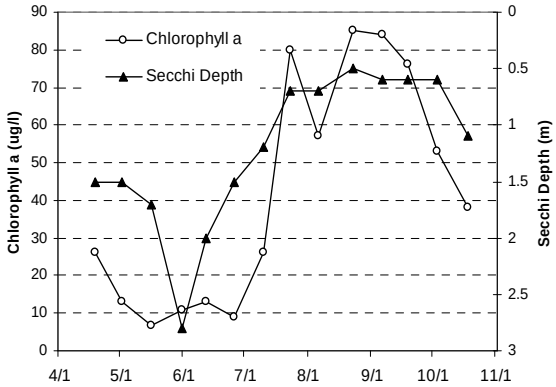
The lake received a lake grade of C for 2008, which is an improvement from last year's D lake grade. Additional years of monitoring will be needed to build the water quality database to determine trends in water quality.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 1.7 (between 1- "crystal clear" and 2- "some algae present"). The average recreational suitability ranking was 1.5 (between 1- "beautiful" and 2- "minor aesthetic problem").

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.

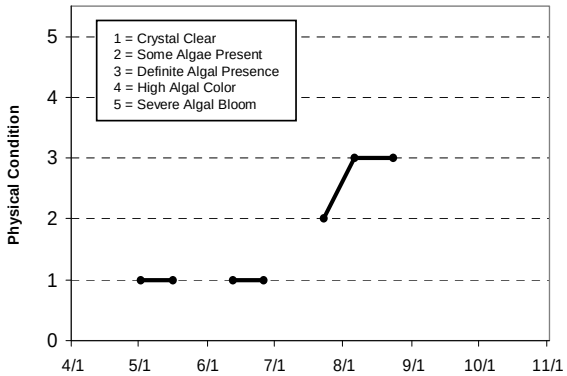



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/19 | 6.6 | | | | 26 | 236 | | 1.5 | | |
| 5/2 | 12.1 | | | | 13 | 55 | | 1.5 | 1 | |
| 5/16 | 20.6 | | | | 6.8 | 45 | | 1.7 | 1 | 1 |
| 5/31 | 22.2 | | | | 11 | 45 | | 2.8 | | 1 |
| 6/12 | 24.4 | | | | 13 | 24 | | 2 | 1 | 1 |
| 6/26 | 26.9 | | | | 9 | 36 | | 1.5 | 1 | 3 |
| 7/10 | 26.5 | | | | 26 | 92 | | 1.2 | | |
| 7/23 | 28.9 | | | | 80 | 76 | | 0.7 | 2 | |
| 8/6 | 27.8 | | | | 57 | 59 | | 0.7 | 3 | |
| 8/23 | 25.9 | | | | 85 | 66 | | 0.5 | 3 | |
| 9/6 | 22.3 | | | | 84 | 94 | | 0.6 | | |
| 9/19 | 22.4 | | | | 76 | 81 | | 0.6 | | |
| 10/3 | 16.9 | | | | 53 | 83 | | 0.6 | | |
| 10/18 | 14.1 | | | | 38 | 64 | | 1.1 | | |



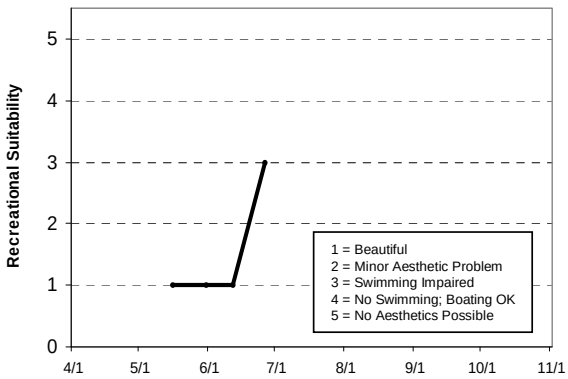

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | D | C |
| Chlorophyll a | | | | C | C |
| Secchi Depth | | | | F | C |
| **Lake Grade** | | | | **D** | **C** |

Source: Metropolitan Council and STORET data



## Sea Lake (82-0053) *Forest Lake – Comfort Lake Watershed District*

Scout Lake is a small lake located in Scandia (Washington County). Little information is available on the morphology of the lake. This was the first year that the lake has been involved in the CAMP. A search through the STORET database revealed no historical water quality data for the lake.

The lake was monitored 12 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

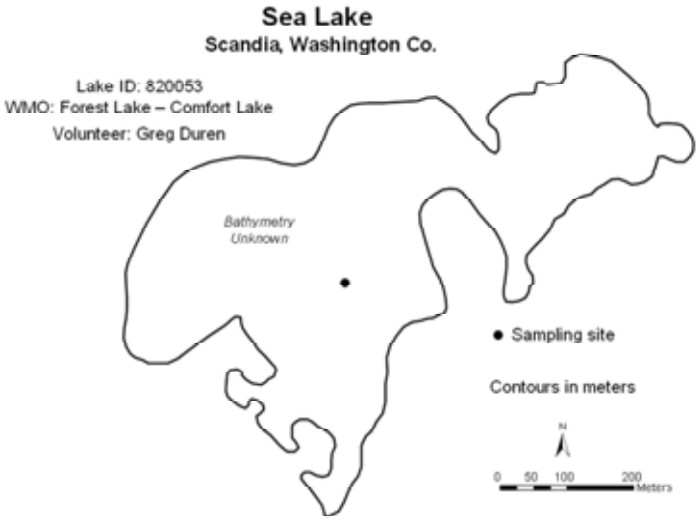
**2008 summer (May-September) data summary**

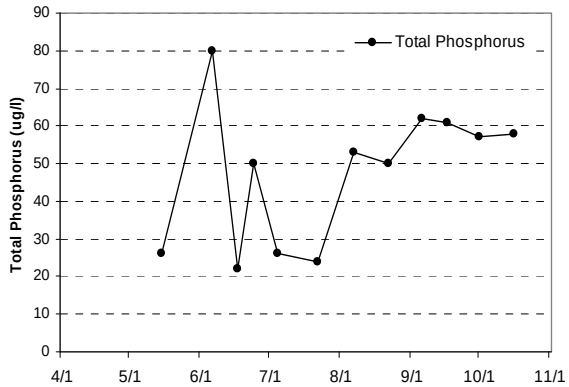
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 45.4 | 22.0 | 80.0 | C |
| **CLA** (µg/l) | 12.0 | 7.1 | 19.0 | B |
| **Secchi** (m) | 1.2 | 1.1 | 1.4 | D |
| **TKN** (mg/l) | 1.61 | 0.78 | 3.00 | |
| | | | ***Lake Grade*** | C |

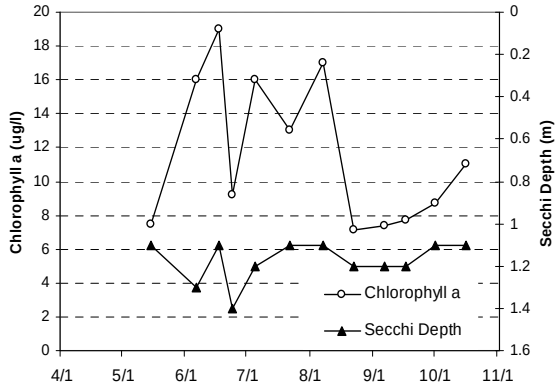
The lake received a lake grade of C for 2008. Additional years of monitoring will be needed to build the water quality database to determine trends in water quality. The water clarity grade of D does not correlate well with the chlorophyll-a grade of B. A possible explanation may be that the water clarity may be affected by higher levels of total suspended solids from surface runoff. It is possible for higher suspend solids loadings to decrease water clarity which would decrease light penetration thereby inhibiting algal growth.

The volunteer's perceptions of the physical conditions of the lake are shown on the next page. The condition was ranked on a scale of 1 to 5. The average physical condition ranking was 2.8 (between 2- "some algae present" and 3- "definite algae present"). The recreational suitability rankings were not recorded by the volunteer.

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.

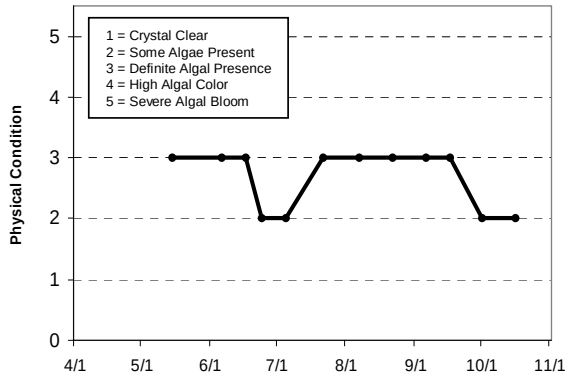



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/15 | 13.3 | | | | 7.5 | 26 | | 1.1 | 3 | |
| 6/6 | 20 | | | | 16 | 80 | | 1.3 | 3 | |
| 6/17 | 22.5 | | | | 19 | 22 | | 1.1 | 3 | |
| 6/24 | 21.1 | | | | 9.2 | 50 | | 1.4 | 2 | |
| 7/5 | 23.7 | | | | 16 | 26 | | 1.2 | 2 | |
| 7/22 | 25.4 | | | | 13 | 24 | | 1.1 | 3 | |
| 8/7 | 25.2 | | | | 17 | 53 | | 1.1 | 3 | |
| 8/22 | 25.6 | | | | 7.1 | 50 | | 1.2 | 3 | |
| 9/6 | 25.7 | | | | 7.4 | 62 | | 1.2 | 3 | |
| 9/17 | 24.9 | | | | 7.7 | 61 | | 1.2 | 3 | |
| 10/1 | 17.2 | | | | 8.7 | 57 | | 1.1 | 2 | |
| 10/16 | 11.1 | | | | 11 | 58 | | 1.1 | 2 | |



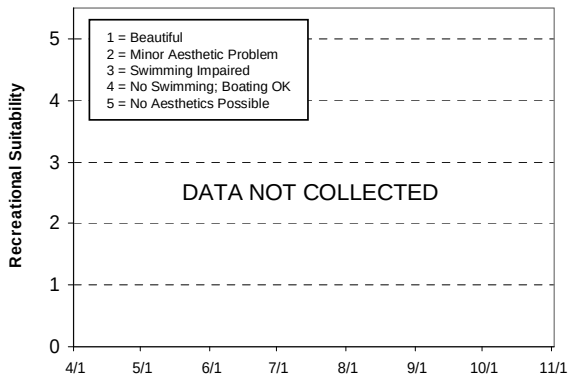

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | | C |
| Chlorophyll a | | | | | B |
| Secchi Depth | | | | | D |
| **Lake Grade** | | | | | **C** |

Source: Metropolitan Council and STORET data



## **Seidl's Lake (19-0095)** Cities of ***Inver Grove Heights and South St. Paul***

Seidl's Lake is a 14-acre lake located in the City of Inver Grove Heights (Dakota County) which receives inflow from five inlets. Other than that the maximum depth of the lake is approximately 5.0 m (17 feet), there is very little known morphological data available. The lake has been enrolled in CAMP since 1995.

The lake was monitored 4 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

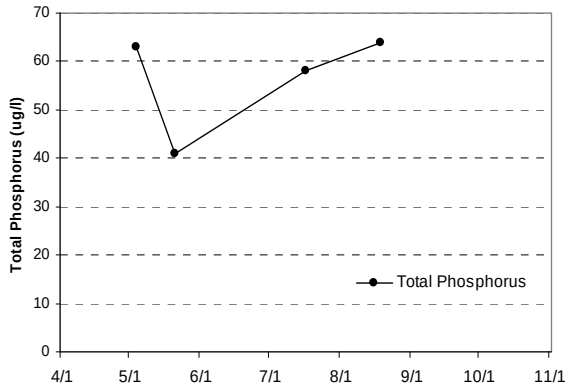
**2008 summer (May-September) data summary**

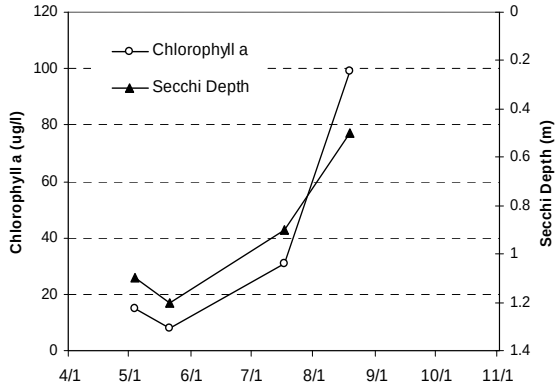
| ***Parameter*** | ***Mean*** | ***Minimum*** | ***Maximum*** | ***Grade*** |
|---|---|---|---|---|
| **TP** (µg/l) | 56.5 | 41.0 | 64.0 | |
| **CLA** (µg/l) | 38.3 | 8.1 | 99.0 | |
| **Secchi** (m) | 0.9 | 0.5 | 1.2 | |
| **TKN** (mg/l) | 2.05 | 1.40 | 2.60 | |
| | | | ***Lake Grade*** | |

No lake grade or parameter grades were issued this year because of too few monitoring events. At least 5 monitoring events during the summer-time period are required to determine grades. However, a trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed a statistically significant declining trend in water clarity (MPCA 2008).

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.3 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 3.8 (between 3- "swimming slightly impaired" and 4- "no swimming/boating ok").

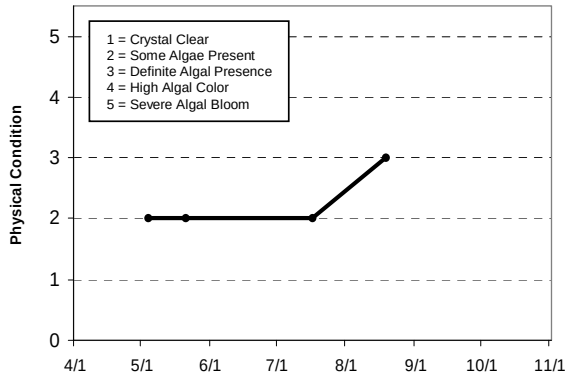
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.




## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/4 | 14.3 | | | | 15 | 63 | | 1.1 | 2 | 4 |
| 5/21 | 18.4 | | | | 8.1 | 41 | | 1.2 | 2 | 4 |
| 7/17 | 28.9 | | | | 31 | 58 | | 0.9 | 2 | 3 |
| 8/19 | 29.4 | | | | 99 | 64 | | 0.5 | 3 | 4 |



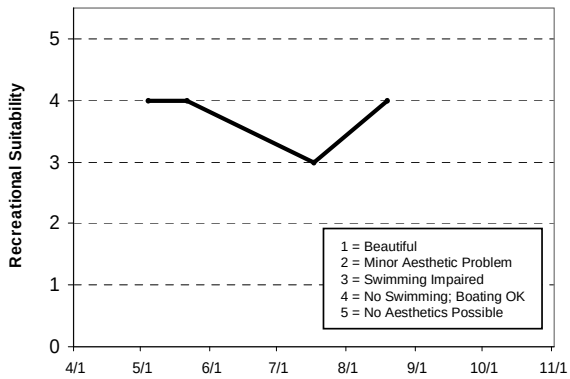

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | C |
| Chlorophyll a | | | | | | | | | | | | C |
| Secchi Depth | | | | | | | | | | | | D |
| **Lake Grade** | | | | | | | | | | | | **C** |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | C | C | C | C | D | C | C | D | C |
| Chlorophyll a | | | | A | B | B | C | C | C | C | C | B |
| Secchi Depth | | 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 |
|---|---|---|---|---|---|
| Total Phosphorus | D | C | D | D | |
| Chlorophyll a | B | C | C | C | |
| Secchi Depth | C | D | F | F | |
| **Lake Grade** | **C** | **C** | **D** | **D** | |

Source: Metropolitan Council and STORET data



## Silver Lake [Washington County] (82-0016) *Carnelian - Marine Watershed District*

Silver Lake is a 98-acre lake located within Stillwater Township (Washington County). The maximum and mean depths of the lake are 3.4 m (roughly 11 feet) and 1.7 m (five-and-a-half feet), respectively. The mean depth of the lake and its surface area translate to an approximate lake volume of 549 ac-ft. The entire area of the lake is considered littoral zone which is the 0-15 feet depth zone of aquatic plant dominance. Furthermore, the lake does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the water column.

The lake's 455-acre watershed and surface area translates to a watershed-to-lake size ratio of 4.6:1 (the greater the ratio, the greater the potential stress on the lake from surface runoff).

The lake was monitored 7 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 39.0 | 24.0 | 56.0 | C |
| **CLA** (µg/l) | 18.9 | 3.4 | 51.0 | B |
| **Secchi** (m) | 2.2 | 1.8 | 2.7 | C |
| **TKN** (mg/l) | 0.96 | 0.75 | 1.50 | |
| | | | ***Lake Grade*** | C |

The lake's 2007 Lake Grade is similar to that recorded in 1996-1998 and 2000-2001 and 2006, better than the Lake Grade of D in 1999 and worse than the Lake Grades of B in 2004-2005. When looking at the grades and individual parameter means, it is apparent that 2004 was the lakes best-recorded water quality year. The water quality database shows that the lake has varied from C to D to B to C grades since 1996. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed a statistically significant improving trend in water clarity (MPCA 2008).

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.2 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 2.5 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

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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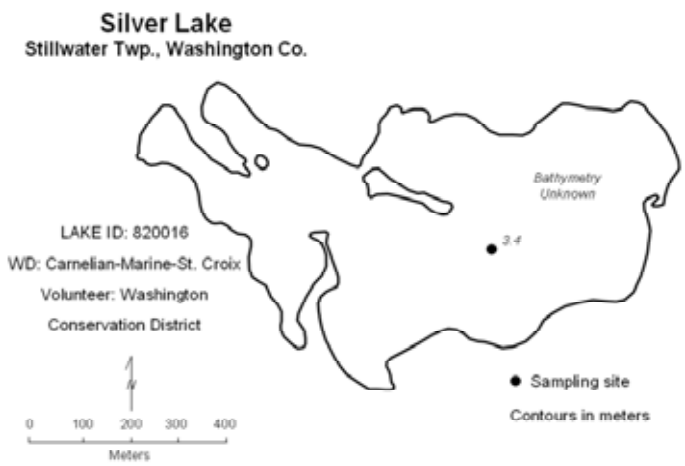
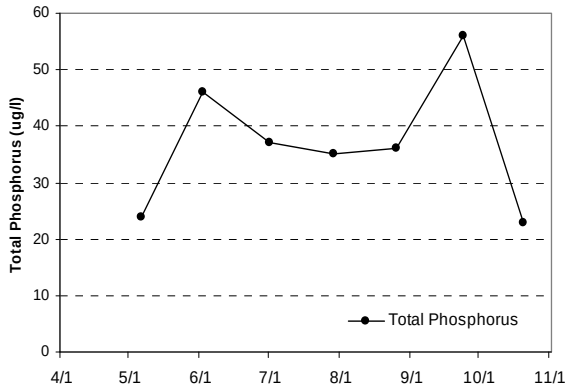
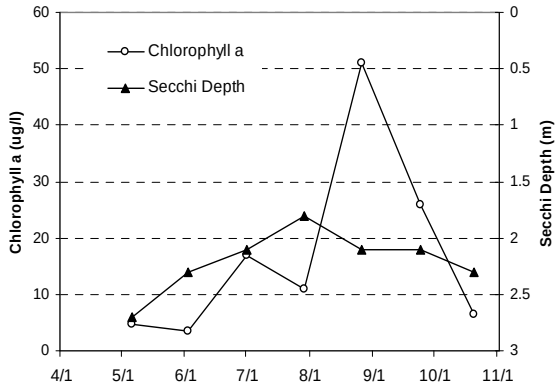
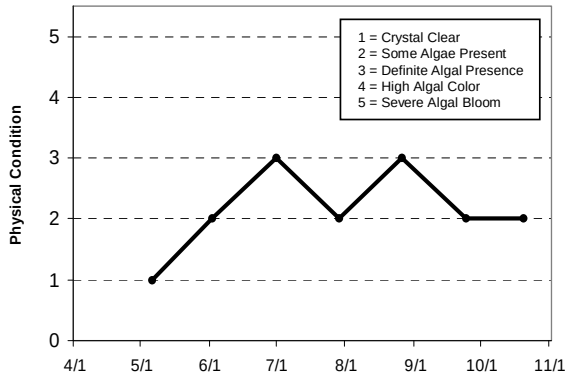



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/6 | 13.6 | 12.6 | 10.99 | 8.47 | 4.7 | 24 | | 2.7 | 1 | 1 |
| 6/2 | 20.5 | 18.6 | 8.48 | 2.7 | 3.4 | 46 | 22 | 2.3 | 2 | 2 |
| 7/1 | 24.6 | 20.3 | 9.57 | 0.35 | 17 | 37 | 120 | 2.1 | 3 | 4 |
| 7/29 | 26.9 | 21.2 | 8.08 | 0.23 | 11 | 35 | 154 | 1.8 | 2 | 3 |
| 8/26 | 22.3 | 21.5 | 6.26 | 0.3 | 51 | 36 | 459 | 2.1 | 3 | 2 |
| 9/24 | 19.7 | 18.9 | 6.6 | 0.32 | 26 | 56 | 39 | 2.1 | 2 | 3 |
| 10/20 | 12 | 11.9 | 9.25 | 6.18 | 6.4 | 23 | 27 | 2.3 | 2 | 2 |



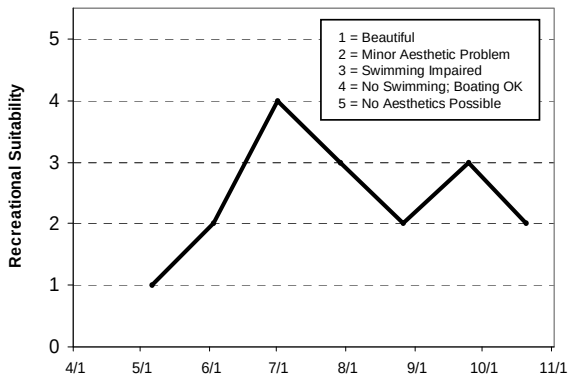

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | C | C | C | D | C | C | | |
| Chlorophyll a | | | | | C | C | C | D | B | B | | |
| Secchi Depth | | | | | C | D | D | D | C | C | C | B |
| **Lake Grade** | | | | | **C** | **C** | **C** | **D** | **C** | **C** | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | B | C | C | C | C |
| Chlorophyll a | A | A | B | B | B |
| Secchi Depth | B | B | C | C | C |
| **Lake Grade** | **B** | **B** | **C** | **C** | **C** |

Source: Metropolitan Council and STORET data



## South Oak Lake (27-0661) *City of St. Louis Park*

South Oak 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 lake was monitored 5 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

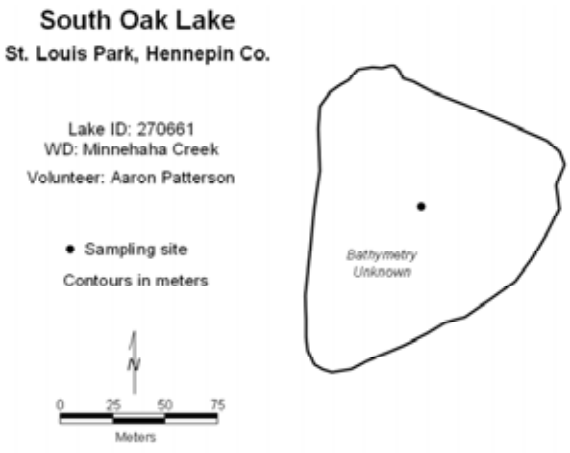
**2008 summer (May-September) data summary**

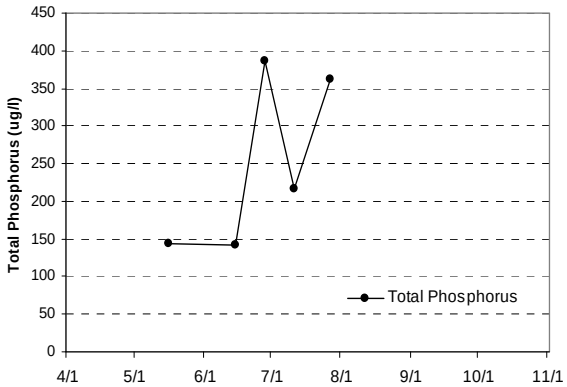
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 250.2 | 142.0 | 387.0 | F |
| **CLA** (µg/l) | 151.8 | 30.0 | 310.0 | F |
| **Secchi** (m) | 0.5 | 0.3 | 0.7 | F |
| **TKN** (mg/l) | 2.24 | 1.30 | 3.20 | |
| | | | ***Lake Grade*** | F |

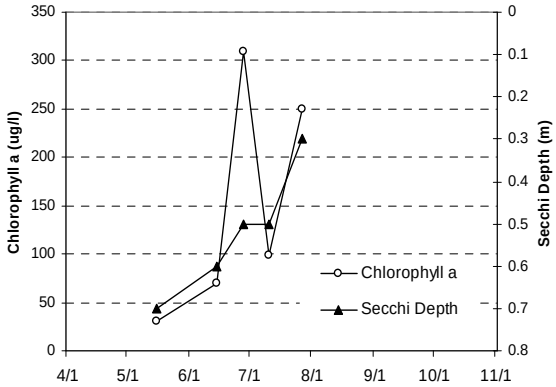
The lake received a lake grade of F for 2008, which is similar to last year's lake grade of F. With two consecutive years of the lake receiving F lake grades, the water quality of the lake may be degrading. Continued monitoring of this lake is suggested to determine if this downward trend continues.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 1.6 (between 1- "crystal clear" and 2- "some algae present"). The average recreational suitability ranking was 2.4 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

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.

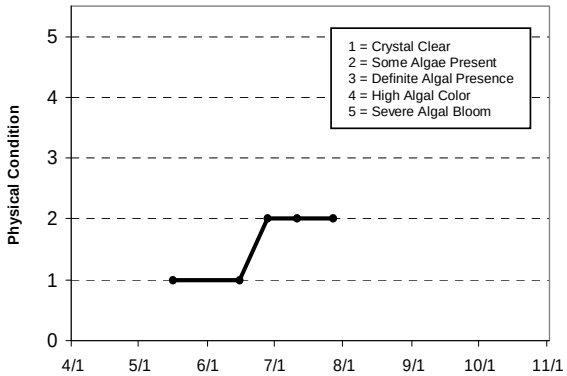



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/16 | 15.7 | | | | 30 | 143 | | 0.7 | 1 | 4 |
| 6/15 | 22.1 | | | | 70 | 142 | | 0.6 | 1 | 2 |
| 6/28 | 24.9 | | | | 310 | 387 | | 0.5 | 2 | 2 |
| 7/11 | 22.8 | | | | 99 | 216 | | 0.5 | 2 | 2 |
| 7/27 | 26.1 | | | | 250 | 363 | | 0.3 | 2 | 2 |



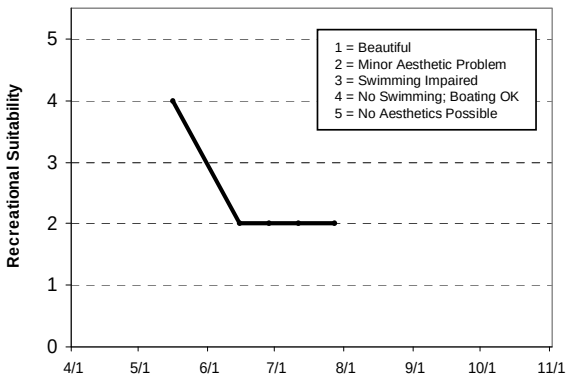

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | D | D |
| Chlorophyll a | | | | | | | | | | | D | C |
| Secchi Depth | | | | | | | | | | | D | F |
| **Lake Grade** | | | | | | | | | | | **D** | **D** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | D | F | F |
| Chlorophyll a | | | C | F | F |
| Secchi Depth | | | D | F | F |
| **Lake Grade** | | | **D** | **F** | **F** |

Source: Metropolitan Council and STORET data



## South Rice Lake (27-0645) *Bassett Creek Watershed Management Organization*

South Rice Lake is a 3.2-acre lake located within the City of Golden Valley (Hennepin County). The maximum and mean depths of the lake are 2.5 m (roughly 8 feet) and 0.5 m (one-and-a-half feet), respectively. The mean depth of the lake and its surface area translate to an approximate lake volume of 5.4 ac-ft. The entire area of the lake is considered littoral zone which is the 0-15 feet depth zone of aquatic plant dominance. Furthermore, the lake does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the water column.

The lake's 63-acre immediate watershed and surface area translates to a watershed-to-lake area ratio of 20:1 (the greater the ratio, the greater the potential stress on the lake from surface runoff). When including the lake's whole contributing watershed (including flow from Grimes Pond and North Rice Lake), however, the size increases to 514 acres (160:1) (Barr 1997).

The lake was monitored 6 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

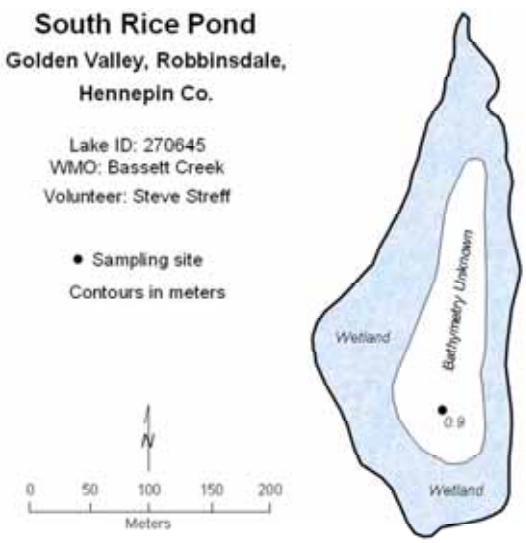
**2008 summer (May-September) data summary**

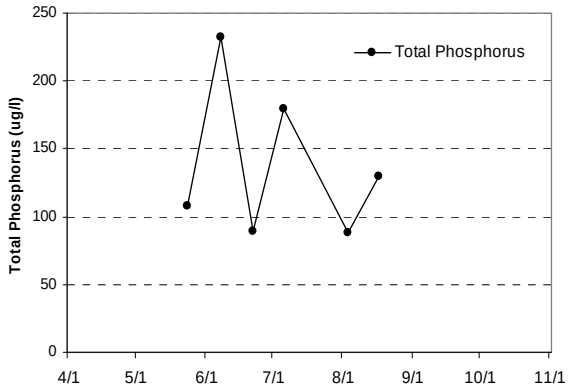
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 137.7 | 88.0 | 232.0 | D |
| **CLA** (µg/l) | 38.0 | 3.6 | 85.0 | C |
| **Secchi** (m) | 0.6 | 0.3 | 0.9 | F |
| **TKN** (mg/l) | 2.07 | 1.20 | 2.70 | |
| | | | ***Lake Grade*** | D |

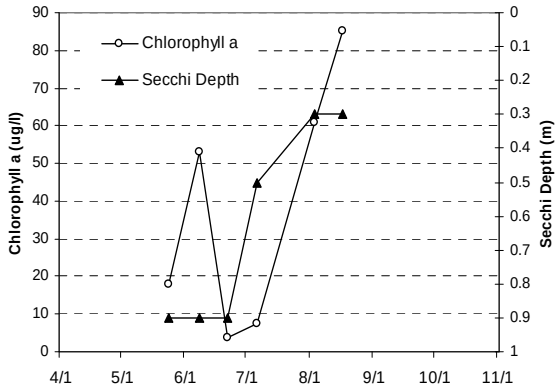
The lake received a lake grade of D for 2008, which is similar to most lake grades received in the previous years since 2000.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 3.8 (between 3- "definite algae present" and 4- "high algal color"). The average recreational suitability ranking was 4.3 (between 4- "no swimming/boating ok" and 5- "no aesthetics possible").

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.

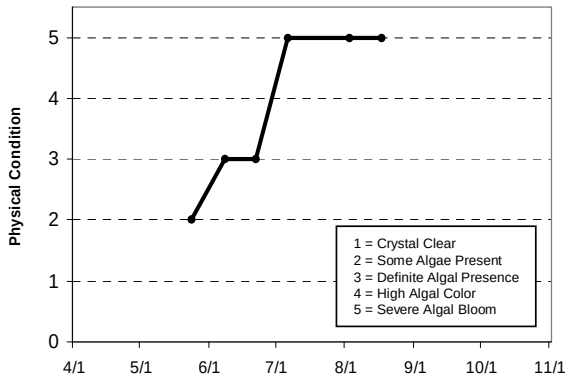



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/24 | 20 | | | | 18 | 108 | | 0.9 | 2 | 3 |
| 6/8 | 23 | | | | 53 | 232 | | 0.9 | 3 | 4 |
| 6/22 | 24 | | | | 3.6 | 89 | | 0.9 | 3 | 4 |
| 7/6 | 27 | | | | 7.3 | 179 | | 0.5 | 5 | 5 |
| 8/3 | 22 | | | | 61 | 88 | | 0.3 | 5 | 5 |
| 8/17 | 22 | | | | 85 | 130 | | 0.3 | 5 | 5 |



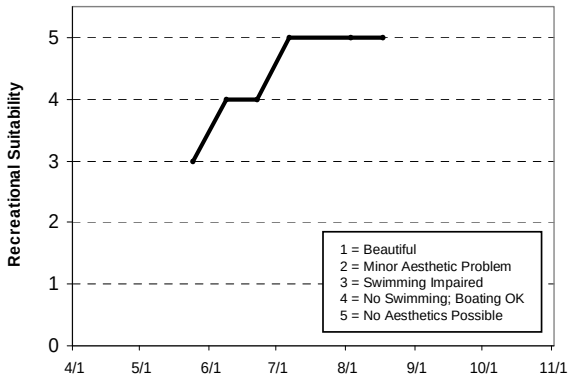

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | F | F | D | F |
| Chlorophyll a | | | | | | | | | F | B | B | C |
| Secchi Depth | | | | | | | | | F | F | F | F |
| **Lake Grade** | | | | | | | | | **F** | **D** | **D** | **D** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | D | D | F | F | D |
| Chlorophyll a | A | C | C | C | C |
| Secchi Depth | D | D | D | D | F |
| **Lake Grade** | **C** | **D** | **D** | **D** | **D** |

Source: Metropolitan Council and STORET data



## South School Section Lake (82-0151) *Browns Creek Watershed District*

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). About 41 percent of the lake's area is considered littoral, the shallow (0-15 feet) area dominated by aquatic vegetation.

The lake was monitored 14 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. Depth profiles for temperature and dissolved oxygen were also measured. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

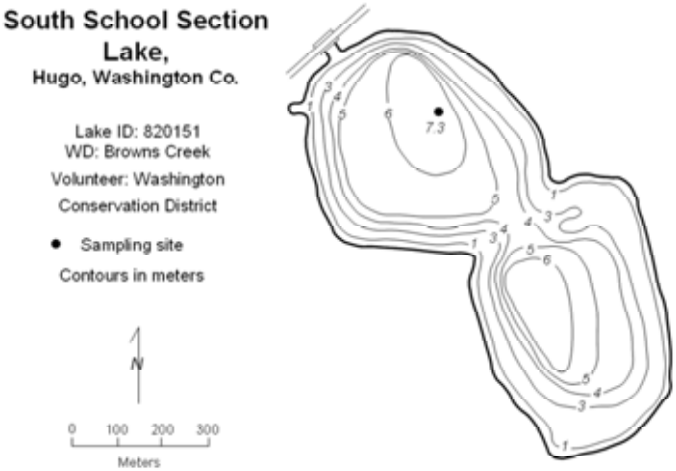
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 58.9 | 27.0 | 165.0 | C |
| **CLA** (µg/l) | 19.9 | 4.5 | 43.0 | B |
| **Secchi** (m) | 2.1 | 1.2 | 4.3 | C |
| **TKN** (mg/l) | 1.37 | 0.84 | 3.00 | |
| | | | ***Lake Grade*** | C |

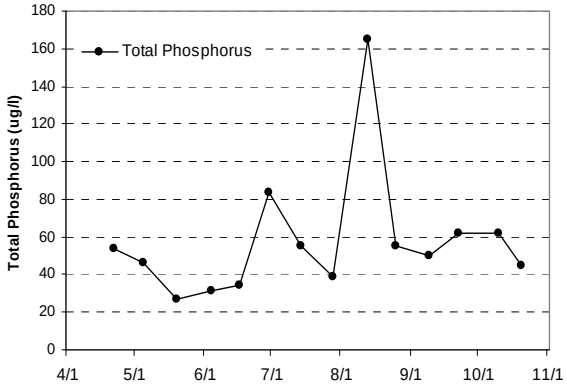
The lake received a lake grade of C for 2008. The lake has consistently received C lake grades during monitoring years since 1995.

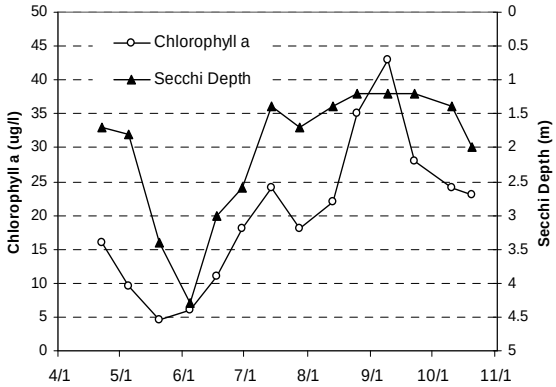
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.9 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 3.3 (between 3- "swimming slightly impaired" and 4- "no swimming/boating ok").

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.

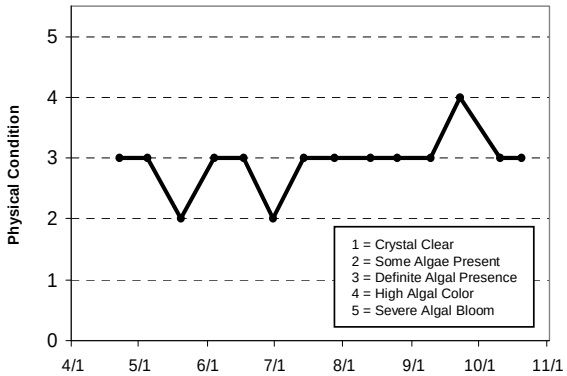



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/22 | 5.9 | 5.2 | 15.99 | 5.23 | 16 | 54 | | 1.7 | 3 | 4 |
| 5/5 | 9.9 | 9.2 | 11.36 | 0.59 | 9.6 | 46 | | 1.8 | 3 | 4 |
| 5/20 | 14.2 | 14.1 | 9.27 | 0.71 | 4.5 | 27 | 24 | 3.4 | 2 | 2 |
| 6/4 | 17.7 | 16.3 | 8.36 | 0.15 | 6 | 31 | 20 | 4.3 | 3 | 3 |
| 6/17 | 19.7 | 19.3 | 7.67 | 0.17 | 11 | 34 | 28 | 3 | 3 | 2 |
| 6/30 | 22.7 | 19.2 | 7.18 | 0.45 | 18 | 84 | 81 | 2.6 | 2 | 3 |
| 7/14 | 22.7 | 22.4 | 6.05 | 0.31 | 24 | 55 | 49 | 1.4 | 3 | 4 |
| 7/28 | 25.2 | 21.4 | 8.26 | 26 | 18 | 39 | 63 | 1.7 | 3 | 3 |
| 8/13 | 24.1 | 22.1 | 5.68 | 0.27 | 22 | 165 | 45 | 1.4 | 3 | 3 |
| 8/25 | 24 | 23 | 6.97 | 3.77 | 35 | 55 | 48 | 1.2 | 3 | 4 |
| 9/9 | 19.2 | 19.4 | 8.11 | 0.23 | 43 | 50 | 50 | 1.2 | 3 | 4 |
| 9/22 | 20.1 | 18.5 | 10 | 0.28 | 28 | 62 | 69 | 1.2 | 4 | 4 |
| 10/10 | 14.2 | 14.1 | 7.01 | 0.66 | 24 | 62 | 44 | 1.4 | 3 | 4 |
| 10/20 | 12.3 | 12.3 | 8.07 | 0.35 | 23 | 45 | 39 | 2 | 3 | 4 |



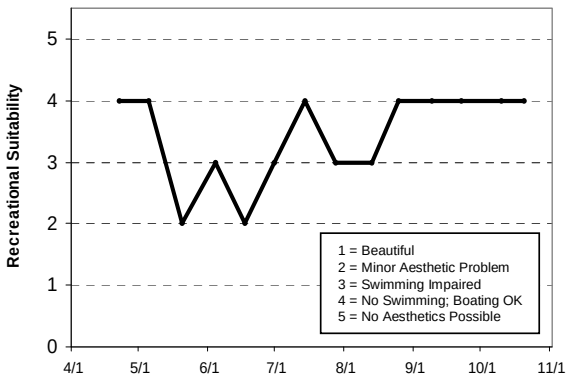

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | C | C | | C | | | | | |
| Chlorophyll a | | | | C | C | | C | | | | | |
| Secchi Depth | | | | C | C | | C | | | | | |
| **Lake Grade** | | | | **C** | **C** | | **C** | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | C | C | C | C |
| Chlorophyll a | | C | C | C | B |
| Secchi Depth | | B | C | C | C |
| **Lake Grade** | | **C** | **C** | **C** | **C** |

Source: Metropolitan Council and STORET data



## South Twin Lake (82-0019) Carnelian - Marine Watershed District

South Twin Lake is a 54-acre lake located within Stillwater Township (Washington County). The maximum and mean depths of the lake are 4.0 m (13 ft) and 2.0 m (6.5 ft), respectively. The mean depth of the lake and its surface area translate to an approximate lake volume of 356 ac-ft. The entire area of the lake is considered littoral zone which is the 0-15 feet depth zone of aquatic plant dominance. Furthermore, the lake does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the water column.

The lake's 63-acre immediate watershed and surface area translates to a watershed-to-lake area ratio of 1.2:1 (the greater the ratio, the greater the potential stress on the lake from surface runoff).

The lake was monitored 8 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

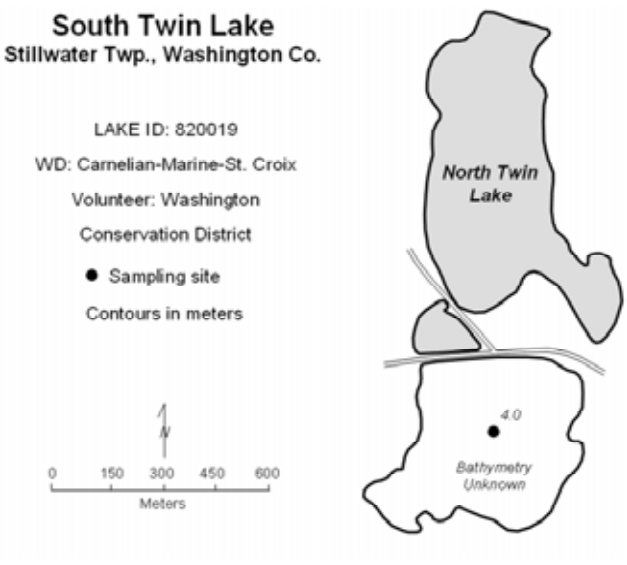
**2008 summer (May-September) data summary**

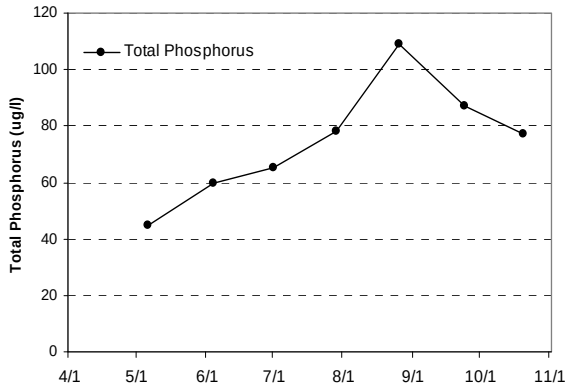
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 74.0 | 45.0 | 109.0 | D |
| **CLA** (µg/l) | 35.5 | 13.0 | 69.0 | C |
| **Secchi** (m) | 1.1 | 0.6 | 1.7 | D |
| **TKN** (mg/l) | 2.13 | 1.70 | 3.00 | |
| | | | ***Lake Grade*** | D |

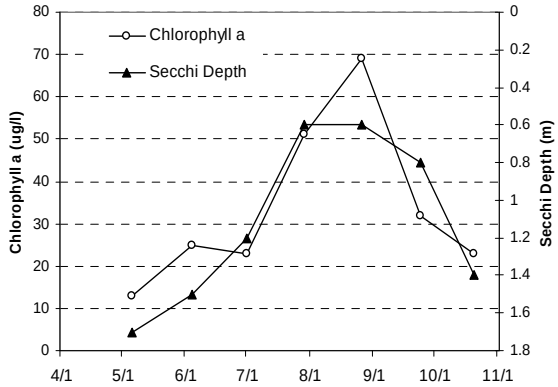
The lake received a lake grade of D for 2008. The lake has received various lake grades since 1996. They varied from D to F to C to D. To better understand the lake's overall water quality and where it may be heading, continued monitoring is suggested.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 3.3 (between 3- "definite algae present" and 4- "high algal color"). The average recreational suitability ranking was 4.0 ("no swimming/boating ok").

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.

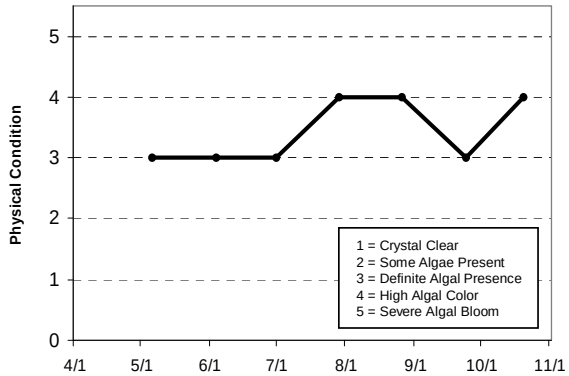



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/5 | | | | | | | | | | |
| 5/6 | 13.2 | 11.4 | 10.93 | 0.69 | 13 | 45 | | 1.7 | 3 | 4 |
| 6/4 | 18.6 | 17.7 | 8.27 | 0.28 | 25 | 60 | 52 | 1.5 | 3 | 4 |
| 7/1 | 24.5 | 22.1 | 10.33 | 0.33 | 23 | 65 | 101 | 1.2 | 3 | 4 |
| 7/29 | 26.9 | 22.7 | 10.96 | 0.17 | 51 | 78 | 210 | 0.6 | 4 | 4 |
| 8/26 | 22.8 | 22.2 | 7.5 | 0.17 | 69 | 109 | 100 | 0.6 | 4 | 4 |
| 9/24 | 19.8 | 19.6 | 5.23 | 0.22 | 32 | 87 | 93 | 0.8 | 3 | 4 |
| 10/20 | 12.2 | 12.2 | 8.17 | 0.34 | 23 | 77 | 76 | 1.4 | 4 | 4 |



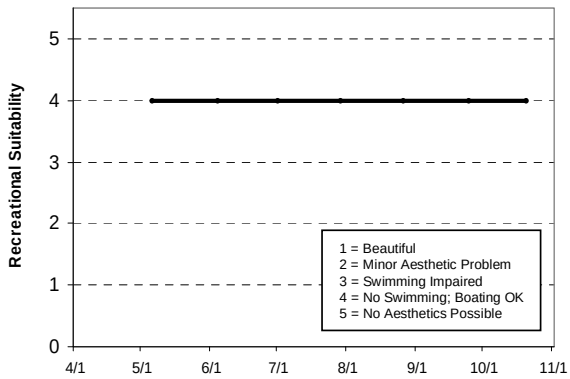

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | C | C | D | D | C | D | | |
| Chlorophyll a | | | | | D | D | D | F | C | D | | |
| Secchi Depth | | | | | D | D | F | F | D | F | D | C |
| **Lake Grade** | | | | | **D** | **D** | **D** | **F** | **C** | **D** | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | C | C | D | D | D |
| Chlorophyll a | B | C | C | C | C |
| Secchi Depth | C | C | D | D | D |
| **Lake Grade** | **C** | **C** | **D** | **D** | **D** |

Source: Metropolitan Council and STORET data



## Spring Lake (70-0054) *Prior Lake - Spring Lake Watershed District*

Spring Lake is located in Spring Lake Township (Scott County). It is considered a Priority Lake by the Metropolitan Council for its high regional recreation value. The lake has a surface area of 630 acres. The maximum and mean depths of the lake are 11.3 and 5.6 m (37 and 18 feet), respectively. About 50 percent of the lake's area is considered littoral, which is the 0-15 feet depth area dominated by aquatic vegetation. The approximate volume of the lake is approximately 11,500 acre-feet (ac-ft). The lake has a 13,500-acre watershed. The lake and watershed areas translate to a watershed-to-lake area ratio of 21:1. The larger the ratio, the greater the potential stress on the lake's quality from surface runoff.

In an attempt to improve the lake's water quality, a ferric chloride ($FeCl_3$) addition system was constructed at the outlet of the Highway 13 wetland in 1998. Continuous operation started in 1999. The system was designed to enhance phosphorus (P) removal from the discharge of the wetland prior to entering the lake. The system consists of a dosing station at the outlet of the wetland, followed by a settling basin. The dosing station meters $FeCl_3$ into the wetland outlet. The $FeCl_3$ disassociates into free iron (Fe) where it combines with P to form an insoluble Fe-P complex called floc. The desiltation basin then provides an area where the floc can settle out and be removed. The watershed district continues to monitor the effectiveness of the system.

The lake has been monitored in the past by Metropolitan Council staff and via the CAMP. The lake was monitored 5 times in 2008 via the CAMP. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

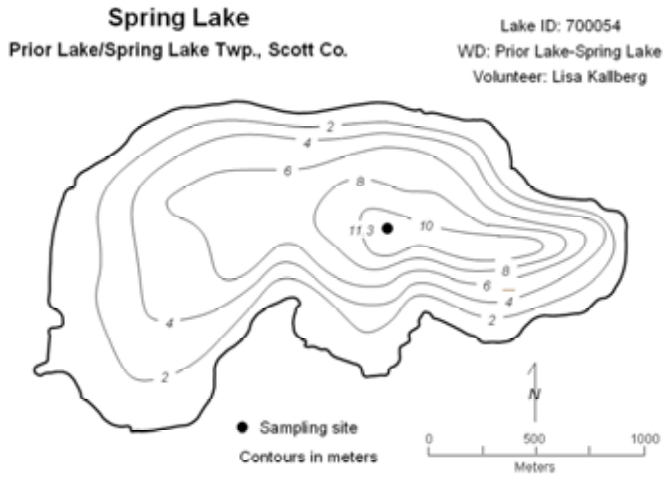
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 58.6 | 48.0 | 65.0 | C |
| **CLA** (µg/l) | 59.6 | 55.0 | 63.0 | D |
| **Secchi** (m) | 0.9 | 0.6 | 1.4 | D |
| **TKN** (mg/l) | 1.92 | 1.70 | 2.20 | |
| | | | ***Lake Grade*** | D |

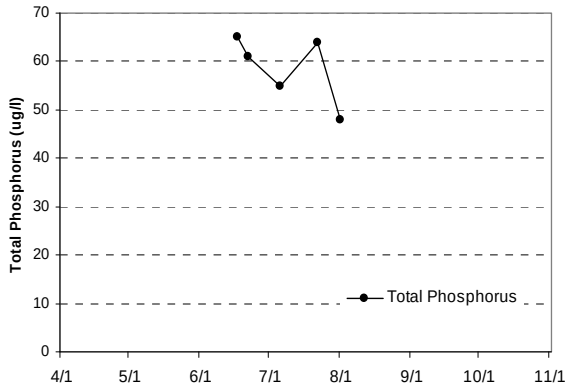
The lake received a lake grade of D in 2008. The lake grades have varied from Cs to Ds since 1980. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008). Continued monitoring is suggested to provide water quality data for supporting the PLSLWD's efforts in managing Spring Lake.

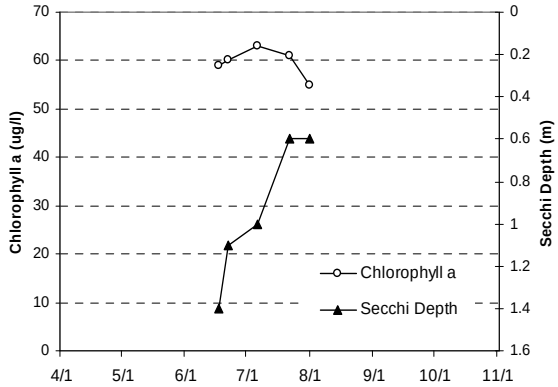
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.0 ("some algae present"). The average recreational suitability ranking was 1.5 (between 1- "beautiful" and 2- "minor aesthetic problem").

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.

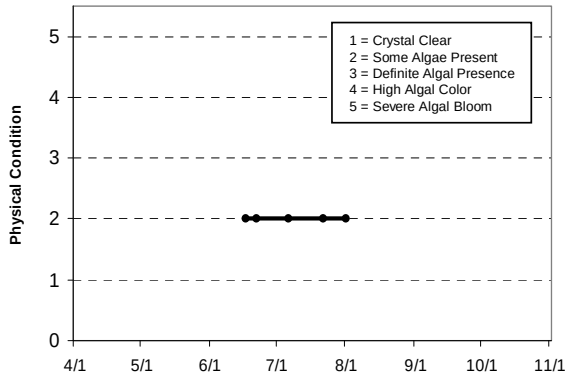



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 6/17 | 20.4 | | | | 59 | 65 | | 1.4 | 2 | 2 |
| 6/22 | | | | | 60 | 61 | | 1.1 | 2 | |
| 7/6 | 25.1 | | | | 63 | 55 | | 1 | 2 | 2 |
| 7/22 | 27.6 | | | | 61 | 64 | | 0.6 | 2 | 1 |
| 8/1 | 25 | | | | 55 | 48 | | 0.6 | 2 | 1 |



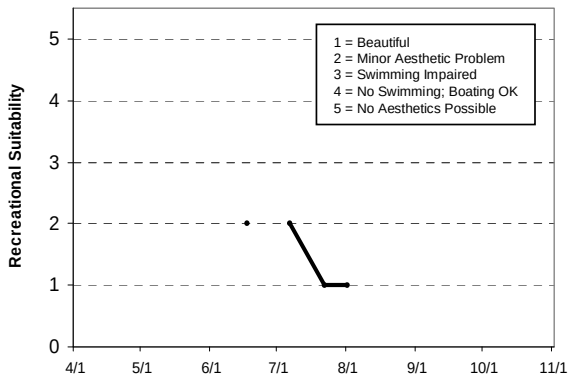

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | F | D | D | | D | | | | | | | |
| Chlorophyll a | C | C | C | | D | | | | | | C | |
| Secchi Depth | C | B | C | C | C | D | D | D | D | C | B | D |
| **Lake Grade** | **D** | **C** | **C** | | **D** | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | D | D | | | F | D | D | D |
| Chlorophyll a | | | | | C | C | | | D | D | F | C |
| Secchi Depth | C | C | C | C | D | D | | | C | D | F | C |
| **Lake Grade** | | | | | **D** | **D** | | | **D** | **D** | **F** | **C** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | D | D | D | C | C |
| Chlorophyll a | D | C | C | | D |
| Secchi Depth | D | C | C | D | D |
| **Lake Grade** | **D** | **C** | **C** | **C** | **D** |

Source: Metropolitan Council and STORET data



## Square Lake (82-0046) *Marine on St. Croix Watershed Management Organization*

Square Lake is located in May Township (Washington County). The lake has a surface area of 193 acres, and a maximum and mean depth of 20.7 and 9.0 m, respectively. It has an approximate volume of 5,694 ac-ft. Approximately 65 percent of the lake's surface area is considered littoral zone, which is the 0-15 feet depth zone of aquatic plant dominance.

It is considered a Priority Lake by the Metropolitan Council for its high regional recreation value and exceptional water clarity. The lake is stocked with rainbow trout by the MN DNR. The lake's level is maintained by a combination of groundwater and runoff from the lake's watershed (MDNR 1996). The lake's watershed area is about 782 acres. The watershed is rural and largely undeveloped. The watershed and lake area translate to a watershed-to-lake area ratio of 4:1. The smaller the ratio, the less stress is put on the lake from surface runoff.

The lake has been monitored via the CAMP in 1993-1997 and 1999-2008. The lake also has been monitored in the past by Metropolitan Council staff. The lake was monitored 7 times in 2008. On each sampling day the lake was monitored for Secchi transparency, perceived physical condition, and recreational suitability. Depth profiles for temperature and dissolved oxygen were also measured. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **Secchi** (m) | 5.0 | 4.4 | 5.2 | A |

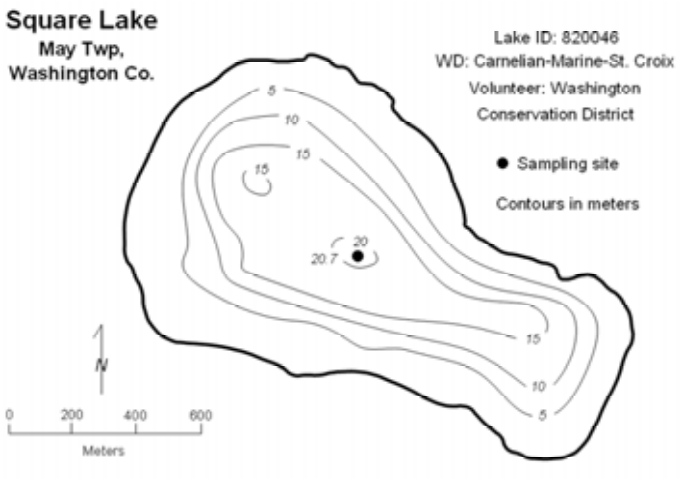
The lake continues to receive A grades for water clarity. However, A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed a statistically significant declining trend in water clarity (MPCA 2008).

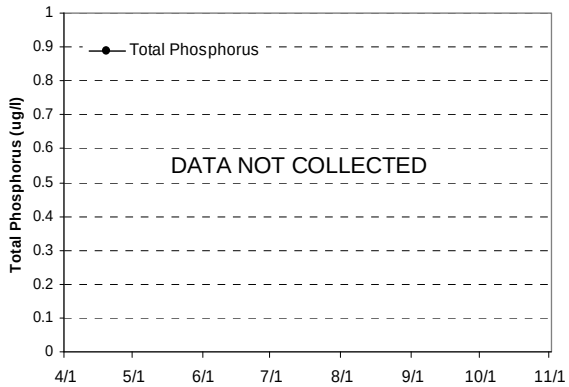
More detailed discussions on the lake, its water chemistry, biological make-up, and hydrology and their influence on the lake can be found in the recent diagnostic-feasibility study completed on the lake as part of a Clean Water Partnership (Square Lake 2001). The complete report highlights the concern of a degrading water clarity trend, the importance of the lake's biological make-up on its overall water quality, and the influence the lake's surface and groundwater watersheds have on the lake's phosphorous load. The Clean Water Partnership report also includes proposed watershed, shoreland, and in-lake projects designed to address issues affecting the lake's quality. An additional resource is an October 2002 report summarizing the lakes recent zooplankton population from monitoring conducted from August 2001-July 2002 (Washington Conservation District 2002)

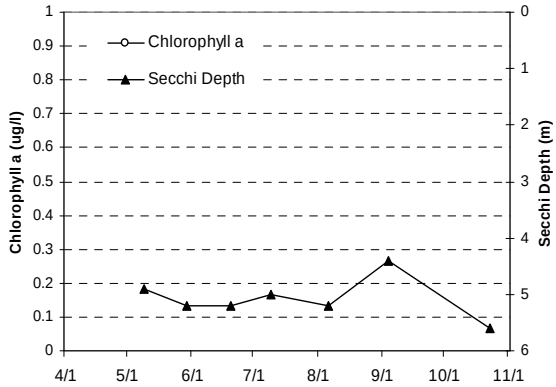
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 1.2 (between 1- "crystal clear" and 2- "some algae present"). The average recreational suitability ranking was 1.0 ("beautiful").

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.

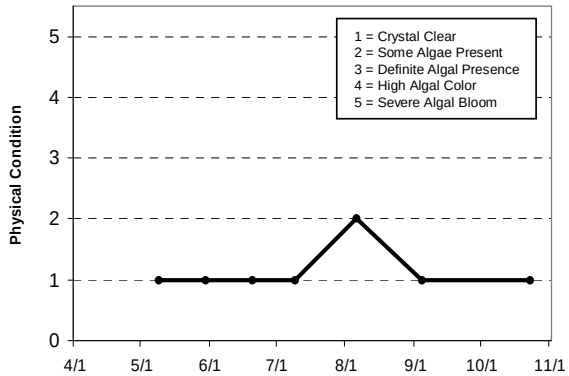



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/9 | 11.4 | 6.1 | 11.24 | 0.5 | | | | 4.9 | 1 | 1 |
| 5/30 | 16.1 | 0.13 | 10.41 | 6.6 | | | | 5.2 | 1 | 1 |
| 6/20 | 22.3 | 6.7 | 9.38 | 0.18 | | | | 5.2 | 1 | 1 |
| 7/9 | 24.7 | 6.8 | 8.58 | 0.37 | | | | 5 | 1 | 1 |
| 8/6 | 25.8 | 6.9 | 7.42 | 0.28 | | | | 5.2 | 2 | 1 |
| 9/4 | 22.4 | 7 | 7.04 | 0.23 | | | | 4.4 | 1 | 1 |
| 10/23 | 12.2 | 7.3 | 8.76 | 0.29 | | | | 5.6 | 1 | 1 |



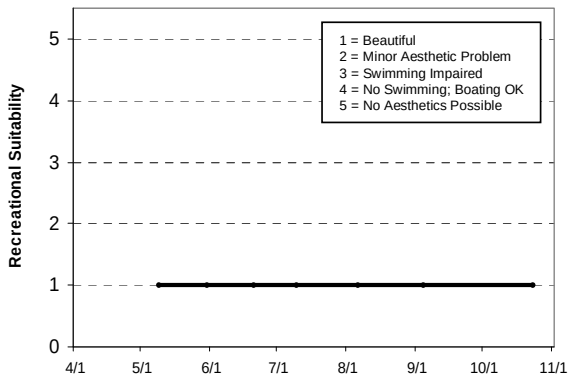

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | B | A | A | A | A | A | | | | A | | |
| Chlorophyll a | A | A | A | A | A | A | | | | A | | |
| Secchi Depth | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | A | A | A | A | A | A | A | A | A | A | A |
| Chlorophyll a | | A | A | A | A | A | A | A | A | A | A | A |
| Secchi Depth | | A | A | A | A | A | A | A | A | A | A | A |
| **Lake Grade** | | **A** | **A** | **A** | **A** | **A** | **A** | **A** | **A** | **A** | **A** | **A** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | A | A | A | A | |
| Chlorophyll a | A | A | A | A | |
| Secchi Depth | A | A | A | A | A |
| **Lake Grade** | **A** | **A** | **A** | **A** | |

Source: Metropolitan Council and STORET data



## St. Croix Lake [Whole Lake] (82-0001) *St. Croix Basin Planning Team*

Lake St. Croix is divided into four distinct pools: Bayport Pool, Troy Beach Pool, Black Bass Pool, and Kinnickinnic Pool. There were five monitoring sites amongst the four pools in 2008. The results will be discussed for the entire lake, as well as individually for each of the five sites.

Lake St. Croix (approximately 8,600 acres) is considered by the MNDNR to extend from Stillwater, Minnesota to Prescott, Wisconsin, a distance of approximately 23 miles. The morphometry of each of the pools is shown in the table below.

**Lake St. Croix Morphometry**

| *Pool Name* | *Length (miles)* | *Area (ac)* | *Volume (ac-ft)* | *Mean depth range (dry vs. wet years) (meters)* |
|---|---|---|---|---|
| **Bayport Pool** | 6.0 | 2,800 | 62,500 | 6.2-7.3 |
| **Troy Beach Pool** | 6.0 | 3,100 | 107,800 | 9.9-11.0 |
| **Black Bass Pool** | 7.0 | 1,300 | 59,600 | 12.9-14.0 |
| **Kinnickinnic Pool** | 5.0 | 1,400 | 46,274 | 9.2-10.3 |

(USGS 2002)

The MN DNR has designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) and Zebra mussels (*Dreissena spp.*).

This marks the fourth year in which any of the Lake St. Croix sites have been formally involved in CAMP. A citizen-monitoring program conducted by the St. Croix Basin Team produced water quality data for four sites (Bayport Pool- Site 2; Troy Beach Pool-Site 3; Troy Beach Pool-Site 5; and Black Bass Pool-Site 6) during the 1999-2002 and 2005-2008 periods, and for one site (Kinnickinnic Pool-Site 7) during the 2000-2001 and 2005-2008 periods. All data are available in STORET.

On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 41 | 25 | 72 | C |
| **CLA** (µg/l) | 16 | 4.8 | 33 | B |
| **Secchi** (m) | 1.6 | 1.0 | 3.2 | C |
| **TKN** (mg/l) | 0.75 | 0.44 | 1.30 | |
| | | | ***Lake Grade*** | C |

The whole lake received a lake grade of C for 2008, which is similar to those recorded in 1999-2002 and 2005-2007. That said, the individual parameter means indicate that 2006 was the lake's best water quality year since the inception of the volunteer monitoring program. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008). To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

**Lake water quality grades based on the whole lakes summer means**

| *Year* | *1999* | *2000* | *2001* | *2002* | *2003* | *2004* | *2005* | *2006* | *2007* | *2008* |
|---|---|---|---|---|---|---|---|---|---|---|
| **Total Phosphorus** | D | D | C | C | | | C | C | C | C |
| **Chlorophyll a** | B | C | C | C | | | B | B | C | B |
| **Secchi Depth** | C | C | C | C | | | C | C | C | C |
| **Overall** | **C** | **C** | **C** | **C** | | | **C** | **C** | **C** | **C** |

Source: Metropolitan Council and STORET data

The volunteer's perceptions of the physical and recreational conditions of the lake were averaged to determine the perceptions for the whole lake. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.3 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 2.0 ("minor aesthetic problem").

The Fisheries Section of the Minnesota Department of Natural Resources (MNDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MNDNR 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.

## St. Croix Lake [Bayport Pool-Site 2] (82-0001) *St. Croix Basin Planning Team*

Lake St. Croix [Bayport Pool-Site 2] was monitored 9 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 42.0 | 34.0 | 56.0 | C |
| **CLA** (µg/l) | 19 | 8.2 | 33 | B |
| **Secchi** (m) | 1.4 | 1.2 | 1.6 | C |
| **TKN** (mg/l) | 0.74 | 0.56 | 1.00 | |
| | | | ***Lake Grade*** | C |

The pool received a lake grade of C for 2008, which is similar to lake grades received in the past. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.0 ("some algae present"). The average recreational suitability ranking was 1.6 (between 1- "beautiful" and 2- "minor aesthetic problem").

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 St. Croix, Bayport Pool, Site 2

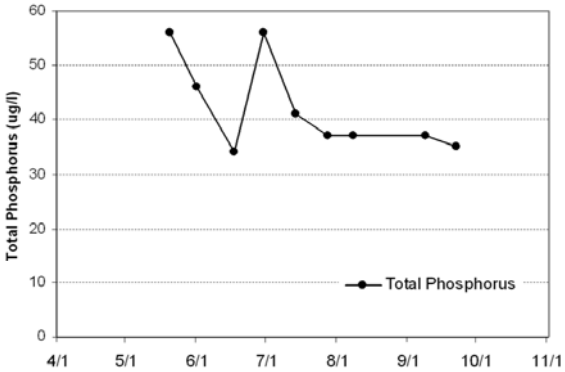
**Minnesota/Wisconsin**

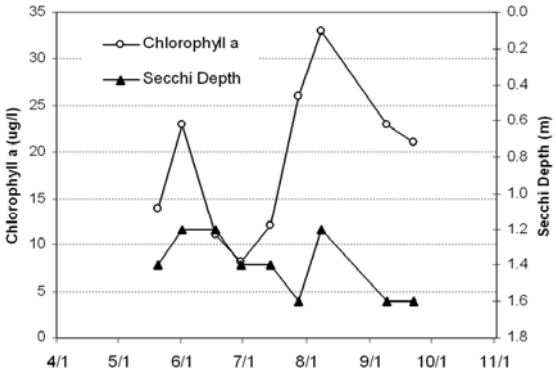
Lake ID: 820001-02

Volunteers: Jim and Roberta Harper

● Sampling site

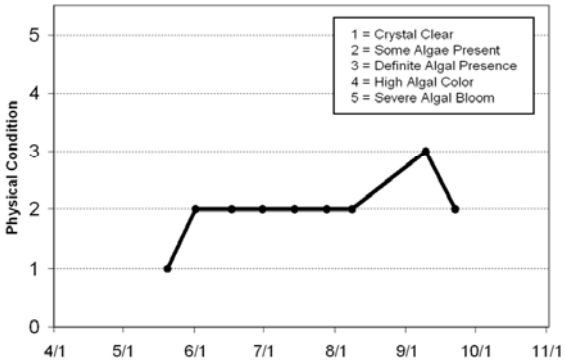
Contours in meters




### 2008 Data

| Date | Surf Tmp C | CLA ug/L | Surf TP ug/L | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|
| 5/20 | 17.4 | 14 | 56 | 1.4 | 1 | 1 |
| 6/1 | 21.2 | 23 | 46 | 1.2 | 2 | 1 |
| 6/17 | 21.1 | 11 | 34 | 1.2 | 2 | 2 |
| 6/30 | 24.2 | 8.2 | 56 | 1.4 | 2 | 1 |
| 7/14 | 27.4 | 12 | 41 | 1.4 | 2 | 2 |
| 7/28 | 28.0 | 26 | 37 | 1.6 | 2 | 1 |
| 8/8 | 27.2 | 33 | 37 | 1.2 | 2 | 2 |
| 9/9 | 24.4 | 23 | 37 | 1.6 | 3 | 2 |
| 9/22 | 20.7 | 21 | 35 | 1.6 | 2 | 2 |



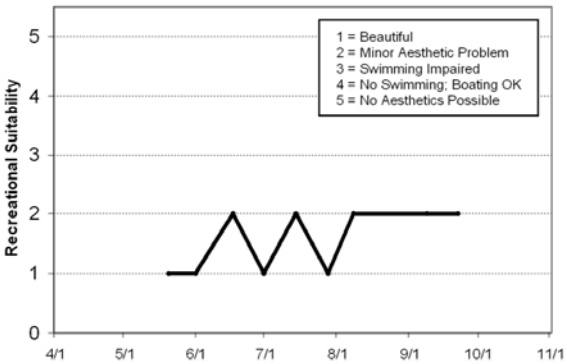

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | C | D | D | D | |
| Chlorophyll a | | | | | | | | B | C | C | C | |
| Secchi Depth | | | | | | | | C | C | C | D | |
| **Lake Grade** | | | | | | | | **C** | **C** | **C** | **D** | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | C | C | C | C |
| Chlorophyll a | | C | C | C | B |
| Secchi Depth | | C | C | C | C |
| **Lake Grade** | | **C** | **C** | **C** | **C** |

Source: Metropolitan Council and STORET data



## St. Croix Lake [Troy Beach Pool-Site 3] (82-0001) *St. Croix Basin Planning Team*

Lake St. Croix [Troy Beach Pool-Site 3] was monitored 10 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

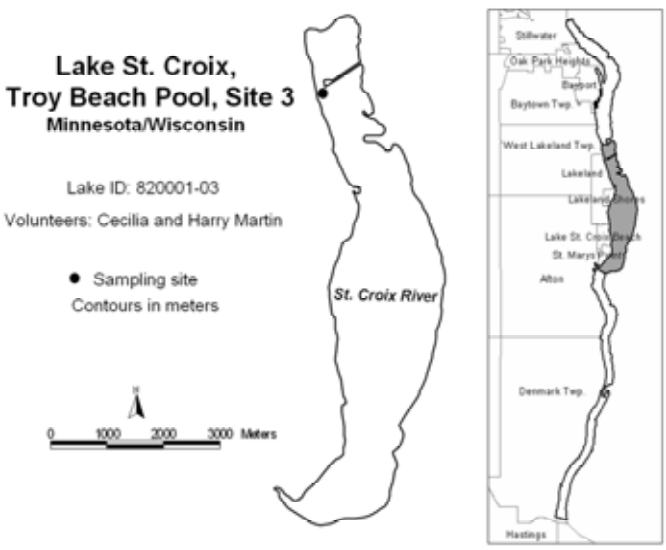
**2008 summer (May-September) data summary**

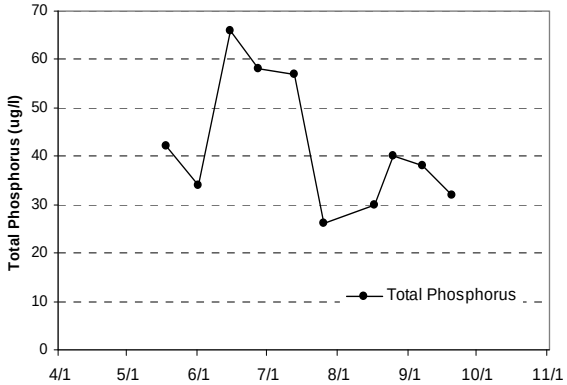
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 42.0 | 26.0 | 66.0 | C |
| **CLA** (µg/l) | 15 | 4.9 | 24 | B |
| **Secchi** (m) | 1.6 | 1.0 | 2.0 | C |
| **TKN** (mg/l) | 0.65 | 0.44 | 0.90 | |
| | | | ***Lake Grade*** | C |

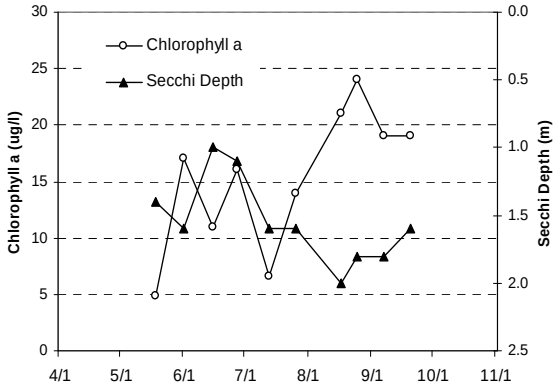
The site received a lake grade of C for 2008, which is similar to those recorded in 1999-2001 and 2005-2007, and better than the D recorded in 2002. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.1 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 2.1 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

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.

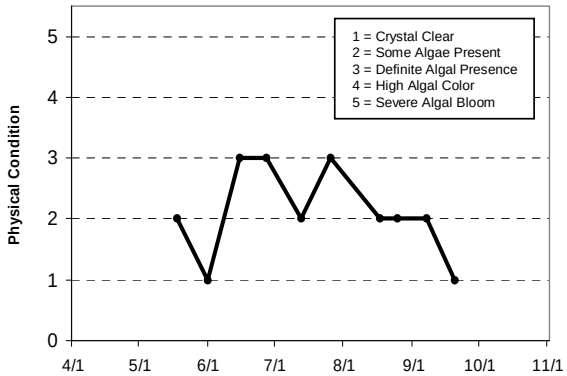



## 2008 Data

| Date | Surf Tmp C | CLA ug/L | Surf TP ug/L | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|
| 5/18 | 15.1 | 4.9 | 42 | 1.4 | 2 | 2 |
| 6/1 | 20.8 | 17 | 34 | 1.6 | 1 | 1 |
| 6/15 | 21.1 | 11 | 66 | 1.0 | 3 | 3 |
| 6/27 | 25.0 | 16 | 58 | 1.1 | 3 | 3 |
| 7/13 | 23.8 | 6.6 | 57 | 1.6 | 2 | 2 |
| 7/26 | 26.4 | 14 | 26 | 1.6 | 3 | 3 |
| 8/17 | 24.6 | 21 | 30 | 2.0 | 2 | 2 |
| 8/25 | 25.5 | 24 | 40 | 1.8 | 2 | 2 |
| 9/7 | 20.3 | 19 | 38 | 1.8 | 2 | 2 |
| 9/20 | 20.5 | 19 | 32 | 1.6 | 1 | 1 |



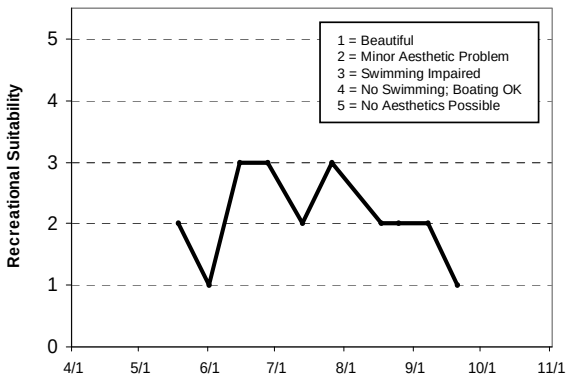

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | D | D | D | D | |
| Chlorophyll a | | | | | | | | B | C | C | C | |
| Secchi Depth | | | | | | | | D | C | C | D | |
| **Lake Grade** | | | | | | | | **C** | **C** | **C** | **D** | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | C | C | C | C |
| Chlorophyll a | | B | B | C | B |
| Secchi Depth | | C | C | C | C |
| **Lake Grade** | | **C** | **C** | **C** | **C** |

Source: Metropolitan Council and STORET data



## St. Croix Lake [Troy Beach Pool-Site 5] (82-0001) *St. Croix Basin Planning Team*

Lake St. Croix [Troy Beach Pool-Site 5] was monitored 8 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

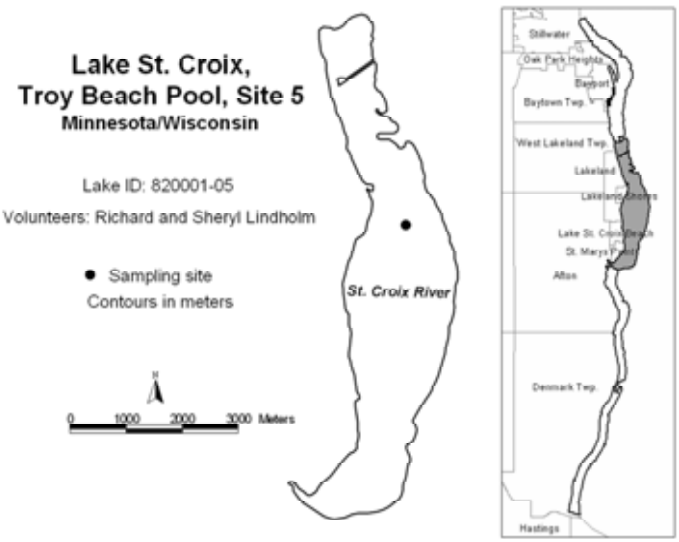
**2008 summer (May-September) data summary**

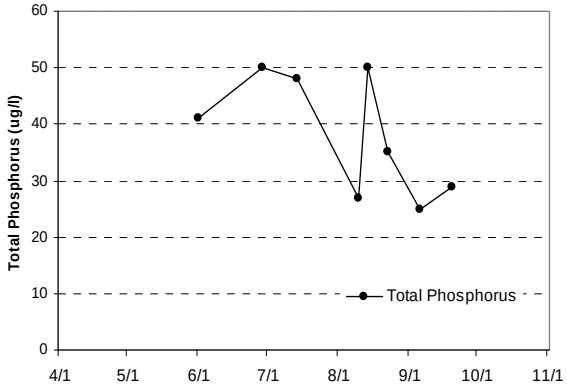
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 38.0 | 25.0 | 50.0 | C |
| **CLA** (µg/l) | 16 | 7.0 | 22 | B |
| **Secchi** (m) | 1.7 | 1.0 | 2.0 | C |
| **TKN** (mg/l) | 0.72 | 0.54 | 0.92 | |
| | | | ***Lake Grade*** | C |

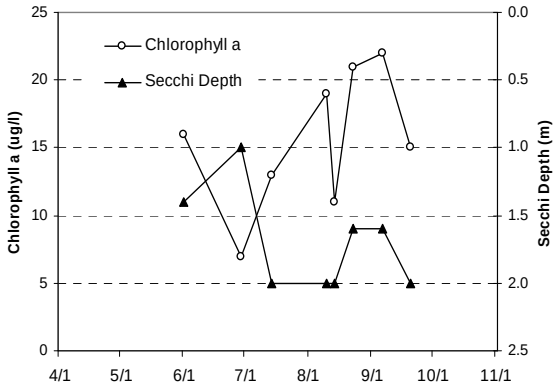
The site received a lake grade of C, which is similar to those recorded in 1999-2002 and 2005-2007. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.1 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 1.4 (between 1- "beautiful" and 2- "minor aesthetic problem").

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.

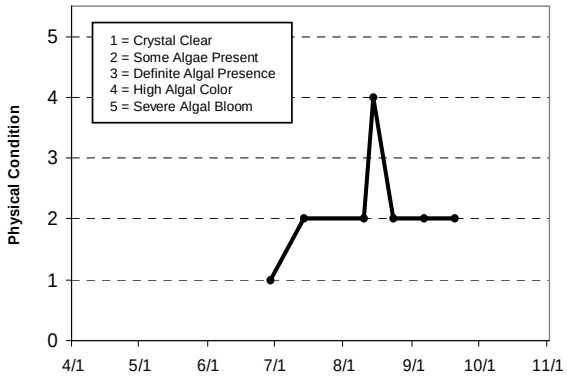



## 2008 Data

| Date | Surf Tmp C | CLA ug/L | Surf TP ug/L | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|
| 6/1 | 19.2 | 16 | 41 | 1.4 | | 1 |
| 6/29 | 23.0 | 7.0 | 50 | 1.0 | 1 | 1 |
| 7/14 | 26.1 | 13 | 48 | 2.0 | 2 | 2 |
| 8/10 | 26.1 | 19 | 27 | 2.0 | 2 | 1 |
| 8/14 | 26.2 | 11 | 50 | 2.0 | 4 | 3 |
| 8/23 | 24.9 | 21 | 35 | 1.6 | 2 | 1 |
| 9/6 | 22.3 | 22 | 25 | 1.6 | 2 | 1 |
| 9/20 | 21.7 | 15 | 29 | 2.0 | 2 | 1 |



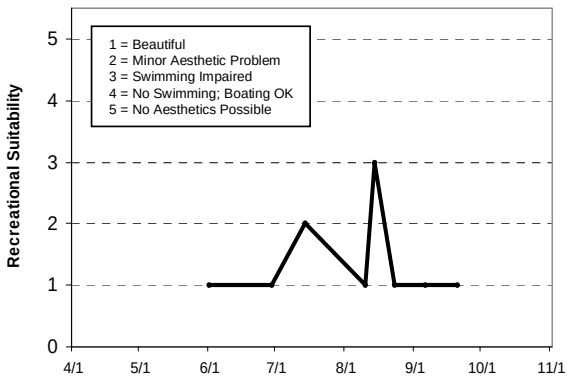

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | D | D | C | C | |
| Chlorophyll a | | | | | | | | B | C | C | C | |
| Secchi Depth | | | | | | | | C | C | C | C | |
| **Lake Grade** | | | | | | | | **C** | **C** | **C** | **C** | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | C | C | C | C |
| Chlorophyll a | | C | B | C | B |
| Secchi Depth | | C | C | C | C |
| **Lake Grade** | | **C** | **C** | **C** | **C** |

Source: Metropolitan Council and STORET data



## St. Croix Lake [Black Bass Pool-Site 6] (82-0001) *St. Croix Basin Planning Team*

Lake St. Croix [Black Bass Pool-Site 6] was monitored 10 times between mid-May and late-September, 2007. On each sampling day the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data and graphs appear on the next page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 41.0 | 27.0 | 54.0 | C |
| **CLA** (µg/l) | 15.0 | 4.8 | 23.0 | B |
| **Secchi** (m) | 1.7 | 1.4 | 2.0 | C |
| **TKN** (mg/l) | 0.81 | 0.64 | 1.00 | |
| | | | ***Lake Grade*** | C |

The site received a lake grade of C for 2008, which is similar to those recorded in 1999-2002 and 2005-2006. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.6 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 2.3 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

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 St. Croix, Black Bass Pool, Site 6

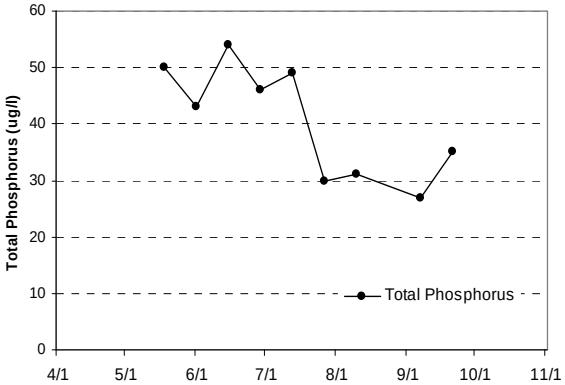
**Minnesota/Wisconsin**

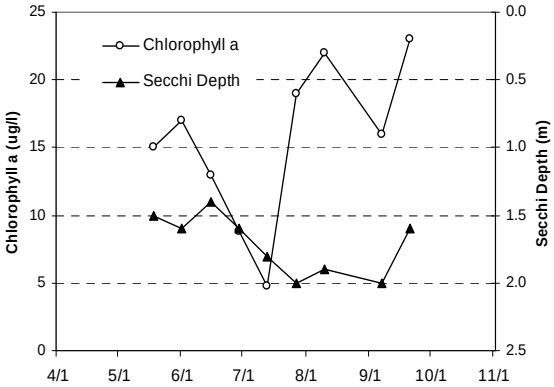
Lake ID: 820001-06

Volunteer: Rick Meierotto

● Sampling site

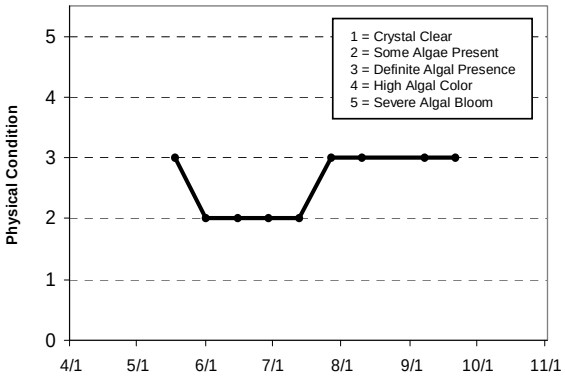
Contours in meters




## 2008 Data

| Date | Surf Tmp C | CLA ug/L | Surf TP ug/L | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|
| 5/18 | 15.9 | 15 | 50 | 1.5 | 3 | 2 |
| 6/1 | 20.5 | 17 | 43 | 1.6 | 2 | 2 |
| 6/15 | 22.4 | 13 | 54 | 1.4 | 2 | 2 |
| 6/29 | 23.9 | 8.8 | 46 | 1.6 | 2 | 2 |
| 7/13 | 24.1 | 4.8 | 49 | 1.8 | 2 | 2 |
| 7/27 | 26.8 | 19 | 30 | 2.0 | 3 | 2 |
| 8/10 | 26.4 | 22 | 31 | 1.9 | 3 | 3 |
| 9/7 | 22.9 | 16 | 27 | 2.0 | 3 | 3 |
| 9/21 | 22.8 | 23 | 35 | 1.6 | 3 | 3 |



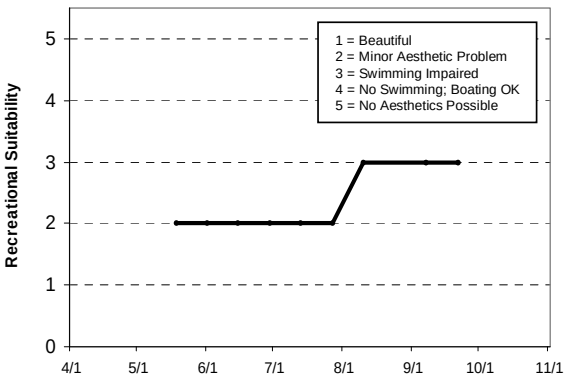

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | C | C | C | C | |
| Chlorophyll a | | | | | | | | B | C | B | C | |
| Secchi Depth | | | | | | | | C | C | C | C | |
| **Lake Grade** | | | | | | | | **C** | **C** | **C** | **C** | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | C | C | C | C |
| Chlorophyll a | | B | B | C | B |
| Secchi Depth | | C | C | C | C |
| **Lake Grade** | | **C** | **C** | **C** | **C** |

Source: Metropolitan Council and STORET data



## St. Croix Lake [Kinnickinnic Pool-Site 7] (82-0001) *St. Croix Basin Planning Team*

Lake St. Croix [Kinnickinnic Pool-Site 7] was monitored 5 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

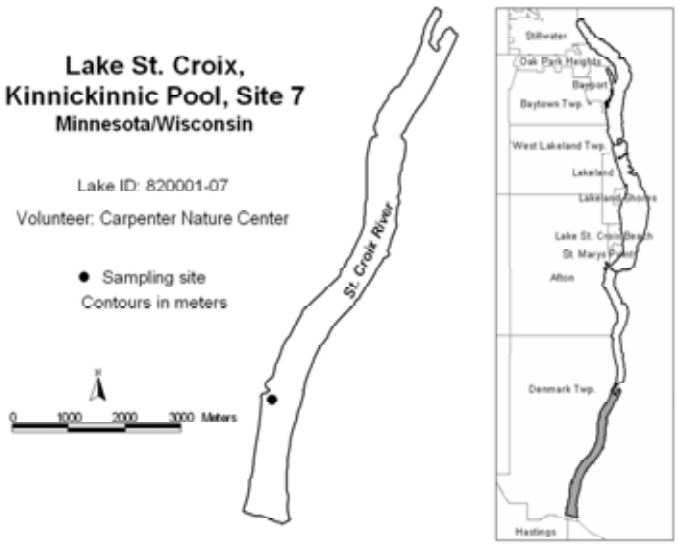
**2008 summer (May-September) data summary**

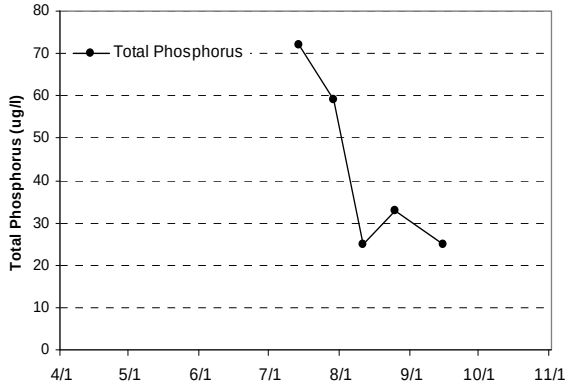
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 43.0 | 25.0 | 72.0 | C |
| **CLA** (µg/l) | 20 | 9.4 | 33 | B |
| **Secchi** (m) | 2.0 | 1.0 | 3.2 | C |
| **TKN** (mg/l) | 0.91 | 0.43 | 2.10 | |
| | | | ***Lake Grade*** | C |

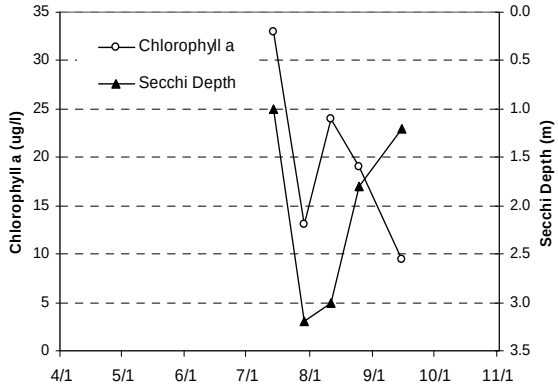
The site received a lake grade of C for 2008, which is similar to the C recorded in 2000 and but worse than the B lake grades received in 2005 – 2007. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 3.0 ("definite algae present"). The average recreational suitability ranking was 3.2 (between 3- "swimming slightly impaired" and 4- "no swimming/boating ok").

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.

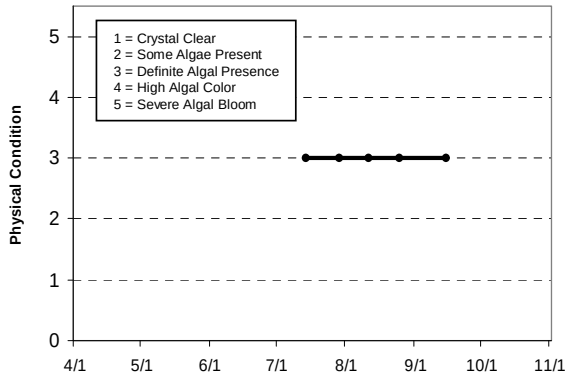



## 2008 Data

| Date | Surf Tmp C | CLA ug/L | Surf TP ug/L | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|
| 7/14 | 28.7 | 33 | 72 | 1.0 | 3 | 3 |
| 7/29 | 27.5 | 13 | 59 | 3.2 | 3 | 3 |
| 8/11 | 25.4 | 24 | 25 | 3.0 | 3 | 3 |
| 8/25 | 24.9 | 19 | 33 | 1.8 | 3 | 4 |
| 9/15 | 22.0 | 9.4 | 25 | 1.2 | 3 | 3 |



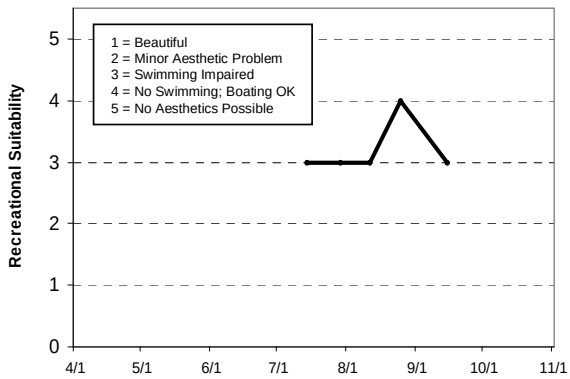

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | C | D | | |
| Chlorophyll a | | | | | | | | | B | B | | |
| Secchi Depth | | | | | | | | | C | NA | | |
| **Lake Grade** | | | | | | | | | **C** | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | B | B | B | C |
| Chlorophyll a | | B | B | B | B |
| Secchi Depth | | C | C | C | C |
| **Lake Grade** | | **B** | **B** | **B** | **C** |

Source: Metropolitan Council and STORET data



## St. Joe Lake (10-0011) *City of Chanhassen*

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). Approximately 46 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 was monitored 9 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

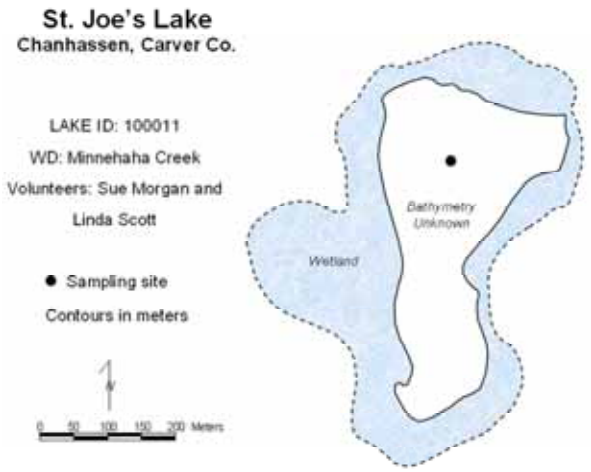
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 19.1 | 16.0 | 23.0 | A |
| **CLA** (µg/l) | 7.1 | 1.5 | 19.0 | A |
| **Secchi** (m) | 2.9 | 1.7 | 4.4 | B |
| **TKN** (mg/l) | 0.95 | 0.75 | 1.10 | |
| | | | ***Lake Grade*** | A |

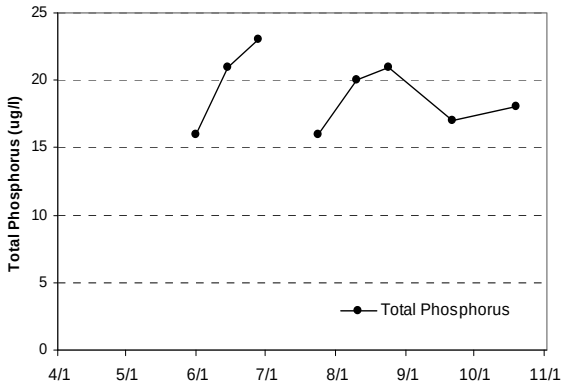
The lake received a lake grade of A for 2008, which is similar to lake grades received in the past. Continued monitoring is suggested to continue to build the water quality database for improving confidence in detecting potential trends in water quality.

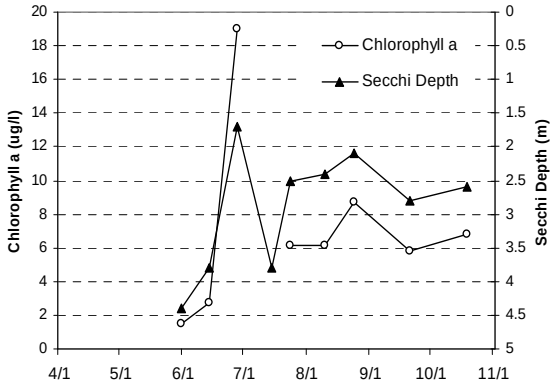
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 3.1 (between 3- "definite algae present" and 4- "high algal color"). The average recreational suitability ranking was 1.9 (between 1- "beautiful" and 2- "minor aesthetic problem").

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.

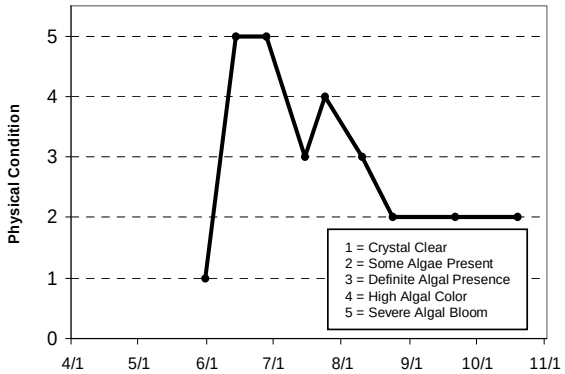



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/31 | 18.5 | | | | 1.5 | 16 | | 4.4 | 1 | 1 |
| 6/14 | 20.5 | | | | 2.7 | 21 | | 3.8 | 5 | 2 |
| 6/28 | 23.7 | | | | 19 | 23 | | 1.7 | 5 | 4 |
| 7/15 | 24.9 | | | | | | | 3.8 | 3 | 2 |
| 7/24 | 26 | | | | 6.1 | 16 | | 2.5 | 4 | 2 |
| 8/10 | 26.6 | | | | 6.1 | 20 | | 2.4 | 3 | 2 |
| 8/24 | 25 | | | | 8.7 | 21 | | 2.1 | 2 | 1 |
| 9/21 | 21.2 | | | | 5.8 | 17 | | 2.8 | 2 | 1 |
| 10/19 | 13.2 | | | | 6.8 | 18 | | 2.6 | 2 | 1 |



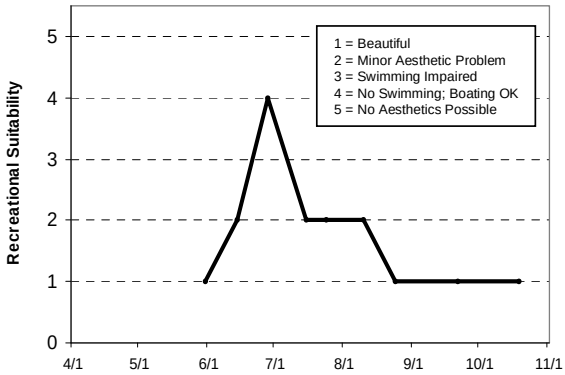

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | C | | B | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | A | A | C | A | A |
| Chlorophyll a | A | A | A | A | A |
| Secchi Depth | B | A | B | A | B |
| **Lake Grade** | **A** | **A** | **B** | **A** | **A** |

Source: Metropolitan Council and STORET data



## Staples Lake (82-0028) *Carnelian - Marine Watershed District*

Staples Lake is a 24-acre lake located within May Township (Washington County). The maximum and mean depths of the lake are 4.3 m (14 feet) and 2.1 m (6.9 ft), respectively. The mean depth of the lake and its surface area translate to an approximate lake volume of 165 ac-ft. The entire area of the lake is considered littoral zone which is the 0-15 feet depth zone of aquatic plant dominance. Furthermore, the lake does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the water column.

The lake's 127-acre watershed and surface area translates to a watershed-to-lake size ratio of 5.3:1 (the greater the ratio, the greater the potential stress on the lake from surface runoff).

The lake was monitored 7 times in 2008. On each sampling day the lake was monitored for Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. Depth profiles for temperature and dissolved oxygen were also measured. The resulting data are summarized in tables and figures on the following page.

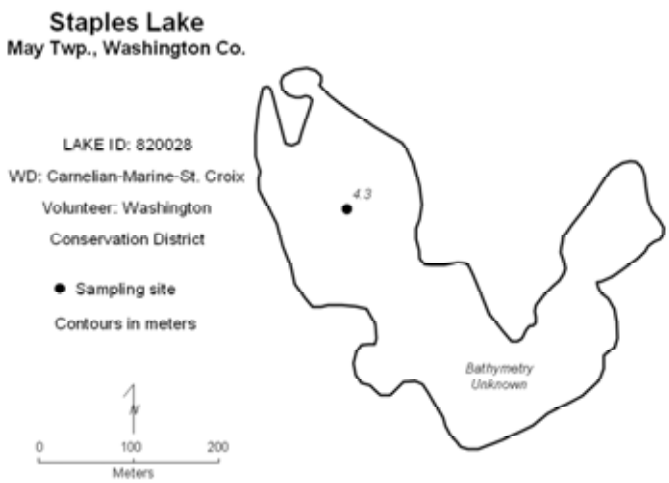
**2008 summer (May-September) data summary**

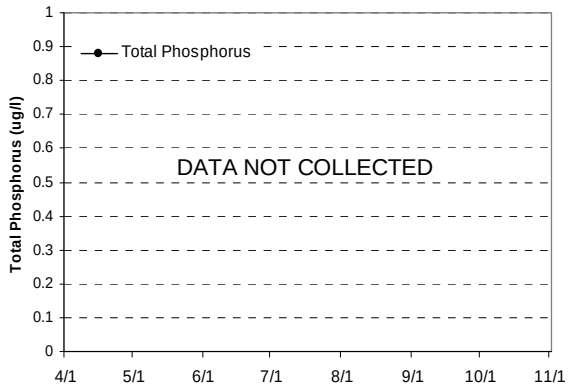
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **Secchi** (m) | 2.6 | 1.8 | 3.4 | B |

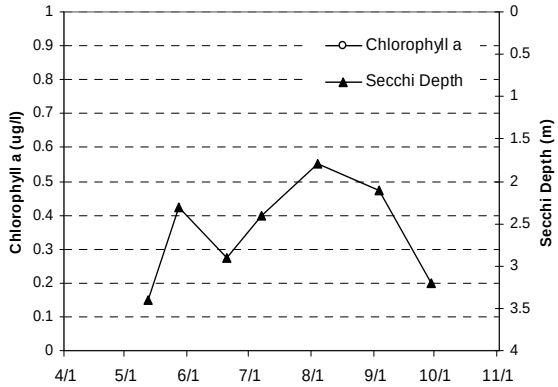
The lake received a water clarity grade of B for 2008, which is consistent with the historical database.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.4 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 2.6 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

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.

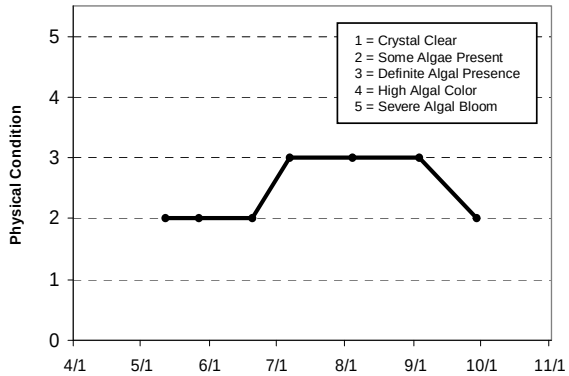



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/12 | 14.1 | 12.4 | 9.67 | 3.51 | | | | 3.4 | 2 | 3 |
| 5/27 | 17 | 15.7 | 8.32 | 0.19 | | | | 2.3 | 2 | 3 |
| 6/20 | 23.7 | 18.3 | 8.74 | 0.19 | | | | 2.9 | 2 | 2 |
| 7/7 | 26.3 | 22.7 | 7.4 | 0.32 | | | | 2.4 | 3 | 2 |
| 8/4 | 25.2 | 21.6 | 4.99 | 0.23 | | | | 1.8 | 3 | 3 |
| 9/3 | 22 | 19.9 | 4.35 | 0.12 | | | | 2.1 | 3 | 3 |
| 9/29 | 18.1 | 17.6 | 4.63 | 0.18 | | | | 3.2 | 2 | 2 |



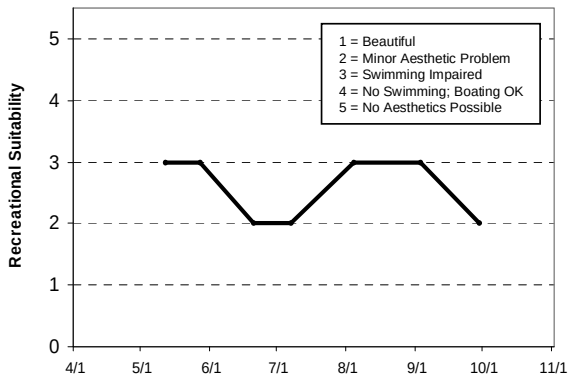

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | B | A | A | C | B | | |
| Chlorophyll a | | | | | | C | B | B | B | B | | |
| Secchi Depth | | | | | | B | B | B | B | B | B | C |
| **Lake Grade** | | | | | | **B** | **B** | **B** | **B** | **B** | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | C | A | C | B | |
| Chlorophyll a | A | A | A | A | |
| Secchi Depth | B | B | A | B | B |
| **Lake Grade** | **B** | **A** | **B** | **B** | |

Source: Metropolitan Council and STORET data



## Success Lake (27-0634) *Shingle Creek Watershed Management Commission*

Success Lake is located in the City of Brooklyn Park (Hennepin County). Bathymetric information is unavailable for this lake.

The lake was monitored 10 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

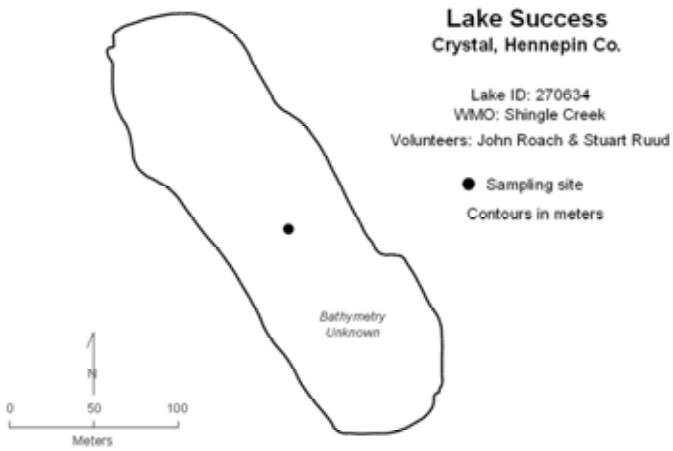
**2008 summer (May-September) data summary**

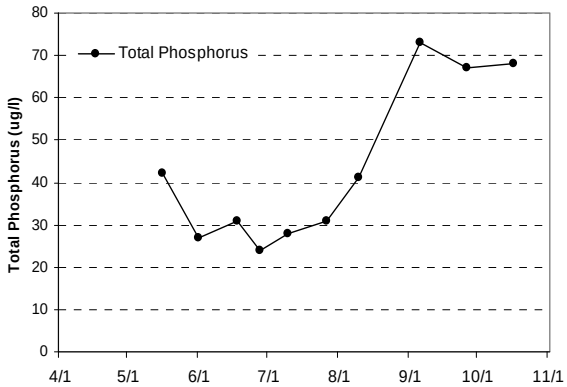
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 40.4 | 24.0 | 73.0 | C |
| **CLA** (µg/l) | 16.7 | 3.6 | 39.0 | B |
| **Secchi** (m) | 1.2 | 0.5 | 1.7 | C |
| **TKN** (mg/l) | 1.20 | 0.34 | 2.00 | |
| | | | ***Lake Grade*** | C |

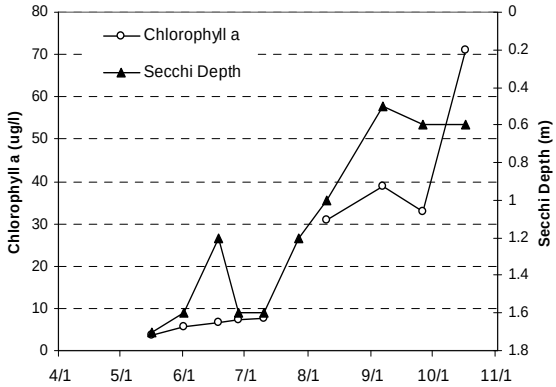
The lake received a lake grade of C for 2008, which is consistent with the lake grades received in 2003 and 2006. However, the lake received a better lake grade of B in 1996. Continued monitoring is suggested to continue to build the historical water quality database for determining potential trends in water quality.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.3 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 2.7 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

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.

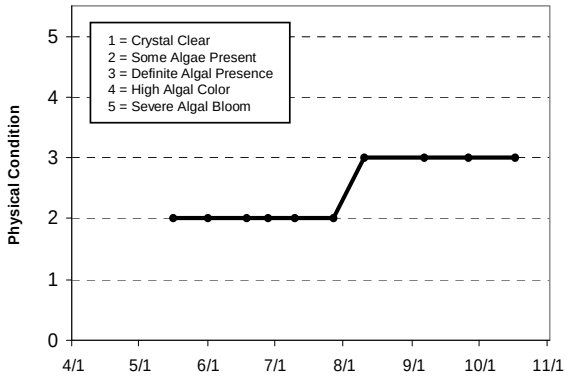



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/16 | 20.1 | | | | 3.6 | 42 | | 1.7 | 2 | 2 |
| 6/1 | 21.9 | | | | 5.8 | 27 | | 1.6 | 2 | 2 |
| 6/18 | 24.2 | | | | 6.5 | 31 | | 1.2 | 2 | 3 |
| 6/28 | 24.5 | | | | 7.4 | 24 | | 1.6 | 2 | 2 |
| 7/10 | 25.3 | | | | 7.6 | 28 | | 1.6 | 2 | 2 |
| 7/27 | 27.1 | | | | | 31 | | 1.2 | 2 | 2 |
| 8/10 | 26.2 | | | | 31 | 41 | | 1 | 3 | 3 |
| 9/6 | 21.7 | | | | 39 | 73 | | 0.5 | 3 | 4 |
| 9/26 | 21.2 | | | | 33 | 67 | | 0.6 | 3 | 4 |
| 10/17 | 12.5 | | | | 71 | 68 | | 0.6 | 3 | 3 |



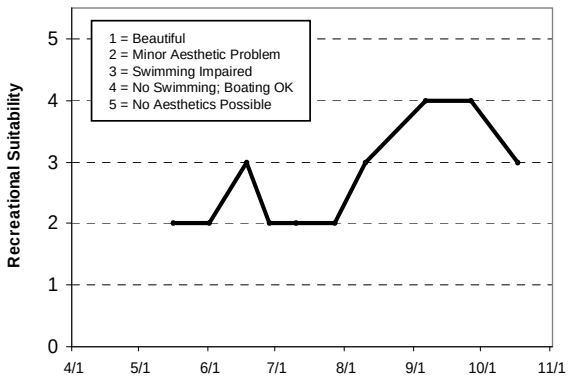

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | B | | | | | | | C |
| Chlorophyll a | | | | | A | | | | | | | B |
| Secchi Depth | | | | | B | | | | | | | D |
| **Lake Grade** | | | | | **B** | | | | | | | **C** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | D | | C |
| Chlorophyll a | | | B | | B |
| Secchi Depth | | | D | | C |
| **Lake Grade** | | | **C** | | **C** |

Source: Metropolitan Council and STORET data



## Sunfish Lake [Sunfish Lake] (19-0050) *City of Sunfish Lake*

Sunfish Lake is a small 49-acre lake located in the City of Sunfish Lake (Dakota County). This was the third year that Sunfish Lake has been involved in the CAMP. A search through the STORET nationwide water quality database for data on the lake provided no data other than Secchi depth information for 1984-1986 and 1991. Therefore 2006 through 2008 are the only years of available water quality data.

The lake was monitored 13 times between early May and mid-October 2008. During each sampling event the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), and total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

**2008 summer (May-September) data summary**

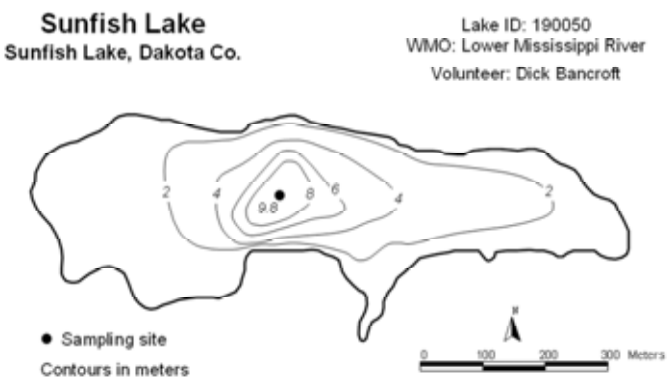
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 39 | 13 | 73 | C |
| **CLA** (µg/l) | 32 | 1.7 | 82 | C |
| **Secchi** (m) | 1.6 | 0.6 | 4.1 | C |
| **TKN** (mg/l) | 1.1 | 0.62 | 1.9 | |
| | | | ***Lake Grade*** | C |

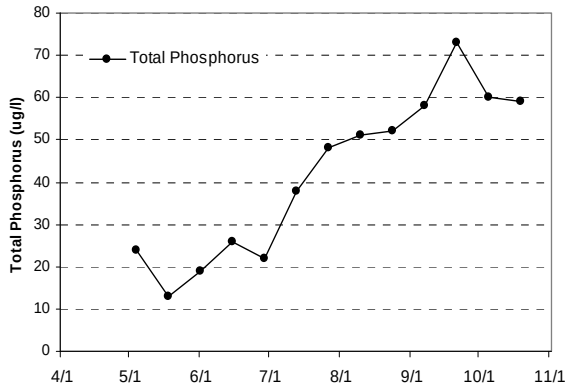
The lake water quality grade for 2008 was a C, which is similar to the lake grades received in 2006 and 2007. The average TP concentration was similar in magnitude as observed in 2007. The minimum and maximum TP concentrations were similar between 2008 and 2007 as well. The average CLA concentration in 2008 was higher in comparison to 2007, with the same pattern observed in the minimum and maximum CLA values. The average water clarity was lower in 2008 than in 2007 but the minimum and maximum water clarity measurements were similar in 2008 and 2007. It appears that the lake water quality in 2008 was similar to 2007 with respect to TP, but algal abundance was higher and water clarity was lower in 2008 compared to 2007, on average, as indicated by the CLA and Secchi measurements. However, the average TP, Secchi depth, and TKN measurements in 2008 were indicative of better water quality in comparison to those measurements in 2006. CLA concentrations (average, minimum, maximum) in 2008 were similar to those observed in 2006.

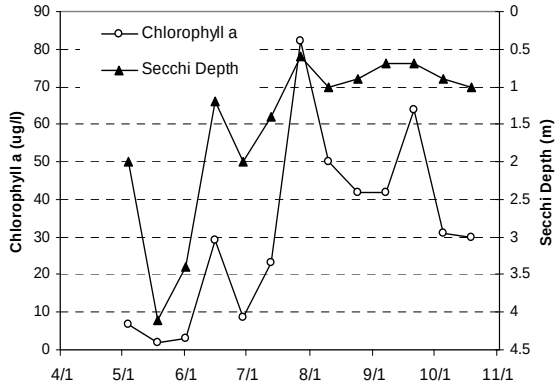
As mentioned earlier, there are no nutrient data available for Sunfish Lake other than the 2006 through 2008 CAMP data. Therefore there are insufficient data at this time to determine long-term trends with sufficient statistical confidence. Given the past 3 years of water quality data, the lake appears to be characterized by a lake water quality grade of C with some variation in water quality conditions from year to year. Furthermore, Secchi measurements indicate that the water clarity from the mid-1980s was represented by a grade of C as well. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

The perceived physical and recreational conditions (ranked on a 1-to-5 scale) are shown on the lake's information sheet on the next page. The average user perception rankings were 3.0 for physical condition ("definite algae present"), and 1.9 for recreational suitability (between 1- "Beautiful" and 2- "minor aesthetic problem").

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.

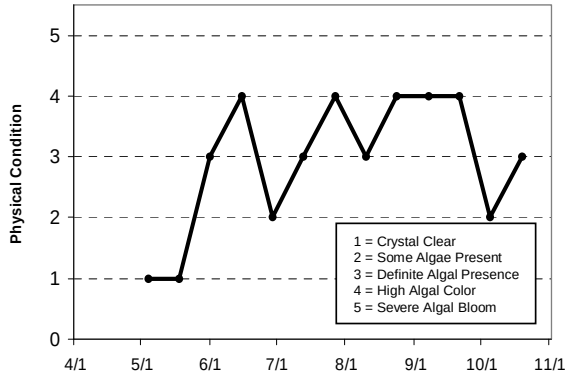



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/4 | 13.1 | | | | 6.9 | 24 | | 2 | 1 | 1 |
| 5/18 | 16.4 | | | | 1.7 | 13 | | 4.1 | 1 | 1 |
| 6/1 | 19.2 | | | | 3.1 | 19 | | 3.4 | 3 | 1 |
| 6/15 | 21.3 | | | | 29 | 26 | | 1.2 | 4 | 2 |
| 6/29 | 23.9 | | | | 8.5 | 22 | | 2 | 2 | 1 |
| 7/13 | 23.9 | | | | 23 | 38 | | 1.4 | 3 | 1 |
| 7/27 | 26.5 | | | | 82 | 48 | | 0.6 | 4 | 3 |
| 8/10 | 24.7 | | | | 50 | 51 | | 1 | 3 | 3 |
| 8/24 | 23.6 | | | | 42 | 52 | | 0.9 | 4 | 3 |
| 9/7 | 19.9 | | | | 42 | 58 | | 0.7 | 4 | |
| 9/21 | 20.7 | | | | 64 | 73 | | 0.7 | 4 | 3 |
| 10/5 | 15.3 | | | | 31 | 60 | | 0.9 | 2 | 2 |
| 10/19 | 13.4 | | | | 30 | 59 | | 1 | 3 | 2 |



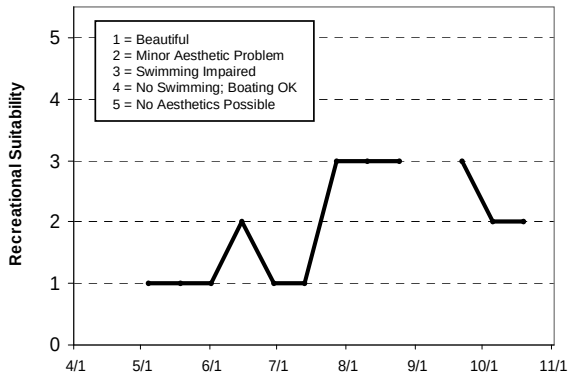

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | C | C | C | | | | | C |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | C | C | C |
| Chlorophyll a | | | C | C | C |
| Secchi Depth | | | D | C | C |
| **Lake Grade** | | | **C** | **C** | **C** |

Source: Metropolitan Council and STORET data



## Sunfish Lake [Lake Elmo] (82-0107) *Valley Branch Watershed District*

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 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 lake was monitored 7 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

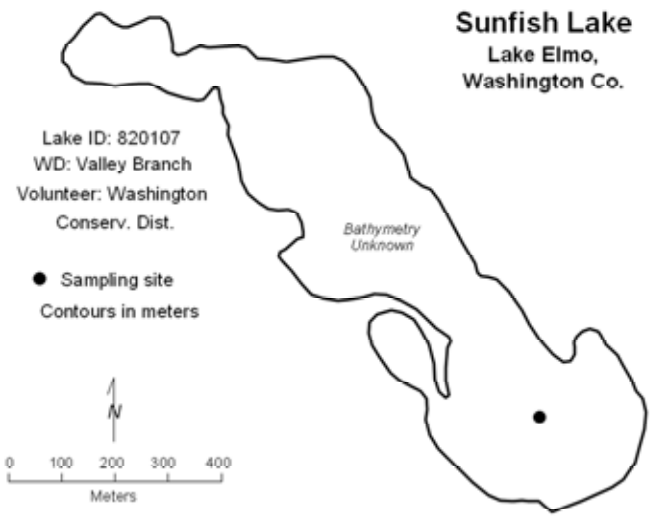
**2008 summer (May-September) data summary**

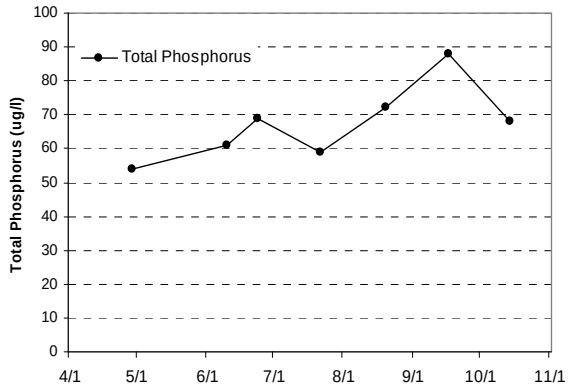
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 69.8 | 59.0 | 88.0 | D |
| **CLA** (µg/l) | 47.8 | 31.0 | 78.0 | C |
| **Secchi** (m) | 0.6 | 0.3 | 0.9 | F |
| **TKN** (mg/l) | 1.92 | 1.50 | 2.30 | |
| | | | ***Lake Grade*** | D |

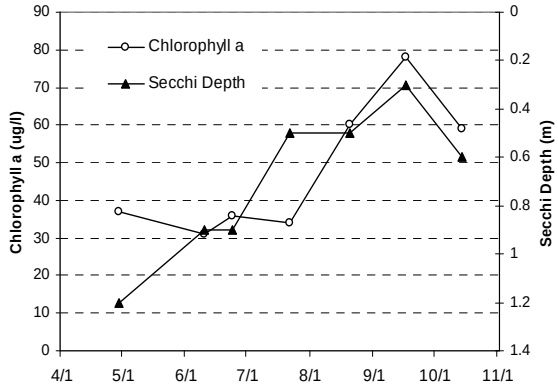
The lake received a lake grade of D for 2008, which is similar to lake grades received in the past. Continued monitoring is suggested to continue to build the water quality database for this lake.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 3.6 (between 3- "definite algae present" and 4- "high algal color"). The average recreational suitability ranking was 4.0 ("no swimming/boating ok").

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.

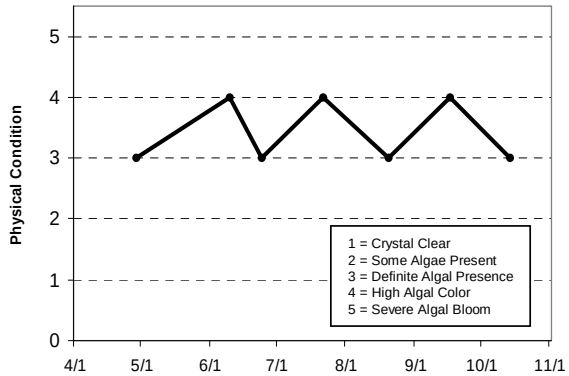



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/29 | 8 | 7.4 | 11.77 | 1.11 | 37 | 54 | | 1.2 | 3 | 4 |
| 6/10 | 21.4 | 18.5 | 9.4 | 0.05 | 31 | 61 | | 0.9 | 4 | 4 |
| 6/24 | 25 | 20.1 | 8.84 | 0.5 | 36 | 69 | | 0.9 | 3 | 4 |
| 7/22 | 26.2 | 22.4 | 8.32 | 19 | 34 | 59 | | 0.5 | 4 | 4 |
| 8/20 | 25.6 | 22.8 | 9.18 | 0.17 | 60 | 72 | | 0.5 | 3 | 4 |
| 9/17 | 20.1 | 17.5 | 12.18 | 0.3 | 78 | 88 | | 0.3 | 4 | 4 |
| 10/14 | 14.3 | 14.3 | 9.93 | 0.45 | 59 | 68 | | 0.6 | 3 | 4 |



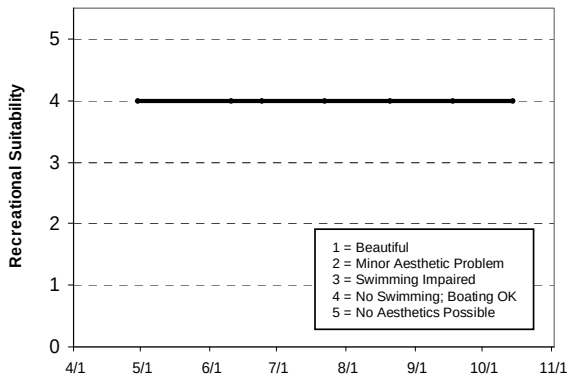

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | C | | | |
| Chlorophyll a | | | | | | | | | C | | | |
| Secchi Depth | | | | | | | | | D | | | |
| **Lake Grade** | | | | | | | | | **C** | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | C | C | | D |
| Chlorophyll a | | C | C | | C |
| Secchi Depth | | F | F | | F |
| **Lake Grade** | | **D** | **D** | | **D** |

Source: Metropolitan Council and STORET data



## Sunnybrook Lake (82-0133) *Valley Branch Watershed District*

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. The approximate volume of the lake is 104 ac-ft. The majority of the lake's area is considered littoral zone (the area of aquatic vegetation dominance). The lake has a 630-acre immediate watershed, which translates to a watershed-to-lake area ratio of 39:1. The larger the ratio the greater the potential stress put on the lake from surface runoff.

The lake was monitored 14 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

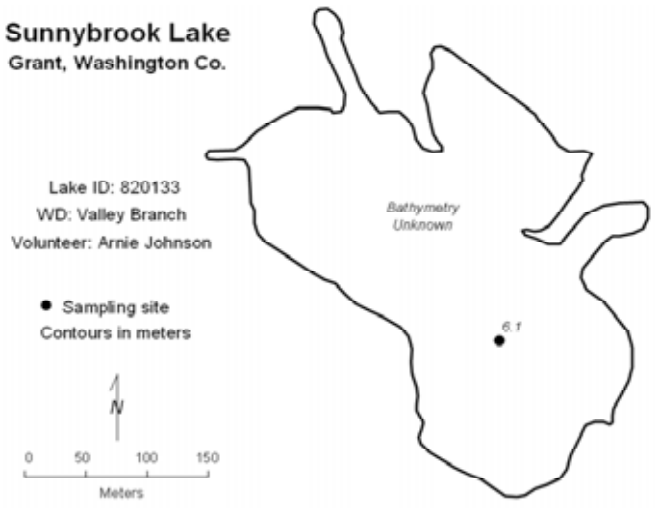
**2008 summer (May-September) data summary**

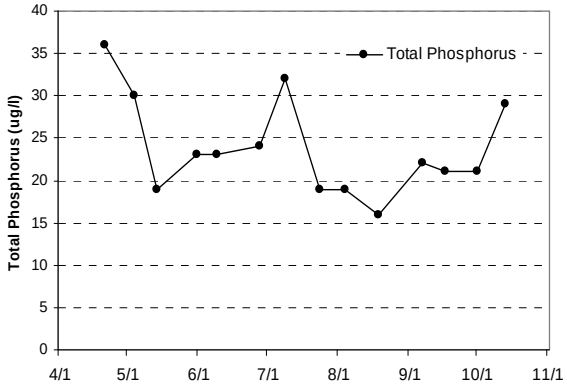
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 22.5 | 16.0 | 32.0 | A |
| **CLA** (µg/l) | 5.5 | 2.4 | 10.0 | A |
| **Secchi** (m) | 2.5 | 1.5 | 4.2 | B |
| **TKN** (mg/l) | 0.91 | 0.77 | 1.10 | |
| | | | ***Lake Grade*** | A |

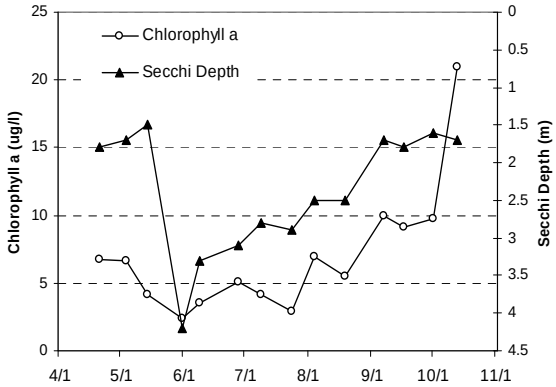
The lake received a lake grade of A for 2008, which is the first time it received such a lake grade. The total phosphorus concentrations were generally lower in 2008 than in previous years. The lake generally maintains an overall letter grade of B with some variation in the individual parameter letter grades. Additional monitoring is suggested to provide data for evaluating potential trends in water quality, such as the TP parameter.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 1.5 (between 1- "crystal clear" and 2- "some algae present"). The average recreational suitability ranking was 1.5 (between 1- "beautiful" and 2- "minor aesthetic problem").

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.

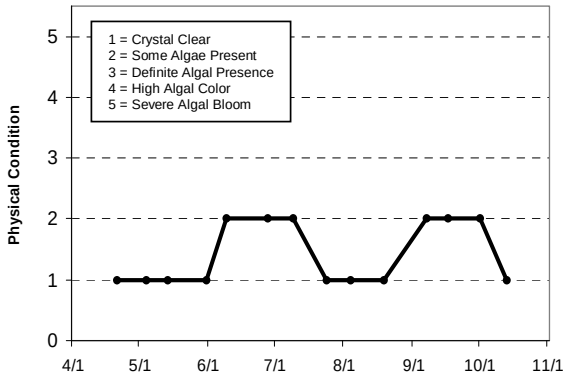



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/21 | 7.2 | | | | 6.7 | 36 | | 1.8 | 1 | 1 |
| 5/4 | 13.6 | | | | 6.6 | 30 | | 1.7 | 1 | 1 |
| 5/14 | 17.8 | | | | 4.2 | 19 | | 1.5 | 1 | 1 |
| 5/31 | 18.4 | | | | 2.4 | 23 | | 4.2 | 1 | 1 |
| 6/9 | 21.3 | | | | 3.5 | 23 | | 3.3 | 2 | 2 |
| 6/28 | 25.1 | | | | 5.1 | 24 | | 3.1 | 2 | 2 |
| 7/9 | 25.9 | | | | 4.1 | 32 | | 2.8 | 2 | 2 |
| 7/24 | 26.8 | | | | 2.9 | 19 | | 2.9 | 1 | 2 |
| 8/4 | 26.2 | | | | 6.9 | 19 | | 2.5 | 1 | 1 |
| 8/19 | 27.7 | | | | 5.5 | 16 | | 2.5 | 1 | 1 |
| 9/7 | 20.7 | | | | 10 | 22 | | 1.7 | 2 | 1 |
| 9/17 | 19.4 | | | | 9.1 | 21 | | 1.8 | 2 | 2 |
| 10/1 | 17.2 | | | | 9.8 | 21 | | 1.6 | 2 | 1 |
| 10/13 | 16.2 | | | | 21 | 29 | | 1.7 | 1 | 1 |



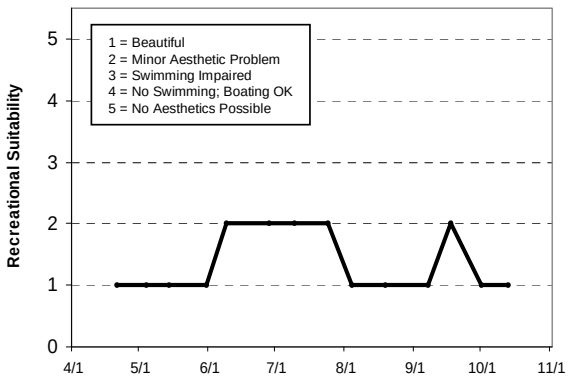

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | C | | B | B | C |
| Chlorophyll a | | | | | | | | B | | A | A | A |
| Secchi Depth | | | | | | | | C | | B | B | C |
| **Lake Grade** | | | | | | | | **C** | | **B** | **B** | **B** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | B | C | B | B | A |
| Chlorophyll a | A | B | A | A | A |
| Secchi Depth | B | B | B | B | B |
| **Lake Grade** | **B** | **B** | **B** | **B** | **A** |

Source: Metropolitan Council and STORET data



## Sunset Lake (82-0153) *Rice Creek Watershed District*

Sunset Lake, with a surface area of about 124 acres (2.3 miles in circumference), is located in the southern portion of the City of Hugo (Washington County). It has a maximum depth of 5.2 m (17 ft). The lake is considered a "Priority Lake" by the Metropolitan Council due to its multi-recreational uses. The MN DNR has designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*).

Sunset Lake has been involved in CAMP since 1993. The lake was monitored 9 times from in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 22.0 | 13.0 | 44.0 | A |
| **CLA** (µg/l) | 4.2 | 1.9 | 6.6 | A |
| **Secchi** (m) | 3.3 | 2.5 | 4.2 | A |
| **TKN** (mg/l) | 0.64 | 0.34 | 0.76 | |
| | | | ***Lake Grade*** | A |

The lake received a lake grade of A for 2008. The lake has received A lake grades since 2001. According to the historical water quality database, the lake's 2001-2008 lake grades of A have been an improvement over the B lake grades received in 1994 and 2000 and the C lake grades received in 1993 and 1995-1999.

Besides the lake's CAMP data, Secchi transparencies were measured throughout the mid- and late-1980's as part of the MPCA's volunteer program. The lake appears to have changed from a C grade lake to an A grade lake over the past 25 years. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed a statistically significant improving trend in water clarity (MPCA 2008).

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 1.9 (between 1- "crystal clear" and 2- "some algae present"). The average recreational suitability ranking was 2.3 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

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

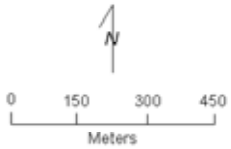
WD: Rice Creek

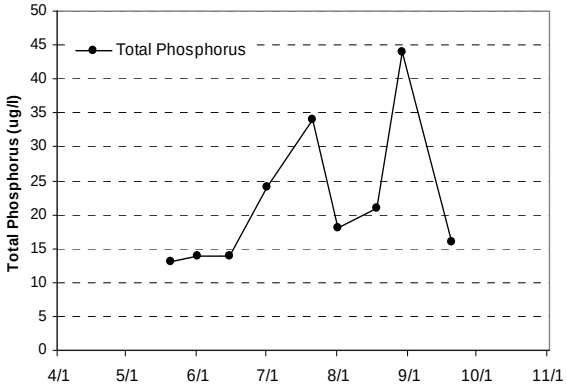
Volunteer:

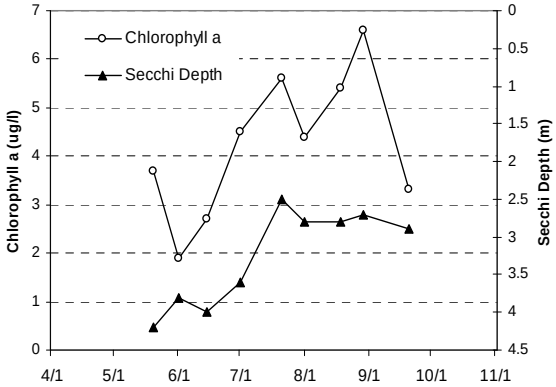
Diane Coderre

● Sampling site

Contours in meters

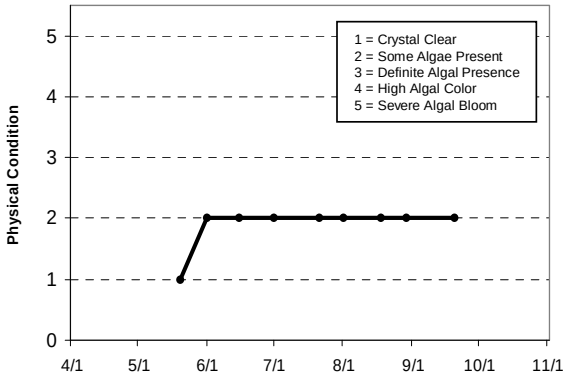





### 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/20 | 16.6 | | | | 3.7 | 13 | | 4.2 | 1 | 1 |
| 6/1 | 21.2 | | | | 1.9 | 14 | | 3.8 | 2 | 3 |
| 6/15 | 22.5 | | | | 2.7 | 14 | | 4 | 2 | 3 |
| 7/1 | 25.8 | | | | 4.5 | 24 | | 3.6 | 2 | |
| 7/21 | 27.5 | | | | 5.6 | 34 | | 2.5 | 2 | |
| 8/1 | 28 | | | | 4.4 | 18 | | 2.8 | 2 | |
| 8/18 | 27.7 | | | | 5.4 | 21 | | 2.8 | 2 | |
| 8/29 | 24.1 | | | | 6.6 | 44 | | 2.7 | 2 | |
| 9/20 | 21.9 | | | | 3.3 | 16 | | 2.9 | 2 | |



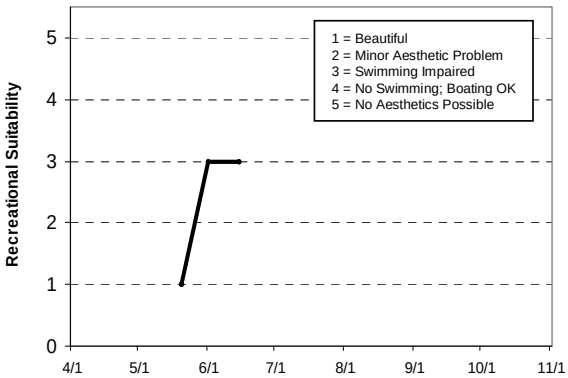

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | D | | | | | | | |
| Chlorophyll a | | | | | C | | | | | | | |
| Secchi Depth | | | | | C | D | C | D | D | C | C | |
| **Lake Grade** | | | | | **C** | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | C | B | C | C | C | C | C | B | A | A | A |
| Chlorophyll a | | B | B | B | C | C | B | B | A | A | A | A |
| Secchi Depth | | 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 |
|---|---|---|---|---|---|
| Total Phosphorus | A | A | A | A | A |
| Chlorophyll a | A | A | A | A | A |
| Secchi Depth | A | A | A | B | A |
| **Lake Grade** | **A** | **A** | **A** | **A** | **A** |

Source: Metropolitan Council and STORET data



## Sunset Pond (19-0451) *Black Dog Watershed Management Commission*

Sunset Pond, a 60-acre man-made lake, is located in the City of Burnsville (Dakota County). It has been involved in CAMP since 1994 (with an omission in 1999). The pond has a normal maximum depth of 3.7 m (12 ft). The entire area of the lake is considered littoral zone which is the 0-15 feet depth zone of aquatic plant dominance. Furthermore, the lake does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the water column. The pond collects drainage from a portion of the city of Burnsville's and Savage's stormwater conveyance systems, including outflow from Crystal and Earley lakes. Because the lake was created to detain stormwater, the pond can experience extreme bounce in its water level during runoff conditions.

The pond has been designated by the MN DNR as being infested with Eurasian water milfoil (*Myriophyllum spicatum*).

The pond was sampled 14 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

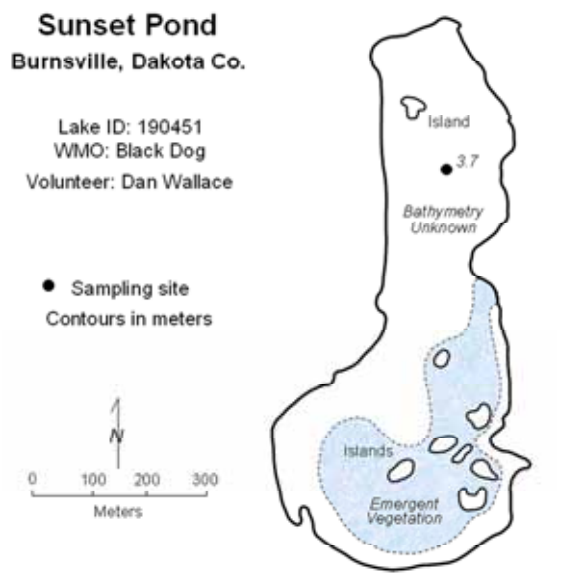
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 50.2 | 33.0 | 70.0 | C |
| **CLA** (µg/l) | 7.1 | 2.2 | 12.0 | A |
| **Secchi** (m) | 1.8 | 1.4 | 2.1 | C |
| **TKN** (mg/l) | 1.67 | 1.10 | 2.00 | |
| | | | ***Lake Grade*** | B |

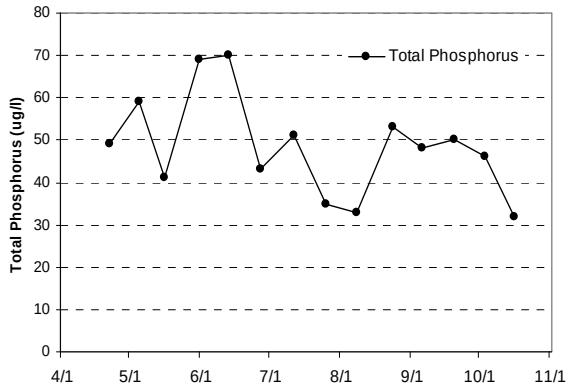
The pond received a lake grade of B for 2008. The pond experiences variability in its water quality as demonstrated by the variation in the historical lake grades. The lake typically receives a B or C lake grade. The water clarity grade of C does not correlate well with the chlorophyll-a grade of A. A possible explanation may be that the water clarity may be affected by higher levels of total suspended solids from surface runoff from storm sewers and the surrounding urbanized watershed. It is possible for higher suspend solids loadings to decrease water clarity which would decrease light penetration thereby inhibiting algal growth. In other words, the algal population may be light-limited rather than nutrient-limited.

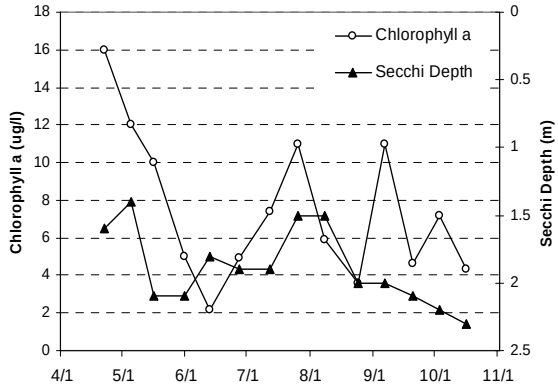
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 3.8 (between 3- "definite algae present" and 4- "high algal color"). The average recreational suitability ranking was 3.9 (between 3- "swimming slightly impaired" and 4- "no swimming/boating ok").

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.

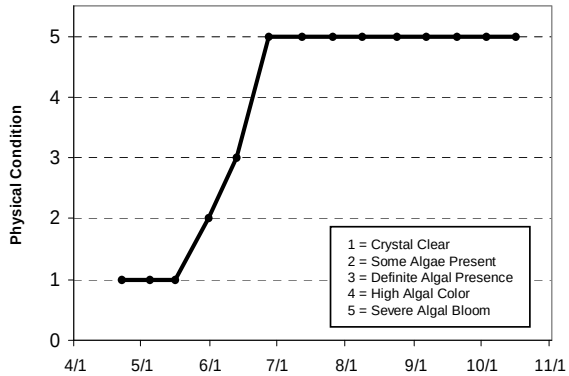



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/22 | 15.5 | | | | 16 | 49 | | 1.6 | 1 | 1 |
| 5/5 | 16.6 | | | | 12 | 59 | | 1.4 | 1 | 1 |
| 5/16 | 17.8 | | | | 10 | 41 | | 2.1 | 1 | 1 |
| 5/31 | 17.2 | | | | 5 | 69 | | 2.1 | 2 | 3 |
| 6/13 | 20.6 | | | | 2.2 | 70 | | 1.8 | 3 | 4 |
| 6/27 | 24.1 | | | | 4.9 | 43 | | 1.9 | 5 | 5 |
| 7/12 | 24.7 | | | | 7.4 | 51 | | 1.9 | 5 | 5 |
| 7/26 | 24.2 | | | | 11 | 35 | | 1.5 | 5 | 5 |
| 8/8 | 23.7 | | | | 5.9 | 33 | | 1.5 | 5 | 5 |
| 8/24 | 21.4 | | | | 3.6 | 53 | | 2 | 5 | 5 |
| 9/6 | 18.2 | | | | 11 | 48 | | 2 | 5 | 5 |
| 9/20 | 19.9 | | | | 4.6 | 50 | | 2.1 | 5 | 4 |
| 10/3 | 16.4 | | | | 7.2 | 46 | | 2.2 | 5 | 4 |
| 10/16 | 12.7 | | | | 4.3 | 32 | | 2.3 | 5 | 2 |



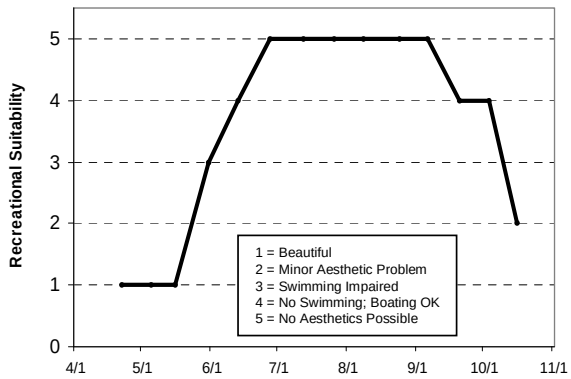

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | C | C | C | C | C | | C | C | C | D |
| Chlorophyll a | | | A | B | B | B | A | | A | A | A | B |
| Secchi Depth | | | 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 |
|---|---|---|---|---|---|
| Total Phosphorus | D | | D | C | C |
| Chlorophyll a | A | | B | A | A |
| Secchi Depth | B | | C | C | C |
| **Lake Grade** | **B** | | **C** | **B** | **B** |

Source: Metropolitan Council and STORET data



## Susan Lake (10-0013) *City of Chanhassen*

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). Approximately 81 percent of the lake's surface area is considered littoral zone, which is the 0-15 feet depth zone of aquatic plant dominance. Because of its multi-recreational uses, the lake is considered a "Priority Lake" in the Metropolitan Area. The MN DNR has designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*).

This was the third year that Susan Lake has been involved in CAMP. A search through the STORET nationwide water quality database for data on the lake provided only the historical CAMP data.

The lake was monitored 13 times in 2009. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

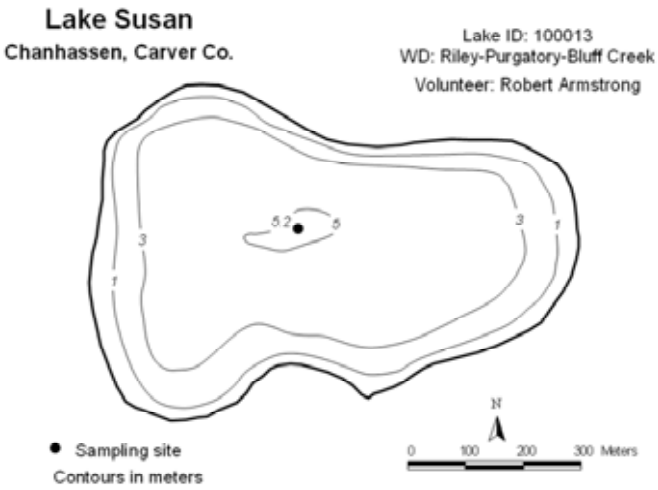
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 425.2 | 30.0 | 3790.0 | F |
| **CLA** (µg/l) | 61.4 | 10.0 | 120.0 | D |
| **Secchi** (m) | 0.9 | 0.0 | 2.1 | D |
| **TKN** (mg/l) | 6.68 | 1.70 | 49.00 | |
| | | | ***Lake Grade*** | D |

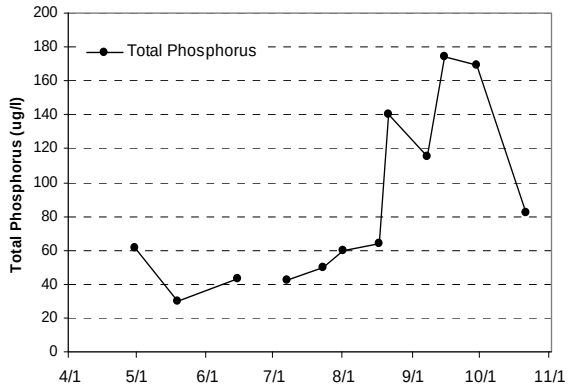
The lake received a lake grade of D for 2008, which is worse than the C lake grades received in the previous two year. Continued monitoring is recommended to build the water quality base for this lake, and to aid in evaluating potential trends in water quality.

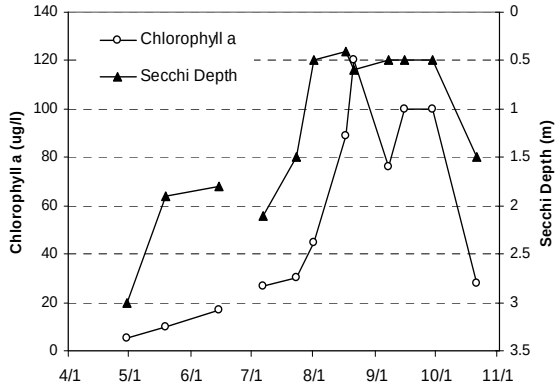
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 3.3 (between 3- "definite algae present" and 4- "high algal color"). The average recreational suitability ranking was 2.6 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

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.

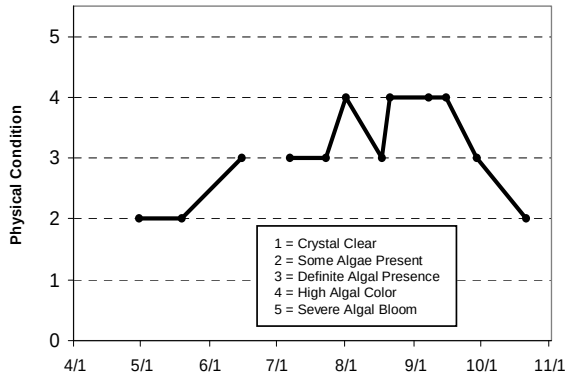



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/30 | 9.1 | | | | 5.2 | 61 | | 3 | 2 | |
| 5/19 | 16.1 | | | | 10 | 30 | | 1.9 | 2 | 1 |
| 6/15 | 22.4 | | | | 17 | 43 | | 1.8 | 3 | 2 |
| 6/17 | | | | | | | | | | |
| 7/7 | 19.5 | | | | 27 | 42 | | 2.1 | 3 | 3 |
| 7/23 | 25.5 | | | | 30 | 50 | | 1.5 | 3 | 3 |
| 8/1 | 27.7 | | | | 45 | 60 | | 0.5 | 4 | 3 |
| 8/17 | 25.7 | | | | 89 | 64 | | 0.4 | 3 | 2 |
| 8/21 | 23.7 | | | | 120 | 140 | | 0.6 | 4 | 3 |
| 9/7 | 22.9 | | | | 76 | 115 | | 0.5 | 4 | 3 |
| 9/15 | 17.2 | | | | 100 | 174 | | 0.5 | 4 | 3 |
| 9/29 | 18.4 | | | | 100 | 169 | | 0.5 | 3 | 3 |
| 10/21 | 11.4 | | | | 28 | 82 | | 1.5 | 2 | 3 |



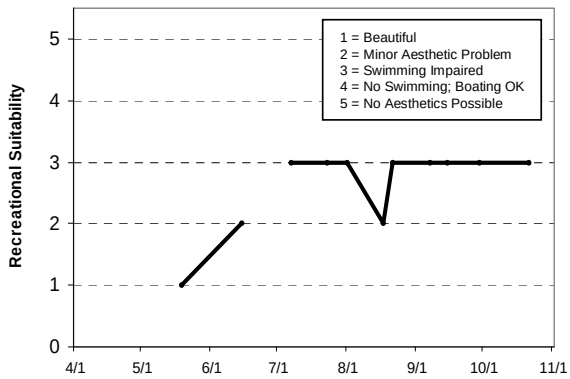

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | D | C | F |
| Chlorophyll a | | | C | C | D |
| Secchi Depth | | | C | C | D |
| **Lake Grade** | | | **C** | **C** | **D** |

Source: Metropolitan Council and STORET data



## Swede Lake (10-0095) *Carver County Environmental Services*

Swede Lake is a 376-acre lake located in Watertown Township (Carver County) with a maximum depth of approximately 4.0 m (13.1 feet). Because of the shallowness of the lake, its entire surface area is considered littoral (the shallow [0-15 foot depth] area dominated by aquatic vegetation). The MN DNR has designated the lake as being infested with Eurasian Water Milfoil (*Myriophyllum spicatum*).

The year 2008 was the seventh year that Swede Lake has been involved in the CAMP (2002 being the first). Additionally, Metropolitan Council staff monitored the lake in 1996 and 2001. The 1996 and 2001-2008 data are the only water quality data found for the lake.

The lake was monitored 14 times between mid April and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

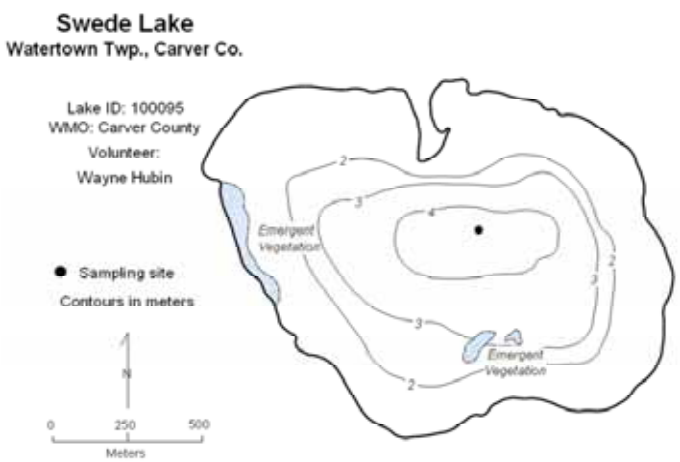
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 318.8 | 127.0 | 753.0 | F |
| **CLA** (µg/l) | 199.1 | 31.0 | 650.0 | F |
| **Secchi** (m) | 0.4 | 0.2 | 0.7 | F |
| **TKN** (mg/l) | 5.07 | 2.70 | 8.60 | |
| | | | ***Lake Grade*** | F |

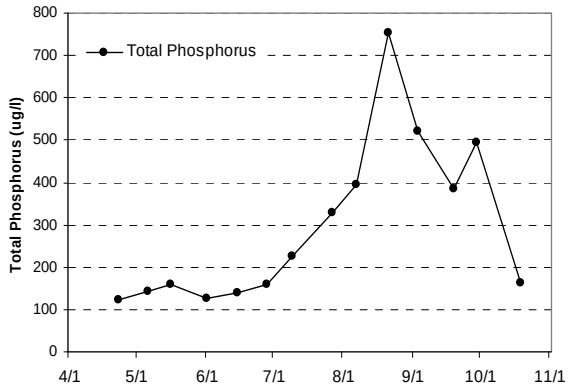
The lake received a lake grade of F for 2008. The lake has received F lake grades for two thirds of the years the lake has been monitored. The remaining years the lake received lake grades of D. The lake's water quality seems well represented by a lake grade of F with occasional variation.

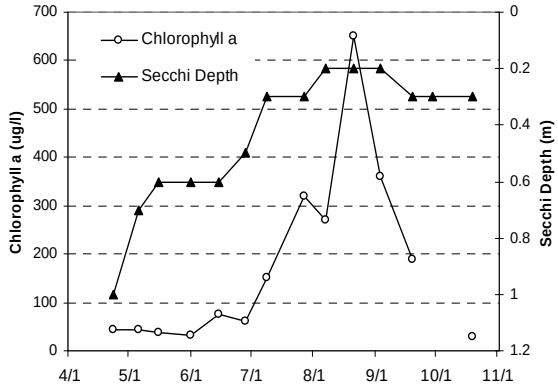
Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The average user perception rankings were 3.2 for physical condition (between 3- "definite algae present" and 4- "high algal color"), and 4.0 for recreational suitability (4- "no swimming - boating ok").

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.

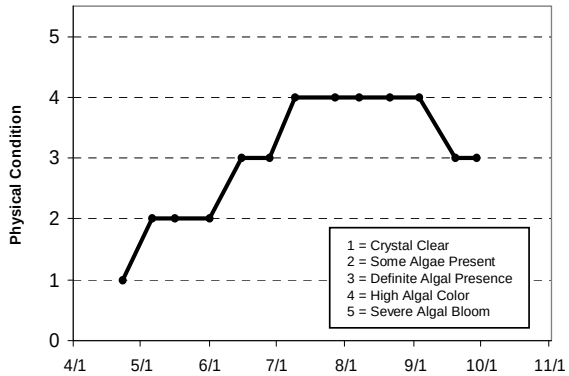



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/23 | 14 | | | | 45 | 122 | | 1 | 1 | |
| 5/6 | 16 | | | | 45 | 142 | | 0.7 | 2 | 4 |
| 5/16 | 17 | | | | 39 | 158 | | 0.6 | 2 | 4 |
| 6/1 | 19 | | | | 31 | 127 | | 0.6 | 2 | 4 |
| 6/15 | 23 | | | | 75 | 138 | | 0.6 | 3 | 4 |
| 6/28 | 23 | | | | 60 | 158 | | 0.5 | 3 | 4 |
| 7/9 | 26 | | | | 150 | 226 | | 0.3 | 4 | 4 |
| 7/27 | 27.5 | | | | 320 | 328 | | 0.3 | 4 | 4 |
| 8/7 | 27 | | | | 270 | 396 | | 0.2 | 4 | 4 |
| 8/21 | 27 | | | | 650 | 753 | | 0.2 | 4 | 4 |
| 9/3 | 23 | | | | 360 | 521 | | 0.2 | 4 | 4 |
| 9/19 | 21 | | | | 190 | 385 | | 0.3 | 3 | 4 |
| 9/29 | 21 | | | | | 494 | | 0.3 | 3 | 4 |
| 10/19 | 17 | | | | 29 | 161 | | 0.3 | | |



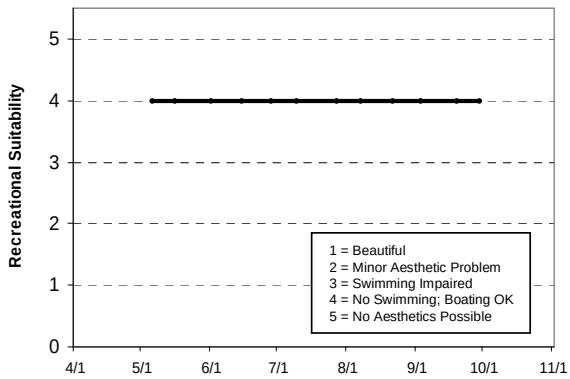

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | D | | | | | D | F | F |
| Chlorophyll a | | | | | F | | | | | D | C | F |
| Secchi Depth | | | | | F | | | | | D | C | F |
| **Lake Grade** | | | | | **F** | | | | | **D** | **D** | **F** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | F | F | F | F | F |
| Chlorophyll a | D | D | F | F | F |
| Secchi Depth | F | D | F | F | F |
| **Lake Grade** | **F** | **D** | **F** | **F** | **F** |

Source: Metropolitan Council and STORET data



## Sweeney Lake (27-0035) *Bassett Creek Watershed Management Organization*

Sweeney Lake is located in the City of Golden Valley (Hennepin County). The 66-acre lake has a mean and maximum depth of 3.6 m (11.8 feet) and 8.0 m (26.0 feet), respectively. It has an approximate lake volume of 790 ac-ft. Approximately 52 percent of the lake's surface area is considered littoral zone, which is the 0-15 feet depth zone of aquatic plant dominance. Additionally, the lake's surface area and 2,400-acre watershed translates to a 36:1 watershed-to-lake area ratio. 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. Sweeny 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 west and south shorelines of Sweeny Lake consist of single family homes. The east shore is bordered by the Glenwood Hills Hospital and park consisting of a lawn, a golf course, and a wooded area (Barr, 1994).

The lake has a hypolimnetic aeration system which generally operates year round. The lake aerators were 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 an impaired water in 2004 by the Minnesota Pollution Control Agency. The impaired listing is due to excessive nutrients.

Site 1 of the lake (the southern site) was monitored 12 times in 2008 via the CAMP. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. Depth profiles for temperature and dissolved oxygen were also measured. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

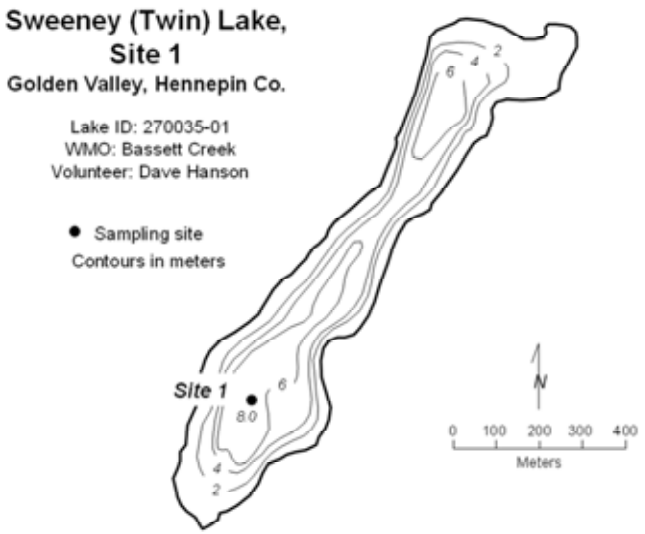
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 39.3 | 18.0 | 104.0 | C |
| **CLA** (µg/l) | 17.0 | 6.6 | 46.0 | B |
| **Secchi** (m) | 1.5 | 0.8 | 2.1 | C |
| **TKN** (mg/l) | 1.55 | 1.00 | 2.40 | |
| | | | ***Lake Grade*** | C |

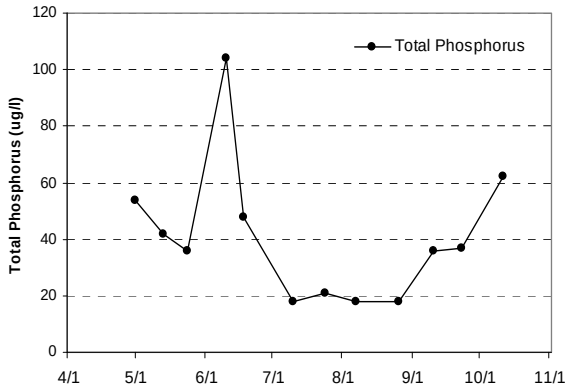
The 2008 water quality lake grade of C is similar to the lake grades received in 2000-2005 and 2007, and an improvement over the grade of D received in 2006. Water clarity was noticeably less clear in the years 2006 and 2007, but improved during the 2008 monitoring season. Over the long term however, the water quality of the lake seems well represented by a lake grade of C. To better understand the quality of the lake and what direction it may be heading, continued monitoring is suggested.

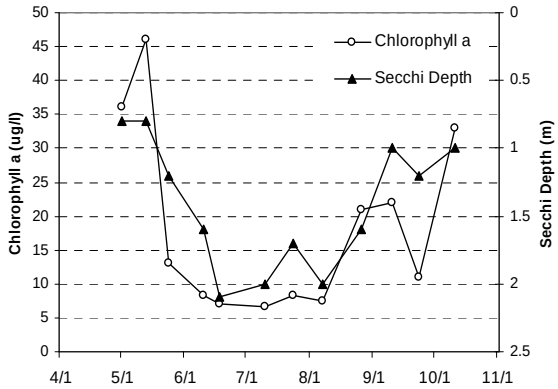
Throughout the monitoring period, the physical and recreational conditions of the lake were ranked on a 1-to-5 scale according to the volunteer's perceptions. The 2008 average perceived physical condition of the lake was 1.3 (between 1- "crystal clear" and 2- "some algae present"), while the mean recreational suitability was 1.1 (between 1- "beautiful" and 2- "minor aesthetic problem").

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.

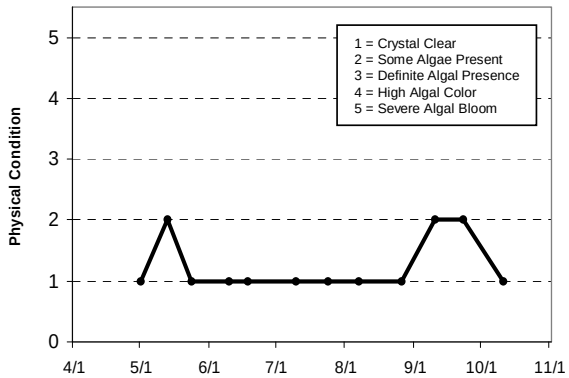



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/1 | 16.5 | 5.3 | 16 | 2.7 | 36 | 54 | | 0.8 | 1 | 1 |
| 5/13 | 14.8 | 6.2 | 16.1 | 0.48 | 46 | 42 | | 0.8 | 2 | 1 |
| 5/24 | 18.9 | 7.2 | 11.9 | 0.23 | 13 | 36 | | 1.2 | 1 | 1 |
| 6/10 | 20.2 | 7.7 | 8.18 | 0.16 | 8.3 | 104 | | 1.6 | 1 | 1 |
| 6/18 | 21.5 | 8.3 | 8.9 | 0.15 | 7 | 48 | | 2.1 | 1 | 1 |
| 7/10 | 25.9 | 11.2 | 8.7 | 0.17 | 6.6 | 18 | | 2 | 1 | 1 |
| 7/24 | 26.6 | 13.5 | 8.57 | 0.17 | 8.3 | 21 | | 1.7 | 1 | 1 |
| 8/7 | 27.1 | 14.1 | 9.5 | 0.11 | 7.4 | 18 | | 2 | 1 | 1 |
| 8/26 | 24.2 | 12.4 | 8.7 | 0.16 | 21 | 18 | | 1.6 | 1 | 1 |
| 9/10 | 19.5 | 12.8 | 7.6 | 0.17 | 22 | 36 | | 1 | 2 | 1 |
| 9/23 | 20.7 | 13.8 | 9.91 | 0.21 | 11 | 37 | | 1.2 | 2 | 2 |
| 10/11 | 15.2 | 14.8 | 6.6 | 4.32 | 33 | 62 | | 1 | 1 | 1 |



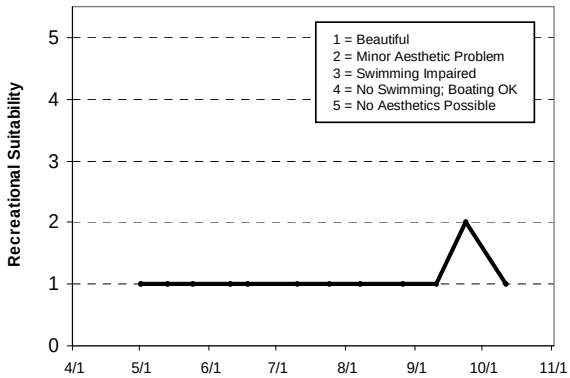

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | | |

| Year | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 Site 1 | 2000 Site 2 | 2001 Site 1 | 2001 Site 2 | 2002 Site 1 | 2002 Site 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | C | C | C | C | C | NA |
| Chlorophyll a | | | | | | | | C | C | B | C | B | NA |
| Secchi Depth | | | | | | | | D | D | C | C | C | NA |
| **Lake Grade** | | | | | | | | **C** | **C** | **C** | **C** | **C** | **NA** |

| Year | 2003 Site 1 | 2004 Site 1 | 2005 Site 1 | 2006 Site 1 | 2007 Site 1 | 2008 Site 1 |
|---|---|---|---|---|---|---|
| Total Phosphorus | C | C | C | D | C | C |
| Chlorophyll a | B | B | C | C | B | B |
| Secchi Depth | C | C | C | D | D | C |
| **Lake Grade** | **C** | **C** | **C** | **D** | **C** | **C** |

Source: Metropolitan Council and STORET data



## Sylvan Lake (27-0171) *Elm Creek Watershed Management Commission*

Sylvan Lake is located in Hassan Township (Hennepin County). The lake has a surface area of approximately 114 acres. It has a maximum depth of approximately 4 m (13 feet). Because of the shallowness of the lake, its entire surface area is considered littoral zone. The littoral zone is the shallow 0-15 feet depth zone dominated by aquatic vegetation).

The year 2008 was the first year that the lake has been monitored via the CAMP. A search through the EPA's STORET database provided Secchi water clarity data for the year 1997. Therefore, the 2008 CAMP data are the only nutrient data available for the lake.

The lake was monitored 10 times between mid May and mid October 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

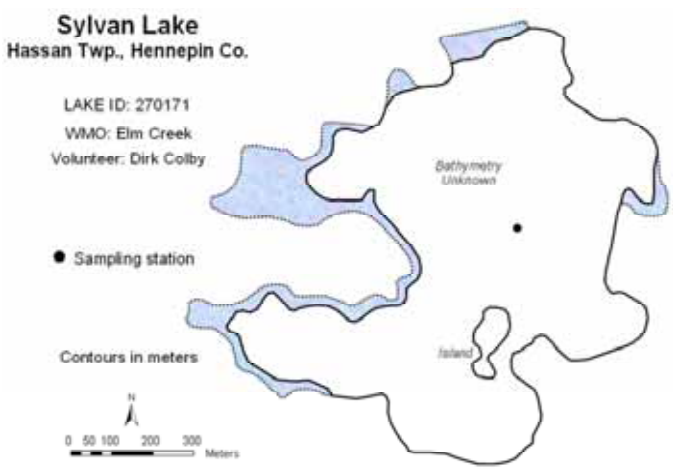
**2008 summer (May-September) data summary**

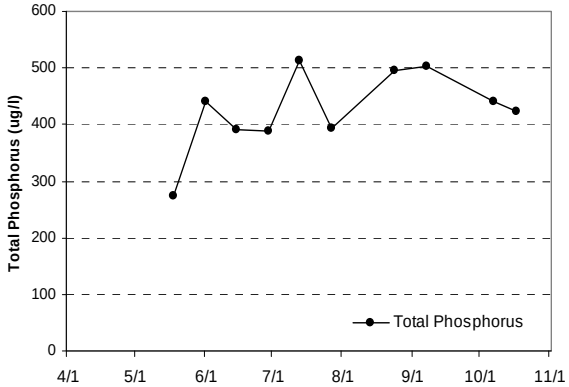
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 425.3 | 274.0 | 514.0 | F |
| **CLA** (µg/l) | 26.7 | 1.7 | 66.0 | C |
| **Secchi** (m) | 2.0 | 1.0 | 4.0 | C |
| **TKN** (mg/l) | 1.46 | 0.78 | 2.40 | |
| | | | ***Lake Grade*** | D |

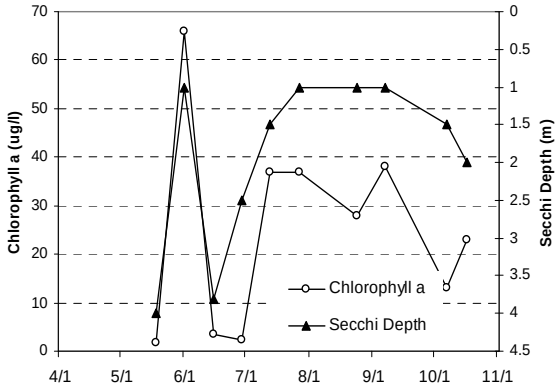
The lake received a lake grade of D for 2008. The TP concentrations were very high as indicated by the summer-time mean of 425 ug/L which yields a parameter grade of F. The CLA concentrations and water clarity both received C parameter grades. The CLA and water clarity grades are consistent with respect to each other not only in magnitude of the mean, but also consistent with respect to patterns in peaks and lows of the seasonal data. Therefore the water quality with respect to water clarity and algal abundance was not affected as greatly by TP as would be suggested by the higher TP concentrations. Further monitoring is suggested to determine if this interesting pattern is a characteristic of this lake.

Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The average user perception rankings were 2.8 for physical condition (between 2- "some algae present" and 3- "definite algae present"), and 3.1 for recreational suitability (between 3- "swimming slightly impaired" and 4- "no swimming - boating ok").

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.

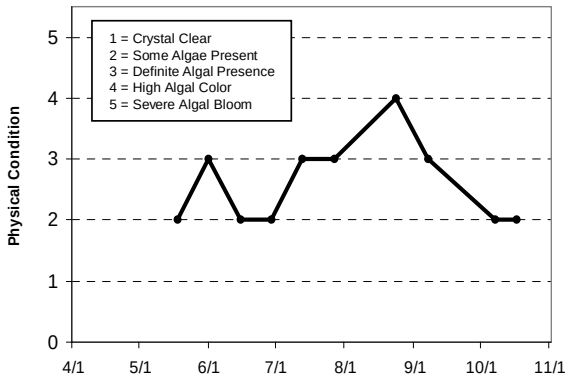



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/18 | 16 | | | | 1.7 | 274 | | 4 | 2 | 1 |
| 6/1 | 19 | | | | 66 | 441 | | 1 | 3 | 4 |
| 6/15 | 19.5 | | | | 3.5 | 391 | | 3.8 | 2 | 3 |
| 6/29 | 21.5 | | | | 2.2 | 389 | | 2.5 | 2 | 3 |
| 7/13 | | | | | 37 | 514 | | 1.5 | 3 | |
| 7/27 | 25.2 | | | | 37 | 394 | | 1 | 3 | 4 |
| 8/24 | 22.8 | | | | 28 | 496 | | 1 | 4 | 4 |
| 9/7 | 19 | | | | 38 | 503 | | 1 | 3 | 3 |
| 10/7 | 15 | | | | 13 | 441 | | 1.5 | 2 | 4 |
| 10/17 | 11.9 | | | | 23 | 422 | | 2 | 2 | 3 |



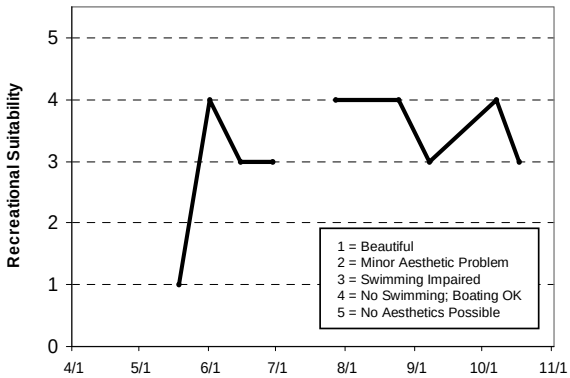

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | F | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | | F |
| Chlorophyll a | | | | | C |
| Secchi Depth | | | | | C |
| **Lake Grade** | | | | | **D** |

Source: Metropolitan Council and STORET data



## Sylvan Lake [Half Breed Lake] (82-0080) *Comfort Lake-Forest Lake Watershed District*

Sylvan Lake (also known as Half Breed Lake) is a 75-acre lake located in Forest Lake Township (Washington County). It is considered a Priority Lake by the Metropolitan Council for its exceptional water clarity. The lake's mean and maximum depth of 1.7 m (5.6 feet) and 10.3 m (34 feet) translates to an approximate volume of 420 ac-ft. Approximately 67 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 has a 303-acre watershed which results in a watershed-to-lake area ratio of 4:1. The larger the ratio the greater the potential stress on the lake from surface runoff. The lake has no inlets and no public access to the lake.

The lake was monitored 9 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

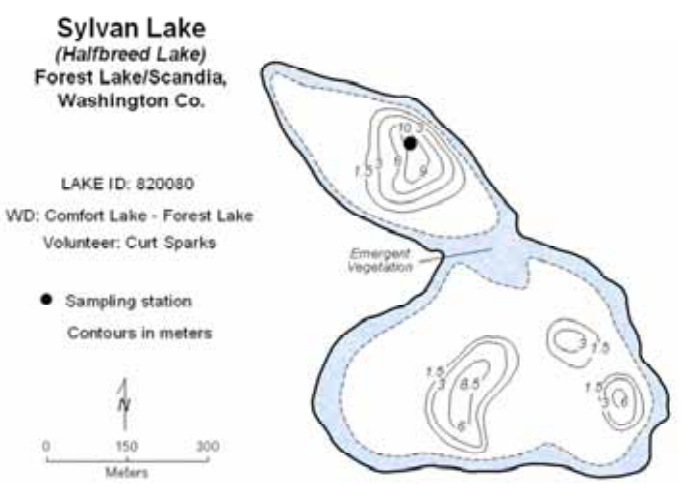
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 12.9 | 8.0 | 35.0 | A |
| **CLA** (µg/l) | 2.6 | 1.3 | 4.7 | A |
| **Secchi** (m) | 4.7 | 4.0 | 5.5 | A |
| **TKN** (mg/l) | 0.83 | 0.38 | 2.60 | |
| | | | ***Lake Grade*** | A |

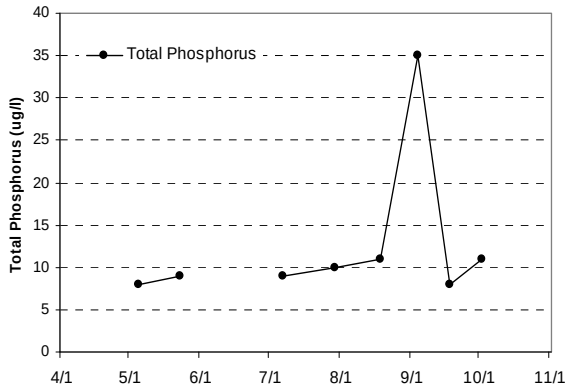
The lake received a lake grade of A for 2008, which is consistent with the lake grades received over the past two decades. The historic water quality database indicates that the lake has maintained its high quality over the past 20+ years. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed a statistically significant improving trend in water clarity (MPCA 2008).

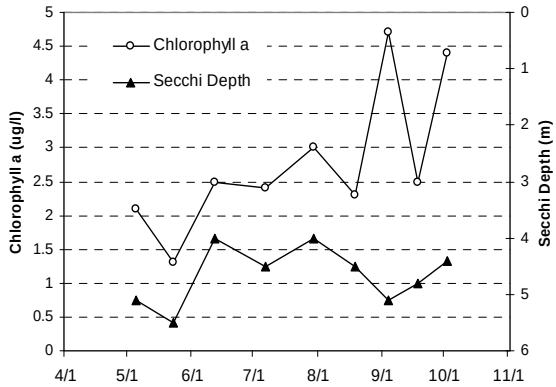
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 1.1 (between 1- "crystal clear" and 2- "some algae present"). The average recreational suitability ranking was 1.0 ("beautiful").

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.

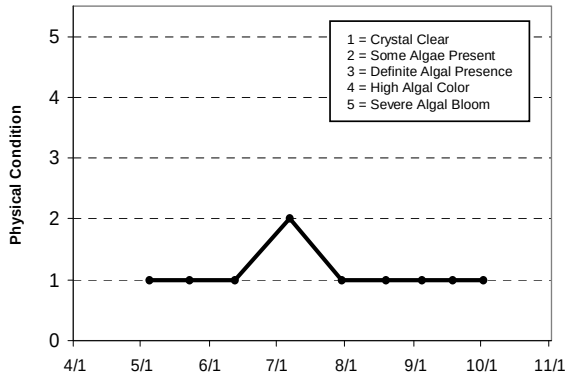



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/5 | 12.1 | | | | 2.1 | 8 | | 5.1 | 1 | 1 |
| 5/23 | 17.8 | | | | 1.3 | 9 | | 5.5 | 1 | 1 |
| 6/12 | 22.3 | | | | 2.5 | | | 4 | 1 | 1 |
| 7/7 | 25.2 | | | | 2.4 | 9 | | 4.5 | 2 | 1 |
| 7/30 | 26.8 | | | | 3 | 10 | | 4 | 1 | 1 |
| 8/19 | 26.4 | | | | 2.3 | 11 | | 4.5 | 1 | 1 |
| 9/4 | 22.1 | | | | 4.7 | 35 | | 5.1 | 1 | 1 |
| 9/18 | 18.6 | | | | 2.5 | 8 | | 4.8 | 1 | 1 |
| 10/2 | 16.1 | | | | 4.4 | 11 | | 4.4 | 1 | 1 |



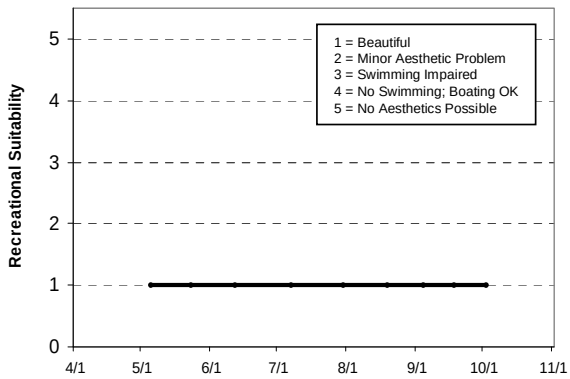

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | B | A | | | | | C | B | A | A | | A |
| Chlorophyll a | | | | | | | B | A | A | A | | A |
| Secchi Depth | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | A | | | A | | A | A | A | A | A | A |
| Chlorophyll a | | A | | | A | | A | A | A | A | A | A |
| Secchi Depth | 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 |
|---|---|---|---|---|---|
| Total Phosphorus | A | A | | A | A |
| Chlorophyll a | A | A | | A | A |
| Secchi Depth | A | A | | A | A |
| **Lake Grade** | **A** | **A** | | **A** | **A** |

Source: Metropolitan Council and STORET data



## Tamarack Lake (10-0010) *Minnehaha Creek Watershed District*

Tamarack Lake is located in the City of Victoria (Carver County). The lake has a surface area of 24 acres. It has a maximum depth of approximately 20 m (66 ft). Approximately 41 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 was monitored 11 in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

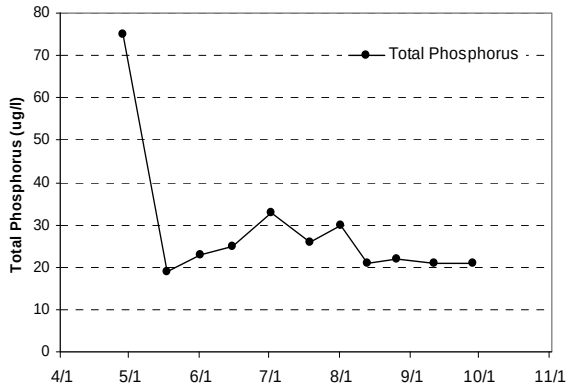
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 24.1 | 19.0 | 33.0 | B |
| **CLA** (µg/l) | 9.7 | 3.4 | 21.0 | A |
| **Secchi** (m) | 2.8 | 1.8 | 4.3 | B |
| **TKN** (mg/l) | 1.21 | 0.96 | 1.40 | |
| | | | ***Lake Grade*** | B |

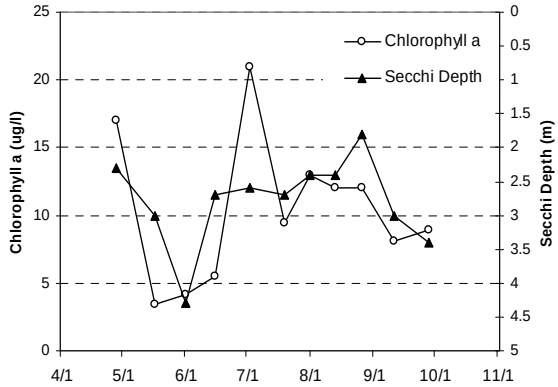
The lake received a lake grade of B for 2008, which is similar to the B lake grades received in 2001, 2002, and 2007. The lake has received varying lake grades over the past 9 years of CAMP monitoring, varying in the C and B grades. Continued monitoring is suggested to continue to build the water quality database for increasing the ability to detect potential trends in water quality.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.3 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 1.0 ("beautiful").

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/.

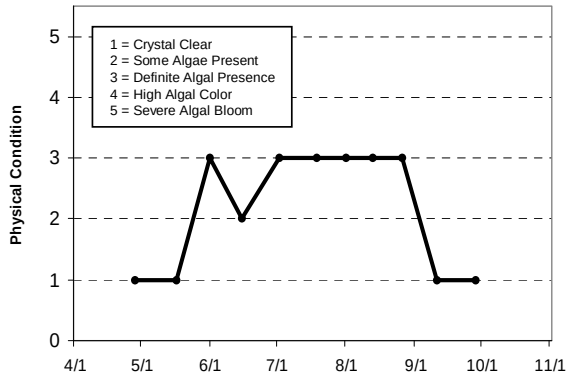
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.




## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/28 | 4.4 | | | | 17 | 75 | | 2.3 | 1 | 1 |
| 5/17 | 16 | | | | 3.4 | 19 | | 3 | 1 | 1 |
| 6/1 | 21 | | | | 4.1 | 23 | | 4.3 | 3 | 1 |
| 6/15 | 21 | | | | 5.5 | 25 | | 2.7 | 2 | 1 |
| 7/2 | 22 | | | | 21 | 33 | | 2.6 | 3 | 1 |
| 7/19 | 27 | | | | 9.4 | 26 | | 2.7 | 3 | 1 |
| 8/1 | 27 | | | | 13 | 30 | | 2.4 | 3 | 1 |
| 8/13 | 22 | | | | 12 | 21 | | 2.4 | 3 | 1 |
| 8/26 | 22 | | | | 12 | 22 | | 1.8 | 3 | 1 |
| 9/11 | 17 | | | | 8.1 | 21 | | 3 | 1 | 1 |
| 9/28 | 18 | | | | 8.9 | 21 | | 3.4 | 1 | |



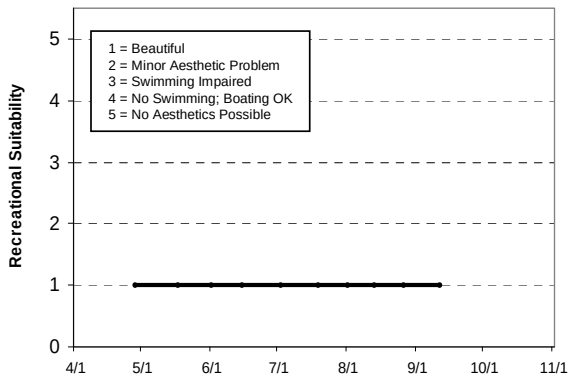

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | C | B | B | C |
| Chlorophyll a | | | | | | | | | C | A | B | B |
| Secchi Depth | | | | | A | | | | C | B | C | C |
| **Lake Grade** | | | | | | | | | **C** | **B** | **B** | **C** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | D | C | D | B | B |
| Chlorophyll a | C | C | C | B | A |
| Secchi Depth | C | C | C | B | B |
| **Lake Grade** | **C** | **C** | **C** | **B** | **B** |

Source: Metropolitan Council and STORET data



## Terrapin Lake (82-0031) *Marine on St. Croix Watershed Management Organization*

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 entire area of the lake is considered littoral zone which is the 0-15 feet depth zone of aquatic plant dominance. Furthermore, the lake does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the water column.

The lake was monitored 7 times in 2008. On each sampling day the lake was monitored for Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. Depth profiles for temperature and dissolved oxygen were also measured. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **Secchi** (m) | 3.3 | 2.7 | 3.8 | A |

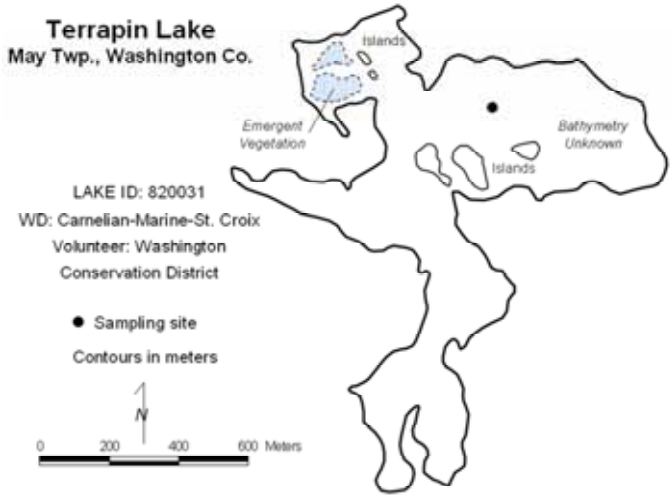
The lake received a Secchi grade of A for 2008, which is consistent with the historical water quality database. No lake grade was given for the lake this year because total phosphorus and chlorophyll-a were not monitored.

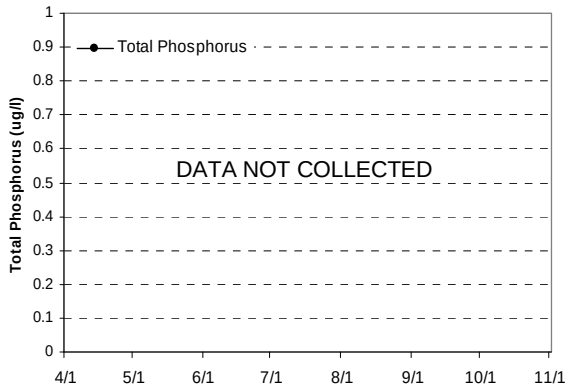
There are insufficient data to determine potential trends in water quality because of the limited quantity of data in the database. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

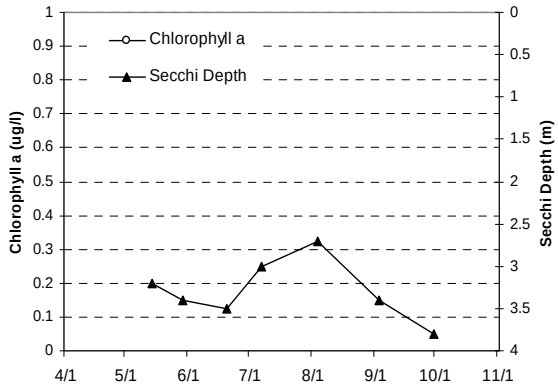
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 1.9 (between 1- "crystal clear" and 2- "some algae present"). The average recreational suitability ranking was 1.9 (between 1- "beautiful" and 2- "minor aesthetic problem").

The Fisheries Section of the Minnesota Department of Natural Resources (MNDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MNDNR 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.

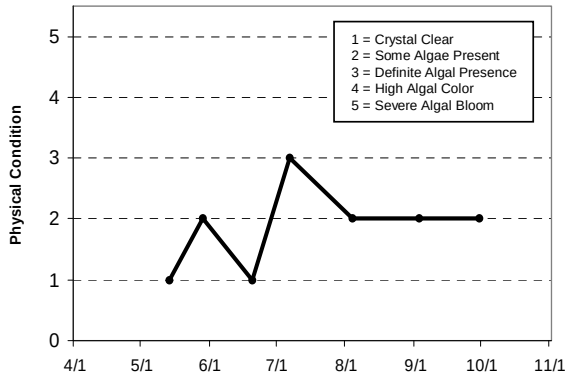



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/14 | 14.2 | 13.7 | 9.51 | 1.68 | | | | 3.2 | 1 | 1 |
| 5/29 | 18 | 16.8 | 9.18 | 0.76 | | | | 3.4 | 2 | 1 |
| 6/20 | 23.5 | 19.2 | 9.79 | 0.23 | | | | 3.5 | 1 | 2 |
| 7/7 | 26 | 23 | 9.45 | 0.56 | | | | 3 | 3 | 2 |
| 8/4 | 25 | 21 | 5.41 | 0.2 | | | | 2.7 | 2 | 3 |
| 9/3 | 21.8 | 20.8 | 4.63 | 0.2 | | | | 3.4 | 2 | 2 |
| 9/30 | 17.6 | 17.8 | 4.45 | 3.8 | | | | 3.8 | 2 | 2 |



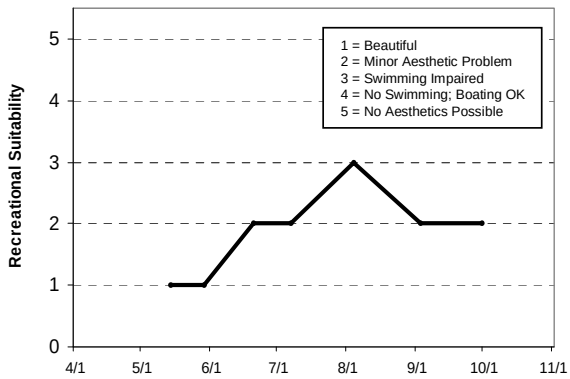

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | B | A | C | B | |
| Chlorophyll a | A | A | A | A | |
| Secchi Depth | A | A | A | B | A |
| **Lake Grade** | **A** | **A** | **B** | **B** | |

Source: Metropolitan Council and STORET data



## Turtle Lake (82-0036) *Carnelian - Marine Watershed District*

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 (7.9 ft) and 1.2 m (3.9 ft), respectively. It has an approximate volume of 172 ac-ft. The entire area of the lake is considered littoral zone which is the 0-15 feet depth zone of aquatic plant dominance. Furthermore, the lake does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the water column. The lake's watershed area is approximately 699 acres. The lake has 16:1 watershed-to-lake area ratio. The greater the ratio, the greater the potential stress on the lake from surface runoff.

The lake was monitored 7 times in 2008. On each sampling day the lake was monitored for Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. Depth profiles for temperature and dissolved oxygen were also measured. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

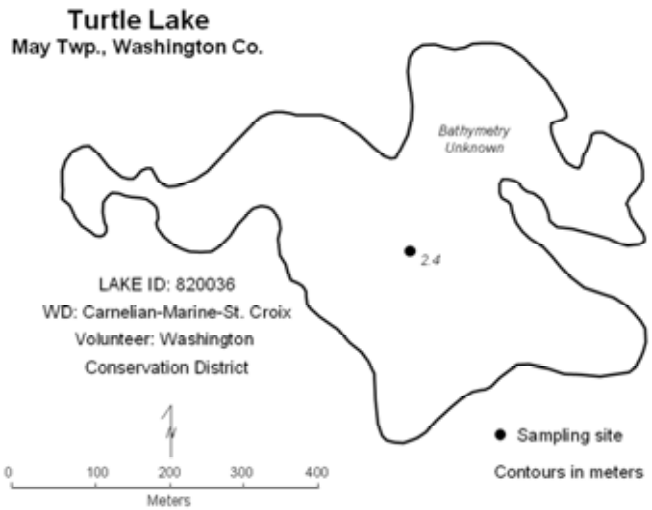
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **Secchi** (m) | 1.4 | 0.9 | 1.7 | C |

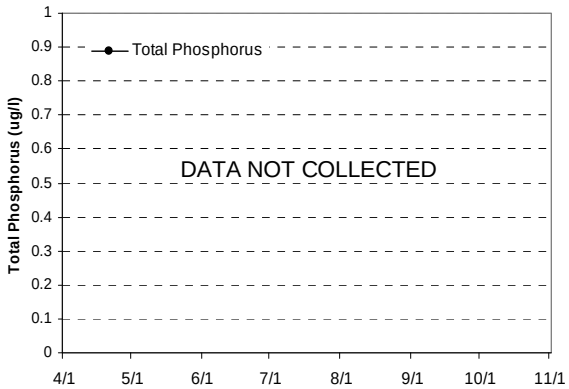
The lake received a Secchi grade of C for 2008, which is consistent with the historical water quality database for the monitoring years since 1999. No lake grade was given for the lake this year because total phosphorus (TP) and chlorophyll-a (CLA) were not monitored.

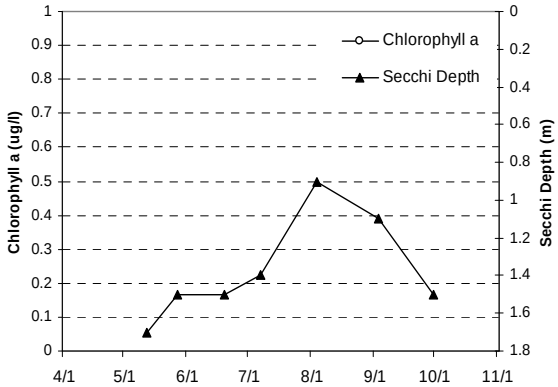
A review of the historical water quality database shows that lake grades and individual parameter grades (particularly chlorophyll-a and Secchi depth grades) seem to have improved during the period from 1991-2008. However, a lake grade has not been able to be determined since 2003. To better understand the lake's water quality and where it may be heading, continued monitoring is suggested particularly for adding the two other trophic indicator parameters, TP and CLA, so as to determine an up to date lake grade.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.0 ("some algae present"). The average recreational suitability ranking was 2.9 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

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.

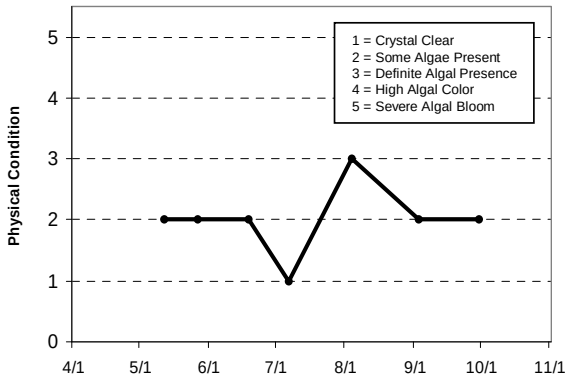



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/12 | 13.6 | 13.5 | 7.3 | 7.14 | | | | 1.7 | 2 | 2 |
| 5/27 | 16.2 | 15.7 | 6.76 | 6.78 | | | | 1.5 | 2 | 3 |
| 6/19 | 24 | 21 | 8.84 | 0.98 | | | | 1.5 | 2 | 4 |
| 7/7 | 26.2 | 23.3 | 9.58 | 0.33 | | | | 1.4 | 1 | 2 |
| 8/4 | 26.1 | 23.2 | 10.33 | 0.32 | | | | 0.9 | 3 | 4 |
| 9/3 | 20.2 | 19.7 | 7.3 | 0.38 | | | | 1.1 | 2 | 3 |
| 9/30 | 15.3 | 15.6 | 6.83 | 1.58 | | | | 1.5 | 2 | 2 |



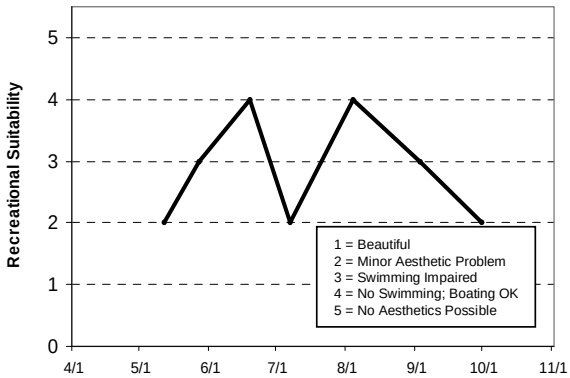

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | F |
| Chlorophyll a | | | | | | | | | | | | F |
| Secchi Depth | | | | | | | | | | | | F |
| **Lake Grade** | | | | | | | | | | | | **F** |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | F | | | | C | C | C | B | D | C | | D |
| Chlorophyll a | F | | | | D | D | D | C | B | B | | B |
| Secchi Depth | 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 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | | |
| Chlorophyll a | | | | | |
| Secchi Depth | C | C | C | C | C |
| **Lake Grade** | | | | | |

Source: Metropolitan Council and STORET data



## Twin Lake [Burnsville] (19-0028) *Black Dog Watershed Management Commission*

Twin Lake is an 11-acre lake located in the City of Burnsville (Dakota County). The entire area of the lake is considered littoral zone which is the 0-15 feet depth zone of aquatic plant dominance. Furthermore, the lake does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the water column. The lake has been designated by the MN DNR has being infested with Eurasian water milfoil (*Myriophyllum spicatum*).

The lake was monitored 14 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

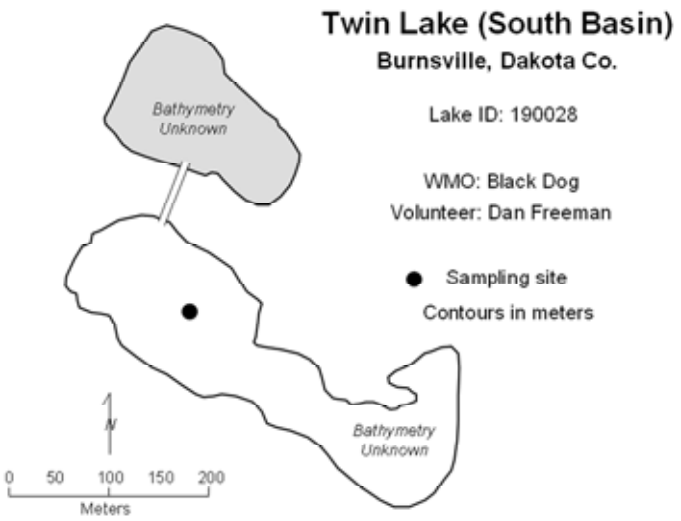
**2008 summer (May-September) data summary**

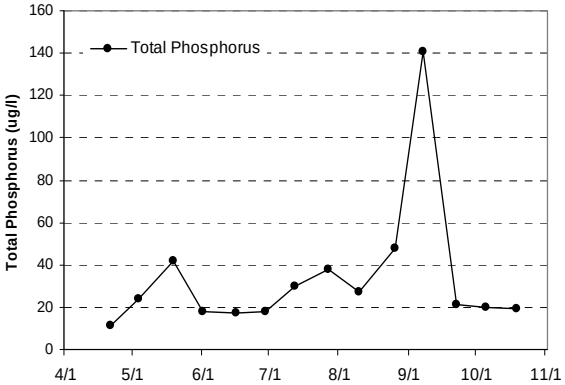
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 38.5 | 17.0 | 141.0 | C |
| **CLA** (µg/l) | 10.8 | 4.5 | 23.0 | B |
| **Secchi** (m) | 2.0 | 1.3 | 2.5 | C |
| **TKN** (mg/l) | 1.30 | 0.56 | 1.80 | |
| | | | ***Lake Grade*** | C |

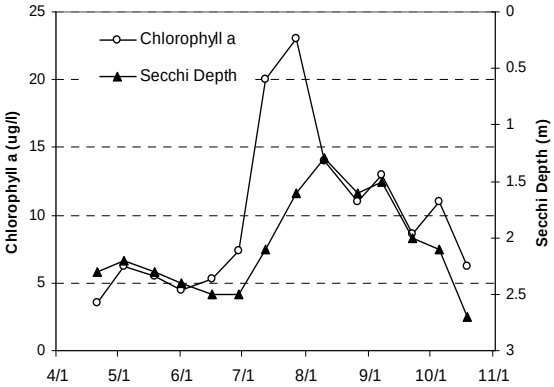
The lake received a lake grade of C for 2008. The lake grades received in the past have varied in the B and C range. Crushed corn meal was added as a carbon amendment in year 2006 to try to decrease algal concentrations. Since 2005 CLA grades have varied widely from an A in 2005, to a C in 2006, back to an A in 2007, and then to a B in 2008. The water clarity grades have remained a C since 2001.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.7 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 4.1 (between 4- "no swimming/boating ok" and 5- "no aesthetics possible").

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.

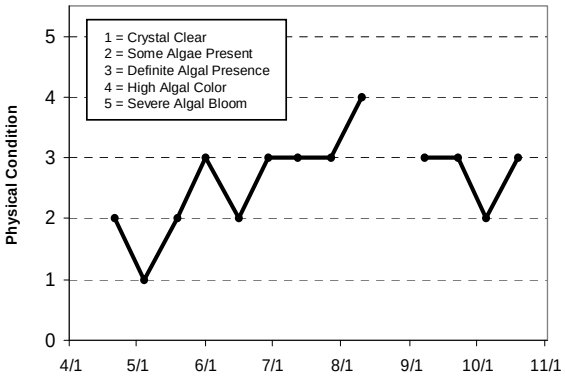



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/21 | 13 | | | | 3.5 | 11 | | 2.3 | 2 | 4 |
| 5/4 | 13 | | | | 6.2 | 24 | | 2.2 | 1 | 4 |
| 5/19 | 17.1 | | | | 5.5 | 42 | | 2.3 | 2 | 4 |
| 6/1 | 20.6 | | | | 4.5 | 18 | | 2.4 | 3 | 4 |
| 6/16 | 21 | | | | 5.3 | 17 | | 2.5 | 2 | 4 |
| 6/29 | 24.9 | | | | 7.4 | 18 | | 2.5 | 3 | 4 |
| 7/12 | 26.6 | | | | 20 | 30 | | 2.1 | 3 | 4 |
| 7/27 | 26.5 | | | | 23 | 38 | | 1.6 | 3 | 4 |
| 8/10 | 26.5 | | | | 14 | 27 | | 1.3 | 4 | 4 |
| 8/26 | 23.2 | | | | 11 | 48 | | 1.6 | | 5 |
| 9/7 | 19 | | | | 13 | 141 | | 1.5 | 3 | 4 |
| 9/22 | 21.2 | | | | 8.6 | 21 | | 2 | 3 | 4 |
| 10/5 | 15 | | | | 11 | 20 | | 2.1 | 2 | 4 |
| 10/19 | 13.9 | | | | 6.2 | 19 | | 2.7 | 3 | 4 |



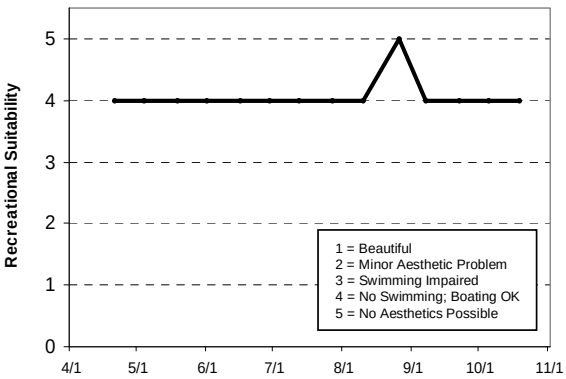

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | D | | C | C | C |
| Chlorophyll a | | | | | | | | B | | A | A | A |
| Secchi Depth | | | | | | | | D | | C | C | C |
| **Lake Grade** | | | | | | | | **C** | | **B** | **B** | **B** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | C | D | C | C |
| Chlorophyll a | | A | C | A | B |
| Secchi Depth | | C | C | C | C |
| **Lake Grade** | | **B** | **C** | **B** | **C** |

Source: Metropolitan Council and STORET data



## Twin Lake [upper basin] (27-0042-01) *Shingle Creek Watershed Management Commission*

The upper basin of Twin Lake is located in the City of Brooklyn Park (Hennepin County). It has a maximum depth of 2.4 m (8 ft) and a mean depth of 0.9 m (3 ft). The entire surface area of the basin is considered littoral zone, which is the 0-15 feet depth zone of aquatic plant dominance. The basin does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the lake's water column.

Twin Lake consists of 3 basins: upper, middle, and lower. The lake has a surface area of approximately 215 acres. Approximately 80 percent of the lake's surface area is considered littoral zone.

The basin was monitored 12 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 129.2 | 74.0 | 252.0 | D |
| **CLA** (µg/l) | 93.6 | 11.0 | 180.0 | F |
| **Secchi** (m) | 0.6 | 0.2 | 1.2 | F |
| **TKN** (mg/l) | 2.58 | 2.10 | 3.20 | |
| | | | ***Lake Grade*** | F |

The basin received a lake grade of F for 2008, which is consistent with most lake grades from the previous 13 years. The basin received D lake grades in 1991, 1993, and 1998. On the basis of the historical water quality database, the water quality of this basin has fluctuated between lake grades D and F, but with only F lake grades being received over the past decade. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008).

The volunteer's perceptions of the physical and recreational conditions of the basin are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.3 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 2.1 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

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.

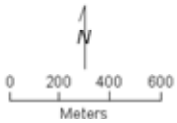
## Twin Lake, Upper Basin,

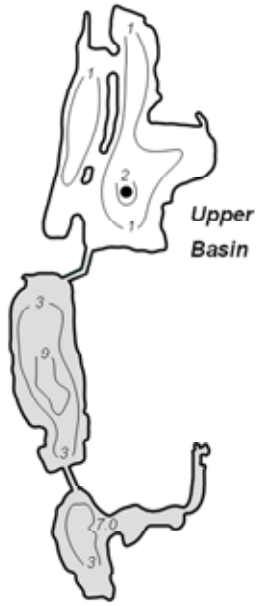
**Brooklyn Center, Hennepin Co.**

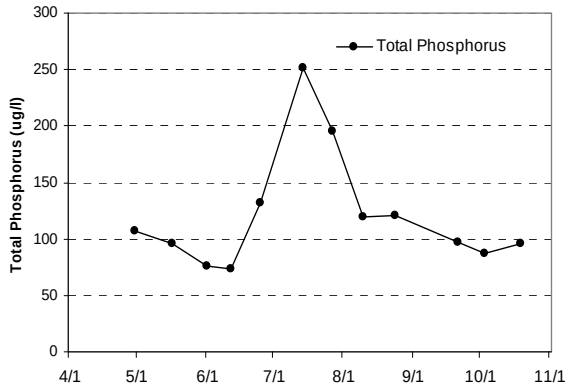
Lake ID: 270042-01
WMO: Shingle Creek
Volunteer: Kris Mann

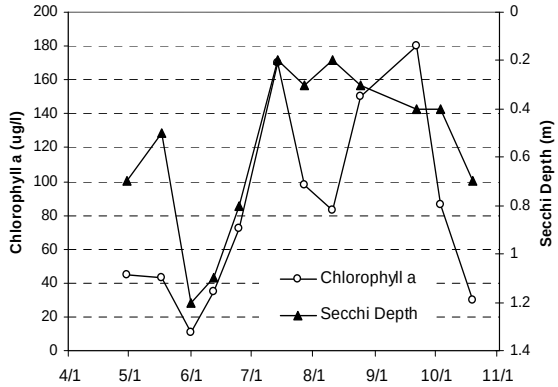
● Sampling site

Contours in meters



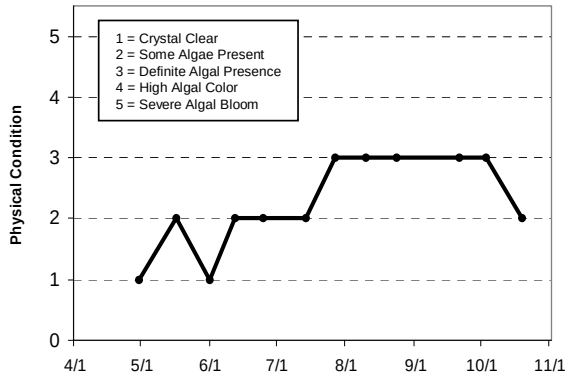




### 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/30 | 10 | | | | 45 | 107 | | 0.7 | 1 | 1 |
| 5/17 | 20 | | | | 43 | 96 | | 0.5 | 2 | 2 |
| 6/1 | 25.7 | | | | 11 | 76 | | 1.2 | 1 | 1 |
| 6/12 | 23.8 | | | | 35 | 74 | | 1.1 | 2 | 1 |
| 6/25 | 30.3 | | | | 72 | 132 | | 0.8 | 2 | 2 |
| 7/14 | 28.5 | | | | 170 | 252 | | 0.2 | 2 | 3 |
| 7/27 | 29.2 | | | | 98 | 196 | | 0.3 | 3 | 2 |
| 8/10 | 29.5 | | | | 83 | 119 | | 0.2 | 3 | 2 |
| 8/24 | 27.4 | | | | 150 | 121 | | 0.3 | 3 | 3 |
| 9/21 | 24.8 | | | | 180 | 97 | | 0.4 | 3 | 3 |
| 10/3 | 20.3 | | | | 86 | 87 | | 0.4 | 3 | 3 |
| 10/19 | 23.2 | | | | 30 | 96 | | 0.7 | 2 | 2 |

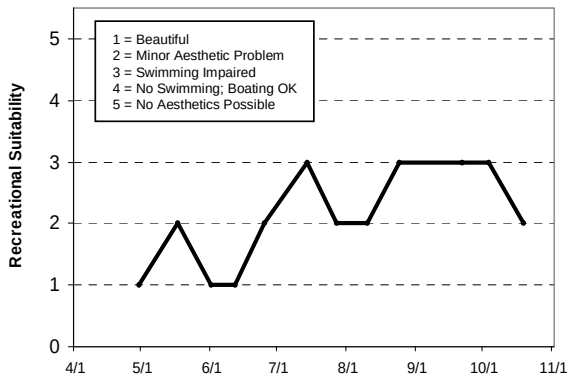



### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | D |
| Chlorophyll a | | | | | | | | | | | | D |
| Secchi Depth | | | | | | | | | | | F | F |
| **Lake Grade** | | | | | | | | | | | | **D** |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | D | | | F | | D | | F | | D | |
| Chlorophyll a | | D | | | D | | D | | F | | F | |
| Secchi Depth | | F | | | F | | F | | F | | F | |
| **Lake Grade** | | **D** | | | **F** | | **D** | | **F** | | **F** | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | F | | F | | D |
| Chlorophyll a | F | | F | | F |
| Secchi Depth | F | | F | | F |
| **Lake Grade** | **F** | | **F** | | **F** |




Source: Metropolitan Council and STORET data

## Twin Lake [middle basin] (27-0042-02) *Shingle Creek Watershed Management Commission*

The middle basin of Twin Lake is located in the City of Crystal (Hennepin County). It has a maximum depth of 14 m (46 ft) and a mean depth of 4.9 m (16 ft). Twin Lake consists of 3 basins: upper, middle, and lower. The lake has a surface area of approximately 215 acres. Approximately 80 percent of the lake's surface area is considered littoral zone.

The basin was monitored 13 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 44.1 | 22.0 | 96.0 | C |
| **CLA** (µg/l) | 17.7 | 2.1 | 37.0 | B |
| **Secchi** (m) | 1.9 | 0.9 | 4.9 | C |
| **TKN** (mg/l) | 1.55 | 1.10 | 1.80 | |
| | | | ***Lake Grade*** | C |

The basin received a lake grade of C for 2008, which is consistent with the lake grades received over the past decade. The basin has received B and D lake grades in the past. Since 1985 the annual lake grades have varied between B to D but have been consistently C over the past decade. Continued monitoring is suggested to determine if the lake grades of the past decade indicate that the water quality of the basin is stabilizing at a C lake grade.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.5 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 3.9 (between 3- "swimming slightly impaired" and 4- "no swimming/boating ok").

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.

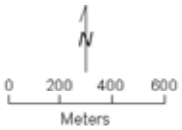
## Twin Lake, Middle Basin,

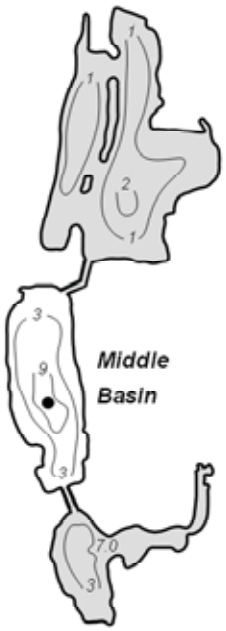
**Crystal, Hennepin Co.**

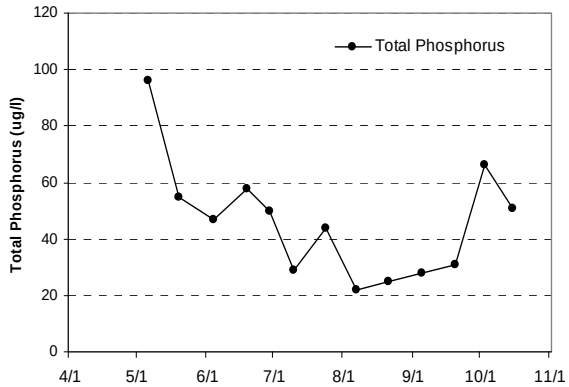
Lake ID: 270042-02
WMO: Shingle Creek
Volunteer: Janet Moore

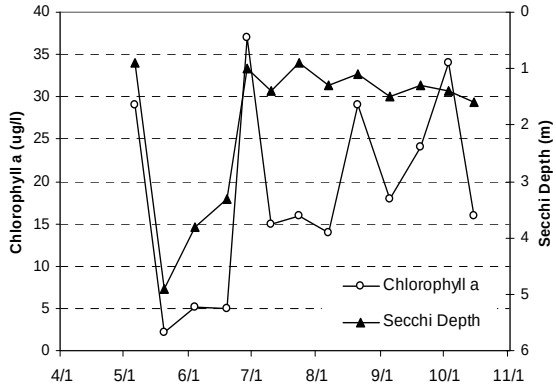
● Sampling site

Contours in meters



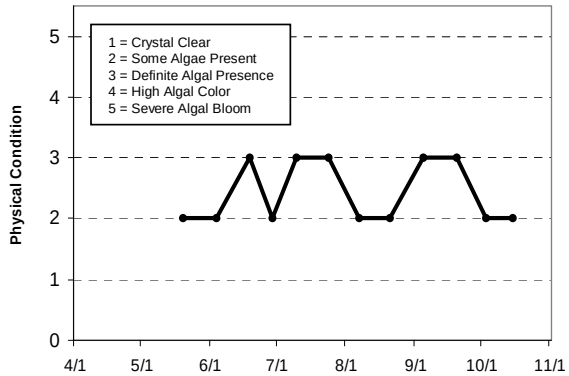




### 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/6 | 16 | | | | 29 | 96 | | 0.9 | | 4 |
| 5/20 | 18 | | | | 2.1 | 55 | | 4.9 | 2 | 3 |
| 6/4 | 20 | | | | 5.1 | 47 | | 3.8 | 2 | 4 |
| 6/19 | 27 | | | | 5 | 58 | | 3.3 | 3 | 4 |
| 6/29 | 26 | | | | 37 | 50 | | 1 | 2 | 4 |
| 7/10 | 25 | | | | 15 | 29 | | 1.4 | 3 | 4 |
| 7/24 | 25 | | | | 16 | 44 | | 0.9 | 3 | 4 |
| 8/7 | 26 | | | | 14 | 22 | | 1.3 | 2 | 4 |
| 8/21 | 25 | | | | 29 | 25 | | 1.1 | 2 | 4 |
| 9/5 | 21 | | | | 18 | 28 | | 1.5 | 3 | 4 |
| 9/20 | 22 | | | | 24 | 31 | | 1.3 | 3 | 4 |
| 10/3 | 18 | | | | 34 | 66 | | 1.4 | 2 | 4 |
| 10/15 | 13.5 | | | | 16 | 51 | | 1.6 | 2 | 4 |

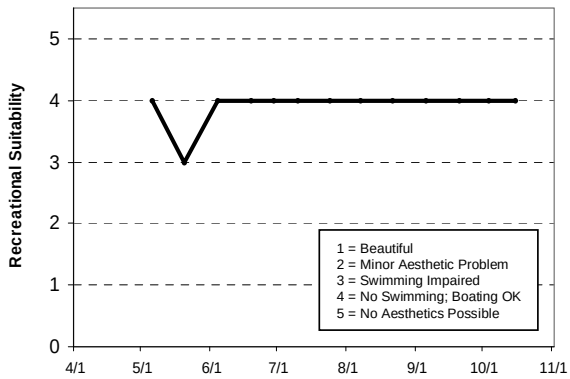



### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | C | | | | | | C |
| Chlorophyll a | | | | | | B | | | | | | D |
| Secchi Depth | | | | | | A | | | | | | D |
| **Lake Grade** | | | | | | **B** | | | | | | **D** |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | C | C | | C | C | | | |
| Chlorophyll a | | | | | C | A | | B | C | | | |
| Secchi Depth | | | | | C | C | | C | C | | | |
| **Lake Grade** | | | | | **C** | **B** | | **C** | **C** | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | C | | | C |
| Chlorophyll a | | B | | | B |
| Secchi Depth | | C | | | C |
| **Lake Grade** | | **C** | | | **C** |




Source: Metropolitan Council and STORET data

## Twin Lake [St. Louis Park] (27-0656) *City of St. Louis Park*

Twin Lake is a small shallow lake located within the city of St. Louis Park (Hennepin County). Bathymetric information is unknown for the lake.

The lake was monitored 10 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

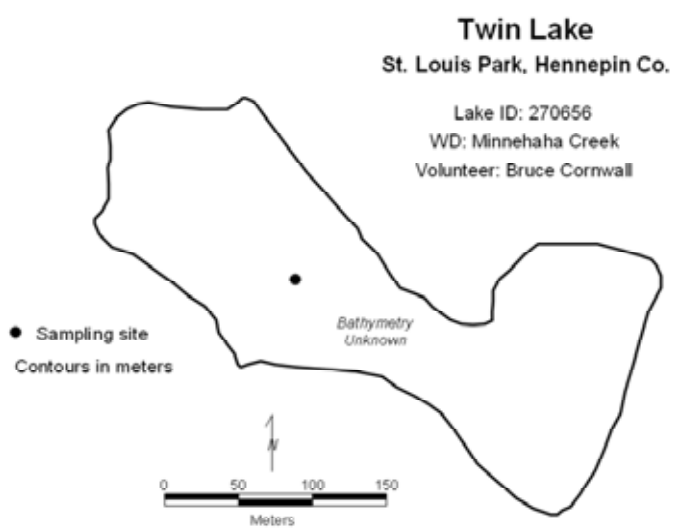
**2008 summer (May-September) data summary**

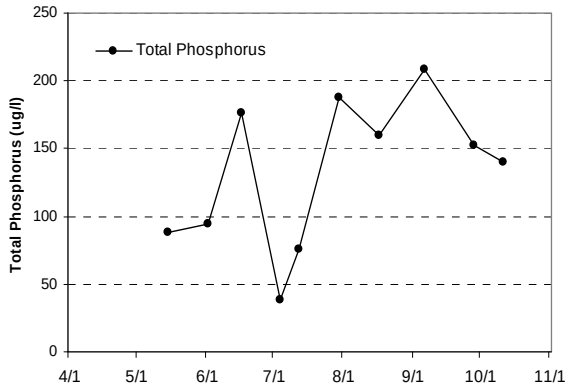
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 131.2 | 38.0 | 208.0 | D |
| **CLA** (µg/l) | 71.1 | 13.0 | 230.0 | D |
| **Secchi** (m) | 0.5 | 0.3 | 0.9 | F |
| **TKN** (mg/l) | 2.22 | 0.96 | 3.50 | |
| | | | ***Lake Grade*** | D |

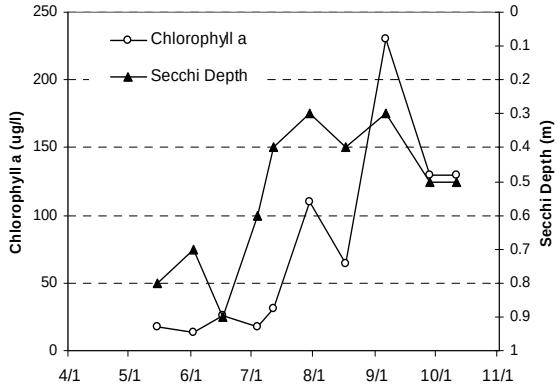
The lake received a lake grade of D for 2008, which is an improvement over last year's F lake grade. Water clarity (Secchi) remains poor with a grade of F. The chlorophyll-a grade has digressed from a B grade in 2002, to C grades in 2003, 2005, and 2006, and then to D grades in 2007 and 2008. Furthermore, water clarity grades in 2002-2004 were Ds, but since then water clarity grades digressed to Fs. These observations seem to indicate that the water quality for Twin Lake has degraded since 2002. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.9 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 4.0 ("no swimming/boating ok").

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.

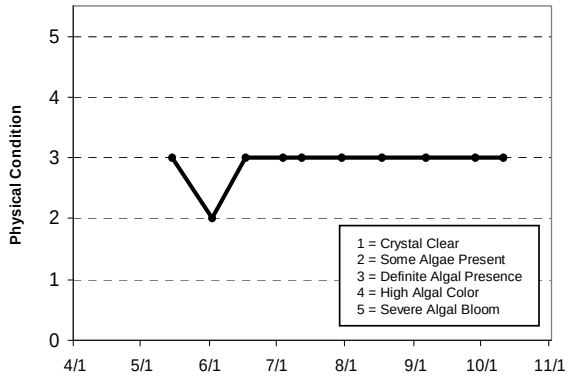



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/15 | 21 | | | | 18 | 88 | | 0.8 | 3 | 4 |
| 6/2 | 22.7 | | | | 13 | 94 | | 0.7 | 2 | 4 |
| 6/17 | 23.1 | | | | 26 | 176 | | 0.9 | 3 | 4 |
| 7/4 | 24.5 | | | | 18 | 38 | | 0.6 | 3 | 4 |
| 7/12 | 24.3 | | | | 31 | 76 | | 0.4 | 3 | 4 |
| 7/30 | 29.6 | | | | 110 | 188 | | 0.3 | 3 | 4 |
| 8/17 | 27.4 | | | | 64 | 160 | | 0.4 | 3 | 4 |
| 9/6 | 20.6 | | | | 230 | 208 | | 0.3 | 3 | 4 |
| 9/28 | 18.5 | | | | 130 | 153 | | 0.5 | 3 | 4 |
| 10/11 | 15.3 | | | | 130 | 140 | | 0.5 | 3 | 4 |



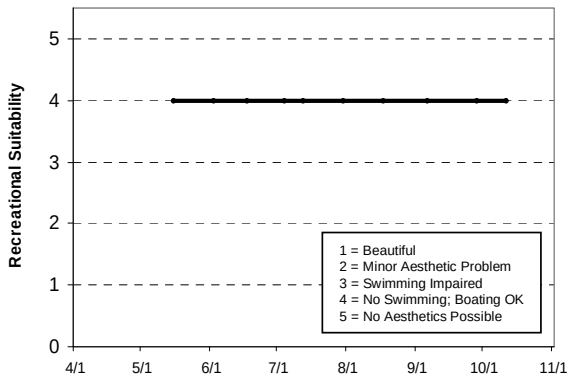

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | F | F |
| Chlorophyll a | | | | | | | | | | | B | C |
| Secchi Depth | | | | | | | | | | | D | D |
| **Lake Grade** | | | | | | | | | | | **D** | **D** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | F | F | D | F | D |
| Chlorophyll a | D | C | C | D | D |
| Secchi Depth | D | F | F | F | F |
| **Lake Grade** | **D** | **D** | **D** | **F** | **D** |

Source: Metropolitan Council and STORET data



## Twin Lake [south basin] (82-0048) *Washington Conservation District*

Twin Lake is located in May Township (Washington County). The south basin has a maximum depth of 10 m (33 ft). Other bathymetric information is unknown for this lake. The lake's inflow receives water from Square Lake.

The lake was monitored 14 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. Depth profiles for temperature and dissolved oxygen were also measured. The resulting data are summarized in tables and figures on the following page.

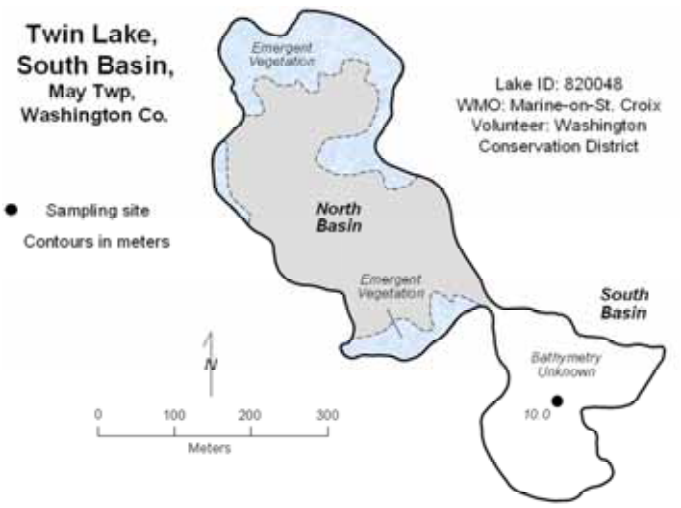
**2008 summer (May-September) data summary**

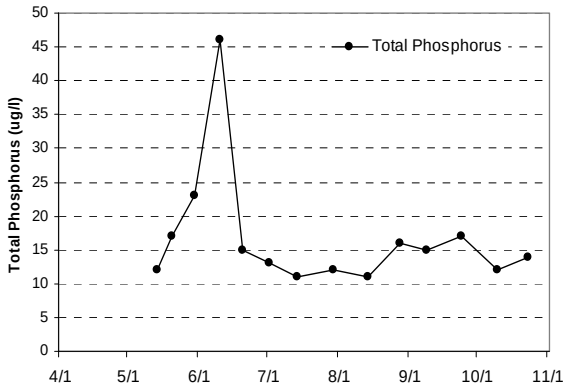
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 17.3 | 11.0 | 46.0 | A |
| **CLA** (µg/l) | 4.6 | 2.2 | 9.6 | A |
| **Secchi** (m) | 5.0 | 3.8 | 7.0 | A |
| **TKN** (mg/l) | 0.68 | 0.45 | 1.30 | |
| | | | ***Lake Grade*** | A |

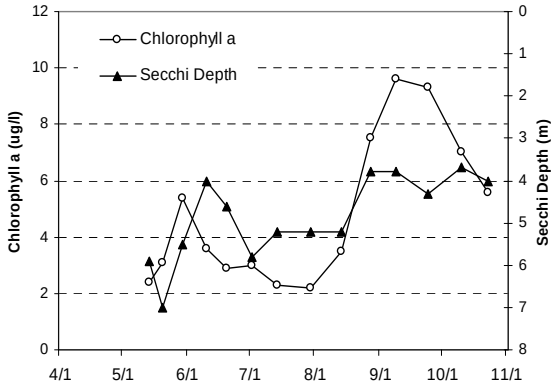
The lake received a lake grade of A for 2008, which is consistent with the other two historical lake grades in the water quality database (1997, 1998). A search for historical monitoring data through STORET, the national water quality database, revealed only the historical CAMP data collected in 1997 and 1998.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 1.4 (between 1- "crystal clear" and 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 1.4 (1- "beautiful" and 2- "minor aesthetic problem").

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.

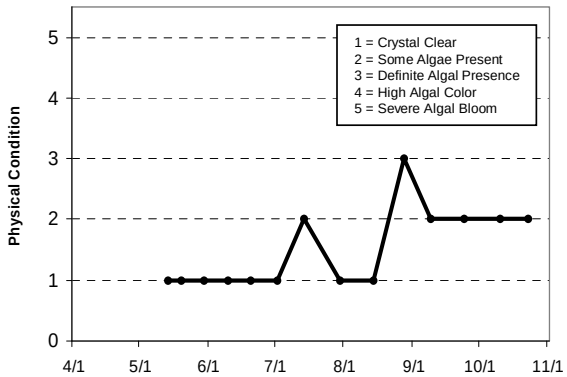



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/13 | | | | | | | | | | |
| 5/14 | 13.6 | 5.7 | 9.84 | 0.38 | 2.4 | 12 | | 5.9 | 1 | 1 |
| 5/20 | 15.4 | 5.9 | 9.32 | 0.27 | 3.1 | 17 | | 7 | 1 | 1 |
| 5/30 | 17.2 | 6.3 | 9.12 | 0.19 | 5.4 | 23 | | 5.5 | 1 | 1 |
| 6/10 | 20.7 | 6.8 | 8.35 | 0.26 | 3.6 | 46 | | 4 | 1 | 2 |
| 6/20 | 24 | 7 | 8.01 | 0.25 | 2.9 | 15 | | 4.6 | 1 | 1 |
| 7/2 | 25 | 8 | 8.29 | 0.56 | 3 | 13 | | 5.8 | 1 | 1 |
| 7/14 | 26.3 | 8.8 | 7.47 | 0.48 | 2.3 | 11 | | 5.2 | 2 | 2 |
| 7/30 | 28.2 | 9.4 | 7.97 | 0.25 | 2.2 | 12 | | 5.2 | 1 | 1 |
| 8/14 | 24.9 | 9.4 | 7.07 | 1.02 | 3.5 | 11 | | 5.2 | 1 | 1 |
| 8/28 | 23.6 | 9.4 | 6.11 | 0.26 | 7.5 | 16 | | 3.8 | 3 | 2 |
| 9/9 | 22 | 10.3 | 7.7 | 0.28 | 9.6 | 15 | | 3.8 | 2 | 2 |
| 9/24 | 21.3 | 11 | 8.32 | 0.25 | 9.3 | 17 | | 4.3 | 2 | 2 |
| 10/10 | 15.3 | 10.5 | 7.18 | 0.33 | 7 | 12 | | 3.7 | 2 | 1 |
| 10/23 | 12.2 | 10.2 | 7.73 | 0.47 | 5.6 | 14 | | 4 | 2 | 1 |



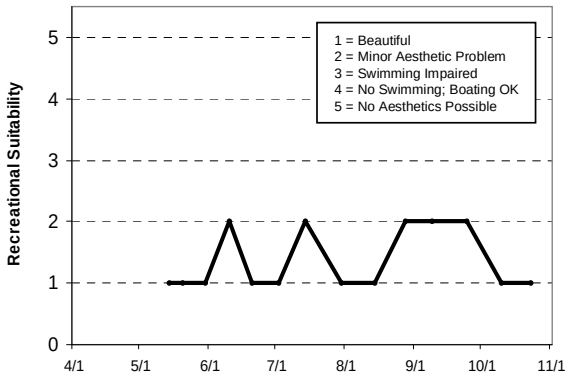

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | A | A | | | | | |
| Chlorophyll a | | | | | | A | A | | | | | |
| Secchi Depth | | | | | | A | A | | | | | |
| **Lake Grade** | | | | | | **A** | **A** | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | | A |
| Chlorophyll a | | | | | A |
| Secchi Depth | | | | | A |
| **Lake Grade** | | | | | **A** |

Source: Metropolitan Council and STORET data



## Valentine Lake (62-0071) *Rice Creek Watershed District*

Valentine Lake is located within the City of Arden Hills in Ramsey County. The lake has a surface area of 60-acres and a maximum and mean depth of 4.0 m (13.1 feet) and 1.5 m (4.9 feet), respectively. The entire area of the lake is considered littoral zone which is the 0-15 feet depth zone of aquatic plant dominance. Furthermore, the lake does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the water column. The volume of the lake is approximately 300 ac-ft. The drainage area of the lake is approximately 2,237 acres. Therefore, the watershed-to-lake area ratio is 37:1. The greater the ratio, the greater the potential stress on the lake from surface runoff.

The lake was monitored 13 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 65.2 | 33.0 | 89.0 | C |
| **CLA** (µg/l) | 16.8 | 5.4 | 71.0 | B |
| **Secchi** (m) | 1.8 | 0.8 | 3.2 | C |
| **TKN** (mg/l) | 1.67 | 1.10 | 2.00 | |
| | | | ***Lake Grade*** | C |

The lake received a lake grade of C for 2008, which is consistent with the historical water quality database. The TP grade returned to a C from last year's D grade. On the basis of the historical database, the lake appears to be represented by a lake grade of C. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed a statistically significant improving trend in water clarity (MPCA 2008).

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.0 ("some algae present"). The average recreational suitability ranking was 2.5 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

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.

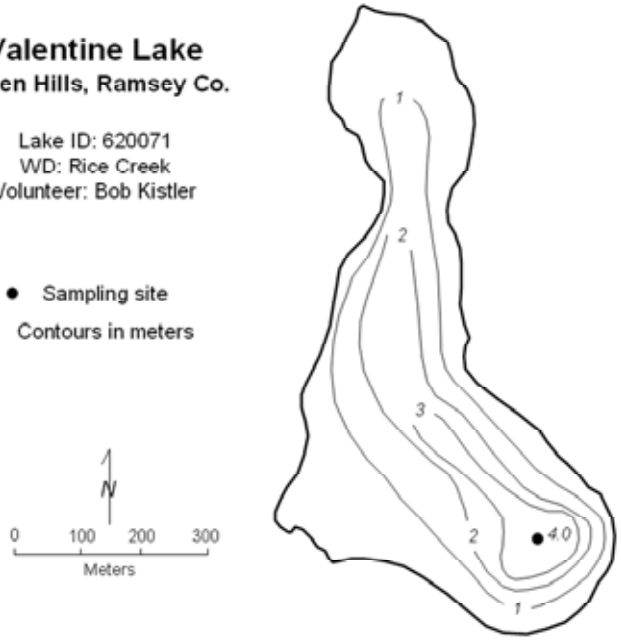
# Valentine Lake

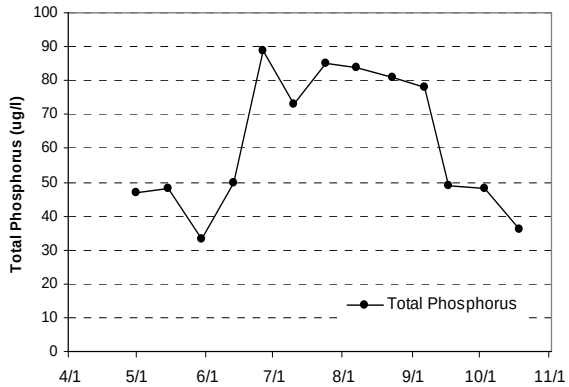
**Arden Hills, Ramsey Co.**

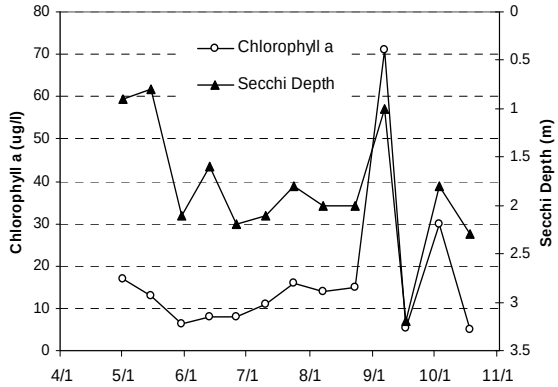
Lake ID: 620071
WD: Rice Creek
Volunteer: Bob Kistler

● Sampling site

Contours in meters

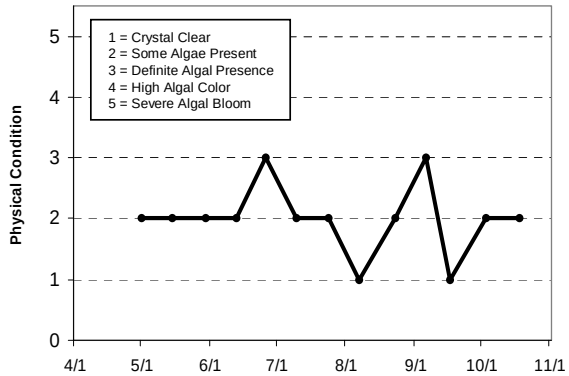



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/1 | 11.2 | | | | 17 | 47 | | 0.9 | 2 | 1 |
| 5/15 | 17.6 | | | | 13 | 48 | | 0.8 | 2 | 1 |
| 5/30 | 17.6 | | | | 6.3 | 33 | | 2.1 | 2 | 4 |
| 6/13 | 20.9 | | | | 7.9 | 50 | | 1.6 | 2 | 4 |
| 6/26 | 26.1 | | | | 7.9 | 89 | | 2.2 | 3 | 4 |
| 7/10 | 25.4 | | | | 11 | 73 | | 2.1 | 2 | 4 |
| 7/24 | 25.5 | | | | 16 | 85 | | 1.8 | 2 | 4 |
| 8/7 | 26.5 | | | | 14 | 84 | | 2 | 1 | 4 |
| 8/23 | 24.1 | | | | 15 | 81 | | 2 | 2 | 4 |
| 9/6 | 20.5 | | | | 71 | 78 | | 1 | 3 | 4 |
| 9/17 | 19.6 | | | | 5.4 | 49 | | 3.2 | 1 | 4 |
| 10/3 | 16.4 | | | | 30 | 48 | | 1.8 | 2 | 4 |
| 10/18 | 12.6 | | | | 4.9 | 36 | | 2.3 | 2 | 4 |



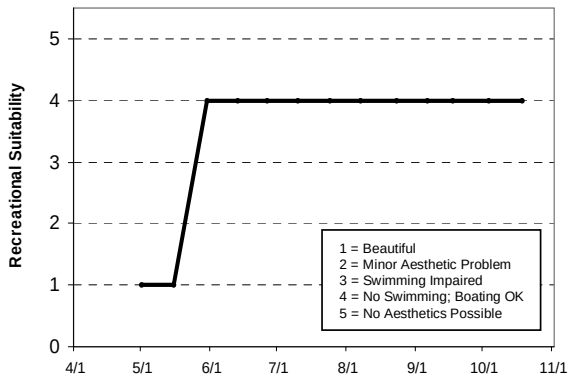

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | C | C | C |
| Chlorophyll a | | | | | | | | | | B | B | C |
| Secchi Depth | | | | | | | | | | C | C | D |
| **Lake Grade** | | | | | | | | | | **C** | **C** | **C** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | C | C | C | D | C |
| Chlorophyll a | C | C | B | C | B |
| Secchi Depth | C | C | C | C | C |
| **Lake Grade** | **C** | **C** | **C** | **C** | **C** |

Source: Metropolitan Council and STORET data



## Valley Lake (19-0348) *City of Lakeville*

Valley Lake is located in the City of Lakeville (Dakota County). The surface area of the lake is 8 acres, and it has a maximum depth of 3.2 m (10 ft). Because of the shallowness of the lake, the entire lake is considered littoral zone, which is 0 – 15 feet depth zone dominated by aquatic vegetation. The majority of the land within the lake's 117-acre watershed is parkland or single-family residential homes. The watershed-to-lake size ratio is 8:1. The greater the ratio, the greater the potential stress on the lake from surface runoff. The MN DNR has designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*).

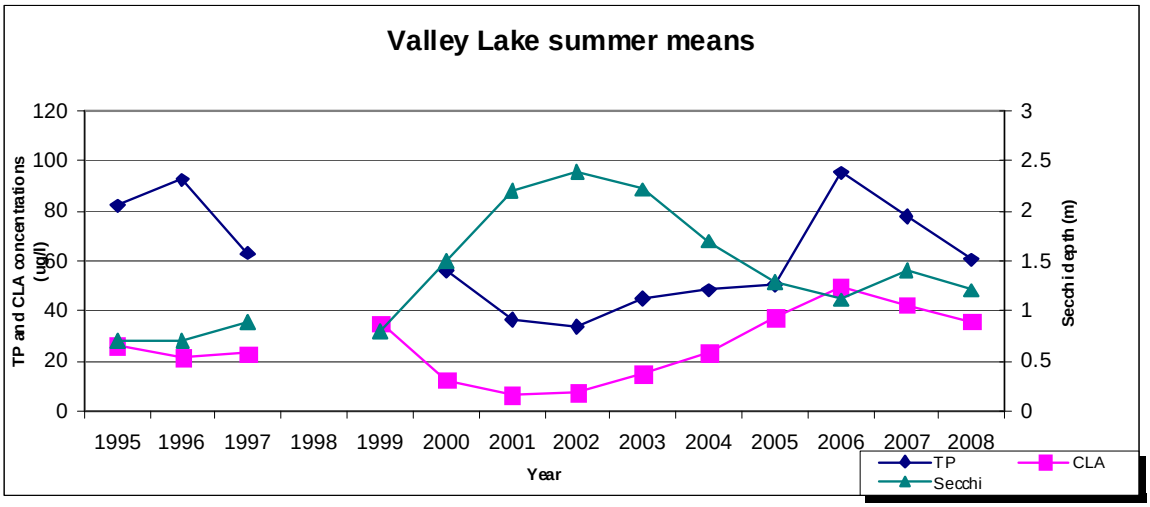
The lake has been involved in a project where barley straw or crushed corn was added to the lake in an attempt to inhibit algal populations. Barley straw has been used for algal control in the United Kingdom for many years but the controlling mechanism has not been known. Therefore, the Valley Lake project was an attempt to answer two questions; 1) the success of the barley straw treatment in Valley Lake; and 2) to clarify the controlling mechanism. CAMP data was used to evaluate the effectiveness of the carbon amendments. The 2006 Metropolitan Council lake study report (METC 2007) included a synopsis of the carbon amendment study. More detailed discussion of the study can be found in McComas and Stuckert (2007).

A search through the STORET nationwide water quality database revealed no water quality data on the lake other than the 1995 CAMP data. The lake was monitored 13 times between late April and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 60.6 | 48.0 | 86.0 | C |
| **CLA** (µg/l) | 36.0 | 11.0 | 96.0 | C |
| **Secchi** (m) | 1.2 | 0.6 | 2.2 | C |
| **TKN** (mg/l) | 1.33 | 0.74 | 2.10 | |
| | | | ***Lake Grade*** | C |

The lake received a lake grade of C for 2008, which is similar to previous years' lake grades. The individual water quality parameter grades were similar to those observed during the 2004 and 2005 monitoring seasons. The following figure shows an improvement in summer time means for the three water quality parameters from 1999 to 2002, and then a continued decline from 2002 through 2006. TP and CLA appear to be improving since 2006, but water clarity appears stagnant over the same time period. It appears that recent summer time means are returning to similar values observed in the mid-1990's. Furthermore, a trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008).




The volunteer(s) ranked their perception of the lake's physical and recreational conditions on a 1-to-5 scale as shown on the attached information sheet. The summertime mean recorded physical condition was 2.5 (between 2- "some algae present" and 3- "definite algae present"). The mean suitability for recreation ranking was 2.7 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

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/.

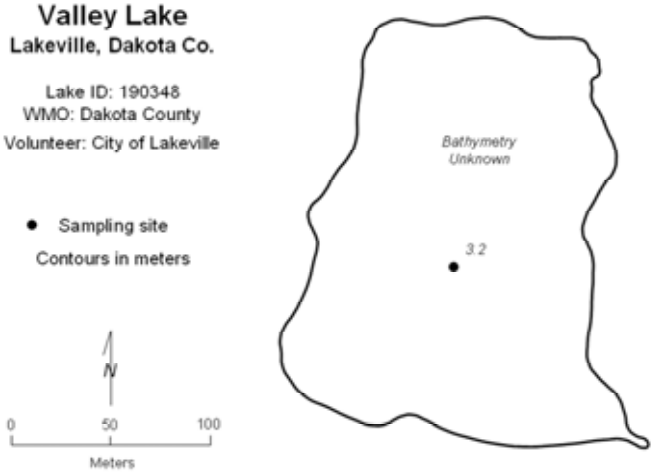
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or brian.johnson@metc.state.mn.us.

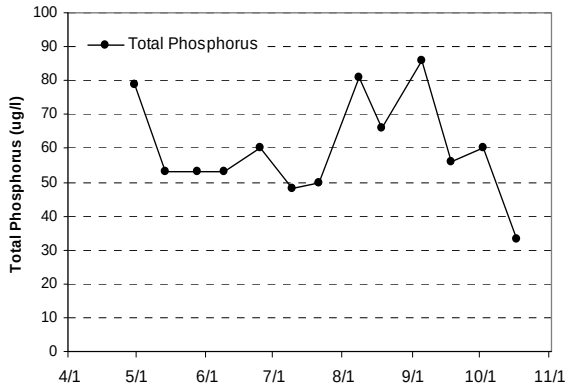
# Valley Lake

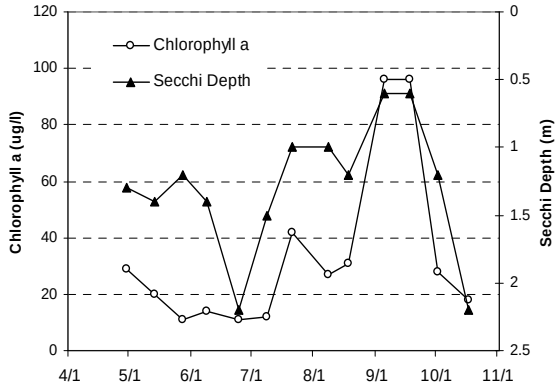
**Lakeville, Dakota Co.**

Lake ID: 190348
WMO: Dakota County
Volunteer: City of Lakeville

● Sampling site
Contours in meters

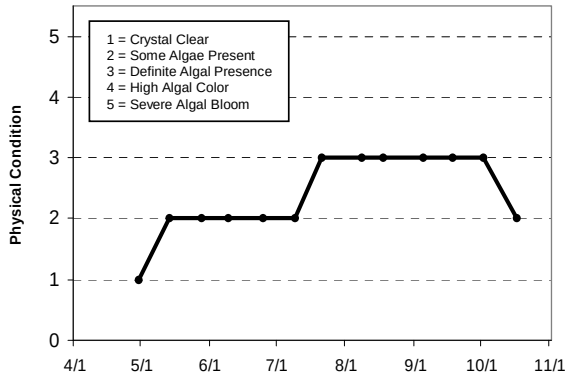



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/30 | 10 | | | | 29 | 79 | | 1.3 | 1 | 1 |
| 5/14 | 14 | | | | 20 | 53 | | 1.4 | 2 | 1 |
| 5/28 | 18 | | | | 11 | 53 | | 1.2 | 2 | 2 |
| 6/9 | 21 | | | | 14 | 53 | | 1.4 | 2 | 3 |
| 6/25 | 25 | | | | 11 | 60 | | 2.2 | 2 | 2 |
| 7/9 | 26 | | | | 12 | 48 | | 1.5 | 2 | 3 |
| 7/21 | 28 | | | | 42 | 50 | | 1 | 3 | 3 |
| 8/8 | 27 | | | | 27 | 81 | | 1 | 3 | 3 |
| 8/18 | 25.9 | | | | 31 | 66 | | 1.2 | 3 | 2 |
| 9/5 | 21 | | | | 96 | 86 | | 0.6 | 3 | 4 |
| 9/18 | 19 | | | | 96 | 56 | | 0.6 | 3 | 4 |
| 10/2 | 14 | | | | 28 | 60 | | 1.2 | 3 | 3 |
| 10/17 | 11 | | | | 18 | 33 | | 2.2 | 2 | 3 |



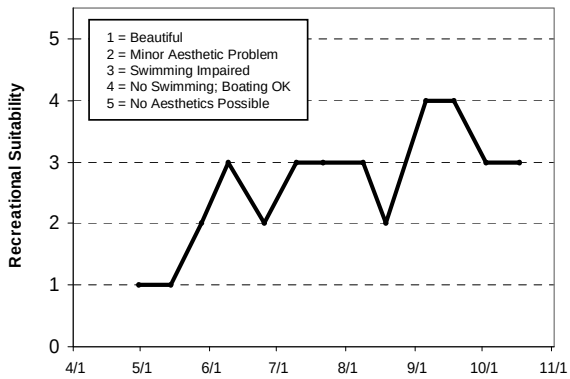

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | D | D | C | | | C | C | C | C |
| Chlorophyll a | | | | C | C | C | | C | B | A | A | B |
| Secchi Depth | | | | D | D | D | | D | C | C | B | B |
| **Lake Grade** | | | | **D** | **D** | **C** | | | **C** | **B** | **B** | **B** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | C | C | D | D | C |
| Chlorophyll a | C | C | D | C | C |
| Secchi Depth | C | C | D | C | C |
| **Lake Grade** | **C** | **C** | **D** | **C** | **C** |

Source: Metropolitan Council and STORET data



## Waconia Lake (10-0059) *Carver County Environmental Services*

Lake Waconia is located near the City of Waconia (Carver County). It is considered a Priority Lake by the Metropolitan Council for its high regional recreation value. The lake is one of the largest bodies of water in the region. It has a surface area of approximately 3,000 acres (6.8 miles in circumference), and mean and maximum depths of 4.0 and 11.3 m (13.1 and 47.1 feet), respectively. The lake has an approximate volume of 38,632 ac-ft (resulting in a retention time of about 10 years) and an approximate watershed-to-lake size ratio of 4:1. The greater the ratio, the greater the potential stress on the lake from surface runoff.

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

Lake Waconia has been involved in CAMP since 1994 (and monitored by Council staff in 2004). In 2008, the lake was monitored 13 times between early May and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

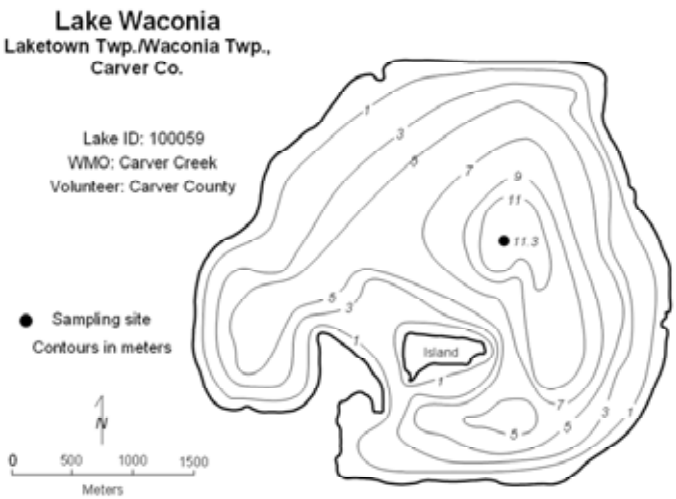
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 43.3 | 19.0 | 96.0 | C |
| **CLA** (µg/l) | 23.2 | 4.9 | 74.0 | C |
| **Secchi** (m) | 2.5 | 1.0 | 4.5 | B |
| **TKN** (mg/l) | 1.10 | 0.51 | 1.60 | |
| | | | ***Lake Grade*** | C |

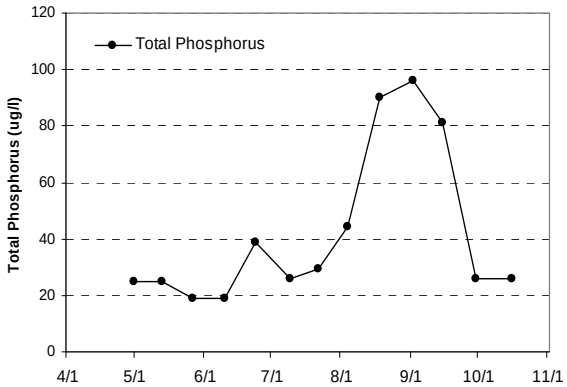
The lake received a lake grade of C for 2008, which is consistent with the historical database. The lake grades fluctuate from year to year, but generally the lake receives either a B or C lake grade. The lake has experienced this pattern since 1980. Nutrient water quality data is available for 1980, 1981, 1985, 1990, and 1994-2008 (all as a part of the Council's lake monitoring programs). Additionally, Secchi transparencies have been collected through the MPCA's Citizen Lake Monitoring Program since 1974. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed a statistically significant improving trend in water clarity (MPCA 2008).

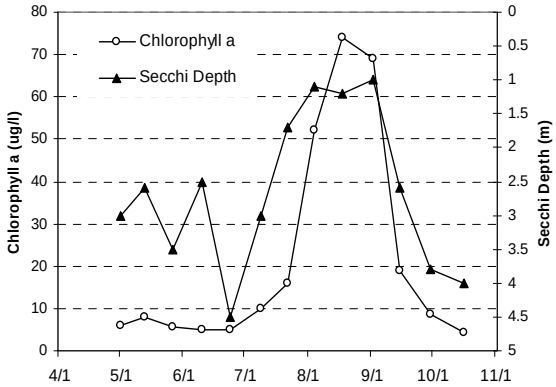
The volunteer's perceptions of the lake's physical and recreational conditions were ranked on a 1-to-5 scale during each monitoring event. The rankings are shown on the information sheet on the next page. The mean physical condition ranking was 2.2 (between 2- "some algae present" and 3- "definite algae present"), and the mean recreational suitability ranking was 2.0 (2- "minor aesthetic problem").

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.

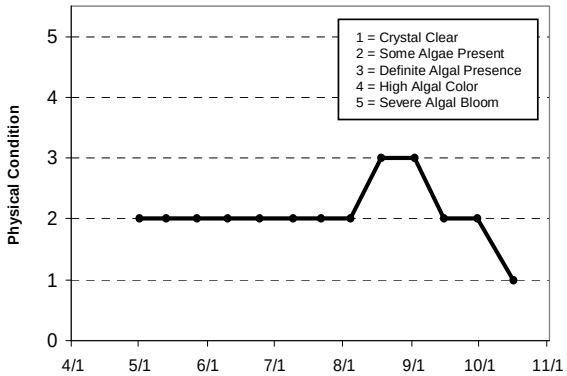



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/1 | 6.98 | | 11.29 | | 5.9 | 25 | | 3 | 2 | 3 |
| 5/13 | 11.22 | | 10.89 | | 8 | 25 | | 2.6 | 2 | 2 |
| 5/27 | 15.52 | | 7.89 | | 5.5 | 19 | | 3.5 | 2 | 1 |
| 6/10 | 19.12 | | 8.35 | | 4.9 | 19 | | 2.5 | 2 | 2 |
| 6/24 | 22.43 | | 10.95 | | 4.9 | 39 | | 4.5 | 2 | 2 |
| 7/9 | 24.31 | | 8.61 | | 10 | 26 | | 3 | 2 | 2 |
| 7/22 | 24.18 | | 7.71 | | 16 | 29.5 | | 1.7 | 2 | 2 |
| 8/4 | 24.95 | | 6.41 | | 52 | 44.5 | | 1.1 | 2 | 2 |
| 8/18 | 25.88 | | 12.52 | | 74 | 90 | | 1.2 | 3 | 2 |
| 9/2 | 22.85 | | 7.76 | | 69 | 96 | | 1 | 3 | 3 |
| 9/15 | 17.88 | | 5.4 | | 19 | 81 | | 2.6 | 2 | 2 |
| 9/30 | 17.94 | | 4.84 | | 8.6 | 26 | | 3.8 | 2 | 1 |
| 10/16 | 13.41 | | 6.47 | | 4.3 | 26 | | 4 | 1 | 1 |

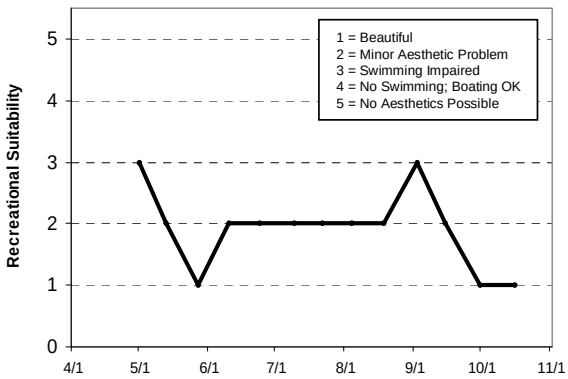



### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | C | B | | | | B | | | | | | |
| Chlorophyll a | C | B | | | | B | | | | | C | |
| Secchi Depth | C | C | C | C | D | C | C | C | D | C | C | C |
| **Lake Grade** | **C** | **B** | | | | **B** | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | A | A | B | B | C | C | C | C | B | C |
| Chlorophyll a | | | A | B | B | B | B | B | B | B | B | B |
| Secchi Depth | C | C | A | B | C | C | C | C | C | B | B | C |
| **Lake Grade** | | | **A** | **B** | **B** | **B** | **C** | **C** | **C** | **B** | **B** | **C** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | B | B | C | C | C |
| Chlorophyll a | B | B | C | B | C |
| Secchi Depth | C | A | B | C | B |
| **Lake Grade** | **B** | **B** | **C** | **C** | **C** |




Source: Metropolitan Council and STORET data

## Weber Pond (82-0119) *Valley Branch Watershed District*

Weber Pond is located in the City of Mahtomedi (Washington County). It has a surface area of 7.5 acres and a maximum depth of 2.0 m (6.5 ft). Other bathymetric information for the pond is unknown. The entire area of the pond is considered littoral zone which is the 0-15 feet depth zone of aquatic plant dominance. Furthermore, the pond does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the water column. The pond's watershed area is approximately 141 acres. The watershed to pond area ratio is 19:1. The greater the ratio, the greater the potential stress on the pond from surface runoff.

The pond was monitored 7 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. Depth profiles for temperature and dissolved oxygen were also measured. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

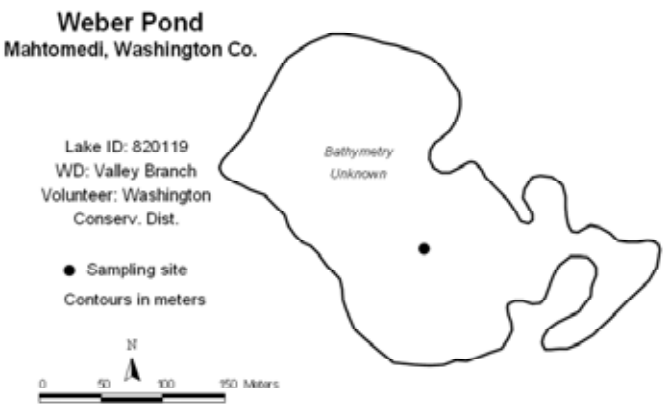
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 37.3 | 30.0 | 51.0 | |
| **CLA** (µg/l) | 6.2 | 4.7 | 8.7 | A |
| **Secchi** (m) | 1.0 | 0.3 | 1.5 | D |
| **TKN** (mg/l) | 1.53 | 1.20 | 2.00 | |
| | | | ***Lake Grade*** | |

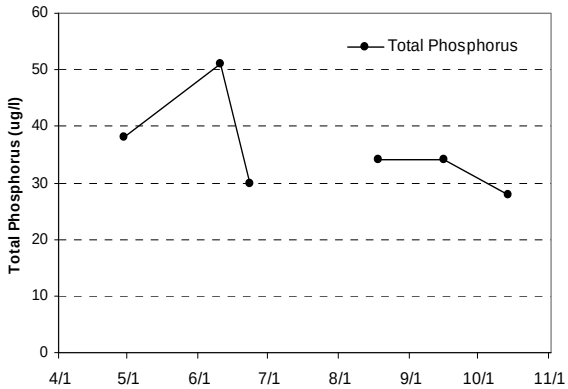
The lake did not receive a lake grade for 2008, because there were an insufficient number of samples for TP. At least 5 samples spread throughout the summer-time period are required to calculate a grade.

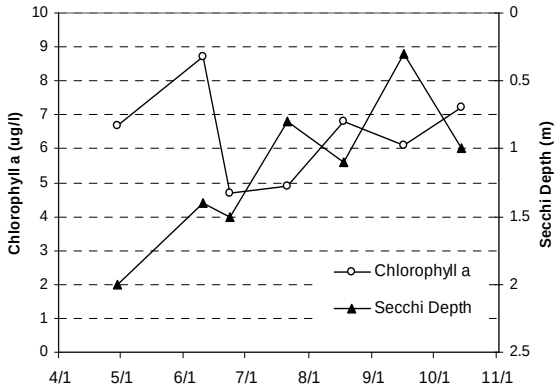
The water clarity grade of D does not correlate well with the chlorophyll-a grade of A. A possible explanation may be that the water clarity may be affected by higher levels of total suspended solids from surface runoff from storm sewers and the surrounding suburban watershed. It is possible for higher suspend solids loadings to decrease water clarity which would decrease light penetration thereby inhibiting algal growth.

The volunteer's perceptions of the lake's physical and recreational conditions were ranked on a 1-to-5 scale during each monitoring event. The rankings are shown on the information sheet on the next page. The mean physical condition ranking was 2.8 (between 2- "some algae present" and 3- "definite algae present"), and the mean recreational suitability ranking was 4.0 ("no swimming/boating ok").

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.

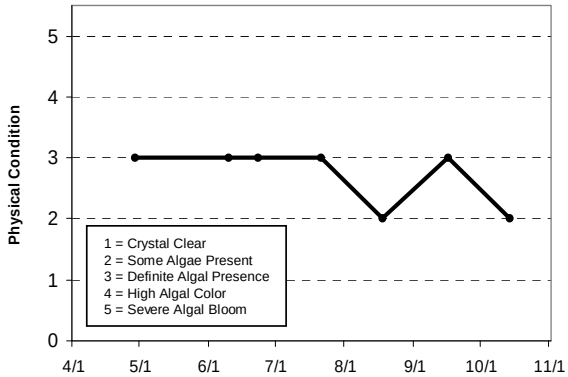



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/29 | 8.7 | 7.7 | 11.45 | 1.36 | 6.7 | 38 | | 2 | 3 | 4 |
| 6/10 | 20.6 | 16.6 | 11.22 | 0.32 | 8.7 | 51 | | 1.4 | 3 | 4 |
| 6/23 | 25.9 | 20.6 | 13.9 | 0.78 | 4.7 | 30 | | 1.5 | 3 | 4 |
| 7/21 | 28.1 | 24.2 | 9.23 | 0.41 | 4.9 | | | 0.8 | 3 | 4 |
| 8/18 | 27.3 | 21.5 | 9.98 | 0.2 | 6.8 | 34 | | 1.1 | 2 | 4 |
| 9/16 | 20 | 16 | 12.73 | 0.49 | 6.1 | 34 | | 0.3 | 3 | 4 |
| 10/14 | 13.9 | 13.8 | 10.15 | 1.86 | 7.2 | 28 | | 1 | 2 | 4 |



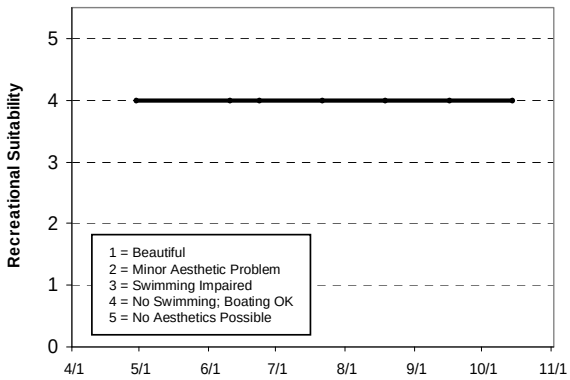

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | D | | |
| Chlorophyll a | | | A | | A |
| Secchi Depth | | | D | | D |
| **Lake Grade** | | | **C** | | |

Source: Metropolitan Council and STORET data



## West Boot Lake (82-0044) *Carnelian - Marine Watershed District*

West Boot Lake is located in May Township (Washington County). It is considered a Priority Lake by the Metropolitan Council for its exceptional water clarity. The 110-acre lake has a mean and maximum depth of 5.9 m (19 feet) and 11.9 m (39 feet), respectively. The mean depth of the lake and its surface area translate to an approximate lake volume of 2,090 ac-ft. Approximately 56 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 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.

The lake was monitored 7 times in 2008. On each sampling day the lake was monitored for Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. Depth profiles for temperature and dissolved oxygen were also measured. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

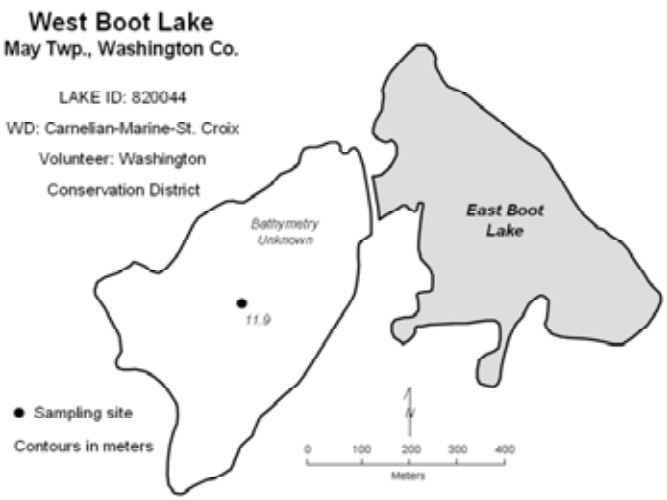
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **Secchi** (m) | 4.5 | 3.8 | 5.3 | A |

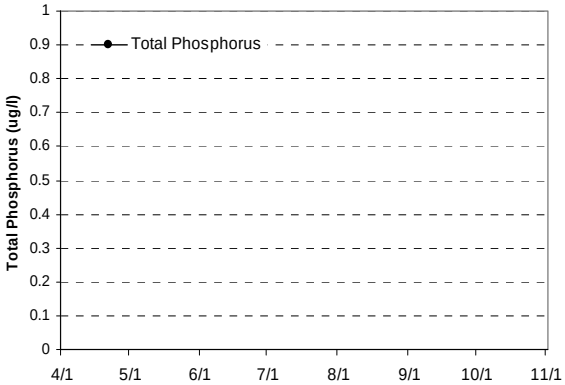
A lake grade was not given this year because total phosphorus and chlorophyll-a were not collected in 2008. The Secchi depth grade of A for 2008 is consistent with the A grades received since 1999. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed a statistically significant improving trend in water clarity (MPCA 2008).

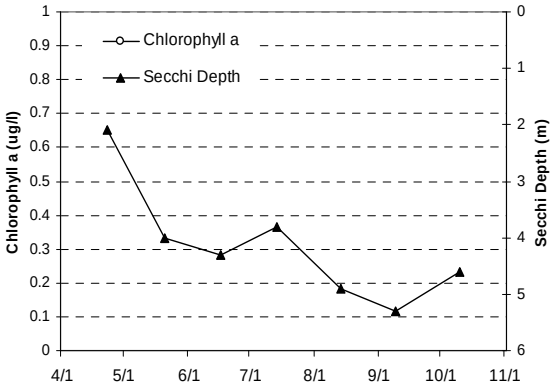
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.2 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 2.2 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

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.

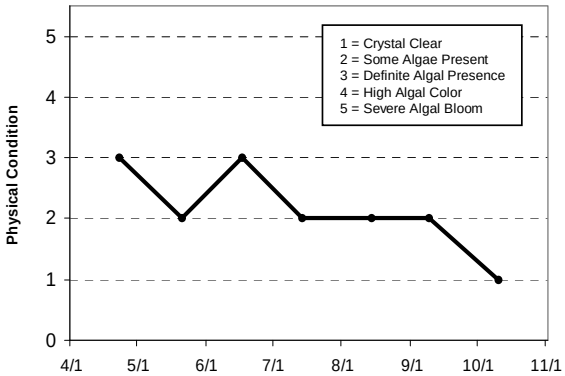



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/23 | 9.4 | 4.5 | 10.48 | 1.05 | | | | 2.1 | 3 | 2 |
| 5/21 | 16.5 | 4.6 | 8.88 | 0.24 | | | | 4 | 2 | 3 |
| 6/17 | 22.2 | 4.6 | 9 | 0.28 | | | | 4.3 | 3 | 2 |
| 7/14 | 25.8 | 4.7 | 7.13 | 0.45 | | | | 3.8 | 2 | 2 |
| 8/14 | 23.9 | 4.9 | 5.06 | 0.49 | | | | 4.9 | 2 | 2 |
| 9/9 | 20.1 | 5 | 6.86 | 0.27 | | | | 5.3 | 2 | 2 |
| 10/10 | 14 | 5.3 | 7.36 | 0.32 | | | | 4.6 | 1 | 1 |

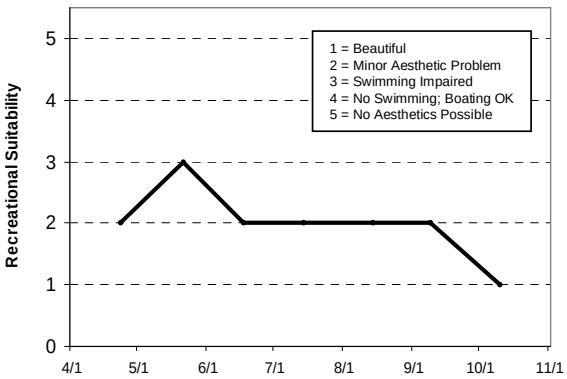



### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | C |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | B | C | A | A | A | A | A | B |
| Chlorophyll a | | | | | A | B | C | A | A | A | A | A |
| Secchi Depth | | | | | B | C | B | A | A | A | A | A |
| **Lake Grade** | | | | | **B** | **C** | **B** | **A** | **A** | **A** | **A** | **A** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | A | A | A | B | |
| Chlorophyll a | A | A | A | A | |
| Secchi Depth | A | A | A | A | A |
| **Lake Grade** | **A** | **A** | **A** | **A** | |




Source: Metropolitan Council and STORET data

## West Lakeland Storage Site [north basin] (82-0119) *Valley Branch Watershed District*

The West Lakeland Storage Site is located in West Lakeland Township (Washington County). The storage site consists of three basins: north, middle, and south. The north basin has a maximum depth of 5.8 m (19 ft). Other bathymetric information for the basin is unknown. Most of the area of the basin is considered littoral zone which is the 0-15 feet depth zone of aquatic plant dominance.

A search through STORET, the nation-wide water quality database, showed that the north basin was monitored for nutrients and Secchi depth for two days in 2000.

The north basin was monitored 7 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. Depth profiles for temperature and dissolved oxygen were also measured. The resulting data are summarized in tables and figures on the following page.

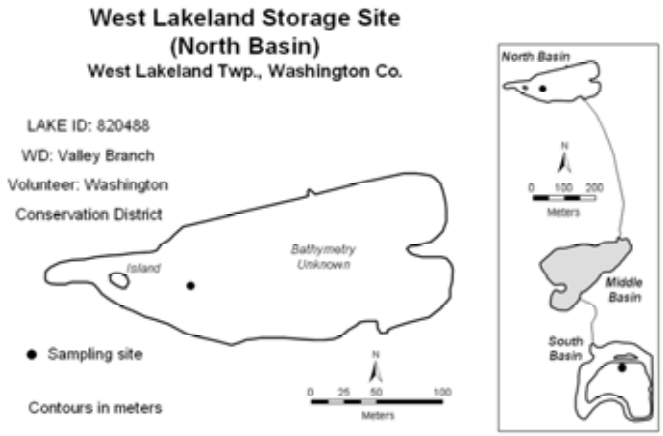
**2008 summer (May-September) data summary**

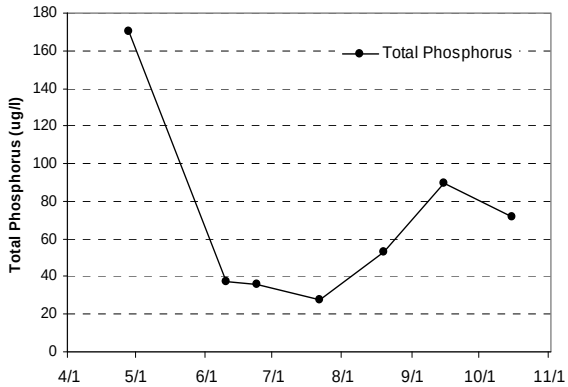
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 48.8 | 28.0 | 90.0 | C |
| **CLA** (µg/l) | 15.2 | 6.8 | 40.0 | B |
| **Secchi** (m) | 2.1 | 0.9 | 3.2 | C |
| **TKN** (mg/l) | 1.70 | 1.30 | 2.40 | |
| | | | ***Lake Grade*** | C |

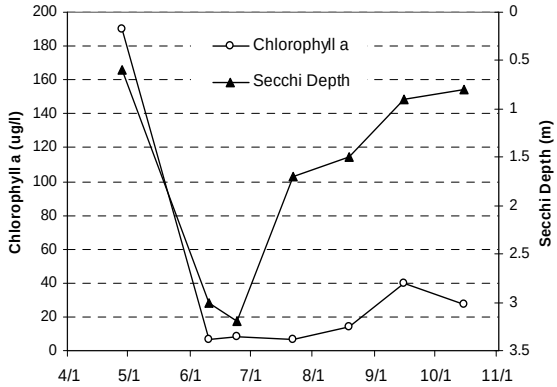
The north basin received a lake grade of C for 2008. Additional years of monitoring are needed to build the water quality database for this water body.

The volunteer's perceptions of the lake's physical and recreational conditions were ranked on a 1-to-5 scale during each monitoring event. The rankings are shown on the information sheet on the next page. The mean physical condition ranking was 2.6 (between 2- "some algae present" and 3- "definite algae present"), and the mean recreational suitability ranking was 3.2 (between 3- "swimming impaired" and 4- "no swimming/boating ok").

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.

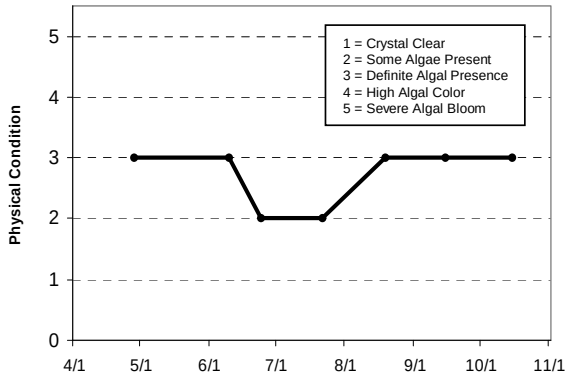



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/28 | 7.7 | 5.5 | 15.07 | 0.11 | 190 | 170 | | 0.6 | 3 | 4 |
| 6/10 | 21.2 | 8.3 | 9.44 | 0.02 | 7 | 37 | | 3 | 3 | 2 |
| 6/24 | 25.2 | 7.9 | 8.75 | 0.78 | 8 | 36 | | 3.2 | 2 | 3 |
| 7/22 | 27.1 | 9.5 | 7.3 | 0.26 | 6.8 | 28 | | 1.7 | 2 | 3 |
| 8/19 | 25.8 | 13.8 | 8.17 | 0.23 | 14 | 53 | | 1.5 | 3 | 4 |
| 9/15 | 19.8 | 15.1 | 6.65 | 0.2 | 40 | 90 | | 0.9 | 3 | 4 |
| 10/15 | 13.8 | 13.5 | 6.33 | 0.21 | 27 | 72 | | 0.8 | 3 | 4 |



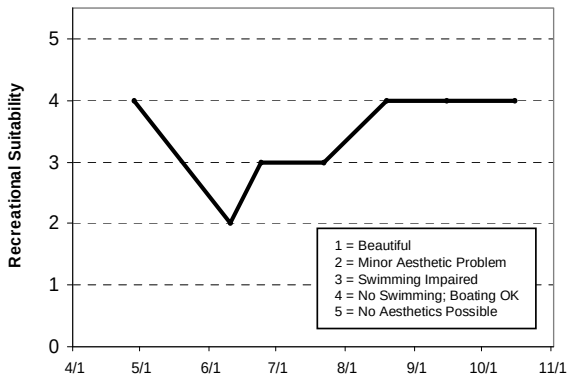

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | | C |
| Chlorophyll a | | | | | B |
| Secchi Depth | | | | | C |
| **Lake Grade** | | | | | **C** |

Source: Metropolitan Council and STORET data



## West Lakeland Storage Site [south basin] *Valley Branch Watershed District*

The West Lakeland Storage Site is located in West Lakeland Township (Washington County). The storage site consists of three basins: north, middle, and south. The south basin had a maximum depth of 0.46 m (1.5 ft) in 2008. Other bathymetric information for the basin is unknown. The entire area of the basin is considered littoral zone which is the 0-15 feet depth zone of aquatic plant dominance.

No other monitoring data is known for this water body. A search through STORET was not possible because the south basin does not have a DNR lake ID number.

The north basin was monitored 3 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. Depth profiles for temperature and dissolved oxygen were also measured. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 327.0 | 302.0 | 352.0 | |
| **CLA** (µg/l) | 29.0 | 19.0 | 39.0 | |
| **Secchi** (m) | 0.4 | 0.3 | 0.5 | |
| **TKN** (mg/l) | 6.60 | 4.70 | 8.50 | |
| | | | ***Lake Grade*** | |

The south basin did not receive a lake grade and individual parameter grades because there were only 3 monitoring events in 2008. At least 5 monitoring events throughout the summer-time period are required to calculate a grade. Monitoring was discontinued in 2008 because of extremely low water levels.

The volunteer's perceptions of the lake's physical and recreational conditions were ranked on a 1-to-5 scale during each monitoring event. The rankings are shown on the information sheet on the next page. The mean physical condition ranking was 3.0 ("definite algae present"), and the mean recreational suitability ranking was 4.5 (between 4- "no swimming/boating ok" and 5- "no aesthetics possible").

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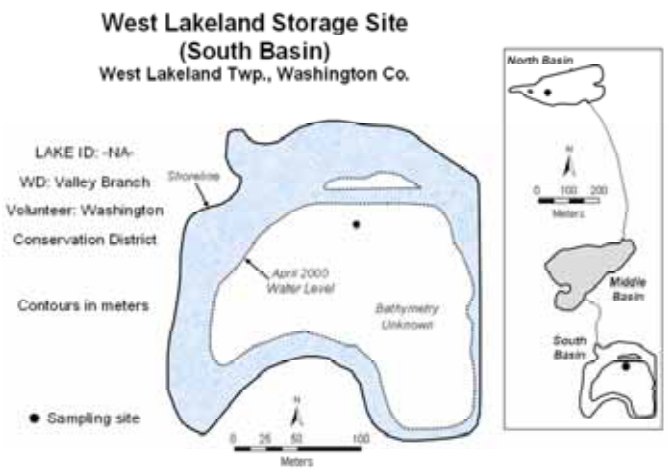
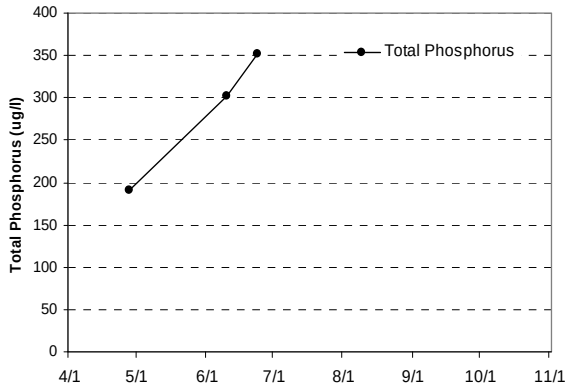
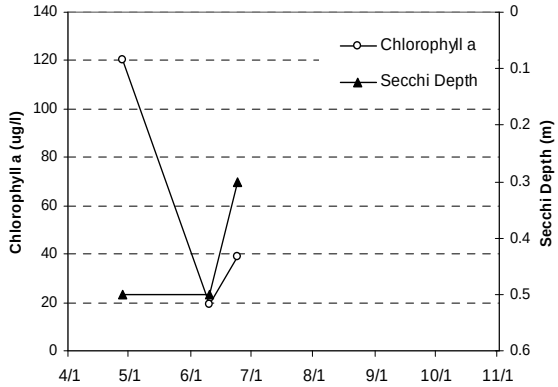
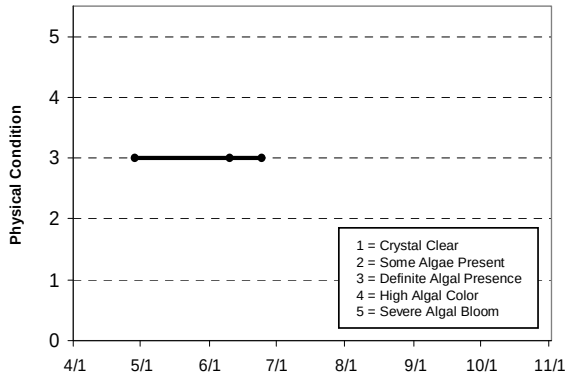



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/28 | 6.7 | | 15.31 | | 120 | 191 | | 0.5 | 3 | 4 |
| 6/10 | 22.5 | | 4.31 | | 19 | 302 | | 0.5 | 3 | 5 |
| 6/24 | 29.6 | 28.6 | 7.48 | 1.23 | 39 | 352 | | 0.3 | 3 | 4 |

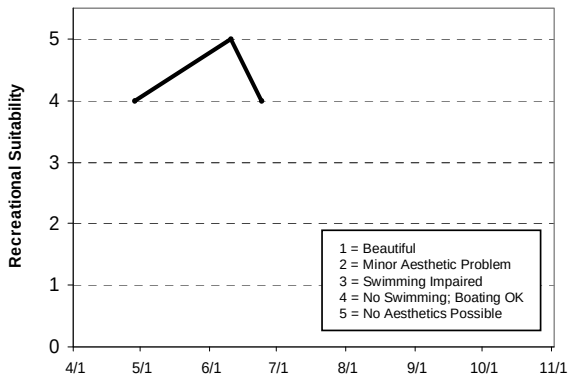



### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | | | |
| Chlorophyll a | | | | | |
| Secchi Depth | | | | | |
| **Lake Grade** | | | | | |




Source: Metropolitan Council and STORET data

## Westwood Lake (27-0711) *Bassett Creek Watershed Management Organization*

Westwood Lake is located in the City of St. Louis Park (Hennepin County). The lake has a surface are of 41 acres and a maximum depth of 2.0 m (6.6 ft). The entire area of the lake is considered littoral zone which is the 0-15 feet depth zone of aquatic plant dominance. Furthermore, the lake does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the water column.

The lake was monitored 7 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2005 summer (May-September) data summary**

| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 29.9 | 22.0 | 39.0 | B |
| **CLA** (µg/l) | 6.5 | 2.5 | 15.0 | A |
| **Secchi** (m) | 1.2 | 0.6 | 1.7 | D |
| **TKN** (mg/l) | 1.66 | 1.30 | 2.00 | |
| | | | ***Lake Grade*** | B |

The lake received a lake grade of B in 2008, which is consistent with the lake grades received in 2000, 2003, and 2004. The lake grades have varied mainly in the Cs and Bs. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008). Continued monitoring is suggested to enhance the ability to detect potential trends in water quality.

The water clarity grade of D does not correlate well with the CLA grade of A and the TP grade of B. Other years in which a poor correlation between water clarity and CLA grades existed were 2003 and 2004. A possible explanation may be that in certain years the water clarity may be affected by higher levels of total suspended solids from surface runoff from the surrounding urban watershed. It is possible for higher suspend solids loadings to decrease water clarity which would decrease light penetration thereby inhibiting algal growth. Furthermore, the relatively lower TP concentrations could possibly limit the abundance of algae.

Throughout the monitoring period, the volunteers' opinions of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. These user perception rankings are shown on the lake information sheet. The average user perception rankings, on a 1-to-5 scale, were 2.4 for physical condition (between 2- "some algae present" and 3- "definite algal color"), and 3.3 for recreational suitability (between 3- "swimming impaired" and 4- "no swimming/boating ok").

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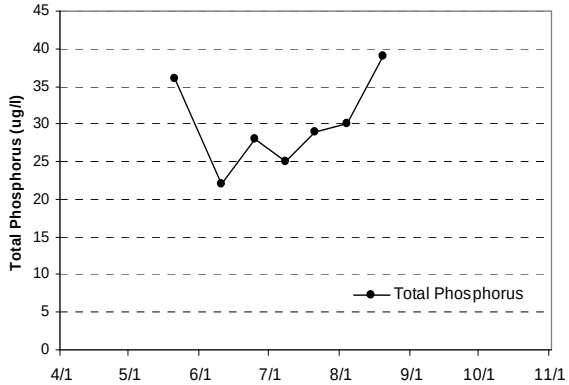
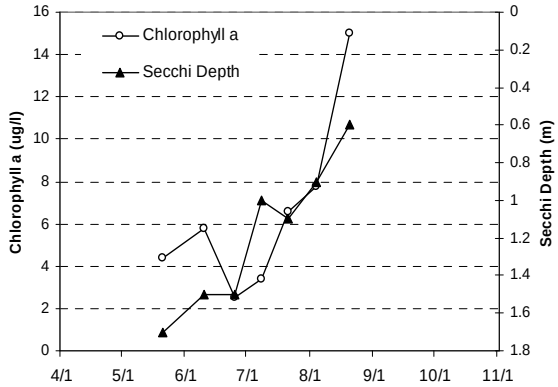
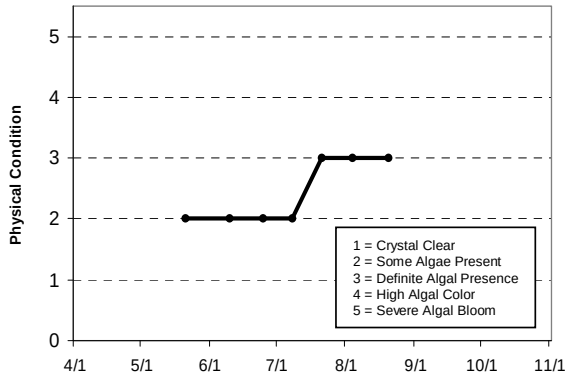



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/21 | 17.5 | | | | 4.4 | 36 | | 1.7 | 2 | 2 |
| 6/10 | 20.4 | | | | 5.8 | 22 | | 1.5 | 2 | 2 |
| 6/25 | 27.5 | | | | 2.5 | 28 | | 1.5 | 2 | 4 |
| 7/8 | | | | | 3.4 | 25 | | 1 | 2 | 3 |
| 7/21 | 28.4 | | | | 6.6 | 29 | | 1.1 | 3 | 4 |
| 8/4 | 26.9 | | | | 7.8 | 30 | | 0.9 | 3 | 4 |
| 8/20 | 25.8 | | | | 15 | 39 | | 0.6 | 3 | 4 |



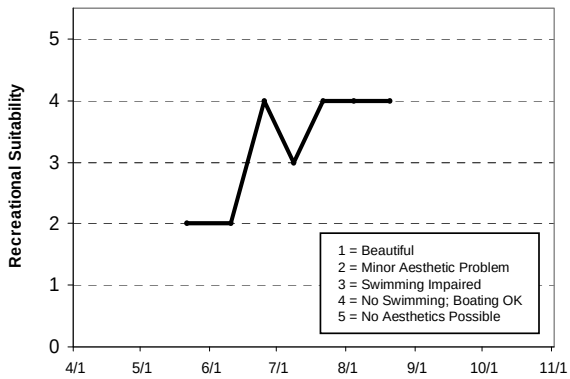

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | F | | | | | | | | | |
| Chlorophyll a | | | C | | | | | | | | | |
| Secchi Depth | | | D | | | | | | | | | |
| **Lake Grade** | | | **D** | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | C | | | | | | | B | B | C | C |
| Chlorophyll a | | C | | | | | | | B | C | B | A |
| Secchi Depth | | C | | | | | | | C | C | C | C |
| **Lake Grade** | | **C** | | | | | | | **B** | **C** | **C** | **B** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | C | D | D | C | B |
| Chlorophyll a | A | C | B | B | A |
| Secchi Depth | C | C | C | C | D |
| **Lake Grade** | **B** | **C** | **C** | **C** | **B** |

Source: Metropolitan Council and STORET data



## White Rock Lake (82-0072) *Rice Creek Watershed District*

White Rock Lake is a 65-acre lake located in Washington County. There is no other known morphological data for the lake. This was the third year that White Rock Lake has been involved in CAMP. A search through the STORET nationwide water quality database for data on the lake provided just the historical CAMP data.

The lake was monitored 13 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

| *Parameter* | Mean | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 78.9 | 65.0 | 120.0 | D |
| **CLA** (µg/l) | 36.5 | 11.0 | 98.0 | C |
| **Secchi** (m) | 0.7 | 0.5 | 1.2 | D |
| **TKN** (mg/l) | 2.28 | 1.50 | 3.20 | |
| | | | ***Lake Grade*** | D |

The lake received a lake grade of D in 2008, which is similar to the previous two years' grades. There is limited water quality data available for White Rock Lake. Therefore, additional years of data are needed to determine potential trends in water quality.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.6 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 2.5 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

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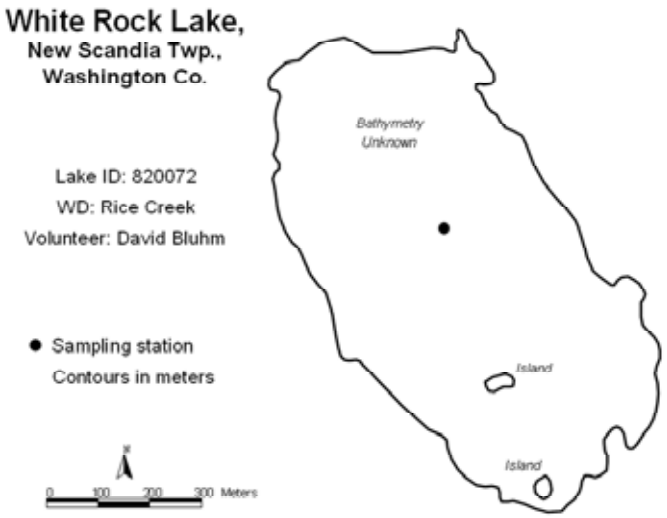
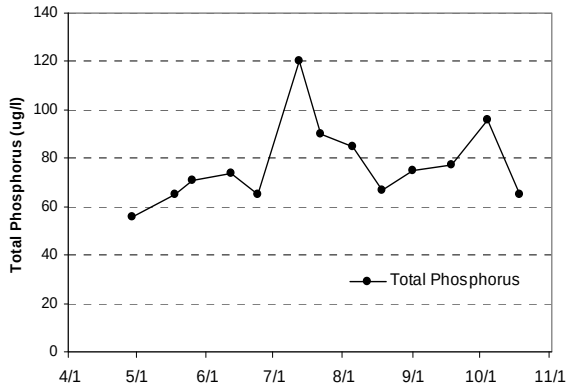
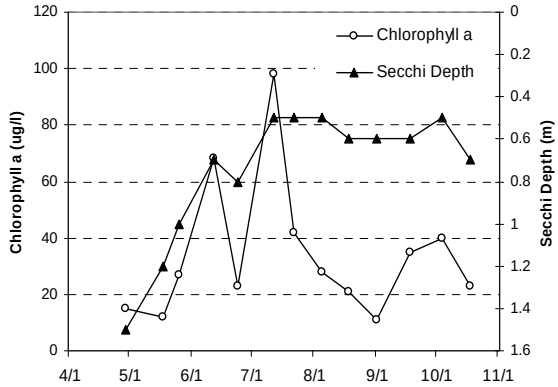
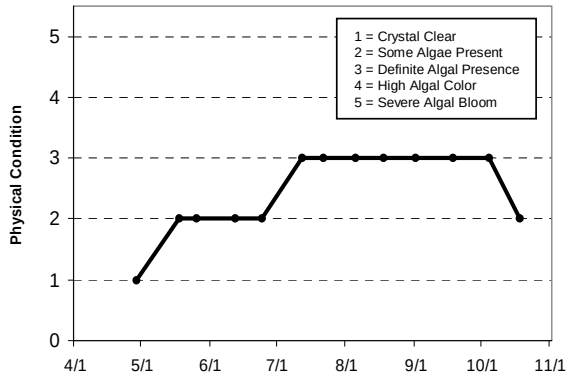



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/29 | 10.5 | | | | 15 | 56 | | 1.5 | 1 | 1 |
| 5/18 | 18.3 | | | | 12 | 65 | | 1.2 | 2 | 1 |
| 5/26 | 18.2 | | | | 27 | 71 | | 1 | 2 | 2 |
| 6/12 | 23 | | | | 68 | 74 | | 0.7 | 2 | 2 |
| 6/24 | 21.6 | | | | 23 | 65 | | 0.8 | 2 | 2 |
| 7/12 | 25 | | | | 98 | 120 | | 0.5 | 3 | 3 |
| 7/22 | 27.3 | | | | 42 | 90 | | 0.5 | 3 | 3 |
| 8/5 | 26.8 | | | | 28 | 85 | | 0.5 | 3 | 3 |
| 8/18 | 28.5 | | | | 21 | 67 | | 0.6 | 3 | 3 |
| 9/1 | 24.1 | | | | 11 | 75 | | 0.6 | 3 | 3 |
| 9/18 | 19.9 | | | | 35 | 77 | | 0.6 | 3 | 3 |
| 10/4 | 15.6 | | | | 40 | 96 | | 0.5 | 3 | 3 |
| 10/18 | 12.7 | | | | 23 | 65 | | 0.7 | 2 | 2 |



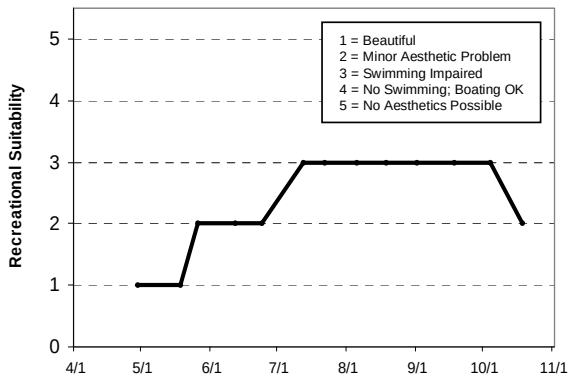

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | D | D | D |
| Chlorophyll a | | | C | C | C |
| Secchi Depth | | | F | F | D |
| **Lake Grade** | | | **D** | **D** | **D** |

Source: Metropolitan Council and STORET data



## Wilmes Lake (82-0090) *City of Woodbury*

Wilmes Lake is located in the City of Woodbury (Washington County). It is classified as a minnow lake that experiences frequent fish kills. The lake has a surface area of 41 acres and a maximum depth of 5.5 m (18 feet). The lake's 2,247-acre watershed translates to a watershed-to-lake area ratio of 55:1. The larger the ratio, the greater the potential stress on the lake quality from surface runoff. The MN DNR has designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*).

The lake was monitored 11 times between mid April and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

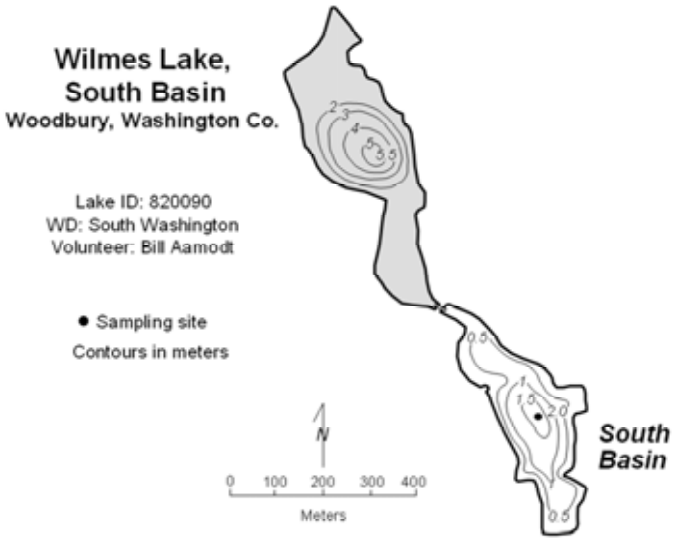
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 65.3 | 39.0 | 92.0 | C |
| **CLA** (µg/l) | 24.7 | 19.0 | 30.0 | C |
| **Secchi** (m) | 1.2 | 0.9 | 1.4 | D |
| **TKN** (mg/l) | 1.80 | 1.50 | 2.50 | |
| | | | ***Lake Grade*** | C |

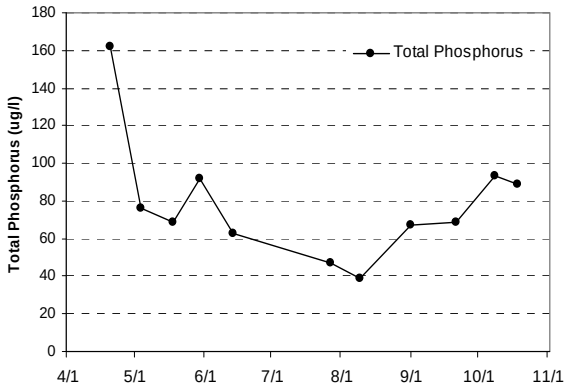
The lake received a lake grade of C for 2008, which is consistent with lake grades received in the lake's historical water quality database. The water quality of the lake varies between a lake grade of C and D on the basis of the historical database. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008).

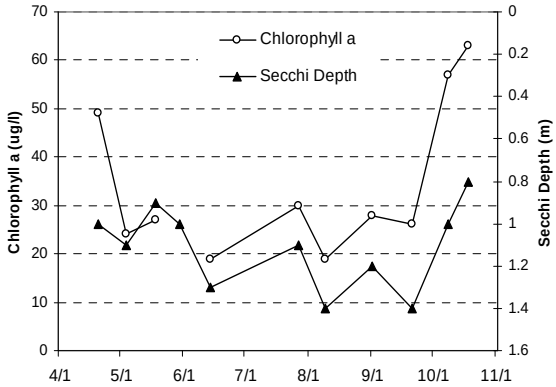
The 1994 and 1995 CAMP monitoring was performed in the northern basin of Wilmes Lake, while the 1996-2008 monitoring was performed in the lake's south basin. Comparisons between the 1994-1995 data and the 1996-2006 data should not be made as they are from different basins.

Throughout the monitoring period, the perceived physical condition and recreational suitability of the lake were ranked on a 1-to-5 scale by the volunteer monitors. These user perception rankings are presented in data tables and graphs on the information sheet. The mean physical condition ranking was 2.5 (between 2- "some algae present" and 3-"definite algae present"). The mean recreational suitability ranking was 2.4 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

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.

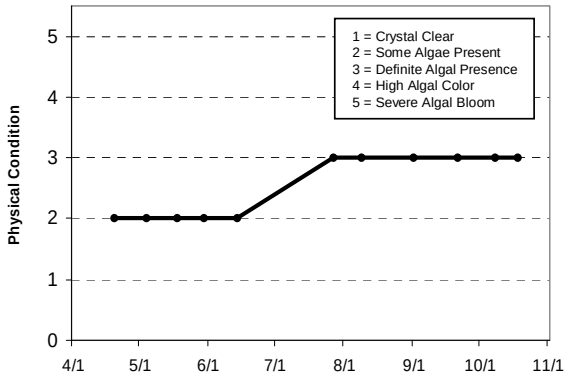



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/20 | 8.9 | | | | 49 | 162 | | 1 | 2 | 2 |
| 5/4 | 14.4 | | | | 24 | 76 | | 1.1 | 2 | 2 |
| 5/18 | 17.6 | | | | 27 | 69 | | 0.9 | 2 | 2 |
| 5/30 | 18.6 | | | | | 92 | | 1 | 2 | 2 |
| 6/14 | 22.5 | | | | 19 | 63 | | 1.3 | 2 | 2 |
| 7/27 | 26.4 | | | | 30 | 47 | | 1.1 | 3 | 3 |
| 8/9 | 26.4 | | | | 19 | 39 | | 1.4 | 3 | 3 |
| 9/1 | 24.1 | | | | 28 | 67 | | 1.2 | 3 | 2 |
| 9/21 | 21.8 | | | | 26 | 69 | | 1.4 | 3 | 3 |
| 10/8 | 16.6 | | | | 57 | 93 | | 1 | 3 | 3 |
| 10/18 | 13.7 | | | | 63 | 89 | | 0.8 | 3 | 3 |



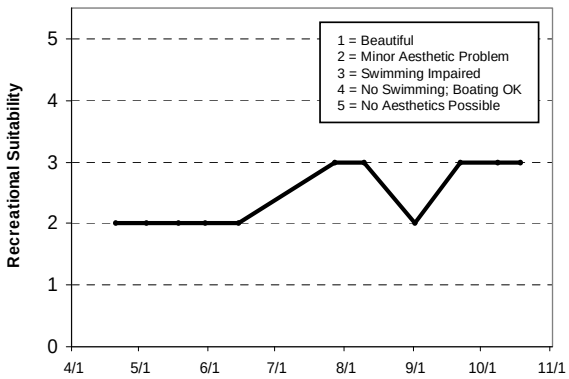

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | C | D | D | D | D | D | D | D | D | D |
| Chlorophyll a | | | B | B | C | C | C | C | C | C | D | C |
| Secchi Depth | | | 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 |
|---|---|---|---|---|---|
| Total Phosphorus | C | D | D | D | C |
| Chlorophyll a | C | C | C | C | C |
| Secchi Depth | C | D | C | C | D |
| **Lake Grade** | **C** | **D** | **C** | **C** | **C** |

Source: Metropolitan Council and STORET data



## Wing Lake (27-0091) *Nine Mile Creek Watershed District*

Wing Lake is a small 11-acre lake located within the City of Minnetonka (Hennepin County). There is little known morphological data available for the lake.

This was the third year that Wing Lake has been involved in the CAMP. A search through the STORET nationwide water quality database for data on the lake provided no data other than the historical CAMP data.

The lake was monitored 12 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

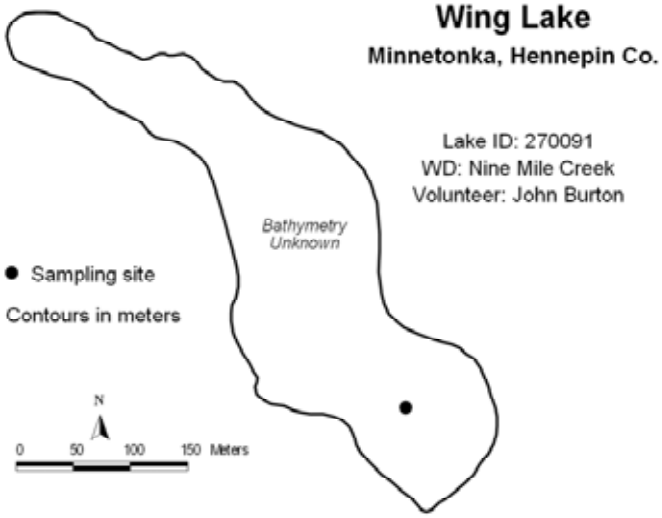
**2008 summer (May-September) data summary**

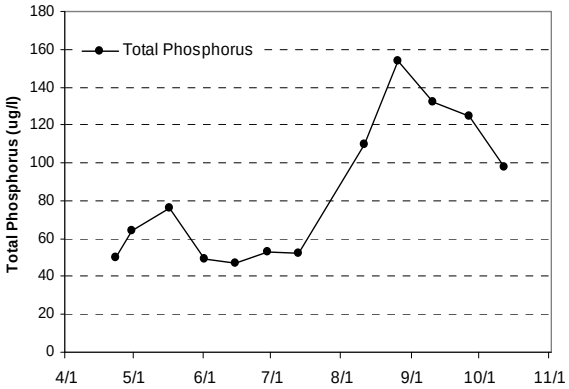
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 88.7 | 47.0 | 154.0 | D |
| **CLA** (µg/l) | 40.3 | 4.1 | 100.0 | C |
| **Secchi** (m) | 1.1 | 0.7 | 1.5 | D |
| **TKN** (mg/l) | 1.77 | 1.30 | 2.00 | |
| | | | ***Lake Grade*** | D |

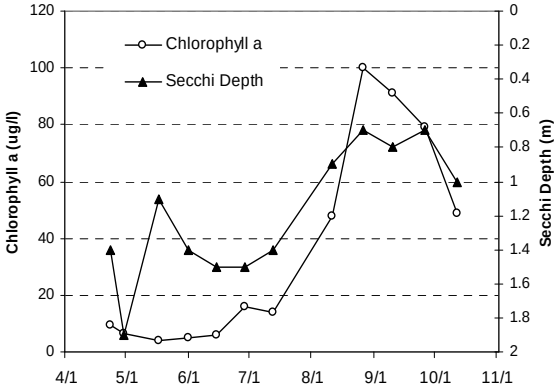
The lake received a lake grade of D for 2008, which is consistent with the previous two years' of data. The individual parameter grades have remained unchanged for the past 3 years as well. Since only 3 years of data are available, additional years of monitoring are needed to determine potential trends in water quality.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.7 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 4.8 (between 4- "no swimming/boating ok" and 5- "no aesthetics possible").

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.

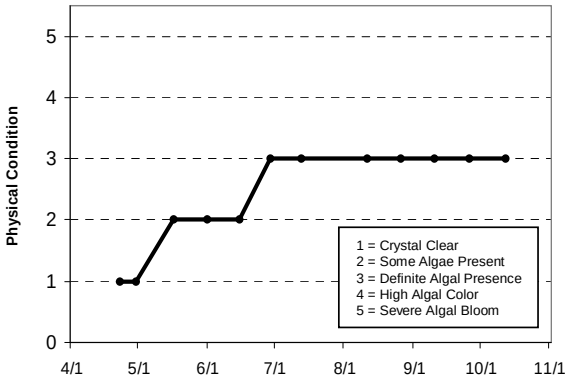



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/23 | 15.7 | | | | 9.6 | 50 | | 1.4 | 1 | 1 |
| 4/30 | 12 | | | | 6.6 | 64 | | 1.9 | 1 | 1 |
| 5/17 | 19 | | | | 4.1 | 76 | | 1.1 | 2 | 4 |
| 6/1 | 25 | | | | 5.2 | 49 | | 1.4 | 2 | |
| 6/15 | 24 | | | | 5.8 | 47 | | 1.5 | 2 | 4 |
| 6/29 | 24 | | | | 16 | 53 | | 1.5 | 3 | 5 |
| 7/13 | 23 | | | | 14 | 52 | | 1.4 | 3 | 5 |
| 8/11 | 25 | | | | 48 | 110 | | 0.9 | 3 | 5 |
| 8/26 | 21 | | | | 100 | 154 | | 0.7 | 3 | 5 |
| 9/10 | 16.4 | | | | 91 | 132 | | 0.8 | 3 | 5 |
| 9/26 | 19.6 | | | | 79 | 125 | | 0.7 | 3 | 5 |
| 10/12 | 16.7 | | | | 49 | 98 | | 1 | 3 | 5 |



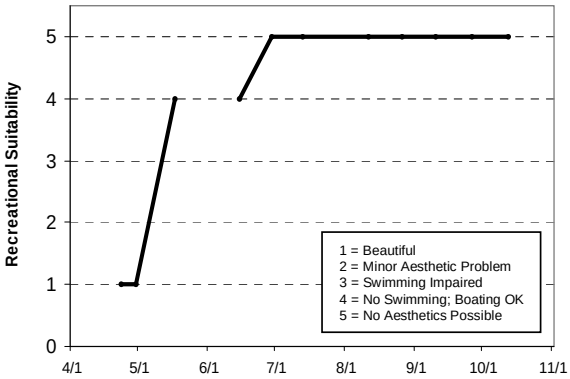

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | D | D | D |
| Chlorophyll a | | | C | C | C |
| Secchi Depth | | | D | D | D |
| **Lake Grade** | | | **D** | **D** | **D** |

Source: Metropolitan Council and STORET data



## Winkler Lake (10-0066) *Carver County Environmental Services*

Winkler Lake is a 129-acre lake located within Benton Township (Carver County). The lake has a 2,758-acre immediate watershed, which translates to a watershed-to-lake area ratio of 21:1 (the larger the ratio the greater the potential stress put on the lake from surface runoff). The lake is the receiving waterbody for the Bongard's wastewater treatment plant.

The DNR has designated the lake as being infested with Eurasian Water Milfoil (*Myriophyllum spicatum*).

A search through the STORET nationwide water quality database provided one additional year of data (1995) besides historical CAMP data.

The lake was monitored 13 times between mid April and mid October. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

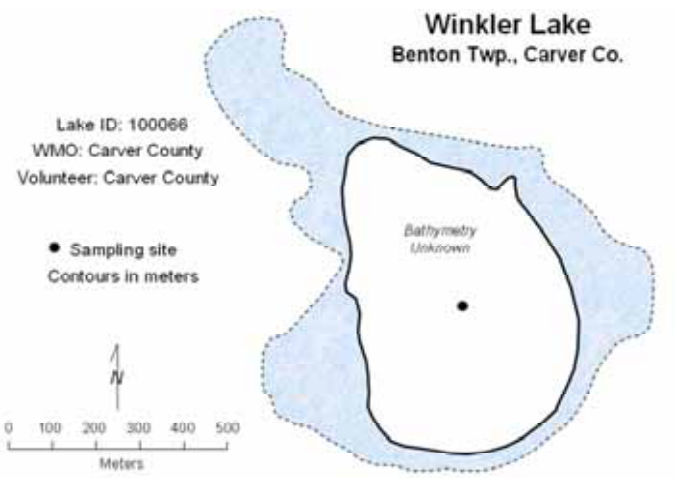
**2008 summer (May-September) data summary**

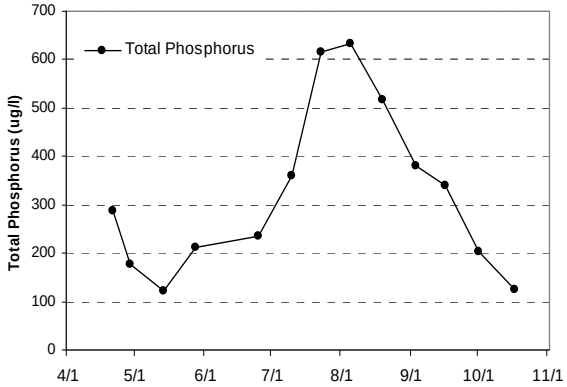
| *Parameter* | Mean | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 379.6 | 122.0 | 633.0 | F |
| **CLA** (µg/l) | 77.2 | 18.0 | 240.0 | F |
| **Secchi** (m) | 0.6 | 0.2 | 0.9 | F |
| **TKN** (mg/l) | 3.28 | 1.40 | 5.20 | |
| | | | ***Lake Grade*** | F |

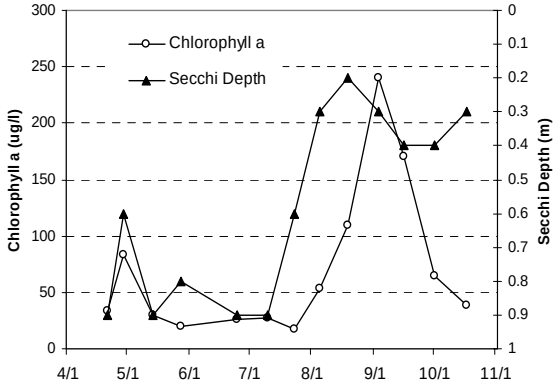
The lake received a lake grade of F for 2008. The lake appears to fluctuate between lake grades of D and F, except that F lake grades are more common. The lake received a lake grade of C in 1995, so to better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

The average user perception rankings, on a 1-to-5 scale, were 3.4 for physical condition (between 3- "definite algae present" and 4- "high algal color") and 4.6 for recreational suitability ranking (between 4- "no swimming - boating ok" and 5- "no aesthetics possible").

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.

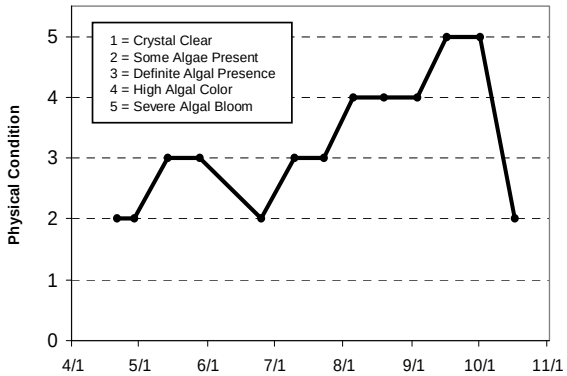



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/21 | 11.12 | | 10.7 | | 34 | 287 | | 0.9 | 2 | 4 |
| 4/29 | 4.2 | | 21.8 | | 83 | 176 | | 0.6 | 2 | 4 |
| 5/14 | 12.44 | | 10.56 | | 30 | 122 | | 0.9 | 3 | 4 |
| 5/28 | 16 | | 7.79 | | 20 | 212 | | 0.8 | 3 | 5 |
| 6/25 | 24.48 | | 7.35 | | 26 | 235 | | 0.9 | 2 | 4 |
| 7/10 | 25.87 | | 8.98 | | 27 | 359 | | 0.9 | 3 | 4 |
| 7/23 | 27.26 | | 4.03 | | 18 | 616 | | 0.6 | 3 | 4 |
| 8/5 | 26.74 | | 12.36 | | 54 | 633 | | 0.3 | 4 | 5 |
| 8/19 | 25.69 | | 9.88 | | 110 | 518 | | 0.2 | 4 | 5 |
| 9/3 | 17.84 | | 13.42 | | 240 | 381 | | 0.3 | 4 | 5 |
| 9/16 | 16.61 | | 10.53 | | 170 | 340 | | 0.4 | 5 | 5 |
| 10/1 | 12.86 | | 6.8 | | 65 | 202 | | 0.4 | 5 | 5 |
| 10/17 | 10.47 | | 6.56 | | 38 | 126 | | 0.3 | 2 | 3 |



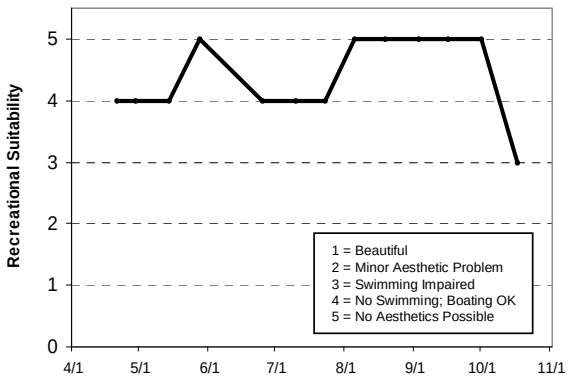

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | F | | | | F | F | F | | F |
| Chlorophyll a | | | | A | | | | D | F | C | | F |
| Secchi Depth | | | | C | | | | F | F | F | | F |
| **Lake Grade** | | | | **C** | | | | **F** | **F** | **D** | | **F** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | F | | F | F |
| Chlorophyll a | | F | | C | F |
| Secchi Depth | | F | | F | F |
| **Lake Grade** | | **F** | | **D** | **F** |

Source: Metropolitan Council and STORET data



## Wood Lake (19-0024) *Black Dog Watershed Management Commission*

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 area of the lake is considered littoral zone which is the 0-15 feet depth zone of aquatic plant dominance. Furthermore, the lake does not maintain a thermocline, which is a density gradient caused by changing water temperatures throughout the water column. The majority of the land within the lake's 157-acre immediate watershed is urban/developed. The resulting watershed-to-lake area ratio is 17:1. The greater the ratio, the greater the potential stress on the lake from surface runoff.

The lake was monitored 12 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

**2008 summer (May-September) data summary**

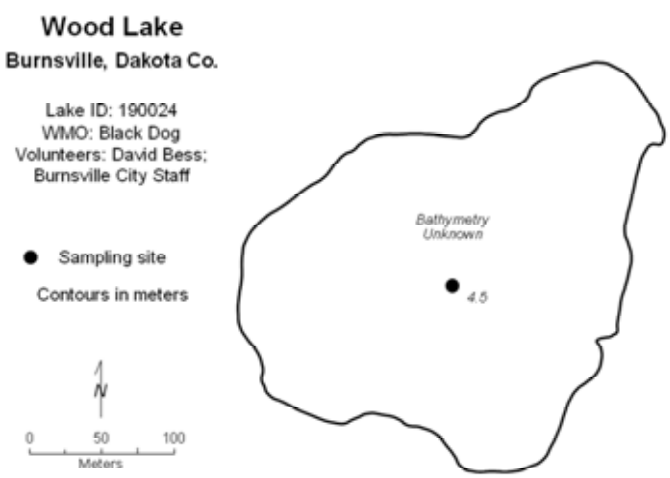
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 59.7 | 35.0 | 109.0 | C |
| **CLA** (µg/l) | 14.1 | 1.8 | 33.0 | B |
| **Secchi** (m) | 2.1 | 0.8 | 5.0 | C |
| **TKN** (mg/l) | 1.81 | 1.50 | 2.10 | |
| | | | ***Lake Grade*** | C |

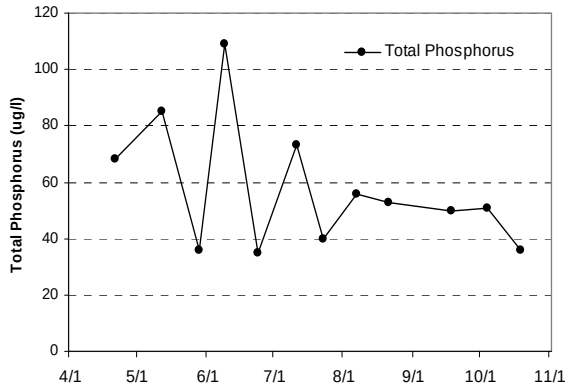
The lake received a lake grade of C for 2008, which is consistent with most of lake grades received in previous years. The lake appears to be represented by a lake grade of C, on the basis of the water quality database. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008).

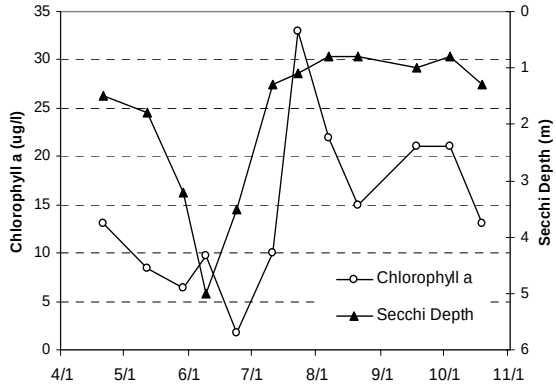
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.4 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 3.6 (between 3- "swimming slightly impaired" and 4- "no swimming/boating ok").

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.

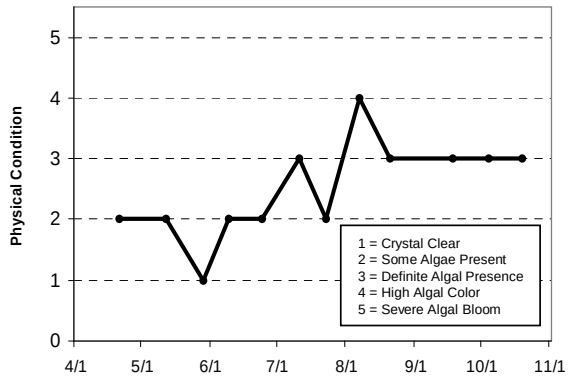



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/21 | 11.4 | | | | 13 | 68 | | 1.5 | 2 | 4 |
| 5/12 | 14.8 | | | | 8.4 | 85 | | 1.8 | 2 | 4 |
| 5/29 | 17.6 | | | | 6.4 | 36 | | 3.2 | 1 | 4 |
| 6/9 | 21.3 | | | | 9.7 | 109 | | 5 | 2 | 2 |
| 6/24 | 25 | | | | 1.8 | 35 | | 3.5 | 2 | 3 |
| 7/11 | 27.2 | | | | 10 | 73 | | 1.3 | 3 | 3 |
| 7/23 | 27.8 | | | | 33 | 40 | | 1.1 | 2 | 4 |
| 8/7 | 26.3 | | | | 22 | 56 | | 0.8 | 4 | 4 |
| 8/21 | 25.7 | | | | 15 | 53 | | 0.8 | 3 | 4 |
| 9/18 | 20.7 | | | | 21 | 50 | | 1 | 3 | 4 |
| 10/4 | 17.2 | | | | 21 | 51 | | 0.8 | 3 | 4 |
| 10/19 | 13.9 | | | | 13 | 36 | | 1.3 | 3 | 4 |



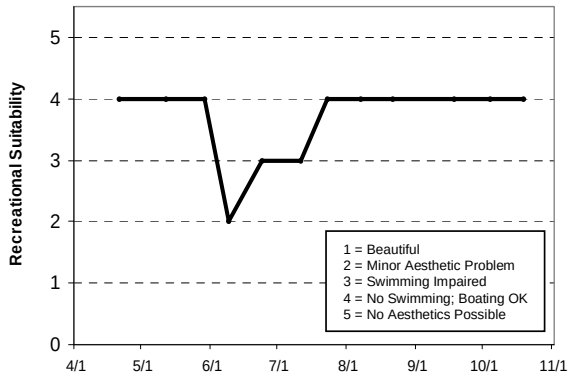

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | C | C | B | C | C | C | C | C |
| Chlorophyll a | | | | | B | B | B | B | B | C | C | B |
| Secchi Depth | | | | | C | C | C | C | C | C | C | C |
| **Lake Grade** | | | | | **C** | **C** | **B** | **C** | **C** | **C** | **C** | **C** |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | C | C | D | C | C |
| Chlorophyll a | B | C | C | B | B |
| Secchi Depth | C | C | C | C | C |
| **Lake Grade** | **C** | **C** | **C** | **C** | **C** |

Source: Metropolitan Council and STORET data



## Woodpile Lake (82-0132) *Browns Creek Watershed District*

Woodpile Lake is a small 15-acre lake located in Washington County. The maximum depth of the lake is 8.2 m (27 ft). This was the third year that Woodpile Lake has been involved in the CAMP. A search through the STORET nationwide water quality database for data on the lake provided only the historical CAMP data.

The lake was monitored 14 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

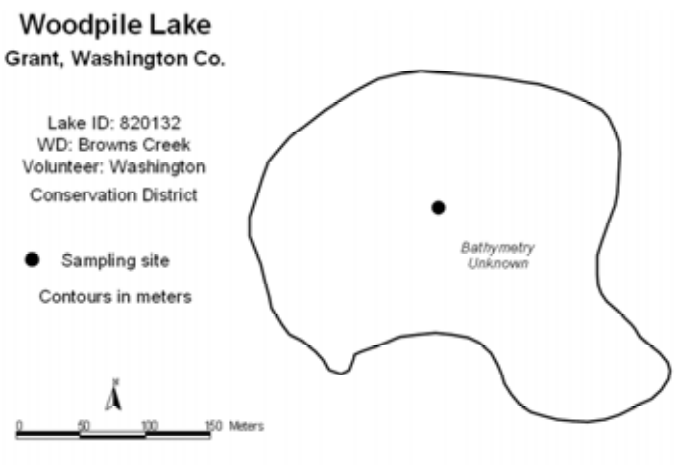
**2008 summer (May-September) data summary**

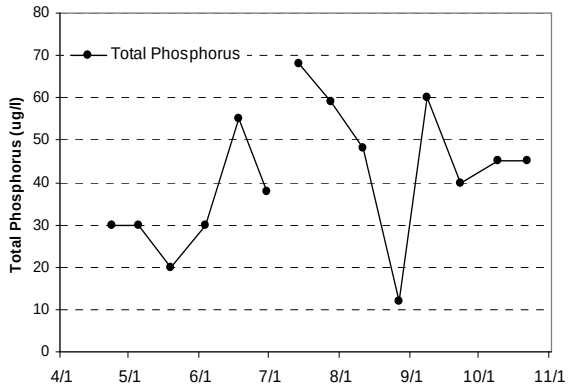
| *Parameter* | *Mean* | *Minimum* | *Maximum* | *Grade* |
|---|---|---|---|---|
| **TP** (µg/l) | 41.8 | 12.0 | 68.0 | C |
| **CLA** (µg/l) | 20.9 | 3.5 | 74.0 | C |
| **Secchi** (m) | 2.0 | 0.9 | 3.5 | C |
| **TKN** (mg/l) | 1.27 | 0.71 | 2.60 | |
| | | | ***Lake Grade*** | C |

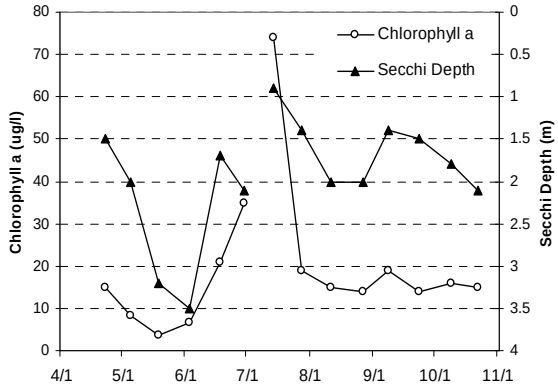
The lake received a lake grade of C for 2008, which is similar to the lake grade received in 2006, but worse than the B lake grade received last year. The quantity of data in the water quality database is limited, so additional years of data are needed to determine potential trends in water quality.

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.9 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 3.8 (between 3- "swimming slightly impaired" and 4- "no swimming/boating ok").

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.

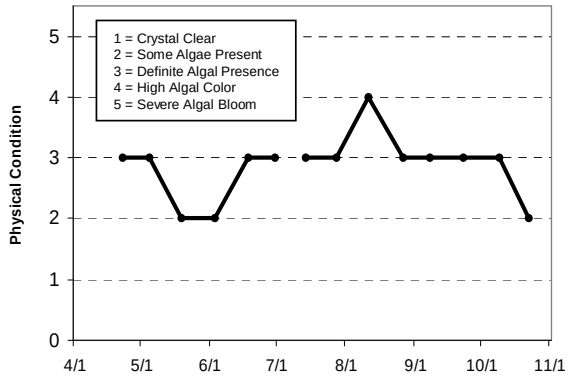



## 2008 Data

| DATE | Surf Tmp (ºC) | Bot Tmp (ºC) | Surf DO (mg/L) | Bot DO (mg/L) | CLA (µg/L) | Surf TP (µg/L) | Bot TP (µg/L) | Secchi (m) | PC | RS |
|---|---|---|---|---|---|---|---|---|---|---|
| 4/23 | 12.1 | 5 | 12.82 | 1.47 | 15 | 30 | | 1.5 | 3 | 3 |
| 5/5 | 13.9 | 5 | 11.69 | 0.86 | 8.3 | 30 | | 2 | 3 | 4 |
| 5/19 | 16.1 | 5.3 | 9.71 | 0.34 | 3.5 | 20 | | 3.2 | 2 | 3 |
| 6/3 | 19.4 | 5.8 | 9.23 | 0.2 | 6.6 | 30 | | 3.5 | 2 | 3 |
| 6/18 | 22.1 | 6.1 | 11.4 | 0.26 | 21 | 55 | | 1.7 | 3 | 4 |
| 6/30 | 25.5 | 6.3 | 10.89 | 0.77 | 35 | 38 | | 2.1 | 3 | 4 |
| 7/8 | | | | | | | | | | |
| 7/14 | 25 | 7 | 8.53 | 0.44 | 74 | 68 | | 0.9 | 3 | 4 |
| 7/28 | 27.4 | 6.7 | 8.66 | 0.39 | 19 | 59 | | 1.4 | 3 | 4 |
| 8/11 | 25.5 | 7 | 6.88 | 0.26 | 15 | 48 | | 2 | 4 | 4 |
| 8/27 | 22.7 | 7.2 | 7.31 | 0.49 | 14 | 12 | | 2 | 3 | 4 |
| 9/8 | 20.4 | 7.5 | 6.67 | 0.21 | 19 | 60 | | 1.4 | 3 | 4 |
| 9/23 | 20.5 | 7.7 | 8.66 | 0.35 | 14 | 40 | | 1.5 | 3 | 4 |
| 10/9 | 14.4 | 7.9 | 7.79 | 0.3 | 16 | 45 | | 1.8 | 3 | 3 |
| 10/22 | 11.1 | 8.3 | 7.78 | 0.53 | 15 | 45 | | 2.1 | 2 | 3 |



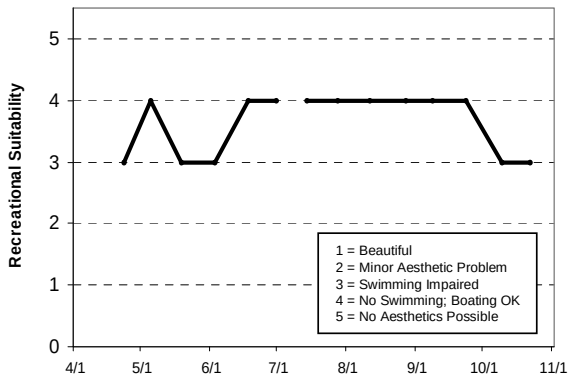

### Lake Water Quality Grades Based on Summertime Averages

| Year | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus | | | | | | | | | | | | |
| Chlorophyll a | | | | | | | | | | | | |
| Secchi Depth | | | | | | | | | | | | |
| **Lake Grade** | | | | | | | | | | | | |

| Year | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Total Phosphorus | | | D | C | C |
| Chlorophyll a | | | B | B | C |
| Secchi Depth | | | C | B | C |
| **Lake Grade** | | | **C** | **B** | **C** |

Source: Metropolitan Council and STORET data



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**APPENDIX A**

**Lakes Sampled by Metropolitan Council Staff and the CAMP, 1980 - 2008**

(Numbers indicate sampling events per year. Sampling by volunteers is indicated by a "v".)

| Lake | DNR ID | Location | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acorn Lake | 82010200 | | | | | | | | | | | | | | | | | | | | | | | | | | | | v14 | | v 6 |
| Alimagnet Lake | 19002100 | | | | | | | | | | | | | | | | | v 12 | v10 | v10 | v10 | v10 | v10 | v8 | v9 | v12 | v10 | v10 | v8 | v10 | v 12 |
| Ann Lake | 10001200 | | | | | | | 5 | | | | 13 | | | | | | | | | | | | | 13 | | | | | | |
| Ardmore Lake | 27015300 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | v4 | v 11 |
| Armstrong Lake | 82011602 | south basin | | | | | | | | | | | | | | | | | | | v15 | v10 | v13 | v14 | v15 | v14 | v14 | v14 | v7 | v7 | v 7 |
| Assumption Lake | 10006300 | | | | | | | | | | | | | | | | | | | | | v1 | | | | | | | | | |
| Auburn Lake | 10004401 | west | | | | 10 | | | 17 | 18 | | | | 12 | | | 13 | | | | | | | | | | | | | | |
| Auburn Lake | 10004402 | east | | | | 10 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aue Lake | 10002800 | | | | | | | | | | | | | | | | | | | | | v1 | | | | | | | | | |
| Bald Eagle Lake | 62000200 | site 1 | 4 | 5 | | 5 | | | | | | | | | | | | | | | | | | | | | 13 | 13 | | | |
| Bald Eagle Lake | 62000200 | site 2 | | | | | | | | | | | | | | | | | | | | | | | | | 13 | 13 | | | |
| Barker Lake | 82007600 | | | | | | | | | | | | | | | | | | | | | | v5 | v5 | v7 | v7 | v7 | v7 | v7 | v7 | v 7 |
| Barnes Lake | 10010900 | | | | | | | | | | | | | | | | | | | | | v1 | | | | | | | | | |
| Bass Lake | 27001500 | St. Louis Park | | | | | | | | | | | | | | | | | | | | | | | v12 | | | v12 | v2 | | |
| Bass Lake | 27009800 | Plymouth | 4 | | | | | | | | | | | | | | v16 | | | v15 | | v15 | | v13 | | v9 | | v15 | | v14 | |
| Bass Lake | 82003500 | May Township | | | | | | | | | | | | | | | | | | | | | v14 | v5 | v7 | v7 | v7 | v7 | v7 | v7 | v 7 |
| Bass Lake | 82012300 | west [Grant Twnshp] | | | | | | | | | | | | | | | | | | | | | | | | | | | v7 | v8 | v 7 |
| Bass Lake | 82012400 | east [Grant Twnshp] | | | | | | | | | | | | | | | | | | | | | | | | | | | v7 | v7 | v 7 |
| Battle Creek Lake | 82009100 | | | | | | | | | | | | | | | v14 | v13 | v11 | v13 | | | | | | | | | | | | |
| Bavaria Lake | 10001900 | | | | | 5 | | | 17 | 18 | | | | | | | 13 | | v11 | v12 | v15 | v12 | v14 | v14 | v14 | v19 | v16 | v18 | v16 | v14 | v 14 |
| Bay Pond | 82001100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | v14 | v14 | v 11 |
| Benton Lake | 10006900 | | | | | | | | | | | | | | | | | | | | | v13 | v14 | v14 | | v15 | | v14 | | v13 | v 14 |
| Benz Lake | 82012000 | | | | | | | | | | | | | | | | | | | | v8 | | | | | | | v14 | v14 | v14 | v 14 |
| Berliner Lake | 10010300 | | | | | | | | | | | | | | | | | | | | | v1 | | | | | | | | | |
| Beutel Pond | 82039900 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | v 7 |
| Big Carnelian Lake | 82004900 | | | | | | 5 | | | | | 13 | | | | | 13 | | | 13 | | | v14 | v7 | v14 | v14 | v14 | v14 | v7 | v7 | v 6 |
| Big Comfort Lake | 13005300 | | | | | | | | | | | | | | | | | | | v3 | | | v14 | v14 | v14 | v14 | v14 | v13 | v14 | v14 | v 14 |
| Big Marine Lake | 82005200 | | 4 | 5 | | | 5 | | | | | 13 | | | | | 13 | | | 13 | | | v14 | v7 | v14 | v14 | v14 | v14 | v7 | v7 | v 7 |
| Birch Lake | 13004200 | | | | | | | | | | | | | | | | | | | | | | | | | | | v10 | v7 | v7 | |
| Birch Lake | 62002400 | | 2 | | | | | | | | | | | | | | | | | | | | | | | | | v14 | | | |
| Bluebill Bay Lake | 19044900 | | | | | | | | | | | | | | | | | | | v8 | | | | | | | | | | | |
| Bone Lake | 82005400 | | | | | | 5 | | | | | 13 | | | | v7 | | v14 | | v14 | v14 | v14 | | v14 | v14 | v14 | v14 | v14 | 13 | v10 | v 15 |
| Brand Lake | 10011000 | | | | | | | | | | | | | | | | | | | | | v1 | | | | | | | | | |

**APPENDIX A**

**Lakes Sampled by Metropolitan Council Staff and the CAMP, 1980 - 2008**

(Numbers indicate sampling events per year. Sampling by volunteers is indicated by a "v".)

| Lake | DNR ID | Location | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Braunworth Lake | 10010700 | | | | | | | | | | | | | | | | | | | | | v1 | | | | | | | | | |
| Brick Pond | 82030800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | v 7 |
| Brickyard Clayhole Lake | 10022500 | | | | | | | | | | | | | | | | | | | | | | | | v14 | v13 | v14 | v14 | v14 | v13 | v 14 |
| Bryant Lake | 27006700 | | 2 | 5 | 16 | | 5 | | | | | 13 | 13 | 12 | | | | | | | | | | | | | | | | | |
| Burandt Lake | 10008400 | | | | | | | | | | | | | | | | | | | | | v7 | v13 | v9 | | | v18 | v22 | | | |
| Bush Lake | 27004700 | | | | | | 5 | | | | | | | | | 13 | 13 | | | | | 13 | | 13 | | | 13 | | v13 | v15 | v 13 |
| Byllesby Lake | 19000600 | | | | | | | | | | | | | | | v14 | v14 | v13 | | | | | | | | | | | | | |
| Calhoun Lake | 27003100 | | | 5 | | | 5 | | | | | | | | | | | | | | | | | | | | | | | | |
| Campbell Lake | 10012700 | | | | | | | | | | | | | | | | | | | | | v2 | v14 | | v10 | | | v14 | v14 | | |
| Capaul Pond | 82036500 | east basin | | | | | | | | | | | | | | | | | | | | | | | | | | | | | v 7 |
| Capaul Pond | 82036500 | west basin | | | | | | | | | | | | | | | | | | | | | | | | | | | | | v 7 |
| Carol Lake | 82001700 | | | | | | | | | | | | | | | | | | | | | | v5 | v5 | v7 | v7 | v7 | v7 | v7 | v7 | v 7 |
| Carver Lake | 82016600 | | | | | | | | | | 20 | | | | | v15 | v15 | v16 | v9 | | | | | | | | | | | | |
| Cates Lake | 70001800 | | | | | | | | | | | | | | | | | | | | | | | | v14 | v13 | v15 | v13 | v14 | v13 | v 12 |
| Cedar Island Lake | 27011900 | | | | | | | | | | | | | | | | | v13 | | | | | | v13 | | v11 | | | v9 | | |
| Cedar Lake | 27003900 | Minneapolis | | | | | 5 | | | | | | | | | | | | | | | | | | | | | | | | |
| Cedar Lake | 70009100 | Scott Co. | 4 | 5 | | | 5 | | | | | | 13 | | | 14 | | | | | 13 | | | 13 | | | | 13 | v14 | v14 | v 14 |
| Cenaiko Lake | 2065400 | | | | | | | | | | | | | | | | | | | v12 | v11 | v13 | v11 | v13 | v12 | v12 | v14 | v14 | v14 | v12 | v 13 |
| Centerville Lake | 2000600 | | 4 | 5 | | 5 | | | | | | | | | | | | | | | | | 13 | 13/v4 | v1 | 13 | 13 | | | | |
| Charley Lake | 62006200 | | | | | | | 5 | | | | | | | | | | | | | | | | | | | | | | | |
| Christmas Lake | 27013700 | | 4 | 5 | | | | 5 | | | | | | | | | | | | 13 | 13 | 13 | | | 13 | 13 | | | | | |
| Chub Lake | 19002000 | | 2 | | | | | | | | | | | | | v14 | v14 | v11 | | | | | | | | | | | | | |
| Clear Lake | 82004500 | May Township | | | | | | | | | | | | | | | | | | | | | | | | | | | | | v 14 |
| Clear Lake | 82016300 | Forest Lake | 4 | | | | 5 | | | | | | 13 | | | v11 | v12 | v12 | v11 | v10 | v11 | v10 | v9 | v12 | v12 | v12 | v6 | | 13 | | |
| Cleary Lake | 70002200 | | | | | | 5 | | | | | | | | | | | | | | | | | | | | | | | | |
| Cloverdale Lake | 82000900 | | | | | | | | | | | | | | | | | | | | | | | v10 | v10 | v11 | v13 | v12 | v11 | v10 | v 9 |
| Cobblecrest Lake | 27005300 | | | | | | | | | | | | | | | | | | | | | | | | v4 | | v14 | v16 | v13 | v13 | v 13 |
| Cobblestone Lake | 19045600 | | | | | | | | | | | | | | | | | | | | | | | | | | | v14 | v14 | v12 | v 14 |
| Cody Lake | 66006100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | v3 | |
| Colby Lake | 82009400 | | | | | | | | | | | | | | | | v13 | v14 | v13 | v13 | v12 | v12 | v9 | v10 | v10 | v10 | v10 | v6 | v7 | v7 | v 9 |
| Coon Lake | 2004200 | | 4 | | | | 5 | | | | | | | | | | 13 | | | 13 | | | | | | | | | | | |
| Cornelia Lake | 27002800 | | | | | | | | | | | | | | | | | | | | | | | | | v7 | | v11 | v14 | v14 | v 13 |
| Courthouse Lake | 10000500 | Chaska | | | | | | | | | | | | | | | | | v2 | v14 | v13 | v13 | v14 | v14 | v14 | v14 | v14 | v14 | v13 | v13 | v 14 |

**APPENDIX A**

**Lakes Sampled by Metropolitan Council Staff and the CAMP, 1980 - 2008**

(Numbers indicate sampling events per year. Sampling by volunteers is indicated by a "v".)

| Lake | DNR ID | Location | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cowley Lake | 27016900 | | | | | | | | | | | | | | | | | | v12 | | | | | | | | | | v10 | v1 | |
| Crane Lake | 27073400 | | | | | | | | | | | | | | | v9 | | | | | | | | | | | | | | | |
| Crooked Lake | 2008400 | | | | | 5 | | | | | | 13 | | | | v15 | v15 | v14 | v14 | v12 | v14 | v14 | | | | | | | | | |
| Crystal Lake | 19002700 | Burnsville | 2 | | | 5 | | | | | | 13 | | | | | 13 | 13 | 13 | 13 | 13 | v12 | v10 | v14 | v15 | v15 | v15 | v16 | v14 | v14 | v 14 |
| Crystal Lake | 27003400 | Robbinsdale | | | | | | | 17 | 19 | 19 | | | | | | v15 | | | v11 | | | | v8 | | | | v7 | | | v 7 |
| Crystal Lake | 70006100 | Spring Lake | | | | | | | | | | | | | | | | | | v12 | | v11 | | | | | | | | | |
| Cynthia Lake | 70005200 | | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dan Patch Lake | 70001600 | | | | | | | | | | | | | | | | | | | v15 | | | | | | | | | | | |
| Dean Lake | 70007400 | | | | | | | | | | | | | | | | | | | | | | | | v7 | v7 | v6 | v7 | v8 | v9 | v 10 |
| Deeg Lake | 19011700 | | | | | | | | | | | | | | | | | | | | | | | v12 | | | | | | | |
| Deep Lake | 62001800 | | | | | | | 5 | | | | | | | | | | | | | | | | | | | | | | | |
| Demontreville Lake | 82010100 | | 4 | | | | 5 | | | | | | | 12 | | v15 | | 14 | | | | | 13 | | | 13 | v14 | v7 | v7 | v11 | v 20 |
| Diamond Lake | 27012500 | Dayton | 2 | | | | | | | | | | | | | | v13 | | | | | | | | | | 13 | | | | |
| Downs Lake | 82011000 | | | | | | | | | | | | | | | | | | | | | v14 | | v9 | v9 | v6 | v7 | v9 | v7 | v5 | v 2 |
| Dutch Lake | 27018100 | | | | | | 5 | | | | | | | | | | | | | | | | | | | | | | | | |
| Eagle Lake | 10012100 | Young America | 4 | 5 | | | | 5 | | | | | | | | | | | 12 | | v15 | v14 | v14 | v12 | v14 | v14 | 13 | v14 | v14 | v13 | v 13 |
| Eagle Lake | 27011101 | Maple Grove | 4 | | | 5 | | | 17 | 18 | | | | 11 | | v15 | | | v14 | v14 | v14 | | v6 | | v4 | | | v6 | | | |
| Eagle Point Lake | 82010900 | | | | 2 | | | | | | | | | | | v14 | | | | | | | | | | | | | v5 | v2 | v 2 |
| Earley Lake | 19003300 | | | | | | | | | | | | | | | | v10 | v11 | v9 | v10 | v10 | v9 | v8 | v6 | v10 | v9 | v6 | v7 | v9 | v12 | v 9 |
| East Boot Lake | 82003400 | | | | | | | | | | | | | | | | | | | | | | v14 | v14 | v14 | v14 | v14 | v14 | v7 | v7 | v 7 |
| East Lake | 19034900 | | | | | | | | | | | | | | | | | | | | | | | | | | | v13 | v6 | v14 | v 13 |
| East Twin Lake | 2013300 | | 2 | 5 | | 5 | | | | | | 13 | | | | | | 13 | | | 13 | | | | | | | | | | |
| Echo Lake | 82013500 | | | | | | | | | | | | | | | | | | | | | | | | | | | | v10 | v8 | v 4 |
| Edina Lake | 27002900 | | | | | | | | | | | | | | | | | | | | | | | | | | v10 | v10 | | | |
| Edith Lake | 82000400 | | | | | | | | | | | | | | | | | | | | | | | | | | | v6 | v12 | v12 | v 15 |
| Egg Lake | 82014700 | | | | | | | | | | | | | | | | | | | | | | | v3 | | | | | | | |
| Elmo Lake | 82010600 | | 4 | 5 | 16 | | 5 | | | | 19 | | | 12 | | | v11 | | | | | | | | | | | v9 | v8 | v8 | v 18 |
| Fahlstrom Pond | 82000500 | east basin | | | | | | | | | | | | | | | | | | | | | | | | | | | | | v 3 |
| Fahlstrom Pond | 82000500 | west basin | | | | | | | | | | | | | | | | | | | | | | | | | | | | | v 5 |
| Farquhar Lake | 19002300 | | 4 | | | | | | | | | | | | | | v15 | v16 | v14 | v15 | | v15 | v13 | v11 | v13 | v14 | v14 | v15 | v13 | v13 | v 13 |
| Fireman's Clayhole Lake | 10022600 | | | | | | | | | | | | | | | | | | | | | | | v12 | v14 | v14 | v14 | v14 | v13 | v13 | v 14 |
| Fish Lake | 19005700 | Eagan | | | | | | | | | | 13 | | | | | | | | | | | | | | | | | | | |
| Fish Lake | 27011800 | Maple Grove | 4 | 5 | 16 | | | 5 | | | | | 13 | | | | | | | | | | | | | | | | | | |

**APPENDIX A**

**Lakes Sampled by Metropolitan Council Staff and the CAMP, 1980 - 2008**

(Numbers indicate sampling events per year. Sampling by volunteers is indicated by a "v".)

| Lake | DNR ID | Location | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fish Lake | 70006900 | Scott Co. | 4 | | | | 5 | | | | | | 13 | | | | | 13 | | v2 | v13 | v8 | v12 | v9 | v14 | v13 | v11 | v13 | v11 | v13 | v 11 |
| Fish Lake | 82006400 | Washington Co. | | | | | | | | | | | | | | | | | | | | | v5 | v14 | v7 | v7 | v7 | v7 | v7 | v7 | v 7 |
| Fish Lake | 82013700 | Grant Township | | | | | | | | | | | | | | | | | | | | | | | v5 | v5 | v4 | | | | |
| Forest Lake | 82015900 | east basin | 4 | | | | 5 | | | | | | 13 | | | v7 | | | v12 | | | | | | 13 | | | 13 | 13 | | |
| Forest Lake | 82015900 | middle basin | | | | | 5 | | | | | | 13 | | | v7 | | | v12 | | | | | | 13 | | | 13 | 13 | | |
| Forest Lake | 82015900 | west basin | | | | | 5 | | | | | | 13 | | | v7 | | | v12 | v14 | v15 | v14 | v14 | v14 | v14 | v14 | v14 | v14 | 13 | v14 | v 14 |
| French Lake | 27012700 | | | | | | | | | | | | | | | | | | | | | | | v11 | v10 | v7 | v7 | | | | |
| Friedrich's Pond | 82010800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | v13 | v14 | v 11 |
| Gables Lake | 82008200 | | | | | | | | | | | | | | | | | | | | v8 | v5 | | | | | | | | | |
| Gaystock Lake | 10003100 | | | | | | | | | | | | | | | | | | | | | v2 | v14 | v14 | | | | v14 | v14 | | |
| George Lake | 2009100 | | 4 | 5 | 16 | | 5 | | | | | 13 | | | | | 13 | | | | 13 | | | | | | | | | | |
| George Watch Lake | 2000500 | | | | | | | | | | | | | | | | | | v14 | v12 | v11 | v11 | v6 | v7 | v8 | v9 | v10 | v12 | v7 | v8 | v 12 |
| German Lake | 82005600 | | | | | | | | | | | | | | | | | | | | | | | | v7 | v7 | v7 | v7 | v7 | v7 | v 7 |
| Gervais Lake | 62000700 | | | | | | | 5 | | | | | | | | | | | | | | | | | | | | | | | |
| Glen Lake | 27009300 | | | | | | | | | | | | | | | | | | | | | | | | | | | | v13 | v7 | v 4 |
| Goetschel Lake | 82031300 | | | | | | | | | | | | | | | | | | | | | | | | v11 | v9 | v4 | v15 | v9 | v5 | v 7 |
| Goggins Lake | 82007700 | | | | | | | | | | | | | | | | | | | | | v13 | v14 | v14 | v14 | v14 | v14 | v14 | v14 | v14 | v 14 |
| Golden Lake | 2004500 | | 2 | | | | | | | | | | | 12 | | 14 | | | v13 | v11 | v15 | v13 | v13 | v12 | v11 | v11 | v10 | v11 | v11 | v10 | v 9 |
| Goose Lake | 10008900 | Waconia | | | | | | | | | | | | | | | | v9 | v7 | v15 | v15 | v14 | v11 | v14 | v14 | v14 | v14 | v14 | v14 | v13 | v 14 |
| Goose Lake | 19036000 | Lakeville | | | | | | | | | | | | | | | | v13 | v13 | | | | | | | | | | | | |
| Goose Lake | 82005900 | New Scandia | | | | | | | | | | | | | | | v15 | v15 | v13 | v13 | v15 | | | | | | v7 | v7 | v7 | v7 | v 14 |
| Goose Lake | 82011301 | north basin [Lake Elmo] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | v 7 |
| Goose Lake | 82011302 | south basin [Lake Elmo] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | v 7 |
| Grace Lake | 10021800 | | | | | | | | | | | | | | | | | | | | | | | | v11 | v14 | v14 | | v14 | | v 14 |
| Grass Lake | 27068100 | | | | | | | | | | | | | | | | | | | v12 | | | | | | | | | | | |
| Hafften Lake | 27019900 | | | | | | | | | | | | | | | | | | | | | | 13 | 13 | | | 13 | v15 | v13 | | |
| Ham Lake | 2005300 | | | | | | 5 | | | | | | | | | v15 | v13 | | v13 | v9 | v14 | | | | | | | | | | |
| Harriet Lake | 27001600 | | | | | | 5 | | | | | | | | | | | | | | | | | | | | | | | | |
| Hart Lake | 2008100 | | | | | | | | | | | | | | | | | | | | | | | | | | v6 | v4 | v8 | | |
| Harvey Lake | 27067000 | | | | | | | | | | | | | | | | | | | | | | | | | | v10 | | | | |
| Haughey Lake | 27018700 | | | | | | | | | | | | | | | | | | | | | | | | v4 | | | | | | |
| Hay Lake | 82006500 | | | | | | | | | | | | | | | | | | | | v14 | v13 | v14 | v14 | v4 | v7 | v7 | v7 | v7 | v7 | v 14 |
| Hazeltine Lake | 10001400 | | | | | | | | | | | | | | | | | | | | | v1 | v14 | v14 | | | | v14 | v14 | | |

**APPENDIX A**

**Lakes Sampled by Metropolitan Council Staff and the CAMP, 1980 - 2008**

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| Lake | DNR ID | Location | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Henry Lake | 27017500 | | | | | | | | | | | | | | | | | v10 | | | | | | | | | | v11 | v11 | v6 | v 7 |
| Herber Pond | 82001501 | | | | | | | | | | | | | | | | | | | | | | | | | | v14 | v14 | v7 | v7 | |
| Highland Lake | 2007900 | | | | | | | | | | | | | | | | | | | | | v13 | v11 | v13 | v12 | v12 | v14 | v14 | v14 | v12 | |
| Holland Lake | 19006500 | | | | | 10 | 16 | 15 | | | 20 | | | | | 13 | | | | | | 13 | | | | | | | | | |
| Hornbeam Lake | 19004700 | | | | | | | | | | | | | | | | | | | | | | | | | | | | v11 | v8 | v 7 |
| Horseshoe Lake | 19003200 | Dakota Co. | | | | | | | | | | | | | | | | v11 | v10 | | | | | | | | | | | | v 1 |
| Horseshoe Lake | 19005100 | Sunfish Lake | | | | | | | | | | | | | | | | | | | | | | | | | | | v11 | v11 | v 8 |
| Horseshoe Lake | 82007400 | Washington Co. | | | | | | | | | | | | | | | | | | | | v1 | | | | | | | | | |
| Hydes Lake | 10008800 | | | | | | | 5 | | | | | | 12 | | 13 | | | 12 | | | v11 | v4 | v9 | v14 | v15 | v14 | v14 | v14 | v13 | v 13 |
| Independence Lake | 27017600 | | 4 | 5 | | 5 | | | | | | | 13 | | | v14 | v15 | | | | | | | | | | | | | | |
| Isabelle Lake | 19000400 | | | | | | | | | | | | | | | | v14 | | | | | | | | | | | | | | |
| Island Lake | 2002200 | Linwood | | | | 7 | | | | | | | | | | | | | | | | | | | | v12 | v14 | v14 | v14 | v13 | v 13 |
| Jane Lake | 82010400 | | | | | | 5 | | 17 | 18 | | | | 12 | | | v12 | | | | | | 13 | | | | v15 | v13 | v10 | v12 | v 16 |
| Jellums Lake | 82005202 | Site 1 | | | | | | | | | | | | | | | | | | | | | v14 | v14 | v12 | v14 | v14 | v14 | v7 | v7 | v 7 |
| Jellums Lake | 82005202 | Site 2 | | | | | | | | | | | | | | | | | | | | | | | v11 | v11 | | | | | |
| Johanna Lake | 62007800 | | | 5 | | | | 5 | | | | 13 | | | | | | | | | | | | | | | | | | | |
| Jonathan Lake | 10021700 | | | | | | | | | | | | | | | | | | | | | | | | v13 | | | | v14 | | v 14 |
| Josephine Lake | 62005700 | | | | | | | 5 | | | | 13 | | | | | | | | | | | | | | | | | | | |
| Jubert Lake | 27016500 | | | | | | | | | | | | | | | | | | | | | | v11 | | | | | | | | |
| July Lake | 82031800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | v7 | v7 | v 7 |
| Karth Lake | 62007200 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | v11 | v 13 |
| Keller Lake | 19002500 | Burnsville | | | | | | | | | | | | | | | | | 13 | 13 | v13 | v15 | v14 | v12 | v13 | v15 | v15 | v14 | \14 | v12 | v 8 |
| Keller Lake | 62001000 | Maplewood | | | | | | 5 | | | | | | | | | | | | | | | | | | | | | | | |
| Kingsley Lake | 19003000 | | | | | | | | | | | | | | | 5 | | v11 | v10 | v9 | | | v14 | v14 | v15 | v14 | v15 | v16 | v14 | v14 | v 13 |
| Kismet Lake | 82033400 | | | | | | | | | | | | | | | | | | | | v14 | v13 | v14 | v14 | v14 | v14 | v14 | v13 | v14 | v14 | v 14 |
| Klawitter Pond | 82036800 | | | | | | | | | | | | | | | | | | | | | | | | v13 | v13 | v14 | v13 | v12 | v12 | v 13 |
| Kohlman Lake | 62000600 | | | | | | | 5 | | | | | | | | | | | | | | | | | | | | | | | |
| Kramer Pond | 82011700 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | v 7 |
| La Lake | 82009700 | | | | | | | | | | | | | | | | v13 | v11 | v13 | v11 | v10 | v10 | v8 | v6 | v5 | v6 | v3 | v13 | v12 | v14 | v 11 |
| Lac Lavon Lake | 19044600 | | | | | | | | | | | | | | | | | | | v11 | v10 | v10 | v9 | v2 | v7 | v12 | v12 | v12 | v12 | v13 | v 12 |
| Laddie Lake | 2007200 | | 4 | | | | | | | | | | | | | v13 | v14 | v12 | | | | | v13 | v13 | v14 | v10 | | | | | |
| Lake Forest | 82018700 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | v 12 |
| Lake Minnetonka | 27013302 | lower | 4 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | |

**APPENDIX A**

**Lakes Sampled by Metropolitan Council Staff and the CAMP, 1980 - 2008**

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| Lake | DNR ID | Location | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lake Minnetonka | 27013305 | upper | 2 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Langdon Lake | 27018200 | | | | | | 5 | | | | | | | | | | | | | | | | | | | | | | | | |
| Langton Lake | 62004901 | site 1 | | | | | | | | | | | | | | | | | | | | | | | | | | v14 | v7 | v13 | v 13 |
| Langton Lake | 62004902 | site 2 | | | | | | | | | | | | | | | | | | | | | | | | | | v14 | v13 | v13 | v 13 |
| Langton Lake | 62020400 | north basin | | | | | | | | | | | | | | | | | | | | | | | | | | v14 | | | |
| Lee Lake | 19002900 | | | | | | | | | | | | | | | | v14 | v15 | v14 | v13 | | | v12 | v13 | v11 | v9 | v15 | v9 | v14 | v14 | v 13 |
| Legion Pond | 82046200 | | | | | | | | | | | | | | | | | | | | | | | | | | | v14 | v10 | | v 7 |
| Lemay Lake | 19008200 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | v11 | v 11 |
| Libbs Lake | 27008500 | | | | | | | | | | | | | | | | | | | | | | | | | | v10 | | | | |
| Lily Lake | 82002300 | | | | | | | | | | | | | | | | | v15 | v14 | v14 | v15 | v13 | v14 | v14 | v14 | v7 | v7 | v7 | v7 | v7 | v 14 |
| Linwood Lake | 2002600 | | 4 | 5 | | 7 | | | | | | 13 | | | | | 13 | | | 13 | | | | | | | | | | | v 13 |
| Lippert Lake | 10010400 | | | | | | | | | | | | | | | | | | | | | v1 | | | | | | | | | |
| Little Carnelian Lake | 82001400 | | | | | | | | | | | | | | | | | | | | | | v14 | v7 | v14 | v14 | v14 | v14 | v7 | v7 | v 7 |
| Little Comfort Lake | 13005400 | | | | | | | | | | | | | | | | | | | | | | | | | | | | v14 | v13 | v 12 |
| Little Johanna Lake | 62005800 | | | | | | | | | | | | | | | | | | | | | | | v12 | v16 | v15 | v8 | v6 | v3 | | v 14 |
| Little Long Lake | 27017901 | | 4 | | | | 5 | | | | | | 13 | | | | | | | | 13 | | | 13 | | 13 | | | v11 | v2 | |
| Lochness Lake | 2058500 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | v12 | v 11 |
| Long Lake | 10001600 | Carver Co. | | | | | | | | | | | | | | | | | | | | v2 | | v13 | | v5 | | | | | |
| Long Lake | 19002200 | Apple Valley | | | | | | | | | | | | | | | | | | v16 | | | | | v11 | v13 | v12 | v15 | v14 | v13 | v 14 |
| Long Lake | 27016000 | Orono | | | | 5 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Long Lake | 62006700 | north site [New Brighton] | | | | | | 5 | | | | | | | | | | | | | | | | | | | | | | | |
| Long Lake | 62006700 | south site [New Brighton] | | | | | | 5 | | | | | | | | | | | | | | | | | | | | | | | |
| Long Lake | 82002100 | Stillwater | | | | | | | | | | | | | | | | v14 | v7 | | v14 | v13 | v14 | v14 | v14 | v14 | v14 | v14 | v14 | v14 | v 14 |
| Long Lake | 82003000 | May Township | | | | | | | | | | | | | | v14 | v14 | v14 | v13 | v14 | | v14 | v14 | v14 | v14 | v14 | v7 | v7 | v7 | v7 | v 7 |
| Long Lake | 82006800 | Scandia | | | | | | | | | | | | | | | | | | | | | v5 | v14 | v7 | v7 | v7 | v7 | v7 | v7 | v 8 |
| Long Lake | 82011800 | Pine Springs | | | | | | | | | | | | | | v14 | | | | | | | | | | 13 | v15 | v14 | v14 | v14 | v 14 |
| Long Lake | 82013000 | Mahtomedi | | | | | | | | | | | | | | | | | | | | | | | | v11 | v9 | v12 | v10 | v10 | v 10 |
| Loon Lake | 82001502 | | | | | | | | | | | | | | | | | | | | | | v14 | v14 | v7 | v7 | v7 | v7 | v7 | v7 | v 14 |
| Lost Lake | 27010300 | | | | | | | | | | | | | | | v13 | | | | | | | | | | | | | | | |
| Lost Lake | 82013401 | north basin | | | | | | | | | | | | | | | | | | | | | | | | | | | v13 | v13 | v 11 |
| Lotus Lake | 10000600 | | | | | | | 5 | | | | | 13 | | | | | | | | | 13 | 13 | | | v5 | v10 | v8 | v11 | v9 | v 11 |
| Louise Lake | 82002500 | | | | | | | | | | | | | | | | | | | | | | v5 | v5 | v7 | v7 | v7 | v7 | v7 | v7 | v 14 |
| Lower Prior Lake | 70002600 | Site 1 | | | | | 5 | | | | | | 13 | | | | | | 13 | v15 | v14 | v13 | v9 | v14 | v16 | v13 | v12 | v12 | v12 | v12 | v 12 |

**APPENDIX A**

**Lakes Sampled by Metropolitan Council Staff and the CAMP, 1980 - 2008**

(Numbers indicate sampling events per year. Sampling by volunteers is indicated by a "v".)

| Lake | DNR ID | Location | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lower Prior Lake | 70002600 | Site 2 | | | | | | | | | | | | | | | | | | | v14 | v13 | v9 | v14 | v15 | | | | | | |
| Lucy Lake | 10000700 | | | | | | | 5 | | | | | | | | | | | | | | | | | | | | | | | |
| Lynch Lake | 82004200 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | v7 | v 14 |
| MacDonald Lake | 82006200 | | | | | | | | | | | | | | | | | | | | | | | | | | v14 | v14 | v7 | v7 | |
| Magda Lake | 27006500 | | | | | | | | | | | | | | | | | | | | | v14 | v13 | | | v11 | | | v12 | | |
| Maple Marsh Lake | 82003800 | | | | | | | | | | | | | | | | | | | | | | v5 | v5 | v7 | v7 | v7 | v7 | v7 | v7 | |
| Marcott Lakes | 19004100 | south | | | | | | | | | | | | | | | | v15 | v13 | v10 | v10 | v12 | v10 | v6 | v5 | | | | | | |
| Marcott Lakes | 19026300 | north | | | | | | | | | | | | | | | | v15 | | | | | | | | | | | | | |
| Maria Lake | 10005800 | | | | | | | | | | | | | | | | | | | | | v2 | v14 | v14 | | | | v13 | | | |
| Marion Lake | 19002601 | | 2 | 5 | | 5 | | | | | | 13 | | | | | v15 | | | | | v15 | v14 | v13 | v14 | v14 | v15 | v16 | v15 | v14 | v 13 |
| Markgraf Lake | 82008900 | | | | | | | | | | | | | | | | v15 | v11 | v12 | v10 | v15 | v10 | v10 | v9 | v13 | v14 | v14 | v14 | v15 | v14 | v 14 |
| Markley Lake | 70002100 | | | | | | | | | | | | | | | | | | | v11 | v13 | v12 | v14 | v13 | v9 | v6 | v4 | | v10 | v7 | |
| Marsh Lake | 10005400 | | | | | | | | | | | | | | | | | | | | | v1 | | | | | | | | | |
| Marshan Lake | 2000700 | | | | | | | | | | | | | | | | | | v10 | v13 | v10 | v9 | v8 | v7 | | | | | | | |
| Martin Lake | 2003400 | | | | | 7 | | | | | | | | | | | | | | | 13 | | | | | | | | | | v 13 |
| Masterman Lake | 82012600 | | | | | | | | | | | | | | | | | | | | | | | | | | | | v14 | v14 | v 14 |
| Mays Lake | 82003300 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | v 14 |
| McCarrons Lake | 62005400 | | | | | | 12 | 20 | 17 | 18 | 19 | 13 | 13 | 12 | | 14 | 13 | 16 | 13 | | | 18 | 13 | 13 | 13 | | 13 | 13 | | | |
| McDonald Lake | 82001000 | | | | | | | | | | | | | | | | | | | | | v11 | | v14 | v9 | v12 | v12 | v14 | v10 | v9 | v 15 |
| McDonough Lake | 19007600 | | | | | | | 5 | | | | | | | | | | | | | | 13 | | | | | | | | | |
| McKnight Lake | 10021600 | | | | | | | | | | | | | | | | | | | | | | | | | | | | v14 | | v 14 |
| McKusick Lake | 82002000 | | | | | | | | | | | | | | | | v14 | v14 | v14 | v14 | v14 | v13 | v14 | v14 | v14 | v14 | v14 | v14 | v14 | v14 | v 15 |
| McMahon Lake | 70005000 | | 2 | | | | 5 | | | | | | | | | | | 13 | | | 13 | | | 13 | | | | 13 | v14 | v10 | v 11 |
| Meadow Lake | 27005700 | | | | | | | | | | | | | | | | | | v12 | | | v12 | | | v9 | | | v10 | | | v 14 |
| Medicine Lake | 27010400 | | 4 | 5 | | 10 | | | | | | | 13 | 12 | | | | | | | | | | | | | | | | | |
| Mergens Pond | 82048200 | | | | | | | | | | | | | | | | | | | | | | v10 | | | v3 | v2 | v6 | | | v 6 |
| Meuwissen Lake | 10007000 | | | | | | | | | | | | | | | | | | | | | v1 | | | | | | | | | v 11 |
| Miller Lake | 10002900 | | | | | | | | | | | | | | | | | | v6 | v13 | | v12 | v14 | v13 | v13 | v14 | v14 | v14 | v12 | v13 | v 14 |
| Minnetoga Lake | 27008800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | v14 | v 12 |
| Minnewashta Lake | 10000900 | | | | | | 5 | | | | | | 13 | | | 13 | | | | 13 | 13 | 13 | | | 13 | 13 | | | | | |
| Mitchell Lake | 27007000 | | | | | | | | | | | | | | | | | 13 | | | | 13 | 13 | | | 13 | v14 | v14 | v14 | v13 | v 13 |
| Moody Lake | 13002300 | | | | | | | | | | | | | | | | | | | | | | | | | | | v14 | v14 | v14 | |
| Mooney Lake | 27013400 | | | | | | | | | | | | | | | v14 | v10 | | | | | | | | | | | | | | |

**APPENDIX A**

**Lakes Sampled by Metropolitan Council Staff and the CAMP, 1980 - 2008**

(Numbers indicate sampling events per year. Sampling by volunteers is indicated by a "v".)

| Lake | DNR ID | Location | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Moore Lake | 2007502 | | | | | | | | | | | | | | | | | | | | | v14 | | | | | | | | | |
| Mud Lake | 82002602 | | | | | | | | | | | | | | | | | | | | | | v5 | v5 | v7 | v7 | v7 | v7 | v7 | v7 | |
| Myers Lake | 10006800 | | | | | | | | | | | | | | | | | | | | | v1 | | | | | | | | | |
| Nokomis Lake | 27001900 | | 4 | | | | 5 | | | | | | | | | | | | | | | | | | | | | | | | |
| Normandale Lake | 27104500 | | | | | | | | | | | | | | | | | | | | | | | | | | | | v5 | v3 | |
| North Twin Lake | 82001800 | | | | | | | | | | | | | | | | | | | | | | v5 | v5 | v7 | v7 | v7 | v7 | v7 | v7 | v 7 |
| Northwood Lake | 27062700 | | | | | | | | | | | | | | | | | | | | | | v12 | v10 | v13 | v12 | v12 | v10 | v10 | v10 | v 9 |
| Oak Lake | 10009300 | site 1 | | | | | | | | | | | | | | | | | | | | v2 | | v14 | v13 | v12 | v14 | v14 | v14 | | v 15 |
| Oak Lake | 10009300 | site 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | v10 | | |
| Oak Lake | 10009300 | site 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | v10 | | |
| O'Connor Lake | 82000200 | | | | | | | | | | | | | | | | | | | | | | | | | | | v8 | v15 | v12 | v 15 |
| O'dowd Lake | 70009500 | | | | | | 5 | | | | | | | | | | 13 | | | 13 | | | 13 | | 13 | | | 13 | v12 | v13 | v 14 |
| Olson Lake | 82010300 | | | | | | | | | | | | | 12 | | v15 | | 14 | | | | | 13 | | | 13 | v14 | v7 | v7 | v11 | v 19 |
| Oneka Lake | 82014000 | | | | | | | | | | | | | | | | | | | | | v13 | v11 | v11 | v9 | v6 | v5 | | | | |
| Orchard Lake | 19003100 | | 4 | 5 | | 5 | | | | | | 13 | | | | 13 | | | | | 13 | v15 | v13 | v13 | | v14 | v14 | v14 | v14 | v14 | v 12 |
| Otter Lake | 2000300 | | 2 | | | 5 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Owasso Lake | 62005600 | | 4 | | | 5 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ox Yoke Lake | 27017800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | v 1 |
| Pamela Lake | 27067500 | | | | | | | | | | | | | | | | | | | | | | | | | | | v10 | | | |
| Parkers Lake | 27010700 | | 4 | | | | | | | | | | 13 | | | | | 13 | | | | 13 | v12 | | v14 | v15 | v15 | v15 | v14 | v14 | v 13 |
| Parley Lake | 10004200 | | | | | | 5 | | 17 | 18 | | | | 12 | | | | | 12 | | | 13 | | 13 | | 13 | | | 13 | | |
| Pat Lake | 82012500 | | | | | | | | | | | | | | | | | | | | | | | | | | | | v7 | v7 | v 8 |
| Patterson Lake | 10008600 | | | | | | | | | | | | | | | | | | | | | v2 | | | | | | | | | |
| Peltier Lake | 2000400 | | | | | 5 | | | | | | | | | | v14 | v16 | v15 | v14 | v14 | v13 | v13 | v14 | v13 | v17 | v15 | v15 | v16 | v17 | v16 | |
| Pepin Lake | 40002800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | v13 | |
| Phalen Lake | 62001300 | | 4 | 5 | | | | 5 | | | | | | | | | | | | | | | | | | | | | | | |
| Pickerel Lake | 2013000 | | 2 | | | | | | | | | | | | | | | 13 | | | | | | | | | | | | | |
| Pierson Lake | 10005300 | | 2 | 5 | | 5 | | | | | | 13 | | | | | | 13 | | | | | | 13 | 13 | 13 | | | 13 | | |
| Pike Lake | 27011102 | Maple Grove | | | | | | | | | | | | | | | | | v14 | v15 | v13 | | v13 | | | | | | | v4 | |
| Pike Lake | 62006900 | Ramsey Co. | | | | | | | | | | | | | | | | | | | | v14 | v10 | v14 | v14 | v14 | v15 | v15 | v11 | v14 | v 13 |
| Pike Lake | 70007600 | site 1 [Scott Co.] | | | | | | | | | | | | | | | | | | v9 | | v10 | v9 | v9 | v11 | v15 | v15 | v13 | | | |
| Pike Lake | 70007600 | site 2 [Scott Co.] | | | | | | | | | | | | | | | | | | | | | | | v11 | | | | | | |
| Pine Tree Lake | 82012200 | | | | | | | 5 | | | | | | | | v14 | v14 | v16 | v14 | v15 | v15 | v13 | v14 | v9 | v12 | v7 | v8 | v12 | v10 | v9 | v 7 |

**APPENDIX A**

**Lakes Sampled by Metropolitan Council Staff and the CAMP, 1980 - 2008**

(Numbers indicate sampling events per year. Sampling by volunteers is indicated by a "v".)

| Lake | DNR ID | Location | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Plaisted Lake | 82014800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | v 7 |
| Pleasant Lake | 62004600 | North Oaks | | | | | | 5 | | | | | | | | | | | | | | | | | | | | | | | |
| Pleasant Lake | 70009800 | New Prague | | | | | | | | | | | | | | 13 | | | | | | | | | | | | | | | |
| Pomerleau Lake | 27010000 | | | | | | | | | | | | | | | | | | v9 | | | v10 | | v6 | | v3 | | | | | |
| Powers Lake | 82009200 | | | | | | | | | | | | | | | | v12 | v13 | v13 | v12 | v9 | v10 | v8 | v5 | v7 | v14 | v14 | v14 | v14 | v14 | v 14 |
| Priebe Lake | 62003600 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | v 13 |
| Raven Lake | 19036900 | | | | | | | | | | | | | | | | | v13 | v6 | v8 | | | | | | | | | | | |
| Rebecca Lake | 27019200 | | | | | 10 | 12 | 12 | | | | | | | | | | | | | | | | | | | | | | | |
| Red Rock Lake | 27007600 | | | | | | | | | | | | | | | | | | | | | 12 | 13 | | | 13 | 13 | | 13 | | |
| Regional Park Lake | 82008700 | | | | | | | | | | | | | | | | | | | | v12 | v14 | v12 | v13 | v14 | v15 | v15 | v14 | v7 | v7 | v 7 |
| Reitz Lake | 10005200 | | | | | | | 5 | | | | | | 12 | | 13 | | | | | | v15 | v13 | v7 | v13 | v14 | v14 | 15 | v14 | v14 | v 11 |
| Reshanau Lake | 2000900 | | 2 | | | | | | | | | | | | | | | | | | | v7 | v1 | v6 | | | | | v13 | v9 | v 7 |
| Rest Area Pond | 82051400 | | | | | | | | | | | | | | | | | | | | | | | | | | | | v13 | v10 | v 13 |
| Rice Lake | 10007800 | Carver Co. | 2 | | | | | | | | | | | | | | | | | | | v1 | | | | | | | | | |
| Rice Lake | 27011600 | Maple Grove | | | | | | | | | | | | | | | | | | | | | | | | | | | | v10 | v 10 |
| Riley Lake | 10000200 | | 2 | 5 | 16 | | | 5 | 17 | 18 | | | 13 | 12 | | 13 | | | | 13 | | | 13 | | 13 | v14 | v15 | v14 | v10 | v15 | v 12 |
| Rogers Lake | 19008000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | v12 | v 9 |
| Rose Lake | 27009200 | Minnetonka | | | | | | | | | | | | | | | | | | | | | | | | | | | v14 | v13 | v 13 |
| Rose Lake | 82011200 | north basin [Lake Elmo] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | v 7 |
| Rose Lake | 82011200 | south basin [Lake Elmo] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | v 7 |
| Rutz Lake | 10008000 | | | | | | | | | | | | | | | | | | | | | v1 | v14 | v14 | v14 | | | | v14 | v7 | v 5 |
| Ryan Lake | 27005800 | | | | | | | | | | | | | | | | | | v14 | | v5 | | v9 | | v4 | v6 | | | | | v 13 |
| Sanborn Lake | 40002700 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | v2 | |
| Sand Lake | 82006700 | | | | | | | | | | | | | | | v7 | v14 | v14 | v13 | | | | | | v14 | v7 | v7 | v7 | v7 | v7 | v 14 |
| Sarah Lake | 27019100 | | 4 | | | 5 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Scheuble Lake | 10008500 | | | | | | | | | | | | | | | | | | | | | v1 | | | | | | | | | |
| Schmidt Lake | 27010200 | | | | | | | | | | | | | | | | | v14 | | | v12 | | v12 | v9 | | | v14 | v9 | | v9 | |
| School Lake | 13005700 | | | | | | | | | | | | | | | | | | | | | | | | | | | v14 | v7 | v7 | |
| Schroeder Pond | 82030100 | | | | | | | | | | | | | | | | | | | | | | | | | | v14 | v14 | v7 | v7 | |
| Schultz Lake | 19007500 | | | | | | 5 | 5 | | | | | | | | | | | | | | 13 | | | | | | | | | |
| Schutz Lake | 10001800 | | | | | | 5 | | | | | | | | | | | | | | | | v6 | v10 | v6 | v8 | v9 | v11 | | | |
| Scout Lake | 19019800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | v14 | v 14 |
| Sea Lake | 82005300 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | v 12 |

**APPENDIX A**

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| Lake | DNR ID | Location | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Seidl Lake | 19009500 | | | | | | | | | | | | | | | | | v15 | v14 | v14 | v15 | v16 | v14 | v14 | v15 | v8 | v14 | v14 | v14 | v8 | v 4 |
| Shavers Lake | 27008600 | east basin | | | | | | | | | | | | | | | | | | | | | | | | | | v14 | v13 | | |
| Shavers Lake | 27008600 | west basin | | | | | | | | | | | | | | | | | | | | | | | | | | | v6 | | |
| Shields Lake | 82016200 | | | | | | | | | | | | | | | v6 | v14 | v14 | v13 | v13 | v14 | v14 | v14 | v14 | v14 | v14 | v14 | v14 | v14 | v7 | |
| Silver Lake | 62000100 | North St. Paul | | | | | | | | | | | | | | | | | | | | | | | | | | | v12 | | |
| Silver Lake | 82001600 | Washington Co. | | | | | | | | | | | | | | | | | | | | | v14 | v5 | v7 | v7 | v7 | v7 | v7 | v7 | v 7 |
| Simley Lake | 19003700 | | | | | | | | | | | | | | | | | v10 | v16 | v14 | v15 | v16 | v14 | v12 | v14 | | | | | | |
| Snail Lake | 62007300 | | 4 | | | | | 5 | | | | | | | | | | | | | | | | | | | | | | | |
| South Oak Lake | 27066100 | | | | | | | | | | | | | | | | | | | | | | | | v12 | v15 | | | v9 | v8 | v 5 |
| South Rice Lake | 27064500 | | | | | | | | | | | | | | | | | | | | | | v9 | v14 | v15 | v14 | v14 | v15 | v14 | v12 | v 6 |
| South School Section Lake | 82015100 | | | | | | | | | | | | | | | | | v14 | v7 | | v14 | | | | | | | v14 | v14 | v14 | v 14 |
| South Twin Lake | 82001900 | | | | | | | | | | | | | | | | | | | | | | v5 | v5 | v7 | v7 | v7 | v7 | v7 | v7 | v 7 |
| Spring Lake | 2007100 | Anoka Co. | | | | | | | | | | | | | | | | | | | | | | v11 | | | | | | | |
| Spring Lake | 70005400 | Prior Lake | 4 | 5 | 16 | | 5 | | | | | | 13 | | | | | | 13 | v12 | | | v6 | v11 | v13 | v14 | v14 | v13 | v9 | v8 | v 5 |
| Square Lake | 82004600 | | 4 | 5 | 16 | 6 | 7 | 7 | | | | 13 | | | | v11 | v14 | v14 | v13 | v14 | 19 | v14 | v14 | v15 | v14 | v14 | v14 | v14 | v14 | v14 | v 7 |
| St. Croix Lake | 82000100 | S-1 upper basin | | | | | | | | | | | | | | | | | | | | | | | | | | | v2 | | |
| St. Croix Lake | 82000100 | S-2 upper basin | | | | | | | | | | | | | | | | | | | | | | | | | | v10 | v10 | v9 | v 9 |
| St. Croix Lake | 82000100 | S-3 mid basin | | | | | | | | | | | | | | | | | | | | | | | | | | v11 | v9 | v9 | v 10 |
| St. Croix Lake | 82000100 | S-5 mid basin | | | | | | | | | | | | | | | | | | | | | | | | | | v8 | v10 | v7 | v 8 |
| St. Croix Lake | 82000100 | S-6 lower basin | | | | | | | | | | | | | | | | | | | | | | | | | | v11 | v10 | v10 | v 9 |
| St. Croix Lake | 82000100 | S-7 lower basin | | | | | | | | | | | | | | | | | | | | | | | | | | v8 | v8 | v10 | v 5 |
| St. Joe Lake | 10001100 | | | | | | | | | | | | | | | | | | | | | | | | | | v17 | v8 | v9 | v9 | v 9 |
| Staples Lake | 82002800 | | | | | | | | | | | | | | | | | | | | | | v14 | v5 | v7 | v7 | v7 | v7 | v7 | v7 | v 7 |
| Staring Lake | 27007800 | | 4 | | | | | 5 | | | | | | | | | | 13 | | | | 13 | | 13 | | | 13 | | 13 | | |
| Stieger Lake | 10004500 | | | | | | 12 | | | | | 13 | | | | | | 13 | | | | | | | | | | | | | |
| Success Lake | 27063400 | | | | | | | | | | | | | | | | | | v10 | | | | | | | v11 | | | v11 | | v 10 |
| Sucker Lake | 62002800 | | | | | | | 5 | | | | | | | | | | | | | | | | | | | | | | | |
| Sullivan Lake | 2008000 | | | | | | | | | | | | | | | v14 | v14 | v15 | | v15 | v14 | v13 | v11 | v11 | v12 | v12 | | | | | |
| Sunfish Lake | 19005000 | Sunfish Lake | | | | | | | | | | | | | | | | | | | | | | | | | | | v13 | v13 | v 13 |
| Sunfish Lake | 82010700 | Lake Elmo | | | | | | | | | | | | | | | | | | | | | v10 | | | | | v13 | v11 | | v 7 |
| Sunnybrook Lake | 82013300 | | | | | | | | | | | | | | | | | | | | | v14 | | v13 | v10 | v12 | v10 | v16 | v14 | v14 | v 14 |
| Sunset Lake | 82015300 | | | | | | 5 | | | | | | | | | v14 | v14 | v12 | v13 | v16 | v12 | v10 | v13 | v13 | v18 | v20 | v15 | v17 | v12 | v10 | v 9 |
| Sunset Pond | 19045100 | | | | | | | | | | | | | | | | v14 | v14 | v14 | v12 | v10 | | v13 | v11 | v10 | v12 | v11 | | v14 | v14 | v 14 |

**APPENDIX A**

**Lakes Sampled by Metropolitan Council Staff and the CAMP, 1980 - 2008**

(Numbers indicate sampling events per year. Sampling by volunteers is indicated by a "v".)

| Lake | DNR ID | Location | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Susan Lake | 10001300 | | | | | | | | | | | | | | | | | | | | | | | | | | | | v7 | v11 | v 12 |
| Swan Lake | 10008200 | | | | | | | | | | | | | | | | | | | | | v1 | | | | | | | | | |
| Swede Lake | 10009500 | | 2 | | | | | | | | | | | | | | | | 13 | | | | | 13 | v14 | v16 | v13 | v14 | v14 | v13 | v 14 |
| Sweeney Lake | 27003501 | | | | | | | | | | | | | | | | | | | | | | v11 | v9 | | | | | | | |
| Sweeney Lake | 27003501 | | | | | | | | | | | | | | | | | | | | | | v11 | v9 | v14 | v13 | v14 | v11 | v10 | v15 | v 12 |
| Sylvan Lake | 27017100 | Hennepin Co. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | v 10 |
| Sylvan Lake | 82008000 | Washington Co. | | | | | | | | | | | | | | v7 | | | v14 | | v15 | v14 | v14 | v14 | v14 | v14 | v14 | v14 | | v11 | v 9 |
| Tamarack Lake | 10001000 | | | | | | | | | | | | | | | | | | | | | | | v10 | v11 | v12 | v11 | v11 | v13 | v14 | v 11 |
| Tanners Lake | 82011500 | | 2 | | | | | | | | 20 | | | | | v14 | v13 | v12 | v14 | | | | | | | | | | | | |
| Terrapin Lake | 82003100 | | | | | | | | | | | | | | | | | | | | | | | | | | v7 | v7 | v7 | v7 | v 7 |
| Thole Lake | 70012001 | | | | | | 5 | | | | | | | | | | 13 | | | 13 | | | 13 | | 13 | | | 13 | v14 | | |
| Thomas Lake | 19006700 | | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tiger Lake | 10010800 | | | | | | | | | | | | | | | | | | | | | v1 | | | | | | | | | |
| Turtle Lake | 62006100 | Ramsey Co. | 4 | 5 | | 5 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Turtle Lake | 82003600 | Washington Co. | | | | | | | | | | | | | | | | | | | | | v5 | v5 | v7 | v7 | v7 | v7 | v7 | v7 | v 7 |
| Twin Lake | 19002800 | Burnsville | | | | | | | | | | | | | | | | | | | | v6 | | v13 | v11 | v6 | v2 | v11 | v8 | v8 | v 14 |
| Twin Lake | 27004201 | upper [Br. Center] | | | | | | | | | | | | 12 | | v14 | | | 11 | | v15 | | v11 | | v13 | | v14 | | v13 | | v 12 |
| Twin Lake | 27004202 | middle [Crystal] | | | | | | 5 | | | | | | 12 | | | | | 13 | v11 | | v13 | 13 | | | v13 | | v8 | | | v 13 |
| Twin Lake | 27004203 | lower [Robbinsdale] | | | | | | | | | | | | 12 | | v14 | | | 13 | | v5 | | 13 | | | v13 | | v8 | | | |
| Twin Lake | 27065600 | St. Louis Park | | | | | | | | | | | | | | | | | | | | | | | v12 | v14 | v14 | v11 | v14 | v10 | v 10 |
| Twin Lake | 82004800 | south [May Twnshp] | | | | | | | | | | | | | | | | | | v13 | v13 | | | | | | | | | | v 14 |
| Upper Prior Lake | 70007200 | Site 1 | 4 | 5 | | | 5 | | | | | | 13 | | | | | | 13 | v15 | v14 | v13 | v9 | v14 | v12 | v13 | v10 | v9 | v9 | v5 | v 11 |
| Upper Prior Lake | 70007200 | Site 2 | | | | | | | | | | | | | | | | | | | | | | | v12 | | | | | | |
| Vadnais Lake | 62003801 | | | | | | | 5 | | | | | | | | | | | | | | | | | | | | | | | |
| Valentine Lake | 62007100 | | | | | | | | | | | | | | | | | | | | | | | v14 | v13 | v12 | v12 | v9 | v10 | v12 | v 13 |
| Valley Lake | 19034800 | | | | | | | | | | | | | | | | | v15 | v14 | v11 | | v8 | v14 | v14 | v14 | v14 | v14 | v13 | v14 | v14 | v 13 |
| Virginia Lake | 10001500 | | | | | | | | | | | | | | | | | | | | | | v11 | v12 | v14 | v12 | v15 | v13 | | | |
| Wabasso Lake | 62008200 | | 4 | 5 | | 5 | | | | | | 12 | | | | | | | | | | | | | | | | | | | |
| Waconia Lake | 10005900 | | 4 | 5 | | | | 5 | | | | | 13 | | | | v16 | v13 | v15 | v17 | v15 | v14 | v14 | v14 | v15 | v14 | 12 | v14 | v14 | v13 | v 13 |
| Wasserman Lake | 10004800 | | | | | 5 | | | 17 | 18 | | | | | | | 13 | | | 13 | 13 | 13 | | | 13 | 13 | | | 13 | | |
| Weaver Lake | 27011700 | | | | | 5 | | | 17 | 18 | | | | | | | | | | | | | | | | | | | | | |
| Weber Lake | 82011900 | | | | | | | | | | | | | | | | | | | | | | | | | | | | v12 | | v 7 |
| West Boot Lake | 82004400 | | | | | | | | | | | | | | | | | | | | | | v14 | v14 | v14 | v14 | v14 | v14 | v7 | v7 | v 7 |

**APPENDIX A**

**Lakes Sampled by Metropolitan Council Staff and the CAMP, 1980 - 2008**

(Numbers indicate sampling events per year. Sampling by volunteers is indicated by a "v".)

| Lake | DNR ID | Location | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| West Lakeland Storage Site | 82048800 | north basin | | | | | | | | | | | | | | | | | | | | | v2 | | | | | | | | v 7 |
| West Lakeland Storage Site | 0 | south basin | | | | | | | | | | | | | | | | | | | | | | | | | | | | | v 3 |
| Westwood Lake | 27071100 | | | | | | | | | | | | | | | v13 | | | | | | | v15 | v14 | v10 | v9 | v7 | v7 | v8 | v8 | v 7 |
| Whaletail Lake | 27018401 | | | | | | | | | | | | | | | | | | | | | | | | | | 13 | 13 | | | |
| Whaletail Lake | 27018402 | | 4 | | | | 5 | | | | | | | | | | | | | | 13 | | | 13 | | | 13 | 13 | | | |
| White Bear Lake | 82016700 | | 4 | 5 | | | 5 | | | | | | | | | | | | | | | | | | | | | | | | |
| White Rock Lake | 82007200 | | | | | | | | | | | | | | | | | | | | | | | | | | | | v11 | v14 | v 13 |
| Wilmes Lake | 82009000 | | | | | | | | | | | | | | | | v14 | v15 | v14 | v15 | v15 | v14 | v13 | v13 | v10 | v12 | v12 | v10 | v12 | v11 | v 11 |
| Windsor Lake | 27008200 | | | | | | | | | | | | | | | | | | | | | | | | | | v12 | v14 | | | |
| Wing Lake | 27009100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | v14 | v14 | v 12 |
| Winkler Lake | 10006600 | | | | | | | | | | | | | | | | | | | | | v8 | v6 | v6 | | v13 | | v14 | | v13 | v 13 |
| Wolsfeld Lake | 27015700 | | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Wood Lake | 19002400 | | | | | | | | | | | | | | | | | | v10 | v14 | v15 | v15 | v14 | v13 | v14 | v14 | v14 | v14 | v13 | v13 | v 12 |
| Woodpile Lake | 82013200 | | | | | | | | | | | | | | | | | | | | | | | | | | | | v7 | v7 | v 15 |
| Young America Lake | 10010500 | | | | | | | | | | | | | | | | | | | | | v1 | | | | | | | | | |
| Zumbra Lake | 10004100 | | | | | | 5 | | | | | | 13 | | | | | | | | | | | | 13 | | | | | | |

## APPENDIX B
## Lake Characteristics

| Lake Name & DNR ID# | Surface Area (ac) | Watershed Area (ac) | Watershed to Surface Area Ratio | Max Depth (m) | Mean Depth (m) | Volume (ac-ft) | % Littoral | # Inlets | Thermo-cline? | Public Access | Shore Length (miles) | DNR Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acorn 82-102 | 44 | 296 | 6.7 | 3 | 0.7 | 101 | 100 | 0 | N | | | |
| Alimagnet 19-21 | 109 | 1,094 | 10.0 | 3 | 1.5 | 545 | 100 | 12 | N | C | 3.2 | |
| Ardmore 27-0153 | 10.1 | | | 6.1 | 2.4 | 78 | | | | | | |
| Armstrong 82-116-02 | 39 | | | 1.5 | 1 | 128 | 100 | | N | N | | |
| Barker 82-76 | 45 | 823 | 18.3 | 9 | 4.4 | 648 | | | Y | N | | |
| Bass (Hennepin) 27-98 | 194 | 3,100 | 16.0 | 9.4 | 3.1 | 1,979 | 82 | | Y | N | 2.3 | |
| Bass (St. Louis Park) 27-15 | 95 | | | | | | | | | | | |
| Bass (Washington) 82-35 | 81 | | | 4.3 | | | 100 | | N | N | | |
| Bass, east (Wash) 82-123 | | | | | | | 100 | | N | N | | |
| Bass, west (Wash) 82-124 | | | | | | | 100 | | N | N | | |
| Bavaria 10-19 | 200 | 711 | 3.6 | 18.3 | 5.6 | 3,674 | 40 | | Y | Y | | Centrarchid |
| Bay Pond 82-11 | 10.2 | 849 | 83.2 | 1.1 | | | | | | | | |
| Benton 10-69 | 115 | 322 | 2.8 | 2 | | | 100 | | N | N | | |
| Benz 82-120 | 36 | | | | | | 100 | | N | N | | |
| Big Carnelian 82-49 | 455 | 1,900 | 4.2 | 20 | 9.8 | 14,560 | 28 | | Y | Y | | |
| Big Comfort 13-53 | 219 | | | 14.3 | | | 41 | | Y | Y | | |
| Big Marine 82-52 | 1,706 | 2,659 | 1.6 | 15.2 | 7.6 | 42,527 | 67 | | Y | Y | | |
| Birch 13-42 | 65 | | | | | | | | | | | |
| Bone 82-54 | 212 | 5,177 | 24.4 | 9.8 | 3.7 | 2,820 | 59 | 3 | Y | Y | | |
| Brickyard 10-225 | 17 | | | 13.1 | | | 35 | | Y | N | | |
| Burandt 10-84 | 93 | | | 7.3 | | | 72 | | Y | N | | |

## APPENDIX B
## Lake Characteristics

| Lake Name & DNR ID# | Surface Area (ac) | Watershed Area (ac) | Watershed to Surface Area Ratio | Max Depth (m) | Mean Depth (m) | Volume (ac-ft) | % Littoral | # Inlets | Thermo-cline? | Public Access | Shore Length (miles) | DNR Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bush 27-47 | 172 | | | 8.5 | | | 64 | | Y | Y | | |
| Campbell 10-127 | 72 | | | 2 | | | 100 | | N | N | | |
| Carol 82-17 | 63 | 375 | 6.0 | 1.8 | 0.9 | 186 | 100 | | N | N | | |
| Cates 70-18 | 27 | | | 4 | | | 100 | | N | N | | |
| Cedar (Scott) 70-91 | 742 | 11,104 | 15.0 | 4.7 | 2.1 | 5,194 | 100 | | N | Y | | |
| Cedar Island 27-119 | 80 | 800 | 10.0 | 2.1 | 1.4 | 368 | 100 | | N | N | | |
| Cenaiko 2-654 | 29 | | | 9.1 | | | 40 | | Y | N | 0.6 | Stocked w/Trout - Fishing Pier |
| Clear 82-163 | 400 | | | 8.5 | 3.7 | 4,800 | 67 | | Y | Y | 3.9 | Walleye |
| Clear (Lk. Elmo) 82-99 | | | | | | | | | | | | |
| Cloverdale 82-9 | 45 | 819 | 18.2 | 8.5 | 3 | 450 | 86 | | Y | N | | |
| Cobblecrest 27-53 | 10 | | | | | | | | | N | | |
| Cobblestone 19-456 | | | | | | | | | | | | |
| Cody 66-61 | 256 | | | 3.7 | 2.4 | 78 | | | | | | |
| Colby 82-94 | 71 | 8,088 | 113.9 | 3.4 | | | 100 | | N | N | | |
| Cornelia 27-28 | | | | | | | | | | N | | |
| Courthouse 10-5 | 10 | | | 17.4 | | | 30 | | Y | N | 0.6 | Stocked w/Trout |
| Cowley 27-169 | | | | | | | | | | | | |
| Crystal (Burnsville) 19-27 | 292 | 2,001 | 6.9 | 11.3 | 3.1 | 2,920 | 72 | | Y | Y | | Panfish - Fishing Pier |
| Crystal (Robbinsdale) 27-34 | 76 | 1,272 | 16.7 | 10.4 | 3.7 | 917 | 68 | | Y | Y | 1.4 | Centrarchid - Fishing Pier |
| Dean 70-74 | 128 | | | | | | 100 | | N | N | | |
| DeMontreville 82-101 | 160 | 1,108 | 6.9 | 7.3 | 2.4 | 1,280 | 90 | | Y | Y | | |

## APPENDIX B
## Lake Characteristics

| Lake Name & DNR ID# | Surface Area (ac) | Watershed Area (ac) | Watershed to Surface Area Ratio | Max Depth (m) | Mean Depth (m) | Volume (ac-ft) | % Littoral | # Inlets | Thermo-cline? | Public Access | Shore Length (miles) | DNR Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Downs 82-110 | 35 | 2,400 | 68.6 | 2.1 | 1.5 | 175 | 100 | | N | N | | |
| Eagle (Carver) 10-121 | 233 | 1,050 | 4.5 | 4 | 1.2 | 920 | 100 | | N | Y | | Natural Environment |
| Eagle (Maple Grove) 27-111 | 291 | 3,220 | 11.1 | 10.4 | 3.8 | 3,667 | 68 | | Y | Y | 3.2 | Centrarchid |
| Eagle Point 82-109 | 120 | 11,502 | 95.9 | 1.8 | 1 | 360 | 100 | | N | N | | |
| Earley 19-33 | 29 | 1,629 | 56.2 | | | | | | | N | | |
| East 19-349 | 40 | | | | | | | | | | | |
| East Boot 82-34 | 47 | 93 | 2.0 | 8.2 | 0.9 | 282 | 84 | | Y | Y | | |
| Echo 82-135 | 41 | 194 | 4.7 | 1.8 | 0.8 | 107 | 100 | | N | N | | |
| Edina 27-29 | | | | 1 | | | 100 | | N | N | | |
| Edith 82-4 | 81 | 1,576 | 19.5 | 13 | | | | | Y | | | |
| Elmo 82-106 | 284 | 1,191 | 4.2 | 41.7 | | | 22 | | Y | | | |
| Farquar 19-23 | 63 | 353 | 5.6 | 3 | 1.4 | 290 | 100 | | N | N | | |
| Fireman's 10-226 | 8 | | | 7 | | | 88 | | Y | | | |
| Fish (Grant) 82-137 | 21 | | | 10.4 | | | 67 | | Y | | | |
| Fish (Scott) 70-69 | 171 | 660 | 3.9 | 8.5 | 4.4 | 2,468 | 43 | | Y | Y | | Centrarchid |
| Fish (Washington) 82-64 | 72 | 683 | 9.5 | 3 | 1.5 | 360 | 100 | | N | N | | |
| Forest 82-159 | 2,249 | 4,285 | 1.9 | 11.5 | 3.4 | 24,986 | 68 | 14 | Y | Y | | |
| French 27-127 | 352 | 870 | 2.5 | 1 | | | | | N | Y | | |
| Friedrich's 82-108 | 14.5 | 360 | 24.8 | | | | | | | | | |
| Gaystock 10-31 | 105 | | | 5 | | | 100 | | N | N | | |
| George Watch 2-5 | 528 | | | 2 | 1.5 | 2,587 | 100 | | N | Y | | |

## APPENDIX B
## Lake Characteristics

| Lake Name & DNR ID# | Surface Area (ac) | Watershed Area (ac) | Watershed to Surface Area Ratio | Max Depth (m) | Mean Depth (m) | Volume (ac-ft) | % Littoral | # Inlets | Thermo-cline? | Public Access | Shore Length (miles) | DNR Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| German 82-56 | 109 | | | | | | | | | | | |
| Glen 27-93 | 98 | | | 7.6 | | | 91 | | | N | | |
| Goetschel 82-313 | 22 | 2,812 | 127.8 | 4.2 | 1.2 | 88 | 100 | | N | N | | |
| Goggins 82-77 | 11 | | | | | | 100 | | N | N | | |
| Golden 2-45 | 57 | 7,680 | 134.7 | 7.3 | 2.5 | 463 | 90 | 1 | Y | Y | 1.5 | |
| Goose (Scandia) 82-59 | 83 | | | 7.6 | 2.4 | 664 | 55 | | | Y | | |
| Goose (Waconia) 10-89 | 407 | 1,100 | 2.7 | 3 | 1.5 | 2,035 | 100 | | N | C | | Natural Environment |
| Grace 10-218 | 22 | | | 6.7 | | | 79 | | | | | |
| Hafften 27-199 | 43 | | | | | | 60 | | Y | Y | | |
| Half Breed 82-80 | 75 | 303 | 4.0 | 10.3 | 1.7 | 420 | 67 | | Y | N | | |
| Hart 2-81 | 8 | | | | | | 100 | | N | N | | |
| Harvey 27-?? | | | | 0.7 | | | 100 | | N | N | | |
| Hay 82-65 | 33 | | | | | | | | | N | | |
| Hazeltine 10-14 | 236 | | | 2 | | | 100 | | N | N | | |
| Heims 13-56 | | | | | | | | | | | | |
| Henry 10-175 | 77 | | | 1.5 | | | 100 | | N | N | | |
| Herbers Pond 82-15-01 | | | | 2 | | | 100 | | N | N | | |
| Highland 2-79 | 22 | | | 1 | | | 100 | | N | N | | |
| Hornbean 19-47 | 22 | | | | | | | | | | | |
| Horseshoe 19-51 | 16 | | | | | | | | | | | |
| Horseshoe (Wash) 82-74 | | | | | | | | | | | | |

## APPENDIX B
## Lake Characteristics

| Lake Name & DNR ID# | Surface Area (ac) | Watershed Area (ac) | Watershed to Surface Area Ratio | Max Depth (m) | Mean Depth (m) | Volume (ac-ft) | % Littoral | # Inlets | Thermo-cline? | Public Access | Shore Length (miles) | DNR Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hydes 10-88 | 215 | 430 | 2.0 | 5.5 | 3 | 2,150 | 88 | | Y | Y | | |
| Island 2-22 | 67 | | | 6.7 | | | 87 | | Y | N | | |
| Jane 82-104 | 155 | 1,402 | 9.0 | 12 | 3.7 | 1,860 | 72 | | Y | Y | | |
| Jellum's 82-5202 | 72 | 333 | 4.6 | 4.9 | 2.4 | 569 | 100 | | N | N | | |
| Jonathon 10-217 | | | | | | | | | | | | |
| July 82-318 | | | | | | | | | | | | |
| Karth 62-0072 | | | | | | | | | | | | |
| Keller (Burnsville) 19-25 | 60 | | | 2.5 | 1.5 | 300 | 100 | | N | N | | |
| Kingsley 19-30 | 44 | 193 | 4.4 | 4 | | | 100 | | N | N | 1.7 | |
| Kismet 82-333 | | | | | | | | | | N | | |
| Klawitter 82-368 | 4.5 | 168 | 37.3 | | | | 100 | | | | | |
| La 82-97 | 35 | | | 3.5 | | | 100 | | N | N | 1.3 | |
| Lac Lavon 19-446 | 69 | 306 | 4.4 | 9.8 | | | 26 | | Y | N | 2.3 | Stocked w/Trout - Fishing Pier |
| Langton 62-49 | 30 | 257 | 8.6 | 1.5 | 1.2 | 120 | 100 | | N | | | |
| Lee 19-29 | 25 | 324 | 13.0 | 5.2 | | | 100 | | N | N | 1 | |
| Legion Pond 82-462 | 16 | 224 | 14.0 | | | | | | | | | |
| LeMay 27-85 | 34 | | | 4 | 1.6 | 173 | | | | | | |
| Libbs 27-85 | 23 | | | 2.1 | | | 100 | | N | N | | |
| Lily 82-23 | 52 | | | 17.4 | | | 73 | | Y | Y | | Centrarchid - Fishing Pier |
| Little Carnelian 82-14 | 162 | 565 | 3.5 | 21.3 | 10.7 | 5,686 | | | Y | N | 1.7 | |
| Little Comfort 13-54 | 36 | | | 17 | | | 44 | | Y | N | | |

## APPENDIX B
## Lake Characteristics

| Lake Name & DNR ID# | Surface Area (ac) | Watershed Area (ac) | Watershed to Surface Area Ratio | Max Depth (m) | Mean Depth (m) | Volume (ac-ft) | % Littoral | # Inlets | Thermo-cline? | Public Access | Shore Length (miles) | DNR Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Little Johanna 62-58 | 35 | | | 12 | | | 67 | | N | N | | |
| Little Long 27-179 | 108 | | | 23.2 | | | 49 | | Y | Y | | |
| Lochness 2-0584 | 5.3 | | | 4.9 | | | | | | | | |
| Lone 27-94 | | | | | | | | | | | | |
| Long (Apple Valley) 19-22 | 36 | | | 3.5 | | | 100 | | N | N | | |
| Long (Mahtomedi) 82-130 | 48 | | | 7.7 | | | 92 | | Y | N | | |
| Long (May) 82-30 | 88 | | | 3.7 | | | 100 | | N | Y | | |
| Long (Pine Springs) 82-118 | 62 | 2,060 | 33.2 | 10.4 | 3.6 | 744 | 55 | | Y | N | | |
| Long (Stillwater) 82-21 | 71 | | | 6.7 | | | 96 | | N | N | | |
| Long (Wash) 82-68 | 35 | 381 | 10.9 | 2.1 | 1.1 | 126 | 100 | | N | N | | |
| Loon 82-15 | 64 | 407 | 6.4 | 4.9 | 2.4 | 206 | 100 | | N | N | | |
| Lost 82-134 | 9.1 | | | 7.9 | | | 82 | | | | | |
| Lotus 10-6 | 246 | 1,033 | 4.2 | 8.8 | 4.3 | 3,500 | 74 | | Y | Y | | |
| Louise 82-25 | 48 | 616 | 12.8 | 3.7 | 1.8 | 283 | 100 | | N | N | | |
| Lynch 82-42 | 43 | | | | | | | | | | | |
| MacDonald Pond 82-62 | 12 | | | 2.7 | | | 100 | | N | N | | |
| Magda 27-65 | 15 | | | | | | | | | | | |
| Maple Marsh 82-38 | 38 | 148 | 3.9 | 3.4 | 1.7 | 212 | 100 | | N | N | | |
| Maria 10-58 | 169 | | | 1 | | | 100 | | Y | N | | |
| Marion 19-26 | 560 | | | 6.4 | | | 81 | | Y | Y | | |
| Markgrafs 82-89 | 46 | 413 | 9.0 | 2.4 | | | 100 | | N | N | 2.6 | Rearing |

## APPENDIX B
## Lake Characteristics

| Lake Name & DNR ID# | Surface Area (ac) | Watershed Area (ac) | Watershed to Surface Area Ratio | Max Depth (m) | Mean Depth (m) | Volume (ac-ft) | % Littoral | # Inlets | Thermo-cline? | Public Access | Shore Length (miles) | DNR Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Markley 70-21 | 27 | | | 3.7 | | | 100 | | N | N | | |
| Masterman 82-126 | 45 | | | | | | | | | | | |
| McDonald 82-10 | 54 | 1,051 | 19.5 | 3.7 | 1.8 | 324 | 100 | | N | N | | |
| McKnight 10-216 | | | | | | | | | | | | |
| McKusick 82-20 | 46 | | | 4.7 | | | 100 | | N | N | 1.6 | |
| McMahon 70-50 | 110 | | | 4.5 | | | 100 | | N | Y | | |
| Meadow 27-57 | 11 | 121 | 11.0 | 1.2 | | | 100 | | N | N | 0.7 | |
| Mergen's 82-482 | 12 | 1,383 | 115.3 | 1.3 | | | 100 | | N | N | | |
| Miller 10-29 | 145 | 16,701 | 115.2 | 4.3 | 3.1 | 1,479 | 100 | | N | N | | |
| Minnetoga 27-88 | 14.4 | | | 8.2 | 3.9 | 183 | | | | | | |
| Mitchell 27-70 | 112 | | | 5.8 | | | 97 | | N | Y | | |
| Moody 13-23 | 35 | | | 14.6 | | | 63 | | Y | N | | |
| Mud 82-26-02 | 62 | 899 | 14.5 | 2.1 | 1.1 | 224 | 100 | | N | N | | |
| Normandale 21-1045 | 103 | | | 3.7 | | | 100 | | N | | | |
| North Twin 82-18 | 69 | 187 | 2.7 | 1.8 | 0.9 | 207 | 100 | | N | N | | |
| Northwood 27-627 | 15 | 1,341 | 89.4 | 1.5 | 0.8 | 41 | 100 | | N | N | | |
| O'Connor 82-2 | 38 | | | | | | | | | N | | |
| O'Dowd 70-95 | 258 | | | 6.7 | | | 91 | | Y | Y | | |
| Oak 10-93 | 339 | | | 3.4 | | | 100 | | N | N | | |
| Olson 82-103 | 89 | 200 | 2.2 | 4.5 | 2.1 | 623 | 100 | | N | Y | | |
| Oneka 82-140 | 381 | | | 2.1 | 1.2 | 1,524 | 100 | | N | N | | Wildlife |

## APPENDIX B
## Lake Characteristics

| Lake Name & DNR ID# | Surface Area (ac) | Watershed Area (ac) | Watershed to Surface Area Ratio | Max Depth (m) | Mean Depth (m) | Volume (ac-ft) | % Littoral | # Inlets | Thermo-cline? | Public Access | Shore Length (miles) | DNR Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Orchard 19-31 | 250 | 2,012 | 8.0 | 10 | 3 | 2,500 | 75 | | Y | Y | | Centrarchid |
| Pamela 27-675 | 18 | | | 1.5 | | | 100 | | N | N | | |
| Parkers 27-107 | 97 | 950 | 9.8 | 11.3 | 3.7 | 1,164 | 70 | | Y | Y | | |
| Pat 82-125 | 13 | | | | | | | | | | | |
| Peltier 2-4 | 174 | 68,082 | 391.3 | 4.9 | 2.1 | 3,255 | 100 | | N | Y | | Gamefish |
| Penn 27-4 | | | | | | | | | | | | |
| Pepin 40-28 | 326 | | | 3.4 | 1.1 | 1,150 | | | | Y | | |
| Peter 27-147 | | | | | | | | | | | | |
| Pike (Maple Grove) 27-111 | 59 | 919 | 15.6 | 11.9 | 2 | 395 | 95 | | Y | Y | 1.5 | Centrarchid |
| Pike (Ramsey) 62-69 | 35 | | | 4.9 | 2.1 | 252 | 100 | | N | N | | Gamefish |
| Pike (Scott) 70-76 | 57 | 1,991 | 34.9 | 2.7 | | | 100 | | N | N | | |
| Pine Tree 82-122 | 174 | | | 7.9 | 3 | 1,740 | 91 | | Y | N | | Centrarchid |
| Powers 82-92 | 57 | 1,238 | 21.7 | 12.5 | | | 57 | 2 | Y | N | 1.8 | Centrarchid |
| Prior (Lower) 70-26 | 827 | 19,560 | 23.7 | 18.3 | 4.1 | 11,120 | 46 | 1 | Y | Y | | Centrarchid |
| Prior (Upper) 70-72 | 340 | 16,460 | 48.4 | 15.2 | 3.1 | 3,460 | 93 | 2 | Y | Y | | Centrarchid |
| Region Park 82-87 | 16 | 600 | 37.5 | 5.8 | | | 100 | | N | N | | |
| Reitz 10-52 | 79 | 3,711 | 47.0 | 11 | 4 | 1,027 | 58 | | Y | Y | | |
| Reshnanau 2-9 | | | | | | | | | | | | |
| Rest Area 82-0514 | 12.6 | 17,781 | 1411.2 | | | | | | | | | |
| Rice 27-116 | 252 | | | 3.4 | 1.9 | 1,570 | | | | Y | | |
| Riley 10-2 | 297 | 4,796 | 16.1 | 15 | 6.6 | 6,429 | 34 | | Y | Y | 2.9 | |

## APPENDIX B
## Lake Characteristics

| Lake Name & DNR ID# | Surface Area (ac) | Watershed Area (ac) | Watershed to Surface Area Ratio | Max Depth (m) | Mean Depth (m) | Volume (ac-ft) | % Littoral | # Inlets | Thermo-cline? | Public Access | Shore Length (miles) | DNR Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rogers 19-80 | 94 | | | 2.4 | 1.3 | 393 | | | | Y | | |
| Rose 27-92 | 17 | | | | | | | | | | | |
| Ryan 27-58 | 20 | 5,510 | 275.5 | 10.7 | 64.8 | 312 | 56 | | Y | N | 0.6 | |
| S. School Section 82-151 | 125 | | | 8 | | | 41 | | | | | |
| Sanborn 40-27 | | | | 1.2 | 0.9 | | | | | Y | | |
| Sand 82-67 | 46 | | | 5.5 | 2.4 | 368 | 46 | 2 | | N | 1.8 | |
| Schmidt 27-102 | 37 | 190 | 5.1 | 9.1 | 1.5 | 207 | 92 | | Y | N | 1.6 | |
| School 13-57 | 48 | | | | | | | | | | | |
| Schroeder Pond 82-301 | | | | 3 | | | 100 | | N | N | | |
| Schutz 10-18 | 105 | 943 | 9.0 | 15 | 6 | 2,100 | 27 | | Y | N | | |
| Scout 19-198 | | | | 2.9 | | | | | | | | |
| Seidl's 19-95 | 14 | 415 | 29.6 | 5 | | | 100 | 5 | N | N | | Rearing |
| Shady Oak 27-89 | | | | | | | | | | | | |
| Shaver 27-86 | 11 | | | | | | | | | N | | |
| Shields 82-162 | 27 | | | 8.2 | | | 85 | | Y | N | 0.8 | |
| Silver 82-16 | 98 | 455 | 4.6 | 3.4 | 1.7 | 549 | 100 | | N | N | | |
| Silver (Ramsey) 62-1 | 72 | | | 5.5 | | | 99 | | | Y | | |
| South Oak 27-661 | | | | | | | | | | N | | |
| South Rice 27-645 | 3.2 | 63 | 19.7 | 2.5 | 0.5 | 5 | 100 | | N | N | | |
| South Twin 82-19 | 54 | 63 | 1.2 | 4 | 2 | 356 | 100 | | N | N | | |
| Spring (Scott) 70-54 | 630 | 13,500 | 21.4 | 11.3 | 5.6 | 11,500 | 50 | 2 | Y | Y | 5 | |

## APPENDIX B
## Lake Characteristics

| Lake Name & DNR ID# | Surface Area (ac) | Watershed Area (ac) | Watershed to Surface Area Ratio | Max Depth (m) | Mean Depth (m) | Volume (ac-ft) | % Littoral | # Inlets | Thermo-cline? | Public Access | Shore Length (miles) | DNR Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Square 82-46 | 193 | 782 | 4.1 | 20.7 | 9 | 5,694 | 65 | 5 | Y | Y | 2.2 | Stocked w/Trout |
| St. Croix 82-1 | 8,600 | 4,918,790 | 572.0 | 23.8 | | | | | Y | Y | | |
| St. Joe 10-11 | 14 | | | 15.9 | | | 46 | | Y | Y | | |
| Staples 82-28 | 24 | 127 | 5.3 | 4.3 | 2.1 | 165 | 100 | | N | N | | |
| Success 27-634 | | | | | | | | | | | | |
| Sunfish 19-50 | 49 | | | | | | | | | | | |
| Sunfish 82-107 | 50 | 526 | 10.5 | | | | | | | N | | |
| Sunnybrook 82-133 | 16 | 630 | 39.4 | 6.1 | 2 | 104 | | | Y | N | | |
| Sunset 82-153 | 124 | | | 5.2 | | | 100 | | N | N | 2.3 | Gamefish |
| Sunset Pond 19-451 | 60 | | | 3.7 | | | 100 | | N | N | 1.9 | |
| Susan 10-13 | 93 | | | 5.2 | | | 81 | | | Y | | |
| Swede 10-95 | 376 | | | 4 | | | 100 | | N | Y | | |
| Sweeney 27-35 | 66 | 2,400 | 36.4 | 8 | 3.6 | 790 | 52 | | Y | N | | Panfish |
| Tamarack 10-10 | 24 | | | 20 | | | 41 | | Y | N | | |
| Terrapin 82-31 | 86 | | | 4.6 | | | 100 | | N | N | | |
| Thole 70-120 | 105 | | | 3.7 | | | 100 | | N | Y | | |
| Turtle 82-36 | 44 | 699 | 15.9 | 2.4 | 1.2 | 172 | 100 | | N | N | | |
| Twin (Burnsville) 19-28 | 11 | | | | | | 100 | | | | | |
| Twin (Lower) (Rob) 27-42 | 46 | 5,322 | 115.7 | 6.7 | 2.3 | 340 | 83 | | Y | Y | 1.2 | Centrarchid |
| Twin (Middle) (Cry) 27-42 | 69 | 4,053 | 58.7 | 14 | 4.9 | 918 | 57 | | Y | Y | 1.4 | Centrarchid |
| Twin (St. Louis Pk) 27-656 | | | | | | | | | | N | | |

## APPENDIX B
## Lake Characteristics

| Lake Name & DNR ID# | Surface Area (ac) | Watershed Area (ac) | Watershed to Surface Area Ratio | Max Depth (m) | Mean Depth (m) | Volume (ac-ft) | % Littoral | # Inlets | Thermo-cline? | Public Access | Shore Length (miles) | DNR Classification |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Twin (Upper) (Br.P) 27-42 | 137 | 3,657 | 26.7 | 2.4 | 0.9 | 397 | 100 | | Y | N | 2.8 | Centrarchid |
| Valentine 62-71 | 60 | 2,237 | 37.3 | 4 | 1.5 | 300 | 100 | | N | | | |
| Valley 19-348 | 8 | 117 | 14.6 | 3.2 | | | 100 | 1 | N | N | | |
| Virginia 10-18 | 110 | 772 | 7.0 | 10.4 | 3.3 | 1,210 | 88 | | Y | Y | | |
| Waconia 10-59 | 3,000 | 7,880 | 2.6 | 11.3 | 4 | 38,632 | 53 | | Y | Y | 6.8 | Centrarchid |
| Weber 82-119 | 7.5 | 1.4 | 0.2 | 1.5 | | | 100 | | N | N | | |
| West Boot 82-44 | 110 | 209 | 1.9 | 11.9 | 5.9 | 2,090 | 56 | | Y | Y | | |
| West Lakeland 82-488 | 27 | 1,139 | 42.2 | | | | | | N | N | | |
| Westwood 27-711 | 41 | | | 2 | | | 100 | | N | N | | |
| White Rock 82-72 | 65 | | | | | | | | | | | |
| Wilmes 82-90 | 41 | 2,247 | 54.8 | 5.5 | | | | | | Y | 1.3 | |
| Windsor 27-82 | 14 | | | | | | | | | N | | |
| Wing 27-91 | 11 | | | | | | | | | | | |
| Winkler 10-66 | 129 | 2,758 | 21.4 | | | | | | | | | |
| Wood (Burnsville) 19-24 | 9 | 157 | 17.4 | 4.5 | | | 100 | 1 | N | N | | Panfish |
| Woodpile 82-132 | 19 | | | | | | | | | | | |
| | | | | | | | | | | | | |

# APPENDIX C

2008 CAMP Volunteers

| Enrolling Group | Lake | DNR ID | Volunteer |
|---|---|---|---|
| Anoka County | Cenaiko | 2065400 | Anoka County Parks |
| Anoka County | Island | 2002200 | Anoka County Parks |
| Anoka County | Linwood | 2002600 | Anoka County Parks |
| Anoka County | Martin | 2003400 | Anoka County Parks |
| | | | |
| Apple Valley, City of | Cobblestone | 19045600 | Jeff Sluiter |
| Apple Valley, City of | Farquar | 19002300 | Bill Sherry |
| Apple Valley, City of | Long | 19002200 | Cristy McGlocklin & Al Kettelkamp |
| Apple Valley, City of | Scout | 19019800 | Dan Stanek |
| | | | |
| Bassett Creek WMO | Northwood | 27062700 | Robert White |
| Bassett Creek WMO | Parkers | 27010700 | Bob Videen |
| Bassett Creek WMO | South Rice | 27064500 | Steve Streff |
| Bassett Creek WMO | Sweeney | 27003501 | Dave Hanson |
| Bassett Creek WMO | Westwood | 27071100 | Westwood Nature Center |
| | | | |
| Black Dog WMO | Crystal | 19002700 | Carroll Armett, PhD |
| Black Dog WMO | Keller | 19002500 | Glen Gramse |
| Black Dog WMO | Kingsley | 19003000 | City of Lakeville |
| Black Dog WMO | Lac Lavon | 19044600 | Wally Shaver |
| Black Dog WMO | Orchard | 19003100 | Tom Goodwin |
| Black Dog WMO | Sunset Pond | 19045100 | Dan Wallace |
| | | | |
| Burnsville, City of | Alimagnet | 19002100 | John Ritter |
| Burnsville, City of | Earley | 19003300 | Brian Lee |
| Burnsville, City of | Twin, South | 19002800 | Dan Freeman |
| Burnsville, City of | Wood Pond | 19002400 | David Bess and City Staff |
| | | | |
| Carver County | Bavaria | 10001900 | John Ryski |
| Carver County | Benton | 10006900 | Don Smitth |
| Carver County | Brickyard | 10022500 | Carver County |
| Carver County | Burandt | 10008400 | Carver County |
| Carver County | Courthouse | 10000500 | Carver County |
| Carver County | Eagle | 10012100 | Carver County |
| Carver County | Firemens | 10022600 | Carver County |
| Carver County | Goose | 10008900 | Carver County |
| Carver County | Grace | 10021800 | Carver County |
| Carver County | Hydes | 10008800 | Carver County |
| Carver County | Jonathan | 10021700 | Carver County |
| Carver County | McKnight | 10021600 | Carver County |
| Carver County | Meuwissen | 10007000 | Mark & Jacob Stienbauer & Don Smith |
| Carver County | Miller | 10002900 | Carver County |
| Carver County | Oak | 10009300 | Carver County |
| Carver County | Reitz | 10005200 | Lynne McMullen |
| Carver County | Rutz | 10008000 | Marty Ziermann |
| Carver County | Swede | 10009500 | Wayne Hubin |

# APPENDIX C

2008 CAMP Volunteers

| Enrolling Group | Lake | DNR ID | Volunteer |
|---|---|---|---|
| Carver County | Waconia | 10005900 | Carver County |
| Carver County | Winkler | 10006600 | Carver County |
| | | | |
| Chanhassen, City of | Lotus | 10000600 | Shelley Strohmaier |
| Chanhassen, City of | Riley | 10000200 | David Florenzano |
| Chanhassen, City of | St. Joe | 10001100 | Sue Morgan & Linda Scott |
| Chanhassen, City of | Susan | 10001300 | Robert Armstrong |
| | | | |
| Comfort Lake - Forest Lake WD | Big Comfort | 13005300 | Chuck Rheault |
| Comfort Lake - Forest Lake WD | Bone | 82005400 | Jon Hafner & Don Jack |
| Comfort Lake - Forest Lake WD | Forest, west | 82015900 | Jack Beckman |
| Comfort Lake - Forest Lake WD | Sylvan | 82008000 | Curt Sparks |
| | | | |
| Eden Prairie, City of | Mitchell | 27007000 | Gordon & Fran Warner |
| | | | |
| Elm Creek WMC | Henry | 27017500 | George & Pam Christ |
| Elm Creek WMC | Rice | 27011600 | George Schneider |
| Elm Creek WMC | Sylvan | 27017100 | Dirk Colby |
| | | | |
| Lake St. Croix Planning Team | Lake St. Croix - Bayport (site 2) | 82000100 | Roberta and Jim Harper |
| Lake St. Croix Planning Team | Lake St. Croix - Black Bass (site 6) | 82000100 | Rick Meierotto |
| Lake St. Croix Planning Team | Lake St. Croix - Kinnickinnic (site 7) | 82000100 | Carpenter Nature Center |
| Lake St. Croix Planning Team | Lake St. Croix - Troy Beach (site 3) | 82000100 | Cecilia and Harry Martin |
| Lake St. Croix Planning Team | Lake St. Croix - Troy Beach (site 5) | 82000100 | Sheryl and Rich Lindholm |
| | | | |
| Lakeville, City of | East | 19034900 | City of Lakeville |
| Lakeville, City of | Lee | 19002900 | City of Lakeville |
| Lakeville, City of | Marion | 19002600 | Wally Potter |
| Lakeville, City of | Valley | 19034800 | City of Lakeville |
| | | | |
| Lower St. Croix WMO | O'Connors | 82000200 | Jeff Keene |
| | | | |
| Mahtomedi, City of | Lost | 82013400 | Martha Popp |
| | | | |
| Mendota Heights, City of | LeMay | 19008200 | City of Mendota Heights |
| Mendota Heights, City of | Rogers | 19008000 | Doug Hennes |
| | | | |
| Minnehaha Creek WD | Tamarack | 10001000 | Mike Shouldice |
| | | | |
| Minnetonka, City of | Minnetoga | 27008800 | Maressia & John Twele |
| Minnetonka, City of | Rose | 27009200 | Mark Storck |
| Minnetonka, City of | Wing | 27009100 | John Burton |

# APPENDIX C

2008 CAMP Volunteers

| Enrolling Group | Lake | DNR ID | Volunteer |
|---|---|---|---|
| Nine Mile Creek WD | Bush | 27004700 | Gregg Thompson |
| Nine Mile Creek WD | Cornelia | 27002800 | Jon Moon & Heidi Dorfmeister |
| Nine Mile Creek WD | Glen | 27009300 | Christine Peterson |
| | | | |
| Pioneer-Sarah WMC | Ardmore | 27015300 | Greg Durand |
| | | | |
| Prior Lake-Spring Lake WD | Cates | 70001800 | Tom & Peggy Sletta |
| Prior Lake-Spring Lake WD | Fish | 70006900 | Steve Pierson |
| Prior Lake-Spring Lake WD | Prior, lower | 70002600 | Walt Burris |
| Prior Lake-Spring Lake WD | Prior, upper | 70007200 | Frank Fourre |
| Prior Lake-Spring Lake WD | Spring | 70005400 | Lisa Kallberg |
| | | | |
| Rice Creek WD | George Watch | 2000500 | Wargo Nature Center |
| Rice Creek WD | Golden | 2004500 | Dave Phipps - City of Circle Pines |
| Rice Creek WD | Karth | 62007200 | Gary Gerding |
| Rice Creek WD | Lake Forest (New Brighton) | 62018700 | Bruce Adelsman |
| Rice Creek WD | Langton (site 1) | 62004901 | Tam & Dick McGehee, Yul Yost |
| Rice Creek WD | Langton (site 2) | 62004902 | Tam & Dick McGehee, Yul Yost |
| Rice Creek WD | Little Johanna | 62005800 | Fred Fox |
| Rice Creek WD | Lochness | 2058500 | Jim & Tricia Hafner |
| Rice Creek WD | Long | 82013000 | Kitty Francy-Payton |
| Rice Creek WD | Pike | 62006900 | Phil Goodrich |
| Rice Creek WD | Pine Tree | 82012200 | Gene Berwald |
| Rice Creek WD | Priebe | 62003600 | David Dixen |
| Rice Creek WD | Reshanau | 2000900 | Lori Fredlund |
| Rice Creek WD | Sunset | 82015300 | Diane Coderre |
| Rice Creek WD | Valentine | 62007100 | Bob Kistler |
| Rice Creek WD | White Rock | 82007200 | David Bluhm |
| | | | |
| Scott WMO | Cedar | 70009100 | Jerry Edberg |
| Scott WMO | McMahon | 70005000 | Joe Williamson |
| | | | |
| Shakopee, City of | Dean | 70007400 | Andy Voit |
| Shakopee, City of | O'Dowd | 70009500 | Sandy Boyce |
| | | | |
| Shingle Creek WMC | Crystal | 27003400 | Wayne, Luke, & Leif Sicora |
| Shingle Creek WMC | Meadow | 27005700 | Diane Stauner |
| Shingle Creek WMC | Ryan | 27005800 | Paul Brenna |
| Shingle Creek WMC | Success | 27063400 | John Roach & Stuart Ruud |
| Shingle Creek WMC | Twin, middle | 27004202 | Janet Moore |
| Shingle Creek WMC | Twin, upper | 27004201 | Kris Mann |
| | | | |
| South St. Paul (share with IGH) | Seidl's | 19009500 | Randy Bjorklund |
| | | | |
| St. Louis Park, City of | Cobblecrest | 27005300 | Jim Kellogg |
| St. Louis Park, City of | South Oak | 27066100 | Aaron Patterson |

# APPENDIX C

2008 CAMP Volunteers

| Enrolling Group | Lake | DNR ID | Volunteer |
|---|---|---|---|
| St. Louis Park, City of | Twin | 27065600 | Bruce Cornwall |
| | | | |
| Sunfish Lake, City of | Hornbeam | 19004700 | Dave Johnson |
| Sunfish Lake, City of | Horseshoe | 19005100 | Jim Nayes |
| Sunfish Lake, City of | Sunfish | 19005000 | Dick Bancroft |
| | | | |
| Valley Branch WD | Bay Pond | 82001100 | Folz, Freeman, Erickson, Inc. |
| Valley Branch WD | Cloverdale | 82000900 | Dr. Kevin Bjork |
| Valley Branch WD | DeMontreville | 82010100 | Steve Iverson |
| Valley Branch WD | Downs | 82011000 | Wesley Sly Family |
| Valley Branch WD | Eagle Point | 82010900 | Bob Schumacher |
| Valley Branch WD | Echo | 82013500 | Jim Serley |
| Valley Branch WD | Edith | 82000400 | Dave Nimmer, Guy & Kim Reithmeyer. |
| Valley Branch WD | Elmo | 82010600 | Scott Knudson |
| Valley Branch WD | Friedrich's Pond | 82010800 | Folz, Freeman, Erickson, Inc. |
| Valley Branch WD | Goetschel Pond | 82031300 | Rolf Larson |
| Valley Branch WD | Jane | 82010400 | Chuck Taylor |
| Valley Branch WD | Klawitter Pond | 82036800 | Bonnie Juran |
| Valley Branch WD | Long | 82011800 | Bill Feely |
| Valley Branch WD | McDonald | 82001000 | Randy Hunt |
| Valley Branch WD | Olson | 82010300 | Bob Meier |
| Valley Branch WD | Rest Area Pond | 82051400 | MnDOT |
| Valley Branch WD | Sunnybrook | 82013300 | Arnie Johnson |
| | | | |
| Washington SWCD | Acorn | 82010200 | Washington Conservation District |
| Washington SWCD | Armstrong | 82011600 | Todd Heruth |
| Washington SWCD | Barker | 82007600 | Washington Conservation District |
| Washington SWCD | Bass | 82003500 | Washington Conservation District |
| Washington SWCD | Bass East | 82012400 | Washington Conservation District |
| Washington SWCD | Bass West | 82012300 | Washington Conservation District |
| Washington SWCD | Benz | 82012000 | Washington Conservation District |
| Washington SWCD | Beutel Pond | 82039900 | Washington Conservation District |
| Washington SWCD | Big Carnelian | 82004900 | Washington Conservation District |
| Washington SWCD | Big Marine | 82005200 | Washington Conservation District |
| Washington SWCD | Brick Pond | 82030800 | Washington Conservation District |
| Washington SWCD | Capaul's Pond (east basin) | 82036500 | Washington Conservation District |
| Washington SWCD | Capaul's Pond (west basin) | 82036500 | Washington Conservation District |
| Washington SWCD | Carol | 82001700 | Washington Conservation District |
| Washington SWCD | Clear | 82004500 | Warner Nature Center |
| | | | |
| Washington SWCD | DeMontreville | 82010100 | Washington Conservation District |
| Washington SWCD | East Boot | 82003400 | Washington Conservation District |
| Washington SWCD | Edith | 82000400 | Washington Conservation District |

# APPENDIX C

2008 CAMP Volunteers

| Enrolling Group | Lake | DNR ID | Volunteer |
|---|---|---|---|
| Washington SWCD | Elmo | 82010600 | Washington Conservation District |
| Washington SWCD | Fahlstrom Pond (east basin) | 82000500 | Washington Conservation District |
| Washington SWCD | Fahlstrom Pond (west basin) | 82000500 | Washington Conservation District |
| Washington SWCD | Fish | 82006400 | Washington Conservation District |
| Washington SWCD | German | 82005600 | Washington Conservation District |
| Washington SWCD | Goggins | 82007700 | Washington Conservation District |
| Washington SWCD | Goose | 82005900 | Washington Conservation District |
| Washington SWCD | Goose (north basin) | 82011301 | Washington Conservation District |
| Washington SWCD | Goose (south basin) | 82011302 | Washington Conservation District |
| Washington SWCD | Hay | 82006500 | Washington Conservation District |
| Washington SWCD | Jane | 82010400 | Washington Conservation District |
| Washington SWCD | Jellums | 82005202 | Washington Conservation District |
| Washington SWCD | July Ave | 82031800 | Washington Conservation District |
| Washington SWCD | Kismet | 82033300 | Washington Conservation District |
| Washington SWCD | Kramer Pond | 82011700 | Washington Conservation District |
| Washington SWCD | Legion Pond | 82046200 | Washington Conservation District |
| Washington SWCD | Lily | 82002300 | Washington Conservation District |
| Washington SWCD | Little Carnelian | 82001400 | Washington Conservation District |
| Washington SWCD | Little Comfort | 13005400 | Steve Schrieber |
| Washington SWCD | Long | 82003000 | Washington Conservation District |
| Washington SWCD | Long | 82002100 | Washington Conservation District |
| Washington SWCD | Long | 82006800 | Washington Conservation District |
| Washington SWCD | Loon | 82-001502 | Washington Conservation District |
| Washington SWCD | Louise | 82002500 | Washington Conservation District |
| Washington SWCD | Lynch | 82004200 | Washington Conservation District |
| Washington SWCD | Masterman | 82012600 | Washington Conservation District |
| Washington SWCD | Mays | 82003300 | Warner Nature Center |
| Washington SWCD | McDonald | 82001000 | Washington Conservation District |
| Washington SWCD | McKusick | 82002000 | Washington Conservation District |
| Washington SWCD | Mergens Pond | 82048200 | Washington Conservation District |
| Washington SWCD | North Twin | 82001800 | Washington Conservation District |
| Washington SWCD | Olson | 82010300 | Washington Conservation District |
| Washington SWCD | Pat | 82012500 | Washington Conservation District |
| Washington SWCD | Plaisted | 82014800 | Washington Conservation District |
| Washington SWCD | Powers | 82009200 | Washington Conservation District |
| Washington SWCD | Regional Park Lake (Cottage Grove Park) | 82008700 | Washington Conservation District |
| Washington SWCD | Rose Lake (north basin) | 82011200 | Washington Conservation District |
| Washington SWCD | Rose Lake (south basin) | 82011200 | Washington Conservation District |
| Washington SWCD | Sand | 82006700 | Washington Conservation District |
| Washington SWCD | Sea Lake | 82005300 | Greg Duren |
| Washington SWCD | Silver | 82001600 | Washington Conservation District |
| Washington SWCD | South School Section | 82015100 | Washington Conservation District |
| Washington SWCD | South Twin | 82001900 | Washington Conservation District |

# APPENDIX C

2008 CAMP Volunteers

| Enrolling Group | Lake | DNR ID | Volunteer |
|---|---|---|---|
| Washington SWCD | Square | 82004600 | Washington Conservation District |
| Washington SWCD | Staples | 82002800 | Washington Conservation District |
| Washington SWCD | Sunfish | 82010700 | Washington Conservation District |
| Washington SWCD | Terrapin | 82003100 | Washington Conservation District |
| Washington SWCD | Turtle | 82003600 | Washington Conservation District |
| Washington SWCD | Twin | 82004800 | Washington Conservation District |
| Washington SWCD | Weber Pond | 82011900 | Washington Conservation District |
| Washington SWCD | West Boot | 82004400 | Washington Conservation District |
| Washington SWCD | West Lakeland Storage Site (north basin) | 82048800 | Washington Conservation District |
| Washington SWCD | West Lakeland Storage Site (south basin) | NA | Washington Conservation District |
| Washington SWCD | Wood Pile | 82013200 | Washington Conservation District |
| | | | |
| Woodbury, City of | Colby | 82009400 | Annie Gustafson |
| Woodbury, City of | La | 82009700 | Simon Fung |
| Woodbury, City of | Markgrafs | 82008900 | Terry Riley |
| Woodbury, City of | Wilmes | 82009000 | Bill Aamodt |

# Appendix D
## 2008 CAMP Quality Control Data

| Lake Name | DNR ID# | Date | CLA ug/L | TP mg/L | Secchi Depth m |
|---|---|---|---|---|---|
| Bavaria Lake | 10001900 | 10/2/2008 | 19 | 0.024 | 1.9 |
| Bone Lake | 82005400 | 9/18/2008 | 33 | 0.038 | 1.3 |
| Cedar Lake | 70009100 | 9/19/2008 | 65 | 0.194 | 0.7 |
| Crystal Lake | 19002700 | 7/25/2008 | 30 | 0.041 | 1.5 |
| Crystal Lake | 19002700 | 9/30/2008 | 31 | 0.041 | 1.4 |
| Demontreville Lake | 82010100 | 7/8/2008 | 2.9 | 0.03 | 4.7 |
| Demontreville Lake | 82010100 | 9/29/2008 | 13 | 0.018 | 2.8 |
| Elmo Lake | 82010600 | 7/8/2008 | 2.9 | 0.013 | 2.7 |
| Goose Lake | 82005900 | 9/18/2008 | 90 | 0.082 | 1.1 |
| Jane Lake | 82010400 | 7/9/2008 | 2.7 | 0.056 | 5.6 |
| Linwood Lake | 2002600 | 9/16/2008 | 50 | 0.061 | 0.7 |
| Lower Prior Lake | 70002600 | 8/19/2008 | 20 | 0.027 | 1.9 |
| Lower Prior Lake | 70002600 | 10/3/2008 | 24 | 0.03 | 1.6 |
| Marion Lake | 19002601 | 7/25/2008 | 28 | 0.037 | 1.7 |
| Marion Lake | 19002601 | 9/30/2008 | 36 | 0.049 | 1.4 |
| McMahon Lake | 70005000 | 9/19/2008 | 78 | 0.12 | 0.5 |
| O'dowd Lake | 70009500 | 8/19/2008 | 70 | 0.051 | 0.6 |
| Olson Lake | 82010300 | 7/9/2008 | 3.6 | 0.022 | 3.8 |
| Olson Lake | 82010300 | 9/29/2008 | 11 | 0.018 | 3.0 |
| Orchard Lake | 19003100 | 7/25/2008 | 7.2 | 0.02 | 3.0 |
| Orchard Lake | 19003100 | 9/30/2008 | 28 | 0.039 | 2.0 |
| Reitz Lake | 10005200 | 10/2/2008 | 17 | 0.029 | 2.0 |
| Riley Lake | 10000200 | 8/8/2008 | 22 | 0.034 | 1.2 |
| Riley Lake | 10000200 | 10/3/2008 | 25 | 0.036 | 1.3 |
| Susan Lake | 10001300 | 8/8/2008 | 72 | 0.059 | 0.5 |
| Susan Lake | 10001300 | 10/3/2008 | 110 | 0.15 | 0.5 |
| Swede Lake | 10009500 | 10/2/2008 | 350 | 0.432 | 0.3 |
| Upper Prior Lake | 70007200 | 8/19/2008 | 92 | 0.076 | 0.5 |
| Upper Prior Lake | 70007200 | 10/3/2008 | 57 | 0.085 | 0.6 |