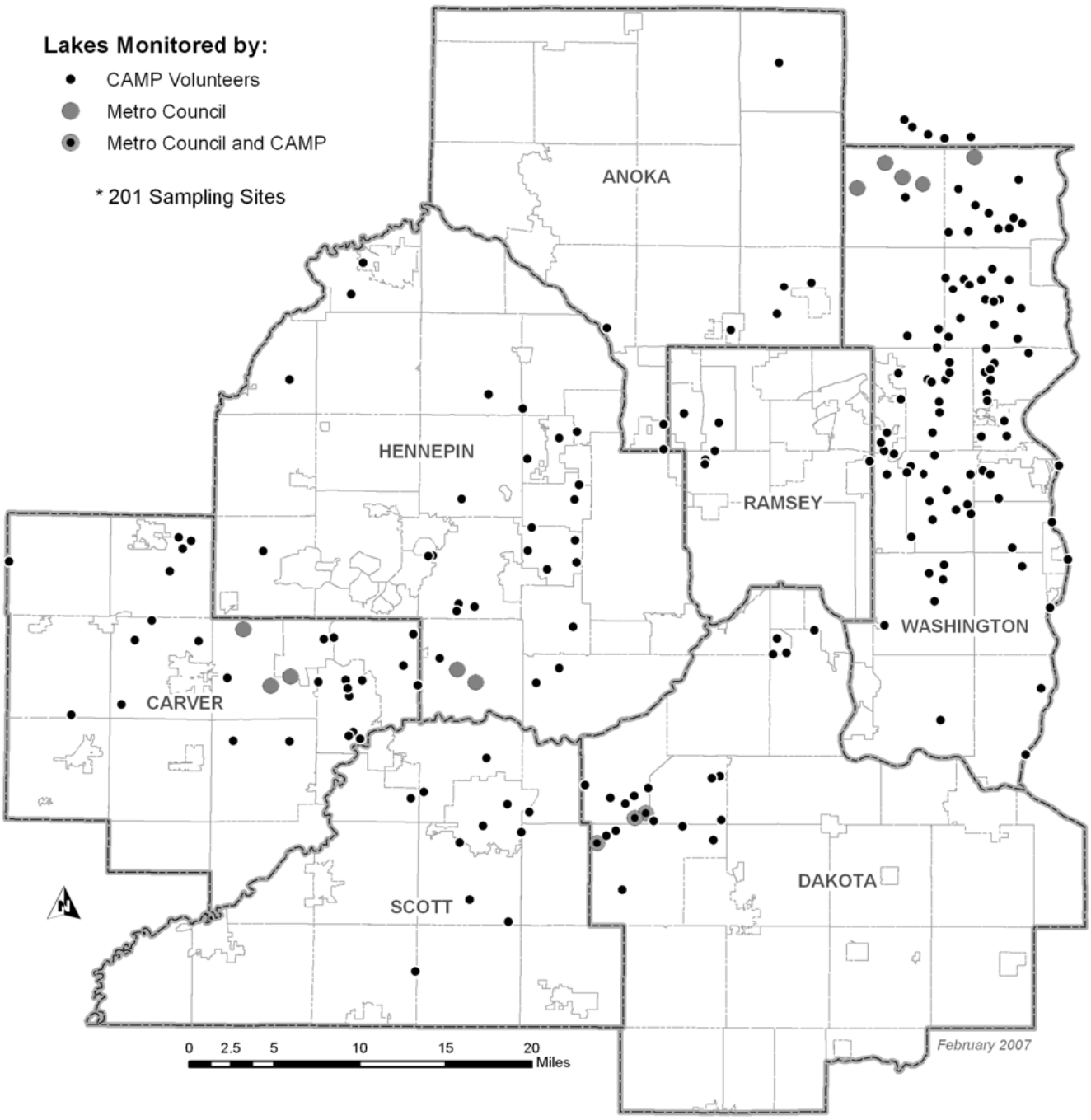
2006 Study of the Water Quality of 186 Metropolitan Area Lakes *



By
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Judith Sventek

EXECUTIVE SUMMARY

To date, the Metropolitan Council's lake monitoring programs (including the staff- and volunteer-monitoring programs) have provided an important tool for making informed lake management decisions. Data from our regional lake monitoring programs 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 landuse and water quality.

This report is the latest in a continuing series of reports summarizing results of the Metropolitan Council's (Council) annual lake monitoring program. The Council has collected water quality data on area lakes since 1980. This report contains data from a total of 201 lake sites on 186 lakes sampled in 2006. A total of 188 sites on 178 lakes were monitored by volunteers through the Council's Citizen-Assisted Lake Monitoring Program (CAMP), and an additional 13 sites on 11 lakes were monitored by Council staff (three of the thirteen lakes were also monitored through CAMP).

Seventy-six of the 186 lakes monitored in 2006 are listed by the MPCA as impaired waters due to excessive phosphorus which affects the lakes' ability to support their designated recreational uses. Seventy-one of those lakes were monitored through CAMP, and five were monitored by Council staff. To learn more about the impaired lakes listings and potential next steps, see http://www.pca.state.mn.us/water/tmdl/index.html.

The objectives of this study were to:

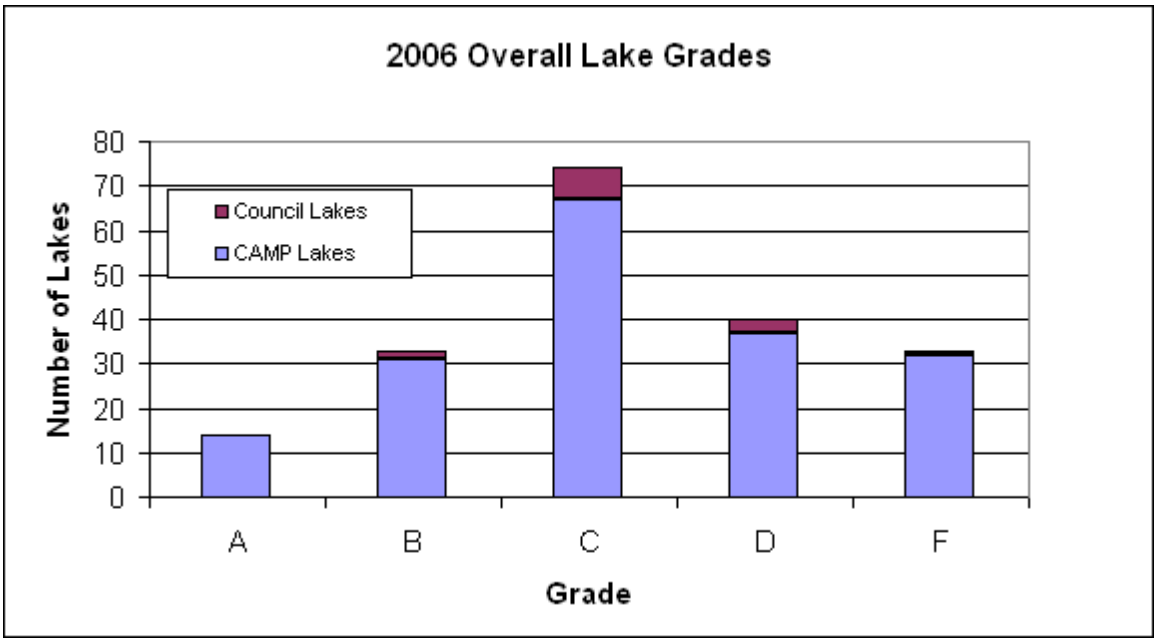
1. Provide lake water quality data to lake, watershed and water resource managers.
2. Advise managers of known or suspected threats to lake water quality.
3. Continue to compile a water quality database on the five area lakes that support a trout fishery.
4. Collect lake water quality data on: Alimagnet, Lee, Twin [Burnsville], and Valley Lakes, to determine the results of in-lake organic carbon amendment (barley straw or cornmeal treatments) on the lakes' algal population and resulting water clarity.
5. Collect water quality data on: Bone, Crystal [Burnsville], Forest, and Keller [Burnsville] Lakes, in order to provide sufficient information for in-lake and watershed water quality modeling efforts.

The year 2006 marked the fourteenth year that CAMP was used to increase our knowledge of the water quality of area lakes. Once again, volunteers measured surface water temperature and transparency, and collected surface water samples that were analyzed for total phosphorus, total Kjeldahl nitrogen, and chlorophyll-a on a biweekly basis from mid-April to mid-October (approximately 14 sampling events).

This year's monitoring program included 25 lakes never before monitored by the Council, and 141lake sites that were previously monitored in 2005. The 2006 lakes monitoring program included lake data from all 24 of the 26 watersheds/municipalities/counties represented in the 2005 program. Additionally, the 2006 CAMP program enrolled six new groups, continuing to expand the list of monitoring partners.

The greatest percentage of the lake sites monitored through CAMP in 2006 received an overall water quality grade of "C" (37 percent). When combining the CAMP and Council staff monitored lake site grades, 38 percent of the lakes received an overall grade of "C". The water quality of these lakes is considered average as compared to others in the seven-county metropolitan area. When comparing the percentage of above-average lakes, those receiving grades of "A" or "B", (24%) to below-average lakes, those receiving "D" or "F", (38%) more lakes were below average. The complete 2006 CAMP lake report card grade tally (for those lakes with sufficient data) assigned "A's" to 14 lake sites (8 percent), "B's" to

31 lake sites (17 percent), “C’s” to sixty-seven lake sites (37 percent), “D’s” to 37 lake sites (20 percent), and “F’s” to 32 lake sites (18 percent).



Of the 141 lakes previously monitored in 2005 with a sufficient database needed to generate overall grades, 36 had a worse overall water quality grade in 2006 (Aligmagnet, Bass-West (Washington County), Big Comfort, Big Marine, Cedar (Scott County), Cloverdale, Colby, Dean, Downs, Eagle, Edith, Fireman’s, George Watch, Goggins, Keller (Burnsville), Kingsley, Markgrafs, Miller, Mitchell, Northwood, Oak (Site 1), O’Dowd, Peltier, Prior Lake (Upper), Prior Lake (Lower), Seidl’s, Silver (Washington County), South Twin, Staples, St. Joe, Swede, Sweeney, Terrapin, Twin (Burnsville), Valley, and Waconia), 15 lakes had a better overall water quality grade in 2006 (Bavaria, Benz, Birch, Cobblestone, Earley, Farquhar, Hay, Henry, Herber’s Pond, Long (Washington County), MacDonald’s Pond, O’Connor, Riley, Schroeder’s Pond, and Wilmes), and 90 lakes had the same overall water quality grade for both years.

Water quality data from the 141 lake sites monitored in both 2005 and 2006 seem to indicate that the Metro Area lakes experienced slightly worse water quality conditions in 2006 as compared to 2005. This continued a trend noted in 2005, when the lake monitoring program revealed slightly worse lake water quality than that recorded during the 2004 monitoring year.

A recently conducted statewide trend analysis by MPCA on lakes with extensive Secchi transparency databases revealed that, while the majority of statistically assessed lakes showed no trends in water clarity (either negative or improving), more lakes showed an improving trend than a negative trend (MPCA 2006). Of the CAMP lakes assessed in 2006 (those with sufficient data), 16 showed an improving trend in water clarity (Big Marine, Courthouse, DeMontreville, Elmo, Langton (south basin), Little Carnelian, Long (May Township), Long (Stillwater), McKusick, Olson, Sunset, Upper Prior, Valentine, Valley, Waconia, and West Boot Lakes) and six showed a negative trend (Bavaria, Cedar Island, Farquhar, Markgrafs, Seidl, and Square Lakes) (MPCA 2006).

Overall, only 2 of the 13 lake sites monitored by the Council in 2006 were also monitored in 2005. However, five of the lakes monitored by the Council in 2005 were monitored by CAMP volunteers in 2006. Therefore, a total of seven lake sites monitored by the Council in 2005 were again monitored in 2006. While six of these seven lakes sites received identical overall water quality grades in both years, one lake site experienced worse water quality in 2006 (Keller - Burnsville).

Since 1980, 322 Metropolitan Area lakes have been monitored through the Council's lake monitoring program. Since some of these lakes have multiple monitoring sites a total of 343 lake sites have been monitored. The list of lakes in the Council's monitoring database is shown in Appendix C. The resulting data from the Council's lake monitoring program are permanently stored in the U.S. EPA's national water quality data bank, STORET (STOrage and RETrieval). The majority of the 343 lake sites have been revisited on a rotating schedule throughout the past 27 years, to develop a working baseline to help determine possible water quality trends, and to aid lake and watershed managers in their decision making. While the Council 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 watershed management organizations, counties, and cities. So while the first 14 years of CAMP have been very successful, our future goal is to continue to expand the coverage of our lake monitoring program, in order to better understand and manage the areas water resources.

The Council's lake monitoring program, especially the use of volunteer monitors through CAMP, has played a key role in the Council's recent efforts to use satellite images to assess annual lake water clarity for the entire region. The monitoring program provides "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 region's lake water quality from just the lakes involved in our ground-based programs to all the lakes in the region. 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. A satellite assessment of regional lake water quality could not be completed in 2006 due to the lack of a clear image. However, annual satellite data for Metropolitan Area lakes are available for the 2003-2005 period.

If you have questions pertaining to the lake data or descriptions contained in this report, inquiries about CAMP, or suggestions of lakes the Council should consider monitoring in the future, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

ACKNOWLEDGMENTS

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

- The various watershed management organizations (WMOs), participating agencies, and volunteers involved in the citizen-assisted monitoring program (CAMP). Without their enthusiastic participation, CAMP would not be successful. A list of involved WMOs, agencies, and volunteer lake monitors is shown in Appendix B. The following volunteers should be given added thanks for their multiple years of service:

14 years of service
Diane and Bob Coderre - Sunset Lake

13 years of service
Washington Co. SWCD- Multiple

12 years of service
Bill Aamadt- Wilmes Lake
Janet and Harvey Bartz- Seidl's Lake
Carver Co. Env. Services- Multiple
Wayne LeBlanc- Lake Peltier

11 years of service
City of Circle Pines- Golden Lake
John Ritter - Lake Alimagnet
Wargo Nature Center- George Watch

10 years of service
Anoka Co. Parks- Multiple

9 years of service
Glen Gramse- Keller Lake
Wally Shaver- Lac Lavon Lake
City of Prior Lake- Markley Lake

8 years of service
Philip Goodrich- Pike Lake
Hvass Family - Colby Lake
Lakeville- Valley and Lee lakes
John Ryski- Bavaria Lake
Westwood Nature Center- Westwood Lake

7 years of service
Steve Bur- Northwood Lake
Dave Hanson-Sweeney Lake

6 years of service
Arnett Family- Crystal Lake
Gene Berwald- Pine Tree Lake
Kevin Bjork- Cloverdale Lake
Tom/Dorothy Goodwin- Orchard Lake

6 years of service- continued
Madison Groves- Upper Prior Lake
Green Family- Kingsley Lake
Kristin Mann- Upper Twin Lake
NW College- Little Johanna Lake
Wally Potter- Marion Lake
Rice Creek WD- Multiple
Terry Riley- Markgrafs Lake
Mike Shouldrice- Tamarack Lake
Sly Family- Downs Lake
Phillip Solseng- Long Lake
Streff Family- South Rice Lake
Bob Videen- Parkers Lake

5 years of service
Carolyn Dindorf- Magda Lake
Gerlach Family- Dean Lake
Bonnie Jurand- Klawitter Lake
Wally/Ardyce Potter- Marion Lake
Al Kettlekamp- Long Lake (A.V.)
Tom Sletta- Cates Lake

4 years of service
Rick Bruneau- Farquhar Lake
Walt Burris- Lower Prior Lake
Conservation League of Edina-Cornelia Lake
Bill Feely- Long Lake
Grove Family-McDonald Lake
Kellogg Family- Cobblecrest Lake
Kitty Francy-Payton- Long Lake
Steve Lane- Cedar Island Lake
Bill Tisdell- Spring Lake

3 years service
David Bess- Wood Lake
David Florenzano- Riley Lake
Wayne Hubin- Swede Lake
Muno Family- Hart Lake
Stuart Ruud- Success Lake
Shelly Strohmaier- Lotus Lake
Chuck Taylor- Jane Lake
Gordan Warner- Mitchell Lake

- The Metropolitan Council Environmental Services – Laboratory Services Section, for laboratory analysis of the lake samples.

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Physical/chemical lake data and copies of the volunteer monitoring methods pilot study can be obtained upon request by contacting Kent Johnson at (651) 602-8117 or kent.johnson@metc.state.mn.us**.**

PART I - METROPOLITAN COUNCIL 2006 LAKE MONITORING PROGRAM

INTRODUCTION

Metropolitan Council staff monitored 13 lake sites on 11 lakes in 2006 as part of its continuing effort to manage lakes in the Twin Cities Metropolitan Area (TCMA) (Figure 1). This report continues a series of annual lake studies from 1980 to present (the list of past annual reports is included in the References section later in this report).

Since 1980, 322 Metropolitan Area lakes have been monitored through the Council's lake monitoring program. Since some of these lakes have multiple monitoring sites, a total of 343 lake sites have been monitored. The list of lakes in the Council's monitoring database is shown in Appendix C. The resulting data from the Council's lake monitoring program are permanently stored in the U.S. EPA's national water quality data bank, STORET (STOrage and RETrieval).

The long-term goal of the Council's lake studies has been to provide a comprehensive database to enable cities, counties and watershed management organizations (WMOs) to better manage area lakes. The Council believes that, without such comprehensive lake data, the foundation of lake and watershed management plans is weakened. While the Council has provided a commendable lake monitoring program, the monitoring of others, specifically WMOs, is encouraged (Osgood 1989c). Several agencies and cities have taken initiative (for example, Ramsey County, Eagan, Maple Grove, and Minneapolis Park and Rec. Board), but for the most part the WMOs are not collecting adequate data.

To date, the Council's lake monitoring programs have provided an important tool for making informed lake management decisions. Data from our regional lake monitoring programs 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 landuse 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.

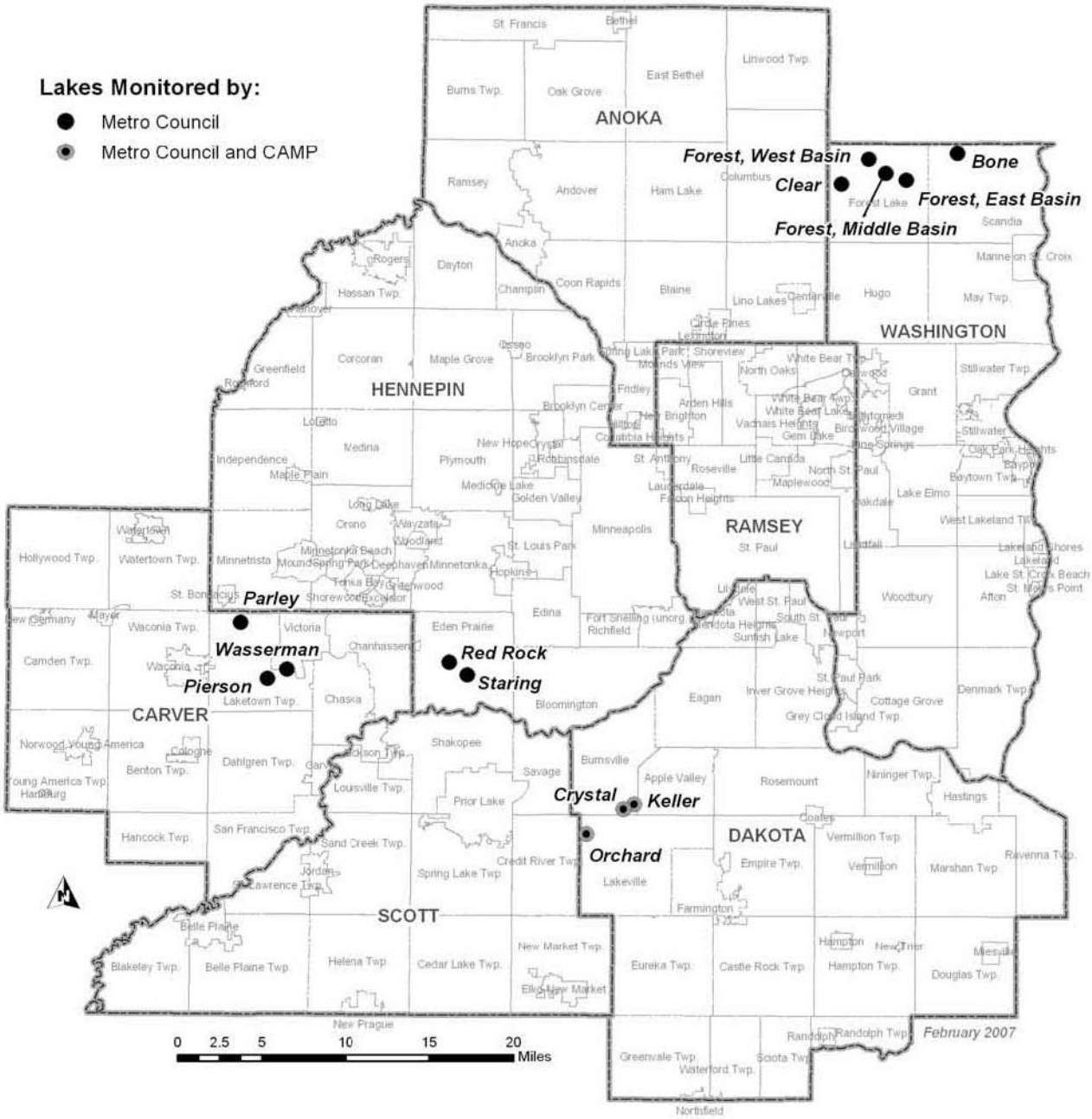
The Council addressed this lack of adequate lake water quality data by initiating a citizen-assisted lake monitoring program (CAMP) in 1993. CAMP is funded in part by watershed districts (WDs), WMOs, counties, and cities that are participating in the program. Through this program, citizens collect comprehensive data. To assure that the data collection methods used by citizen volunteers are credible, the Council conducted a pilot study along with its routine monitoring in 1991 (Hartsoe and Osgood 1991). The pilot study and its results are included in the 1993 lake report, and can be obtained by contacting Kent Johnson at (651) 602-8117 or kent.johnson@metc.state.mn.us. The methods and results of 2006 CAMP monitoring are described in Part II of this report.

The Council's lake monitoring program, especially the use of volunteer monitors through CAMP, has played a key role in the Council's recent efforts to use satellite images to assess annual lake water clarity for the entire region. The monitoring program provides "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 region'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.

A satellite assessment of the lake water quality for the region could not be completed for 2006 due to the lack of a clear image. However, annual satellite assessment data for Metropolitan Area lakes are available for the 2003-2005 period.

Figure 1

2006 Metropolitan Council Study Lakes



METHODS

Thirteen sites on 11 lakes were monitored by Council staff at two-week intervals from mid-April through mid-October, 2006. The lakes were normally visited between 8:00 a.m. and noon on the sampling days. Samples were collected from one station located over the deepest spot near the center of each lake. The sampling location(s), as well as graphs of the seasonal data, are shown on lake information sheets located in alphabetical order at the end of Part I of this report.

A hand-held Global Positioning System (GPS) was used to lock in sampling location coordinates (shown as latitude and longitude on the lake information sheets), and to aid in relocating sampling locations during each ensuing monitoring event. Time, surf and weather conditions, and station depth were recorded upon anchoring at the site. Temperature, dissolved oxygen, pH, specific conductivity, turbidity, chloride, and oxidation reduction potential were measured at one-meter intervals (additional readings are captured at half-meter intervals near the thermocline) using a Yellow Springs, Inc. (model 650 MDS) multiparameter field monitoring system. The YSI was calibrated in the morning, prior to the daily monitoring, and again after the last lake was monitored on that day. Water transparency was measured using a 20 cm black-and-white Secchi disk.

Water was collected from the lake surface (0-2 m) using a two-meter PVC pipe with a two-liter capacity. Two or three such samples were mixed in an 8-liter plastic jug. Subsurface samples (middle and near bottom) were drawn using a 2-liter Van Dorn. All water samples were transported on ice in a dark cooler and processed and preserved within six hours of collection. Water from the surface jug was withdrawn for the following chemical analyses (depending on the lake): total phosphorus (TP), total Kjeldahl nitrogen (TKN), chlorophyll-a (CLA), and chloride (Cl). Subsurface samples were analyzed for TP/TKN on all lakes deeper than 2.5 meters. Additionally, surface and subsurface samples on Bone, Crystal (Burnsville), Forest (all three basins), and Keller (Burnsville) Lakes were analyzed for dissolved ortho-phosphorus (DOP), total iron (TFe), and total dissolved iron (TDFe).

The routine chemical analyses were performed at the Metropolitan Council Environmental Services - Environmental Quality Assurance Department (MCES-EQA) 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 1980). Samples analyzed for TKN were chemically reduced the same way as the TP samples, 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, at which time their average values were reported.

Water samples to be analyzed for CLA were filtered onto a 0.45 μm glass-fiber-filter, saturated with magnesium carbonate, and stored frozen in the dark until analyzed (within 30 days). 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 1980).

RESULTS and ANALYSIS

Tables 1, 2, and 3 show summertime average phosphorus concentrations in micrograms per liter (µg/l), chlorophyll-a concentrations in µg/l, and Secchi transparency measurements in meters (m), for the 13 lake sites monitored by the Council. Raw data will be input into the STORET database, or it can be obtained upon request by contacting Kent Johnson at (651) 602-8117 or kent.johnson@metc.state.mn.us. Tables 1, 2, and 3 also document summertime means (May through September) for any prior years the lake was monitored by the Council. Seasonal data for each lake are graphed at the end of Part I of this report.

Due to normal seasonal variability, insufficient data collection intensity for each lake, and changing climatological conditions, determining long-range water quality trends in area lakes is generally not statistically reliable. Accurate conclusions are difficult because one year's data may represent only one monitoring date or parameter, water quality may fluctuate greatly from year to year, and/or the lake may only be monitored once every ten years. Therefore, to fully determine if there truly is a change in the water quality of a lake, either additional years of data collection are needed in the future to accurately determine the present condition of the lake, and/or a broader, more complete historical baseline database is needed.

While an extensive database of a lake's present water quality is obtainable, a more extensive historical database is not. In other words, without a complete and accurate historical database, which is rare, it is difficult to determine if a lake's quality has changed because it is not known what its quality used to be. Therefore, an extensive baseline database needs to be constructed now, so lake quality trends can be determined in the future. Recent statistical trend analysis completed by the MPCA revealed that only one of the 13 lakes had a statistically significant trend: Pierson Lake showed a decreasing water clarity trend (MPCA 2006).

After comparing the 2006 data to pre-2006 data on the 13 lake sites, a few general comments and observations can be made. A review of each lake's summertime TP, CLA and Secchi means and water quality grades reveal that all lake sites seem to have water quality levels in 2006 that fall within their normal fluctuation ranges of seasonal water quality.

Overall, seven of the 13 lake sites monitored by the Council in 2006 were also monitored in 2005. While six of these seven lakes received identical overall water quality grades in both years, one lake experienced worse water quality in 2006 (Keller - Burnsville).

Table 1
Trends in May - September Average Surface Total Phosphorus Concentration (μg/l)

Lake	'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
Bone	--	--	--	--	83	--	--	--	--	46	--	50	47	58	--	--	--	36	34	--	--	40	66	75	59	57	54
Clear	43	--	--	--	44	--	--	--	--	--	--	--	--	49	29	31	23	22	29	36	69	34	44	38	--	--	44
Crystal (Burnsville)	45*	--	--	38	--	--	--	--	--	30	--	--	--	--	34	45	68	38	43	35	38	29	37	52	39	37	45
Forest (East Basin)	40	--	--	--	36	--	--	--	--	--	--	--	--	--	40	--	--	33	--	--	--	--	26	--	--	35	38
Forest (Mid. Basin)	--	--	--	--	40	--	--	--	--	--	--	--	--	--	37	--	--	31	--	--	--	--	23	--	--	41	37
Forest (West Basin)	--	--	--	--	40	--	--	--	--	--	--	--	--	33	--	--	35	26	28	44	38	27	34	34	30	38	39
Keller (Burnsville)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	141	70	43	104	114	100	65	109	41	56	87
Orchard	40	26	--	31	--	--	--	--	--	28	--	--	--	35	--	--	--	--	38	34	39	25	--	38	38	30	40
Parley	--	--	--	--	91	--	207	133	--	--	--	104	--	--	--	--	94	--	--	79	--	90	--	75	--	--	95
Pierson	25*	24	--	18	--	--	--	--	--	20	--	--	--	--	--	21	--	--	--	--	--	18	21	19	--	--	31
Red Rock	--	--	--	--	--	--	--	--	--	--	--	70	--	--	--	--	--	--	--	74	80	--	--	70	83	--	94
Staring	80	--	--	--	--	80	--	--	--	--	--	--	--	--	--	76	--	--	--	--	--	110	--	--	117	--	118
Wasserman	--	--	--	78	--	--	44	48	--	--	--	--	--	--	64	--	--	63	65	85	--	--	51	72	--	--	74

* Sampled only twice in 1980

Table 2
Trends in May - September Average Surface Chlorophyll-a Concentration (µg/l)

Lake	'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
Bone	--	--	--	--	54	--	--	--	--	28	--	29	52	38	--	7	--	16	20	34	--	31	40	39	32	20	18
Clear	38	--	--	--	29	--	--	--	--	--	18	--	--	13	9	9	9	9	12	12	10	14	9	8	--	--	14
Crystal (Burnsville)	22*	--	--	19	--	--	--	--	--	14	--	--	--	--	15	32	24	22	40	15	37	19	16	27	18	22	25
Forest (East Basin)	49	--	--	--	32	--	--	--	--	--	17	--	--	--	18	--	--	15	--	--	--	--	15	--	--	22	18
Forest (Mid. Basin)	--	--	--	--	34	--	--	--	--	--	20	--	--	--	18	--	--	12	--	--	--	--	14	--	--	23	18
Forest (West Basin)	--	--	--	--	34	--	--	--	--	--	22	--	--	--	15	--	14	14	16	17	11	17	13	14	9	22	19
Keller (Burnsville)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	81	36	5	36	34	26	20	42	14	12	62
Orchard	16	11	--	11	--	--	--	--	--	14	--	--	--	17	--	--	--	--	24	30	20	13	--	22	17	12	18
Parley	--	--	--	--	70	--	86	66	--	--	--	76	--	--	--	--	55	--	--	57	--	78	--	65	--	--	90
Pierson	12*	8	--	14	--	--	--	--	--	10	--	--	--	--	--	11	--	--	--	--	--	18	12	13	--	--	17
Red Rock	--	--	--	--	--	--	--	--	--	--	--	50	--	--	--	--	--	--	--	62	41	--	--	51	70	--	64
Staring	48	--	--	--	--	50	--	--	--	--	--	--	--	--	--	36	--	--	--	68	--	71	--	--	106	--	95
Wasserman	--	--	--	65	--	--	42	40	--	--	--	--	--	--	47	--	--	44	64	50	--	--	19	30	--	--	41

* Sampled only twice in 1980

Table 3
Trends in May - September Average Secchi Disk Transparency (m)

Lake	'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
Bone	--	--	--	--	1.2	--	1.0	1.6	1.1	1.3	1.3	1.7	0.9	1.1	1.0	1.1	1.3	1.5	1.5	1.1	--	1.5	1.1	1.4	1.6	2.0	2.0
Clear	1.3	--	--	--	1.2	--	--	--	--	--	1.5	--	--	1.2	1.2	1.4	1.4	1.4	1.4	1.4	1.3	1.3	1.5	1.8	--	--	1.9
Crystal (Burnsville)	2.0*	--	--	2.2	--	--	--	--	--	2.5	--	--	--	--	1.9	1.5	1.7	2.2	1.8	1.4	1.3	2.0	2.2	1.5	1.9	1.6	1.9
Forest (East Basin)	1.3	--	--	--	1.4	--	--	--	--	--	2.0	--	--	--	1.7	--	--	1.8	--	--	--	--	2.0	--	--	1.9	1.8
Forest (Mid. Basin)	--	--	--	--	1.3	--	--	--	--	--	1.8	--	--	--	1.6	--	--	1.7	--	--	--	--	2.0	--	--	1.9	1.8
Forest (West Basin)	--	--	--	--	1.4	--	--	--	--	--	--	--	--	1.6	--	--	1.5	1.5	1.7	1.3	1.4	1.7	2.0	1.7	2.2	2.2	1.7
Keller (Burnsville)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.1	0.9	2.0	1.0	0.7	1.1	1.1	0.7	1.5	1.5	1.3
Orchard	2.0	3.0	--	2.9	--	--	--	--	--	2.1	--	--	--	2.0	--	--	--	--	1.9	2.1	2.0	2.3	--	2.0	2.6	2.4	2.4
Parley	--	--	--	--	0.8	--	1.8	1.1	--	--	--	1.0	--	--	--	--	1.3	--	--	1.2	--	1.4	--	1.5	--	--	0.8
Pierson	2.4*	3.3	--	2.4	--	--	--	--	--	2.7	--	--	--	--	--	2.2	--	--	--	--	--	2.0	2.0	2.7	--	--	2.0
Red Rock	--	--	--	--	--	--	--	--	--	--	--	0.7	--	--	--	--	--	--	--	1.2	1.5	--	--	1.6	1.3	--	1.2
Staring	0.6	--	--	--	--	0.9	--	--	--	--	--	--	--	--	--	0.8	--	--	--	0.5	--	0.7	--	--	0.5	--	0.6
Wasserman	--	--	--	1.3	--	--	2.4	2.2	--	--	--	--	--	--	0.9	--	--	1.2	0.9	0.9	--	--	1.1	1.3	--	--	1.2

* Sampled only twice in 1980

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 disk. These percentiles use ranked data from 120 lakes sampled 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 commonality, 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. And finally, 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 TP, CLA and Secchi grades to the monitored lakes. Therefore, a lake having a mean summertime Secchi transparency of 1.7 m would receive a “C” grade, or is considered average compared to other area lakes. Overall lake water quality grades were determined by averaging the individual grades. Grades will generally correspond to descriptive rankings and recreational-use impairments of lakes. Lakes receiving an “A” grade (<10-percentile) can be deemed exceptional as compared to other area lakes and as having no recreational use impairments. A “B” grade lake is considered to have very good water quality and some recreational use impairment, while lakes receiving a “C” are considered to have average water quality and are recreationally impaired. A “D” grade lake translates to a very poor ranking (severely impaired), and a lake receiving a grade of “F” would mean extremely poor quality compared to other area lakes, with no possible recreational use.

The report card for lakes sampled by Metropolitan Council staff in 2006 is presented below. Grades for CAMP-monitored lakes will be addressed later in this report. The grades are based on all data from past studies, so that the grade represents an overall characterization.

2006 LAKE QUALITY REPORT CARD

Bone	C	Orchard	B
Clear	C	Parley	D
Crystal (Burnsville)	C	Pierson	B
Forest (West Basin)	C	Red Rock	D
Forest (Middle Basin)	C	Staring	F
Forest (East Basin)	C	Wasserman	C
Keller (Burnsville)	D		

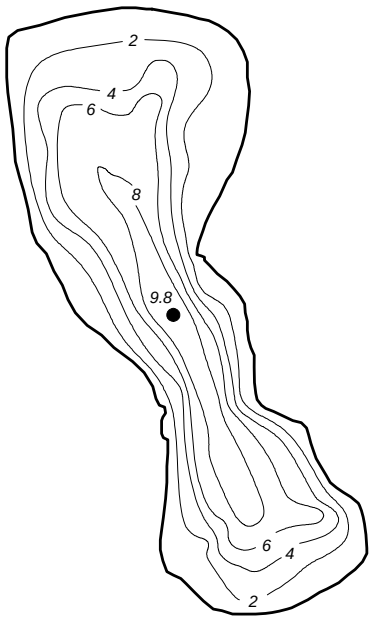
Bone Lake

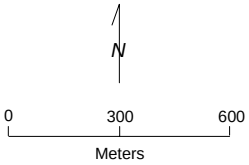
New Scandia Twp,
Washington Co.

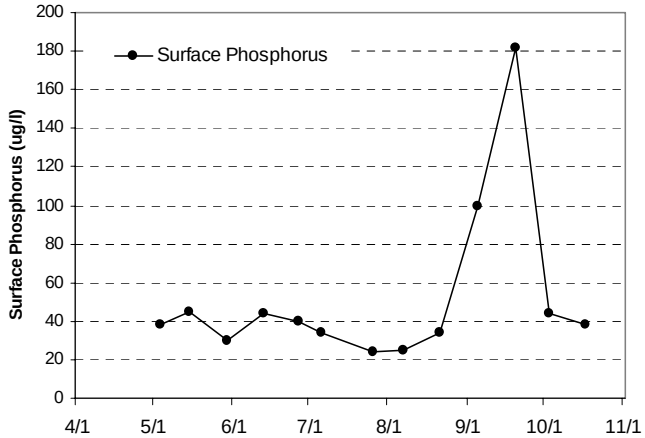
Lake ID: 820054
WMO: Comfort Lake-Forest Lake

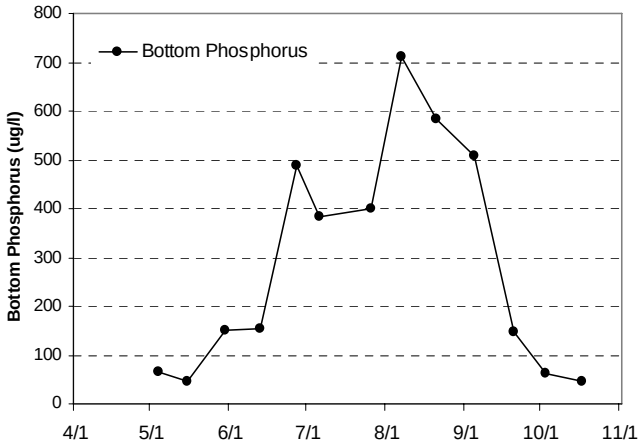
● Sampling site

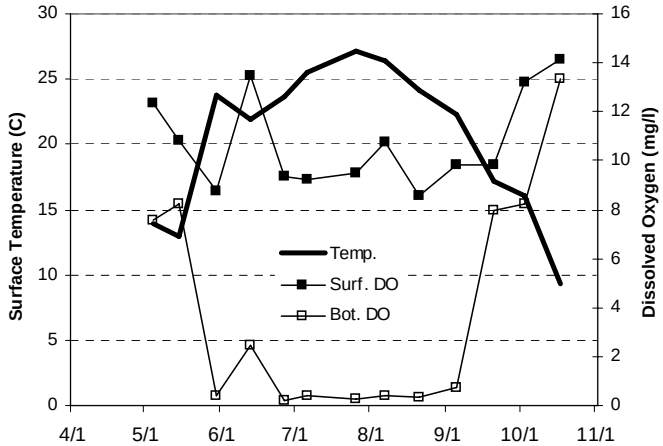
Contours in meters

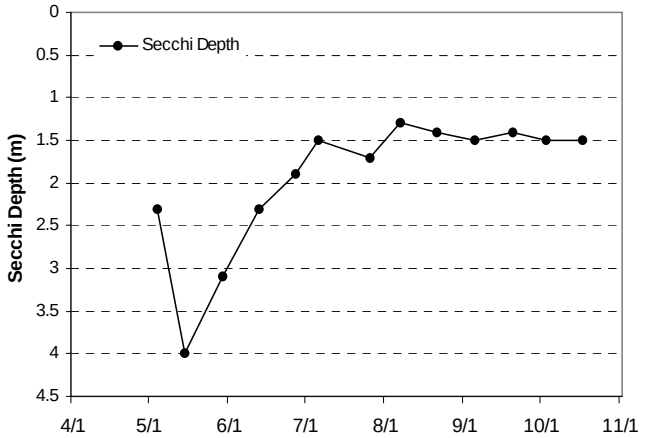












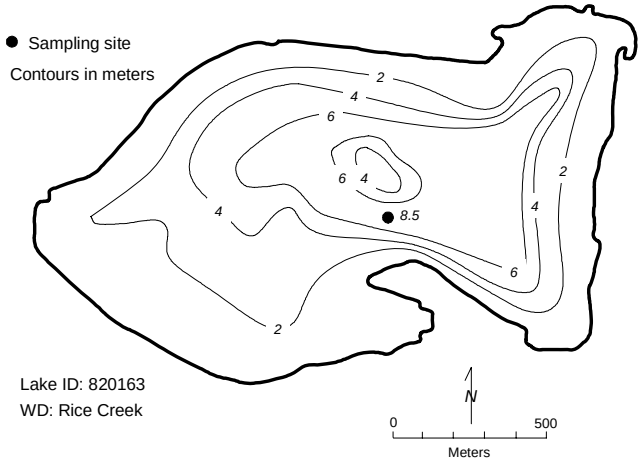
Lake Water Quality Grades Based on Summertime Averages

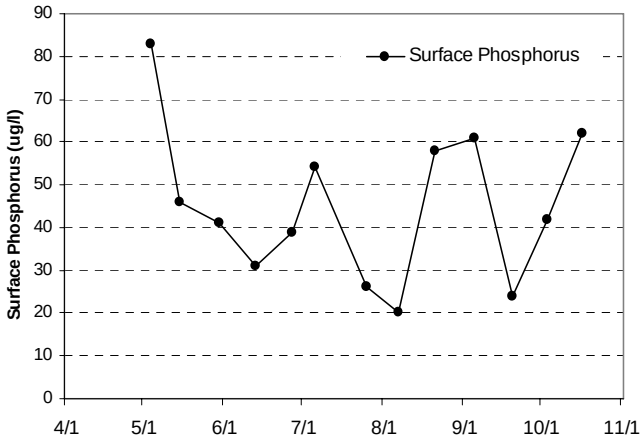
Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus					D			C	C	C		D	
Chlorophyll a					C			B	C	C		C	
Secchi Depth					C		D	C	D	C	C	C	
Overall					**C**			**C**	**C**	**C**		**C**	

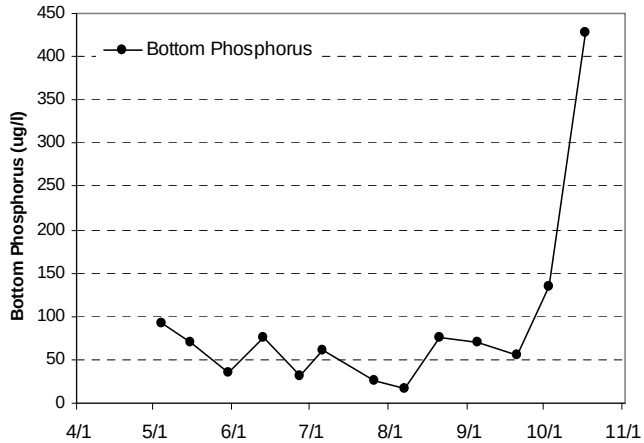
Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus	C				C	C	C		C	C	D	C	C	C
Chlorophyll a	C				B	B	C		C	C	C	C	B	B
Secchi Depth	C	D	C		C	C	D		C	D	C	C	C	C
Overall	**C**				**C**	**C**	**C**		**C**	**C**	**C**	**C**	**C**	**C**

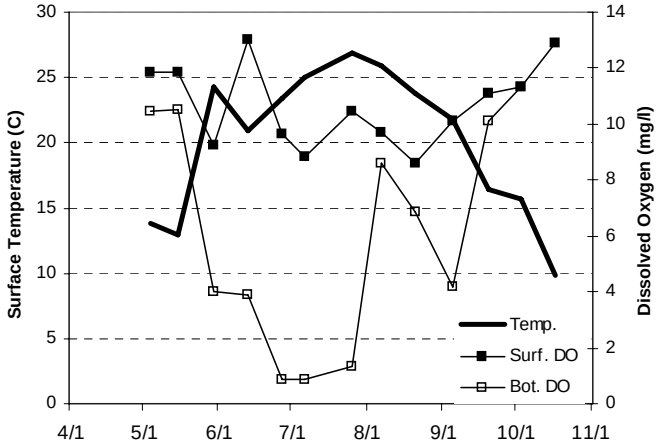
Source: Metropolitan Council and STORET data

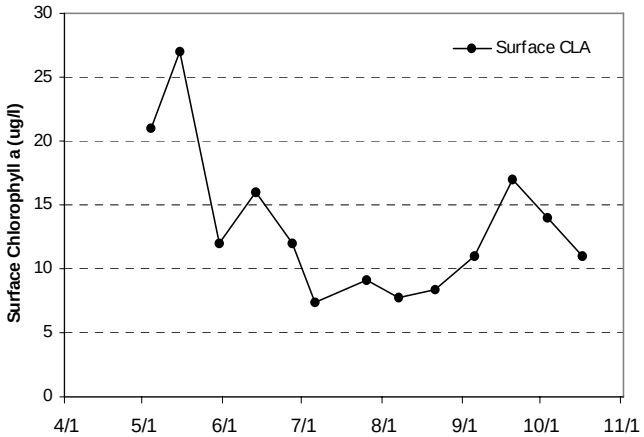
Clear Lake
Columbus Twp., Anoka Co.









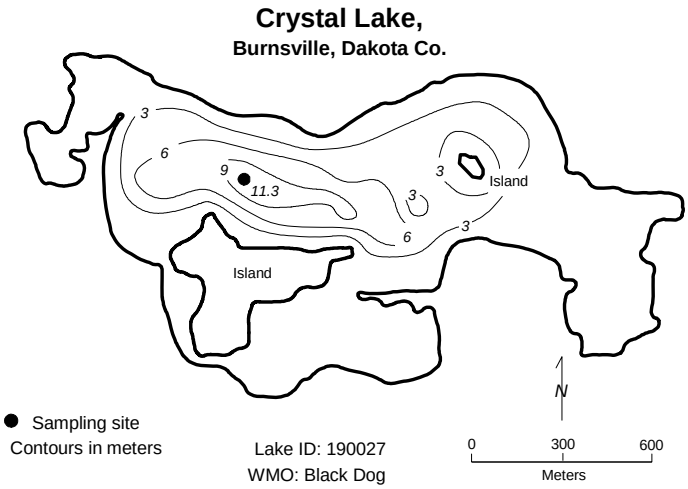


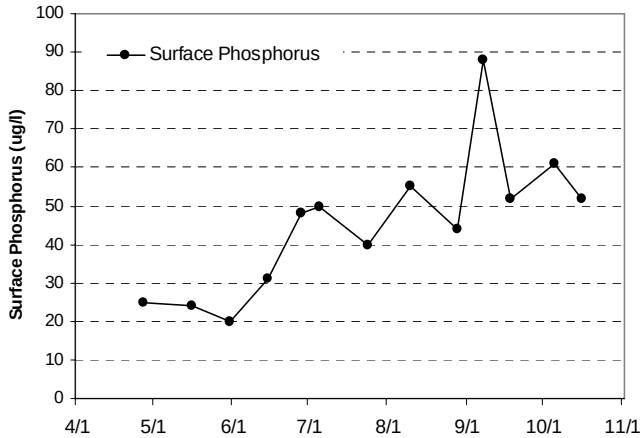
Lake Water Quality Grades Based on Summertime Averages

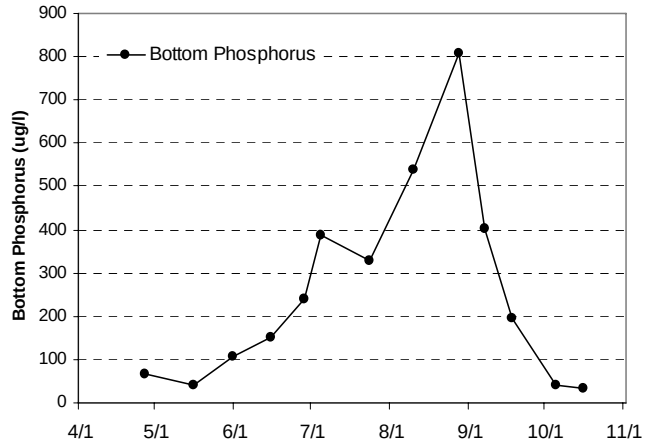
Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus	C				C								
Chlorophyll a	C				B						B		
Secchi Depth	C				C	F		D	D	C	C	D	D
Overall	**C**				**C**								

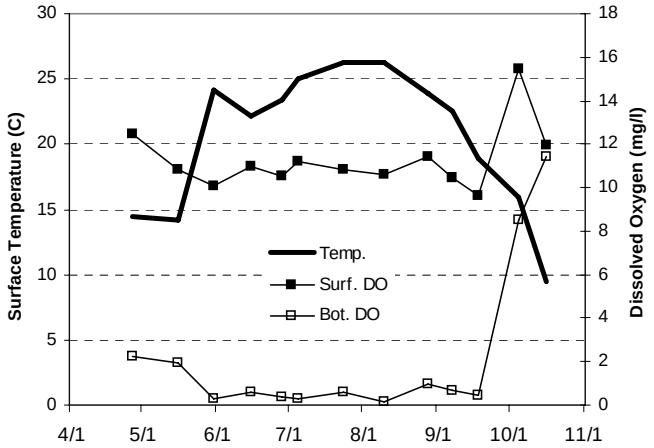
Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus	C	B	B	B	A	B	B	D	C	C	C			C
Chlorophyll a	B	A	A	A	A	B	B	B	B	A	A			B
Secchi Depth	C	C	C	C	C	C	C	C	C	C	C			C
Overall	**C**	**B**	**B**	**B**	**B**	**B**	**B**	**C**	**C**	**B**	**B**			**C**

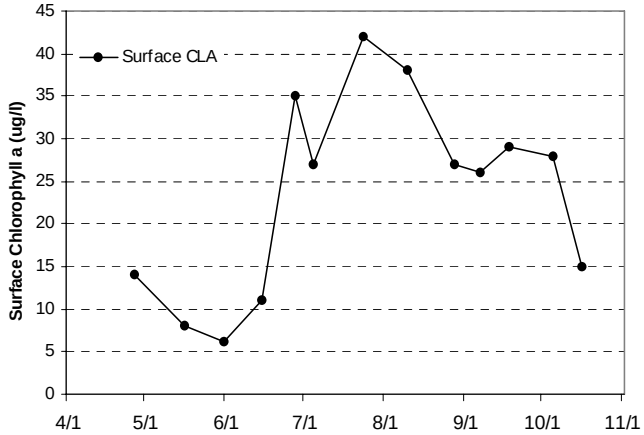
Source: Metropolitan Council and STORET data

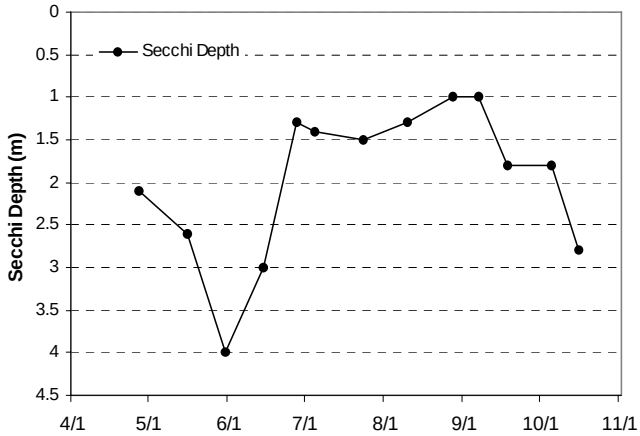










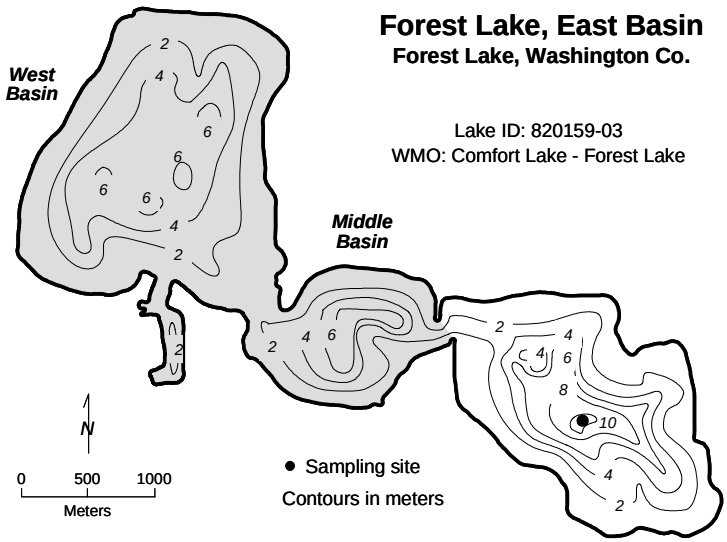


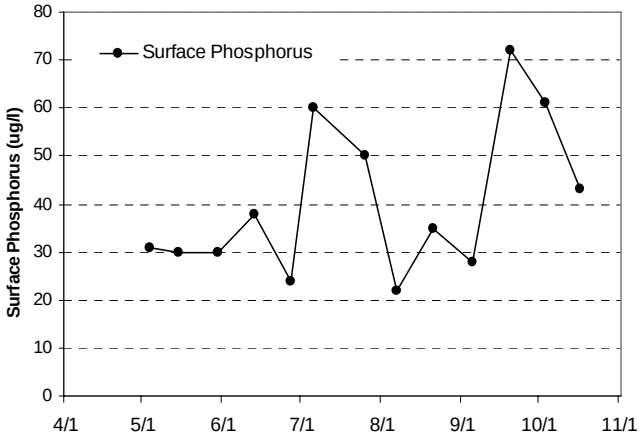
Lake Water Quality Grades Based on Summertime Averages

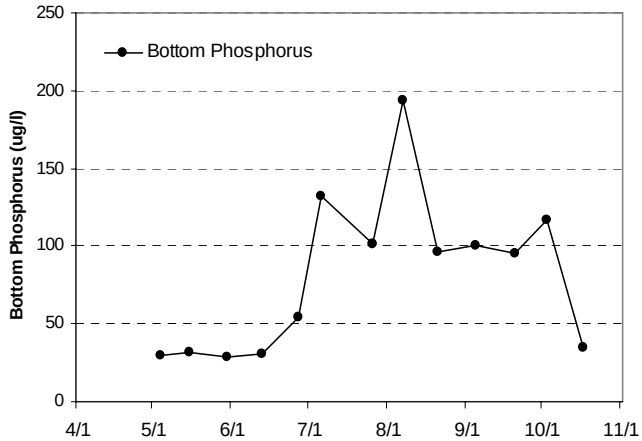
Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus	C	C		C						B			
Chlorophyll a	C			B				C		B			
Secchi Depth	C	C	C	B	C	B	B	C	C	B	C	B	B
Overall	**C**			**B**						**B**			

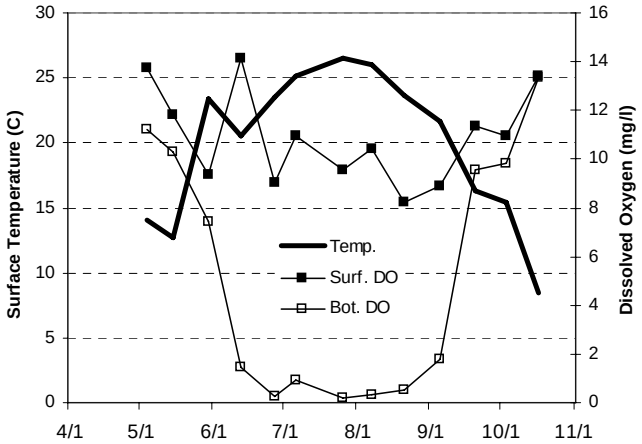
Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus		C	C	C	C	C	C	C	B	C	C	C	C	C
Chlorophyll a		B	C	C	C	C	B	C	B	B	C	B	C	C
Secchi Depth		C	C	C	C	C	C	C	C	C	C	C	C	C
Overall		**C**	**C**	**C**	**C**	**C**	**C**	**C**	**B**	**C**	**C**	**C**	**C**	**C**

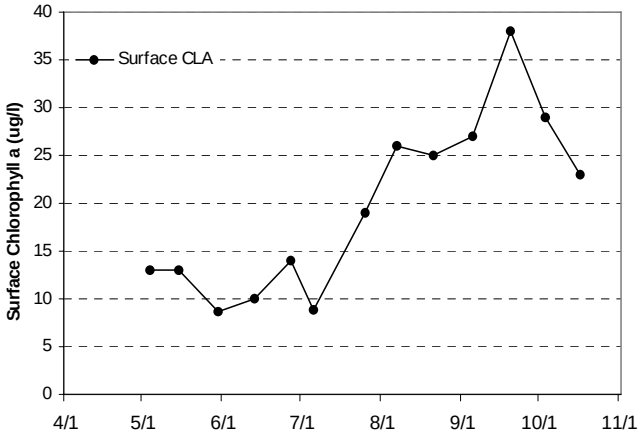
Source: Metropolitan Council and STORET data









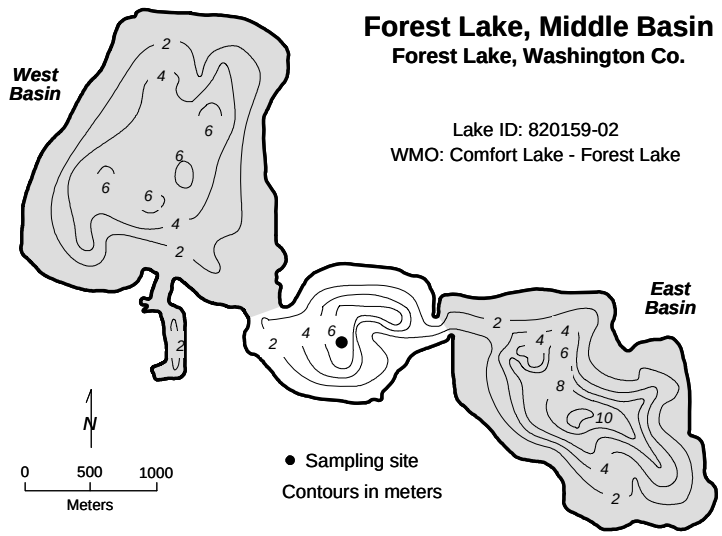


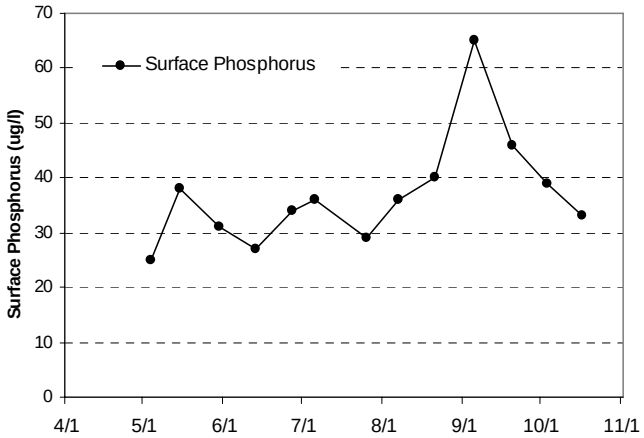
Lake Water Quality Grades Based on Summertime Averages

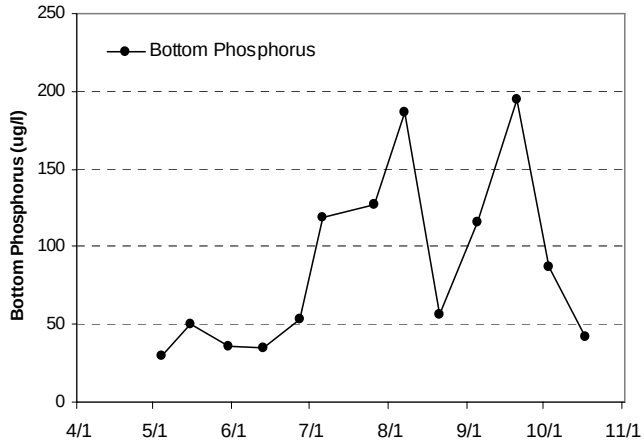
Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus	C				C		D	C		B		B	
Chlorophyll a	D				C		C			B	B	C	
Secchi Depth	C				C		C	C	C	C	C	C	
Overall	**C**				**C**		**C**			**B**		**C**	

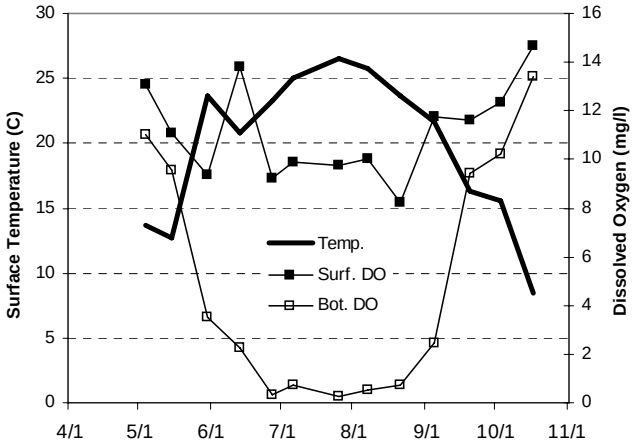
Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus	C			C						B			C	C
Chlorophyll a	B			B						B			C	B
Secchi Depth	C			C						C			C	C
Overall	**C**			**C**						**B**			**C**	**C**

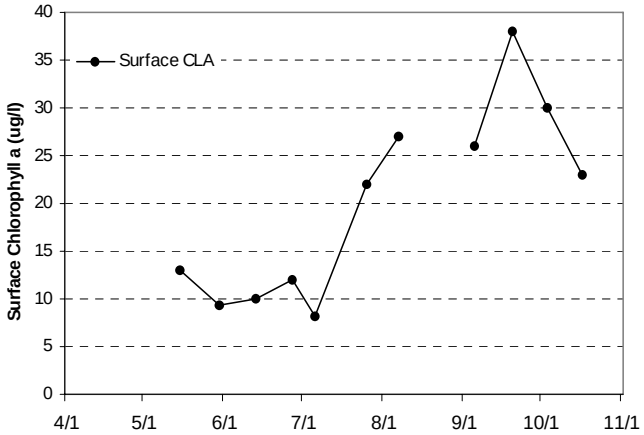
Source: Metropolitan Council and STORET data

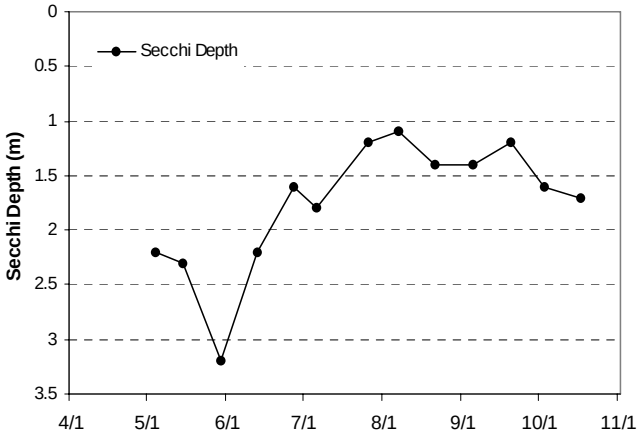










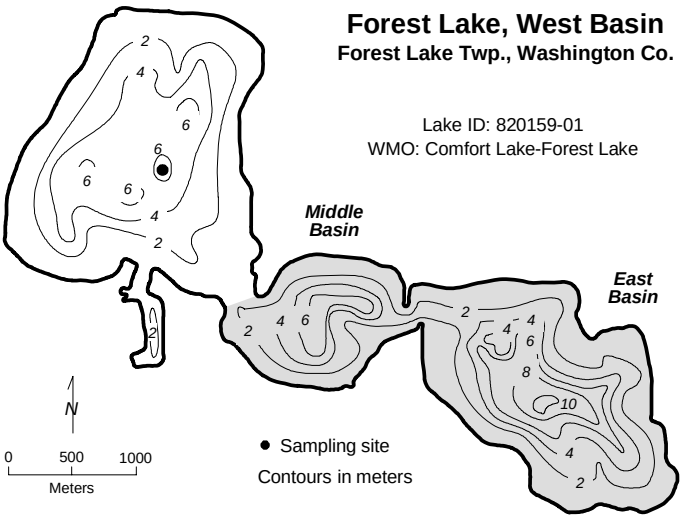


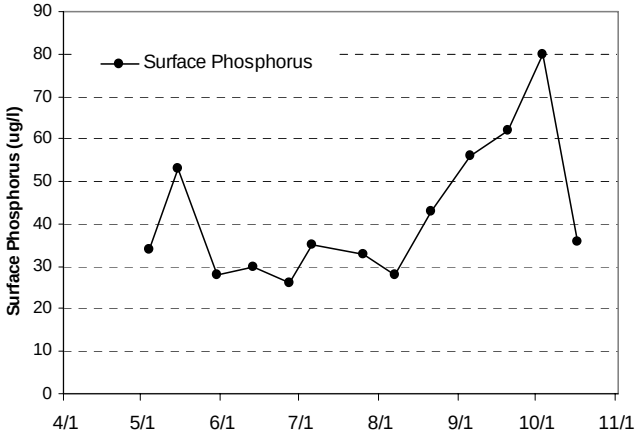
Lake Water Quality Grades Based on Summertime Averages

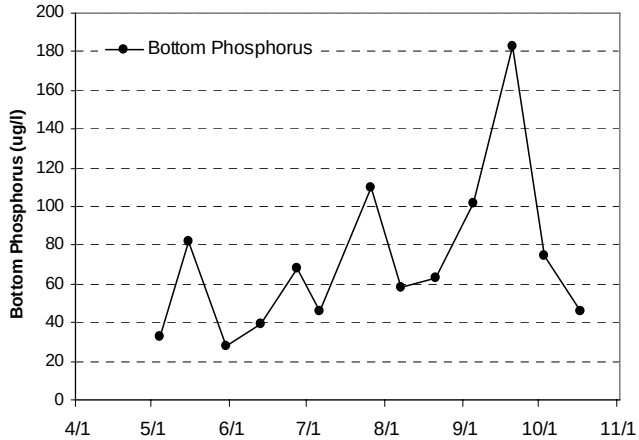
Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus					C		C	C	C	B		C	
Chlorophyll a					C		C		C	B	B	B	
Secchi Depth					C		C	C	C	C	C	C	
Overall					**C**		**C**		**C**	**B**		**C**	

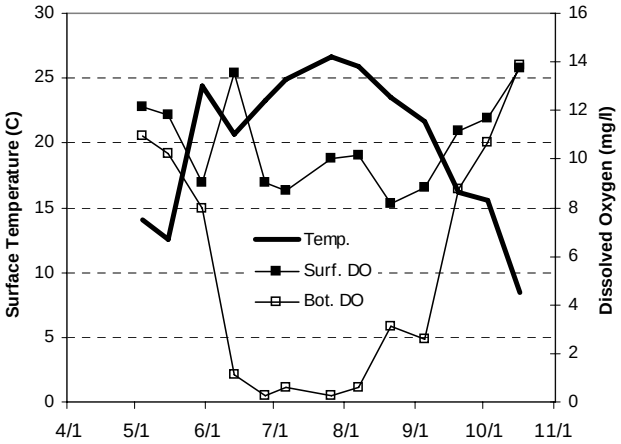
Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus	C		B							A			C	C
Chlorophyll a	B		B							B			C	B
Secchi Depth	C		C							C			C	C
Overall	**C**		**B**							**B**			**C**	**C**

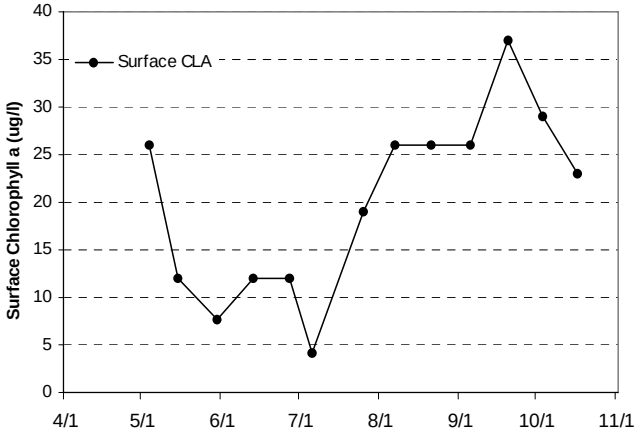
Source: Metropolitan Council and STORET data

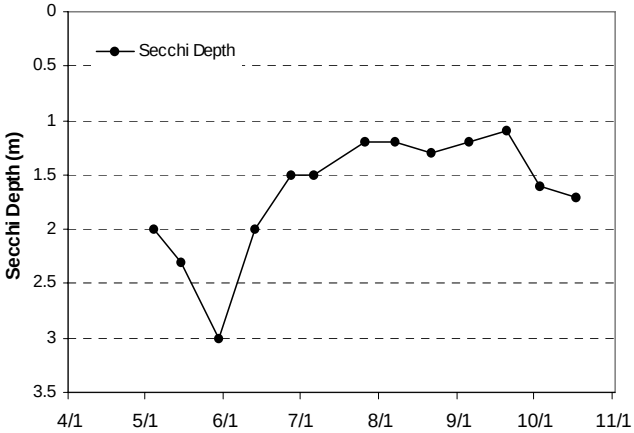












Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus					C		C	C	C	B		C	
Chlorophyll a					C		C		C	B	C	B	
Secchi Depth					C		C	C	C	C	C	C	
Overall					**C**		**C**		**C**	**B**		**C**	

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus	C			C	B	B	C	C	B	C	C	B	C	C
Chlorophyll a	B			B	B	B	B	B	B	B	B	A	C	B
Secchi Depth	C			C	C	C	C	C	C	C	C	B	C	C
Overall	**C**			**C**	**B**	**B**	**C**	**C**	**B**	**C**	**C**	**B**	**C**	**C**

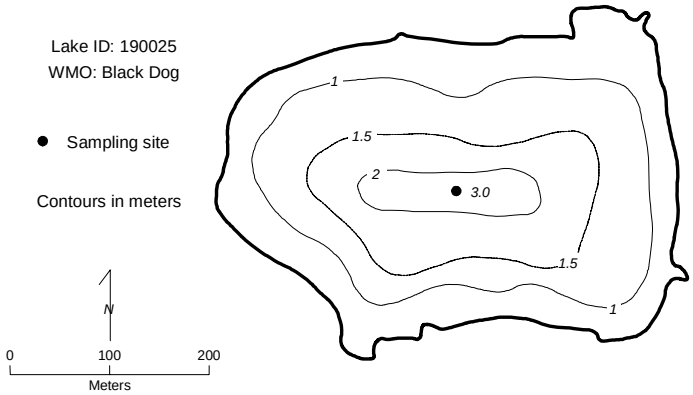
Source: Metropolitan Council and STORET data

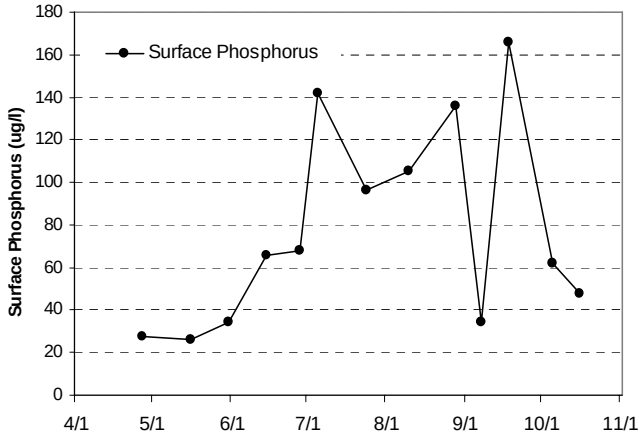
Keller Lake
Burnsville, Dakota Co.

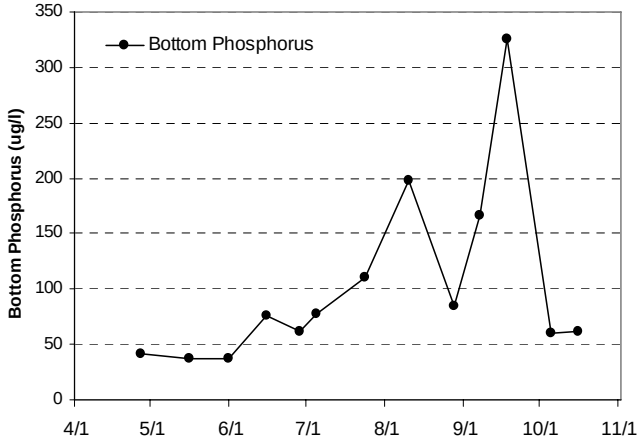
Lake ID: 190025
WMO: Black Dog

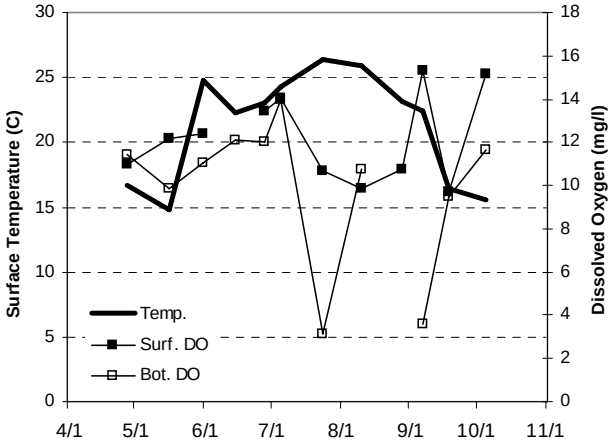
● Sampling site

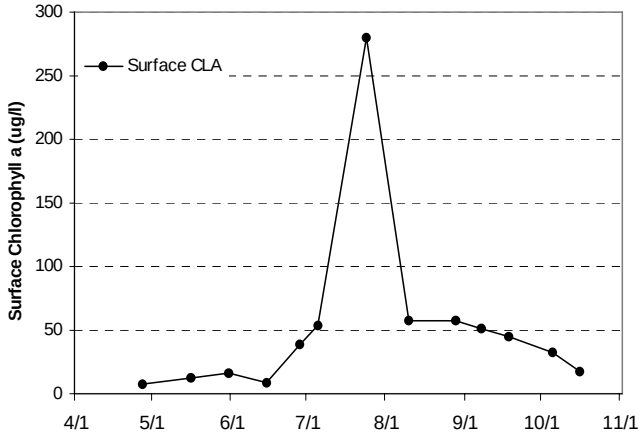
Contours in meters

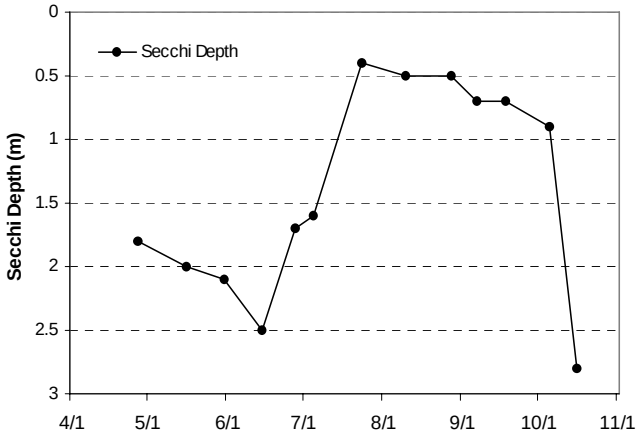












Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus				D	D	C	D	D	D	C	D	C	C	D
Chlorophyll a				F	C	A	C	C	C	B	C	B	B	D
Secchi Depth				D	D	C	D	D	D	D	D	C	C	C
Overall				**D**	**D**	**B**	**D**	**D**	**D**	**C**	**D**	**C**	**C**	**D**

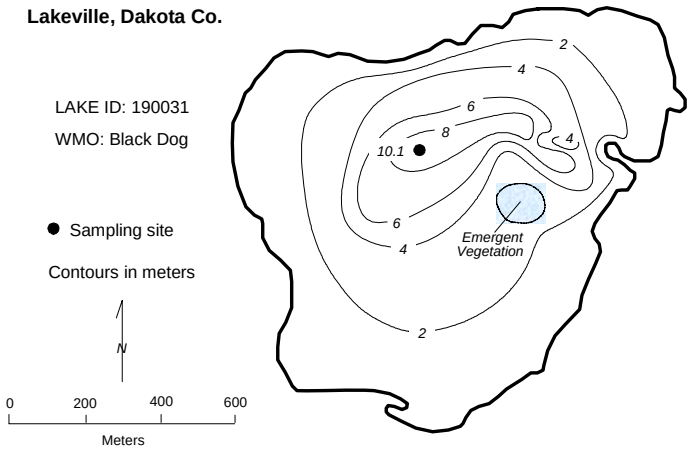
Source: Metropolitan Council and STORET data

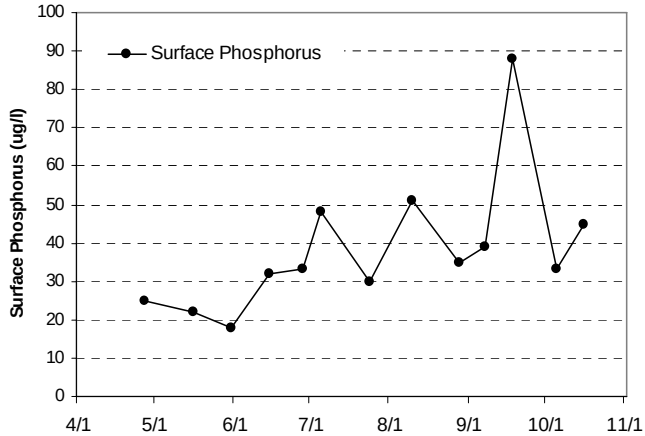
Orchard Lake

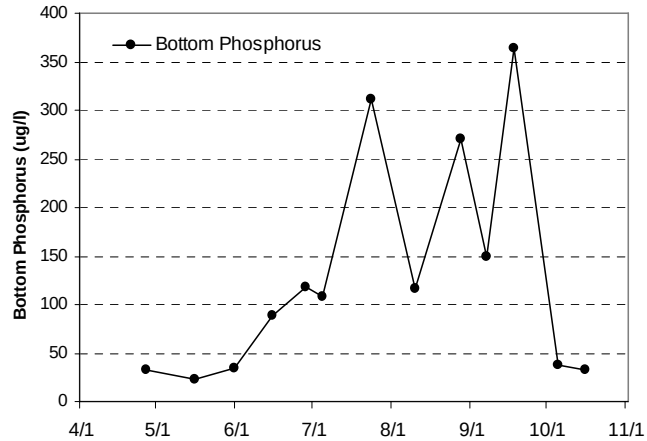
Lakeville, Dakota Co.

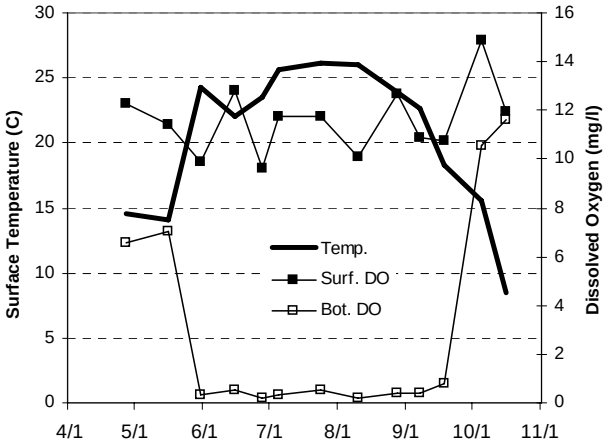
LAKE ID: 190031

WMO: Black Dog







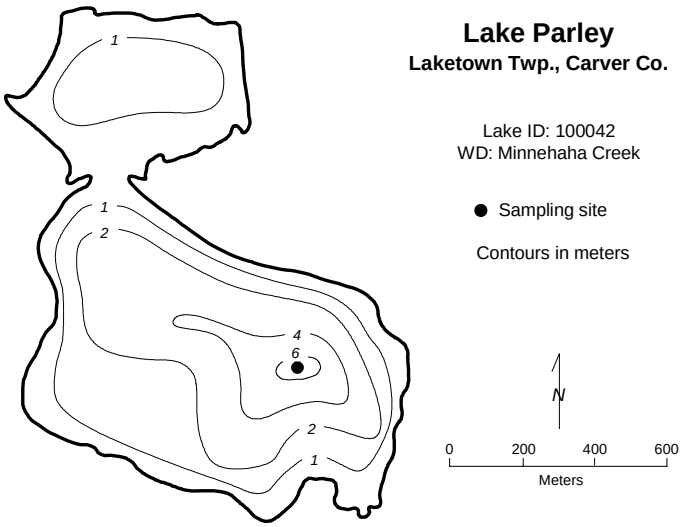


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus	C	B		B						B			
Chlorophyll a	B	B		B						B			
Secchi Depth	C	B		B				C	C	C	D	C	
Overall	**C**	**B**		**B**						**B**			

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus	C					C	C	C	B		C	C	B	C
Chlorophyll a	B					C	C	C	B		C	B	B	B
Secchi Depth	C					C	C	C	B		C	B	B	B
Overall	**C**					**C**	**C**	**C**	**B**		**C**	**B**	**B**	**B**

Source: Metropolitan Council and STORET data



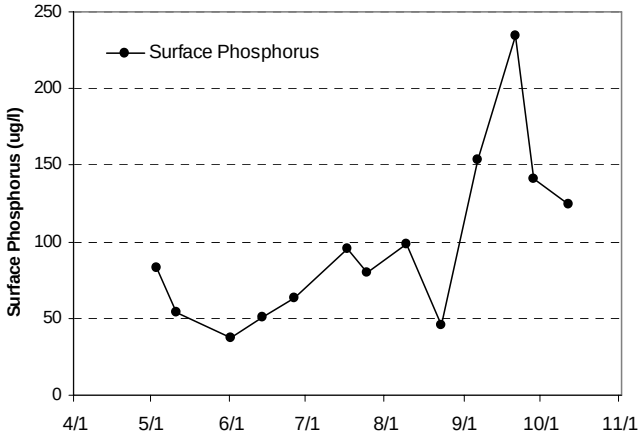
Lake Parley

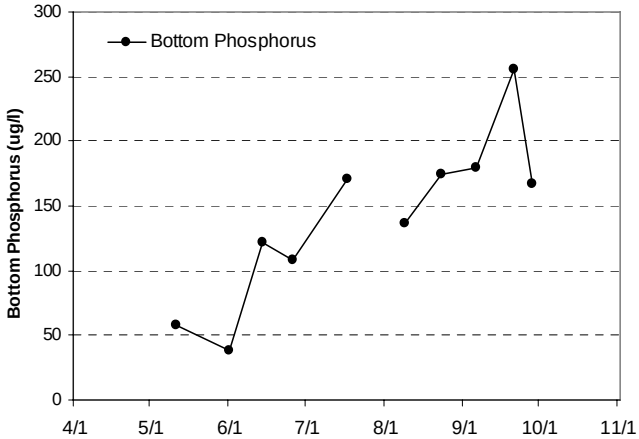
Laketown Twp., Carver Co.

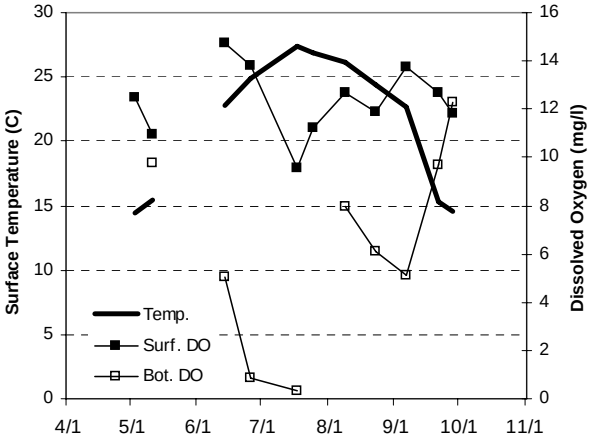
Lake ID: 100042
WD: Minnehaha Creek

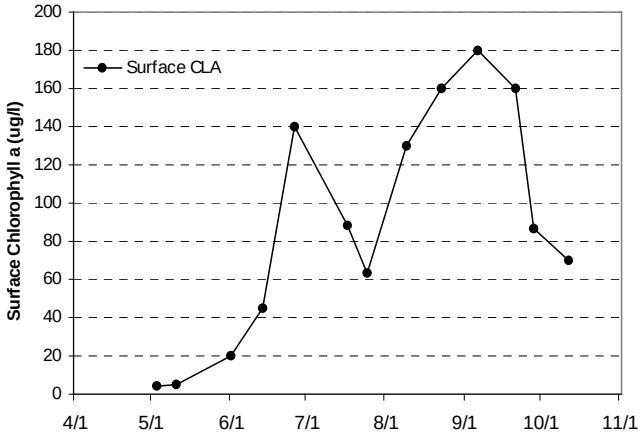
● Sampling site

Contours in meters









Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus					D		F	D				D	
Chlorophyll a					D		F	D				D	
Secchi Depth					D		C	D				D	
Overall					**D**		**D**	**D**				**D**	

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus				D			D				D			D
Chlorophyll a				D			D				D			F
Secchi Depth				C			D				C			D
Overall				**D**			**D**				**D**			**D**

Source: Metropolitan Council and STORET data

Lake Pierson

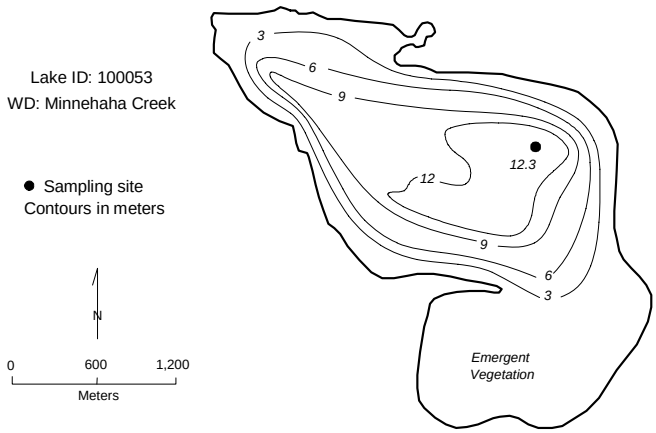
Laketown Twp., Carver Co.

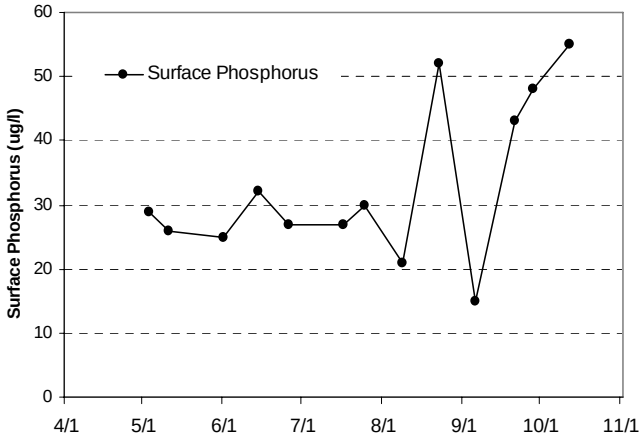
Lake ID: 100053

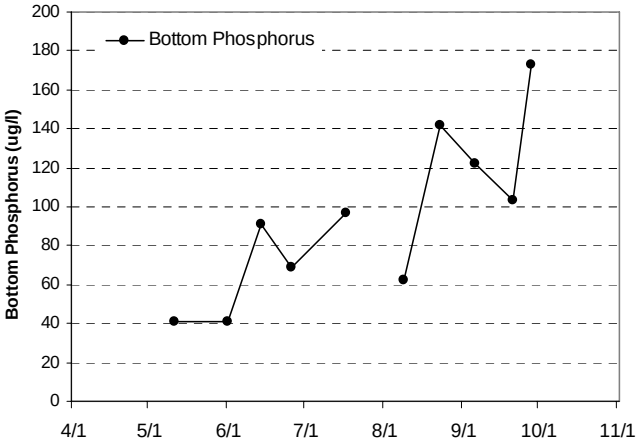
WD: Minnehaha Creek

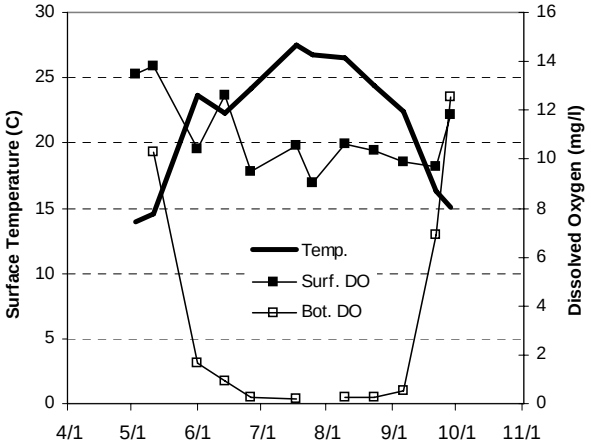
● Sampling site

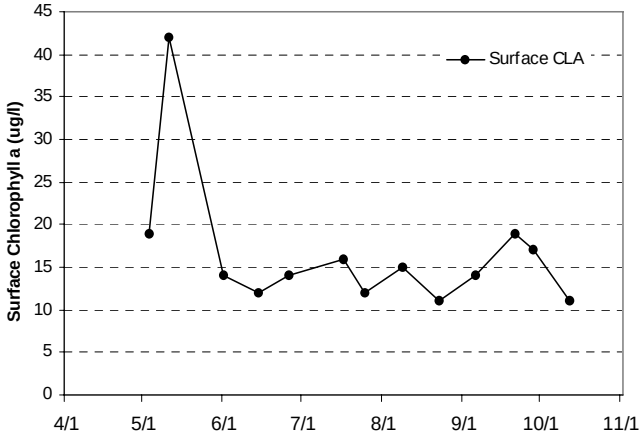
Contours in meters

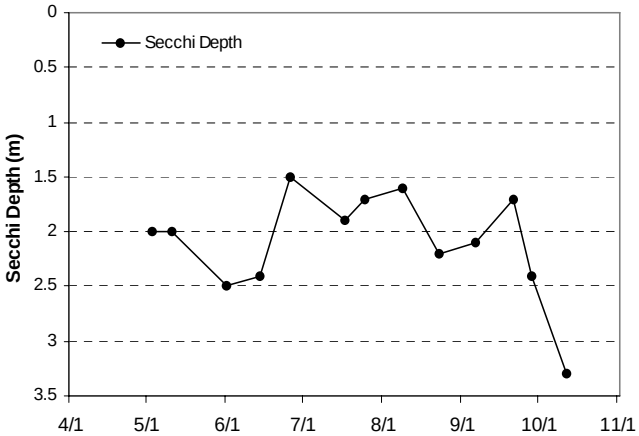










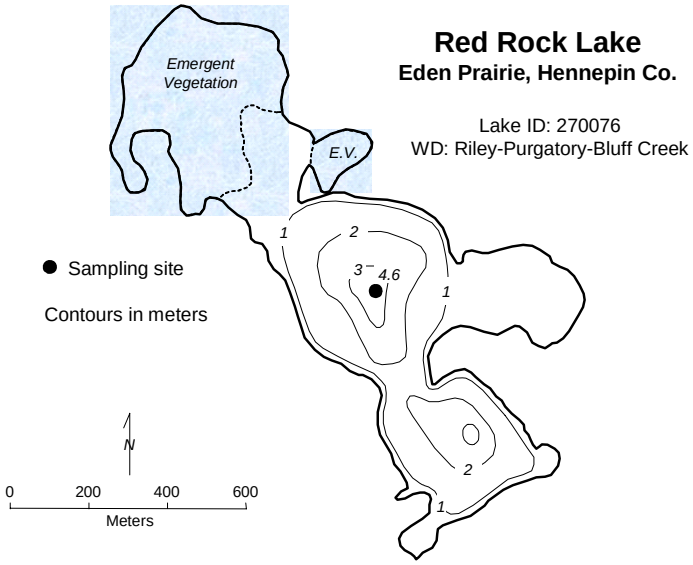


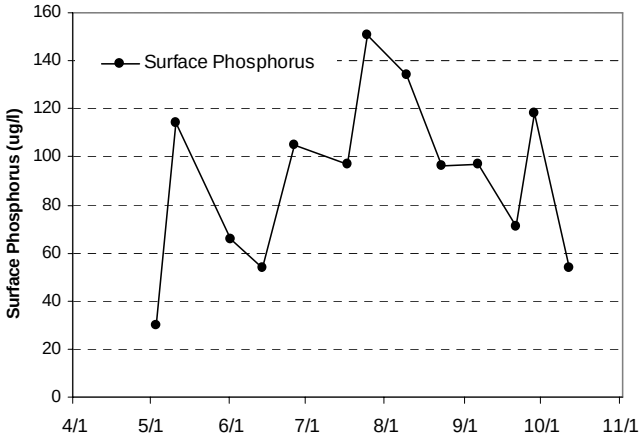
Lake Water Quality Grades Based on Summertime Averages

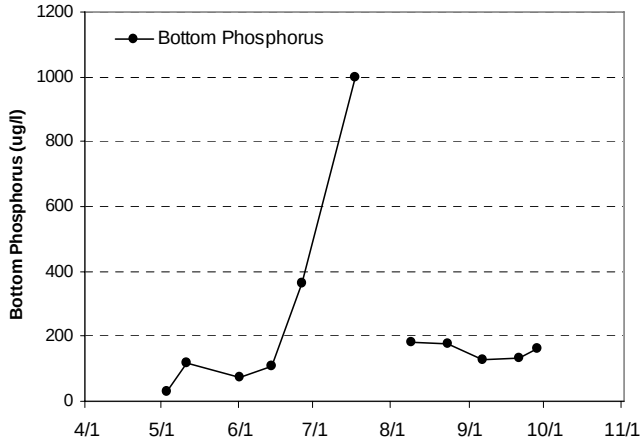
Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus	B	A	A							A			
Chlorophyll a	B	A	B							A			
Secchi Depth	B	A	B							B			
Overall	**B**	**A**	**A**							**A**			

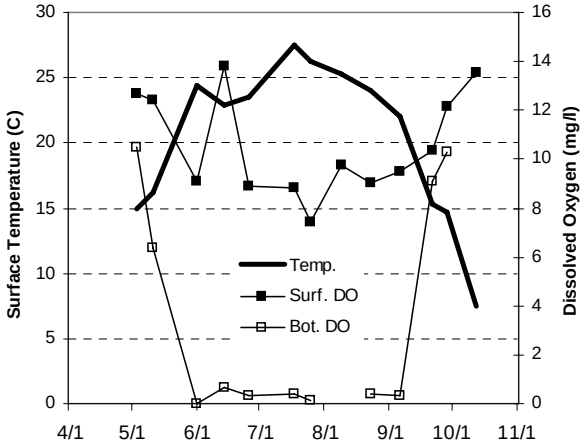
Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus			A						B	A	A			B
Chlorophyll a			B						B	B	B			B
Secchi Depth			B						C	C	B			C
Overall			**B**						**B**	**B**	**B**			**B**

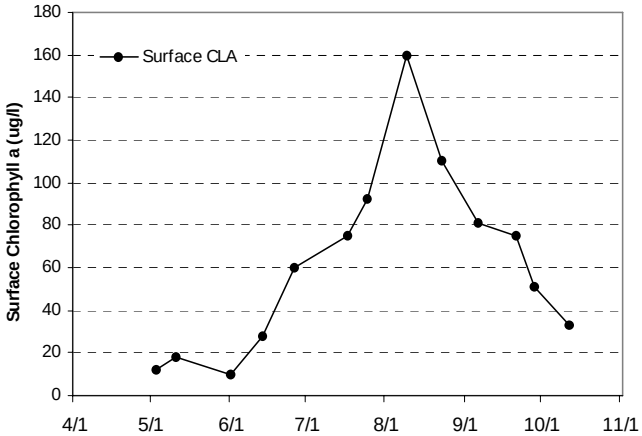
Source: Metropolitan Council and STORET data











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													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus							D	D			D	D		D
Chlorophyll a							D	C			D	D		D
Secchi Depth							C	C			C	C		D
Overall							**C**	**C**			**D**	**D**		**D**

Source: Metropolitan Council and STORET data

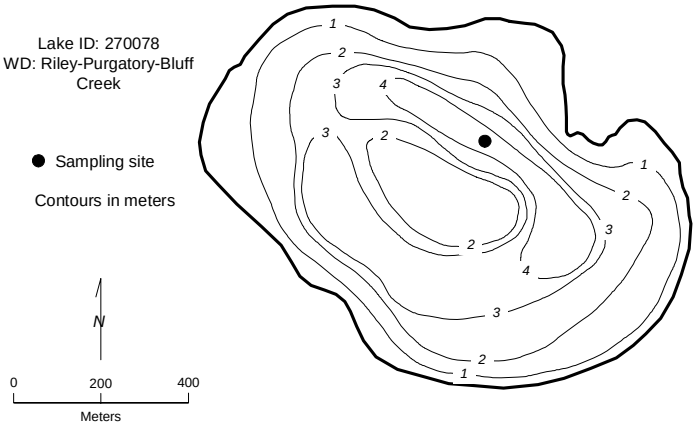
Staring Lake

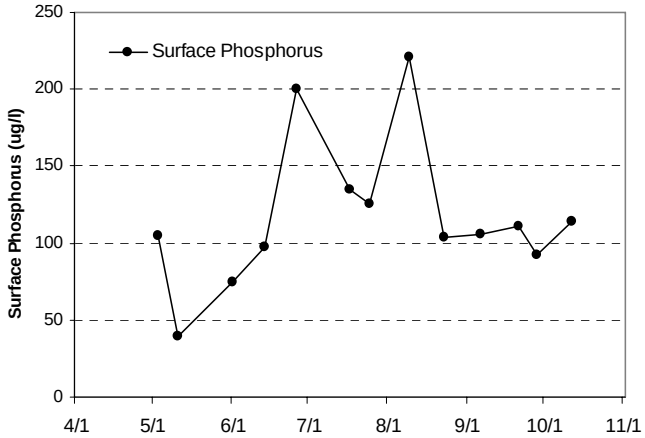
Eden Prairie, Hennepin Co.

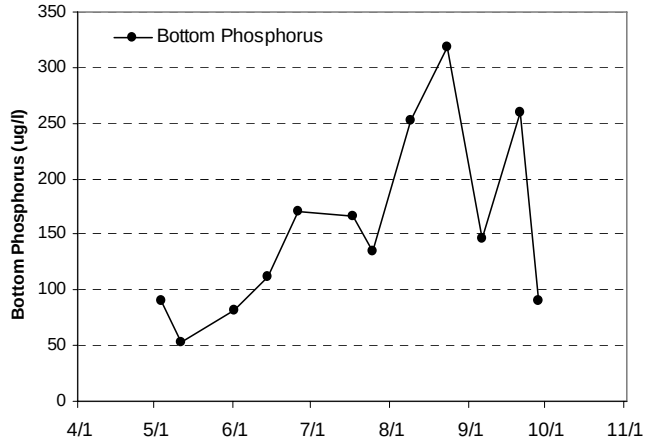
Lake ID: 270078
WD: Riley-Purgatory-Bluff Creek

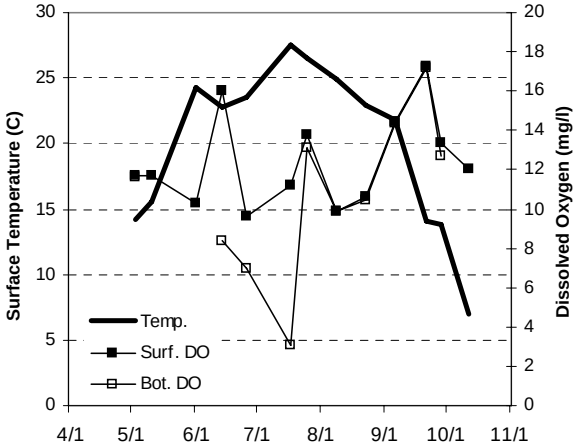
● Sampling site

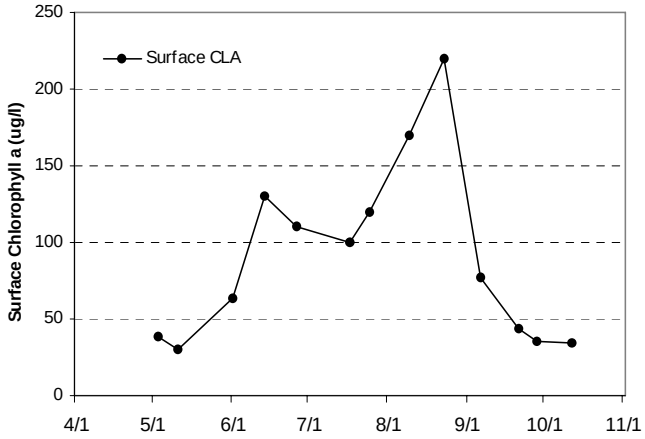
Contours in meters











Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus	D					D							
Chlorophyll a	D					D							
Secchi Depth	F					D							
Overall	**D**					**D**							

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus			D				D		D			D		D
Chlorophyll a			C				D		D			F		F
Secchi Depth			D				F		D			F		F
Overall			**D**				**D**		**D**			**F**		**F**

Source: Metropolitan Council and STORET data

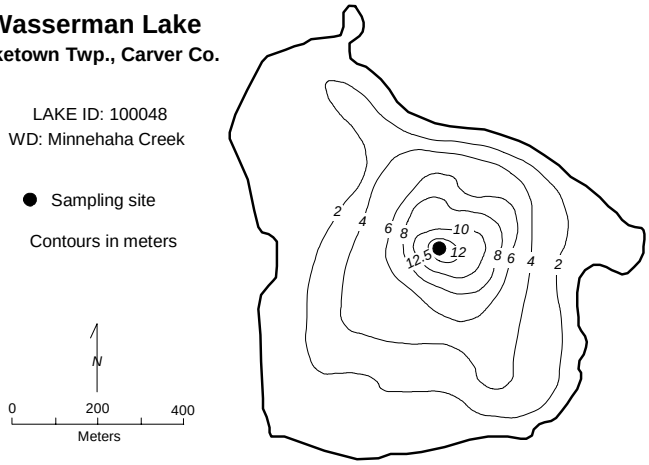
Wasserman Lake

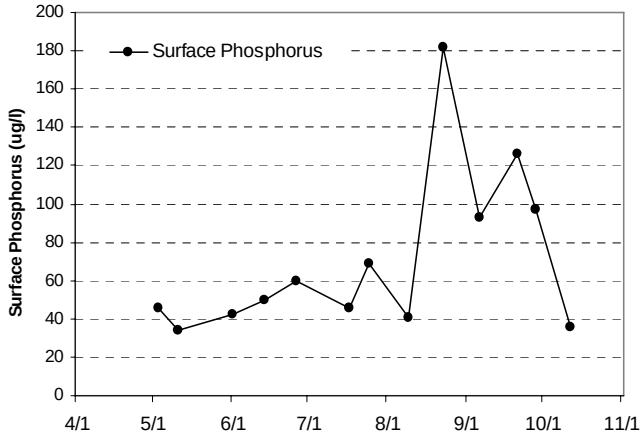
Laketown Twp., Carver Co.

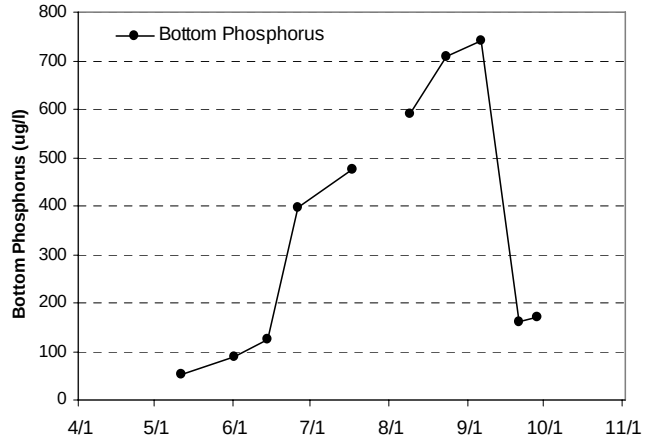
LAKE ID: 100048
WD: Minnehaha Creek

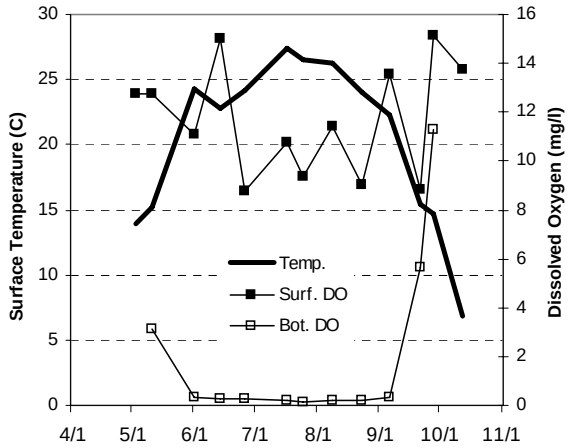
● Sampling site

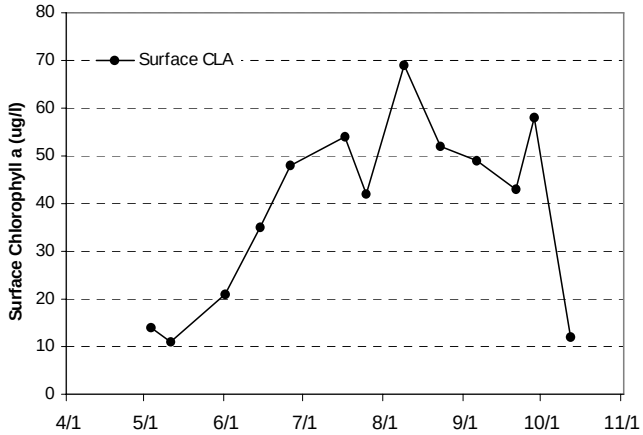
Contours in meters

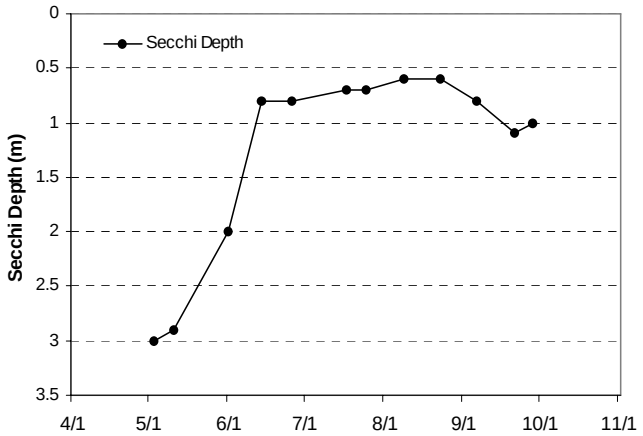












Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus				D			C	C					
Chlorophyll a				D			C	C					
Secchi Depth				C			B	C					
Overall				**D**			**C**	**C**					

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus		C			C	C	D			C	D			D
Chlorophyll a		C			C	D	D			B	C			C
Secchi Depth		D			C	D	D			D	C			C
Overall		**C**			**C**	**D**	**D**			**C**	**C**			**C**

Source: Metropolitan Council and STORET data

PART II – 2006 CITIZEN-ASSISTED LAKE MONITORING PROGRAM (CAMP)

ACKNOWLEDGMENTS

The success of the 2006 volunteer lake monitoring program would not have been possible without the greatly appreciated work done by volunteer monitors, and the support of the organizations that enrolled lakes in the program.

The enrolling organizations, which included 18 watershed management organizations/watershed districts (WMO/WD), 15 cities, two counties, one basin planning group, and one lake association, 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.

However, those deserving the greatest appreciation are the volunteers themselves. Their help has made this program successful. The list of the volunteers involved in the 2006 Citizen-Assisted Monitoring Program (CAMP) is shown in Appendix B. The Metropolitan Council and local WMO/WDs thank them for their sustained efforts over six months, as well as and the quality of their work.

INTRODUCTION

Volunteer monitoring is a growing endeavor around the country. Citizens are finding that good information on the status of local water quality and the causes of water quality degradation are often not available from scientific research projects or government surveys. Therefore, the citizens themselves are collecting this information.

As is the case throughout the United States, the majority of lakes in the Twin Cities Metropolitan Area (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 the lakes in the area, and local decision-makers are forced to make management decisions lacking adequate information.

CAMP was initiated by the Metropolitan Council in 1993 to help bridge the data gaps for area lakes, provide a more complete and improved Metropolitan Area database, give local decision makers a better idea of the water quality of their lakes, and assist them in decision making on water quality issues. The Council's goal for CAMP is to provide a means to gather as much information on area lakes as is economically possible.

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).

Not only does volunteer involvement in the lake monitoring process substantially reduce the cost of obtaining data, but it enhances the grass-roots understanding of how lakes work and how certain lake conditions relate to the surrounding watershed.

PURPOSE OF THE VOLUNTEER MONITORING PROGRAM

The main purpose of CAMP is to provide lake and watershed managers with water quality data that will not only support them in properly managing the resources, but also provide much needed historical baseline data to help document water quality impacts and trends. As noted earlier, 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.

CAMP involves the collection of lake samples by volunteers. Monitoring procedures and sample handling methods were determined through a pilot study during the summer of 1991. The pilot study was designed to evaluate the validity of data collected using several possible citizen monitoring and sample handling methods by comparing them to routine methods (Hartsoe and Osgood 1991). The pilot study and results are presented in Appendix D of the Council's 1993 lake monitoring report (Anhorn 1994) and can be obtained by contacting Kent Johnson at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Volunteers collect surface water samples that are analyzed for total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll-a (CLA) [a select few of the lakes are analyzed for chloride as well]. In addition, they measure surface water temperature and water transparency, and record user perceptions (some monitors also measure 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 2006, 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. Samples are submitted to Council staff and then forwarded to the MCES-EQA laboratory for analysis.

CAMP METHODS

RECRUITING VOLUNTEERS

Active recruitment of lakes and interested volunteers for the 2006 volunteer monitoring program began in the winter months of 2005. Letters and registration forms were sent to various WMOs, counties, and cities to determine their interest in enrolling lakes within their jurisdiction. The organizations were then encouraged to recruit volunteers for each lake they enrolled in the program. If there were problems finding willing volunteers, the Council assisted in 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 WMOs.

The year 2006 marked the fourteenth year of the Council's volunteer program. Eighteen watershed management organizations/watershed districts (WMO/WD), 15 cities, two counties, one basin planning group, and one lake association participated in CAMP in 2006, enrolling a total of 186 lakes. This year's volunteer-monitoring program included 25 lake sites never before monitored by the Council and 141 lake sites which were also monitored in 2005. A map indicating the 2006 CAMP lakes and their affiliated enrolling entity is shown in Figure 2, while a list of the volunteer monitors for each lake is provided in Appendix B.

TRAINING VOLUNTEERS

Volunteer training was conducted by Council staff at various locations throughout the seven- county metropolitan area. Volunteer training was scheduled between late-February and early-April 2006. 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 Council and loaned to the volunteers. At the end of the year's 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 Council or the agency enrolling the lake in the program (i.e. the watershed management organization), 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 3, provided 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.

Figure 2

2006 CAMP Study Lakes

Key to Lake Numbering

1. MacDonald's Pond	9. East Boot	17. Carol	25. Woodpile	33. Cloverdale
2. Jellum's Bay	10. Schroeder's Pond	18. Silver	26. Sunnybrook	34. McDonald
3. Big Marine	11. South School Section	19. Twin, North	27. Weber	35. Jane
4. Staples	12. Goggins	20. Twin, South	28. Long	36. Sunfish
5. Mud	13. July	21. Pat	29. Klawitter	37. Friedrich's Pond
6. Turtle	14. Louise	22. Kismet	30. Olson	38. Elmo
7. Bass	15. Loon	23. Bass, East and West	31. DeMontreville	39. Legion Pond
8. West Boot	16. Herber's Pond	24. Masterman	32. Goetschel Pond	

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.

Collecting a surface water sample. 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 tested and prepared it for the following parameters:

- **Temperature**. Surface water temperature was measured from 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 0.45 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 TN 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 Council staff and delivered to the MCES EQA laboratory for chemical analysis. Results from the 1991 pilot study reveal that the volunteer monitoring and handling methods chosen for use in the CAMP program yield results comparable to routine methods used by the Council (Hartsoe and Osgood 1991).

In addition, a few WMO/WDs had their volunteer(s) record dissolved oxygen (DO) and temperature profiles, as well as collect surface chloride and subsurface TP and CLA samples. Chloride samples were prepared in the field in a manner identical to that used for the TP/TKN samples. The WMO/WDs provided their volunteers with supplementary equipment and training to use this equipment, and also paid for the additional cost of laboratory analysis of the chloride and TP samples. The additional profile data and subsurface samples were picked up by Council staff, along with the routine samples. Profile data obtained by the volunteers were then mailed to the WMO/WD, and the samples were delivered to the lab for analysis.

Figure 3. Example of CAMP Monitoring Form

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)

DATA HANDLING AND ANALYSIS

Once each lake's sampling forms and lab analyses were delivered to the Council, the data 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/or lake observations, Council staff contacted the volunteer. The Council maintained contact with most volunteers throughout the season by telephone or in person during sample pick-up. Statistical analyses were performed on the lake data, and tables and plots of the data were prepared.

PROGRAM QUALITY ASSURANCE/QUALITY CONTROL

The quality assurance/quality control (QA/QC) objective for CAMP is to prevent erroneous data from being produced and used. If by chance errors did occur, they were identified and corrected. Additionally, all suspect data were excluded in lake databases and/or data assessment.

The MCES EQA laboratory follows its own internal QA/QC program, which employs an extensive internal and external check and balance system to ensure credible data. Documentation of these QA/QC procedures can be obtained from the laboratory.

To ensure that CAMP volunteers were using proper sampling techniques and producing credible data, two QA/QC methods were used. Either Council staff accompanied a volunteer on a sampling event to oversee his/her collection and preparation procedures, or staff monitored a CAMP lake site during the same week (although not necessarily the same day) that the volunteer was to sample the lake site. The first method was used to simply observe the volunteer's methods to determine if there were any problems that needed to be addressed. This procedure was usually undertaken when the Council staff member was in a volunteer's area on a known sampling day, or when it seemed necessary.

The most common quality assurance check, however, involved monitoring of the lake by the Council during a scheduled monitoring week. For these sampling events, Council staff used the same type of equipment and same methods as the volunteers. The Council-collected QA/QC samples were then treated just as the volunteer samples were, so that the nutrient concentrations and Secchi transparencies of both sampling events could be compared to determine if any procedural problems existed. If there seemed to be discrepancies, Council staff would accompany the volunteer on their next sampling event to observe their methods and, if necessary, re-train them. Data determined to be erroneous were eliminated from the database.

During the 2006 monitoring season, roughly 44 percent of the CAMP lake sites monitored more than three times throughout the summer were also monitored by Council staff during scheduled monitoring

weeks, to determine the credibility of the volunteer data. Unfortunately, the CLA and TP/TKN samples that had been stored in a laboratory freezer were mistakenly discarded sometime during the summer. Therefore, the only 2006 monitoring data available for comparison between the volunteer- and professionally-collected information is Secchi transparency.

Many of the lakes that were 'checked' by Council staff in 2006 were also monitored by volunteers (and 'checked') as a part of past CAMP monitoring years. Council-sampled QA/QC measurements are presented along with volunteer samples in each lake's descriptive section. A regression analysis was performed on the QA/QC dataset to determine if any statistically significant difference was found between volunteer- and professionally-collected data. The resulting statistical analysis of the quality check data revealed excellent agreement between volunteer- and professionally-collected samples.

Regression analysis. The 2005 and 1993-2005 QA/QC volunteer- and professional-collected TP and CLA and 2006 and 1993-2006 Secchi transparency data were plotted on a scatter plot graph (Figures 4-9). A linear regression (shown on the graph as a solid line) was run on the data. If the professionally- (y) and volunteer-collected (x) data were identical, the data points would fall along the dashed line shown on the following graphs (x=y).

The graphs show that while the majority of the data points do not fall exactly on the x=y-line, they do fit the x=y-line quite well. The graphs also show that while the regression lines for each parameter are nearly identical to the x=y-lines when the levels of the tested parameters are low, the regression line begins to fall away from the x=y-line as the parameter levels increase. Because of the close fit of the regression line to the x=y-line and because of the strong linear relationships of each dataset, (shown as a high R^2 value), it is apparent that there is no statistically significant difference between samples collected by volunteers and those collected by Council staff.

Figure 4. 2005 CAMP-collected TP vs. professionally-collected "quality check" TP

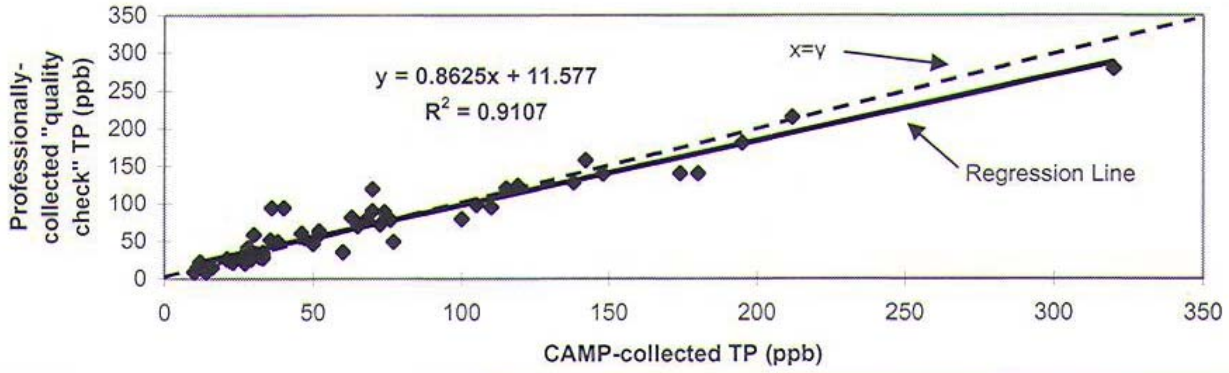


Figure 5. 2005 CAMP-collected CLA vs. professionally-collected "quality check" CLA

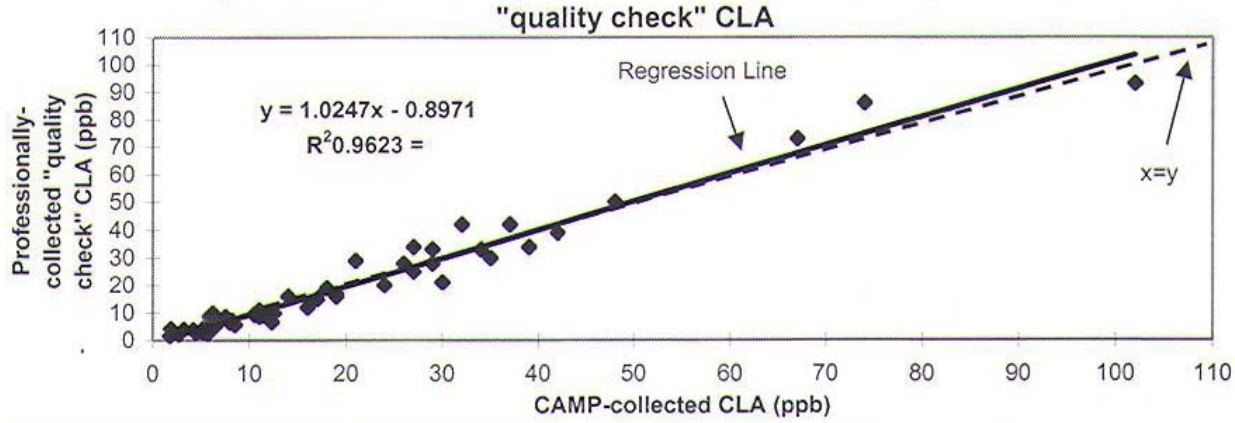


Figure 6. 2006 CAMP-collected Secchi transparency vs. professionally-collected "quality check" Secchi transparency

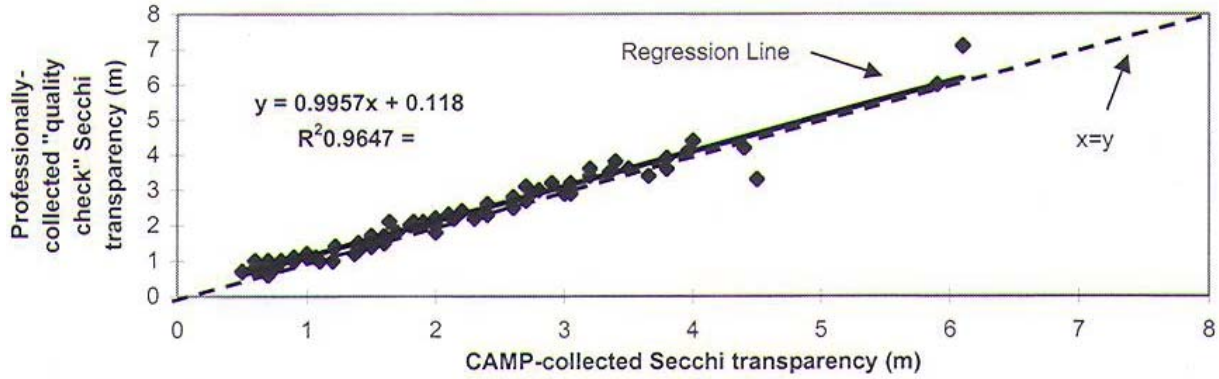


Figure 7. 1993-2005 CAMP-collected TP vs. professionally-collected "quality check" TP

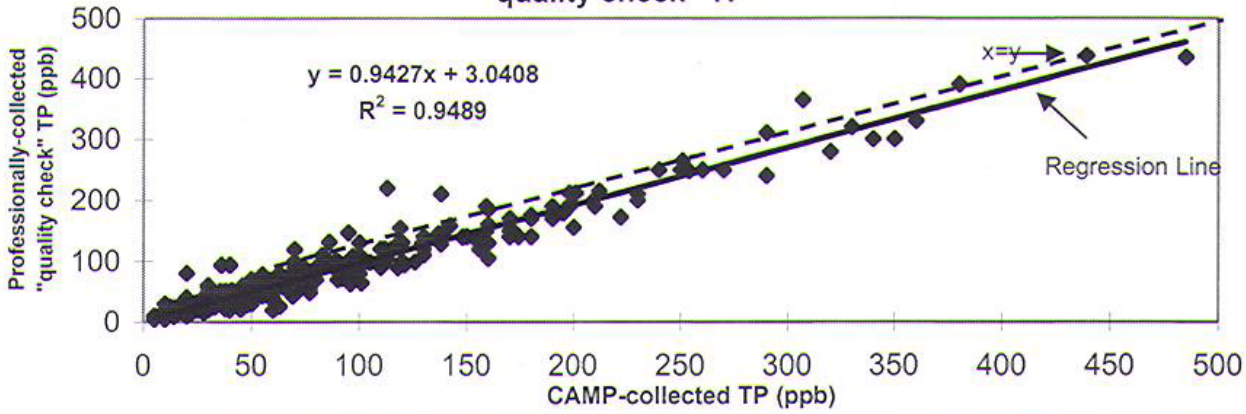


Figure 8. 1993-2005 CAMP-collected CLA vs. professionally-collected "quality check" CLA

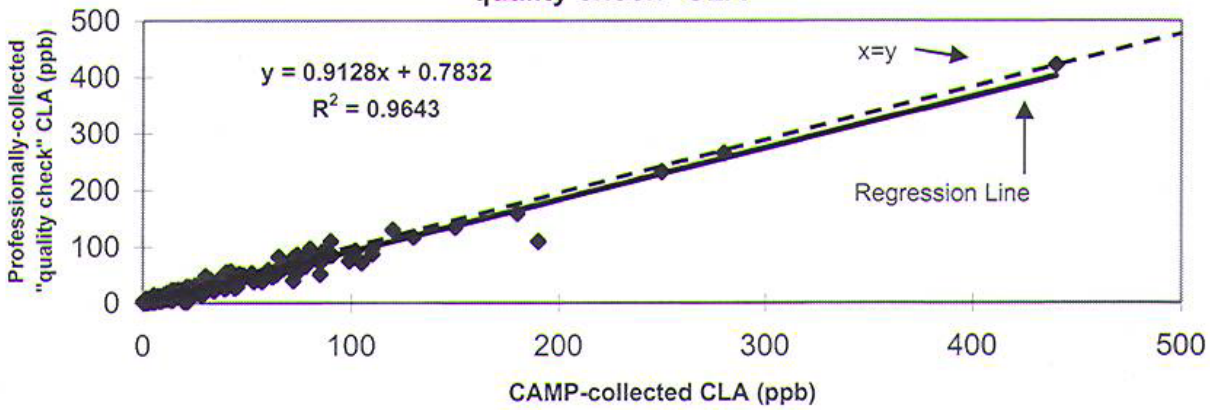
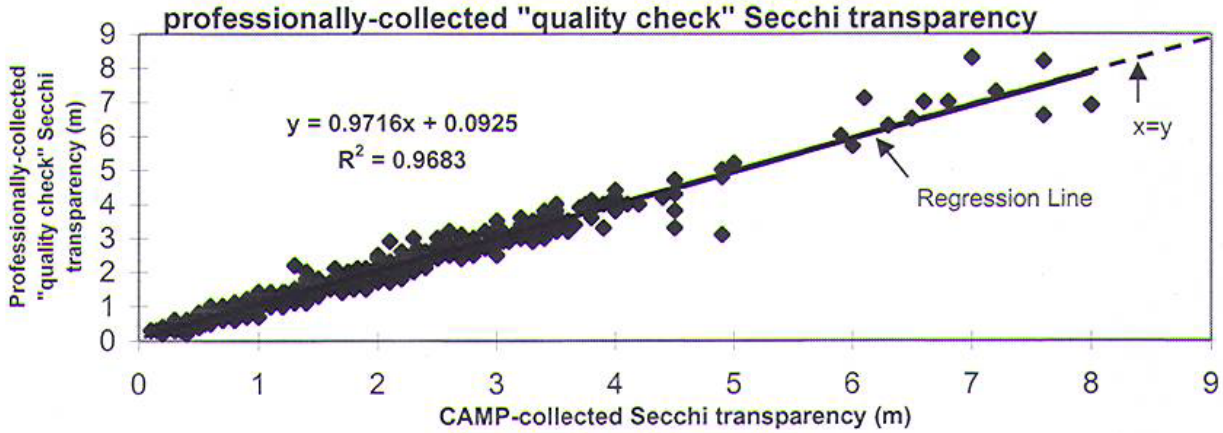


Figure 9. 1993-2006 CAMP-collected Secchi transparency vs. professionally-collected "quality check" Secchi transparency



RESULTS AND ANALYSIS

The water quality of the CAMP lakes is discussed on a lake-by-lake basis in the following pages. *The Handbook for the Citizen-Assisted Lake Monitoring Program* (Anhorn 1993) 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 current condition as determined through 2006 CAMP monitoring, and a separate lake information sheet. Each information sheet includes current 2006 water quality data, shown in both tabular and graphic form, and all 1980-to-present lake water quality grades (the methodology and percentile ranges of the grading system are discussed in Part I of this report). To determine any water quality trends (i.e., whether lake quality is improving, degrading, staying the same, or has no trend) each lake's 1980-to-present database was used.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

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

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

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

This was the first year that Acorn 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 CAMP data represents the only year of available nutrient data. 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 lake was monitored 14 times between mid-April and mid-October, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	64.7	29.0	141.0	C
CLA (µg/l)	9.3	4.1	27.0	A
Secchi (m)	0.4	0.2	0.7	F
TKN (mg/l)	1.10	0.80	1.50	
			Overall Grade	C

The lake's 2006 overall lake quality grade of C is somewhat skewed due to the lake's poor Secchi mean. The reason for the poor Secchi readings is mainly due to the amount of in-lake vegetation. The excessive vegetation growth resulted in the volunteer monitor being unable to canoe out to the center of the lake and samples were collected off the lake's fishing pier. For this reason, during each monitoring event, vegetation interfered with the Secchi transparency reading.

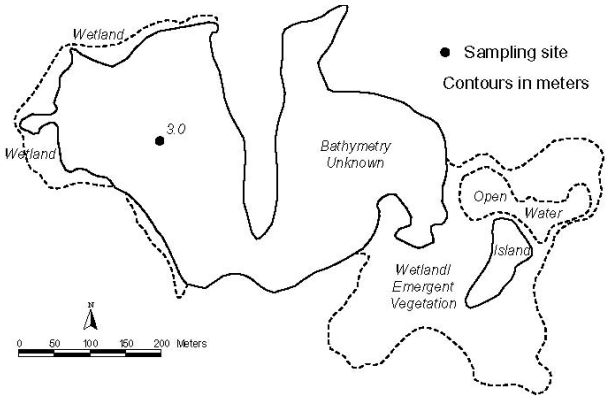
As mentioned earlier, there are no nutrient data available for Acorn Lake other than the 2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

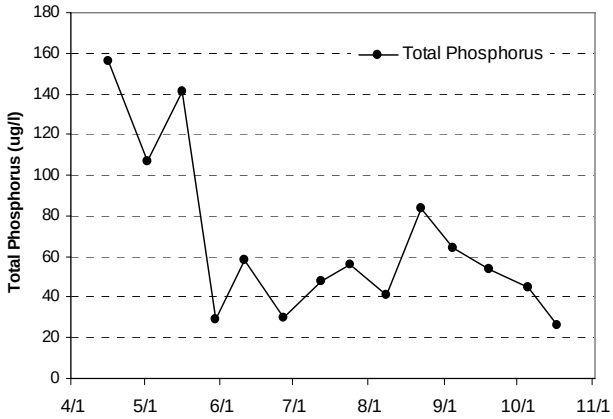
The perceived physical and recreational conditions (ranked on a 1-to-5 scale) are shown on the lake's information sheet on the next page. The average user perception rankings, were 1.7 for physical condition (between 1- "crystal clear" and 2- "some algae present"), and 5.0 for recreational suitability (5- "no aesthetics possible").

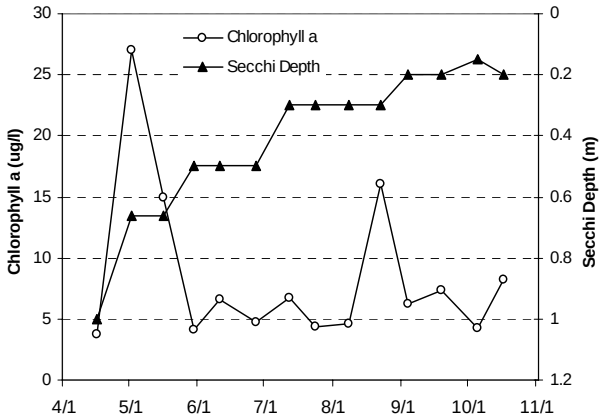
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Acorn Lake
Oakdale, Washington Co.

Lake ID: 820102
WD: Valley Branch
Volunteer: Steven Yahr

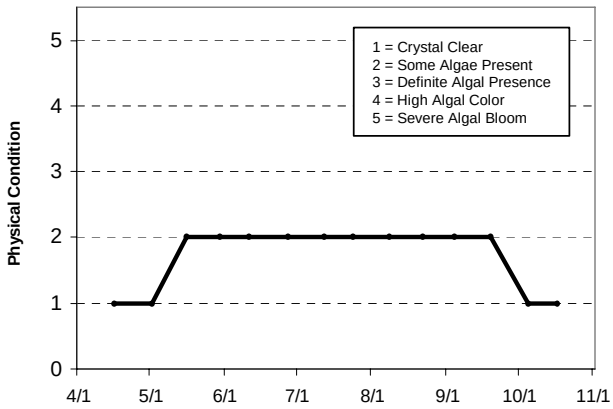






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/16/06	19.6				3.7	156		1	1	5
5/2/06	20				27	107		0.66	1	5
5/16/06	21.4				15	141		0.66	2	5
5/30/06	29.5				4.1	29		0.5	2	5
6/11/06	20.7				6.6	58		0.5	2	5
6/27/06	27.7				4.7	30		0.5	2	5
7/12/06	31.9				6.7	48		0.3	2	5
7/24/06	29.5				4.4	56		0.3	2	5
8/8/06	28.2				4.6	41		0.3	2	5
8/22/06	27.2				16	84		0.3	2	5
9/4/06	23.6				6.2	64		0.2	2	5
9/19/06	16.1				7.3	54		0.2	2	5
10/5/06	21.3				4.2	45		0.15	1	5
10/17/06	11.4				8.2	26		0.2	1	5

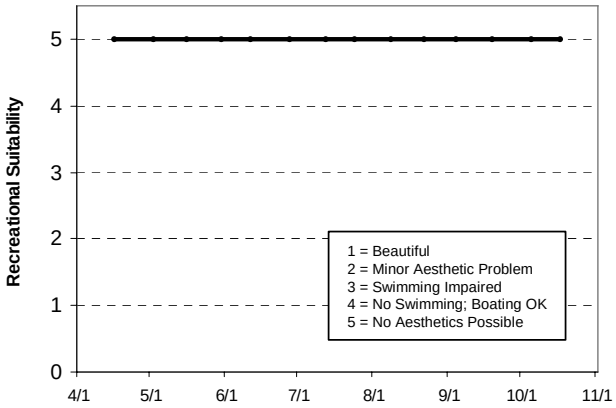


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus														C
Chlorophyll a														A
Secchi Depth														F
Overall														**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.

There are 12 inlets into the lake. A 1990 Clean Water Partnership Diagnostic-Feasibility Study on the lake estimated land use for the watershed at: 29 percent single-family residential, eight percent multi-family residential, three percent commercial/industrial, 19 percent wooded, 10 percent open waters/wetlands, and 31 percent open/undeveloped (Montgomery Watson 1990). Land use percentages have no doubt continued to shift from open/undeveloped to urban uses (single-family residential, multi-family residential and commercial/industrial) since that study.

The lake, which has been monitored through CAMP since 1995, was sampled eight times between mid-May and early-September, 2006.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	154.4	76.0	345.0	F
CLA (µg/l)	55.2	13.0	140.0	D
Secchi (m)	0.5	0.2	0.8	F
TKN (mg/l)	2.39	1.4	4.0	
			Overall Grade	F

The 2006 overall grade (F) was the worst recorded grade for this lake. The lake's historic overall water quality grades indicate that the lake fluctuates between a C and D. Most recently the lake's overall grade has consistently been D (1999-2005). The lake's water quality was at its best in 1995, 1997, and 1998 (overall grade of C). The lake's 2006 summertime TP, CLA, and Secchi means were slightly worse but similar to those recorded in 2004 and 2005 (which represent some of the lake's worst water quality).

In an attempt to reduce algal blooms and improve the lake's water quality, crushed cornmeal was used in 2005 and 2006 as an in-lake organic carbon amendment. A recent study on Valley Lake-Lakeville, Minnesota (discussed later in Valley Lake section of this report), has suggested that carbon from the decaying barley straw inhibits algal populations via microbial competition for phosphorus (McComas and Anhorn 2004). The use of the cornmeal, however, did not result in the anticipated improvements in Alimagnet's water quality (McComas 2005 and 2006). The lack of improvement was determined by comparing the 2006 CLA and Secchi transparency means to those of recent "non-crushed cornmeal" years. One potential factor limiting the beneficial effects of the organic carbon amendment could be the result of recent partial winterkills creating an unbalanced fish population (bluegill and bullhead population densities greater than the norm). It is speculated that the lake's large bluegill and bullhead population, could adversely be impacting the water quality and negating the benefits of the carbon amendment (McComas 2005 and 2006).

Throughout the monitoring period, the volunteers' opinion 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 3.6 on a 1-to-5 scale shown on the lake

information sheet (between 3- “definite algae present” and 4-“high algal color”). The mean suitability for recreation ranking, also on a 1-to-5 scale, was 3.0 (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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

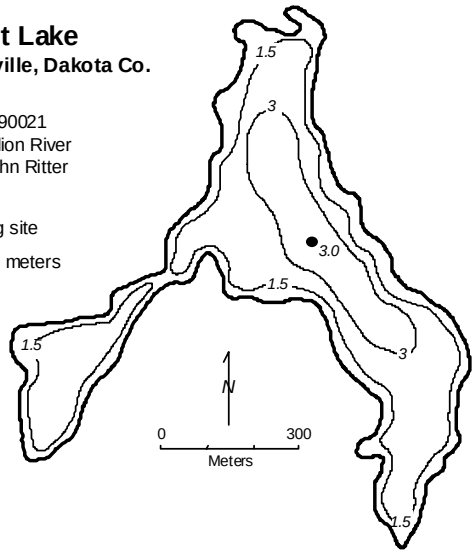
Alimagnet Lake

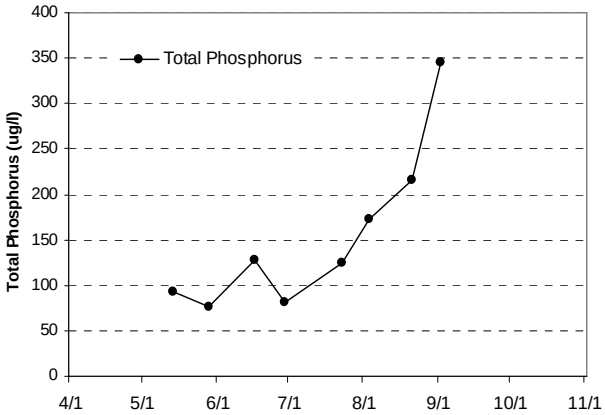
Apple Valley/Burnsville, Dakota Co.

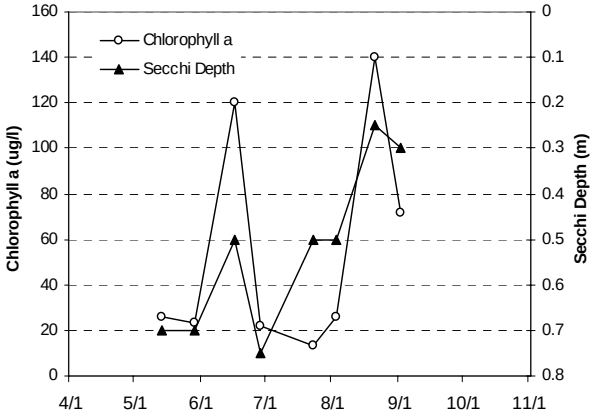
Lake ID: 190021
WMO: Vermillion River
Volunteer: John Ritter

● Sampling site

Contours in meters

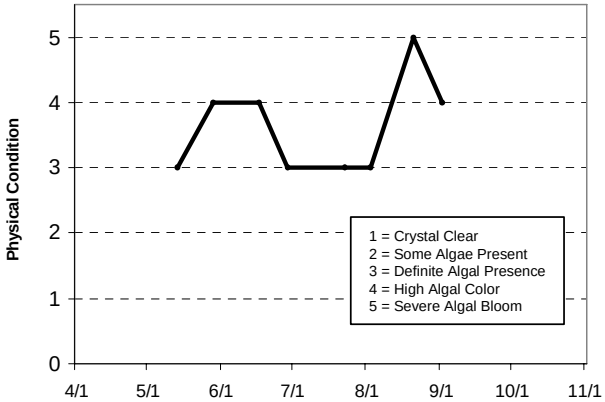






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/14/06	12.9				26	93		0.7	3	2
5/29/06	23.5				23	76		0.7	4	3
6/17/06	24.6				120	127		0.5	4	4
6/29/06	25.8				22	81		0.75	3	3
7/23/06	28				13	125		0.5	3	3
8/3/06	27.4				26	173		0.5	3	3
8/21/06	25.8				140	215		0.25	5	3
9/2/06	21.3				72	345		0.3	4	3

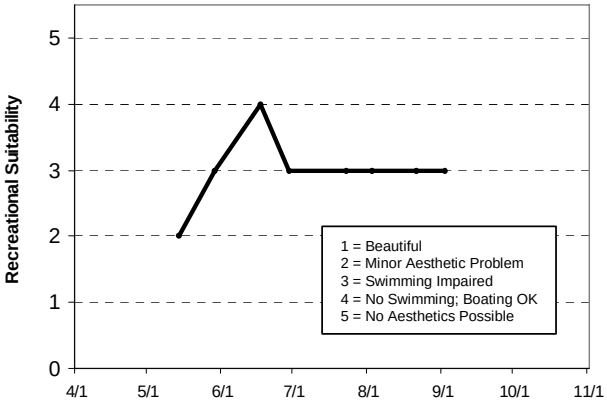


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus	F	D									F		
Chlorophyll a											D		
Secchi Depth	F	F	D	D	C	D	F	F	F	F	D	C	D
Overall											**D**		

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus			D	D	C	D	F	D	D	D	D	D	D	F
Chlorophyll a			B	C	C	C	D	D	C	C	C	D	D	D
Secchi Depth	C	C	C	D	C	C	D	F	D	F	F	F	F	F
Overall			**C**	**D**	**C**	**C**	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**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 mid-April and early-October, 2006. Results are presented in both graphs and data tables on the lake's information sheet on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	92.0	45.0	187.0	D
CLA (µg/l)	10.8	3.4	21.0	B
Secchi (m)	1.0	0.9	1.4	D
TKN (mg/l)	1.62	1.10	1.80	
			Overall Grade	C

The lake's 2006 overall water quality grade was identical to that of 2000, 2002-2005, and better than the D's recorded in 1998-1999 and 2001. However, the lake's 2006 parameter means recorded were worse than the means recorded in 2004 and 2005. The main reason for the lake's decline was the reduction in mean total phosphorus and chlorophyll concentrations as compared to previous years.

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

Statistical analysis of the lake's water quality database failed to produce any statistically significant long-term trends. To better understand the lake's current water quality condition, and which direction it may be heading, continued monitoring is suggested. In the short-tern, however, the lake's quality seems best described by a high D/low C grade.

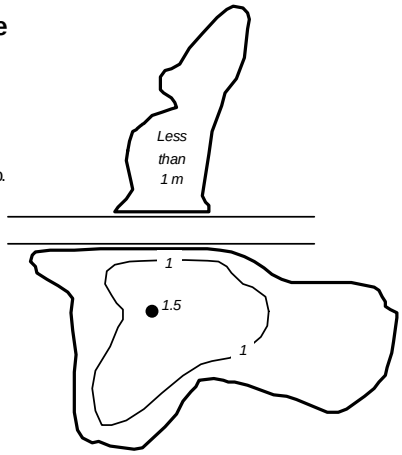
Throughout the monitoring period, the volunteers' opinion of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. These user perception rankings are shown on the lake information sheet. The mean physical condition ranking was 2.6 (ranking between 2- "some algae present" and 3- "definite algae present"), while the mean recreational suitability ranking was 3.7 (between 3- "swimming slightly impaired" and 4- "no swimming – boating ok").

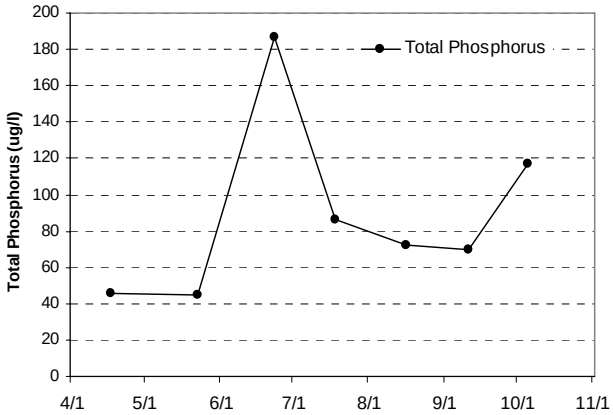
If you detect any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

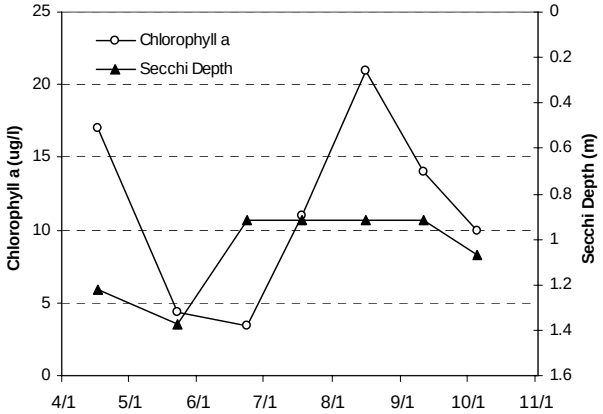
Armstrong Lake
Lake Elmo/Oakdale, Washington Co.

LAKE ID: 820116
WD: South Washington
Volunteer: Washington Co. SWCD

● Sampling site
Contours in meters

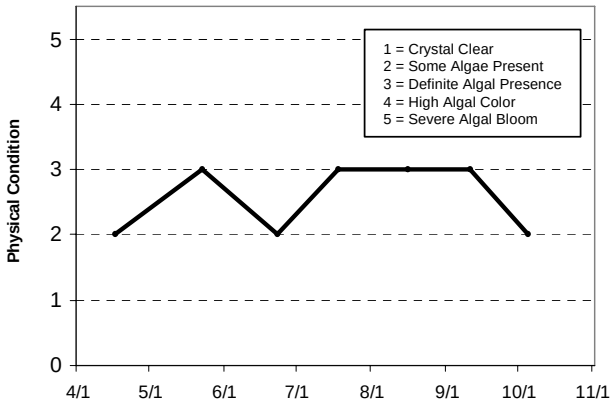






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/17/06	14	14	6.21	6.09	17	46		1.219	2	4
5/23/06	18	17.8	11.7	12.08	4.4	45		1.372	3	4
6/23/06	23.3	21.8	7.91	4.84	3.4	187		0.914	2	4
7/18/06	29.4	25.8	9.17	0.29	11	86		0.914	3	4
8/16/06	23.1		8.1		21	72		0.914	3	4
9/11/06	14.4	15	6.73	0.12	14	70		0.914	3	3
10/5/06	14.7	14.7	7.37	0.16	10	117		1.067	2	3

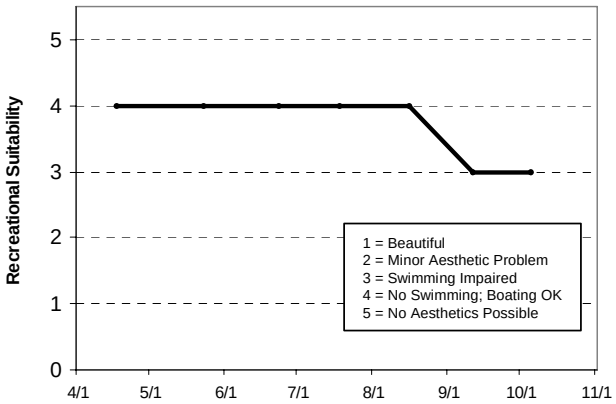


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus						D	F	C	D	D	D	C	C	D
Chlorophyll a						D	C	C	C	B	B	A	A	B
Secchi Depth						D	F	D	D	D	D	D	D	D
Overall						**D**	**D**	**C**	**D**	**C**	**C**	**C**	**C**	**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.

This marks the seventh year in which Barker Lake has been involved in CAMP. A search through the STORET nationwide water quality database for data on the lake revealed a limited amount of data (1997-2005) collected over the past twenty years.

The lake's Secchi transparency was monitored seven times from mid-May to mid-October, 2006. Results are presented in both graphs and data tables on the lake's information sheet on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)				
CLA (µg/l)				
Secchi (m)	1.7	0.9	2.6	C
TKN (mg/l)				
			Overall Grade	

Water samples to be analyzed for TP, TKN and chlorophyll were not collected for the lake in 2006. Because Secchi transparency was the only data collected there are no nutrient or chlorophyll concentration means to compare to previous years. The lake's 2006 summertime (May through September) mean Secchi transparency was 1.7 m (minimum of 0.91 m and a maximum of 2.59 m). This translates to a grade of C for water clarity (similar to the water clarity grades recorded in 1998-2004 and better than that of 2005).

Statistical analysis on the lake's water quality database did not detect any long-term trends. To better understand the lake's current water quality and in which direction it may be heading, continued monitoring is suggested.

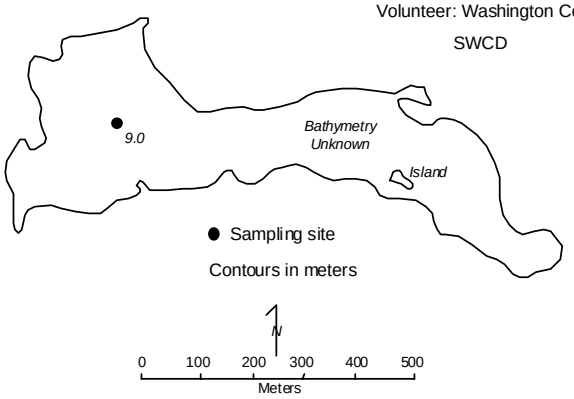
The last two graphs show seasonal variation in the lake's perceived physical condition and recreational suitability. The average user perception rankings, on a 1-to-5 scale, were 2.3 for physical condition (between 2- "some algae present and 3- "definite algae present"), and 2.9 for recreational suitability (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

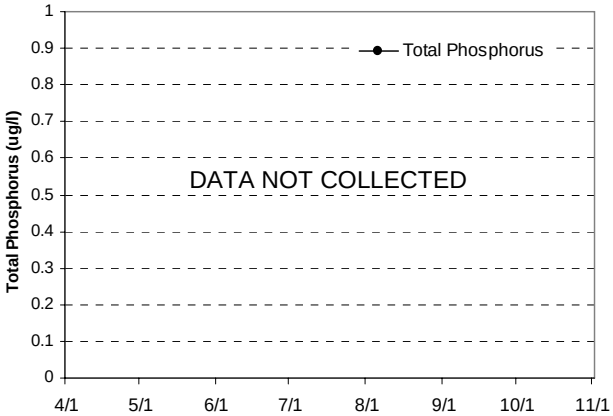
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

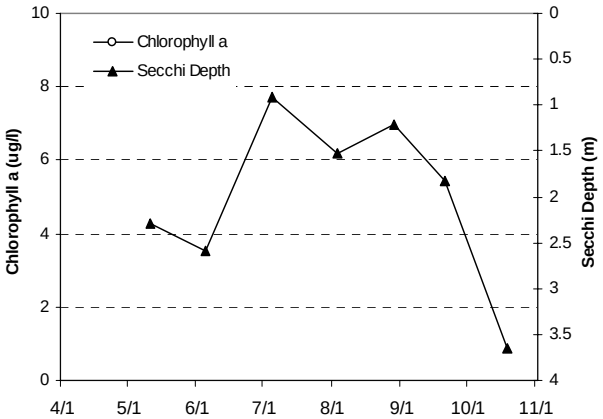
Barker Lake

Hugo, May Twp., Washington Co.

LAKE ID: 820076
WD: Carnelian-Marine
Volunteer: Washington Co. SWCD

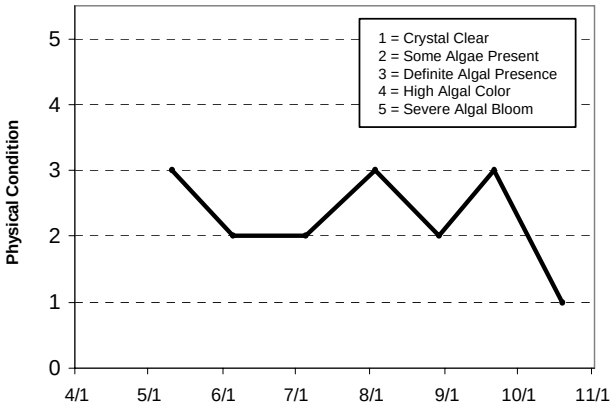






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/11/06	15.5	7.4	8.68	0.48				2.286	3	3
6/5/06	25.8	9.3	5.09	0.06				2.591	2	3
7/5/06	26.2	9.5	8.95	0.07				0.914	2	3
8/3/06	26.8	9.9	6.99	0.06				1.524	3	3
8/29/06	23.7	9.9	8.44	0.06				1.219	2	3
9/21/06	15.5	14	7.7	0.02				1.829	3	4
10/19/06	8	7.8	8.69	0.19				3.658	1	1

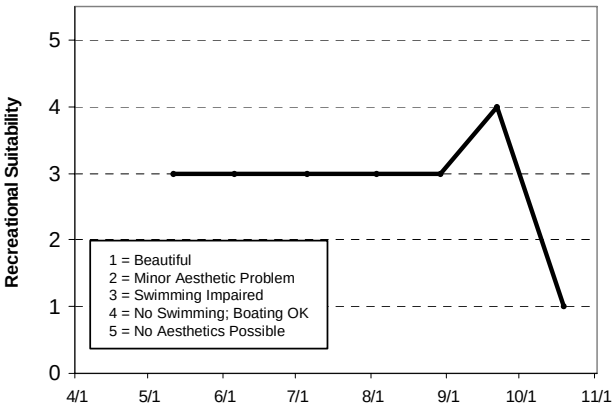


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus					C	D	D	C	D					
Chlorophyll a					C	C	D	B	C					
Secchi Depth					D	C	C	C	C	C	C	C	D	C
Overall					**C**	**C**	**D**	**C**	**C**					

Source: Metropolitan Council and STORET data



Bass Lake (27-0015) *City of St. Louis Park*

Bass Lake is a small shallow lake 95-acre lake located within City of St. Louis Park (Hennepin County). There is very little known morphological data available for the lake.

This marks the third year in which Bass Lake has been involved in CAMP. A search through the STORET nationwide water quality database for historic data revealed only the 2002 and 2005 CAMP data. Thus, 2002 and 2005-2006 are the only years of available data. 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 lake was only monitored two times between early- and mid-May, 2006. For this reason, no summer means and associated grades could be calculated for the lake in 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	***Mean***	***Minimum***	***Maximum***	***Grade***
TP (µg/l)	NA	143.0	248.0	NA
CLA (µg/l)	NA	12.0	12.0	NA
Secchi (m)	NA	0.85	0.90	NA
TKN (mg/l)	NA	0.82	1.20	
			Overall Grade	NA

As mentioned earlier, there are no water quality data available for Bass Lake other than the 2002, 2005 and limited 2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. 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. Again, because the lake was only monitored two times in 2006, no representative summer means could be determined.

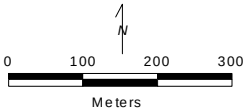
If you notice any errors in the lake data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us

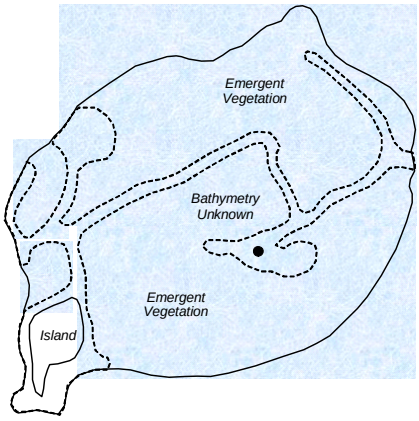
Bass Lake
St. Louis Park, Hennepin Co.

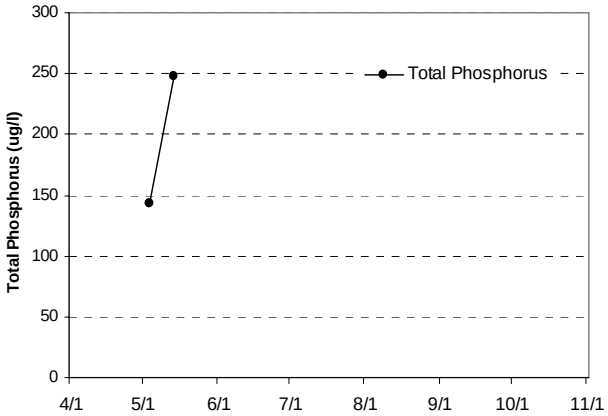
LAKE ID: 270015
WD: Minnehaha Creek
Volunteer:
Jason Westrum

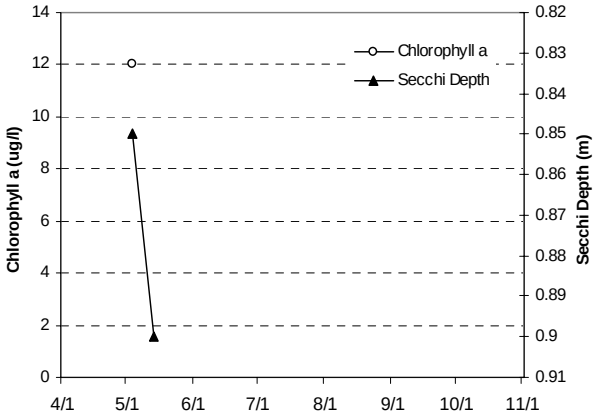
● Sampling site

Contours in meters



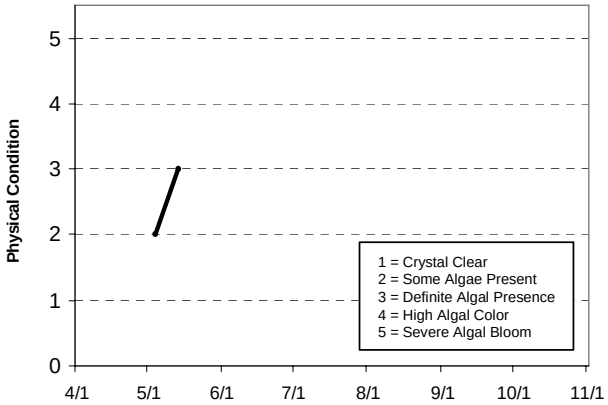






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/4/06	14.3				12	143		0.85	2	5
5/14/06	11.3					248		0.9	3	5

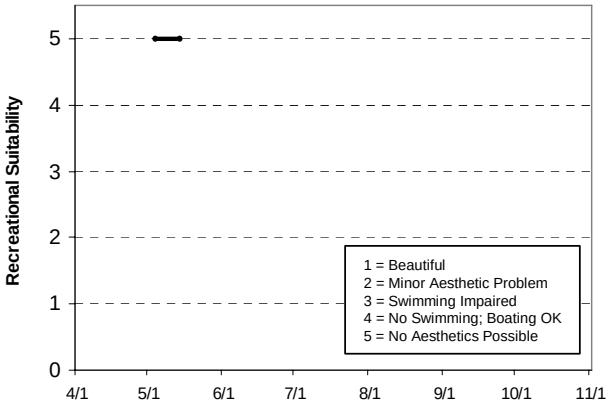


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus										F			D	N/A
Chlorophyll a										C			C	N/A
Secchi Depth										F			F	N/A
Overall										**D**			**D**	**N/A**

Source: Metropolitan Council and STORET data



Bass Lake [West Basin] (82-0123-02) *Browns Creek Watershed District*

Bass Lake is divided into two distinct basins. For this reason there were two monitoring sites in 2006. There is very little other known morphological data available for the lake. The 2006 monitoring results will be discussed individually for each of the two sites.

This marks the first year in which any of the two Bass Lake sites have been involved in CAMP. A search through the STORET nationwide water quality database for historic data on the lake was unsuccessful. Therefore, 2006 is the only known year of available data. 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.

Bass Lake (West Basin) was monitored seven times between late-April and late-September, 2006. The resulting data and graphs appear on the next page.

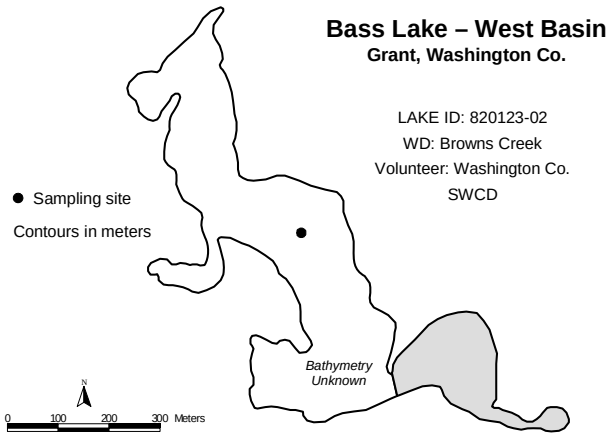
2006 summer (May-September) data summary

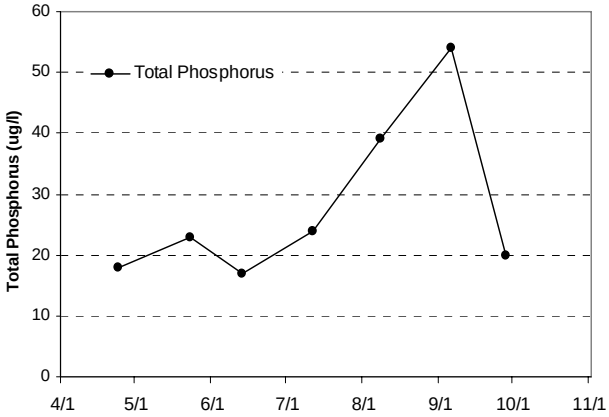
Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	29.5	17.0	54.0	B
CLA (µg/l)	3.93	1.2	5.8	A
Secchi (m)	3.1	2.4	3.7	A
TKN (mg/l)	0.79	0.67	0.94	
			Overall Grade	A

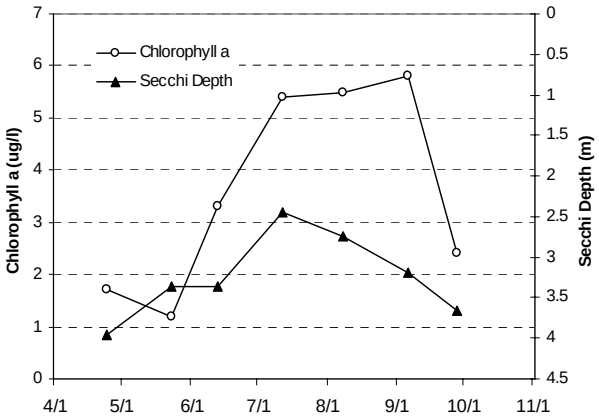
As mentioned earlier, there are no water quality data available for Bass Lake (West Basin) other than the 2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection 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 2.1 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").

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

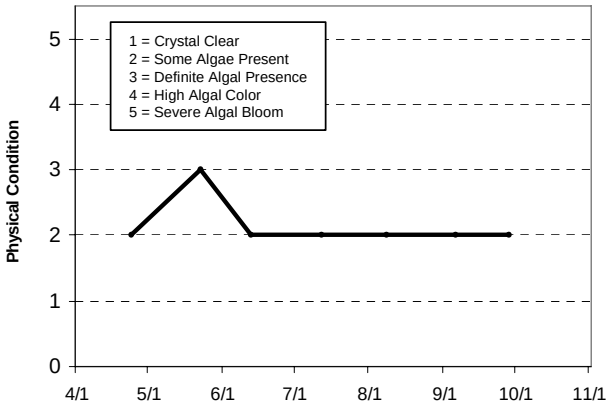






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/24/06	15.5	13.4	7.38	4.66	1.7	18		3.962	2	2
5/23/06	19.6	12.9	11.97	0.45	1.2	23		3.353	3	2
6/13/06	22.3	19.7	7.6	0.08	3.3	17		3.353	2	2
7/12/06	26.2	24.6	8.57	0.27	5.4	24		2.438	2	2
8/8/06	26.3	24.4	5.94	0.07	5.5	39		2.743	2	3
9/6/06	22.5		8.79		5.8	54		3.2	2	2
9/28/06	14.8	14.8	8.95	0.14	2.4	20		3.658	2	2

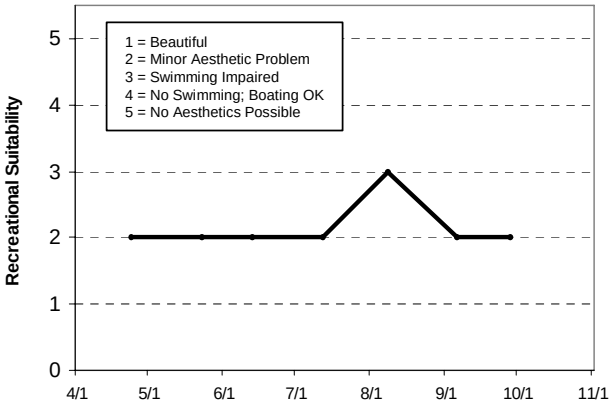


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus														B
Chlorophyll a														A
Secchi Depth														A
Overall														**A**

Source: Metropolitan Council and STORET data



Bass Lake [East Basin] (82-0123-01) *Browns Creek Watershed District*

Bass Lake is divided into two distinct basins. For this reason there were two monitoring sites in 2006. There is very little other known morphological data available for the lake. The 2006 monitoring results will be discussed individually for each of the two sites.

This marks the first year in which any of the two Bass Lake sites have been involved in CAMP. A search through the STORET nationwide water quality database for historic data on the lake was unsuccessful. Therefore, 2006 is the only known year of available data. 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.

Bass Lake (East Basin) was monitored seven times between late-April and late-September, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	64.3	37.0	117.0	C
CLA (µg/l)	11.5	2.7	23.0	B
Secchi (m)	2.2	0.8	3.2	C
TKN (mg/l)	1.19	0.97	1.60	
			Overall Grade	C

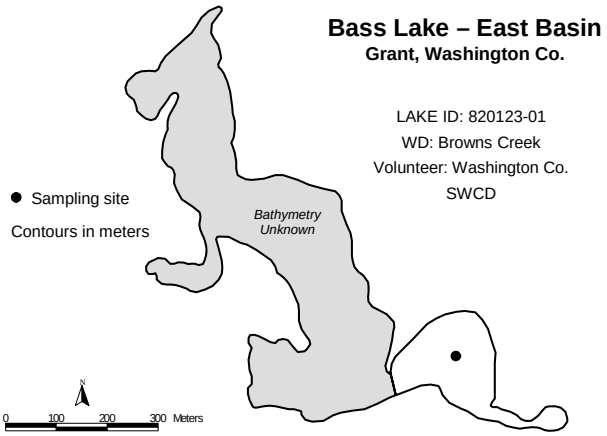
As mentioned earlier, there are no water quality data available for Bass Lake (East Basin) other than the 2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. A recent MPCA conducted trend analysis on the lake's Secchi transparency data, revealed a statistically significant improvement in recent water clarity.

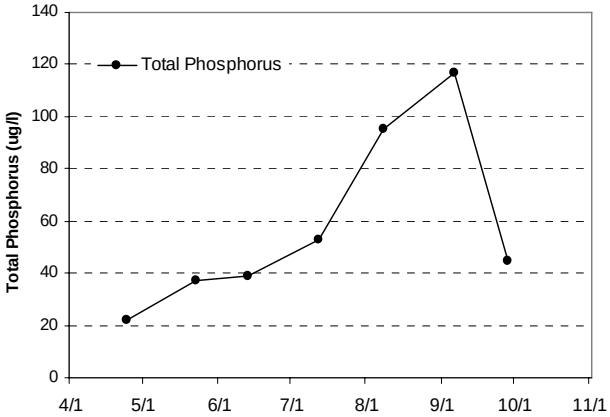
To better understand the lake's overall water quality and where it may be heading, additional years of data collection are needed.

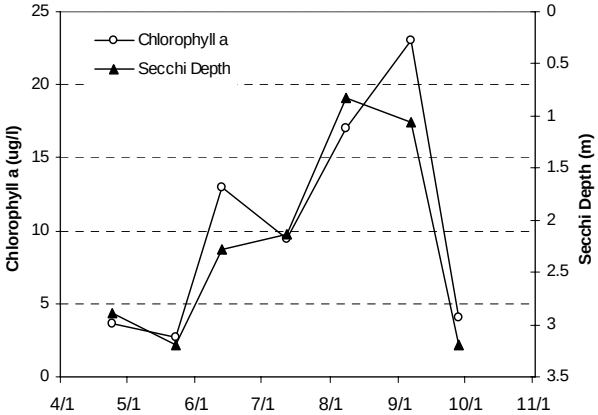
Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The average user perception rankings were 2.7 for physical condition (between 2- "some algae present" and 3- "definite algae present"), and 3.0 for recreational suitability (3- "swimming slightly impaired").

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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

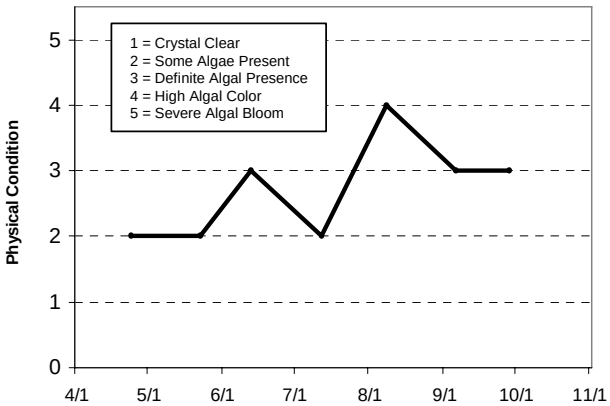






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/24/06	16.2	8.6	7.46	6.63	3.6	22		2.896	2	2
5/23/06	18.4	15.7	10.95	8.85	2.7	37		3.2	2	3
6/13/06	22.2	17.9	9.24	0.08	13	39		2.286	3	3
7/12/06	26.8	22.2	8.4	0.14	9.4	53		2.134	2	2
8/8/06	26.3	21.5	8.76	0.17	17	95		0.823	4	4
9/6/06	22.5	20.1	8.18	0.05	23	117		1.067	3	4
9/28/06	14.9	14.8	7.86	0.1	4	45		3.2	3	3

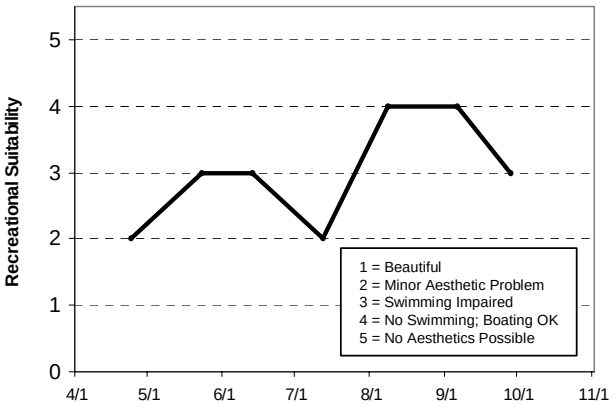


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus														C
Chlorophyll a														B
Secchi Depth														C
Overall														**C**

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).

This was the seventh year that Bass Lake was monitored through CAMP. A search through the STORET nationwide water quality database provided a moderate amount of historic data including Secchi data from 1991-2003 and nutrient and CLA data in 1991-1992, 1996-2001, and 2003-2005.

The lake was monitored seven times between early-May and mid-October, 2006. The resulting data and graphs appear on the next page. 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.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	38.0	21.0	60.0	C
CLA (µg/l)	13.7	2.8	29.0	B
Secchi (m)	2.2	1.2	3.5	C
TKN (mg/l)	0.86	0.60	1.00	
			Overall Grade	C

The 2006 grade of C is similar to that recorded in 1991, 1997-2001 and 2003, and slightly worse than the B's recorded in 1992, 2004-2005. The 2006 summer means were slightly worse than those recorded in 2005.

Statistical analysis on the lake's water quality database did not detect any long-term trends. The lake's water quality seems to be well represented by an overall grade of C+/B-. To better understand the lake's water quality and where it may be heading, more data are needed.

Throughout the monitoring period, the volunteers' opinion 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 2.3 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").

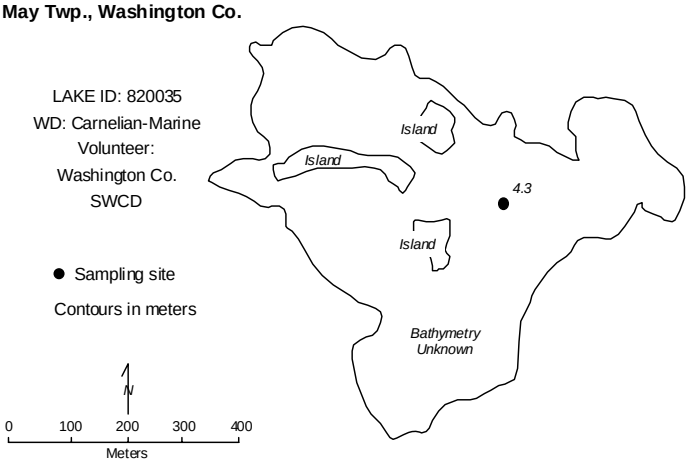
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

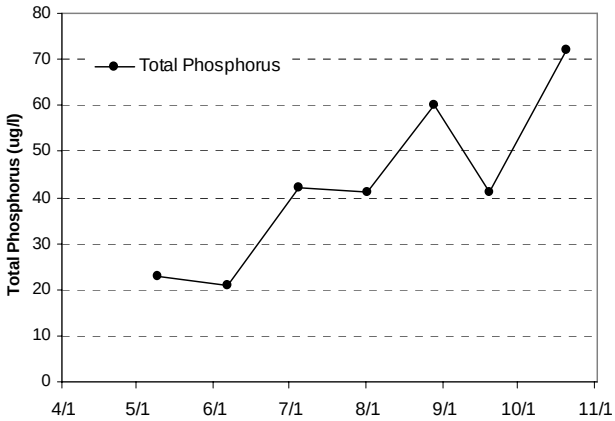
Bass Lake
May Twp., Washington Co.

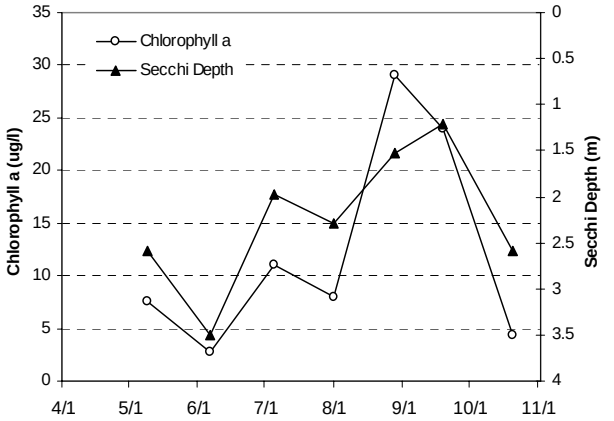
LAKE ID: 820035
WD: Carnelian-Marine
Volunteer:
Washington Co.
SWCD

● Sampling site

Contours in meters

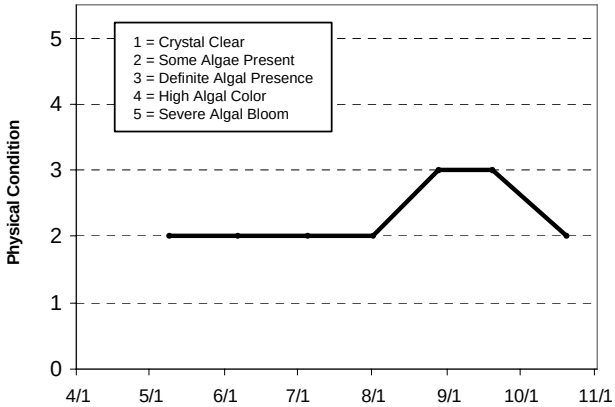






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/9/06	18.6	15.2	7.29	6.83	7.6	23		2.591	2	3
6/6/06	24.8	16.7	6.11	4.16	2.8	21		3.505	2	2
7/5/06	25.2	17.8	10.14	0.12	11	42		1.981	2	2
8/1/06	28.9	19.9	6.2	0.05	8	41		2.286	2	2
8/28/06	22.9	20.8	6.3	0.03	29	60		1.524	3	3
9/19/06	15	16.5	9.95	0.11	24	41		1.219	3	3
10/20/06	7	7.1	10.37	0.11	4.4	72		2.591	2	2

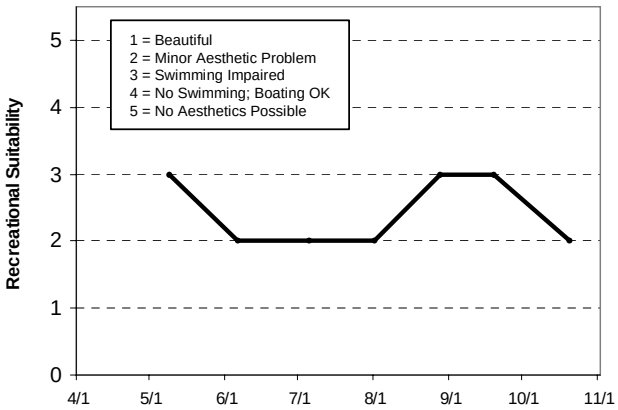


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus												C	B
Chlorophyll a												B	B
Secchi Depth												C	C
Overall												**C**	**B**

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus				C	C	C	C	C	C		C	B	C	C
Chlorophyll a				C	C	B	B	B	B		B	A	B	B
Secchi Depth	C	C	C	C	C	C	C	C	C	B	C	B	B	C
Overall					**C**	**C**	**C**	**C**	**C**		**C**	**B**	**B**	**C**

Source: Metropolitan Council and STORET data



Bavaria Lake (10-0019) *City of Chaska*

Lake Bavaria, located in the City of Chaska (Carver County), the 200-acre lake has a mean and maximum depth of 5.6 m (18.4 feet) and 18.3 m (60 feet), respectively. Roughly 65 percent of the lake is considered littoral, the shallow (0-15 foot depth) area dominated by aquatic vegetation. Eurasian Water Milfoil (*Myriophyllum spicatum*) [EWM] has been reported on the lake.

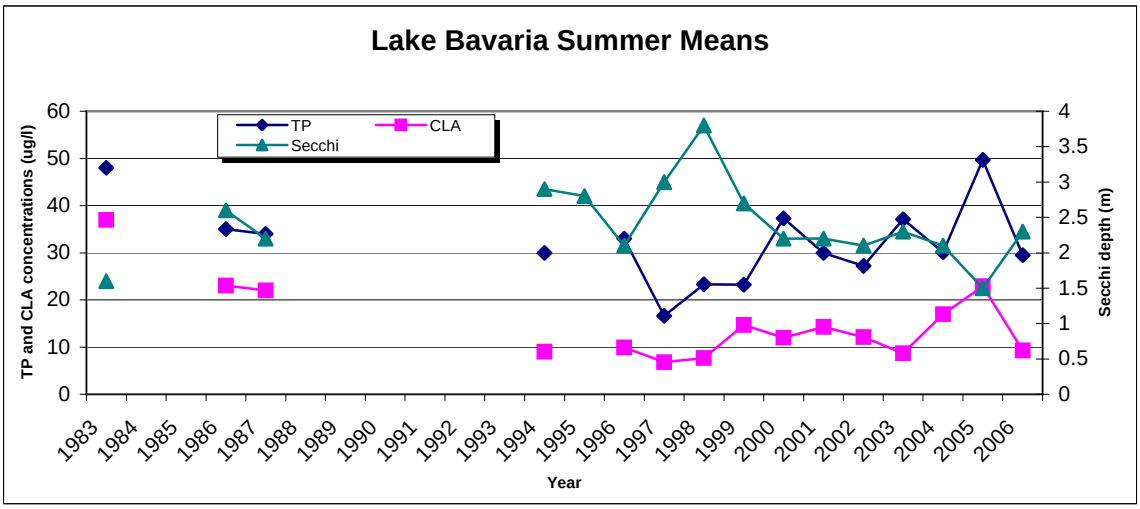
The lake's surface area and mean depth translates to an approximate lake volume of 3,674 ac-ft. The lake has a 711-acre immediate watershed, which translates to a watershed-to-lake area ratio of 3.5:1 (the larger the ratio the greater the potential stress put on the lake from surface runoff). A 1999 water quality report on water resources in Carver County estimates land use for the watershed at: 17.5 percent residential, 52.7 percent agricultural, 29.7 percent commercial/industrial, and 0.2 percent open/undeveloped (Carver County Planning 1999). A public access is located on the lake's western edge and because of its multi-recreational uses, it is considered a "Priority Lake" in the Metropolitan Area.

While 2006 was the eleventh 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 16 times between mid-April and mid-October, 2006.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	29.5	12.0	47.0	B
CLA (µg/l)	9.3	1.2	43.0	A
Secchi (m)	2.3	1.3	4.5	B
TKN (mg/l)	1.09	0.56	1.30	
			Overall Grade	B



Available data for Bavaria Lake reveal that the lake water quality remained constant through the 1980's (C's) and improved through the mid-1990s (overall grades of B in 1994 and 1996, and A in 1997-1998), before falling back to overall grades of B in 1999-2004. In 2005, the overall grade once again was a C but the overall water quality in 2006 has increased and the overall grade is back to a B.

The lake's summer mean graph and report card grades clearly depict that the lake's water quality has recently (mid-1990s to present) started to degrade. In fact, a recent MPCA conducted trend analysis on the lake's Secchi transparency data, revealed a statistically significant decrease in recent water clarity.

Throughout the monitoring period, the volunteers' opinion 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 2.3 (between 2- "some algae present and 3- "definite algae present"), while the mean recreational suitability ranking for the lake was 1.9 (between 1- "beautiful" and 2- "minor aesthetic problem").

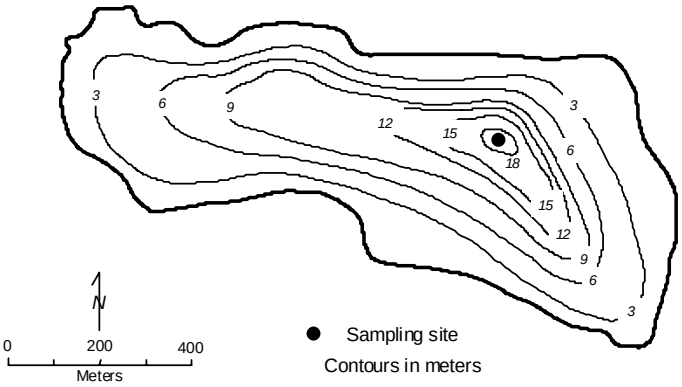
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

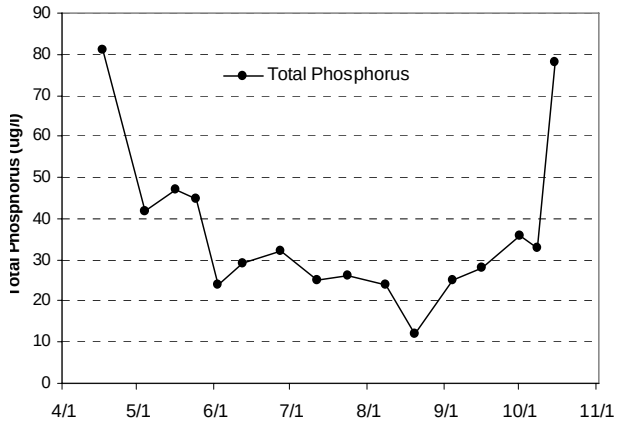
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

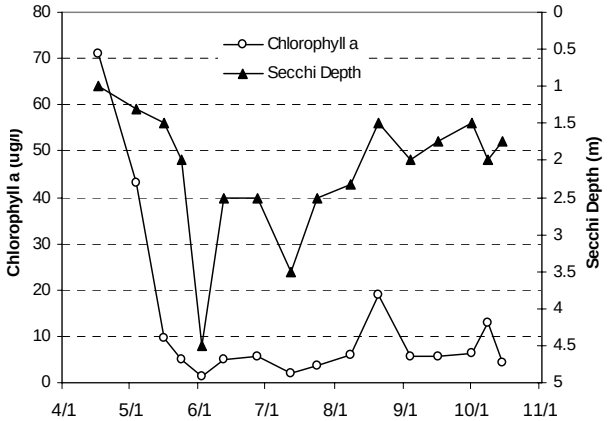
Lake Bavaria

Chaska/Laketown Twp., Carver Co.

LAKE ID: 100019
WMO: Carver County
Volunteer: John Ryski

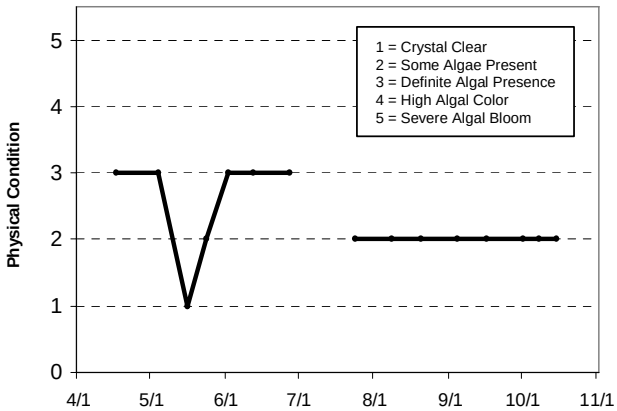






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/17/06	10.75		15.2		71	81		1	3	2
5/4/06	12.76		10.93		43	42		1.3	3	2
5/16/06	14				9.6	47		1.5	1	1
5/24/06	17				5	45		2	2	2
6/2/06	26				1.2	24		4.5	3	2
6/12/06	20				4.9	29		2.5	3	3
6/27/06	23				5.6	32		2.5	3	2
7/12/06	25				2	25		3.5		
7/24/06	25				3.6	26		2.5	2	1
8/8/06	25				5.9	24		2.33	2	2
8/20/06	23				19	12		1.5	2	2
9/4/06	20				5.8	25		2	2	2
9/16/06	17				5.6	28		1.75	2	2
10/1/06	16				6.2	36		1.5	2	2
10/8/06	13				13	33		2	2	2
10/15/06	10				4.3	78		1.75	2	2

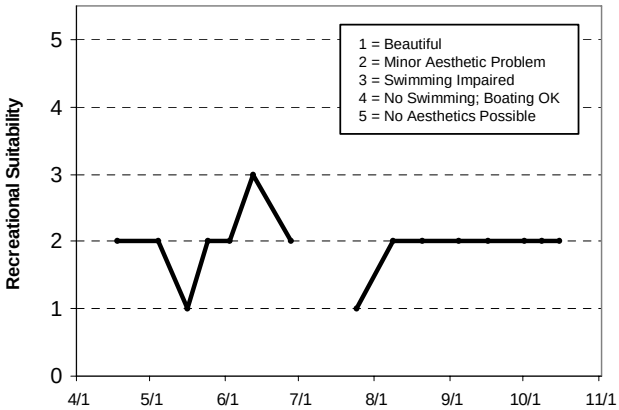


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus				C			C	C					
Chlorophyll a				C			C	C					
Secchi Depth				C			C	C					
Overall				**C**			**C**	**C**					

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus		B		C	A	B	B	C	B	B	C	B	C	B
Chlorophyll a		A		A	A	A	B	B	B	B	A	B	C	A
Secchi Depth		B	B	C	A	A	B	B	B	C	B	C	C	B
Overall		**B**		**B**	**A**	**A**	**B**	**B**	**B**	**B**	**B**	**B**	**C**	**B**

Source: Metropolitan Council and STORET data



Bay Pond 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.

This was the first year that Bay Pond 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 CAMP data represent the only nutrient data available. 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 lake was monitored 14 times between mid-April and mid-October, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	219.4	101.0	473.0	F
CLA (µg/l)	95.4	9.4	290.0	F
Secchi (m)	0.6	0.30	1.00	F
TKN (mg/l)	3.11	1.10	6.30	
			Overall Grade	F

As mentioned earlier, there are no nutrient data available for Bay Pond other than the 2006 CAMP data. Therefore it is not possible to determine any long-term or short-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 2.7 for physical condition (between 2- "some algae present" and 3- "definite algae present"), and 2.7 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Bay Pond (Bay Lake)

Baytown Twp., Washington Co.

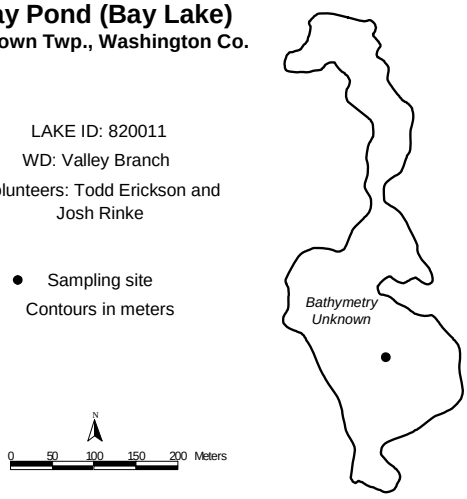
LAKE ID: 820011

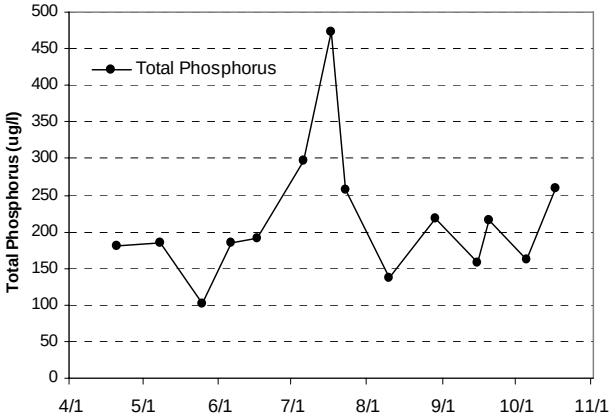
WD: Valley Branch

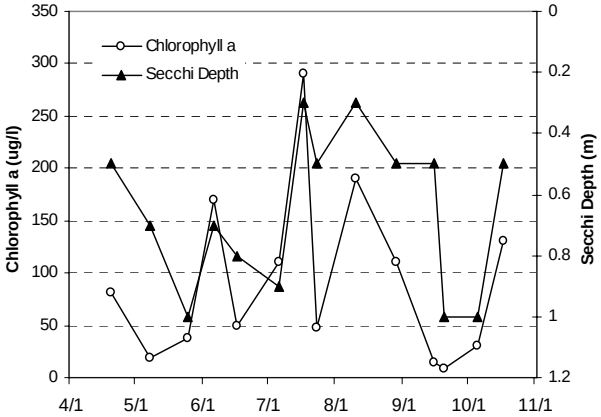
Volunteers: Todd Erickson and Josh Rinke

● Sampling site

Contours in meters

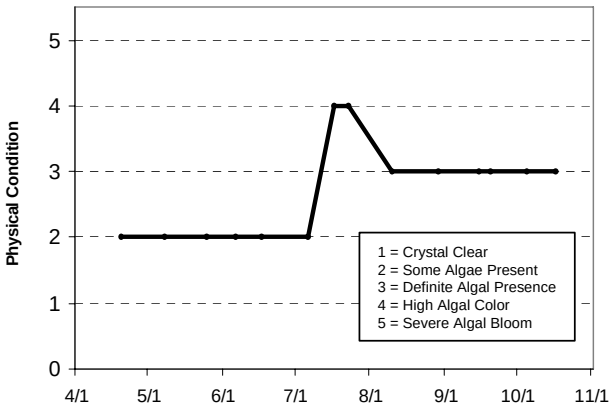






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/20/06	15				82	180		0.5	2	2
5/8/06	20				19	184		0.7	2	2
5/25/06	22				38	101		1	2	3
6/6/06	24.3				170	185		0.7	2	3
6/17/06	24				50	190		0.8	2	2
7/6/06	26				110	296		0.9	2	2
7/17/06	28				290	473		0.3	4	3
7/23/06	29.6				48	258		0.5	4	3
8/10/06	28.3				190	136		0.3	3	3
8/29/06	25.5				110	218		0.5	3	3
9/15/06	20.7				15	157		0.5	3	3
9/20/06	16.5				9.4	215		1	3	3
10/5/06	18.5				30	162		1	3	3
10/17/06	10				130	260		0.5	3	3

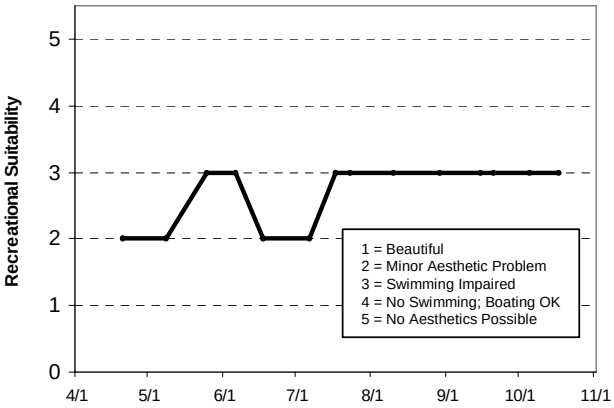


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus														F
Chlorophyll a														F
Secchi Depth														F
Overall														**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 year 2006 marks the third year that Benz Lake has been involved in CAMP (1998 being the first). A search through the STORET nationwide water quality database provided no additional data other than the 1998 and 2005 CAMP data.

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 lake was monitored 14 times between mid-April and mid-October, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	219.8	85.0	542.0	F
CLA (µg/l)	52.8	12.0	99.0	D
Secchi (m)	0.8	0.3	1.7	D
TKN (mg/l)	4.13	1.7	13.0	
			Overall Grade	D

The lake received an overall grade of a D in 2006 which was slightly improved from conditions seen in 2005.

As mentioned earlier, there is a very limited amount of water quality data available for Benz Lake. Therefore it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

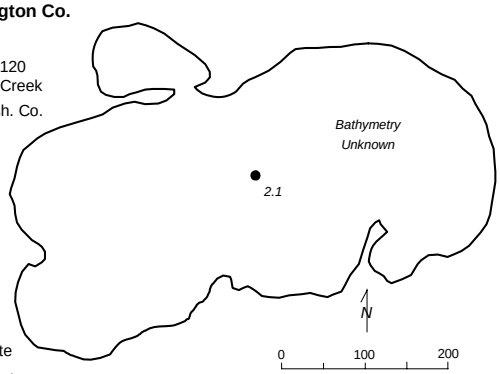
Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The average user perception rankings were 3.4 for physical condition (between 3- "definite algae present" and 4- "high algal color"), and 3.8 for recreational suitability (between 3- "swimming slightly impaired" and 4- "no swimming - boating ok").

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Benz Lake

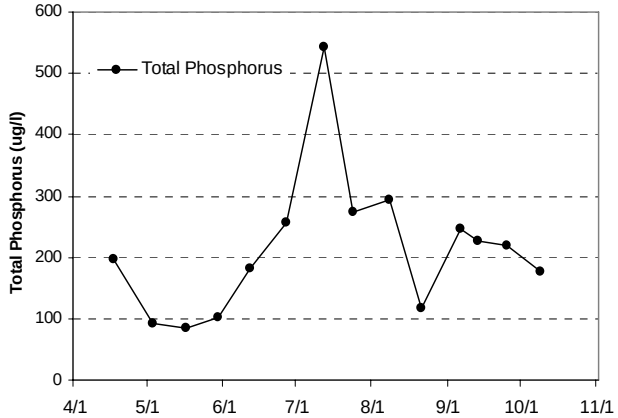
Grant, Washington Co.

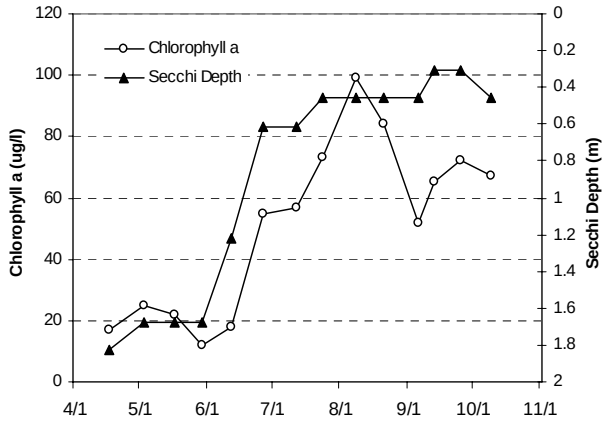
Lake ID: 820120
WMO: Browns Creek
Volunteer: Wash. Co. SWCD



● Sampling site
Contours in meters

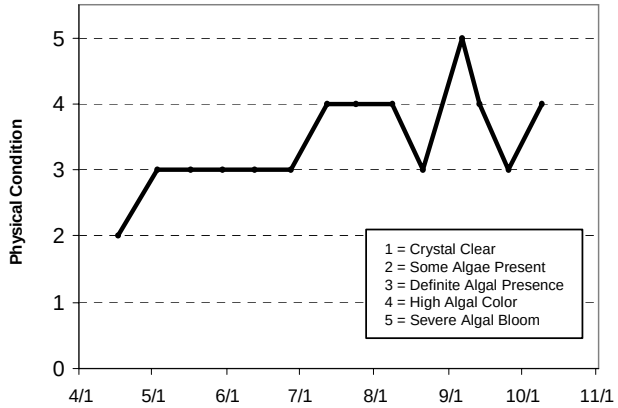
0 100 200
Meters





2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/17/06	15.9	15.1	6.53	6.6	17	196		1.829	2	4
5/3/06	15.6	15.5	9.1	8.96	25	92		1.676	3	4
5/17/06	18.5	14.1	10.34	10.54	22	85		1.676	3	4
5/30/06	27.5	20.7	4.84	6	12	103		1.676	3	4
6/12/06	21.3	20.2	4.59	0.09	18	181		1.219	3	3
6/27/06	26.5	23.7	10.91	0.06	55	257		0.61	3	3
7/12/06	25.8	25.1	4.28	0.09	57	542		0.61	4	4
7/24/06	27	25.2	9.71	0.12	73	273		0.457	4	4
8/8/06	27	25.6	8.77	0.07	99	295		0.457	4	4
8/21/06	24.7	23.4	8.93	0.08	84	117		0.457	3	4
9/6/06	24.7		11.08		52	247		0.457	5	4
9/13/06	18	17.3	12.18	0.16	65	226		0.305	4	4
9/25/06	16.3	14.3	11.77	0.1	72	219		0.305	3	3
10/9/06	14.1		9.08		67	176		0.457	4	4

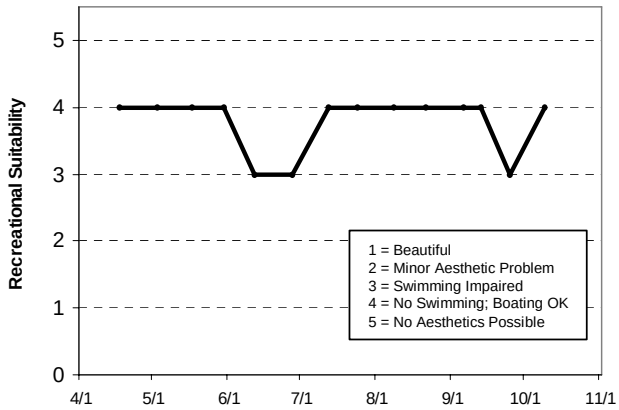


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus													F	F
Chlorophyll a													F	D
Secchi Depth						F							F	D
Overall													**F**	**D**

Source: Metropolitan Council and STORET data



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

Big Carnelian Lake, located within May Township (Washington County), has a public access on its southwestern side, and is considered a "Priority Lake" due to its multi-recreational uses. 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 seven times between early-May and early-October, 2006. The data and related graphs are presented on the information sheet on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	31.8	18.0	46.0	B
CLA (µg/l)	7.1	3.0	13.0	A
Secchi (m)	3.5	3.0	4.0	A
TKN (mg/l)	0.69	0.56	0.78	
			Overall Grade	A

The lake received overall grades of A in 1980, 1989, 1991, 1994, 1996-1998, 2000-2002, and 2004-2006, and a grade of B in 1984, 1999, and 2003.

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 2.0 (2- "some algae present"), while the mean recreational suitability ranking was 1.7 (between 1- "beautiful" and 2- "minor aesthetic problem").

No statistically significant long-term trend is evident from the lake's water quality database, in the short-term however, the lake's quality seems well represented by an overall grade of A.

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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Big Carnelian Lake
May Twp., Washington Co.

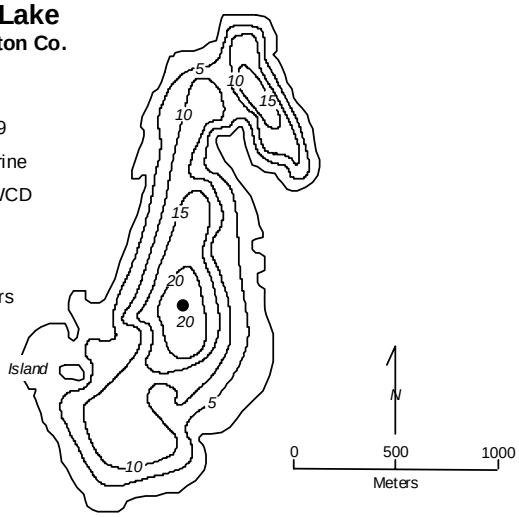
LAKE ID: 820049

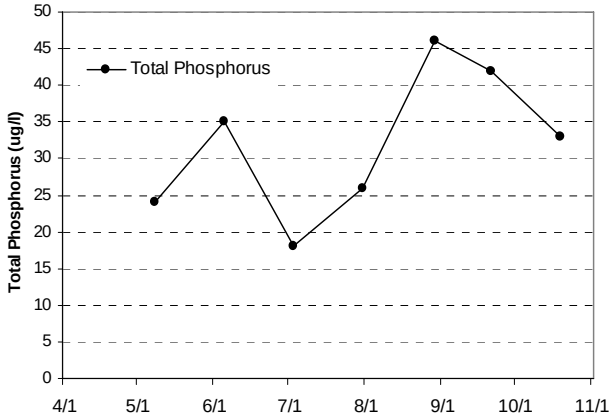
WD: Carnelian-Marine

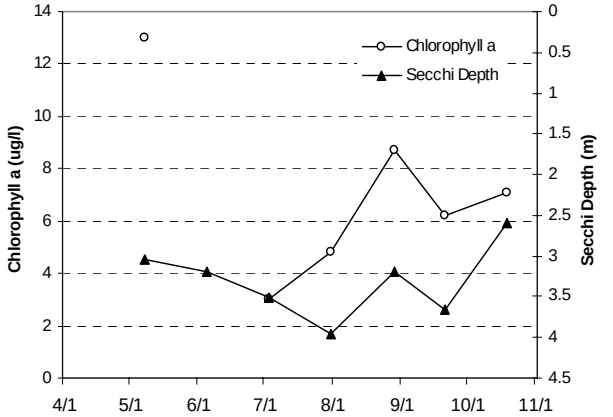
Washington Co. SWCD

● Sampling site

Contours in meters

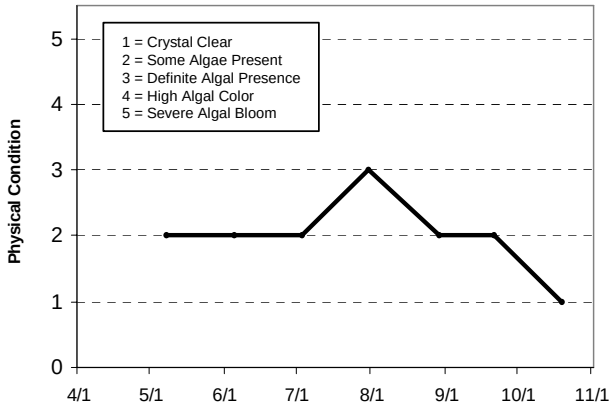






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/8/06	13.9	5.3	9.18	0.35	13	24		3.048	2	2
6/5/06	23.5		6.32			35		3.2	2	2
7/3/06	25.6	5.8	8.39	0.06	3	18		3.505	2	2
7/31/06	28	6	8.2	0.04	4.8	26		3.962	3	2
8/29/06	22.9	6.3	7.59	0.04	8.7	46		3.2	2	2
9/21/06	17.6	6.3	8.65	0.04	6.2	42		3.658	2	1
10/19/06	10.2	6.5	8.13	0.06	7.1	33		2.591	1	1

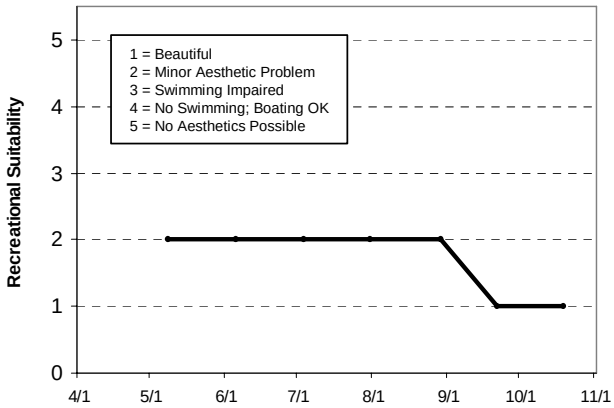


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus	A				B					A		A	
Chlorophyll a	A				B					A		A	
Secchi Depth	A				B					A		B	B
Overall	**A**				**B**					**A**		**A**	

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus		A		A	A	A	A	A	A	B	A	A	A	B
Chlorophyll a		A		A	A	A	B	A	A	A	A	A	A	A
Secchi Depth	B	B	B	B	A	A	B	A	A	A	B	A	A	A
Overall		**A**		**A**	**A**	**A**	**B**	**A**	**A**	**A**	**B**	**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 just north east of the City of Forest Lake, in Isanti County. This year marked the eighth year that the 219-acre lake has been enrolled in CAMP (1998 [it was, however, only monitored a two times in October] and 2000-2006). 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 BlueWater Science in the early-2000's.

Big Comfort Lake was monitored 14 times between early-May and mid-October, 2006. The data and related graphs are presented on the information sheet on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	49.8	23.0	98.0	C
CLA (µg/l)	12.5	9.2	17.0	B
Secchi (m)	2.1	1.4	3.0	C
TKN (mg/l)	1.39	1.1	2.80	
			Overall Grade	C

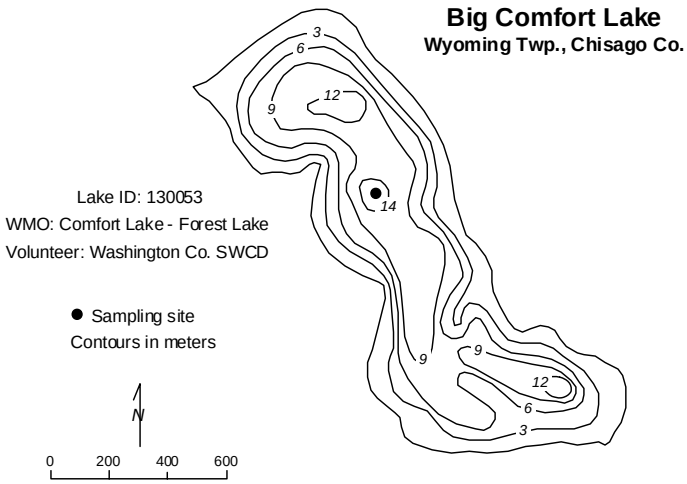
The lakes 2006 overall grade is similar to that recorded in 2000 and 2002-2004 but worse than that reported in 2001 and 2005.

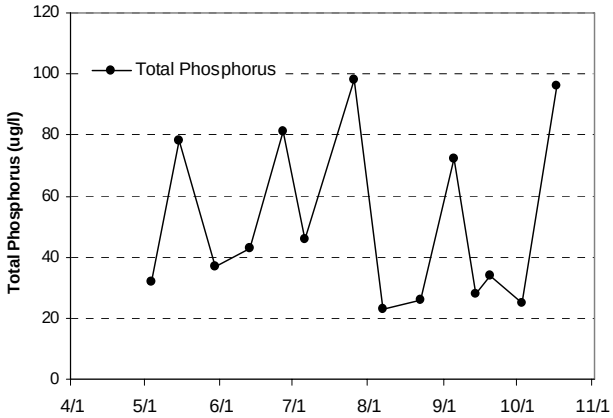
Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The resulting user perception rankings are shown on the information sheet. The mean physical condition ranking was 2.1 (between 2- "some algae present" and 3- "definite algae present"), while the mean recreational suitability ranking was 2.2 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

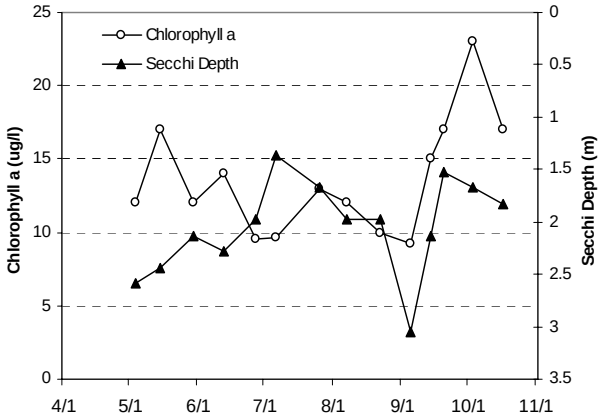
Statistical analysis on the lake's water quality database did not detect any long-term trends. In the short-term however, the lake seems well represented by an overall grade of C+. To better understand the lake's current water quality and in which direction it may be heading, continued monitoring is suggested.

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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

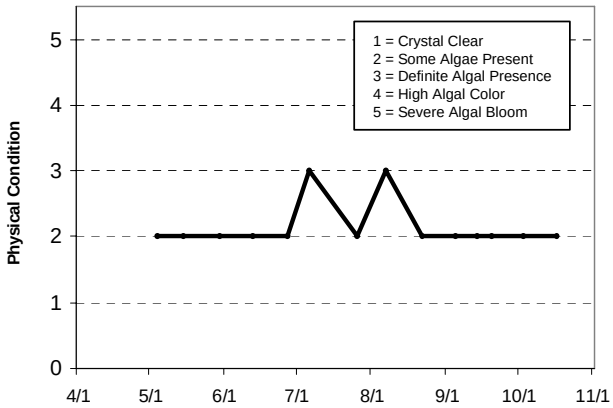






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/4/06	13.6	7.6	8.74	0.35	12	32		2.591	2	2
5/15/06	12.8	8.1	9.01	0.51	17	78	35	2.438	2	2
5/30/06	24.6		6.56		12	37	125	2.134	2	2
6/13/06	21.5	9.7	8.9	0.03	14	43	270	2.286	2	2
6/27/06	23.5	10.3	8	0.02	9.5	81	270	1.981	2	2
7/6/06	25.1	10.2	7.8	0.04	9.6	46	336	1.372	3	3
7/26/06	27	10.4	8.25	0.04	13	98	336	1.676	2	2
8/7/06	25.9	10.5	7.35	0.03	12	23	527	1.981	3	3
8/22/06	23.8	10.7	8.1	0.04	10	26	346	1.981	2	3
9/5/06	22.1	10.7	8.43	0.04	9.2	72	398	3.048	2	2
9/14/06	18.9	11	7.84	0.04	15	28	226	2.134	2	2
9/20/06	17	10.9	6.85	0.04	17	34	501	1.524	2	2
10/3/06	16	10.7	8.43	0.06	23	25	203	1.676	2	2
10/17/06	10.3	10.2	9.75	0.11	17	96		1.829	2	2

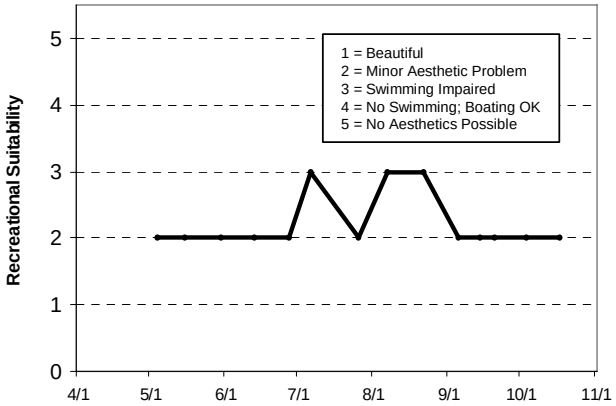


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth								B	B	B			
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus		D						C	B	C	C	C	B	C
Chlorophyll a		B						C	B	C	C	B	B	B
Secchi Depth		C	C		C	C		C	C	C	C	C	C	C
Overall		**C**						**C**	**B**	**C**	**C**	**C**	**B**	**C**

Source: Metropolitan Council and STORET data



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

Big Marine Lake, located within City of Scandia (Washington County), has two public accesses, and is considered a "Priority Lake" due to its multi-recreational uses. 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.

Big Marine Lake was monitored seven times between late-April and early-October, 2006. The data and related graphs are presented on the information sheet on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	35.2	20.0	45.0	C
CLA (µg/l)	8.4	5.1	12.0	A
Secchi (m)	3.1	2.4	3.8	A
TKN (mg/l)	0.87	0.74	1.20	
			Overall Grade	B

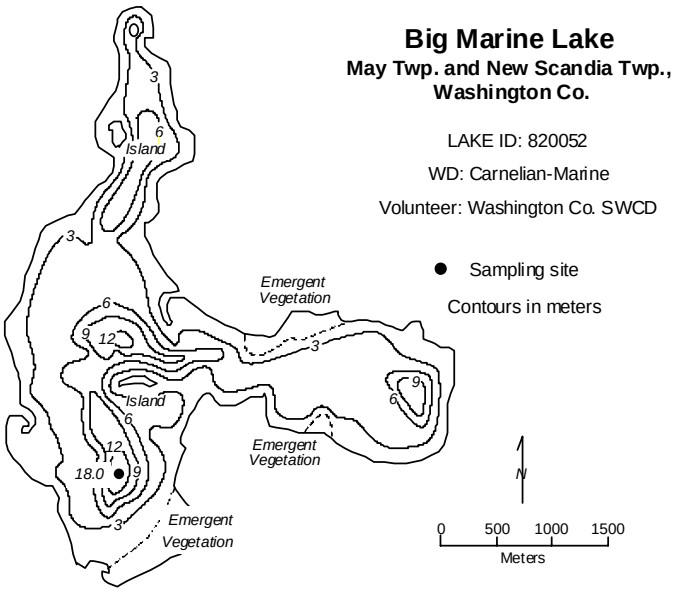
The overall lake grade in 2006 was a B which is consistent with grades received in 1980, 1981, 1984, 1991, 1999, and 2002. The lake received overall grades of A in 1989, 1994, 1996-1998, 2000-2001, and 2003-2005.

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 2.1 (between 2- "some algae present" and 3- "definite algae present"), while the mean recreational suitability ranking was 2.0 (2- "minor aesthetic problem").

While no statistically significant long-term trend is evident from the lake's whole water quality database (including TP, CLA and Secchi data), a recent MPCA conducted trend analysis using just the lake's Secchi transparency data, revealed a statistically significant improvement in recent water clarity. In the short-term, the lake's quality seems well represented by an overall grade of B/A.

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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.



Big Marine Lake

May Twp. and New Scandia Twp., Washington Co.

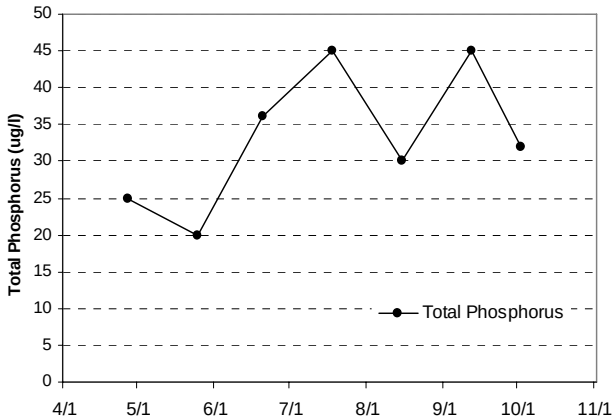
LAKE ID: 820052

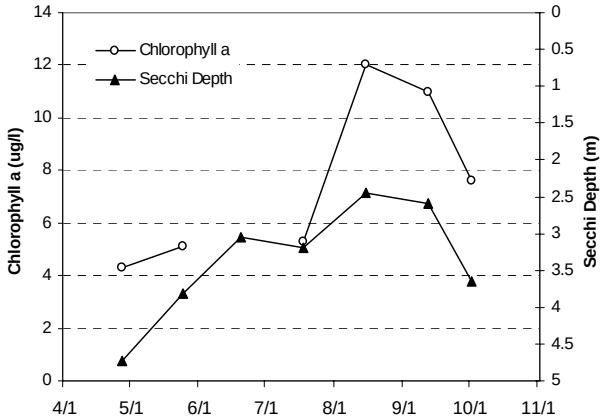
WD: Carnelian-Marine

Volunteer: Washington Co. SWCD

● Sampling site

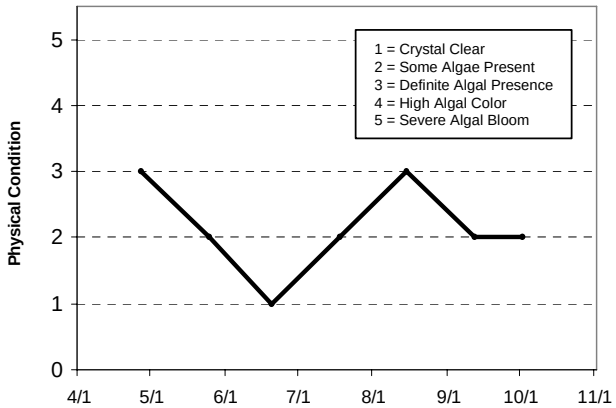
Contours in meters





2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/27/06	13.2	10.9	7.3	0.5	4.3	25		4.724	3	2
5/25/06	17.2		7.55		5.1	20		3.81	2	2
6/20/06	22.9	13.9	8.12	0.03		36		3.048	1	1
7/18/06	26.7	14.1	8.02	0.03	5.3	45		3.2	2	2
8/15/06	23.9	14	6.87	0.04	12	30		2.438	3	3
9/12/06	18.8	14	8.01	0.04	11	45		2.591	2	2
10/2/06	17.3	14.4	8.98	0.05	7.6	32		3.658	2	2

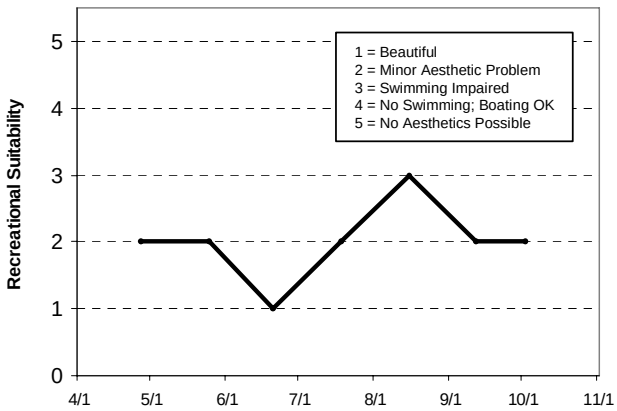


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus	B	B			B					A		B	
Chlorophyll a	B	B			B					A		A	
Secchi Depth	B	B			B	B	B	B	C	A	C	B	A
Overall	**B**	**B**			**B**					**A**		**B**	

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus		A		B	A	A	A	A	A	B	A	A	A	C
Chlorophyll a		A		A	A	A	B	A	A	B	A	A	A	A
Secchi Depth	A	B		A	B	A	B	A	A	B	B	A	A	A
Overall		**A**		**A**	**A**	**A**	**B**	**A**	**A**	**B**	**A**	**A**	**A**	**B**

Source: Metropolitan Council and STORET data



Birch Lake (13-0042) *Comfort Lake-Forest Lake Watershed District*

Birch Lake is a 65-acre lake located in southern Chisago County. There is very little other known morphological data available for the lake.

This marks the second year in which Birch Lake has been involved in CAMP. A search through the STORET nationwide water quality database for historic data on the lake came up empty. Therefore, 2005 and 2006 are the only known years of water quality data available. 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 lake was monitored seven times between early-May and mid-October, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	107.8	56.0	215.0	D
CLA (µg/l)	20.1	6.8	43.0	C
Secchi (m)	1.6	0.9	2.3	C
TKN (mg/l)	1.27	0.76	1.9	
			Overall Grade	C

The overall grade for the lake in 2006 was a C which is better than the overall water quality of a D reported in 2005. This appears to be the result of a lower mean CLA results for the 2006 sampling season. Because of the limitedness of the lake's water quality database, it is not possible to determine any long-term or short-term trends. 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 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

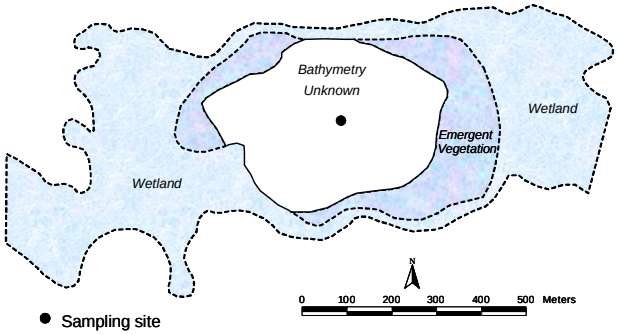
Birch Lake

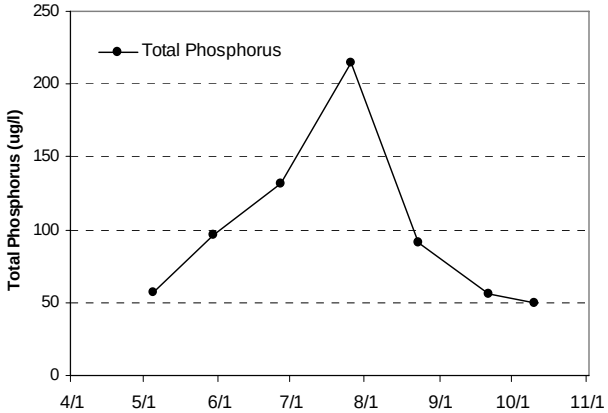
Chisago Lake Twp. and Wyoming Twp., Chisago Co.

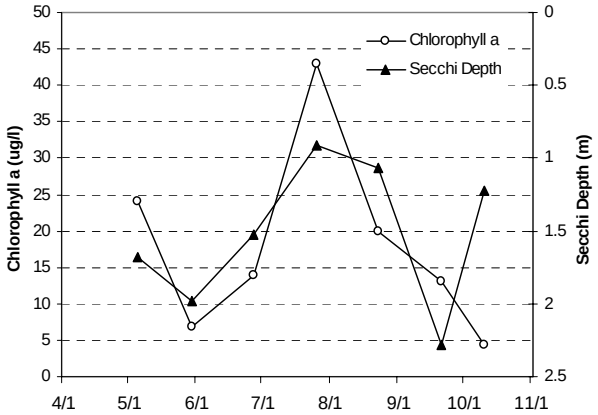
LAKE ID: 130042

WMO: Comfort Lake-Forest Lake

Volunteer: Washington Co. SWCD

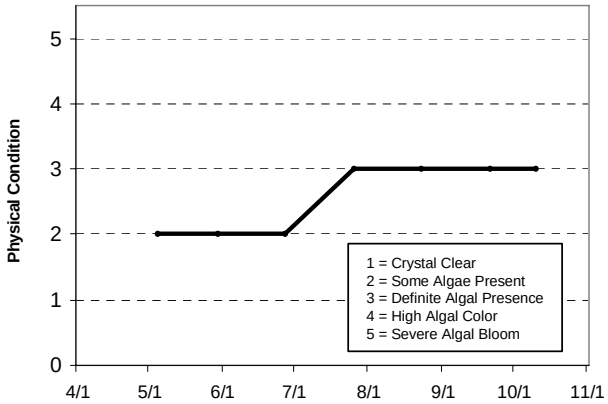






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/5/06	12.5	12.5	6.42	5.98	24	57		1.676	2	4
5/30/06	27	14.9	4.86	0.24	6.8	96		1.981	2	3
6/27/06	23.2	17.1	6.3	0.08	14	132		1.524	2	3
7/26/06	25.9	21.7	4.56	0.06	43	215		0.914	3	3
8/23/06	22.1	21.2		0.03	20	91		1.067	3	4
9/21/06	13.4	14	10.51	0.21	13	56		2.286	3	4
10/10/06	12.2	12.5	8.89	0.07	4.4	50		1.219	3	3

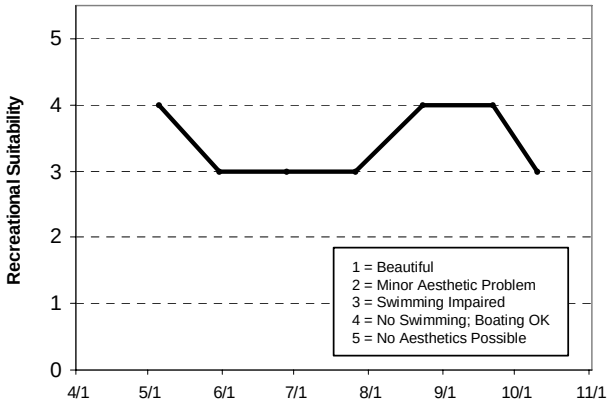


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus													D	D
Chlorophyll a													D	C
Secchi Depth													C	C
Overall													**D**	**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).

This was the fifth year that Brickyard Lake has been involved in CAMP (2002 being the first). The lake was monitored 13 times between mid-April and mid-October, 2006. During each monitoring event the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as its perceived physical condition and recreational suitability. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	24.4	10.0	70.0	B
CLA (µg/l)	2.67	1.0	8.0	A
Secchi (m)	4.9	3.6	5.8	A
TKN (mg/l)	0.51	0.27	0.88	
			Overall Grade	A

To the best of our knowledge, there are no water quality data available for Brickyard Lake other than the 2002-2006 CAMP data. Therefore it is not possible to determine any long-term or trends. In the short-term however, the lake's water quality is well represented by an overall grade of A. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

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 1.0 for physical condition (1- "crystal clear"), and 1.0 for recreational suitability (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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

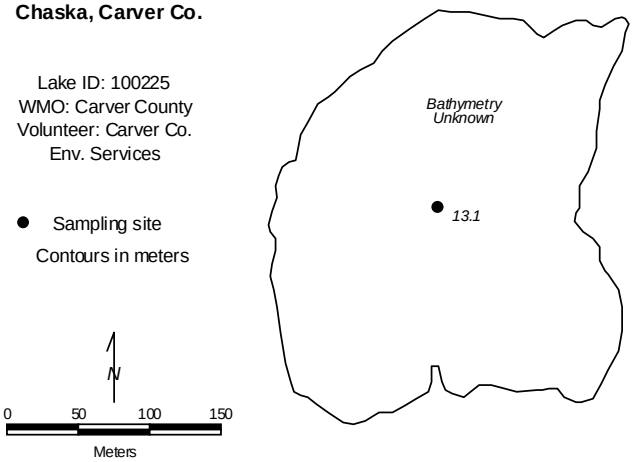
Brickyard Lake

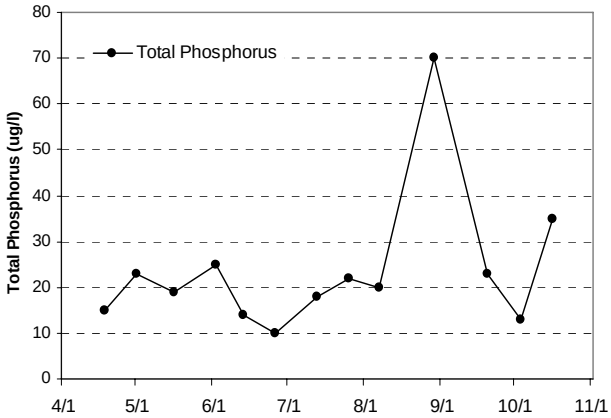
Chaska, Carver Co.

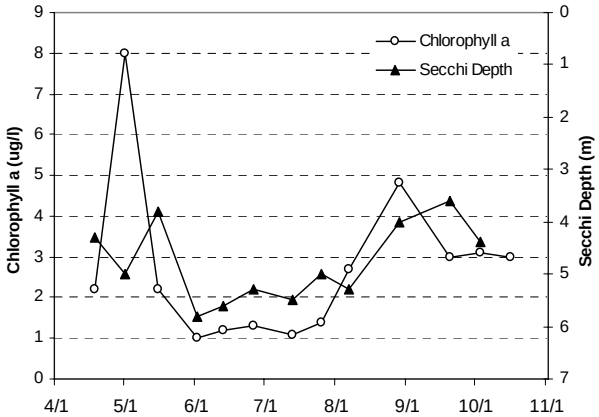
Lake ID: 100225
WMO: Carver County
Volunteer: Carver Co.
Env. Services

● Sampling site

Contours in meters

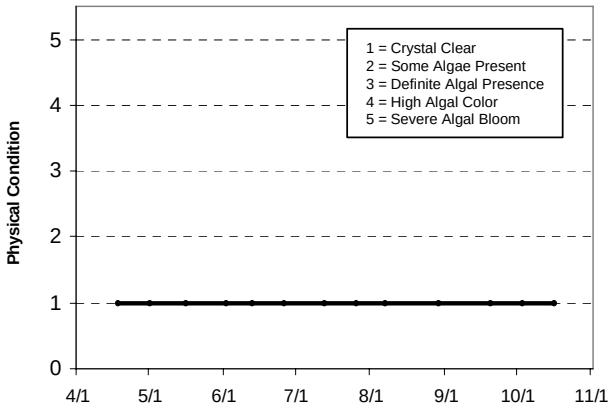






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/18/06	15.67		10.11		2.2	15		4.3	1	1
5/1/06	13.46		10.6		8	23		5	1	1
5/16/06	15.47		11.2		2.2	19		3.8	1	1
6/2/06	24.64		9.83		1	25		5.8	1	1
6/13/06	21.56		12		1.2	14		5.6	1	1
6/26/06	24.52		9.19		1.3	10		5.3	1	1
7/13/06	26.88		9.84		1.1	18		5.5	1	1
7/26/06	26.86		9.3		1.4	22		5	1	1
8/7/06	27.95		7.76		2.7	20		5.3	1	1
8/29/06	23.72		6.95		4.8	70		4	1	1
9/20/06	18.2		8.26		3	23		3.6	1	1
10/3/06	17.58		9.75		3.1	13		4.4	1	1
10/16/06	12.28		8.9		3	35			1	1

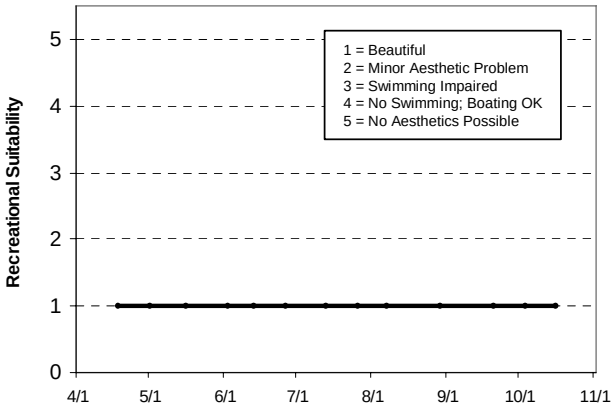


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus										A	A	A	A	B
Chlorophyll a										A	A	A	A	A
Secchi Depth										A	A	A	A	A
Overall										**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), covers an 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). Because of its multi-recreational uses, the lake is considered a "Priority Lake" in the Metropolitan Area. Eurasian Water Milfoil (*Myriophyllum spicatum*) [EWM] has been reported on the lake.

Although this is only the first year that Bush Lake has been enrolled in CAMP, the lake had been monitored by Council staff in the past. In 2006, the lake was monitored 13 times between mid-April and mid-October. The collected data and resulting graphs showing TP and CLA concentrations, Secchi transparency, and user perception (physical condition and recreational suitability) are presented on the lake's information sheet on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	20.0	14.0	28.0	A
CLA (µg/l)	6.3	1.7	16.0	A
Secchi (m)	2.9	1.5	4.0	B
TKN (mg/l)	0.74	0.37	0.94	
			Overall Grade	A

The lake's overall grade in 2006 (A) is similar to that recorded in 1984, 1993-1994 and 2001, and is better than those recorded in 1983, 1999 and 2004 (B). No statistically significant long-term trend is evident from the lake's water quality database. The lake's water quality seems to be best represented by an overall grade of A/B.

Throughout the 2006 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 2.4 (between 2- "some algae present" and 3- "definite algae present"), while the mean recreational suitability 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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Bush Lake

Bloomington, Hennepin Co.

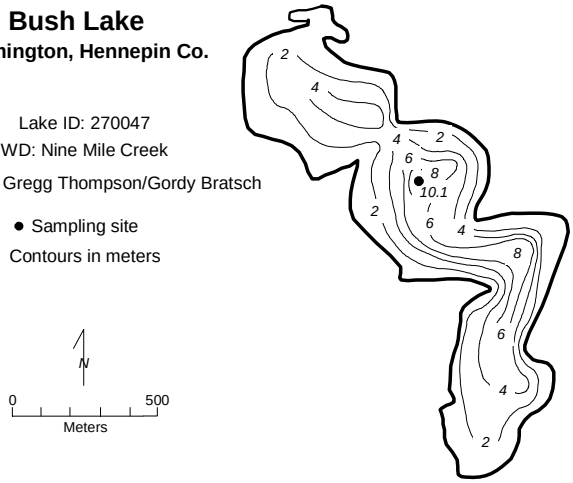
Lake ID: 270047

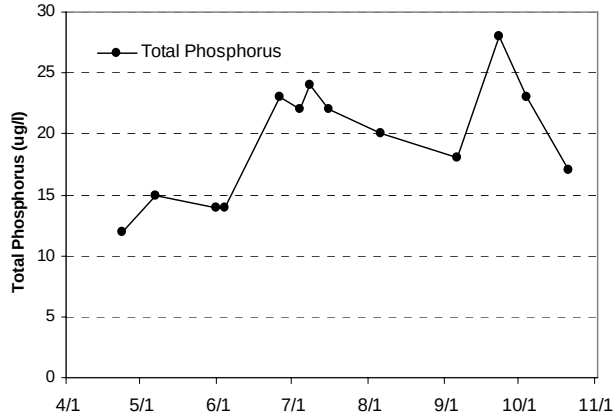
WD: Nine Mile Creek

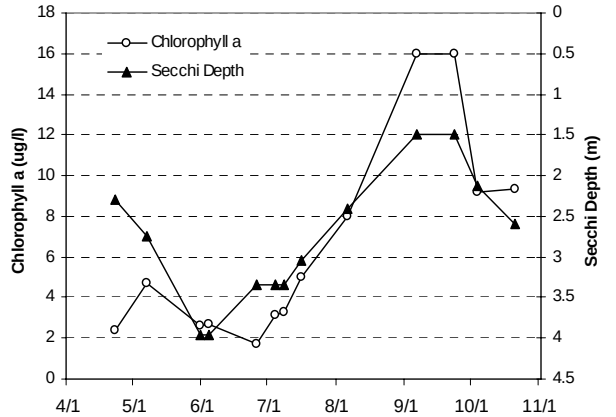
Volunteers: Gregg Thompson/Gordy Bratsch

● Sampling site

Contours in meters

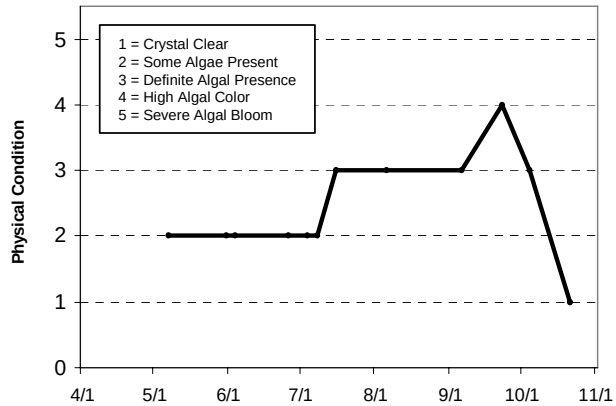






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/23/06	17.3				2.4	12		2.3		
5/7/06	17.4				4.7	15		2.74	2	1
5/31/06	26.4				2.6	14		3.96	2	1
6/4/06	25.9				2.7	14		3.96	2	1
6/26/06	26.4				1.7	23		3.35	2	2
7/4/06	26.4				3.1	22		3.35	2	2
7/8/06	27.1				3.3	24		3.35	2	2
7/16/06	28.6				5	22		3.05	3	2
8/6/06	28.6				8	20		2.4	3	2
9/6/06	25.2				16	18		1.5	3	2
9/23/06	16.8				16	28		1.5	4	3
10/4/06	17.5				9.2	23		2.13	3	2
10/21/06	8.9				9.3	17		2.6	1	1

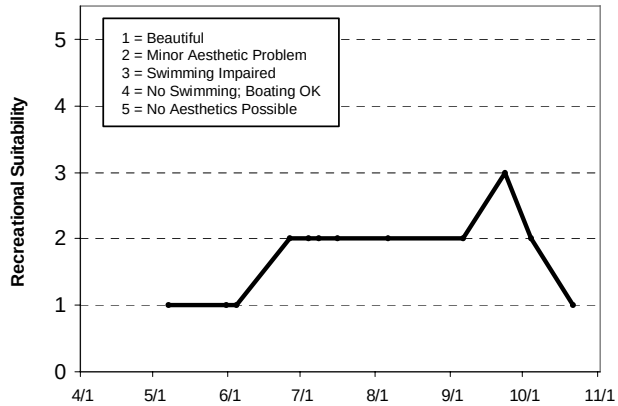


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus				B	A								
Chlorophyll a				B	A								
Secchi Depth				B	A	B	A	B	C				
Overall				**B**	**A**								

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus	A	A					B		A			A		A
Chlorophyll a	A	A					B		B			B		A
Secchi Depth	A	B					B		A			B		B
Overall	**A**	**A**					**B**		**A**			**B**		**A**

Source: Metropolitan Council and STORET data



Campbell Lake (10-0127) *Carver County Environmental Services*

Campbell Lake is located within Hollywood Township (Carver County). The maximum depth of the 72-acre lake is 2.0 m (roughly six-and-a-half 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 fifth year in which Campbell Lake has been involved in CAMP (the others being 1999 [where it was only monitored twice (no grade determined)], 2000, 2002, and 2005). Other than the mentioned CAMP data, a search through the STORET nationwide water quality database for data on the lake came up empty. Therefore, 1999-2000, 2002, 2005 and 2006 are the only years of available data.

The lake was monitored 14 times from mid-April to mid-October, 2006. Results are presented in both graphs and data tables on the lake's information sheet on the following page.

2006 summer (May-September) data summary

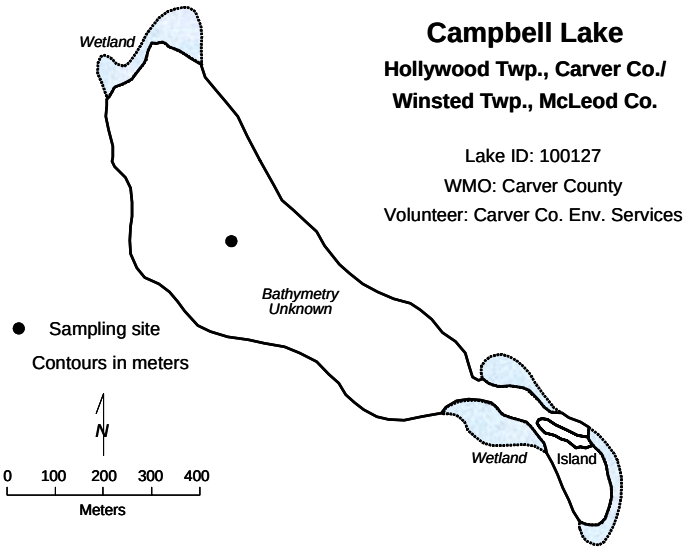
Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	392.9	182.0	694.0	F
CLA (µg/l)	180.8	21.0	450.0	F
Secchi (m)	0.2	0.2	0.5	F
TKN (mg/l)	4.72	2.10	8.00	
			Overall Grade	F

The lake's overall grade in 2006 (F) is similar to that recorded in 2000 and 2005, and is worse than those recorded in 2002 (D). No statistically significant long-term trend is evident from the lake's water quality database.

As mentioned earlier, there is no water quality data available for Campbell Lake other then that collected in 1999 (just two data points), 2000, 2002, and now 2005-2006. Therefore it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, more data are needed.

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 4.0 for physical condition (4- "high algal color"), and 4.0 for recreational suitability (4- "no swimming - boating ok").

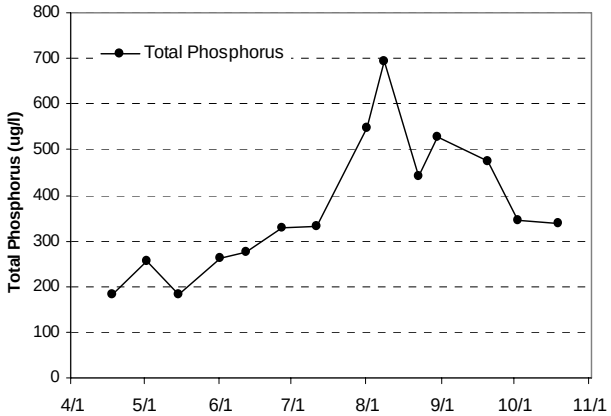
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

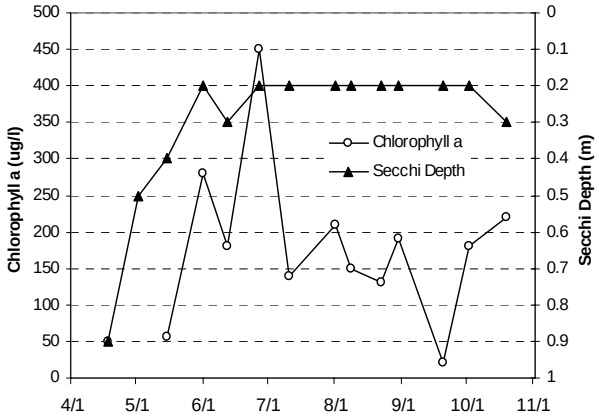


Campbell Lake

Hollywood Twp., Carver Co./
Winsted Twp., McLeod Co.

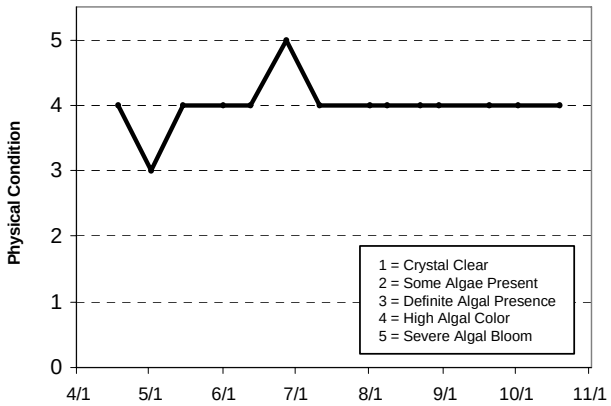
Lake ID: 100127
WMO: Carver County
Volunteer: Carver Co. Env. Services





2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/18/06	14.24		9.29		49	181		0.9	4	4
5/2/06	15.15		12.6			254		0.5	3	3
5/15/06	12.32		12.14		57	182		0.4	4	4
6/1/06	24.72		18.47		280	263		0.2	4	4
6/12/06	18.06		11.43		180	275		0.3	4	4
6/27/06	24.44		16.52		450	330		0.2	5	5
7/11/06	23.57		9.34		140	333		0.2	4	4
8/1/06	27.3		4.3		210	547		0.2	4	4
8/8/06	23.91		6.24		150	694		0.2	4	4
8/22/06	23.68		17.34		130	440		0.2	4	4
8/30/06	21.09		9.19		190	528		0.2	4	4
9/20/06	12.18		11.5		21	476		0.2	4	4
10/2/06	16		14.39		180	344		0.2	4	4
10/19/06	6.05		9.87		220	339		0.3	4	4

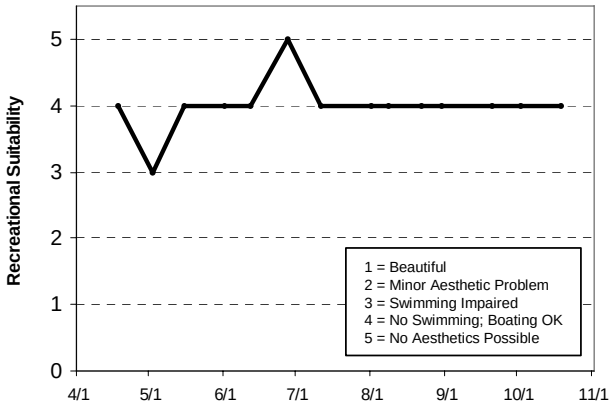


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus								D		F			F	F
Chlorophyll a								F		C			F	F
Secchi Depth								F		D			F	F
Overall								**F**		**D**			**F**	**F**

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.

This was the seventh year that Carol Lake has been involved in CAMP. A search through the STORET nationwide water quality database for data on the lake revealed a fair amount of historic data (1996-2005).

The lake was monitored seven times from early-May to mid-October, 2006. The collected data and resulting graphs showing TP and CLA concentrations, Secchi transparency, and user perception (physical condition and recreational suitability) are presented on the lake's information sheet on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	35.5	25.0	49.0	C
CLA (µg/l)	7.3	3.6	11.0	A
Secchi (m)	1.1	0.8	1.5	D
TKN (mg/l)	0.70	0.57	0.83	
			Overall Grade	C

Although no "statistically significant" trend can be determined from the lake's water quality database, the 2003-2006 overall grades are the lake's worst to date. The lake had received overall grades of B in the earlier years of monitoring (1996-2001). In fact, the lake's Secchi transparency grade has steadily fallen from B's in 1996-1999, to C's in 2000-2001, to D's in 2002-2006. This decrease in the lake's short-term water quality should cause some concern and a watchful eye should be kept on the lake's future quality. To better understand the lake's overall water quality and where it may truly be heading, more data are needed.

As mentioned in past reports, the lake's overall grade may be skewed due to the shallowness of the lake. When looking at the lake's 2000 and 2001 mean TP and CLA readings, it seems that the associated Secchi readings could have been limited by the shallowness of the lake rather than excessive nutrients and algal growth. So, while the lake only received an overall grade of B, the actual water quality may have been more representative of an A. This, however, does not explain the drop in mean clarity form grades of B in the late-1990's, to C in 2000-2001, and D in 2002-2006.

Additionally, the difference between the TP, CLA and Secchi grades in recent years (see report grade on the lake's information page), may indicate that suspended sediments may play a large role in the inner workings of the lake. This scenario can be fairly typical for shallow lakes where wind action and storm sewer inflow either increase the influx of sediments to the system or cause the re-suspension of existing bottom sediments. That is, the suspended sediments influence the lake's phosphorus make-up (a larger portion of the in-lake phosphorus in particulate form rather than a soluble form more readily available for algal uptake), reduce water clarity, and could actually be limiting the amount of light available for algal growth, thus keeping the CLA concentrations down (resulting in a better than expected grade).
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 2.3 for physical condition

(between 2- “some algae present” and 3- “definite algae present”), and 3.7 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Carol Lake

Stillwater Twp., Washington Co.

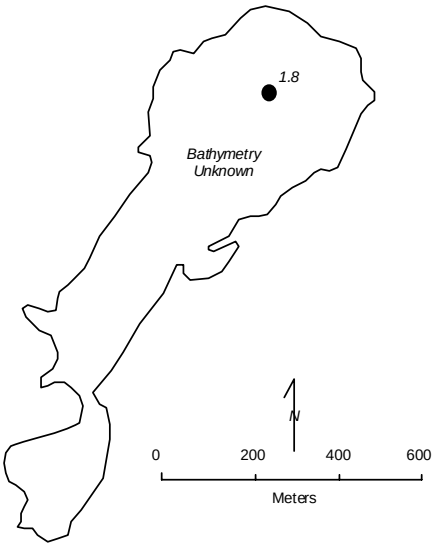
LAKE ID: 820017

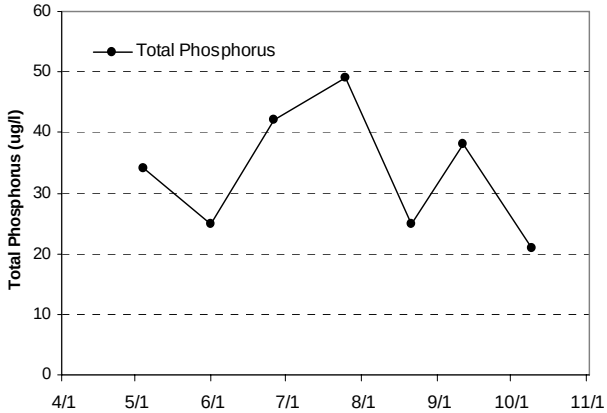
WD: Carnelian-Marine

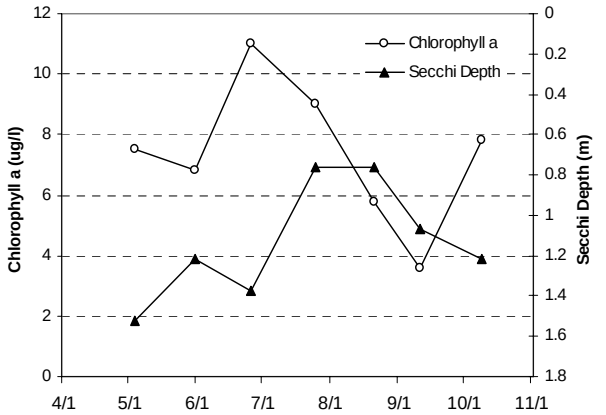
Volunteer: Washington Co. SWCD

● Sampling site

Contours in meters

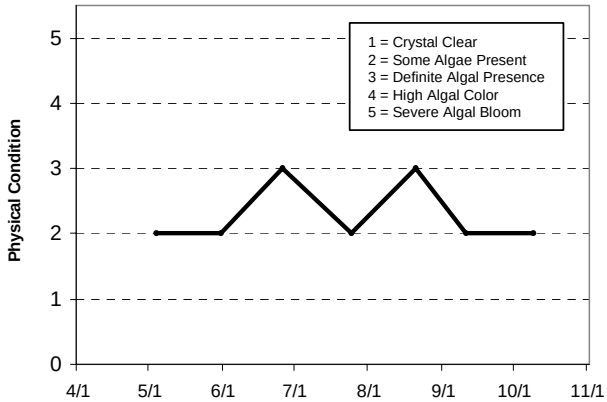






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/4/06	15.2	15.2	8.75	0.55	7.5	34		1.524	2	4
5/31/06	24.5	18.9	6.2	0.25	6.8	25		1.219	2	3
6/26/06	23.3	21.1	5.68	0.1	11	42		1.372	3	4
7/25/06	26.3	23.1	5.38	0.09	9	49		0.762	2	4
8/21/06	25.9	21.3	8.15	0.1	5.8	25		0.762	3	4
9/11/06	16.8	16.4	4.33	0.18	3.6	38		1.067	2	3
10/9/06	13.3		8.07		7.8	21		1.219	2	4

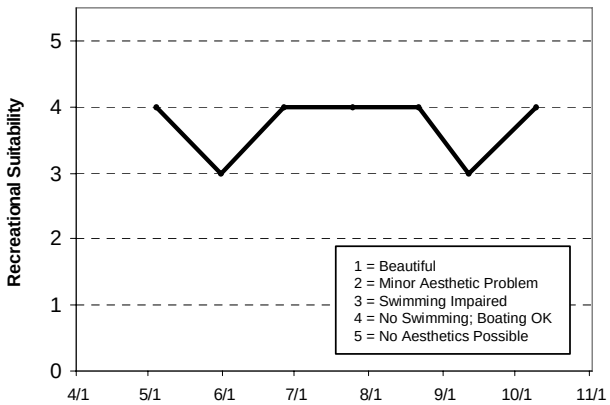


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus				B	A	A	A	A	B		C	C	C	C
Chlorophyll a				B	C	C	C	A	A		B	B	B	A
Secchi Depth				B	B	B	B	C	C	D	D	D	D	D
Overall				**B**	**B**	**B**	**B**	**B**	**B**		**C**	**C**	**C**	**C**

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.

This was the fifth year that Cates Lake has been involved in CAMP (2002 being the first). The lake was monitored 14 times between mid-April and mid-October, 2006. During each monitoring event the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as its perceived physical condition and recreational suitability. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	24.6	19.0	43.0	B
CLA (µg/l)	3.4	2.4	5.1	A
Secchi (m)	1.7	1.3	2.1	C
TKN (mg/l)	1.12	0.71	1.40	
			Overall Grade	B

To the best of our knowledge, there are no water quality data available for Cates Lake other than the 2002-2006 CAMP data. Therefore it is not possible to determine any long-term trends. In the short-term however, the lake's water quality is well represented by an overall grade of B. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

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 2.8 (between 2- "some algae present" and 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Cates Lake
Prior Lake, Scott Co.

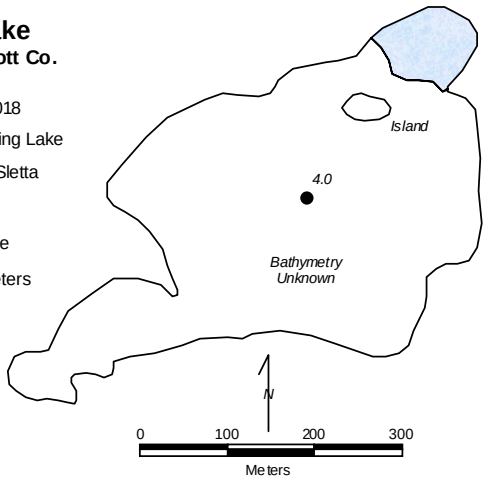
LAKE ID: 700018

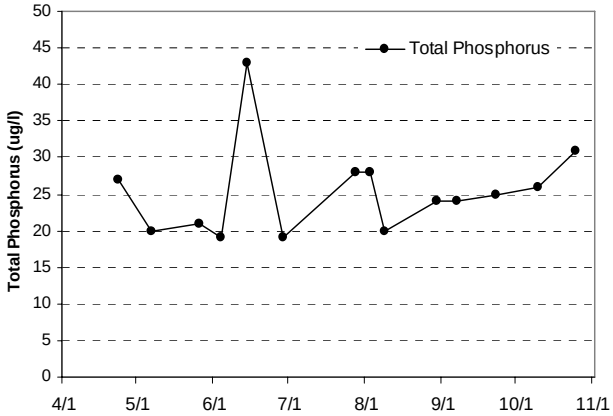
WD: Prior Lake-Spring Lake

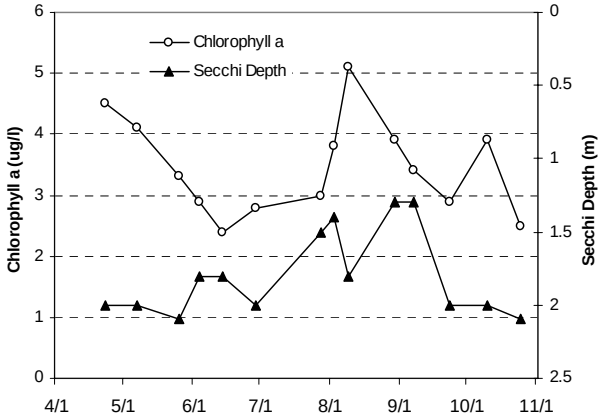
Volunteer: Tom Sletta

● Sampling site

Contours in meters

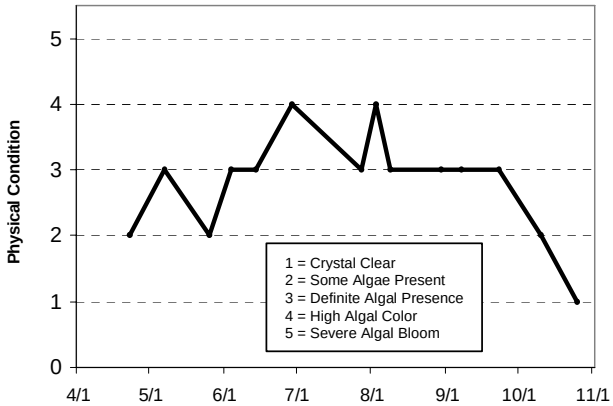






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/23/06	17.6				4.5	27		2	2	4
5/7/06	17				4.1	20		2	3	4
5/26/06	21.8				3.3	21		2.1	2	4
6/4/06	26.3				2.9	19		1.8	3	4
6/14/06	23.5				2.4	43		1.8	3	4
6/29/06	24.3				2.8	19		2	4	4
7/28/06	28				3	28		1.5	3	4
8/3/06	26.9				3.8	28		1.4	4	4
8/9/06	26				5.1	20		1.8	3	4
8/30/06	22.4				3.9	24		1.3	3	4
9/7/06	22.9				3.4	24		1.3	3	4
9/23/06	14.6				2.9	25		2	3	4
10/10/06	14				3.9	26		2	2	4
10/25/06	6.7				2.5	31		2.1	1	4

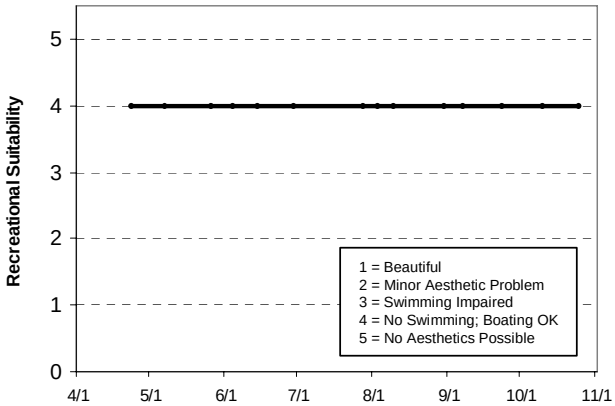


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus										A	B	B	A	B
Chlorophyll a										A	A	A	A	A
Secchi Depth										C	C	C	C	C
Overall										**B**	**B**	**B**	**B**	**B**

Source: Metropolitan Council and STORET data



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

Cedar Lake, located in Cedar Lake Township (Scott County), covers 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). Because of its multi-recreational uses, the lake is considered a "Priority Lake" in the Metropolitan Area

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).

Although this is only the first year that Cedar Lake has been enrolled in CAMP, the lake had been monitored by Council staff in the past. In 2006, the lake was monitored 14 times between mid-April and mid-October. The collected data and resulting graphs showing TP and CLA concentrations, Secchi transparency, and user perception (physical condition and recreational suitability) are presented on the lake's information sheet on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	156.1	24.0	248.0	F
CLA (µg/l)	68.7	3.6	150.0	D
Secchi (m)	1.1	0.3	2.6	D
TKN (mg/l)	1.87	0.93	2.90	
			Overall Grade	D

The lake's overall grade in 2006 (D) is similar to that recorded in 1981, 1984, 1993, and 1998, better than those recorded in 1980 and 2001 (F), and worse than the C recorded in 2005. Because of the variability of the lake's grades, no statistically significant long-term trend is evident from the lake's water quality database. The lake's water quality seems to be best represented by an overall grade of D.

Throughout the 2006 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 2.5 (between 2- "some algae present" and 3- "definite algae present"), while the mean recreational suitability 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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Cedar Lake

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

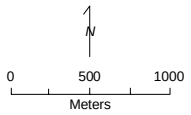
● Sampling site

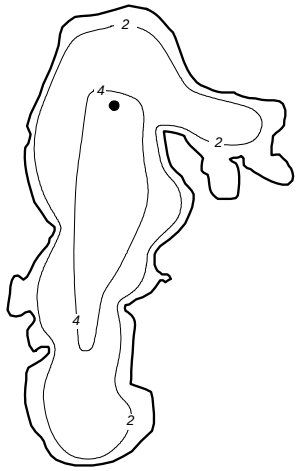
Contours in meters

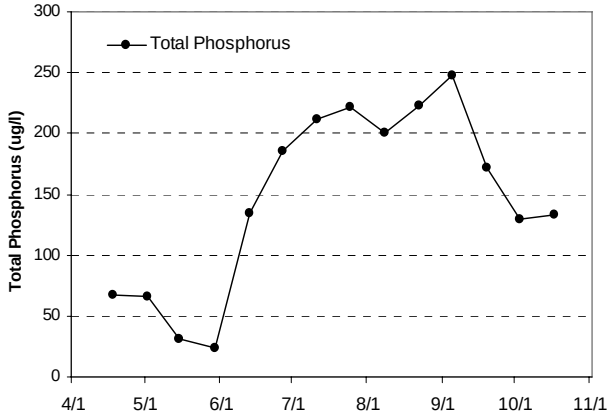
Volunteer: Jerry Edberg

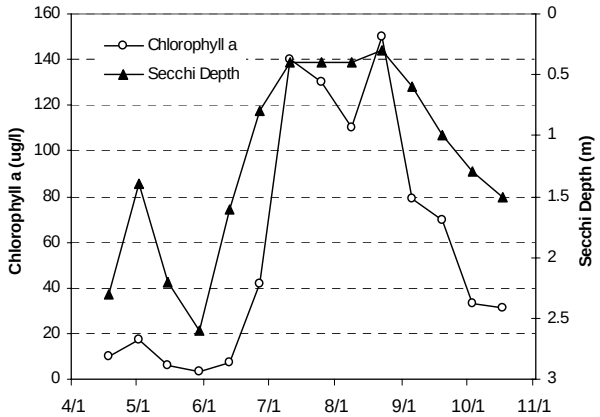
LAKE ID: 700091

WMO: Scott County



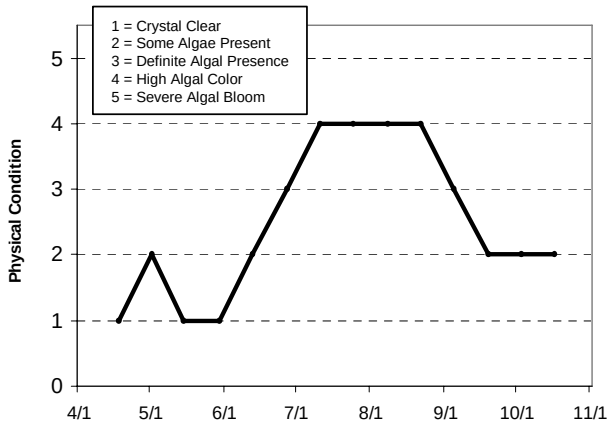






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/18/06	13.7				9.7	67		2.3	1	1
5/2/06					17	66		1.4	2	2
5/15/06	12.2				6.1	31		2.2	1	2
5/30/06	24				3.6	24		2.6	1	2
6/13/06	20.3				7.6	135		1.6	2	2
6/27/06	24.2				42	185		0.8	3	2
7/11/06	25				140	211		0.4	4	2
7/25/06	27.4				130	222		0.4	4	3
8/8/06	25.8				110	200		0.4	4	3
8/22/06	25.4				150	223		0.3	4	3
9/5/06	22.8				79	248		0.6	3	2
9/19/06	16.2				70	172		1	2	1
10/3/06	16.1				33	129		1.3	2	2
10/17/06	8.1				31	133		1.5	2	1

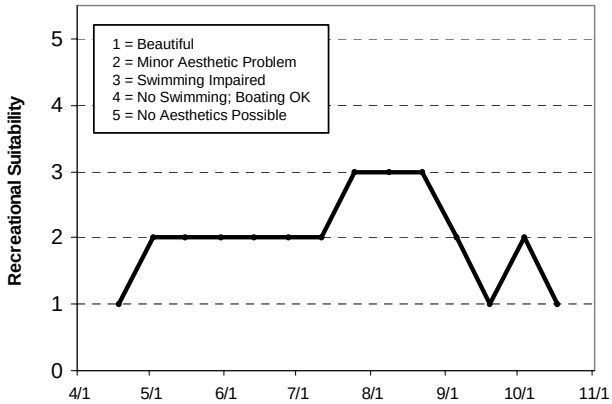


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus	F	F			F								
Chlorophyll a	F	D			D						D		
Secchi Depth	C	C	C	C	C	C				F	D	D	D
Overall	**F**	**D**			**D**								

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus	F					F			F				D	F
Chlorophyll a	C					D			F				C	D
Secchi Depth	C					D			D				C	D
Overall	**D**					**D**			**F**				**C**	**D**

Source: Metropolitan Council and STORET data



Cedar Island Lake (27-0119) *Shingle Creek Watershed Management Commission*

This was the fourth year that Cedar Island Lake has been enrolled in CAMP (the lake was involved in CAMP in 1995, 2001, and 2003). The 80-acre lake is located within the City of Maple Grove (Hennepin County). It has an 800-acre immediate watershed. The lake and watershed areas translate to a watershed-to-lake area ratio of 8:1. The larger the ratio the greater the potential stress on the lake from surface runoff.

The maximum and mean depths of the lake are 2.1 and 1.4 m (seven and 4.5 feet), respectively. The mean depth and surface translates to an approximate lake volume of 360 ac-ft and it would take approximately 0.5 years to replenish itself. Because of the shallowness of the lake, 100 percent of the lake's area is considered littoral (the 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).

Cedar Island Lake was monitored nine times from early-July to mid-October, 2006. The data and resulting graphs showing seasonal variability in TP and CLA concentrations, Secchi transparency, and user perceptions are presented on the information sheet following these written comments.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	214.4	169.0	294.0	F
CLA (µg/l)	111.7	25.0	270.0	F
Secchi (m)	0.4	0.4	0.4	F
TKN (mg/l)	5.69	4.30	7.20	
			Overall Grade	F

The lake's 2006 overall water quality grade is identical to that recorded in 1995 and 2003, and worse than that of 2001 (D). The 2006 summer means are the some of the worst recorded to date.

A search for water quality data through Council, MPCA, and STORET files resulted in a minimal amount of data. 1984, 1995, 2001, 2003, and now 2006 are the only years for which nutrient data are available. Using Secchi transparency data collected through the MPCA's Citizen-Lake monitoring Program to supplement the four years of nutrient data it becomes apparent that the lake's water quality through the 1990's has remained somewhat constant. The recently poor water quality (especially shown as a dramatic decrease in 2006 and 2003 as compared to 2001), however, should be a reason for concern. To better understand the lake's water quality and where it may be heading (if the decline in water quality revealed in 2003 and again in 2006 is a potential trend or if it is a result of climatological conditions), additional years of data collection are needed.

A recent MPCA conducted trend analysis on the lake's Secchi transparency data, revealed a statistically significant decrease in recent water clarity.

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 3.3 (between 3- "definite algae present" and 4- "high algal color"), 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

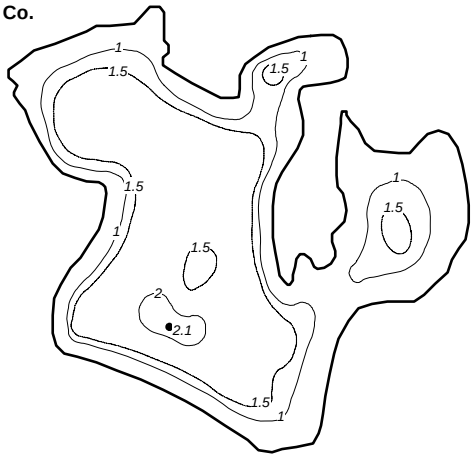
Cedar Island Lake

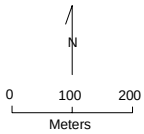
Maple Grove, Hennepin Co.

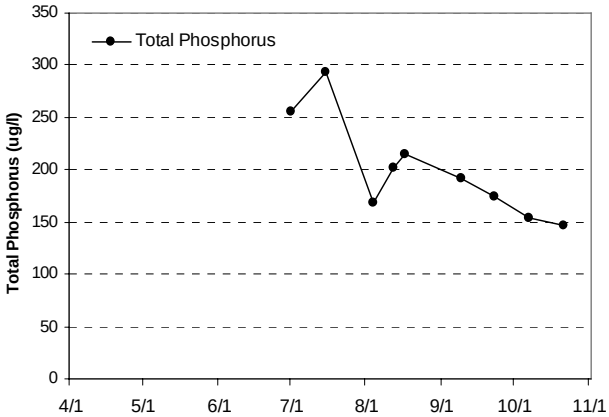
Lake ID: 270119
WMO: Shingle Creek
Volunteer: Steve Lane

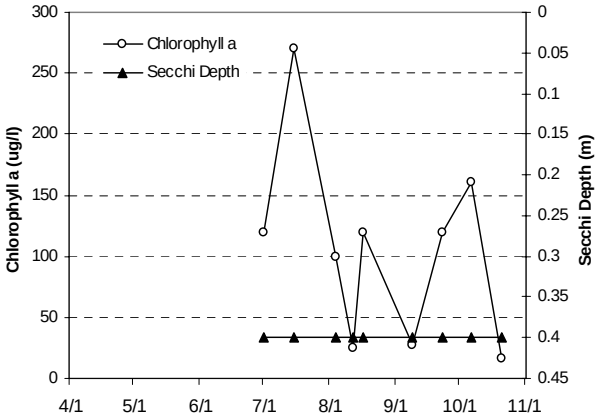
● Sampling site

Contours in meters



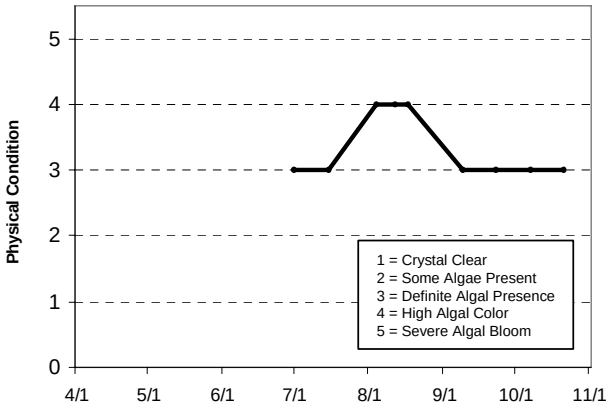






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
7/1/06	26.6				120	255		0.4	3	3
7/15/06	28.2				270	294		0.4	3	3
8/4/06	27.8				100	169		0.4	4	3
8/12/06	26.1				25	202		0.4	4	3
8/17/06	24.5				120	215		0.4	4	3
9/9/06	18.5				27	192		0.4	3	3
9/23/06	15.7				120	174		0.4	3	3
10/7/06	15.4				160	154		0.4	3	3
10/21/06	6.2				16	147		0.4	3	3

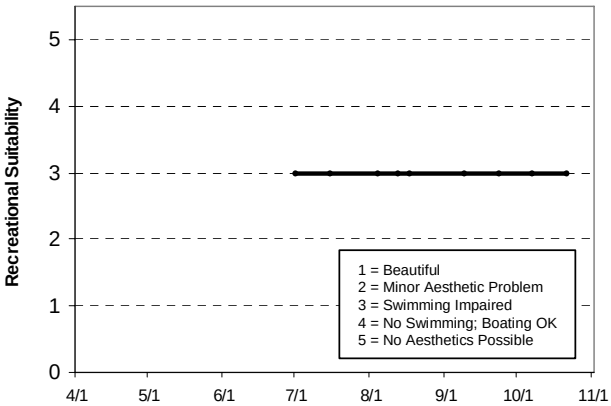


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus					D								
Chlorophyll a					B								
Secchi Depth					D						F		F
Overall					**C**								

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus			D						D		F			F
Chlorophyll a			F						D		F			F
Secchi Depth	F	F	F	F	F	F	F	F	D	F	F			F
Overall			**F**						**D**		**F**			**F**

Source: Metropolitan Council and STORET data



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

This was the tenth year in which Cenaiko Lake, located within Coon Rapids Dam Regional Park in the City of Coon Rapids in Anoka County, has been monitored through CAMP. Except for the ten years of CAMP data, a search through the STORET nationwide water quality database for historic data on the lake came up empty.

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). Eurasian Water Milfoil (*Myriophyllum spicatum*) [EWM] has been reported on the lake.

Cenaiko Lake was monitored 14 times between mid-April and mid-October, 2006. The data and resulting graphs showing seasonal variability in TP and CLA concentrations, Secchi transparency, and user perceptions are presented on the information sheet following these written comments.

2006 summer (May-September) data summary

Parameter	***Mean***	***Minimum***	***Maximum***	***Grade***
TP (µg/l)	18.6	5.0	61.0	A
CLA (µg/l)	2.6	1.2	4.1	A
Secchi (m)	3.1	2.30	5.7	A
TKN (mg/l)	0.91	0.52	1.20	
			Overall Grade	A

The lake's 2006 overall lake quality grade of A is consistent with grades reported in 1998-2000, 2002-2005 and is better than grades reported (B) in 1997 and 2001. No statistically significant trends are evident from the lake's water quality database. The lake seems well represented by an overall grade of B+/A. To better understand the quality of the lake and what direction it may be heading, continued monitoring is recommended.

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 2.1 (roughly 2- "some algae present"), and 1.5 for recreational suitability (between 1- "beautiful" and 2- "minor aesthetic problems").

Cenaiko Lake was one of eight lakes in Minnesota and one in Wisconsin that where a part of a research project supported by the MDNR and conducted by researchers at the University of Minnesota. The research project examined the possibilities of an aquatic weevil *Euryhchiopsis lecontei* as a biological control agent for EWM (U.S.EPA 1997). The following is an excerpt from a U.S.EPA document detailing research in weevils as a biological control:

> Of the nine sites, the most pronounced weevil infestation was found in Cenaiko Lake in Anoka County, Minnesota. Weevils caused severe damage to the EWM plants in Cenaiko Lake, most likely resulting in the plants' decreased abundance. EWM biomass (wet weight) at Cenaiko decline from 974 g/m^2 in July 1996, to 239 g/m^2 in September 1996 (Newman et al. 1996). Researchers estimate that the biomass in June 1996 (before sampling) was close to 2,000 g/m^2 (Newman we al. 1996). In July 1996, EWM was approximately 50 percent of the total plant biomass in the lake; by September 1996, this value had decreased to 14 percent.

> Monitoring of Cenaiko Lake did not begin until June 1996 when a dense population of weevils was discovered during reconnaissance studies for introduction sites (Newman et al. 1996). Cenaiko Lake was then added to the list of regular sampling sites. Plant samples collected at Cenaiko Lake, as well as at other sites, were processed for invertebrates, plant biomass, and stem damage.
>
> Because monitoring is still ongoing, sampling and data are limited for this study. However, the preliminary results indicate the weevils in Cenaiko Lake may be responsible for the natural decline of EWM.

Since that report however, the lake's biological make-up has changed slightly. The lake's Sunfish population has dramatically increased, which has resulted in a reduced aquatic weevil population (the Sunfish feed on the weevils). The reduction in the aquatic weevil population has resulted in an increase in abundance of EWM within the lake.

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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Lake Cenaiko
Coon Rapids, Anoka Co.

Lake ID: 20654
WD: Coon Creek

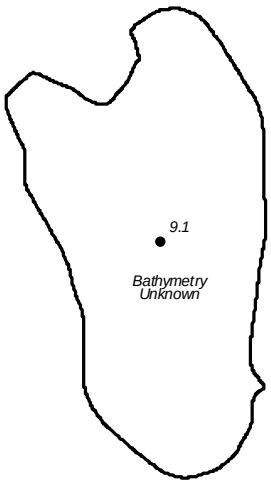
Volunteer: Anoka Co. Parks

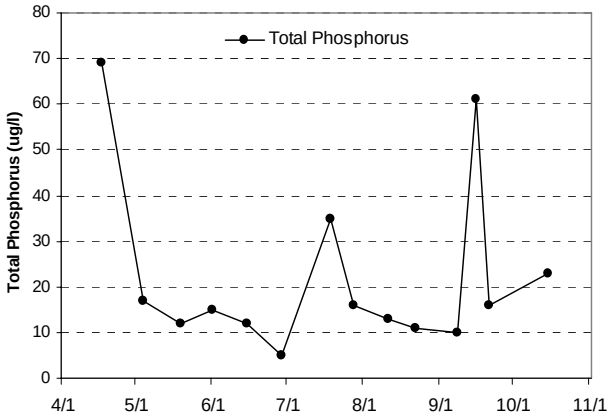
● Sampling site

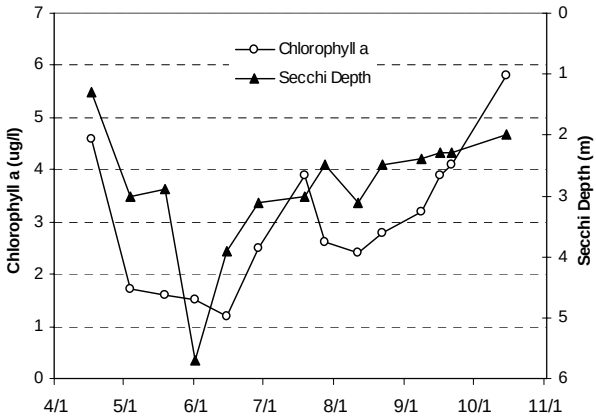
Contours in meters

N

0 100 200
Meters

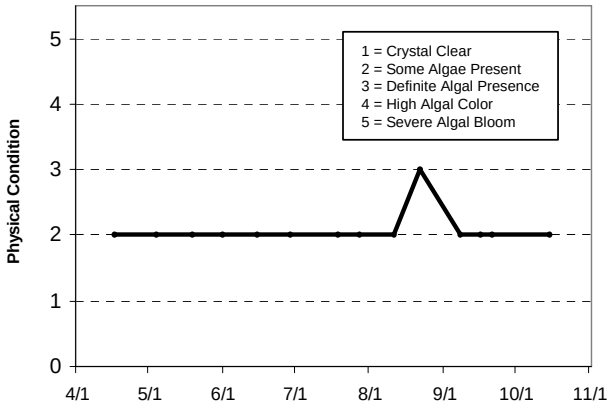






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/17/06	15				4.6	69		1.3	2	1
5/4/06	15				1.7	17		3	2	1
5/19/06	16.3				1.6	12		2.9	2	1
6/1/06	25.4				1.5	15		5.7	2	2
6/15/06	23.7				1.2	12		3.9	2	2
6/29/06	25.1				2.5	5		3.1	2	2
7/19/06	26.6				3.9	35		3	2	2
7/28/06	29				2.6	16		2.5	2	2
8/11/06	26.1				2.4	13		3.1	2	
8/22/06	25.8				2.8	11		2.5	3	2
9/8/06	23.1				3.2	10		2.4	2	1
9/16/06	16.1				3.9	61		2.3	2	1
9/21/06	15.9				4.1	16		2.3	2	2
10/15/06	9.5				5.8	23		2	2	1

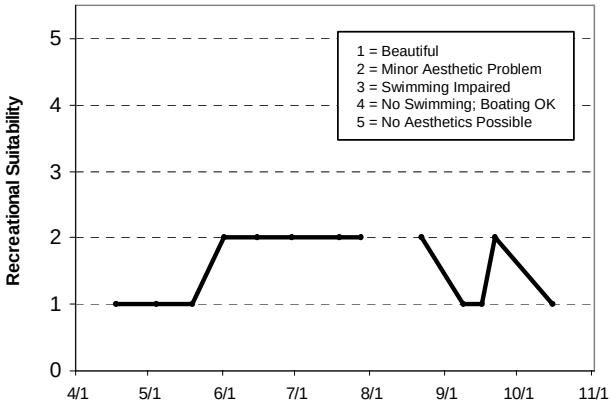


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus					A	A	A	A	A	A	A	A	A	A
Chlorophyll a					A	A	A	A	A	A	A	A	A	A
Secchi Depth					C	A	A	B	C	A	A	B	B	A
Overall					**B**	**A**	**A**	**A**	**B**	**A**	**A**	**A**	**A**	**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.

This was the sixth year that Cloverdale 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, 2001-2006 CAMP data are the only years of available nutrient data. 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 lake was monitored 11 times between mid-April and mid-October, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	30.0	18.0	60.0	B
CLA (µg/l)	11.9	1.4	46.0	B
Secchi (m)	3.7	1.8	5.9	A
TKN (mg/l)	1.03	0.67	1.70	
			Overall Grade	B

The lake's 2006 overall lake quality grade of B is better than the C recorded in 2001, worse than the A recorded in 2005 and similar to the B's recorded in 2002-2004. The lake's 2006 Secchi mean, however, is the best recorded to date.

As mentioned earlier, there are no nutrient data available for Cloverdale Lake other than the 2001-2006 CAMP data. Therefore it is not possible to determine any long-term or short-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 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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Cloverdale Lake

Lake Elmo, Washington Co.

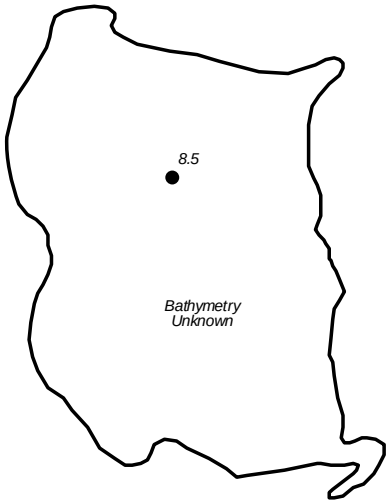
● Sampling site

Contours in meters

Lake ID: 820009

WD: Lower St. Croix Valley

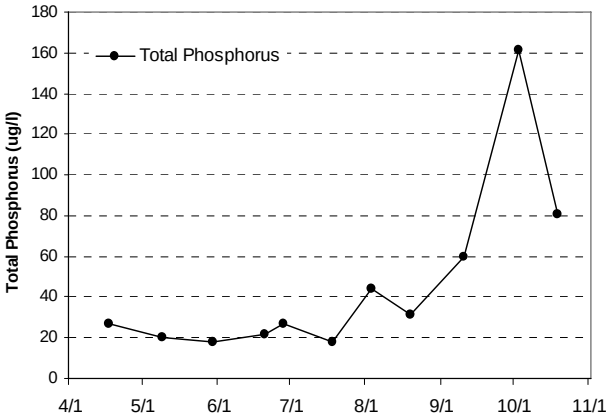
Volunteer: Kevin Bjork

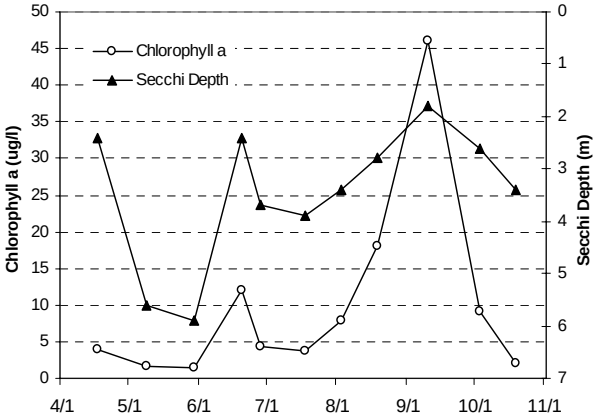


N

0 100 200

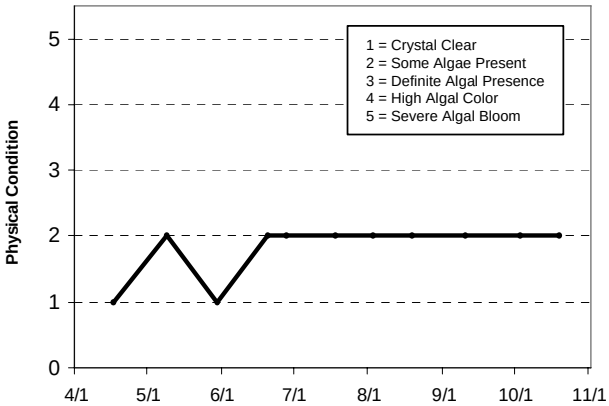
Meters





2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/17/06	12.9				3.9	27		2.4	1	1
5/9/06	19.8				1.7	20		5.6	2	1
5/30/06	24.6				1.4	18		5.9	1	1
6/20/06	28.8				12	22		2.4	2	2
6/28/06	25.6				4.3	27		3.7	2	2
7/18/06	28.6				3.8	18		3.9	2	1
8/3/06	28				7.8	44		3.4	2	1
8/19/06	25.5				18	31		2.8	2	2
9/10/06	20.7				46	60		1.8	2	2
10/3/06	17.3				9.2	161		2.6	2	2
10/19/06	9.9				2	81		3.4	2	2

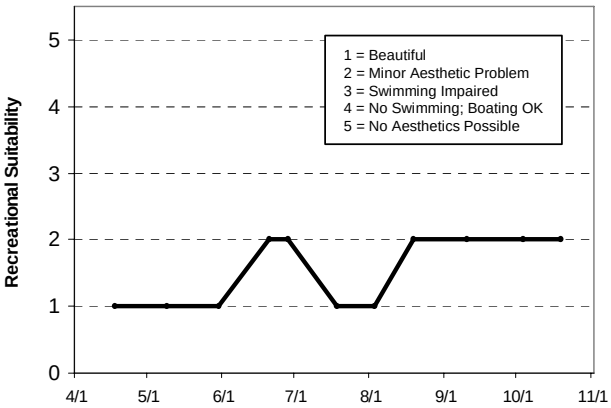


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus									C	C	C	C	B	B
Chlorophyll a									B	B	B	B	A	B
Secchi Depth									C	B	B	A	A	A
Overall									**C**	**B**	**B**	**B**	**A**	**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.

This marks the fourth year in which Cobblecrest Lake has been involved in CAMP (2002 and 2004-2005 being the others). Other than for the mentioned CAMP data, a search through the STORET nationwide water quality database for historic data on the lake was unsuccessful. Thus, 2002 and 2004-2006 are the only complete years of available data. 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 lake was monitored 13 times between mid-April and mid-October, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	149.3	69.0	245.0	D
CLA (µg/l)	107.2	31.0	190.0	F
Secchi (m)	0.4	0.3	0.7	F
TKN (mg/l)	2.76	1.80	4.00	
			Overall Grade	F

The lake's 2006 overall lake quality grade of F is consistent with the overall lake grades in 2004-2005 and worse than the C recorded in 2002.

As mentioned earlier, there are no water quality data available for Cobblecrest Lake other than the 2002 and 2004-2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

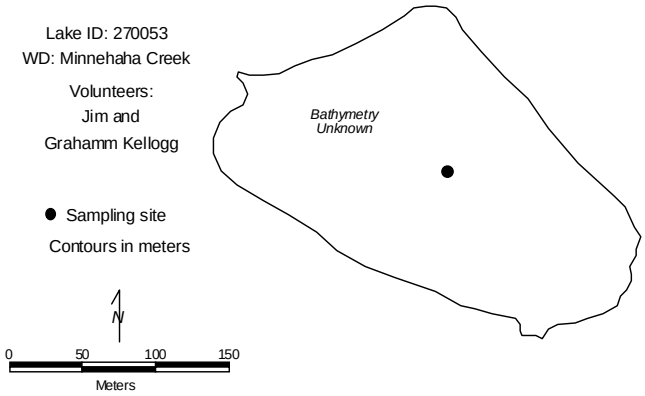
Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The average user perception rankings were 2.4 for physical condition (between 2- "some algae present" and 3- "definite algae present"), and 4.0 for recreational suitability (4- "no swimming – boating ok").

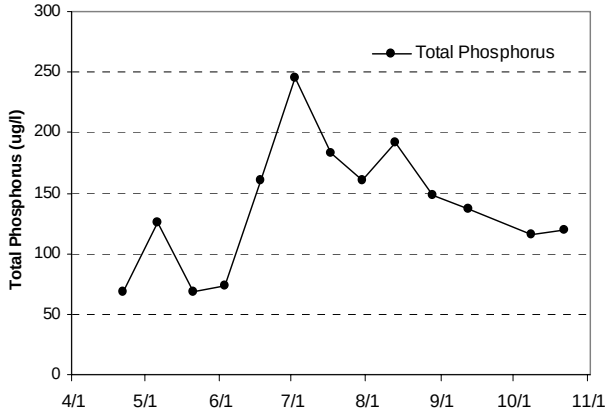
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

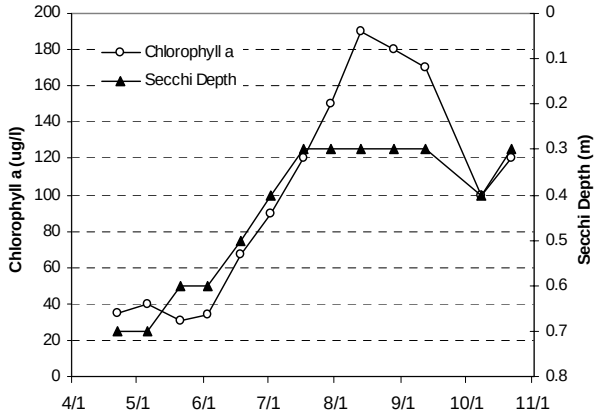
Cobblecrest Lake
St. Louis Park, Hennepin Co.

Lake ID: 270053
WD: Minnehaha Creek

Volunteers:
Jim and
Grahamm Kellogg

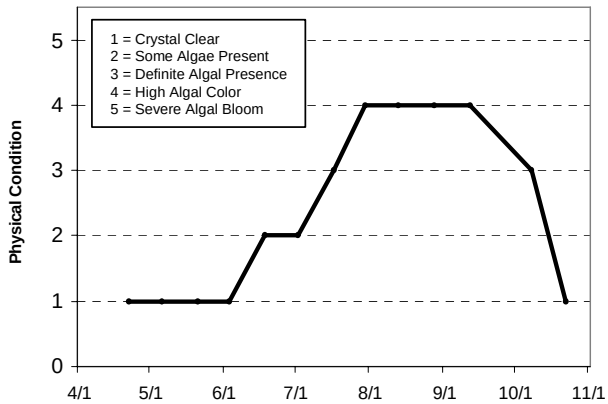






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/22/06	16.8				35	69		0.7	1	4
5/6/06	18.3				40	126		0.7	1	4
5/21/06	19.3				31	69		0.6	1	4
6/3/06	24.2				34	73		0.6	1	4
6/18/06	25.3				67	160		0.5	2	4
7/2/06	24.5				90	245		0.4	2	4
7/17/06	27.8				120	183		0.3	3	4
7/30/06	27.3				150	160		0.3	4	4
8/13/06	23.3				190	192		0.3	4	4
8/28/06	22.2				180	148		0.3	4	4
9/12/06	19.6				170	137		0.3	4	4
10/8/06	14.7				100	116		0.4	3	4
10/22/06	10				120	120		0.3	1	4

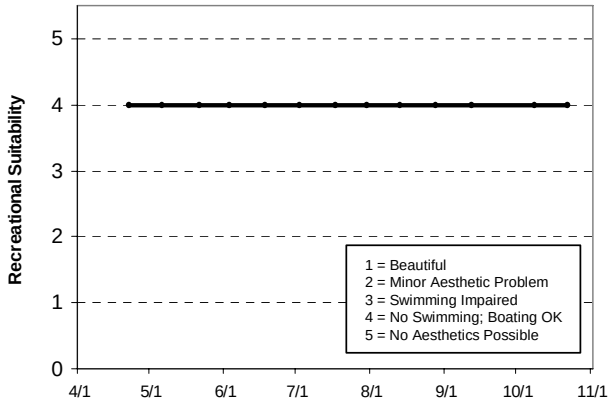


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus										C		D	F	D
Chlorophyll a										C		F	F	F
Secchi Depth										C		F	F	F
Overall										**C**		**F**	**F**	**F**

Source: Metropolitan Council and STORET data



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

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

This marks the second year in which Cobblestone Lake has been involved in CAMP (2005 being the other). A search through the STORET nationwide water quality database for historic data on the lake came up empty. Therefore, 2005 and 2006 are the only complete years of water quality data available. 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 lake was monitored 14 times between mid-April and mid-October, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	***Mean***	***Minimum***	***Maximum***	***Grade***
TP (µg/l)	59.1	27.0	127.0	C
CLA (µg/l)	25.1	4.2	42.0	C
Secchi (m)	1.0	0.6	1.9	D
TKN (mg/l)	1.41	1.00	2.00	
			Overall Grade	C

The lake's 2006 overall lake quality grade of C is slightly better than the recorded overall lake grade in 2005 (D).

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 1.9 (between 1- "crystal clear" and 2- "some algae present"), while the mean recreational suitability ranking was 2.0 (2- "minor aesthetic problem").

Because of the limitedness of the lake's water quality database, it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

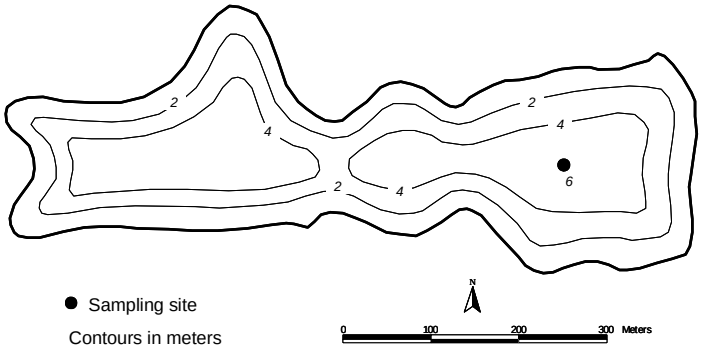
Cobblestone Lake

Apple Valley, Dakota Co.

Lake ID: 190456

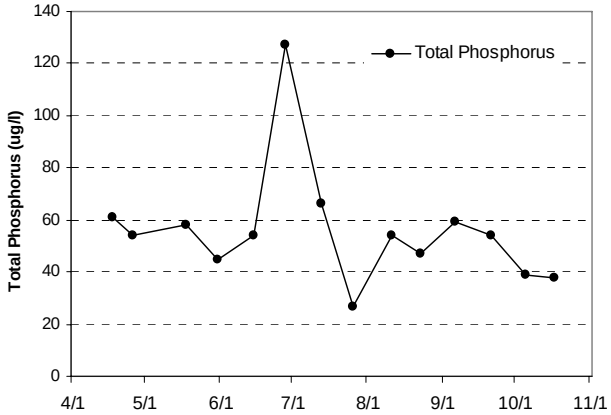
WMO: Vermillion River

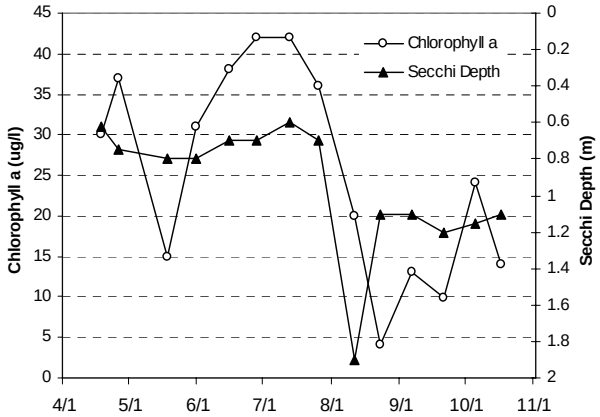
Volunteer: City of Apple Valley



● Sampling site

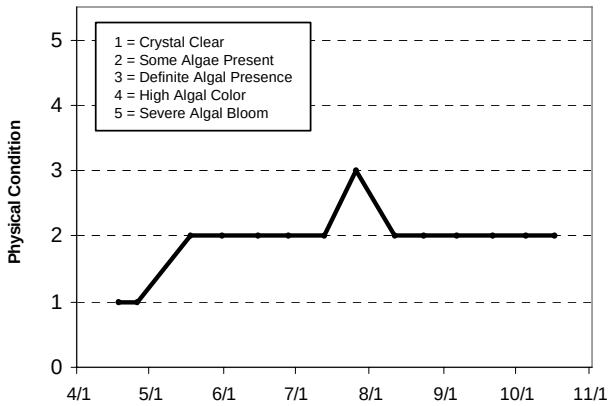
Contours in meters





2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/18/06	13.6				30	61		0.625	1	2
4/26/06	14				37	54		0.75	1	2
5/18/06	15.5				15	58		0.8	2	2
5/31/06	24.5				31	45		0.8	2	2
6/15/06	22.2				38	54		0.7	2	2
6/28/06	23.5				42	127		0.7	2	2
7/13/06	27.5				42	66		0.6	2	3
7/26/06	27.5				36	27		0.7	3	4
8/11/06	26.5				20	54		1.9	2	2
8/23/06	25.9				4.2	47		1.1	2	2
9/6/06	24.1				13	59		1.1	2	2
9/21/06	15.4				9.9	54		1.2	2	1
10/5/06	17.2				24	39		1.15	2	1
10/17/06					14	38		1.1	2	1

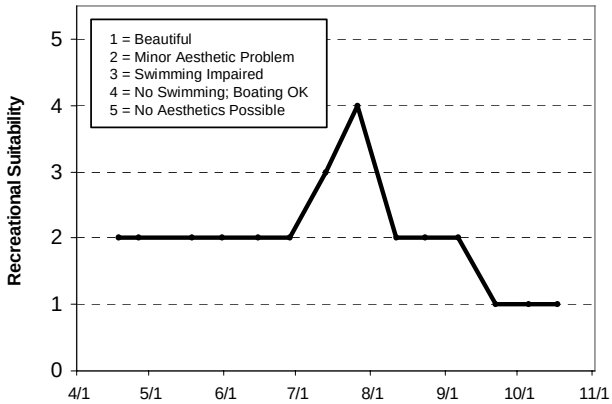


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus													D	C
Chlorophyll a													D	C
Secchi Depth													F	D
Overall													**D**	**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. Colby Lake's database now includes 13 years of CAMP collected data (1994-2006). Analysis on the lake' water quality database reveals no statistically significant trend in its water quality (either improving or degrading). The lake's water quality seems well represented by an overall water quality grade of D/F.

Information from the City of Woodbury revealed that the lake has a surface area of 71 acres and a maximum depth of just 3.4 m (11 feet). The lake's large 8,088-acre contributing watershed results in a large 114:1 watershed-to-lake size ratio. The larger the ratio the greater the 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.

As part of the city's involvement in CAMP in 2006, the lake was monitored seven times between early-June and mid-October. During each sampling event the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	282.0	107.0	982.0	F
CLA (µg/l)	82.3	15.0	300.0	F
Secchi (m)	0.7	0.3	1.2	F
TKN (mg/l)	1.80	0.87	3.10	
			Overall Grade	F

The lake's 2006 overall grade (F) was worse than the D grades recorded in 1994, 1997, 1999-2000, 2002, and 2004-2005 and similar to the F grades recorded in 1995, 1996, 1998, 2001, and 2003.

Throughout the monitoring period, the volunteers' opinion 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").

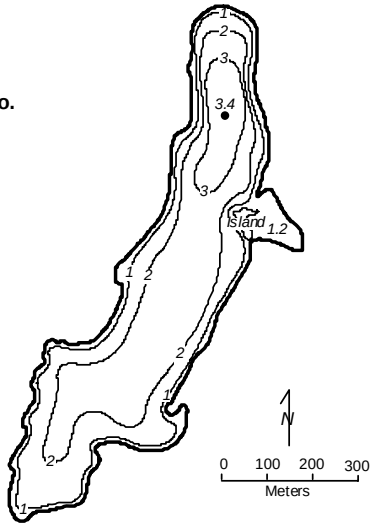
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

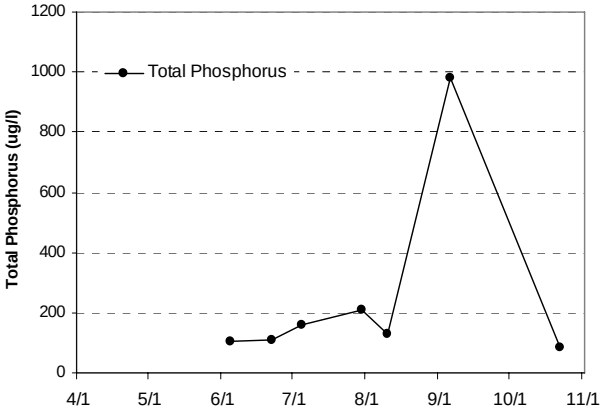
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

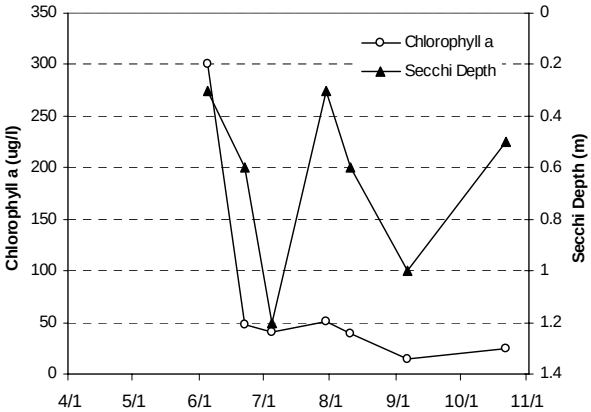
Colby Lake
Woodbury, Washington Co.

Lake ID: 820094
WD: South Washington
Volunteers: The Hvass Family

● Sampling site
Contours in meters

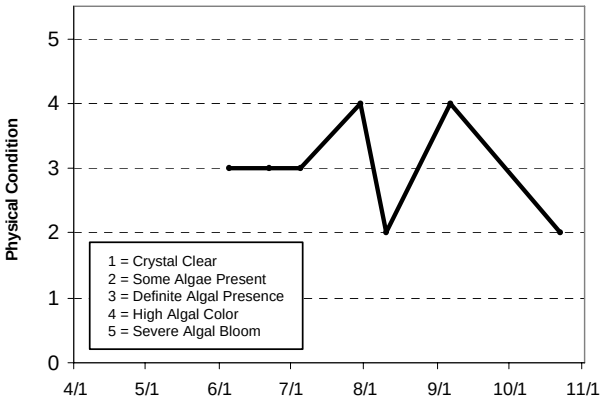






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
6/5/06	26.3				300	107		0.3	3	4
6/22/06	26.3				48	112		0.6	3	4
7/5/06	24.9				41	157		1.2	3	4
7/30/06	31.4				51	207		0.3	4	4
8/10/06	28.6				39	127		0.6	2	4
9/6/06	25.3				15	982		1	4	4
10/22/06	7.3				25	87		0.5	2	4

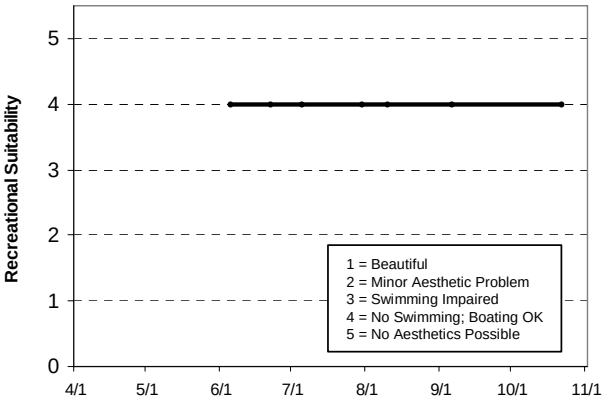


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus		D	D	F	F	F	D	D	F	F	F	D	D	F
Chlorophyll a		D	F	F	C	F	F	D	F	C	D	C	F	F
Secchi Depth		F	F	F	F	F	D	D	D	F	F	F	D	F
Overall		**D**	**F**	**F**	**D**	**F**	**D**	**D**	**F**	**D**	**F**	**D**	**D**	**F**

Source: Metropolitan Council and STORET data



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

Lake Cornelia is a small shallow lake located within Edina (Hennepin County). There is very little known morphological data available for the lake.

This marks the third year in which Lake Cornelia has been involved in CAMP (2003 being the first). In fact, a search through the STORET nationwide water quality database for historic data on the lake produced only the mentioned CAMP collected data. 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 lake was monitored 14 times between mid-April and mid-October, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	154.2	77.0	287.0	F
CLA (µg/l)	73.0	16.0	140.0	D
Secchi (m)	0.5	0.2	1.0	F
TKN (mg/l)	2.05	0.97	3.70	
			Overall Grade	F

The lakes' 2006 overall grade of F is identical to those recorded in 2003 and 2005.

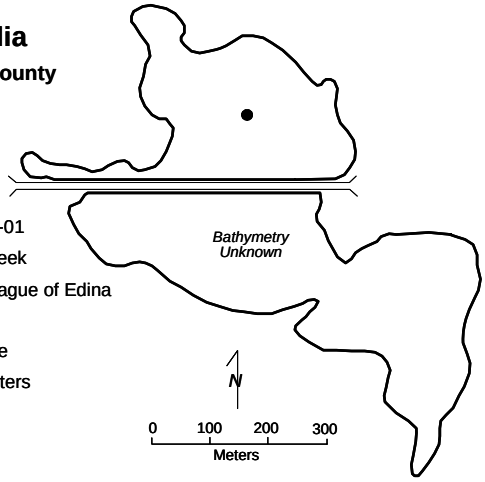
Because of the limitedness of the Lake Cornelia water quality database, it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

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 3.5 for physical condition (between 3- "definite algae present" and 4- "high algal color"), and 4.0 for recreational suitability (between 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Lake Cornelia

Edina, Hennepin County



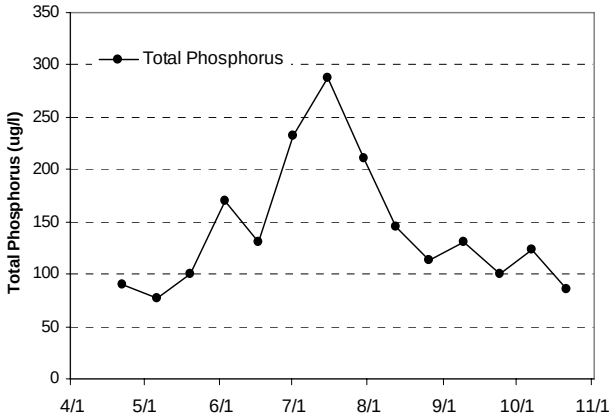
Lake ID: 270028-01

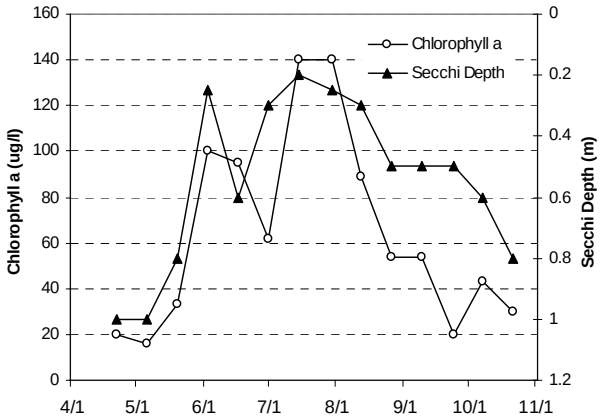
WD: Nine Mile Creek

Volunteer: Conservation League of Edina

● Sampling site

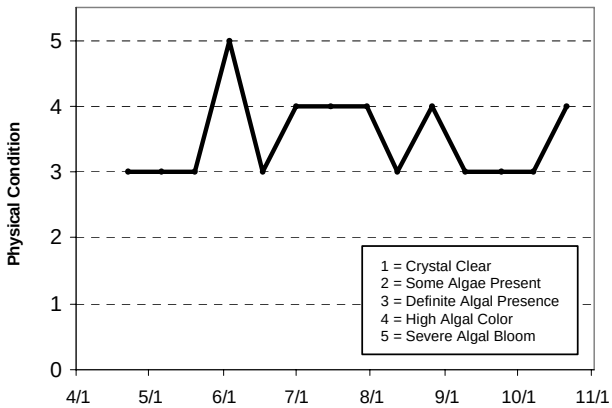
Contours in meters





2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/22/06	15				20	90		1	3	4
5/6/06	15				16	77		1	3	4
5/20/06	18				33	100		0.8	3	4
6/3/06	26				100	170		0.25	5	4
6/17/06	25				95	130		0.6	3	4
7/1/06	26				62	232		0.3	4	4
7/15/06	27				140	287		0.2	4	4
7/30/06	30				140	211		0.25	4	4
8/12/06	25				89	145		0.3	3	4
8/26/06	20				54	114		0.5	4	4
9/9/06	18				54	130		0.5	3	4
9/24/06	15				20	100		0.5	3	4
10/7/06	17				43	124		0.6	3	4
10/21/06	7				30	85		0.8	4	4

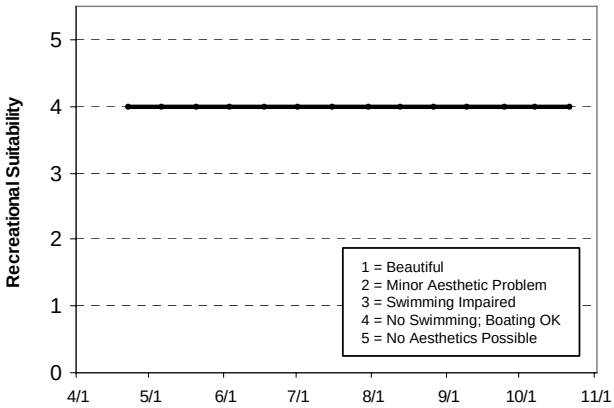


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus											F		F	F
Chlorophyll a											F		D	D
Secchi Depth											F		F	F
Overall											**F**		**F**	**F**

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). Very little lake data (or physical information) are available for Courthouse Lake. The 10-acre lake (0.6 miles in circumference) 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 1996-2006.

Courthouse Lake was monitored biweekly from mid-April to mid-October, 2006, for a total of 13 monitoring events. The data collected by volunteers showed seasonal variability in TP and CLA concentrations, Secchi transparency, and user perception (physical condition and recreational suitability). Results are presented on the lake's information sheet.

2006 summer (May-September) data summary

Parameter	***Mean***	***Minimum***	***Maximum***	***Grade***
TP (µg/l)	18.6	8.0	45.0	A
CLA (µg/l)	2.4	1.0	5.1	A
Secchi (m)	4.8	3.6	6.0	A
TKN (mg/l)	0.56	0.41	0.83	
			Overall Grade	A

The lake's 2006 overall grade was similar to that of 1996, 1998-2001, and 2003-2005, and better than 1997 and 2002 (overall grades of B).

Analysis on the lake' water quality database reveals no statistically significant trend in its water quality (either improving or degrading). The lake's water quality seems well represented by an overall water quality grade of A/B+.

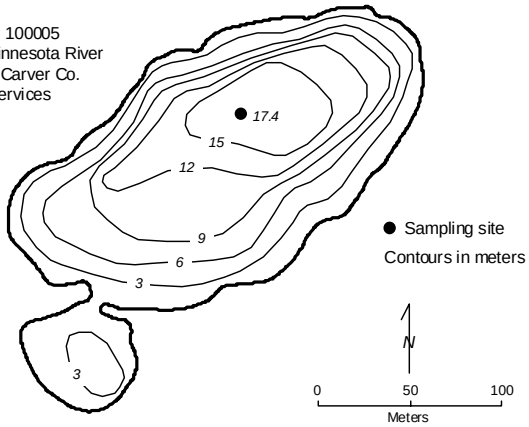
The average user perception rankings, on a 1-to-5 scale, were 1.2 for physical condition (between 1- "crystal clear" and 2- "some algae present"), and 1.2 for recreational suitability (between 1- "beautiful" and 2- "minor aesthetic problem").

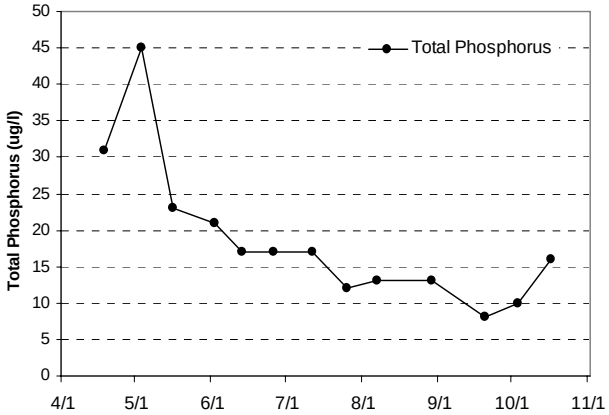
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

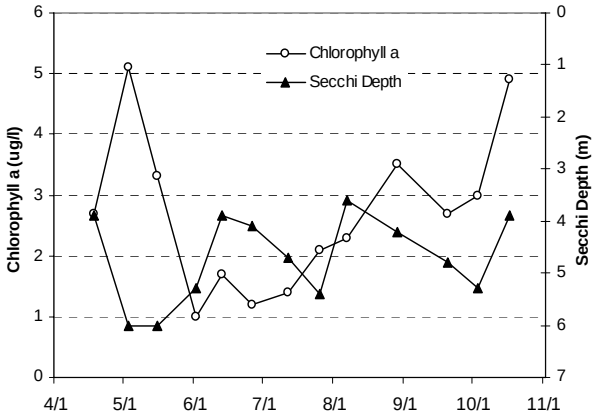
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Courthouse Lake
Chaska, Carver Co.

Lake ID: 100005
WD: Lower Minnesota River
Volunteer: Carver Co.
Env. Services

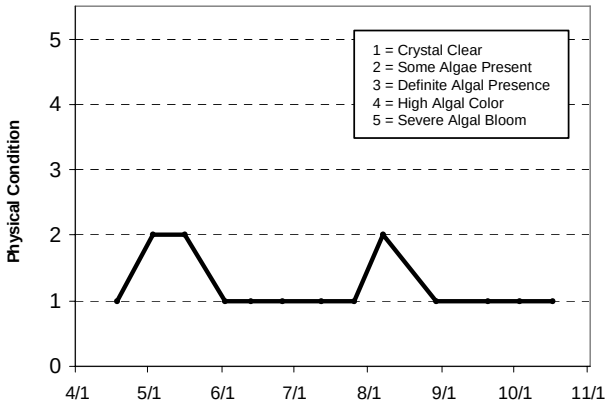






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/18/06	15.48		10.57		2.7	31		3.9	1	1
5/3/06	13		10.35		5.1	45		6	2	1
5/16/06	15.79		11.02		3.3	23		6	2	2
6/2/06	24.94		9.67		1	21		5.3	1	1
6/13/06	22.11		11.02		1.7	17		3.9	1	1
6/26/06	25.51		8.03		1.2	17		4.1	1	1
7/12/06	26.92		9.06		1.4	17		4.7	1	1
7/26/06	27.5		8.55		2.1	12		5.4	1	1
8/7/06	28.58		7.88		2.3	13		3.6	2	2
8/29/06	23.33		7.38		3.5	13		4.2	1	1
9/20/06	18.18		9.12		2.7	8		4.8	1	1
10/3/06	17.55		9.62		3	10		5.3	1	1
10/17/06	11.86		7.91		4.9	16		3.9	1	1

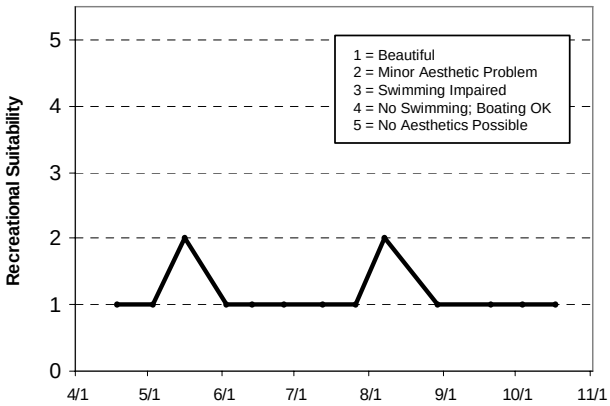


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus				A	A	A	A	A	A	B	A	A	A	A
Chlorophyll a				A	A	A	A	A	A	A	A	A	A	A
Secchi Depth				A	C	A	B	A	A	B	A	B	A	A
Overall				**A**	**B**	**A**	**A**	**A**	**A**	**B**	**A**	**A**	**A**	**A**

Source: Metropolitan Council and STORET data



Cowley Lake (27-0169) *Elm Creek Watershed management Commission*

Cowley Lake is a small lake located within Hassan Township (Hennepin County). There is little morphological information available for the waterbody. 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 second year that Cowley's Pond has been involved in CAMP (1996 being the other). On each of the sampling days the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The lake was monitored 10 times between early-May and early-September, 2006.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	414.5	92.0	838.0	F
CLA (µg/l)	104.7	4.4	370.0	F
Secchi (m)	1.2	0.2	2.2	D
TKN (mg/l)	2.75	1.20	6.30	
			Overall Grade	F

The lake's 2006 overall grade is an F.

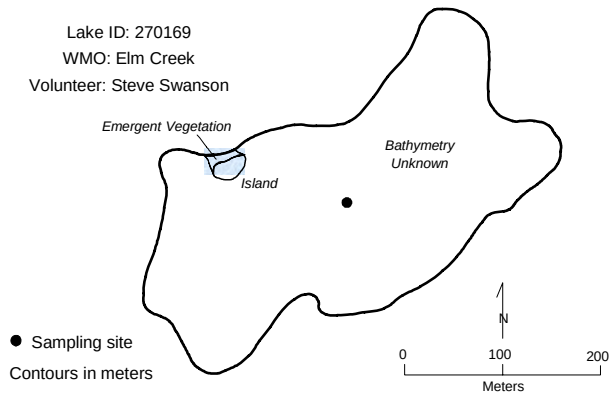
Other than for the limited data in 1996 and the 2006 CAMP data, there are no known water quality data available for Cowley Lake. Therefore it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

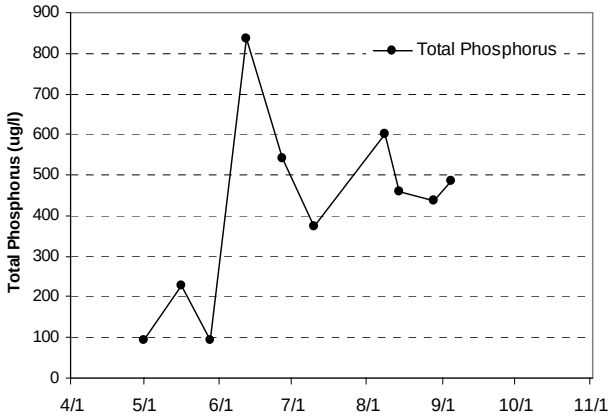
The perceived physical and recreational conditions (ranked on a 1-to-5 scale) are shown on the lake's information sheet on the next page. The average user perception rankings, were 3.8 for physical condition (between 3- "definite algae present" and 4- "high algal color"), and 4.9 for recreational suitability (between 4- "no swimming – boating ok" and 5- "no aesthetics possible").

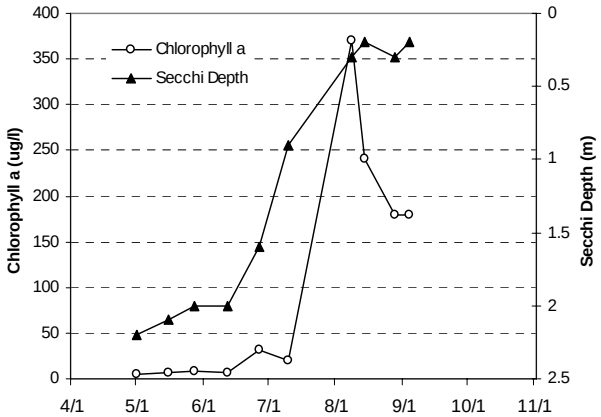
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Cowley Lake
Hassan Twp., Hennepin Co.

Lake ID: 270169
WMO: Elm Creek
Volunteer: Steve Swanson

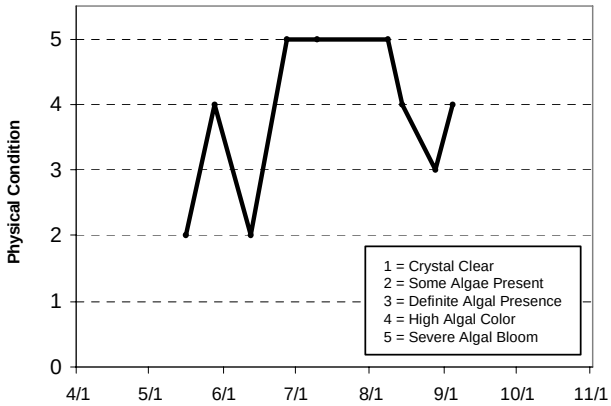






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/1/06	17.4				4.4	92		2.2		
5/16/06					7.2	226		2.1	2	4
5/28/06	26.9				7.8	92		2	4	5
6/12/06	24.1				6.9	838		2	2	5
6/27/06	25.7				31	540		1.6	5	5
7/10/06	28				20	374		0.9	5	5
8/8/06	30.9				370	602		0.3	5	5
8/14/06	30.4				240	459		0.2	4	5
8/28/06	24				180	437		0.3	3	5
9/4/06	24.9				180	485		0.2	4	5

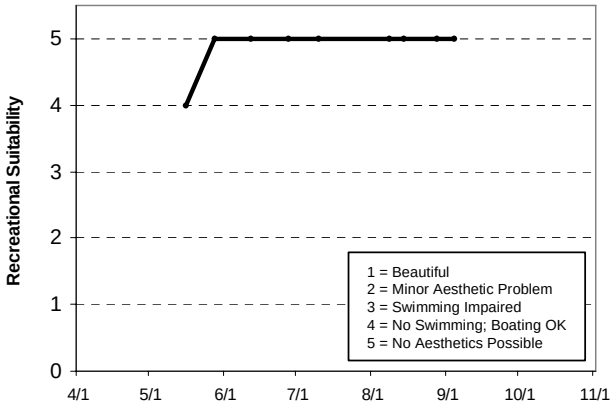


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus				F										F
Chlorophyll a														F
Secchi Depth				D										D
Overall														**F**

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) covers an 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. One problem that may possibly hinder future recreational activity on the lake, however, is Eurasian Water Milfoil (*Myriophyllum spicatum*), which has been reported in the lake.

This was the eighth year that Crystal Lake has been involved in CAMP (1999-2006). The lake which had been monitored by Council staff prior to 1999 was again monitored by Council staff in 2006. The 2006 Council staff monitoring included additional samples collected at subsurface depth analyzed for a more complete array of parameters to help determine the effectiveness of a ferric chloride dosing system. The following information in this section is based on data collected by the CAMP volunteer. Part 1 of the report discusses results of the data collected by Council staff. 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 late-April and mid-October, 2006. Results are presented on graphs and data tables on the following page. During each monitoring event, the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as its perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	43.6	20.0	72.0	C
CLA (µg/l)	22.4	4.9	40.0	C
Secchi (m)	1.8	1.1	3.9	C
TKN (mg/l)	1.15	0.36	1.90	
			Overall Grade	C

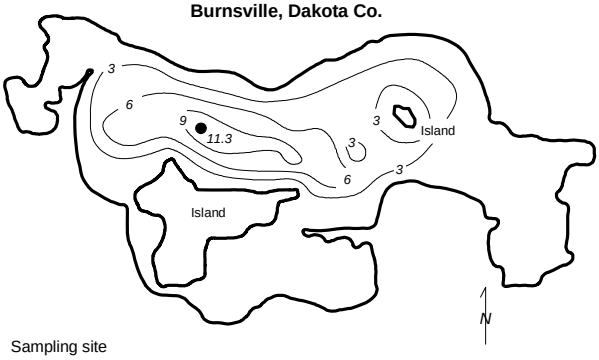
The 2006 overall grade of a C is similar to those recorded from 1994-2000, and 2002-2005, and worse than the B's recorded in 1983, 1989, and 2001. Analysis on the lake's water quality database reveals no statistically significant trend in its water quality (either improving or degrading). The lake's water quality seems well represented by an overall water quality grade of C/B-.

Throughout the monitoring period, the volunteer's opinion 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 2.3 for physical condition (between 2- "some algae present" and 3- "definite algae present"), and 1.7 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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

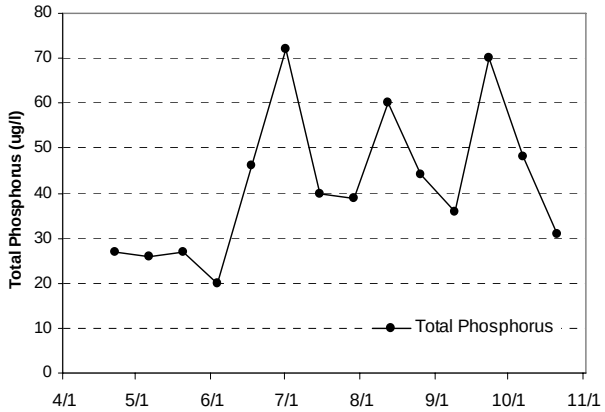
Crystal Lake,
Burnsville, Dakota Co.

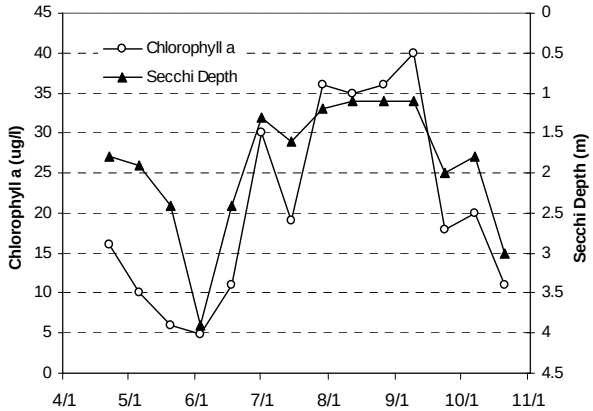


● Sampling site
Contours in meters

Lake ID: 190027
WMO: Black Dog
Volunteers: The Arnett Family

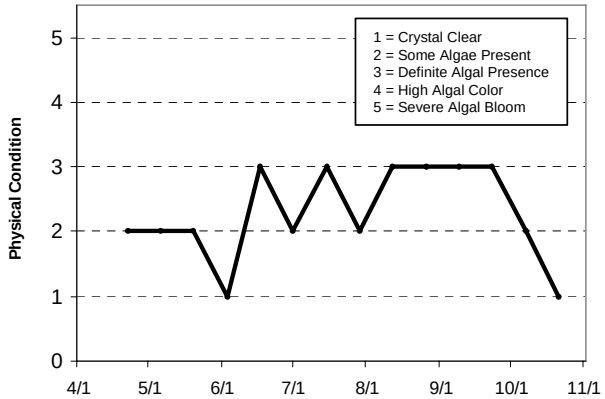
0 300 600
Meters





2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/22/06	13.6				16	27		1.8	2	1
5/6/06	15.1				10	26		1.9	2	1
5/20/06	17				6	27		2.4	2	2
6/3/06	24.7				4.9	20		3.9	1	2
6/17/06	24.3				11	46		2.4	3	2
7/1/06	26				30	72		1.3	2	2
7/15/06	27.9				19	40		1.6	3	2
7/29/06	29.5				36	39		1.2	2	2
8/12/06	26.4				35	60		1.1	3	2
8/26/06	24.4				36	44		1.1	3	2
9/9/06	21.4				40	36		1.1	3	2
9/23/06	15.7				18	70		2	3	2
10/7/06	15.6				20	48		1.8	2	1
10/21/06	7.4				11	31		3	1	1

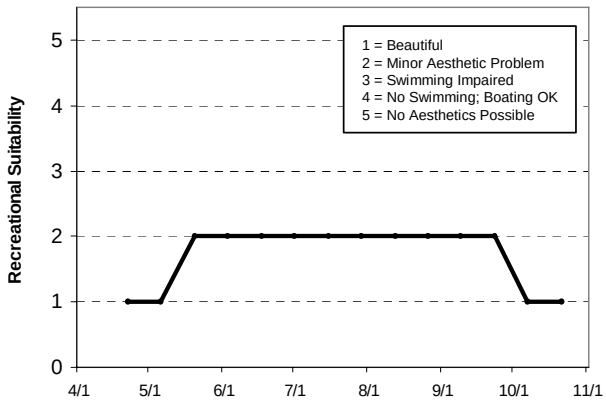


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus	C	C		C						B			
Chlorophyll a	C			B				C		B			
Secchi Depth	C	C	C	B	C	B	B	C	C	B	C	B	B
Overall	**C**			**B**						**B**			

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus		C	C	C	C	C	C	C	B	C	C	C	C	C
Chlorophyll a		B	C	C	C	C	B	C	B	B	C	B	C	C
Secchi Depth		C	C	C	C	C	C	C	C	C	C	C	C	C
Overall		**C**	**C**	**C**	**C**	**C**	**C**	**C**	**B**	**C**	**C**	**C**	**C**	**C**

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).

Two thousand and six marks the fifth year in which Dean Lake has been involved in CAMP. A search through the STORET nationwide water quality database for historic data on the lake was unsuccessful. Thus, 2002-2006 are the only years of available data. 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 lake was monitored eight times between early-May and mid-September, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

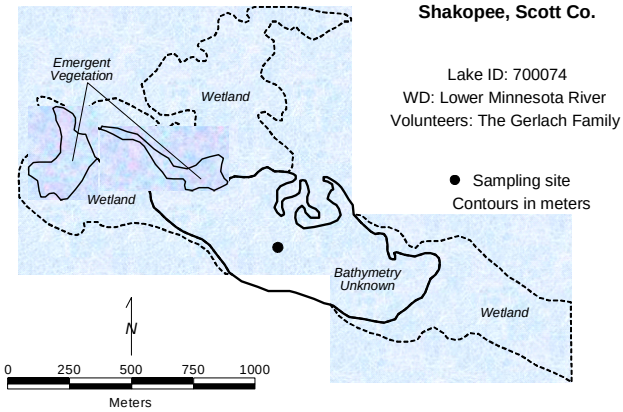
Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	279.9	30.0	661.0	F
CLA (µg/l)	72.9	1.8	310.0	D
Secchi (m)	0.6	0.4	1.0	F
TKN (mg/l)	3.36	0.88	7.90	
			Overall Grade	F

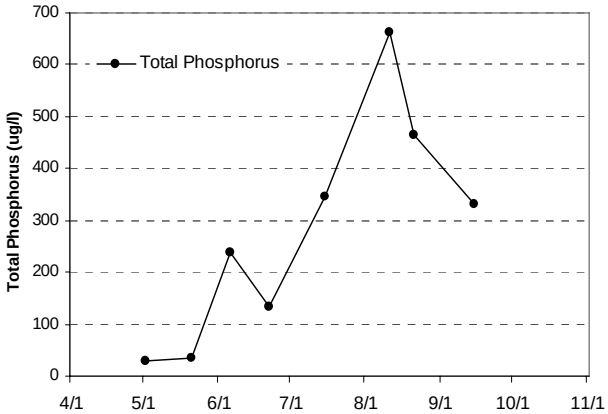
The difference between the TP, CLA and Secchi grades in current and past years (see report grade on the lake's information page), may indicate that suspended sediments may play a large role in the inner workings of the lake. This scenario can be fairly typical for shallow lakes where wind action and storm sewer inflow either increase the influx of sediments to the system or cause the re-suspension of existing bottom sediments. That is, the suspended sediments influence the lake's phosphorus make-up (a larger portion of the in-lake phosphorus in particulate form rather than a soluble form more readily available for algal uptake), reduce water clarity, and could actually be limiting the amount of light available for algal growth, thus keeping the CLA concentrations down (resulting in a better than expected grade).

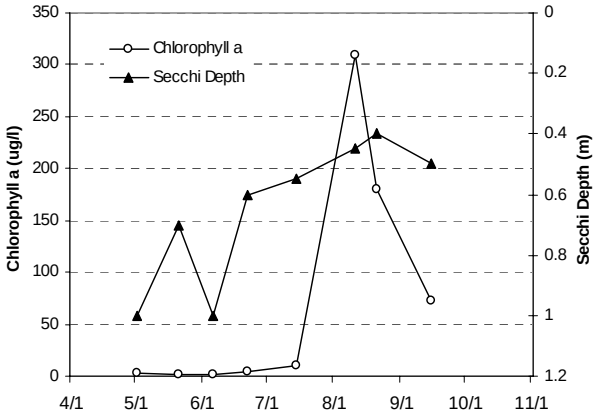
The overall lake grade recorded in 2006 was an F which is similar to the overall grade in 2002 and worse than the overall grade of a D for 2003-2005. As mentioned earlier, there are no water quality data available for Dean Lake other than the 2002-2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. 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 3.0 for physical condition (3- "definite algae present"), and 3.6 for recreational suitability (between 3- "swimming slightly impaired"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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

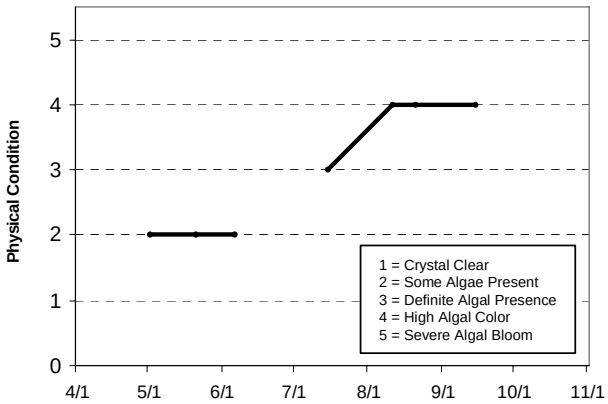






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/2/06	19				2.4	30		1	2	1
5/21/06	22				2	34		0.7	2	2
6/6/06	26				1.8	239		1	2	5
6/22/06	28				4.7	133		0.6		5
7/15/06	29.5				9.6	347		0.55	3	4
8/11/06	28				310	661		0.45	4	4
8/21/06	28				180	465		0.4	4	4
9/15/06	22.4				73	330		0.5	4	4

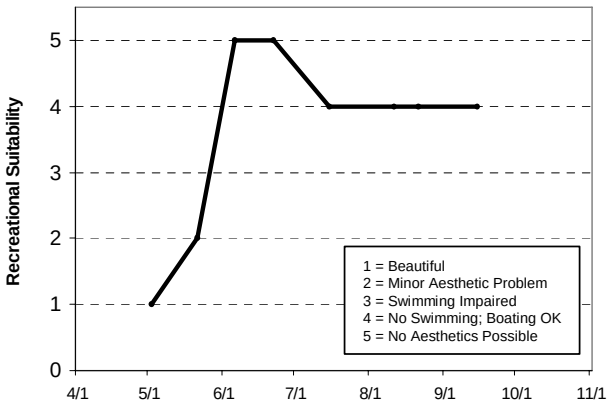


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus										F	F	D	F	F
Chlorophyll a										D	C	B	C	D
Secchi Depth										F	F	F	F	F
Overall										**F**	**D**	**D**	**D**	**F**

Source: Metropolitan Council and STORET data



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

Lake DeMontreville, located in Lake Elmo (Washington County), has public access on its northwestern side, and is considered a "Priority Lake" due to its multi-recreational uses. 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.

This was the fourth year that Lake DeMontreville has been involved in 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 2003-2006. Additionally, Secchi transparency data are available for 1985-1986, and 1988-1989.

The lake was monitored seven times between early-May and late-September, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	47.4	25.0	83.0	C
CLA (µg/l)	19.9	3.1	38.0	B
Secchi (m)	2.5	0.76	4.4	B
TKN (mg/l)	2.56	0.87	7.30	
			Overall Grade	B

The overall grade for the lake in 2006 was a B. Historically, 1980-2005 lake quality grades for Lake DeMontreville (see lake information sheet on the following page) show that the quality of the lake has improved over the past 25 years. The overall grades in 1980, 1984, and 1991 were all C. The overall grades in 1993, 1995, and 2005 were B, and the overall grades for 2000, and 2003-2004 were A. A recent MPCA conducted trend analysis on the lake's Secchi transparency data, revealed a statistically significant improvement in recent water clarity.

The graphs showing the volunteer's perceptions of the lake's physical condition and recreational suitability seem somewhat correlated to the other graphs for this lake. The better the lake's clarity (also relating to lower TP and CLA concentrations), the better the lake's perceived physical condition and recreational suitability. The summertime mean recorded physical condition was 2.6 on a 1 to 5 ranking scale shown on the lake information sheet (between 2- "some algae present" and 3- "definite algae present"). The mean suitability for recreation ranking, also on a 1-to-5 scale, was 2.6 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

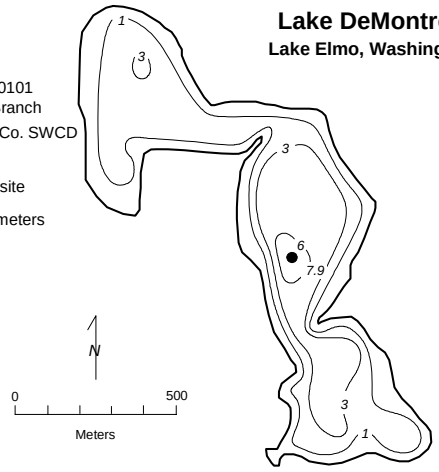
Lake DeMontreville

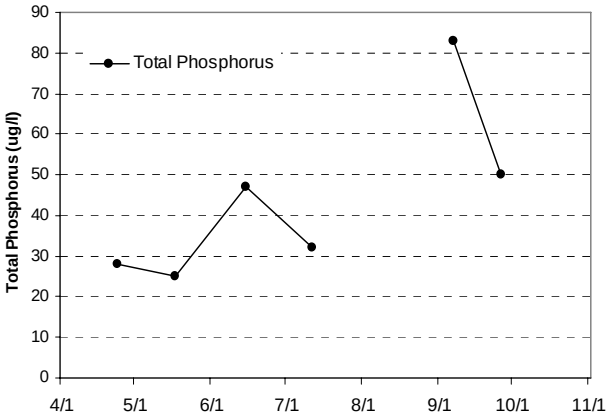
Lake Elmo, Washington Co.

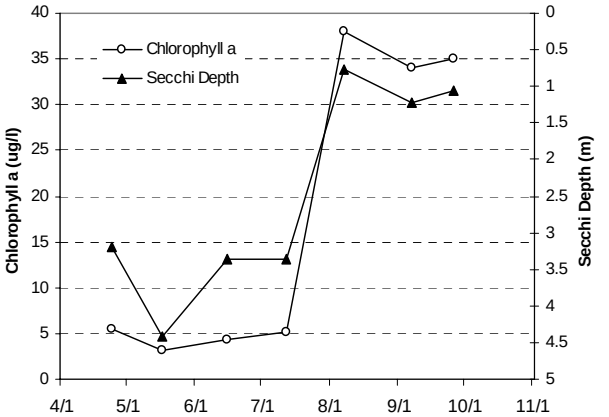
Lake ID: 820101
WD: Valley Branch
Volunteer: Wash. Co. SWCD

● Sampling site

Contours in meters

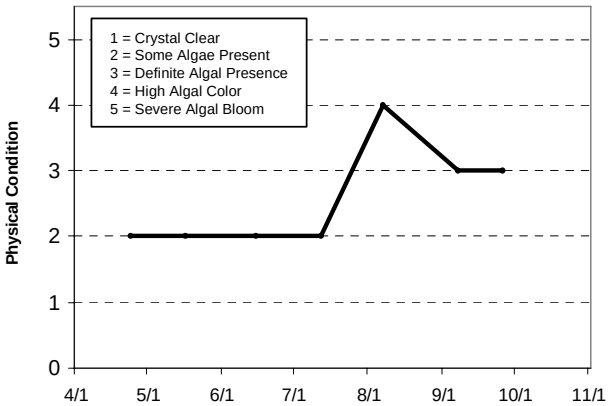






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/24/06	14.2	7.2	7.88	1.15	5.5	28		3.2	2	2
5/17/06	15.4	10.4	9.54	0.56	3.1	25		4.42	2	2
6/15/06	23.1	10.4	8.15	0.04	4.3	47		3.353	2	2
7/12/06	27.3	11.5	9.03	0.07	5.2	32		3.353	2	2
8/7/06	28.2	14.3	8.94	0.05	38			0.762	4	4
9/7/06	23.5	13.4	10.57	0.05	34	83		1.219	3	3
9/26/06	15.9	15.4	8.62	0.13	35	50		1.067	3	3

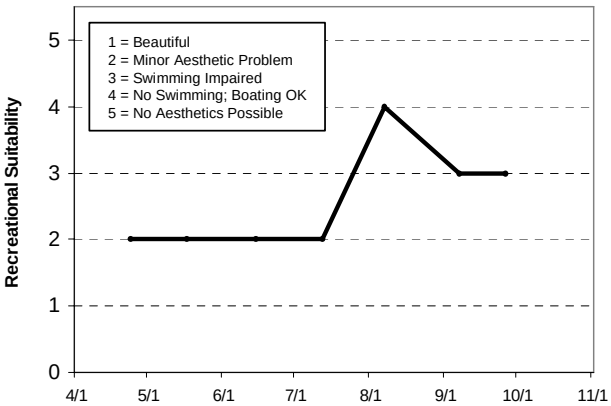


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus	C				C							B	
Chlorophyll a	C				C							C	
Secchi Depth	C				C	C	C		C	D		C	
Overall	**C**				**C**							**C**	

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus	B		C					A			A	A	B	C
Chlorophyll a	A		B					A			B	A	B	B
Secchi Depth	B		B					A			A	B	A	B
Overall	**B**		**B**					**A**			**A**	**A**	**B**	**B**

Source: Metropolitan Council and STORET data



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

Downs Lake, located in Lake Elmo (Washington County), was monitored seven times between early-May and late-September, 2006. 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.

This was the seventh year in which Downs Lake has been involved in CAMP (1999 and 2001-2005 being the others). A search through the STORET nationwide water quality database for data on the lake resulted in no data other than that collected through CAMP. Thus, 1999 and 2001-2006 are the only years where data are available. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	174.1	98.0	324.0	F
CLA (µg/l)	110.3	35.0	260.0	F
Secchi (m)	0.4	0.1	0.6	F
TKN (mg/l)	2.87	1.40	4.30	
			Overall Grade	F

The summertime means resulted in a TP grade of F, CLA grade of F, and Secchi transparency grade of F. The overall grade, calculated from all three parameters was F. The lake's 2006 overall water quality grade is similar to that recorded in 2001-2002 and 2004, and worse than those of 1999, 2003 and 2005 (overall grade of D).

As mentioned earlier, there are no water quality data available for Downs Lake other than the 1999 and 2001-2006 CAMP data. Therefore it is not possible to determine any long-term. In the short-term, the lake seems to fluctuate between overall grades of D/F. 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 opinion 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 3.9 for recreational suitability (roughly 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Downs Lake
Lake Elmo, Washington Co.

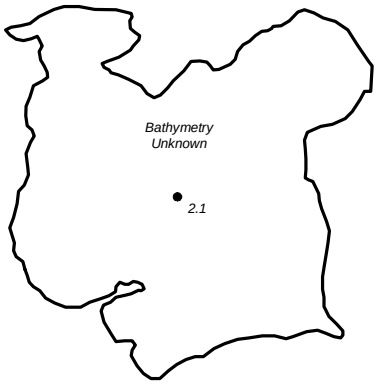
Lake ID: 820110

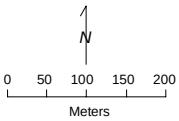
WD: Valley Branch

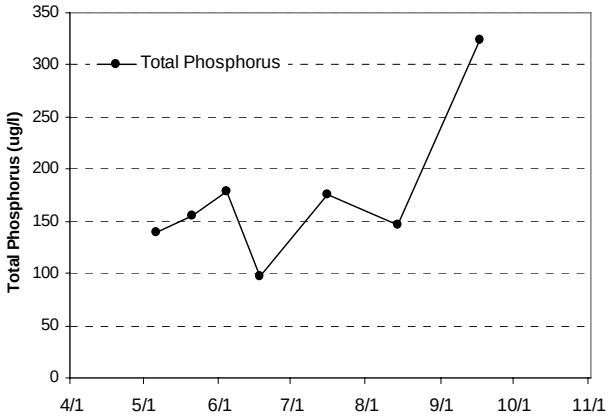
Volunteers: The Wesley Sly Family

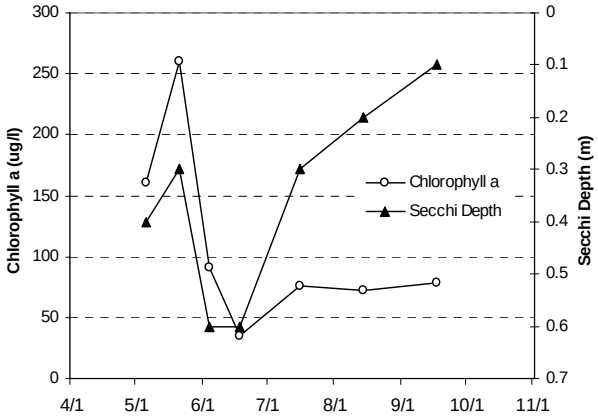
● Sampling site

Contours in meters



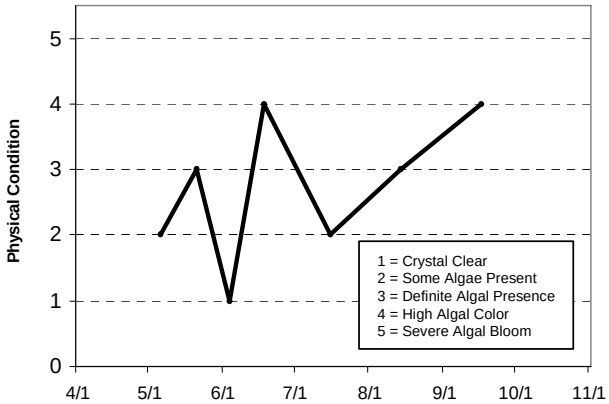






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/6/06	15.6				160	139		0.4	2	4
5/21/06	17				260	156		0.3	3	4
6/4/06	26				91	179		0.6	1	3
6/18/06	26.3				35	98		0.6	4	4
7/16/06	28				76	176		0.3	2	4
8/14/06	24.8				72	147		0.2	3	4
9/17/06	20.5				78	324		0.1	4	4

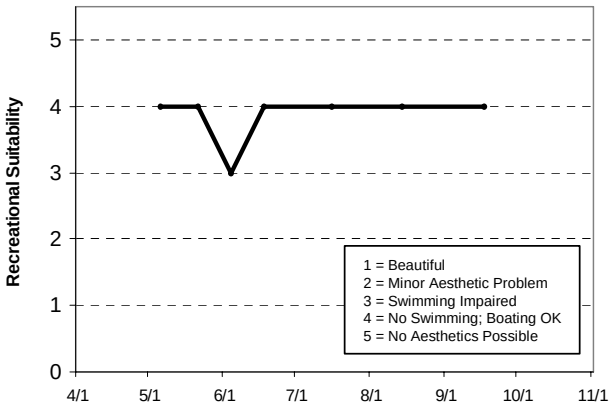


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus							D		D	F	D	F	D	F
Chlorophyll a							D		F	F	C	D	D	F
Secchi Depth							D		F	F	F	F	F	F
Overall							**D**		**F**	**F**	**D**	**F**	**D**	**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 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). Eurasian Water Milfoil (*Myriophyllum spicatum*) [EWM] has been reported on the lake.

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). A 1999 water quality report on water resources in Carver County estimates land use for the watershed at: two percent residential, 63 percent agricultural, and 35 percent open/undeveloped (Carver County Planning 1999).

This was the eighth year that Eagle Lake has been involved in CAMP (previously enrolled in 1998-2003 and 2005), although it has been previously monitored by Council staff (as recently as 2004). The lake was monitored 14 times between mid-April and mid-October, 200. 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.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	209.6	46.0	318.0	F
CLA (µg/l)	77.9	8.7	160.0	F
Secchi (m)	1.0	0.4	2.4	D
TKN (mg/l)	2.22	0.87	3.5	
			Overall Grade	F

The lake's 2006 overall water quality grade (F) is similar to that recorded in 1985 and 2002 and worse than that recorded (D) in 1980-1981, 1996, 1998-2001, 2003-2004, and in 2005 (overall grade of C).

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 3.1 (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").

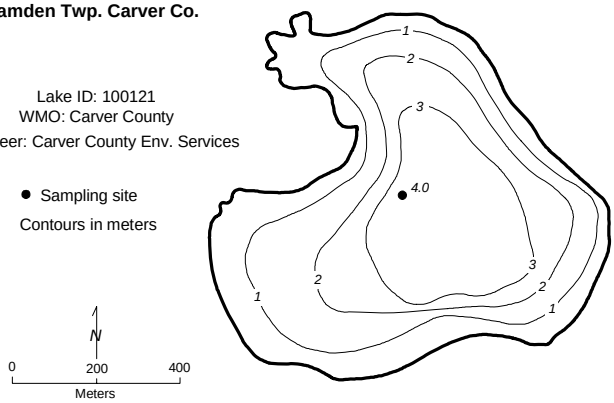
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

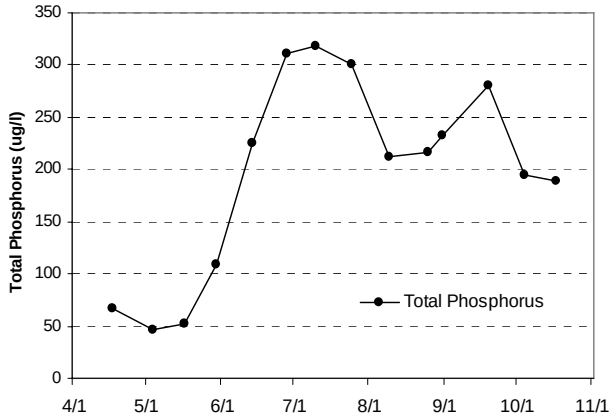
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

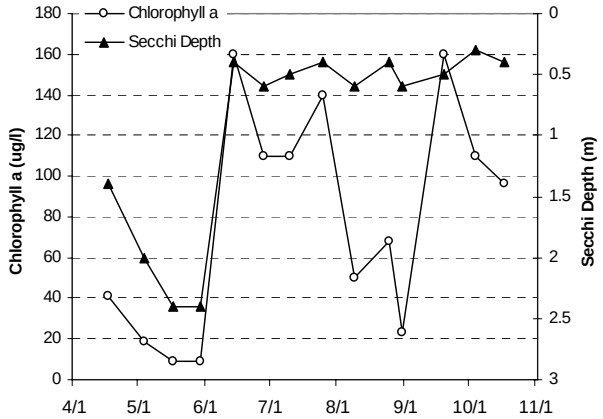
Eagle Lake,
Camden Twp. Carver Co.

Lake ID: 100121
WMO: Carver County
Volunteer: Carver County Env. Services

● Sampling site
Contours in meters

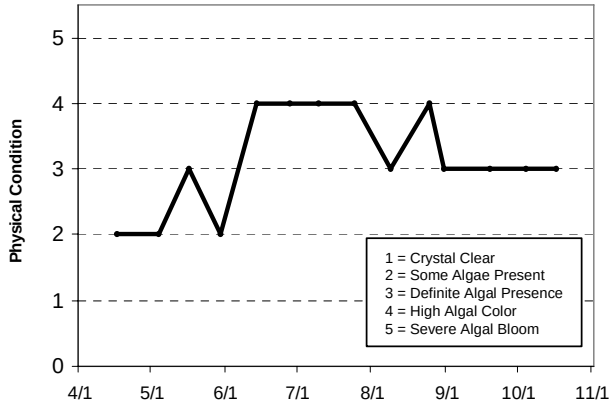






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/17/06	13.3		11.31		41	67		1.4	2	2
5/4/06	13.81		10.11		19	46		2	2	2
5/17/06	14.51		10.87		8.7	53		2.4	3	3
5/30/06	23.08		8.71		8.7	109		2.4	2	3
6/14/06	21.67		14.2		160	225		0.4	4	4
6/28/06	23.95		9.27		110	311		0.6	4	4
7/10/06	25.12		10.14		110	318		0.5	4	4
7/25/06	26.9		17.39		140	301		0.4	4	4
8/9/06	25.85		3.63		50	212		0.6	3	3
8/25/06	23.11		4.72		68	216		0.4	4	4
8/31/06	22.43		4.53		23	233		0.6	3	3
9/19/06	16.06		9.63		160	281		0.5	3	3
10/4/06	15.58		10.5		110	195		0.3	3	3
10/17/06	8.27		9.8		96	189		0.4	3	3

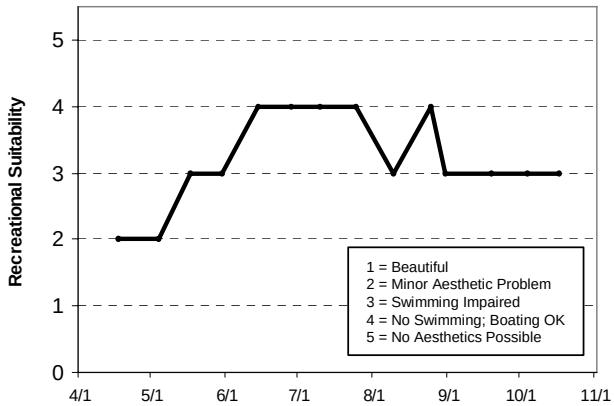


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus	F	F				F							
Chlorophyll a	D	C				F							
Secchi Depth	C	C				F							
Overall	**D**	**D**				**F**							

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus				F		F	F	F	F	F	F	F	D	F
Chlorophyll a				C		C	C	C	D	D	C	C	C	F
Secchi Depth				B		C	B	C	D	F	D	D	C	D
Overall				**D**		**D**	**D**	**D**	**D**	**F**	**D**	**D**	**C**	F

Source: Metropolitan Council and STORET data



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

Eagle Point Lake is an approximate 120-acre lake located within the City of Lake Elmo (Washington County). 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 results in 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. The greater the ratio, the greater the potential stress on the lake from surface runoff.

This was the second year that Eagle Point has been involved in CAMP (1993 being the other). On each of the sampling days the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The lake was monitored 5 times between mid-July and mid-October, 2005.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	859.8	602.0	1,320.0	F
CLA (µg/l)	115.5	4.8	260.0	F
Secchi (m)	0.1	0.1	0.2	F
TKN (mg/l)	8.35	6.80	11.00	
			Overall Grade	F

Not only did Eagle Point Lake receive an overall water quality grade of F in 2006, but its individual parameter means were the worst recorded in CAMP 2006.

Other than for the 1993 and 2006 CAMP data, there are no known water quality data available for Eagle Point Lake. Therefore it is not possible to determine any long-term or short-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 4.8 for physical condition (between 4- "high algal color" and 5- "severe algal bloom"), and 4.0 for recreational suitability (4- "no swimming – boating ok").

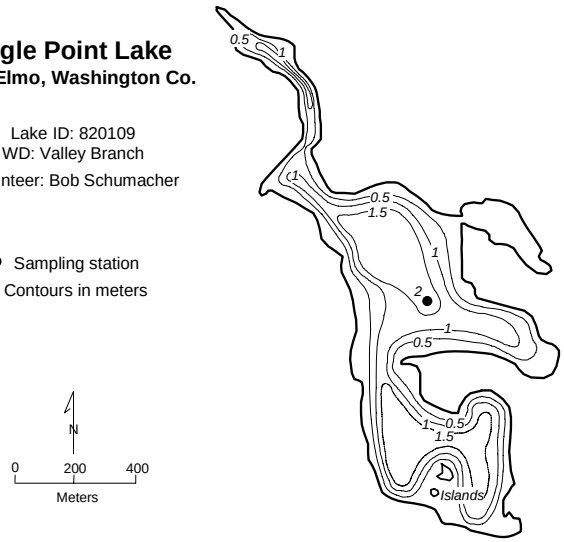
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

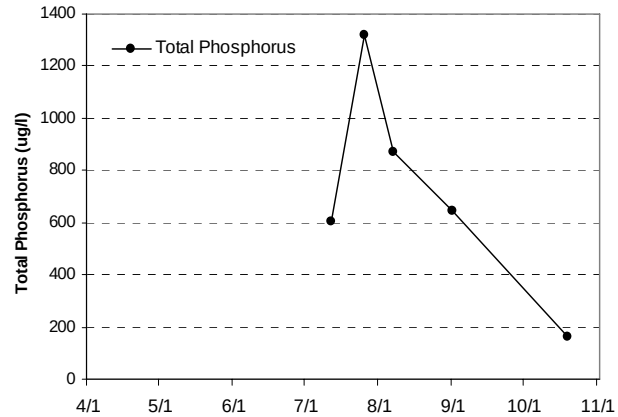
Eagle Point Lake

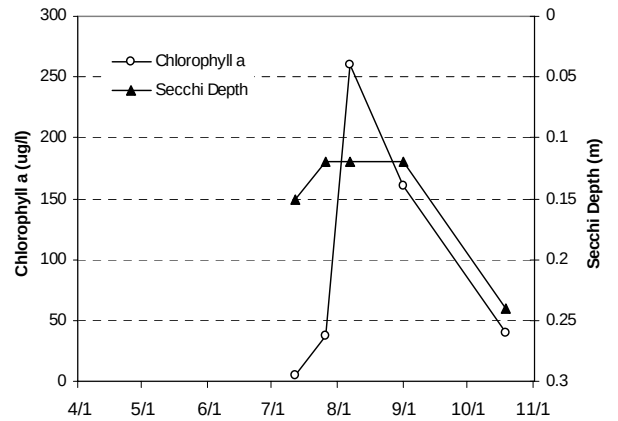
Lake Elmo, Washington Co.

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

● Sampling station
Contours in meters

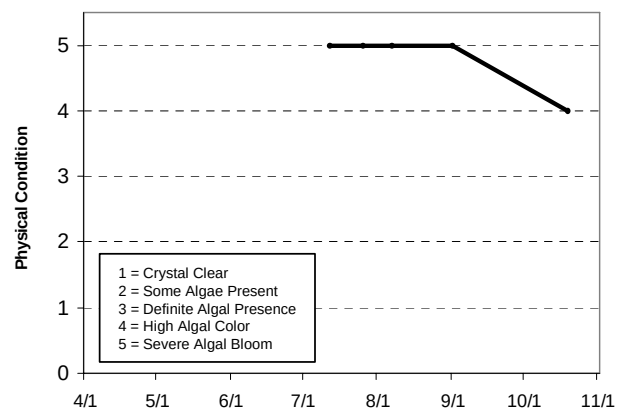






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
7/12/06	32.4				4.8	602		0.15	5	4
7/26/06	32.1				37	1320		0.12	5	4
8/7/06	32.4				260	871		0.12	5	4
9/1/06	22.8				160	646		0.12	5	4
10/19/06	7.3				40	164		0.24	4	4

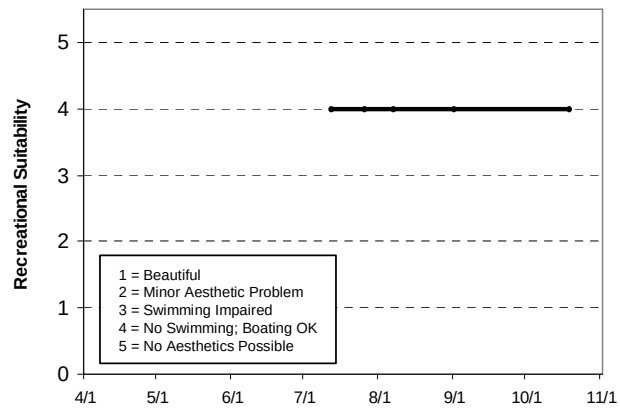


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus	F													F
Chlorophyll a														F
Secchi Depth	F													F
Overall														**F**

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.

Earley Lake has been enrolled in CAMP since 1994. The lake was monitored nine times between mid-May and mid-October, 2006. On each sampling date the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	46.0	27.0	67.0	C
CLA (µg/l)	5.4	3.0	7.8	A
Secchi (m)	1.5	1.1	2.1	C
TKN (mg/l)	0.96	0.54	1.60	
			Overall Grade	B

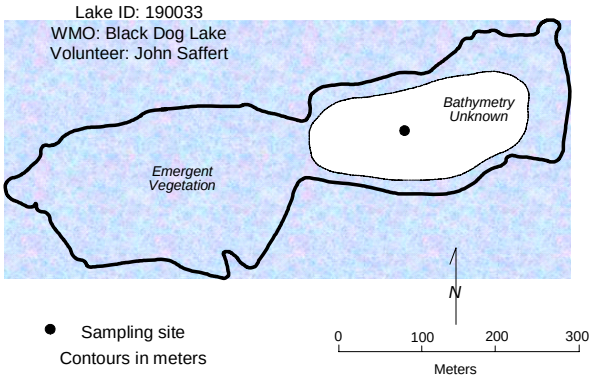
The lake's overall water quality grade for 2006 is its best recorded overall grade to date. The lake received overall grades of C from 1994-2005.

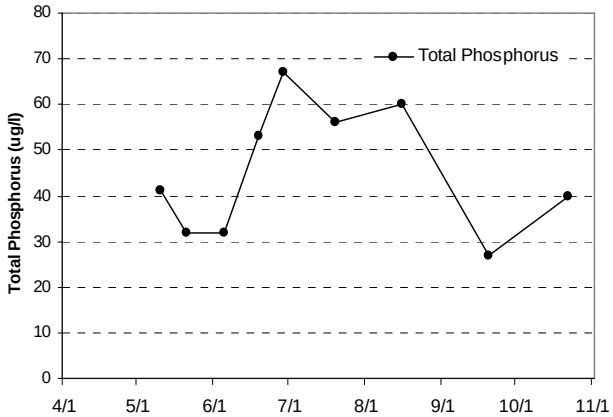
Throughout the monitoring period, the volunteers' opinion of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. The mean physical condition ranking was 2.2 (between 2- "some algae present" and 3- "definite algae present"), while the mean recreational suitability ranking was 4.1 (roughly 4- "no swimming – boating ok").

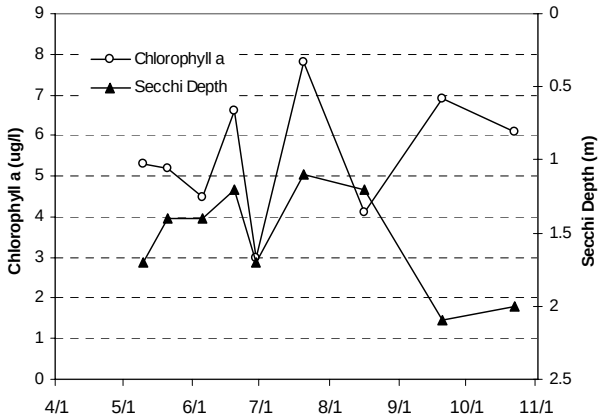
Statistical analysis on the lake's water quality database did not detect any long-term trends, in the short-term however, the lake seems to be very well represented by an overall water quality grade of B+/C. To better understand the quality of the lake and what direction it may be heading, continued monitoring is suggested.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Earley Lake
Burnsville, Dakota Co.

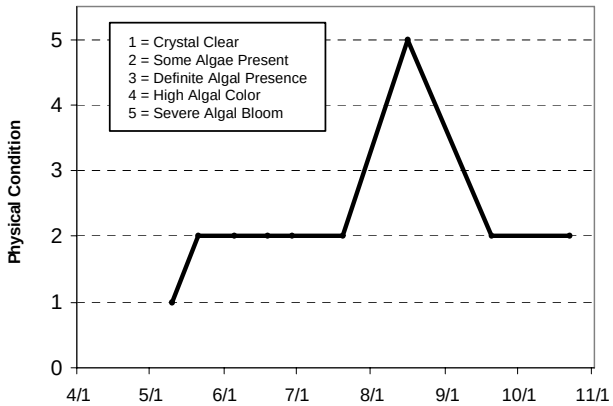






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/10/06	19.3				5.3	41		1.7	1	4
5/21/06	18.5				5.2	32		1.4	2	4
6/5/06	26.9				4.5	32		1.4	2	4
6/19/06	25.7				6.6	53		1.2	2	4
6/29/06	27				3	67		1.7	2	4
7/20/06	27.1				7.8	56		1.1	2	4
8/16/06	27				4.1	60		1.2	5	5
9/20/06	15.2				6.9	27		2.1	2	4
10/22/06	6.5				6.1	40		2	2	4

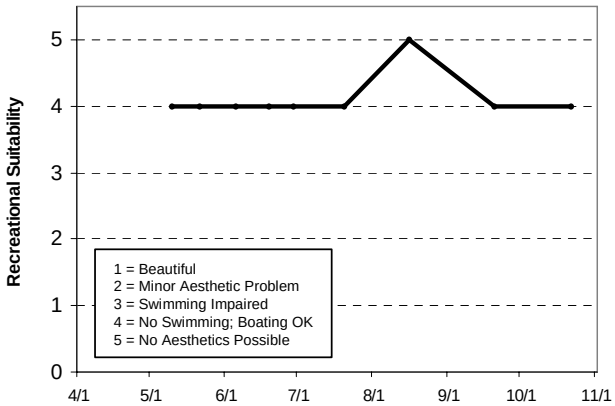


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus		C	C	C	C	C	C	C	C	C	C	C	C	C
Chlorophyll a		B	B	B	B	B	B	B	B	B	B	B	B	A
Secchi Depth		C	C	C	C	C	C	C	C	C	C	C	C	C
Overall		**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**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.

This marks the second year in which East Lake has been involved in CAMP. A search through the STORET nationwide water quality database for historic data on the lake came up empty. Therefore, 2005-2006 are the only years where water quality data are available. 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 lake was monitored six times between mid-May and mid-August, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

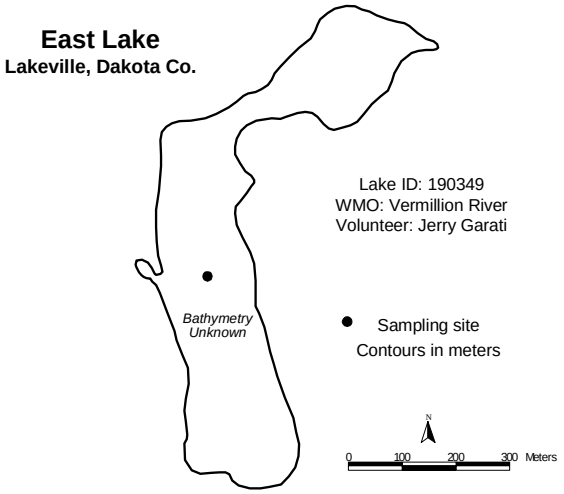
Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	85.3	51.0	159.0	N/A
CLA (µg/l)	38.8	4.9	100.0	N/A
Secchi (m)	1.4	0.5	2.4	N/A
TKN (mg/l)	1.42	0.80	2.60	
			Overall Grade	N/A

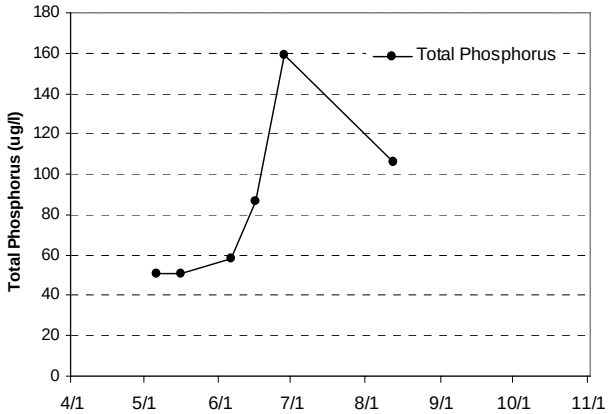
The lake was monitored six times throughout the summer. Due to the lack of sufficient representative samples for summer conditions, no grades were calculated for the lake. No samples were collected in July and only one sample was collected in August. The table above includes the means, minimums and maximums using the limited data set available which may not be truly representative of lake conditions.

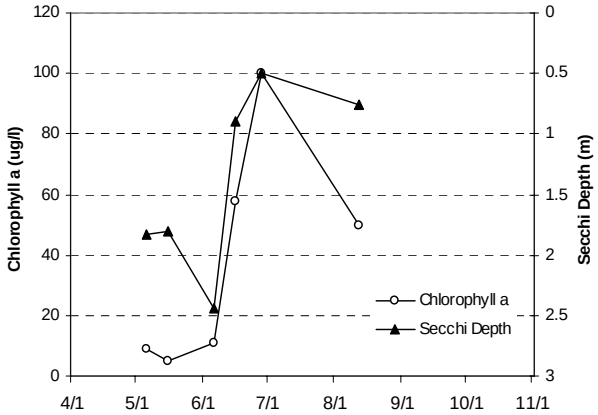
Throughout the monitoring period, the volunteers ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The resulting user perception rankings are shown on the information sheet. The mean physical condition ranking was 3.4 (between 3- "definite algae present" and 4- "high algal color"), and 3.2 for recreational suitability (between 3- "swimming slightly impaired" and 4- "no swimming - boating ok").

Because of the limitedness of the lake's water quality database, it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

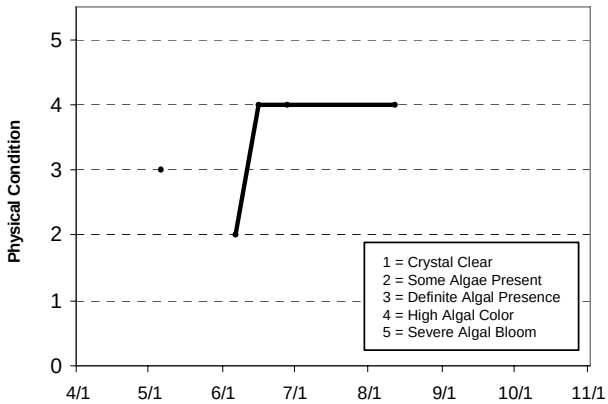






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/6/06	15.2				9.1	51		1.83	3	4
5/16/06	16.8				4.9	51		1.8		2
6/6/06	25.7				11	58		2.44	2	2
6/16/06	25.5				58	87		0.9	4	3
6/28/06	25.9				100	159		0.5	4	4
8/12/06	29.3				50	106		0.76	4	4



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													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus													F	NA
Chlorophyll a													F	NA
Secchi Depth													F	NA
Overall													**F**	

Source: Metropolitan Council and STORET data

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

East Boot Lake, located in May Township (Washington County), was monitored seven times between mid-April and mid-October, 2006. 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.

This was the seventh year that East Boot Lake has been involved in CAMP. A search through the STORET nationwide water quality database for data on the lake revealed historical data for 1996-2005 and now 2006.

On each sampling date, the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	***Mean***	***Minimum***	***Maximum***	***Grade***
TP (µg/l)	63.0	20.0	197.0	C
CLA (µg/l)	22.2	3.1	45.0	C
Secchi (m)	3.1	0.8	7.0	A
TKN (mg/l)	1.40	0.72	2.30	
			Overall Grade	B

The lake's 2006 overall grade is identical to those recorded through CAMP in 1996-1998 and 2004-2005, and better than the recent grades posted in 1999-2003 (C).

Statistical analysis on the lake's water quality database did not detect any trends. With this in mind however, the lake's recent water quality seems to be well represented by an overall grade of C+/B-. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

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 (roughly 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 (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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

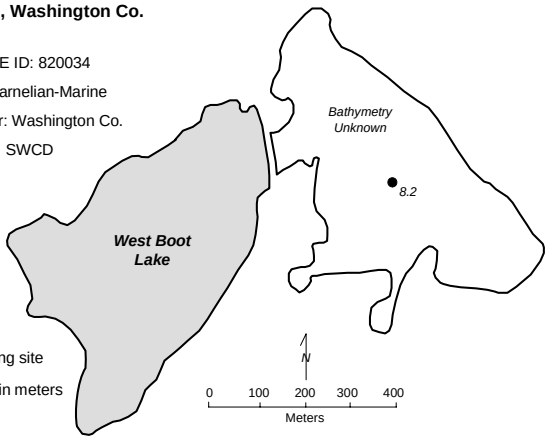
East Boot Lake

May Twp., Washington Co.

LAKE ID: 820034

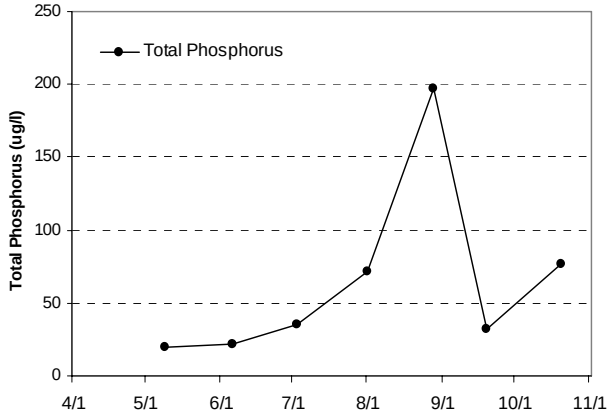
WD: Carnelian-Marine

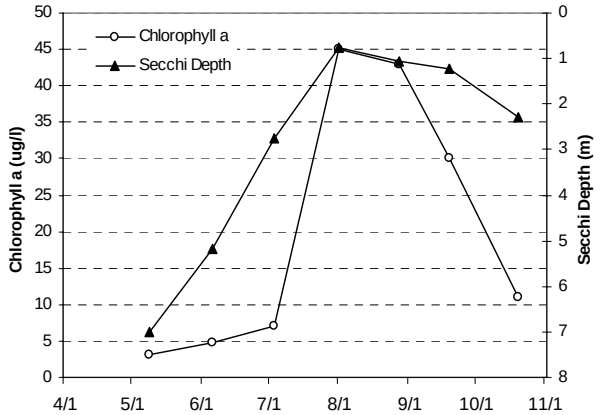
Volunteer: Washington Co. SWCD



● Sampling site

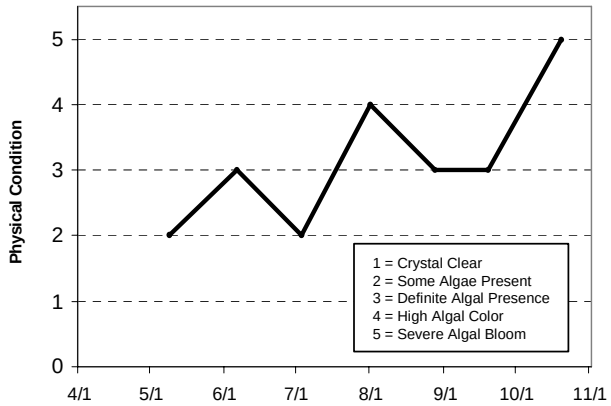
Contours in meters





2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/9/06	17.6	5.2	7.86	0.26	3.1	20		7.01	2	2
6/6/06	24.6		6.18		4.7	22		5.182	3	3
7/3/06	27.5	6.3	8.33	0.08	7.1	35		2.743	2	3
8/1/06	29.3	6.8	8.22	0.06	45	72		0.762	4	4
8/28/06	23.5	8.1	7.74	0.05	43	197		1.067	3	4
9/19/06	17.3	7.2	7.4	0.05	30	32		1.219	3	3
10/20/06	8.3	8	8.21	0.07	11	77		2.286	5	4

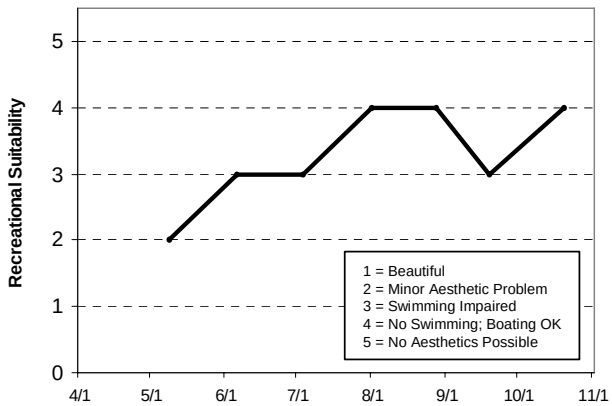


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus				B	B	B	C	C	C	C	C	C	C	C
Chlorophyll a				B	C	C	C	C	C	C	C	B	B	C
Secchi Depth				B	A	B	C	C	C	B	B	A	A	A
Overall				**B**	**B**	**B**	**C**	**C**	**C**	**C**	**C**	**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 first year that Echo Lake has been involved in 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 CAMP data are the only known nutrient data available. 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 lake was monitored 10 times between mid-April and mid-October, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	71.3	57.0	96.0	D
CLA (µg/l)	39.3	27.0	78.0	C
Secchi (m)	0.69	0.50	0.80	F
TKN (mg/l)	1.54	1.10	2.00	
			Overall Grade	D

As mentioned earlier, there are no nutrient data available for Echo Lake other than the 2006 CAMP data. Therefore it is not possible to determine any long-term or short-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 2.8 for physical condition (between 2- "some algae present" and 3- "definite algae present"), and 3.9 for recreational suitability (roughly 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Echo Lake
Mahtomedi, Washington Co.

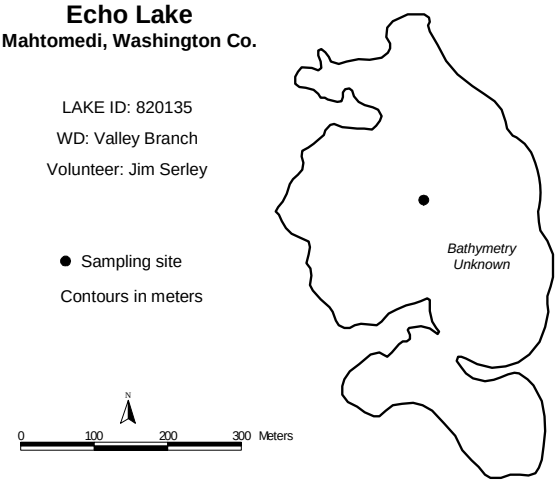
LAKE ID: 820135

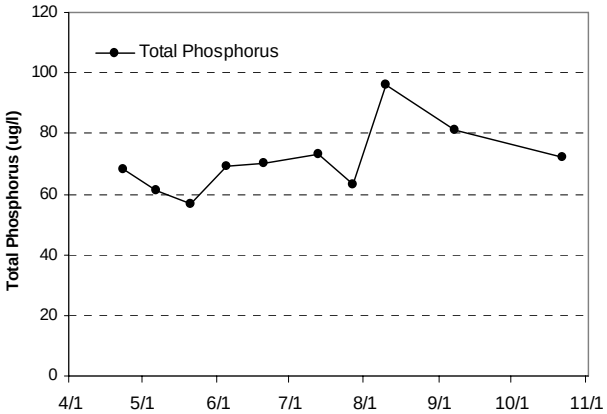
WD: Valley Branch

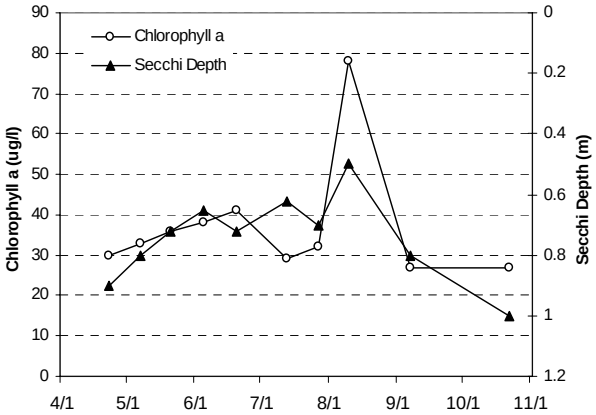
Volunteer: Jim Serley

● Sampling site

Contours in meters

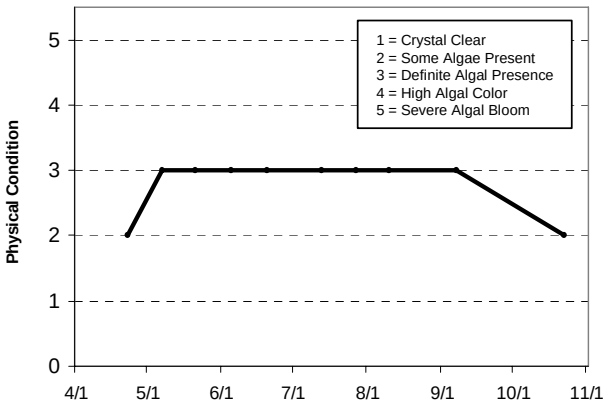






2006 Data

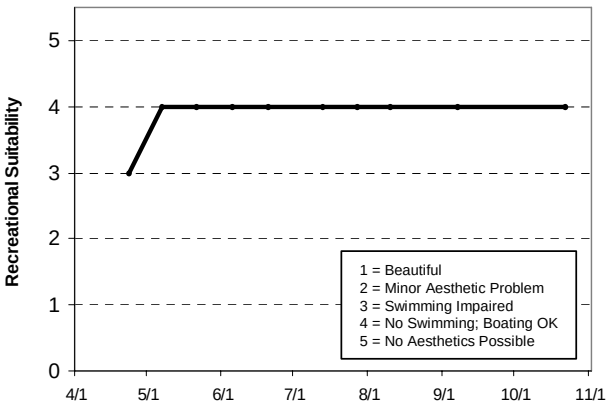
Date	Surf. Tmp C	Bot. Tmp C	Surf. DO mg/L	Bot. DO mg/L	CLA ug/L	Surf. TP ug/L	Bot. TP ug/L	Secchi M	PC 1 thru 5	RS 1 thru 5
4/23/06	17.5				30	68		0.9	2	3
5/7/06	15.2				33	61		0.8	3	4
5/21/06	16.8				36	57		0.72	3	4
6/5/06	24.3				38	69		0.65	3	4
6/20/06	23.6				41	70		0.72	3	4
7/13/06	26.7				29	73		0.62	3	4
7/27/06	27.5				32	63		0.7	3	4
8/10/06	26.7				78	96		0.5	3	4
9/7/06	23.7				27	81		0.8	3	4
10/22/06	6.3				27	72		1	2	4



Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus														D
Chlorophyll a														C
Secchi Depth													F	F
Overall														**D**

Source: Metropolitan Council and STORET data



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

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).

Additionally, the lake has a 1,576-acre immediate drainage area, which results in a watershed-to-lake area ratio of 19:1. The greater the ratio, the greater the potential stress on the lake from surface runoff.

This marks the second year in which Edith Lake has been involved in CAMP (2005 being the first). A search through the STORET nationwide water quality database for historic data on the lake was unsuccessful. Therefore, 2005-2006 are the only known years where data are available. 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 lake was monitored 12 times between mid-April and mid-October, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	29.1	18.0	60.0	B
CLA (µg/l)	4.5	1.5	8.5	A
Secchi (m)	2.0	1.6	2.5	C
TKN (mg/l)	0.64	0.47	0.78	
			Overall Grade	B

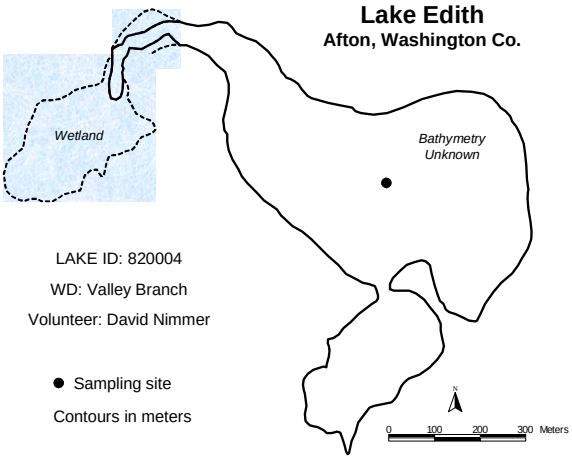
The lake's 2006 overall grade of a B is worse than the 2005 overall grade of A.

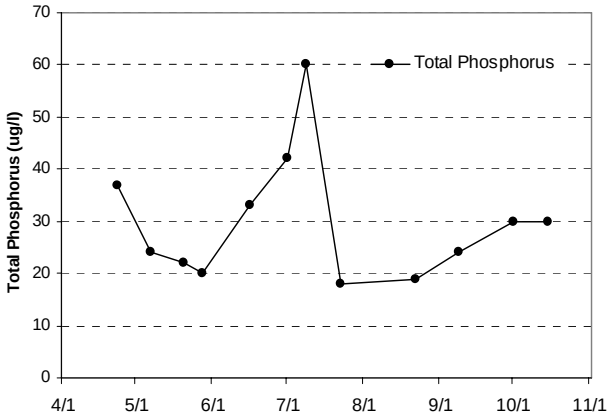
As mentioned earlier, there are no water quality data available for Edith Lake other than the 2005-2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

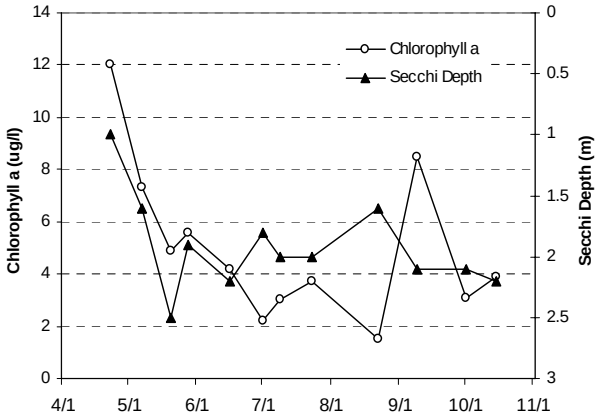
Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The average user perception rankings were 1.8 for physical condition (between 1- "crystal clear" and 2- "some algae present"), and 1.9 for recreational suitability (between 1- "beautiful" and 2- "minor aesthetic problem").

The Fisheries Section of the Minnesota Department of Natural Resources (MNDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MNDNR 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

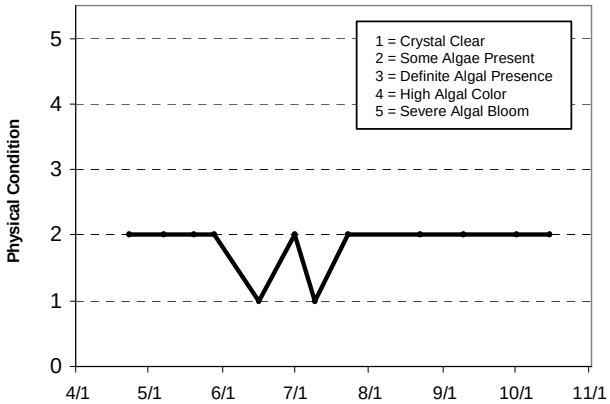






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/23/06	17.4				12	37		1	2	3
5/7/06	16.4				7.3	24		1.6	2	2
5/20/06	18.1				4.9	22		2.5	2	2
5/28/06	24.6				5.6	20		1.9	2	1
6/16/06	26.2				4.2	33		2.2	1	1
7/1/06	27.7				2.2	42		1.8	2	2
7/9/06	27.8				3	60		2	1	2
7/23/06	28.7				3.7	18		2	2	2
8/22/06					1.5	19		1.6	2	2
9/9/06	20.1				8.5	24		2.1	2	2
10/1/06	15.4				3.1	30		2.1	2	2
10/15/06	8.8				3.9	30		2.2	2	2

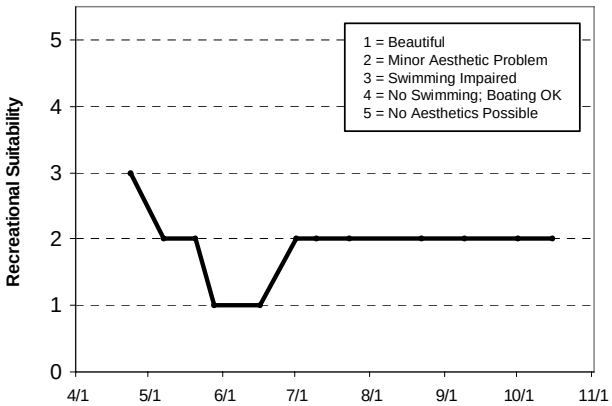


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus													A	B
Chlorophyll a													A	A
Secchi Depth													B	C
Overall													**A**	**B**

Source: Metropolitan Council and STORET data



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

Lake Elmo, located in Lake Elmo (Washington County), has public access associated with the Lake Elmo Regional Park located on the west side of the lake. The lake is considered a "Priority Lake" due to its multi-recreational uses. 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 lake was monitored eight times from early-May to late-August, 2006.

This was the third year that Lake Elmo has been involved in CAMP (the others being 1994 and 2005). The lake has been monitored in the past by Council staff (most recently in 1991).

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	17.0	10.0	28.0	A
CLA (µg/l)	2.4	1.1	3.9	A
Secchi (m)	3.3	2.5	4.5	A
TKN (mg/l)	0.44	0.32	0.58	
			Overall Grade	A

The lake's 2006 overall water quality grade (A) is identical to those recorded in 1981, 1988, 1991, 1994 and 2005 and better than those recorded in 1980, 1982, and 1984 (B).

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's database indicates that the lake's recent water quality is well represented by an overall grade of A. Additionally, a recent MPCA conducted trend analysis on the lake's Secchi transparency data, revealed a statistically significant improvement in recent 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 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) 297-4916 or by downloading the information off the internet at http://www.dnr.state.mn.us/lakefind/.

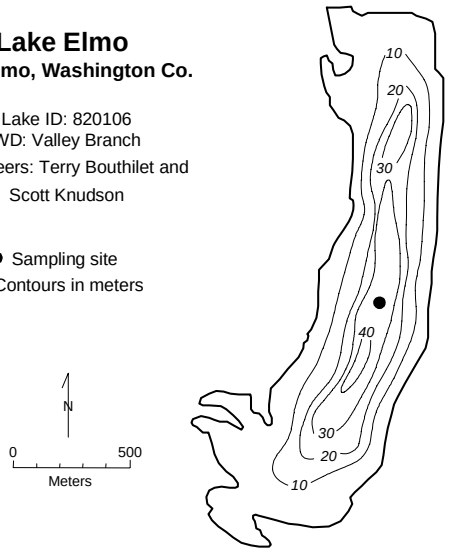
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

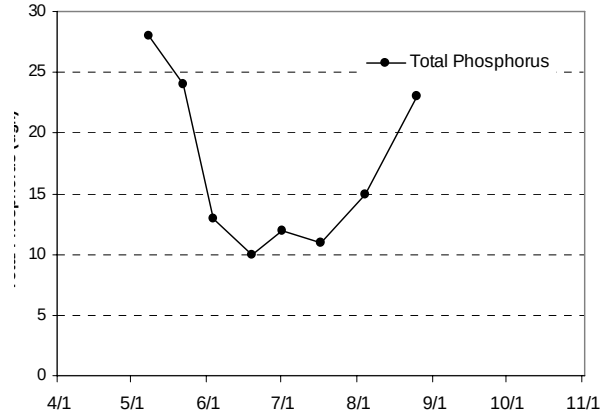
Lake Elmo

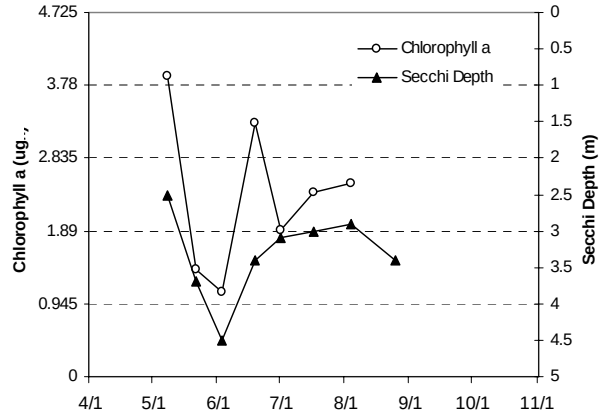
Lake Elmo, Washington Co.

Lake ID: 820106
WD: Valley Branch
Volunteers: Terry Bouthilet and Scott Knudson

● Sampling site
Contours in meters

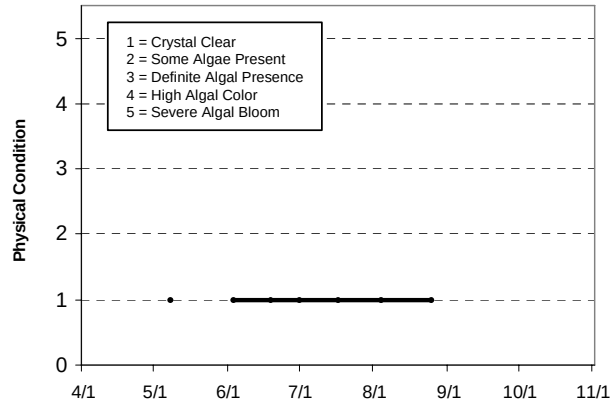






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/8/06	14.4				3.9	28		2.5	1	1
5/22/06	16.6				1.4	24		3.7		
6/3/06	24.2				1.1	13		4.5	1	1
6/19/06	23.9				3.3	10		3.4	1	1
7/1/06	26.2				1.9	12		3.1	1	1
7/17/06	27.4				2.4	11		3	1	1
8/4/06	27.9				2.5	15		2.9	1	1
8/25/06	23.6					23		3.4	1	1

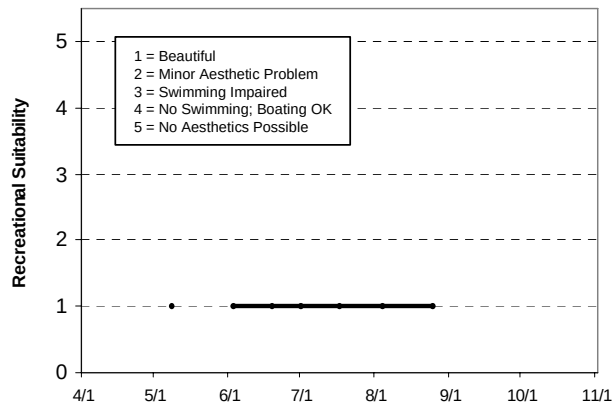


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
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	A
Overall	**B**	**A**	**B**		**B**				**A**			**A**	

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus		A											A	A
Chlorophyll a		A											A	A
Secchi Depth	A	A											A	A
Overall		**A**											**A**	**A**

Source: Metropolitan Council and STORET data



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

Farquhar Lake, located in the City of Apple Valley (Dakota County), covers an area of 63 acres and has a maximum depth of 3.0 m (10 feet). The lake's mean depth of 1.4 m (4.6 feet) and surface area translates to an approximate lake volume of 290 ac-ft (the lake volume may have changed over the past couple years due to the lake level rising 1.5 to 2.0 feet above normal). 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).

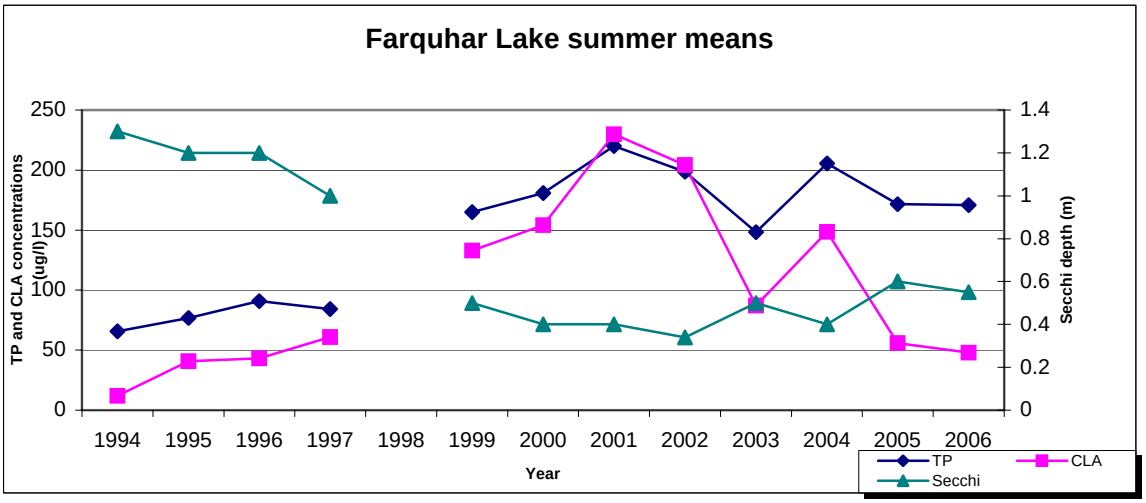
The land uses within the 353-acre contributing watershed to the lake are approximately split between agricultural uses and urban/residential. The watershed-to-lake size ratio is 6:1 (the greater the ratio, the greater the potential stress on the lake from surface runoff).

This was the twelfth year that Farquhar Lake has been enrolled in CAMP. The lake was monitored 13 times between mid-April and mid-October, 2006.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	170.8	78.0	320.0	F
CLA (µg/l)	47.9	9.8	110.0	C
Secchi (m)	0.6	0.3	1.1	F
TKN (mg/l)	2.66	1.30	3.90	
			Overall Grade	D

The lake's 2006 overall grade is identical to those recorded in 1995 and 1997, and worse than the C's recorded in 1994 and 1996, and better than the F's of 1999-2005.



The above graph clearly depicts the lakes recent (mid-1990s to present) degradation. In fact, a recent MPCA conducted trend analysis on the lake's Secchi transparency data, revealed a statistically significant decrease in recent water clarity. The reason for the degradation in the lake's water quality is not entirely known. A more in-depth study combining watershed as well as in-lake monitoring may help determine the areas contributing the most to the lake's degradation.

Throughout the 2006 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 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) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

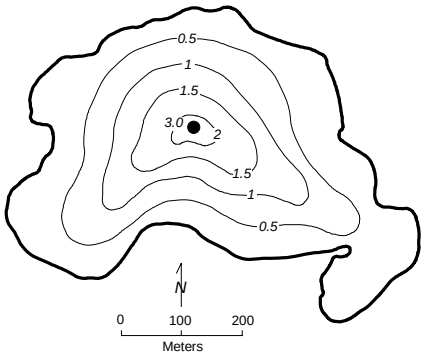
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

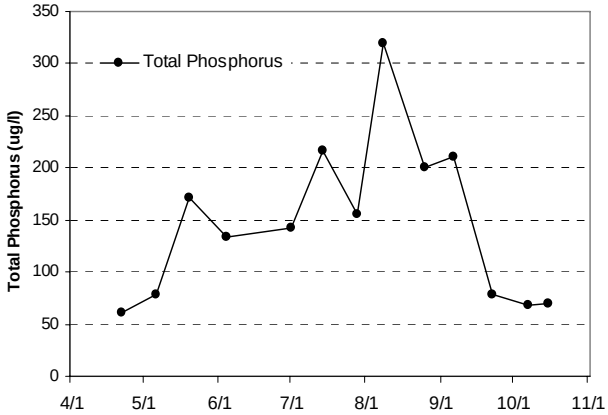
Farquhar Lake

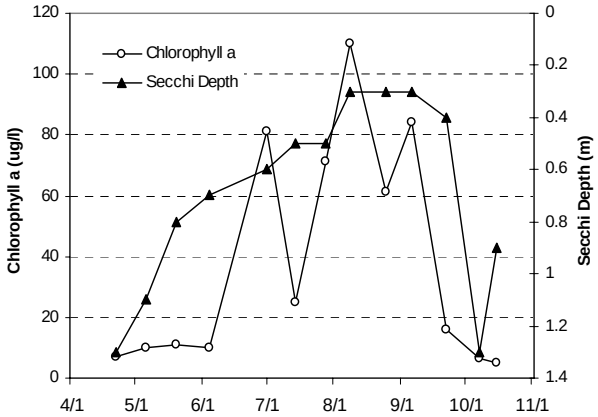
Apple Valley, Dakota Co.

Lake ID: 190023
WMO: Dakota County
Volunteer: Rick Bruneau

● Sampling site
Contours in meters

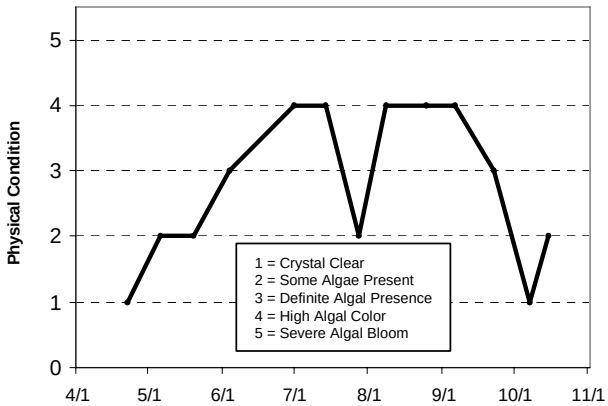






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/22/06	18.9				6.9	61		1.3	1	2
5/6/06	20.7				9.8	79		1.1	2	4
5/20/06	23				11	171		0.8	2	3
6/4/06	30				10	134		0.7	3	4
7/1/06	29.3				81	143		0.6	4	4
7/14/06	31				25	217		0.5	4	4
7/28/06	31				71	156		0.5	2	3
8/8/06	30				110	320		0.3	4	4
8/25/06	26				61	200		0.3	4	4
9/6/06	27				84	210		0.3	4	4
9/22/06	18				16	78		0.4	3	3
10/7/06	8				6.3	68		1.3	1	1
10/15/06	11				4.8	69		0.9	2	2

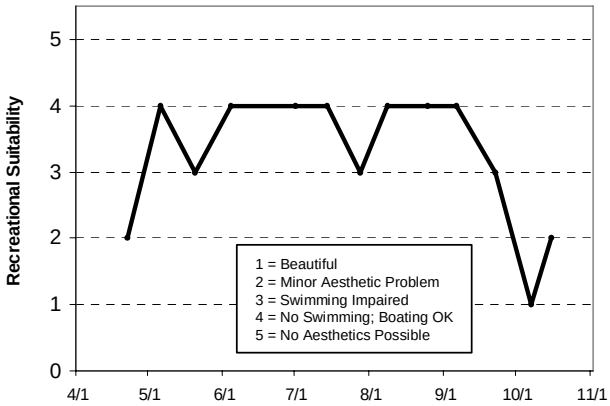


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus		C	D	D	D		F	F	F	F	D	F	F	F
Chlorophyll a		B	C	C	D		F	F	F	F	F	F	D	C
Secchi Depth		C	D	C	D		F	F	F	F	F	F	F	F
Overall		**C**	**D**	**C**	**D**		**F**	**F**	**F**	**F**	**F**	**F**	**F**	**D**

Source: Metropolitan Council and STORET data



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

This was the sixth year that Fireman's Lake (located within the City of Chaska [Carver County]), has been involved in CAMP (the lake was first enrolled in 2001). The 8-acre lake has 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). Eurasian Water Milfoil (*Myriophyllum spicatum*) [EWM] has been reported on the lake.

A search through the STORET nationwide water quality database determined that the 2001-2006 CAMP data are the only years of available water quality data for the lake.

The lake was monitored 13 times from mid-April to mid-October, 2006. Results are presented in both graphs and data tables on the lake's information sheet on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	28.2	12.0	50.0	B
CLA (µg/l)	6.2	1.0	12.0	A
Secchi (m)	2.7	1.9	4.0	B
TKN (mg/l)	0.47	0.23	0.75	
			Overall Grade	B

The lake's 2006 overall grade (B) has declined compared to overall grades (A) reported in 2001-2005.

As mentioned earlier, there are no water quality data available for Fireman's Lake other than the limited 2001-2006 CAMP data. Therefore it is not possible to determine any long-term trends. In the short-term however, the lake's water quality is well represented by an overall grade of A/B+. To better understand the lake's water quality and where it may be heading, more data are needed.

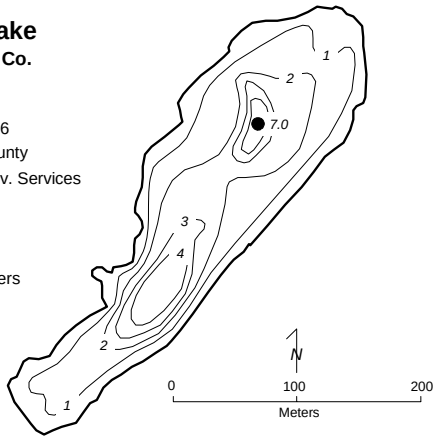
The last two graphs show seasonal variation in the lake's perceived physical condition and recreational suitability. The average user perception rankings, on a 1-to-5 scale, were 1.5 for physical condition (between 1- "crystal clear" and 2- "some algae present"), and 1.5 for recreational suitability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

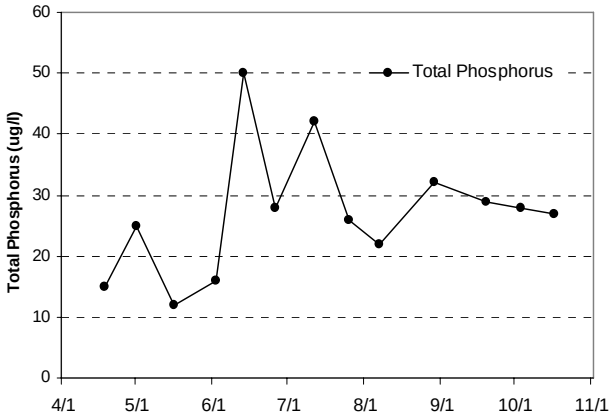
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

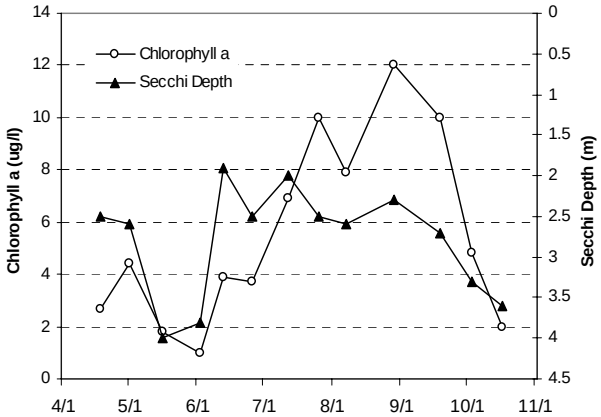
Fireman's Lake
Chaska, Carver Co.

Lake ID: 100226
WMO: Carver County
Volunteer: Carver Co. Env. Services

● Sampling site
Contours in meters

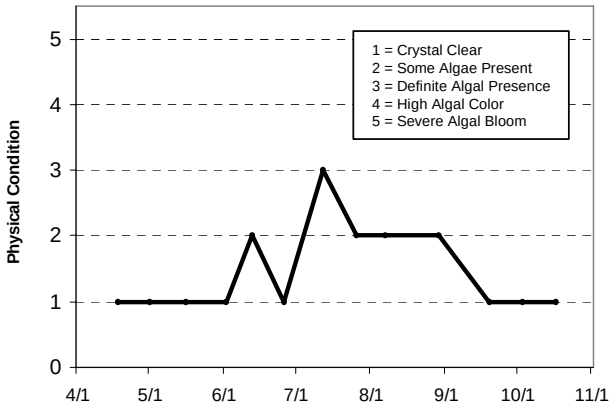






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/18/06	15.42		9.43		2.7	15		2.5	1	1
5/1/06	13.8		9.55		4.4	25		2.6	1	1
5/16/06	16.59		10.71		1.8	12		4	1	1
6/2/06	24.79		11.34		1	16		3.8	1	1
6/13/06	21.85		7.27		3.9	50		1.9	2	2
6/26/06	26.1		7.36		3.7	28		2.5	1	1
7/12/06	28.56		13.4		6.9	42		2	3	3
7/26/06	28.4		13.64		10	26		2.5	2	2
8/7/06	28.58		7.42		7.9	22		2.6	2	2
8/29/06	23.53		5.04		12	32		2.3	2	2
9/19/06	18.14		6.06		10	29		2.7	1	1
10/3/06	17.61		11.31		4.8	28		3.3	1	1
10/17/06	10.91		7.93		2	27		3.6	1	1

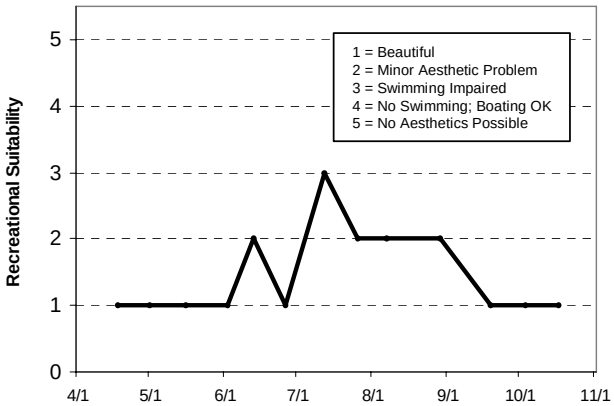


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus									A	A	B	A	B	B
Chlorophyll a									A	A	A	A	A	A
Secchi Depth									B	A	A	A	A	B
Overall									**A**	**A**	**A**	**A**	**A**	**B**

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). This was the eighth year that the 171-acre lake has been a part of CAMP. 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, that is, the 0-15 foot depth area of the lake dominated by aquatic vegetation. The lake has a 434-acre watershed that, when divided by the surface area of the lake results in a rather small watershed-to-lake size ratio of 2.5:1 (the larger the ratio the greater the potential stress on the lake from surface runoff). The lake is considered a Metropolitan Council "Priority Lake" due to its multi-recreational uses. The lake can be accessed on the northwestern end.

The lake was monitored 11 times between mid-May and early-October, 2006. A search for historic water quality data through Council, MPCA, and STORET files resulted in a few years of data (1980, 1984, 1990, 1995, 1997 [only two monitoring events], and 1998-2006).

The collected data and resulting graphs showing TP and CLA concentrations, Secchi transparency, and user perception (physical condition and recreational suitability) are presented on the lake's information sheet on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	46.3	20.0	92.0	C
CLA (µg/l)	15.7	2.8	26.0	B
Secchi (m)	1.4	1.1	1.8	C
TKN (mg/l)	1.18	0.77	1.50	
			Overall Grade	C

The lake has received overall grades of C in 1980, 1995, 1997-2000 and 2003-2006, overall grade of B in 2001 and D's in 1984 and 2002.

During each visit, the volunteers' opinion of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. The mean physical condition ranking was 2.5 (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").

Statistical analysis on the lake's water quality database did not detect any long-term trends, in the short-term however, the lake seems to be very well represented by an overall lake water quality grade of C/C+. To better determine if this indicates a possible trend or is simply a fluctuation within the lake's normal range, more data are needed.

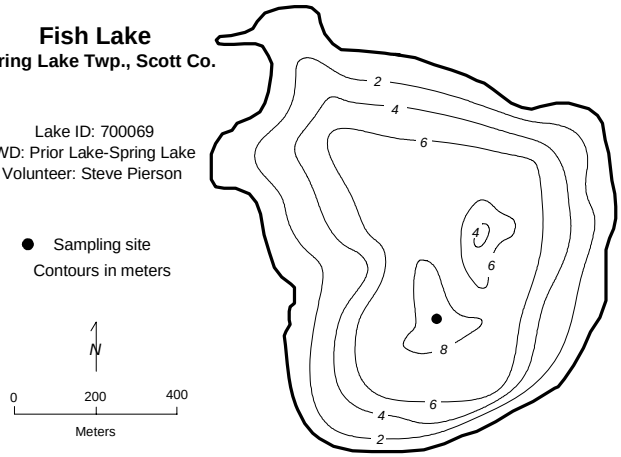
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

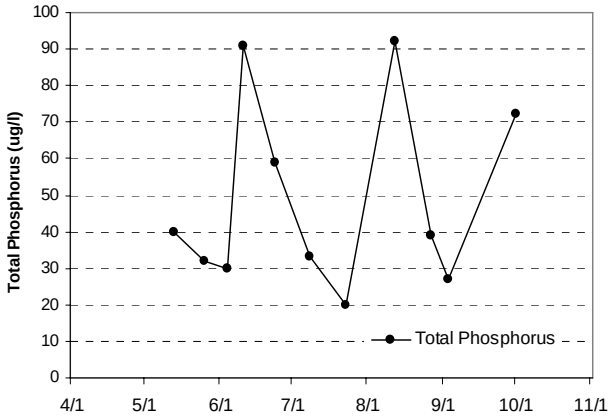
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

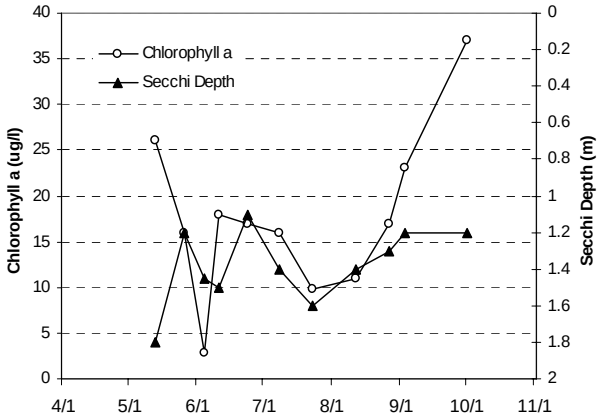
Fish Lake
Spring Lake Twp., Scott Co.

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

● Sampling site
Contours in meters

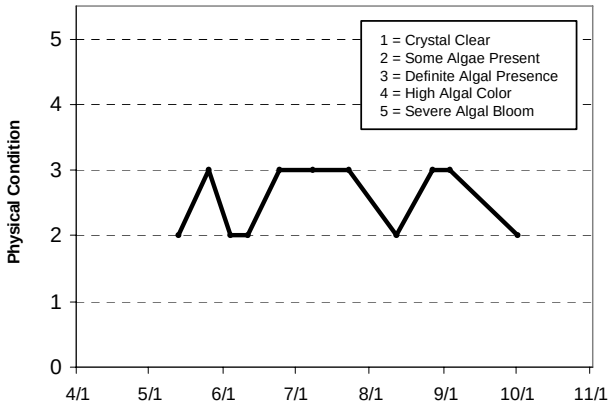






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/13/06	12.9				26	40		1.8	2	1
5/26/06	21.9				16	32		1.2	3	2
6/4/06	25				2.8	30		1.45	2	2
6/11/06	21.3				18	91		1.5	2	2
6/24/06	25.1				17	59		1.1	3	2
7/8/06	25.4				16	33		1.4	3	2
7/23/06	26.8				9.8	20		1.6	3	2
8/12/06	26.4				11	92		1.4	2	2
8/27/06	25.9				17	39		1.3	3	2
9/3/06	23.4				23	27		1.2	3	2
10/1/06	15.9				37	72		1.2	2	2

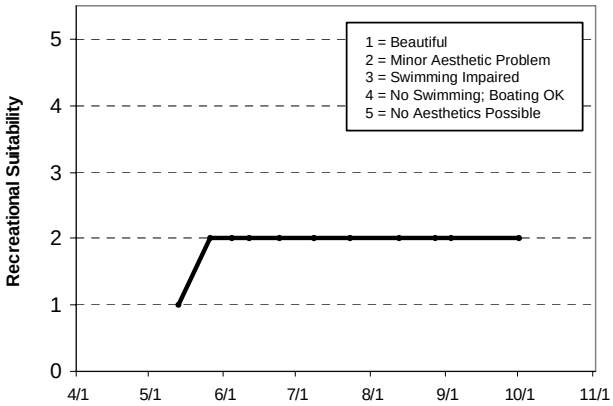


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus	C				D								
Chlorophyll a	C				D						C		
Secchi Depth	D				D						C		
Overall	**C**				**D**								

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus			C		C	C	C	C	C	D	C	C	C	C
Chlorophyll a			C		C	C	C	C	B	C	C	C	C	B
Secchi Depth			D		C	C	C	B	B	D	B	C	C	C
Overall			**C**		**C**	**C**	**C**	**C**	**B**	**D**	**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, and it does not maintain a thermocline (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).

This was the sixth year that Fish Lake has been involved in CAMP. A search through the STORET nationwide water quality database for data on the lake revealed a limited amount of data collected. Water quality data were found for 1998-2005 and now 2006.

The lake was monitored seven times between late-April and early-October, 2006. 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.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	129.4	56.0	173.0	D
CLA (µg/l)	57.2	14.0	130.0	D
Secchi (m)	0.8	0.3	1.2	D
TKN (mg/l)	2.42	1.20	3.60	
			Overall Grade	D

The resulting overall grade for 2006 is identical to that recorded in 2002 and 2004-2005, and better than those recorded in 1998-2001 and 2003 (F).

Because of the limitedness of the lake's water quality database, the determination of any long-term trends is not possible to determine. In the short-term, the lake seems well represent by the overall grade of D/F. To better understand the lake's water quality and what direction it may be heading, more years of data collection are needed.

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 3.0 (3- "definite algae present"), while the mean recreational suitability ranking was 3.1 (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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Fish Lake

New Scandia Twp., Washington Co.

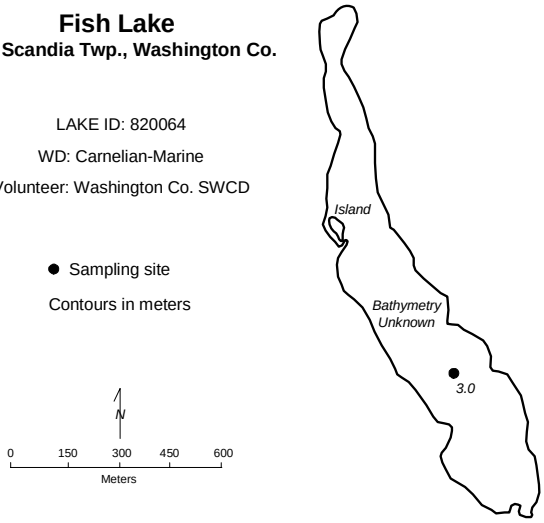
LAKE ID: 820064

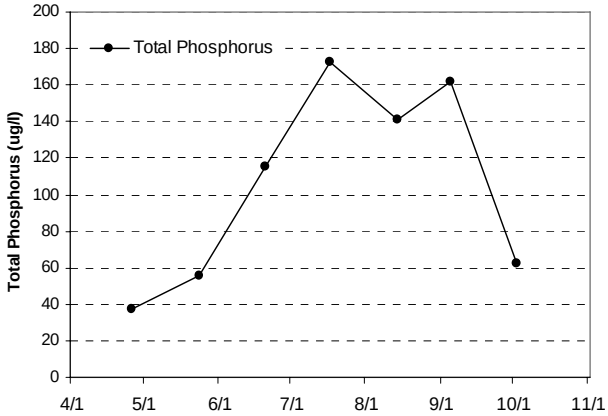
WD: Carnelian-Marine

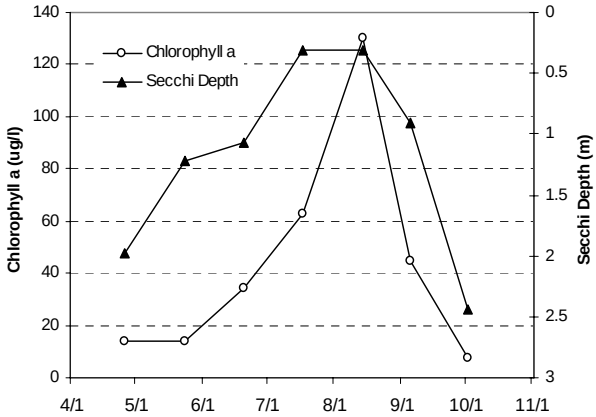
Volunteer: Washington Co. SWCD

● Sampling site

Contours in meters

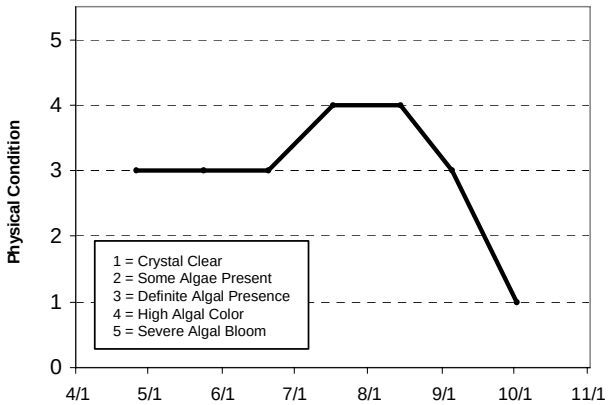






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/26/06	14.5	14.2	6.58	5.98	14	37		1.981	3	3
5/24/06	20.2	19	6.7	0.37	14	56		1.219	3	4
6/20/06	23.7	22.2	6.77	0.08	34	115		1.067	3	3
7/17/06	27.9	22.6	8.21	0.07	63	173		0.305	4	4
8/14/06	24.3	23.5	8.48	0.11	130	141		0.305	4	4
9/5/06	22.2	21.2	7.85	0.12	45	162		0.914	3	3
10/2/06	15.5	15.2	5.64	0.14	7.7	62		2.438	1	1

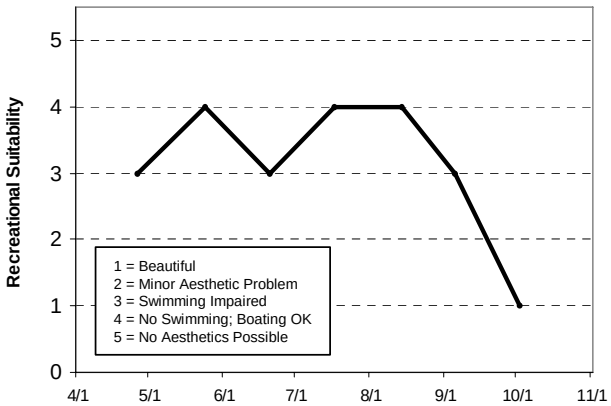


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus						F	F	D	D	D	D	D	D	D
Chlorophyll a						D	D	F	F	D	F	F	C	D
Secchi Depth						F	F	F	F	D	F	D	D	D
Overall						**F**	**F**	**F**	**F**	**D**	**F**	**D**	**D**	**D**

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 first year that Friedrich's Pond 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 CAMP data are the only known nutrient data available. 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 lake was monitored 13 times between mid-April and mid-October, 2006. The resulting data and graphs appear on the next page.

200 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	341.8	184.0	475.0	F
CLA (µg/l)	101.0	60.0	190.0	F
Secchi (m)	0.4	0.2	0.7	F
TKN (mg/l)	4.87	1.60	7.70	
			Overall Grade	F

The lake's 2006 overall lake quality grade was an F.

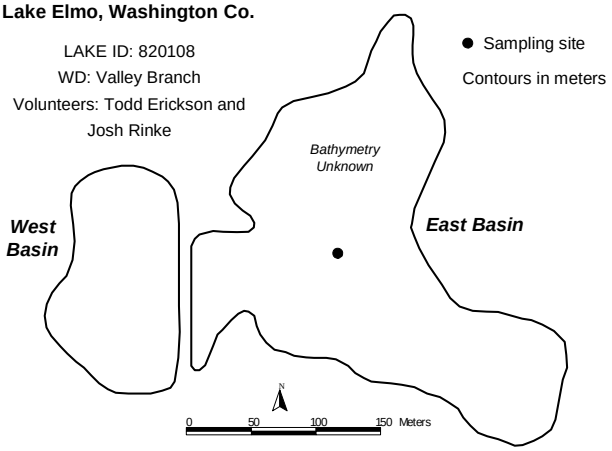
As mentioned earlier, there are no nutrient data available for Friedrich's Pond other than the 2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

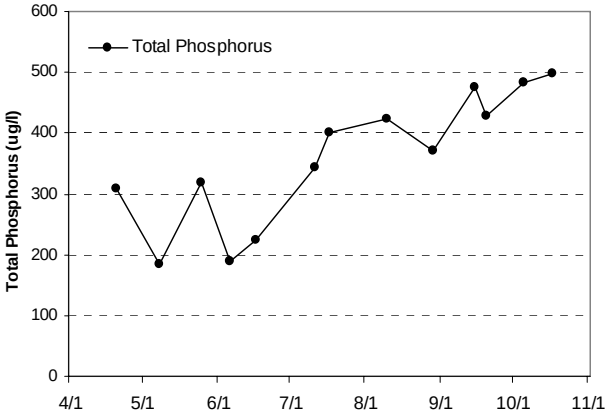
The perceived physical and recreational conditions (ranked on a 1-to-5 scale) are shown on the lake's information sheet on the next page. The average user perception rankings, were 3.2 for physical condition (between 3- "definite algae present" and 4- "high algal color"), and 3.1 for recreational suitability (roughly 3- "swimming slightly impaired").

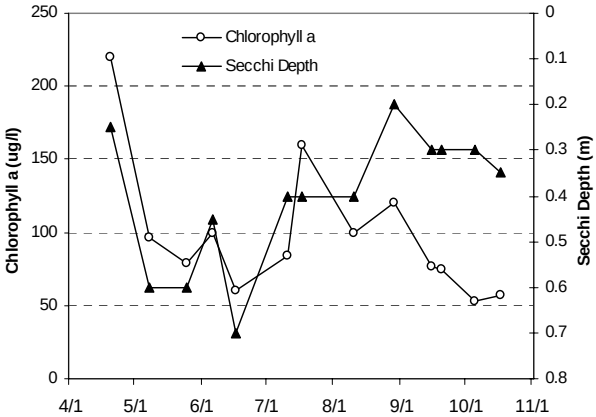
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Friedrich's Pond
Lake Elmo, Washington Co.

LAKE ID: 820108
WD: Valley Branch
Volunteers: Todd Erickson and Josh Rinke

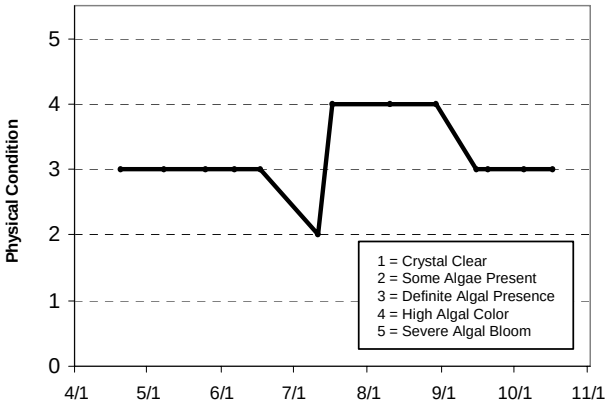






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/20/06	26				220	309		0.25	3	4
5/8/06	16.7				96	184		0.6	3	4
5/25/06	24				79	319		0.6	3	3
6/6/06	24.4				100	188		0.45	3	3
6/17/06	25.6				60	224		0.7	3	3
7/11/06	24.4				84	344		0.4	2	2
7/17/06	26.8				160	402		0.4	4	3
8/10/06	32				100	422		0.4	4	3
8/29/06	27.1				120	371		0.2	4	3
9/15/06	19.6				77	475		0.3	3	3
9/20/06	17				75	429		0.3	3	3
10/5/06	19.4				53	483		0.3	3	3
10/17/06	11				57	497		0.35	3	3

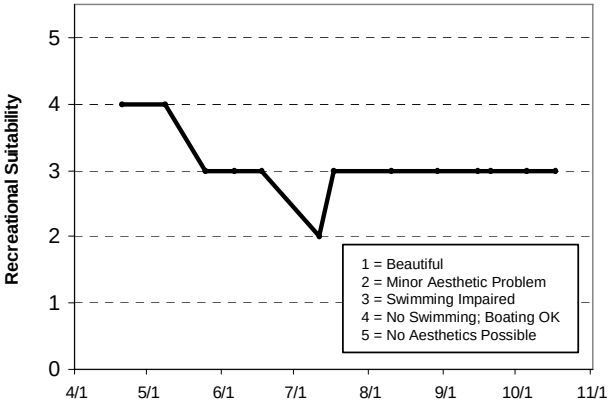


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus														F
Chlorophyll a														F
Secchi Depth														F
Overall														**F**

Source: Metropolitan Council and STORET data



Gaystock Lake (10-0031) *Carver County Environmental Services*

This year marks the fifth year of CAMP monitoring on Gaystock Lake, which is located in Dahlgren Township (Carver County). Other than the 1999 (only two monitoring events), 2000, 2001 and 2005-2006 CAMP data, a search for any historical water quality data came up empty. The 105-acre lake has a maximum depth of 5.0 m (16 feet). Because of the shallowness of the lake, the majority of its area is considered littoral zone (the 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 lake does not have a public access.

The lake was monitored 14 times between mid-April and mid-October, 2006. The collected data and resulting graphs showing TP and CLA concentrations, Secchi transparency, and user perception (physical condition and recreational suitability) are presented on the lake's information sheet on the following page.

2006 summer (May-September) data summary

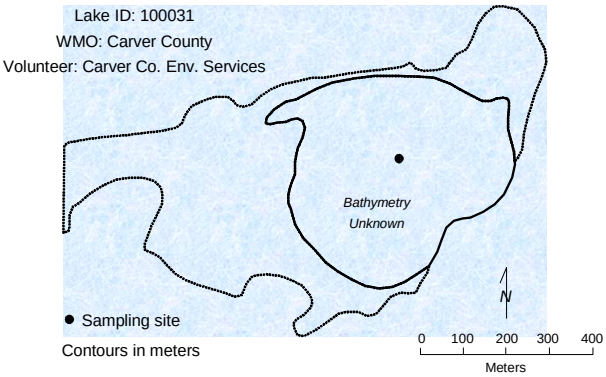
Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	190.9	96.0	305.0	F
CLA (µg/l)	146.3	41.0	260.0	F
Secchi (m)	0.4	0.2	0.8	F
TKN (mg/l)	2.86	1.40	4.80	
			Overall Grade	F

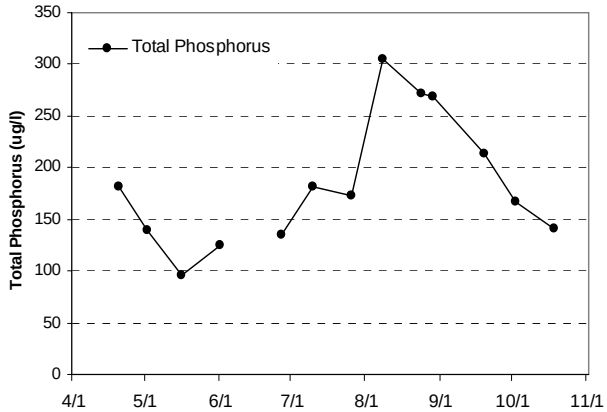
Throughout the summer, the volunteer ranked the lake's perceived physical condition on a 1-to-5 scale (see lake information sheet). The mean physical condition ranking was 3.4 (between 3- "definite algal presence" and 4- "high algal color"), while the mean recreational suitability ranking was 3.4 (between 3- "swimming slightly impaired" and 4- "no swimming - boating ok").

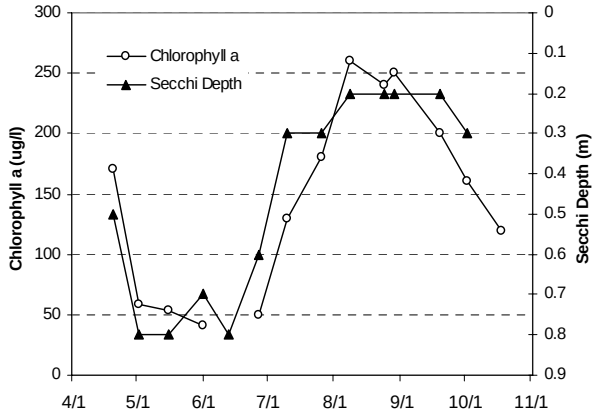
Because 2006 was only the fifth year of collected data (no grades were determined in 1999 because of the lack of sufficient data), no long- trends can be determined. In the short-term, however, the lake's water quality seems well represented by a grade of D-/F. To better understand the lake's quality and what direction it may be heading, more years of data collection are needed.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Gaystock Lake
Dahlgren Twp., Carver Co.

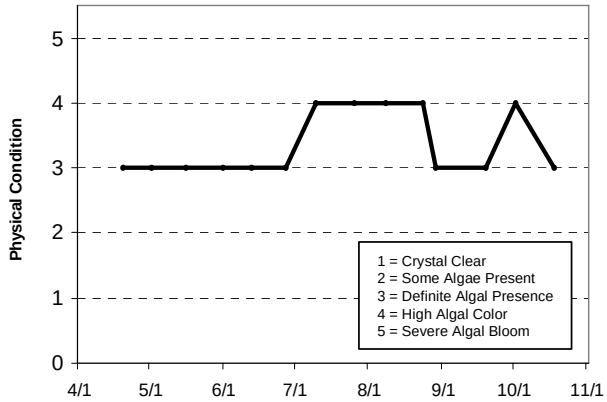






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/20/06	13.3		14.06		170	182		0.5	3	3
5/2/06	15.49		10.11		58	140		0.8	3	3
5/16/06	15.26		15.64		54	96		0.8	3	3
6/1/06	25.54		10.19		41	125		0.7	3	3
6/13/06	21.84		16.21					0.8	3	3
6/27/06	24.87		8.48		50	135		0.6	3	3
7/10/06	25.83		13.22		130	181		0.3	4	4
7/26/06	29.19		17.94		180	173		0.3	4	4
8/8/06	26.14		7.43		260	305		0.2	4	4
8/24/06	23.69		6.34		240	272		0.2	4	4
8/29/06	23.18		7.63		250	268		0.2	3	3
9/19/06	15.29		9.06		200	214		0.2	3	3
10/2/06	17.33		15.92		160	167		0.3	4	4
10/18/06	7.54		9.58		120	141			3	3

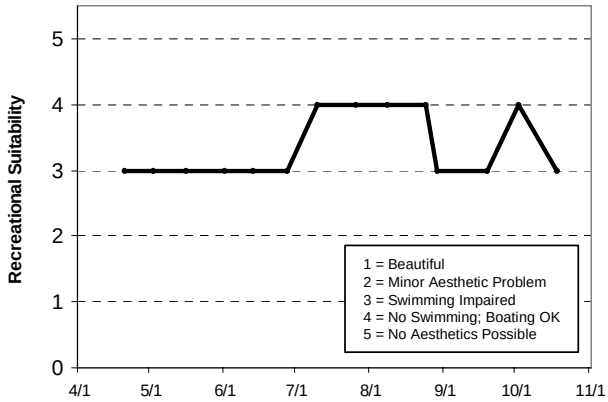


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus								C	F				F	F
Chlorophyll a								F	F				F	F
Secchi Depth								F	D				F	F
Overall								**D**	**F**				**F**	**F**

Source: Metropolitan Council and STORET data



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

This was the eleventh year that George Watch Lake, located in the City of Lino Lakes (Anoka County), has been enrolled in CAMP. The lake was monitored seven times from late-April to late-September, 2006. The 528-acre lake, which has a canoe access on its eastern side, 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 and because of the shallowness of the lake, it is entirely littoral zone (the area of aquatic plant dominance) and never develops and maintains a thermocline (a density gradient owed to changing water temperatures throughout the lake's water column) through the summer months. The major land use within the lake's immediate watershed is undeveloped/park.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	171.0	64.0	283.0	F
CLA (µg/l)	213.3	43.0	440.0	F
Secchi (m)	0.7	0.3	1.0	F
TKN (mg/l)	2.37	1.80	2.90	
			Overall Grade	F

The lake's 2006 overall lake quality grade was an F consistent with grades reported in 1981, 1989, 1991, 1996, 1998, 2001, and 2004 and worse that grades reported in 1982-1983, 1985, 1987-1988, 1990, 1997, 1999-2000, 2002-2003, and 2005.

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 1996-2005-2006. The lake's overall lake water quality grades seem to indicate that the lake water quality has remained fairly constant fluctuating between an F and D grade throughout the 20+ years of data. The TP and Secchi data has remained fairly consistent throughout the monitoring years, but the CLA seems to fluctuate greatly. A reason for the fluctuating CLA means while the Secchi and TP numbers remain fairly constant could be the amount of sedimentation that could at times be limiting the amount of light available for algal growth thus keeping CLA low and vice versa

Throughout the monitoring period, the volunteers' opinion 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 4.0 (4- "no swimming - boating ok").

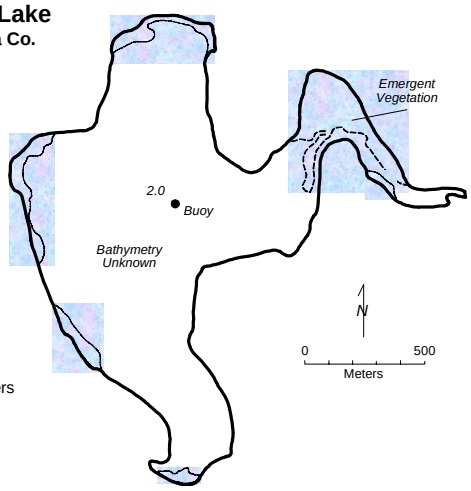
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

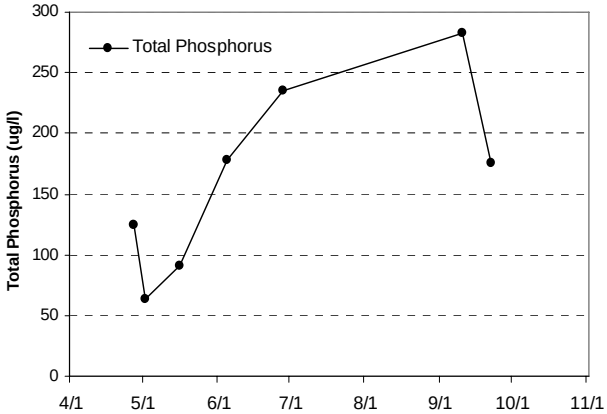
George Watch Lake
Lino Lakes, Anoka Co.

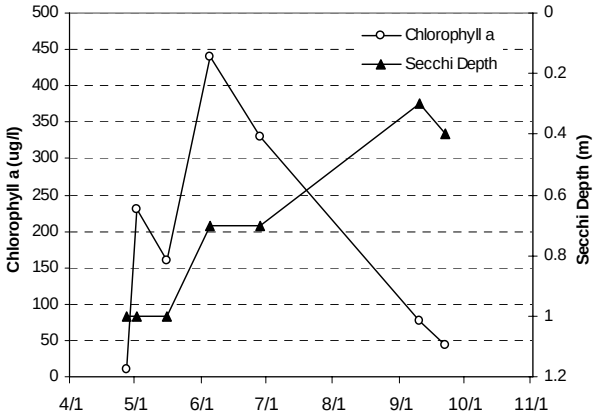
Lake ID: 20005
WD: Rice Creek

Volunteer:
Wargo Nature
Center



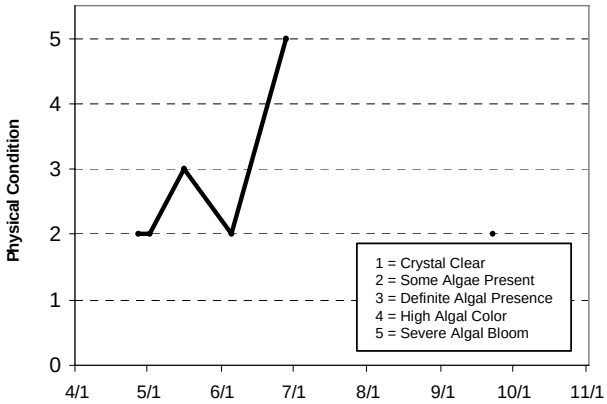
● Sampling site
Contours in meters





2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/27/06	20				9.7	124		1	2	4
5/2/06	17.4				230	64		1	2	4
5/16/06	16.4				160	91		1	3	4
6/5/06	24				440	178		0.7	2	4
6/28/06	26.3				330	235		0.7	5	4
9/10/06	17.3				77	283		0.3		4
9/22/06	12.77				43	175		0.4	2	4

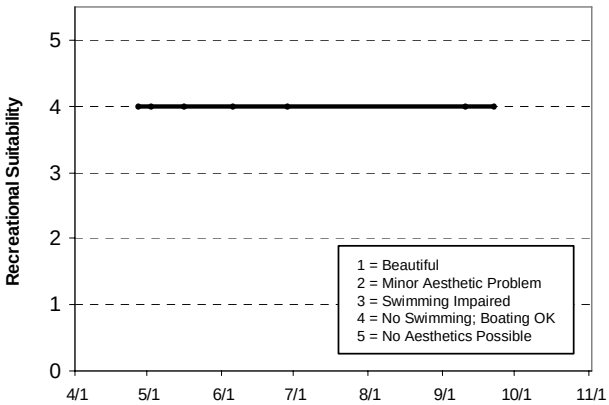


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
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	
Overall		**F**	**D**	**D**		**D**		**D**	**D**	**F**	**D**	**F**	

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus				F	D	F	D	D	F	D	F	F	F	F
Chlorophyll a				D	C	D	C	C	F	D	C	D	C	F
Secchi Depth				F	F	F	D	F	D	F	D	F	F	F
Overall				**F**	**D**	**F**	**D**	**D**	**F**	**D**	**D**	**F**	**D**	**F**

Source: Metropolitan Council and STORET data



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

German Lake is a 109-acre lake located in City of Scandia (Washington County). There is very little known morphological data available for the lake.

This was the fifth year that German Lake has been involved in CAMP. A search through the STORET nationwide water quality database determined that the 2002-2006 CAMP data are the only years of available water quality data for the lake.

As part of the watershed's involvement in CAMP in 2006, the lake was monitored seven times between mid-April and early-October. During each sampling event the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	35.6	30.0	45.0	C
CLA (µg/l)	6.3	2.0	19.0	A
Secchi (m)	2.2	1.5	2.6	B
TKN (mg/l)	0.84	0.53	1.00	
			Overall Grade	B

The lake 2006 overall water quality grade (B) is similar to those recorded in 2002-2005.

Throughout the monitoring period, the volunteers' opinion 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 1.9 (between 1- "crystal clear" and 2- "some algae present"), while the mean recreational suitability ranking was 2.4 (between 2- "minor aesthetics" and 3- "swimming slightly impaired").

As mentioned earlier, there are no water quality data available for German Lake other than the 2002-2006 CAMP data. Therefore it is not possible to determine any long-term trends. In the short-term however, the lake's water quality is well represented by an overall grade of B. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

German Lake

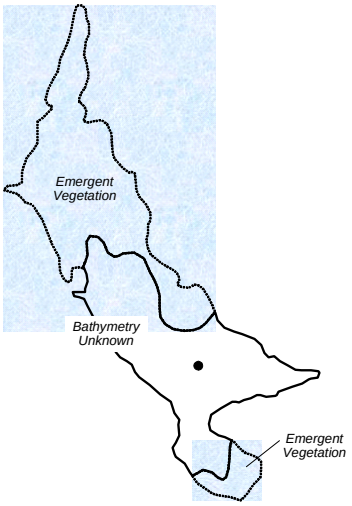
Forest Lake, Washington Co.

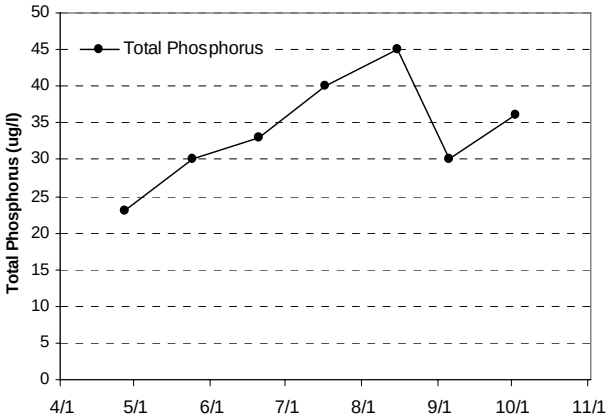
Lake ID: 820056
WMO: Carnelian-Marine

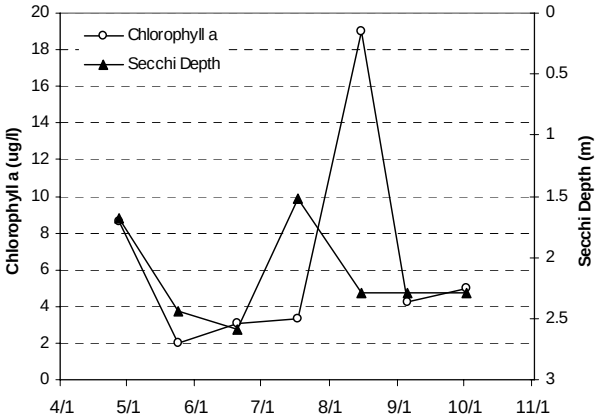
Volunteer: Wash. Co. SWCD

● Sampling site

Contours in meters

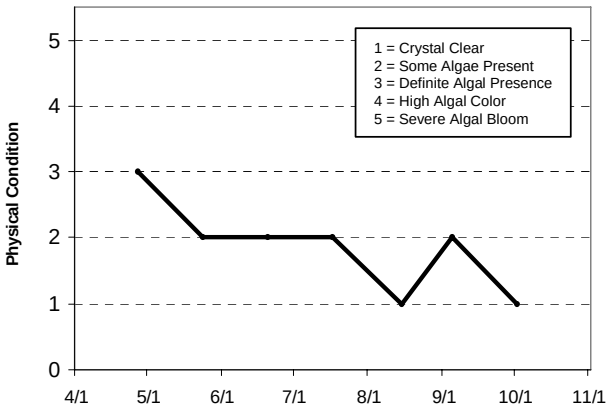






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/27/06	15	14.5	6.22	5.71	8.6	23		1.676	3	4
5/24/06	17	17.6	7.88	4.58	2	30		2.438	2	2
6/20/06	23.3	22.9	8.33	1.17	3.1	33		2.591	2	4
7/17/06	27.4	26.9	5.79	0.31	3.3	40		1.524	2	2
8/15/06	23.8		6.64		19	45		2.286	1	2
9/5/06	22.4	21.4	8.97	0.21	4.2	30		2.286	2	2
10/2/06	15.1	15	9.11	0.5	5	36		2.286	1	1

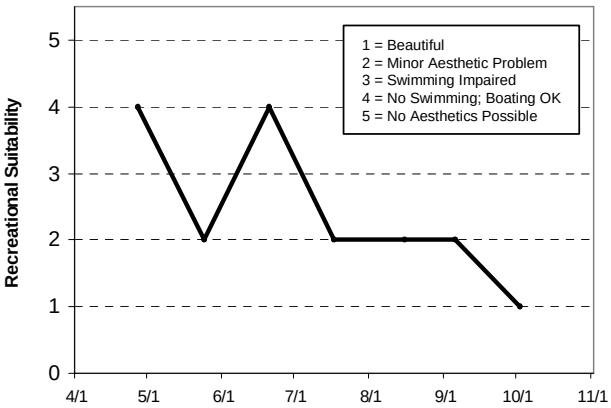


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus										B	B	B	B	C
Chlorophyll a										A	A	A	A	A
Secchi Depth										C	B	B	B	B
Overall										**B**	**B**	**B**	**B**	**B**

Source: Metropolitan Council and STORET data



Glen Lake (27-0093) *Nine Mile Creek Watershed District*

Glen Lake is a 98-acre lake located within the City of Minnetonka (Hennepin County). 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).

This was the first year that Glen 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 CAMP data are the only known nutrient data available. 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 lake was monitored 13 times between mid-April and late-October, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	34.6	16.0	67.0	C
CLA (µg/l)	2.4	1.7	3.0	A
Secchi (m)	3.5	2.8	4.7	A
TKN (mg/l)	0.72	0.61	0.90	
			Overall Grade	B

The lake's 2006 overall lake quality grade was a B. As mentioned earlier, there are no nutrient data available for Glen Lake other than the 2006 CAMP data. Therefore it is not possible to determine any long-term or short-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 1.2 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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Glen Lake

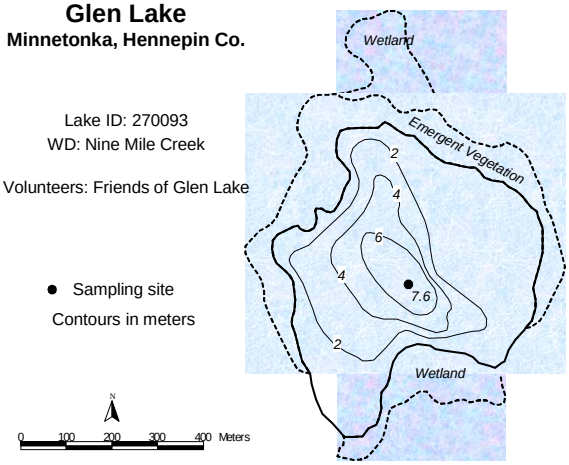
Minnetonka, Hennepin Co.

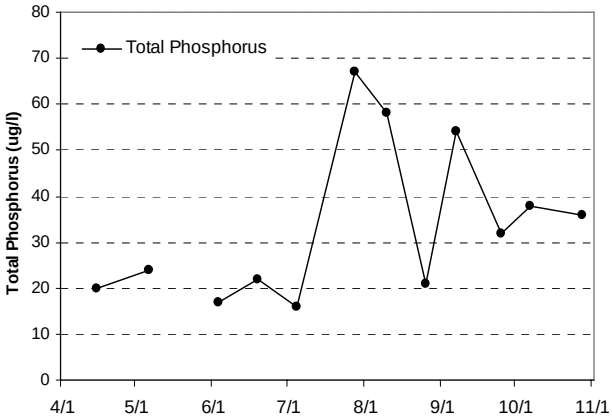
Lake ID: 270093
WD: Nine Mile Creek

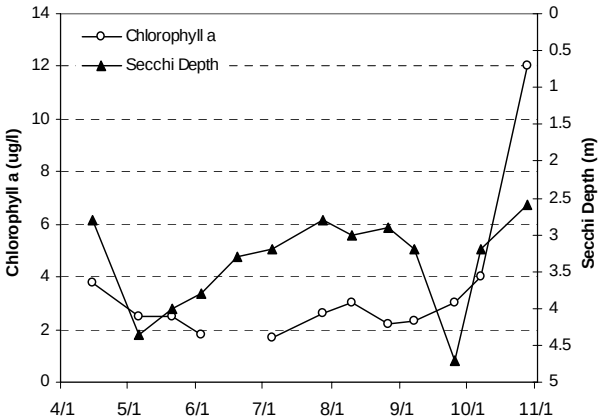
Volunteers: Friends of Glen Lake

● Sampling site

Contours in meters

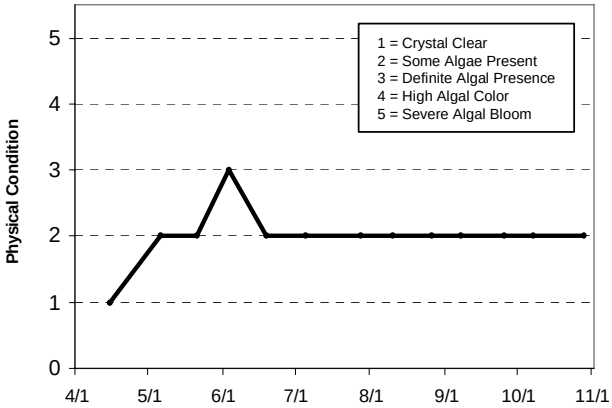






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/15/06	15.1				3.8	20		2.8	1	1
5/6/06	14.4				2.5	24		4.35	2	1
5/21/06	17.6				2.5			4	2	1
6/3/06	25.5				1.8	17		3.8	3	1
6/19/06	24.5					22		3.3	2	1
7/5/06	24.9				1.7	16		3.2	2	2
7/28/06	27.9				2.6	67		2.8	2	2
8/10/06	25.6				3	58		3	2	2
8/26/06	23.9				2.2	21		2.9	2	1
9/7/06	23.4				2.3	54		3.2	2	1
9/25/06	15.1				3	32		4.7	2	1
10/7/06	15.6				4	38		3.2	2	1
10/28/06	6.5				12	36		2.6	2	1

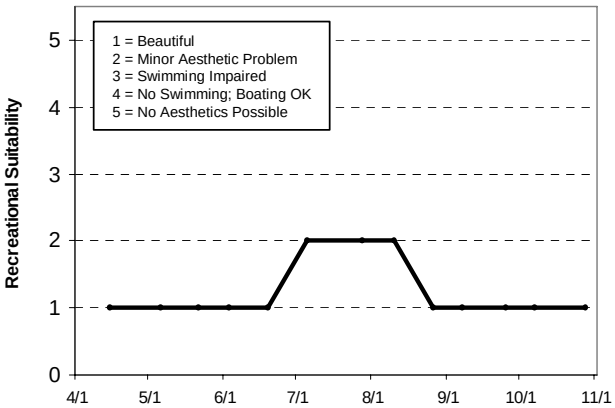


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus														C
Chlorophyll a														A
Secchi Depth														A
Overall														**B**

Source: Metropolitan Council and STORET data



Goetschel Lake (82-0313) *Valley Branch Watershed District*

Goetschel Lake is located in Grant Township (Washington County). This was the fifth year that the 22-acre lake has been a part of CAMP. 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, that is, the 0-15 foot depth area of the lake dominated by aquatic vegetation. The lake has a 2,812-acre watershed that, when divided by the surface area of the lake results in a large watershed-to-lake size 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 2002-2006 CAMP data are the only years of available water quality data for the lake.

As part of the watershed's involvement in CAMP in 2006, the lake was monitored nine times between early-May and early-October. During each sampling event the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	49.0	20.0	151.0	C
CLA (µg/l)	4.5	1.4	7.3	A
Secchi (m)	2.2	1.3	3.5	B
TKN (mg/l)	0.63	0.41	0.90	
			Overall Grade	B

The lakes 2006 overall water quality grade is identical to those recorded in 2002-2005.

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 2.7 (between 2- "some algae present" and 3- "definite algae present"), while the mean recreational suitability ranking was 4.0 (4- "no swimming – boating ok").

As mentioned earlier, there are no water quality data available for Goetschel Lake other than the 2002-2006 CAMP data. Therefore it is not possible to determine any long-term trends. In the short-term however, the lake's water quality is well represented by an overall grade of B. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

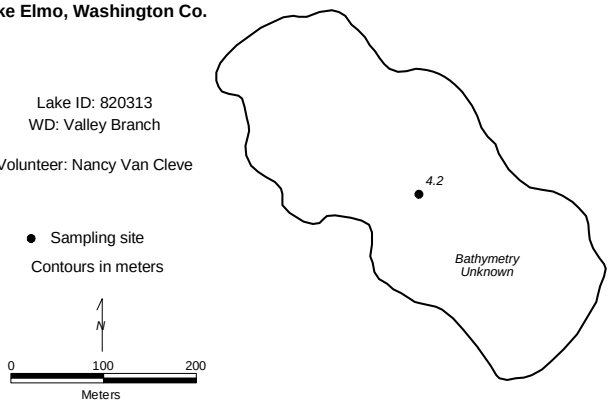
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

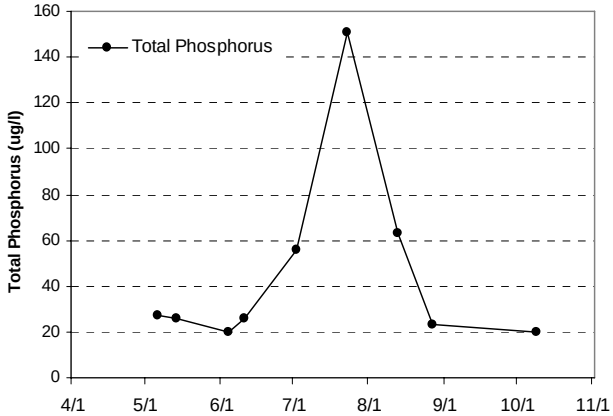
Goetschel Pond
Lake Elmo, Washington Co.

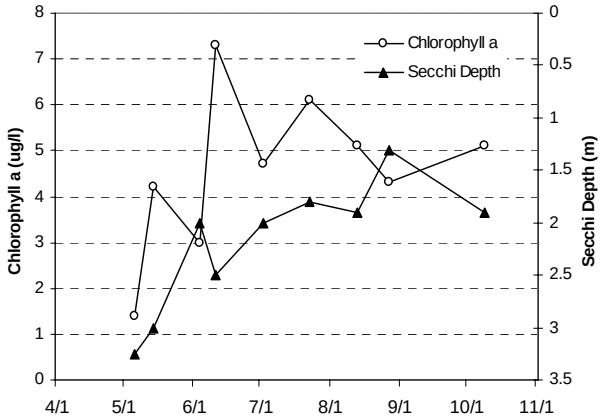
Lake ID: 820313
WD: Valley Branch

Volunteer: Nancy Van Cleve

● Sampling site
Contours in meters

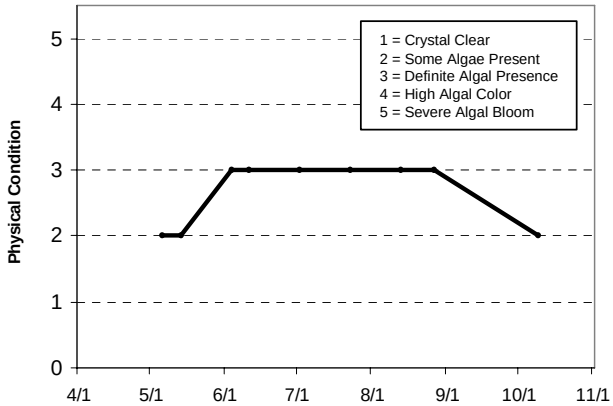






2006 Data

Date	Surf. Tmp C	Bot. Tmp C	Surf. DO mg/L	Bot. DO mg/L	CLA ug/L	Surf. TP ug/L	Bot. TP ug/L	Secchi M	PC 1 thru 5	RS 1 thru 5
5/6/06					1.4	27		3.25	2	4
5/14/06	12.4				4.2	26		3	2	4
6/4/06	26				3	20		2	3	4
6/11/06	20.7				7.3	26		2.5	3	4
7/2/06					4.7	56		2	3	4
7/23/06	25.3				6.1	151		1.8	3	4
8/13/06	24.4				5.1	63		1.9	3	4
8/27/06	28.5				4.3	23		1.3	3	4
10/9/06	15.6				5.1	20		1.9	2	4

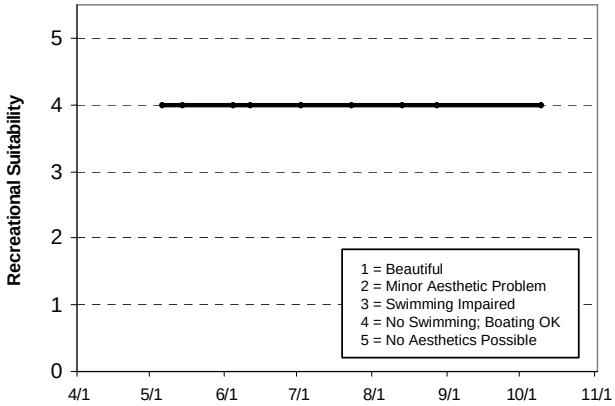


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus										C	C	B	C	C
Chlorophyll a										A	A	B	A	A
Secchi Depth										C	B	C	C	B
Overall										**B**	**B**	**B**	**B**	**B**

Source: Metropolitan Council and STORET data



Goggins Lake (82-0077) *Browns Creek Watershed District*

Goggins Lake is an 11-acre lake located within May Township (Washington County). 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 eighth year that Goggins Lake has been involved in CAMP (1999 being the first). Other than the CAMP data, a search through the STORET nationwide water quality database for historical water quality data for the lake came up empty. The lake was monitored 14 times between mid-April and mid-October, 2006. 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.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	100.5	49.0	197.0	D
CLA (µg/l)	35.0	20.0	49.0	C
Secchi (m)	0.9	0.5	1.7	D
TKN (mg/l)	2.13	1.20	3.10	
			Overall Grade	D

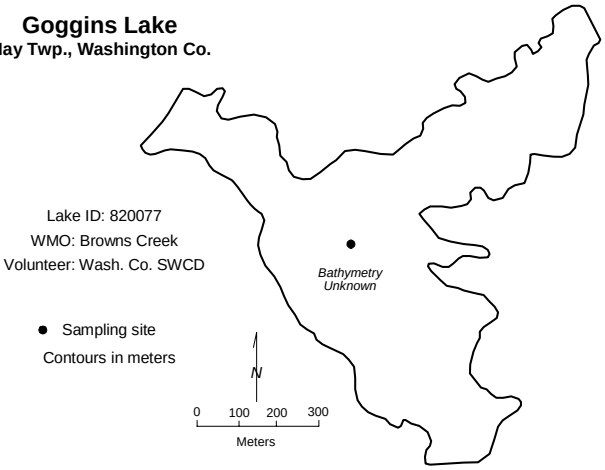
The 2005 overall grade is identical to that recorded 2000-2002 and worse than that recorded in 1999 and 2003-2004 (overall grade of a C). Results are presented on graphs and data tables on the following page.

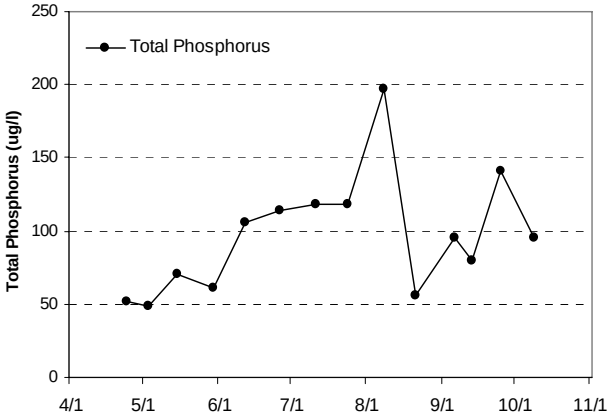
Statistical analysis on the lake's water quality database did not detect any long-term trends. In the short-term however, the lake's water quality is well represented by an overall grade of D+/C. To better understand the quality of the lake and what direction it may be heading, continued monitoring is suggested.

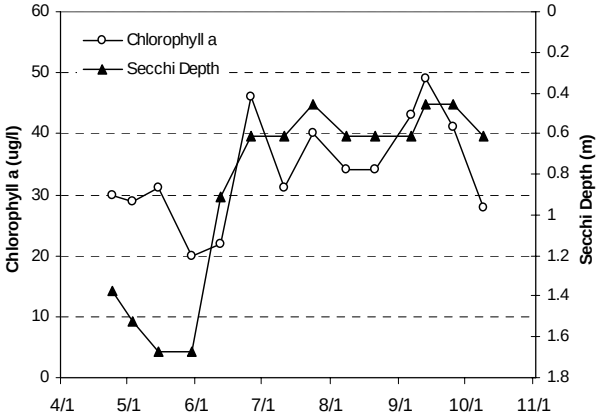
The last two graphs show seasonal variation in the lake's perceived physical condition and recreational suitability. The average user perception rankings, on a 1-to-5 scale, were 3.4 for physical condition (between 3- "definite algae present" and 4- "high algal color"), and 3.6 for recreational suitability (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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Goggins Lake
May Twp., Washington Co.

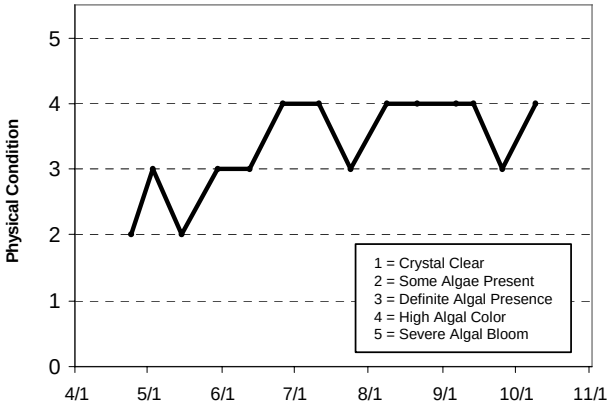






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/24/06	15.2	13	10.25	6.13	30	52		1.372	2	3
5/3/06	14.5	12.8	8.6	6.68	29	49		1.524	3	3
5/15/06	13.2	12.4	8.98	8.09	31	71		1.676	2	3
5/30/06	25.5	14.6	6.26	0.48	20	61		1.676	3	3
6/12/06	19.4	14.6	6.65	0.19	22	106		0.914	3	3
6/26/06	24.1	15.9	9.41	0.04	46	114		0.61	4	4
7/11/06	27.3	15.9	12.19	0.13	31	118		0.61	4	4
7/24/06	27.3		11.59		40	118		0.457	3	4
8/8/06	25.4	18.4	9.6	0.07	34	197		0.61	4	4
8/21/06	23.9	19	8.32	0.07	34	56		0.61	4	4
9/6/06	21.9	19.9	13.45	0.07	43	95		0.61	4	4
9/13/06	17.7	17.2	9.4	0.19	49	80		0.457	4	4
9/25/06	14.3	14.2	10.81	0.17	41	141		0.457	3	3
10/9/06	13.6	13.6	9.62	0.13	28	95		0.61	4	4

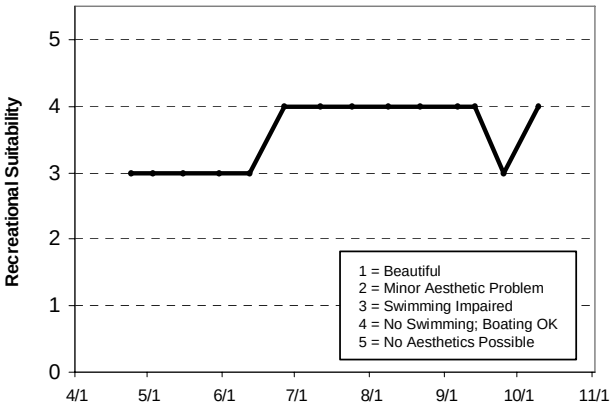


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus							D	D	D	D	C	C	D	D
Chlorophyll a							C	C	C	C	C	C	C	C
Secchi Depth							C	D	D	D	C	D	C	D
Overall							**C**	**D**	**D**	**D**	**C**	**C**	**C**	**D**

Source: Metropolitan Council and STORET data



Golden Lake (2-0045) *Rice Creek Watershed District*

Golden Lake, located in the City of Circle Pines (Anoka County), was monitored 11 times between mid-April and late-October, 2006. Public access to the 57-acre lake (1.5 miles in circumference) is possible for non-motorized boats through Golden Lake County Park. 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 large watershed-to-lake size ratio of 135:1. The greater the ratio, the greater the potential stress on the lake from surface runoff.

On each sampling date, the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	93.2	38.0	218.0	D
CLA (µg/l)	30.2	11.0	63.0	C
Secchi (m)	1.4	0.7	2.1	C
TKN (mg/l)	1.99	0.98	3.00	
			Overall Grade	C

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 1.6 (between 1- " crystal clear" and 2- "some algae present"). The mean suitability for recreation ranking, was 1.5 (between 1- "beautiful" and 2- "minor aesthetic problem").

Golden Lake has a fairly extensive water quality database with Secchi and nutrient data for 1980-1981, 1984-1991, and 1993-2005. Because the lake's water quality grade has fluctuated between C, D, and F (a C in 1986, 1996, 1998-2000, 2005 and 2006, D in 1980, 1985, 1987, 1993, 1997 and 2001-2004, and an F in 1988-1991) throughout these 20+ years of monitoring data, no long-trends can be determined. It seems that the lake has a very wide fluctuation range in its water quality. In order to detect any possible long-term trends, more years of data collection are needed.

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/.

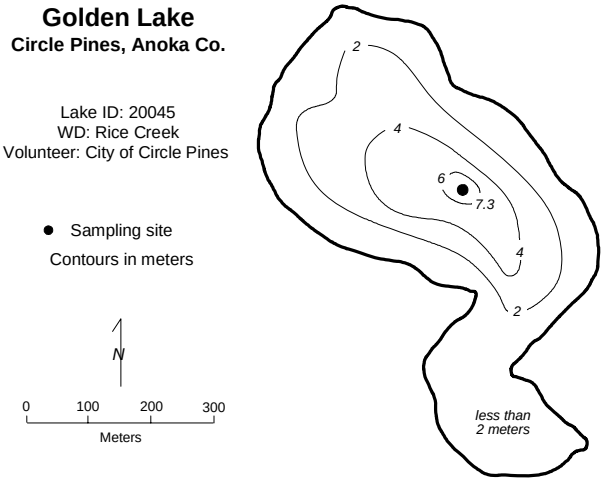
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

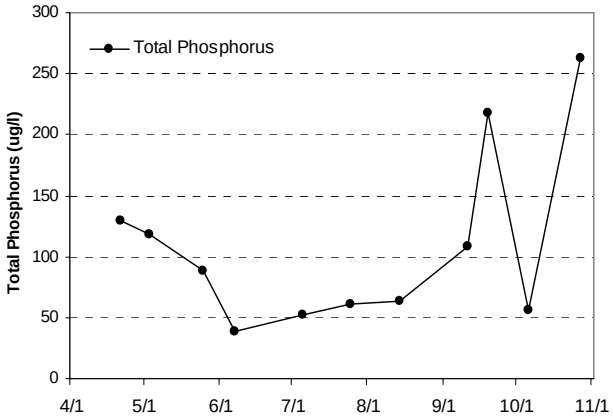
Golden Lake
Circle Pines, Anoka Co.

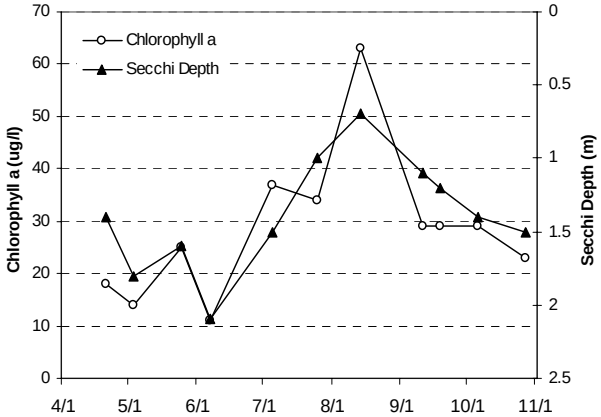
Lake ID: 20045
WD: Rice Creek
Volunteer: City of Circle Pines

● Sampling site

Contours in meters

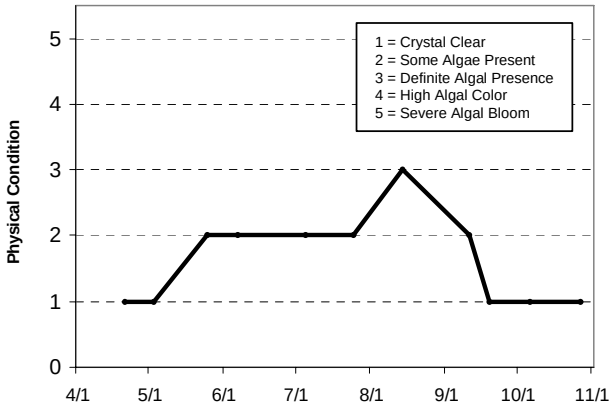






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/21/06	14				18	130		1.4	1	1
5/3/06	16.2				14	118		1.8	1	1
5/25/06	21.3				25	88		1.6	2	2
6/7/06	26.5				11	38		2.1	2	2
7/5/06	26				37	52		1.5	2	2
7/25/06	28				34	61		1	2	2
8/14/06	24.3				63	63		0.7	3	2
9/11/06	17.9				29	108		1.1	2	2
9/19/06	16.8				29	218		1.2	1	1
10/6/06	16.2				29	56		1.4	1	1
10/27/06	9.9				23	263		1.5	1	1

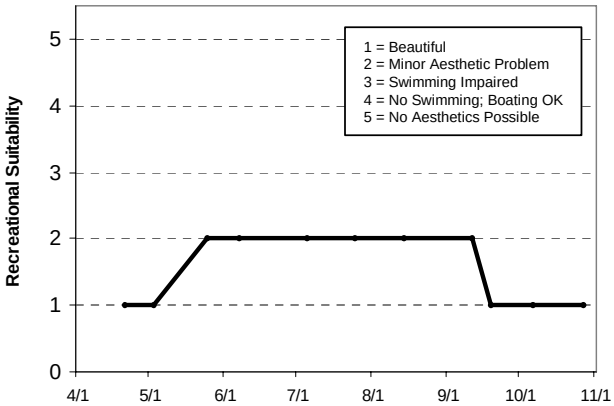


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
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	
Overall	**D**					**D**	**C**	**D**	**F**	**F**	**F**	**F**	

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus	D			C	D	C	C	C	D	D	D	D	C	D
Chlorophyll a	D			C	C	C	C	C	D	D	C	D	C	C
Secchi Depth	D			D	D	D	D	C	D	D	D	F	C	C
Overall	**D**			**C**	**D**	**C**	**C**	**C**	**D**	**D**	**D**	**D**	**C**	**C**

Source: Metropolitan Council and STORET data



Goose Lake [Scandia] (82-0059) *Marine on St. Croix Watershed Management Organization*

Goose Lake, an 83-acre lake (1.9 miles in circumference) located in the City of Scandia (Washington County), was monitored seven times from late-April to early-October, 2006. Goose Lake was enrolled in CAMP in 1994-1998 and 2004-2006. 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. Because of the shallowness of the lake, roughly 98 percent of the lake is considered littoral (the area of aquatic vegetation dominance). A Public access is located on the western side of the lake.

The collected data and resulting graphs showing TP and CLA concentrations, Secchi transparency, and user perception (physical condition and recreational suitability) are presented on the lake's information sheet on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	82.2	38.0	124.0	D
CLA (µg/l)	32.2	10.0	60.0	C
Secchi (m)	1.6	0.61	2.29	C
TKN (mg/l)	1.44	1.20	1.90	
			Overall Grade	C

The lake's 2006 overall grade was the same as those recorded in 1994-1998 and 2004-2005.

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 3.1 (roughly 3- "definite algae present"), while the mean recreational suitability ranking was 3.4 (between 3- "swimming slightly impaired" and 4- "no swimming – boating ok").

Because 1994-1998 and 2004-2006 are the only years of available data, no long-term trends can be determined. On the short-term, however, the lake's overall water quality seems to be represented quite well by an overall grade of C. There is some normal fluctuation in each parameters annual means, however. To better understand the quality of the lake and what direction it may be heading, more years of data collection are needed.

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/.

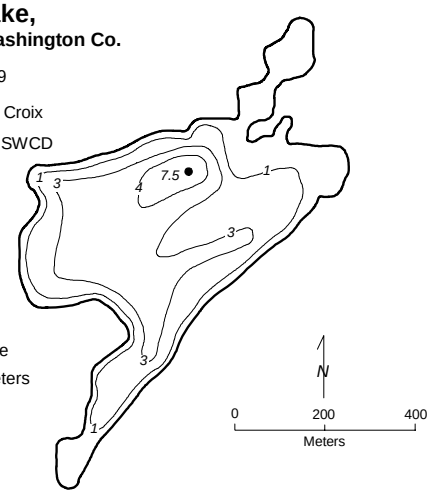
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Goose Lake,
New Scandia Twp., Washington Co.

Lake ID: 820059

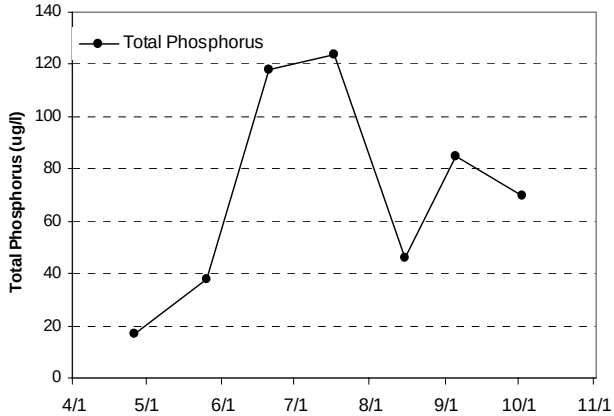
WMO: Marine on St. Croix

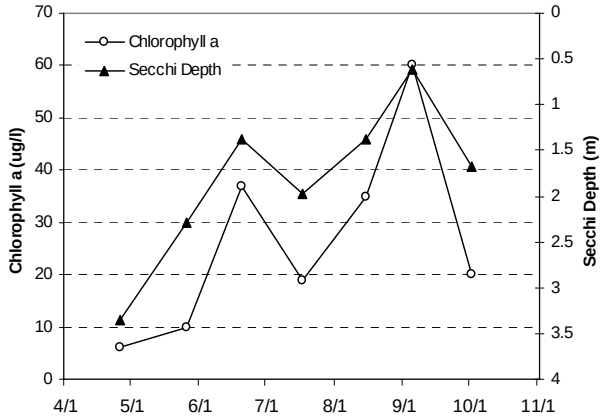
Volunteer: Wash. Co. SWCD



● Sampling site

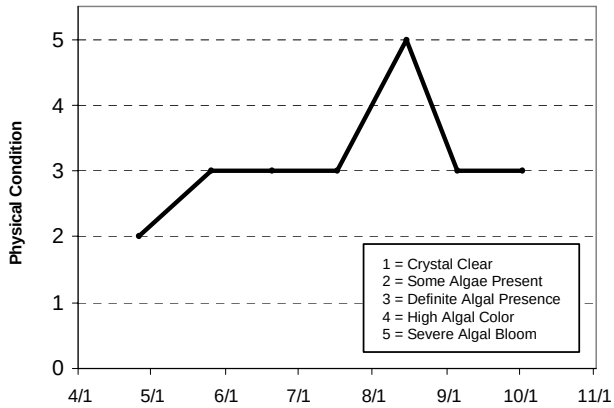
Contours in meters





2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/26/06	14.1	9.9	7.48	0.46	6.1	17		3.353	2	3
5/26/06	19.5	13.7	7.48	0.3	10	38		2.286	3	3
6/20/06	23.4	16.9	8.88	0.07	37	118		1.372	3	3
7/17/06	27.5	15.9	9.53	0.08	19	124		1.981	3	3
8/15/06	25.2	21.6	7.9	0.1	35	46		1.372	5	5
9/5/06	22.8	19.8	11.94	0.04	60	85		0.61	3	4
10/2/06	15.8	14.6	6.67	0.05	20	70		1.676	3	3

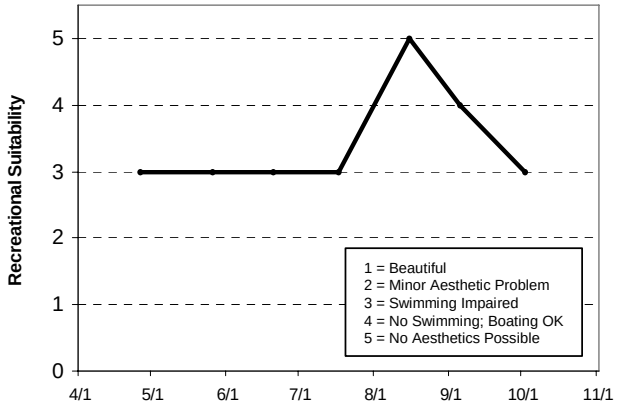


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus		C	D	C	C	C						C	C	D
Chlorophyll a		C	B	C	C	C						C	C	C
Secchi Depth		D	C	C	C	C						B	C	C
Overall		**C**	**C**	**C**	**C**	**C**						**C**	**C**	**C**

Source: Metropolitan Council and STORET data



Goose Lake [Waconia] (10-0089) *Carver County Environmental Services*

Goose Lake, located in Waconia Township in Carver County, was monitored 14 times between mid-April and mid-October, 2006. The lake has been involved in CAMP since 1995. Because the maximum depth of the 407-acre lake is only 3.0 m (10 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). The lake's mean depth of 1.5 m (roughly 5 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). A 1999 water quality report on water resources in Carver County estimates land use for the watershed at: four percent residential, 61.0 percent agricultural, and 35.0 percent open/undeveloped (Carver County Planning 1999).

On each sampling date, the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	107.6	74.0	141.0	D
CLA (µg/l)	100.6	49.0	190.0	F
Secchi (m)	0.5	0.3	0.7	F
TKN (mg/l)	2.94	2.10	4.20	
			Overall Grade	F

The physical and recreational conditions of Goose 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 3.5 (between 3- "definite algae present" and 4- "high algal color"), while the mean recreational suitability ranking was 3.5, (between 3- "swimming slightly impaired" and 4- "no swimming – boating ok").

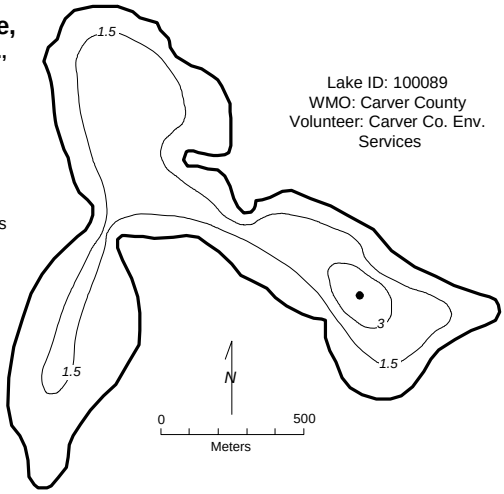
Because of the variability among the eleven years of data (grades ranging from C to F), no long-term trends can be determined. In the short-term however, the lake fluctuates greatly, with an overall grade of C in 1996 and 1998, D in 1995, 1999, 2001-2002, and an overall grade of F in 1997, 2000, 2003 and 2005-2006.

To better understand the quality of the lake and what direction it may be heading, continued monitoring is suggested.

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/.

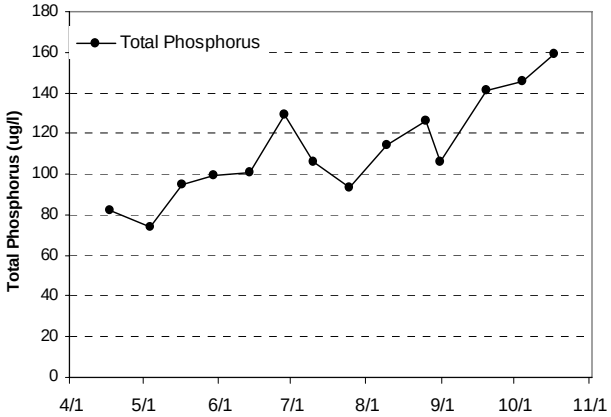
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

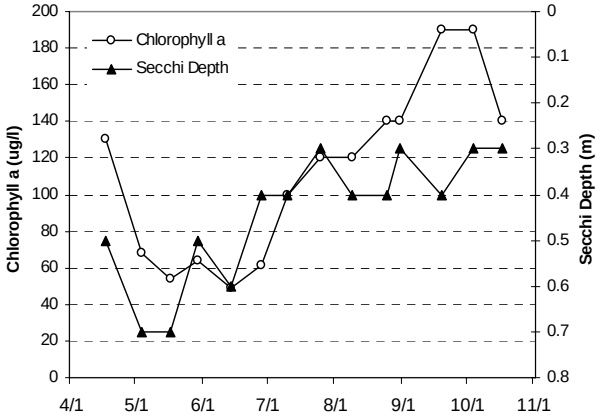
Goose Lake,
Waconia Twp., Carver Co.



Lake ID: 100089
WMO: Carver County
Volunteer: Carver Co. Env. Services

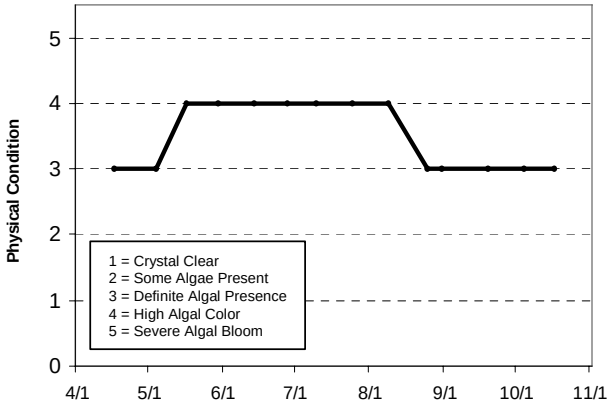
● Sampling site
Contours in meters





2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/17/06	14.4		12.24		130	82		0.5	3	3
5/4/06	13.81		9.91		68	74		0.7	3	3
5/17/06	15.42		12.2		54	95		0.7	4	4
5/30/06	24.99		9.46		64	99		0.5	4	4
6/14/06	21.98		9.66		49	101		0.6	4	4
6/28/06	24.87		9.56		61	129		0.4	4	4
7/10/06	25.3		11.02		100	106		0.4	4	4
7/25/06	27.44		13.33		120	93		0.3	4	4
8/9/06	26.09		6.52		120	114		0.4	4	4
8/25/06	22.47		7.14		140	126		0.4	3	3
8/31/06	22.76		9.5		140	106		0.3	3	3
9/19/06	12.25		10		190	141		0.4	3	3
10/4/06	15.88		10.13		190	146		0.3	3	3
10/17/06	7.87		10.13		140	159		0.3	3	3

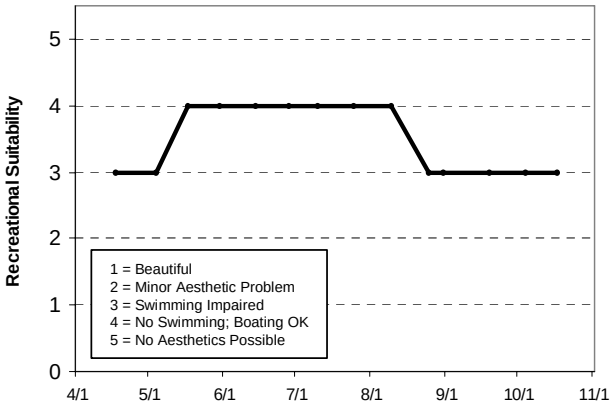


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus			D	C	F	D	D	F	D	D	F		D	D
Chlorophyll a			C	C	D	C	D	F	C	C	F		F	F
Secchi Depth			F	C	F	C	F	F	D	F	F		F	F
Overall			**D**	**C**	**F**	**C**	**D**	**F**	**D**	**D**	**F**		**F**	**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 (Washington 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).

This was the fourth year that Grace Lake has been involved in CAMP. A search through the STORET nationwide water quality database for data on the lake provided no data, therefore 2002-2004 and 2006 are the only years of available water quality data for the lake.

As part of the county's involvement in CAMP in 2006, the lake was monitored 14 times between mid-April and mid-October. During each sampling event the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	92.2	35.0	174.0	D
CLA (µg/l)	38.6	9.1	96.0	C
Secchi (m)	1.1	0.4	2.6	D
TKN (mg/l)	1.61	0.76	2.50	
			Overall Grade	D

The lakes 2006 overall water quality grade is the same as in 2002-2003 and worse than the overall grade of a C for 2004.

Throughout the monitoring period, the volunteers' opinion 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- "high algal color"), while the mean recreational suitability ranking was 2.9 (between 2- "minor aesthetic problems" and 3- "swimming slightly impaired").

As mentioned earlier, there are no water quality data available for Grace Lake other than the limited 2002-2004 and 2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

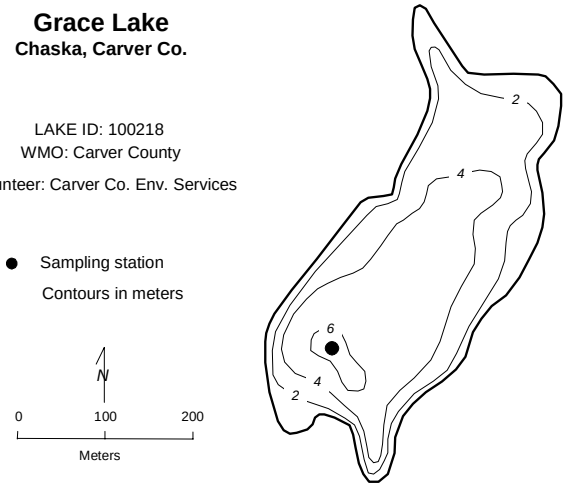
Grace Lake
Chaska, Carver Co.

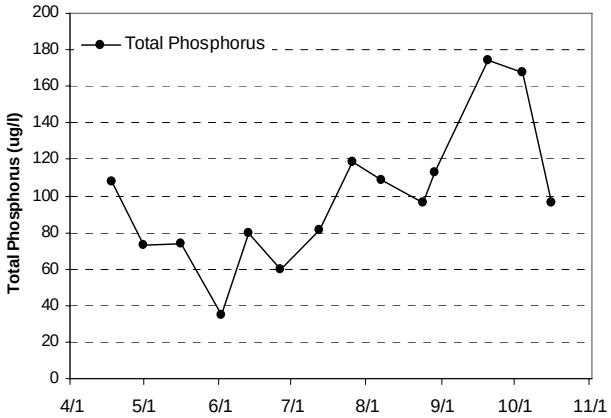
LAKE ID: 100218
WMO: Carver County

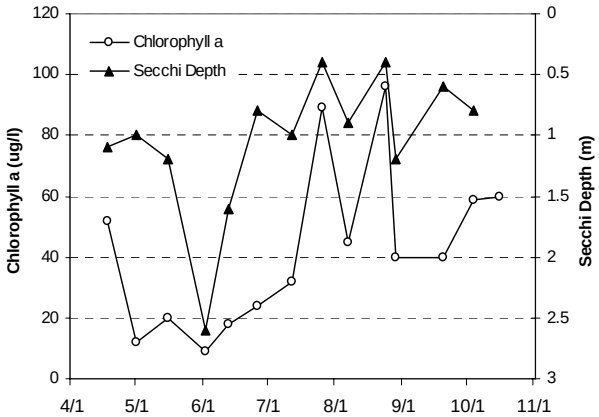
Volunteer: Carver Co. Env. Services

● Sampling station

Contours in meters

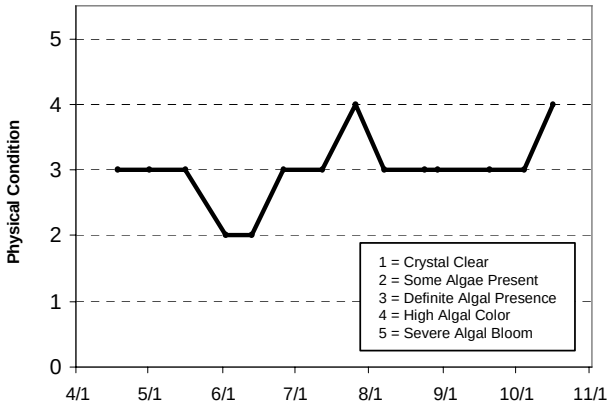






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/18/06	15.6		14.36		52	108		1.1	3	3
5/1/06	13.42		7.18		12	73		1	3	3
5/16/06	14.27		8.84		20	74		1.2	3	3
6/2/06	25.36		4.57		9.1	35		2.6	2	2
6/13/06	21.85		10.44		18	80		1.6	2	2
6/26/06	24.6		8.98		24	60		0.8	3	3
7/12/06	26.58		12.5		32	81		1	3	3
7/26/06	27.17		15.58		89	119		0.4	4	4
8/7/06	26.5		8.29		45	109		0.9	3	3
8/24/06	23.6		8.18		96	96		0.4	3	3
8/29/06	22.69		4.4		40	113		1.2	3	3
9/20/06	16.37		8.67		40	174		0.6	3	3
10/4/06	16.03		8.69		59	168		0.8	3	3
10/16/06	10.3		10.4		60	96			4	3

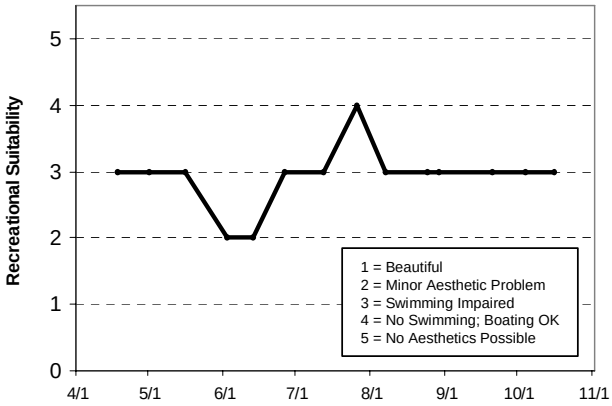


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus										F	D	D		D
Chlorophyll a										C	C	B		C
Secchi Depth										D	D	D		D
Overall										**D**	**D**	**C**		**D**

Source: Metropolitan Council and STORET data



Hafften Lake (27-0199) *Pioneer-Sarah Watershed Management Commission*

Hafften Lake, located in Greenfield (Hennepin County), has public access on the eastern side of the lake. The 43-acre lake has a maximum depth of 13.4 m (roughly 44 feet). Roughly 60 percent of the lake's surface area is considered littoral zone (the 0-15 foot depth area of aquatic plant dominance).

The lake was monitored 13 times from mid-April to mid-October, 2006.

While this was the second year that Hafften Lake was monitored through CAMP (2005 being the first), the lake has been monitored by Council staff in the past (most recently in 2004). A search of the STORET nationwide water quality database for data on the lake revealed a limited database with nutrient and Secchi transparency data available in 2000-2001, and 2004-2006.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	85.1	32.0	198.0	D
CLA (µg/l)	10.5	5.0	17.0	B
Secchi (m)	1.6	0.8	3.5	C
TKN (mg/l)	1.39	1.00	1.80	
			Overall Grade	C

While the lake's 2006 overall grade is the same as those recorded in 2000-2001 and 2004-2005, the individual parameter means seem to indicate that 2006 represents the lake's best monitored CLA and the worst monitored TP to date.

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 2.5 (between 2- "some algae present" and 3- "definite algae present"), while the mean recreational suitability ranking was 2.5 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

Because 2000-2001 and 2004-2006 are the only years of available data, no long-term trends can be determined. On the short-term, however, the lake's overall water quality seems to be well represented by an overall grade of C. To better understand the quality of the lake and what direction it may be heading, more years of data collection are needed.

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) 297-4916 or by downloading the information off the internet at http://www.dnr.state.mn.us/lakefind/.

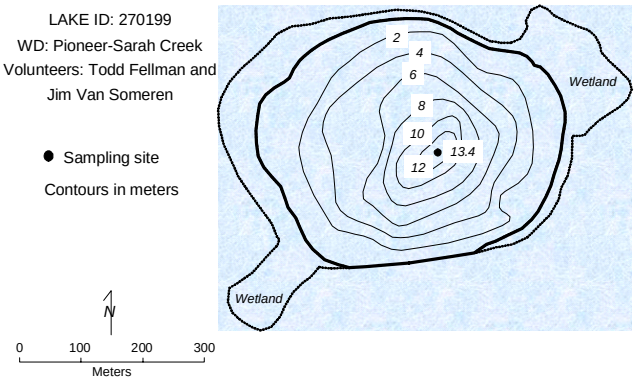
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

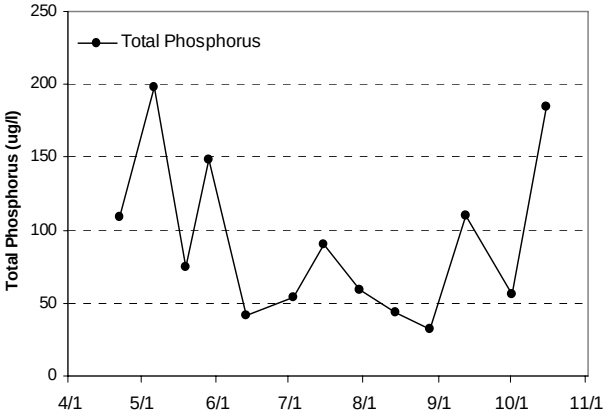
Hafften Lake,
Greenfield, Hennepin Co.

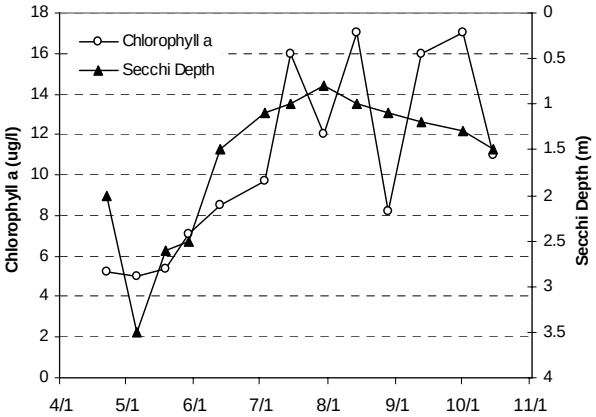
LAKE ID: 270199
WD: Pioneer-Sarah Creek
Volunteers: Todd Fellman and Jim Van Someren

● Sampling site

Contours in meters

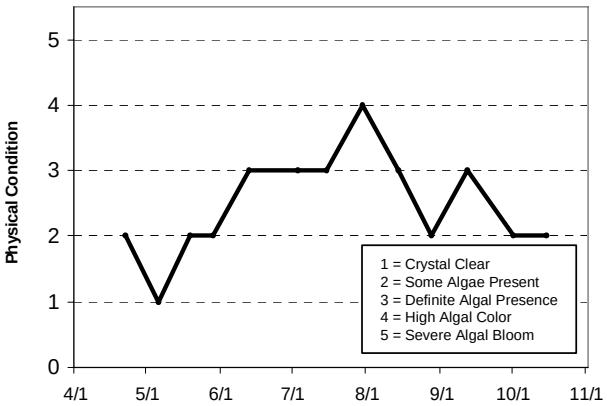






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/22/06	16.7				5.2	109		2	2	1
5/6/06	15.7				5	198		3.5	1	1
5/19/06	18.5				5.4	75		2.6	2	2
5/29/06	26.9				7.1	148		2.5	2	2
6/13/06	24.6				8.5	41		1.5	3	3
7/3/06	27.4				9.7	54		1.1	3	3
7/15/06	28.6				16	90		1	3	3
7/30/06	30.7				12	59		0.8	4	3
8/14/06	25.1				17	44		1	3	3
8/28/06	25.1				8.2	32		1.1	2	3
9/12/06	22.3				16	110		1.2	3	3
10/1/06	17.2				17	56		1.3	2	3
10/15/06	9.8				11	185		1.5	2	3

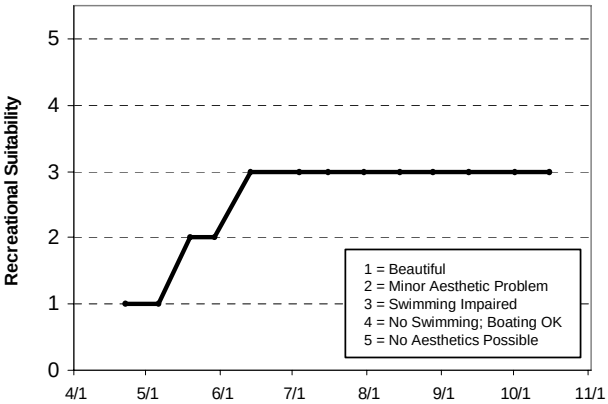


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus								C	C			C	C	D
Chlorophyll a								C	C			C	C	B
Secchi Depth								C	C			D	C	C
Overall								**C**	**C**			**C**	**C**	**C**

Source: Metropolitan Council and STORET data



Hart Lake (02-0081) *Rice Creek Watershed District*

Hart Lake is an eight-acre lake located within the city of Columbia Heights (Anoka County). There is very little known morphological data available for the lake.

This marks the third year in which Hart Lake has been involved in CAMP (2004 being the first). A search through the STORET nationwide water quality database for historic data on the lake was unsuccessful. Thus, 2004-2006 are the only complete years of data available. 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 lake was monitored eight times between mid-May and late-October, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	155.2	106.0	215.0	F
CLA (µg/l)	96.8	40.0	220.0	F
Secchi (m)	0.4	0.2	0.8	F
TKN (mg/l)	3.00	1.50	5.20	
			Overall Grade	F

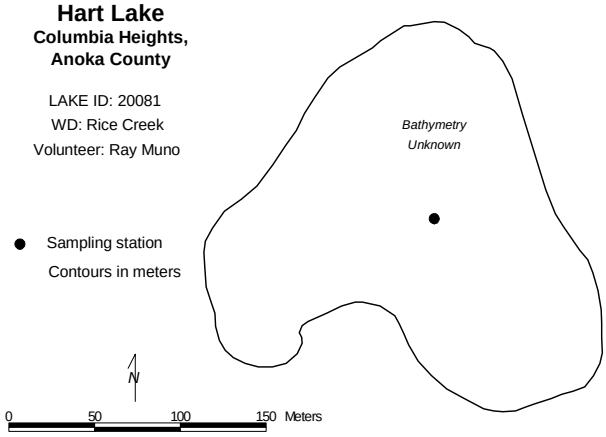
The overall grade reported for 2005 and 2006 was an F. As mentioned earlier, there are no water quality data available for Hart Lake other than the 2004-2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

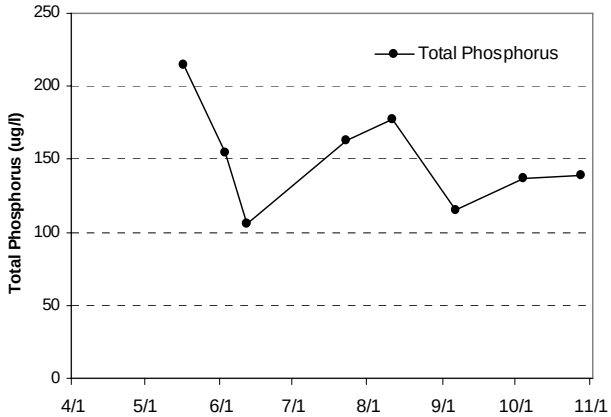
Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The average user perception rankings were 3.8 for physical condition (between 3- "definite algae present" and 4- "high algal color"), and 4.0 for recreational suitability (4- "no swimming – boating ok").

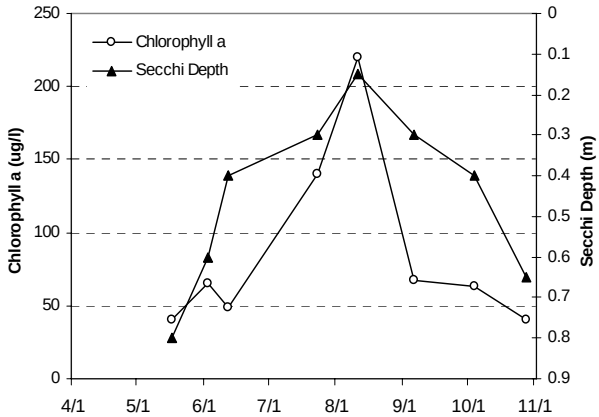
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Hart Lake
Columbia Heights, Anoka County

LAKE ID: 20081
WD: Rice Creek
Volunteer: Ray Muno

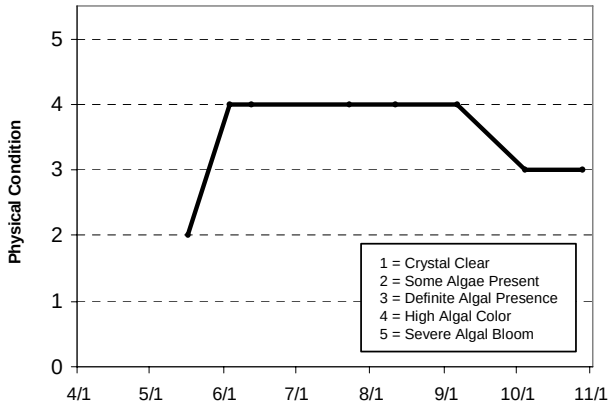






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/17/06	25.5				40	215		0.8	2	4
6/3/06	28				65	155		0.6	4	4
6/12/06	26.8				49	106		0.4	4	4
7/23/06	30.7				140	163		0.3	4	4
8/11/06	24.6				220	177		0.15	4	4
9/6/06	22.1				67	115		0.3	4	4
10/4/06	17.8				63	137		0.4	3	4
10/28/06	10.8				40	139		0.65	3	4

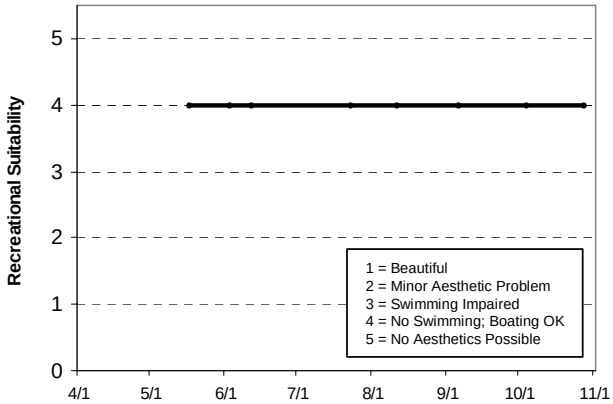


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus												NA	F	F
Chlorophyll a												NA	D	F
Secchi Depth												NA	F	F
Overall												**NA**	**F**	**F**

Source: Metropolitan Council and STORET data



Hay Lake (82-0065) *Marine on St. Croix Watershed Management Organization*

This was the eighth year of CAMP monitoring on Hay Lake, located in City of Scandia (Washington County). The lake was monitored seven times between late-April and early-October, 2006. The only known morphological data available for the 33-acre lake is its maximum depth (6.1 m [20 feet]). Other than the 1998-2001, and 2003-2006 CAMP data for the lake, a search for historical water quality data and any physical information came up empty.

During each monitoring event, the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. Results are presented on graphs and data tables on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	82.4	68.0	105.0	D
CLA (µg/l)	18.8	6.3	33.0	B
Secchi (m)	1.8	1.4	2.0	C
TKN (mg/l)	1.34	1.20	1.60	
			Overall Grade	C

The lake's overall 2006 lake water quality grade (C) was identical to that recorded in 2003 and better than those recorded in 1998-2001, and 2004-2005 (D). Most notable is the CLA grade which appeared to be the best CLA on record (B). However, the CLA grade should be viewed cautiously since there were only four CLA records available to compute the grade with in 2006.

Statistical analysis on the lake's water quality database did not detect any long-term trends. In the short-term however, the lake seems well represented with an overall water quality grade of D/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 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 2.8 (between 2- "some algae present" and 3- "definite algal presence"), while the mean recreational suitability was 3.4 (between 3- "swimming slightly impaired" and 4- "high algal color").

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Hay Lake

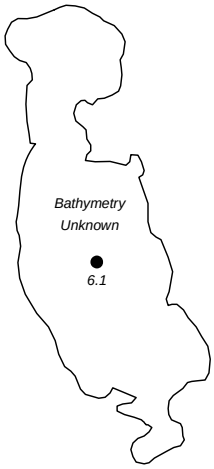
New Scandia Twp.,
Washington Co.

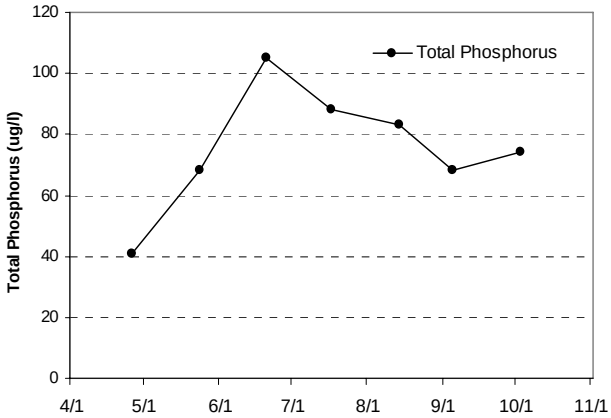
LAKE ID: 820065
WMO: Marine-on-St. Croix
Volunteer: Washington Co. SWCD

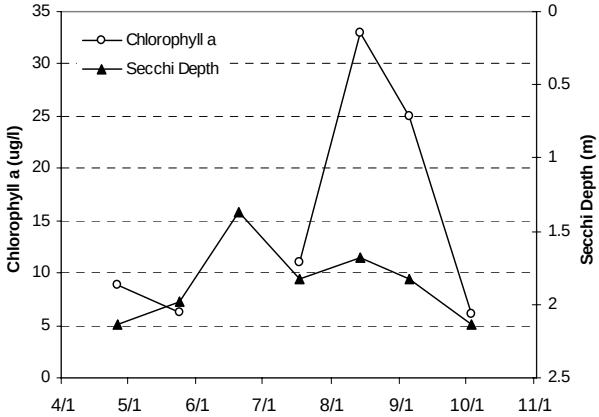
● Sampling site
Contours in meters

N

0 200 400
Meters

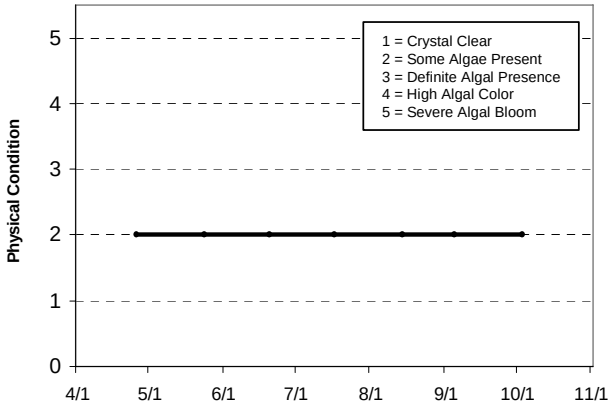






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/26/06	15		6.17		8.8	41		2.134	2	3
5/24/06	20.3	19.6	6.19	0.19	6.3	68		1.981	2	3
6/20/06	23.1	22.2	5.42	0.06		105		1.372	2	3
7/17/06	27.7	26.2	5.67	0.1	11	88		1.829	2	2
8/14/06	24		6.25		33	83		1.676	2	3
9/5/06	22.4	20.7	8.18	0.09	25	68		1.829	2	3
10/3/06	15.9	14.9	7.7	0.16	6.1	74		2.134	2	2

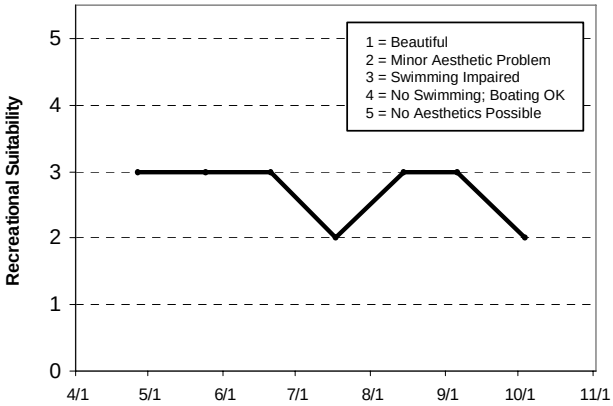


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus						D	D	D	D		D	D	D	D
Chlorophyll a						F	F	F	F		C	D	F	B
Secchi Depth						D	D	D	D		C	D	D	C
Overall						**D**	**D**	**D**	**D**		**C**	**D**	**D**	**C**

Source: Metropolitan Council and STORET data



Hazeltine Lake (10-0014) *Carver County Environmental Services*

Hazeltine Lake is a 236-acre lake located within the City of Chaska (Carver County). The maximum depth of the lake is 2.0 m (roughly six-and-a-half 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 Hazeltine Lake has been involved in CAMP (1999 [where it was only monitored twice], 2000 and 2005 were the others). Other than the past CAMP data, a search through the STORET nationwide water quality database for data on the lake came up empty.

The lake was monitored 14 times from mid-April to mid-October, 2006. Results are presented in both graphs and data tables on the lake's information sheet on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	205.1	91.0	328.0	F
CLA (µg/l)	301.0	31.0	710.0	F
Secchi (m)	0.4	0.1	0.8	F
TKN (mg/l)	4.38	1.50	7.70	
			Overall Grade	F

Similar to that recorded in 2000, 2001and 2005, the individual grades result in an overall water quality grade of F for Hazeltine Lake in 2006.

As mentioned earlier, there is very little water quality data available for Hazeltine Lake. Therefore it is impossible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, more data are needed.

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 3.7 for physical condition (between 3- "definite algal presence" and 4- "high algal color"), and 3.8 for recreational suitability (between 3-"swimming impaired" and 4- "no swimming - boating ok").

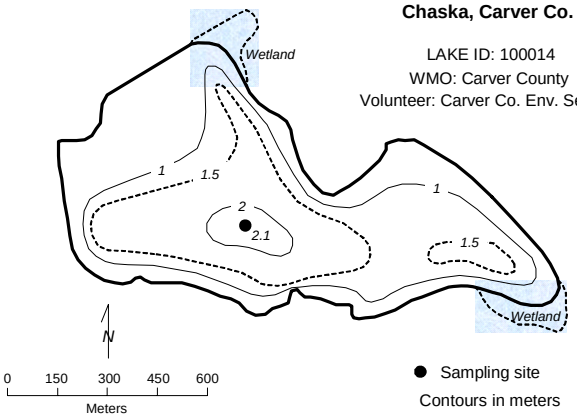
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

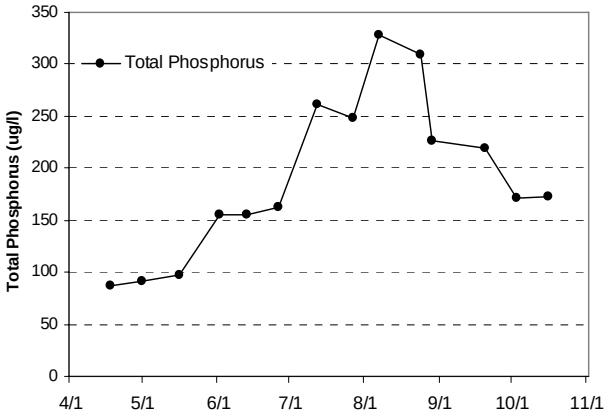
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

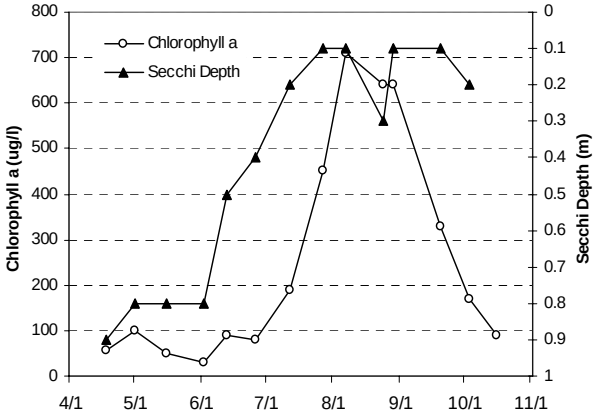
Lake Hazeltine

Chaska, Carver Co.

LAKE ID: 100014
WMO: Carver County
Volunteer: Carver Co. Env. Serives

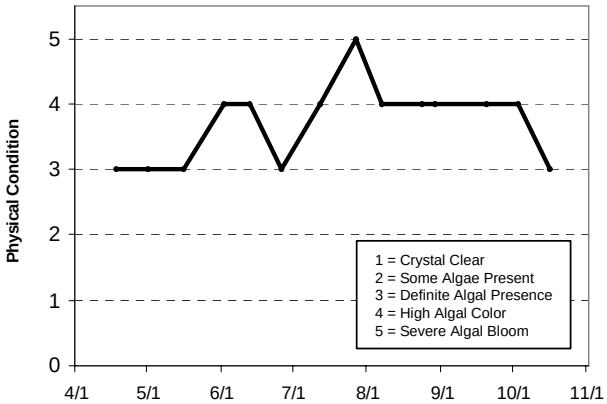






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/18/06	14.86		10.02		57	87		0.9	3	4
5/1/06	13.52		11.35		98	91		0.8	3	3
5/16/06	15.34		13.28		50	98		0.8	3	3
6/2/06	24.94		10.79		31	156		0.8	4	4
6/13/06	18.91		14.89		91	156		0.5	4	4
6/26/06	25.32		11.13		81	162		0.4	3	3
7/12/06	27.25		16.1		190	261		0.2	4	4
7/27/06	28.16		15.66		450	248		0.1	5	4
8/7/06	26.29		12		710	328		0.1	4	4
8/24/06	22.1		6.2		640	310		0.3	4	4
8/29/06	21.94		7.74		640	226		0.1	4	4
9/20/06	12.48		9.55		330	220		0.1	4	4
10/3/06	17.5		9.98		170	171		0.2	4	4
10/16/06	9.65		9.27		88	173			3	4

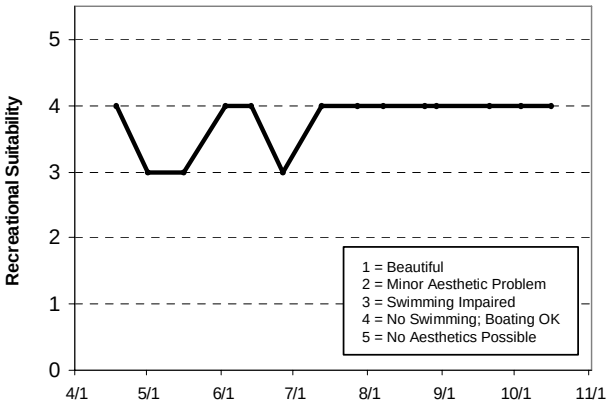


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus								F	F				F	F
Chlorophyll a								F	F				F	F
Secchi Depth								F	F				F	F
Overall								**F**	**F**				**F**	**F**

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 third year that Henry Lake has been involved in CAMP (1995 and 2005 being the others). Other than for the 1995, 2005 and 2006 CAMP data, a search through the STORET nationwide water quality database for historic data on the lake came up empty. Therefore, 1995, 2005 and 2006 are the only known years of data available. 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 lake was monitored 11 times between late-May and mid-October, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	193.7	56.0	419.0	F
CLA (µg/l)	18.7	6.6	75.0	B
Secchi (m)	1.28	1.1	1.5	C
TKN (mg/l)	1.90	1.10	2.80	
			Overall Grade	C

The lake's 2006 overall grade and individual grade for CLA is the best on record (C), however, the individual grade for TP is the worst on record (F).

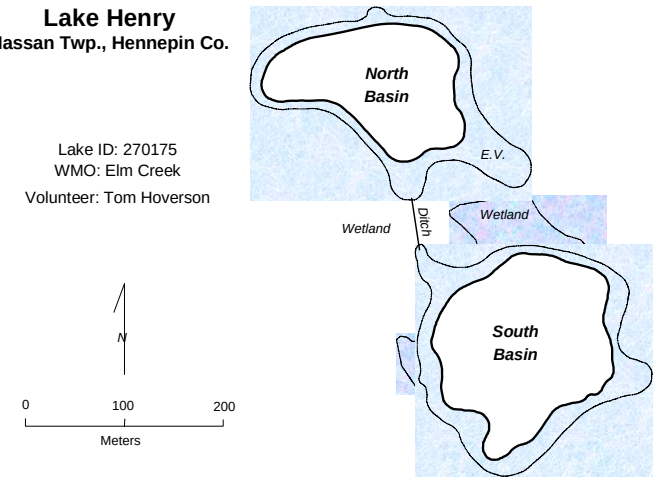
As mentioned earlier, there are no water quality data available for Henry Lake other than the 1995, 2005 and 2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

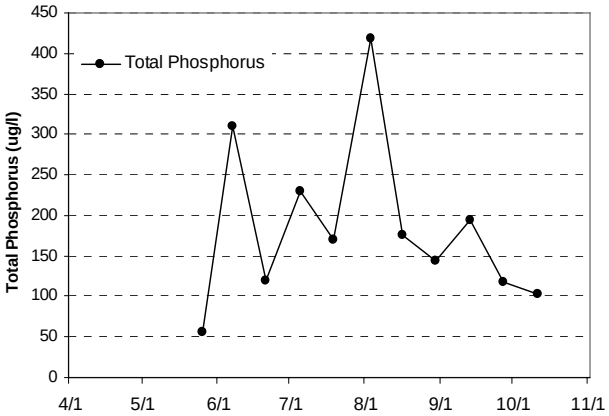
Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The average user perception rankings were 4.0 for physical condition (4- "high algal color"), and 4.6 for recreational suitability (between 4- "no swimming – boating ok" and 5- "no aesthetics possible").

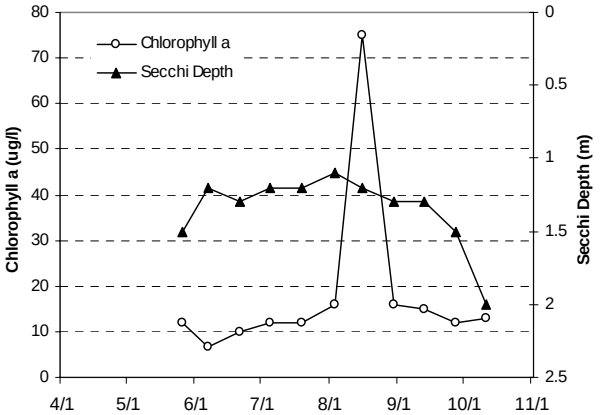
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Lake Henry
Hassan Twp., Hennepin Co.

Lake ID: 270175
WMO: Elm Creek
Volunteer: Tom Hoverson

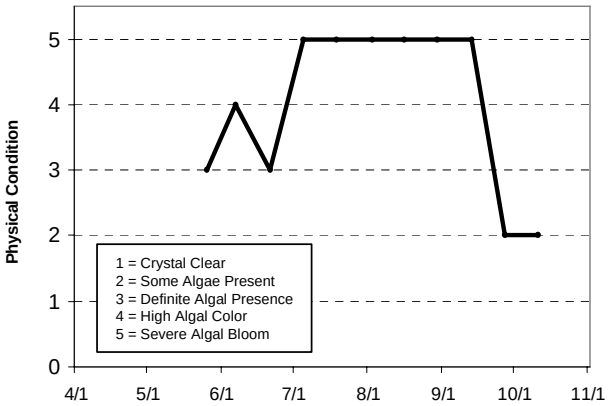






2006 Data

Date	Surf. Tmp C	Bot. Tmp C	Surf. DO mg/L	Bot. DO mg/L	CLA ug/L	Surf. TP ug/L	Bot. TP ug/L	Secchi M	PC 1 thru 5	RS 1 thru 5
5/26/06	21.5				12	56		1.5	3	4
6/7/06	19.6				6.6	310		1.2	4	4
6/21/06	19.6				10	120		1.3	3	5
7/5/06	24.6				12	230		1.2	5	5
7/19/06	31.9				12	170		1.2	5	5
8/3/06	26.9				16	419		1.1	5	5
8/16/06	26.3				75	176		1.2	5	5
8/30/06	21.3				16	143		1.3	5	5
9/13/06	19.6				15	195		1.3	5	5
9/27/06	17.36				12	118		1.5	2	4
10/11/06	9.5				13	103		2	2	4

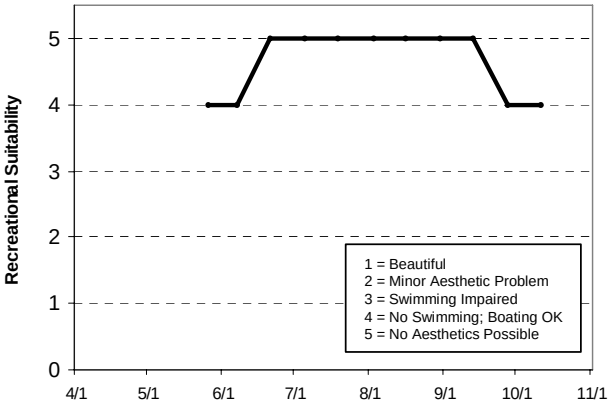


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus			D										D	F
Chlorophyll a			C										C	B
Secchi Depth			D										D	C
Overall			**D**										**D**	**C**

Source: Metropolitan Council and STORET data



Herber's Pond (82-0015-01) *Carnelian – Marine Watershed District*

Herber's Pond is a small (13-acre) shallow lake (a maximum depth of approximately 2.0 m (6.6 feet), located in Hugo (Washington County). 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). There is very little other known morphological data available for the waterbody.

This was the third year that Herber's Pond has been involved in CAMP (2004 being the first). The lake was monitored 7 times between early-May and mid-October, 2006. On each of the sampling days the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	***Mean***	***Minimum***	***Maximum***	***Grade***
TP (µg/l)	106.5	62.0	161.0	D
CLA (µg/l)	35.2	18.0	56.0	C
Secchi (m)	1.4	1.1	1.7	C
TKN (mg/l)	1.45	1.20	1.90	
			Overall Grade	C

The lake's 2006 individual summer means and overall water quality grade is identical to that recorded in 2004 and better than that recorded in 2005.

As mentioned earlier, there are no known nutrient data available for Herber's Pond other than the 2004-2006 CAMP data. Therefore it is not possible to determine any long-term or short-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 2.4 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Herber's Pond

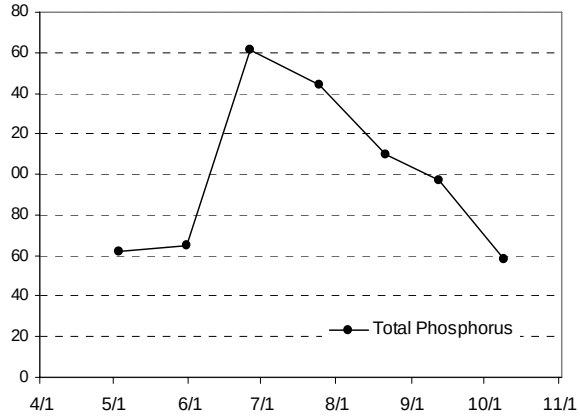
Stillwater Twp.,
Washington Co.

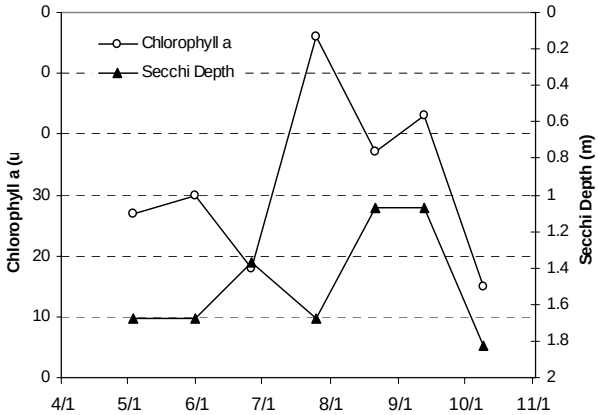
LAKE ID: 820015-01
WD: Carnelian-Marine
Volunteer: Washington Co. SWCD

● Sampling site
Contours in meters

N

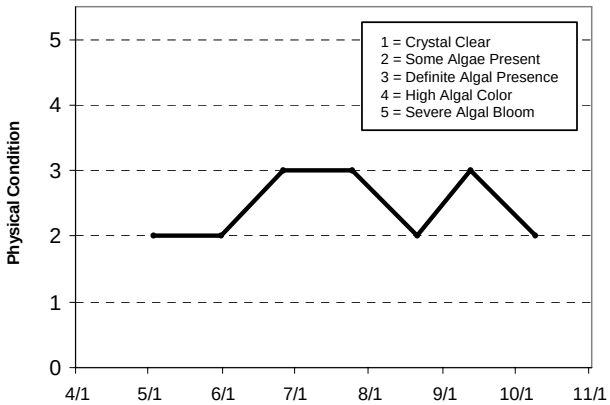
0 50 100 150 200 Meters





2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/3/06	16.1		7.46		27	62		1.676	2	3
5/31/06	25.1	17.3	5.98	0.28	30	65		1.676	2	3
6/26/06	24.2	19.5	8.46	0.04	18	161		1.372	3	3
7/25/06	25	22	6.02	0.05	56	144		1.676	3	4
8/21/06	25.3	20.8	3.34	0.04	37	110		1.067	2	4
9/12/06	16.8	16.1		0.05	43	97		1.067	3	3
10/9/06	13.2		6.4		15	58		1.829	2	4

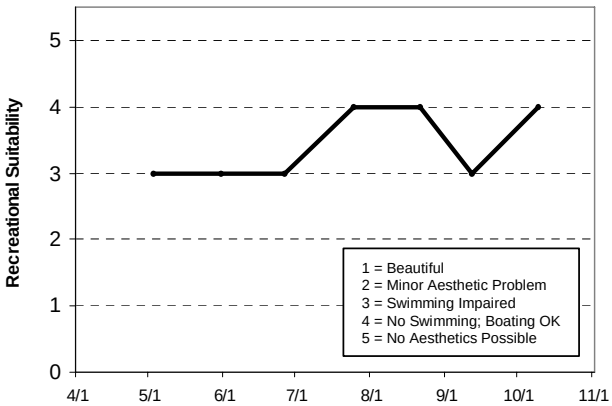


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus												D	D	D
Chlorophyll a												C	D	C
Secchi Depth												C	D	C
Overall												**C**	**D**	**C**

Source: Metropolitan Council and STORET data



Highland Lake (2-0079) *Anoka County Parks*

Highland Lake is a 22-acre lake located within the City of Columbia Heights (Anoka County). The maximum depth of the lake is approximately only 1.0 m (roughly 3 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).

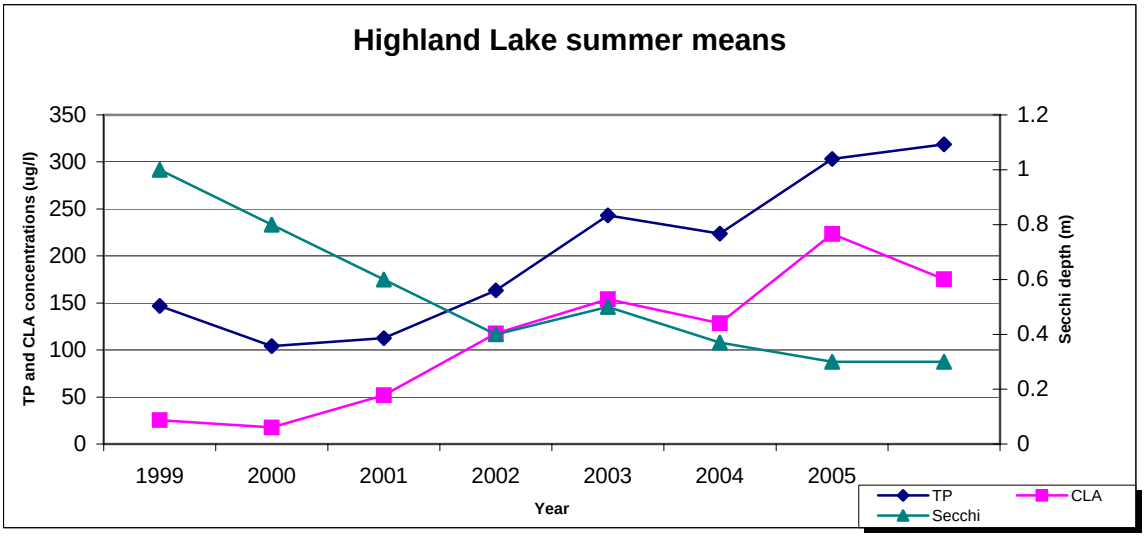
This was the eighth year that Highland Lake has been involved in CAMP (the lake was initially enrolled in 1999). Other than the past CAMP data, a search through the STORET nationwide water quality database for data on the lake came up empty.

The lake was monitored 14 times between mid-April and mid-October, 2006. During each monitoring event, the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. Results are presented on graphs and data tables on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	318.9	146.0	534.0	F
CLA (µg/l)	175.4	44.0	350.0	F
Secchi (m)	0.3	0.1	0.4	F
TKN (mg/l)	4.25	2.30	6.20	
			Overall Grade	F

The lake's recent water quality (2002-2006), is quite a bit worse than that recorded in 1999-2001. As mentioned earlier, there are no water quality data available for Highland Lake other than the 1999-2006 CAMP data. Therefore it is not possible to determine any long-term trends. In the short-term, however, the lake's water quality seems to be degrading. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.



The above graph clearly depicts the lakes recent degradation. The reason for the degradation in the lake's water quality is not entirely known. A more in-depth study combining watershed as well as in-lake monitoring may help determine the areas contributing the most to the lake's degradation.

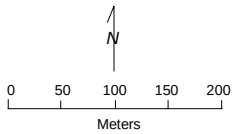
The last two graphs on the information sheet show seasonal variation in the lake's perceived physical condition and recreational suitability. The average user perception ranking, on a 1-to-5 scale, was 3.6 for physical condition (between 3- "definite algae present" and 4- "high algal color") and 3.5 for recreational suitability (between 3- "swimming slightly impaired" and 4- "no swimming – boating ok").

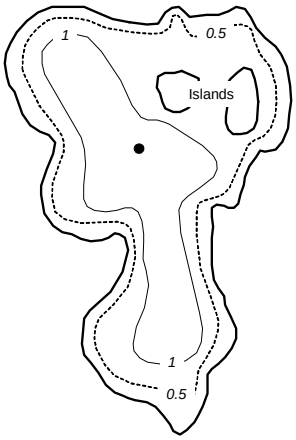
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

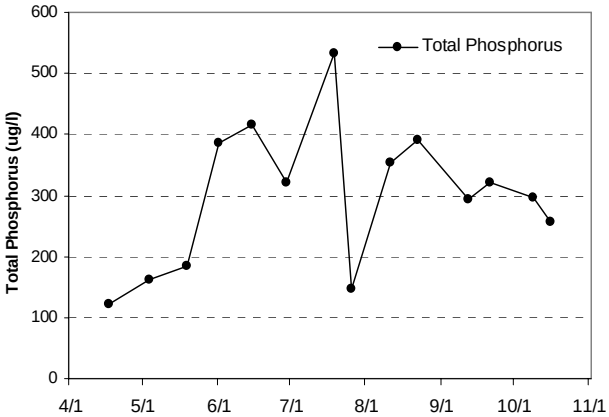
Highland Lake
Columbia Heights, Anoka Co.

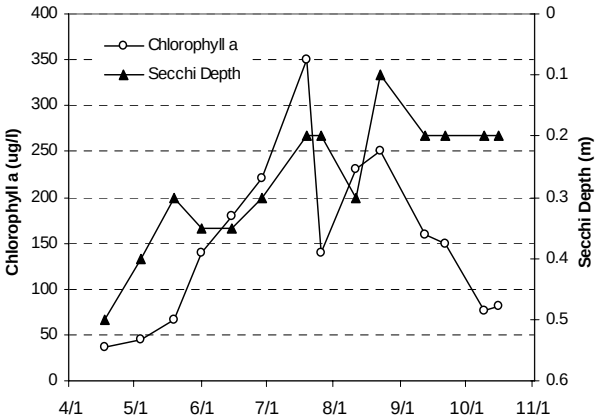
Lake ID: 20079
WMO: Six Cities
Volunteer: Anoka Co. Parks

● Sampling site
Contours in meters



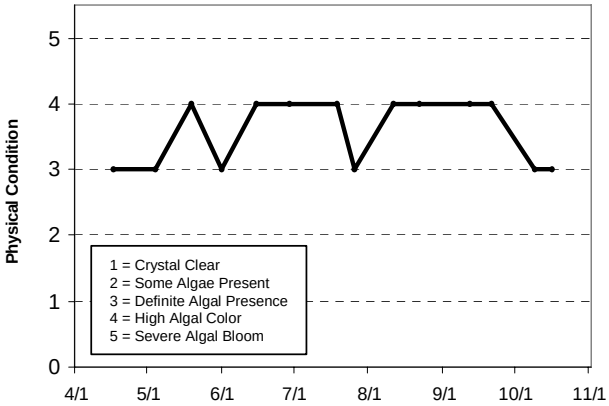






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/17/06	15.4				37	122		0.5	3	2
5/4/06	15.3				44	161		0.4	3	2
5/19/06	18.1				66	183		0.3	4	4
6/1/06	24.8				140	387		0.35	3	4
6/15/06	22.7				180	417		0.35	4	4
6/29/06	25.1				220	321		0.3	4	4
7/19/06	23.8				350	534		0.2	4	4
7/26/06	25				140	146		0.2	3	2
8/11/06	26.6				230	354		0.3	4	
8/22/06	24.4				250	392		0.1	4	4
9/12/06	15.6				160	293		0.2	4	4
9/21/06	12.9				150	320		0.2	4	4
10/9/06	13				77	296		0.2	3	4
10/16/06	8				82	257		0.2	3	4

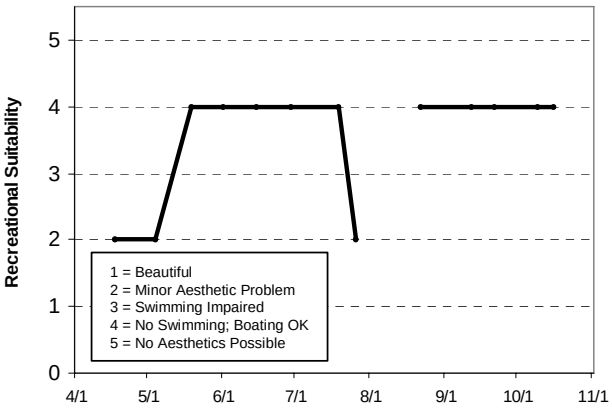


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus							D	D	D	F	F	F	F	F
Chlorophyll a							C	B	D	F	F	F	F	F
Secchi Depth							D	D	F	F	F	F	F	F
Overall							**D**	**C**	**D**	**F**	**F**	**F**	**F**	**F**

Source: Metropolitan Council and STORET data



Hornbean Lake (19-0047) *City of Sunfish Lake*

Hornbean Lake is an approximate 22-acre lake located within the City of Sunfish Lake (Dakota County). There is very little morphological information available for the lake.

This was the first 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 CAMP data are the only nutrient data available. 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 lake was monitored 11 times between mid-April and mid-October, 2006. The resulting data and graphs appear on the next page.

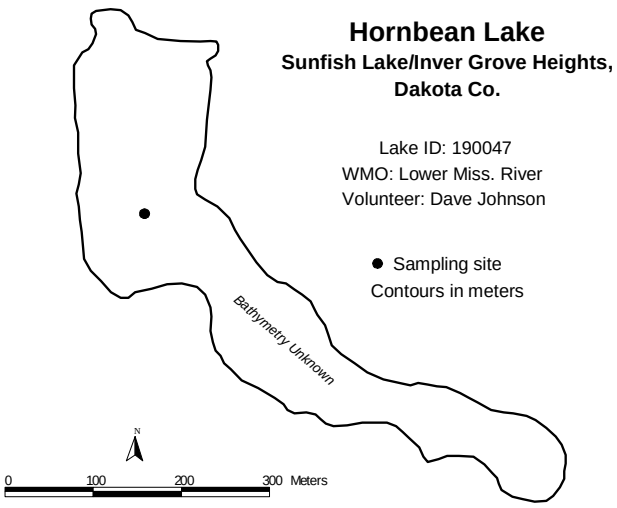
2006 summer (May-September) data summary

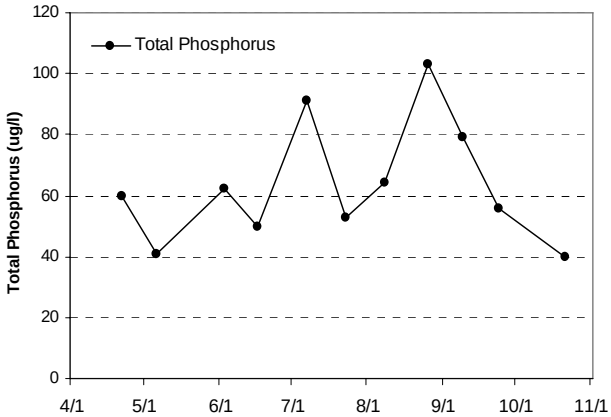
Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	66.6	41.0	103.0	C
CLA (µg/l)	18.2	7.4	31.0	B
Secchi (m)	1.3	0.9	2.0	C
TKN (mg/l)	1.39	0.95	1.90	
			Overall Grade	C

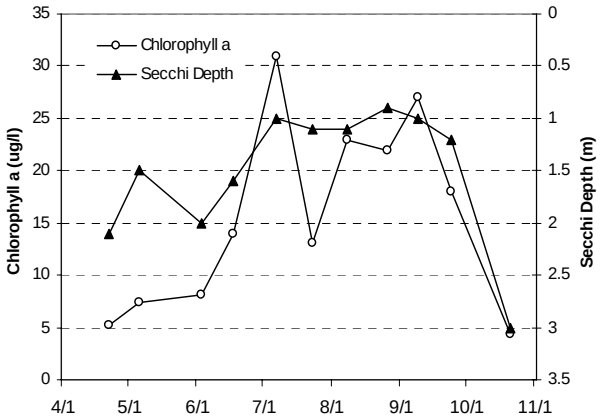
The lake's 2006 overall lake quality grade was a C. As mentioned earlier, there are no nutrient data available for Hornbean Lake other than the 2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may 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 2.8 for physical condition (between 2- "some algae present" and 3- "definite algae present"), and 2.7 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

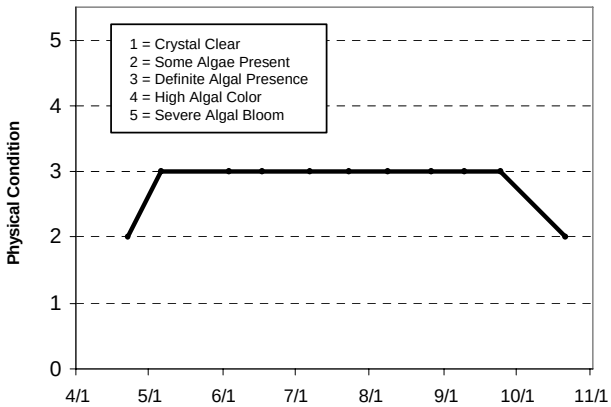






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/22/06	16.8				5.3	60		2.1	2	2
5/6/06	15.7				7.4	41		1.5	3	2
6/3/06	26.3				8.2	62		2	3	3
6/17/06	22.5				14	50		1.6	3	3
7/7/06	28				31	91		1	3	3
7/23/06	28				13	53		1.1	3	3
8/8/06	29.5				23	64		1.1	3	3
8/26/06	24				22	103		0.9	3	3
9/9/06	18.3				27	79		1	3	3
9/24/06	17.3				18	56		1.2	3	3
10/21/06	7.2				4.3	40		3	2	2

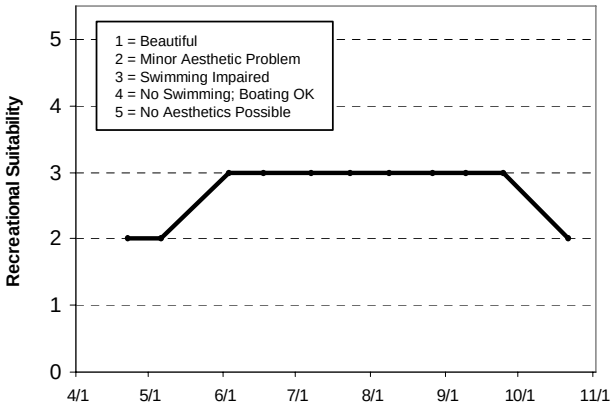


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus														C
Chlorophyll a														B
Secchi Depth														C
Overall														**C**

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 first 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 CAMP data are the only nutrient data available. 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 lake was monitored 11 times between mid-April and mid-October, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	28.8	23.0	35.0	C
CLA (µg/l)	6.3	2.3	12.0	A
Secchi (m)	3.0	1.6	4.3	C
TKN (mg/l)	0.84	0.48	1.30	
			Overall Grade	B

The lake's 2006 overall lake quality grade was a B. As mentioned earlier, there are no nutrient data available for Horseshoe Lake other than the 2006 CAMP data. Therefore it is not possible to determine any long-term or short-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 2.7 for physical condition (between 2- "some algae present" and 3- "definite algae present"), 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

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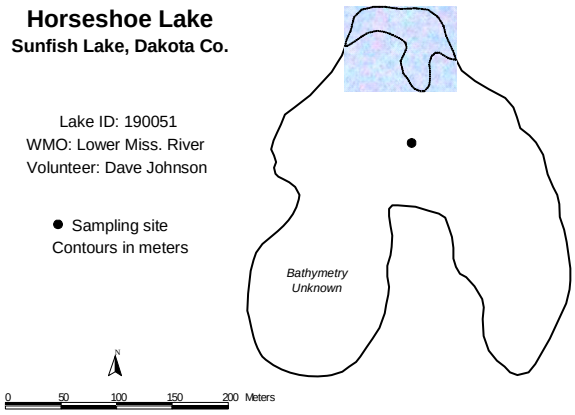
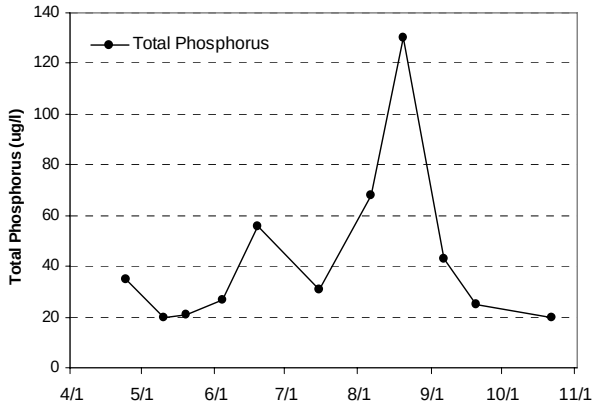
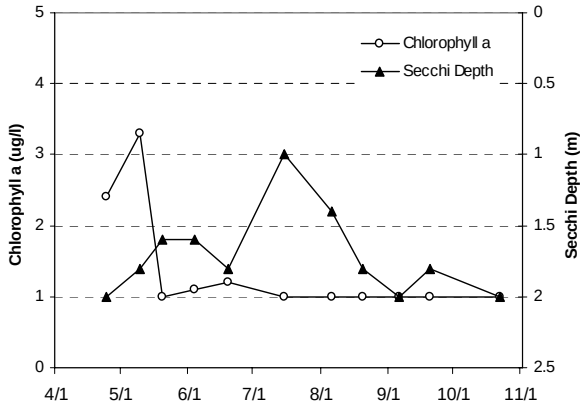
Horseshoe Lake
Sunfish Lake, Dakota Co.

Lake ID: 190051
WMO: Lower Miss. River
Volunteer: Dave Johnson

● Sampling site
Contours in meters

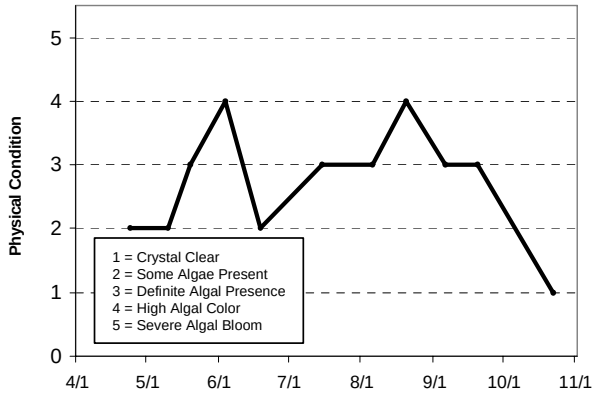






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/24/06	15.9				2.4	35		2	2	4
5/10/06	14.3				3.3	20		1.8	2	4
5/20/06	23.2				1	21		1.6	3	4
6/4/06	27				1.1	27		1.6	4	4
6/19/06	24.5				1.2	56		1.8	2	4
7/15/06	31				1	31		1	3	4
8/6/06	28.6				1	68		1.4	3	4
8/20/06	27.8				1	130		1.8	4	4
9/6/06	25.2				1	43		2	3	4
9/20/06	18.6				1	25		1.8	3	4
10/22/06	7.7				1	20		2	1	3

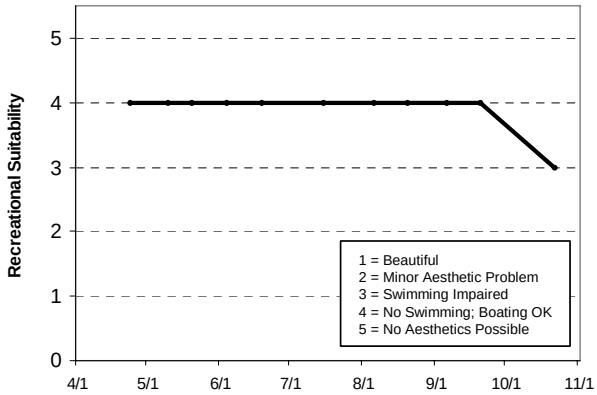


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus														C
Chlorophyll a														A
Secchi Depth														C
Overall														**B**

Source: Metropolitan Council and STORET data



Hydes Lake (10-0088) *Carver County Environmental Services*

Hydes Lake, a 215-acre lake located within Waconia Township (Carver County) 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 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). A 1999 water quality report on water resources in Carver County estimates land use for the watershed at: seven percent residential, 76 percent agricultural, and 17 percent open/undeveloped (Carver County Planning 1999).

This was the eighth year that Hydes Lake has been involved in CAMP (the lake was initially enrolled 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 14 times between mid-April and mid-October, 2006. 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.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	197.2	66.0	355.0	F
CLA (µg/l)	47.8	3.9	150.0	C
Secchi (m)	1.4	0.4	2.7	C
TKN (mg/l)	2.42	1.10	4.40	
			Overall Grade	D

The lake's 2006 overall grade is identical to those recorded in 1985, 1991, 1993, 1996, 1999-2000, 2002, and 2004-2005, and worse than that of 2001 and 2003 (C).

Statistical analysis on the lake's water quality database did not detect any long-term trends. In the short-term however, the lake's water quality seems to be well represented by an overall grade of D. In order to detect any possible long-term trends, additional years of data collection are needed.

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 3.0 for physical condition (3- "definite algae present") and 2.9 for recreational suitability (roughly 3- "swimming slightly impaired").

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

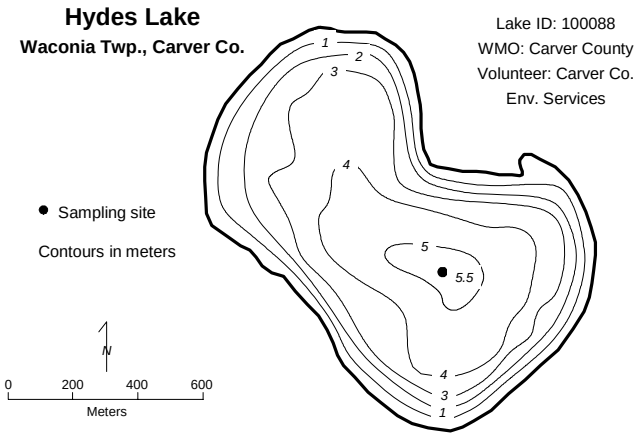
fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

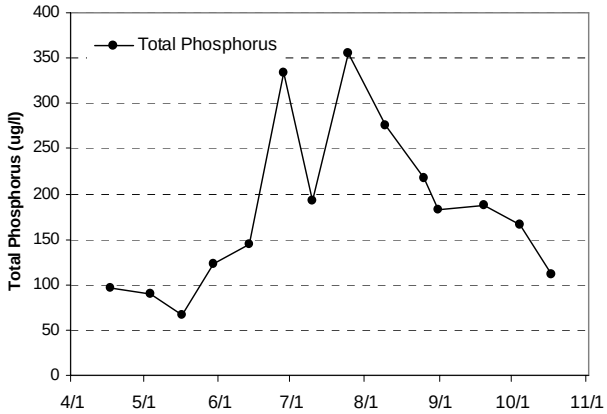
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

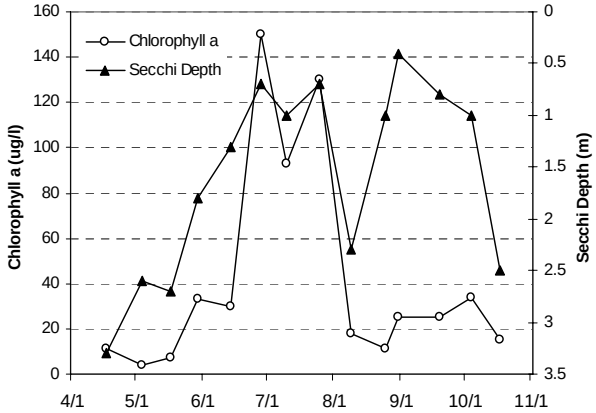
Hydes Lake

Waconia Twp., Carver Co.

Lake ID: 100088
WMO: Carver County
Volunteer: Carver Co.
Env. Services

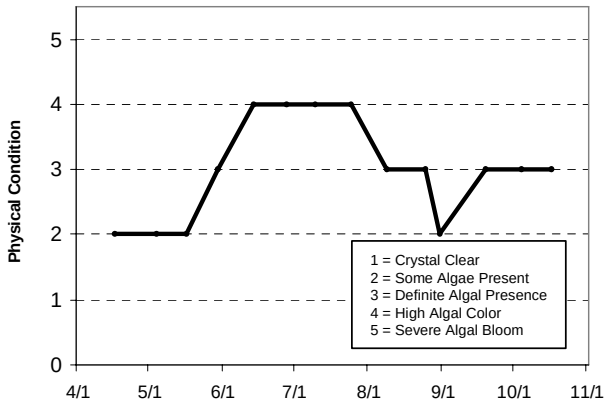






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/17/06	12.4		9.68		11	97		3.3	2	1
5/4/06	13.83		8.78		3.9	89		2.6	2	2
5/17/06	14.68		10.52		7.5	66		2.7	2	2
5/30/06	13.82		9.99		33	123		1.8	3	3
6/14/06	22.52		10.27		30	144		1.3	4	4
6/28/06	23.96		12.84		150	334		0.7	4	4
7/10/06	25.22		10.52		93	193		1	4	4
7/25/06	26.81		11.71		130	355		0.7	4	4
8/9/06	26.33		4.56		18	276		2.3	3	3
8/25/06	23.44		4.8		11	218		1	3	3
8/31/06	22.42		4.62		25	183		0.4	2	2
9/19/06	16.83		8.86		25	188		0.8	3	3
10/4/06	15.74		9.47		34	166		1	3	3
10/17/06	8.75		9.78		15	111		2.5	3	3

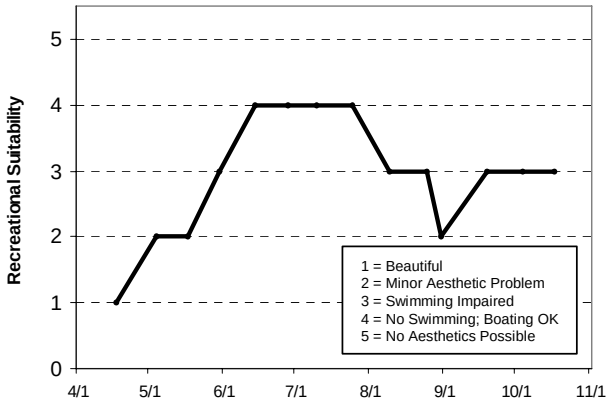


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus						F						F	
Chlorophyll a						D						D	
Secchi Depth						D						D	
Overall						**D**						**D**	

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus	F			F			F	F	D	D	D	D	F	F
Chlorophyll a	C			C			C	C	C	C	C	D	D	C
Secchi Depth	C			C			C	C	C	F	C	D	C	C
Overall	**D**			**D**			**D**	**D**	**C**	**D**	**C**	**D**	**D**	**D**

Source: Metropolitan Council and STORET data



Island Lake (2-0022) *Anoka County Parks*

This was the fourth year of CAMP monitoring on Island Lake, which 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 (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 data on the lake provided only one prior year of water quality data for the lake (1983) prior to the 2003-2006 CAMP data. The lake was monitored 14 times between mid-April and mid-October, 2006. 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

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	44.7	20.0	111.0	C
CLA (µg/l)	11.6	5.6	21.0	B
Secchi (m)	1.5	1.0	2.5	C
TKN (mg/l)	0.92	0.66	1.20	
			Overall Grade	C

The lake's overall 2006 lake quality grade of C is identical to that recorded in 1983 and 2005 and worse than the B calculated from the 2003-2004 data.

Because 2006 is only the fifth year of available data, no long- or short-term trends can be determined. To better understand the quality of the lake and what direction it may be heading, more years of data collection are needed. A recent MPCA conducted trend analysis on the lake's Secchi transparency data, however, revealed a statistically significant decrease in the lake's recent water clarity.

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 2.0 for physical condition (between 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) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

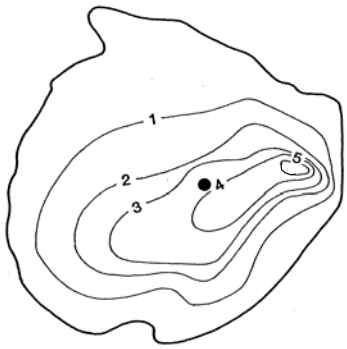
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

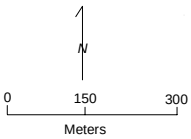
Island Lake

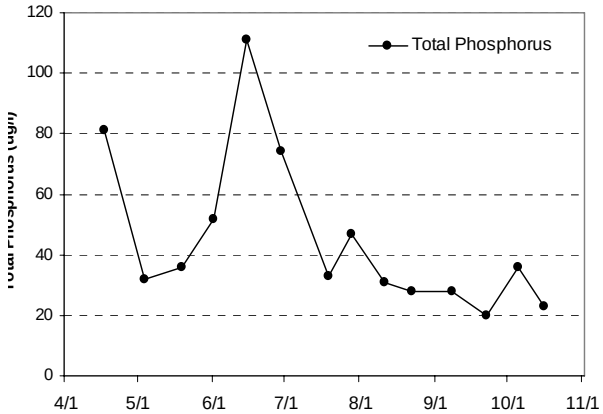
Linwood Twp., Anoka Co.

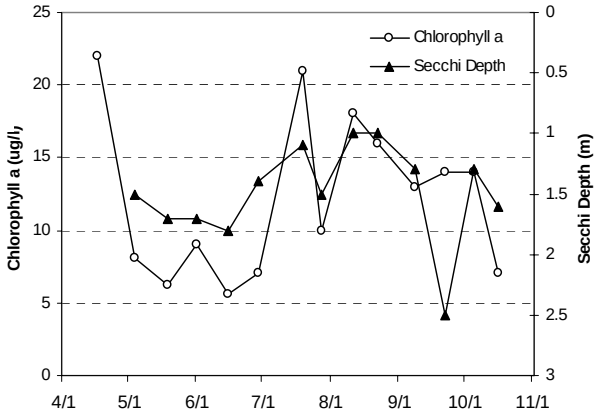
Lake ID: 20022
WMO: Sunrise River
Volunteer: Anoka Co. Parks

● Sampling site
Contours in meters



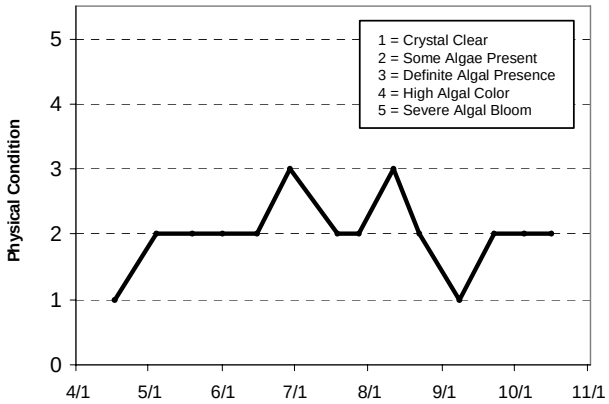






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/17/06	15.6				22	81			1	1
5/4/06	14.7				8.1	32		1.5	2	1
5/19/06	16.1				6.2	36		1.7	2	2
6/1/06	24.9				9	52		1.7	2	2
6/15/06	22.9				5.6	111		1.8	2	3
6/29/06	24.2				7.1	74		1.4	3	2
7/19/06	25.8				21	33		1.1	2	2
7/28/06	28.9				10	47		1.5	2	2
8/11/06	24.8				18	31		1	3	
8/22/06	24.8				16	28		1	2	2
9/8/06	17.7				13	28		1.3	1	1
9/22/06	12.3				14	20		2.5	2	1
10/5/06	15.1				14	36		1.3	2	1
10/16/06	7.4				7.1	23		1.6	2	1

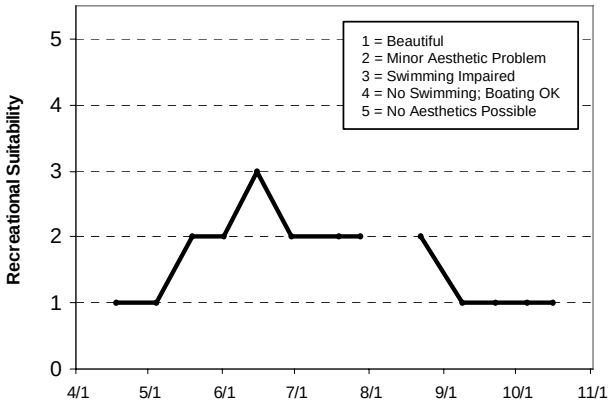


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus				C									
Chlorophyll a				C									
Secchi Depth				D									
Overall				**C**									

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus											B	C	C	C
Chlorophyll a											B	A	B	B
Secchi Depth											C	C	C	C
Overall											**B**	**B**	**C**	**C**

Source: Metropolitan Council and STORET data



Jane Lake (82-0104) *Valley Branch Watershed District*

Lake Jane, which has a surface area of roughly 155 acres, is located in the northwest corner of the City of Lake Elmo (Washington County). The maximum and mean depths of the lake are 12.0 and 3.7 m (39 and 12 feet), respectively (roughly 72 % of the lake is considered littoral; the area of aquatic plant dominance). The approximate volume of the lake is 1,860 acre-feet (ac-ft) and its residence time (the estimated time it would take the lake to replenish itself if it were drained), is roughly 1.4 years. The size of the lake's immediate 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 MNDNR manages the lake for largemouth bass, bluegill and crappie, and reports good reproduction) and boaters during the summer months. Furthermore, Lake Jane is considered a "Priority Lake" in the Metropolitan Area because of its multi-recreational uses.

This is the fourth year the lake has been a part of CAMP (1994 being the first). In addition to the CAMP monitoring, the lake has been monitored in past years by Council staff. As part of the 2006 volunteer monitoring program, Lake Jane was monitored 10 times from early-May to mid-September. Graphs as well as the actual data collected by volunteers show the seasonal variability in TP and CLA concentrations, Secchi transparency, and user perception (physical condition and recreational suitability). The graphs and data tables are presented on the information sheet on the next page.

2006 summer (May-September) data summary

Parameter	***Mean***	***Minimum***	***Maximum***	***Grade***
TP (µg/l)	14.0	10.0	20.0	A
CLA (µg/l)	2.4	1.2	4.4	A
Secchi (m)	5.0	3.0	6.6	A
TKN (mg/l)	0.67	0.44	0.84	
			Overall Grade	A

Data retrieved from the MPCA's STORET water quality database revealed an extensive historical database for Lake Jane. Varying amounts of water quality data were available representing each year since 1980. Out of the 19 years of data, Secchi transparencies were recorded annually, phosphorus was measured in 11 of those 19 years, and CLA nine years. The lake’s best water quality has been recorded in 2000 and 2004-2005.

The average user perception rankings of Lake Jane correspond to the overall good quality of the lake. On a 1 to 5 ranking scale, the mean physical condition ranking was 1.0 (1- "crystal clear”).

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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

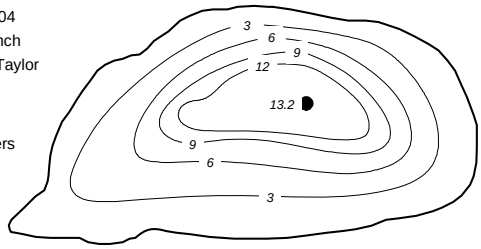
Lake Jane

Lake Elmo, Washington Co.

LAKE ID: 820104
WD: Valley Branch
Volunteer: Chuck Taylor

● Sampling site

Contours in meters



N

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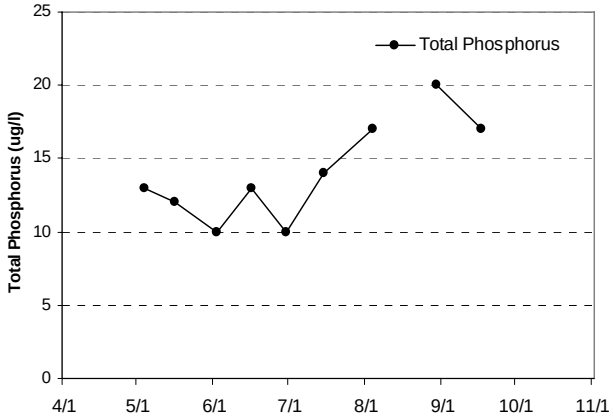
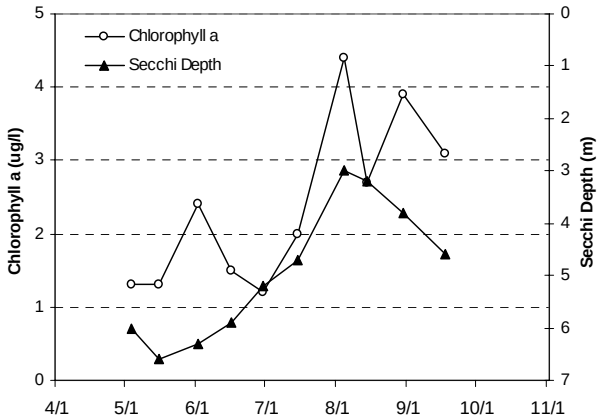
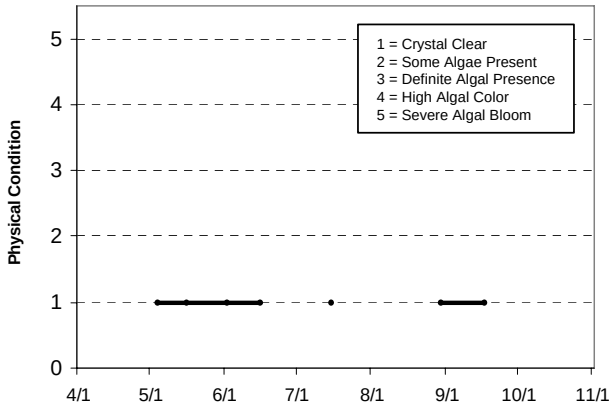
Meters





2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/4/06	14.1				1.3	13		6	1	
5/16/06	14.3				1.3	12		6.6	1	
6/2/06	24.6				2.4	10		6.3	1	
6/16/06	25.3				1.5	13		5.9	1	
6/30/06	25.3				1.2	10		5.2		
7/15/06	27.7				2	14		4.7	1	
8/4/06	27.7				4.4	17		3		
8/14/06					2.7			3.2		
8/30/06	24.4				3.9	20		3.8	1	
9/17/06	20				3.1	17		4.6	1	

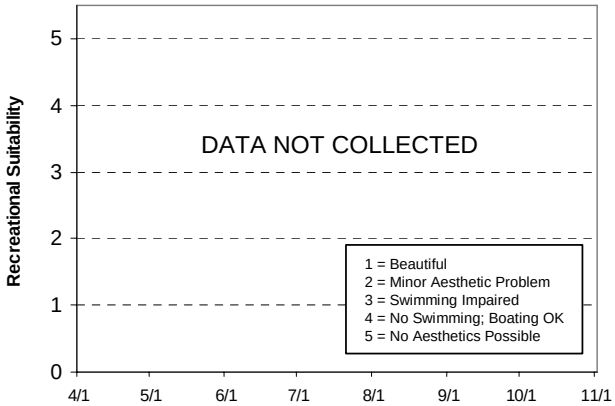


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus	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	C
Overall					**C**		**B**	**B**				**B**	

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus		A						A				A	A	A
Chlorophyll a		A						A				A	A	A
Secchi Depth	B	B						A				A	A	A
Overall		**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. This was the sixth year the lake has been involved in CAMP. Because the maximum depth of the 72-acre lake is only 4.9 m (16 feet), the majority of the lake's 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). 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 immediate 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).

A search through the STORET nationwide water quality database for data on the lake provided historical water quality data on the lake for years 1996-2005. The resulting data and graphs appear on the next page.

The lake was monitored 7 times between late-April and early-October, 2006. Results are presented on graphs and data tables on the following page. During each monitoring event the lake was monitored for TP, CLA, TKN, Secchi transparency, as well as the perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	131.8	55.0	215.0	D
CLA (µg/l)	39.4	13.0	66.0	C
Secchi (m)	1.1	0.6	1.5	D
TKN (mg/l)	1.84	1.30	2.50	
			Overall Grade	D

The lake's 2006 overall grade of D (calculated from the three individual grades) is identical to those recorded in 1996-1999, and 2001-2005, and better than that of 2000 (F).

Statistical analysis on the lake's water quality database did not detect any long-term trends. In the short-term however, the lake's water quality seems to be well represented by an overall grade of D. In order to detect any possible long-term trends, 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. The mean perceived physical condition of Jellum's Bay was 3.0 (3- "definite algae present"), while the mean recreational suitability 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Jellum's Lake, Site 1

New Scandia Twp.,
Washington Co.

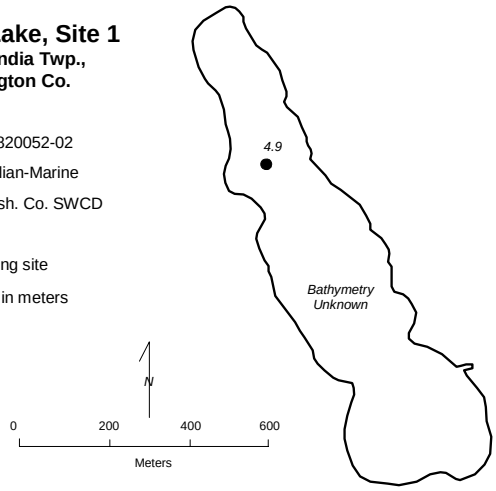
LAKE ID: 820052-02

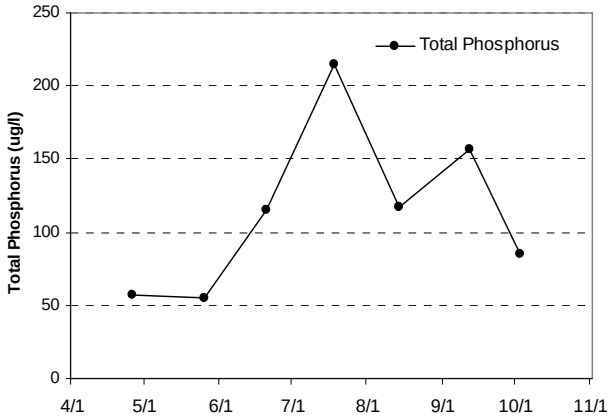
WD: Carnelian-Marine

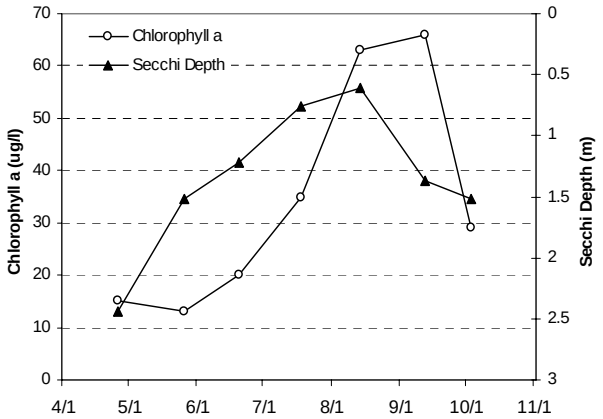
Volunteer: Wash. Co. SWCD

● Sampling site

Contours in meters

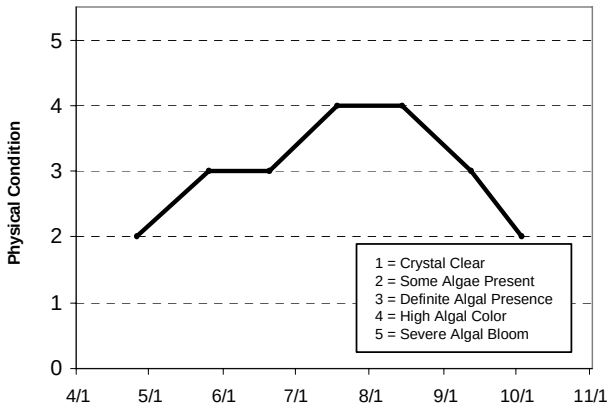






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/26/06	14.4	13.3	6.25	5.04	15	57		2.438	2	3
5/26/06	20.8	14.2	6.02	0.27	13	55		1.524	3	3
6/20/06	23.4	17.1	6.49	0.05	20	115		1.219	3	4
7/18/06	27.9	17.8	9.34	0.04	35	215		0.762	4	4
8/14/06	24.2	22.4	5.24	1.08	63	117		0.61	4	4
9/12/06	18.6	17.9	7.35	0.11	66	157		1.372	3	3
10/3/06	16.3	15.1	8.59	0.1	29	85		1.524	2	3

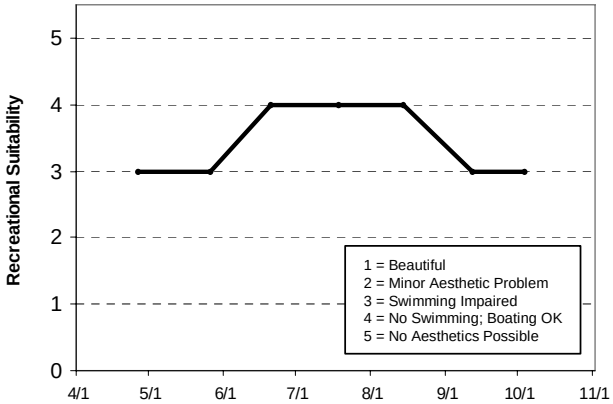


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus				F	D	D	D	D	D	C	D	D	D	D
Chlorophyll a				D	D	D	D	F	D	D	F	C	D	C
Secchi Depth				D	D	F	F	F	D	D	D	D	D	D
Overall				**D**	**D**	**D**	**D**	**F**	**D**	**D**	**D**	**D**	**D**	**D**

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 second year that Jonathan Lake has been involved in CAMP (2002 being the first). A search through the STORET nationwide water quality database for data on the lake provided no data, therefore 2002 and 2006 are the only years where water quality data are available for the lake.

As part of the county's involvement in CAMP in 2006, the lake was monitored 14 times between mid-April and mid-October. During each sampling event the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	207.0	124.0	499.0	F
CLA (µg/l)	63.8	23.0	150.0	D
Secchi (m)	0.5	0.3	0.7	F
TKN (mg/l)	2.07	1.30	3.10	
			Overall Grade	F

The overall lake quality grade for 2006 was an F which is worse than the only other year of recorded data (overall grade of a D).

Throughout the monitoring period, the volunteers' opinion 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 3.4 (between 3- "swimming impaired" and 4- "no swimming – boating ok").

As mentioned earlier, there are no water quality data available for Jonathan Lake other than the 2002 and 2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Jonathan Lake
Chaska, Carver Co.

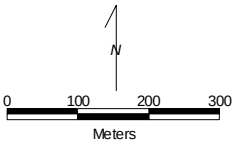
LAKE ID: 100217

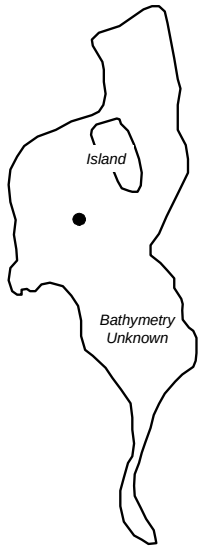
WMO: Carver County

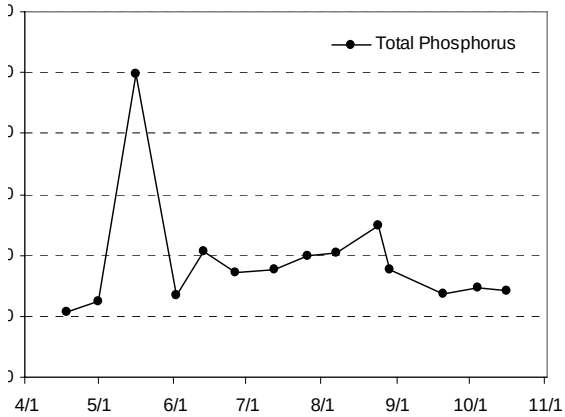
Volunteer: Carver Co. Env. Services

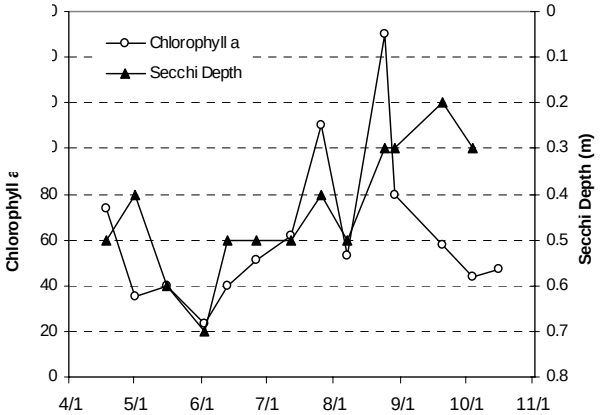
● Sampling site

Contours in meters



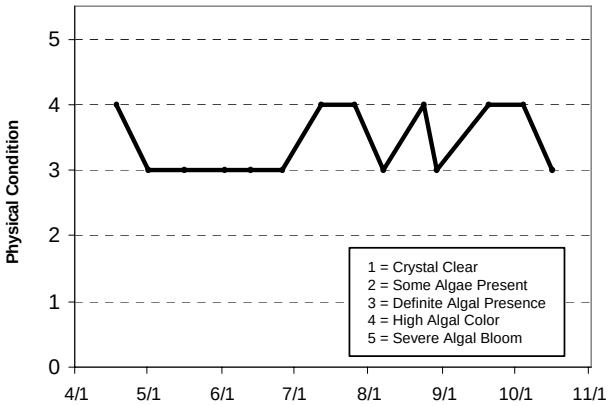






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/18/06	15.01		11.39		74	107		0.5	4	4
5/1/06	13.23		8.66		35	124		0.4	3	3
5/16/06	14.81		10.61		40	499		0.6	3	3
6/2/06	25.93		9.42		23	134		0.7	3	3
6/13/06	22.67		12.7		40	206		0.5	3	3
6/26/06	24.85		8.3		51	172		0.5	3	3
7/12/06	26.17		9.26		62	178		0.5	4	4
7/26/06	27.2		4.61		110	200		0.4	4	4
8/7/06	26.46		7.16		53	203		0.5	3	3
8/24/06	22.76		8.02		150	248		0.3	4	4
8/29/06	21.96		8.05		80	176		0.3	3	3
9/20/06	14.1		9.19		58	137		0.2	4	3
10/4/06	16.66		8.85		44	148		0.3	4	4
10/16/06	9.21		10.44		47	141			3	3

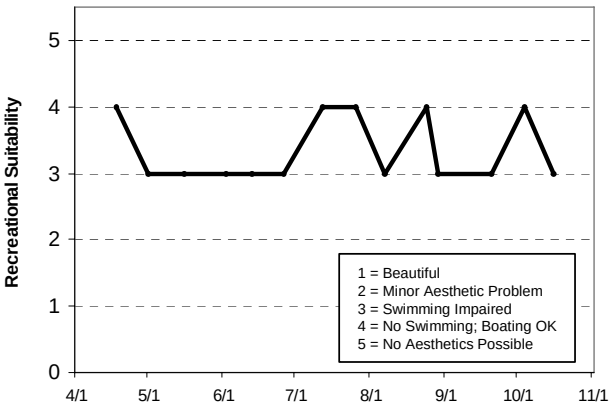


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus										F				F
Chlorophyll a										C				D
Secchi Depth										F				F
Overall										**D**				**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 very little known morphological data available for the lake.

This was the first year that July Lake has been involved in CAMP. A search through the STORET nationwide water quality database for data on the lake provided no data, therefore 2006 is the only year of available water quality data for the lake.

As part of the watershed's involvement in CAMP in 2006, the lake was monitored 7 times between mid-April and late-September. During each sampling event the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	258.5	67.0	812.0	F
CLA (µg/l)	192.2	32.0	410.0	F
Secchi (m)	0.3	0.2	0.6	F
TKN (mg/l)	6.98	1.50	20.0	
			Overall Grade	F

The lake's 2006 overall lake quality grade was an F. As mentioned earlier, there are no nutrient data available for July Lake other than the 2006 CAMP data. Therefore it is not possible to determine any long-term or short-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 3.9 for physical condition (roughly 4- "high algal color"), and 4.1 for recreational suitability (roughly 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

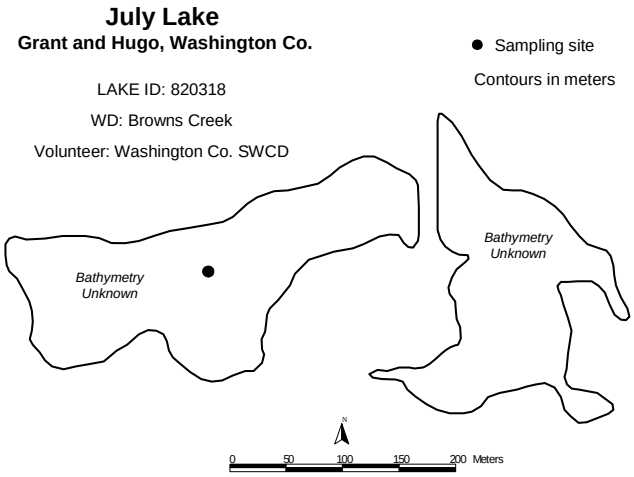
July Lake

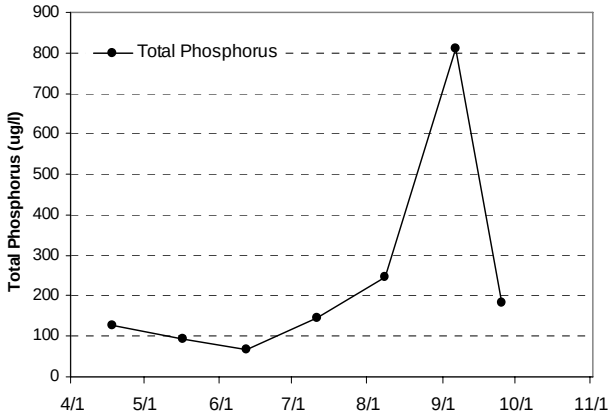
Grant and Hugo, Washington Co.

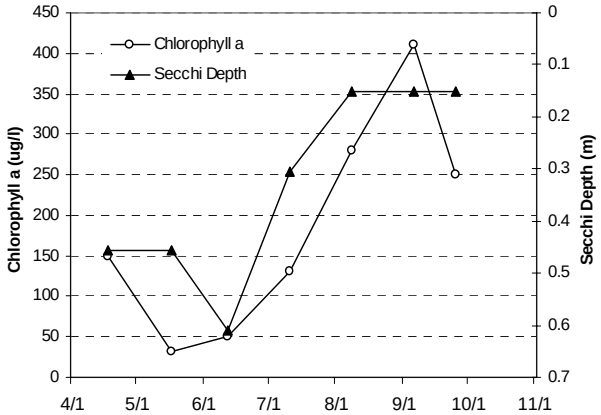
LAKE ID: 820318

WD: Browns Creek

Volunteer: Washington Co. SWCD

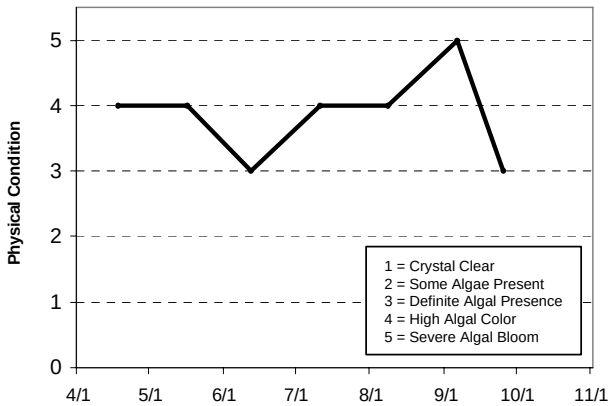






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/18/06	13.9	13.8	11.53	10.8	150	127		0.457	4	4
5/17/06	20.7	13.2	10.53	1.54	32	95		0.457	4	5
6/12/06	19.4	18.3	5.15	0.51	51	67		0.61	3	4
7/11/06	25.2	21.7	9.98	0.1	130	146		0.305	4	4
8/8/06	24.9	22	9.06	0.09	280	248		0.152	4	4
9/6/06	21.5		10.6		410	812		0.152	5	4
9/25/06	14	13.6	9.08	0.15	250	183		0.152	3	4

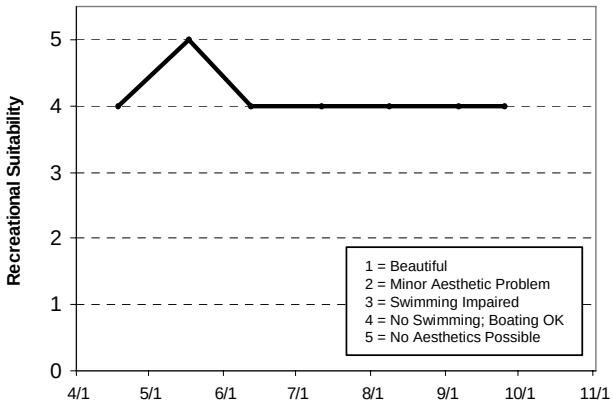


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus														F
Chlorophyll a														F
Secchi Depth														F
Overall														**F**

Source: Metropolitan Council and STORET data



Keller Lake [Burnsville] (19-0025) *Black Dog Watershed Management Commission*

Keller Lake, located in the cities of Apple Valley and Burnsville (Dakota County), covers an area of 63 acres with a maximum depth of 3.0 m (10 feet). The lake's mean depth of 1.4 m (4.6 feet) and surface area translates to an approximate lake volume of 290 ac-ft (the lake volume may have changed over the past few years due to the lake level rising 1.5 to 2.0 feet above normal). 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 land uses within the 353-acre contributing watershed to the lake are approximately split between agricultural uses and urban/residential. The watershed-to-lake size ratio is 6:1 (the greater the ratio, the greater the potential stress on the lake from surface runoff).

This was the eighth year that Keller Lake has been enrolled in CAMP. The lake had been monitored by Council staff in the past as part of a study on Crystal Lake (which Keller flows into), and was again monitored by Council staff in 2006. The 2006 Council staff monitoring included additional samples collected at subsurface depth analyzed for a more complete array of parameters to help determine the effectiveness of a ferric chloride dosing system. The following information in this section is based on data collected by the CAMP volunteer. Part 1 of the report discusses results of the Council staff data.

As part of CAMP in 2006, volunteers monitored the lake14 times between mid-April and mid-October. The collected data and resulting graphs showing TP and CLA concentrations, Secchi transparency, and user perception (physical condition and recreational suitability) are presented on the lake's information sheet on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	84.8	29.0	208.0	D
CLA (µg/l)	61.8	5.8	420.0	D
Secchi (m)	1.17	0.3	2.5	D
TKN (mg/l)	1.72	0.80	4.70	
			Overall Grade	D

The lake's overall grade in 2006 (D) is similar to that recorded in 1996-1997, 1999-2001 and 2003 and worse than those recorded in 2002, 2004-2005 (C). Because of the variability of the lake's grades, no statistically significant long-term trend is evident from the lake's water quality database. The lake's water quality seems to be best represented by an overall grade of D+/C.

Similar to past years, the 2006 Secchi transparency would have been greater except on many monitoring events the lake's excessive submergent macrophyte growth got in the way. Therefore, the lake's 2006 water clarity was actually better than that represented by the summer mean and resulting grade.

Throughout the 2005 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 3.1 (roughly 3- "definite algae present"), while the mean recreational suitability 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) 297-4916 or by downloading Internet information at http://www.dnr.state.mn.us/lakefind/.

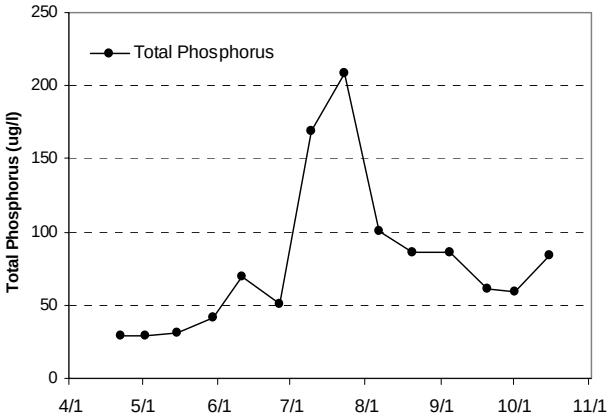
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

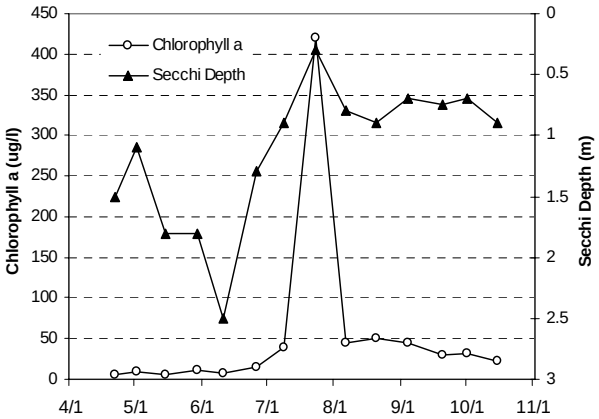
Keller Lake
Burnsville, Dakota Co.

Lake ID: 190025
WMO: Black Dog
Volunteer: Glen Gramse

● Sampling site

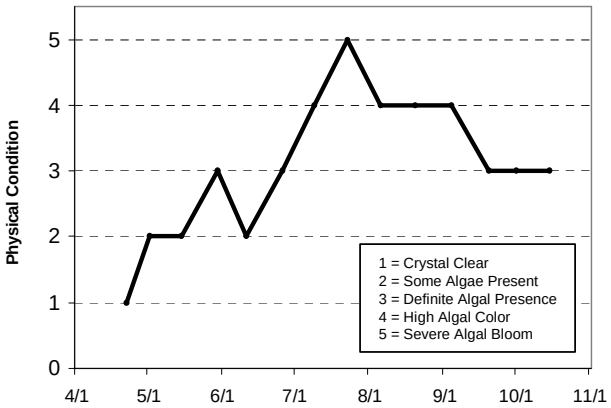
Contours in meters





2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/22/06	15.2				4.9	29		1.5	1	1
5/2/06	16.2				9.9	29		1.1	2	2
5/15/06	14.7				5.8	31		1.8	2	4
5/30/06	27.2				12	41		1.8	3	4
6/11/06	20.5				7	70		2.5	2	3
6/26/06	25.2				15	51		1.3	3	4
7/9/06	26.7				40	169		0.9	4	4
7/23/06	26.4				420	208		0.3	5	5
8/6/06	26.9				45	101		0.8	4	4
8/20/06	25.8				50	86		0.9	4	4
9/4/06	24.1				45	86		0.7	4	4
9/20/06	15.8				30	61		0.75	3	4
10/1/06	16.1				32	59		0.7	3	4
10/15/06	6.9				22	84		0.9	3	4

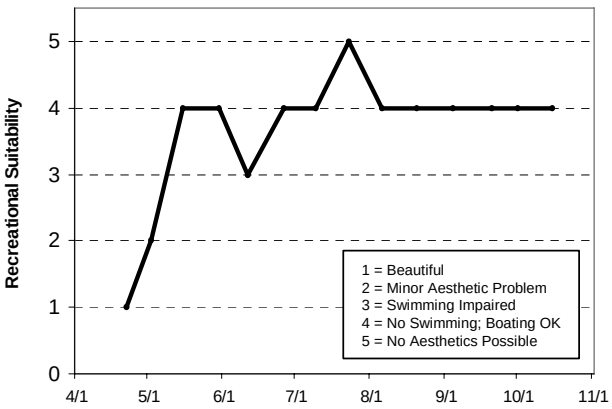


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus				D	D	C	D	D	D	C	D	C	C	D
Chlorophyll a				F	C	A	C	C	C	B	C	B	B	D
Secchi Depth				D	D	C	D	D	D	D	D	C	C	D
Overall				**D**	**D**	**B**	**D**	**D**	**D**	**C**	**D**	**C**	**C**	**D**

Source: Metropolitan Council and STORET data



Kingsley Lake (19-0030) *Black Dog Watershed Management Commission*

This was the ninth year that Kingsley Lake has been monitored as part of CAMP (1995-1997 and 2000-2006). Additionally, the lake was monitored by Council staff in 1993. The 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 4:1 that no doubt contributes to the good water quality of the lake. Because of the shallowness of the lake, the entire lake is considered littoral (area of aquatic vegetation dominance), and never develops and maintains a thermocline.

Kingsley Lake was monitored 14 times between mid-April and early-October, 2006. Results are presented in both graphs and data tables on the lake's information sheet on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	23.9	12.0	35.0	B
CLA (µg/l)	2.3	1.4	3.5	A
Secchi (m)	2.2	1.6	2.8	B
TKN (mg/l)	0.63	0.41	1.00	
			Overall Grade	B

Similar to past years, the Secchi transparency in 2006 would have been greater except that on many monitoring events, the lake's excessive submergent macrophyte growth got in the way. For this reason, if it weren't for the macrophyte interference, the water clarity conditions may have actually been that of an A grade.

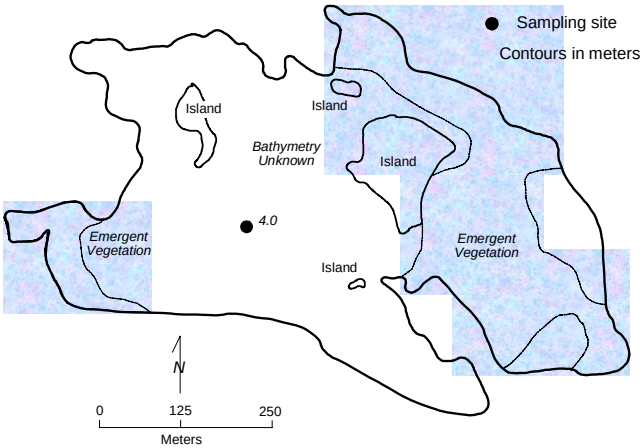
The physical and recreational conditions of Kingsley Lake as perceived by the volunteer(s) were ranked on a 1-to-5 scale. The mean physical condition ranking was 1.9 (roughly 2- "some algae present"), while the mean recreational suitability ranking was 2.4 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

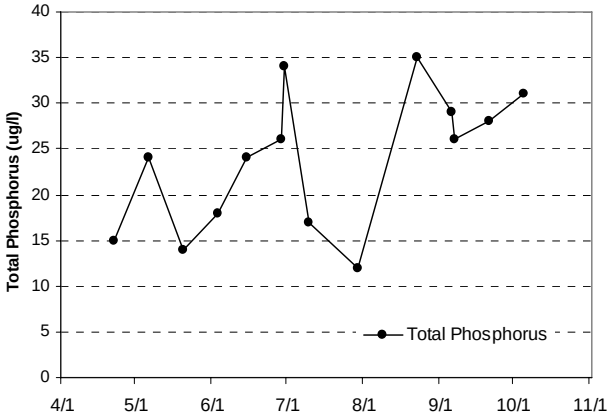
No statistically significant long-term trend is evident from the lake's water quality database, in the short-term however, the lake's water quality seems to be represented by a water quality grade of A/B+.

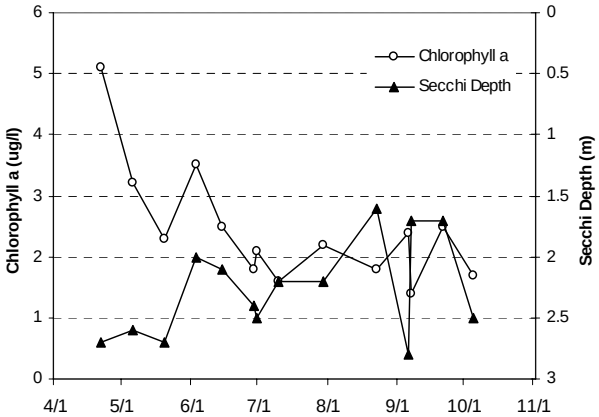
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Lake ID: 190030
WMO: Black Dog
Volunteers: The Green Family

Kingsley Lake
Lakeville, Dakota Co.

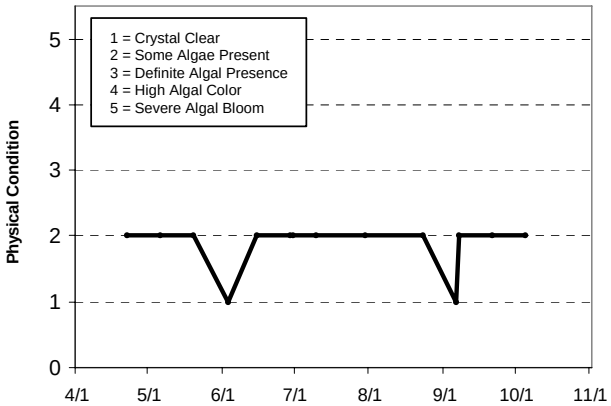






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/22/06	15.7				5.1	15		2.7	2	1
5/6/06	15				3.2	24		2.6	2	1
5/20/06	18.7				2.3	14		2.7	2	1
6/3/06	25.5				3.5	18		2	1	1
6/15/06	23.1				2.5	24		2.1	2	2
6/29/06	25.2				1.8	26		2.4	2	3
6/30/06	26.9				2.1	34		2.5	2	3
7/10/06	27.2				1.6	17		2.2	2	4
7/30/06	29				2.2	12		2.2	2	3
8/23/06	25.2				1.8	35		1.6	2	4
9/6/06	21.8				2.4	29		2.8	1	1
9/7/06	23.6				1.4	26		1.7	2	4
9/21/06	14.9				2.5	28		1.7	2	4
10/5/06	16.8				1.7	31		2.5	2	2

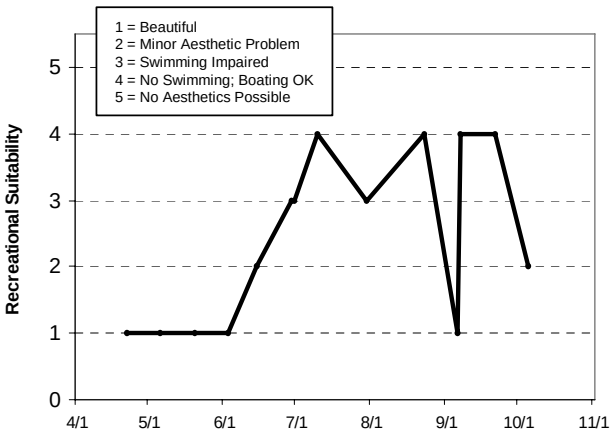


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus	B		B	A	A			A	A	A	B	A	A	B
Chlorophyll a	A		A	A	A			A	A	A	A	A	A	A
Secchi Depth	A		B	B	B			B	C	B	B	B	B	B
Overall	**A**		**B**	**A**	**A**			**A**	**B**	**A**	**B**	**A**	**A**	**B**

Source: Metropolitan Council and STORET data



Kismet Lake (82-0333) *Browns Creek Watershed District*

Kismet Lake is located in Washington County. The 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, the shallow (0-15 foot depth) area dominated by aquatic vegetation.

This was the ninth year that Kismet Lake has been involved in CAMP (it was initially enrolled in 1998). The only available lake data found through a search for historical water quality was the 1998-2006 CAMP data. The lake was monitored 14 times between mid-April and mid-October, 2006. 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.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	66.4	28.0	209.0	C
CLA (µg/l)	25.3	5.5	88.0	C
Secchi (m)	1.8	1.5	2.3	C
TKN (mg/l)	1.23	0.73	3.40	
			Overall Grade	C

The lake's 2006 overall grade is identical to those recorded in 1998-2002 and 2005, and worse than those recorded in 2003-2004 (B).

No statistically significant long-term trend is evident from the lake's water quality database, in the short-term however, the lake's quality seems well represented by an overall grade of B+/C. To better understand the quality of the lake and what direction it may be heading, continued monitoring is suggested.

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 (2- "some algae present"), while the mean 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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

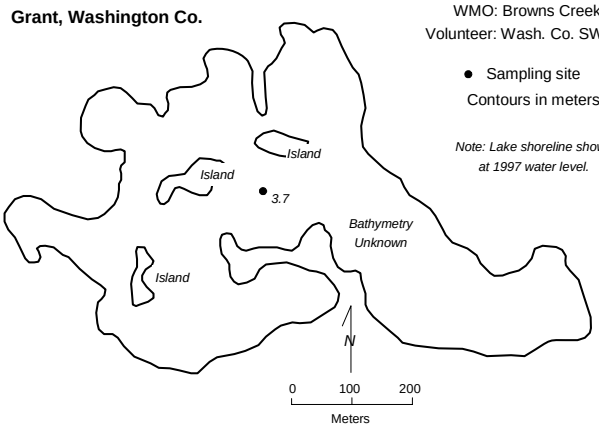
Kismet Lake

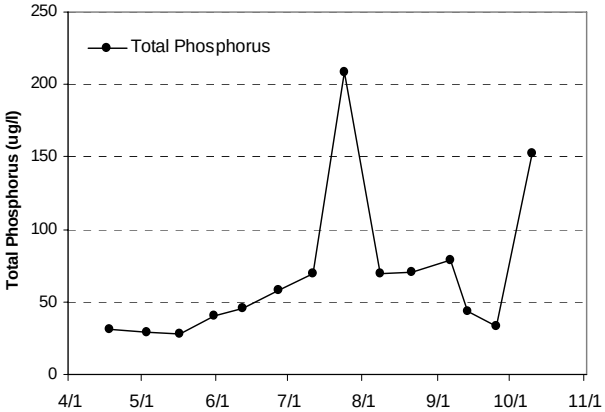
Grant, Washington Co.

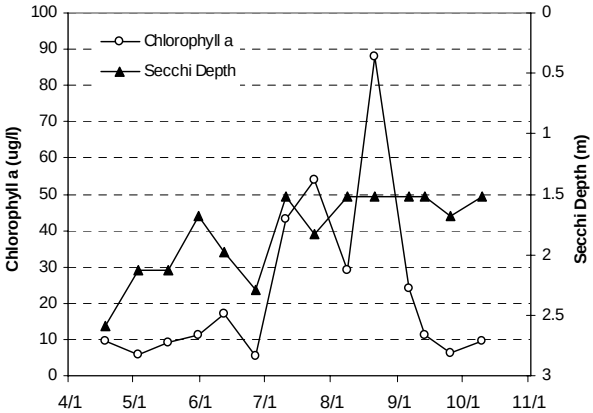
Lake ID: 820333
WMO: Browns Creek
Volunteer: Wash. Co. SWCD

● Sampling site
Contours in meters

Note: Lake shoreline shown at 1997 water level.

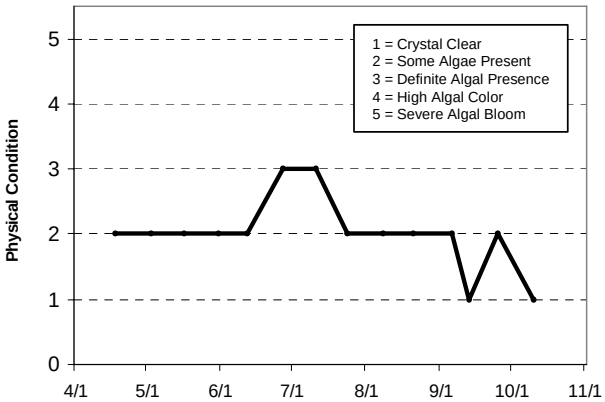






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/18/06	14.4	9.35	9.88	8.8	9.4	31		2.591	2	1
5/3/06	16.3	13.4	8.45	4.6	5.7	29		2.134	2	2
5/17/06	17.6	13.1	10.21	6.01	9	28		2.134	2	3
5/31/06	26.1	16.5	6.16	0.08	11	40		1.676	2	2
6/12/06	21	19.2	4.87	0.07	17	46		1.981	2	3
6/27/06	24.7	20.8	8.29	0.09	5.5	58		2.286	3	3
7/11/06	26.2	21.2	8.95	0.05	43	70		1.524	3	4
7/24/06	27.5	22.3	8.41	0.08	54	209		1.829	2	3
8/8/06	27.2	22.9	7.2	0.06	29	69		1.524	2	3
8/21/06	24.8	21.8	7.51	0.06	88	71		1.524	2	3
9/6/06	23.4	20.6	7.27	0.17	24	79		1.524	2	2
9/13/06	19.2	17.2	5.94	0.07	11	44		1.524	1	2
9/25/06	14.4	13.9	10.48	0.12	6.2	33		1.676	2	2
10/10/06	12.7	12.8	8.49	0.05	9.4	153		1.524	1	2

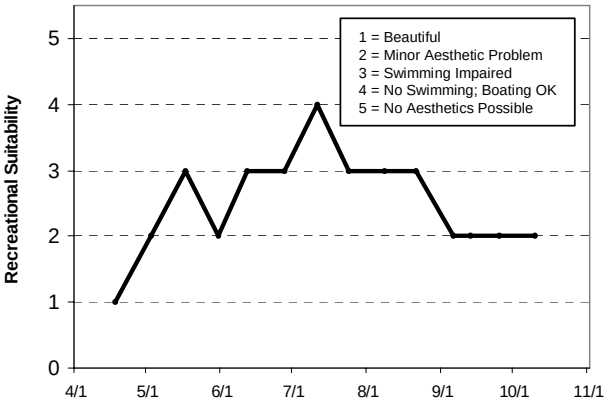


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus						C	C	D	C	C	B	B	C	C
Chlorophyll a						C	C	C	B	B	B	A	B	C
Secchi Depth						C	C	C	C	C	B	B	C	C
Overall						**C**	**C**	**C**	**C**	**C**	**B**	**B**	**C**	**C**

Source: Metropolitan Council and STORET data



Klawitter Lake (82-0368) *Valley Branch Watershed District*

Klawitter Lake is a small 4.5-acre lake located within the boundaries of Lake Elmo (Washington County). Because of the shallowness of the lake, it is considered entirely littoral (the 0-15 foot depth zone of a lake 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 lake's surface area and watershed size (168 acres) translates to a 37:1 watershed-to-lake size ratio. Generally the larger the ratio, the greater the potential stress on the lake from surface runoff.

This was the fifth year that Klawitter Lake has been involved in CAMP. Other than for the 2002-2006 CAMP data, a search through the STORET nationwide water quality database for data on the lake came up empty.

As part of the watershed's involvement in CAMP in 2006, the lake was monitored 12 times between late-April and late-October. During each sampling event the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	101.7	32.0	194.0	D
CLA (µg/l)	32.9	9.0	55.0	C
Secchi (m)	0.7	0.4	1.0	F
TKN (mg/l)	1.99	0.80	2.8	
			Overall Grade	D

The 2006 overall grade determined through the calculation of all three parameters (D), is similar to that recorded in 2003-2005, and worse than the overall grade of C in 2002.

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 3.3 (between 3- "swimming slightly impaired" and 4- "no swimming – boating ok").

As mentioned earlier, there are no water quality data available for Klawitter Lake other than the 2002-2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Klawitter Pond

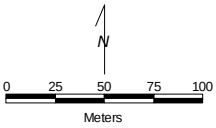
Lake Elmo, Washington Co.

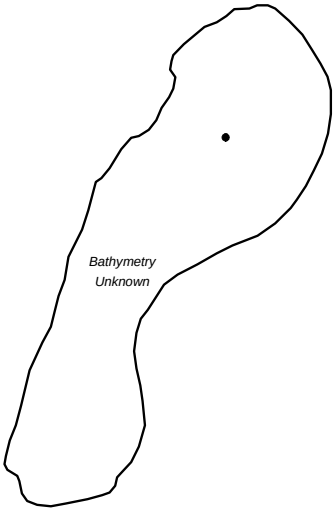
Lake ID: 820368
WD: Valley Branch

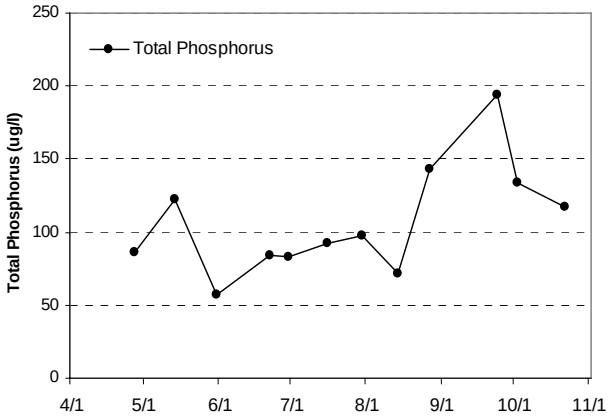
Volunteer: Bonnie Jurand

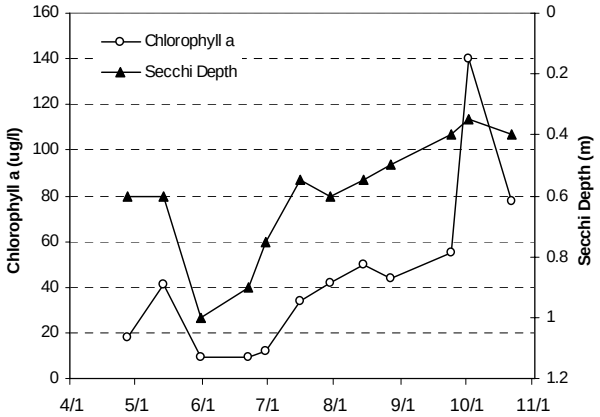
● Sampling site

Contours in meters



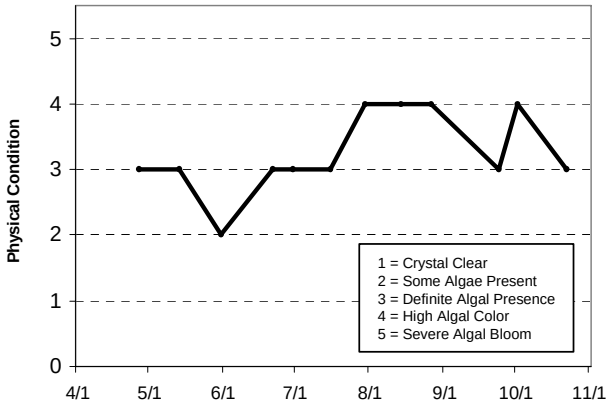






2006 Data

Date	Surf. Tmp C	Bot. Tmp C	Surf. DO mg/L	Bot. DO mg/L	CLA ug/L	Surf. TP ug/L	Bot. TP ug/L	Secchi M	PC 1 thru 5	RS 1 thru 5
4/27/06	14.7				18	86		0.6	3	2
5/14/06	14.7				41	122		0.6	3	2
5/31/06	27.5				9.5	57		1	2	3
6/22/06	25.9				9	84		0.9	3	3
6/30/06	27.7				12	83		0.75	3	3
7/16/06	27.9				34	92		0.55	3	3
7/30/06	29.7				42	98		0.6	4	3
8/14/06	27.2				50	72		0.55	4	3
8/27/06	23.8				44	143		0.5	4	4
9/24/06	17.1				55	194		0.4	3	4
10/2/06	17.2				140	134		0.35	4	5
10/22/06	7.2				78	117		0.4	3	5

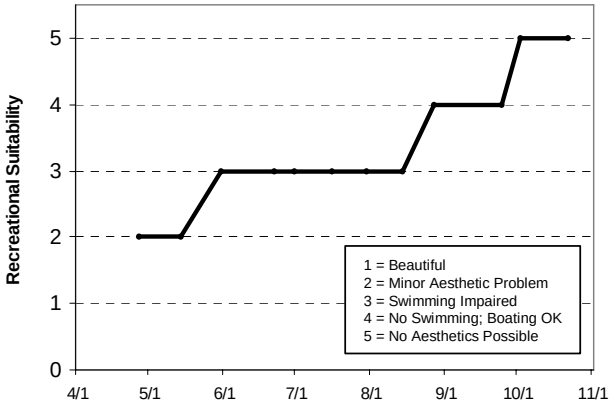


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus										D	D	D	D	D
Chlorophyll a										B	C	C	C	C
Secchi Depth										D	F	D	D	F
Overall										**C**	**D**	**D**	**D**	**D**

Source: Metropolitan Council and STORET data



La Lake (82-0097) *City of Woodbury*

La Lake, located in the City of Woodbury (Washington County), has been monitored through CAMP since 1994. The lake has a surface area of approximately 35 acres (1.3 miles around) and a maximum depth of 3.5 m (11 feet). Because of the shallowness of the lake, it is considered entirely littoral (the 0-15 foot depth zone of a lake dominated by aquatic vegetation), and does not maintain a thermocline (a density gradient owed to changing water temperatures throughout the lake's water column).

As part of the lake's involvement in CAMP in 2006, the lake was monitored 12 times between mid-April and mid-October. During each sampling event the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	***Mean***	***Minimum***	***Maximum***	***Grade***
TP (µg/l)	94.2	50.0	131.0	D
CLA (µg/l)	37.1	2.5	76.0	C
Secchi (m)	1.4	0.5	2.8	C
TKN (mg/l)	1.53	0.88	2.20	
			Overall Grade	C

The lake's 2006 overall grade was identical to those recorded in 1994, 1996-1997, and 1999-2003, and 2005 and worse than the B's recorded in 1995 and 1998.

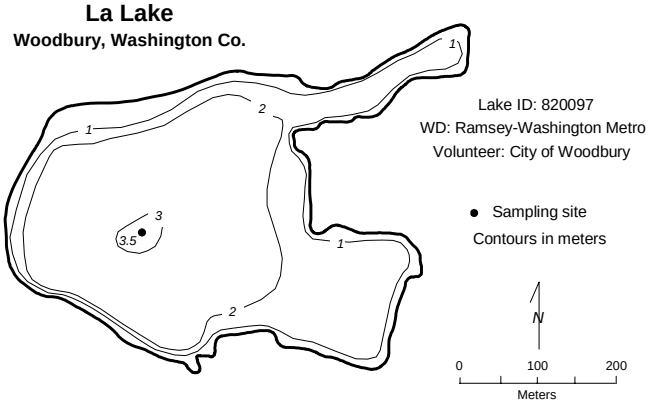
No statistically significant long-term trend is evident from the lake's water quality database, in the short-term however, the lake's overall water quality seems to be well represented by a water quality grade of high-C/low-B. With this in mind, however, some concern should be given to the recent (late-1990's and early-2000's) poor water quality years.

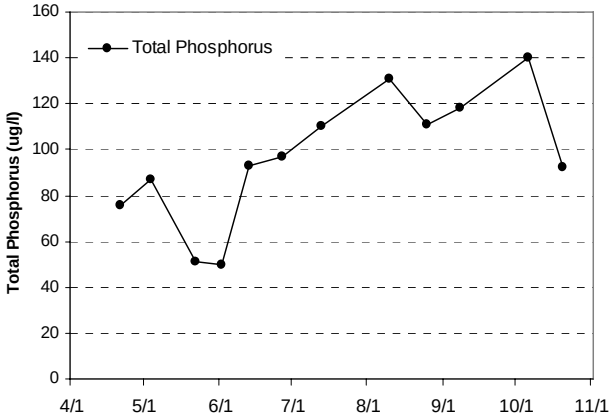
Throughout the monitoring period, the volunteers' opinions of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. These user perception rankings are shown on the following page. The mean physical condition ranking was 2.4 (between 2- "some algae present" and 3- "definite algae present"), while the mean recreational suitability ranking was 2.7 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

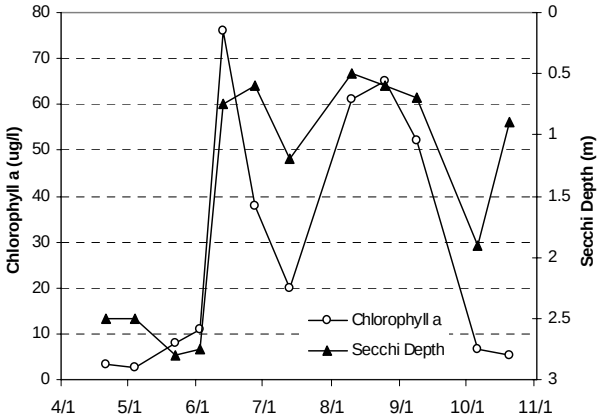
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

La Lake

Woodbury, Washington Co.

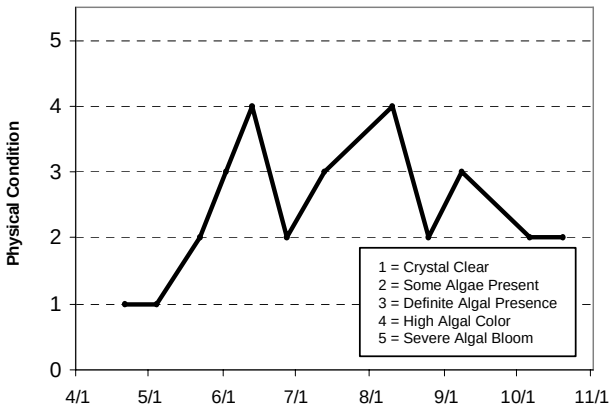






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/21/06	14.7				3.3	76		2.5	1	1
5/4/06	15.1				2.5	87		2.5	1	1
5/22/06	18.8				8.1	51		2.8	2	2
6/2/06	25.8				11	50		2.75	3	3
6/13/06	22.9				76	93		0.75	4	4
6/27/06	25.8				38	97		0.6	2	3
7/13/06	27.7				20	110		1.2	3	3
8/10/06	25.6				61	131		0.5	4	4
8/25/06	22.2				65	111		0.6	2	4
9/8/06	22.9				52	118		0.7	3	4
10/6/06	15.3				6.7	140		1.9	2	3
10/20/06	6.7				5.4	92		0.9	2	3

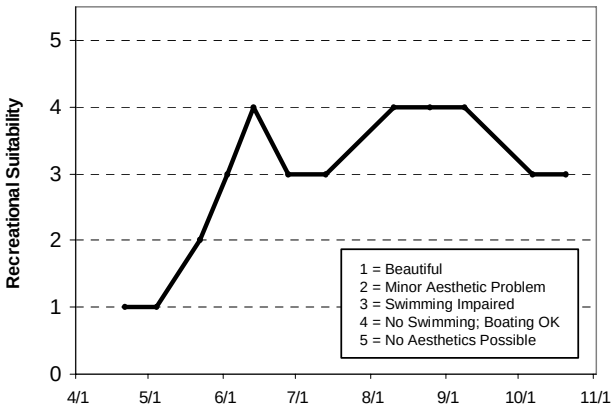


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus		C	C	D	D	C	D	D	D	D	C		C	D
Chlorophyll a		B	A	B	C	B	C	C	C	B	C		B	C
Secchi Depth		C	B	C	C	B	C	C	C	C	B		C	C
Overall		**C**	**B**	**C**	**C**	**B**	**C**	**C**	**C**	**C**	**C**		**C**	**C**

Source: Metropolitan Council and STORET data



Lac Lavon Lake (19-0446) *Black Dog Watershed Management Commission*

This was the tenth year that Lac Lavon has been involved in CAMP. The only known water quality data available for the lake were Secchi transparency data in 1989-1991 and CAMP data for 1997-2006.

The lake, located within the City of Apple Valley in Dakota County, is actually an abandoned gravel pit maintained by groundwater (MDNR 1996). The 55-acre lake (2.3 miles in circumference) has a maximum depth of 9.8 m (32 feet) and 65 percent of the lake is considered littoral zone (the 0-15 foot depth zone of the lake dominated by aquatic vegetation). The lake's fishing pier is located on the eastern end of the lake. An area of concern and need for future management is the recent detection of Eurasian Water Milfoil (*Myriophyllum spicatum*) in the lake.

Lac Lavon was monitored 12 times between mid-April and mid-October, 2006. The data and resulting graphs showing seasonal variability in TP and CLA concentrations, Secchi transparency, and user perceptions are presented on the information sheet following these written comments.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	20.9	14.0	27.0	A
CLA (µg/l)	5.2	2.2	10.0	A
Secchi (m)	3.3	2.5	4.4	A
TKN (mg/l)	0.85	0.56	1.20	
			Overall Grade	A

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").

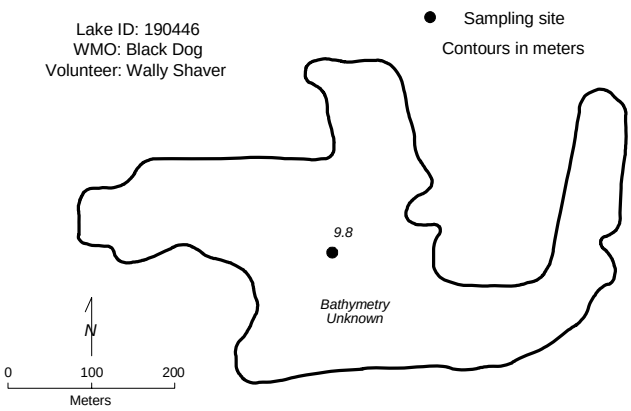
No statistically significant long-term trend is evident from the lake's overall water quality database, in the short-term however, the lake's water quality seems well represented by an overall grade of A. A recent MPCA conducted trend analysis on the lake's Secchi transparency data, however, revealed a statistically significant decrease in recent water clarity. The reason for the degradation in the lake's water clarity is not entirely known. A more in-depth study combining watershed as well as in-lake monitoring may help determine the areas contributing the most to the lake's degradation.

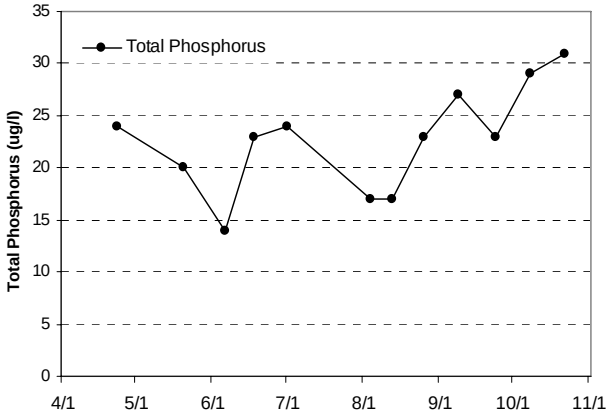
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

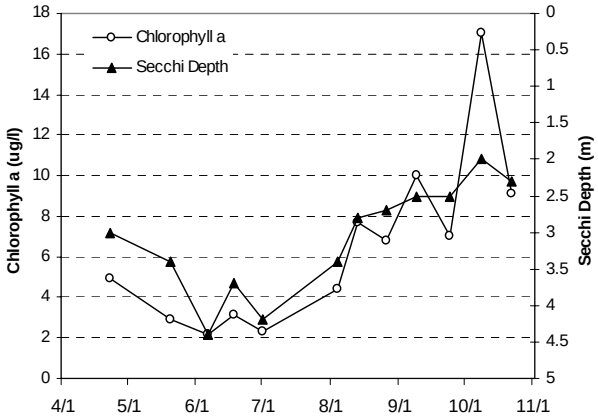
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Lac Lavon
Apple Valley/Burnsville, Dakota Co.

Lake ID: 190446
WMO: Black Dog
Volunteer: Wally Shaver

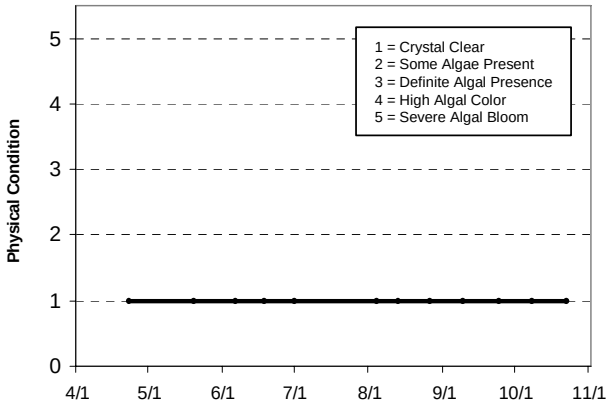






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/23/06	15.1				4.9	24		3	1	1
5/20/06	17.2				2.9	20		3.4	1	1
6/6/06	24.8				2.2	14		4.4	1	1
6/18/06	24.6				3.1	23		3.7	1	1
7/1/06	26				2.3	24		4.2	1	1
8/4/06	27.7				4.4	17		3.4	1	1
8/13/06	25.5				7.7	17		2.8	1	1
8/26/06	24.2				6.8	23		2.7	1	1
9/9/06	19.2				10	27		2.5	1	1
9/24/06	16.4				7	23		2.5	1	1
10/8/06	14.4				17	29		2	1	1
10/22/06	8.2				9.1	31		2.3	1	1

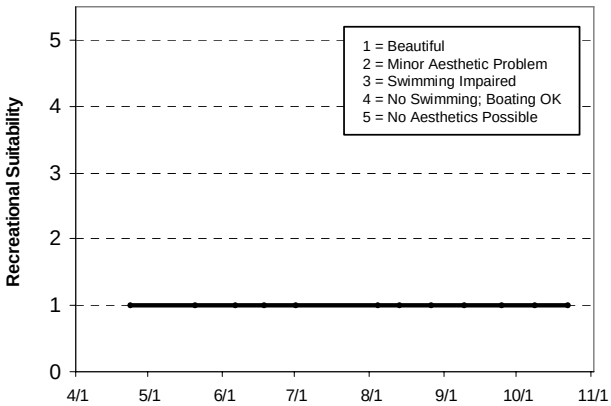


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth										A	A	A	
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus					A	A	A	A	B	A	A	A	A	A
Chlorophyll a					A	A	A	A	A	A	A	A	A	A
Secchi Depth					A	A	A	A	A	A	A	A	A	A
Overall					**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**

Source: Metropolitan Council and STORET data



Langton Lake [Site-1] (62-0049-01) *Rice Creek Watershed District*

Langton Lake is divided into three distinct basins. Two of the three basins were monitoring in 2006. Additionally, the results will be discussed individually for each of the sites monitored in 2006.

The entire 30-acre lake is located within the City of Roseville (Ramsey County). The maximum and mean depths of the lake are 1.5 m and 1.2 m (5 feet and 4 feet), which along with the surface area, translate to an approximate volume of approximately 120 ac-ft. Because of the shallowness of the lake, its entire surface area is considered littoral, (the shallow [0-15 feet] area dominated by aquatic plants). 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).

Langton Lake (Site-1) was monitored seven times between early-May and late-September, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	65.8	25.0	99.0	C
CLA (µg/l)	19.7	4.6	63.0	B
Secchi (m)	1.1	0.9	1.4	D
TKN (mg/l)	1.39	0.52	1.90	
			Overall Grade	C

The lake's 2005 and 2006 overall grades were a C. As mentioned earlier, there are no water quality data available for Langton Lake (Site-1) other than the 2005-2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. A search through the STORET nationwide water quality database for data on the lake did result historical Secchi transparency information. 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 4.0 for recreational suitability (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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Langton Lake, Site 1
Roseville, Ramsey Co.

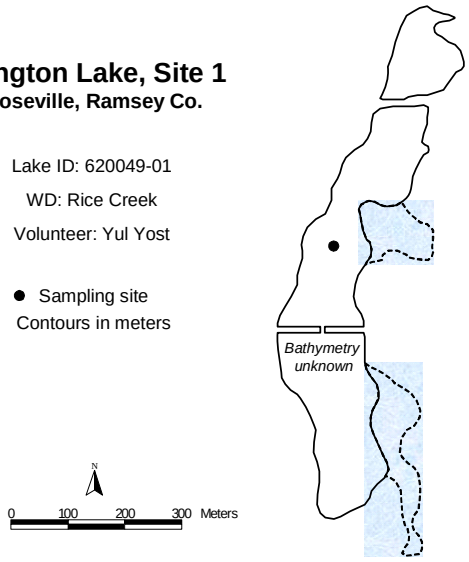
Lake ID: 620049-01

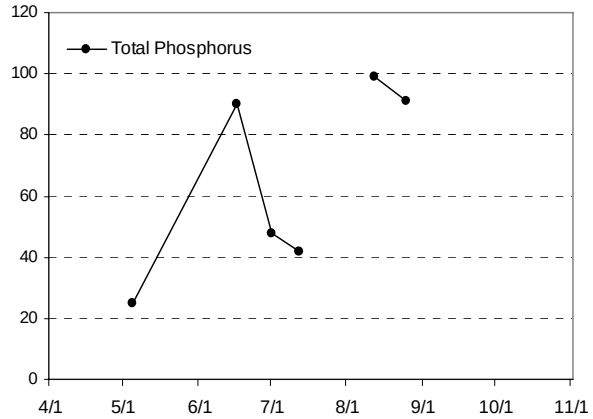
WD: Rice Creek

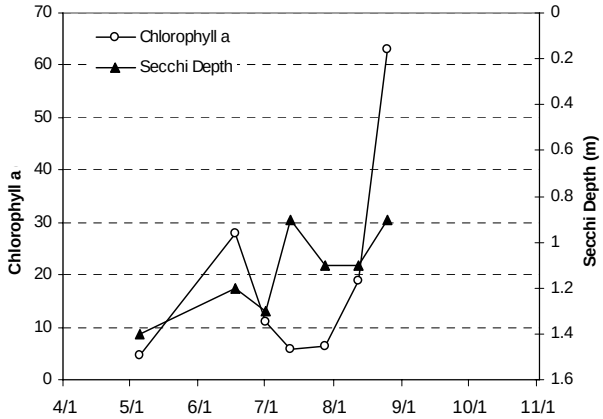
Volunteer: Yul Yost

● Sampling site

Contours in meters

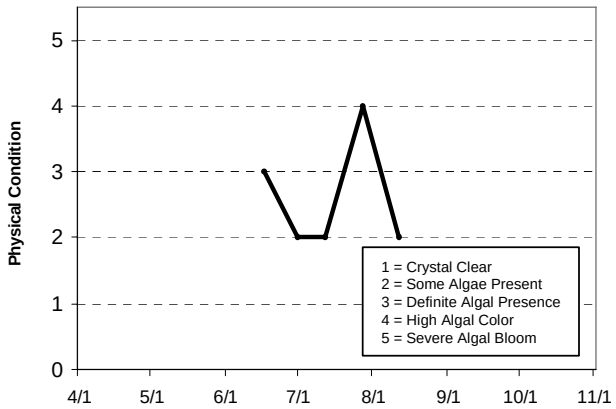






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/5/06	9.5				4.6	25		1.4		
6/17/06	24.6		6.31		28	90		1.2	3	
7/1/06	24.6		5.6		11	48		1.3	2	4
7/12/06	28.7		7.1		5.7	42		0.9	2	
7/28/06	29.3		7.7		6.3			1.1	4	4
8/12/06	23.4		6.62		19	99		1.1	2	4
8/25/06	20.4		3.01		63	91		0.9		

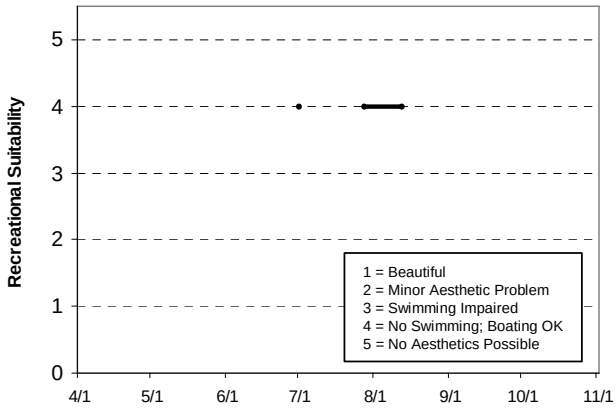


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth					F								
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus													C	C
Chlorophyll a													C	B
Secchi Depth			D	D	D	C	C	D	C	C	C	C	D	D
Overall													**C**	**C**

Source: Metropolitan Council and STORET data



Langton Lake [Site-2] (62-004-02) *Rice Creek Watershed District*

Langton Lake is divided into three distinct basins. Two of the three basins were monitoring in 2006. The results will be discussed individually for each of the sites monitored in 2006.

Langton Lake (Site-2) was monitored 13 times between early-May and mid-October, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	59.4	34.0	107.0	C
CLA (µg/l)	18.0	4.8	36.0	B
Secchi (m)	1.2	0.9	1.6	D
TKN (mg/l)	1.09	0.65	1.70	
			Overall Grade	C

The overall grade for the lake was a C. As mentioned earlier, there are no water quality data available for Langton Lake (Site-2) other than the 2005-2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. A search through the STORET nationwide water quality database for data on the lake did result historical Secchi transparency information. A recent MPCA conducted trend analysis on the lake's Secchi transparency data, revealed a statistically significant improvement in recent water clarity.

To better understand the lake's overall 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 3.5 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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Langton Lake, Site 2

Roseville, Ramsey Co.

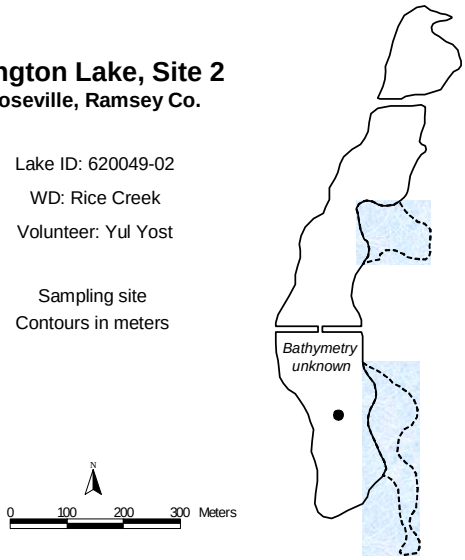
Lake ID: 620049-02

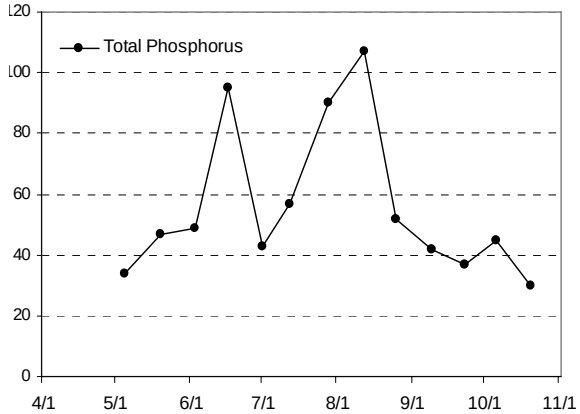
WD: Rice Creek

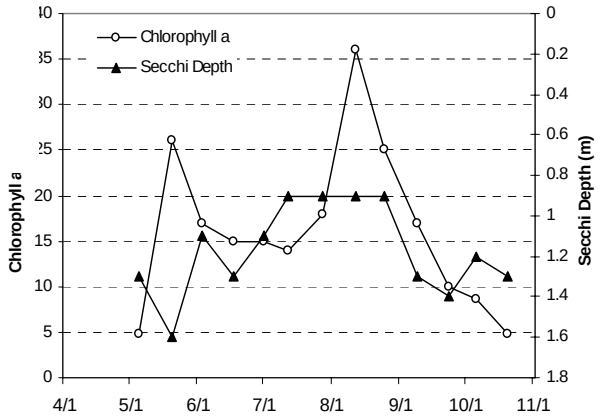
Volunteer: Yul Yost

Sampling site

Contours in meters

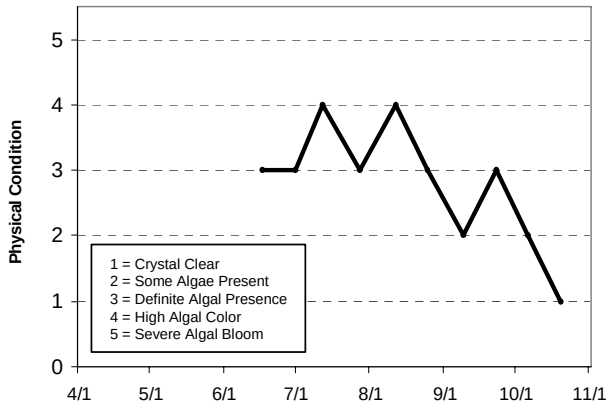






2006 Data

Date	Surf. Tmp C	Bot. Tmp C	Surf. DO mg/L	Bot. DO mg/L	CLA ug/L	Surf. TP ug/L	Bot. TP ug/L	Secchi M	PC 1 thru 5	RS 1 thru 5
5/5/06	9.1				4.8	34		1.3		
5/20/06	18.8				26	47		1.6		
6/3/06	24.6				17	49		1.1		
6/17/06	24.7		6.3		15	95		1.3	3	
7/1/06	25.8		8.3		15	43		1.1	3	4
7/12/06	29.5		8.4		14	57		0.9	4	
7/28/06	30.5		7.77		18	90		0.9	3	4
8/12/06	23.9		4.5		36	107		0.9	4	4
8/25/06	20.8		2.4		25	52		0.9	3	4
9/9/06	19		5.09		17	42		1.3	2	
9/23/06	14.3		5.95		10	37		1.4	3	
10/6/06	15		8.05		8.7	45		1.2	2	4
10/20/06	7.1		8		4.8	30		1.3	1	1

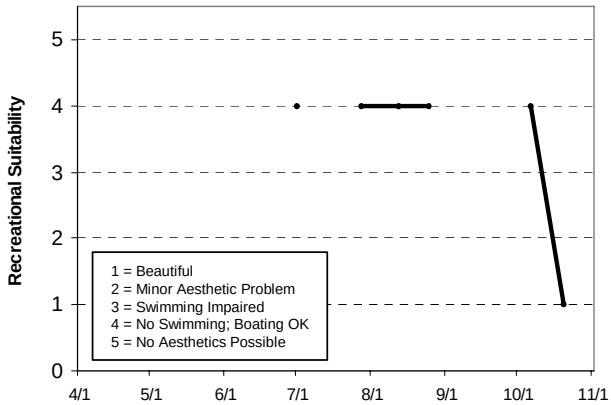


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus													C	C
Chlorophyll a													B	B
Secchi Depth													D	D
Overall													**C**	**C**

Source: Metropolitan Council and STORET data



Lee Lake (19-0029) *City of Lakeville*

Lee Lake, a 25-acre land-locked lake with a maximum depth of 5.2 m (17 feet), is located in Lakeville (Dakota County). The shoreline length of the lake is 1.0 miles. The majority of its 324-acre watershed (which translates to a watershed-to-lake size ratio of 13:1) is now developed with urban uses; however, past cattle farming is the primary phosphorus source to the lake and may have left behind an internal loading problem. To determine if this is the case, a more in-depth monitoring program is needed. 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.

The lake has been involved in CAMP in 1994-1997 and 2000-2006. In an attempt to inhibit algal populations within the lake, barley straw has been added since 2003. Barley straw has been used for algal control in the United Kingdom for many years. A recent study on Valley Lake-Lakeville, Minnesota, (discussed later in Valley Lake section of this report), has suggested that carbon from the decaying barley straw inhibits algal populations via microbial competition for phosphorus (McComas and Anhorn 2004). Therefore, in an attempt to determine if the straw method successfully reduced algal biomass in 2006 TP, TKN, CLA and Secchi transparencies were tested 14 times between mid-April and mid-October. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	79.2	37.0	129.0	D
CLA (µg/l)	15.5	3.2	23.0	B
Secchi (m)	1.7	1.2	2.6	C
TKN (mg/l)	1.52	0.62	2.00	
			Overall Grade	C

The lake's overall water quality grade is identical to those recorded in 1994-1997, 1999, and 2001-2005, and better than that recorded in 2000 (D). No statistically significant long-term trend is evident from the lake's water quality database, in the short-term however, the lake seems well represented by an overall grade of C. In order to determine any long-term trends or to better define the lake's normal water quality range, more data are needed.

After a recent fish survey on the lake suggested that the unusually high fish densities may be impacting the barley treatment on the lake, roughly 80 pounds of fish per acre were recently removed. The survey had revealed that bluegill sunfish, black crappies, and black bullheads dominated the lake's fishery. In fact, the number of bluegills caught per net was high, with the average haul of bluegills per net averaging 465 per net. The local average range for bluegills per net is 3-25 bluegills (McComas 2004). The recent fish removal coincides with the improved water quality suggesting not only that the barley straw treatment was successful at improving the lake's 2005 water quality, but the unbalanced fishery may have been negating the benefits of previous barley straw treatments.

Throughout the course of the study, the volunteer monitors ranked their perceptions of the lake's physical and recreational condition on a 1-to-5 scale. These rankings, as well as the data and graphs discussed above, 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 2.4 (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) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

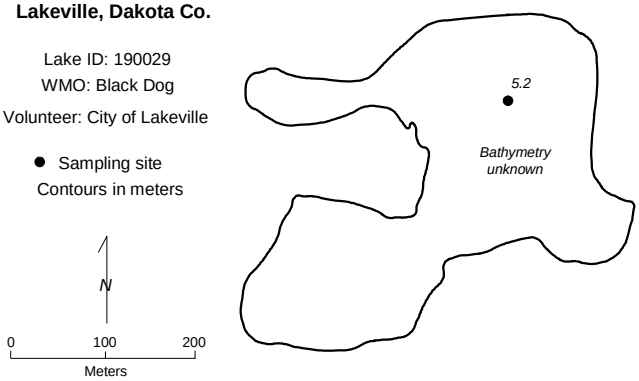
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

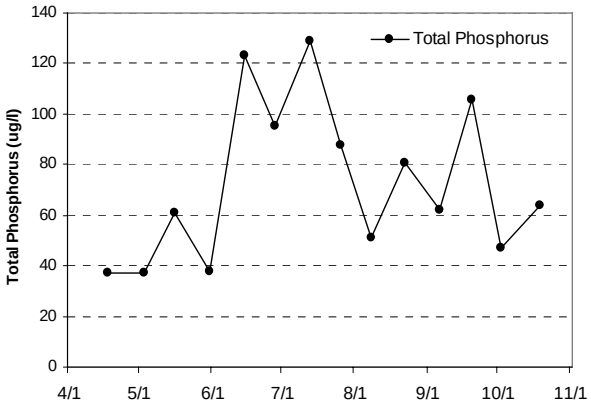
Lee Lake

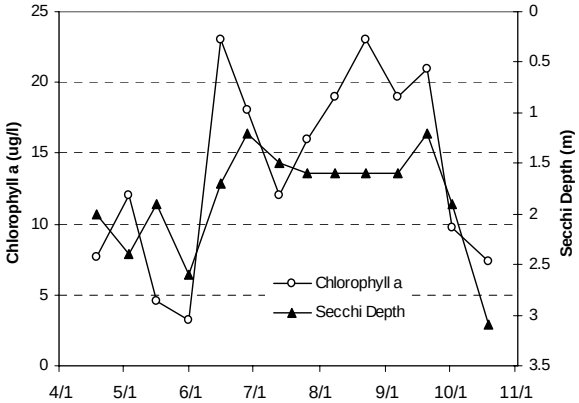
Lakeville, Dakota Co.

Lake ID: 190029
WMO: Black Dog
Volunteer: City of Lakeville

● Sampling site
Contours in meters

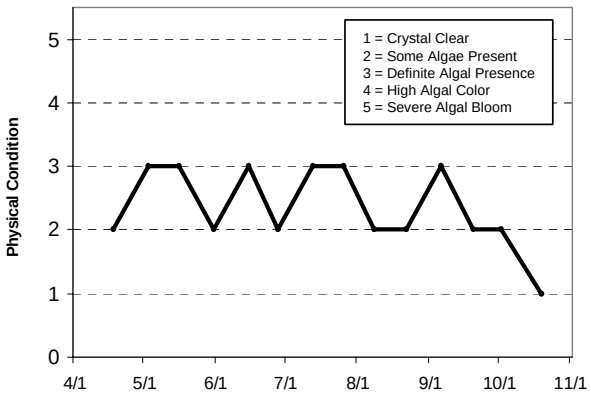






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/18/06	13.4				7.7	37		2	2	2
5/3/06	15.7				12	37		2.4	3	2
5/16/06	17.4				4.6	61		1.9	3	2
5/31/06	26.3				3.2	38		2.6	2	2
6/15/06	22.4				23	123		1.7	3	3
6/28/06	24.6				18	95		1.2	2	2
7/13/06	29.7				12	129		1.5	3	3
7/26/06	28.5				16	88		1.6	3	3
8/8/06	28.5				19	51		1.6	2	3
8/22/06	25.2				23	81		1.6	2	3
9/6/06	23				19	62		1.6	3	3
9/20/06	18.8				21	106		1.2	2	3
10/2/06	17.4				9.8	47		1.9	2	2
10/19/06	8.4				7.4	64		3.1	1	1

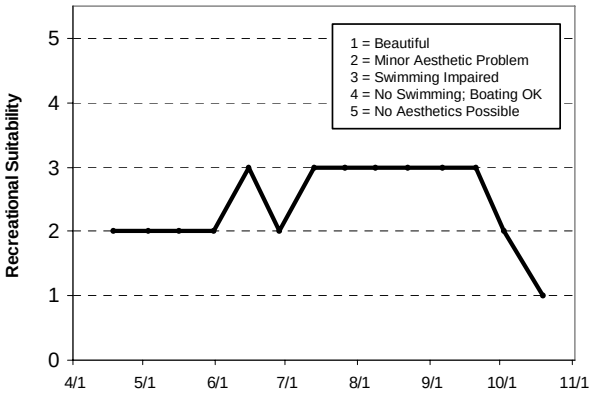


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus		C	C	C	C			D	C	C	C	C	D	D
Chlorophyll a		C	B	B	B			C	B	B	C	C	B	B
Secchi Depth		C	C	C	C			D	C	C	C	D	C	C
Overall		**C**	**C**	**C**	**C**			**D**	**C**	**C**	**C**	**C**	**C**	**C**

Source: Metropolitan Council and STORET data



Legion Pond (82-0462) *Valley Branch Watershed District*

Legion Pond is a small 16-acre lake located within Lake Elmo (Washington County). The lake has a 224-acre immediate drainage area, 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.

This marks the second year in which Legion Pond has been involved in CAMP. A search through the STORET nationwide water quality database for historic data on the lake was unsuccessful. Therefore, 2005 and 2006 are the only known year of available data. 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 lake was monitored 10 times between mid-April and mid-October, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	87.2	46.0	130.0	D
CLA (µg/l)	29.6	4.7	72.0	C
Secchi (m)	0.9	0.6	1.3	D
TKN (mg/l)	1.26	0.85	1.90	
			Overall Grade	D

When comparing the lakes TP (nutrient), CLA (algal biomass estimator), and Secchi (water clarity) grades, it is apparent that the TP and Secchi grades (and summer means) are worse than the CLA grade. In a most cases, the three should be fairly comparable. One possible explanation for the lake's 2006 findings may be that the majority of the lake's TP comes from either in-lake suspended sediments (re-suspension), or the intrusion of sediment-laden runoff to the lake, which in turn lessens the clarity of the water and inhibits algal growth.

As mentioned earlier, there are no water quality data available for Legion Pond other than the 2005-2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

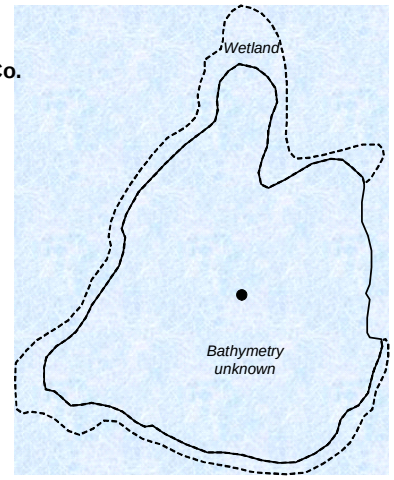
Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The average user perception rankings were 1.6 for physical condition (between 1- "crystal clear" and 2- "some algae present"), and 2.1 for recreational suitability (roughly 2- "minor aesthetic problem").

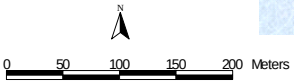
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

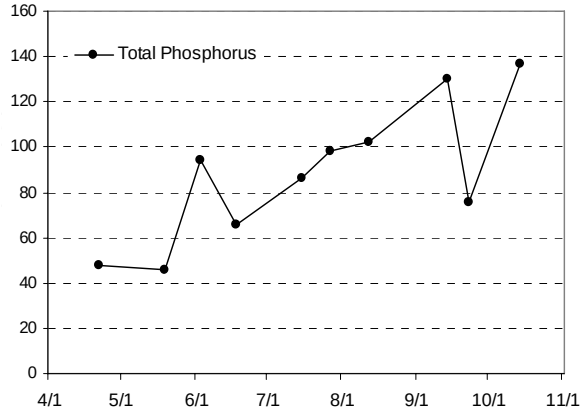
Legion Pond
Lake Elmo, Washington Co.

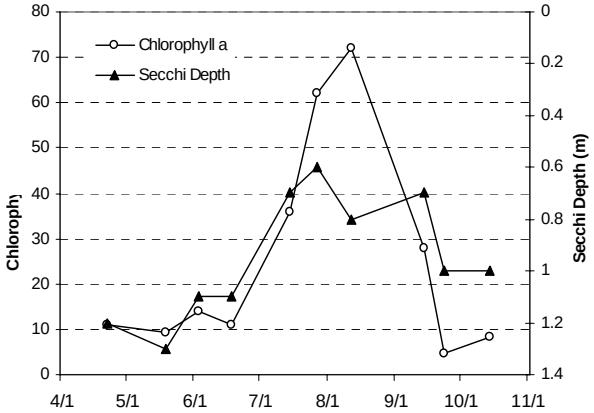
Lake ID: 820462
WD: Valley Branch
Volunteer: Molly Winkels

● Sampling site
Contours in meters



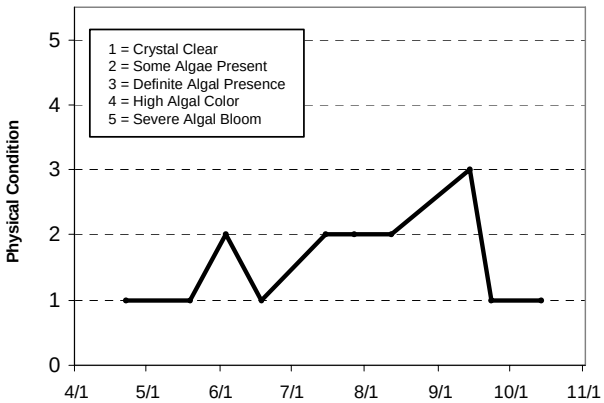






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/22/06	17.2				11	48		1.2	1	1
5/19/06	23.3				9.2	46		1.3	1	5
6/3/06	27.4				14	94		1.1	2	1
6/18/06	26.2				11	66		1.1	1	1
7/15/06	30.8				36	86		0.7	2	1
7/27/06	31.9				62	98		0.6	2	1
8/12/06	26.9				72	102		0.8	2	5
9/14/06	21.2				28	130		0.7	3	5
9/23/06	13.9				4.7	76		1	1	
10/14/06	5				8.2	137		1	1	1

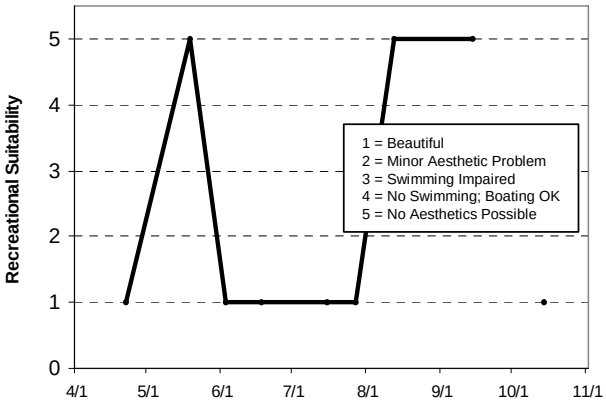


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus													D	D
Chlorophyll a													C	C
Secchi Depth													D	D
Overall													**D**	**D**

Source: Metropolitan Council and STORET data



Lily Lake (82-0023) *City of Stillwater*

Lily Lake, located in the City of Stillwater in Washington County, was monitored seven times between late-April and early-October, 2006. The lake has been monitored through CAMP since 1995.

The 52-acre lake has a maximum depth of 17.4 m (57 feet), and has public access located on the lake's northern shore and a fishing pier on its southern shore. On each sampling date Lily Lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	62.2	34.0	95.0	C
CLA (µg/l)	26.0	4.4	52.0	C
Secchi (m)	1.5	0.6	2.7	C
TKN (mg/l)	1.66	1.20	2.60	
			Overall Grade	C

The lake's 2006 overall water quality grade is similar to those recorded in 1996-2000 and 2002-2005, and worse than those of 1995 and 2001 (B).

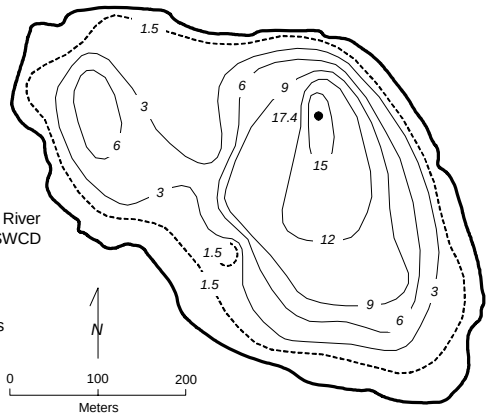
The physical and recreational conditions of Lily Lake as perceived by the volunteer(s) were ranked on a 1-to-5 scale. These rankings are also graphed on the lake's information sheet. The mean physical condition ranking was 3.0 (3- "definite algae present"), while the mean recreational suitability ranking was 3.3 (between 3- "swimming slightly impaired" and 4- "no swimming – boating ok").

A search for water quality data through Council, MPCA, and STORET files resulted in a moderate amount of data. While 1995-2006 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. The data seem to show a wide fluctuation in the lake's mean CLA concentration and water clarity. The best conditions were recorded in 1995 and 2001 (A's and B's), while 1996-2000 and 2002-2006 conditions were mainly represented by C's.

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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

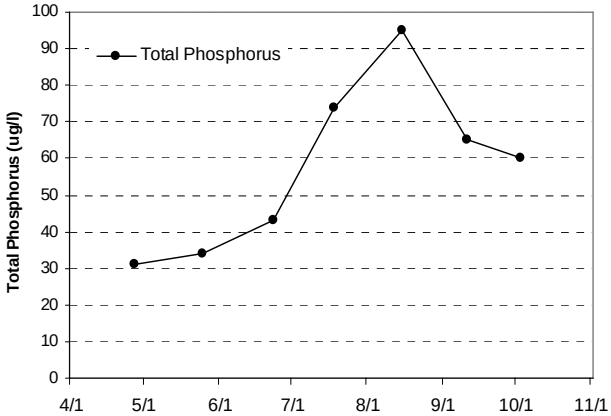
Lily Lake
Stillwater, Washington Co.

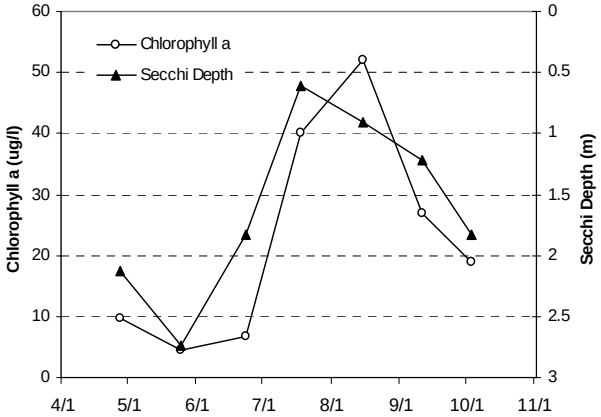


Lake ID: 820023
WMO: Middle St. Croix River
Volunteer: Wash. Co. SWCD

● Sampling site

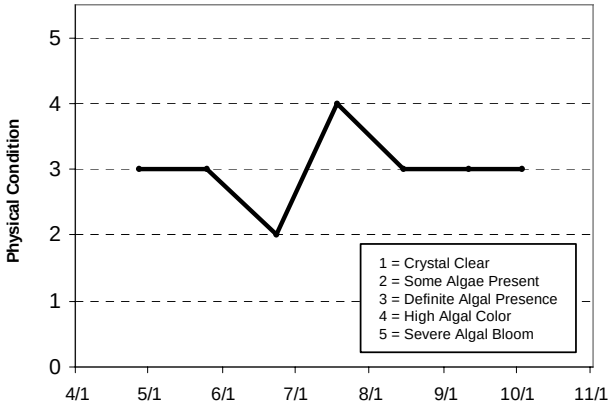
Contours in meters





2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/27/06	15.6	3.8	9.78	0.44	9.6	31		2.134	3	3
5/25/06	20.2	4.4	6.2	0.08	4.4	34		2.743	3	3
6/23/06	23.9	3.9	8.24	0.05	6.7	43		1.829	2	3
7/18/06	29	4	10.14	0.1	40	74		0.61	4	4
8/15/06	26.1	4.1	9.76	0.09	52	95		0.914	3	4
9/11/06	19.1	4.1	4.67	0.05	27	65		1.219	3	3
10/3/06	17.8	4.2	9.68	0.09	19	60		1.829	3	3

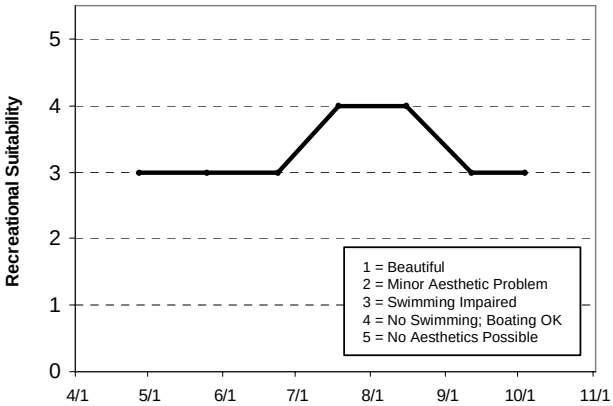


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth						D		C	C	C	C	C	B
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus			C	C	C	C	C	C	C	C	C	C	C	C
Chlorophyll a			B	C	B	C	C	C	A	B	B	B	B	C
Secchi Depth			A	B	C	C	C	C	B	C	C	C	C	C
Overall			**B**	**C**	**C**	**C**	**C**	**C**	**B**	**C**	**C**	**C**	**C**	**C**

Source: Metropolitan Council and STORET data



Little Carnelian Lake (82-0014) *Carnelian - Marine Watershed District*

This was the seventh year of CAMP monitoring in Little Carnelian Lake which is located in Stillwater Township (Washington County). The lake was first enrolled in the program in 2000. The 162-acre lake (which has a shoreline length of 1.7 miles), 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 and its 565-acre watershed translates to a meager 3.5:1 watershed-to-lake size ratio (the greater the ratio, the greater the potential stress on the lake from surface runoff).

The lake was monitored seven times between early-May and mid-October, 2006. During each monitoring event, the lake was monitored for TP, CLA, TKN, Secchi transparency, as well as the perceived physical condition and recreational suitability. The collected data and resulting graphs showing TP and CLA concentrations, Secchi transparency, and user perception (physical condition and recreational suitability) are presented on the lake's information sheet on the following page.

2006 summer (May-September) data summary

Parameter	***Mean***	***Minimum***	***Maximum***	***Grade***
TP (µg/l)	19.0	12.0	39.0	A
CLA (µg/l)	2.2	1.3	3.1	A
Secchi (m)	6.7	5.9	7.6	A
TKN (mg/l)	0.59	0.49	0.69	
			Overall Grade	A

Similar to all past years of CAMP monitoring, the individual grades result in overall lake grade of A for Little Carnelian Lake. This places the lakes water quality within the top 10 percent of Metro Area lakes for the years 2000-2006. In fact, similar to that reported in 2005, the lake's 2006 Secchi mean was again the best mean water clarity in CAMP.

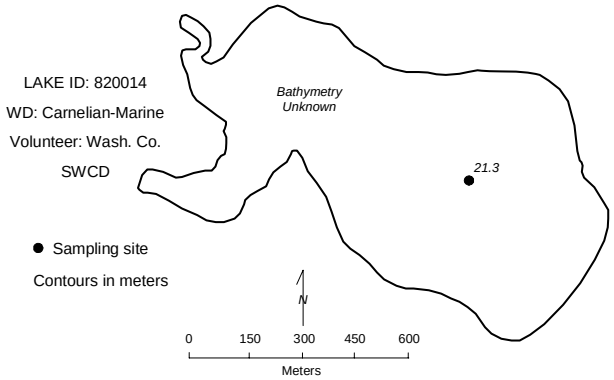
Throughout the summer, the volunteer ranked the lake's perceived physical condition on a 1-to-5 scale (see lake information sheet). The mean physical condition ranking was 1.1 (roughly 1- "crystal clear"), while the mean recreational suitability ranking was 1.0 (1- "beautiful").

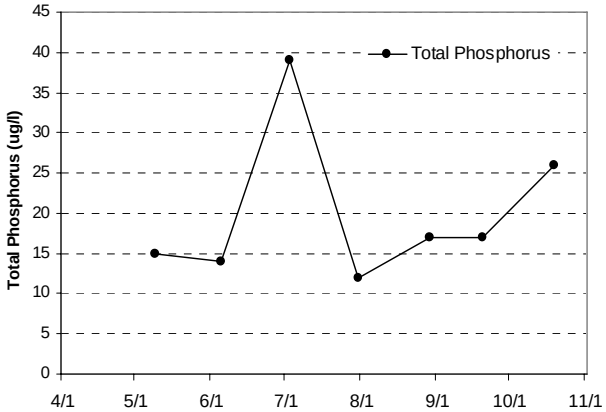
A search of the STORET nationwide water quality database for data on the lake revealed a moderate database throughout the 1990's with nutrient data available in 1991-1996 and 1998-2006. The lake's database indicates that the lake's water quality is well represented by an overall grade of A. Furthermore, a recent MPCA conducted trend analysis on the lake's Secchi transparency data, revealed a statistically significant improvement in recent water clarity.

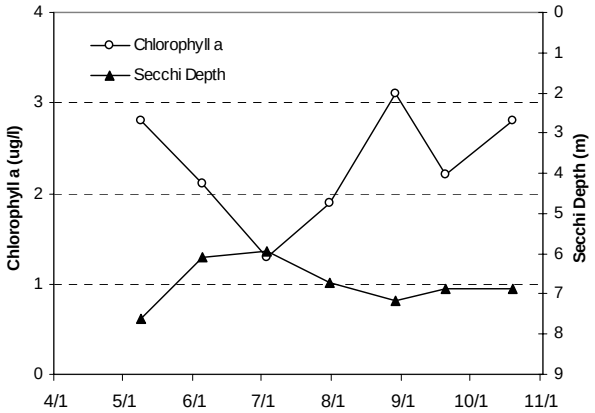
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Little Carnelian Lake
Stillwater Twp., Washington Co.

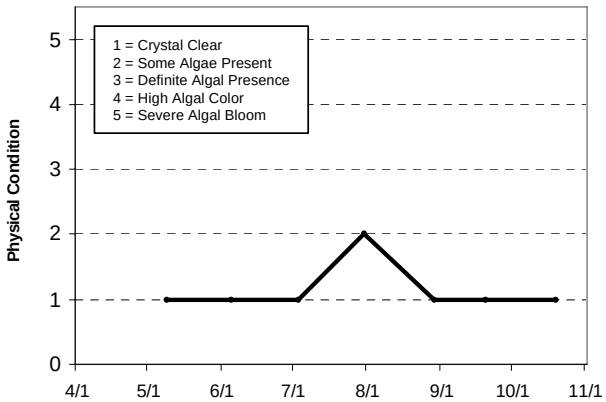






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/9/06	14.6	4.5	8.51	0.68	2.8	15		7.62	1	1
6/5/06	23.9		6.43		2.1	14		6.096	1	1
7/3/06	26.1	5.1	7.99	0.12	1.3	39		5.944	1	1
7/31/06	28.5	5.2	8.15	0.1	1.9	12		6.706	2	1
8/29/06	23.2	5.5	7.49	0.06	3.1	17		7.163	1	1
9/20/06	18.4	5.4	9.55	0.07	2.2	17		6.858	1	1
10/19/06	10.4	5.8	9.91	0.06	2.8	26		6.858	1	1

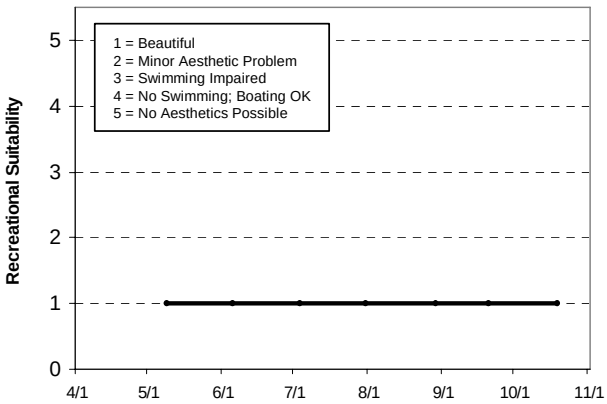


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus												A	A
Chlorophyll a												A	A
Secchi Depth												A	A
Overall												**A**	**A**

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus				A	A			A	B	A	A	A	A	A
Chlorophyll a				A	A			A	A	A	A	A	A	A
Secchi Depth	A	A	A	A	A	A		A	A	A	A	A	A	A
Overall				**A**	**A**			**A**	**A**	**A**	**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 a 36-acre lake located near the City of Wyoming in Chisago County. The lake has a maximum depth of 17.0 m (56 feet). Roughly 44 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).

This was the first 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 data for 1994 as well as the CAMP data for 2006.

As part of the watershed's involvement in CAMP in 2006, the lake was monitored 14 times between early-May and late-October. During each sampling event 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.

2006 summer (May-September) data summary

Parameter	***Mean***	***Minimum***	***Maximum***	***Grade***
TP (µg/l)	69.8	37.0	122.0	D
CLA (µg/l)	22.2	10.0	35.0	C
Secchi (m)	1.6	0.8	2.6	C
TKN (mg/l)	1.62	0.93	3.70	
			Overall Grade	C

The lake's 2006 overall lake quality grade of C was the same as recorded in 1994, however, the individual grade for TP (D) was worse than that recorded in 1994.

As mentioned earlier, there is very limited nutrient data available for Little Comfort Lake. Therefore it is not possible to determine any long-term or short-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 2.6 for physical condition (between 2- "some algae present" and 3- "definite algae present"), and 2.6 for recreational suitability (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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Little Comfort Lake
Wyoming Twp., Chisago Co.

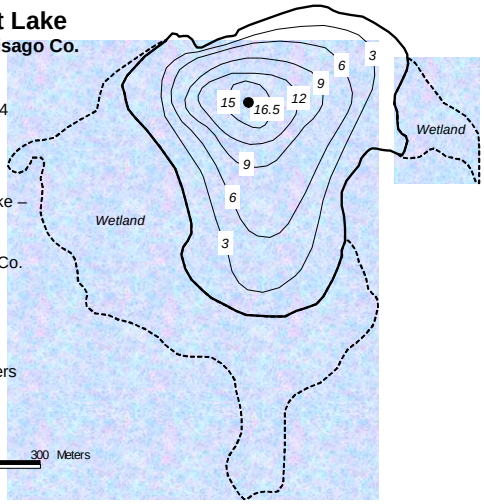
LAKE ID: 130054

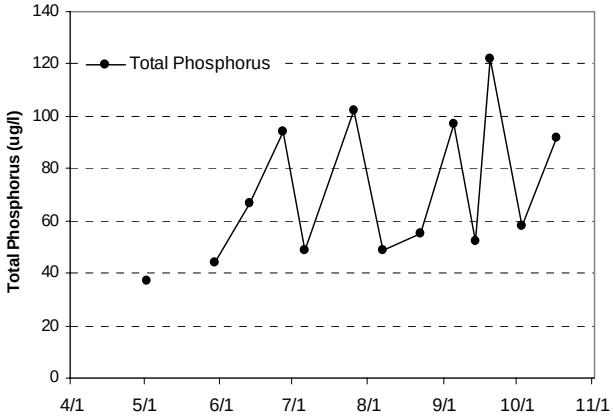
WMO: Comfort Lake – Forest Lake

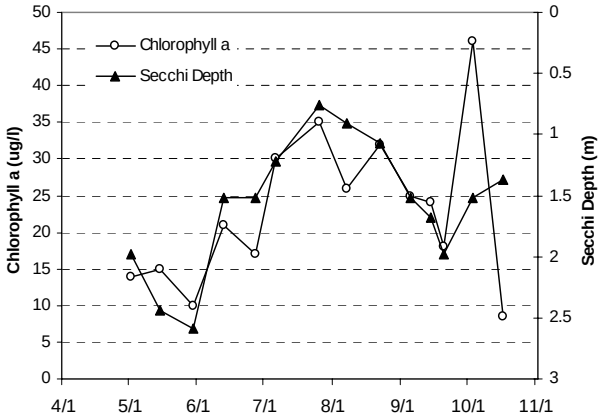
Volunteer: Wash. Co. SWCD

● Sampling site

Contours in meters

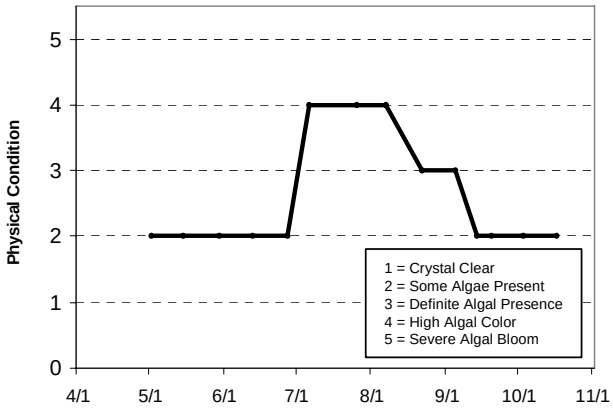






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/2/06	14	3.9	8.96	0.45	14	37	85	1.981	2	2
5/15/06	12.4	4.2	8.58	0.42	15			2.438	2	2
5/30/06	25.4		5.86		10	44	199	2.591	2	2
6/13/06	21.1	4.7	9	0.05	21	67	265	1.524	2	2
6/27/06	23.3	5.3	7.56	0.04	17	94	78	1.524	2	2
7/6/06	24.7	5.2	9	0.04	30	49	470	1.219	4	4
7/26/06	26.6	5.7	8.77	0.06	35	102	540	0.762	4	4
8/7/06	25.9	5.6	8.07	0.04	26	49	581	0.914	4	4
8/22/06	23.7	5.9	8.95	0.04	32	55	217	1.067	3	3
9/5/06	21.5	5.9	7.54	0.04	25	97	361	1.524	3	3
9/14/06	18.2	5.9	8.23	0.04	24	52	359	1.676	2	2
9/20/06	15.9	6	6.9	0.05	18	122	603	1.981	2	2
10/3/06	15.8	6	10.79	0.07	46	58	445	1.524	2	2
10/17/06	9	6.1	6.91	0.05	8.6	92	548	1.372	2	2

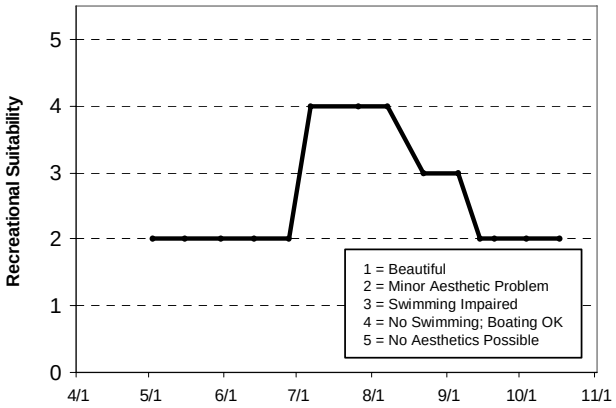


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus		C												D
Chlorophyll a		C												C
Secchi Depth		C												C
Overall		**C**												**C**

Source: Metropolitan Council and STORET data



Little Johanna Lake (62-0058) *Rice Creek Watershed District*

This was the fifth year that Little Johanna Lake, which is located on the boundary between the cities of Arden Hills and Roseville (Ramsey County), was monitored as part of CAMP. The 35-acre lake has a maximum depth of 12.0 m (39 feet). A search through the STORET nationwide water quality database for data on the lake came up empty other than for the 2001-2006 CAMP data.

The lake was monitored only three times from mid-June to mid-August, 2006. Results are presented in both graphs and data tables on the lake's information sheet on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	71.0	58.0	88.0	D
CLA (µg/l)	24.7	11.0	40.0	C
Secchi (m)	1.4	0.8	2.0	C
TKN (mg/l)	1.67	1.50	2.00	
			Overall Grade	C

With the limited data collected, the lake's 2006 overall grade (C) is identical to those of 2001-2005.

Throughout the summer, the volunteer ranked the lake's perceived physical condition on a 1-to-5 scale (see lake information sheet). The mean physical condition ranking was 3.7 (between 3- "definite algae present" and 4- "high algal color"), while the mean recreational suitability ranking was 4.0 (4- "no swimming – boating ok").

As mentioned earlier, there are no water quality data available for Little Johanna Lake other than the recent 2001-2006 data. Therefore it is not possible to determine any long-term trends. In the short-term, however, the lake seems well represented by an overall grade of C. To better understand the lake's water quality and where it may be heading, more data are needed.

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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

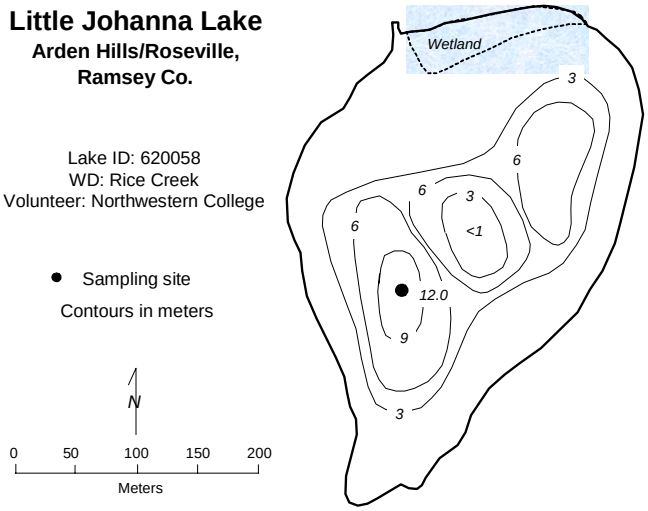
Little Johanna Lake

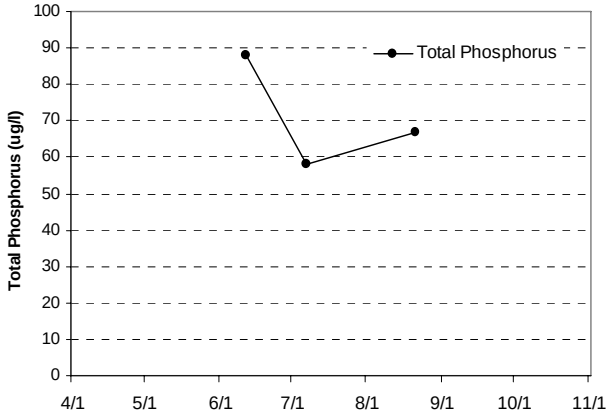
Arden Hills/Roseville, Ramsey Co.

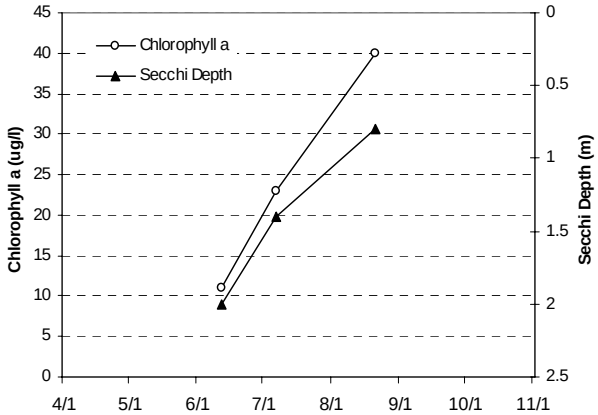
Lake ID: 620058
WD: Rice Creek
Volunteer: Northwestern College

● Sampling site

Contours in meters

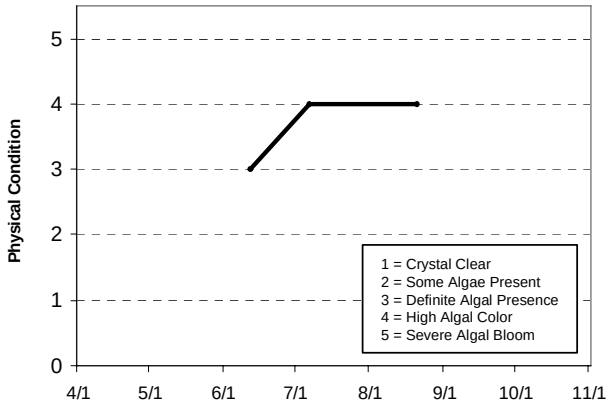






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
6/12/06	23.3				11	88		2	3	4
7/7/06	25.4				23	58		1.4	4	4
8/21/06	28.1				40	67		0.8	4	4

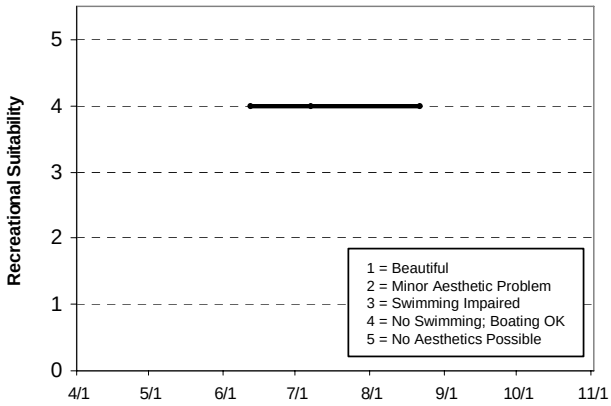


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus									C	D	D	C	C	D
Chlorophyll a									C	C	C	B	C	C
Secchi Depth									C	C	C	C	C	C
Overall									**C**	**C**	**C**	**C**	**C**	**C**

Source: Metropolitan Council and STORET data



Little Long Lake (27-0179-01) *Pioneer-Sarah Watershed Management Commission*

Little Long Lake, located near Minnetrista (Hennepin County), covers an area of 108 acres and has a maximum depth of 23.2 m (76 feet). Roughly 49 percent of the 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). Eurasian Water Milfoil (*Myriophyllum spicatum*) [EWM] has been reported on the lake.

Although this is the first year that Little Long Lake has been enrolled in CAMP, the lake had been monitored by Council staff in the past. In 2006, the lake was monitored 11 times between mid-April and late-September. The collected data and resulting graphs showing TP and CLA concentrations, Secchi transparency, and user perception (physical condition and recreational suitability) are presented on the lake's information sheet on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	41.4	13.0	169.0	C
CLA (µg/l)	3.3	1.7	12.0	A
Secchi (m)	3.6	3.5	4.0	A
TKN (mg/l)	0.77	0.37	2.30	
			Overall Grade	B

The lake's overall grade in 2006 (B) was worse than overall grades (A) reported in 1980, 1984, 1998, 2001 and 2003. The decline in water quality is due to a decline in the individual grade for TP. However, the lake's water quality seems to be best represented by an overall grade of A/B+.

Throughout the 2006 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 1.4 (between 1- "crystal clear" and 2- "some algae present"), while the mean recreational suitability 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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

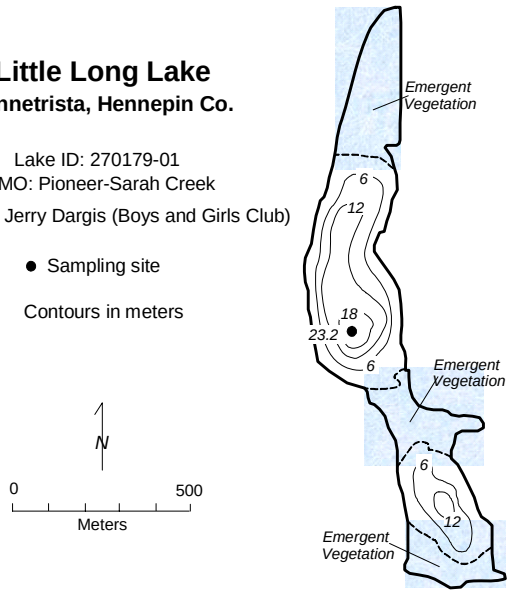
Little Long Lake

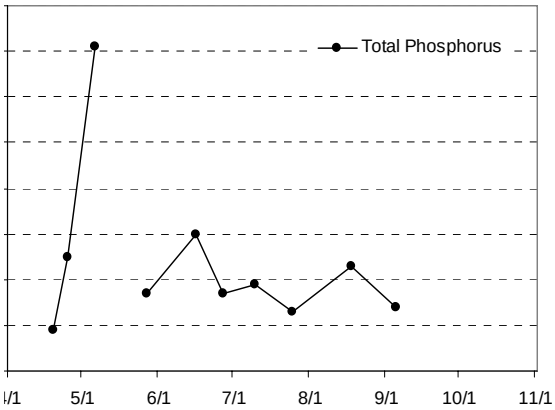
Minnetrista, Hennepin Co.

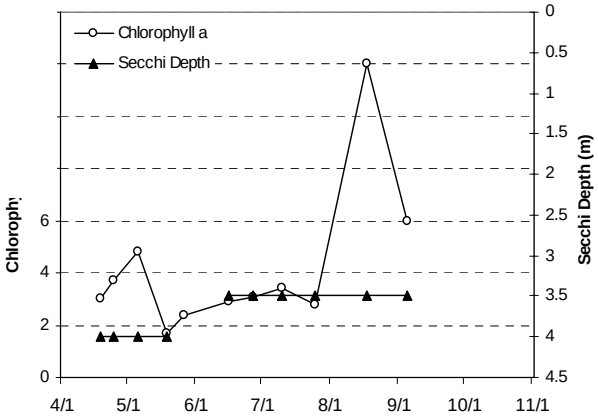
Lake ID: 270179-01
WMO: Pioneer-Sarah Creek
Volunteers: Jerry Dargis (Boys and Girls Club)

● Sampling site

Contours in meters

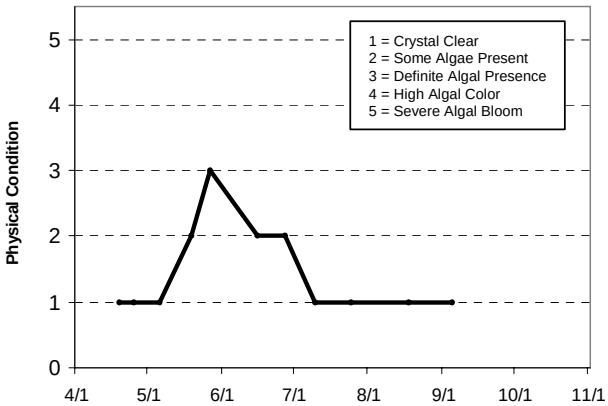






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/19/06	13.9				3	9		4	1	1
4/25/06	14.3				3.7	25		4	1	1
5/6/06	14.4				4.8	71		4	1	1
5/19/06	18.5				1.7			4	2	2
5/27/06	20.8				2.4	17			3	3
6/16/06	24.9				2.9	30		3.5	2	2
6/27/06	23				3.1	17		3.5	2	2
7/10/06	26.8				3.4	19		3.5	1	2
7/25/06	28.6				2.8	13		3.5	1	2
8/18/06	30				12	23		3.5	1	2
9/5/06	29				6	14		3.5	1	1

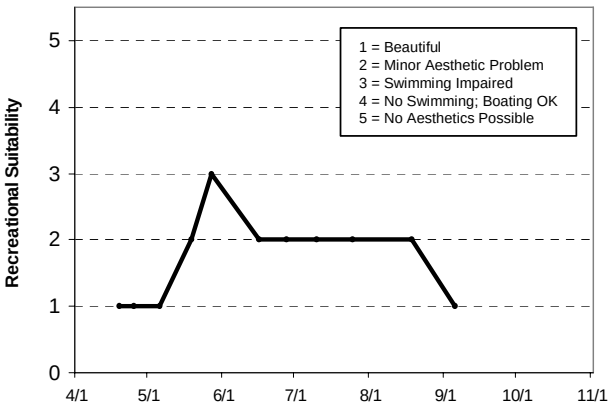


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus	A				A								
Chlorophyll a	A				A						A		
Secchi Depth	A				A						A		
Overall	**A**				**A**								

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus						A			A		A			C
Chlorophyll a						A			A		A			A
Secchi Depth						A			A		A			A
Overall						**A**			**A**		**A**			**B**

Source: Metropolitan Council and STORET data



Long Lake [Apple Valley] (19-0022) *Vermillion River Watershed Management Commission*

Long Lake, which has a surface area of roughly 36 acres, is located within the City of Apple Valley (Dakota County). Other than the fact that the maximum depth of the lake is approximately 3.5 m (10 feet), there is no known morphological data available for the lake. 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).

This is the sixth year in which Long Lake was involved in CAMP (1997 and 2002-2005 being the others). A search for historical water quality data for the lake came up empty.

As part of the 2006 volunteer monitoring program, Long Lake was monitored 14 times from mid-April to mid-October. Graphs as well as the actual data collected by the volunteer(s) show the seasonal variability in TP and CLA concentrations, Secchi transparency, and user perception (physical condition and recreational suitability). The graphs and data tables are presented on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	319.8	106.0	614.0	F
CLA (µg/l)	166.2	24.0	450.0	F
Secchi (m)	0.4	0.2	0.7	F
TKN (mg/l)	5.15	1.40	8.80	
			Overall Grade	F

The lake's 2006 overall grade is identical to those recorded in 2002-2005, and worse than that recorded in 1997 (D)

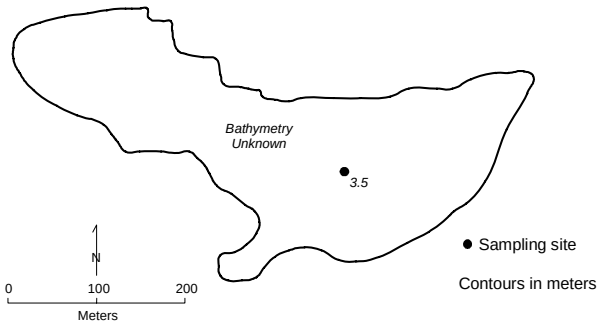
No long-term trends can be determined from the lake's entire dataset. In the short-term however, the lake's overall water quality is well represented by an overall grade of F. To better understand the quality of the lake and what direction it may be heading, more years of data collection are needed.

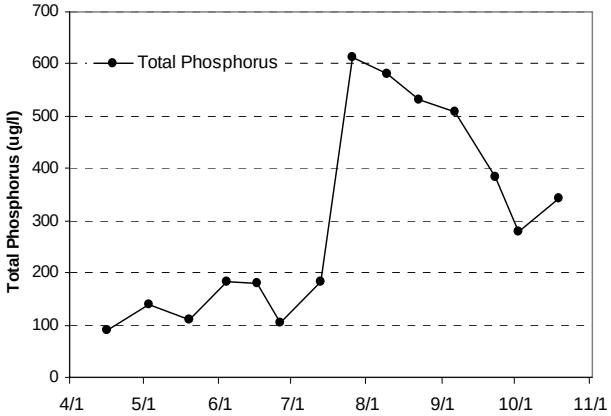
Throughout the course of the study, the volunteer monitors ranked their perceptions of the lake's physical and recreational condition on a 1-to-5 scale. These user perception rankings are shown on the lake's information sheet on the following page. The mean physical condition ranking was 2.9 (between 2- "some algae present" and 3- "definite algae present"), while the mean recreational suitability was 4.0 (4- "no swimming – boating ok").

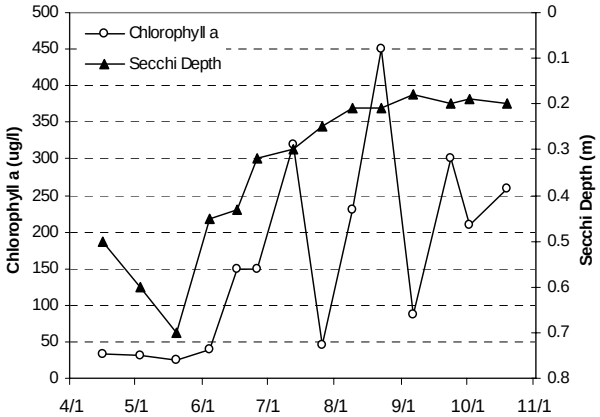
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Long Lake
Apple Valley, Dakota Co.

Lake ID: 190022
WMO: Dakota County
Volunteer: Al Kettlekamp

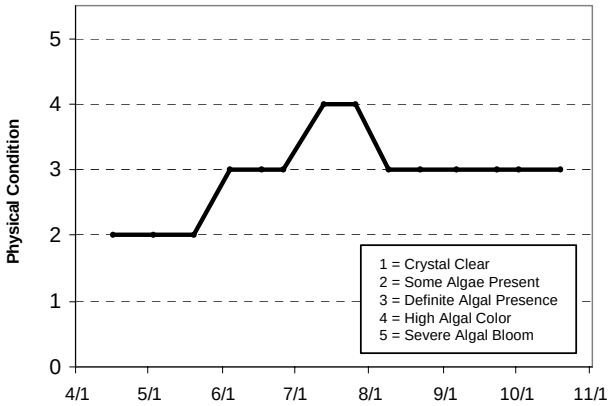






2006 Data

Date	Surf. Tmp C	Bot. Tmp C	Surf. DO mg/L	Bot. DO mg/L	CLA ug/L	Surf. TP ug/L	Bot. TP ug/L	Secchi M	PC 1 thru 5	RS 1 thru 5
4/16/06	20				33	91		0.5	2	4
5/3/06	18				31	140		0.6	2	4
5/20/06	20.1				24	110		0.7	2	4
6/4/06	28.2				39	182		0.45	3	4
6/17/06	27.9				150	179		0.43	3	4
6/26/06	28				150	106		0.32	3	4
7/13/06	29.9				320	183		0.3	4	4
7/26/06	28.2				46	614		0.25	4	4
8/9/06	26.5				230	582		0.21	3	4
8/22/06	26.7				450	532		0.21	3	4
9/6/06	24.9				88	508		0.18	3	4
9/23/06	15				300	382		0.2	3	4
10/2/06	19.2				210	280		0.19	3	4
10/19/06	8				260	342		0.2	3	4

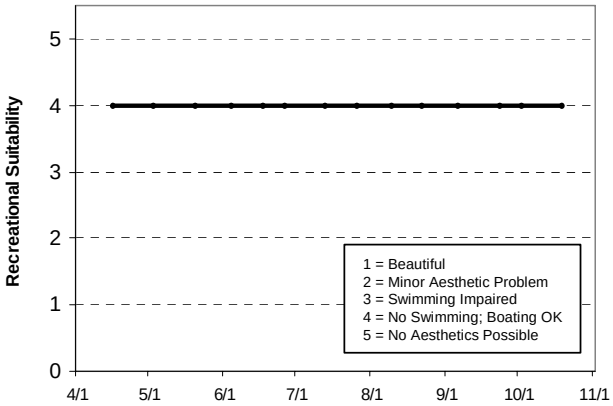


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus					D					F	F	F	F	F
Chlorophyll a					D					F	F	F	F	F
Secchi Depth					F					F	F	F	F	F
Overall					**D**					**F**	**F**	**F**	**F**	**F**

Source: Metropolitan Council and STORET data



Long Lake [Mahtomedi] (82-0130) *Rice Creek Watershed District*

Long Lake, a 48-acre lake with a maximum depth of 7.7 m (25 feet), is located within City of Mahtomedi (Washington County). Roughly 92 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).

This marks the fourth year in which Long Lake has been involved in CAMP. Other than for the 2003-2006 CAMP data, a search through the STORET nationwide water quality database for historic data on the lake was unsuccessful.

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 lake was monitored 10 times between mid-May and late-September, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

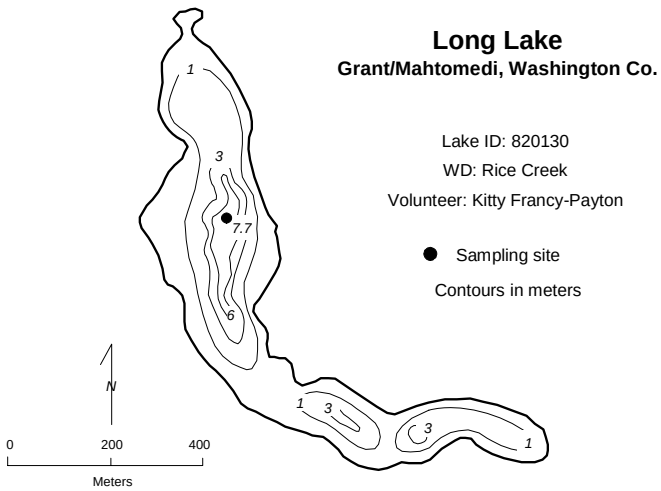
Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	28.9	16.0	76.0	B
CLA (µg/l)	3.4	1.7	5.7	A
Secchi (m)	2.5	2.1	3.1	B
TKN (mg/l)	0.69	0.37	0.85	
			Overall Grade	B

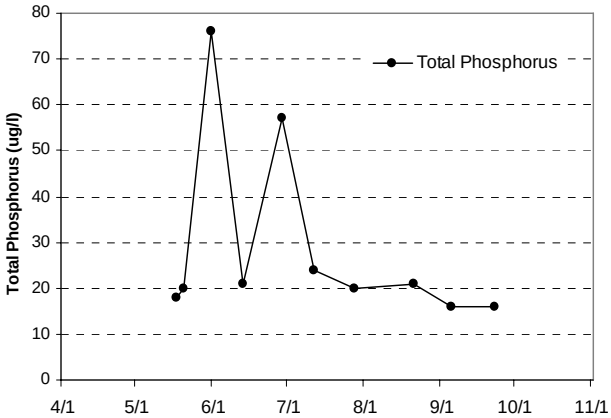
The lake's 2006 overall water quality grade (B) is similar to that recorded in 2003 and 2005 and slightly worse than that recorded in 2004 (overall grade of an A).

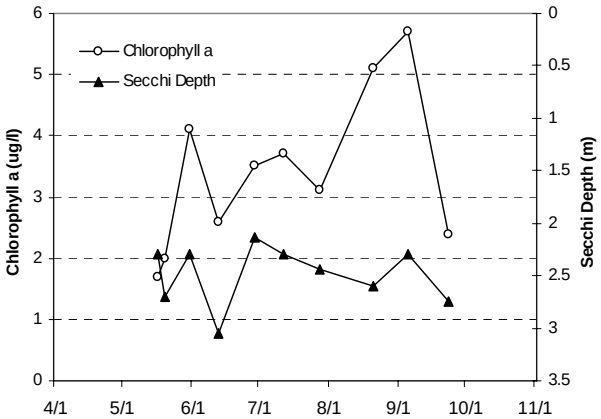
As mentioned earlier, there are no water quality data available for Long Lake other than the 2003-2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection 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 2.5 for physical condition (between 2- "some algae present" and 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

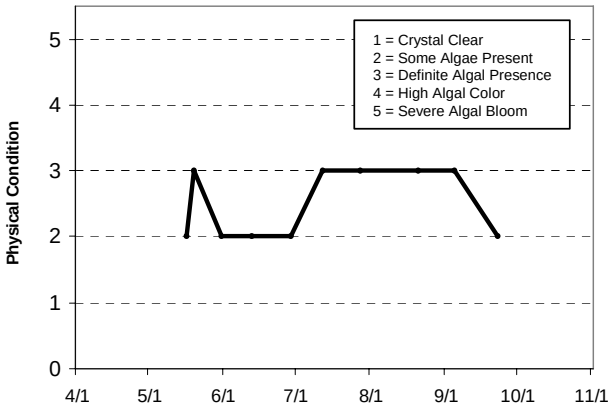






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/17/06	17.9				1.7	18		2.3	2	3
5/20/06	17.9				2	20		2.7	3	4
5/31/06	28				4.1	76		2.3	2	3
6/13/06	23.5				2.6	21		3.05	2	3
6/29/06	26.3				3.5	57		2.13	2	3
7/12/06	30.2				3.7	24		2.3	3	3
7/28/06	32				3.1	20		2.44	3	3
8/21/06	27.4				5.1	21		2.6	3	3
9/5/06	26.3				5.7	16		2.29	3	3
9/23/06	18.5				2.4	16		2.74	2	2

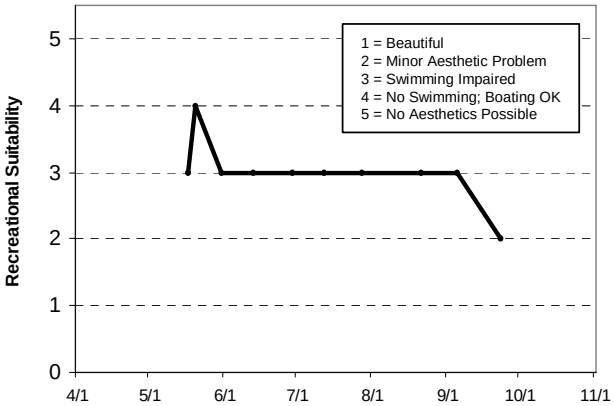


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus											B	A	C	B
Chlorophyll a											A	A	A	A
Secchi Depth											B	B	B	B
Overall											**B**	**A**	**B**	**B**

Source: Metropolitan Council and STORET data



Long Lake [May Township] (82-0030) *Marine on St. Croix WMO*

Long Lake is an 88-acre lake located in May Township (Washington County). There is little morphological data available for the lake. Because the maximum depth is only 3.7 m (12 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 lake, which was monitored through CAMP in 1993-1997 and 1999-2005, was sampled seven times between early-May and mid-October, 2006.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	49.5	29.0	82.0	C
CLA (µg/l)	9.1	2.4	23.0	A
Secchi (m)	2.6	2.0	3.7	B
TKN (mg/l)	0.80	0.73	1.00	
			Overall Grade	B

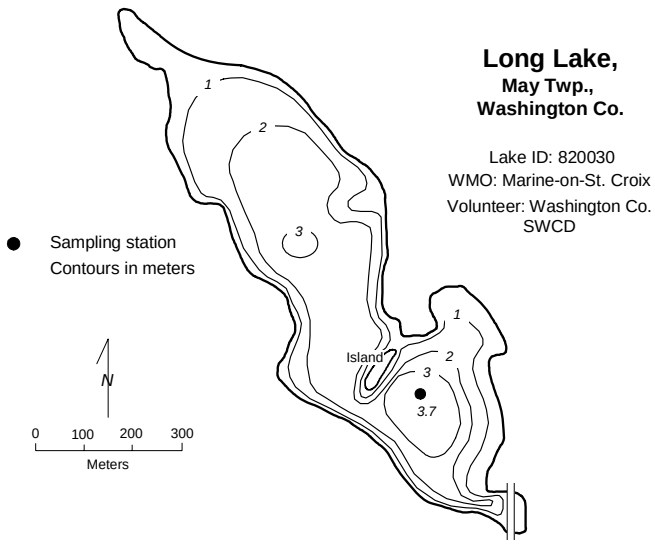
Statistical analysis on the lake's overall database fails to reveal any "statistically significant" long-term trends. The lake's 2006 overall grade was identical to those recorded in 2000-2001 and 2003-2005, and better than those of 1993-1997, 1999, and 2002 (C). Overall, the lake's water quality is representative of a C+/B grade.

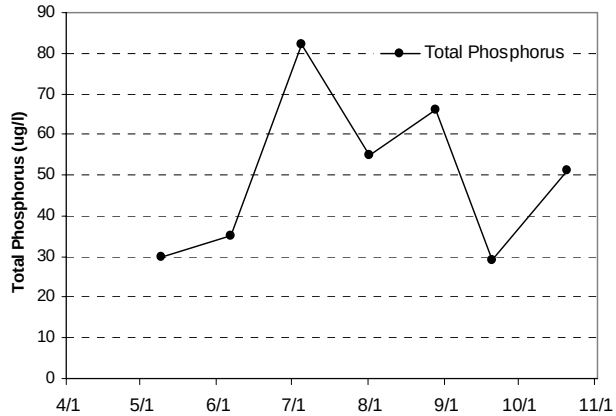
A recent MPCA conducted trend analysis on the lake's Secchi transparency data, however, revealed a statistically significant improvement in recent water clarity.

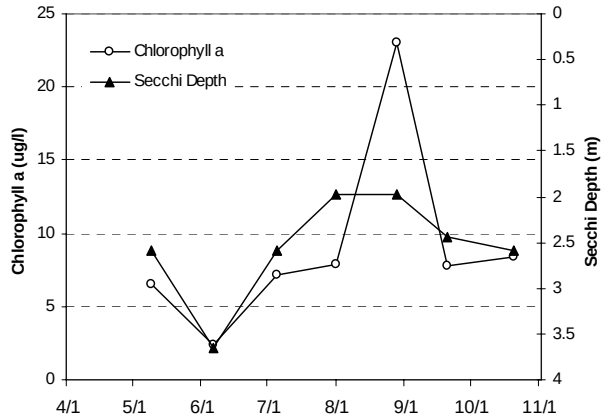
Throughout the course of the study, the volunteer monitor ranked their perceptions of the lake's physical and recreational condition on a 1-to-5 scale. These rankings as well as the data and graphs discussed above are shown on the lake's information sheet on the following page. The mean physical condition ranking was 2.0 (2- "some algae present"), while the mean recreational suitability ranking was 2.1 (roughly 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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

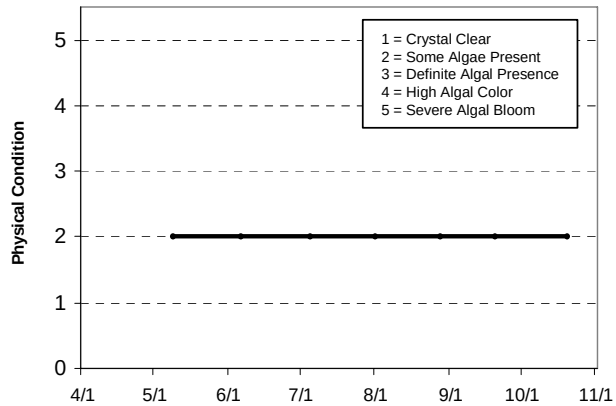






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/9/06	16.7	13.6	7.3	0.81	6.5	30		2.591	2	3
6/6/06	24.7	20	6	0.05	2.4	35		3.658	2	2
7/5/06	25.2	22.3	9.58	0.07	7.2	82		2.591	2	2
8/1/06	28.5	24.5	6.23	0.06	7.9	55		1.981	2	2
8/28/06	22.6	20.9	6.15	0.03	23	66		1.981	2	2
9/20/06	16.6	15.7	7.25	0.11	7.8	29		2.438	2	2
10/20/06	7	7.1	10.3	0.24	8.4	51		2.591	2	2

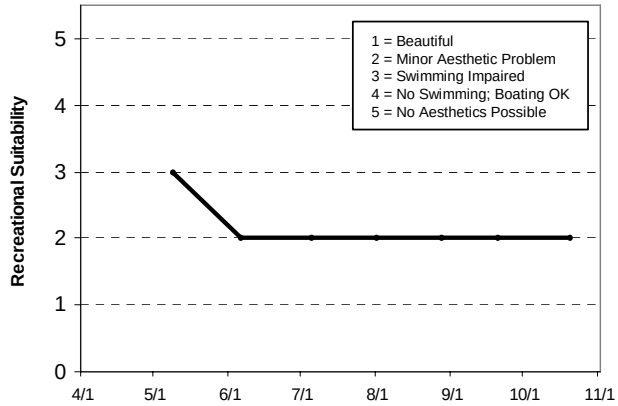


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus	C	C	C	C	C		C	C	C	C	C	B	C	C
Chlorophyll a	C	C	C	B	C		B	B	B	B	A	A	B	A
Secchi Depth	B	C	C	C	C		C	B	B	C	B	B	B	B
Overall	**C**	**C**	**C**	**C**	**C**		**C**	**B**	**B**	**C**	**B**	**B**	**B**	**B**

Source: Metropolitan Council and STORET data



Long Lake [Pine Springs] (82-0118) *Valley Branch Watershed District*

Long Lake is a 62-acre lake located in Pine Springs Township (Washington County). The mean and maximum depth of the lake is 3.6 m (roughly 12 feet) and 10.4 m (34 feet), respectively. Roughly 55 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 744 ac-ft.

The lake's surface area and watershed size (2,060 acres) translates to a 33:1 watershed-to-lake size ratio. Generally the larger the ratio, the greater the potential stress on the lake from surface runoff.

Eurasian Water Milfoil (*Myriophyllum spicatum*) [EWM] has recently been found in the lake.

This was the fourth year that Long Lake has been involved in CAMP (the other being 1993 and 2004-2005). The lake has been monitored in the past by Council staff (most recently in 2003). The lake was monitored 14 times between mid-April and mid-October, 2006. The volunteer data and resulting graphs showing the seasonal variability in TP and CLA concentrations, Secchi transparency, and user perception (physical condition and recreational suitability) are presented on the information sheet on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	39.3	9.0	133.0	C
CLA (µg/l)	20.6	4.3	49.0	C
Secchi (m)	1.6	0.5	3.6	C
TKN (mg/l)	1.20	0.38	2.00	
			Overall Grade	C

A search for water quality data on Long Lake uncovered a very small database. The only years other than 2006 where water quality data was available was 1984, 1993, and 2003-2005. While the limited database restricts the ability to determine long-term trends, the lake seems to fluctuate between an overall grade of B and C. The lake's best recorded water quality was observed in 2003. To better understand the quality of the lake and what direction it may be heading, continued monitoring is suggested.

The average user perception rankings, on a 1-to-5 scale, was 2.4 for physical condition (between 2- "some algae present" and 3- "definite algae present"), and 2.6 for recreational suitability (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

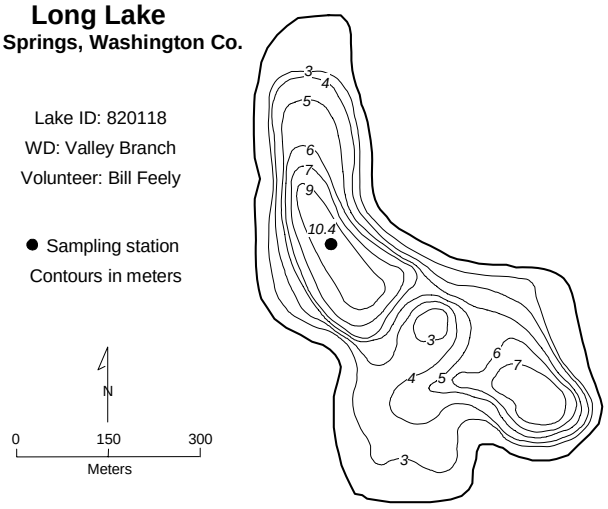
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

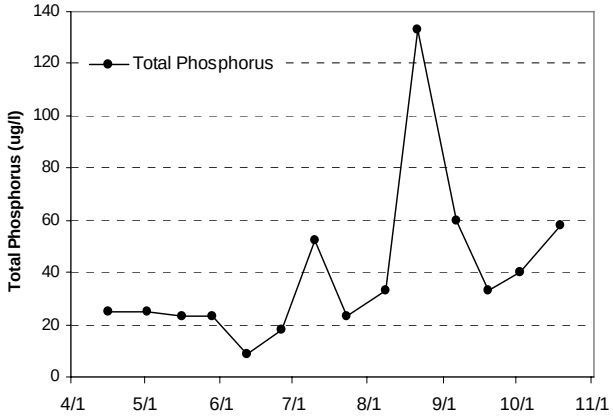
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

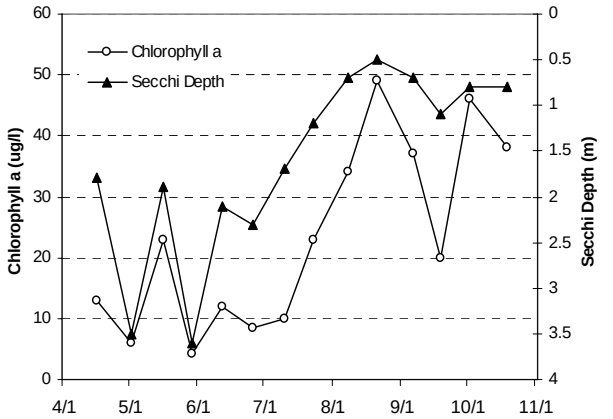
Long Lake
Pine Springs, Washington Co.

Lake ID: 820118
WD: Valley Branch
Volunteer: Bill Feely

● Sampling station
Contours in meters

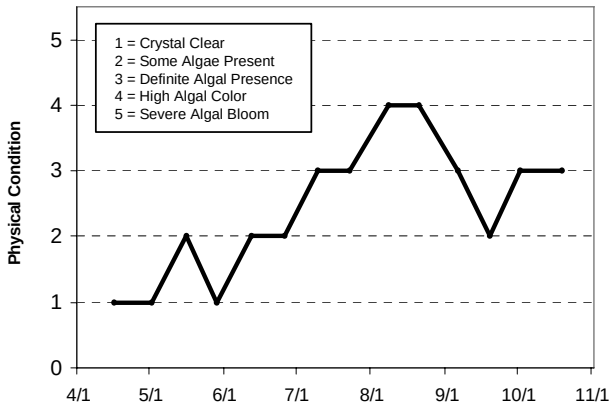






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/16/06	10.7				13	25		1.8	1	1
5/2/06	13.4				6	25		3.5	1	1
5/16/06	13.3				23	23		1.9	2	2
5/29/06	23.7				4.3	23		3.6	1	1
6/12/06	22.3				12	9		2.1	2	3
6/26/06	23.2				8.5	18		2.3	2	3
7/10/06	23.6				10	52		1.7	3	3
7/23/06	24				23	23		1.2	3	3
8/8/06	24.9				34	33		0.7	4	3
8/21/06	25.3				49	133		0.5	4	3
9/6/06	21.9				37	60		0.7	3	3
9/19/06	17.5				20	33		1.1	2	2
10/2/06	16.7				46	40		0.8	3	4
10/19/06	8.6				38	58		0.8	3	4

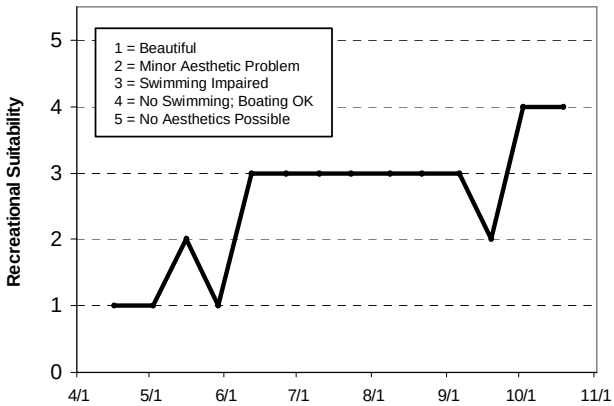


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus					C								
Chlorophyll a					B								
Secchi Depth					C								
Overall					**C**								

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus	B										B	C	C	C
Chlorophyll a	B										A	B	B	C
Secchi Depth	C										B	C	C	C
Overall	**B**										**B**	**C**	**C**	**C**

Source: Metropolitan Council and STORET data



Long Lake [Stillwater] (82-0021) *Browns Creek Watershed District*

Long Lake, which has a surface area of roughly 96 acres, is located on the western boundary of the City of Stillwater (Washington County). Its maximum depth is 6.7 m (22 feet).

As part of the 2006 volunteer monitoring program, Long Lake was monitored 14 times from mid-April to mid-October. This was the ninth year that Long Lake has been involved in CAMP. The lake was also involved in the program in 1995-1996, and 1998-2005. Graphs as well as the actual data collected by volunteers show the seasonal variability in TP and CLA concentrations, Secchi transparency, and user perception (physical condition and recreational suitability). The graphs and data tables are presented on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	85.2	43.0	148.0	D
CLA (µg/l)	24.4	13.0	48.0	C
Secchi (m)	1.1	0.6	1.5	D
TKN (mg/l)	1.95	0.95	2.70	
			Overall Grade	D

A search for water quality data through Council, MPCA, and STORET files resulted in a moderate amount of data. Nutrient data are available for the lake in 1995-1996, and 1998-2006. Additionally, Secchi transparencies collected through the MPCA's Citizen Lake Monitoring Program are available for 1987, 1989, and 1991-1994. When these data are analyzed, it reveals that the lake's water clarity, prior to the C recorded in 2004, had been fairly constant with grades of F in 1987, 1991-1995, 1998-2003, and D in 1989, 1996 (although the 1996 database is limited), 2005 and 2006.

A recent MPCA conducted trend analysis on the lake's Secchi transparency data, revealed a statistically significant decrease in recent 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 mean physical condition ranking was 3.0 (3- "definite algae present"), while the mean recreational suitability 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Long Lake,

Stillwater, Washington Co.

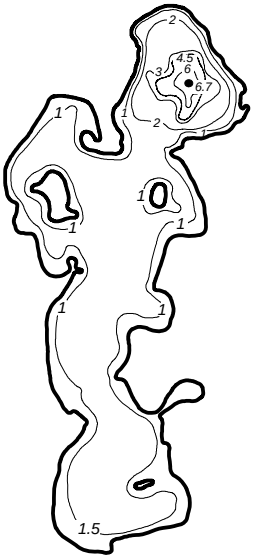
Lake ID: 820021
WMO: Browns Creek
Volunteer: Wash. Co. SWCD

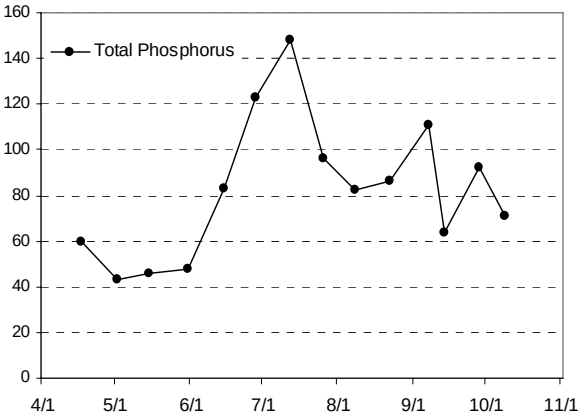
● Sampling site

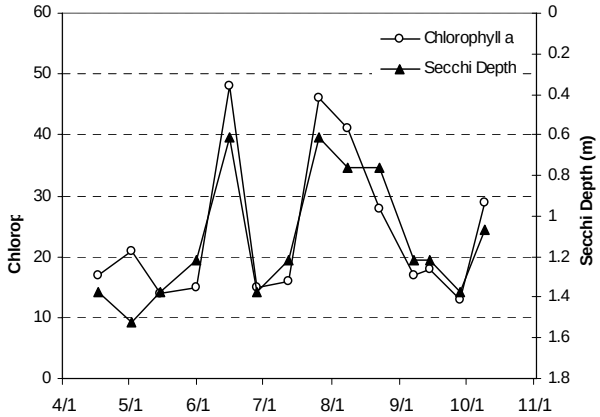
Contours in meters

N

0 100 200
Meters

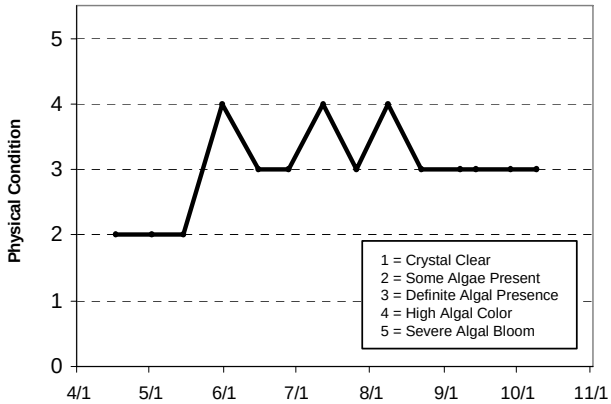






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/17/06	15.5	5.2	6.64	1.09	17	60		1.372	2	3
5/2/06	16.5	6.2	9.66	0.39	21	43		1.524	2	4
5/15/06	14.7	8.6	8.86	0.37	14	46		1.372	2	3
5/31/06	27.5	7.3	6.81	0.02	15	48		1.219	4	4
6/15/06	24	7.6	12.2	0.04	48	83		0.61	3	4
6/28/06	24.2	10.7	6.17	0.07	15	123		1.372	3	4
7/12/06	27.1	9.6	9.74	0.09	16	148		1.219	4	4
7/26/06	28.8	10.6	10.9	0.08	46	96		0.61	3	4
8/8/06	27.8	10.7	10.52	0.1	41	82		0.762	4	4
8/22/06	25.9	10.7	10.71	0.06	28	86		0.762	3	3
9/7/06	23.6	11.2	10.38	0.08	17	111		1.219	3	3
9/14/06	19.7	11.6	8.52	0.06	18	64		1.219	3	3
9/28/06	15.4	13.9	7.84	0.04	13	92		1.372	3	3
10/9/06	14.4	14.1	9.51	8.96	29	71		1.067	3	4

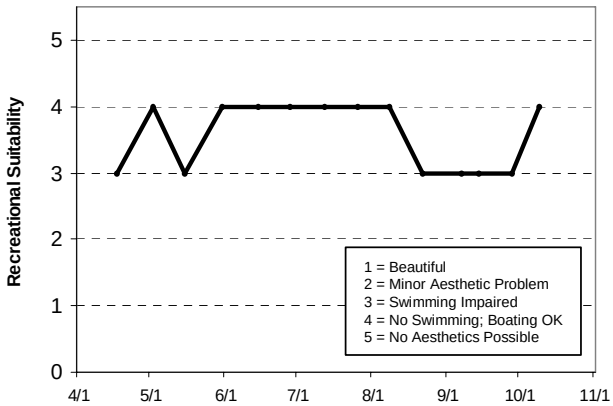


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth								F		D		F	F
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus			D	D		D	D	F	D	D	D	C	D	D
Chlorophyll a			D	D		F	F	F	F	D	D	C	D	C
Secchi Depth	F	F	F	D		F	F	F	F	F	F	C	D	D
Overall			**D**	**D**		**F**	**F**	**F**	**F**	**D**	**D**	**C**	**D**	**D**

Source: Metropolitan Council and STORET data



Long Lake [Washington Co.] (82-0068) *Carnelian - Marine Watershed District*

Long Lake is a 35-acre lake located within City of Scandia (Washington County). The maximum and mean depths of the lake are 2.1 m (roughly seven feet) and 1.1 m (three-and-a-half 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). The lake's surface area and mean depth translates to an approximate volume of 126 ac-ft.

The majority of the land within the 381-acre watershed is undeveloped. The watershed-to-lake size ratio is 11:1 (the greater the ratio, the greater the potential stress on the lake from surface runoff). There is no formal boat access point on the lake.

This was the seventh year that Long Lake has been involved in CAMP. A search through the STORET nationwide water quality database for data on the lake was very limited. The only years in which data are available other than the 2000-2006 CAMP data, were 1998-1999. The lake was monitored seven times between late-April and early-October, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	84.4	50.0	147.0	D
CLA (µg/l)	18.8	2.9	26.0	B
Secchi (m)	1.4	0.9	2.1	C
TKN (mg/l)	1.46	1.10	1.90	
			Overall Grade	C

The lake's 2006 overall grade (C), which is identical to that recorded in 2002, is better than those recorded in 1998-2000, and 2003(F), and 2001, 2004-2005 (overall grade of a D).

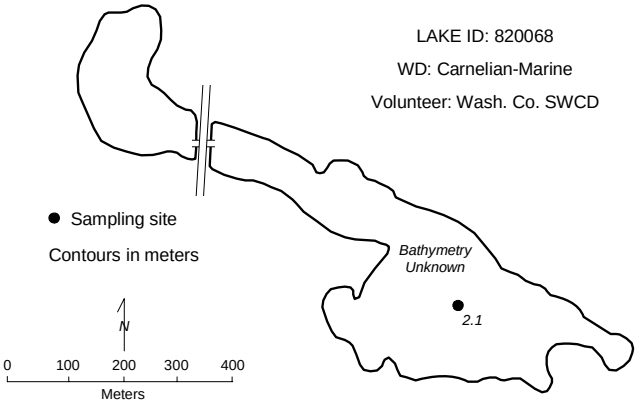
As mentioned earlier, there is a limited amount of water quality data available for Long Lake. Therefore it is not possible to determine any long-term or short-term trends. The lake's quality has fluctuated between an overall grade of C and F. To better understand the lake's water quality and where it may be heading, more data are needed.

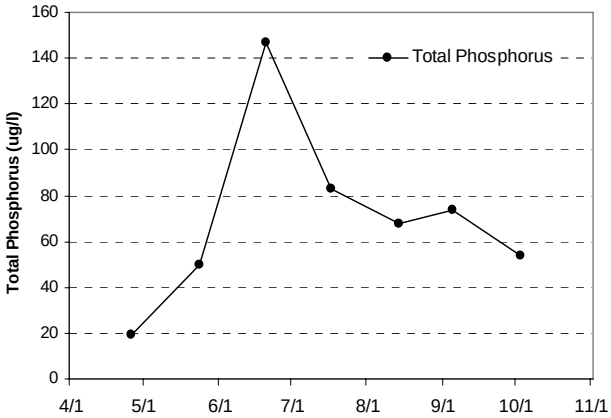
The last two graphs show seasonal variation in the lake's perceived physical condition and recreational suitability. The average user perception rankings, on a 1-to-5 scale, were 2.9 for physical condition (between 2- "some algae present" and 3- "definite algae present"), and 3.6 for recreational suitability (between 3- "swimming impaired and 4- "no swimming – boating ok"").

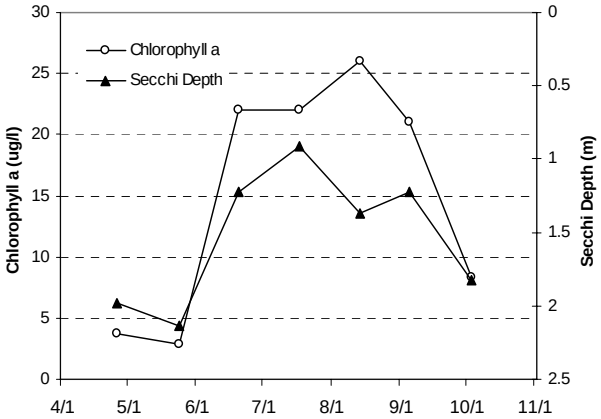
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Long Lake

New Scandia Twp., Washington Co.

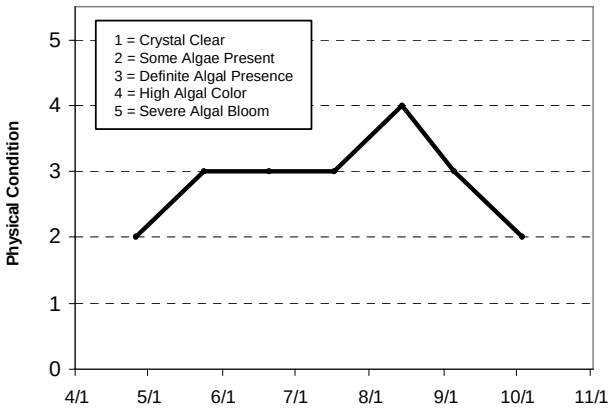






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/26/06	15.2	15	5.93	6.14	3.7	19		1.981	2	4
5/24/06	23.2	18.4	6.14	4.85	2.9	50		2.134	3	4
6/20/06	23.1	23	5.96	5.26	22	147		1.219	3	4
7/17/06	28.8	23.7	6.9	0.09	22	83		0.914	3	4
8/14/06	24.2	23.8	5.97	0.12	26	68		1.372	4	4
9/5/06	23.1	21.6	8.74	0.17	21	74		1.219	3	3
10/3/06	16.5	16.4	8.77	6.26	8.4	54		1.829	2	2

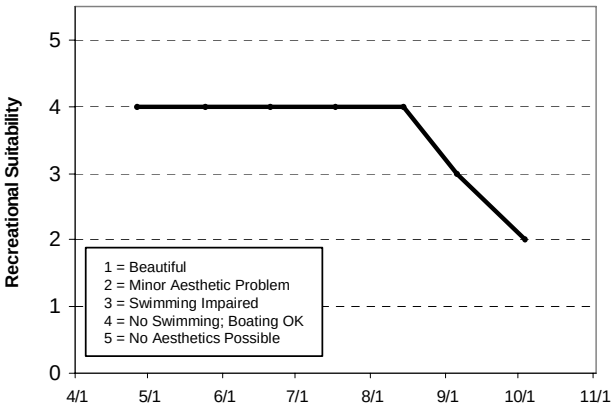


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus						D	D	D	C	C	D	D	D	D
Chlorophyll a						F	F	F	D	C	F	D	C	B
Secchi Depth						F	F	F	D	D	F	D	D	C
Overall						**F**	**F**	**F**	**D**	**C**	**F**	**D**	**D**	**C**

Source: Metropolitan Council and STORET data



Loon Lake (82-0015-02) *Carnelian - Marine Watershed District*

This was the seventh year of CAMP monitoring in Loon Lake, which is located in the Stillwater Township (Washington County). The 64-acre lake 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 (the 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 lake does not have a public access and its 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 seven times between early-May and mid-October, 2006. During each monitoring event, the lake was monitored for TP, CLA, TKN, Secchi transparency, as well as the perceived physical condition and recreational suitability. The collected data and resulting graphs showing TP and CLA concentrations, Secchi transparency, and user perception (physical condition and recreational suitability) are presented on the lake's information sheet on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	165.2	73.0	235.0	F
CLA (µg/l)	107.7	25.0	230.0	F
Secchi (m)	0.7	0.3	1.5	F
TKN (mg/l)	3.25	1.80	5.20	
			Overall Grade	F

The lake's 2006 overall grade was identical to those recorded in 1996-1998 and 2003-2005, and worse than those in 2000-2002 (D).

Throughout the summer, the volunteer ranked the lake's physical and recreational conditions on a 1-to-5 scale (see lake information sheet). The mean physical condition ranking was 3.6 (between 3- "definite algae present" and 4- "high algal color"), while the mean recreational suitability ranking was 3.7 (between 3- "swimming impaired" and 4- "no swimming – boating ok").

Because of the limitedness of the lake's water quality database, no long-trend can be determined. In the short-term however, the lake's water quality seems to be well represented by D/F+. To better understand the quality of the lake and what direction it may be heading, more years of data collection are needed.

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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Loon Lake

Stillwater Twp., Washington Co.

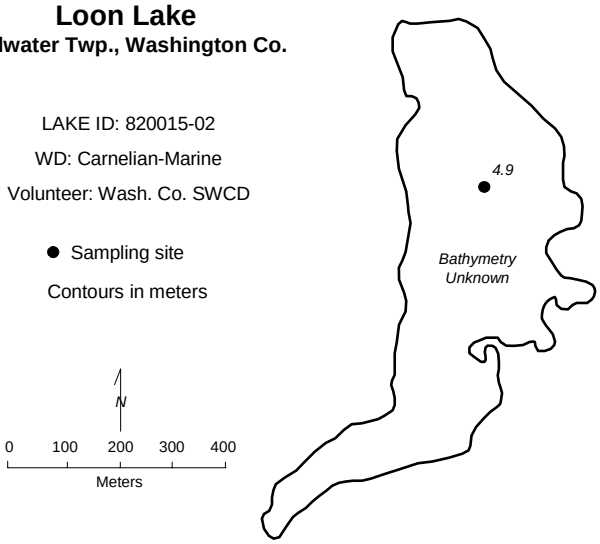
LAKE ID: 820015-02

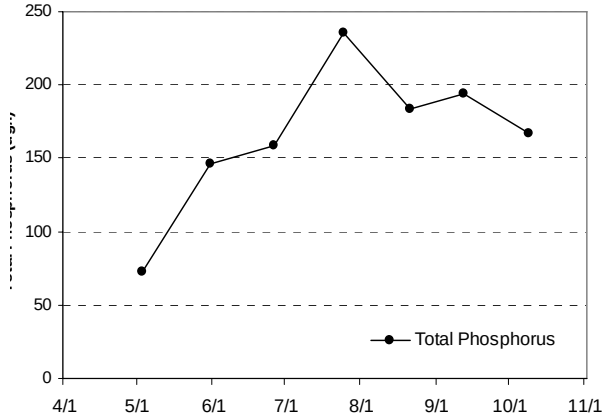
WD: Carnelian-Marine

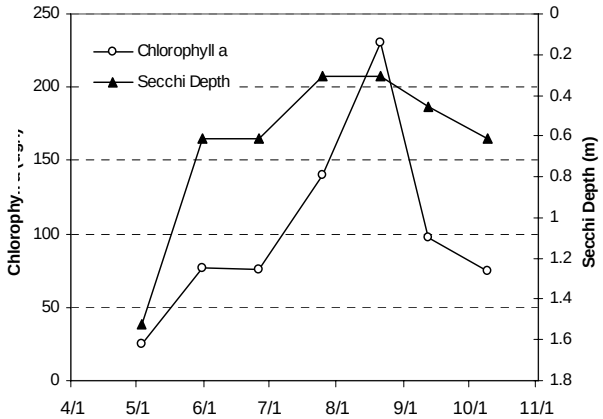
Volunteer: Wash. Co. SWCD

● Sampling site

Contours in meters

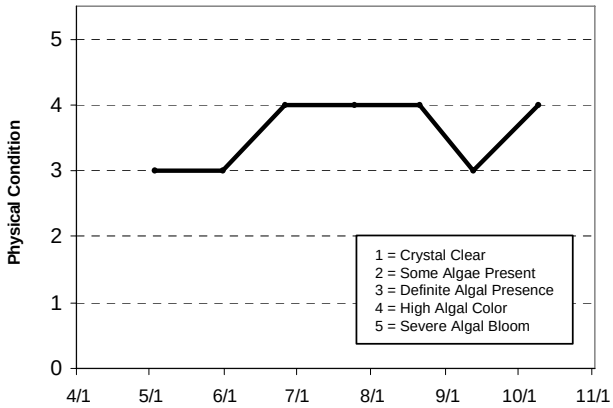






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/3/06	16	13.6	8.22	5.28	25	73		1.524	3	3
5/31/06	25.1	13.1	6.22	0.17	77	146		0.61	3	3
6/26/06	25.4	16.1	10.16	0.04	76	159		0.61	4	4
7/25/06	26.9	23.8	10.51	0.04	140	235		0.305	4	4
8/21/06	25.6	22.9	13.71	0.05	230	184		0.305	4	4
9/12/06	18	17.7	7.56	0.08	98	194		0.457	3	4
10/9/06	14	13.9	9.24	8.48	75	167		0.61	4	4

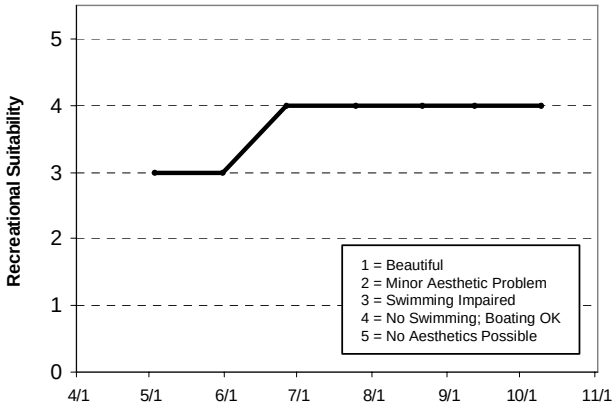


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus				F	F	F	F	D	D	D	D	D	D	F
Chlorophyll a				D	D	D	D	D	D	D	F	F	F	F
Secchi Depth				F	F	F	F	D	D	F	F	F	F	F
Overall				**F**	**F**	**F**	**F**	**D**	**D**	**D**	**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 very little known morphological data available for the lake.

This was the first year that Lost Lake has been involved in CAMP. A search through the STORET nationwide water quality database for data on the lake provided no data, therefore 2006 is the only year of available water quality data for the lake.

As part of the county's involvement in CAMP in 2006, the lake was monitored 13 times between mid-April and mid-October. During each sampling event the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	76.5	42.0	150.0	D
CLA (µg/l)	20.5	3.2	51.0	C
Secchi (m)	1.3	0.6	1.8	C
TKN (mg/l)	1.41	0.97	2.00	
			Overall Grade	C

The lake's 2006 overall lake quality grade was a C. As mentioned earlier, there are no nutrient data available for Lost Lake other than the 2006 CAMP data. Therefore it is not possible to determine any long-term or short-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 2.3 for physical condition (between 2- "some algae present" and 3- "definite algae present"), and 4.0 for recreational suitability (4- "no swimming – boating ok").

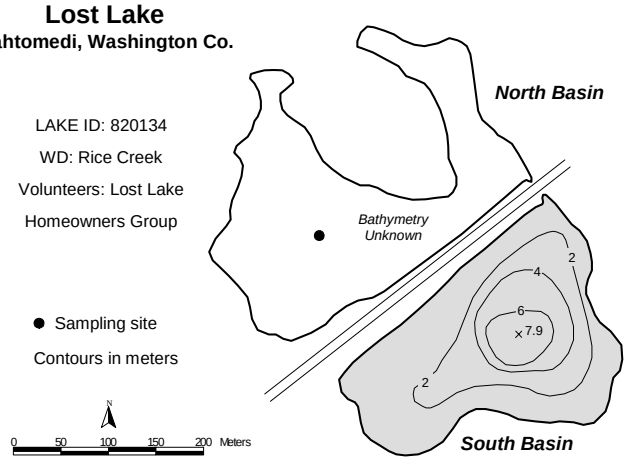
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

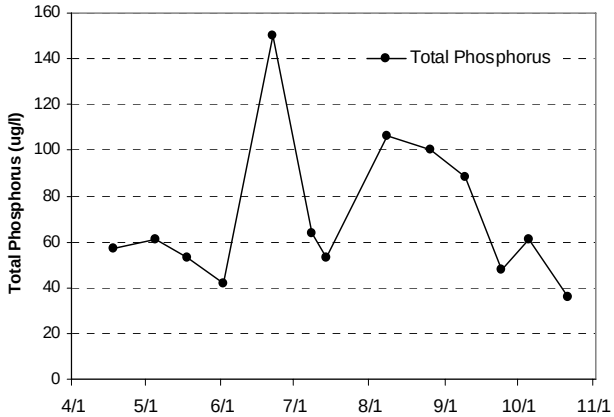
Lost Lake
Mahtomedi, Washington Co.

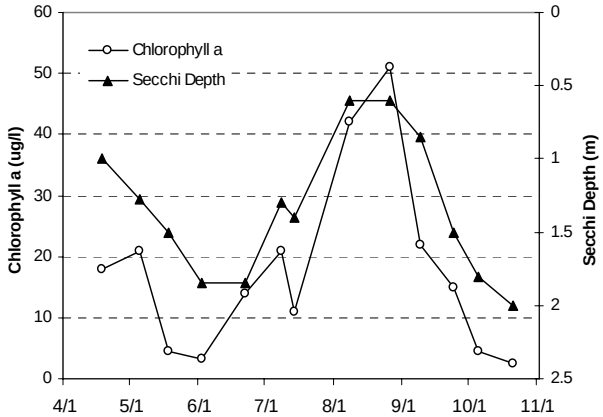
LAKE ID: 820134

WD: Rice Creek

Volunteers: Lost Lake Homeowners Group

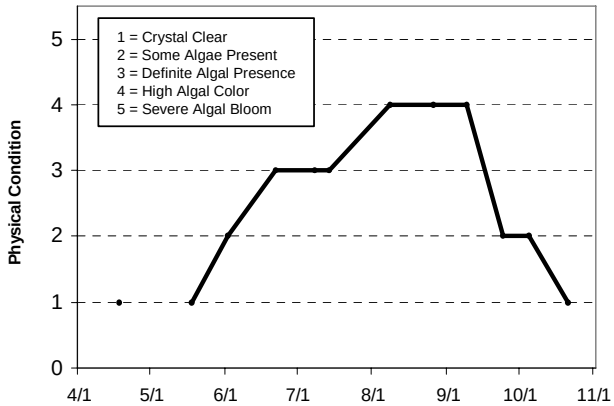






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/18/06	15.4				18	57		1	1	4
5/5/06	14.7				21	61		1.275		4
5/18/06	19.1				4.5	53		1.5	1	4
6/2/06	28.2				3.2	42		1.85	2	4
6/22/06	26.4				14	150		1.85	3	4
7/8/06	28.3				21	64		1.3	3	4
7/14/06	29.8				11	53		1.4	3	4
8/8/06	25.1				42	106		0.6	4	4
8/26/06	24.5				51	100		0.6	4	4
9/9/06	19.9				22	88		0.85	4	4
9/24/06	15.7				15	48		1.5	2	4
10/5/06	16.8				4.4	61		1.8	2	4
10/21/06	5.7				2.5	36		2	1	4

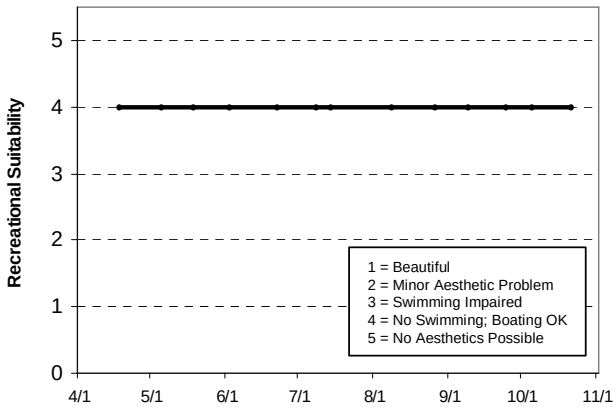


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus														D
Chlorophyll a														C
Secchi Depth														C
Overall														**C**

Source: Metropolitan Council and STORET data



Lotus Lake (10-0006) *City of Chanhassen*

While Lotus Lake has previously been monitored by Council staff (1985, 1990 and 1999-2000) and the MPCA's volunteer Secchi program (1980, 1988-1991), 2006 marks the fourth year the lake has been monitored through CAMP. Lotus Lake, with a surface area of 246 acres, is located within the City of Chanhassen (Carver County) [public access to the lake is possible on the southern end of the lake]. The lake's surface area and its 1,033-acre watershed translates to a 4:1 watershed-to-lake size ratio (the greater the ratio, the greater the potential stress on the lake from surface runoff).

The lake's maximum and mean depths of 8.9 and 4.3 (29.2 and 14.2 feet), along with its surface area, translates to a lake volume of approximately 3,500 ac-ft. Roughly 74 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 lake is considered a "Priority Lake" due to its multi-recreational uses. Eurasian Water Milfoil (*Myriophyllum spicatum*) [EWM] has been reported on the lake.

In 2006, Lotus Lake was monitored 11 times between early-May and early-October. Results are presented on graphs and data tables on the following page. During each monitoring event, the lake was monitored for TP, CLA, TKN, Secchi transparency, as well as the perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	***Mean***	***Minimum***	***Maximum***	***Grade***
TP (µg/l)	62.8	27.0	114.0	C
CLA (µg/l)	44.3	3.0	120.0	C
Secchi (m)	1.2	0.5	2.1	C
TKN (mg/l)	1.63	0.72	2.60	
			Overall Grade	C

The lake's 2006 overall grade of C is identical to those recorded in 1985, 1999-2000, and 2004-2005, and better than the D recorded in 2003.

Throughout the summer, the volunteer ranked their opinion of the lake's physical and recreational conditions on a 1-to-5 scale (see lake information sheet). The mean physical condition was 2.6 (between 2- "some algae present" and 3- "definite algae present"), while the 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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Lotus Lake

Chanhassen, Carver Co.

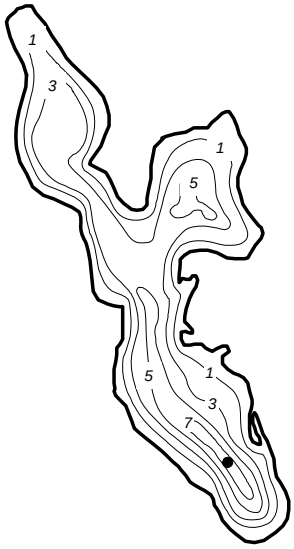
Lake ID: 100006

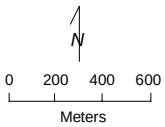
WD: Riley-Purgatory-Bluff Creek

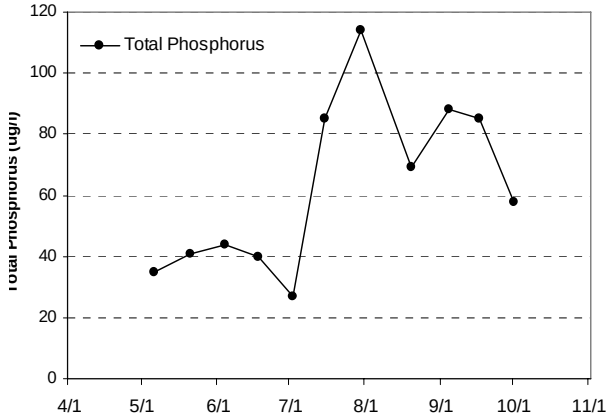
Volunteer: Shelly Strohmaier

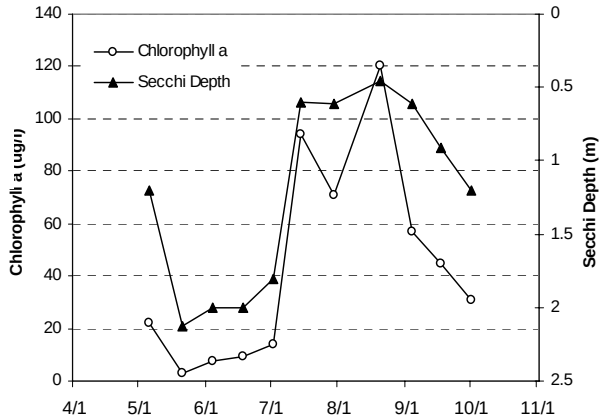
● Sampling site

Contours in meters



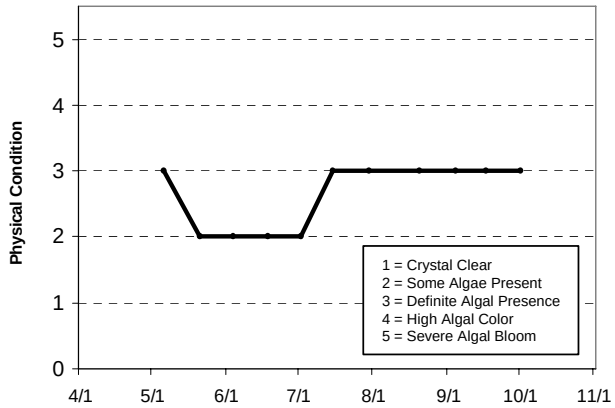






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/6/06	15.1				22	35		1.2	3	2
5/21/06	17				3	41		2.13	2	2
6/4/06	24.5				7.7	44		2	2	2
6/18/06	24.3				9.2	40		2	2	1
7/2/06	26.5				14	27		1.8	2	2
7/15/06	29.1				94	85		0.6	3	3
7/30/06	29.1				71	114		0.61	3	3
8/20/06	25				120	69		0.46	3	3
9/4/06	22.8				57	88		0.61	3	2
9/17/06	20.6				45	85		0.91	3	2
10/1/06	16.3				31	58		1.2	3	3

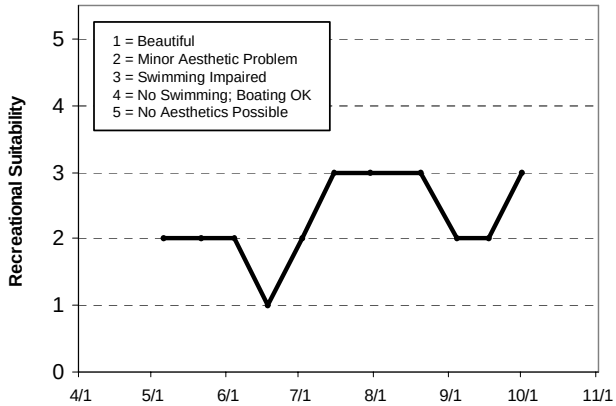


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus						C							
Chlorophyll a						C					C		
Secchi Depth	D					C			D	C	C	C	
Overall						**C**							

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus							C	C			D	C	C	C
Chlorophyll a							C	C			C	C	C	C
Secchi Depth							C	C			D	C	C	C
Overall							**C**	**C**			**D**	**C**	**C**	**C**

Source: Metropolitan Council and STORET data



Louise Lake (82-0025) *Carnelian - Marine Watershed District*

Louise Lake is a 48-acre lake located within Stillwater Township (Washington County). The maximum and mean depths of the lake are 3.7 m (roughly 12 feet) and 1.8 m (six feet), respectively. The mean depth of the lake and its surface area translate to an approximate lake volume of 283 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'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). There is no formal boat access point on the lake.

This was the seventh year that Louise Lake has been involved in CAMP. A search through the STORET nationwide water quality database for data on the lake provided limited information (1996-2005).

The lake's Secchi transparency was monitored seven times from early-May to mid-October, 2006. Results are presented in both graphs and data tables on the lake's information sheet on the following page.

Water samples to be analyzed for TP, TKN and chlorophyll were not collected for the lake in 2006. Because Secchi transparency was the only data collected there are no nutrient or chlorophyll concentration means to compare to previous years. The lake's 2006 summertime (May through September) mean Secchi transparency was 1.02 m (minimum of 0.46 m and a maximum of 1.68 m). This translates to a grade of D for water clarity. The lake's 2006 water clarity was better than that of 2005 (0.7 m), dramatically worse than those recorded in 2003-2004 (2.0 m and 2.5 m), and similar to that of 2001 (0.9 m).

Because of the limitedness of the lake's water quality database, no long-term can be determined. In the short-term however, the data seems to show that the lake, consistently fluctuates between an overall C and D grade. To better understand the lake's water quality and where it may be heading, more data are needed.

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 3.0 for physical condition (3- "definite algae present"), and 3.3 for recreational suitability (between 3- "swimming slightly impaired" and 4- "no swimming – boating ok").

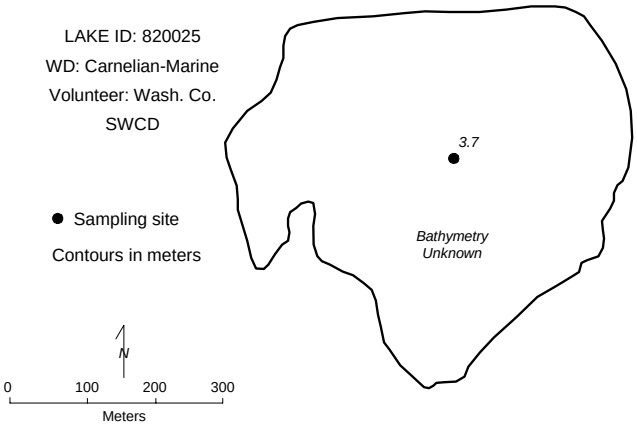
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

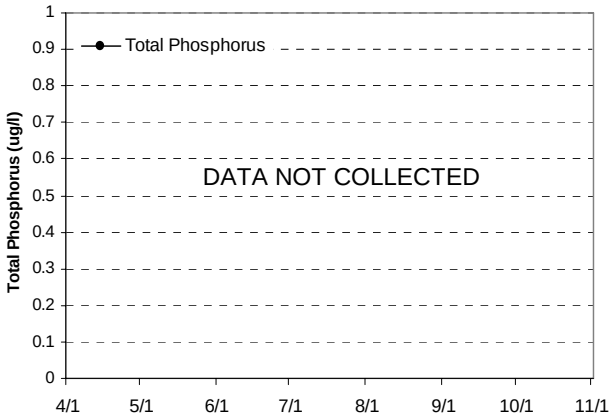
Lake Louise

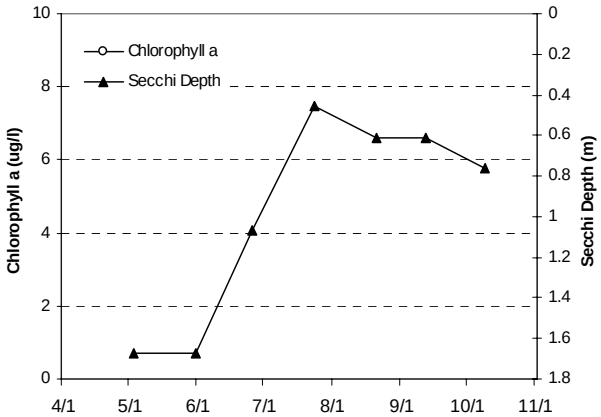
Stillwater Twp., Washington Co.

LAKE ID: 820025
WD: Carnelian-Marine
Volunteer: Wash. Co. SWCD

● Sampling site
Contours in meters

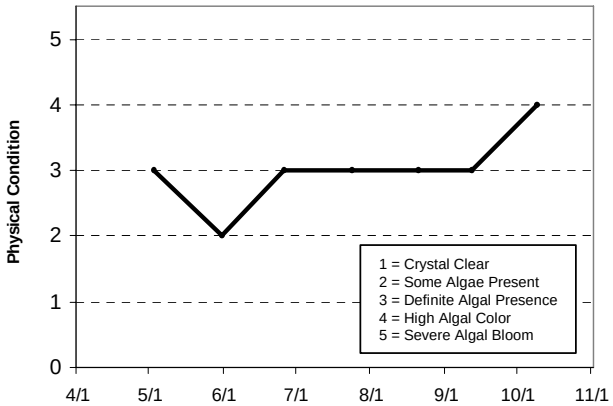






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/3/06	15.5		9.54					1.676	3	4
5/31/06	24.8	16.7	5.75	0.17				1.676	2	3
6/26/06	25.5	21.2	6.68	0.03				1.067	3	3
7/24/06	28.7	23.5	13.62	0.09				0.457	3	3
8/21/06	25.4	23.3	11.73	0.1				0.61	3	3
9/12/06	18.2	17.3	9.61	0.1				0.61	3	3
10/9/06	13.9		7.49					0.762	4	4

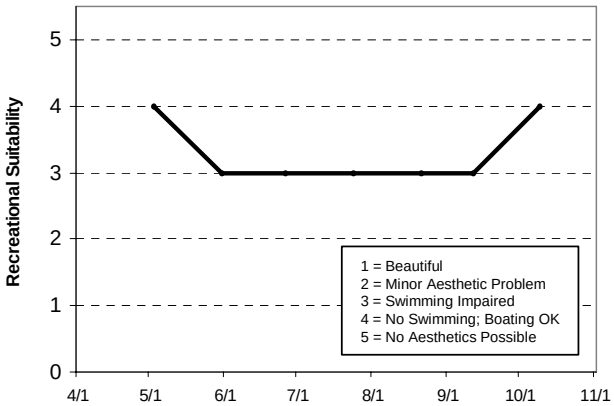


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
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	C	D	D
Overall				**C**	**D**	**C**	**D**	**C**	**D**	**D**				

Source: Metropolitan Council and STORET data



Lynch Lake (82-0042) *Browns Creek Watershed District*

Lynch Lake is a small 43-acre lake located in Washington County. There is very little known morphological data available for the lake.

This was the first 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 data, therefore 2006 is the only year of available water quality data for the lake.

As part of the watershed's involvement in CAMP in 2006, the lake was monitored seven times between mid-April and late-September. During each sampling event the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

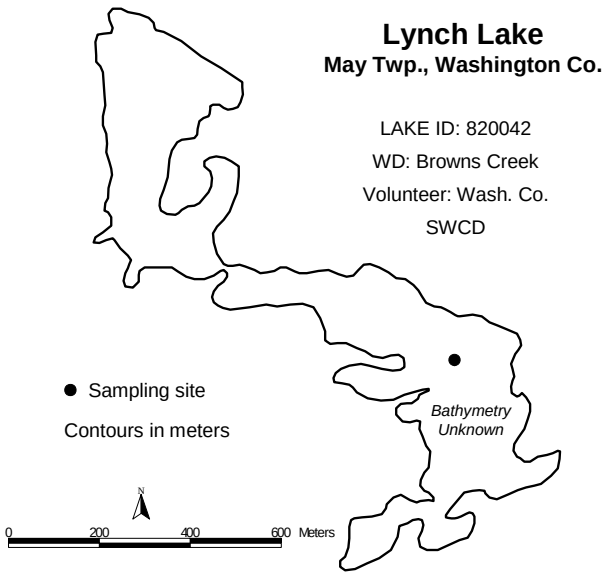
2006 summer (May-September) data summary

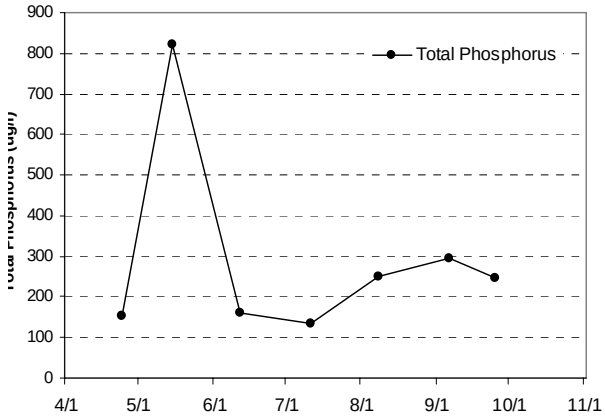
Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	318.7	134.0	822.0	F
CLA (µg/l)	183.3	35.0	340.0	F
Secchi (m)	0.3	0.2	0.5	F
TKN (mg/l)	6.25	1.70	13.00	
			Overall Grade	F

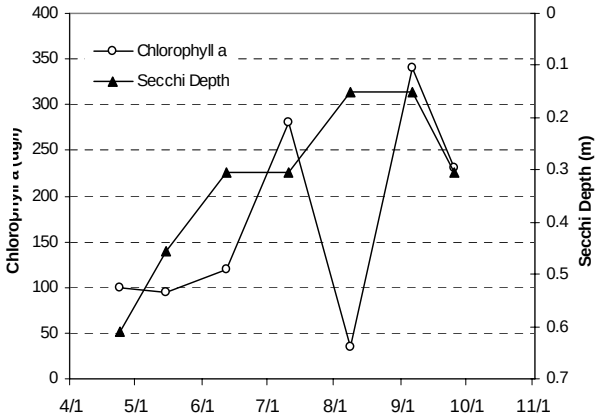
As mentioned earlier, there are no nutrient data available for Lynch Lake other than the 2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

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 3.7 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

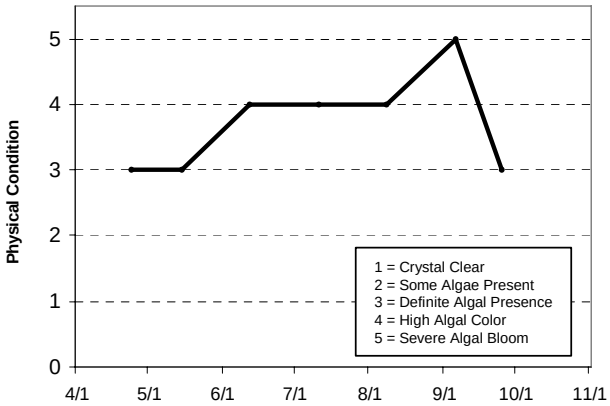






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/24/06	15.8	15.7	7.74	0.57	100	154		0.61	3	4
5/15/06	13	12.5	10.25	9.64	95	822		0.457	3	4
6/12/06	18.3	18	7.11	0.11	120	162		0.305	4	4
7/11/06	24.6	23.3	8.95	0.08	280	134		0.305	4	4
8/8/06	24.7		6.43		35	251		0.152	4	4
9/6/06	21.4		7.99		340	296		0.152	5	4
9/25/06	13.3	13	10.73	0.1	230	247		0.305	3	4

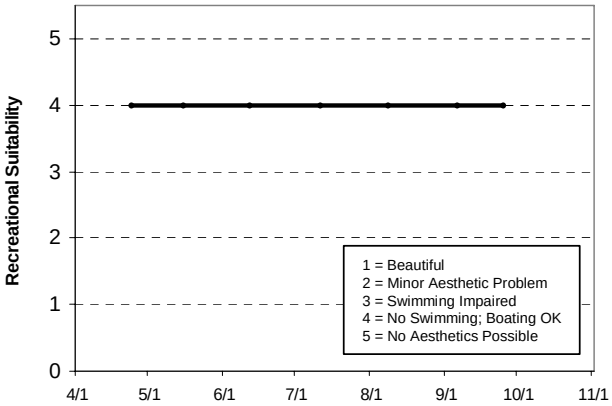


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus														F
Chlorophyll a														F
Secchi Depth														F
Overall														**F**

Source: Metropolitan Council and STORET data



MacDonald's Pond (82-0062) *Carnelian – Marine Watershed District*

MacDonald's Pond is an approximate 12-acre land-locked lake located within City of Scandia (Washington County). The maximum depth of the lake is 2.7 m (roughly 9 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). There is very little other known morphological data available for the waterbody.

This was the third year that MacDonald's Pond has been involved in CAMP (2004 being the first). On each of the sampling days the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The lake was monitored seven times between mid-April and early-October, 2006.

2006 summer (May-September) data summary

Parameter	***Mean***	***Minimum***	***Maximum***	***Grade***
TP (µg/l)	21.6	14.0	33.0	A
CLA (µg/l)	4.3	1.8	8.6	A
Secchi (m)	3.0	2.4	3.2	B
TKN (mg/l)	0.77	0.60	0.86	
			Overall Grade	A

The lake's 2006 overall grade is the same as that reported in 2004 (overall grade of A) and better than the B reported in 2005.

Other than for the 2004-2006 CAMP data, there are no known water quality data available for MacDonald's Pond. Therefore it is not possible to determine any long-term or short-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 1.7 for physical condition (between 1- "crystal clear" and 2- "some 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

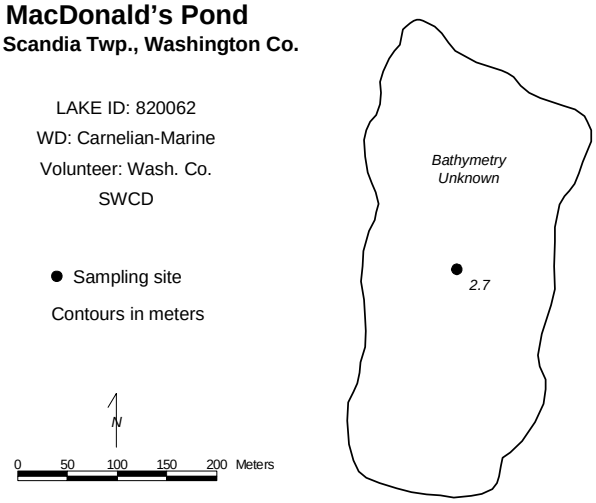
MacDonald's Pond

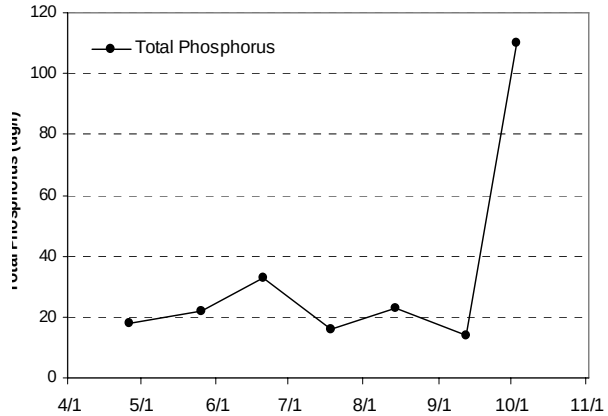
New Scandia Twp., Washington Co.

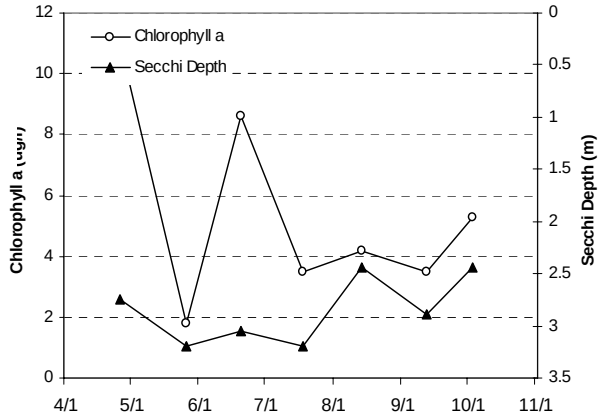
LAKE ID: 820062
WD: Carnelian-Marine
Volunteer: Wash. Co. SWCD

● Sampling site

Contours in meters

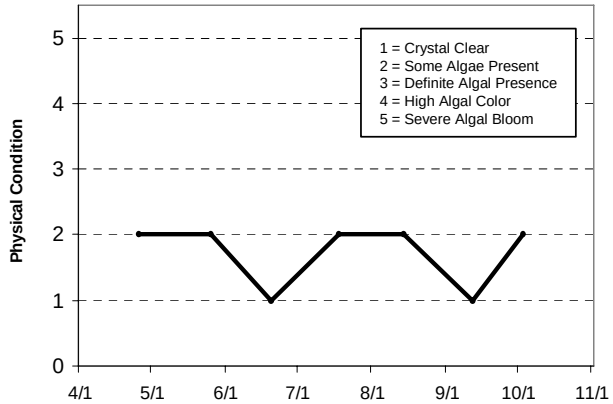






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/26/06	15.3	14.4	7.23	6.83	11	18		2.743	2	2
5/26/06	20.8	16	6.9	0.8	1.8	22		3.2	2	2
6/20/06	24.4		9.43		8.6	33		3.048	1	2
7/18/06	28.7	24.6	7.36	0.09	3.5	16		3.2	2	2
8/14/06	26.1		5.76		4.2	23		2.438	2	2
9/12/06	18.6	18.3	6.8	0.04	3.5	14		2.896	1	1
10/3/06	16.5		9.9		5.3	110		2.438	2	2

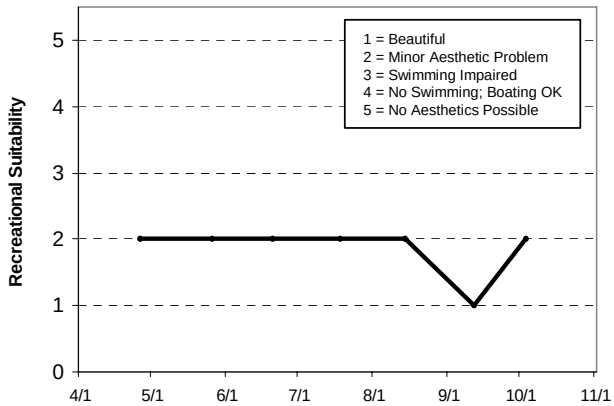


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus												A	B	A
Chlorophyll a												A	A	A
Secchi Depth												A	B	B
Overall												**A**	**B**	**A**

Source: Metropolitan Council and STORET data



Magda Lake (27-0065) *Shingle Creek Watershed Management Commission*

Magda Lake is a 15-acre lake located within City of Brooklyn Park (Hennepin County). There is very little known morphological data available for the lake.

The year 2006 marks the fourth year that Magda Lake has been involved in CAMP. CAMP data for 1999-2000, 2003 and now 2006, are the only years for which data on the lake are known. 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 lake was monitored 12 times between mid-April and early-October, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	154.7	82.0	268.0	F
CLA (µg/l)	106.1	18.0	240.0	F
Secchi (m)	0.4	0.2	0.8	F
TKN (mg/l)	2.99	1.50	4.90	
			Overall Grade	F

The lake's overall grade for 2006 is the same as that recorded in 2003 (F) worse than those recorded in 1999 or 2000 (overall grade of a D).

As mentioned in the previous reports, there is a lack of water quality data available for Magda Lake. The only available data are the 1999-2000, 2003, and 2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. 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 3.7 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").

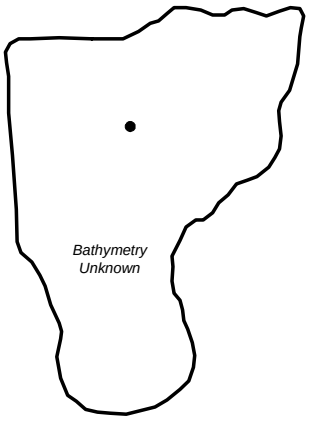
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

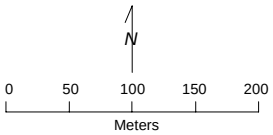
Lake Magda

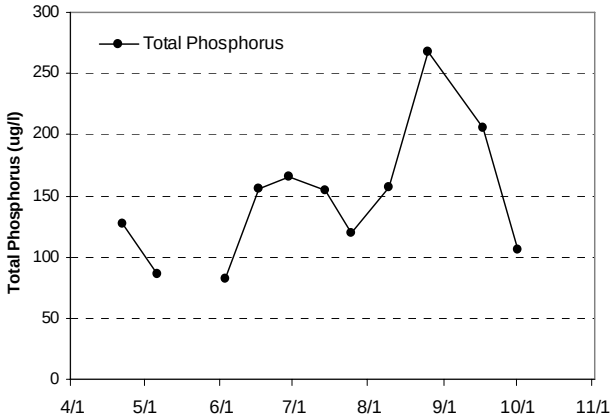
Brooklyn Park, Hennepin Co.

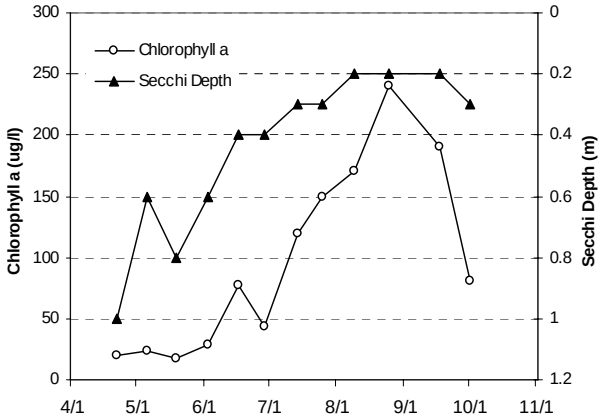
Lake ID: 270065
WD: Shingle Creek
Volunteer: Carolyn Dindorf

● Sampling site
Contours in meters



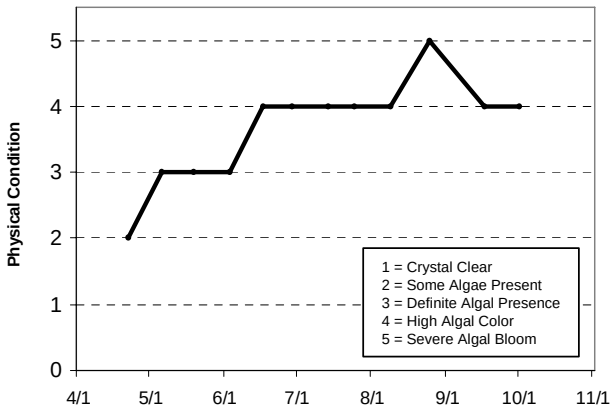






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/22/06	16.7				20	127		1	2	2
5/6/06	16.3				24	86		0.6	3	4
5/19/06	20.3				18			0.8	3	4
6/3/06	26.9				29	82		0.6	3	4
6/17/06	24.8				77	155		0.4	4	4
6/29/06	28.5				43	165		0.4	4	4
7/14/06	27.1				120	154		0.3	4	4
7/25/06	30.5				150	120		0.3	4	4
8/9/06	26.2				170	157		0.2	4	4
8/25/06	23.3				240	268		0.2	5	4
9/17/06	20.7				190	205		0.2	4	4
10/1/06	17.1				81	106		0.3	4	4

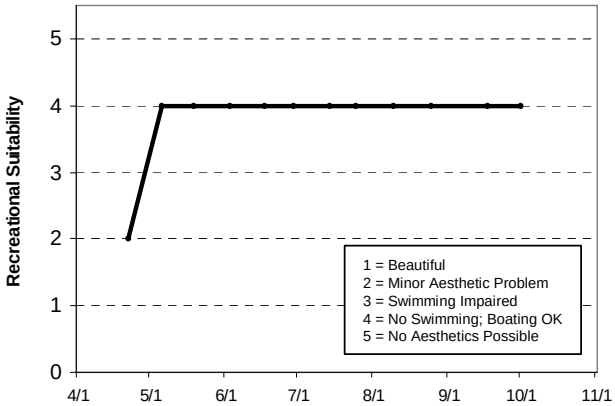


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus							D	D			F			F
Chlorophyll a							D	C			F			F
Secchi Depth							F	F			F			F
Overall							**D**	**D**			**F**			**F**

Source: Metropolitan Council and STORET data



Maple Marsh (82-0038) *Carnelian - Marine Watershed District*

Maple Marsh Lake is a 38-acre lake located within May 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. 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's surface area and mean depth translates to an approximate volume of 126 ac-ft.

The majority of the land within the 148-acre watershed is undeveloped. The watershed-to-lake size ratio is 4:1 (the greater the ratio, the greater the potential stress on the lake from surface runoff).

This was the sixth year that Maple Marsh Lake has been involved in CAMP. A search through the STORET nationwide water quality database for data on the lake provided limited information (1997-2006).

The lake's Secchi transparency was monitored seven times from mid-May to mid-October, 2006. Results are presented in both graphs and data tables on the lake's information sheet on the following page.

Water samples to be analyzed for TP, TKN and chlorophyll were not collected for the lake in 2006. Because Secchi transparency was the only data collected there are no nutrient of chlorophyll concentration means to compare to previous years. The lake's 2006 summertime (May through September) mean Secchi transparency was 0.9 m (minimum of 0.46 m and a maximum of 1.98 m). This translates to a grade of D for water clarity. The lake's 2006 Secchi grade is identical to those recorded in 1997, 1999-2001, 2003 and 2005, better than the F in 1998, but worse than the C's of 2002 and 2004.

Because of the limited nature of the lake's water quality database the determination of any statistically significant long-term trend is not possible. With this in mind, the lake's water quality data seems to show a consistent fluctuation between an overall grade of C and D. To better understand the lake's overall water quality and where it may be heading, more 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 2.8 for physical condition (between 2- "some algae present" and 3- "definite algae present"), and 3.7 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Maple Marsh
May Twp., Washington Co.

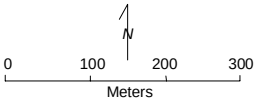
LAKE ID: 820038

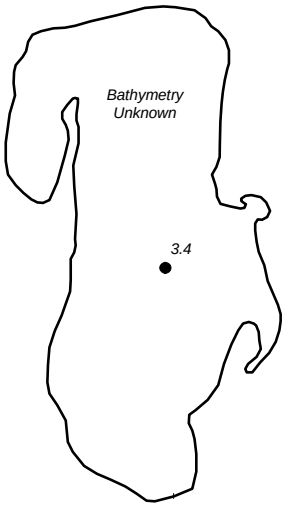
WD: Carnelian-Marine

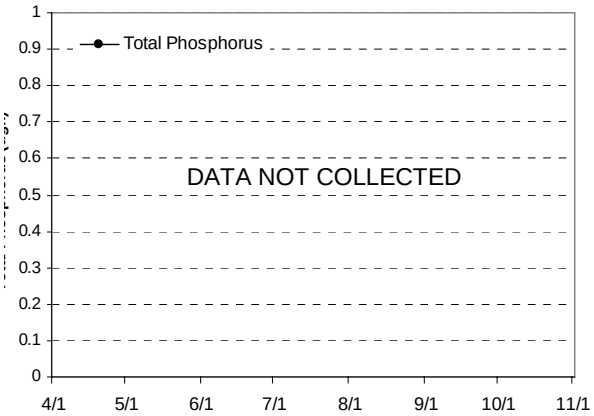
Volunteer: Wash. Co. SWCD

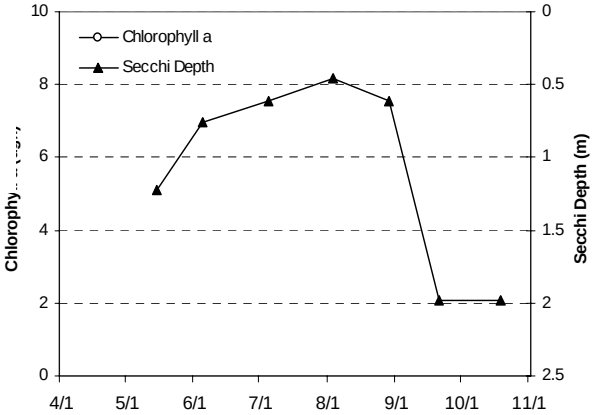
● Sampling site

Contours in meters



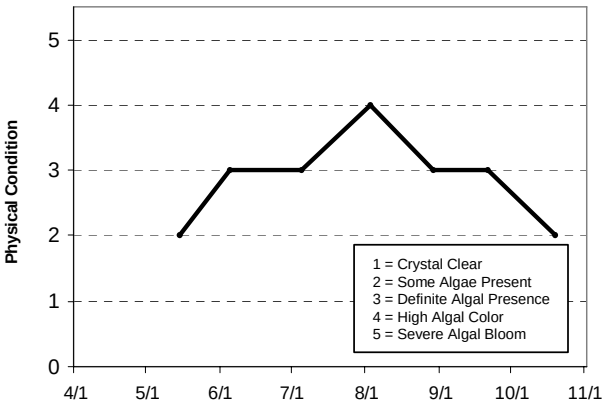






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/15/06	12.2	12	9.56	0.52				1.219	2	4
6/5/06	24.7	24.5	5.73	0.14				0.762	3	4
7/5/06	25.5	24.6	10.75	0.14				0.61	3	3
8/3/06	26.7	25.5	8.46	0.16				0.457	4	4
8/29/06	21.8	21.4	8.48	0.11				0.61	3	3
9/21/06	14.3		7					1.981	3	5
10/19/06	6.4	6.5	11.21	1.04				1.981	2	3

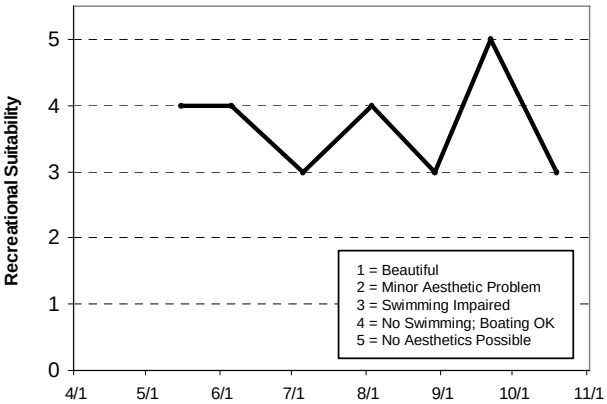


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus					F	F	C	D	F					
Chlorophyll a					D	F	F	C	D					
Secchi Depth					D	F	D	D	D	C	D	C	D	D
Overall					**D**	**F**	**D**	**D**	**D**					

Source: Metropolitan Council and STORET data



Marion Lake (19-0026) *City of Lakeville*

This was the ninth year that Marion Lake has been a part of CAMP (the others were 1994 and 1999-2005). The area around Lake Marion, located in the City of Lakeville (Dakota County), is rapidly developing. The lake covers an area of roughly 560 acres and has a maximum depth of 6.4 m (21 feet). There is one public access to the lake located in Casperspon Park on the western side of the lake off of 195th Street West. Lake Marion is considered a "Priority Lake" by the Metropolitan Council because of its multi-recreational uses. One problem that may possibly hinder future recreational activity on the lake, however, is Eurasian Water Milfoil (*Myriophyllum spicatum*), which has been reported in the lake.

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. Because of past winterkills, the lake's oxygen levels are monitored throughout the winter, and the lake is aerated when needed.

As part of the 2006 volunteer monitoring program, Lake Marion was monitored 15 times from mid-April to mid-October. During each monitoring event the lake was monitored for TP, CLA, TKN, and Secchi transparency, and the lake's perceived physical condition and recreational suitability. Graphs as well as the actual data collected by volunteers, show the seasonal variability of the collected data (see lake information sheet on the next page).

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	44.7	15.0	141.0	C
CLA (µg/l)	21.2	2.2	53.0	C
Secchi (m)	2.1	1.0	3.0	C
TKN (mg/l)	1.30	0.72	1.90	
			Overall Grade	C

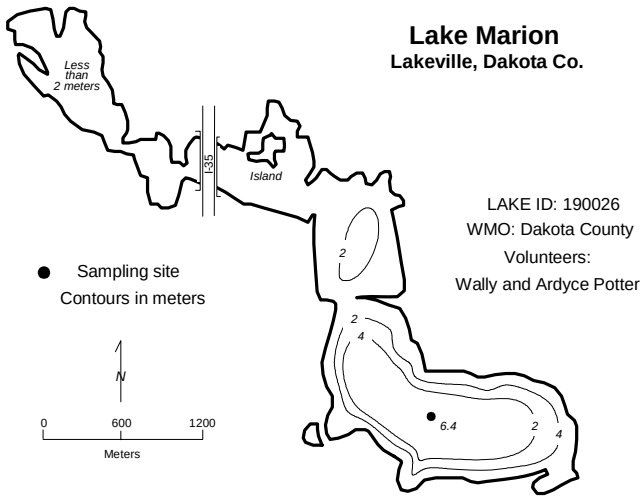
The resulting overall grade in 2006 is a C (similar to those recorded in 2002-2005), represents a decrease in water quality as compared to the overall grade of B the lake received in 1994, and 1999-2001.

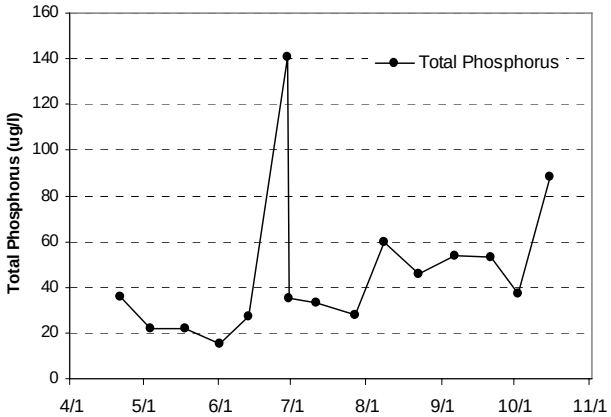
The physical and recreational conditions of the lake, as observed by the volunteer monitors, were ranked on a 1 to 5 ranking scale. The volunteer's user perception rankings are shown on the lake's information sheet. The mean physical condition ranking was 1.7 (between 1- "crystal clear" and 2- "some algae present"), while the lake's mean recreational suitability ranking was 1.3 (between 1- "beautiful" and 2- "minor aesthetic problem").

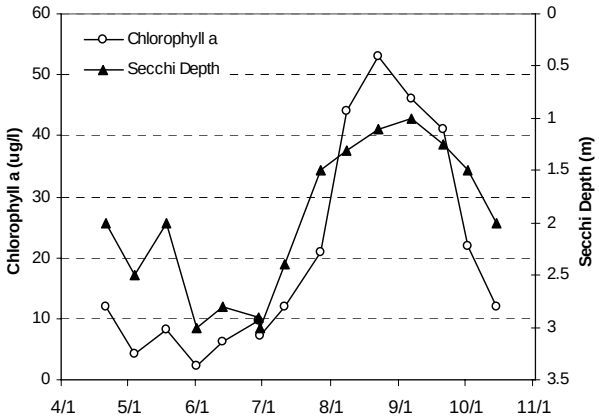
While Lake Marion does have 16 years of data (14 of which contain some nutrient measurements) over the past 25 years, it is difficult to determine what is happening with the lake's water quality. The available data shows a wide range in the lake's quality with the water quality showing an improvement in the 1990's as compared to the 1980's. The lake received an overall water quality grade of D in 1981; C in 1980, 1983, 1987, and 2002-2006; and finally received a B in 1994, and 1999-2001.

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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

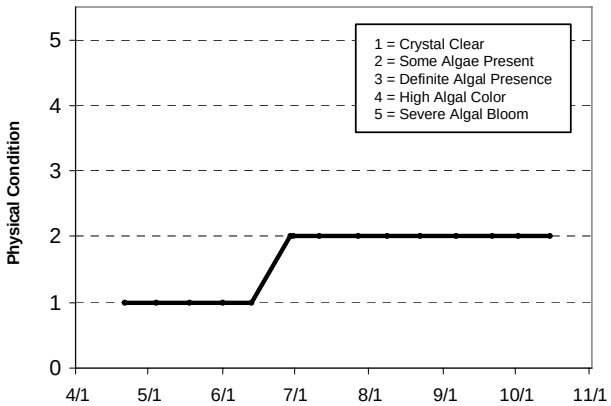






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/21/06	13.4				12	36		2	1	1
5/4/06	14.5				4.2	22		2.5	1	1
5/18/06	15.3				8.1	22		2	1	1
6/1/06	24.7				2.2	15		3	1	1
6/13/06	21.8				6.3	27		2.8	1	1
6/29/06	24.6				9.7	141		2.9	2	1
6/30/06	24.7				7.1	35		3	2	1
7/11/06	26.1				12	33		2.4	2	1
7/27/06	29.2				21	28		1.5	2	2
8/8/06	26.6				44	60		1.3	2	2
8/22/06	24.8				53	46		1.1	2	2
9/6/06	24.1				46	54		1	2	2
9/21/06	16.5				41	53		1.25	2	1
10/2/06	17.8				22	37		1.5	2	1
10/15/06	9				12	88		2	2	1

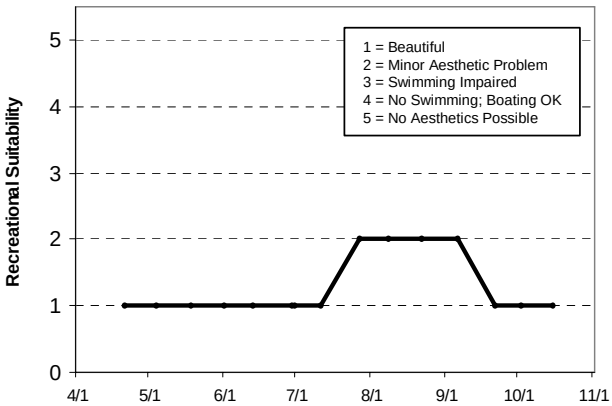


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus	C	C		C				C		C			
Chlorophyll a	C	D		C				C		C			
Secchi Depth	C	D		B				C		C	C	C	
Overall	**C**	**D**		**C**				**C**		**C**			

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus		B					B	B	B	C	B	C	C	C
Chlorophyll a		A					B	A	B	B	C	C	C	C
Secchi Depth		B					C	B	B	C	C	C	C	C
Overall		**B**					**B**	**B**	**B**	**C**	**C**	**C**	**C**	**C**

Source: Metropolitan Council and STORET data



Markgrafs Lake (82-0089) *City of Woodbury*

Markgrafs Lake, located within the City of Woodbury (Washington County), has a surface area of approximately 46 acres (2.6 miles around), and a maximum depth of 2.4 m (8 feet). The lake, which is used by the MDNR Fisheries as a rearing pond for walleyes, 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 413-acre drainage area to the lake is presently made up of open/undeveloped areas. Future land uses are projected to be 11.5 percent single-family residential, 14.8 percent multi-family residential, 51.8 percent commercial/retail, 15.1 percent parks/open space, and 6.8 percent ponds/wetlands. The lake's watershed-to-lake size 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 (the 0-15 foot depth area of the lake dominated by aquatic vegetation). It does not maintain a thermocline (a density gradient owed to changing water temperatures throughout the lake's water column).

The lake has been involved in CAMP since 1994. Between late-April and mid-October, 2006, the lake was monitored 15 times. During each monitoring event; TP, CLA, TKN, and Secchi transparency were measured, as was the lake's perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	***Mean***	***Minimum***	***Maximum***	***Grade***
TP (µg/l)	195.3	124.0	295.0	F
CLA (µg/l)	59.6	26.0	91.0	D
Secchi (m)	0.4	0.3	0.5	F
TKN (mg/l)	2.86	1.50	4.40	
			Overall Grade	F

The lake's 2006 overall lake quality report card grade (F) is identical to those recorded in 1998 and worse than the D's reported in 1994, 1997, 1999, and 2001-2005, and the C's observed in 1995-1996.

A moderate amount historical water quality data is available for Markgrafs Lake. Data found were collected through CAMP in 1994-2006. While no statistically significant long-term trend is evident from the lake's entire water quality database (including TP, CLA and Secchi data), a recent MPCA conducted trend analysis using just the lake's Secchi transparency data, revealed a statistically significant decrease in recent water clarity. The lake's overall quality generally fluctuates between a low C (1995-1996, and 2000) and a D (1994, 1997, 1999, and 2001-2005). The lake experienced its worst recorded overall water quality (F) in 1998 and 2006 and its best water quality in 1995.

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").

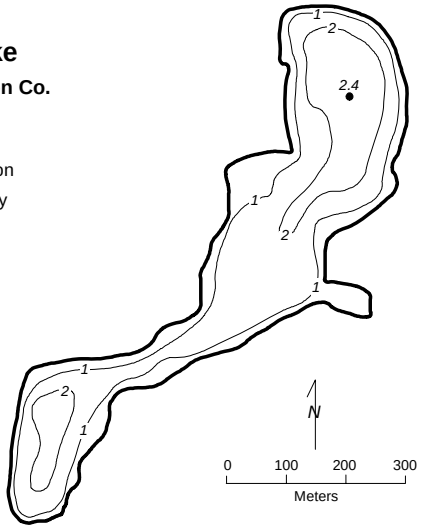
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

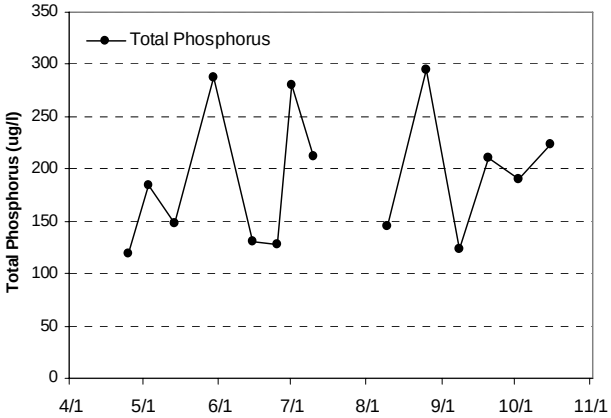
Markgrafs Lake

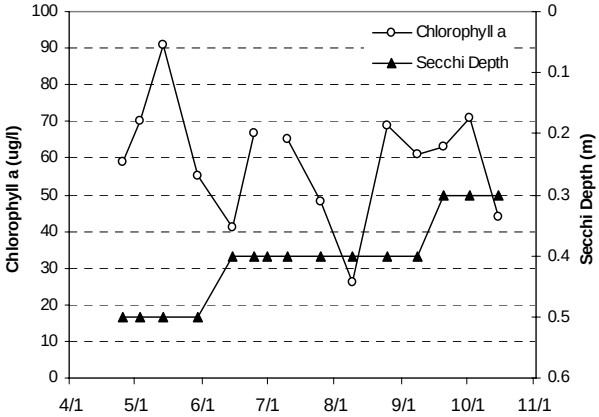
Woodbury, Washington Co.

Lake ID: 820089
WD: South Washington
Volunteer: Terry Riley

● Sampling site
Contours in meters

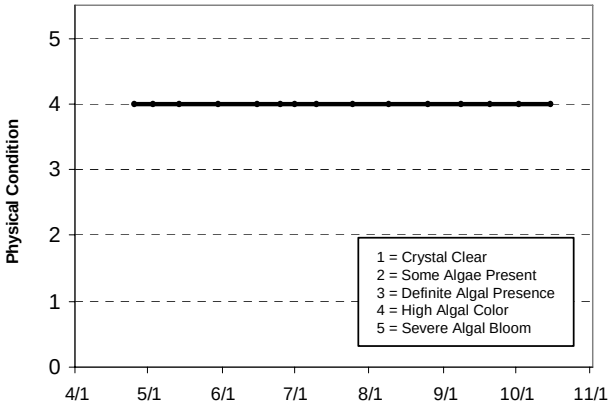






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/25/06	15.7				59	119		0.5	4	4
5/3/06	16.3				70	185		0.5	4	4
5/14/06	14.6				91	148		0.5	4	4
5/30/06	25.8				55	288		0.5	4	4
6/15/06	25.6				41	131		0.4	4	4
6/25/06	24.6				67	128		0.4	4	4
7/1/06	24.6					281		0.4	4	4
7/10/06	26.5				65	212		0.4	4	4
7/25/06	30.8				48			0.4	4	4
8/9/06	29.8				26	145		0.4	4	4
8/25/06	22.9				69	295		0.4	4	4
9/8/06	23.5				61	124		0.4	4	4
9/20/06	18.5				63	211		0.3	4	4
10/2/06	15.7				71	190		0.3	4	4
10/15/06	8.9				44	223		0.3	4	4

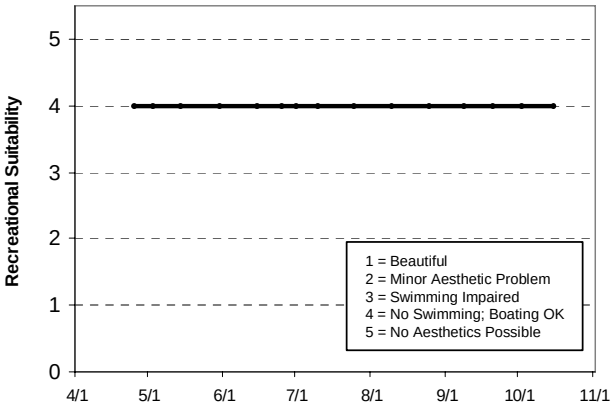


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus		D	C	D	D	F	D	D	F	F	D	D	D	F
Chlorophyll a		C	B	B	C	F	C	C	C	C	C	D	C	D
Secchi Depth		D	C	C	D	F	D	C	D	F	D	F	F	F
Overall		**D**	**C**	**C**	**D**	**F**	**D**	**C**	**D**	**D**	**D**	**D**	**D**	**F**

Source: Metropolitan Council and STORET data



Markley Lake (70-0021) *City of Prior Lake*

This was the ninth year that Markley Lake has been monitored for lake water quality through CAMP. The lake, which has a surface area of roughly 27 acres (because of high water, the actual surface area of the lake may be slightly larger) is located within the City of Prior Lake (Scott County). Its maximum depth is 3.7 m (22 feet). Because of the lake's shallowness 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).

As part of the 2006 volunteer monitoring program, Markley Lake was monitored ten times from late-April to mid-October. During each monitoring event; TP, CLA, TKN, and Secchi transparency were measured, as was the lake's perceived physical condition and recreational suitability. Graphs as well as the actual data collected by volunteers, show the seasonal variability of the collected data (see lake information sheet on the next page).

2006 summer (May-September) data summary

Parameter	***Mean***	***Minimum***	***Maximum***	***Grade***
TP (µg/l)	60.9	32.0	102.0	C
CLA (µg/l)	15.3	4.2	35.0	B
Secchi (m)	1.2	0.6	1.8	C
TKN (mg/l)	1.41	0.99	1.90	
			Overall Grade	C

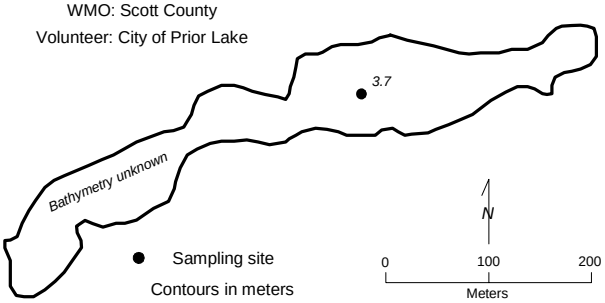
The lake's 2006 overall lake quality report card grade (C) is identical to those recorded in 1997-2004. Data found were collected through CAMP in 1997-2004 and 2006. No statistically significant long-term trend is evident from the lake's water quality database , in the short-term however, the lake's water seems to be well represented by an overall grade of C. In order to detect any possible long-term water quality trends, continued monitoring is suggested.

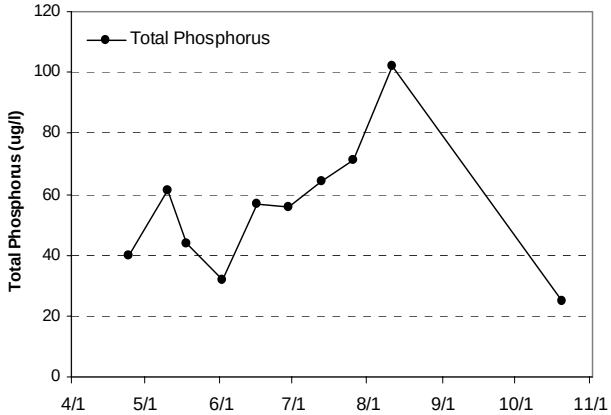
Throughout the course of the monitoring season the volunteer monitor ranked the lake's perceived physical and recreational conditions on a 1-to-5 scale. The mean physical condition was 2.1 (roughly 2- "some algae present") while the mean recreational suitability was 3.3 (between 3- "swimming impaired" and 4- "no swimming – boating ok").

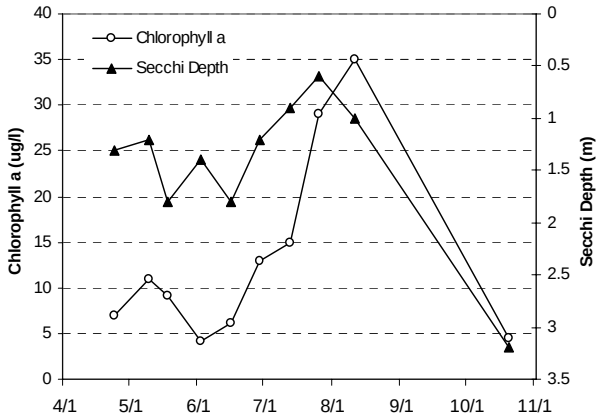
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Markley Lake
Credit River Twp./Prior Lake, Scott Co.

Lake ID: 700021
WMO: Scott County
Volunteer: City of Prior Lake

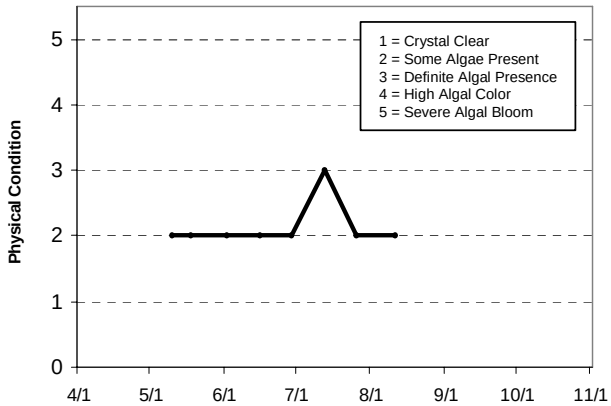






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/24/06	16.8				6.9	40		1.3		3
5/10/06	17.9				11	61		1.2	2	3
5/18/06	17.9				9.1	44		1.8	2	3
6/2/06	24.6				4.2	32		1.4	2	3
6/16/06	18.5				6.2	57		1.8	2	3
6/29/06	25.8				13	56		1.2	2	3
7/13/06	26				15	64		0.9	3	3
7/26/06	26.9				29	71		0.6	2	4
8/11/06	26.9				35	102		1	2	5
10/20/06	6.7				4.4	25		3.2		

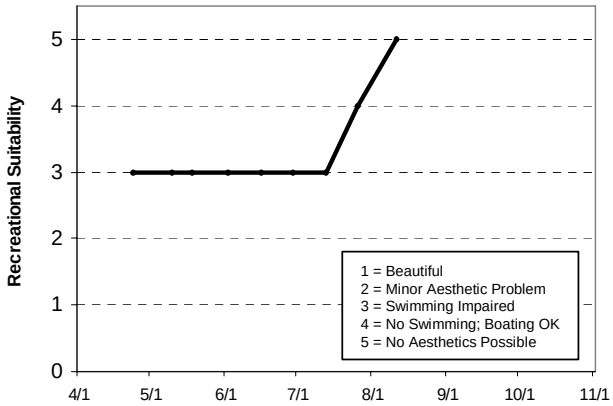


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus					C	C	C	C	C	C	C	C		C
Chlorophyll a					B	B	B	C	B	B	B	B		B
Secchi Depth					C	C	C	C	C	C	C	C		C
Overall					**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**		**C**

Source: Metropolitan Council and STORET data



Masterman Lake (82-0126) *Browns Creek Watershed District*

Masterman Lake is a small 45-acre lake located in Washington County. There is very little known morphological data available for the lake.

This was the first year that Masterman Lake has been involved in CAMP. A search through the STORET nationwide water quality database for data on the lake provided no data, therefore 2006 is the only year of available water quality data for the lake.

As part of the watershed's involvement in CAMP in 2006, the lake was monitored 14 times between mid-April and mid-October. During each sampling event the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. Graphs as well as the actual data collected by volunteers, show the seasonal variability of the collected data (see lake information sheet on the next page).

2006 summer (May-September) data summary

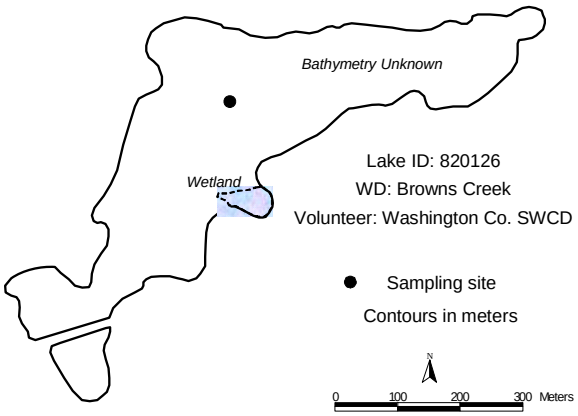
Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	58.8	29.0	114.0	C
CLA (µg/l)	15.6	3.7	36.0	B
Secchi (m)	1.8	0.8	2.3	C
TKN (mg/l)	1.10	0.73	1.80	
			Overall Grade	C

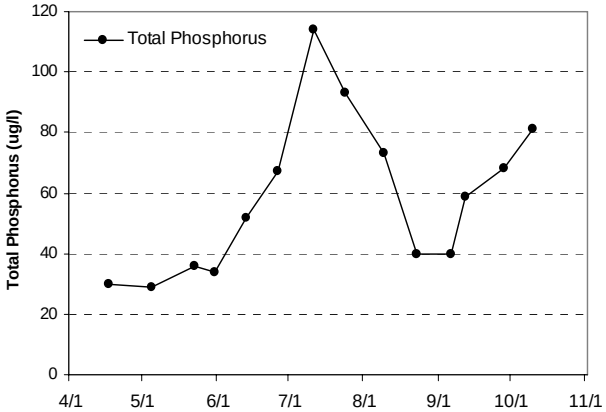
As mentioned earlier, there are no nutrient data available for Masterman Lake other than the 2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

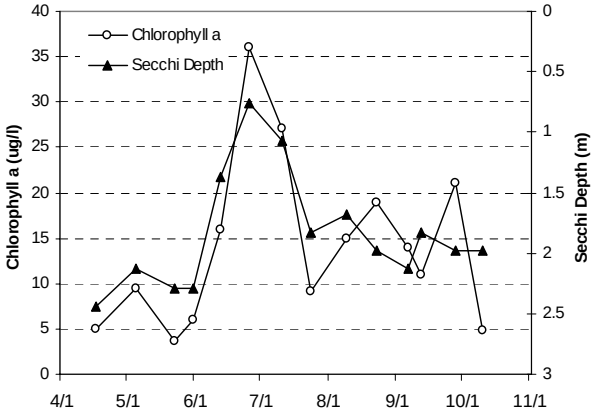
The perceived physical and recreational conditions (ranked on a 1-to-5 scale) are shown on the lake's information sheet on the next page. The average user perception rankings, were 2.2 for physical condition (between 2- "some algae present" and 3- "definite algae present"), and 2.6 for recreational suitability (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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Masterman Lake
Grant, Washington Co.

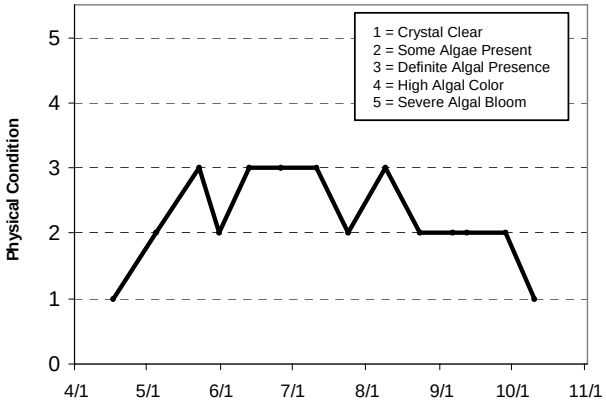






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/17/06	15.2	11.7	6.26	6.8	5	30		2.438	1	2
5/5/06	14.2	14.2	8.07	7.67	9.4	29		2.134	2	3
5/23/06	19.3	16.2	10.52	6.61	3.7	36		2.286	3	3
5/31/06	26.5	17.7	6.19	0.63	5.9	34		2.286	2	2
6/13/06	23.5	19.2	9.62	0.14	16	52		1.372	3	3
6/26/06	27.1	19.5	10.35	0.06	36	67		0.762	3	3
7/11/06	25.4	19.4	10.08	0.13	27	114		1.067	3	3
7/24/06	28.3	21.8	9.04	0.08	9.1	93		1.829	2	3
8/9/06	26.3	22.2	7.46	0.04	15	73		1.676	3	3
8/23/06	26.2	21.6	8.31	0.05	19	40		1.981	2	3
9/6/06	24.2	21.2	9.31	0.09	14	40		2.134	2	3
9/12/06	17.7	17.7	5.96	0.93	11	59		1.829	2	2
9/28/06	14.7	14.7	9.19	4.19	21	68		1.981	2	2
10/10/06	13.3	13.4	7.76	5.73	4.8	81		1.981	1	2

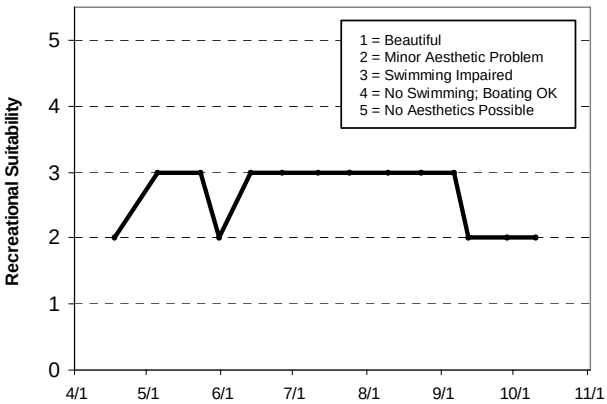


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus														C
Chlorophyll a														B
Secchi Depth														C
Overall														**C**

Source: Metropolitan Council and STORET data



McDonald Lake (82-0010) *Valley Branch Watershed District*

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). 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's size and mean depth results in an approximate lake volume of 324 ac-ft.

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 seventh year in which McDonald Lake has been involved in CAMP (the lake was enrolled in the program in 1999 and 2001-2005 as well). The only historical water quality data found for McDonald Lake were Secchi transparency data for 1998 and 2000, and CAMP data from 1999 and 2001-2005. 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 lake was monitored 10 times between early-May and late-September, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	52.0	22.0	90.0	C
CLA (µg/l)	31.7	2.0	190.0	C
Secchi (m)	2.0	0.7	3.7	C
TKN (mg/l)	1.20	0.63	2.20	
			Overall Grade	C

The lake's 2006 overall grade of C is identical to those recorded in 1999, and 2001-2003 and 2005, and worse than the B recorded in 2004. The lake's 2004 overall grade is the best recorded to date.

Similar to past years, the Secchi transparency in 2006 would have been greater except for the shallowness of the lake. On numerous monitoring events, The Secchi disk was clearly noticeable while resting on the lake's bottom. Therefore, the lake's 2006 water clarity was actually better than that represented by the summer mean and resulting grade.

No statistically significant long-term trend is evident from the lake's water quality database, in the short-term however, the lake's quality seems well represented by an overall grade of C. 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 2.3 for recreational suitability (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

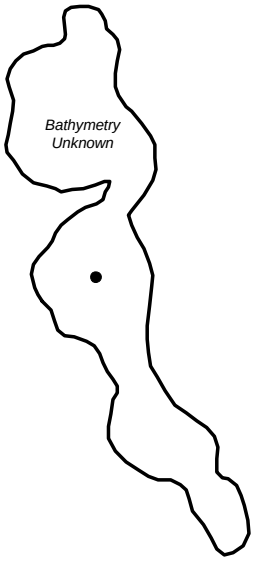
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

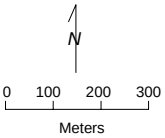
McDonald Lake

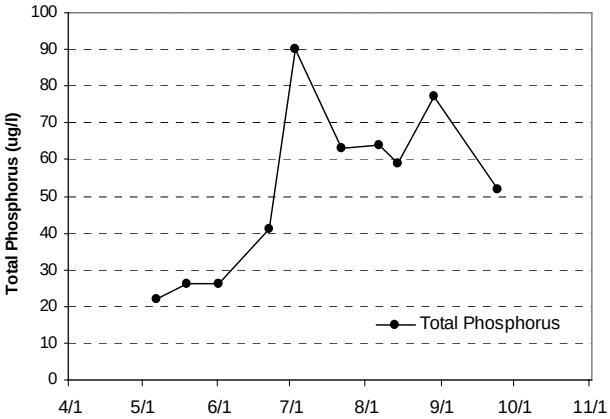
Baytown Twp., Washington Co.

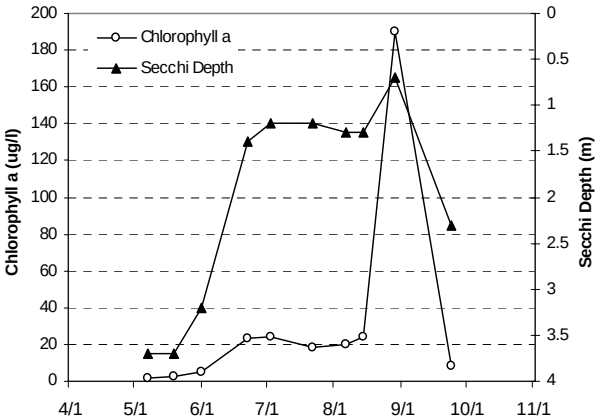
Lake ID: 820010
WD: Valley Branch
Volunteer: Steve Groves

● Sampling site
Contours in meters



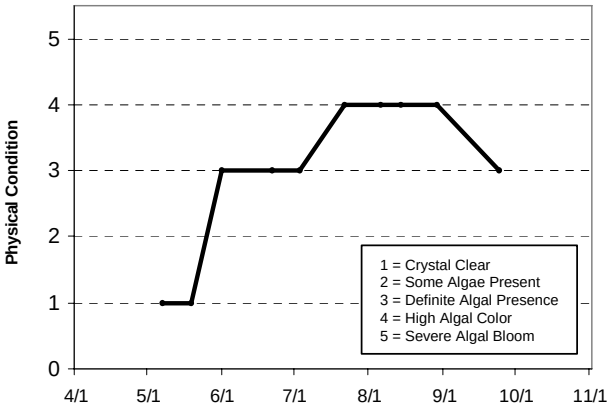






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/7/06	18.1				2	22		3.7	1	1
5/19/06	19.7				2.1	26		3.7	1	1
6/1/06	27.2				4.8	26		3.2	3	1
6/22/06	24.6				23	41		1.4	3	1
7/3/06	28.7				24	90		1.2	3	2
7/22/06	29.1				18	63		1.2	4	3
8/6/06	24.9				20	64		1.3	4	
8/14/06	25.8				24	59		1.3	4	4
8/29/06	24.7				190	77		0.7	4	4
9/24/06	15.5				8.7	52		2.3	3	4

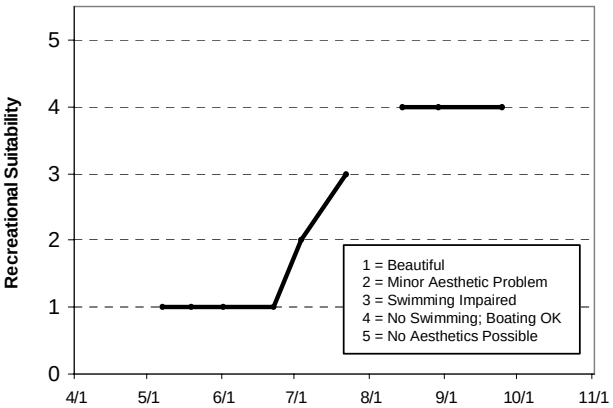


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus							C		C	C	C	C	C	C
Chlorophyll a							B		C	C	C	B	B	C
Secchi Depth						C	C	C	C	C	C	B	C	C
Overall							**C**		**C**	**C**	**C**	**B**	**C**	**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 first year that McKnight Lake has been involved in CAMP. A search through the STORET nationwide water quality database for data on the lake provided no data, therefore 2006 is the only year of available water quality data for the lake.

As part of the watershed's involvement in CAMP in 2006, the lake was monitored 14 times between mid-April and mid-October. During each sampling event the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	161.8	110.0	244.0	F
CLA (µg/l)	74.8	25.0	140.0	D
Secchi (m)	0.4	0.2	0.7	F
TKN (mg/l)	1.84	1.10	2.40	
			Overall Grade	F

As mentioned earlier, there are no nutrient data available for McKnight Lake other than the 2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

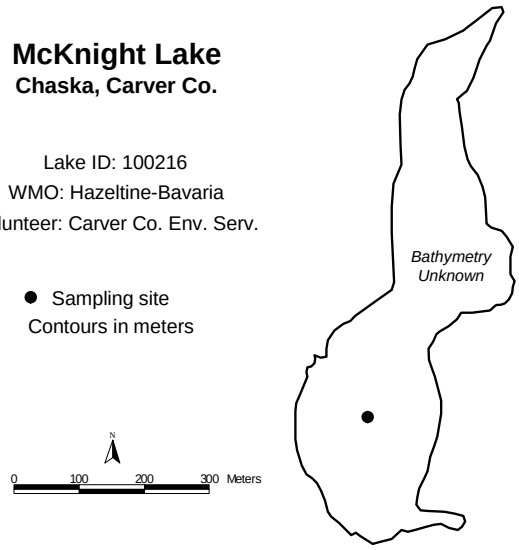
The perceived physical and recreational conditions (ranked on a 1-to-5 scale) are shown on the lake's information sheet on the next page. The average user perception rankings, were 3.1 for physical condition (roughly 3- "definite algae present"), and 3.1 for recreational suitability (roughly 3- "swimming impaired").

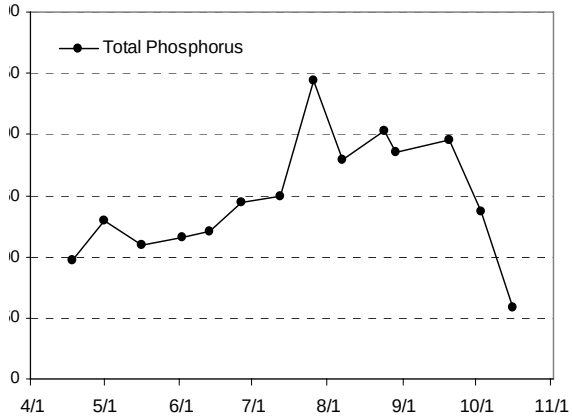
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

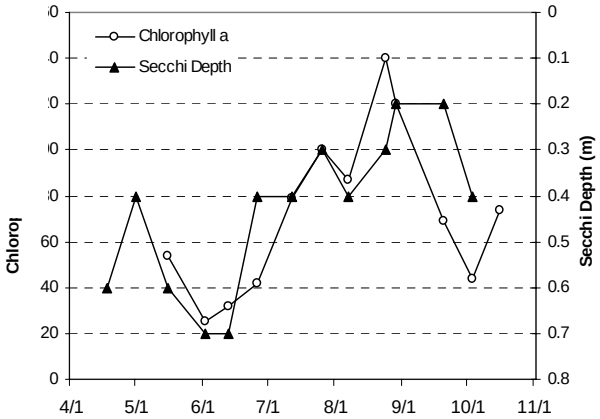
McKnight Lake
Chaska, Carver Co.

Lake ID: 100216
WMO: Hazeltine-Bavaria
Volunteer: Carver Co. Env. Serv.

● Sampling site
Contours in meters

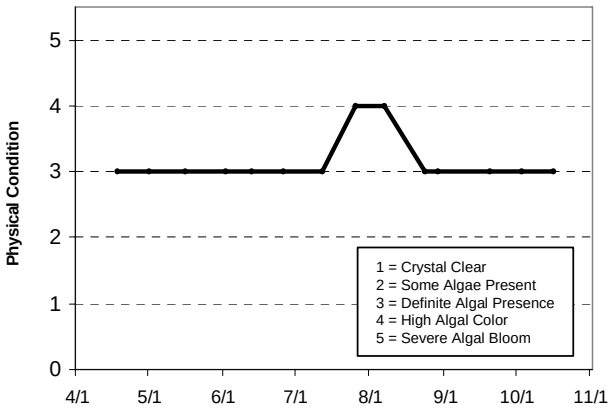






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/18/06	14.84		12.54			97		0.6	3	3
5/1/06	13.25		8.08			130		0.4	3	3
5/16/06	14.6		10.3		54	110		0.6	3	3
6/2/06	27.2		9.35		25	116		0.7	3	3
6/13/06	22.25		11.64		32	121		0.7	3	3
6/26/06	25.22		8.44		42	145		0.4	3	3
7/12/06	26.88		12.2		79	150		0.4	3	3
7/26/06	27.19		12.22		100	244		0.3	4	4
8/7/06	27.17		7.61		87	179		0.4	4	4
8/24/06	23.06		8.02		140	203		0.3	3	3
8/29/06	22.43		7.61		120	186		0.2	3	3
9/20/06	15.56		8.77		69	196		0.2	3	3
10/3/06	19.32		10.38		44	137		0.4	3	3
10/16/06	9.4		10.5		74	59			3	3

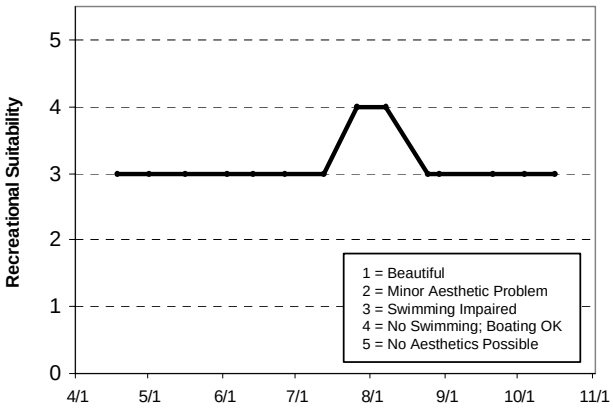


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus														F
Chlorophyll a														D
Secchi Depth														F
Overall														**F**

Source: Metropolitan Council and STORET data



McKusick Lake (82-0020) *Middle St. Croix Watershed Management Organization*

Lake McKusick, a 46-acre lake located within the City of Stillwater (Washington County) has a maximum depth of 4.7 m (roughly 15.5 feet). The lake has been involved in CAMP since 1994. In 2006, the lake was monitored 14 times between mid-April and mid-October.

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.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	65.4	35.0	95.0	C
CLA (µg/l)	14.6	3.6	60.0	B
Secchi (m)	2.1	1.5	3.4	C
TKN (mg/l)	1.22	0.72	1.70	
			Overall Grade	C

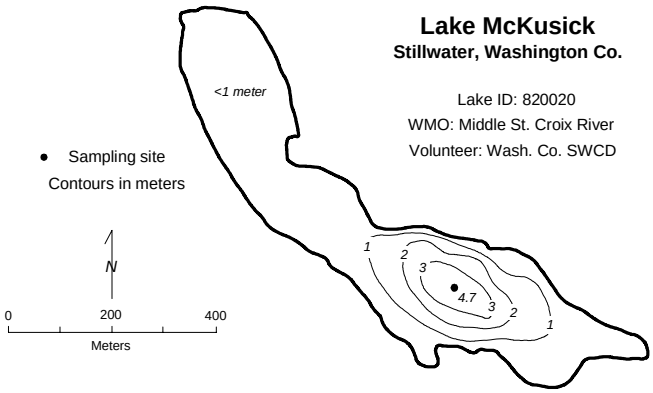
The lake's 2006 overall grade of C is identical to those recorded in 1997, 2002-2003 and 2005, better than the D's of 1994-1996 and 1998-1999, but worse than the B's of 2000-2001 and 2004. The overall grade of B recorded in 2000 and 2001 is the lake's best-recorded overall grade to date. A closer look at the three years that the lake received an overall grade of B, reveals that the best parameter means were recorded in 2004.

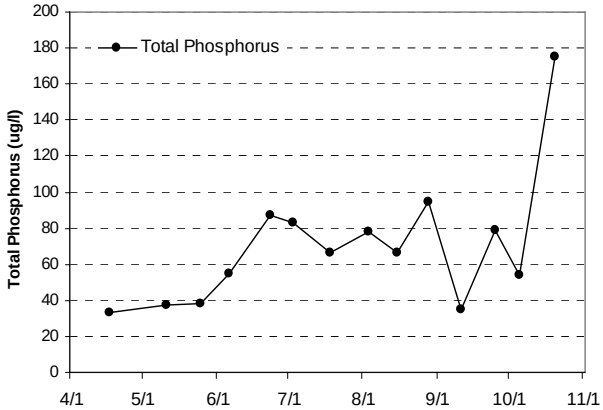
Throughout the monitoring period, the volunteer(s) ranked their opinions of physical and recreational conditions of the lake on a 1-to-5 scale. The resulting user perception rankings are shown on the lake information sheet. The mean physical condition ranking was 2.9 (roughly 3- "definite algae present"), while the mean recreational suitability ranking was 3.4 (between 3- "swimming impaired" and 4- "no swimming – boating ok").

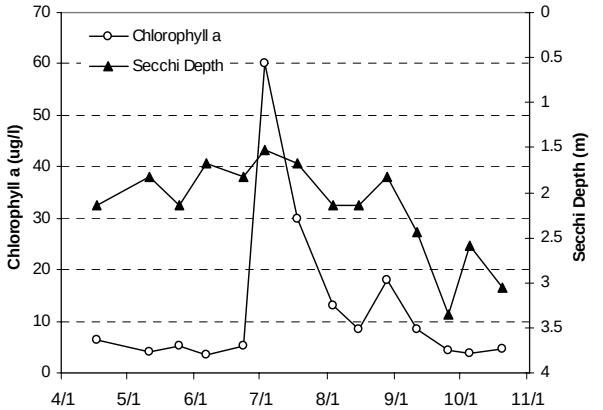
Because of the wide variation in the lake's 1994-2006 overall water quality database, no long-term trends can be determined. In the short-term however, it seems that the lake was well represented by an overall grade of D/C until recently (2000-2005) when the lake's overall grade has improved to C+/B. In order to detect any possible long-term water quality trends, additional years of data collection are needed.

A recent MPCA conducted trend analysis on the lake's Secchi transparency data, however, revealed a statistically significant improvement in recent water clarity.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

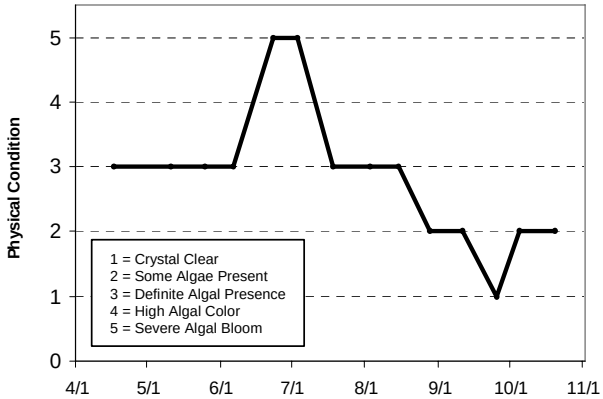






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/17/06	15	5.6	6.26	4.1	6.4	33		2.134	3	3
5/11/06	15.8	13.4	9.59	2.59	4.1	37		1.829	3	3
5/25/06	19.7	9.5	7.03	0.22	5.2	38		2.134	3	4
6/6/06	24.5	13.7	4.97	0.05	3.6	55		1.676	3	4
6/23/06	21.9	10.3	5.89	0.05	5.3	87		1.829	5	5
7/3/06	26.7	10.7	7.7	0.07	60	83		1.524	5	5
7/18/06	28.3	14	7.01	0.07	30	66		1.676	3	4
8/3/06	26.6	12.3	7.09	0.07	13	78		2.134	3	4
8/15/06	23.8	10.7	3.97	0.06	8.4	66		2.134	3	4
8/28/06	22.1	18.6	5.99	0.09	18	95		1.829	2	3
9/11/06	17.1	16	4.55	0.08	8.4	35		2.438	2	2
9/25/06	14.5	13.4	8.44	0.12	4.3	79		3.353	1	2
10/5/06	15.6	13.8	9.8	0.11	3.9	54		2.591	2	2
10/20/06	6.3	6.4	11.26	1.7	4.7	175		3.048	2	3

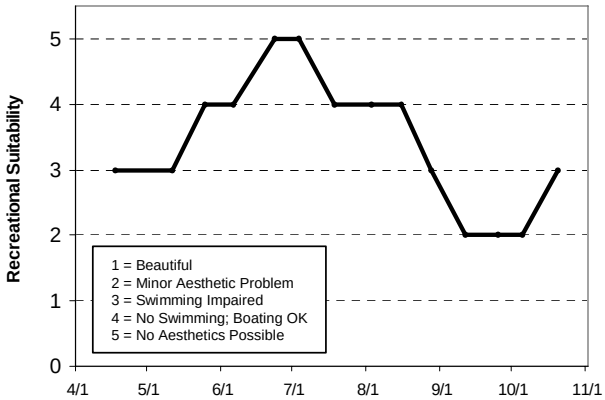


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus		D	D	D	C	D	D	C	C	C	C	C	C	C
Chlorophyll a		D	C	C	C	D	D	B	B	C	B	A	B	B
Secchi Depth		D	D	D	C	D	D	B	B	D	C	B	C	C
Overall		**D**	**D**	**D**	**C**	**D**	**D**	**B**	**B**	**C**	**C**	**B**	**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's surface area is 110 acres and has a maximum depth of 4.5 m (roughly 14 feet). Because the maximum depth is less than 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).

Although this is only the first year that McMahon Lake has been enrolled in CAMP, the lake had been monitored by Council staff in the past. In 2006, the lake was monitored 14 times between mid-April and mid-October. The collected data and resulting graphs showing TP and CLA concentrations, Secchi transparency, and user perception (physical condition and recreational suitability) are presented on the lake's information sheet on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	68.0	29.0	131.0	C
CLA (µg/l)	49.1	7.5	120.0	D
Secchi (m)	0.9	0.6	1.6	D
TKN (mg/l)	1.55	0.77	2.40	
			Overall Grade	D

The lake's overall grade in 2006 (D) is similar to that recorded in 1980, 1984, 1995, 1998, 2001 and 2005. No statistically significant long-term trend is evident from the lake's water quality database. However the lake's water quality seems to be best represented by an overall grade of D.

Throughout the 2006 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 2.4 (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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

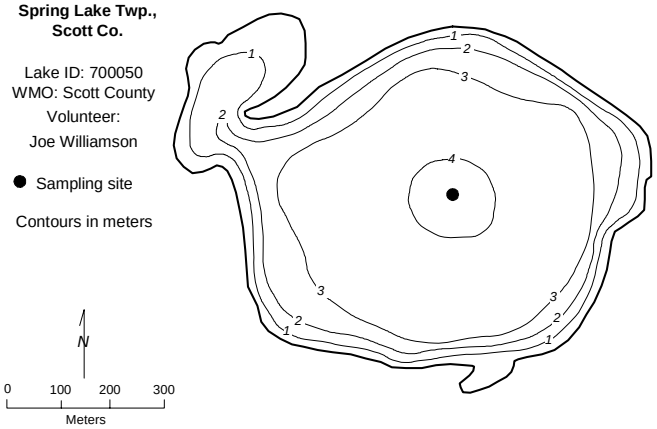
McMahon Lake

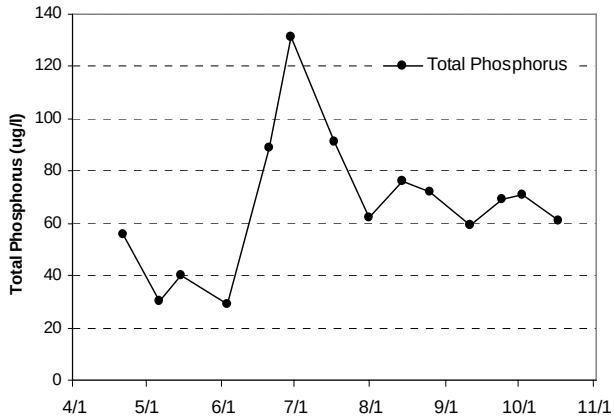
Spring Lake Twp., Scott Co.

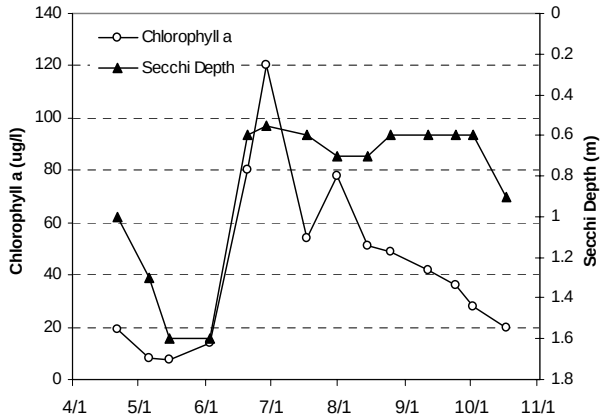
Lake ID: 700050
WMO: Scott County
Volunteer:
Joe Williamson

● Sampling site

Contours in meters

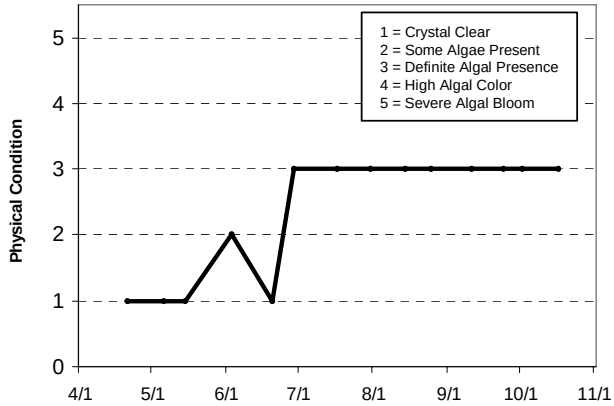






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/21/06	13.9				19	56		1	1	1
5/6/06	16.3				8.3	30		1.3	1	1
5/15/06	15.9				7.5	40		1.6	1	1
6/3/06	24.8				14	29		1.6	2	1
6/20/06	24.2				80	89		0.6	1	1
6/29/06	26.2				120	131		0.55	3	1
7/17/06	28.3				54	91		0.6	3	2
7/31/06	29.1				78	62		0.7	3	2
8/14/06	25.1				51	76		0.7	3	3
8/25/06	23.9				49	72		0.6	3	2
9/11/06	19.1				42	59		0.6	3	3
9/24/06	15.6				36	69		0.6	3	2
10/2/06	16.3				28	71		0.6	3	3
10/17/06	8.1				20	61		0.9	3	

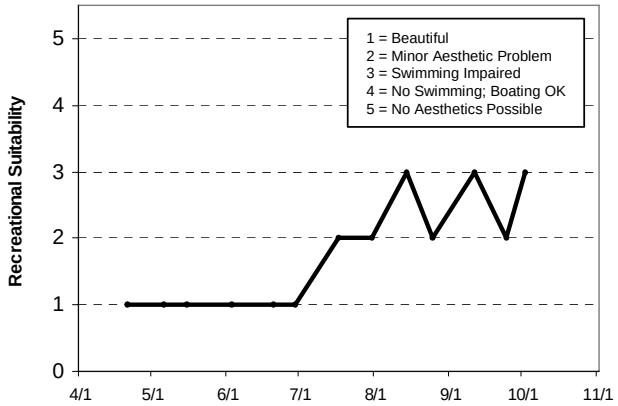


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus	F				D								
Chlorophyll a	F				D								
Secchi Depth	C				D								
Overall	**D**				**D**								

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus			D			D			D				D	C
Chlorophyll a			D			D			D				F	D
Secchi Depth			C			D			D				D	D
Overall			**D**			**D**			**D**				**D**	**D**

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). A 1999 water quality report on water resources in Carver County estimates land use for the watershed at: four percent residential, 71 percent agricultural, two percent commercial/industrial, and 23 percent open/undeveloped (Carver County Planning 1999).

This was the eleventh year that Miller Lake has been involved in CAMP. A search through the STORET nationwide water quality database revealed a limited water quality database with water quality data available for 1995-1997, and 1999-2005.

The lake was monitored 12 times between mid-April and mid-October, 2006. Results are presented on graphs and data tables on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	185.9	79.0	351.0	F
CLA (µg/l)	58.8	32.0	100.0	D
Secchi (m)	0.6	0.3	1.20	F
TKN (mg/l)	1.90	1.40	2.90	
			Overall Grade	F

The lake's 2006 overall grade is identical to those recorded in 1995-1996 and 2003-2004 and worse than the D's recorded in 1997, and 1999-2002, and 2005.

No statistically significant long-term trend is evident from the lake's water quality database, in the short-term however, it seems that the lake is well represented by an overall D/F grade. Also, the lake's CLA grade had steadily improved from F's in 1995-1996, D's in 1997 and 1999, to C's in 2000-2002 before falling back to a D in 2003-2006.

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 3.3 (between 3- "definite algae present" and 4- "high algal color"), while the mean recreational suitability 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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

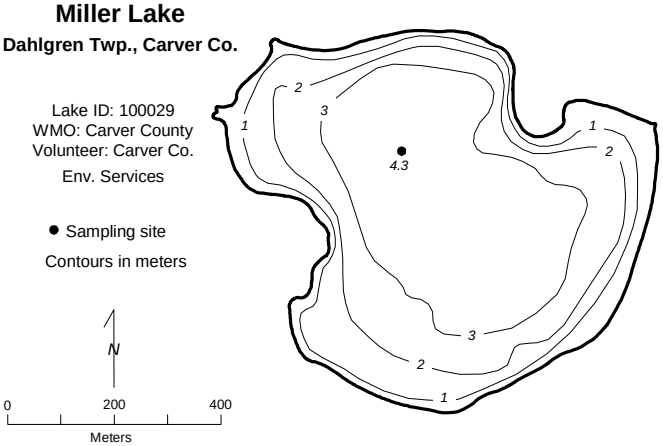
Miller Lake

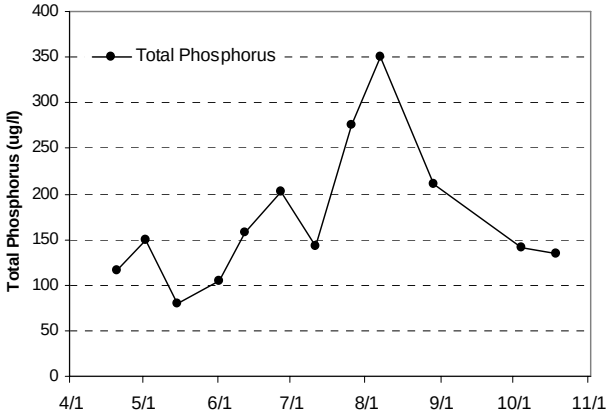
Dahlgren Twp., Carver Co.

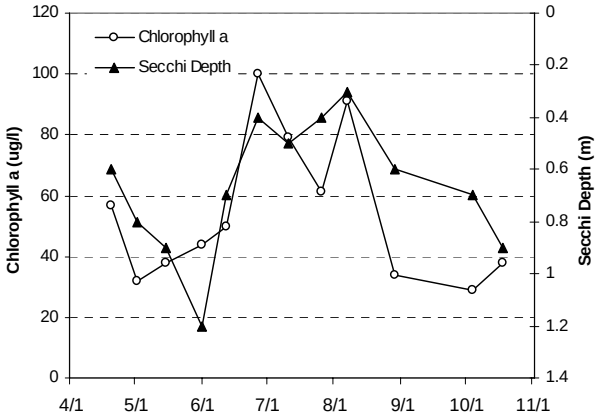
Lake ID: 100029
WMO: Carver County
Volunteer: Carver Co.
Env. Services

● Sampling site

Contours in meters

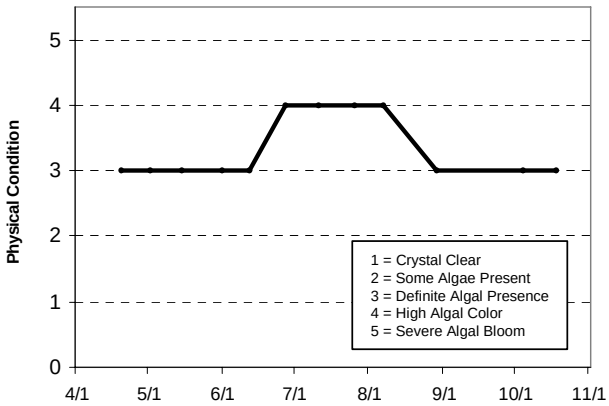






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/20/06	13.39		9.4		57	117		0.6	3	3
5/2/06	14.14		9.15		32	150		0.8	3	3
5/15/06	12.53		10.6		38	79		0.9	3	3
6/1/06	24.9		13.05		44	105		1.2	3	3
6/12/06	22.42		13.45		50	158		0.7	3	3
6/27/06	23.8		17.77		100	203		0.4	4	4
7/11/06	26.38		14.99		79	142		0.5	4	4
7/26/06	29.9		11.22		61	275		0.4	4	4
8/7/06	26.4		10.35		91	351		0.3	4	4
8/29/06	23.19		7.82		34	210		0.6	3	3
10/4/06	15.85		9.69		29	141		0.7	3	3
10/18/06	7.91		9.85		38	134		0.9	3	3

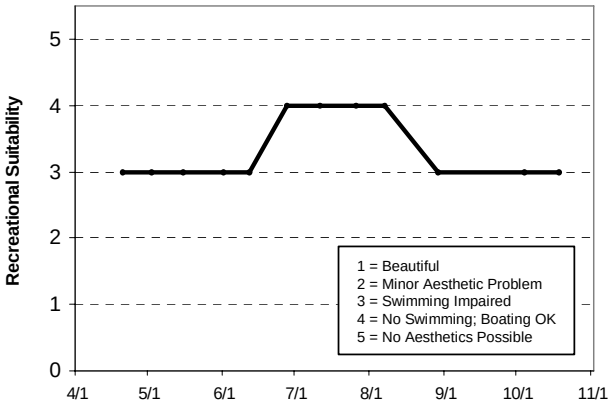


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus			F	F	F		F	F	F	F	F	F	D	F
Chlorophyll a			F	F	D		D	C	C	C	D	D	D	D
Secchi Depth			F	F	D		D	D	C	C	F	F	D	F
Overall			**F**	**F**	**D**		**D**	**D**	**D**	**D**	**F**	**F**	**D**	**F**

Source: Metropolitan Council and STORET data



Mitchell Lake (27-0070) *City of Eden Prairie*

While Mitchell Lake has previously been monitored by Council staff, 2006 marks the third year the lake has been monitored through CAMP (2004 being the first). Mitchell Lake, with a surface area of 112 acres, is located with the City of Eden Prairie (Hennepin County). The maximum and depths of the lake are 5.8 (19 feet), respectively. Because of the shallowness of the lake, roughly 97 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).

Because of its multi-recreational uses, the lake is considered a "Priority Lake". The lake has a public access and fishing pier on its southern end. One problem that may possibly hinder future recreational activity on the lake, however, is Eurasian Water Milfoil (*Myriophyllum spicatum*), which has been reported in the lake.

In 2006, Mitchell Lake was monitored 14 times between mid-April and mid-October. 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.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	99.6	31.0	162.0	D
CLA (µg/l)	32.3	2.7	73.0	C
Secchi (m)	1.2	0.4	3.0	D
TKN (mg/l)	2.10	0.93	2.80	
			Overall Grade	D

The lake's 2006 overall grade of D is identical to those recorded in 1999-2000 and 2003 and worse than the C's recorded in 1991, 1995, 2004-2005.

No statistically significant long-term trend is evident from the lake's water quality database, in the short-term however, the lake's quality seems well represented by an overall grade of C/D+. To better understand the quality of the lake and what direction it may be heading, continued monitoring is suggested.

The average user perception rankings, on a 1-to-5 scale, were 2.1 for physical condition (roughly 2- "some algae present"), and 1.0 for recreational suitability (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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

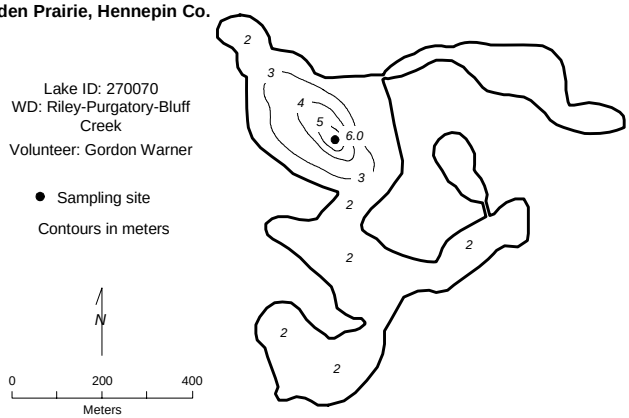
Lake Mitchell

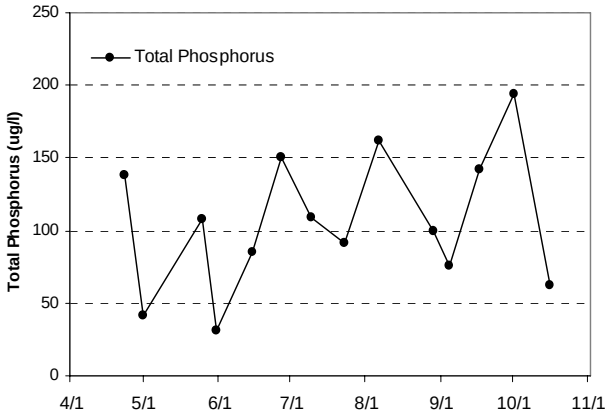
Eden Prairie, Hennepin Co.

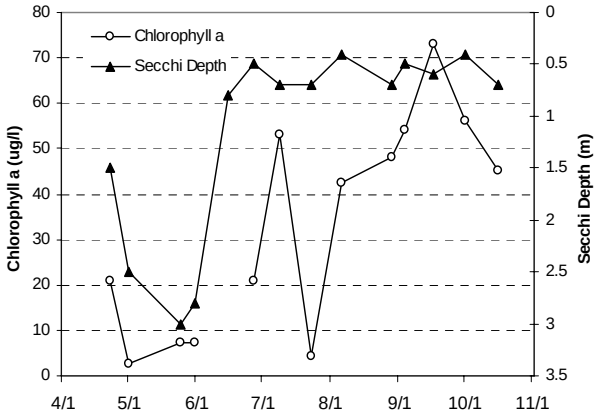
Lake ID: 270070
WD: Riley-Purgatory-Bluff Creek
Volunteer: Gordon Warner

● Sampling site

Contours in meters

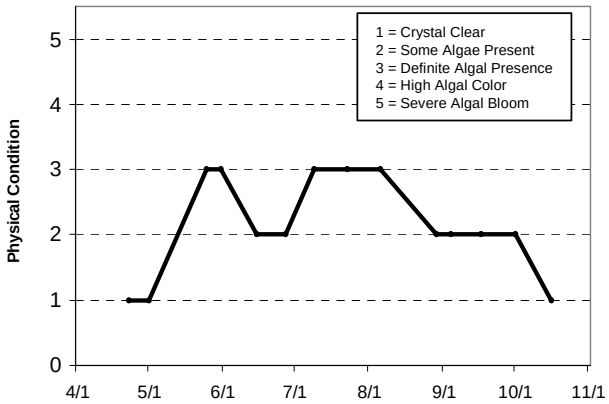






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/23/06	16.8				21	138		1.5	1	1
5/1/06	13.4				2.7	42		2.5	1	1
5/25/06	20.7				7.2	108		3	3	1
5/31/06	26.8				7.3	31		2.8	3	1
6/15/06	23.6					85		0.8	2	1
6/27/06	24.5				21	150		0.5	2	1
7/9/06	26.8				53	109		0.7	3	1
7/23/06	28.6				4.2	91		0.7	3	1
8/6/06	27.6				42.5	162		0.4	3	1
8/29/06	21.6				48	100		0.7	2	1
9/4/06	22.6				54	76		0.5	2	1
9/17/06	19.7				73	142		0.6	2	1
10/1/06	16.1				56	194		0.4	2	1
10/16/06	8.1				45	62		0.7	1	1

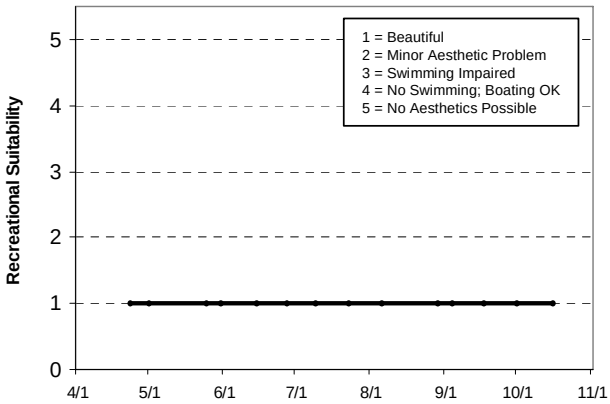


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus												D	
Chlorophyll a												C	
Secchi Depth												C	
Overall												**C**	

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus			C				D	D			D	C	D	D
Chlorophyll a			C				D	D			D	C	C	C
Secchi Depth			C				D	C			C	C	C	D
Overall			**C**				**D**	**D**			**D**	**C**	**C**	**D**

Source: Metropolitan Council and STORET data



Moody Lake (13-0023) *Comfort Lake-Forest Lake Watershed District*

Moody Lake is a 35-acre lake located near Chisago City (Chisago County). The lake has a maximum and mean depth of depth of approximately 14.6 m (48 feet). Roughly 63 percent of the lake's surface area is considered littoral zone (the 0-15 foot depth area of aquatic plant dominance).

This marks the second year in which Moody Lake has been involved in CAMP. A search through the STORET nationwide water quality database for historic data on the lake was unsuccessful. Therefore, 2005-2006 are the only known years of available data. 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 lake was monitored 14 times between early-May and mid-October, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	145.8	79.0	240.0	D
CLA (µg/l)	38.7	12.0	110.0	C
Secchi (m)	1.1	0.5	2.6	D
TKN (mg/l)	2.18	1.50	3.30	
			Overall Grade	D

As mentioned earlier, there are no water quality data available for Moody other than the 2005-2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. 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 3.3 for physical condition (between 3- "definite algae present" and 4- "high algal color"), and 3.6 for recreational suitability (between 3- "swimming 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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Moody Lake

Chisago Lake Twp., Chisago Co.

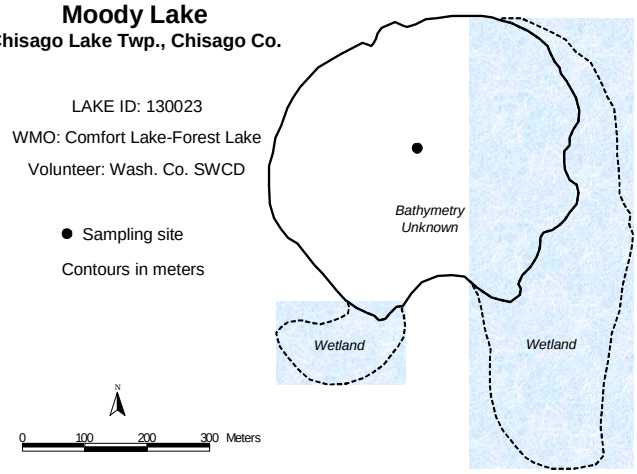
LAKE ID: 130023

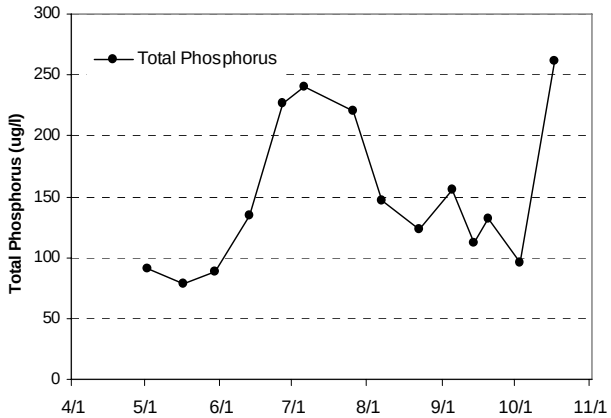
WMO: Comfort Lake-Forest Lake

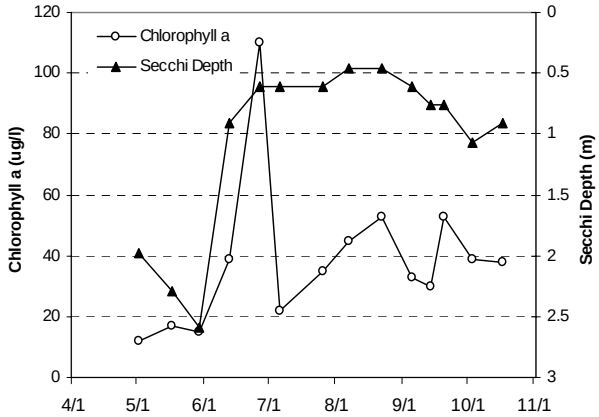
Volunteer: Wash. Co. SWCD

● Sampling site

Contours in meters

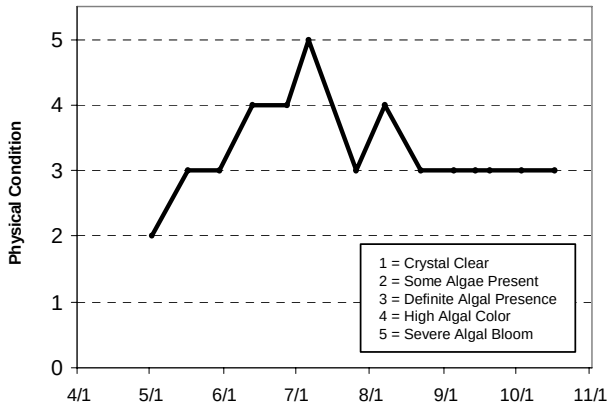






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/2/06	13.1	5.2	8.9	0.46	12	91		1.981	2	4
5/17/06	14.5	5.3	10.01	0.64	17	79		2.286	3	4
5/30/06	24.8		5.39		15	88		2.591	3	3
6/13/06	21.2	6.1	13.29	0.05	39	135		0.914	4	4
6/27/06	23.4	6.8	10.05	0.04	110	226		0.61	4	4
7/6/06	26.5	6.9	10.17	0.04	22	240		0.61	5	5
7/26/06	26.8	7.4	8.75	0.06	35	220		0.61	3	4
8/7/06	26.2	7.2	8.5	0.05	45	147		0.457	4	4
8/22/06	23.8	7.5	11.21	0.03	53	123		0.457	3	4
9/5/06	22	7.8	9.29	0.04	33	156		0.61	3	3
9/14/06	18.4	7.7	10.34	0.03	30	112		0.762	3	3
9/20/06	15.3	7.9	8.18	0.04	53	132		0.762	3	3
10/3/06	15.8	8	10.56	0.07	39	96		1.067	3	3
10/17/06	8.6	7.3	9.34	5.45	38	262		0.914	3	3

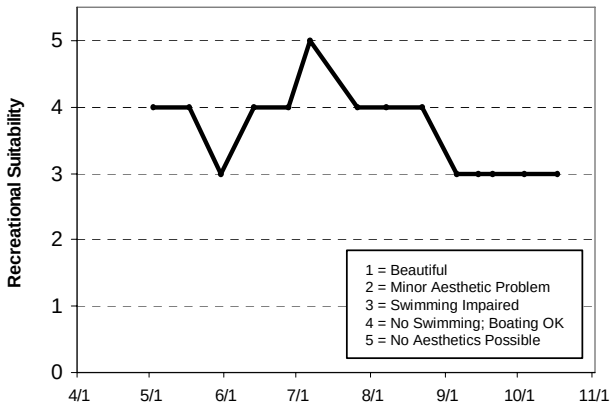


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus													D	D
Chlorophyll a													D	C
Secchi Depth													D	D
Overall													**D**	**D**

Source: Metropolitan Council and STORET data



Mud Lake (82-0026) *Carnelian - Marine Watershed District*

Mud Lake is a 62-acre lake located within May Township (Washington County). The maximum and mean depths of the lake are 2.1 m (roughly seven feet) and 1.1 m (three-and-a-half feet), respectively. The lake's size and mean depth results in an approximate lake volume of 224 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'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.

This was the seventh year that Mud Lake has been involved in CAMP (2000-2006 being the others). A search through the STORET nationwide water quality database for historical data on Mud Lake provided data for 12 years (1995-2006).

The lake's Secchi transparency was monitored seven times from mid-May to mid-October, 2006. Results are presented in both graphs and data tables on the lake's information sheet on the following page.

Water samples to be analyzed for TP, TKN and chlorophyll were not collected for the lake in 2006. Because Secchi transparency was the only data collected there are no nutrient or chlorophyll concentration means to compare to previous years. The lake's 2006 summertime (May through September) mean Secchi transparency was 0.9 m (minimum of 0.5 m and a maximum of 1.2 m). This translates to a grade of D for water clarity.

No statistically significant long-term trend is evident from the lake's water quality database, in the short-term however, the lake's water quality seems to be well represented by an overall grade of F. To better understand the lake's water quality and where it may be heading, more data are needed.

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 2.9 for physical condition (roughly 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Mud Lake

May Twp., Washington Co.

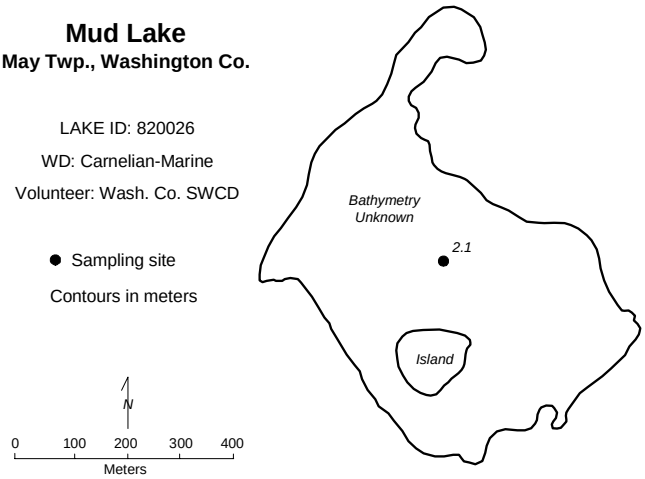
LAKE ID: 820026

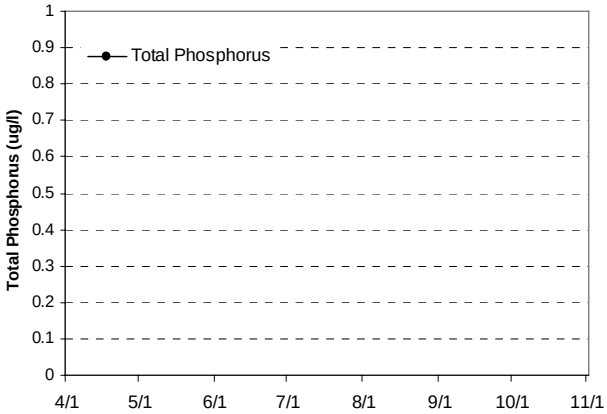
WD: Carnelian-Marine

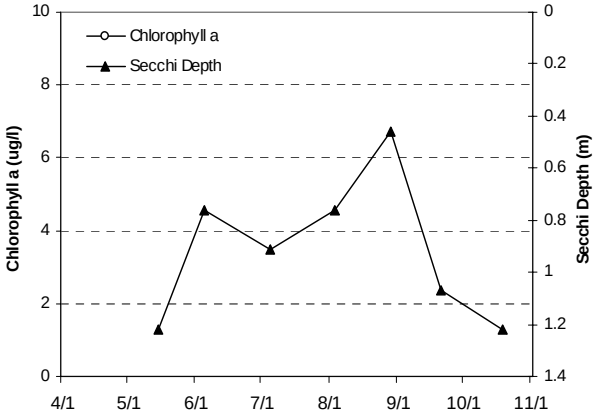
Volunteer: Wash. Co. SWCD

● Sampling site

Contours in meters

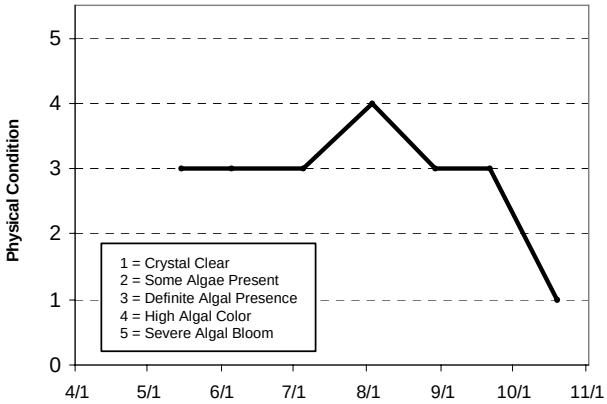






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/15/06	13.1	13.1	9.03	8.94				1.219	3	4
6/5/06	25.7	23.9	7.01	2.6				0.762	3	4
7/5/06	27	24.5	10	0.14				0.914	3	3
8/3/06	27.3	26.1	12.22					0.762	4	4
8/29/06	23.7	21.1	13.58	0.83				0.457	3	4
9/21/06	13.8	13.8	12.01	11.16				1.067	3	4
10/19/06	6.2	6.2	10.48	10.77				1.219	1	2

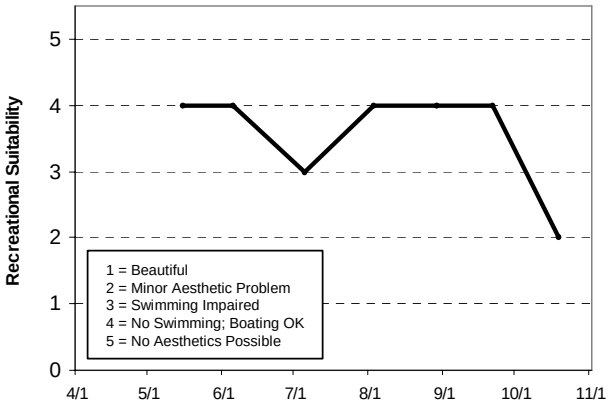


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus				D	F	F	F	F	D					
Chlorophyll a				D	D	F	D	F	F					
Secchi Depth			F	F	F	F	F	F	F	D	D	C	D	D
Overall				**D**	**F**	**F**	**F**	**F**	**F**					

Source: Metropolitan Council and STORET data



Normandale Lake (27-1045) *Nine Mile Creek Watershed District*

Normandale Lake is a 103-acre lake located near in the City of Bloomington (Hennepin County). The lake has a maximum depth of 3.7 m (12 feet). Because of the shallowness of the lake, its entire 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).

This was the first year that Normandale Lake has been involved in CAMP. A search through the STORET nationwide water quality database for historic data on the lake came up empty. Therefore, the 2006 CAMP data are the only known nutrient data available. 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 lake was monitored only five times between early-May and mid-September, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	63.8	52.0	75.0	C
CLA (µg/l)	10.2	1.9	30.0	B
Secchi (m)	1.1	0.9	1.6	D
TKN (mg/l)	1.24	1.20	1.40	
			Overall Grade	C

As mentioned earlier, there are no nutrient data available for Normandale Lake other than the 2006 CAMP data. Therefore it is not possible to determine any long-term or short-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 4.4 for physical condition (between 4- "high algal color" and 5- "severe algal bloom"), and 5 for recreational suitability (5- "no aesthetics possible").

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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

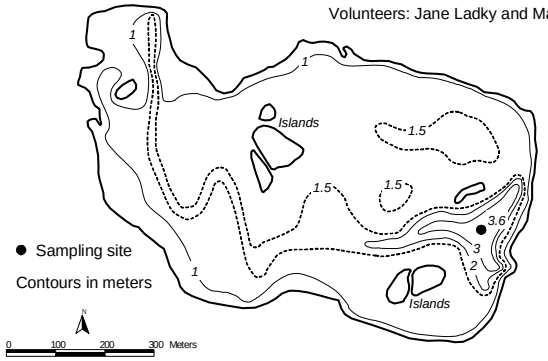
Normandale Lake (Nordmyr Lake)

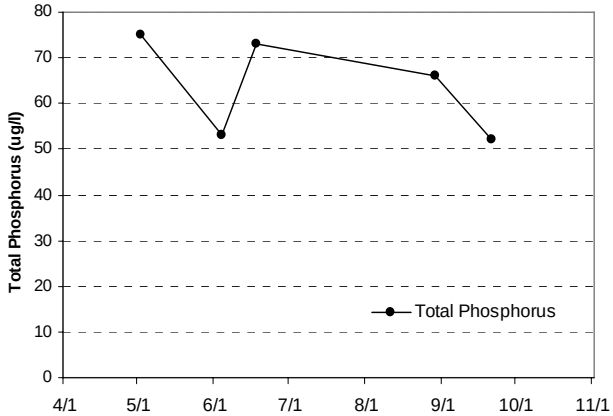
Bloomington, Hennepin Co.

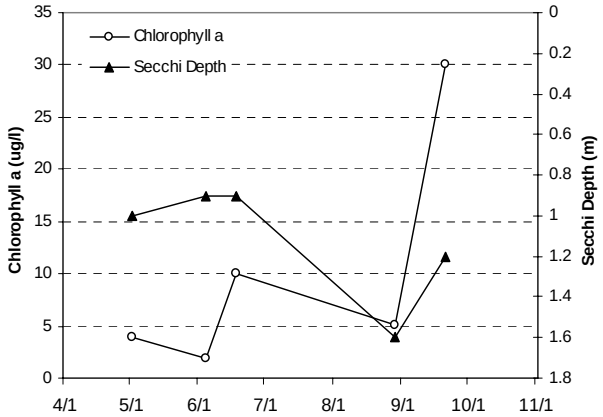
LAKE ID: 271045

WD: Nine Mile Creek

Volunteers: Jane Ladky and Mani Hassan

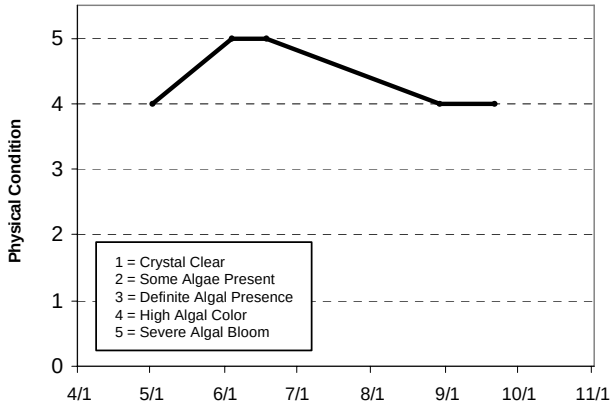






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/2/06	18.7				3.9	75		1	4	5
6/4/06	26.3				1.9	53		0.9	5	5
6/18/06	26.5				10	73		0.9	5	5
8/29/06	13.9				5.1	66		1.6	4	5
9/21/06	23.2				30	52		1.2	4	5

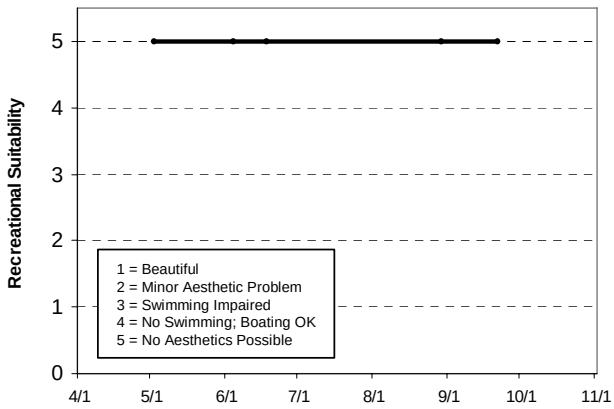


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus														C
Chlorophyll a														B
Secchi Depth														D
Overall														**C**

Source: Metropolitan Council and STORET data



North Twin Lake (82-0018) *Carnelian - Marine Watershed District*

North Twin Lake is a 69-acre lake located in Stillwater Township (Washington County). The maximum and mean depths of the lake are 1.8 m (roughly six feet) and 0.9 m (three feet), respectively. The lake's size and mean depth results in an approximate lake volume of 207 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's 187-acre immediate watershed translates to a small 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 seventh year that North Twin Lake has been involved in CAMP (2000-2005 being the others). A search through the STORET nationwide water quality database for data on the lake provided limited information (1996-2005).

The lake's water quality was monitored seven times from early-May to mid-October, 2006. 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. Results are presented in both graphs and data tables on the lake's information sheet on the following page.

2006 summer (May-September) data summary

Parameter	***Mean***	***Minimum***	***Maximum***	***Grade***
TP (µg/l)	34.8	20.0	59.0	C
CLA (µg/l)	6.7	3.9	10.0	A
Secchi (m)	1.2	1.07	1.37	C
TKN (mg/l)	0.95	0.68	1.20	
			Overall Grade	B

The 2006 overall grade (B) was identical to those recorded in 1997, 1999-2001, and 2003-2005, and better than the C's recorded in 1996 and 1998.

This overall grade is skewed however, due to the shallowness of the lake. When examining the lake's mean TP and CLA concentrations, it seems that the lake's Secchi readings were limited by the shallowness rather than algal abundance. So, while the lake only received an overall grade of B, the actual water quality may have been better.

No statistically significant long-term trend is evident from the lake's water quality database, in the short-term however, the lake's quality seems well represented by an overall grade of B. 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 1.7 for physical condition (between 1- "crystal clear" and 2- "some algae present"), and 2.1 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

North Twin Lake

Stillwater Twp., Washington Co.

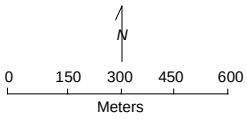
LAKE ID: 820018

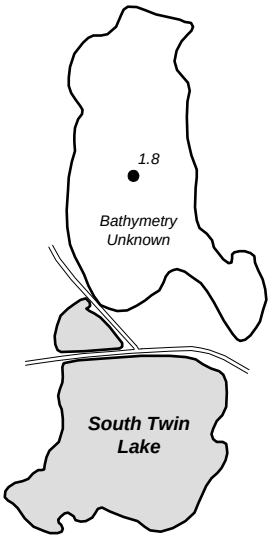
WD: Carnelian-Marine

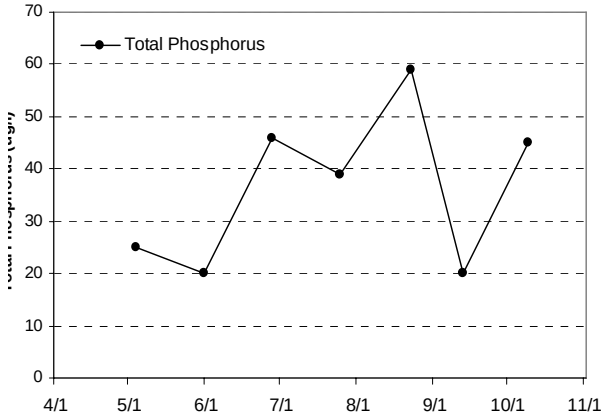
Volunteer: Wash. Co. SWCD

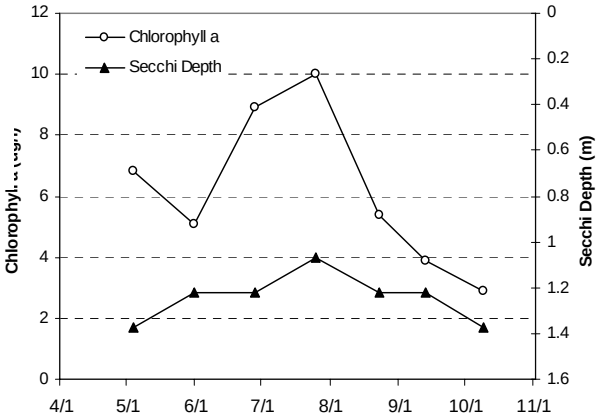
● Sampling site

Contours in meters



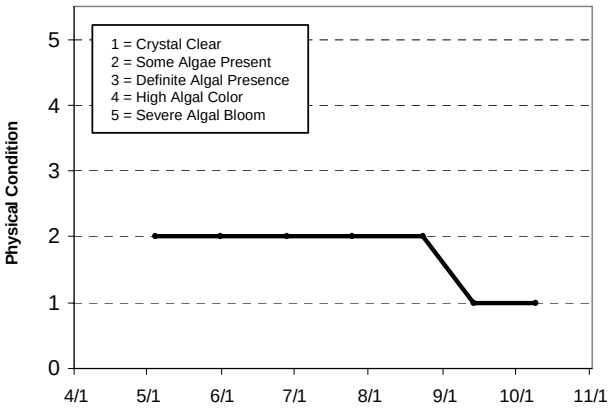






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/4/06	15.2	15.2	9.1	8.71	6.8	25		1.372	2	3
5/31/06	25.6	25	5.02	1.27	5.1	20		1.219	2	2
6/28/06	24.4	23.8	8.31		8.9	46		1.219	2	3
7/25/06	26.8	25.9	6.95	0.17	10	39		1.067	2	2
8/23/06	24.7	23.8	7.45	1.76	5.4	59		1.219	2	2
9/13/06	19.5	17.8	7.01	5.78	3.9	20		1.219	1	1
10/9/06	12.7	12.7	8.51	8.6	2.9	45		1.372	1	2

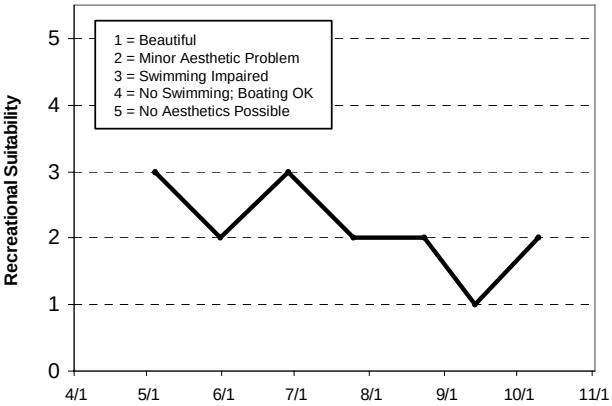


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus				C	B	B	A	B	B		B	A	B	C
Chlorophyll a				D	C	D	B	A	B		A	A	A	A
Secchi Depth				B	B	B	B	C	C	C	C	C	D	C
Overall				**C**	**B**	**C**	**B**	**B**	**B**		**B**	**B**	**B**	**B**

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 (roughly 2.5 feet) and 1.5 m (roughly five feet), respectively. The lake's size and mean depth results in an approximate lake volume of 41 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's 1,341-acre immediate watershed translates to a small watershed-to-lake size ratio of 89:1. The greater the ratio, the greater the potential stress on the lake from surface runoff.

This was the seventh year that Northwood Lake has been involved in CAMP. The lake was also enrolled in the program in 2000-2005. Other than the 2000-2006 CAMP data, a search through the STORET nationwide water quality database for data on the lake came up empty. Thus, 2000-2006 are the only years of available data.

The lake was monitored 10 times from mid-April to mid-October, 2006. 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. Results are presented in both graphs and data tables on the lake's information sheet on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	175.0	66.0	244.0	F
CLA (µg/l)	16.2	4.4	36.0	B
Secchi (m)	1.1	1.0	1.2	D
TKN (mg/l)	1.50	1.20	2.00	
			Overall Grade	D

The lake's 2006 overall grade is similar to those recorded in 2000-2001 and 2003 (D) and worse than the C's recorded in 2002, and 2004-2005.

Similar to past years, the Secchi transparency in 2006 would have been greater except for the shallowness of the lake. On numerous monitoring events, the Secchi disk was clearly noticeable while resting on the lake's bottom. Therefore, the lake's 2006 water clarity was actually better than that represented by the summer mean and resulting grade.

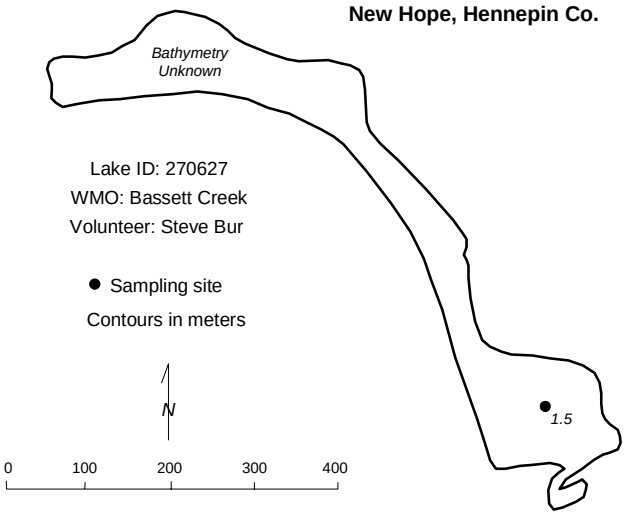
No statistically significant long-term trend is evident from the lake's water quality database, in the short-term however, the lake's quality seems well represented by an overall grade of D/C. To better understand the quality of the lake and what direction it may be heading, continued monitoring is suggested.

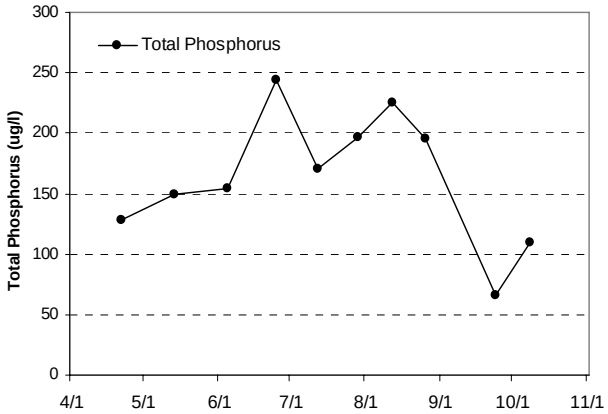
The last two graphs show seasonal variation in the lake's perceived physical condition and recreational suitability. The average user perception rankings, on a 1-to-5 scale, were 4.3 for physical condition (between 4- "high algal color" and 5- "severe bloom"), and 4.4 for recreational suitability (between 4- "no swimming - boating ok" and 5- "no aesthetics possible").

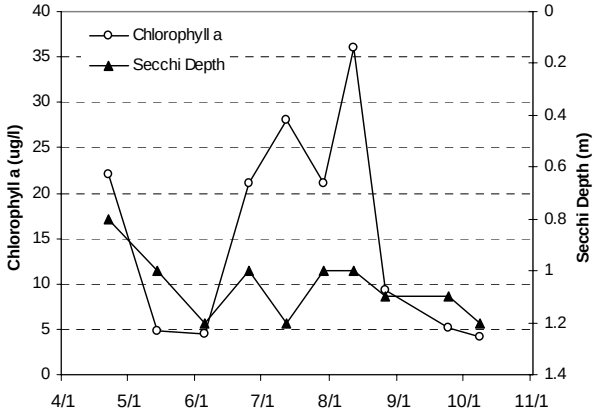
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Northwood Pond

New Hope, Hennepin Co.

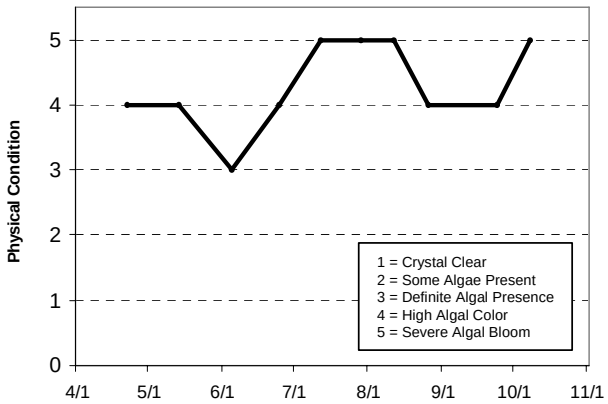






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/22/06	18.8				22	128		0.8	4	4
5/14/06	10.4				4.8	149		1	4	4
6/5/06	26.6				4.4	154		1.2	3	4
6/25/06	25.2				21	244		1	4	4
7/12/06	27.3				28	170		1.2	5	5
7/29/06	29				21	197		1	5	5
8/12/06	25				36	225		1	5	5
8/26/06	24.1				9.3	195		1.1	4	5
9/24/06	12.5				5.1	66		1.1	4	4
10/8/06	14.8				4.2	109		1.2	5	4

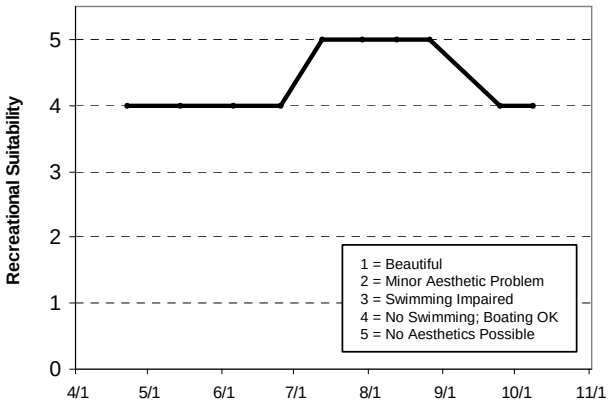


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus								F	F	D	F	D	D	F
Chlorophyll a								B	C	B	C	B	B	B
Secchi Depth								D	D	D	D	D	D	D
Overall								**D**	**D**	**C**	**D**	**C**	**C**	**D**

Source: Metropolitan Council and STORET data



Oak Lake (Site-1) (10-0093) *Carver County Environmental Services*

Oak Lake is divided into three distinct basins. For this reason there were three monitoring sites in 2006. Additionally, the results will be discussed individually for each of the three sites.

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 sixth year in which Oak Lake (Site-1) has been involved in CAMP (2001-2005 being the others). The 2001-2004 CAMP data are the only known available data. This was the first year that Oak Lake site 2 and 3 have been monitored however. 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.

Oak Lake (Site-1) was monitored 14 times between mid-April and early-October, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	171.8	102.0	272.0	D
CLA (µg/l)	75.4	35.0	120.0	F
Secchi (m)	0.5	0.3	0.7	F
TKN (mg/l)	2.41	1.20	4.80	
			Overall Grade	F

The lake's 2006 overall grade of an F was the worst ever reported. In 2001-2002 and 2004 the lake received an overall grade of a C and in 2003 and 2005 it received an overall grade of a D.

As mentioned earlier, there are no water quality data available for Oak Lake (Site-1) other than 2001-2006 CAMP data. Therefore it is not possible to determine any long-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

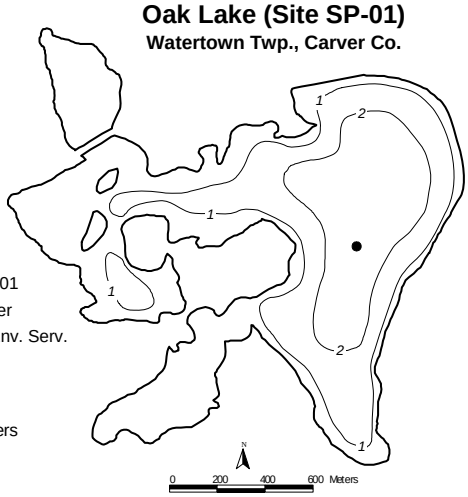
Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The average user perception rankings were 3.1 for physical condition (between 3- "definite algae present" and 4- "high algal color"), and 3.1 for recreational 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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

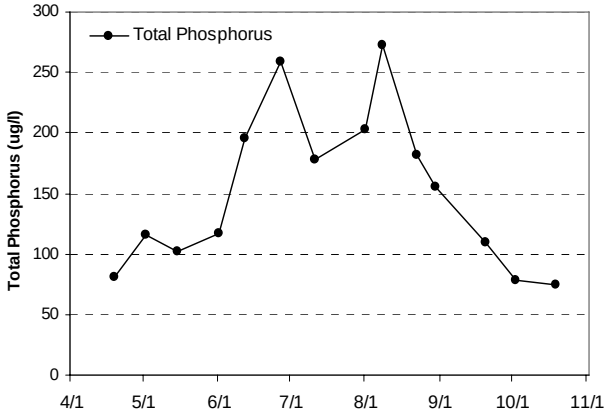
Oak Lake (Site SP-01)

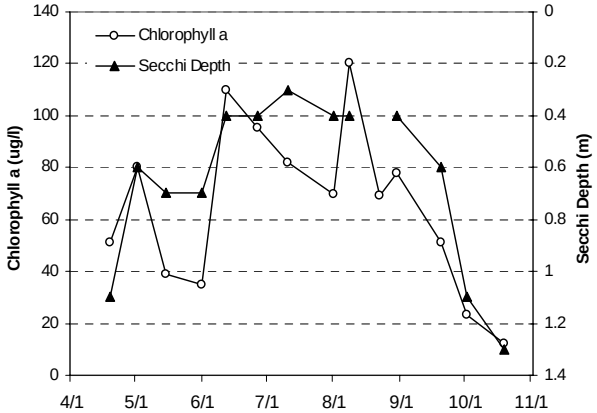
Watertown Twp., Carver Co.



Lake ID: 100093-01
WMO: Crow River
Volunteer: Carver Co. Env. Serv.

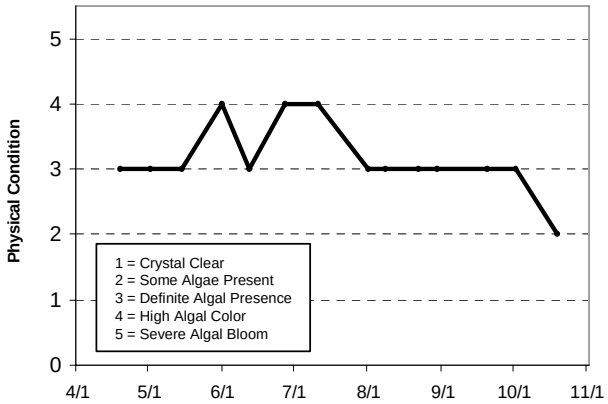
● Sampling site
Contours in meters





2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/19/06	14.11		10.8		51	81		1.1	3	3
5/2/06	13.67		10.6		80	116		0.6	3	3
5/15/06	12.6		10.1		39	102		0.7	3	3
6/1/06	23.7		10.44		35	117		0.7	4	4
6/12/06	20.61		10.93		110	196		0.4	3	3
6/27/06	23.75		9.8		95	259		0.4	4	4
7/11/06	25.7		10.9		82	178		0.3	4	4
8/1/06	28.58		4.54		70	203		0.4	3	3
8/8/06	25.98		7.23		120	272		0.4	3	3
8/22/06	25.14		12.06		69	182			3	3
8/30/06	22.96		8.39		78	156		0.4	3	3
9/20/06	15.82		10.87		51	109		0.6	3	3
10/2/06	16.43		11.89		23	78		1.1	3	3
10/19/06	7.01		9.58		12	75		1.3	2	2

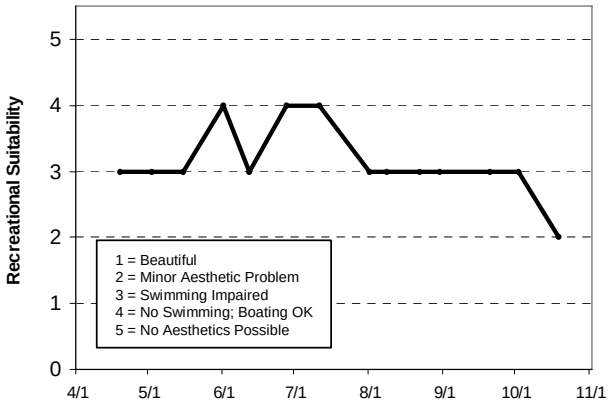


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus									D	D	F	D	D	D
Chlorophyll a									C	C	C	C	D	F
Secchi Depth									C	C	C	C	C	F
Overall									**C**	**C**	**D**	**C**	**D**	**F**

Source: Metropolitan Council and STORET data



Oak Lake (Site-2) (10-0093-02) *Carver County Environmental Services*

Oak Lake (Site-2) was monitored 10 times between mid-April and early-October, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	61.0	45.0	107.0	C
CLA (µg/l)	15.5	5.5	60.0	B
Secchi (m)	1.0	0.7	1.5	D
TKN (mg/l)	1.33	0.94	2.20	
			Overall Grade	C

As mentioned earlier, there are no water quality data available for Oak Lake (Site-2) other than 2006 CAMP data. Therefore it is not possible to determine any long-term trends. To better understand the lake site's water quality and where it may be heading, additional years of data collection are needed.

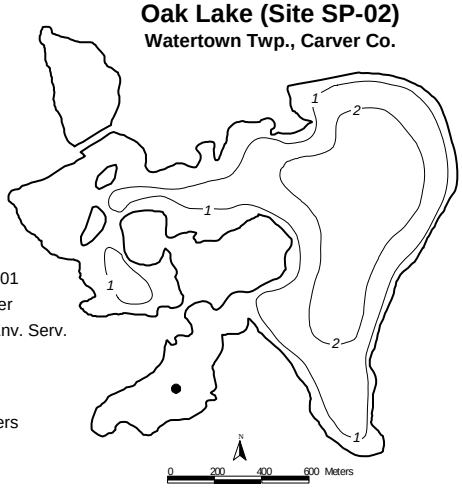
Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The average user perception rankings were 2.9 for physical condition (roughly 3- "definite algae present"), and 3.8 for recreational suitability (between 3- "swimming slightly impaired" and 4- "no swimming – boating ok").

The Fisheries Section of the Minnesota Department of Natural Resources (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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

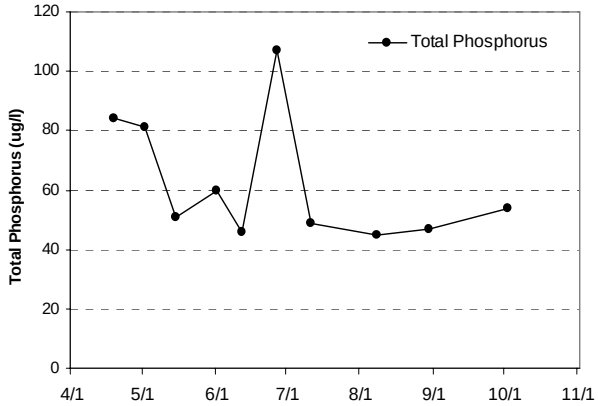
Oak Lake (Site SP-02)

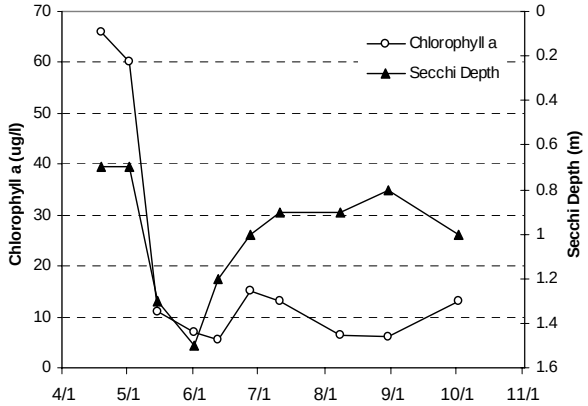
Watertown Twp., Carver Co.



Lake ID: 100093-01
WMO: Crow River
Volunteer: Carver Co. Env. Serv.

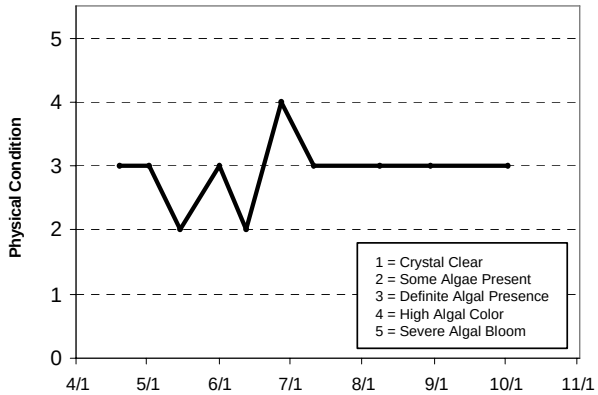
● Sampling site
Contours in meters





2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/19/06	14.8		8.59		66	84		0.7	3	3
5/2/06	13.28		9.4		60	81		0.7	3	3
5/15/06	12.79		10.84		11	51		1.3	2	3
6/1/06	24.19		8.45		7	60		1.5	3	3
6/12/06	17.37		9.68		5.5	46		1.2	2	3
6/27/06	21.06		7.94		15	107		1	4	5
7/11/06	24.18		10.52		13	49		0.9	3	5
8/8/06	22.49		5.06		6.4	45		0.9	3	4
8/30/06	19.09		4.46		6	47		0.8	3	5
10/2/06	17.65		9.01		13	54		1	3	4

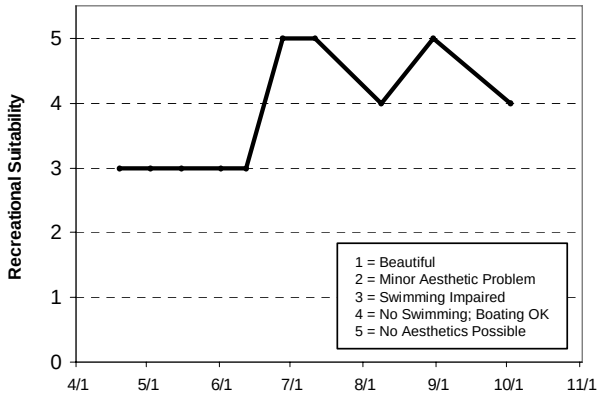


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus														C
Chlorophyll a														B
Secchi Depth														D
Overall														**C**

Source: Metropolitan Council and STORET data



Oak Lake (Site-3) (10-0093-03) *Carver County Environmental Services*

Oak Lake (Site-3) was monitored 10 times between mid-April and early-October, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	174.0	65.0	302.0	F
CLA (µg/l)	63.0	22.0	89.0	D
Secchi (m)	0.7	0.5	1.0	D
TKN (mg/l)	1.80	1.10	2.30	
			Overall Grade	D

As mentioned earlier, there are no water quality data available for Oak Lake (Site-3) other than 2006 CAMP data. Therefore it is not possible to determine any long-term trends. To better understand the lake site's water quality and where it may be heading, additional years of data collection are needed.

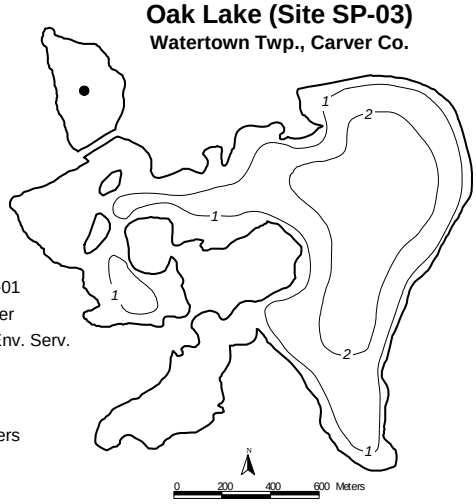
Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The average user perception rankings were 2.9 for physical condition (roughly 3- "definite algae present"), and 2.8 for recreational suitability (between 2- "minor 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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

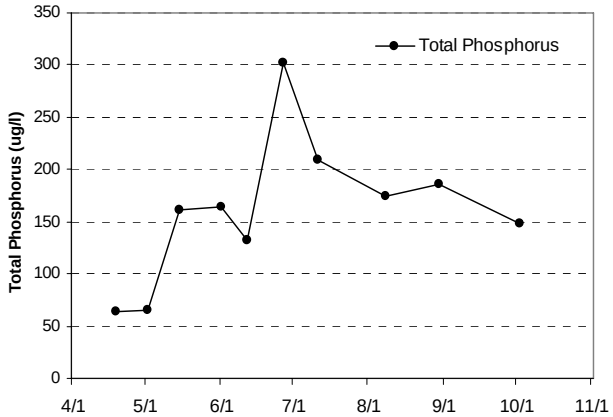
Oak Lake (Site SP-03)

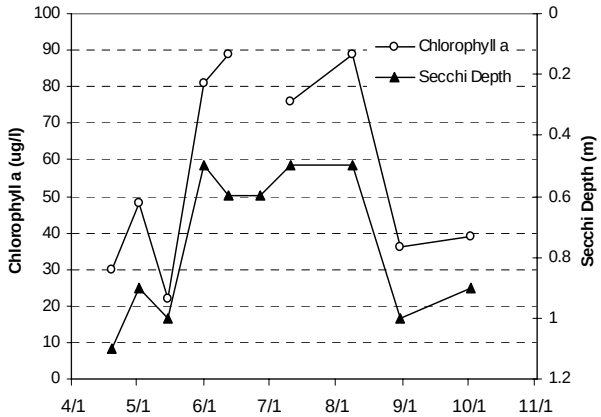
Watertown Twp., Carver Co.



Lake ID: 100093-01
WMO: Crow River
Volunteer: Carver Co. Env. Serv.

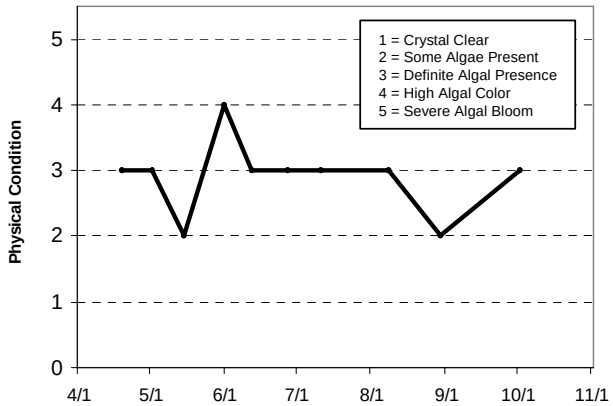
● Sampling site
Contours in meters





2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/19/06	14.84		8.95		30	64		1.1	3	3
5/2/06	13.51		10.2		48	65		0.9	3	3
5/15/06	12.25		10.78		22	161		1	2	2
6/1/06	24.47		9.29		81	164		0.5	4	3
6/12/06	21.6		11.8		89	132		0.6	3	3
6/27/06	23.58		7.9			302		0.6	3	3
7/11/06	25.64		9.84		76	209		0.5	3	3
8/8/06	25.77		5.83		89	175		0.5	3	3
8/30/06	22.7		7.77		36	186		1	2	2
10/2/06	16.36		10.33		39	148		0.9	3	3

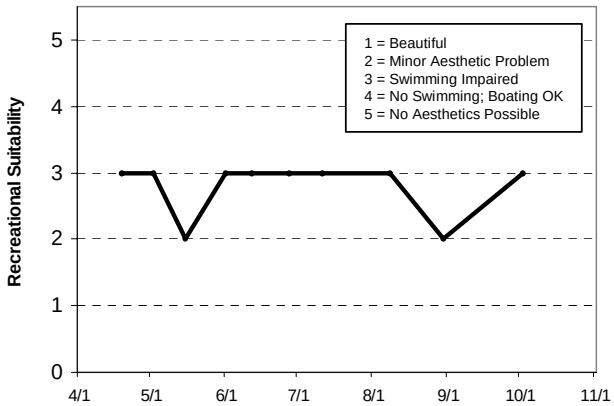


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus														F
Chlorophyll a														D
Secchi Depth														D
Overall														**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 very little known morphological data available for the lake.

This marks the second 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 was unsuccessful. Therefore, 2005-2006 are the only known years of available data. 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 lake was monitored 15 times between mid-April and mid-October, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

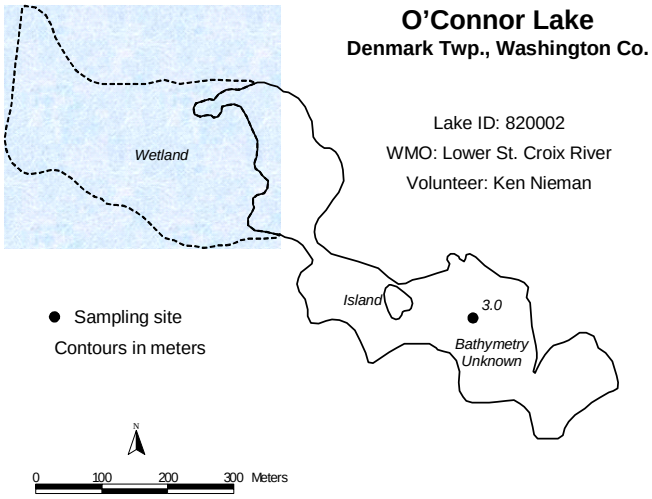
Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	50.1	23.0	149.0	C
CLA (µg/l)	6.1	1.9	13.0	A
Secchi (m)	1.4	0.6	3.2	C
TKN (mg/l)	0.77	0.35	1.30	
			Overall Grade	B

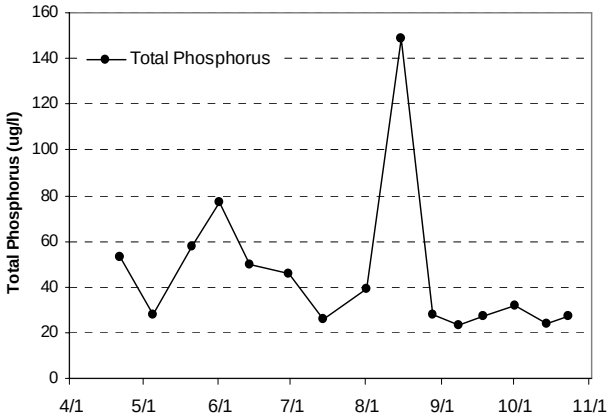
The lake's 2006 overall grade of a B was better than the overall water quality grade reported in 2005 (C). As mentioned earlier, there are no water quality data available for Lake O'Connor other than the 2005-2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

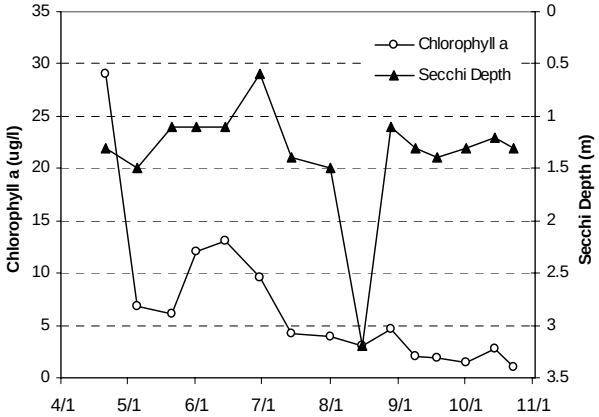
Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical conditions on a 1-to-5 scale. The average user perception rankings were 2.1 for physical condition (between 2- "some algae present" and 3- "definite algae present").

The 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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

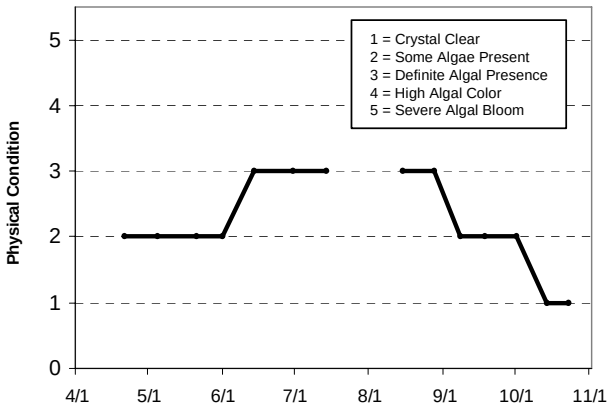






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/21/06	15.9				29	53		1.3	2	4
5/5/06	15.4				6.8	28		1.5	2	
5/21/06	24.2				6.1	58		1.1	2	
6/1/06	24.7				12	77		1.1	2	
6/14/06	25.6				13	50		1.1	3	
6/30/06	28.7				9.6	46		0.6	3	
7/14/06	28.4				4.2	26		1.4	3	
8/1/06	26.6				3.9	39		1.5		
8/15/06	29				3.1	149		3.2	3	
8/28/06	23.1				4.6	28		1.1	3	
9/8/06	18.5				2	23		1.3	2	
9/18/06	18.3				1.9	27		1.4	2	
10/1/06	15.1				1.4	32		1.3	2	
10/14/06	10.3				2.7	24		1.2	1	
10/23/06	7.6				1	27		1.3	1	

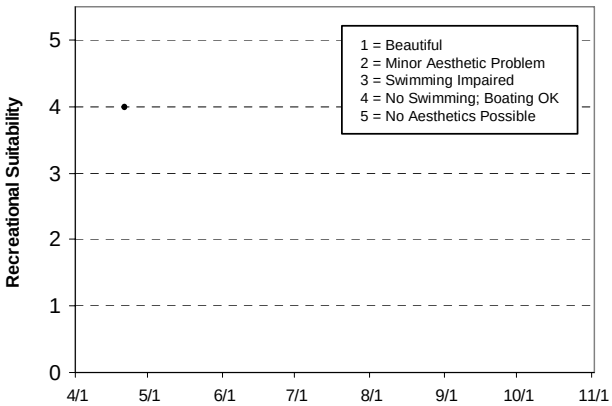


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus													C	C
Chlorophyll a													B	A
Secchi Depth													C	C
Overall													**C**	**B**

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). The lake's surface area is 258 acres and has a maximum depth of 6.7 m (roughly 22 feet). Roughly 63 percent of the lake's surface area is considered littoral zone (the 0-15 foot depth area of aquatic plant dominance). Because of its multi-recreational uses, the lake is considered a "Priority Lake" in the Metropolitan Area

Although this is only the first year that O'Dowd Lake has been enrolled in CAMP, the lake had been monitored by Council staff in the past. In 2006, the lake was monitored 12 times between mid-June and mid-October. The collected data and resulting graphs showing TP and CLA concentrations, Secchi transparency, and user perception (physical condition and recreational suitability) are presented on the lake's information sheet on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	71.7	43.0	126.0	D
CLA (µg/l)	33.6	1.8	86.0	C
Secchi (m)	0.9	0.4	1.4	D
TKN (mg/l)	1.46	0.55	1.90	
			Overall Grade	D

The lake's overall grade in 2006 (D) is similar to that recorded in 1996-1997, 1999-2001 and 2003, and worse than the C's recorded in 2002 and 2004-2005, and the B recorded in 1998. Because of the variability of the lake's grades, no statistically significant long-term trend is evident from the lake's water quality database. The lake's water quality seems to be best represented by an overall grade of D+/C.

Similar to past years, the lake's Secchi transparency in 2006 would have been greater except on many monitoring events the lake's excessive submergent macrophyte growth got in the way. Therefore, the lake's 2006 water clarity was actually better than that represented by the summer mean and resulting grade.

Throughout the 2006 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 2.7 (between 2- "some algae present" and 3- "definite algae present"), while the mean recreational suitability was 2.2 (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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

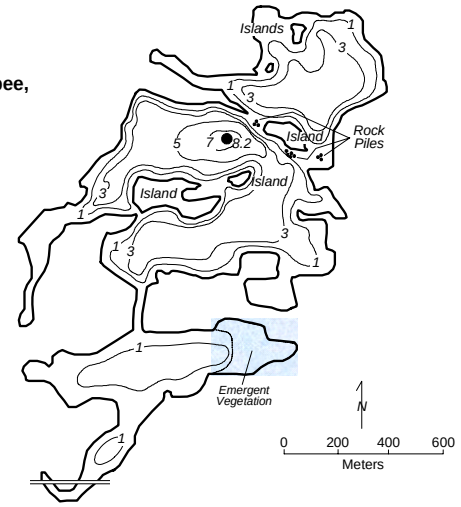
O'Dowd Lake

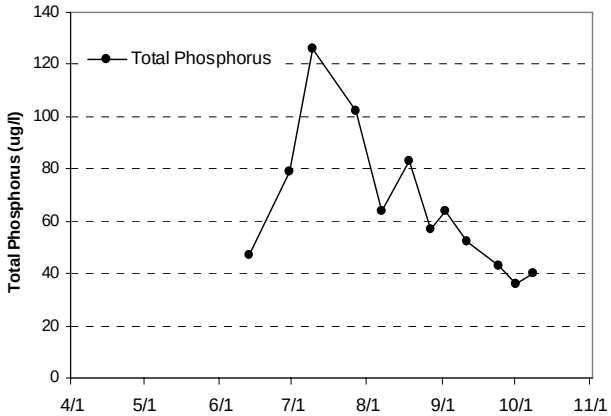
Louisville Twp./Shakopee, Scott Co.

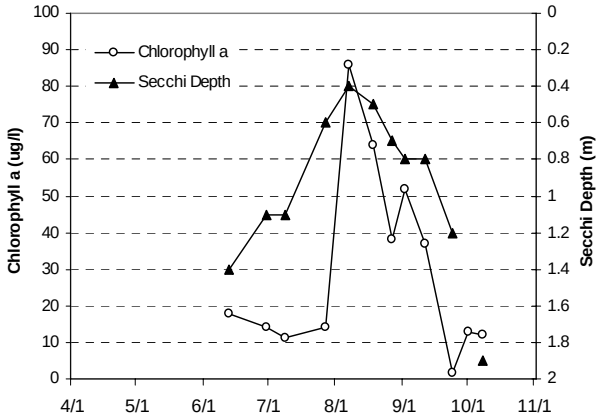
LAKE ID: 700095
WMO: Scott County
Volunteer: Peggy Turnwall

● Sampling site

Contours in meters

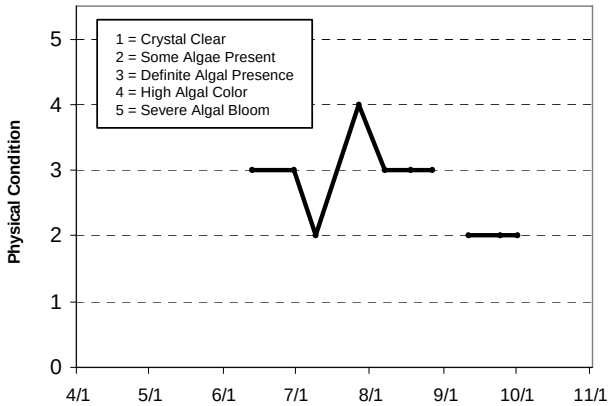






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
6/13/06	24.1				18	47		1.4	3	2
6/30/06					14	79		1.1	3	2
7/9/06	27				11	126		1.1	2	1
7/27/06	28				14	102		0.6	4	3
8/7/06	28.7				86	64		0.4	3	3
8/18/06	26.9				64	83		0.5	3	3
8/27/06	25.7				38	57		0.7	3	2
9/2/06	24.3				52	64		0.8		
9/11/06	19.3				37	52		0.8	2	3
9/24/06	15.6				1.8	43		1.2	2	2
10/1/06	15.6				13	36			2	1
10/8/06	14.9				12	40		1.9		2

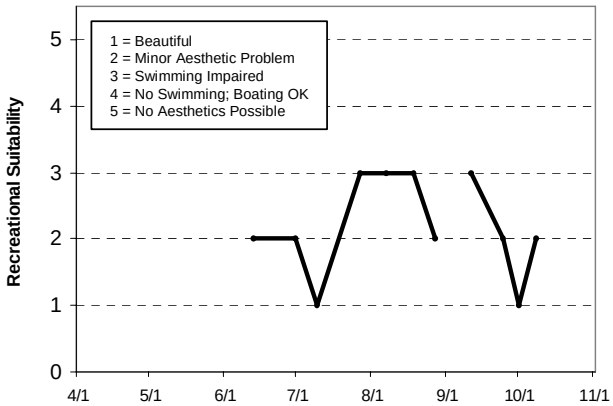


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus					C								
Chlorophyll a					C								
Secchi Depth					C								
Overall					**C**								

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus		C			C			C		D			C	D
Chlorophyll a		D			C			C		D			D	C
Secchi Depth		C			C			C		C			C	D
Overall		**C**			**C**			**C**		**D**			**C**	**D**

Source: Metropolitan Council and STORET data



Olson Lake (82-0103) *Valley Branch Watershed District*

While Olson Lake has previously been monitored by Council staff, 2006 marks only the fourth year the lake has been monitored through CAMP (1993 being the first). The 89-acre lake with a mean and maximum depth of 2.1 (6.9 feet) and 4.5 m (14.8 feet), was monitored 7 times from mid-April to late-September, 2006. 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's size and mean depth results in an approximate lake volume of 623 ac-ft.

The lake's surface area and watershed size (200 acres) translates to a 2:1 watershed-to-lake size ratio. Generally the larger the ratio, the greater the potential stress on the lake from surface runoff.

During each monitoring event the lake was monitored for TP, CLA, TKN, Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data and graphs appear on the next page.

20056summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	46.4	25.0	69.0	C
CLA (µg/l)	17.2	3.4	51.0	B
Secchi (m)	2.3	0.8	4.3	B
TKN (mg/l)	1.60	0.98	2.00	
			Overall Grade	B

The physical and recreational conditions of the lake, as perceived by the volunteer monitor, were ranked on a 1-to-5 scale. The rankings are shown on the lake's information sheet on the next 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 was 2.4 (between 2- "minor aesthetic problem" and 3- "swimming impaired").

Available data for Olson Lake reveals that lake water quality grades have improved since the 1980's. The lake water quality report card shown on the information sheet indicates that the lake received an overall C grade in 1984, as well as receiving Secchi grades of C in 1984-1986, and 1988-1990, before receiving overall grades of B in 1991, 1993, and 1995. More recently, the lake has recorded overall grades of an A in 2000 and 2003-2004, before falling back to an overall grade of B in 2005 and 2006. A recent MPCA conducted trend analysis on the lake's Secchi transparency data, revealed a statistically significant improvement in recent water clarity.

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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

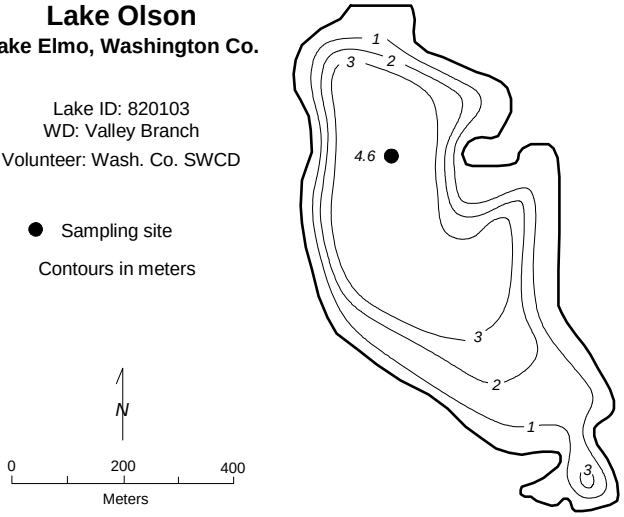
Lake Olson

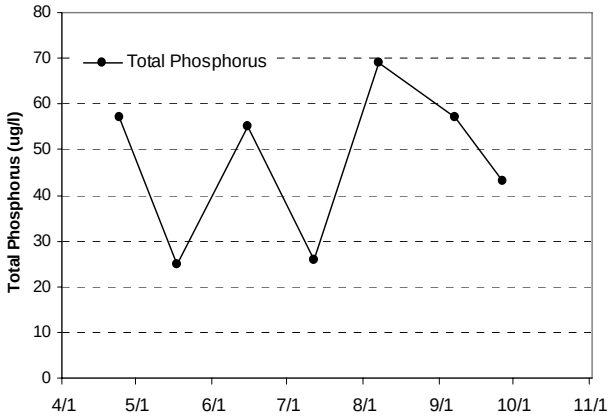
Lake Elmo, Washington Co.

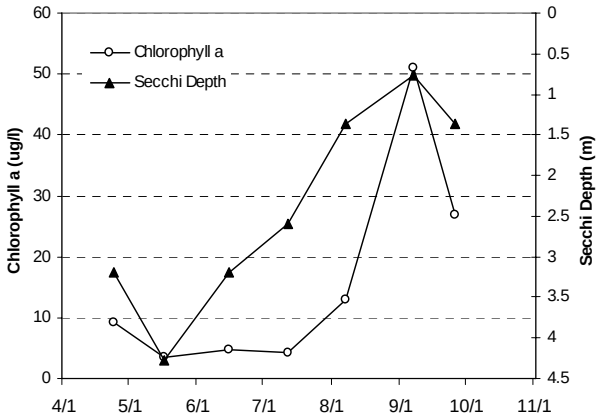
Lake ID: 820103
WD: Valley Branch
Volunteer: Wash. Co. SWCD

● Sampling site

Contours in meters

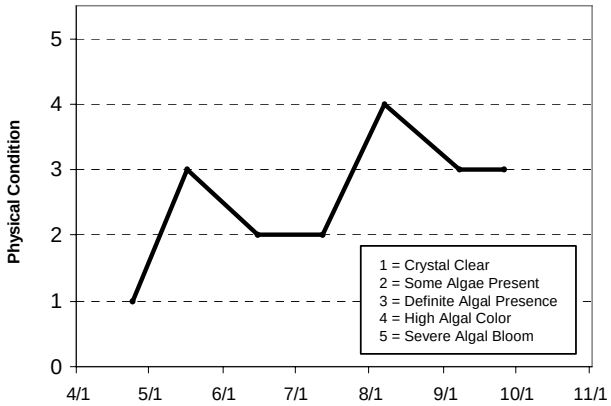






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/24/06	14.4	13.1	8.5	7.26	9.2	57		3.2	1	1
5/17/06	15.8	12.8	10.01	8.89	3.4	25		4.267	3	2
6/15/06	23.1	19.6	8.99	0.07	4.7	55		3.2	2	2
7/12/06	27.9	24.6	9.03	0.07	4.3	26		2.591	2	3
8/7/06	27.6	26.4	8.38		13	69		1.372	4	3
9/7/06	23.3	21.9	12.48	0.07	51	57		0.762	3	3
9/26/06	15.9		8.52		27	43		1.372	3	3

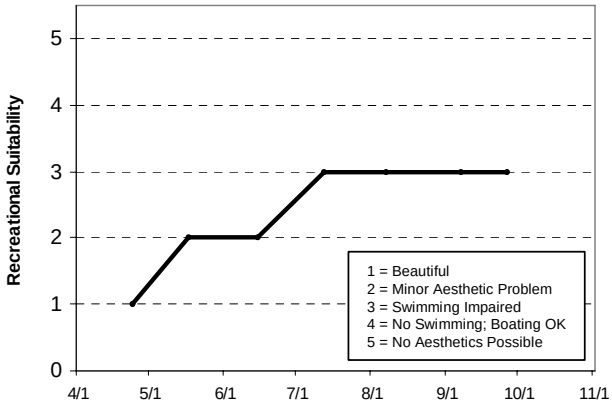


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus					C							B	
Chlorophyll a					C							B	
Secchi Depth					C	C	C		C	C	C	B	
Overall					**C**							**B**	

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus	B		C					A			A	A	B	C
Chlorophyll a	A		B					A			B	A	B	B
Secchi Depth	B		B					A			A	A	B	B
Overall	**B**		**B**					**A**			**A**	**A**	**B**	**B**

Source: Metropolitan Council and STORET data



Orchard Lake (19-0031) *Black Dog Lake Watershed Management Organization*

Orchard Lake, managed by the MDNR as a centrachid lake (bass and panfish), is located within the City of Lakeville (Dakota County). 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 (roughly 33 feet) and 3.0 m (10 feet), 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 are considered littoral zone (area of aquatic plant dominance). A public access is located within the City Park on the lake's southeastern end, and because of its multi-recreational uses, it is considered a "Priority Lake" in the Metropolitan Area.

This was the seventh year that Orchard Lake has been involved in CAMP (also involved in 1999-2001 and 2003-2005). A search through the STORET nationwide water quality database for data on the lake resulted in nutrient and Secchi transparency information for 1980-1981, 1983, 1989, 1993, 1998-2001, and 2003-2005, 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 2006 Council staff monitoring included additional samples collected at subsurface depth and analyzed for a more complete array of parameters. The following information in this section is based on data collected by the CAMP volunteer. Part 1 of the report discusses results of the data collected by Council staff.

As part of the city's involvement in CAMP in 2006, the lake was monitored 14 times between mid-April and mid-October. During each sampling event the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	33.7	18.0	46.0	C
CLA (µg/l)	13.8	1.5	29.0	B
Secchi (m)	2.2	0.7	4.5	B
TKN (mg/l)	1.47	0.82	2.00	
			Overall Grade	B

The lake's 2006 overall grade was similar to those recorded in 1981, 1983, 1989, 2001, 2004 and 2005, and better than the C's recorded in 1980, 1993, 1998-2000 and 2003. The lake's water quality seems to be well represented by an overall grade of C+/B.

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 following page. The mean physical condition ranking was 1.7 (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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

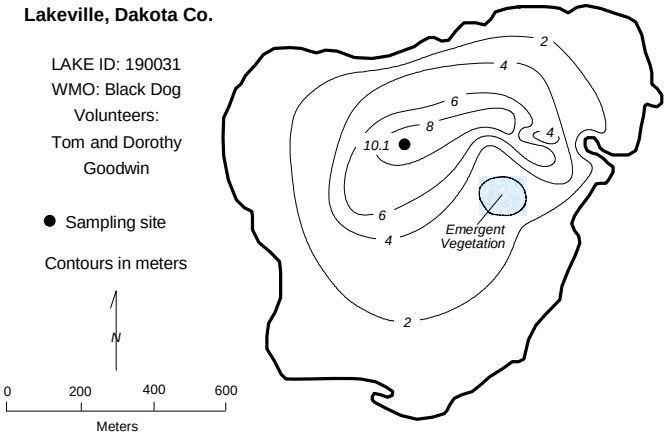
Orchard Lake

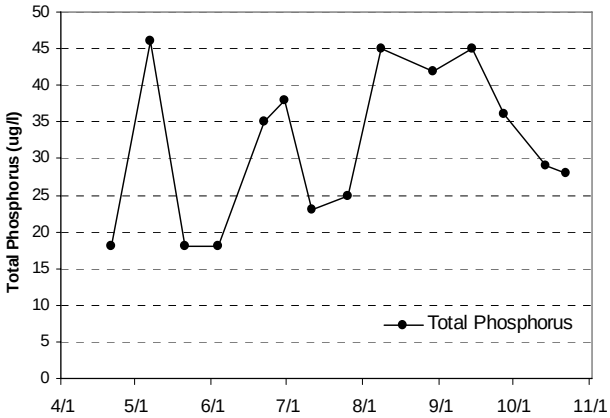
Lakeville, Dakota Co.

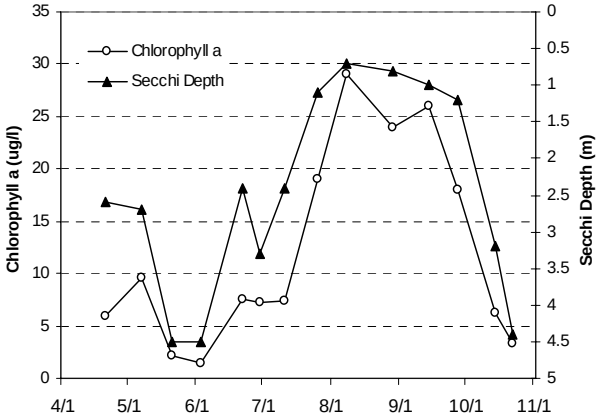
LAKE ID: 190031
WMO: Black Dog
Volunteers:
Tom and Dorothy
Goodwin

● Sampling site

Contours in meters

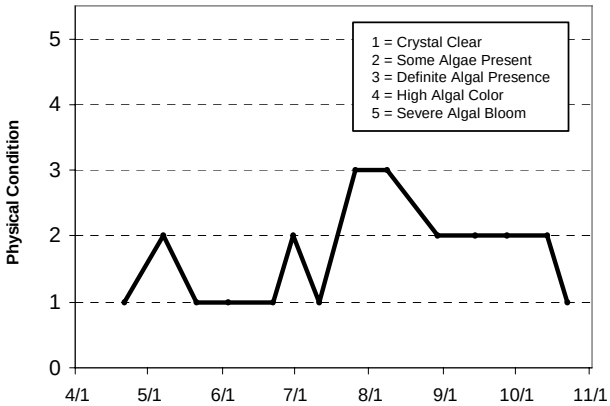






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/21/06	11.2				5.9	18		2.6	1	1
5/7/06	13				9.6	46		2.7	2	1
5/21/06	16.7				2.2	18		4.5	1	1
6/3/06	25				1.5	18		4.5	1	3
6/22/06	24				7.5	35		2.4	1	1
6/30/06	25.8				7.3	38		3.3	2	2
7/11/06	25.6				7.4	23		2.4	1	1
7/26/06	29				19	25		1.1	3	2
8/8/06	27				29	45		0.7	3	2
8/29/06	24.3				24	42		0.8	2	2
9/14/06	19.1				26	45		1	2	2
9/27/06	15.4				18	36		1.2	2	2
10/14/06	8.9				6.3	29		3.2	2	1
10/22/06	7.6				3.4	28		4.4	1	1

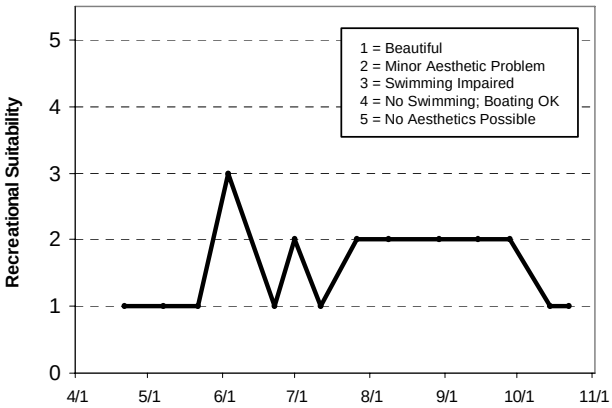


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus	C	B		B						B			
Chlorophyll a	B	B		B						B			
Secchi Depth	C	B		B				C	C	C	D	C	
Overall	**C**	**B**		**B**						**B**			

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus	C					C	C	C	B		C	C	B	C
Chlorophyll a	B					C	C	C	B		C	B	B	B
Secchi Depth	C					C	C	C	B		C	B	B	B
Overall	**C**					**C**	**C**	**C**	**B**		**C**	**B**	**B**	**B**

Source: Metropolitan Council and STORET data



Parkers Lake (27-0107) *Bassett Creek Watershed Management Organization*

This was the sixth year that Parkers Lake has been involved in CAMP (it was first enrolled in 2000). The 97-acre lake, located within the City of Plymouth (Hennepin County), has a public access located within a city park on the lake's north end. One problem that may possibly hinder future recreational activity on the lake, however, is Eurasian Water Milfoil (*Myriophyllum spicatum*), which has been reported in the lake.

The mean and maximum depths of the lake are 3.7 m (roughly 12 feet) and 11.3 m (roughly 37 feet), 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 (area of aquatic plant dominance). The lake's 950-acre immediate watershed translates to a moderate watershed-to-lake size ratio of 10:1. The greater the ratio, the greater the potential stress on the lake from surface runoff.

The lake was monitored 14 times from early-May to mid-October, 2006. Results are presented in both graphs and data tables on the lake's information sheet on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	38.0	15.0	74.0	C
CLA (µg/l)	4.8	1.0	13.0	A
Secchi (m)	3.3	1.6	5.3	A
TKN (mg/l)	1.07	0.73	1.50	
			Overall Grade	B

While the lake's 2006 overall grade (identical to those recorded in 2003-2005) is better than the C's recorded in 1980, 1995, and 1999, it is worse than the recent A's recorded in 2000 and 2002.

A search through the STORET nationwide water quality database for data on the lake resulted in nutrient and Secchi transparency information for 1980, 1990, 1995, and 1999. The 2000 and 2002-2006 water quality years represent the lake's best-monitored water quality. The lake's water quality shows a markable improvement in water quality from 2000 to 2002, before slipping a little in 2003-2006. To better understand the lake's water quality and where it truly 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 2.1 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) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

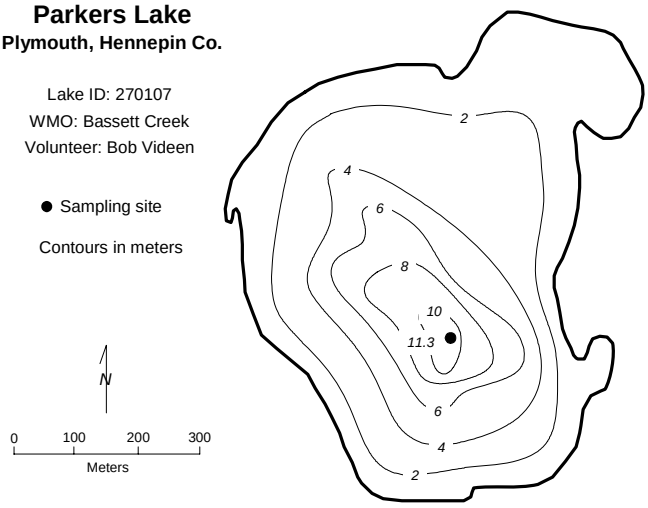
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

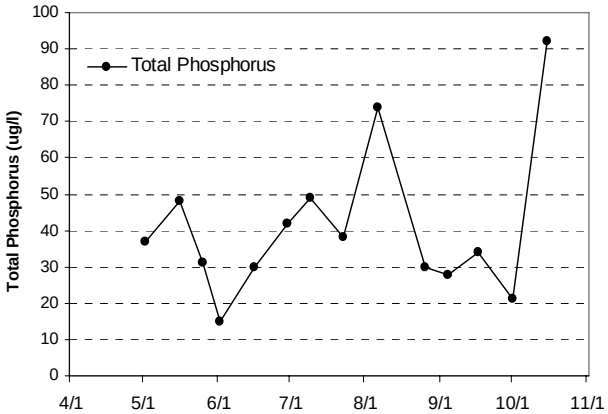
Parkers Lake
Plymouth, Hennepin Co.

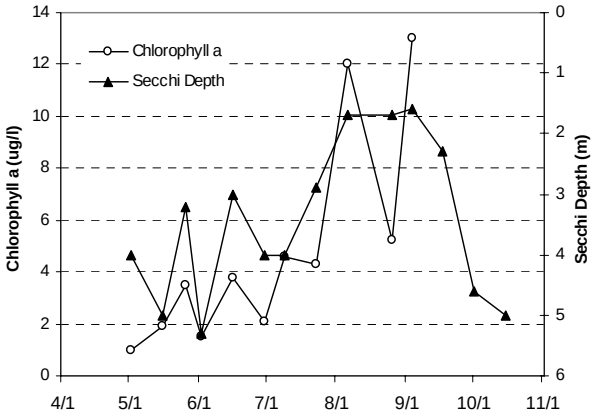
Lake ID: 270107
WMO: Bassett Creek
Volunteer: Bob Videen

● Sampling site

Contours in meters

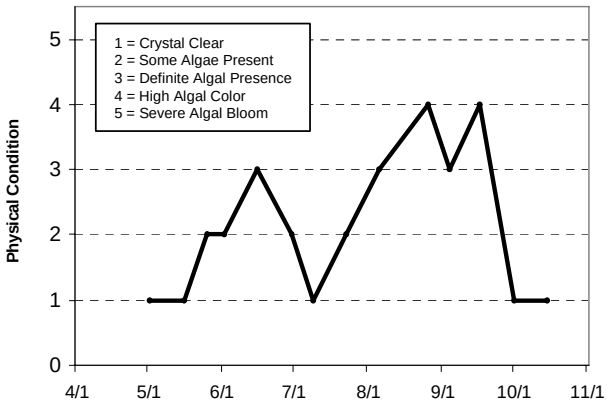






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/2/06	16				1	37		4	1	1
5/16/06	16				1.9	48		5	1	1
5/26/06	22				3.5	31		3.2	2	2
6/2/06	26				1.5	15		5.3	2	2
6/16/06	26				3.8	30		3	3	3
6/30/06	24				2.1	42		4	2	2
7/9/06	26				4.6	49		4	1	1
7/23/06	27				4.3	38		2.9	2	2
8/6/06	29				12	74		1.7	3	3
8/26/06	24				5.2	30		1.7	4	4
9/4/06	24.5				13	28		1.6	3	3
9/17/06	20					34		2.3	4	4
10/1/06	16					21		4.6	1	1
10/15/06	10					92		5	1	1

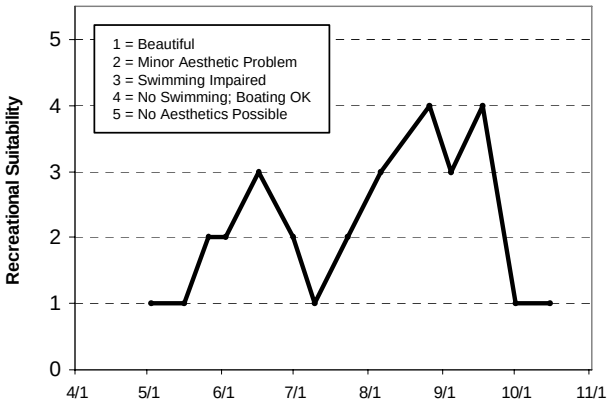


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus	C												
Chlorophyll a	C										B		
Secchi Depth	C										B		
Overall	**C**												

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus			C				C	A		A	B	B	C	C
Chlorophyll a			B				B	A		A	B	A	B	A
Secchi Depth			C				C	B		A	B	C	B	A
Overall			**C**				**C**	**A**		**A**	**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 very little known morphological data available for the lake.

This was the first year that Pat Lake has been involved in CAMP. A search through the STORET nationwide water quality database for data on the lake provided no data; therefore 2006 is the only year of available water quality data for the lake.

As part of the watershed's involvement in CAMP in 2006, the lake was monitored seven times between mid-April and late-September. During each sampling event the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	102.0	28.0	254.0	D
CLA (µg/l)	23.3	4.0	37.0	C
Secchi (m)	1.7	0.8	3.4	C
TKN (mg/l)	1.05	0.75	1.40	
			Overall Grade	C

As mentioned earlier, there are no nutrient data available for Pat Lake other than the 2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

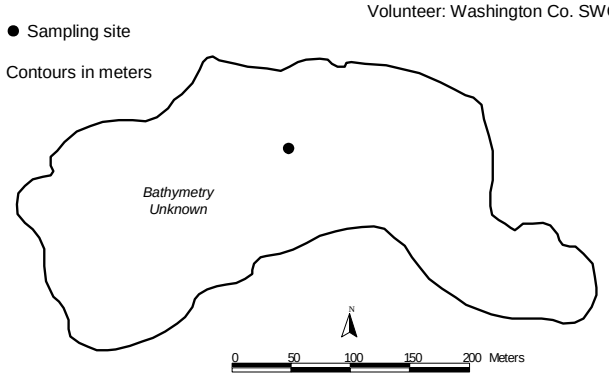
The perceived physical and recreational conditions (ranked on a 1-to-5 scale) are shown on the lake's information sheet on the next page. The average user perception rankings, were 2.9 for physical condition (between 2- "some algae present" and 3- "definite algae present"), and 3.4 for recreational suitability (between 3- "swimming impaired" and 4- "no swimming – boating ok").

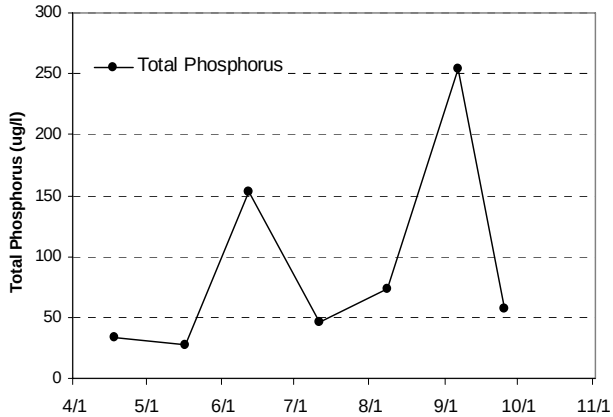
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

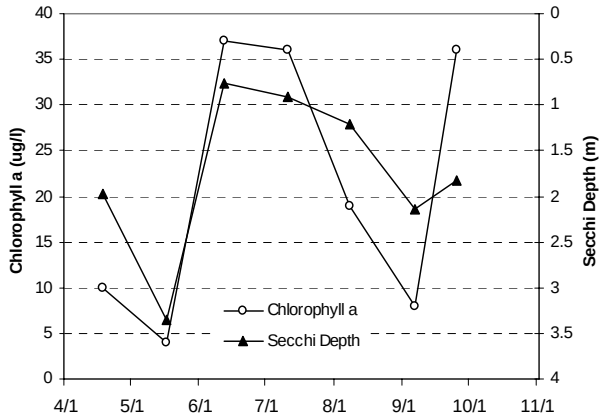
Pat Lake

Grant, Washington Co.

Lake ID: 820125
WMO: Browns Creek
Volunteer: Washington Co. SWCD

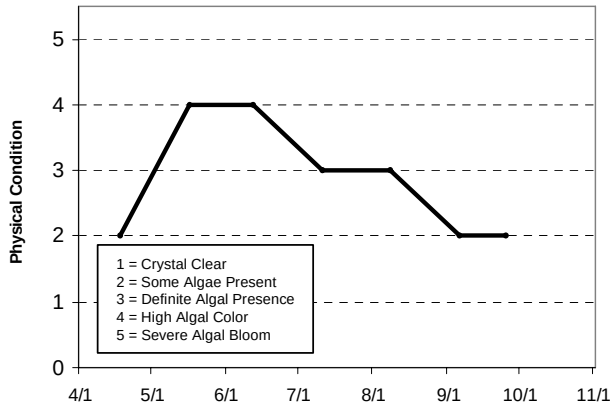






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/18/06	14.4	6.8	9.7	1.55	10	34		1.981	2	3
5/17/06	18.3	12.2	8.77	0.52	4	28		3.353	4	4
6/12/06	21.5		4.77		37	153		0.762	4	4
7/11/06	26.9	23.5	8.76	0.06	36	46		0.914	3	4
8/8/06	27.4		9.56		19	74		1.219	3	4
9/6/06	23.2		8.06		8	254		2.134	2	3
9/25/06	14.7		10.27		36	57		1.829	2	2

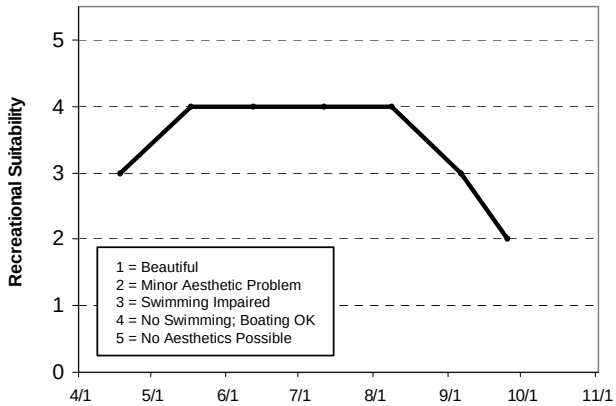


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus														D
Chlorophyll a														C
Secchi Depth														C
Overall														**C**

Source: Metropolitan Council and STORET data



Peltier Lake (2-0004) *Rice Creek Watershed District*

Lake Peltier, with a surface area of 465 acres, is located one mile north of the City of Centerville (Anoka County). The maximum and mean depths of the lake are 4.9 and 2.1 m (16 and seven feet), respectively. The approximate volume of the lake is 3,255 ac-ft. The lake has a drainage area of roughly 68,082 acres, which translates to an extremely large watershed-to-lake size ratio of 391:1. The greater the ratio, the greater the potential stress on the lake from surface runoff. Public access is possible on the southwestern end of the lake through the Rice Creek Chain of Lakes Regional Park.

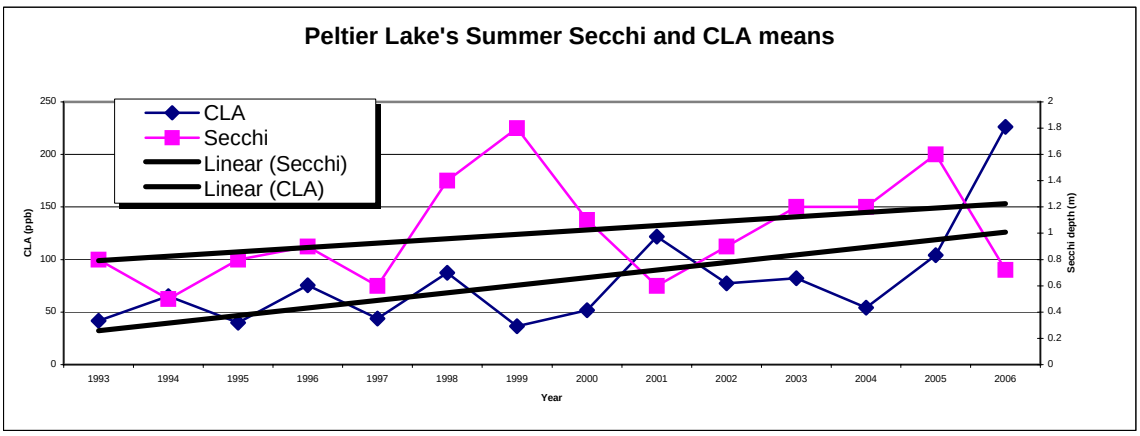
Peltier Lake is managed by the St. Paul Water Utility as a back-up water supply, and due to its multi-recreational uses, is considered a "Priority Lake" in the area by the Metropolitan Council. One aspect which may hinder recreational uses on the lake is the recent discovery of Eurasian Water Milfoil (*Myriophyllum spicatum*) [EWM]. Additionally, the lake, which is managed by the MDNR as a gamefish lake, experiences frequent winterkills.

Lake Peltier has been involved in CAMP since 1993 and was monitored 17 times from mid-April to mid-October, 2006. Results are presented in graphs and data tables on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	283.6	59.0	720.0	F
CLA (µg/l)	226.2	4.6	630.0	F
Secchi (m)	0.7	0.1	2.6	D
TKN (mg/l)	3.14	0.89	7.20	
			Overall Grade	F

The 2006 overall grade of F is similar to those recorded in 1994, and 2001-2002 and worse than the D's recorded in 1993, 1995-2000, and 2003-2005.



Other than the 1993-2006 CAMP data, the only other data found through a search of the STORET database was from 1983. While statistical analysis on the lake's water quality database revealed no "statistically significant" trends, and grades seems to promote the idea that the lake's overall quality has remained fairly constant over the past decade [fluctuating between a low D and F], a simple trend line calculated from the annual summer means shows a slight degradation in the lake's Secchi and chlorophyll-a means (see graph).

The average user perception rankings, on a 1-to-5 scale, was 3.4 for physical condition (between 3- "definite algae present" and 4- "high algal color"), and 3.4 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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Peltier Lake

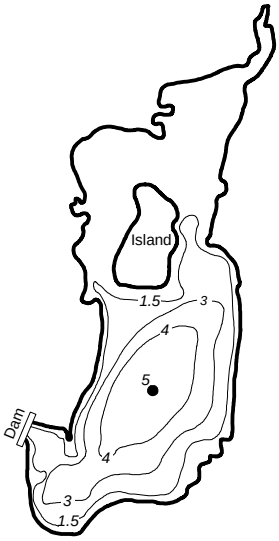
Centerville/Lino Lakes, Anoka Co.

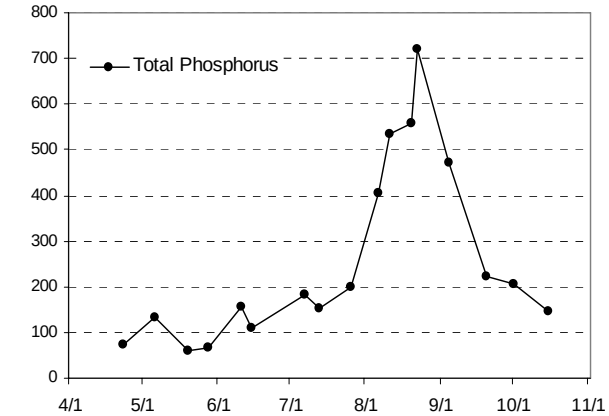
Lake ID: 20004
WD: Rice Creek
Volunteer: Wayne LeBlanc

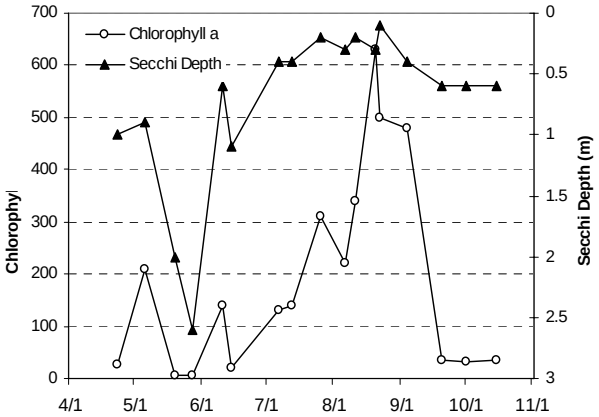
● Sampling site
Contours in meters

N

0 300 600
Meters

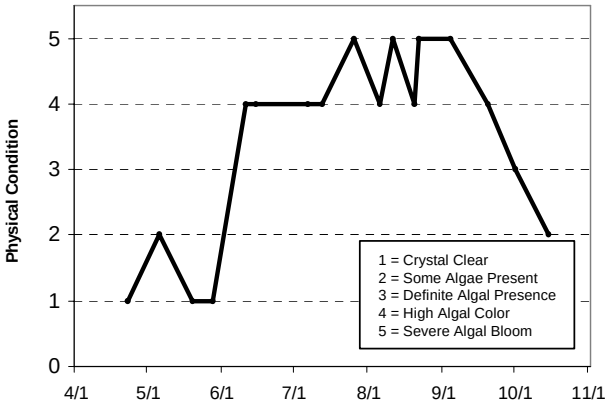






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/23/06	15				25	73		1	1	1
5/6/06	14				210	134		0.9	2	1
5/20/06	16				4.6	59		2	1	1
5/28/06	21				6.6	66		2.6	1	1
6/11/06	20				140	157		0.6	4	4
6/15/06	21				21	110		1.1	4	4
7/7/06	25				130	182		0.4	4	4
7/13/06	26				140	153		0.4	4	4
7/26/06	26				310	198		0.2	5	5
8/6/06	28				220	405		0.3	4	4
8/11/06	25				340	534		0.2	5	5
8/20/06	24				630	558		0.3	4	4
8/22/06	27				500	720		0.1	5	5
9/4/06	22				480	471		0.4	5	5
9/20/06	18				35	224		0.6	4	4
10/1/06	15				32	205		0.6	3	3
10/15/06	6.5				36	147		0.6	2	2

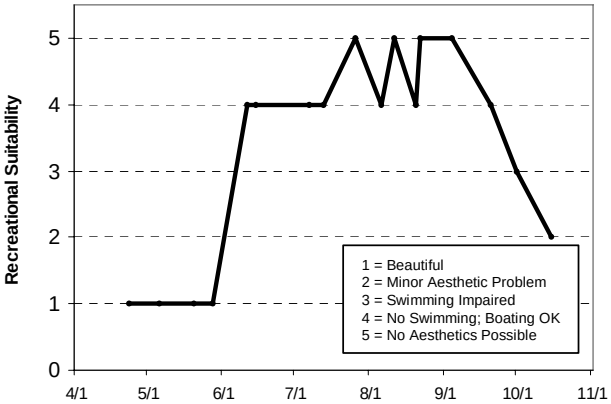


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus				F									
Chlorophyll a				D									
Secchi Depth				D									
Overall				**D**									

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus	F	F	D	F	D	F	F	F	F	F	D	F	F	F
Chlorophyll a	C	D	C	D	C	F	C	D	F	F	D	D	F	F
Secchi Depth	D	F	D	D	F	C	C	D	F	D	D	C	C	D
Overall	**D**	**F**	**D**	**D**	**D**	**D**	**D**	**D**	**F**	**F**	**D**	**D**	**D**	**F**

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 (7 feet) and 4.9 m (16 feet). The lake's mean depth and surface area translate to a lake volume of 245 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).

This was the eighth year that Pike Lake has been involved in CAMP. A search through the STORET nationwide water quality database for data on the lake resulted in nutrient and Secchi transparency information for 1981-1983, 1985-1991, and 1999-2005, as well as just Secchi data for 1992-1993.

As part of the watershed district's involvement in CAMP in 2006, the lake was monitored 11 times between early-June and mid-October. During each sampling event the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	94.3	39.0	131.0	D
CLA (µg/l)	49.0	20.0	80.0	D
Secchi (m)	0.8	0.5	0.9	D
TKN (mg/l)	1.68	1.10	2.10	
			Overall Grade	D

The lake's 2006 overall grade was similar to that of 1981-1982, 1987-1990, and 1999-2005, better than 1991 (F), and worse than that of 1983, and 1985-1986 (all of which were C's). Thus, the lake's quality seems to fluctuate quite a bit, but mostly falls within the overall grade range of low-C/high-D.

Throughout the monitoring period, the volunteers' opinion 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 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) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

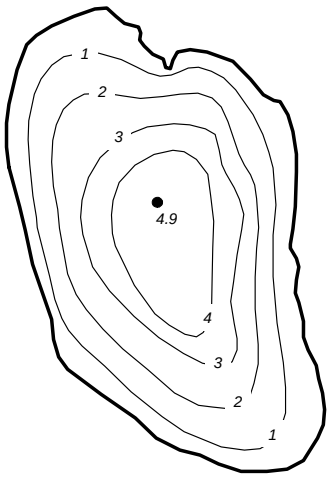
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

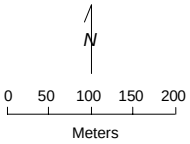
Pike Lake

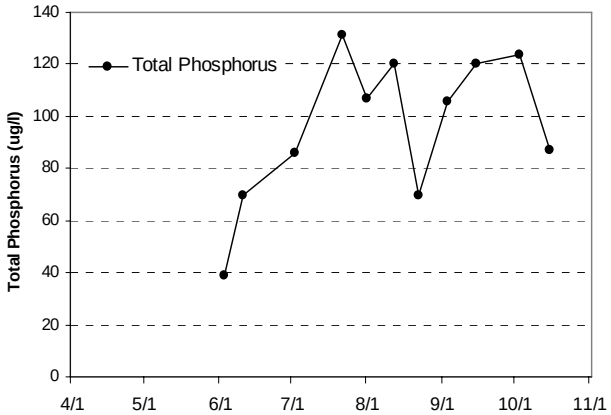
New Brighton, Ramsey Co.

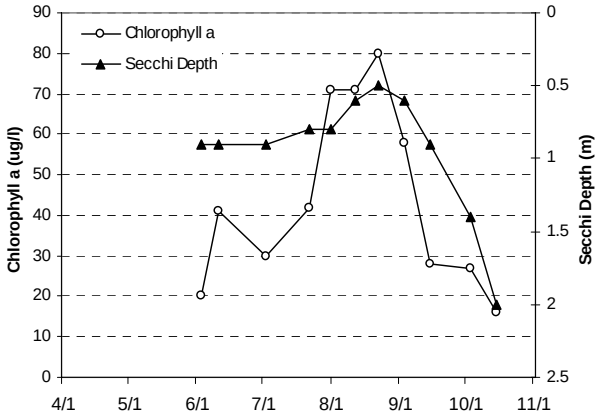
Lake ID: 620069
WD: Rice Creek
Volunteer: Philip Goodrich

● Sampling site
Contours in meters



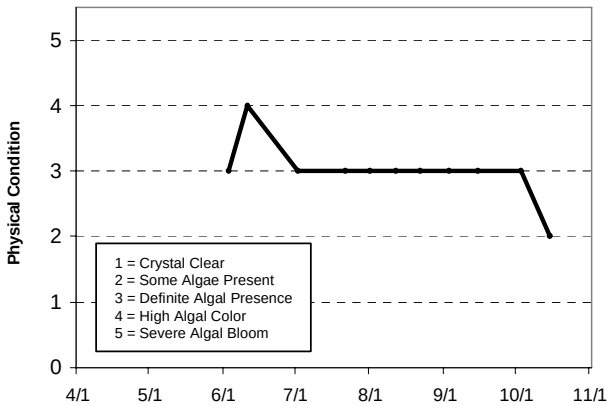






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
6/3/06	27.7				20	39		0.9	3	3
6/11/06	24.6				41	70		0.9	4	3
7/2/06	28.6				30	86		0.9	3	3
7/22/06	27.2				42	131		0.8	3	3
8/1/06	29.4				71	107		0.8	3	3
8/12/06	26				71	120		0.6	3	3
8/22/06	24.6				80	70		0.5	3	3
9/3/06	22.8				58	106		0.6	3	3
9/15/06	20.2				28	120		0.9	3	3
10/3/06	17.2				27	124		1.4	3	2
10/15/06	9.1				16	87		2	2	2

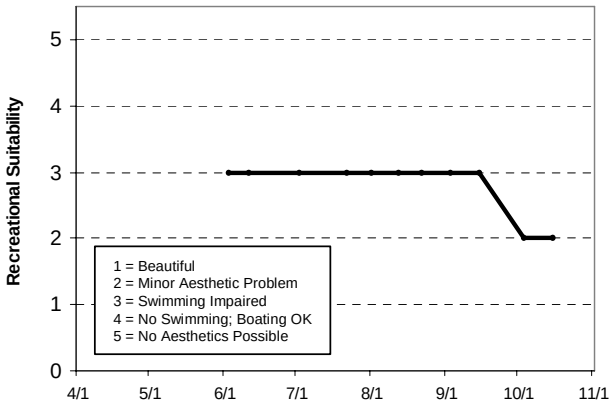


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus		C	C	D		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	D
Overall		**D**	**D**	**C**		**C**	**C**	**D**	**D**	**D**	**D**	**F**	

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus							D	D	D	D	D	D	D	D
Chlorophyll a							C	C	D	C	D	C	D	D
Secchi Depth	D						D	D	C	D	D	D	D	D
Overall							**D**	**D**	**D**	**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 and has a maximum depth of 7.9 m (26 feet). The mean depth of the lake, 3.0 m (10 feet), and its surface area translate to 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.

Pine Tree Lake has been a part of CAMP since 1993. In 2006, the lake was monitored 10 times between late-April and late-October. On each outing, the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	37.8	22.0	53.0	C
CLA (µg/l)	6.9	4.2	13.0	A
Secchi (m)	2.5	1.4	4.0	B
TKN (mg/l)	0.81	0.76	0.90	
			Overall Grade	B

The lake's 2006 overall water quality grade is identical to those recorded in 1993-1994, 1997-2001 and 2004-2005 and better than the C's of 1995-1996 and 2002-2003 and the D recorded in 1985. No statistically significant long-term trend is evident from the lake's overall water quality database (including TP, CLA, and Secchi data), in the short-term however, it seems that the lake's overall water quality is well represented by a B/C grade

The physical and recreational conditions of the lake, as perceived by the volunteer(s), were ranked on a 1-to-5 scale. These rankings are shown in both table and graphic form 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 1.9 (roughly 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) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

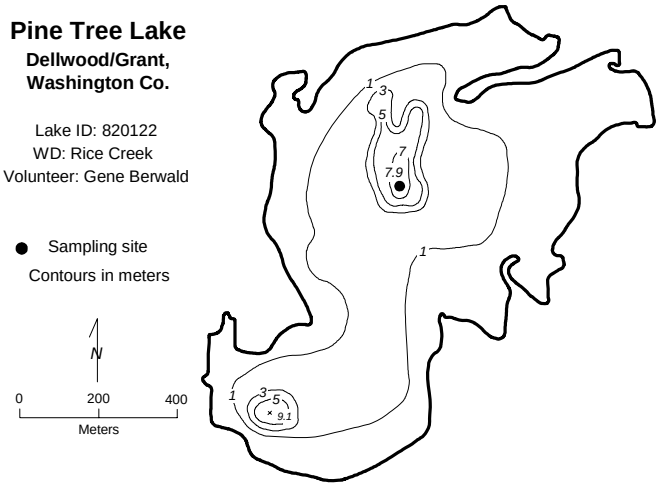
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

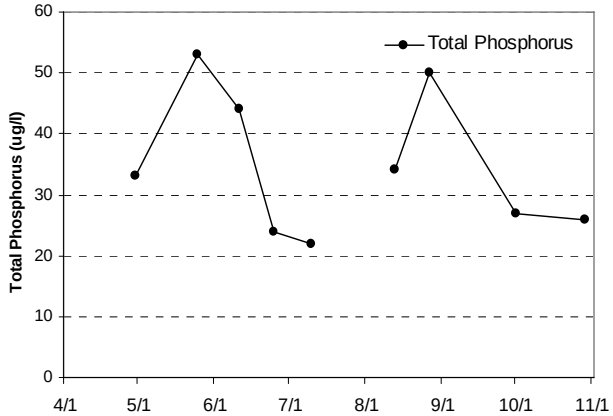
Pine Tree Lake

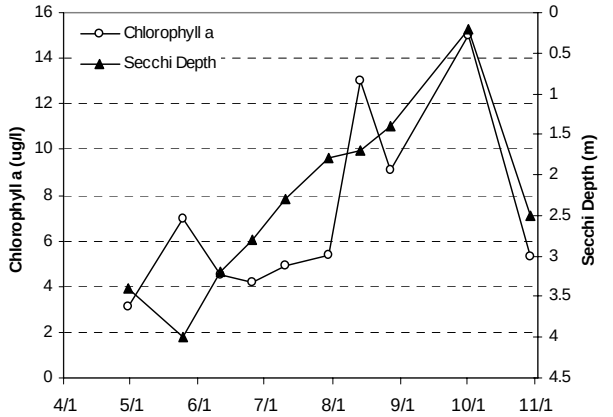
Dellwood/Grant, Washington Co.

Lake ID: 820122
WD: Rice Creek
Volunteer: Gene Berwald

● Sampling site
Contours in meters

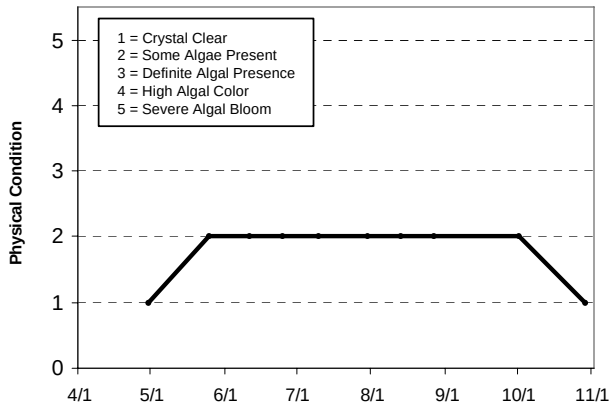






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/30/06	13.4				3.1	33		3.4	1	1
5/25/06	20.6				7	53		4	2	1
6/11/06	19.7				4.5	44		3.2	2	2
6/25/06	24.6				4.2	24		2.8	2	3
7/10/06	25.6				4.9	22		2.3	2	3
7/30/06	29.5				5.4			1.8	2	2
8/13/06	24.6				13	34		1.7	2	3
8/27/06	25.6				9.1	50		1.4	2	2
10/1/06	16.4				15	27		0.2	2	1
10/29/06	7.3				5.3	26		2.5	1	1

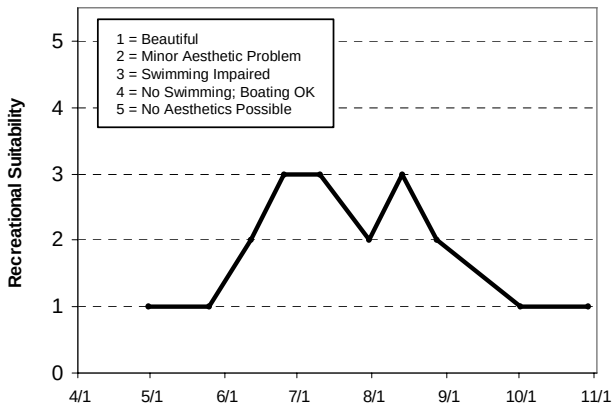


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus						C							
Chlorophyll a						D							
Secchi Depth						D							
Overall						**D**							

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus	B	B	C	C	B	B	B	C	C	C	C	B	B	C
Chlorophyll a	A	A	C	B	A	B	B	A	A	B	C	A	B	A
Secchi Depth	C	B	C	C	B	C	C	A	B	C	C	B	B	B
Overall	**B**	**B**	**C**	**C**	**B**	**B**	**B**	**B**	**B**	**C**	**C**	**B**	**B**	**B**

Source: Metropolitan Council and STORET data



Powers Lake (82-0092) *City of Woodbury*

Powers Lake, located within the City of Woodbury (Washington County), has a surface area of approximately 57 acres (a shoreline length of 1.75 miles), and maximum depth of 12.5 m (41.0 feet). Approximately 50 percent of the lake's surface area is considered littoral, the shallow (0-15 feet) area dominated by aquatic vegetation. There is a public (canoe only) access on the northwest end of the lake near one of its two inlets. The lake has no outlet. Eurasian Water Milfoil (*Myriophyllum spicatum*) [EWM] has been reported on the lake.

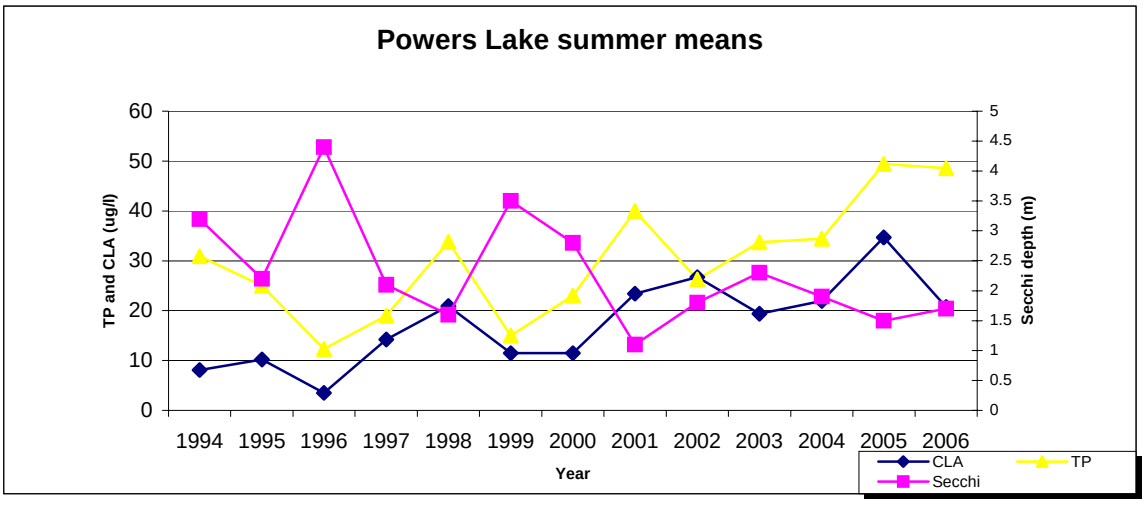
Currently, about 47 percent of the lake's 1,238-acre watershed is open/undeveloped land with the rest either residential or open water/wetlands. Eventually nearly 84 percent of the lake's watershed will be developed as single-family and multi-family residential units. The lake's watershed-to-lake size ratio is 22:1. The greater the ratio, the greater the potential stress on the lake from surface runoff.

Powers Lake has been involved in CAMP since 1994. Between mid-April and mid-October, 2006, the lake was monitored 14 times. Similar to past years, the lake was monitored on each sampling date for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	48.6	13.0	159.0	C
CLA (µg/l)	20.7	6.1	34.0	C
Secchi (m)	1.7	0.9	3.4	C
TKN (mg/l)	1.27	0.83	1.90	
			Overall Grade	C

The lake's water quality in 2006 continues to be inferior to those recorded in 1994-1997 and 1999-2000. The lake has received overall grades of an A in 1994, 1996, and 1999, B in 1995, 1997, 2000 and 2003, and C in 1998, 2001-2002 and 2004-2006.



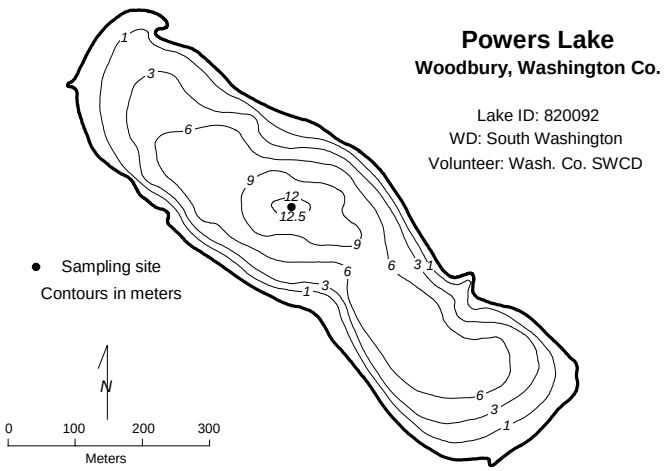
Because of the wide fluctuation in the available data, no "statistically significant" long-term trend was determined. In the short-term however, the lakes recent overall grades of C are worse than the A/B recorded in the 1990's. Additionally the earlier graph reveals that the lake has experienced an increase in

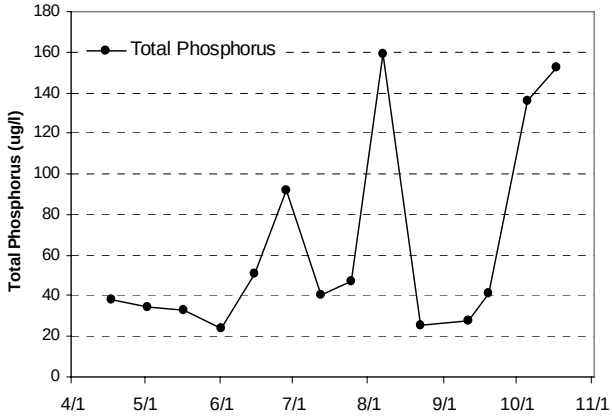
TP and CLA means over the past 10 years. More data are needed, however, to determine if this potential decrease in water quality falls within the lake's normal range or if the increased development around the lake has added to the lake's nutrient load resulting in an increase in algal abundance and reduced clarity. Continued monitoring is suggested.

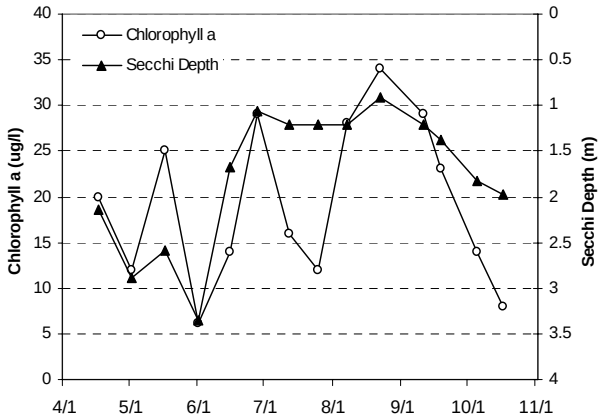
The physical and recreational conditions of the lake, as perceived by the volunteer, were ranked on a 1-to-5 scale and are displayed on the next page. The mean physical condition ranking was 3.1 (between 3- "definite algae present" and 4- "high algal color"), while the mean recreational suitability ranking 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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

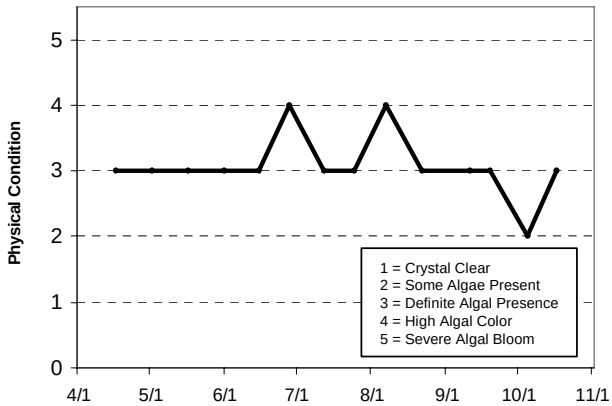






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/17/06	11.9	5	8.84	3.76	20	38		2.134	3	4
5/2/06	15.2	5.4	9.6	0.41	12	34		2.896	3	4
5/17/06	15.5	5.4	11.16	0.4	25	32.5	265	2.591	3	4
6/1/06	24.6	8.8	6.27	0.25	6.1	24	332	3.353	3	4
6/15/06	23.5	6	10.19	0.03	14	51		1.676	3	3
6/28/06	24	6.3	10.44	0.03	29	92	499	1.067	4	4
7/12/06	27.3	6.5	10.32	0.06	16	40		1.219	3	3
7/25/06	28.3	6.8	8.39	0.06	12	47	429	1.219	3	4
8/7/06	27.8	7.1	9.4	0.06	28	159		1.219	4	4
8/22/06	25.3	7	10.53	0.05	34	25.5	329	0.914	3	3
9/11/06	19.7	7.2	6.3	0.04	29	28		1.219	3	3
9/19/06	17.8	7.3	7.51	0.03	23	41	376	1.372	3	3
10/5/06	15.7	7.6	7.95	0.06	14	136		1.829	2	3
10/17/06	10.4	7.5	6.3	0.03	8	152	164	1.981	3	4

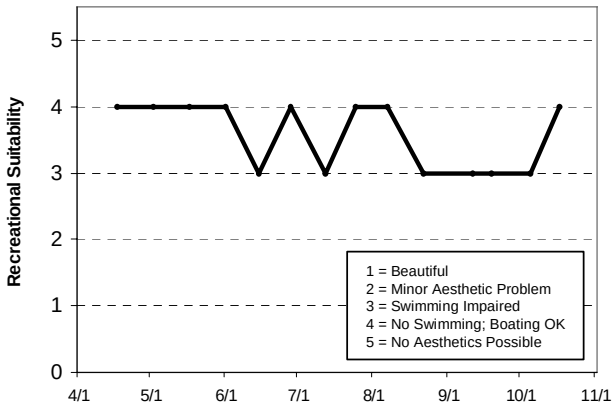


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus		B	B	A	A	C	A	B	C	B	C	C	C	C
Chlorophyll a		A	B	A	B	C	B	B	C	C	B	C	C	C
Secchi Depth		A	B	A	C	C	A	B	C	C	B	C	C	C
Overall		**A**	**B**	**A**	**B**	**C**	**A**	**B**	**C**	**C**	**B**	**C**	**C**	**C**

Source: Metropolitan Council and STORET data



Prior Lake [Lower Basin] [Site-1] (70-0026-01) *Prior Lake - Spring Lake Watershed District*

Prior Lake is divided into two distinct basins (the results of the 2006 monitoring on Prior Lake will be discussed as individual basins, Lower Prior and Upper Prior). Because of the lake's multi-recreational uses it is considered a "Priority Lake" in the Metropolitan Area.

The entire 1,167-acre lake is located within the City of Prior Lake (Scott County). The acreage of each basin is as follows: lower basin= 827 acres and upper basin= 340 acres. The maximum and mean depths of the lower basin are 18.3 and 4.1 m (60 and 13 feet), which along with the surface area, translate to a lower basin volume of approximately 11,120 ac-ft. Roughly 46 percent of the lake's surface area is considered littoral, (the shallow [0-15 feet] area dominated by aquatic plants). 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's public access is located at the southern end of the lake. The lower basin of Prior Lake has one inlet (that from the upper basin of Prior Lake), and one outlet. The outlet structure, located on the southwestern portion of the basin, is a man-made structure that was installed to regulate surface water elevations. Eurasian Water Milfoil (*Myriophyllum spicatum*) [EWM] has been reported on the lower basin of the lake.

In an attempt to address issues either contributing to the eutrophication of Prior Lake or the symptoms from the resulting eutrophication, the Prior Lake - Spring Lake Watershed District has recently completed a Sustainable Water Quality Management Plan for its lakes (including Spring and Prior lakes). The Plan sets goals addressing the lakes' biological and chemical make-up and developed implementation strategies enabling the lakes' goals to be met (PLSLWD 2004).

While the Metropolitan Council has monitored the lower and upper basins of Prior Lake in the past, both basins have been a part of CAMP since 1997.

Lower Prior was monitored 12 times from early-May to mid-October, 2006. On each sampling date the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	35.1	13.0	104.0	C
CLA (µg/l)	11.8	2.5	23.0	B
Secchi (m)	2.9	1.5	4.5	B
TKN (mg/l)	1.16	0.78	1.60	
			Overall Grade	B

The 2006 overall grade is similar to those recorded in 1996, 1998 and 2000-2004 and worse than the A's recorded in 1997, 1999 and 2005.

Throughout the monitoring period, the volunteers' opinion of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. The mean perceived physical condition of Lower Prior Lake was 2.2 (between 2- "some algae present" and 3- "definite algae present"), while the mean recreational suitability was 1.4 (between 1- "beautiful" and 2- "minor aesthetics problem").

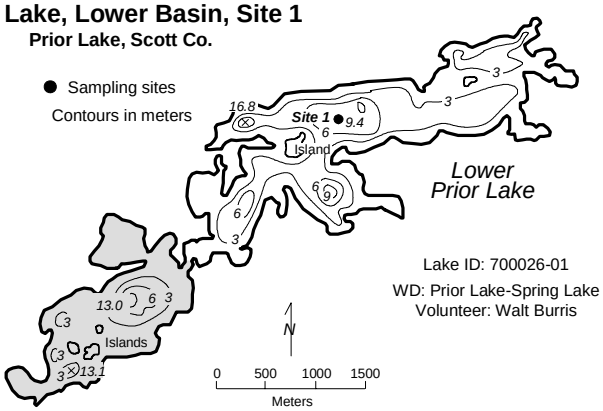
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries

Section by calling (651) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

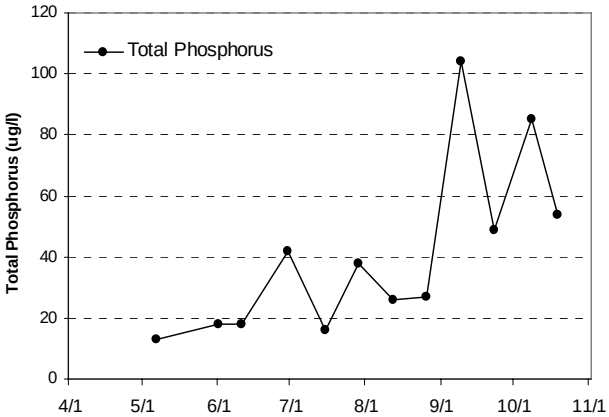
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

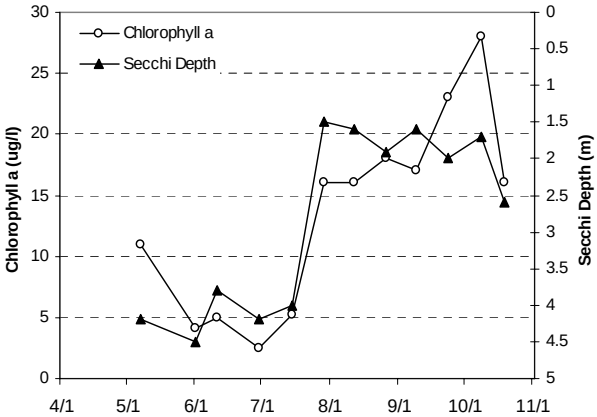
Prior Lake, Lower Basin, Site 1

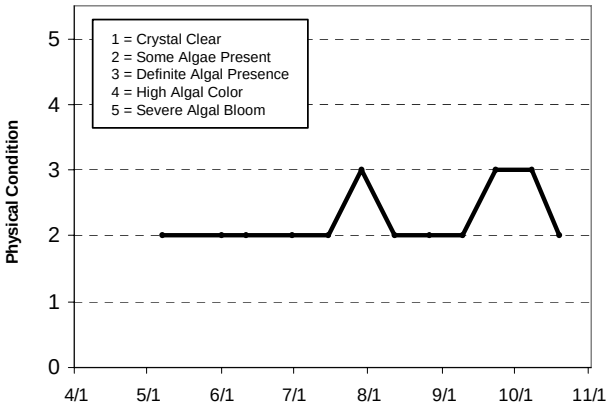
Prior Lake, Scott Co.

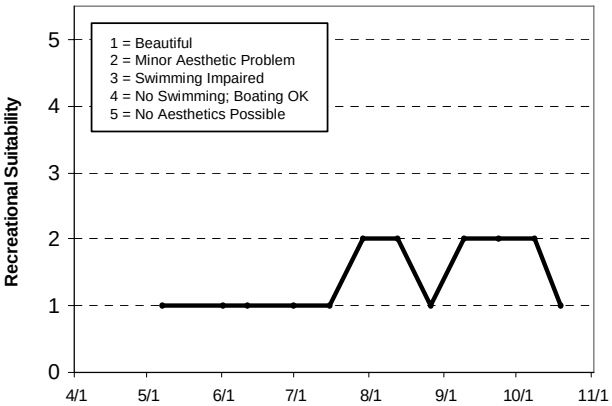


Lake ID: 700026-01
WD: Prior Lake-Spring Lake
Volunteer: Walt Burris









2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/7/06	14.6				11	13		4.2	2	1
6/1/06	25.2				4.1	18		4.5	2	1
6/11/06	22.2				5	18		3.8	2	1
6/30/06	26.4				2.5	42		4.2	2	1
7/15/06	27.4				5.2	16		4	2	1
7/29/06	29.6				16	38		1.5	3	2
8/12/06	27				16	26		1.6	2	2
8/26/06	23.5				18	27		1.9	2	1
9/9/06	23.2				17	104		1.6	2	2
9/23/06	17.1				23	49		2	3	2
10/8/06	16.1				28	85		1.7	3	2
10/19/06	10.2				16	54		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	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
Overall	**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
Overall				**B**	**A**	**B**	**C**	**A**	**C**	**B**	**B**	**B**	**C**

Year	2002 Site 1	2002 Site 2	2003 Site 1	2003 Site 2	2004 Site 1	2004 Site 2	2005 Site 1	2005 Site 2	2006 Site 1	2006 Site 2
Total Phosphorus	B	C	C		B		A		C	
Chlorophyll a	B	C	A		B		A		B	
Secchi Depth	B	C	A		B		A		B	
Overall	**B**	**C**	**B**		**B**		**A**		**B**	

Source: Metropolitan Council and STORET data

Prior Lake [Upper Basin] [Site-1] (70-0072-01) *Prior Lake - Spring Lake Watershed District*

The maximum and mean depths of the upper basin of Prior Lake are 15.2 and 3.1 m (50 and 10 feet), respectively. The resulting water volume of the 340-acre upper basin is 3,460 ac-ft. About 93 percent of the lake's surface area is considered littoral, (the shallow [0-15 feet] area dominated by aquatic plants). 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's public access is located at the northwestern end of the lake.

The upper basin of Prior Lake has two natural inlets, inflow from Spring Lake and the inlet from Rice and Crystal Lake drainage. Agriculturally derived non-point source nutrient loading released through the Spring Lake outlet heavily impacts water quality of the upper basin of Prior Lake.

The upper basin of Prior Lake was monitored nine times from late-April to late-September, 2006. Results are presented on graphs and data tables on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	70.8	25.0	108.0	D
CLA (µg/l)	62.9	9.4	110.0	D
Secchi (m)	1.2	0.6	2.5	C
TKN (mg/l)	1.30	0.73	1.70	
			Overall Grade	D

Historical data for the upper basin of Prior Lake indicate that the water quality of the basin has remained fairly constant over the past decade fluctuating between overall grades of C and D. Lake quality grades (see the lake's information sheet on the following page) show that when nutrient data were collected on the upper basin of Prior Lake, overall grades ranged from C in 1981, 1990, 1996-1997, 2003 and 2005, and a D in 1980, 1984, 1989, 1998-2002, 2004 and 2006.

As apparent by the historic lake water quality grades, the lower basin of Prior Lake has better water quality than the upper basin. The reason being that the upper basin actually acts as a sort of detention basin for the lower basin. That is, the majority of the water entering the lakes goes through the upper basin first, allowing the settlement of sediments and associated nutrients before it enters the lower basin of the lake. The result is better quality water entering the lower basin of Prior Lake than is entering the upper basin.

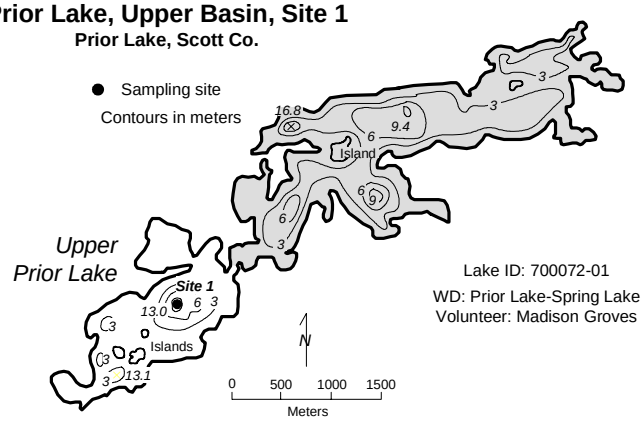
Throughout the monitoring period, the volunteers' opinion of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. The mean perceived physical condition of Upper Prior Lake was 3.3 (ranking between 3- "definite algae present" and 4- "high algal color"), while the mean recreational suitability 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) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

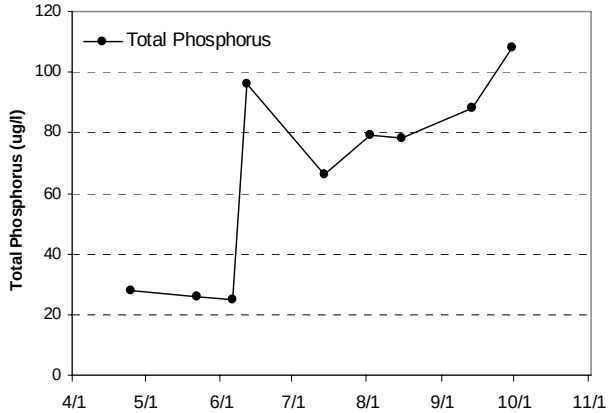
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

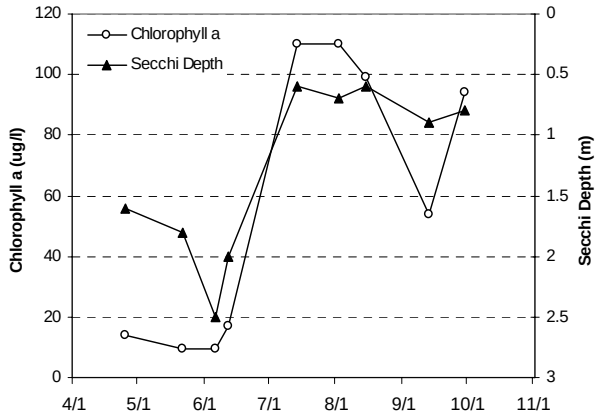
Prior Lake, Upper Basin, Site 1

Prior Lake, Scott Co.



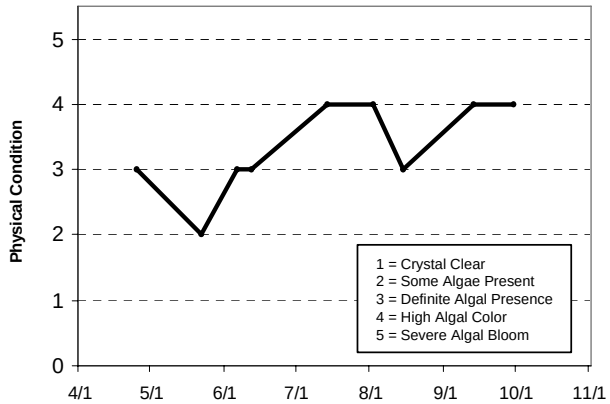
Lake ID: 700072-01
WD: Prior Lake-Spring Lake
Volunteer: Madison Groves





2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/25/06	14.3				14	28		1.6	3	3
5/22/06	17.9				9.7	26		1.8	2	1
6/6/06	24.4				9.4	25		2.5	3	3
6/12/06	21.3				17	96		2	3	3
7/14/06	26.5				110	66		0.6	4	3
8/2/06	27.8				110	79		0.7	4	3
8/15/06	26.3				99	78		0.6	3	3
9/13/06	19.5				54	88		0.9	4	3
9/30/06	15				94	108		0.8	4	3



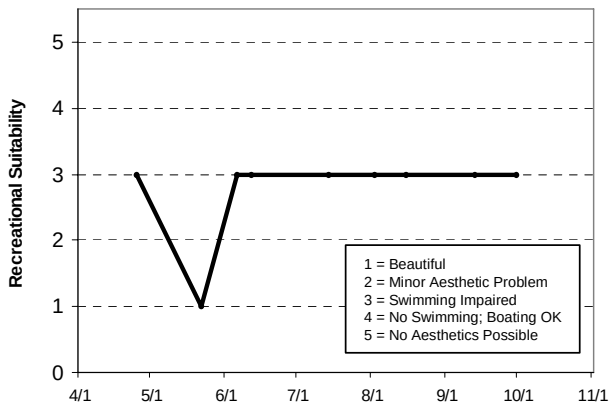
Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	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
Overall	**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	
Overall				**C**	**C**	**D**		**D**		**D**		**D**	

Year	2002 Site 1	2002 Site 2	2003 Site 1	2003 Site 2	2004 Site 1	2004 Site 2	2005 Site 1	2005 Site 2	2006 Site 1	2006 Site 2
Total Phosphorus	D	D	C		D		C		D	
Chlorophyll a	D	D	D		D		C		D	
Secchi Depth	D	D	C		D		C		C	
Overall	**D**	**D**	**C**		**D**		**C**		**D**	

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 (roughly 19 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 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). There is no formal boat access point on the lake.

This was the ninth year that Regional Park Lake has been involved in CAMP. Other than the 1998-2006 CAMP data, a search through the STORET nationwide water quality database for data on the lake came up empty. The lake was monitored seven times between mid-April and early-October, 2006. The resulting data and graphs appear on the next page. On each sampling date the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	102.2	39.0	150.0	D
CLA (µg/l)	25.6	1.9	40.0	C
Secchi (m)	1.9	0.9	3.2	C
TKN (mg/l)	1.29	0.84	1.50	
			Overall Grade	C

The lake's 2006 overall grade is identical to that recorded in 1999, and 2004-2005, and better than the D's of 1998 and 2000-2003.

No statistically significant long-term trend is evident from the lake's water quality database, in the short-term however, the lake's water quality seems well represented by an overall grade of D+/C. To better understand the lake's water quality and where 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 3.7 for recreational suitability (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) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

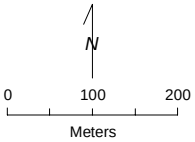
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

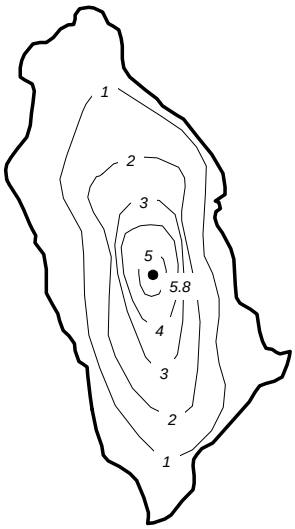
Regional Park Lake

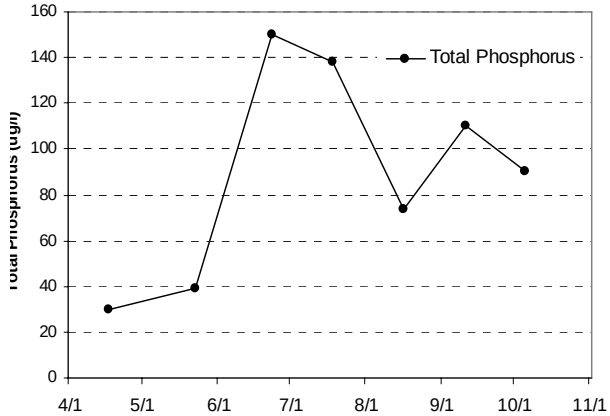
Cottage Grove, Washington Co.

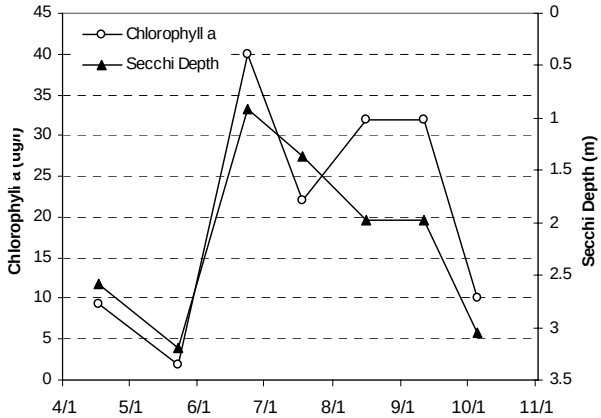
Lake ID: 820087
WD: South Washington
Volunteer: Wash. Co. SWCD

● Sampling site
Contours in meters



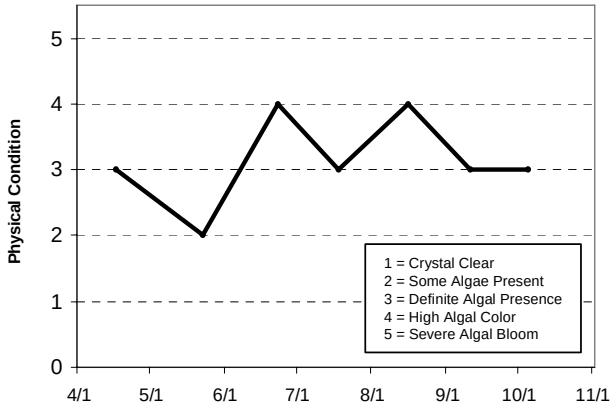






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/17/06	14.8	6.6	11.51	5.53	9.4	30		2.591	3	4
5/23/06	17.8	10.7	13.69	1.04	1.9	39		3.2	2	3
6/23/06	23.3	12.9	8.06	0.03	40	150		0.914	4	5
7/18/06	28.5	14.4	8.02	0.07	22	138		1.372	3	4
8/16/06	23.8	15	7.3	0.04	32	74		1.981	4	4
9/11/06	18	15.7	3.51	0.05	32	110		1.981	3	3
10/5/06	15.1	14.1	8.44	0.16	10	90		3.048	3	3

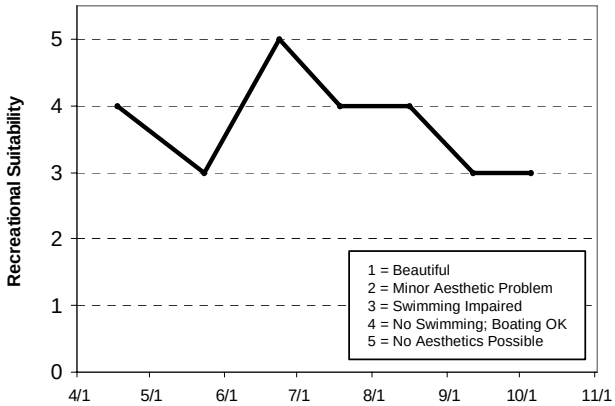


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus						F	C	D	D	D	D	C	C	D
Chlorophyll a						B	B	C	C	D	C	C	C	C
Secchi Depth						F	D	F	F	F	F	D	C	C
Overall						**D**	**C**	**D**	**D**	**D**	**D**	**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). A 1999 water quality report on water resources in Carver County estimates land use for the watershed at: two percent residential, 69 percent agricultural, one percent commercial/industrial, and 28 percent open/undeveloped (Carver County Planning 1999).

This was the eighth year that Reitz Lake has been involved in 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 only three years of data (1985, 1991 and 1993) prior to the 1999-2005 CAMP data.

The lake was monitored 14 times between mid-April and mid-October, 2004. On each outing, the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. Lake samples were also analyzed for additional parameters as part of a Total Maximum Daily Load (TMDL) study on the lake.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	136.0	41.0	346.0	D
CLA (µg/l)	21.1	1.0	43.0	C
Secchi (m)	1.9	0.9	3.8	C
TKN (mg/l)	1.84	1.30	4.00	
			Overall Grade	C

The 2006 overall grade is similar to those recorded in 1999-2000 and 2002-2005, and better than the D's of 1985, 1991, 1993, and 2001.

No statistically significant long-term trend is evident from the lake's water quality database, in the short-term however, in the short-term however, the lake's water quality seems to be well represented by an overall grade of D/low-C. In order to detect any possible long-term trends, 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 2.6 for physical condition (between 2- "some algae present and 3- "definite algae present"), and 2.4 for recreational suitability (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

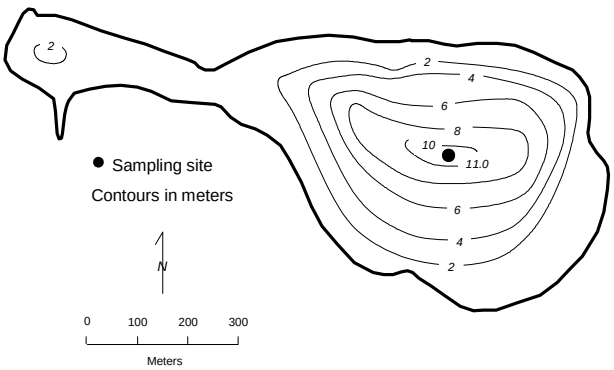
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

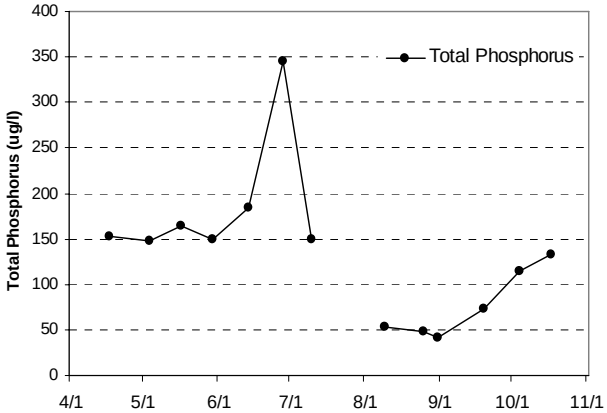
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

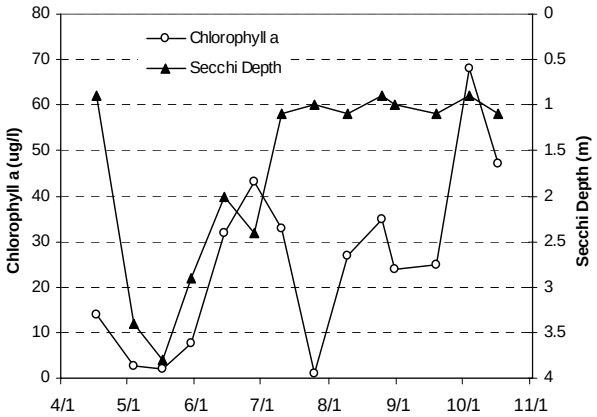
Reitz Lake

Laketown Twp.,Carver Co.

Lake ID: 100052
WMO: Carver County
Volunteer: Carver Co. Env. Services

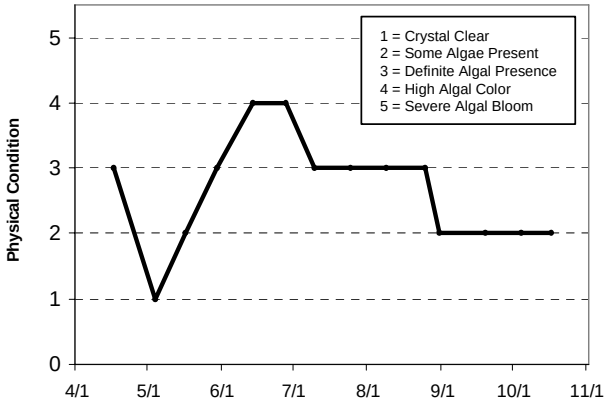






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/17/06	12.68		9.91		14	152		0.9	3	2
5/4/06	13.31		9.27		2.5	148		3.4	1	1
5/17/06	15.65		9.4		1.9	164		3.8	2	2
5/30/06	24.85		10.46		7.7	149		2.9	3	2
6/14/06	22.62		9.31		32	185		2	4	4
6/28/06	24.91		13.42		43	346		2.4	4	3
7/10/06	25.91		12.31		33	150		1.1	3	3
7/25/06	29.31		11.58		1			1	3	3
8/9/06	26.48		7.87		27	53		1.1	3	3
8/25/06	23.32		7.51		35	48		0.9	3	3
8/31/06	23.34		8.65		24	41		1	2	2
9/19/06	16.71		8.75		25	73		1.1	2	2
10/4/06	16.7		12.4		68	114		0.9	2	2
10/17/06	9.41		7.76		47	133		1.1	2	2

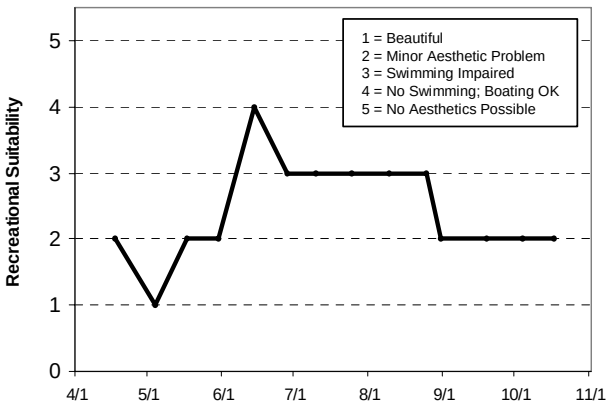


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus						D						D	
Chlorophyll a						F						D	
Secchi Depth						D						C	
Overall						**D**						**D**	

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus	D						C	C	D	D	D	D	D	D
Chlorophyll a	C						B	C	D	C	D	C	C	C
Secchi Depth	D						C	C	F	C	B	C	C	C
Overall	**D**						**C**	**C**	**D**	**C**	**C**	**C**	**C**	**C**

Source: Metropolitan Council and STORET data



Reshanau Lake (02-0009) *Rice Creek Watershed District*

This was the fourth year that Reshanau Lake, which is located in the City of Lino Lakes (Anoka County), was monitored as part of CAMP (although it was only monitored once in 2000). As part of the volunteer monitoring program the lake was sampled 14 times from mid-April to mid-November, 2006. 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. 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).

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	107.6	83.0	186.0	D
CLA (µg/l)	37.8	3.6	69.0	C
Secchi (m)	0.6	0.3	1.2	F
TKN (mg/l)	2.35	1.80	3.10	
			Overall Grade	D

The overall water quality grade in 2006 was a D. While there is a fair amount of historical data available for the lake (1980-1983, 1985, 1987-1991, 1999, and 2000), each years' data (other than 1999 and 2006) consists of only one or two monitoring events. Because of the sporadic and limited nature of the database no long-term trends can be determined. In the short-term, however, the lake's water quality over the past 20+ years seems well represented by a high-D/low-C grade. In order to detect any possible long-term trends, additional years of data collection are needed.

Throughout the course of the monitoring season the volunteers 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 2.3 (between 2- "some algae present" and 3- "definite algae present"). The mean suitability for recreation 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) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

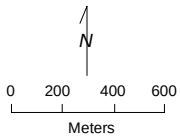
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

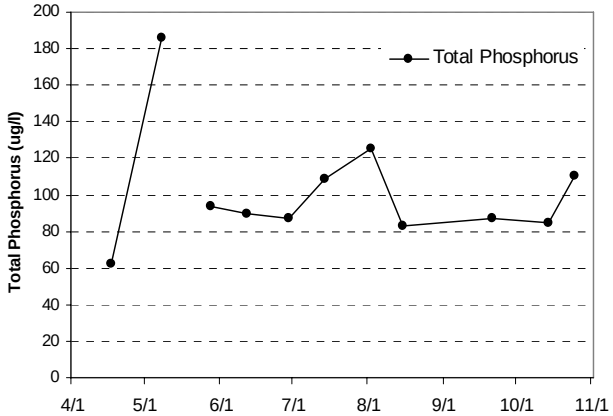
Reshanau Lake

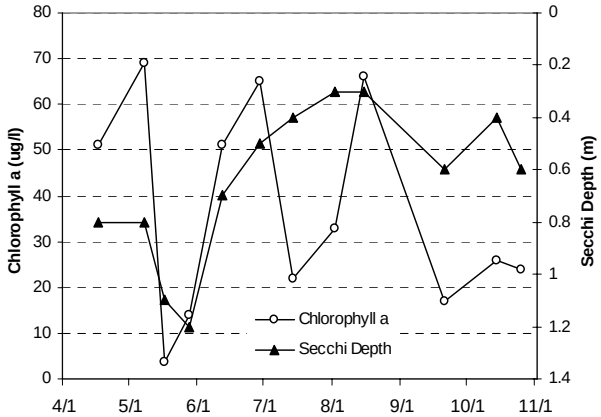
Lino Lakes, Anoka Co.

Lake ID: 20009
WD: Rice Creek
Volunteer: The Fossey Family

● Sampling site
Contours in meters

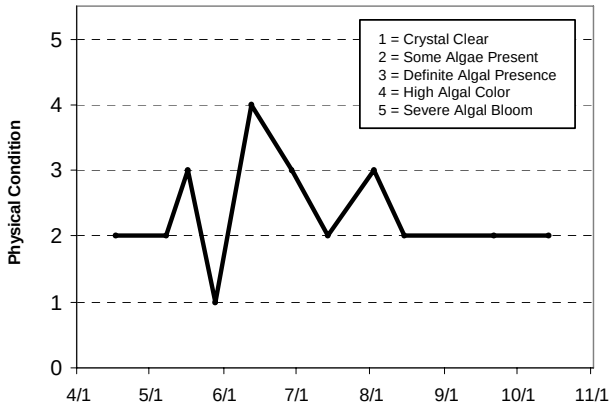






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/17/06	15.4				51	62		0.8	2	2
5/8/06	15.9				69	186		0.8	2	3
5/17/06	17.2				3.6			1.1	3	2
5/28/06	25.6				14	94		1.2	1	1
6/12/06	26.2				51	90		0.7	4	2
6/29/06	26				65	87		0.5	3	1
7/14/06	28.8				22	109		0.4	2	1
8/2/06	30.3				33	125		0.3	3	1
8/15/06	29.2				66	83		0.3	2	2
9/21/06	14.7				17	87		0.6	2	2
10/14/06	6.7				26	85		0.4	2	1
10/25/06	6.9				24	110		0.6		
11/13/06	4.1				11	148		0.8	2	1

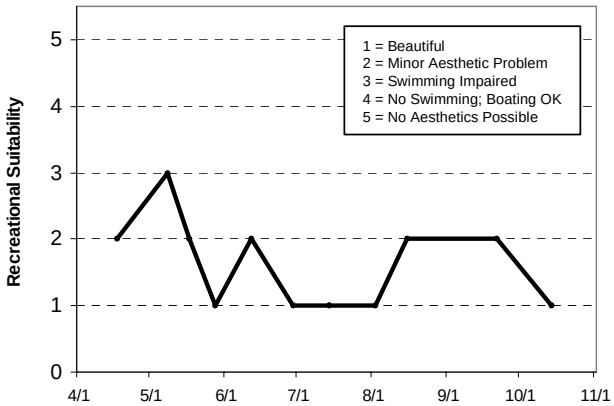


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus														D
Chlorophyll a														C
Secchi Depth														F
Overall														**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 lake.

The lake's surface area and watershed size (17,781 acres) translates to a 157:1 watershed-to-lake size ratio. Generally the larger the ratio, the greater the potential stress on the lake from surface runoff.

This was the first year that Rest Area Pond has been involved in CAMP. A search through the STORET nationwide water quality database for historic data on the lake came up empty. Therefore, the 2006 CAMP data are the only nutrient data available. 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 lake was monitored 13 times between mid-April and early-October, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	141.0	47.0	377.0	D
CLA (µg/l)	58.0	5.0	150.0	D
Secchi (m)	1.2	0.4	2.8	D
TKN (mg/l)	1.96	0.94	2.90	
			Overall Grade	D

As mentioned earlier, there are no nutrient data available for Rest Area Pond other than the 2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

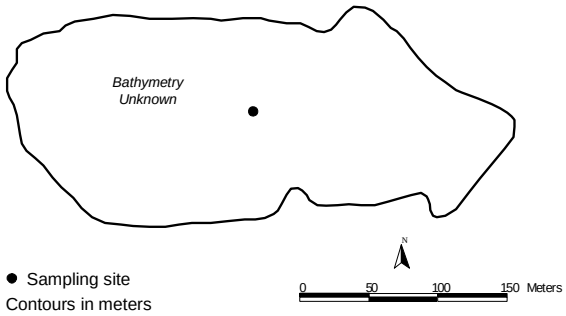
The perceived physical and recreational conditions (ranked on a 1-to-5 scale) are shown on the lake's information sheet on the next page. The average user perception rankings were 2.0 for physical condition (2- "some algae present"), and 4.0 for recreational suitability (4- "no swimming – boating ok").

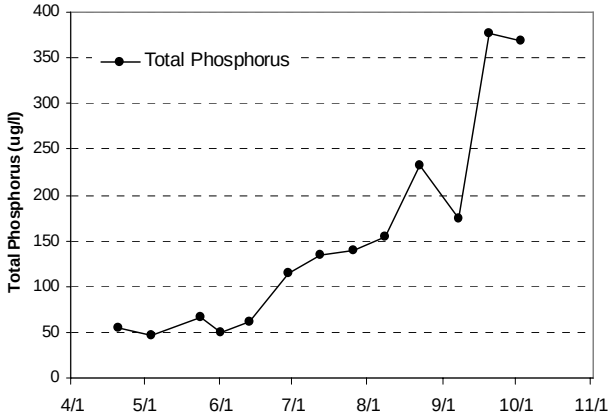
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

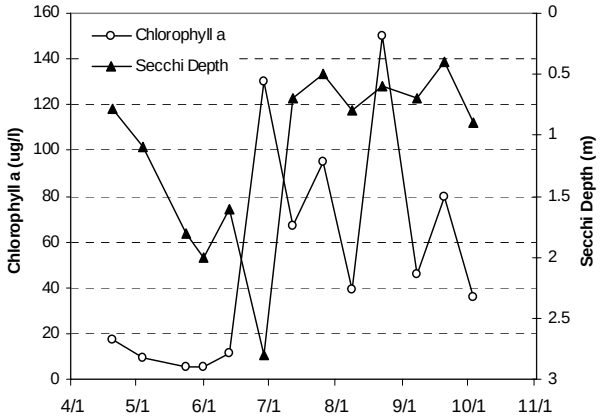
Rest Area Pond

West Lakeland Twp., Washington Co.

Lake ID: 82xxxx
WD: Valley Branch
Volunteer: MnDOT

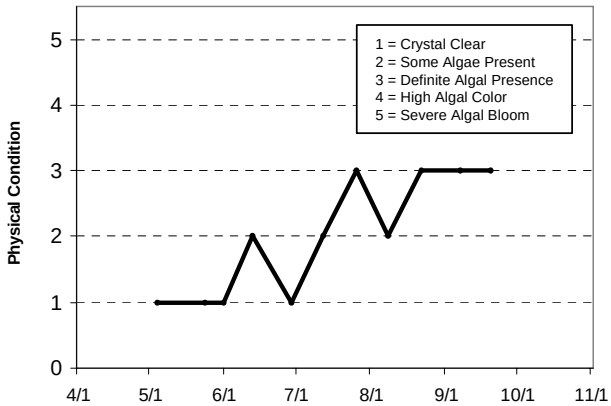






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/20/06	15.1				17	55		0.78		4
5/4/06	14.6				9.2	47		1.1	1	4
5/24/06	20.1				5.2	66		1.8	1	4
6/1/06	25.1				5	50		2	1	4
6/13/06	21.4				11	61		1.6	2	4
6/29/06	25.4				130	115		2.8	1	4
7/12/06	27.3				67	134		0.7	2	4
7/26/06	27.1				95	140		0.5	3	4
8/8/06	26.1				39	154		0.8	2	4
8/22/06	27.5				150	233		0.6	3	4
9/7/06	23.8				46	174		0.7	3	4
9/20/06	16.7				80	377		0.4	3	4
10/3/06	16.5				36	368		0.9		

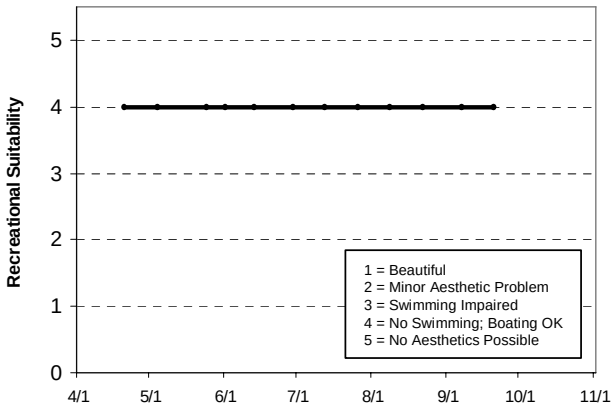


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus														D
Chlorophyll a														D
Secchi Depth														D
Overall														**D**

Source: Metropolitan Council and STORET data



Riley Lake (10-0002) *City of Chanhassen*

While Riley Lake has previously been monitored by Council staff, 2006 marks the fourth year the lake has been monitored through CAMP. Riley Lake, with a surface area of 297 acres (2.9 miles in circumference), is located with the cities of Chanhassen and Eden Prairie (Carver and Hennepin counties). The maximum and mean depths of the lake are 15.0 and 6.6 m (49 and 21.6 feet), respectively. Roughly 34 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 approximate volume of the lake is 6,429 ac-ft.

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). Public access is possible on the southeastern end of the lake. The lake is considered a "Priority Lake" by the Metropolitan Council" because of its multi-recreational uses. Eurasian Water Milfoil (*Myriophyllum spicatum*) [EWM] has been reported on the lake.

In 2006, Riley Lake was monitored 10 times from early-May to mid-October. On each outing, the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	***Mean***	***Minimum***	***Maximum***	***Grade***
TP (µg/l)	57.4	20.0	114.0	C
CLA (µg/l)	13.4	3.2	28.0	B
Secchi (m)	2.4	1.1	6.0	B
TKN (mg/l)	1.20	0.77	1.80	
			Overall Grade	B

The lake's 2006 overall grade of B is better that the past years of monitoring. The overall grades for all of the other years of recorded data were a C.

The lake's average user perception rankings for 2006, on a 1-to-5 scale, were 3.6 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").

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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Lake Riley

Eden Prairie, Hennepin Co./ Chanhassen, Carver Co.

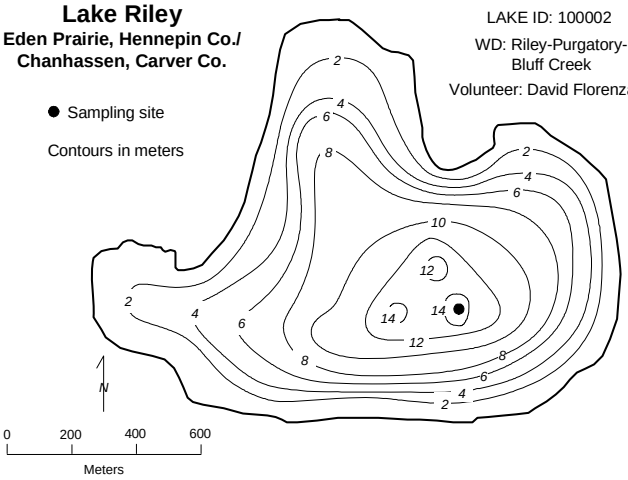
LAKE ID: 100002

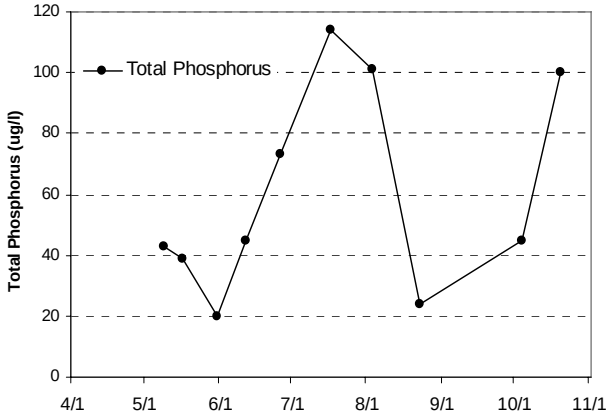
WD: Riley-Purgatory-Bluff Creek

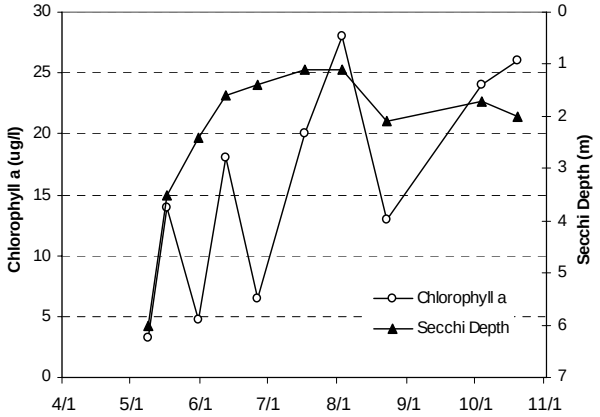
Volunteer: David Florenzano

● Sampling site

Contours in meters

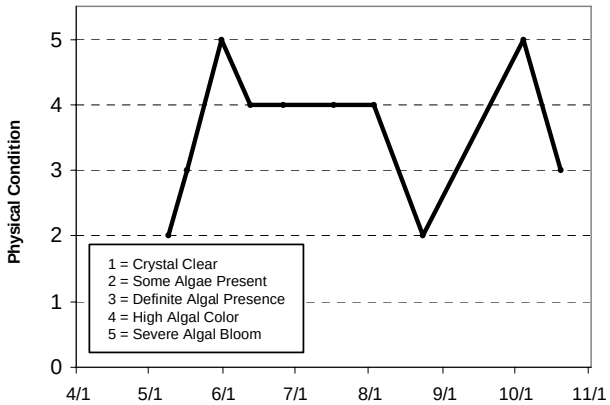






2006 Data

Date	Surf. Tmp C	Bot. Tmp C	Surf. DO mg/L	Bot. DO mg/L	CLA ug/L	Surf. TP ug/L	Bot. TP ug/L	Secchi M	PC 1 thru 5	RS 1 thru 5
5/9/06	13.6				3.2	43		6	2	1
5/17/06	14.7				14	39		3.5	3	2
5/31/06	25.6				4.7	20		2.4	5	3
6/12/06	20.4				18	45		1.6	4	3
6/26/06	24.3				6.5	73		1.4	4	3
7/17/06	27.6				20	114		1.1	4	3
8/3/06	27.5				28	101		1.1	4	3
8/23/06	24.9				13	24		2.1	2	2
10/4/06	15.9				24	45		1.7	5	2
10/20/06	9.5				26	100		2	3	3

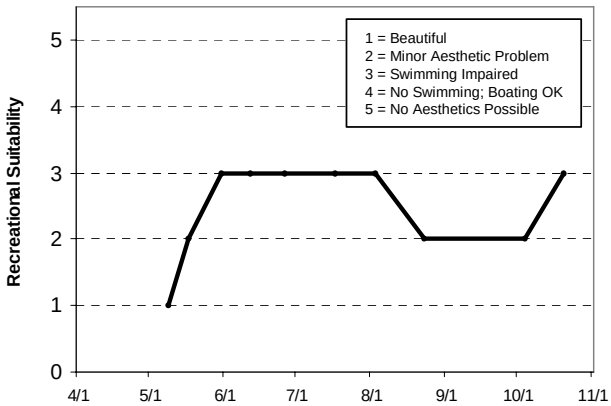


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus	C	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	
Overall	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**				**C**	

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus	C				C			C		C	C	C	C	C
Chlorophyll a	C				C			C		C	D	C	C	B
Secchi Depth	C				C			C		C	C	B	C	B
Overall	**C**				**C**			**C**		**C**	**C**	**C**	**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.

This was the first year that Rose Lake has been involved in CAMP. A search through the STORET nationwide water quality database for data on the lake provided no data; therefore 2006 is the only year of available water quality data for the lake.

As part of the city's involvement in CAMP in 2006, the lake was monitored 14 times between mid-April and late-October. During each sampling event the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability

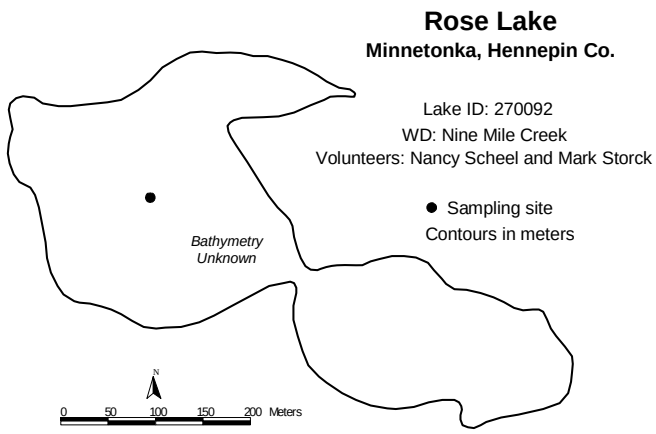
2006 summer (May-September) data summary

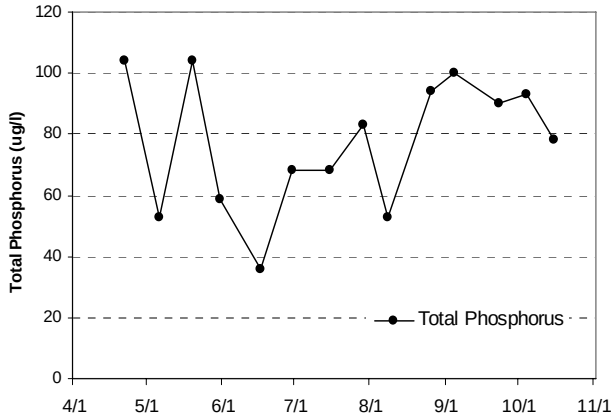
Parameter	***Mean***	***Minimum***	***Maximum***	***Grade***
TP (µg/l)	73.4	36.0	104.0	D
CLA (µg/l)	25.0	6.4	56.0	C
Secchi (m)	1.0	0.7	1.6	D
TKN (mg/l)	1.27	0.79	1.80	
			Overall Grade	D

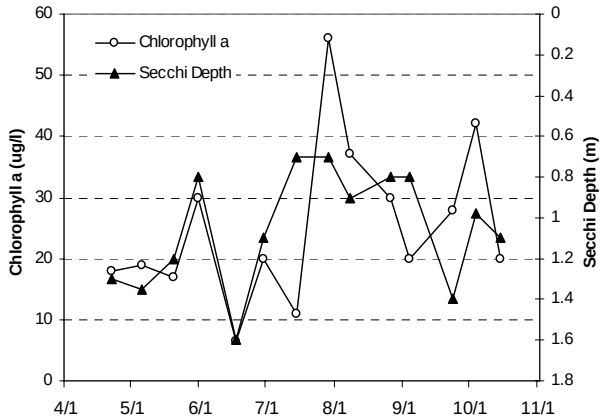
As mentioned earlier, there are no nutrient data available for Rose Lake other than the 2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

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 2.9 for physical condition (roughly 3- "definite algae present"), and 3.6 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

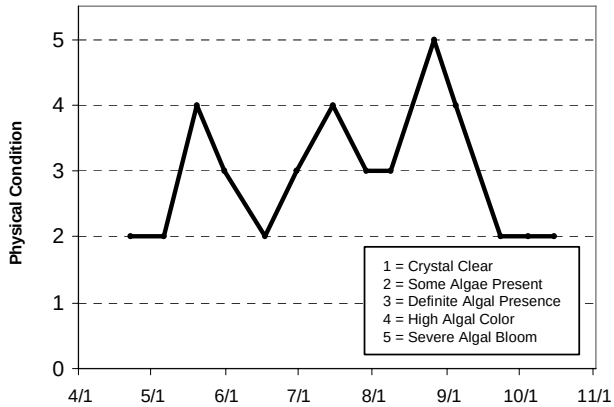






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/22/06	16.3				18	104		1.3	2	1
5/6/06	13.8				19	53		1.35	2	2
5/20/06	18.8				17	104		1.2	4	4
5/31/06	26.5				30	59		0.8	3	4
6/17/06	23.2				6.4	36		1.6	2	4
6/30/06	23.2				20	68		1.1	3	4
7/15/06	26.9				11	68		0.7	4	4
7/29/06	26.1				56	83		0.7	3	
8/8/06	23.2				37	53		0.9	3	4
8/26/06	20.9				30	94		0.8	5	
9/4/06	19.7				20	100		0.8	4	5
9/23/06	12.6				28	90		1.4	2	4
10/4/06	16.9				42	93		0.98	2	
10/15/06	6.4				20	78		1.1	2	4

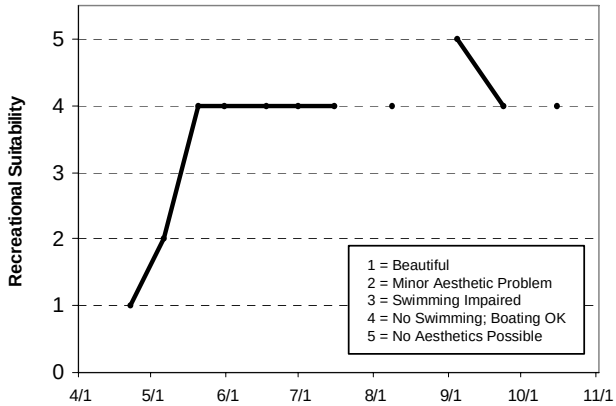


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus														D
Chlorophyll a														C
Secchi Depth														D
Overall														**D**

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 second year that Rutz Lake has been involved in CAMP (2000 being the other). The two years of CAMP data are the only known water quality data available for the lake.

The lake was monitored 14 times from mid-April to mid-October, 2006. Results are presented in both graphs and data tables on the lake's information sheet on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	208.1	80.0	381.0	F
CLA (µg/l)	76.0	31.0	140.0	D
Secchi (m)	0.8	0.2	2.5	D
TKN (mg/l)	2.93	1.60	4.80	
			Overall Grade	D

These grades result in an overall water quality grade of D for Rutz Lake in 2006 (identical to that recorded for 2000).

As mentioned earlier, there is no water quality data available for Rutz Lake other then the 2000 and 2006 CAMP data. Therefore it is impossible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, more data are needed.

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 (roughly 3- "definite algal presence"), and 3.1 for recreational suitability (roughly 3- "swimming impaired").

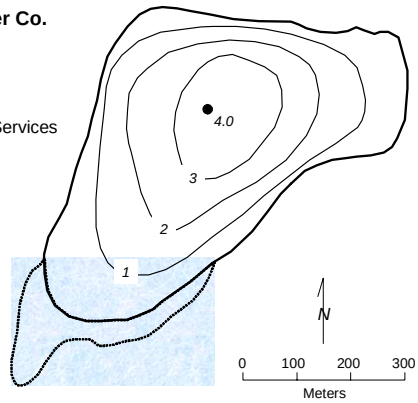
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

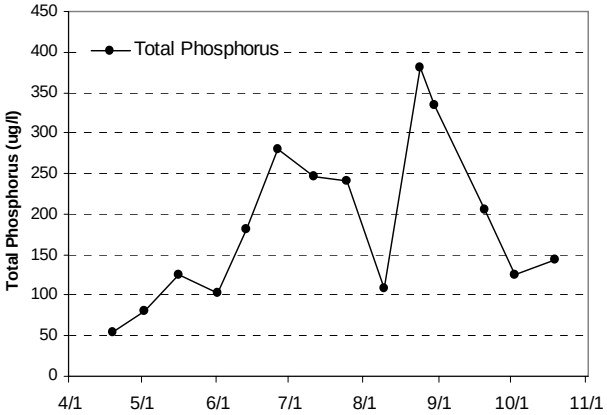
Rutz Lake

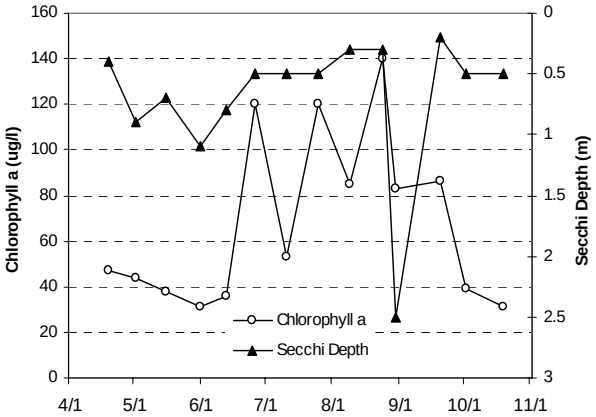
Waconia Twp., Carver Co.

Lake ID: 100080
WMO: Carver County
Volunteer: Carver Co. Env. Services

● Sampling site
Contours in meters

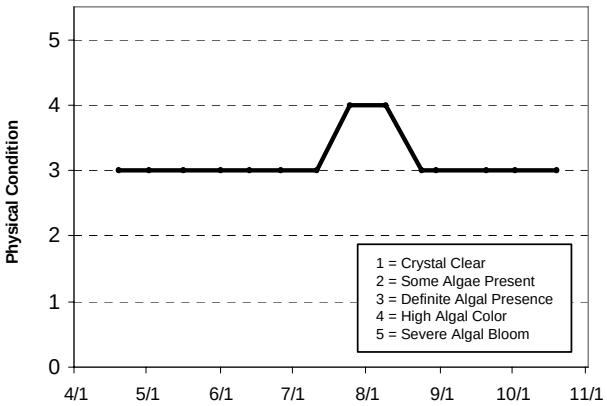






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/19/06	14.71		10.97		47	55		0.4	3	3
5/2/06	14.28		10.83		44	80		0.9	3	3
5/16/06	13.78		11.65		38	126		0.7	3	3
6/1/06	24.04		7.57		31	103		1.1	3	3
6/13/06	21.64		10.02		36	182		0.8	3	3
6/26/06	24.05		8.25		120	281		0.5	3	3
7/11/06	26.19		5.02		53	247		0.5	3	3
7/25/06	27.78		17.55		120	241		0.5	4	4
8/9/06	25.98		7.48		85	108		0.3	4	3
8/24/06	22.29		7.11		140	381		0.3	3	3
8/30/06	23.92		7.64		83	334		2.5	3	3
9/20/06	14.42		9.53		86	206		0.2	3	3
10/2/06	15.89		10.85		39	126		0.5	3	3
10/19/06	6.91		9.84		31	144		0.5	3	3

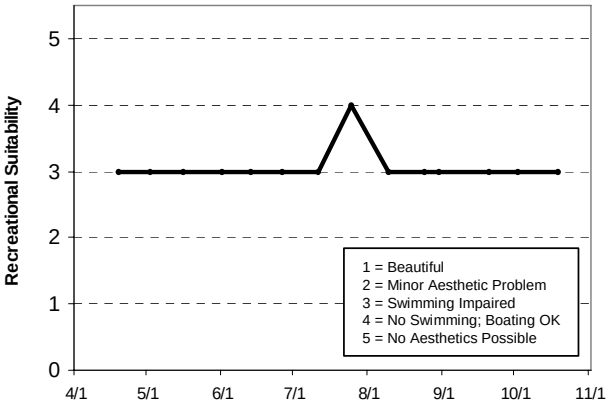


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus								F						F
Chlorophyll a								C						D
Secchi Depth								D						D
Overall								**D**						**D**

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.

This was the ninth year that Sand Lake has been involved in CAMP (the lake was previously enrolled in 1993-1996 and 2002-2005). The 1993-1996 and 2002-2005 CAMP data were the only historic water quality data found for the lake. In 2006, the lake was monitored seven times from late-April to early-October. During each event, the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. Results are presented in both graphs and data tables on the lake's information sheet on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	51.0	37.0	62.0	C
CLA (µg/l)	12.5	2.40	17.0	B
Secchi (m)	2.0	1.4	3.2	C
TKN (mg/l)	1.10	0.98	1.30	
			Overall Grade	C

The lake's 2006 overall grade is identical to those recorded in 1993-1996, 2002-2003 and 2005 and worse than the B recorded in 2004. While 2004 represents the lakes best-recorded water quality year, 1993 represents the worst (as determined by the individual parameter means).

The perceived conditions of the lake (both physical and recreational) were ranked on a 1-to-5 scale by the volunteer monitors. These user perception rankings are shown on the lake's information sheet. The mean physical condition ranking was 2.1 (between 2- "some algae present" and 3- "definite algae present"), while the mean recreational suitability ranking was 2.3 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

The Sand Lake water quality database consists of nine years of CAMP monitoring information for 1993-1996, and 2002-2006. Statistical analysis of the lake's water quality database failed to produce any statistically significant long-term trends. To better understand the lake's current water quality condition, and which direction it may be heading, continued monitoring is suggested. In the short-term, however, the lake's quality seems best described by a grade of C.

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/.

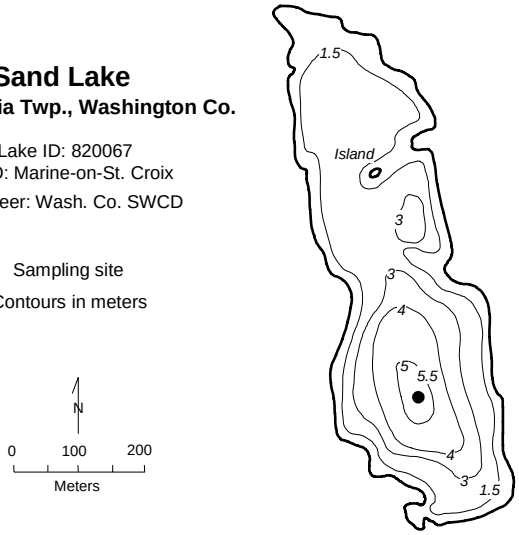
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

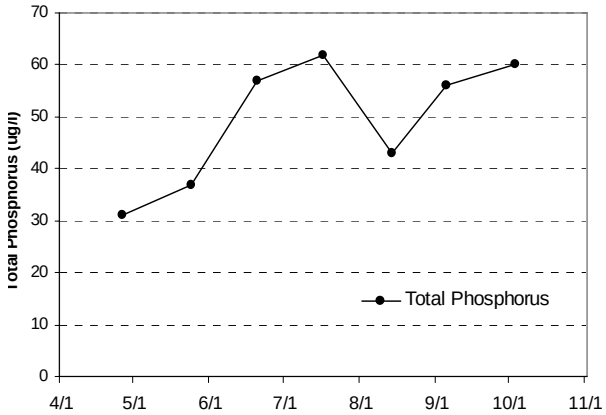
Sand Lake

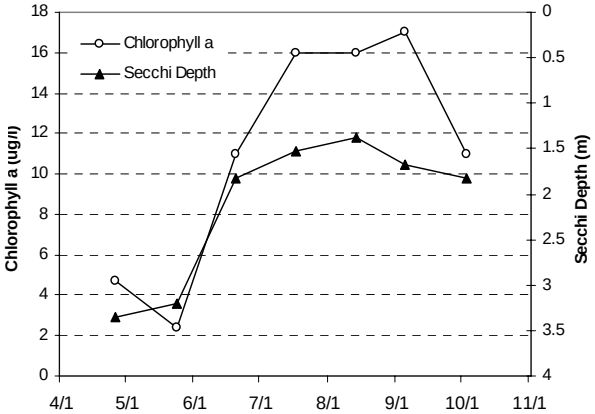
New Scandia Twp., Washington Co.

Lake ID: 820067
WMO: Marine-on-St. Croix
Volunteer: Wash. Co. SWCD

● Sampling site
Contours in meters

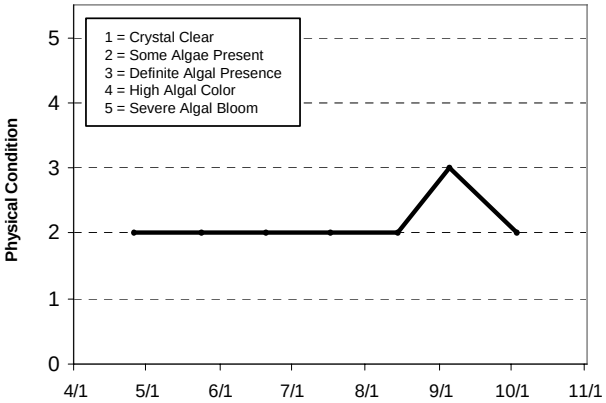






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/26/06	15.3	7.7	6.44	0.87	4.7	31		3.353	2	2
5/24/06	20.1	14.8	6.61	0.22	2.4	37		3.2	2	2
6/20/06	23.9	15.1	23.9	0.09	11	57		1.829	2	2
7/17/06	28.1	16.7	8.3	0.11	16	62		1.524	2	3
8/14/06	24.8		6.94		16	43		1.372	2	2
9/5/06	23.5	20.2	10.14	0.1	17	56		1.676	3	3
10/3/06	16.4	14.8	9.42	0.1	11	60		1.829	2	2

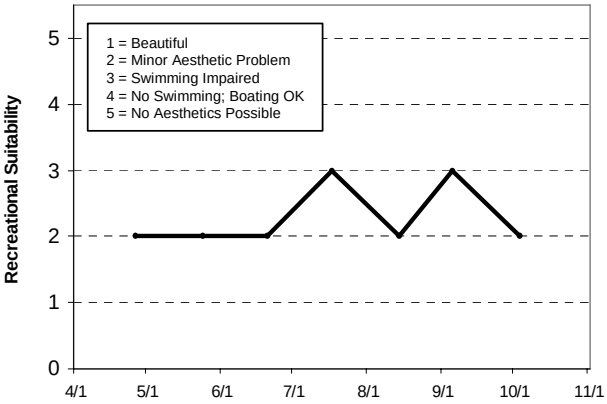


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus	C	C	C	C						C	C	B	C	C
Chlorophyll a	C	C	B	C						B	C	B	C	B
Secchi Depth	D	D	C	C						C	C	C	C	C
Overall	**C**	**C**	**C**	**C**						**C**	**C**	**B**	**C**	**C**

Source: Metropolitan Council and STORET data



School Lake (13-0057) *Comfort Lake-Forest Lake Watershed District*

School Lake is a 48-acre lake located near Chisago City (Chisago County). There is very little known morphological data available for the lake.

This marks the second year in which School Lake has been involved in CAMP (2005 being the first). A search through the STORET nationwide water quality database for historic data on the lake revealed only the 2005 CAMP data. Therefore, 2005-2006 are the only known years of available data. 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 lake was monitored seven times between early-May and mid-October, 2006. The resulting data and graphs appear on the next page.

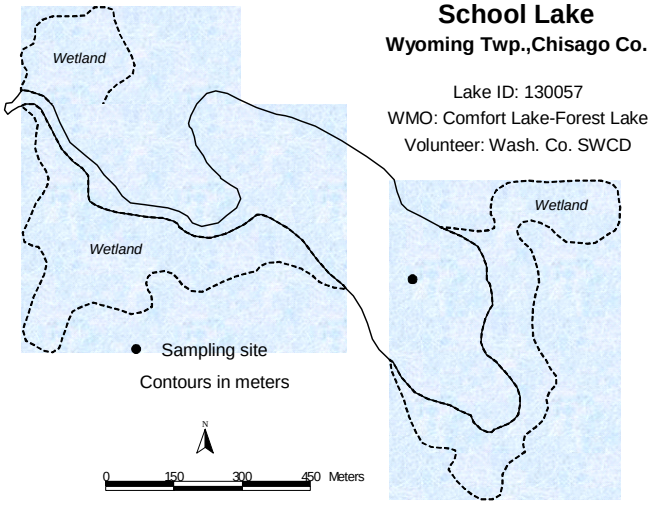
2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	69.2	37.0	124.0	D
CLA (µg/l)	27.8	14.0	42.0	C
Secchi (m)	1.3	0.9	1.8	C
TKN (mg/l)	1.33	1.00	1.60	
			Overall Grade	C

As mentioned earlier, there are no water quality data available for School Lake other than the 2005-2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. 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 2.4 for physical condition (between 2- "some algae present" and 3- "definite algae present"), and 2.6 for recreational suitability (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

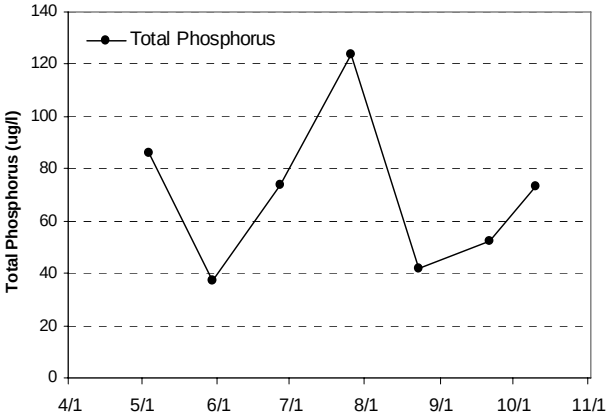
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

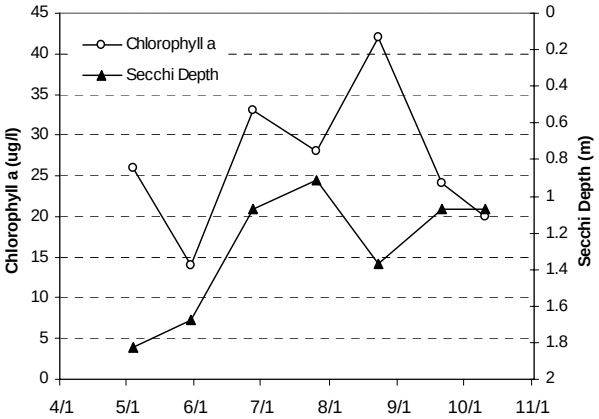


School Lake

Wyoming Twp.,Chisago Co.

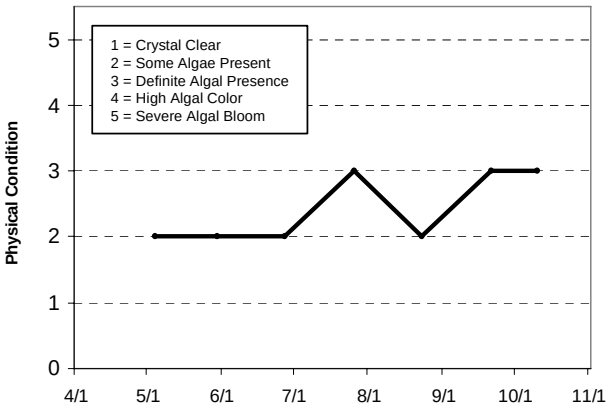
Lake ID: 130057
WMO: Comfort Lake-Forest Lake
Volunteer: Wash. Co. SWCD





2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/4/06	14.5	7	8.8	0.4	26	86		1.829	2	2
5/30/06	26.4	12.3	6.44	0.12	14	37		1.676	2	2
6/27/06	23.7	10.1	9.57	0.04	33	74		1.067	2	2
7/26/06	27.8	10.6	10.2	0.06	28	124		0.914	3	3
8/23/06	23.1	10.8	7.14	0.04	42	42		1.372	2	3
9/21/06	15.9	11.5	5.37	0.05	24	52		1.067	3	3
10/10/06	13.7	12.9	6.76	0.08	20	73		1.067	3	3

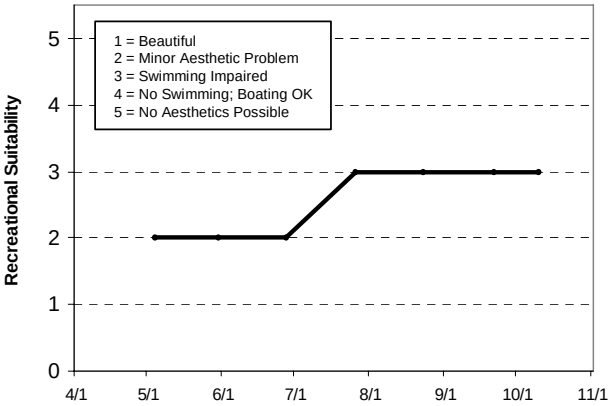


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus													C	D
Chlorophyll a													C	C
Secchi Depth													C	C
Overall													**C**	**C**

Source: Metropolitan Council and STORET data



Schroeder's Pond (82-0301) *Carnelian - Marine Watershed District*

Schroeder's Pond is a small land-locked lake located within May Township (Washington County). The maximum depth of the lake is 3.0 m (roughly 10 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 third year that Schroeder's Pond has been involved in CAMP. On each of the sampling days the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The lake was monitored seven times between mid-May and mid-October, 2006.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	91.7	45.0	140.0	D
CLA (µg/l)	15.2	4.6	33.0	B
Secchi (m)	1.6	1.4	2.0	C
TKN (mg/l)	1.00	0.74	1.30	
			Overall Grade	C

Other than for the 2004-2006 CAMP data, there are no known water quality data available for Schroeder's Pond. Therefore it is not possible to determine any long-term or short-term trends. The lake's water quality in 2006 was better than that recorded in 2005 (overall grade of D) and worse than that recorded in 2004 (overall grade of B). 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 3.0 for recreational suitability (3- "swimming impaired").

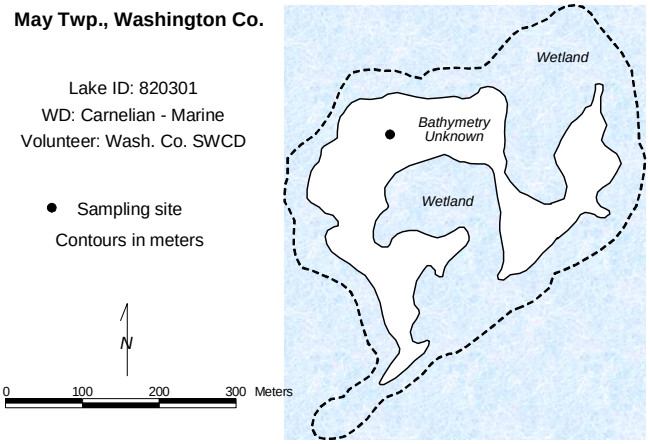
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

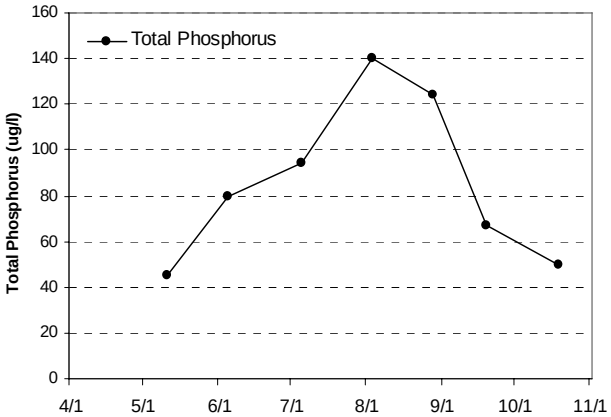
Schroeder's Pond

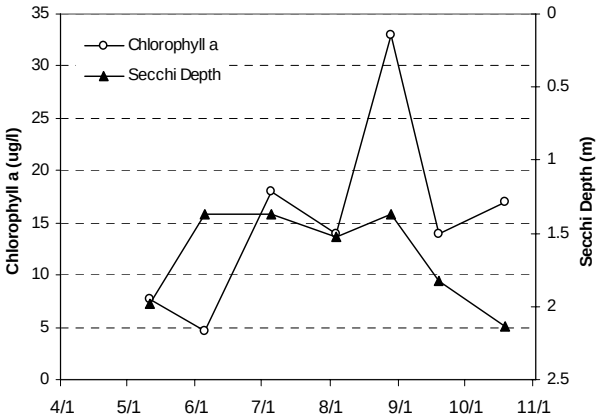
May Twp., Washington Co.

Lake ID: 820301
WD: Carnelian - Marine
Volunteer: Wash. Co. SWCD

● Sampling site
Contours in meters

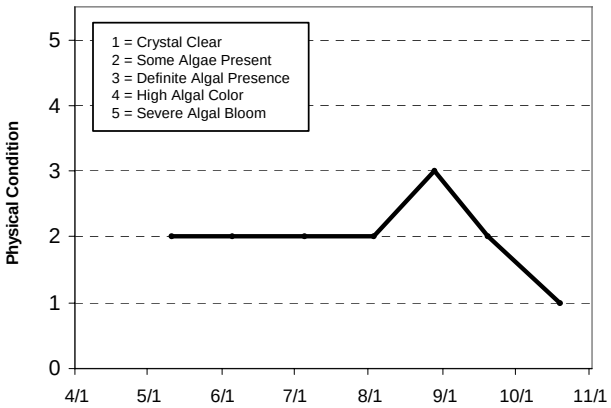






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/11/06	15.8	12.4	7	3.63	7.7	45		1.981	2	4
6/5/06	24.6	14.7	5.08	0.42	4.6	80		1.372	2	3
7/5/06	22.6	18.2	6.81	0.16	18	94		1.372	2	3
8/3/06	23.9	19.8	0.89	0.03	14	140		1.524	2	4
8/28/06	20.1	18.9	1.13	0.04	33	124		1.372	3	4
9/19/06	14.1	14	2.57	0.08	14	67		1.829	2	2
10/19/06	6.4	6.4	9.79	0.15	17	50		2.134	1	1

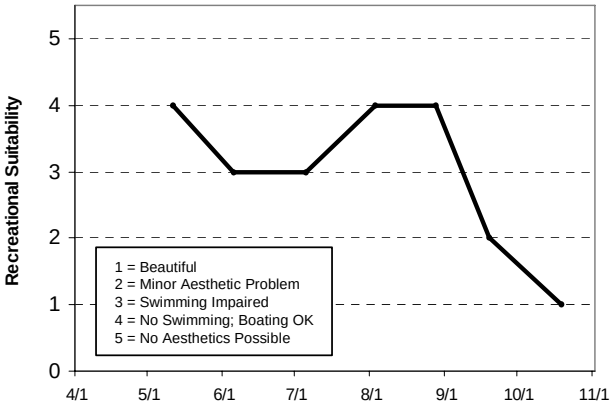


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus												C	D	D
Chlorophyll a												A	D	B
Secchi Depth												C	C	C
Overall												**B**	**D**	**C**

Source: Metropolitan Council and STORET data



Seidl's Lake (19-0095) Cities of ***Inver Grove Heights and South St. Paul***

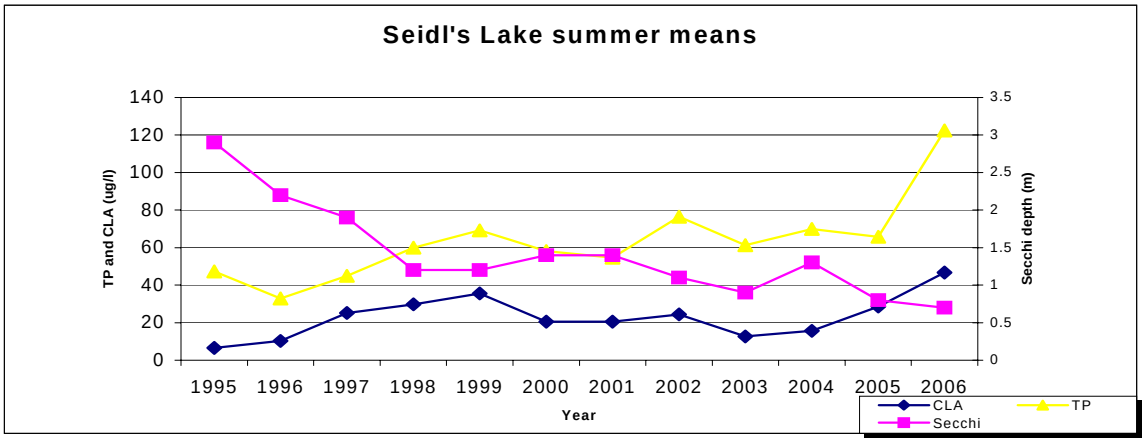
Seidl's Lake is a 14-acre lake located in the City of Inver Grove Heights (Dakota County) which receives inflow from five inlets. Other than the fact that the maximum depth of the lake is approximately 5.0 m (17 feet), there is very little known morphological data available. The lake has been enrolled in CAMP since 1995. In 2006 it was monitored 14 times from mid-April to mid-October. On each sampling date the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	***Mean***	***Minimum***	***Maximum***	***Grade***
TP (µg/l)	122.4	48.0	368.0	D
CLA (µg/l)	46.7	11.0	130.0	C
Secchi (m)	0.7	0.3	0.9	F
TKN (mg/l)	1.63	1.20	2.20	
			Overall Grade	D

Similar to that reported in past lake reports (and noticed again in 2006), the difference between the TP, CLA and Secchi grades in current and past years (see report grade on the lake's information page), may indicate that suspended sediments play a large role in the inner workings of the lake. This scenario can be fairly typical for small shallow lakes where wind action and storm sewer inflow either increase the influx of sediments to the system or cause the re-suspension of existing bottom sediments. That is, the suspended sediments influence the lake's phosphorus make-up (a larger portion of the in-lake phosphorus in particulate form rather than a soluble form more readily available for algal uptake), reduce water clarity, and could actually be limiting the amount of light available for algal growth, thus keeping the CLA concentrations down.

The water quality database for Seidl's Lake consists of nutrients and Secchi data in 1991, Secchi data in 1993-1994, and CAMP data in 1995-2006. While the lake's database is expanding, it is lacking in pre-1995 data. Statistical analysis on the lake's water quality database revealed no "statistically significant" long-trends. A simple regression on the lake's available water quality data, however, does reveal a slight decrease in the lakes quality. Over this time span, the lake's overall water quality grades fluctuated between an overall C and low-B grade in 1991-1998, 2000-2001 and 2003-2005, and a low grade of D in 1999, 2002 and 2006.



In an attempt to address the lake's possible degradation concerns and watershed influences on said degradation, lake area homeowners have been trying to work with the local communities to address areas

of concern to the lake's future management. They are currently working on garnering city involvement and outside funding to further initiate the lake planning/improvement process.

Throughout the monitoring period, the volunteers' opinion of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. The summertime mean recorded physical condition was 3.8 (between 3- "definite algae present" and 4- "high algal color"), while the mean suitability for recreation ranking was 4.0 (4- "no swimming - boating ok").

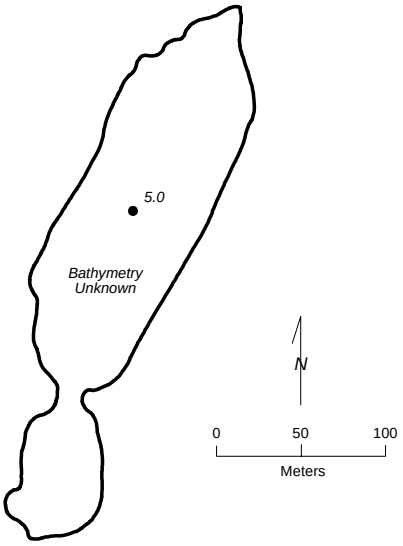
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

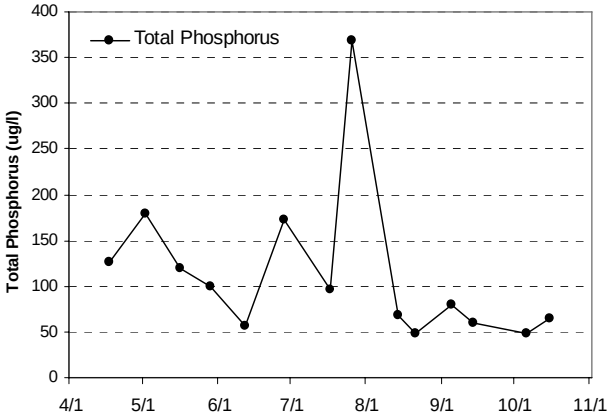
Seidl's Lake

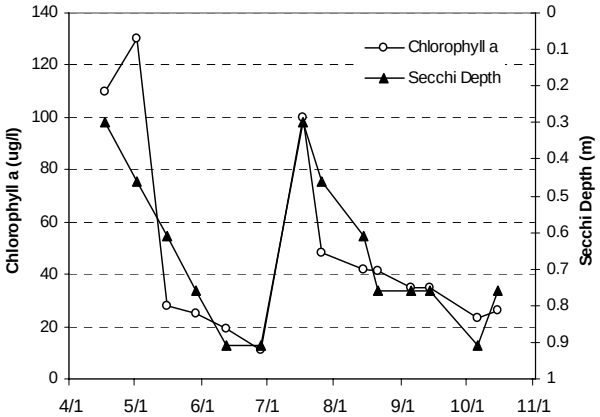
Inver Grove Heights, Dakota Co.

Lake ID: 190095
WMO: Lower Mississippi River
Volunteer: Harv Bartz

● Sampling site
Contours in meters

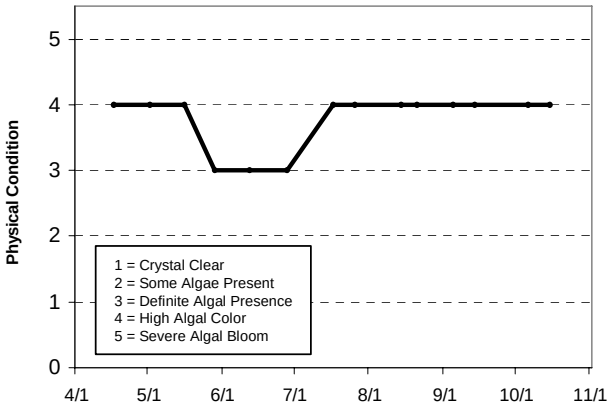






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/17/06	15.4				110	126		0.3	4	4
5/2/06	14.9				130	179		0.46	4	4
5/16/06	16.1				28	120		0.61	4	4
5/29/06	27.3				25	100		0.76	3	4
6/12/06	19.9				19	56		0.91	3	4
6/28/06	24.3				11	173		0.91	3	4
7/17/06	28.4				100	96		0.3	4	4
7/26/06	31.5				48	368		0.46	4	4
8/14/06	26.3				42	68		0.61	4	4
8/21/06	25.2				41	48		0.76	4	4
9/5/06	23.1				35	79		0.76	4	4
9/14/06	20.7				35	59		0.76	4	4
10/6/06	15.6				23	48		0.91	4	4
10/15/06	10.2				26	64		0.76	4	4

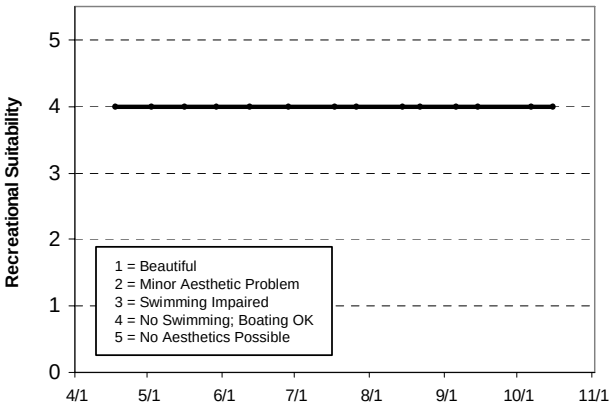


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus												C	
Chlorophyll a												C	
Secchi Depth												D	
Overall												**C**	

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus			C	C	C	C	D	C	C	D	C	D	C	D
Chlorophyll a			A	B	B	C	C	C	C	C	B	B	C	C
Secchi Depth	D	D	B	B	C	D	D	C	C	D	D	C	D	F
Overall			**B**	**B**	**C**	**C**	**D**	**C**	**C**	**D**	**C**	**C**	**C**	**D**

Source: Metropolitan Council and STORET data



Shaver Lake (Site-1) (27-0086-01) *City of Minnetonka*

Shaver Lake is divided into two distinct basins. For this reason there were two monitoring sites in 2006. Additionally, the results will be discussed individually for each of the two sites.

Shaver Lake is a small 11-acre lake located within the cities of Deephaven, Minnetonka, and Woodland (Hennepin County). There is very little known morphological data available for the lake.

While this was the second year that Shaver Lake (Site-1) has been involved in CAMP, it is the first year for (Site-2). On each of the sampling days the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. Shaver Lake (Site-1) was monitored 13 times between mid-April and mid-October, 2006.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	41.5	24.0	89.0	C
CLA (µg/l)	11.7	1.0	41.0	B
Secchi (m)	1.17	0.9	1.50	D
TKN (mg/l)	1.07	0.55	1.80	
			Overall Grade	C

When comparing the lakes TP (nutrient), CLA (algal biomass estimator), and Secchi (water clarity) grades, it is apparent that the TP and Secchi grades (and summer means) are quite a bit worse than the CLA grade. In most cases, the three should be fairly comparable. One possible explanation for the lake's 2006 findings may be that the majority of the lake's TP comes from either in-lake suspended sediments (re-suspension), or the intrusion of sediment-laden runoff to the lake, which in turn lessens the clarity of the water and inhibits algal growth.

Because 2005-2006 are the only years of known water quality data for Shaver Lake (Site-1), it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

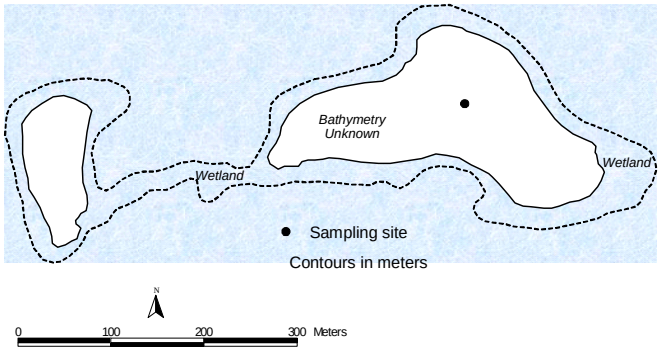
The perceived physical and recreational conditions (ranked on a 1-to-5 scale) are shown on the lake's information sheet on the next page. The average user perception rankings, were 2.8 for physical condition (between 2-"some algae present" and 3- "definite algae present"), and 4.2 for recreational suitability (between 4- "no swimming – boating ok" and 5- "no aesthetics possible").

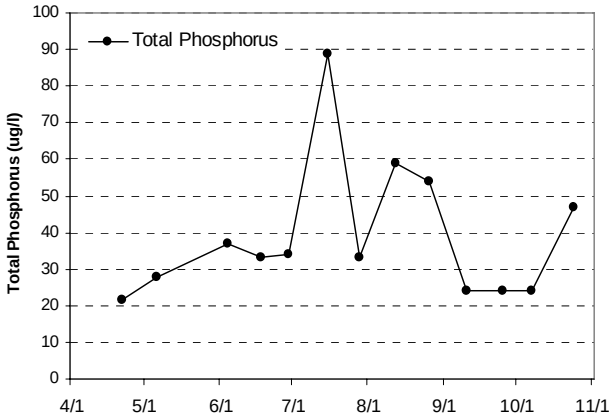
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

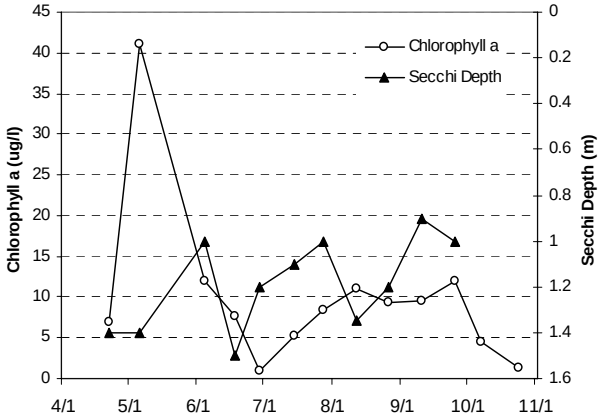
Shaver Lake (Site 1)

Deephaven, Minnetonka and Woodland
Hennepin Co.

Lake ID: 270086
WD: Minnehaha Creek
Volunteers: The Davis Family

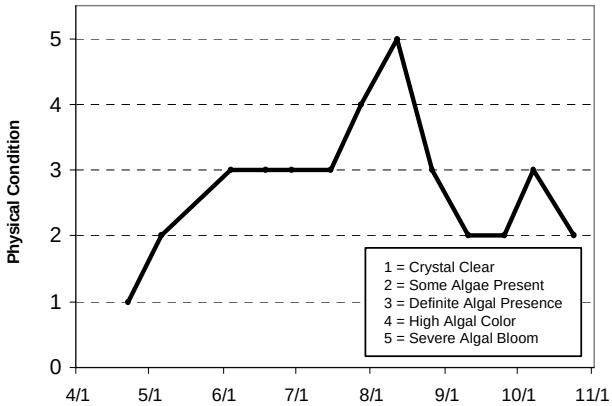






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/22/06	19				7	21.5		1.4	1	2
5/6/06	19.2				41	28		1.4	2	
6/4/06	27.4				12	37		1	3	4
6/18/06	26.3				7.6	33		1.5	3	4
6/29/06	26.3				1	34		1.2	3	4
7/15/06	27.7				5.2	89		1.1	3	5
7/28/06	29.3				8.4	33		1	4	5
8/12/06	26.5				11	59		1.35	5	5
8/26/06	24.3				9.4	54		1.2	3	5
9/10/06	17.6				9.5	24		0.9	2	4
9/25/06	17.6				12	24		1	2	4
10/7/06	15.4				4.5	24			3	4
10/24/06					1.4	47			2	4

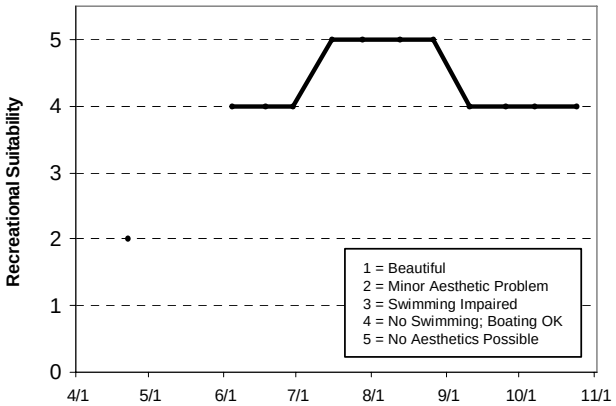


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006 Site 1	2006 Site 2
Total Phosphorus													C	C	C
Chlorophyll a													A	B	B
Secchi Depth													D	D	D
Overall													**C**	**C**	**C**

Source: Metropolitan Council and STORET data



Shaver Lake (Site-2) (27-0086-02) *Shaver Lake Preservation Association*

Shaver Lake (Site-2) was monitored six times between early-May and mid-October, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	38.0	21.0	56.0	C
CLA (µg/l)	13.5	1.9	22.0	B
Secchi (m)	1.0	0.6	1.3	D
TKN (mg/l)	1.03	0.38	1.50	
			Overall Grade	C

As mentioned earlier, there are no nutrient data available for Shaver Lake (Site-2) other than the 2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

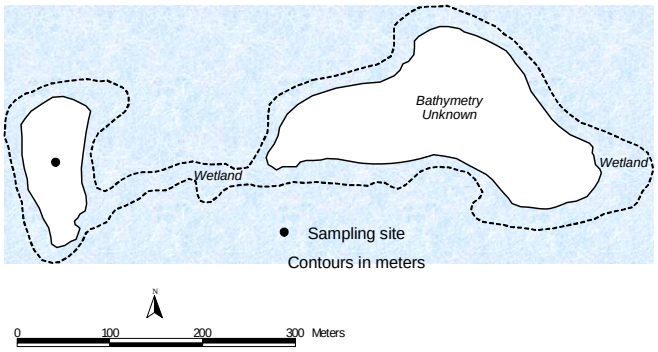
The perceived physical and recreational conditions (ranked on a 1-to-5 scale) are shown on the lake's information sheet on the next page. The average user perception rankings, were 2.7 for physical condition (between 2- "some algae present" and 3- "definite algae present"), and 4.2 for recreational suitability (between 4- "no swimming – boating ok" and 5- "no aesthetics possible").

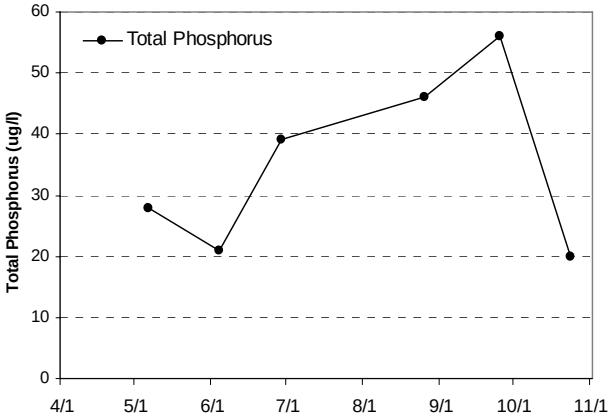
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

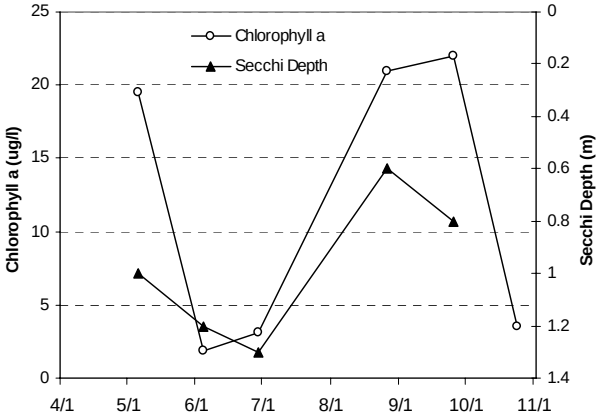
Shaver Lake (Site 2)

Deephaven, Minnetonka and Woodland
Hennepin Co.

Lake ID: 270086
WD: Minnehaha Creek
Volunteers: The Davis Family

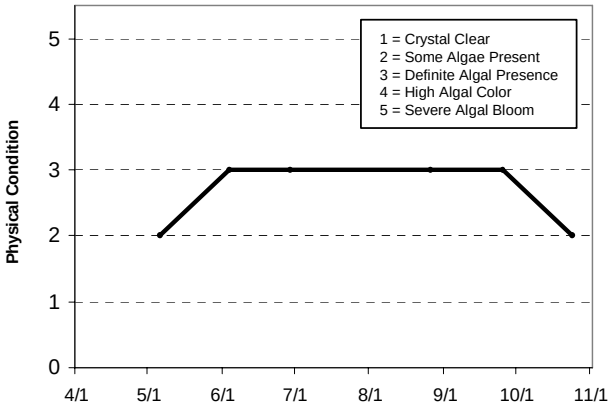






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/6/06	19.1				19.5	28		1	2	4
6/4/06	27.3				1.9	21		1.2	3	4
6/29/06	27.1				3.1	39		1.3	3	4
8/26/06	24.7				21	46		0.6	3	4
9/25/06	17.8				22	56		0.8	3	5
10/24/06					3.5	20			2	4

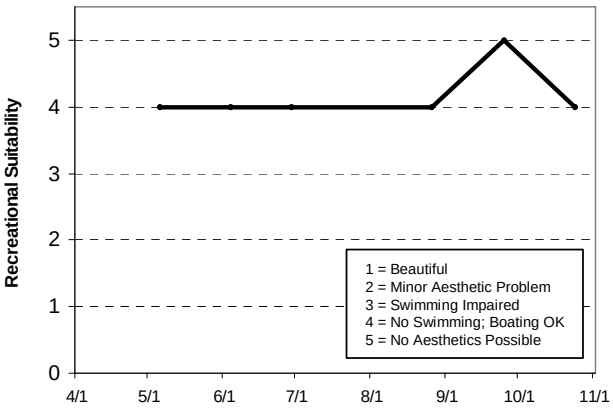


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006 Site 1	2006 Site 2
Total Phosphorus													C	C	C
Chlorophyll a													A	B	B
Secchi Depth													D	D	D
Overall													**C**	**C**	**C**

Source: Metropolitan Council and STORET data



Shields Lake (82-0162) *Comfort Lake-Forest Lake Watershed District*

Shields Lake is located in the City of Forest Lake in Washington County. The lake has a surface area of 27 acres (0.8 miles in circumference) and a maximum depth of 8.2 m (27 feet). About 85 percent of the lake's area is considered littoral, the shallow (0-15 foot depth) area dominated by aquatic vegetation.

Shields Lake has been involved in CAMP since 1993. The lake was monitored 14 times between early-May and mid-October, 2006. 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.

2006 summer (May-September) data summary

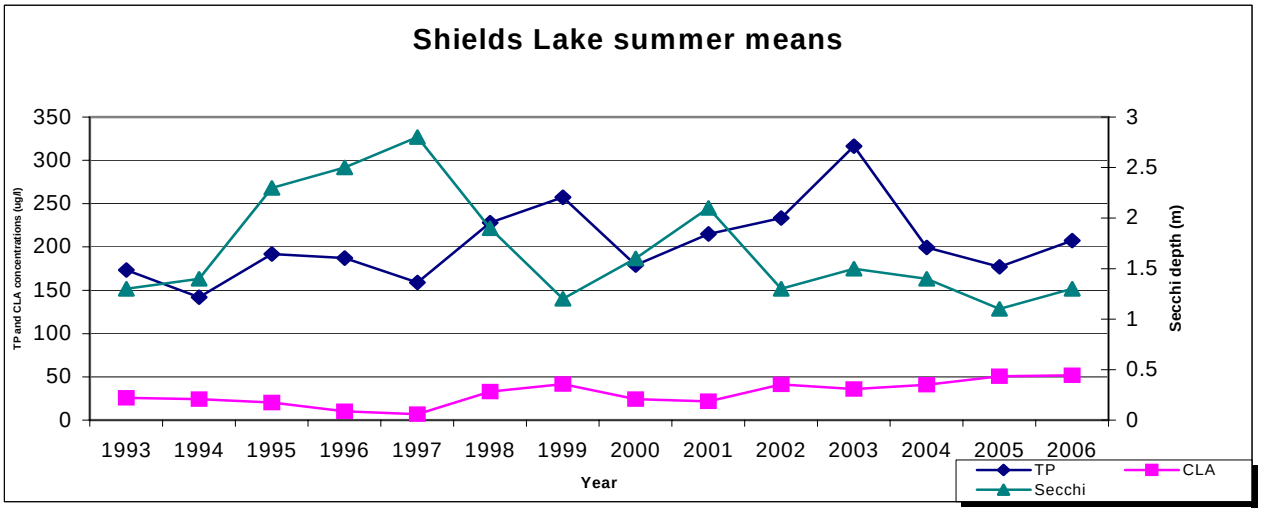
Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	207.3	76.0	374.0	F
CLA (µg/l)	51.7	6.9	230.0	D
Secchi (m)	1.3	0.5	3.2	C
TKN (mg/l)	2.92	1.60	8.70	
			Overall Grade	D

The 2006 CLA was the worst recorded to date. The lakes best recorded water quality was in 1997 (TP mean of 159.0 µg/l, CLA mean of 7.0 µg/l, and a Secchi mean of 2.8 m).

The Shield Lake water quality database includes 15 years (1991, 1993-2006) where TP, CLA, and Secchi transparency data are available to calculate annual grades. The overall grades range from C's in 1991, and 1994-1997, to D's in 1993 and 1998-2006. Additional data found for 1988-1989 had only TP and CLA concentrations, and 1990 had only Secchi depth information.

A quick look at the lake's database seems to show that the TP concentrations have remained consistently high (between D and F). The CLA and Secchi numbers, which improved slightly after the biomanipulation of 1994, degraded in 1998 and 1999 and, until 2002-2006, had shown some improvement in 2000-2001. However, because of the absence of historic data and the great variability of existing data, statistically accurate long-trend analysis is difficult. To better understand the quality of the lake and what direction it may be heading, continued monitoring is suggested.

While the lake's CLA concentrations (corresponding to algal abundance) and Secchi transparencies had shown some improvement in 2000-2001, the recent 2002-2006 data show conditions similar to those of 1998-1999. It was mentioned in the 1998 and 1999 lake reports that TP, CLA, and Secchi transparency conditions in 1998 were similar to that of 1994 and 1995 until early-July, and after the big storms (extreme winds, heavy rains) of late-June, when the lake started to experience below normal water quality conditions. It was further mentioned that, during the July 7, 1998 monitoring event 12 dead turtles were seen at the lake's inlet, no "freshwater shrimp" (zooplankton) were seen in the water samples, and the lake had no oxygen in the water below one meter (approximately three feet). At this point the lake's TP concentrations rose, but more abnormally, the lake's CLA and Secchi readings dramatically worsened. The lake's CLA and Secchi readings did not start to rebound until again until late-September of that year. It is thought that the 1998 storms started the degradation of the lake's water quality by increasing runoff from the surrounding watershed, and riling up the lake's sediments. This potentially resulted in an increased TP and sediment load to the lake, increasing turbidity, TP concentrations, algal populations, and reducing water clarity and in-lake oxygen levels (Anhorn 1999).



The perceived physical and recreational conditions of the lake, recorded by the volunteer(s), 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 3.1 (between 3- "definite algae present" and 4- "high algal color"), 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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

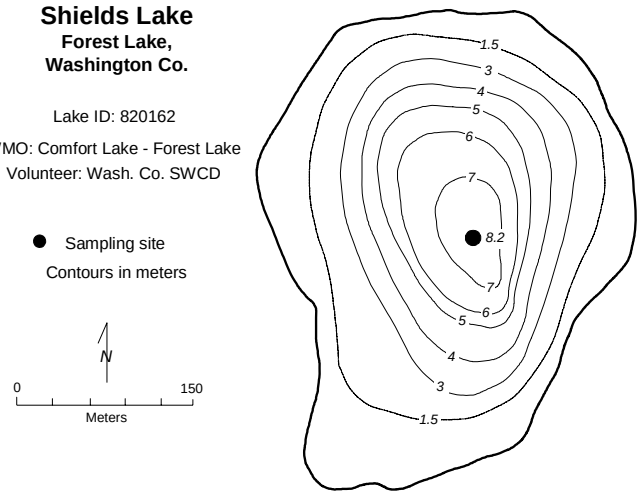
Shields Lake
Forest Lake,
Washington Co.

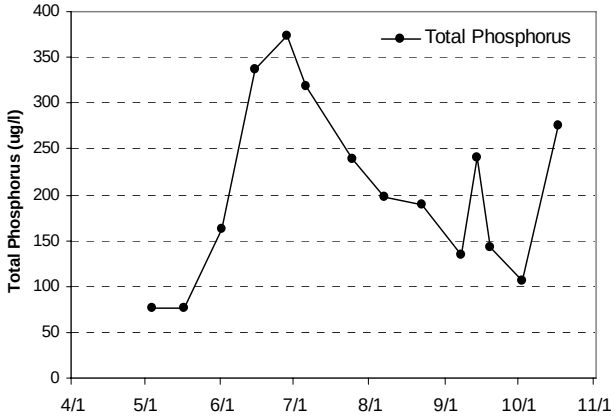
Lake ID: 820162

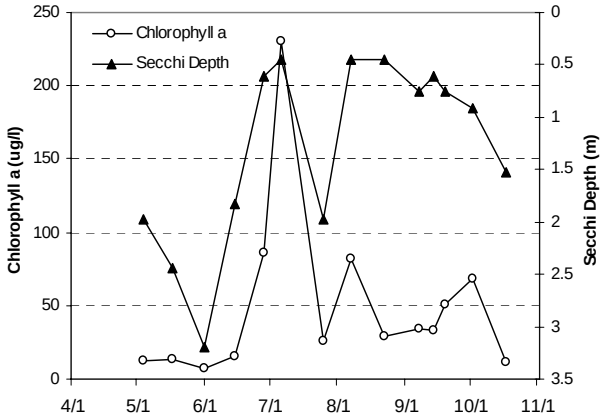
WMO: Comfort Lake - Forest Lake
Volunteer: Wash. Co. SWCD

● Sampling site

Contours in meters

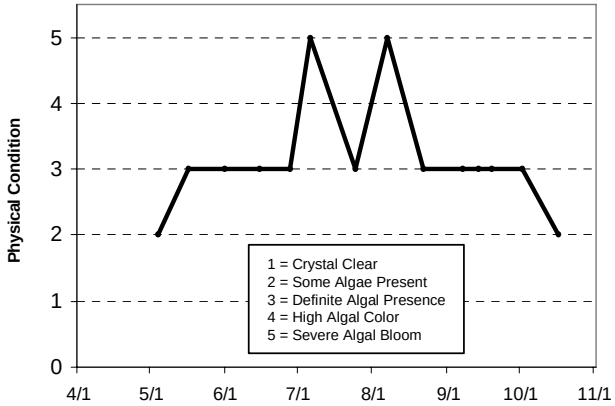






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/4/06	14.4	4.5	9.35	0.4	12	77		1.981	2	4
5/17/06	14.9	4.7	10.3	0.59	14	76		2.438	3	4
6/1/06	23.3	5.5	3.94	0.04	6.9	163		3.2	3	3
6/15/06	22.1	6.8	6.85	0.06	16	337		1.829	3	3
6/28/06	22.9	7	8.71	0.05	86	374		0.61	3	4
7/6/06	24.7	6.5	12.23	0.04	230	318		0.457	5	4
7/25/06	27.8	7.2	2.89	0.05	26	239		1.981	3	4
8/7/06	25.9	7.4	12.65	0.05	82	197		0.457	5	5
8/22/06	23.8	7.7	3.91	0.03	29	189		0.457	3	4
9/7/06	22	8.1	11.2	0.04	34	134		0.762	3	3
9/14/06	18.1	8.2	4.91	0.04	33	241		0.61	3	3
9/19/06	16.4	8.4	7.26	0.06	51	143		0.762	3	3
10/2/06	16.8	8.5	15.94	0.09	68	106		0.914	3	3
10/17/06	8.6	7.1	6.39	0.04	11	275		1.524	2	3

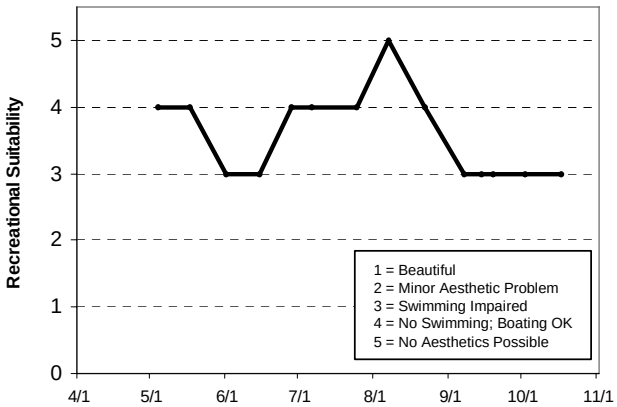


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus									F	D		D	
Chlorophyll a									D	D		C	
Secchi Depth											F	C	
Overall												**C**	

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus	F	D	F	F	F	F	F	F	F	F	F	F	F	F
Chlorophyll a	C	C	C	B	A	C	C	C	C	C	C	C	D	D
Secchi Depth	C	C	B	B	B	C	C	C	C	C	C	C	D	C
Overall	**D**	**C**	**C**	**C**	**C**	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**D**

Source: Metropolitan Council and STORET data



Silver Lake [North St. Paul] (62-0001) *Valley Branch Watershed District*

Silver Lake is located in North St. Paul (Ramsey County). The lake's surface area is 72 acres and has a maximum depth of 5.5 m (18 feet). Roughly 99 percent of the lake's surface area is considered littoral zone (the 0-15 foot depth area of aquatic plant dominance).

This was the first year that Silver Lake in North St. Paul has been involved in CAMP. A search through the STORET nationwide water quality database for data on the lake provided historical data for 1984-2005.

As part of the watershed's involvement in CAMP in 2006, the lake was monitored 12 times between late-April and mid-October. During each sampling event the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	35.0	19.0	84.0	C
CLA (µg/l)	5.6	2.2	11.0	A
Secchi (m)	2.8	2.0	3.5	B
TKN (mg/l)	0.81	0.36	1.40	
			Overall Grade	B

As mentioned earlier, the only CAMP data for Silver Lake was for 2006. Ramsey County has collected data on Silver Lake since 1984. In 2006 the lake received a water quality grade of a B which is consistent with grades received for data reported by Ramsey County in 1985, 1987-1993, 1995, 1999-2004, better than grades reported in 1984 (overall grade of C) and worse than grades reported in 1994, 1996-1998, and 2005 (overall grade of A). The lake seems well represented by a grade of B/A. 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 2.6 for physical condition (between 2- "some algae present" and 3- "definite algae present"), and 2.8 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Silver Lake

North St. Paul, Ramsey Co./
Oakdale, Washington Co.

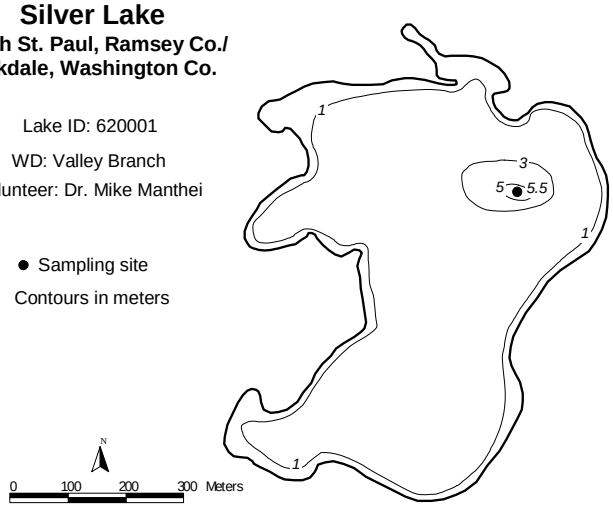
Lake ID: 620001

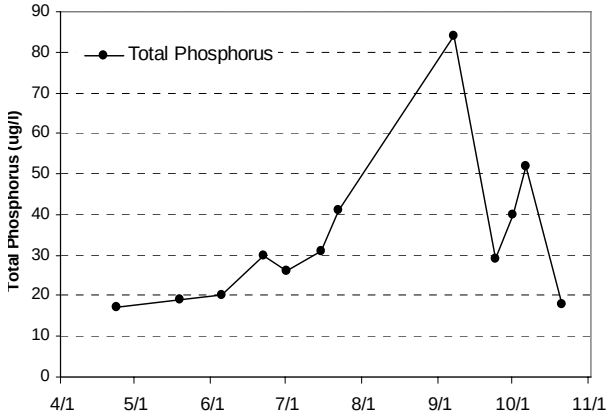
WD: Valley Branch

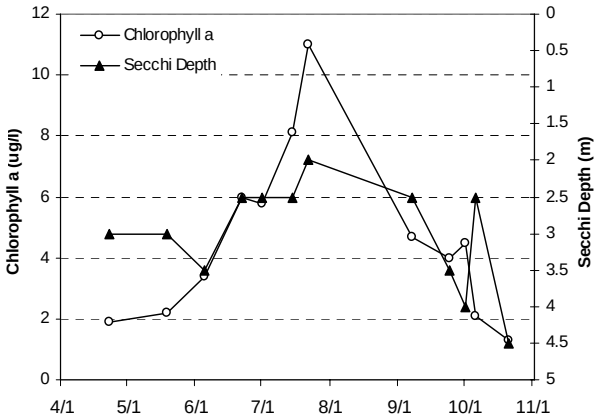
Volunteer: Dr. Mike Manthei

● Sampling site

Contours in meters

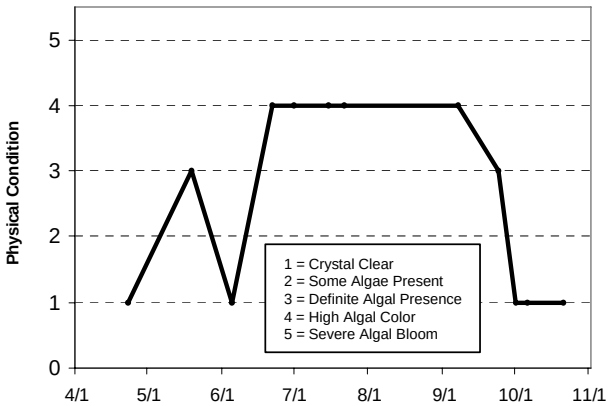






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/23/06	14.9				1.9	17		3	1	1
5/19/06	17.8				2.2	19		3	3	3
6/5/06	24.9				3.4	20		3.5	1	3
6/22/06	24.8				6	30		2.5	4	4
7/1/06	27.9				5.8	26		2.5	4	4
7/15/06	29				8.1	31		2.5	4	3
7/22/06	27				11	41		2	4	4
9/7/06	17.5				4.7	84		2.5	4	5
9/24/06	15.5				4	29		3.5	3	3
10/1/06	15.1				4.5	40		4	1	1
10/6/06	15.4				2.1	52		2.5	1	1
10/21/06	6				1.3	18		4.5	1	1

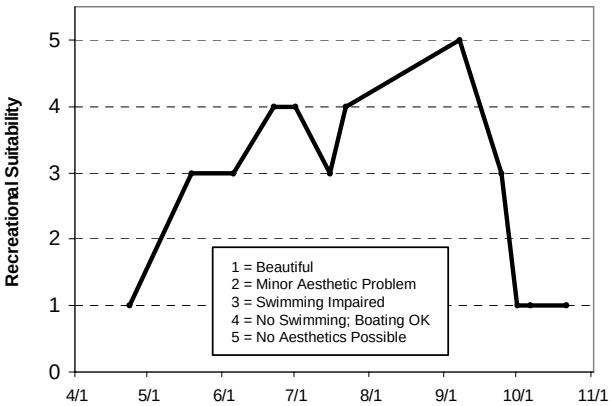


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus					D	C	D	C	C	C	C	C	C
Chlorophyll a					B	A	B	A	A	A	A	B	A
Secchi Depth					C	B	B	C	B	A	B	B	B
Overall					**C**	**B**	**C**	**B**	**B**	**B**	**B**	**B**	**B**

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus	C	B	C	B	B	B	B	B	C	B	C	B	A	C
Chlorophyll a	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Secchi Depth	B	A	A	A	A	A	B	B	A	B	B	B	B	B
Overall	**B**	**A**	**B**	**A**	**A**	**A**	**B**	**B**	**B**	**B**	**B**	**B**	**A**	**B**

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. 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'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). There is no formal boat access point on the lake.

This was the seventh year that Silver Lake has been involved in CAMP (although just Secchi transparencies were collected during two of those years). A search through the STORET nationwide water quality database for data on the lake produced a limited amount of data. The only years in which data were found, other than the 2000-2006 CAMP data, was 1996-1999. The only years of which included TP, CLA and Secchi transparency data are available are 1996-2001 and 2004-2006.

The lake was monitored seven times between early-May and mid-October, 2006. During each event, the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. Results are presented in both graphs and data tables on the lake's information sheet on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	60.3	22.0	127.0	C
CLA (µg/l)	19.4	4.8	45.0	B
Secchi (m)	1.8	0.9	3.0	C
TKN (mg/l)	0.97	0.62	1.50	
			Overall Grade	C

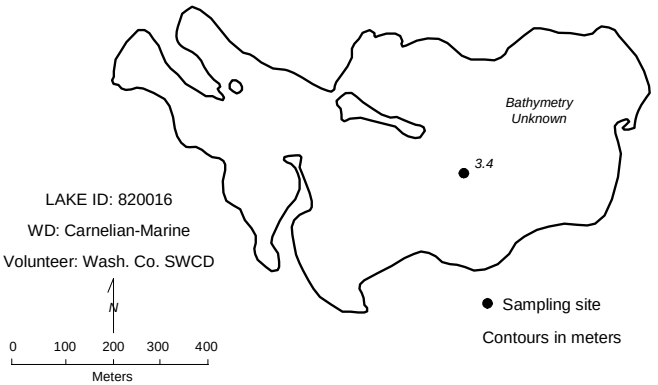
The lake's 2006 overall grade is identical to that recorded in 1996-1998 and 2000-2001, better than the overall grade of D in 1999 and worse than the overall grades of B in 2004-2005. When looking at the grades and individual parameter means, it is apparent that 2004 was the lakes best-recorded water quality year.

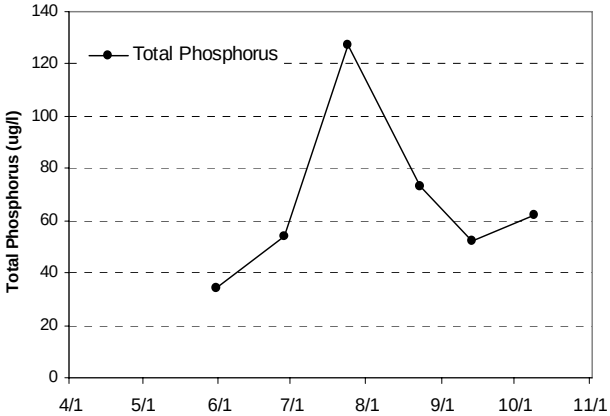
Because of the nature of the lake's water quality database the determination of any statistically significant long-term trend detection is not possible. In the short-term however, the lake's water quality seems to be well represented by an overall grade of C+/B-. To better understand the lake's overall water quality and where it may be heading, continued monitoring is suggested.

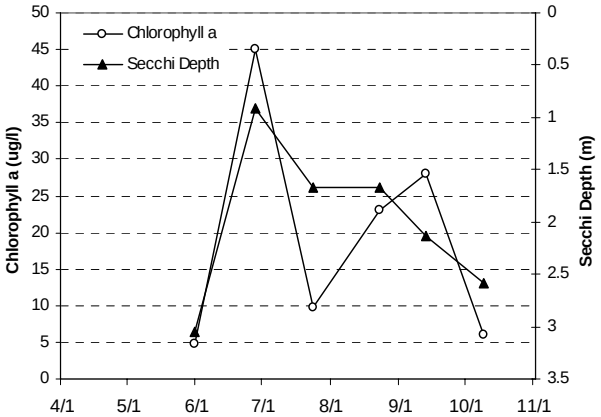
The last two graphs show seasonal variation in the lake's perceived physical condition and recreational suitability. The average user perception rankings, on a 1-to-5 scale, were 2.6 for physical condition (between 2- "some algae present" and 3- "definite algae present"), and 3.0 for recreational suitability (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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Silver Lake
Stillwater Twp., Washington Co.

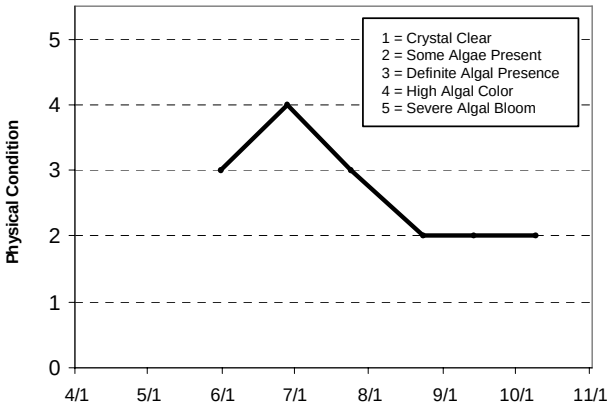






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/3/06	15.4	14.1	9.04	6.89	5.7	22		1.524	2	2
5/31/06	25.3	20.4	6.39	0.05	4.8	34		3.048	3	3
6/28/06	25.4	19.9	9.23	0.06	45	54		0.914	4	4
7/24/06	28.1	21.5	9.22	0.08	9.7	127		1.676	3	4
8/23/06	24.4	21.9	6.99	0.07	23	73		1.676	2	3
9/13/06	19.8	17.3	8.58	2.31	28	52		2.134	2	2
10/9/06	13.9	13.9	8.63	6.15	6.1	62		2.591	2	3

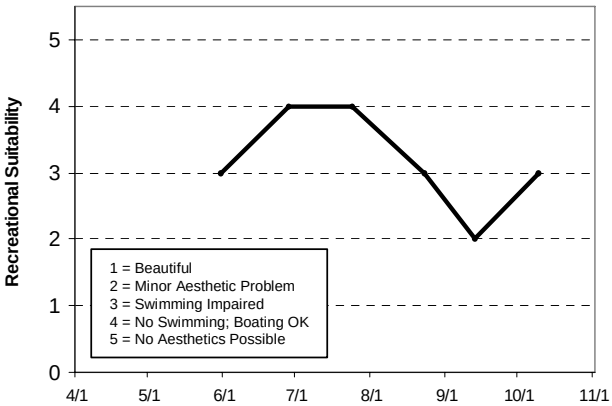


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus				C	C	C	D	C	C			B	C	C
Chlorophyll a				C	C	C	D	B	B			A	A	B
Secchi Depth				C	D	D	D	C	C	C	B	B	B	C
Overall				**C**	**C**	**C**	**D**	**C**	**C**			**B**	**B**	**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 very little known morphological data available for the lake.

Two thousand and six marks the third year in which South Oak Lake has been involved in CAMP. A search through the STORET nationwide water quality database for historic data on the lake was unsuccessful. Thus, 2002-2003 and 2006 are the only complete, years of available data.

The lake was monitored 9 times between late-April and mid-October, 2006. The resulting data and graphs appear on the next page. 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.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	87.9	33.0	178.0	D
CLA (µg/l)	23.4	8.8	54.0	C
Secchi (m)	0.8	0.6	1.0	D
TKN (mg/l)	1.05	0.55	1.80	
			Overall Grade	D

The lake's overall 2006 lake quality grade of D was determined from the individual parameter grades. This is similar to grade reported in 2002-2003.

As mentioned earlier, there are no water quality data available for South Oak Lake other than the 2002-2003 and the 2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. 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 3.4 for physical condition (between 3- "definite algae present" and 4- "high algal color"), and 4.9 for recreational suitability (between 4- "no swimming - boating ok" and 5- "no aesthetics possible").

If you notice any errors in the lake data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us

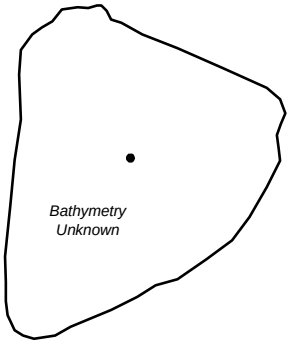
South Oak Lake

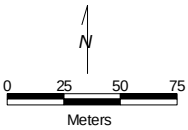
St. Louis Park, Hennepin Co.

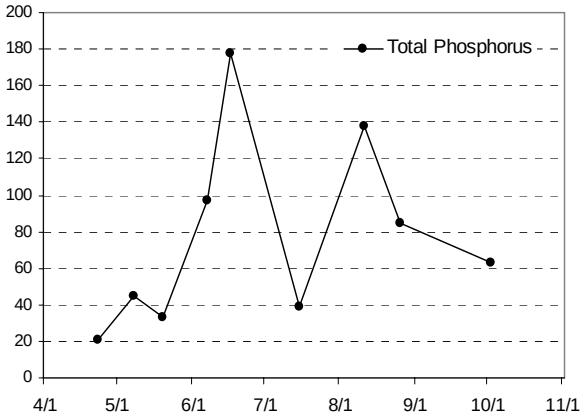
Lake ID: 270661
WD: Minnehaha Creek
Volunteer: Andrea Anderson

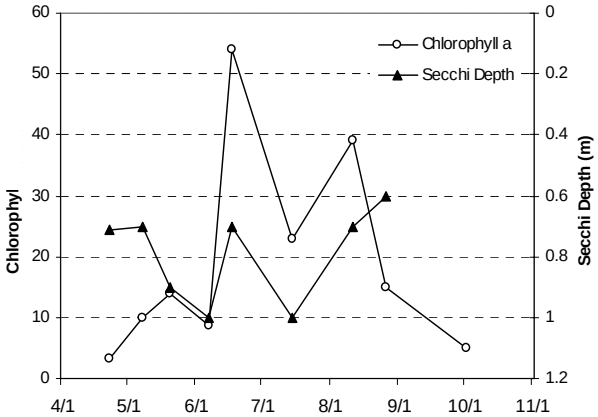
● Sampling site

Contours in meters



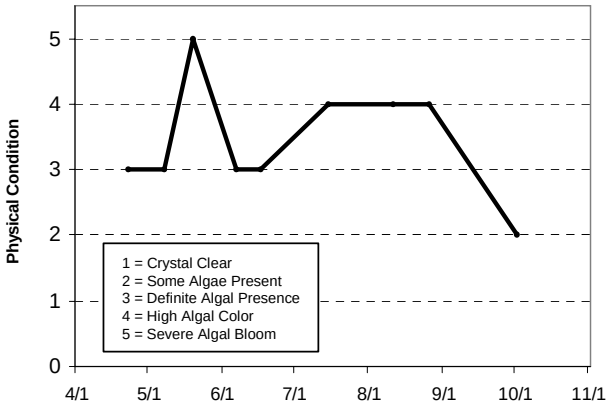






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/23/06	19.1				3.3	21		0.71	3	4
5/8/06	19.7				10	45		0.7	3	5
5/20/06	16.2				14	33		0.9	5	5
6/7/06	28.3				8.8	97		1	3	5
6/17/06	24.7				54	178		0.7	3	5
7/15/06	30.1				23	39		1	4	5
8/11/06	21.9				39	138		0.7	4	5
8/26/06	21.3				15	85		0.6	4	5
10/2/06	18.6				4.9	63			2	5

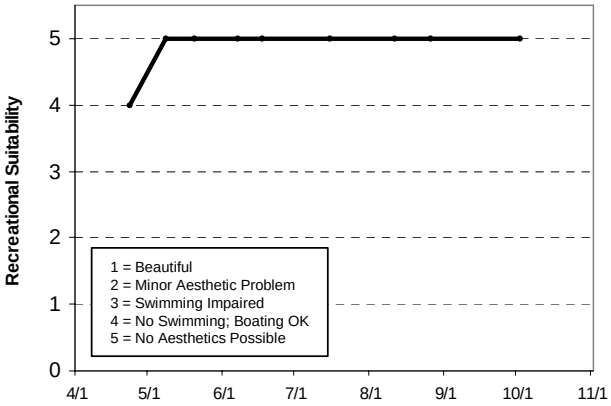


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus										D	D			D
Chlorophyll a										D	C			C
Secchi Depth										D	F			D
Overall										**D**	**D**			**D**

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. 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's 63-acre immediate watershed and surface area translates to a watershed-to-lake size 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).

This was the seventh year that South Rice Lake has been involved in CAMP (it was also involved in 2000-2005). Other than the 2000-2006 CAMP data, a search through the STORET nationwide water quality database for data on the lake came up empty. The lake was monitored 14 times between mid-April and mid-October, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	177.1	73.0	423.0	F
CLA (µg/l)	21.1	1.9	59.0	C
Secchi (m)	0.7	0.3	1.0	D
TKN (mg/l)	1.17	0.51	3.4	
			Overall Grade	D

Of the seven years of monitoring data available for the lake, it is apparent that the lake experienced its best water quality in 2004 and its worst water quality was recorded in 2000. The lake received overall grades of F in 2000, D in 2001-2003 and 2005-2006, and C in 2004.

A recent in-lake alum treatment (applied at ice-off in mid-April, 2002) was meant to lower phosphorus levels, control algal growth and improve water clarity. It was reported in the 2002 Lake Report that the alum treatment was successful in reducing in-lake TP and CLA (indicating a reduction in algal biomass) in 2002. While, the lake's 2002, and 2004-2005 water quality conditions were better than pre-alum treatment, the 2003 and 2006 water quality was not. Additional years of monitoring are needed to truly determine the effectiveness and long-term efficiency of the alum treatment.

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 3.3 for physical condition (between 3- "definite algae present" and 4- "high algal color"), and 4.4 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

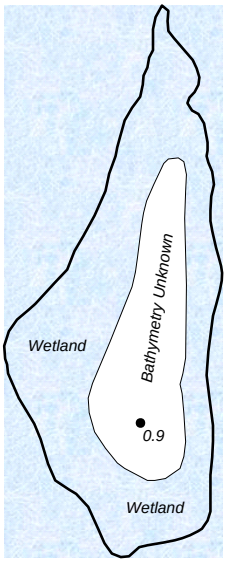
South Rice Pond

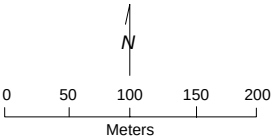
Golden Valley, Robbinsdale, Hennepin Co.

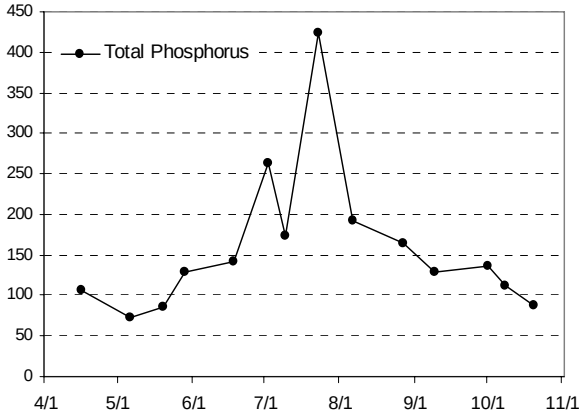
Lake ID: 270645
WMO: Bassett Creek
Volunteer: Steve Streff

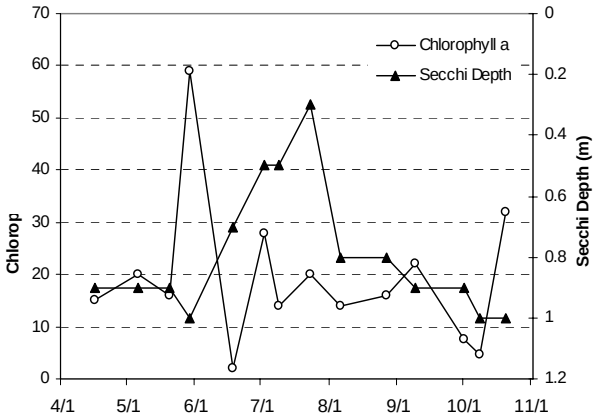
● Sampling site

Contours in meters



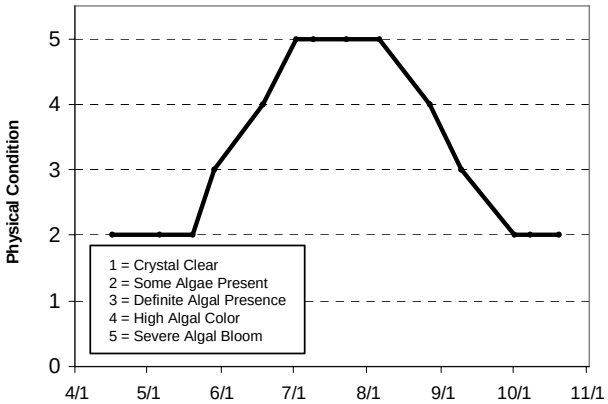






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/16/06	18.5				15	107		0.9	2	4
5/6/06	16.8				20	73		0.9	2	4
5/20/06	18.5				16	85		0.9	2	4
5/29/06					59	128		1	3	4
6/18/06					1.9	141		0.7	4	5
7/2/06					28	263		0.5	5	5
7/9/06					14	173		0.5	5	5
7/23/06					20	423		0.3	5	5
8/6/06					14	192		0.8	5	5
8/27/06	22.4				16	165		0.8	4	4
9/9/06	17.9				22	128		0.9	3	4
10/1/06	15.1				7.6	137		0.9	2	4
10/8/06	15.7				4.6	112		1	2	4
10/20/06	6.7				32	88		1	2	4

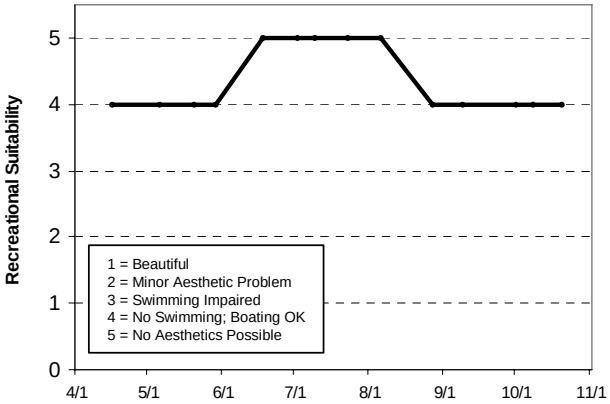


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus								F	F	D	F	D	D	F
Chlorophyll a								F	B	B	C	A	C	C
Secchi Depth								F	F	F	F	D	D	D
Overall								**F**	**D**	**D**	**D**	**C**	**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 foot depth) area dominated by aquatic vegetation.

On each monitoring event, the lake was monitored for TP, CLA, TKN, Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. In 2006, the lake was monitored 14 times between mid-April and mid-October.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	50.9	29.0	80.0	C
CLA (µg/l)	32.0	4.6	70.0	C
Secchi (m)	1.8	0.5	3.4	C
TKN (mg/l)	1.42	0.80	2.20	
			Overall Grade	C

The lake's 2006 overall grade of a C was identical to that of 1995, 1996, and 1998, and 2005. Because data for South School Section Lake are only available for 1995, part of 1996, 1998 and 2005-2006, no long- or short-term trends can be determined. Additional year of data are needed to better understand the lake's water quality and what direction it may be heading.

The physical and recreational conditions of South School Section 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 2.9 (roughly 3- "definite algal presence"). The mean suitability for recreation ranking was 3.1 (between 3- "swimming slightly impaired" and 4- "no swimming – boating ok").

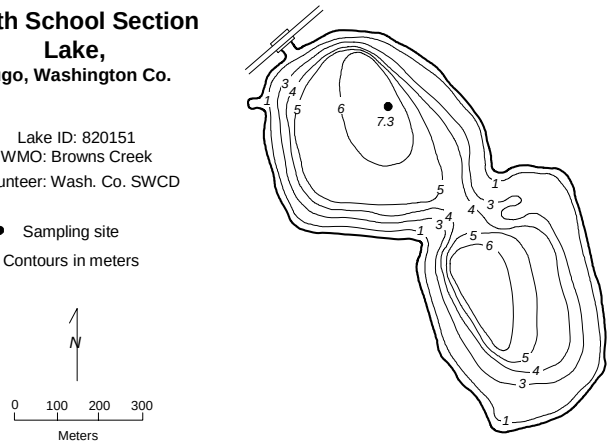
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

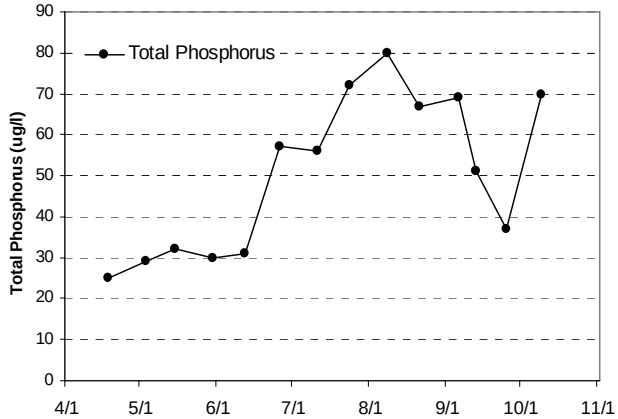
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

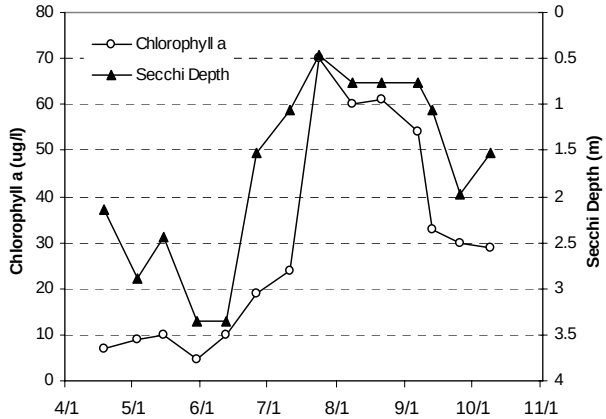
South School Section Lake,
Hugo, Washington Co.

Lake ID: 820151
WMO: Browns Creek
Volunteer: Wash. Co. SWCD

● Sampling site
Contours in meters

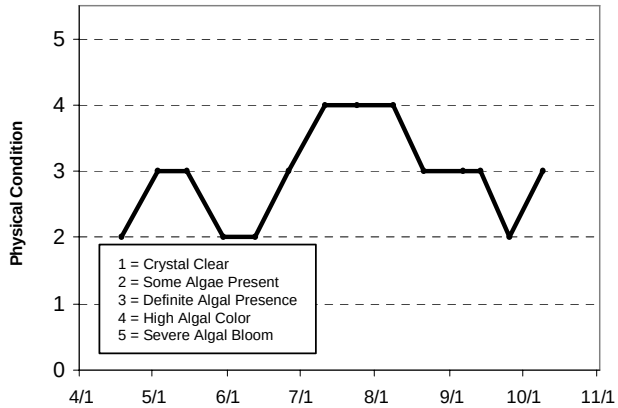






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/18/06	11.3	11.4	11.06	2.22	7	25		2.134	2	2
5/3/06	13.8		8.61		8.8	29		2.896	3	3
5/15/06	13.5	12.9	9.09	0.33	9.8	32		2.438	3	3
5/30/06	23.8	14.7	6.04	0.06	4.6	30		3.353	2	2
6/12/06	20.9	15.3	5.9	0.07	10	31		3.353	2	2
6/26/06	23.5	16.8	8.41	0.02	19	57		1.524	3	3
7/11/06	27.4	17.4	9.96	0.07	24	56		1.067	4	4
7/24/06	27	18.1	11.88	0.06	70	72		0.457	4	4
8/8/06	25.6		6.57		60	80		0.762	4	4
8/21/06	24.4	19.7	9.61	0.05	61	67		0.762	3	3
9/6/06	22.2	21.2	8.66	0.06	54	69		0.762	3	4
9/13/06	20	18.8	6.3	0.05	33	51		1.067	3	4
9/25/06	15.2	15.2	9.14	0.07	30	37		1.981	2	2
10/9/06	14.4		9.26		29	70		1.524	3	3

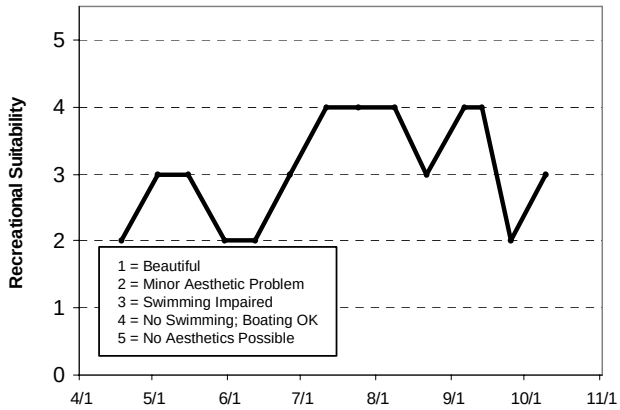


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus			C	C		C							C	C
Chlorophyll a			C	C		C							C	C
Secchi Depth			C	C		C							B	C
Overall			**C**	**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 (roughly 13 feet) and 2.0 m (six and a half feet), respectively. The mean depth of the lake and its surface area translate to an approximate lake volume of 356 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's 63-acre immediate watershed and surface area translates to a very small watershed-to-lake size ratio of 1.2:1 (the greater the ratio, the greater the potential stress on the lake from surface runoff). There is no formal boat access point on the lake.

This was the seventh year that South Twin Lake has been involved in CAMP (although just Secchi transparencies were collected in two of those years). A search through the STORET nationwide water quality database for data on the lake produced a limited amount of data. The only years in which data were found, other than the 2000-2006 CAMP data, was 1996-1999. The years which included TP, CLA and Secchi transparency data were 1996-2001 and 2004-2006.

The lake was monitored seven times between early-May and mid-October, 2006. During each event, the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. Results are presented in both graphs and data tables on the lake's information sheet on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	87.3	56.0	114.0	D
CLA (µg/l)	29.8	11.0	62.0	C
Secchi (m)	1.1	0.6	1.8	D
TKN (mg/l)	1.97	1.40	3.10	
			Overall Grade	D

Because of the variability in the lake's water quality database, the determination of any statistically significant long-term trend detection is not possible. In the short-term however, the lake's water quality seems to be well represented by an overall grade of D+/C, with overall grades of F in 1999, D in 1996-1998, 2001 and 2006, and C in 2000, 2004 (the lakes best recorded water quality year) and 2005. To better understand the lake's overall water quality and where 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 3.4 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

South Twin Lake
Stillwater Twp., Washington Co.

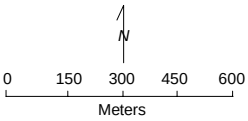
LAKE ID: 820019

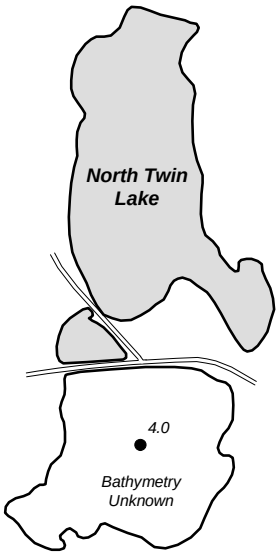
WD: Carnelian-Marine

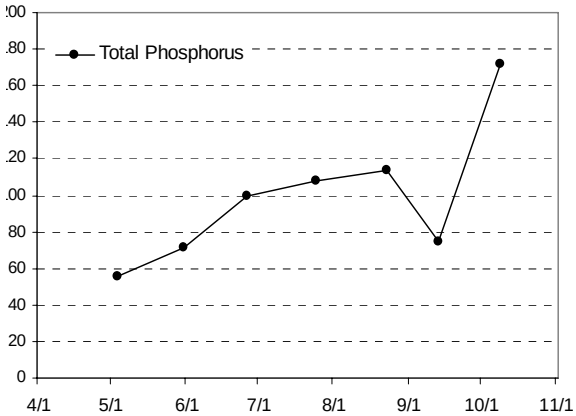
Volunteer: Wash. Co. SWCD

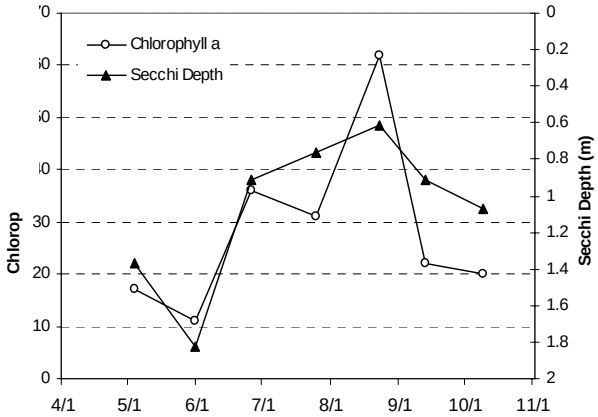
● Sampling site

Contours in meters



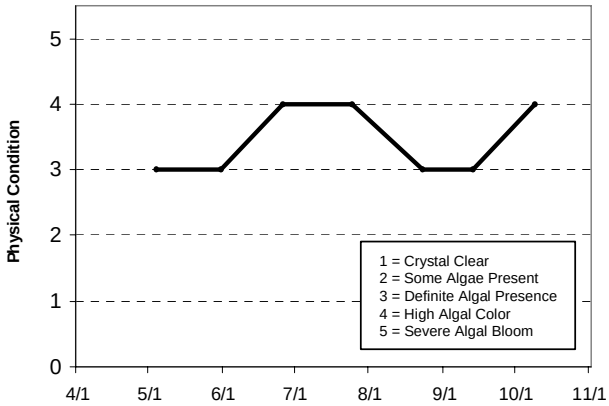






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/4/06	14.8		7.76		17	56		1.372	3	4
5/31/06	26.7	17	6.67	0.06	11	71		1.829	3	3
6/26/06	23.7	20.6	9.54	0.04	36	100		0.914	4	4
7/25/06	27.3	24.6	8.25	0.04	31	108		0.762	4	4
8/23/06	25.5	23.2	8.76	0.05	62	114		0.61	3	4
9/13/06	22	18	8	9.11	22	75		0.914	3	4
10/9/06	14	14	9.04	8.5	20	172		1.067	4	4

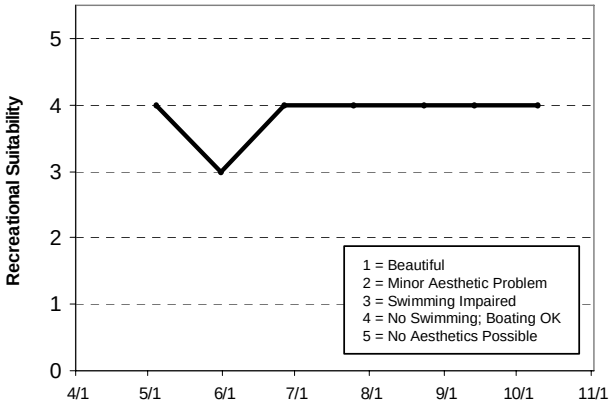


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus				C	C	D	D	C	D			C	C	D
Chlorophyll a				D	D	D	F	C	D			B	C	C
Secchi Depth				D	D	F	F	D	F	D	C	C	C	D
Overall				**D**	**D**	**D**	**F**	**C**	**D**			**C**	**C**	**D**

Source: Metropolitan Council and STORET data



Spring Lake [Scott County] (70-0054) *Prior Lake - Spring Lake Watershed District*

Spring Lake is located in southeastern Spring Lake Township in Scott County. The 630-acre lake (5.0 miles in circumference) is considered a "Priority Lake" by the Metropolitan Council because of its multi-recreational uses.

The lake has a large 13,500-acre watershed. The lake and watershed areas translate to a large 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. The majority of the lake's watershed is agricultural.

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 (the 0-15 foot depth area dominated by aquatic vegetation). The approximate volume of the lake is approximately 11,500 acre-feet (ac-ft) and a public access to the lake is located on its southwestern shores.

Spring Lake is very fertile, receiving nutrients from runoff and from internal sources. The great fertility causes legendary algal growths. The blue-green algal blooms are a serious nuisance, and purportedly have been the cause of the death of four dogs, which died after drinking the water in 1980.

In an attempt to improve the lake's water quality, a ferric chloride addition system was constructed at the outlet of the Highway 13 wetland in 1998 with continuous operation starting in 1999. The system, which consists of a dosing station at the outlet of the wetland, followed by a desiltation (settling) basin, meters ferric chloride into stormwater to enhance phosphorus removal prior to entering the lake. The ferric chloride removes nutrients from the water column, thereby reducing their availability to algal growth. As the ferric chloride dosed stormwater enters the desiltation basin the ferric chloride rapidly dissociates to form free iron which reacts with soluble phosphorus to form relatively insoluble iron-phosphorus complex (referred to as floc). The desiltation basin then provides an area where the floc can settle out through the water column and can be eventually removed.

The results from the monitoring of the system in 1999 indicated that there was significant reductions in the ortho-phosphorus load (41 percent) and some reduction in the total phosphorus load (21 percent) from the ditch prior to entering the lake (Prior Lake – Spring Lake Watershed District 2001). The watershed district has continued to monitor the effectiveness of the system.

While Spring Lake has been monitored by Metropolitan Council staff in the past, 2006 was the eighth year it has been involved in CAMP (the others being 1997 and 2000-2005). In 2006 the lake was monitored nine times between early-May and mid-September. On each monitoring event, the lake was monitored for TP, CLA, TKN, Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	76.2	37.0	197.0	D
CLA (µg/l)	37.9	1.0	65.0	C
Secchi (m)	1.4	0.8	3.0	C
TKN (mg/l)	1.41	0.69	2.30	
			Overall Grade	C

Historical data for Spring Lake indicates that the water quality of the basin has remained fairly constant over the past decade fluctuating between overall grades of C and D. Lake quality grades (see the lake's information sheet on the following page) show that when nutrient data were collected on the lake it corresponds to overall grades of C in 1981-1982, 2003 and 2005-2006, D in 1980, 1984, 1996-1997,

2000-2001, and 2004, and F in 2002. Because of the fluctuation in the lake's overall grades, no long-term trends are apparent. To better understand all aspects of the lake's water quality and what direction it may be heading, continued monitoring is suggested.

In an attempt to address issues either contributing to the eutrophication of Spring Lake or the symptoms from the resulting eutrophication, the Prior Lake - Spring Lake Watershed District has recently completed a Sustainable Water Quality Management Plan for its lakes (including Spring Lake). The Plan set goals addressing the lakes' biological and chemical make-up and developed implementation strategies enabling the lakes' goals to be met (PLSLWD 2004).

The physical and recreational conditions of Spring 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 mean summertime physical condition was 2.8 (between 2- "some algae present" and 3- "definite algae present"). The mean suitability for recreation ranking was 2.1 (between 2- "minor aesthetic problem" and 3- "swimming impaired").

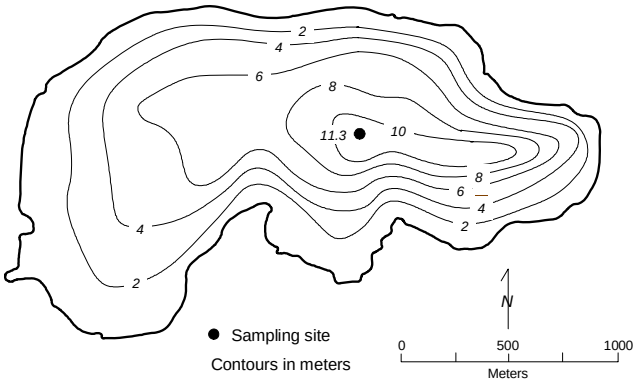
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

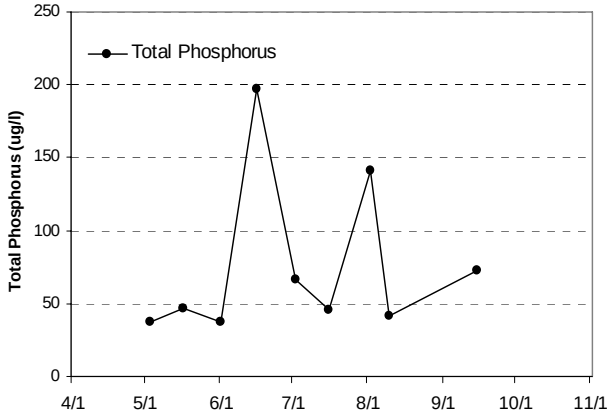
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

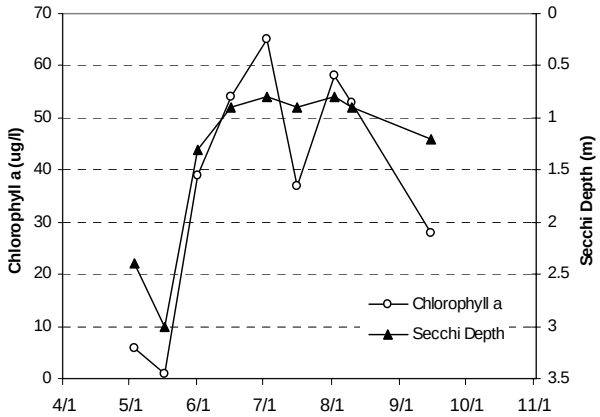
Spring Lake

Prior Lake/Spring Lake Twp., Scott Co.

Lake ID: 700054
WD: Prior Lake-Spring Lake
Volunteer: Bill Tisdell

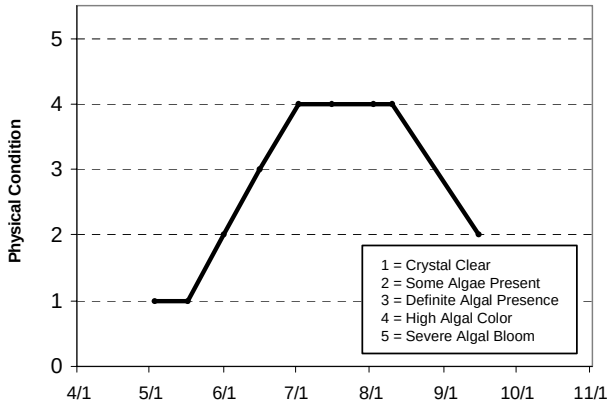






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/3/06	13.6				5.9	37		2.4	1	1
5/17/06	16.2				1	47		3	1	1
6/1/06	21.7				39	37		1.3	2	1
6/16/06	22.5				54	197		0.9	3	2
7/2/06	25				65	66		0.8	4	3
7/16/06	28				37	46		0.9	4	3
8/2/06	30				58	141		0.8	4	3
8/10/06	27				53	42		0.9	4	3
9/15/06	19				28	73		1.2	2	2

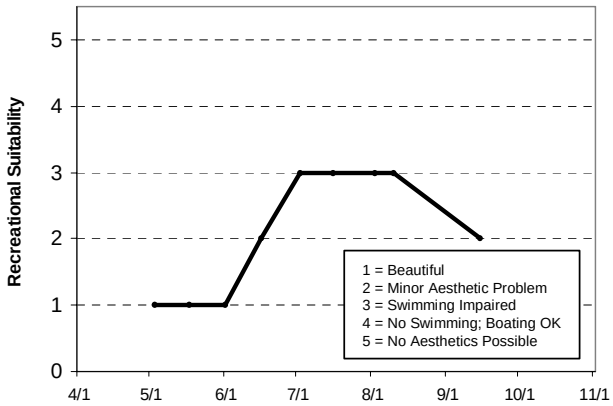


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
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	C
Overall	**D**	**C**	**C**		**D**								

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus				D	D			F	D	D	D	D	D	D
Chlorophyll a				C	C			D	D	F	C	D	C	C
Secchi Depth	C	C	C	D	D			C	D	F	C	D	C	C
Overall				**D**	**D**			**D**	**D**	**F**	**C**	**D**	**C**	**C**

Source: Metropolitan Council and STORET data



Square Lake (82-0046) *Marine on St. Croix Watershed Management Organization*

Square Lake, located in eastern May Township (Washington County), is a 193-acre lake (shoreline length of about 2.2 miles) with a maximum and mean depth of 20.7 and 9.0 m (68.0 and 29.5 feet), respectively, for an approximate lake volume of 5,694 ac-ft. About 65 percent of the lake's area is considered littoral (the 0-15 foot depth area dominated by aquatic vegetation). The lake can be accessed through the county park on the southeastern end of the lake. Because of its multi-recreational uses, it is considered a "Priority Lake" in the Metropolitan Area.

The lake is only one of five lakes in the seven-county metropolitan area stocked with trout (rainbows). The lake's level is maintained by a combination of groundwater and runoff from the lake's watershed (MDNR 1996).

The lake's watershed is small (about 782 acres) and rural. The watershed and lake size translate to a very small watershed-to-lake size ratio of 4:1 (the smaller the ratio the less the stress on the lake from surface runoff). The watershed is largely undeveloped; wetlands, parks and open spaces, grasslands and woodlands comprise about 70 percent of the watershed's area.

Square Lake, which was involved in CAMP in 1993-1997, and monitored by Council staff in 1998 (as an in-kind contribution to a Clean Water Partnership project on the lake), was a part of CAMP again from 1999-2006. The lake was monitored 14 times from mid-April to mid-October, 2006.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	19.4	11.0	34.0	A
CLA (µg/l)	3.5	1.5	5.3	A
Secchi (m)	5.2	4.0	6.9	A
TKN (mg/l)	0.55	0.46	0.78	
			Overall Grade	A

The lake's 2006 overall water quality grade calculated from the TP, CLA, and Secchi grades is identical to those recorded in 1993-2006. That said, a recent trend analysis by the MPCA on the lake's historical (1970-present) Secchi transparency database, revealed a statistically significant decline in recent water clarity.

The water quality graphs show seasonal trends in TP and CLA concentrations, and Secchi transparency for 2006, which closely resemble those of past years. In most metro area lakes, TP, CLA and Secchi transparency generally have a tightly linked relationship such that as TP concentrations increase, algal biomass increases resulting in higher CLA concentrations and lower water clarity. This issue is one that has been addressed as part of the Clean Water Partnership on the lake (Square Lake 2001).

As was mentioned in the previous Council lake reports, the data for Square Lake, shows that the above mentioned relationships are not exclusively dependent on each other. While the graphs show a correlation between CLA and Secchi transparency (clarity increases as CLA decreases and vice versa), TP seemed independent of the other two. An increase or decrease in TP does not automatically result in the same reaction in CLA concentration, which means that phosphorus is not the limiting factor in Square Lake's algal abundance. In fact, earlier Council studies have noted that the lake has lower CLA concentrations than would be expected based on its nutrient levels (Osgood 1981). The reason was discussed in a 1980 Council report and a more recent Clean Water Partnership report on Square Lake which both state that CLA is limited by the presence of large zooplankton (*Daphnia pulicaria*) which are herbivores that graze on algae and keep the lake's CLA concentrations in check. Therefore, the lake's excellent clarity is due to the presence of *Daphnia* rather than limited by nutrients.

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)

On each monitoring date, volunteers ranked their opinions of physical and recreational conditions of the lake on a 1-to-5 scale, which are graphed on the lake information sheet. The summertime mean recorded physical condition was 1.3 (between 1- "crystal clear" and 2- "some algae present"). The mean suitability for recreation ranking 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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

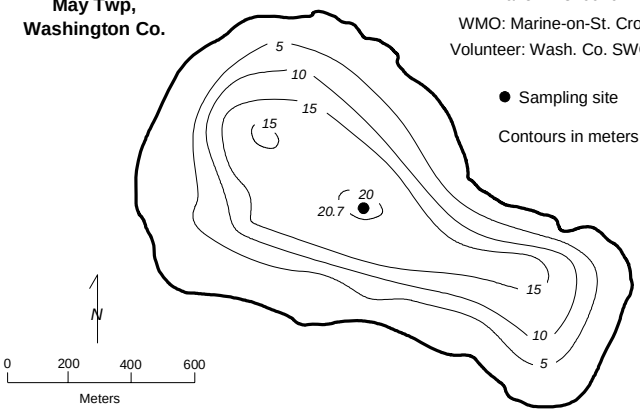
Square Lake

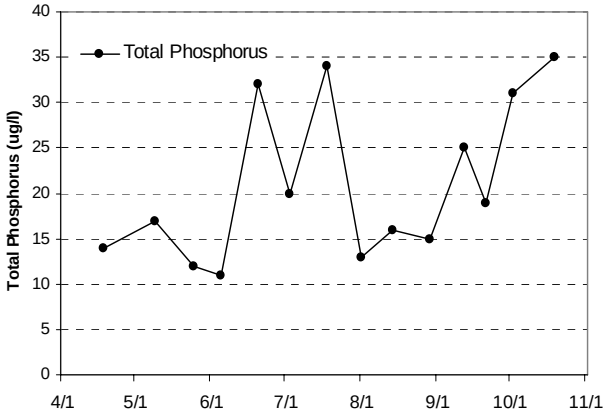
May Twp,
Washington Co.

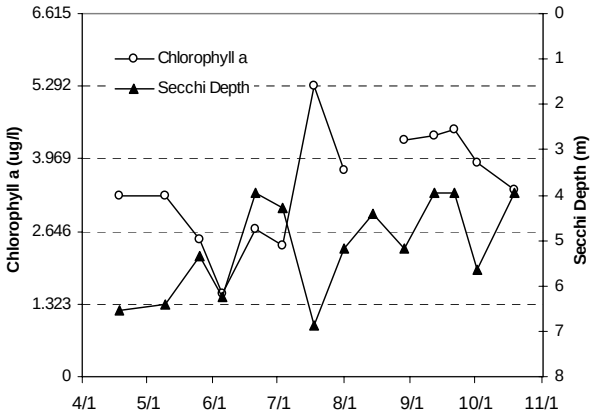
Lake ID: 820046
WMO: Marine-on-St. Croix
Volunteer: Wash. Co. SWCD

● Sampling site

Contours in meters

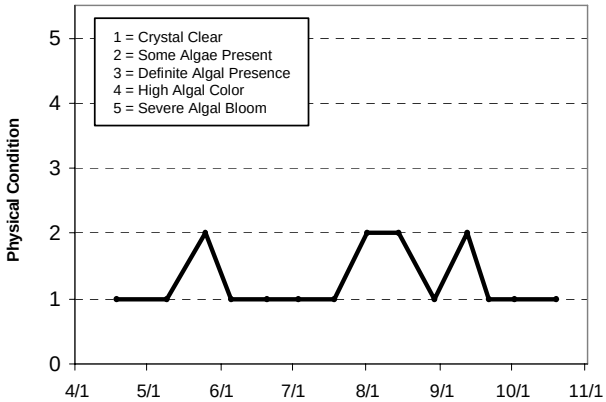






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/18/06	10	4.8	11.32	1.74	3.3	14		6.553	1	1
5/9/06	14.7	5.3	8.63	0.38	3.3	17		6.401	1	1
5/25/06	18.2		8.37		2.5	12		5.334	2	2
6/5/06	24.2		6.98		1.5	11		6.248	1	1
6/20/06	23.4	5.8	8.8	0.05	2.7	32		3.962	1	1
7/3/06	25.7	5.8	8.76	0.06	2.4	20		4.267	1	1
7/18/06	27	5.9	8.2	0.06	5.3	34		6.858	1	1
8/1/06	28.8	6.1	7.77	0.08	3.75	13		5.182	2	1
8/14/06	25.2	6	8.05	0.07		16		4.42	2	1
8/29/06	23.1	6.2	7.54	0.04	4.3	15		5.182	1	1
9/12/06	19.9	6.2	9.48	0.05	4.4	25		3.962	2	2
9/21/06	17.6	6.3	9.48	0.04	4.5	19		3.962	1	1
10/2/06	16.9	6.4	8.76	0.08	3.9	31		5.639	1	1
10/19/06	10.2	6.5	8.93	0.06	3.4	35		3.962	1	1

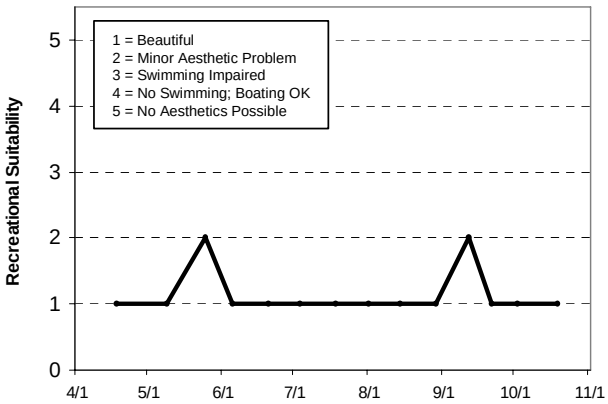


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus	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		
Overall	**A**	**A**	**A**	**A**	**A**	**A**				**A**			

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Chlorophyll a	A	A	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	A	A	A
Overall	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**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 (roughly 14 feet) and 2.1 m (seven feet), respectively. The mean depth of the lake and its surface area translate to an approximate lake volume of 165 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'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). There is no formal boat access point on the lake.

This was the seventh year that Staples Lake has been involved in CAMP (although just Secchi transparencies were collected in two of those years). A search through the STORET nationwide water quality database for data on the lake produced a limited amount of data. The only years in which data were found, other than the 2000-2006 CAMP data, was 1997-1999. The years which included TP, CLA and Secchi transparency data were 1997-2001 and 2004-2006.

The lake was monitored seven times between early-May and mid-October, 2006. During each event, the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. Results are presented in both graphs and data tables on the lake's information sheet on the following page.

2005 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	38.7	26.0	62.0	C
CLA (µg/l)	4.1	2.4	5.3	A
Secchi (m)	3.2	2.6	3.5	A
TKN (mg/l)	0.65	0.50	0.81	
			Overall Grade	B

The lake's 2006 overall water quality grade of B is the same as reported in 1997-2001 and 2004 and worse than that reported in 2005 (overall grade of A).

No statistically significant long-term trend is evident from the lake's water quality database, in the short-term however, the lake's quality seems well represented by an overall grade of B. To better understand the lake's overall water quality and where 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 1.7 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Staples Lake
May Twp., Washington Co.

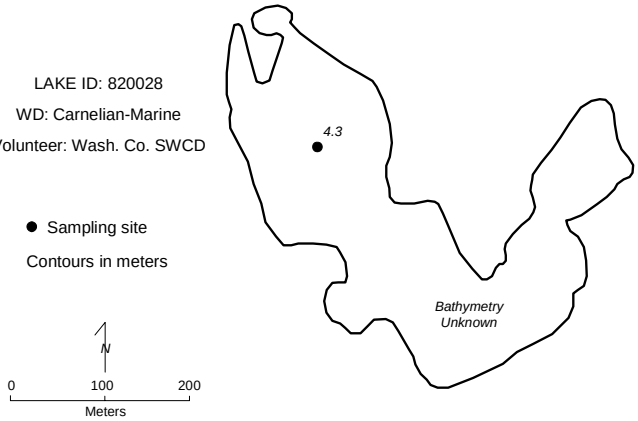
LAKE ID: 820028

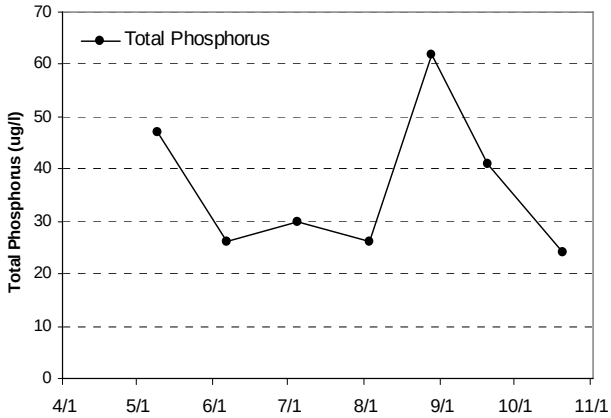
WD: Carnelian-Marine

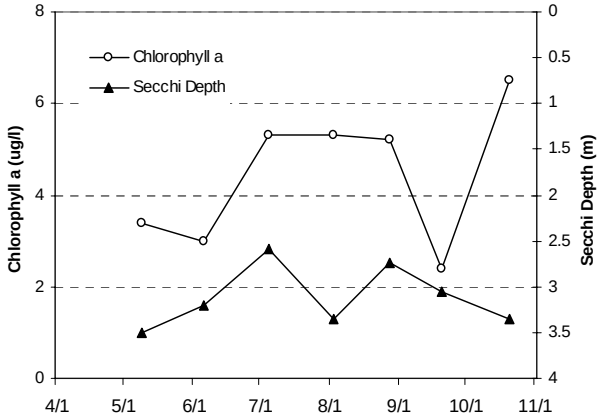
Volunteer: Wash. Co. SWCD

● Sampling site

Contours in meters

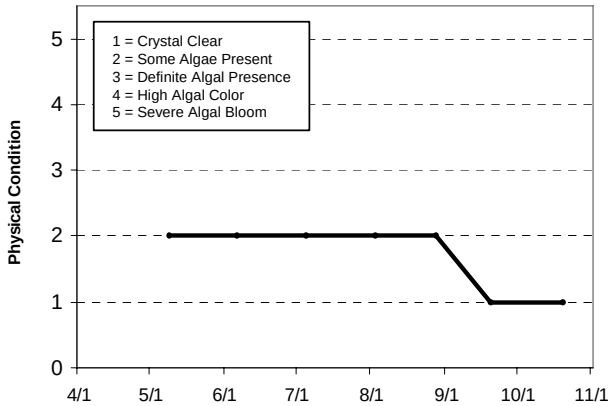






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/9/06	18.4	15.4	7.16	7.6	3.4	47		3.505	2	2
6/6/06	24.8	21.1	5.07	0.42	3	26		3.2	2	2
7/5/06	25.7	22.7	7.22	0.14	5.3	30		2.591	2	2
8/3/06	27.1	25	4.72	0.07	5.3	26		3.353	2	3
8/28/06	23	21.4	4.94	0.09	5.2	62		2.743	2	2
9/20/06	17.2		7.67		2.4	41		3.048	1	1
10/20/06	7.4		10.7		6.5	24		3.353	1	2

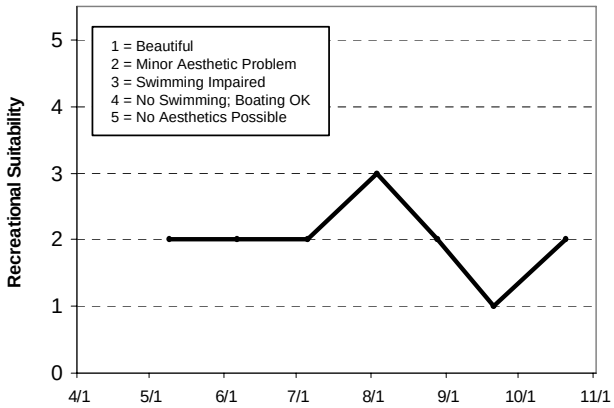


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus					B	A	A	C	B			C	A	C
Chlorophyll a					C	B	B	B	B			A	A	A
Secchi Depth					B	B	B	B	B	B	C	B	B	A
Overall					**B**	**B**	**B**	**B**	**B**			**B**	**A**	**B**

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 2006. 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)

This marks the second 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 2005-2006 period, and for one site (Kinnickinnic Pool-Site 7) during the 2000-2001 and 2005-2006 period. All data are available in STORET.

As part of this report, the lake will first be discussed as a combined "whole" lake system, and then will be followed by sections on each of the five sites individually.

On each sampling event, the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	39.0	23.0	64.0	C
CLA (µg/l)	16.7	3.2	32.0	B
Secchi (m)	1.7	1.0	2.4	C
TKN (mg/l)	0.59	0.36	0.92	
			Overall Grade	C

The whole lake's 2006 overall grade of a "C" (the lake grading system is detailed on page 9 of this report), is identical to those recorded in 1999-2002 and 2005. 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. Because of the limited nature of the lake's database however, it is not possible to determine any long-term or short-term trends. 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	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*
Total Phosphorus							D	D	C	C			C	C
Chlorophyll a							B	C	C	C			B	B
Secchi Depth							C	C	C	C			C	C
Overall							**C**	**C**	**C**	**C**			**C**	**C**

Source: Metropolitan Council and STORET data

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 1.9 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 (MNDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MNDNR 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.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 10 times between late-May and mid-October, 2006. 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.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	49.0	33.0	64.0	C
CLA (µg/l)	22.5	14.0	32.0	C
Secchi (m)	1.5	1.1	1.8	C
TKN (mg/l)	0.62	0.47	0.70	
			Overall Grade	C

The site's 2006 overall grade (C) is identical to those recorded in 1999-2001 and 2005, and better than the D recorded in 2002. Because of the limited nature of the sites database however, it is not possible to determine any long-term or short-term trends. 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 2.2 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 (MNDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MNDNR Fisheries Section by calling (651) 297-4916 or by downloading the information off the internet at http://www.dnr.state.mn.us/lakefind/.

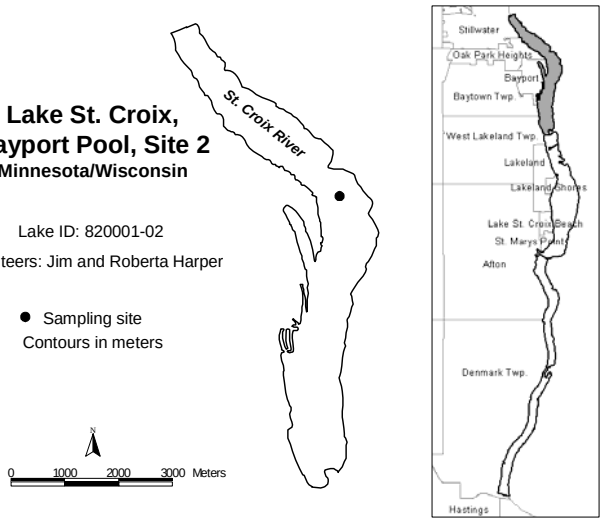
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

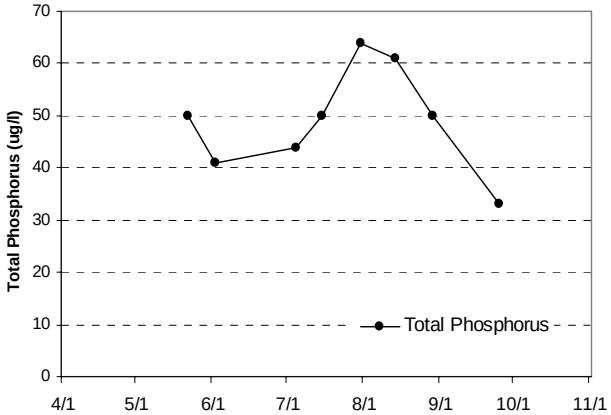
Lake St. Croix, Bayport Pool, Site 2
Minnesota/Wisconsin

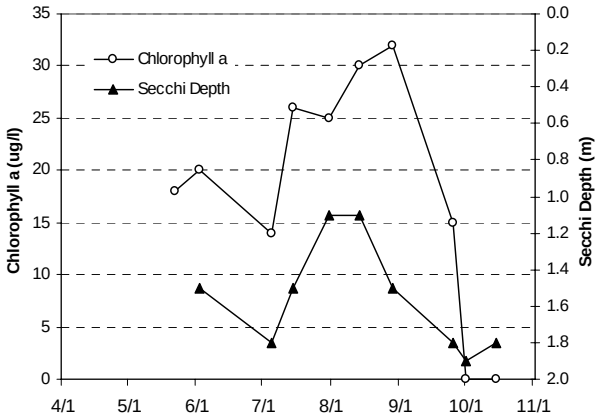
Lake ID: 820001-02

Volunteers: Jim and Roberta Harper

● Sampling site
Contours in meters

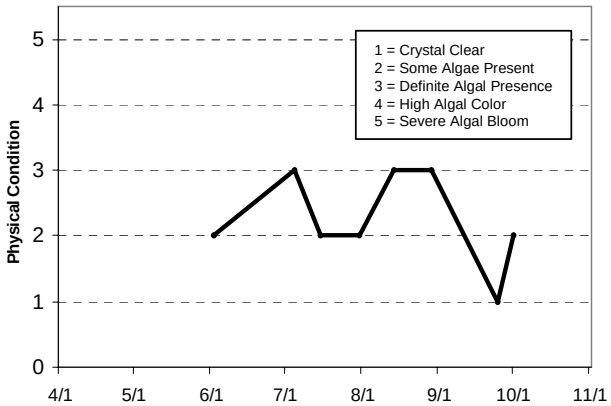






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/22/06					18	50				
6/2/06	26.5				20	41		1.5	2	
7/5/06	25.2				14	44		1.8	3	2
7/15/06	28.1				26	50		1.5	2	2
7/31/06	29.4				25	64		1.1	2	2
8/14/06	25.4				30	61		1.1	3	3
8/29/06	23.0				32	50		1.5	3	2
9/25/06	16.2				15	33		1.8	1	1
10/1/06	15.8							1.9	2	2
10/15/06	10.1							1.8		2

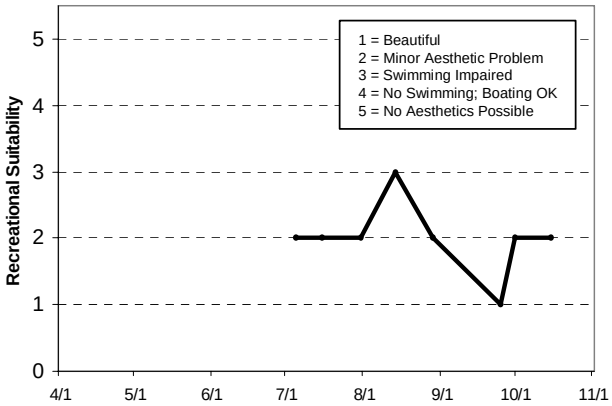


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus							C	D	D	D			C	C
Chlorophyll a							B	C	C	C			C	C
Secchi Depth							C	C	C	D			C	C
Overall							**C**	**C**	**C**	**D**			**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 nine times between late-May and early-October, 2006. 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.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	41.0	30.0	53.0	C
CLA (µg/l)	17.7	4.7	28.0	B
Secchi (m)	1.5	1.2	2.0	C
TKN (mg/l)	0.62	0.36	0.92	
			Overall Grade	C

The site's 2006 overall grade (C) is identical to those recorded in 1999-2001 and 2005, and better than the D recorded in 2002.

Because of the limited nature of the site's database, it is not possible to determine any long-term or short-term trends. 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 1.2 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 (MNDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MNDNR Fisheries Section by calling (651) 297-4916 or by downloading the information off the internet at http://www.dnr.state.mn.us/lakefind/.

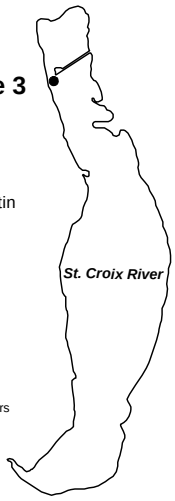
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

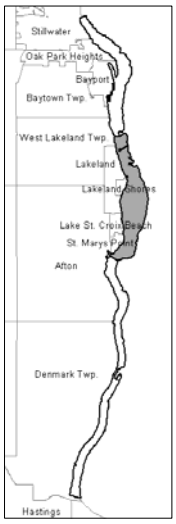
Lake St. Croix, Troy Beach Pool, Site 3
Minnesota/Wisconsin

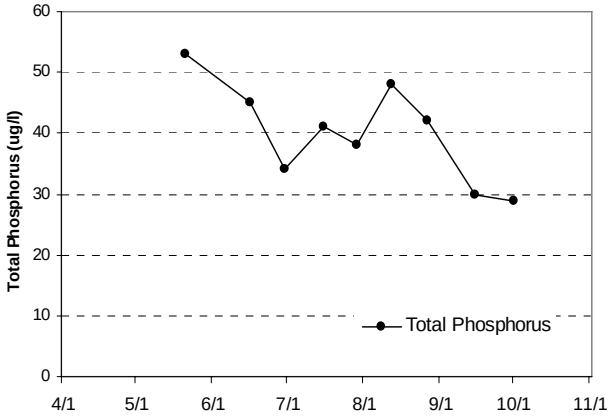
Lake ID: 820001-03

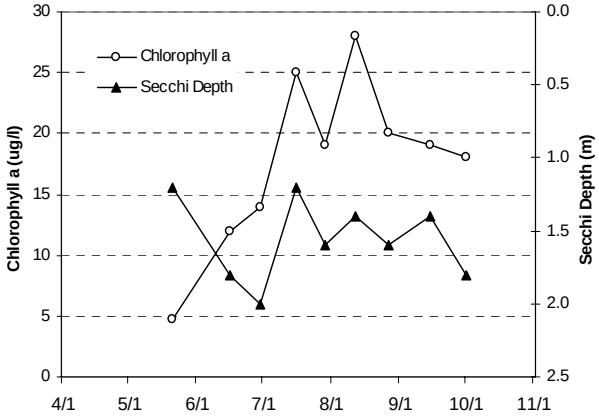
Volunteers: Cecilia and Harry Martin

● Sampling site
Contours in meters



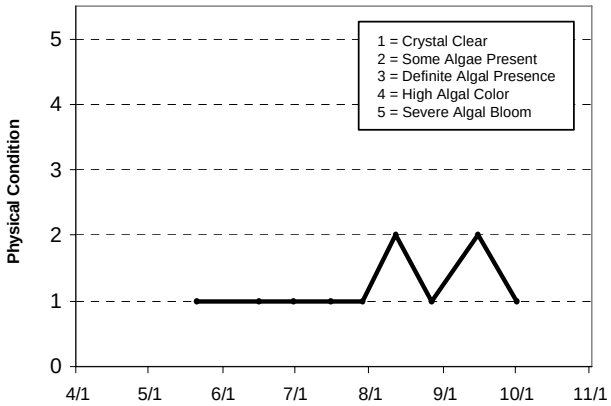






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/21/06	16.0				4.7	53		1.2	1	2
6/16/06	22.2				12	45		1.8	1	1
6/30/06	25.1				14	34		2.0	1	1
7/16/06	26.6				25	41		1.2	1	2
7/29/06	28.1				19	38		1.6	1	1
8/12/06	25.9				28	48		1.4	2	2
8/27/06	24.8				20	42		1.6	1	1
9/15/06	18.9				19	30		1.4	2	2
10/1/06	15.7				18	29		1.8	1	1

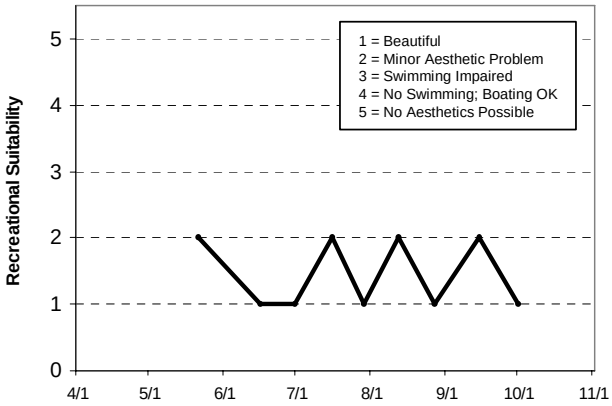


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus							D	D	D	D			C	C
Chlorophyll a							B	C	C	C			B	B
Secchi Depth							D	C	C	D			C	C
Overall							**C**	**C**	**C**	**D**			**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 10 times between late-May and late-September, 2006. 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.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	35.0	29.0	47.0	C
CLA (µg/l)	16.7	8.4	24.0	B
Secchi (m)	1.9	1.4	2.2	C
TKN (mg/l)	0.50	0.37	0.60	
			Overall Grade	C

The lake's 2006 overall grade (C) is identical to those recorded in 1999-2002 and 2005.

Because of the limited nature of the site's database, it is not possible to determine any long-term or short-term trends. 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 1.6 for physical condition (between 1- "crystal clear" and 2- "some algae present"), and 1.2 for recreational suitability (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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Lake St. Croix, Troy Beach Pool, Site 5

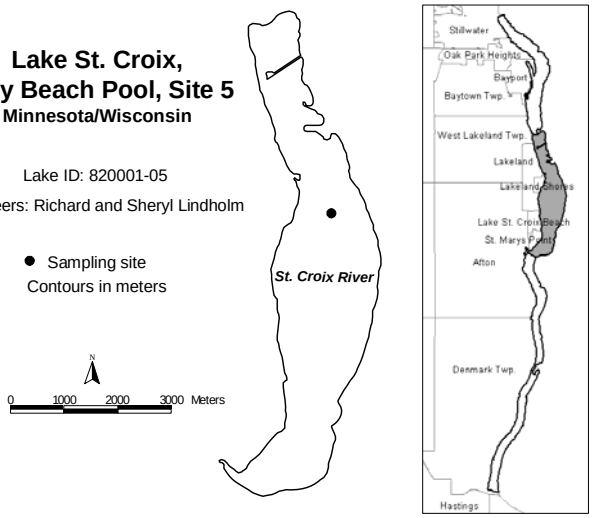
Minnesota/Wisconsin

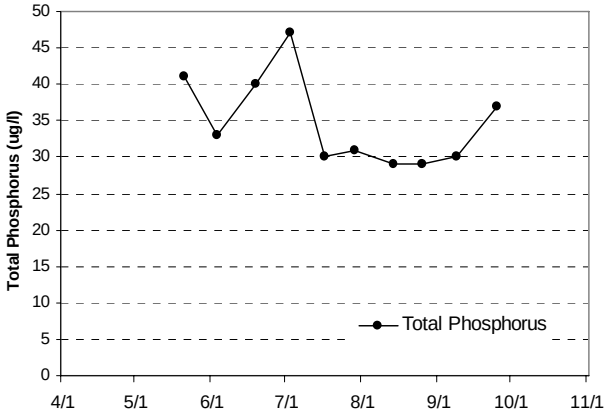
Lake ID: 820001-05

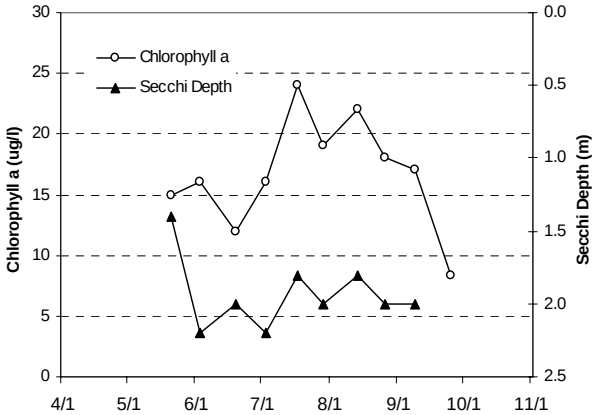
Volunteers: Richard and Sheryl Lindholm

● Sampling site

Contours in meters

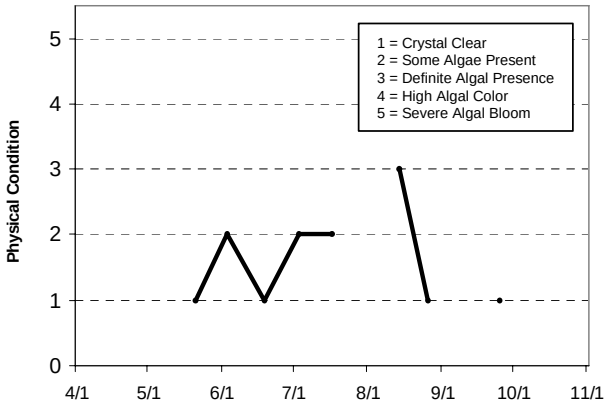






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/21/06	15.3				15	41		1.4	1	1
6/3/06	25.4				16	33		2.2	2	1
6/19/06	23.8				12	40		2.0	1	1
7/3/06	26.3				16	47		2.2	2	1
7/17/06	28.2				24	30		1.8	2	1
7/29/06	28.4				19	31		2.0		1
8/14/06	26.6				22	29		1.8	3	2
8/26/06	23.8				18	29		2.0	1	1
9/9/06	21.9				17	30		2.0		2
9/25/06	17.4				8.4	37			1	1

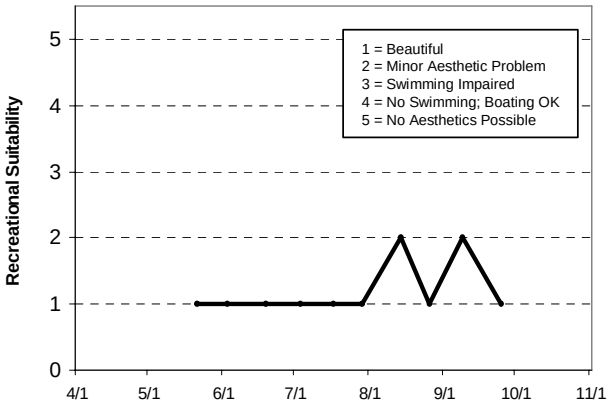


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus							D	D	C	C			C	C
Chlorophyll a							B	C	C	C			C	B
Secchi Depth							C	C	C	C			C	C
Overall							**C**	**C**	**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 late-May and late-September, 2006. 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.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	38.0	26.0	53.0	C
CLA (µg/l)	13.8	7.3	23.0	B
Secchi (m)	1.9	1.4	2.4	C
TKN (mg/l)	0.61	0.47	0.90	
			Overall Grade	C

The lake's 2006 overall grade (C) is identical to those recorded in 1999-2002 and 2005.

Because of the limited nature of the site's database, it is not possible to determine any long-term or short-term trends. 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 2.4 for recreational suitability (between 2- "minor aesthetic problem" and 3- "swimming impaired").

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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

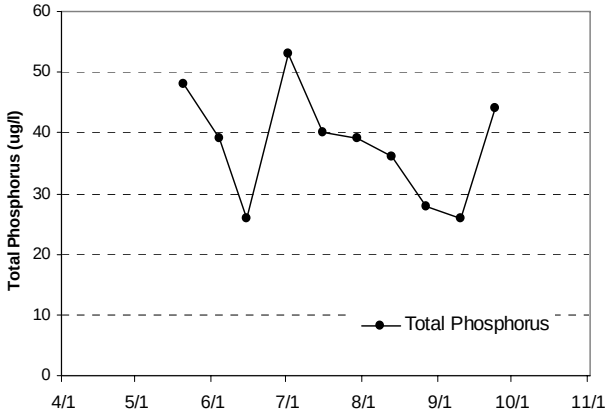
Lake St. Croix, Black Bass Pool, Site 6
Minnesota/Wisconsin

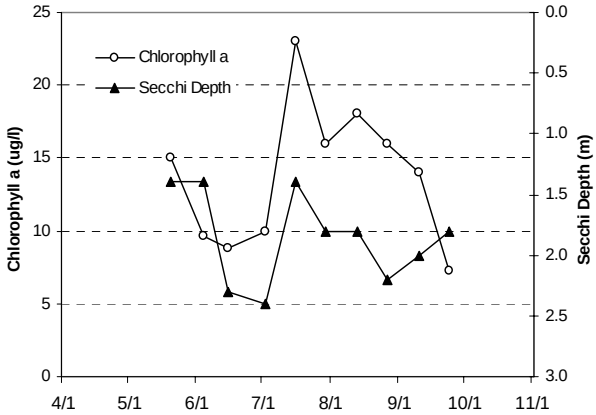
Lake ID: 820001-06

Volunteer: Rick Meierotto

● Sampling site

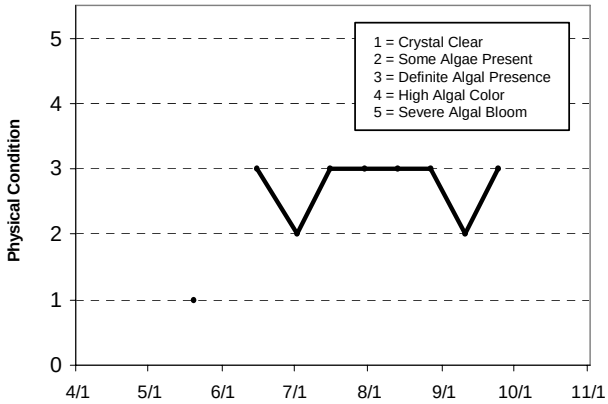
Contours in meters





2006 Data

Date	Surf. Tmp C	Bot. Tmp C	Surf. DO mg/L	Bot. DO mg/L	CLA ug/L	Surf. TP ug/L	Bot. TP ug/L	Secchi M	PC 1 thru 5	RS 1 thru 5
5/20/06	15.4				15	48		1.4	1	2
6/4/06	24.1				9.6	39		1.4		
6/15/06	24.1				8.8	26		2.3	3	2
7/2/06	25.4				10	53		2.4	2	2
7/16/06	26.6				23	40		1.4	3	3
7/30/06	27.9				16	39		1.8	3	3
8/13/06	25.6				18	36		1.8	3	2
8/27/06	25.1				16	28		2.2	3	3
9/10/06	21.1				14	26		2.0	2	2
9/24/06	17.9				7.3	44		1.8	3	3

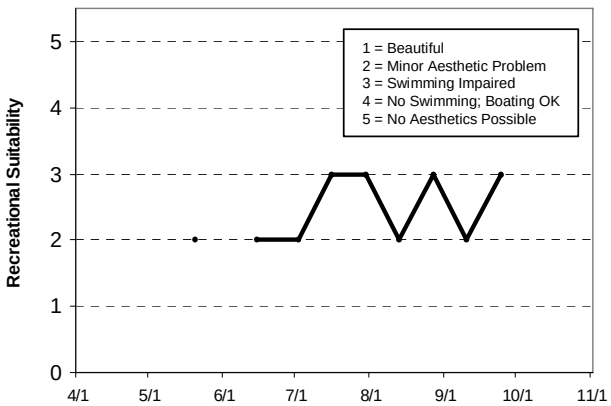


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus							C	C	C	C			C	C
Chlorophyll a							B	C	B	C			B	B
Secchi Depth							C	C	C	C			C	C
Overall							**C**	**C**	**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 eight times between early-June and late-September, 2006. 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.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	31.0	23.0	38.0	B
CLA (µg/l)	13.5	3.2	21.0	B
Secchi (m)	1.6	1.2	1.9	C
TKN (mg/l)	0.61	0.37	0.85	
			Overall Grade	B

The lake's 2006 overall grade of B is better than the C recorded in 2000 and the same as the grade reported in 2005.

Because of the limited nature of the site's database, it is not possible to determine any long-term or short-term trends. 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 2.0 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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Lake St. Croix, Kinnickinnic Pool, Site 7

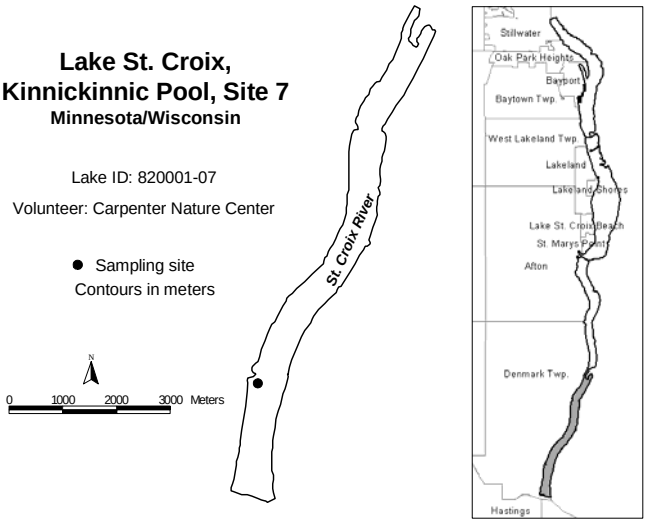
Minnesota/Wisconsin

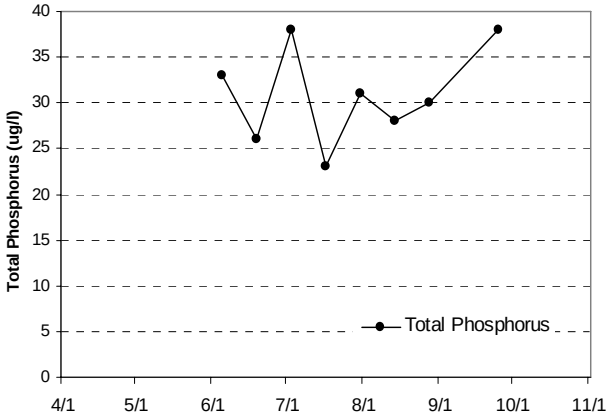
Lake ID: 820001-07

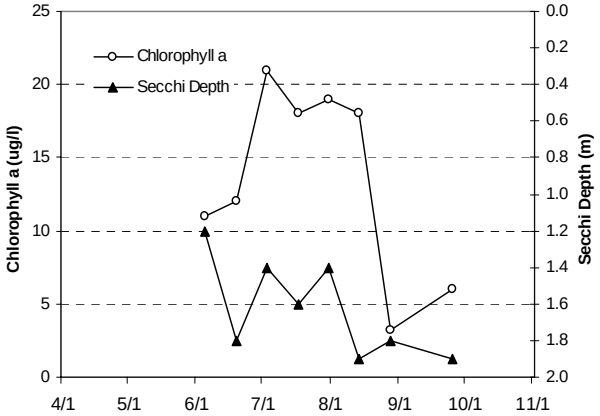
Volunteer: Carpenter Nature Center

● Sampling site

Contours in meters

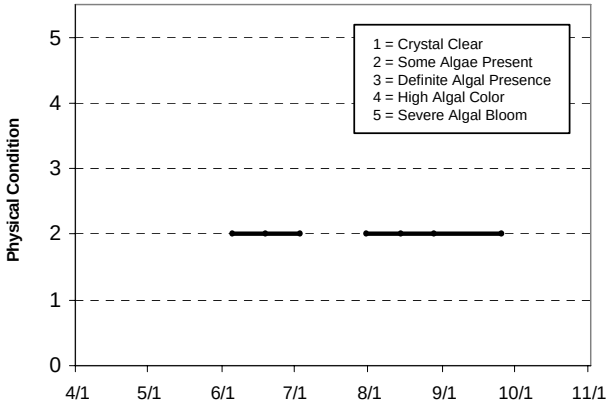






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
6/5/06	26.2				11	33		1.2	2	2
6/19/06	25.0				12	26		1.8	2	2
7/3/06	27.9				21	38		1.4	2	2
7/17/06	30.0				18	23		1.6		2
7/31/06	30.7				19	31		1.4	2	2
8/14/06	26.9				18	28		1.9	2	2
8/28/06	23.8				3.2	30		1.8	2	2
9/25/06	19.0				6.0	38		1.9	2	2

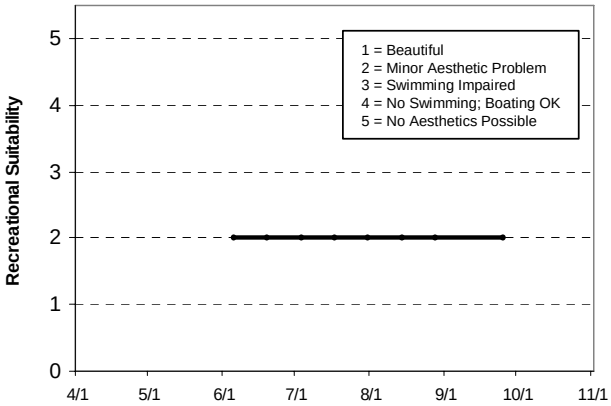


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus								C	D				B	B
Chlorophyll a								B	B				B	B
Secchi Depth								C	NA				C	C
Overall								**C**					**B**	**B**

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), with a maximum depth of 15.9 m (roughly 52 feet). There is very little other known morphological data available for the lake.

This marks the third year in which St. Joe Lake has been involved in CAMP. A search through the STORET nationwide water quality database for historic data on the lake was provided only two years of Secchi transparency data (1994 and 1996). Nutrient data are only available for 2004-2006 are the only years of nutrient data. 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 lake was monitored nine times between early-June and mid-September, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	***Mean***	***Minimum***	***Maximum***	***Grade***
TP (µg/l)	38.9	15.0	103.0	C
CLA (µg/l)	7.9	4.0	15.0	A
Secchi (m)	2.7	1.9	3.2	B
TKN (mg/l)	0.68	0.37	1.40	
			Overall Grade	B

The lake's 2006 overall grade of B is worse than the overall grades reported in 2004 and 2005. As mentioned earlier, there is very little water quality data available for other than the two years of mid-1990's Secchi data and the 2004-2006 CAMP data (both received an overall grade of A). Therefore it is not possible to determine any long-term or short-term trends. 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 1.2 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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

St. Joe's Lake

Chanhassen, Carver Co.

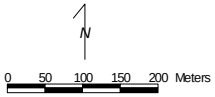
LAKE ID: 100011

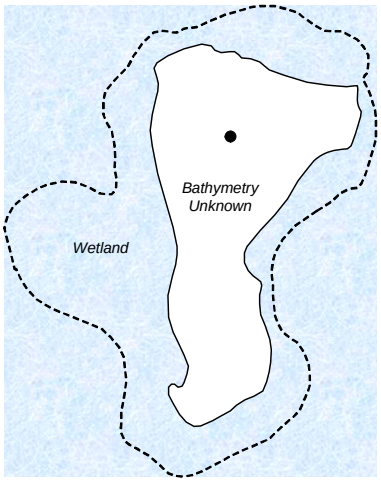
WD: Minnehaha Creek

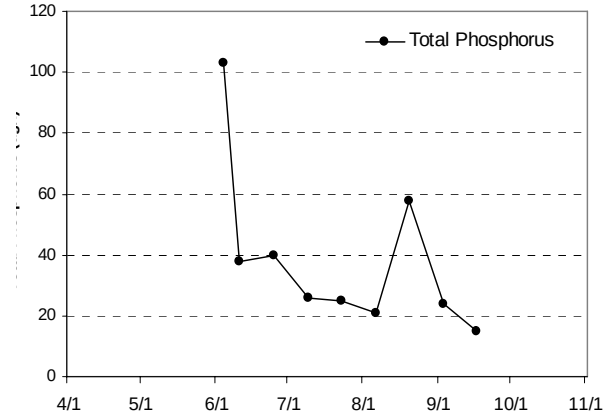
Volunteers: Sue Morgan and Linda Scott

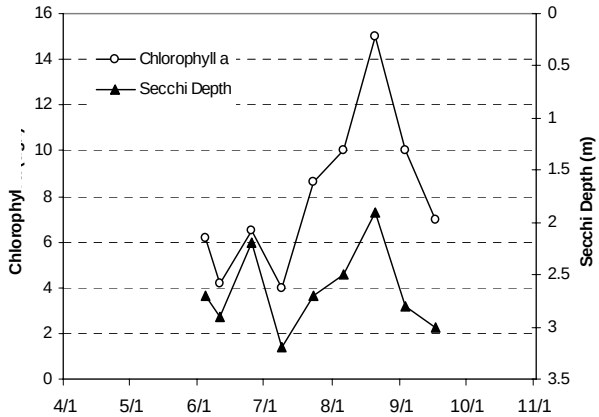
● Sampling site

Contours in meters



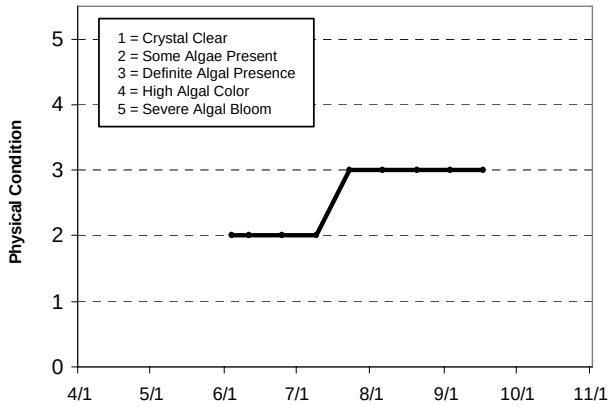






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
6/4/06	24.6				6.2	103		2.7	2	1
6/11/06	20.3				4.2	38		2.9	2	1
6/25/06	24				6.5	40		2.2	2	1
7/9/06	25.4				4	26		3.2	2	1
7/23/06	26				8.6	25		2.7	3	2
8/6/06	27.1				10	21		2.5	3	2
8/20/06	24.5				15	58		1.9	3	1
9/3/06	22.6				10	24		2.8	3	1
9/17/06	20.4				7	15		3	3	1

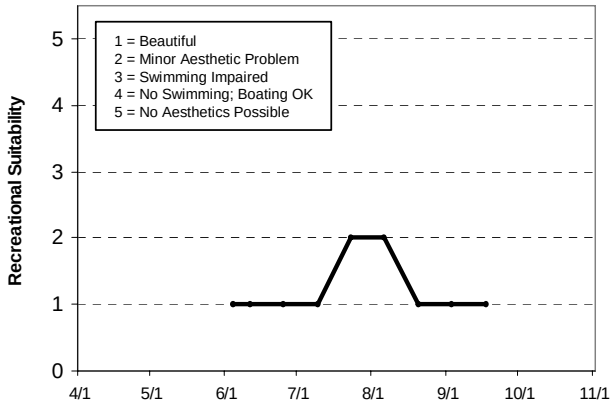


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus												A	A	C
Chlorophyll a												A	A	A
Secchi Depth		C		B								B	A	B
Overall												**A**	**A**	**B**

Source: Metropolitan Council and STORET data



Success Lake (27-0634) *Shingle Creek Watershed Management Commission*

Two thousand and six marks the third year of CAMP monitoring in Success Lake, located in the City of Brooklyn Park (Hennepin County). The lake was also monitored in 1996 and 2003. The lake was monitored 11 times between mid-May and mid-October, 2006. On each monitoring event, the lake was monitored for TP, CLA, TKN, Secchi transparency, as well as the lake's perceived physical condition and recreational suitability Results are presented on graphs and data tables on the following page.

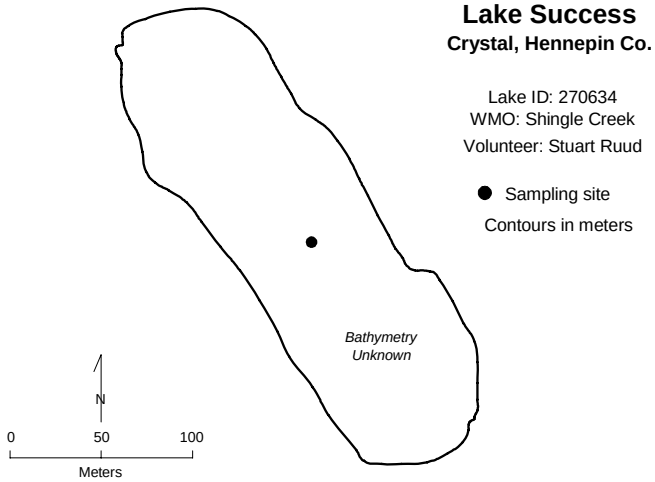
2006 summer (May-September) data summary

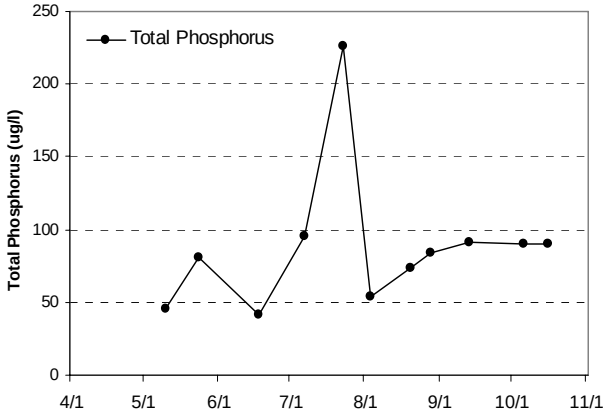
Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	87.4	42.0	226.0	D
CLA (µg/l)	16.4	4.3	33.0	B
Secchi (m)	1.0	0.7	1.4	D
TKN (mg/l)	1.34	0.98	2.40	
			Overall Grade	C

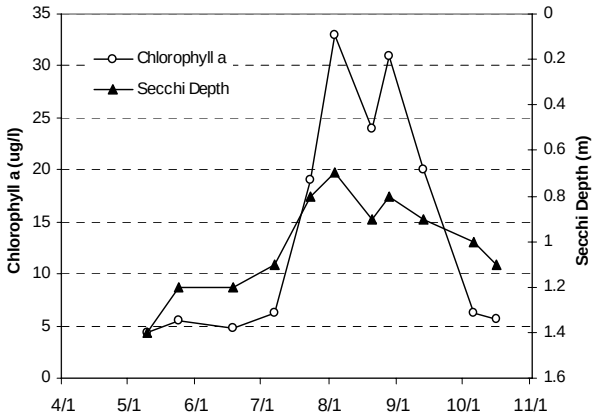
The overall 2006 lake quality grade of C was determined from the individual parameter grades. Because 1996 and 2003 are the only years of available data, no long- or short-term trends can be determined. To better understand the quality of the lake and what direction it may be heading, more years of data collection are needed.

Throughout the monitoring period, the volunteers ranked the perceived physical condition of the lake on a 1-to-5 scale. The mean perceived physical condition of the north basin of Success Lake was 2.5 (between 2- "some algae present" and 3- "definite algae present"), while the mean recreational suitability was 3.0 (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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

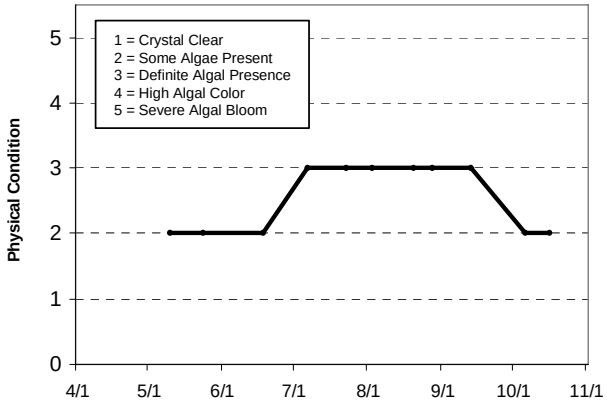






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/10/06	23.2				4.3	46		1.4	2	2
5/24/06	24.8				5.5	81		1.2	2	2
6/18/06	26.5				4.8	42		1.2	2	2
7/7/06	27.2				6.2	95		1.1	3	3
7/23/06	27.1				19	226		0.8	3	3
8/3/06	27.3				33	54		0.7	3	3
8/20/06	24.7				24	74		0.9	3	3
8/28/06	20.1				31	84		0.8	3	4
9/13/06	15				20	91		0.9	3	4
10/6/06	12.2				6.2	90		1	2	4
10/16/06	9.3				5.7	90		1.1	2	3

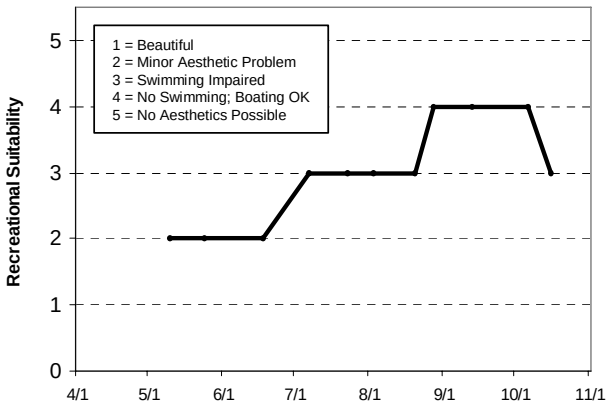


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus				B							C			D
Chlorophyll a				A							B			B
Secchi Depth				B							D			D
Overall				**B**							**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 within Lake Elmo (Washington County). 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. There is very little known morphological data available for the lake.

This marks the third year in which Sunfish Lake has been involved in CAMP (2000 and 2005 being the others). A search through the STORET nationwide water quality database for historic data on the lake produced only the forementioned CAMP data. Therefore, 2000, 2005 and 2006 are the only known years of available data. 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 lake was monitored 11 times between mid-April and mid-October, 2006. The resulting data and graphs appear on the next page.

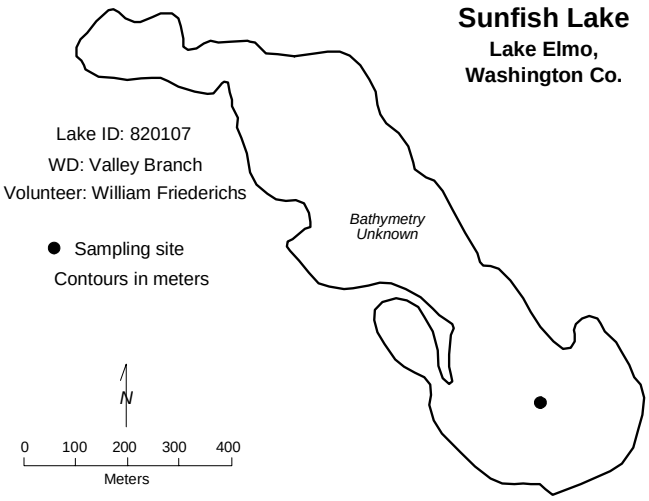
2006 summer (May-September) data summary

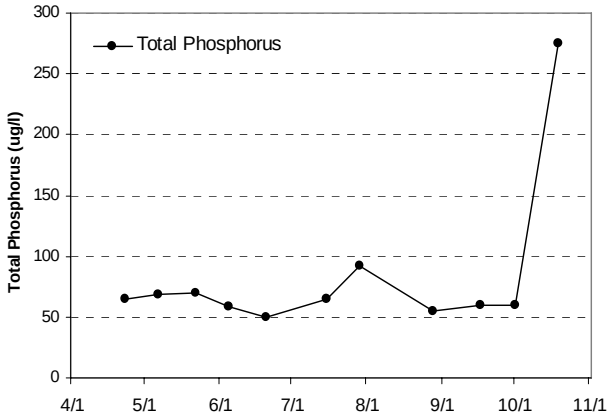
Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	64.9	50.0	92.0	C
CLA (µg/l)	41.8	25.0	58.0	C
Secchi (m)	0.42	0.4	0.50	F
TKN (mg/l)	1.61	1.30	1.90	
			Overall Grade	D

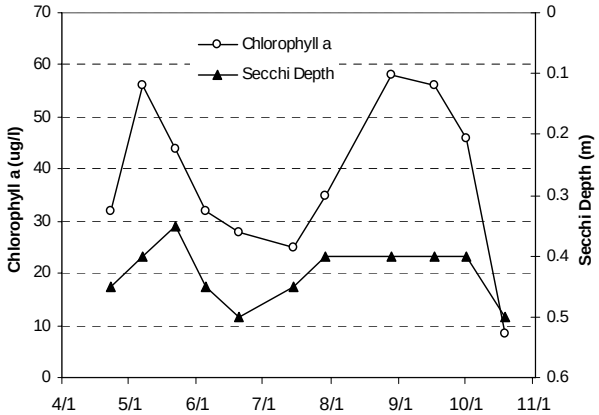
The lake's 2006 overall grade of D is similar to than reported in 2005 and worse than the C recorded in 2000. As mentioned earlier, there are no water quality data available for Sunfish Lake other than the 2000 and 2005-2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. 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, volunteer(s) typically rank their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. No user perceptions were reported for this lake.

If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

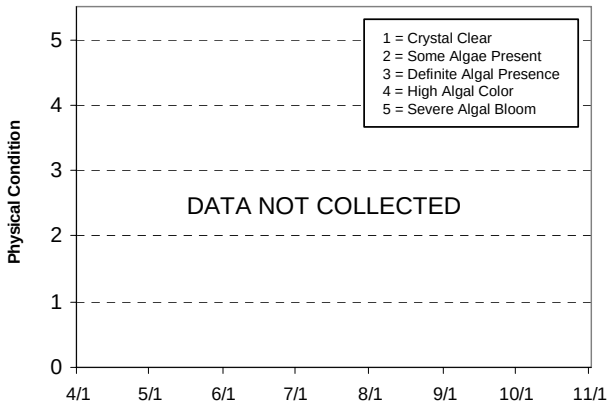






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/23/06	15.3				32	65		0.45		
5/7/06	15.8				56	69		0.4		
5/22/06	18.4				44	70		0.35		
6/5/06	25.2				32	58		0.45		
6/20/06	24.8				28	50		0.5		
7/15/06	28.8				25	65		0.45		
7/29/06	28.9				35	92		0.4		
8/28/06	22.9				58	55		0.4		
9/17/06	20.8				56	60		0.4		
10/1/06	16				46	60		0.4		
10/19/06	9				8.5	275		0.5		

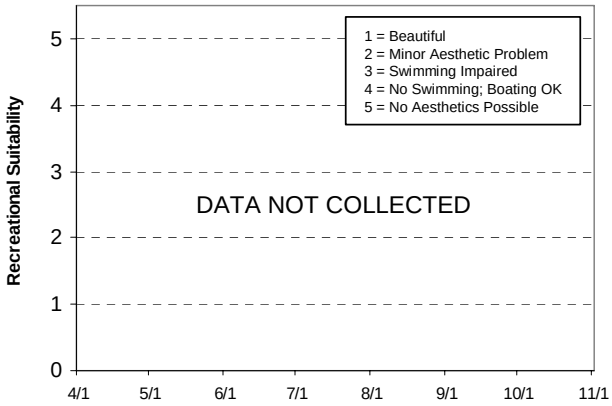


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus								C					C	C
Chlorophyll a								C					C	C
Secchi Depth								D					F	F
Overall								**C**					**D**	**D**

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). There is very little known morphological data available for the lake.

This was the first year that Sunfish Lake (Sunfish 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 Secchi depth information for 1984-1986 and 1991 therefore 2006 is the only year of available water quality data for the lake.

As part of the city's involvement in CAMP in 2006, the lake was monitored 13 times between late-April and mid-October. During each sampling event the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	***Mean***	***Minimum***	***Maximum***	***Grade***
TP (µg/l)	62.4	35.0	112.0	C
CLA (µg/l)	31.6	6.0	81.0	C
Secchi (m)	1.1	0.6	2.2	D
TKN (mg/l)	1.34	0.68	2.00	
			Overall Grade	C

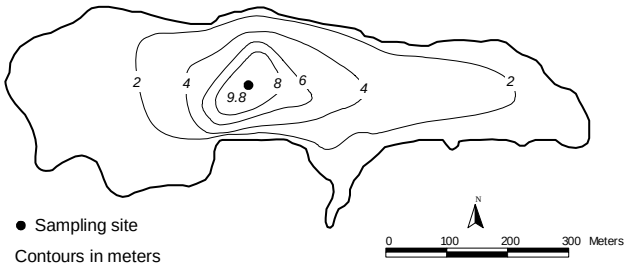
As mentioned earlier, there are no nutrient data available for Sunfish Lake other than the 2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

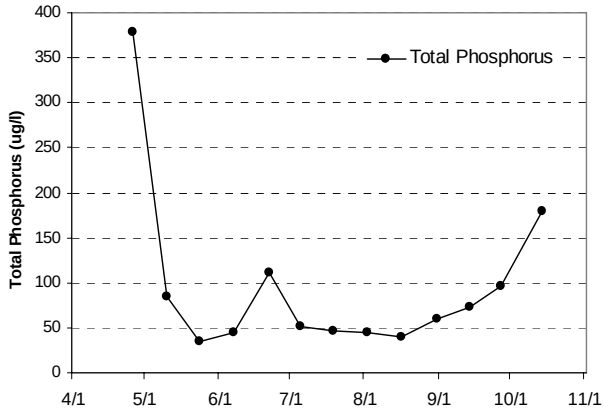
The perceived physical and recreational conditions (ranked on a 1-to-5 scale) are shown on the lake's information sheet on the next page. The average user perception rankings, were 2.3 for physical condition (between 2- "some algae present" and 3- "definite algae present"), and 1.2 for recreational suitability (between 1- "beautiful" and 2- "minor aesthetic problem").

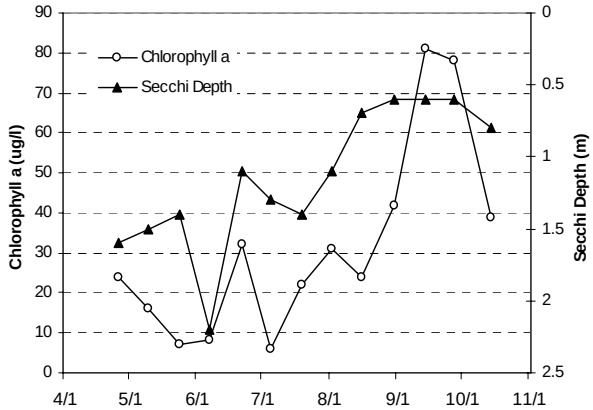
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Sunfish Lake
Sunfish Lake, Dakota Co.

Lake ID: 190050
WMO: Lower Mississippi River
Volunteer: Dick Bancroft

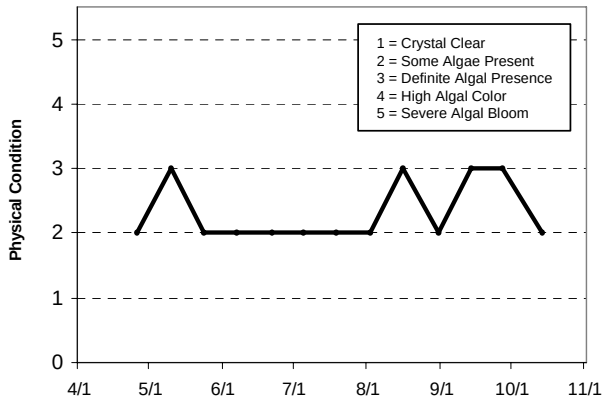






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/26/06	16.1				24	378		1.6	2	1
5/10/06	17.3				16	84		1.5	3	3
5/24/06	20.5				7.1	35		1.4	2	1
6/7/06	24.9				8.3	44		2.2	2	1
6/22/06	25.5				32	112		1.1	2	1
7/5/06	26.4				6	51		1.3	2	1
7/19/06	26.3				22	47		1.4	2	1
8/2/06	29				31	44		1.1	2	1
8/16/06	27.6				24	40		0.7	3	1
8/31/06	24.5				42	60		0.6	2	1
9/14/06	18.5				81	73		0.6	3	1
9/27/06	16				78	97		0.6	3	1
10/14/06	9.3				39	180		0.8	2	1

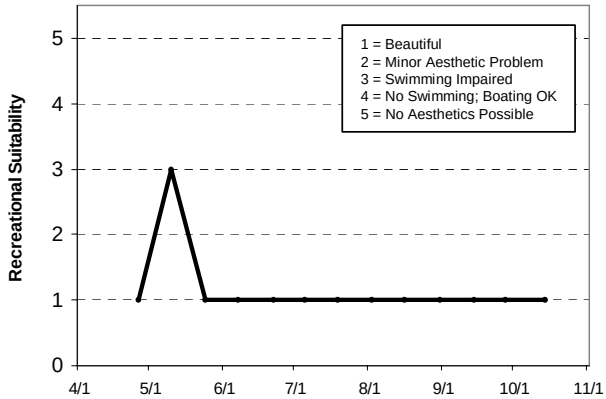


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth					C	C	C					C	
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus														C
Chlorophyll a														C
Secchi Depth														D
Overall														**C**

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, and 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).

This was the seventh year in which Sunnybrook Lake has been involved in CAMP (1999 and 2001-2005 being the others). The lake was monitored 14 times between mid-April and mid-October, 2006. Other than for the 1999 and 2001-2006 CAMP data, a search through the STORET nationwide water quality database for data on the lake came up empty. Thus, 1999 and 2001-2006 are the only years of available data.

During each monitoring event, the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. Results are presented on graphs and data tables on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	25.9	16.0	47.0	B
CLA (µg/l)	5.8	2.7	12.0	A
Secchi (m)	2.4	1.7	3.1	B
TKN (mg/l)	1.09	0.67	3.30	
			Overall Grade	B

The lake's 2006 overall lake quality grade is identical to those recorded in 2001-2005, and better than the C in 1999.

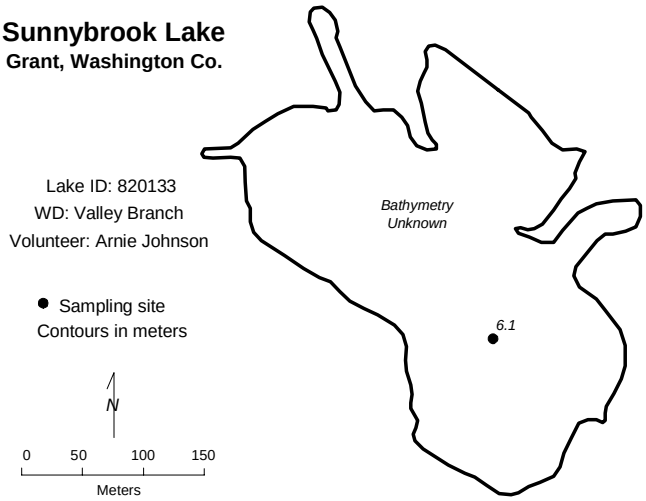
As mentioned earlier, there are no water quality data available for Sunnybrook Lake other than the 1999 and 2001-2006 CAMP data. Therefore it is not possible to determine any long-term trends. In the short-term however, the lakes water quality seems well represented by an overall grade of B. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

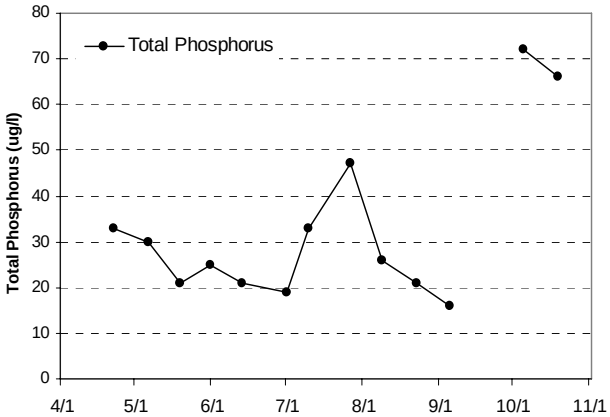
The perceived physical and recreational conditions (ranked on a 1-to-5 scale) are shown on the lake's information sheet on the next page. The average user perception rankings, on a 1-to-5 scale, were 1.7 for physical condition (between 1- "crystal clear" and 2- "some algae present"), and 1.3 for recreational suitability (between 1- "beautiful" and 2- "minor aesthetic problem").

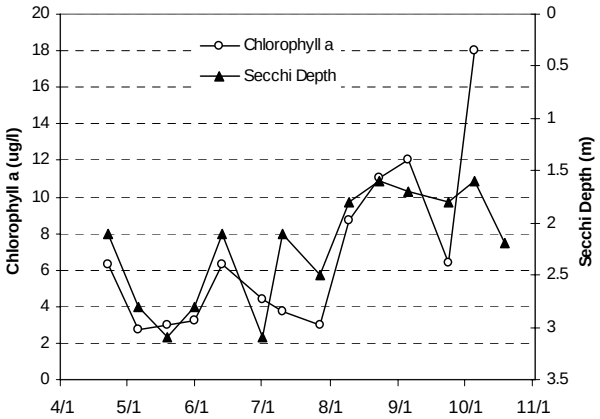
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Sunnybrook Lake
Grant, Washington Co.

Lake ID: 820133
WD: Valley Branch
Volunteer: Arnie Johnson

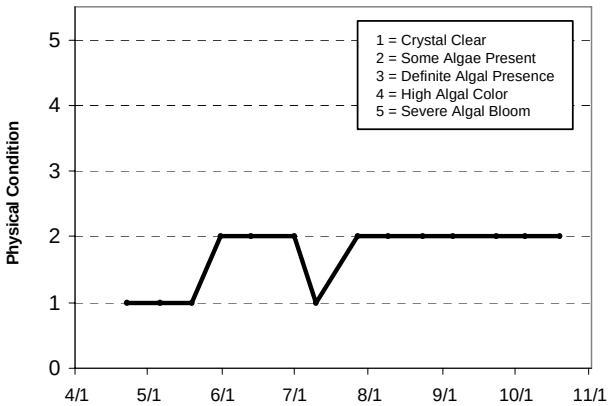






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/22/06	13.3				6.3	33		2.1	1	1
5/6/06	15.8				2.7	30		2.8	1	1
5/19/06	17				3	21		3.1	1	1
5/31/06	24.6				3.2	25		2.8	2	1
6/13/06	23.6				6.3	21		2.1	2	2
7/1/06	25.5				4.4	19		3.1	2	1
7/10/06	27.3				3.7	33		2.1	1	1
7/27/06	30.2				3	47		2.5	2	1
8/9/06	25.7				8.7	26		1.8	2	1
8/23/06	24.3				11	21		1.6	2	2
9/5/06	21.6				12	16		1.7	2	2
9/23/06	15.8				6.4			1.8	2	2
10/5/06	16.1				18	72		1.6	2	1
10/19/06	7.6					66		2.2	2	1

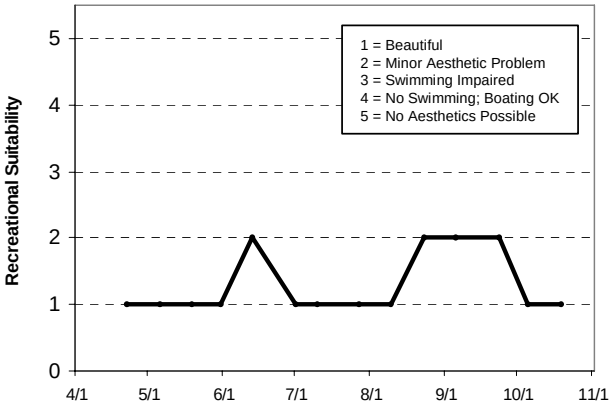


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus							C		B	B	C	B	C	B
Chlorophyll a							B		A	A	A	A	B	A
Secchi Depth							C		B	B	C	B	B	B
Overall							**C**		**B**	**B**	**B**	**B**	**B**	**B**

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). The lake is considered a "Priority Lake" by the Metropolitan Council due to its multi-recreational uses. One problem that may possibly hinder future recreational activity on the lake, however, is Eurasian Water Milfoil (*Myriophyllum spicatum*), which has been reported in the lake. Its deepest point is approximately 5.2 m (17 feet).

Sunset Lake has been involved in CAMP since 1993. The lake was monitored 12 times from mid-April to mid-October, 2006. The data and resulting graphs showing seasonal variability in TP and CLA concentrations, Secchi transparency, and user perception (physical condition and recreational suitability) are presented on the lake information sheet.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	20.9	13.0	29.0	A
CLA (µg/l)	3.9	2.4	6.7	A
Secchi (m)	3.3	2.5	4.1	A
TKN (mg/l)	0.51	0.39	0.63	
			Overall Grade	A

When comparing the 2006 overall grade to those of previously monitored years it becomes apparent that the lake's 2001-2006 overall water quality grade (A) was the best monitored years to date compared to B's in 1994 and 2000, and C's in 1993 and 1995-1999.

Besides the lake's CAMP data, Secchi transparencies had been measured throughout the mid- and late-1980's as part of the MPCA's volunteer program. The lake's historic individual parameter and overall water quality grades (shown on the following information sheet) indicate that the lake's water quality has fluctuated over the years. Because of the range in the lake's quality, a baseline quality for the lake as well as an overall water quality trend is difficult to determine. With this in mind, however, a primitive interpretation of the data seems to show that recently the lake has maintained an "A" grade average (with normal fluctuations). In fact, a recent trend analysis on the lake's Secchi transparency data by the MPCA, revealed a statistically significant improvement in recent water clarity.

The average user perception rankings on a 1-to-5 scale were 1.9 for physical condition (roughly 2- "some algae present"), and 1.0 for recreational suitability (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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Sunset Lake

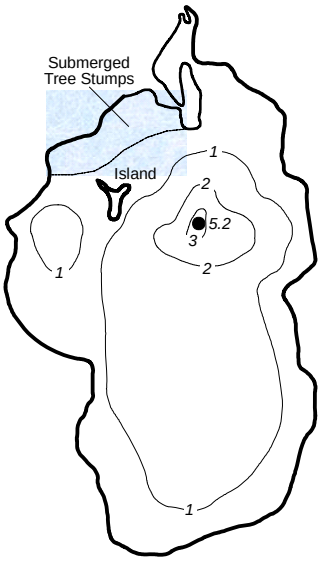
Hugo, Washington Co.

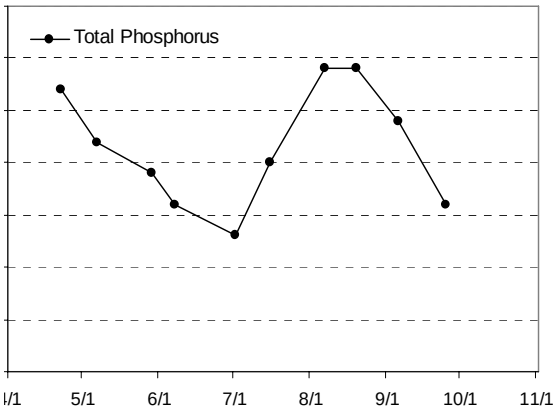
Lake ID: 820153
WD: Rice Creek
Volunteers:
Diane and Bob Coderre

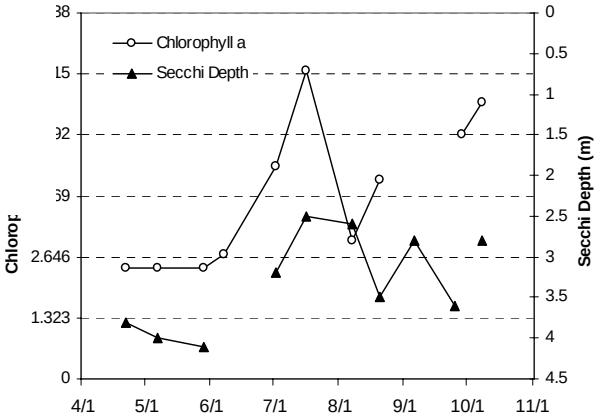
● Sampling site
Contours in meters

N

0 150 300 450
Meters

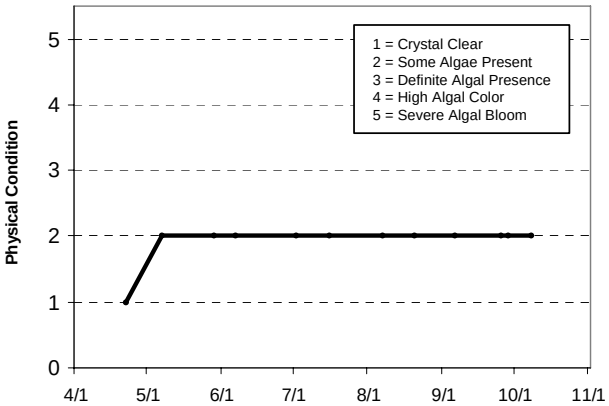






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/22/06	15.1				2.4	27		3.8	1	1
5/7/06	16.4				2.4	22		4	2	1
5/29/06	25.9				2.4	19		4.1	2	
6/7/06	26.5				2.7	16			2	
7/2/06	27.8				4.6	13		3.2	2	
7/16/06	28.1				6.7	20		2.5	2	
8/7/06	27.6				3	29		2.6	2	
8/20/06	25.2				4.3	29		3.5	2	
9/6/06	24.2					24		2.8	2	
9/25/06	16.3					16		3.6	2	
9/28/06					5.3				2	
10/8/06	15.1				6			2.8	2	

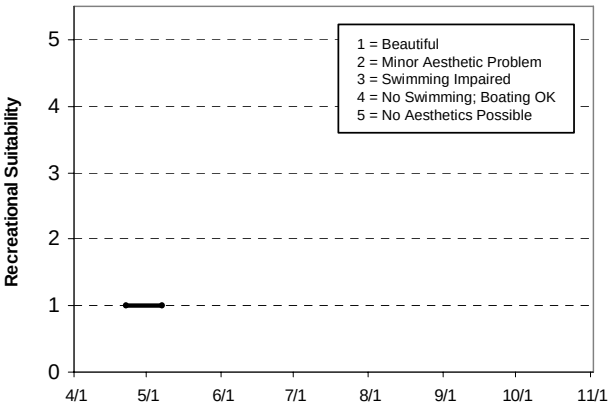


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus					D								
Chlorophyll a					C								
Secchi Depth					C	D	C	D	D	C	C		
Overall					**C**								

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus	C	B	C	C	C	C	C	B	A	A	A	A	A	A
Chlorophyll a	B	B	B	C	C	B	B	A	A	A	A	A	A	A
Secchi Depth	C	B	C	B	C	C	C	B	A	A	A	A	A	A
Overall	**C**	**B**	**C**	**C**	**C**	**C**	**C**	**B**	**A**	**A**	**A**	**A**	**A**	**A**

Source: Metropolitan Council and STORET data



Sunset Pond Lake (19-00451) *Black Dog Watershed Management Commission*

Sunset Pond, a 60-acre man-made lake (1.9 miles in circumference) located in the City of Burnsville (Dakota County), has been involved in CAMP since 1994 (with an omission in 1999). In 2006, the lake was monitored 14 times between mid-April and mid-October.

Because of the shallow depth of the lake ("normal" maximum depth of 3.7 m [about 12 feet]), the entire lake is considered littoral zone (the 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). Because the lake was created to detain stormwater, it collects drainage from a portion of the city of Burnsville and Savage's stormwater conveyance systems, including outflow from Crystal and Earley lakes, it can experience extreme bounce in its water level during wet conditions. An area of concern and need for future management is the recent detection of Eurasian Water Milfoil (*Myriophyllum spicatum*) in the lake.

During each sampling event, the lake was monitored for TP, CLA, TKN, Secchi transparency, as well as perceived physical condition and recreational suitability. Results are presented on graphs and data tables on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	71.6	44.0	144.0	D
CLA (µg/l)	14.3	1.8	80.0	B
Secchi (m)	1.7	1.0	2.4	C
TKN (mg/l)	1.42	0.89	1.90	
			Overall Grade	C

While the lake's 2006 overall lake grade is identical to those recorded in 1995-1997, and 2003 it is worse than B's recorded more recently (1998, and 2000-2002, and 2004). In fact, a review of the lake's past and present individual parameter means reveal that 2002 represents the lake's best-monitored water quality year to date.

No statistically significant long-term trends can be determined from the lake's water quality database, in the short-term however, the lake seems to be well represented by an overall grade of C+/B. To better understand the long-term quality of the lake and what direction it may be heading, more years of sampling data are needed.

Throughout the monitoring period, the volunteers' opinion 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 2.9 (between 2- "some algae present" and 3- "definite algae present"), and the mean recreational suitability ranking 3.8 (between 3- "swimming impaired" and 4- "no swimming - boating ok).

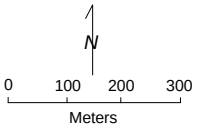
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

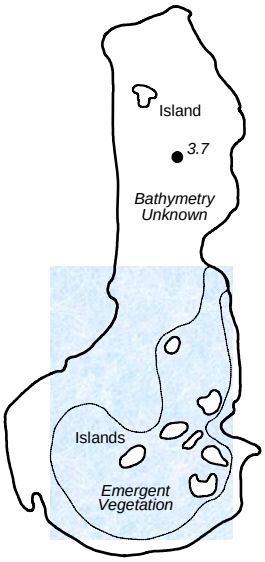
Sunset Pond

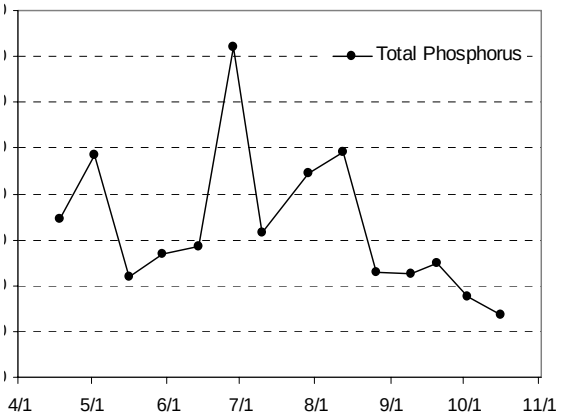
Burnsville, Dakota Co.

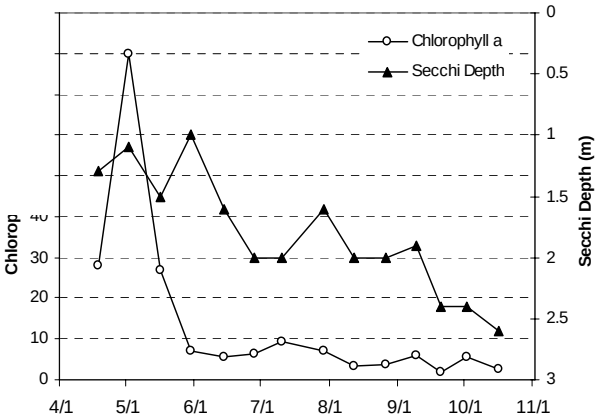
Lake ID: 190451
WMO: Black Dog
Volunteer: Dan Wallace

● Sampling site
Contours in meters



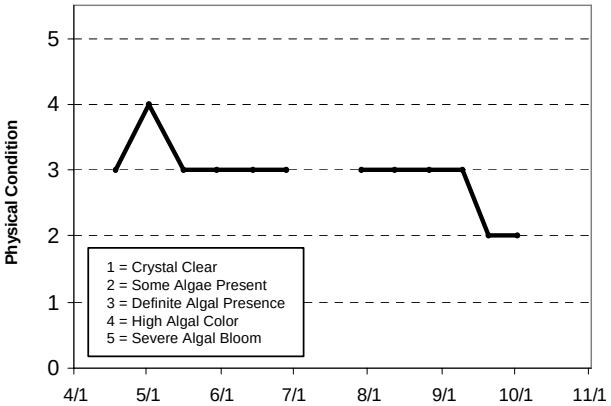






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/18/06	16.2				28	69		1.3	3	4
5/2/06	17.4				80	97		1.1	4	4
5/16/06	18.4				27	44		1.5	3	4
5/30/06	27.3				7.2	54		1	3	4
6/14/06	23.8				5.7	57		1.6	3	4
6/28/06	25.9				6.5	144		2	3	4
7/10/06	27.4				9.2	63		2		4
7/29/06	31.4				7.1	89		1.6	3	4
8/12/06	24.1				3.2	98		2	3	4
8/26/06	24.8				3.6	46		2	3	4
9/9/06	20.1				5.8	45		1.9	3	4
9/20/06	15.7				1.8	50		2.4	2	4
10/2/06	20.5				5.6	35		2.4	2	3
10/16/06	7.7				2.5	27		2.6		2

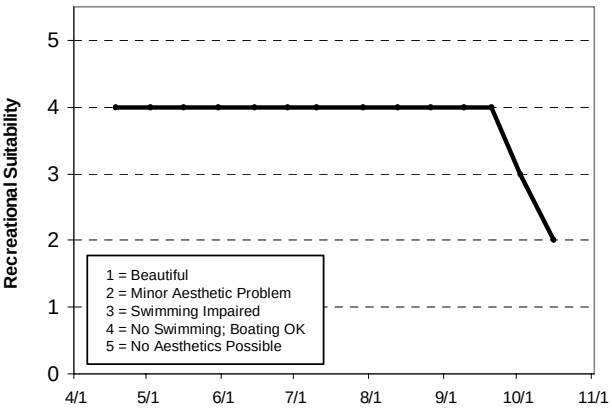


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus		C	C	C	C	C		C	C	C	D	D		D
Chlorophyll a		A	B	B	B	A		A	A	A	B	A		B
Secchi Depth		C	C	C	C	C		C	B	B	C	B		C
Overall		**B**	**C**	**C**	**C**	**B**		**B**	**B**	**B**	**C**	**B**		**C**

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). Eighty-one percent of the lake's surface area is considered littoral zone (area of aquatic plant dominance). Because of its multi-recreational uses, the lake is considered a "Priority Lake" in the Metropolitan Area. An area of concern and need for future management is the recent detection of Eurasian Water Milfoil (*Myriophyllum spicatum*) in the lake.

This was the first year that Susan Lake has been involved in CAMP. A search through the STORET nationwide water quality database for data on the lake provided no data, therefore 2006 is the only year of available water quality data for the lake.

As part of the city's involvement in CAMP in 2006, the lake was monitored seven times between mid-April and late-October. During each sampling event the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	75.6	36.0	133.0	D
CLA (µg/l)	31.0	11.0	92.0	C
Secchi (m)	1.5	0.8	1.9	C
TKN (mg/l)	1.48	1.20	1.80	
			Overall Grade	C

As mentioned earlier, there are no nutrient data available for Susan Lake other than the 2006 CAMP data. Therefore it is not possible to determine any long-term or short-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 1.9 for physical condition (between 1- "crystal clear" and 2- "some algae present"), and 1.0 for recreational suitability (1- "beautiful").

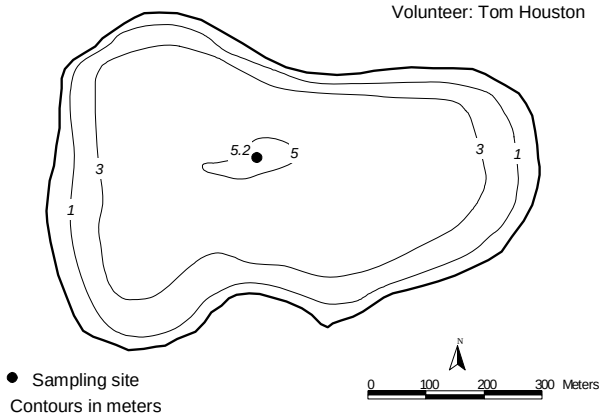
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

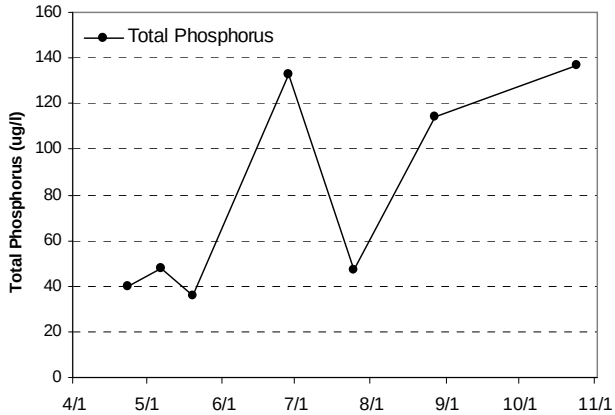
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

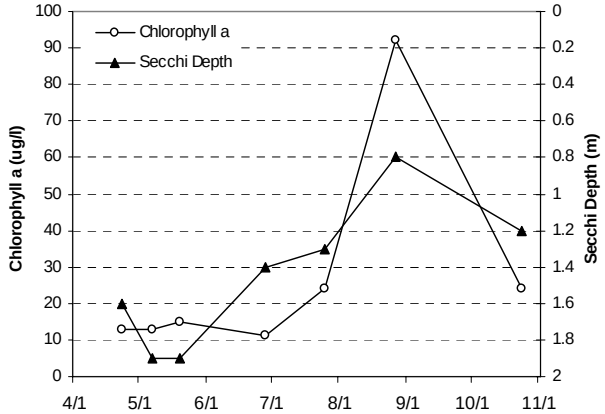
Lake Susan

Chanhassen, Carver Co.

Lake ID: 100013
WD: Riley-Purgatory-Bluff Creek
Volunteer: Tom Houston

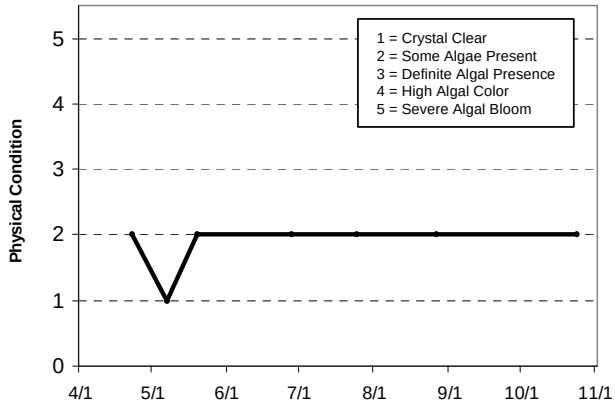






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/23/06	15.8				13	40		1.6	2	1
5/7/06	16.1				13	48		1.9	1	1
5/20/06	17.2				15	36		1.9	2	1
6/28/06	24.2				11	133		1.4	2	1
7/25/06	29.6				24	47		1.3	2	1
8/27/06	23.6				92	114		0.8	2	1
10/24/06	7.1				24	137		1.2	2	1

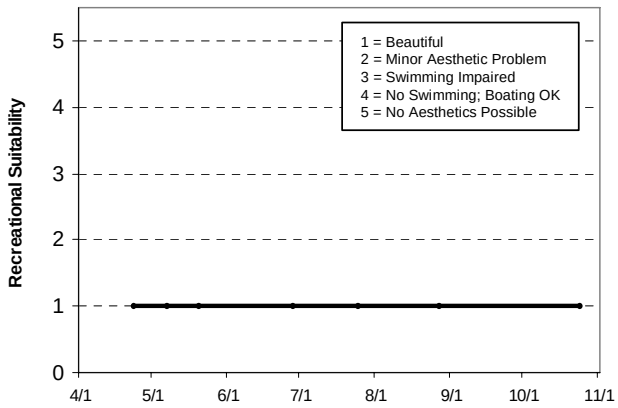


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus														D
Chlorophyll a														C
Secchi Depth														C
Overall														**C**

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 year 2006 marks the fifth year that Swede Lake has been involved in CAMP (2002 being the first). Additionally, Metropolitan Council staff has monitored the lake in 1996 and 2001. The 1996, and 2001-2006 data are the only water quality data found for the lake.

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 lake was monitored 14 times between mid-April and mid-October, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	***Mean***	***Minimum***	***Maximum***	***Grade***
TP (µg/l)	313.3	141.0	468.0	F
CLA (µg/l)	80.3	16.0	250.0	F
Secchi (m)	0.5	0.2	0.9	F
TKN (mg/l)	3.43	2.50	5.10	
			Overall Grade	F

The lake's 2006 overall grade (F) is similar to that of 1996, and 2003-2004 and worse than the overall grade of a D in 2001-2002, and 2005.

As mentioned earlier, there is a limited amount of water quality data available for Swede Lake. Therefore it is not possible to determine any long-term trend. In the short-term however, the lake's quality seems well represented by an overall grade of D/F. To better understand the lake's water quality and where it may be heading, continued monitoring is 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 2.6 for physical condition (between 2- " some algae present" and 3- "definite algae present"), and 4.0 for recreational suitability (4- "no swimming - boating ok").

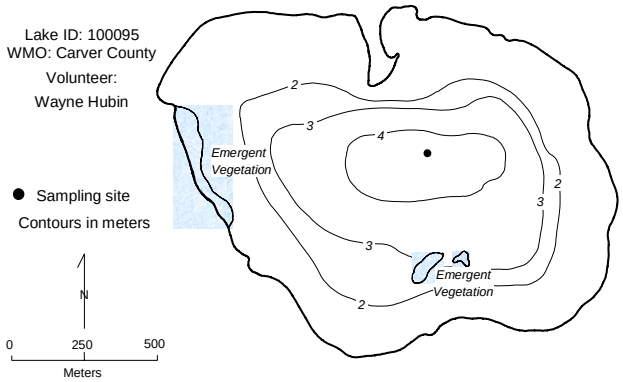
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

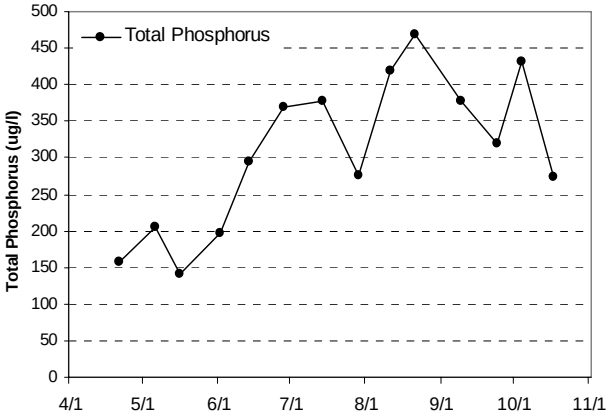
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

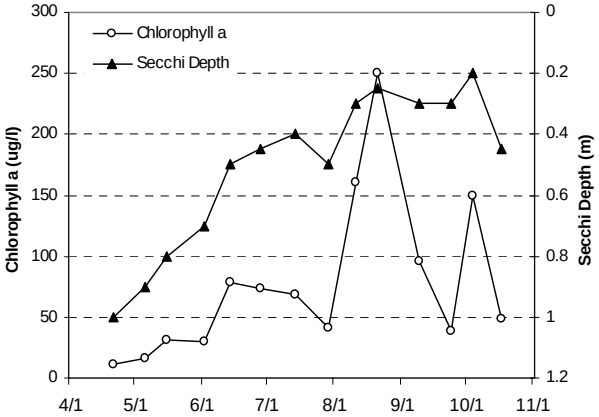
Swede Lake

Watertown Twp., Carver Co.

Lake ID: 100095
WMO: Carver County
Volunteer:
Wayne Hubin

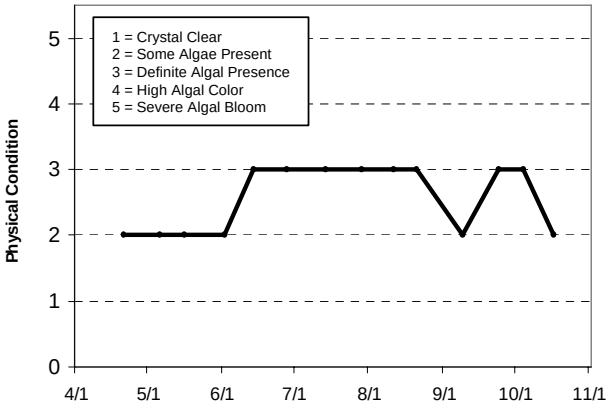






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/21/06	11				11	157		1	2	4
5/6/06	15.7				16	206		0.9	2	4
5/16/06	13				31	141		0.8	2	4
6/2/06	26.9				30	197		0.7	2	4
6/14/06	22				78	294		0.5	3	4
6/28/06	26				74	369		0.45	3	4
7/14/06	28				69	378		0.4	3	4
7/29/06	27				41	276		0.5	3	4
8/11/06	24				160	420		0.3	3	4
8/21/06	22				250	468		0.25	3	4
9/9/06	20				96	377		0.3	2	4
9/24/06	15				38	320		0.3	3	4
10/4/06	21				150	432		0.2	3	4
10/17/06	8				49	274		0.45	2	4

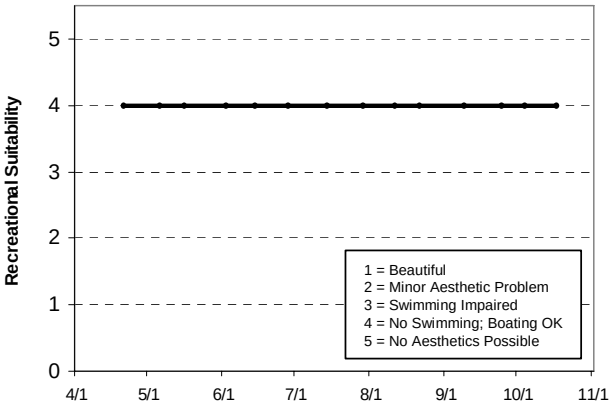


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus				D					D	F	F	F	F	F
Chlorophyll a				F					D	C	F	D	D	F
Secchi Depth				F					D	C	F	F	D	F
Overall				**F**					**D**	**D**	**F**	**F**	**D**	**F**

Source: Metropolitan Council and STORET data



Sweeney Lake (27-0035) *Bassett Creek Watershed Management Organization*

This was the seventh year of CAMP monitoring in Sweeney Lake, which 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. The mean depth of the lake and its surface area translate to an approximate lake volume of 790 ac-ft. The lake has two separate depressions each reaching a maximum depth of approximately 8 meters (26 feet). Roughly 52 percent of the lake's area is considered littoral zone (the 0-15 foot depth area dominated by aquatic vegetation). Additionally, the lake's surface area and 2,400-acre watershed translates to a rather large 36:1 watershed-to-lake size 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 and outlets at the north over a dam. Sweeny Lake is connected to Twin Lake during periods of high lake levels by a meandering channel through a cattail marsh between the northeast shore of Sweeny and the north shore of Twin Lake. The surface elevations of the two lakes are about the same, indicating a minimal flow between the two lakes except during periods of heavy runoff when transfer of water between the two lakes increases. The west and south shoreline of Sweeny Lake consists of privately owned 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).

While the lake has been monitored at two separate sites (north end and south end) in the past, only one site (the southern site) was monitored in 2006. The lake was monitored 10 times between mid-May and mid-October, 2006. Results are presented on graphs and data tables on the following page. During each monitoring event, the lake was monitored for TP, CLA, TKN, Secchi transparency, as well as the perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	95.9	39.0	188.0	D
CLA (µg/l)	23.7	11.0	37.0	C
Secchi (m)	1.0	0.9	1.2	D
TKN (mg/l)	1.96	1.20	6.60	
			Overall Grade	D

The lake's 2006 overall grade (D) is the worst recorded to date. The lake's overall grade in 2000-2005 was a C. No statistically significant long-term trend is evident from the lake's water quality database, in the short-term however, the lake's quality seems well represented by an overall grade of C-/D+. To better understand the quality of the lake and what direction it may be heading, continued monitoring is suggested.

Throughout the monitoring period, the volunteers' opinion of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. The 2004 mean perceived physical condition of the lake was 1.1 (between 1- "crystal clear" and 2- "some algae present"), while the mean recreational suitability was 1.0 (1- "beautiful").

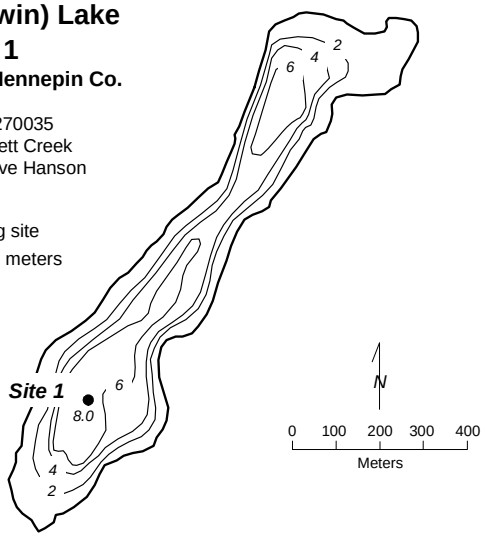
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

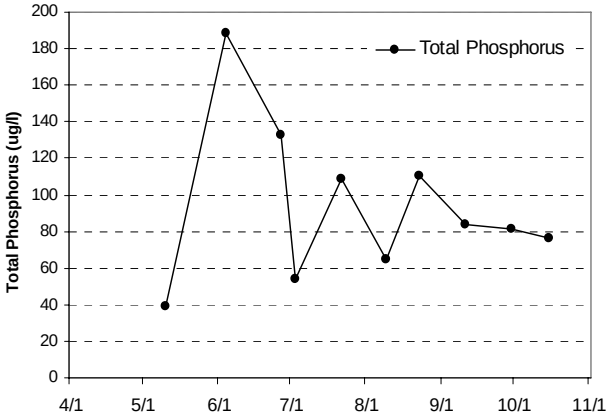
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

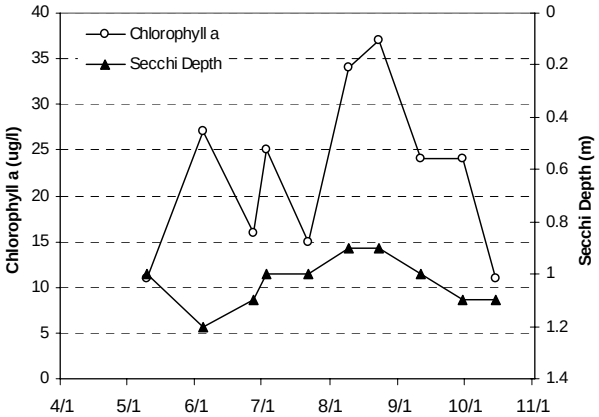
Sweeney (Twin) Lake
Site 1
Golden Valley, Hennepin Co.

Lake ID: 270035
WMO: Bassett Creek
Volunteer: Dave Hanson

● Sampling site
Contours in meters

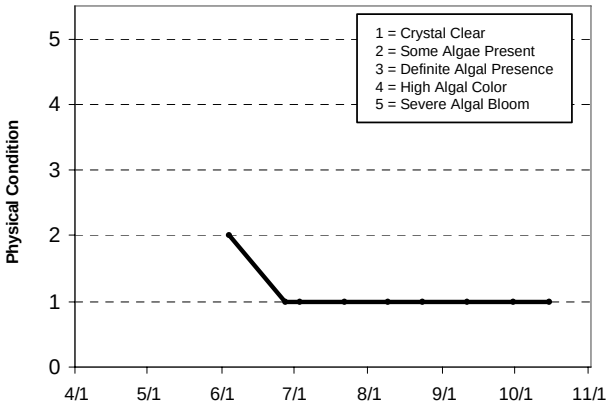






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/10/06	15.9		10.8		11	39		1		
6/4/06	24.2		9.5		27	188		1.2	2	1
6/27/06	25.2		8.4		16	133		1.1	1	1
7/3/06	25.6		6.8		25	54		1	1	1
7/22/06	27.3		7.9		15	109		1	1	1
8/9/06	27		8.3		34	65		0.9	1	1
8/23/06	25.5		9.1		37	110		0.9	1	1
9/11/06	20		8.1		24	84		1	1	1
9/30/06	15.8		10.2		24	81		1.1	1	1
10/15/06	11.1		10.3		11	76		1.1	1	1

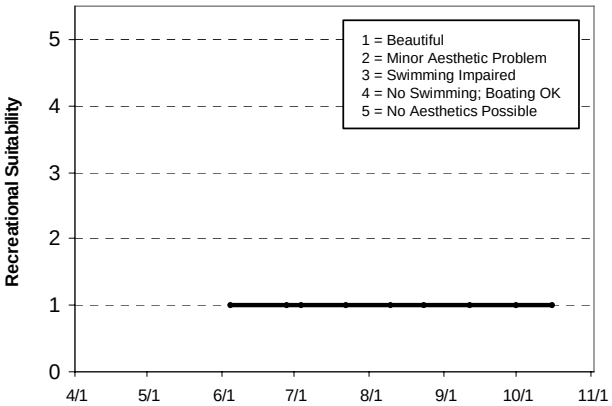


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

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	
Chlorophyll a								C	C	B	C	B	
Secchi Depth								D	D	C	C	C	
Overall								**C**	**C**	**C**	**C**	**C**	

Year	2003 Site 1	2003 Site 2	2004 Site 1	2004 Site 2	2005 Site 1	2005 Site 2	2006 Site 1	2006 Site 2
Total Phosphorus	C		C		C		D	
Chlorophyll a	B		B		C		C	
Secchi Depth	C		C		C		D	
Overall	**C**		**C**		**C**		**D**	



Source: Metropolitan Council and STORET data

Tamarack Lake (10-0010) *Minnehaha Creek Watershed District*

This was the sixth year that Tamarack Lake has been involved in CAMP (the lake was initially enrolled in 2001). While the 24-acre lake has an unexpected maximum depth of roughly 20.0 m (66 feet), the majority of the lake surface area is considered littoral zone (the shallow 0-15 foot area dominated by aquatic plants). A search through the STORET nationwide water quality database for data on the lake provided limited data (just Secchi data in 1985 and Secchi and nutrient data for 2000-2006).

The lake was monitored 13 times from mid-April to mid-October, 2006. Results are presented in both graphs and data tables on the lake's information sheet on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	72.7	26.0	181.0	D
CLA (µg/l)	21.2	9.6	61.0	C
Secchi (m)	2.1	1.1	3.0	C
TKN (mg/l)	1.51	0.87	2.50	
			Overall Grade	C

The lake's 2006 overall grade is identical to that of 2000 and 2003-2005, and worse than the overall grade of B recorded in 2001-2002.

As mentioned earlier, there are very limited amounts of water quality data available for Tamarack Lake. Therefore it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

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 1.2 for recreational suitability (between 1- "beautiful" and 2- "minor aesthetic problem").

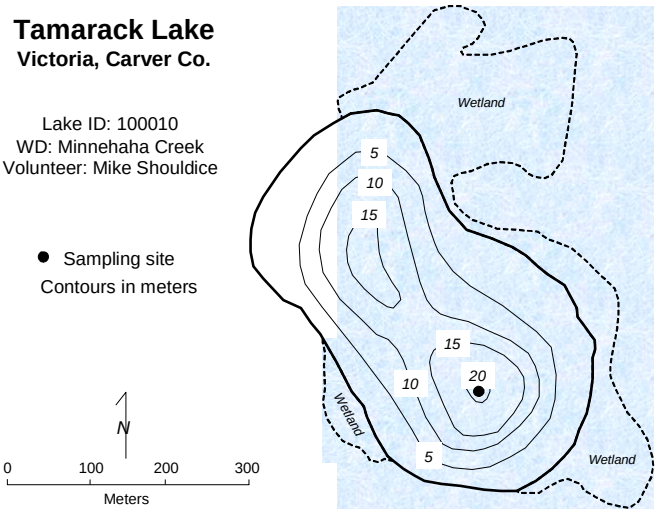
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

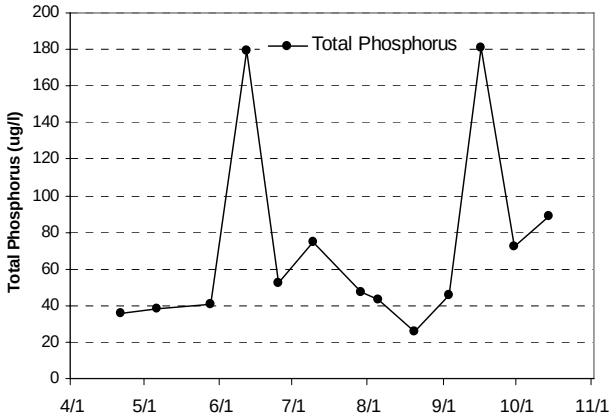
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

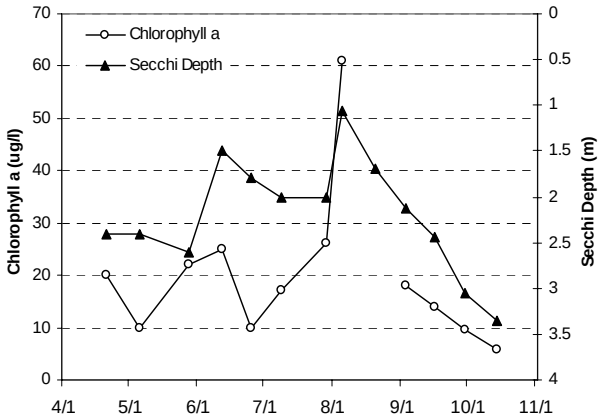
Tamarack Lake
Victoria, Carver Co.

Lake ID: 100010
WD: Minnehaha Creek
Volunteer: Mike Shouldice

● Sampling site
Contours in meters

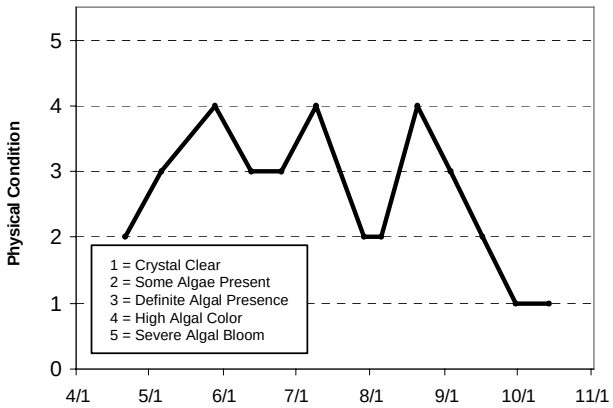






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/21/06	13.4				20	36		2.4	2	1
5/6/06	15.4				9.8	38		2.4	3	1
5/28/06	24.3				22	41		2.6	4	2
6/12/06	22.5				25	179		1.5	3	2
6/25/06	24.7				10	52		1.8	3	1
7/9/06	26.9				17	75		2	4	2
7/29/06	28.6				26	47		2	2	1
8/5/06	26.4				61	43		1.07	2	1
8/20/06	23					26		1.7	4	1
9/3/06	21.5				18	46		2.13	3	1
9/16/06	18.4				14	181		2.44	2	1
9/30/06	13.7				9.6	72		3.05	1	1
10/14/06	8.2				5.8	89		3.35	1	1

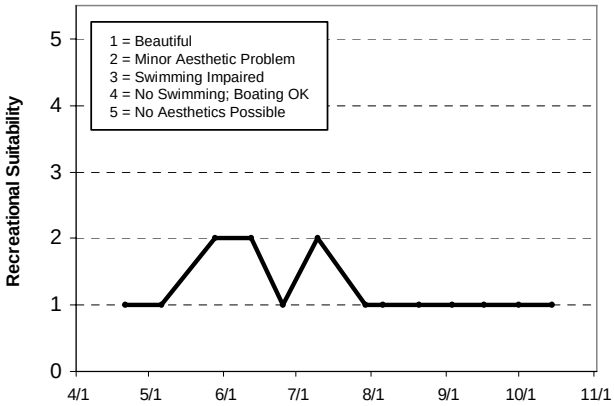


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus								C	B	B	C	D	C	D
Chlorophyll a								C	A	B	B	C	C	C
Secchi Depth				A				C	B	C	C	C	C	C
Overall								**C**	**B**	**B**	**C**	**C**	**C**	**C**

Source: Metropolitan Council and STORET data



Terrapin Lake (82-0031) *Marine on St. Croix Watershed Management Organization*

Terrapin Lake is an 86-acre lake located within the May Township (Washington County), with a maximum depth of 4.6 m (roughly 15 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). There is very little other known morphological data available for the lake.

This marks the third year in which Terrapin Lake has been involved in CAMP (2004-2005 being the others). A search through the STORET nationwide water quality database for historic data on the lake produced only the forementioned CAMP data. Therefore, 2004-2006 are the only complete years of water quality data available for the lake. 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 lake was monitored seven times between mid-May and mid-October, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	39.8	20.0	108.0	C
CLA (µg/l)	3.7	2.5	6.2	A
Secchi (m)	3.6	3.2	4.0	A
TKN (mg/l)	0.72	0.57	0.94	
			Overall Grade	B

The lake's 2006 overall grade of B is worse than that recorded in 2004 and 2005 (overall grade A).

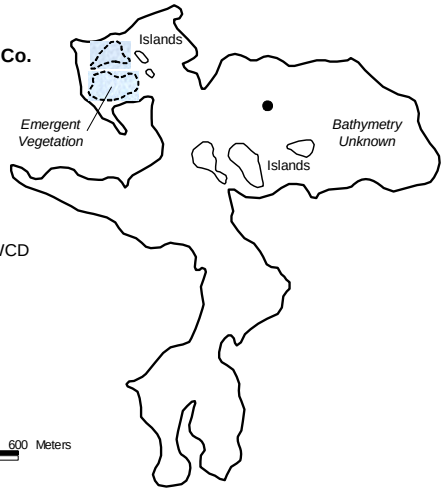
Because of the limitedness of the lake's water quality database, it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

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 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 (MNDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MNDNR 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Terrapin Lake
May Twp., Washington Co.

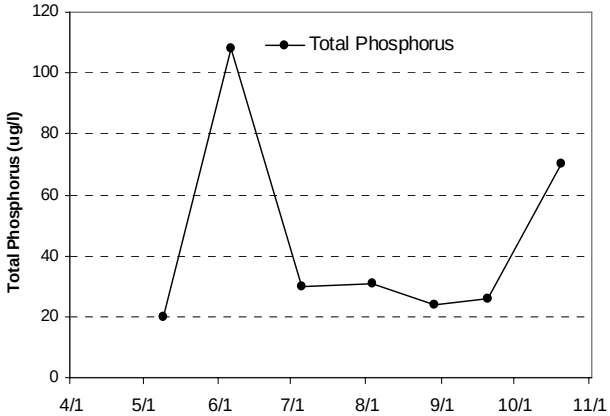


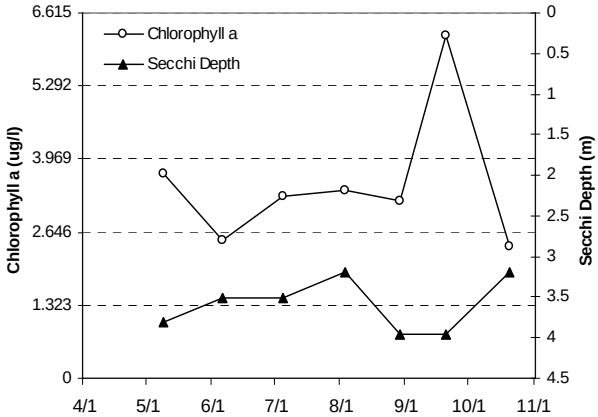
LAKE ID: 820031
WMO: Marine
Volunteer: Wash. Co. SWCD

● Sampling site

Contours in meters

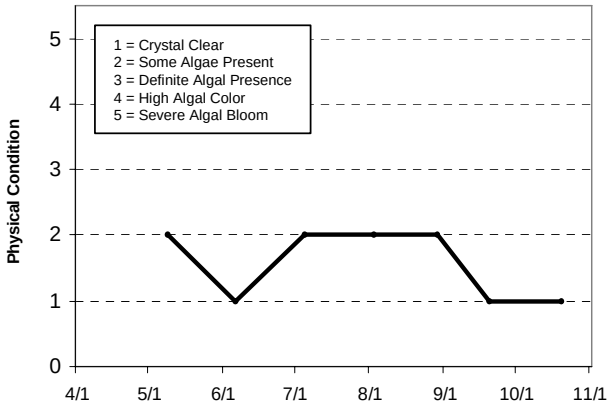
0 200 400 600 Meters





2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/9/06	18.1	15	7.74	7.5	3.7	20		3.81	2	2
6/6/06	24.5	20	7.48	0.63	2.5	108		3.505	1	1
7/5/06	25.7	20.4	10.56	0.09	3.3	30		3.505	2	2
8/3/06	27.4		5.33		3.4	31		3.2	2	2
8/29/06	22.8	21.4	4.83	0.06	3.2	24		3.962	2	2
9/20/06	16.6	16.3	7.16	5	6.2	26		3.962	1	1
10/20/06	7.4	7.4	10.18	0.3	2.4	70		3.2	1	1

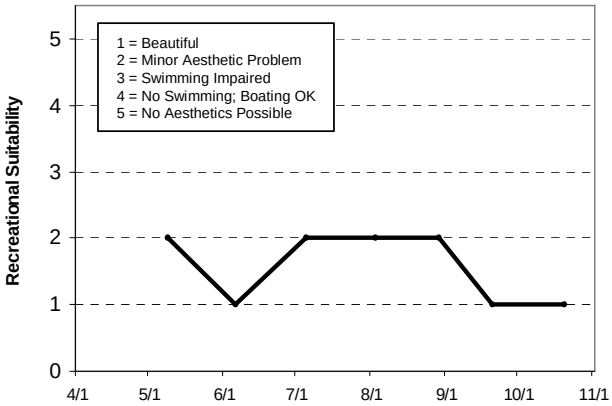


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus												B	A	C
Chlorophyll a												A	A	A
Secchi Depth												A	A	A
Overall												**A**	**A**	**B**

Source: Metropolitan Council and STORET data



Thole Lake (70-0120) *Scott County Watershed Management Organization*

Thole Lake is located in Louisville Township (Scott County). The lake's surface area is 105 acres and has a maximum depth of 3.7 m (roughly 12 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). Due to the lakes multi-recreational uses, it is considered a "Priority Lake" in the Metropolitan Area.

Although this is only the first year that Thole Lake has been enrolled in CAMP, the lake had been monitored by Council staff in the past. In 2006, the lake was monitored 14 times between mid-April and mid-October. The collected data and resulting graphs showing TP and CLA concentrations, Secchi transparency, and user perception (physical condition and recreational suitability) are presented on the lake's information sheet on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	121.6	28.0	214.0	D
CLA (µg/l)	59.4	2.0	110.0	D
Secchi (m)	1.1	0.4	3.5	D
TKN (mg/l)	2.00	0.67	3.10	
			Overall Grade	D

The lake's overall grade in 2006 (D) is similar to that recorded in 1984, 1994, 2000, 2002 and 2005, and worse than the C recorded in 1997. Because of the variability of the lake's grades, no statistically significant long-term trend is evident from the lake's water quality database. The lake's water quality seems to be best represented by an overall grade of D+/C.

Throughout the 2006 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 2.4 (between 2- "some algae present" and 3- "definite algae present"), while the mean recreational suitability was 2.5 (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) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

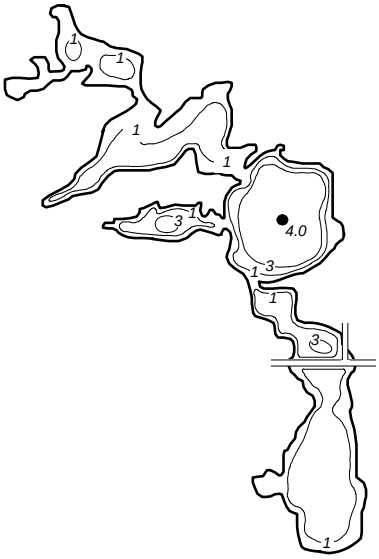
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

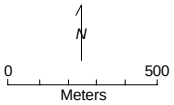
Thole Lake
Louisville Twp., Scott Co.

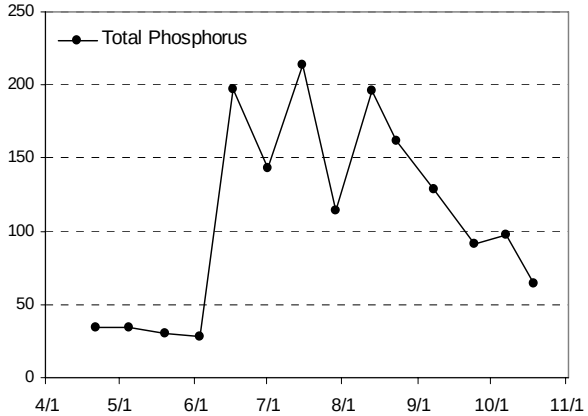
LAKE ID: 700120
WD: Scott County
Volunteer: Darrell Jahn

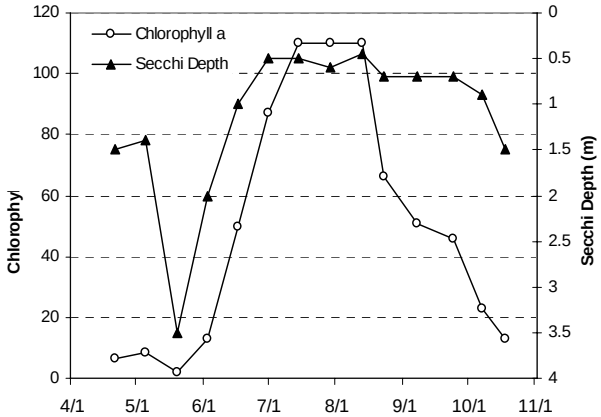
● Sampling site

Contours in meters



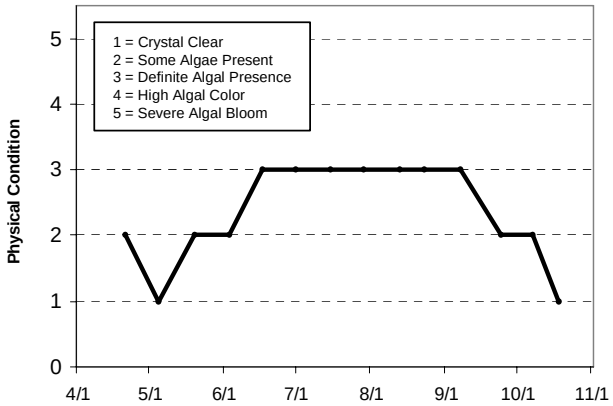






2006 Data

Date	Surf. Tmp C	Bot. Tmp C	Surf. DO mg/L	Bot. DO mg/L	CLA ug/L	Surf. TP ug/L	Bot. TP ug/L	Secchi M	PC 1 thru 5	RS 1 thru 5
4/21/06	14.1				6.7	34		1.5	2	3
5/5/06	15				8.4	34		1.4	1	1
5/20/06	18.7				2	30		3.5	2	2
6/3/06	25.6				13	28		2	2	3
6/17/06	24.1				50	197		1	3	3
7/1/06	27.3				87	143		0.5	3	3
7/15/06	28.6				110	214		0.5	3	3
7/29/06	30.3				110	114		0.6	3	3
8/13/06	25.3				110	196		0.45	3	3
8/23/06	25.1				66	162		0.7	3	3
9/7/06	23.8				51	129		0.7	3	3
9/24/06	16.5				46	91		0.7	2	2
10/7/06	16.7				23	97		0.9	2	2
10/18/06	8				13	64		1.5	1	1

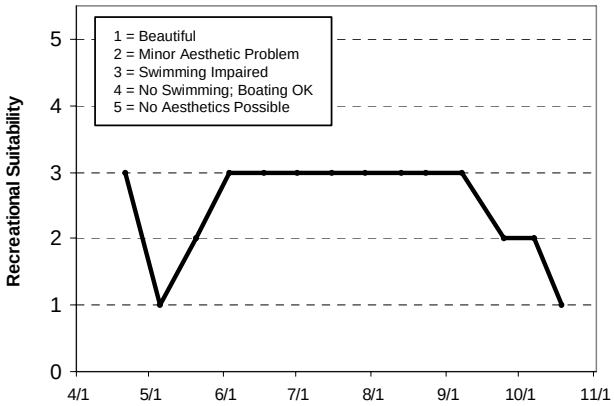


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus					D								
Chlorophyll a					D								
Secchi Depth					D								
Overall					**D**								

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus		F			D			D		D			D	D
Chlorophyll a		D			C			D		D			F	D
Secchi Depth		D			C			C		D			C	D
Overall		**D**			**C**			**D**		**D**			**D**	**D**

Source: Metropolitan Council and STORET data



Turtle Lake (82-0036) *Carnelian - Marine Watershed District*

This was the seventh year of CAMP monitoring in Turtle Lake which is located in the May Township (Washington County). A search through the STORET nationwide water quality database revealed a moderate amount of recent data on the lake. Other than for the 2000-2006 CAMP data (only Secchi transparencies collected in 1993-1995, 2002 and 2004-2006), data were found for 1991-1992 and 1996-2001.

The 44-acre lake has a mean and maximum depth of 2.4 m (eight feet) and 1.2 m (four feet), respectively. The mean depth of the lake and its surface area translate to an approximate lake volume of 172 ac-ft. Because of the shallowness of the lake, it is entirely considered littoral zone (the 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 lake does not have a public access and its 699-acre watershed translates to a 16:1 watershed-to-lake size ratio (the greater the ratio, the greater the potential stress on the lake from surface runoff).

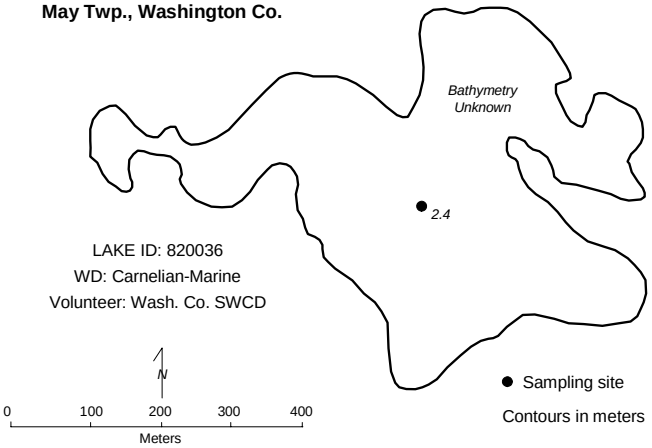
Water samples to be analyzed for TP, TKN and chlorophyll were not collected for the lake in 2006. The lake's Secchi transparency was monitored seven times from mid-May to mid-October 2006. Results are presented in both graphs and data tables on the lake's information sheet on the following page. Because Secchi transparency was the only data collected there are no nutrient or chlorophyll concentration means to compare to previous years. The lake's 2006 summertime (May through September) mean Secchi transparency was 1.3 m (minimum of 0.9 m and a maximum of 1.5 m). This translates to a grade of C for water clarity.

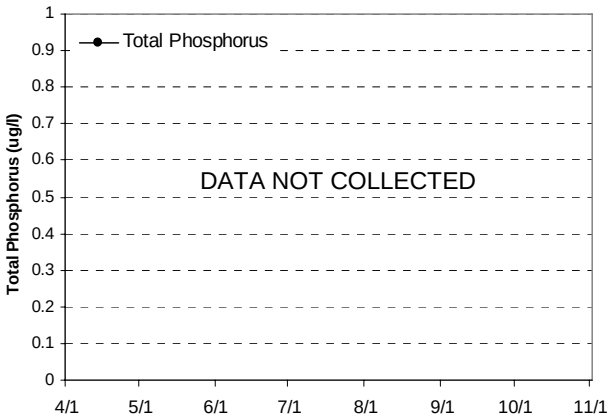
As mentioned earlier, there is a moderate amount of historic data available for Turtle Lake (recent data collected in the 1990's and early-to-mid-2000's). While no "statistically significant" long-term trends were determined through statistical analysis, a glance at the lake's overall grades from 1991-2006 seems to indicate that the lake's water quality has improved. In the short-term, the lake seems well represented by an overall grade of C. To better understand the lake's water quality and where it may be heading, continued monitoring is suggested.

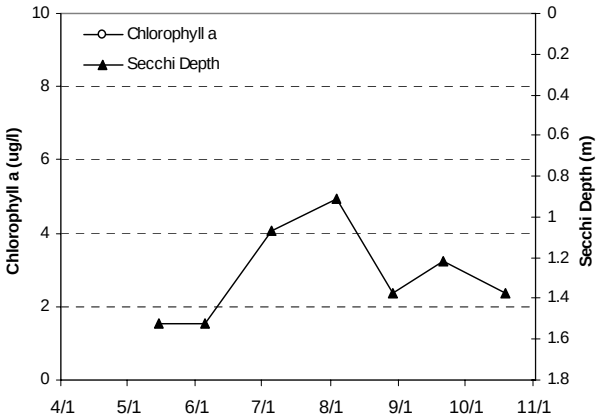
Throughout the summer, the volunteer ranked the lake's perceived physical condition on a 1-to-5 scale (see lake information sheet). The mean physical condition ranking was 2.6 (between 2- "some algae present" and 3- "definite algae present"), while the mean recreational suitability ranking was 3.6 (between 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

Turtle Lake
May Twp., Washington Co.

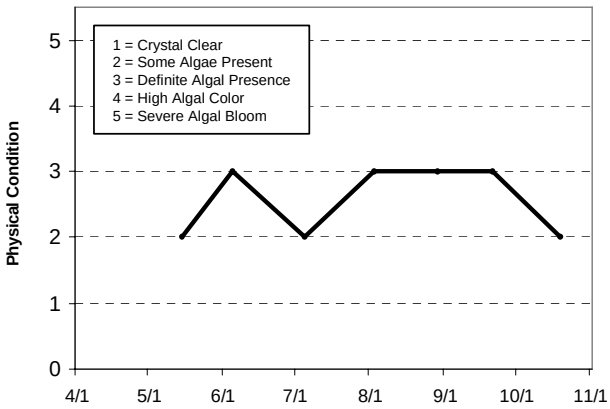






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/15/06	12.7		10.22					1.524	2	4
6/5/06	25.3	23.7	6.96	0.56				1.524	3	4
7/5/06	26.6	23.2	11.98	0.14				1.067	2	4
8/3/06	26.1	24.7	8.04	0.09				0.914	3	4
8/29/06	23.8	20.9	11.05					1.372	3	3
9/21/06	13.2		12.01					1.219	3	4
10/19/06	6.4	6.5	12.41	0.29				1.372	2	2

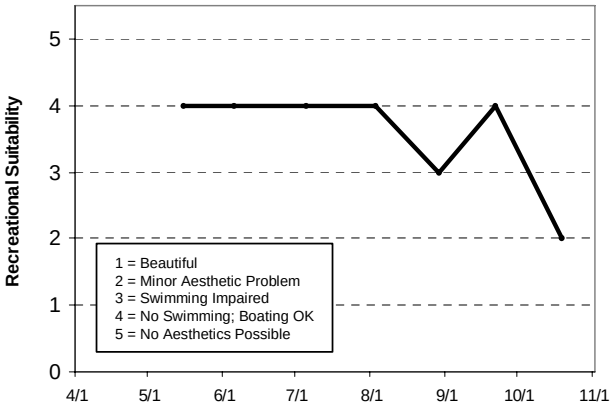


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus												F	F
Chlorophyll a												F	F
Secchi Depth												F	F
Overall												**F**	**F**

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus				C	C	C	B	D	C		D			
Chlorophyll a				D	D	D	C	B	B		B			
Secchi Depth	D	C	D	D	D	D	C	C	C	C	C	C	C	C
Overall				**D**	**D**	**D**	**C**	**C**	**C**		**C**			

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). Because of the shallowness of the lake, its entire area is considered littoral zone (the area of aquatic vegetation dominance) and it does not maintain a thermocline (a density gradient owed to changing water temperatures throughout the lake's water column). There is very little known morphological data available for the lake. An area of concern and need for future management is the recent detection of Eurasian Water Milfoil (*Myriophyllum spicatum*) in the lake.

This was the seventh year in which Twin Lake has been involved in CAMP (1999 and 2001-2006 being the others [although the lake was only monitored twice in 2004]). As part of the lake's involvement in CAMP in 2006, the lake was monitored eight times between early-May and late-August. During each sampling event the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

The lake's 2006 raw data and resulting graphs are presented on the associated lake information page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	109.6	26.0	209.0	D
CLA (µg/l)	30.2	4.4	120.0	C
Secchi (m)	1.3	0.8	2.0	C
TKN (mg/l)	1.40	0.56	2.20	
			Overall Grade	C

In an attempt to reduce algal blooms and improve the lake's water quality, crushed cornmeal was used in 2006 as an in-lake organic carbon amendment. A recent study on Valley Lake-Lakeville, Minnesota (discussed later in Valley Lake section of this report), has suggested that carbon from the decaying barley straw inhibits algal populations via microbial competition for phosphorus (McComas and Anhorn 2004). The use of the cornmeal on Twin Lake did seem to result in the anticipated improvements in the lake's water quality (McComas 2005). However, water quality in 2006 is worse than that reported in 2005 (overall grade of a C).

No statistically significant long-term trend is evident from the lake's water quality database, in the short-term however, the lake's overall water quality seems to be well represented by a water quality grade of C+/B-.

Throughout the summer, the volunteer ranked the lake's perceived physical condition on a 1-to-5 scale (see lake information sheet). The mean physical condition ranking was 4.2 (between 4- "high algal color" and 5- "severe algal bloom"), while the mean 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

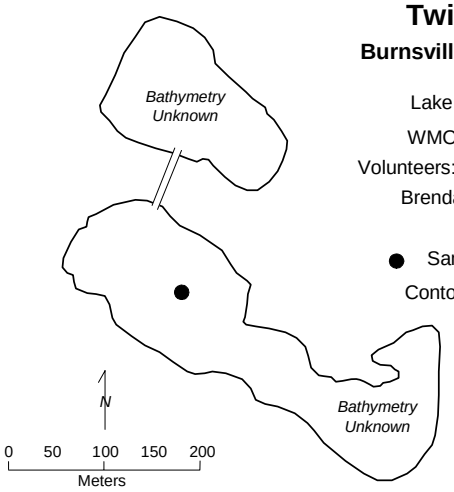
Twin Lake

Burnsville, Dakota Co.

Lake ID: 190028

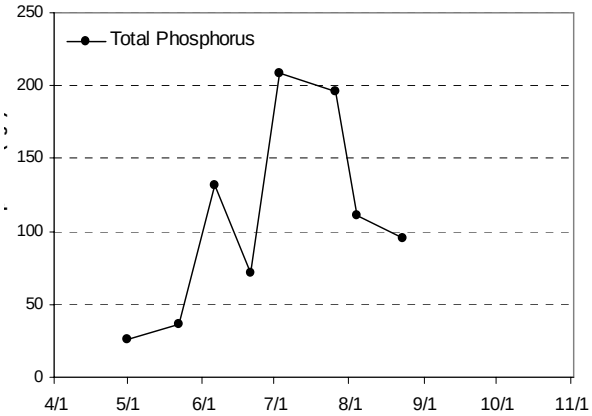
WMO: Black Dog

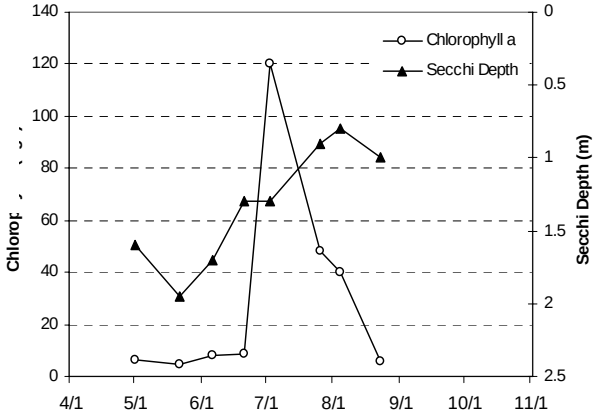
Volunteers: Brad Bobbitt and Brendan Dougherty



● Sampling site

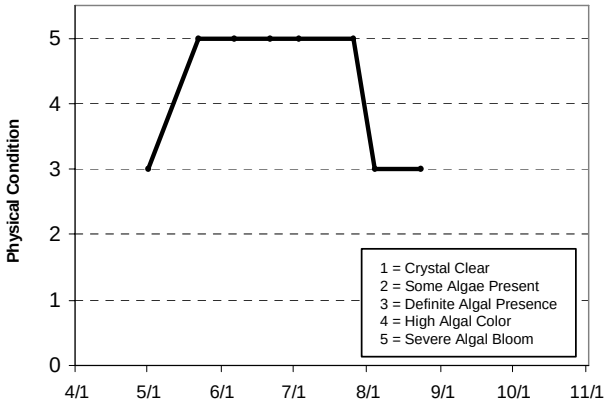
Contours in meters





2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/1/06	13.1				6.6	26		1.6	3	3
5/22/06	17.5				4.4	36		1.95	5	4
6/6/06					8.2	132		1.7	5	4
6/21/06	23.5				9	72		1.3	5	5
7/3/06	24.2				120	209		1.3	5	5
7/26/06	27.1				48	196		0.9	5	5
8/4/06	24.6				40	111		0.8	3	5
8/23/06	22.9				5.6	95		1	3	5

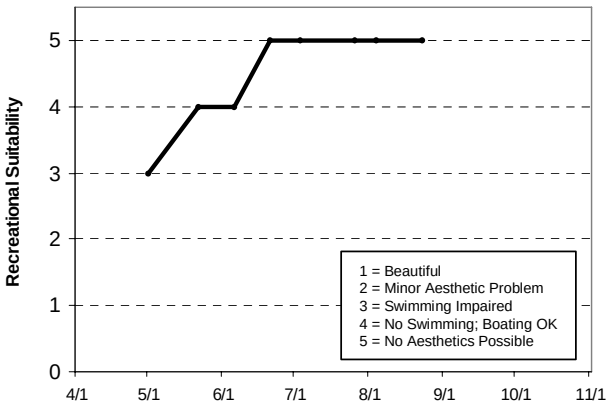


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus							D		C	C	C		C	D
Chlorophyll a							B		A	A	A		A	C
Secchi Depth							D		C	C	C		C	C
Overall							**C**		**B**	**B**	**B**		**B**	**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). There is very little known morphological data available for the lake.

This marks the fifth year in which Twin Lake has been involved in CAMP (2002-2005 being the others). A search through the STORET nationwide water quality database for historic data on the lake provided only the forementioned 2002-2005 CAMP data. 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 lake was monitored 14 times between mid-April and late-October, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	141.4	82.0	194.0	D
CLA (µg/l)	28.1	9.9	54.0	C
Secchi (m)	0.6	0.4	0.7	F
TKN (mg/l)	1.16	0.72	1.90	
			Overall Grade	D

The lake's 2006 overall grade of D is identical to the grades recorded in 2002-2005.

As mentioned earlier, there are no water quality data available for Twin Lake other than the 2002-2006 CAMP data. Therefore it is not possible to determine any long-term trend. In the short-term however, the lake's water quality seems well represented by an overall grade of D. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

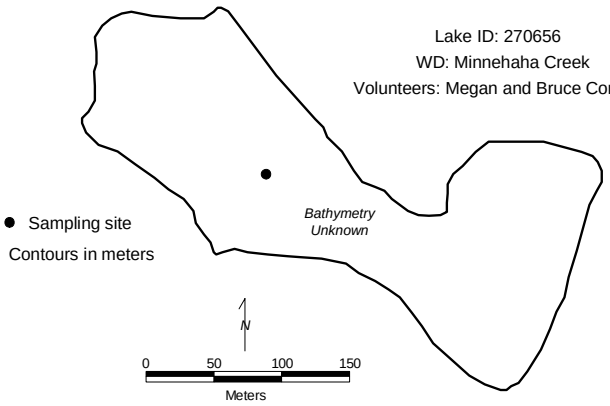
Throughout the monitoring period, the volunteer(s) ranked their opinions of the lake's physical and recreational conditions on a 1-to-5 scale. The average user perception rankings were 2.9 for physical condition (between 2- "some algae present" and 3- "definite algae present"), and 4.0 for recreational suitability (4- "no swimming – boating ok").

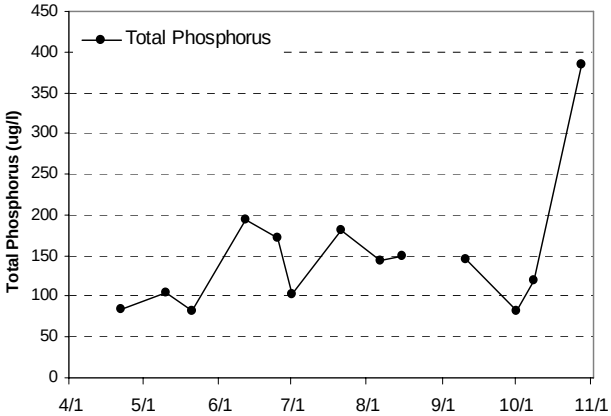
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

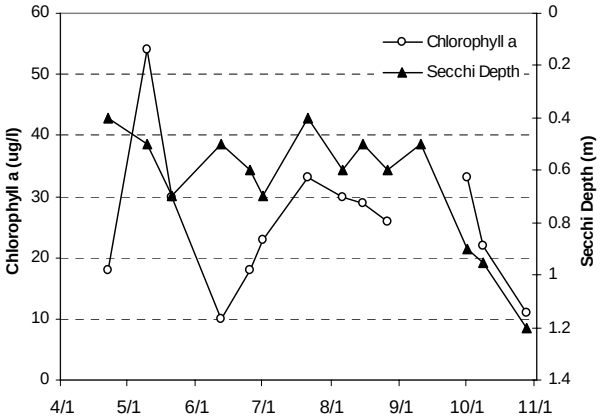
Twin Lake

St. Louis Park, Hennepin Co.

Lake ID: 270656
WD: Minnehaha Creek
Volunteers: Megan and Bruce Cornwall

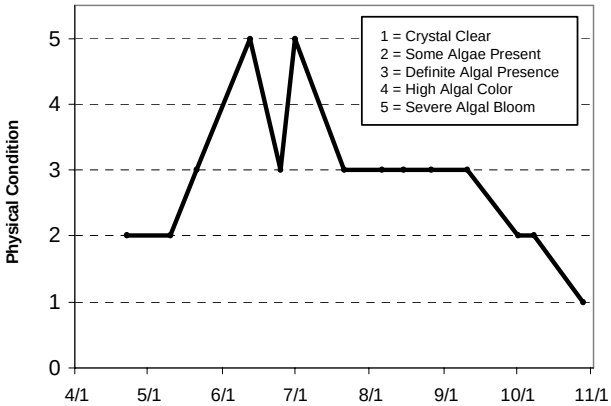






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/22/06	19.8				18	84		0.4	2	4
5/10/06	17.4				54	104		0.5	2	4
5/21/06	18.1				30	82		0.7	3	4
6/12/06	23.8				9.9	194		0.5	5	4
6/25/06	27.1				18	171		0.6	3	4
7/1/06	28.4				23	103		0.7	5	4
7/21/06	26				33	182		0.4	3	4
8/6/06	27.9				30	143		0.6	3	4
8/15/06	28.8				29	149		0.5	3	4
8/26/06	25.2				26			0.6	3	4
9/10/06	18.1					145		0.5	3	4
10/1/06	15.8				33	82		0.9	2	4
10/8/06	15.6				22	119		0.95	2	4
10/28/06	6.1				11	384		1.2	1	4

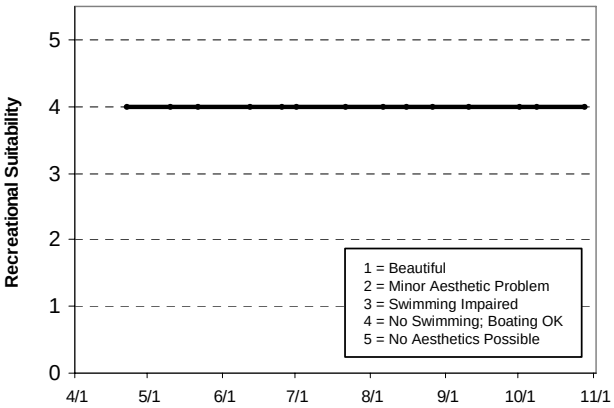


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus										F	F	F	F	D
Chlorophyll a										B	C	D	C	C
Secchi Depth										D	D	D	F	F
Overall										**D**	**D**	**D**	**D**	**D**

Source: Metropolitan Council and STORET data



Twin Lake (Crystal) [Upper Basin] (27-0042) *Shingle Creek Watershed Man. Comm.*

Two thousand and six was the sixth year that the upper basin of Twin Lake, which is located in the City of Crystal (Hennepin County), was monitored as part of CAMP. The lake has also been monitored by Council staff in the past. As part of the volunteer monitoring program, the upper basin of Twin Lake was sampled 13 times from late-April to mid-October, 2006.

The entire 212-acre lake has a maximum and mean depth of 14.0 and 2.1 m (46 and 7 feet), respectively. The acreage of each basin is as follows: lower basin= 46 acres, middle basin= 69 acres, and the upper basin= 137 acres. The upper basin itself has a mean and maximum depth of 2.4 m and 0.9 m (8 and 3 feet). The total volume of the whole lake is approximately 1,490 ac-ft (397 ac-ft of which is contained within the upper basin). About 81 percent of the whole lake's area is considered littoral (the 0-15 foot depth area dominated by aquatic vegetation). Access to the lake can be obtained at two locations, the southern end of the lake and the lake's eastern shore.

The collected data and resulting graphs showing TP and CLA concentrations, Secchi transparency, and user perception (physical condition and recreational suitability) are presented on the lake's information sheet on the following page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	199.7	95.0	311.0	F
CLA (µg/l)	90.1	23.0	140.0	F
Secchi (m)	0.4	0.2	0.5	F
TKN (mg/l)	2.28	1.20	3.30	
			Overall Grade	F

No statistically significant long-term trend is evident from the lake's water quality database, in the short-term however, the lake's quality seems to fluctuate between a low-D and F grade. To better understand the quality of the lake and what direction it may be heading, continued monitoring is suggested.

Throughout the summer, the volunteer ranked the lake's perceived physical condition on a 1-to-5 scale (see lake 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 2.1 (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) 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

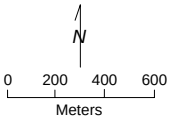
Twin Lake, Upper Basin,

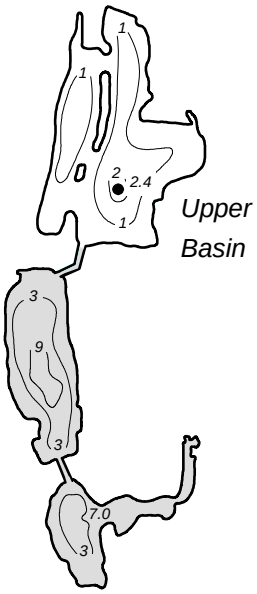
Brooklyn Center, Hennepin Co.

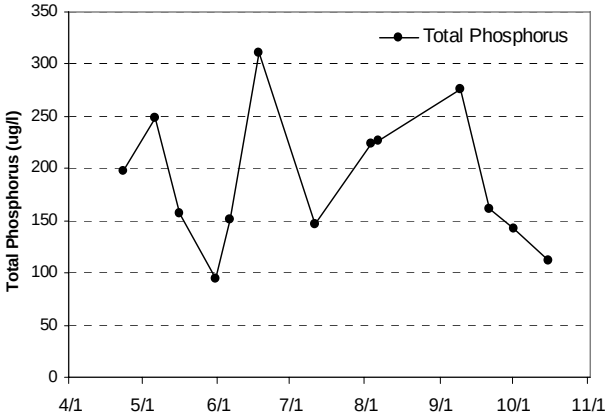
Lake ID: 270042-03
WMO: Shingle Creek
Volunteer: Kristen Mann

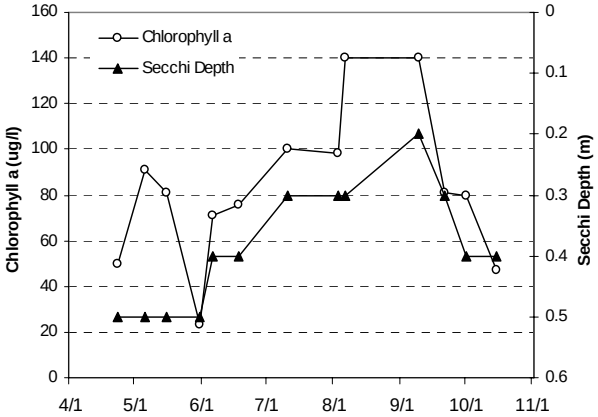
● Sampling site

Contours in meters



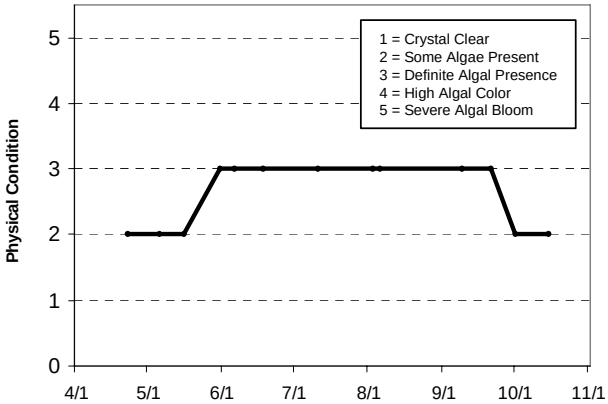






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/23/06	16.3				50	197		0.5	2	1
5/6/06	16.5				91	248		0.5	2	1
5/16/06	16.3				81	157		0.5	2	1
5/31/06	28.3				23	95		0.5	3	2
6/6/06	24.7				71	151		0.4	3	3
6/18/06	25.3				76	311		0.4	3	2
7/11/06	26.3				100	147		0.3	3	2
8/3/06	28.6				98	224		0.3	3	3
8/6/06	26.8				140	227		0.3	3	3
9/9/06	19.5				140	276		0.2	3	2
9/21/06	14.4				81	161		0.3	3	3
10/1/06	15.3				80	143		0.4	2	2
10/15/06	7.2				47	112		0.4	2	2

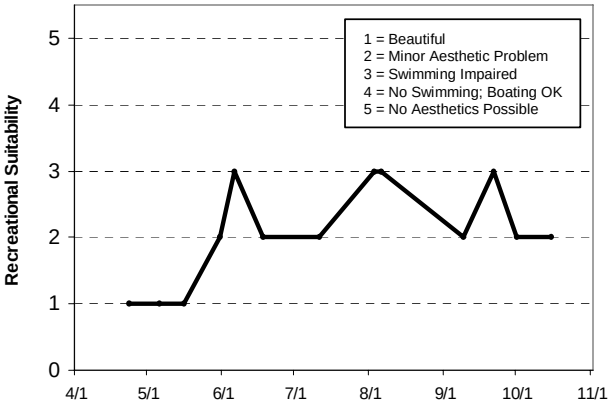


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus												D	
Chlorophyll a												D	
Secchi Depth											F	F	
Overall												**D**	

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus	D			F		D		F		D		F		F
Chlorophyll a	D			D		D		F		F		F		F
Secchi Depth	F			F		F		F		F		F		F
Overall	**D**			**F**		**D**		**F**		**F**		**F**		**F**

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. 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, and it does not maintain a thermocline (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 300 ac-ft. The result of comparing the lake's surface area to its 2,237-acre drainage area (watershed) is a rather large 37:1 watershed-to-lake size ratio (the greater the ratio, the greater the potential stress on the lake from surface runoff).

This was the sixth year that Valentine Lake has been involved in CAMP (2001-2005 being the others). In fact, the 2001-2005 CAMP data were the only data found through STORET nationwide water quality database search. Therefore 2001-2006 represents the only water quality data readily available for the lake.

The lake was monitored 10 times between mid-April and early-October, 2006. 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.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	60.9	42.0	79.0	C
CLA (µg/l)	12.6	5.1	34.0	B
Secchi (m)	1.8	1.0	2.6	C
TKN (mg/l)	1.10	0.82	1.40	
			Overall Grade	C

The resulting overall water quality grade for 2006 (C) is identical to those of 2001-2005. The lake's 2006 nutrient concentrations and Secchi transparencies are graphed on the following page.

Because of the limitedness of the lake's water quality database, the determination of any long- or short-term trends is not possible. It is reported on the MPCA website, however, that a recently conducted trend analysis on the lake's Secchi transparency data revealed a statistically significant improvement in recent water clarity. To better understand the lake's water quality and what direction it may be heading, more years of data collection are needed.

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 1.5 (between 1- "crystal clear" and 2- "some algae present"), while the mean recreational suitability ranking was 2.8 (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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

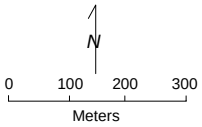
Valentine Lake

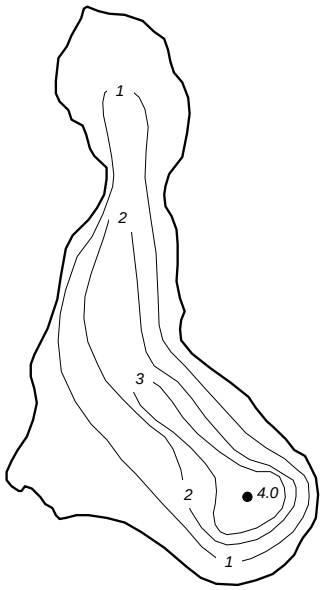
Arden Hills, Ramsey Co.

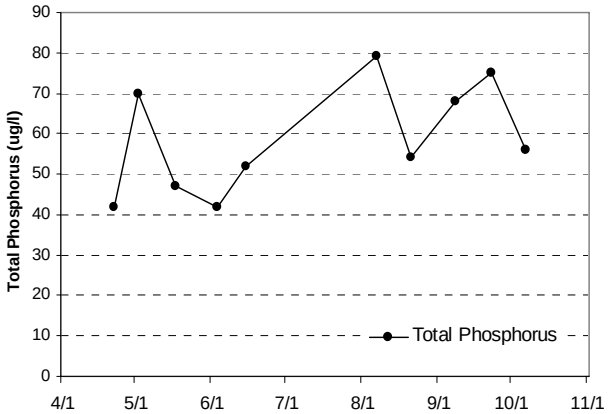
Lake ID: 620071
WD: Rice Creek
Volunteer: Bob Kistler

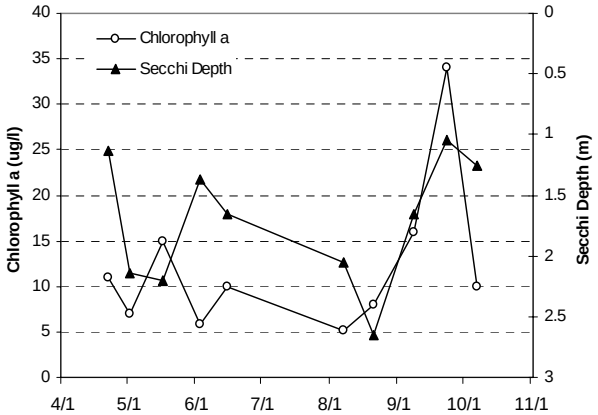
● Sampling site

Contours in meters



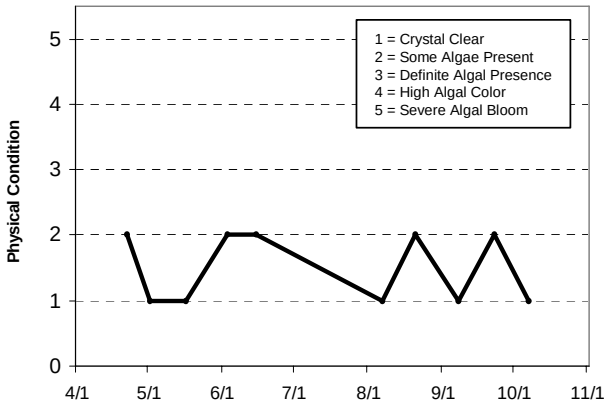






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/22/06	14.9				11	42		1.13	2	1
5/2/06	15.9				7	70		2.14	1	1
5/17/06	16.7				15	47		2.2	1	1
6/3/06	26.4				5.8	42		1.37	2	4
6/15/06	22.4				10	52		1.66	2	4
8/7/06	25.9				5.1	79		2.05	1	4
8/21/06	24.3				8	54		2.65	2	4
9/8/06	21.3				16	68		1.65	1	4
9/23/06	14.6				34	75		1.04	2	4
10/7/06	15.1				10	56		1.26	1	1

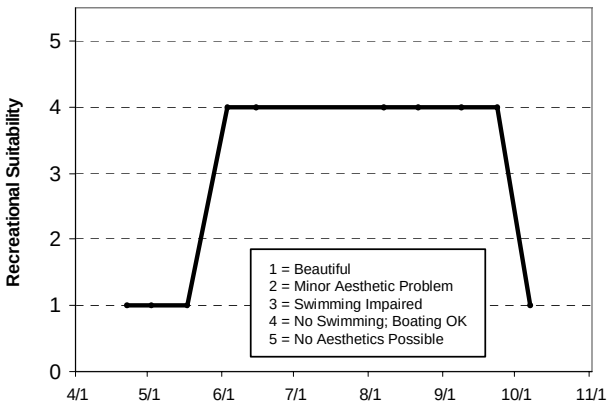


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus									C	C	C	C	C	C
Chlorophyll a									B	B	C	C	C	B
Secchi Depth									C	C	D	C	C	C
Overall									**C**	**C**	**C**	**C**	**C**	**C**

Source: Metropolitan Council and STORET data



Valley Lake (19-0348) *City of Lakeville*

This was the eleventh year that Valley Lake, located in the City of Lakeville (Dakota County), has been involved in CAMP. A search through the nationwide water quality database (STORET) found no water quality data on the lake prior to the 1995 CAMP data.

The 8-acre lake has a maximum depth of 3.2 m (10 feet). Because of the shallowness of the lake, the entire lake is considered littoral (the area 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).

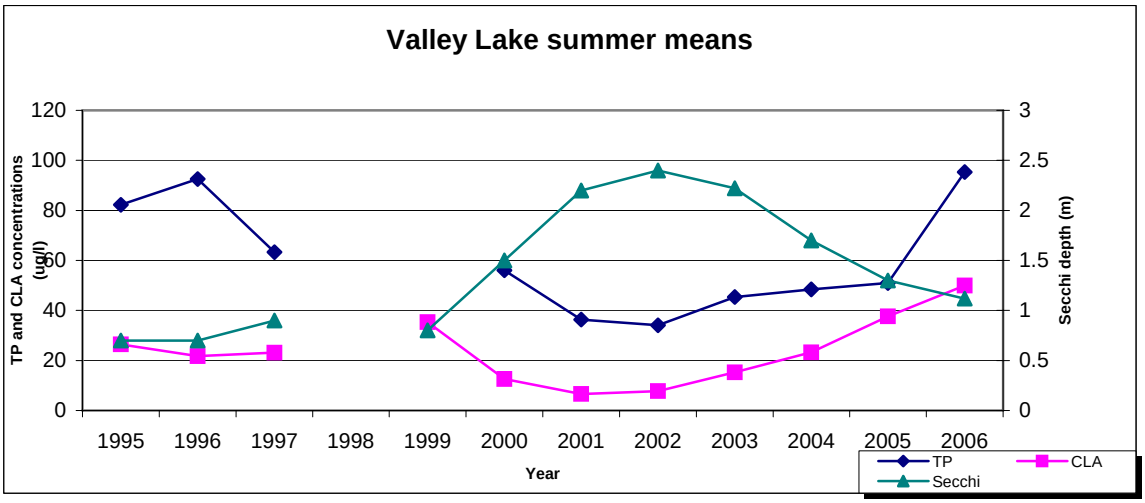
The lake has been involved in CAMP from 1999-2006 as part of a barley straw project on the lake (where barley straw has been added to the lake in order to inhibit algal populations). While, barley straw has been used for algal control in the United Kingdom for many years, the controlling mechanism had not truly been known. Therefore, the Valley Lake study was trying to determine two questions; 1) the success of the barley straw treatment in Valley Lake; and 2) to clarify the controlling mechanism.

In 2006, TP, TKN, CLA, and Secchi transparency were tested 14 times between late-April and mid-October.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	95.3	24.0	211.0	D
CLA (µg/l)	50.0	6.5	140.0	D
Secchi (m)	1.1	0.6	2.3	D
TKN (mg/l)	1.29	0.62	2.00	
			Overall Grade	D

The lake's 2006 water quality grades, although identical to those recorded in 1995-1996, are worse than the C's recorded in 1997, 2000, 2004-2005 and the B's recorded in 2001-2003 (2002 was the lake's best-recorded water quality year).



While the above graph shows a definite improvement in lake water quality since the use of barley straw first began in 1999, the lake's quality has shown some degradation over the last three years (2003-2006). This is especially evident in 2006 where we see the worst TP and CLA summer means of record.

One explanation for the recent dip in water quality could be directly linked to an escalating panfish population. This is similar to what occurred for Alimagnet and Lee lakes, where recent fish surveys suggested that unusually high fish densities might be negating the benefits of the barley treatment on the lakes. The Alimagnet and Lee lake surveys revealed the lake's fishery is being dominated by bluegill sunfish, black crappies, and black bullheads (with as much as 30+ times the areas average number of bluegills per net in Lee Lake) (McComas 2004). The recent removal of roughly 80 pounds of fish per acre on Lee Lake, coinciding with its improved water quality, suggests not only that the barley straw treatment was successful in improving Lee Lake's 2005 water quality, but that the unbalanced fishery may have indeed been negating the benefits of previous barley straw treatments.

While, prior to the change in the lake's fishery, barley straw seemed to inhibit algal growth which in turn resulted in improved water clarity, the reason was not truly understood. In an attempt to identify the algal inhibitor released by the decaying barley straw, additional in-lake water samples were taken in 2001-2005 in Valley Lake along with monthly samples in a nearby sediment basin where barley straw was not used (viewed as a control). These additional samples, which in the past had centered around the break down of phenols concentrations (one of the theories behind the barley straw inhibitor) as a part of 57 base neutral acids organic compounds (BNAs), as well as total and dissolved carbon. Because the breakdown of BNA compounds for each of the collected samples in 2002 came back below detection limit (< 2.0 μg/l), it is not thought that chemical compounds (such as phenols) released from the decomposing straw is the mechanism inhibiting the algal growth (McComas 2003) (McComas and Anhorn 2004).

The examination of the Valley Lake and sedimentation basin carbon data was the focus of the additional monitoring in 2002-2005. The thought is that the carbon may aid another potential algal inhibiting process that is the microbial competition for phosphorus (McComas 2003) (McComas and Anhorn 2004). Therefore, the presence of decaying barley straw results in the lake's algal biomass actually being phosphorus-limited not inhibited by a released chemical compound. The barley straw serves as an organic carbon source for increased heterotrophic production which results in lowering the water column phosphorus and thus reduces algal growth (McComas and Anhorn 2004). Based on the results of the four-year Valley Lake study, heterotrophic production enhanced by barley straw is the most likely algal inhibiting mechanism. For this reason, another organic carbon source, crushed cornmeal (which is less expensive than barley straw yet has a similar C:P ratio), was used in 2005 as the in-lake organic carbon amendment rather than barley straw.

While initial analysis of the 2002-2004 carbon and chlorophyll data seems to strongly support the organic carbon amendment theory, the 2005 data seems to indicate a change in the inner-lake workings. Could this be the result of a shift in the lake's fishery, similar to Alimagnet and Lee lakes, or are there other reasons that the in-lake cornmeal treatment did not work? The results of the fishery survey and additional monitoring will hopefully shed some light on this question.

In addition to the collection of TP, TKN, CLA and Secchi information during each monitoring event in 2006, 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 3.1 (between 3- "definite algae present" and 4- "high algal color"). The mean suitability for recreation 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) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

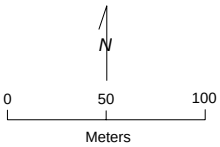
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

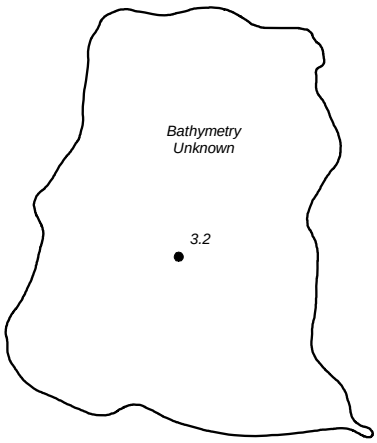
Valley Lake

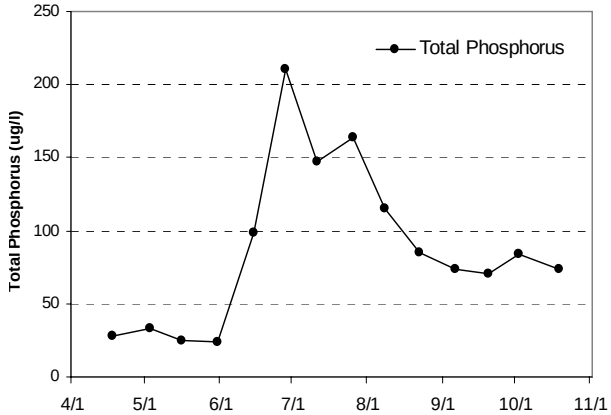
Lakeville, Dakota Co.

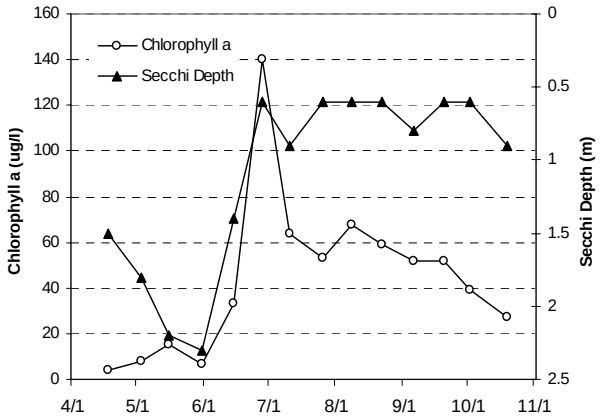
Lake ID: 190348
WMO: Dakota County
Volunteer: City of Lakeville

● Sampling site
Contours in meters



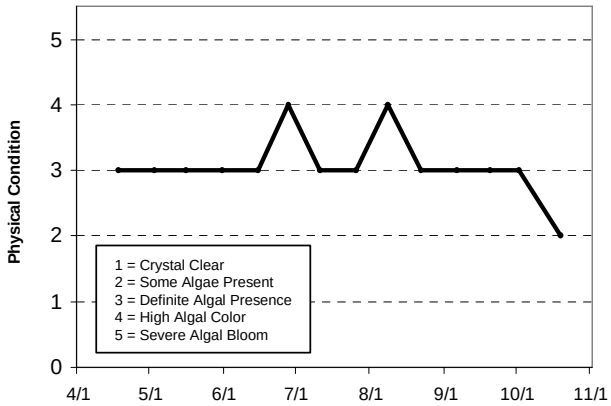






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/18/06	12.9				4.2	28		1.5	3	2
5/3/06	15.7				7.8	33		1.8	3	2
5/16/06	16.8				15	25		2.2	3	3
5/31/06	26.3				6.5	24		2.3	3	2
6/15/06	22.4				33	99		1.4	3	2
6/28/06	24.6				140	211		0.6	4	3
7/11/06	26.3				64	147		0.9	3	3
7/26/06	28				53	164		0.6	3	3
8/8/06	28.2				68	115		0.6	4	3
8/22/06	24.6				59	85		0.6	3	3
9/6/06	23.5				52	74		0.8	3	3
9/20/06	15.7				52	71		0.6	3	3
10/2/06	17.4				39	84		0.6	3	3
10/19/06	7.3				27	74		0.9	2	4

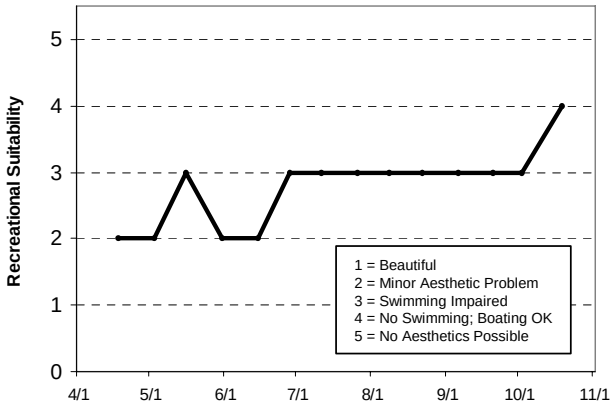


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus			D	D	C			C	C	C	C	C	C	D
Chlorophyll a			C	C	C		C	B	A	A	B	C	C	D
Secchi Depth			D	D	D		D	C	C	B	B	C	C	D
Overall			**D**	**D**	**C**			**C**	**B**	**B**	**B**	**C**	**C**	**D**

Source: Metropolitan Council and STORET data



Waconia Lake (10-0059) *Carver County Environmental Services*

Lake Waconia, located next to the City of Waconia in Carver County, is considered a Metropolitan Area "Priority Lake" because of its multi-recreational uses. Lake Waconia 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.

There are a couple of public accesses on the lake to support its high-volume recreational use. One access is a city-owned access on the southern end of the lake while the other is a state-owned access on the northeastern shore. In the future, the recreational use on and around the lake may increase if a proposed regional park on the lake's southeastern shores becomes a reality. One problem that may possibly hinder future recreational activity on the lake, however, is Eurasian Water Milfoil (*Myriophyllum spicatum*) which has been reported in the lake.

A variety of land uses around Lake Waconia may contribute to the lake's nutrient load. There are residential areas along the lake's shoreline (25.9 homes/shoreline mile), wetlands, commercial/ industrial areas, and rural/agricultural uses. The predominant uses associated with rural/agricultural areas are livestock and crop farming (51 percent), while those affiliated with the City of Waconia include: single and multi-family residential, commercial/industrial, and paved areas such as parking lots and city streets. All the land uses around the lake pose a potential runoff and pollution problem to the lake. Shoreline homes provide the possibility of lawn runoff of herbicides and fertilizers. Rural/agricultural uses, if not properly managed, can result in herbicides, fertilizers, and eroded soils ending up in the lake. City uses, where a majority of the area is paved, can result in large amounts of nutrient rich debris entering the lake after a rainstorm. These non-point pollution problems can hasten the lake's natural eutrophication process, resulting in a lake that cannot support all of its recreational uses.

Lake Waconia has been involved in CAMP since 1994 (and monitored by Council staff in 2004). In 2006, the lake was monitored 14 times between mid-April and mid-October. During each monitoring event the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	52.2	18.0	140.0	C
CLA (µg/l)	29.4	3.0	120.0	C
Secchi (m)	2.4	1.0	4.4	B
TKN (mg/l)	0.88	0.58	1.40	
			Overall Grade	C

The lake's best overall water quality year recorded through CAMP was 1994 (TP= 21.0 µg/l, CLA= 6.3 µg/l, and Secchi= 3.1 m resulting in an overall grade of A). The worst was 2006 (TP= 52.2 µg/l, CLA= 29.4 µg/l, and Secchi= 2.4 m resulting in an overall grade of C).

A search of Council, MPCA, and STORET databases revealed nutrient water quality data for 1980, 1981, 1985, 1990, 1994-2005 (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. The lake received C's in 1980, 1998-2000, 2003 and 2006, B's in 1981, 1985, 1995-1997, 2001-2002 and 2004-2005, and an A in 1994. Supplemental Secchi data from 1980-1993 has resulted in annual grades of C or D. The lake's overall water quality grade seems to be well represented by an overall grade of C+/B.

Additionally, the MPCA recently conducted a trend analysis on the lake's Secchi transparency data, which revealed a statistically significant improvement in recent water clarity

The volunteer monitor's perception 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 1.9 (between 1- "crystal clear" and 2- "some algae present"), while the mean recreational suitability ranking was 1.8 (between 1- "beautiful" and 2- "minor aesthetic problem").

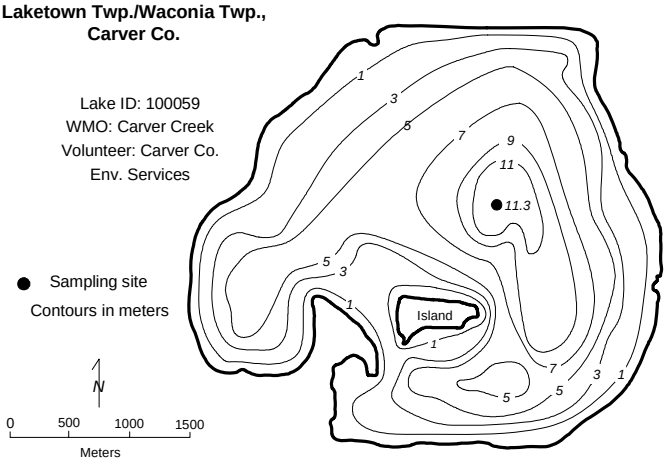
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

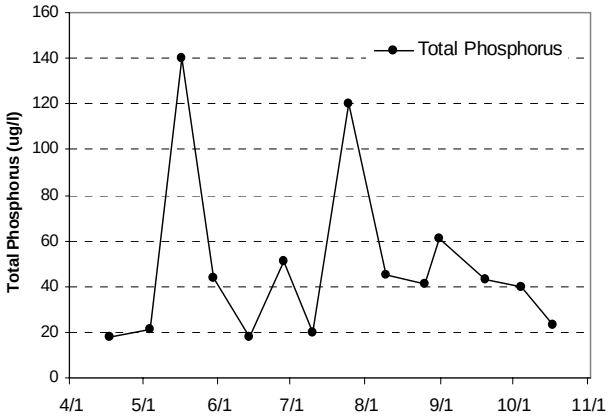
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

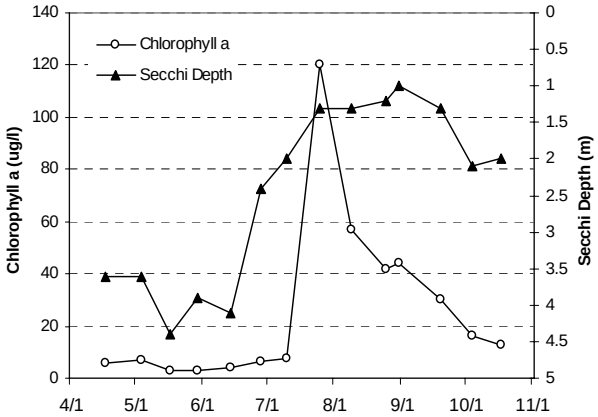
Lake Waconia

Laketown Twp./Waconia Twp., Carver Co.

Lake ID: 100059
WMO: Carver Creek
Volunteer: Carver Co. Env. Services

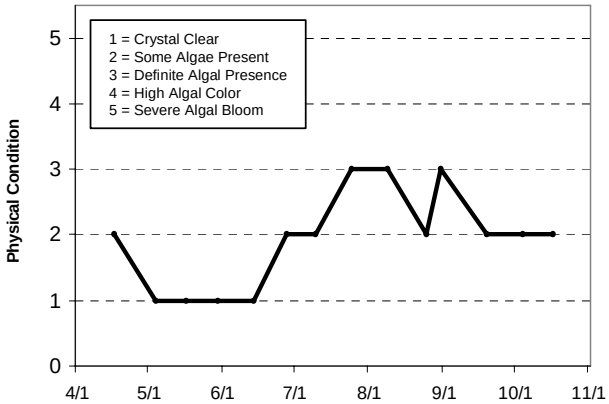






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/17/06	10.82		10.58		5.9	18		3.6	2	1
5/4/06	13.25		10.42		6.7	21.5		3.6	1	1
5/17/06	13.58		10.28		3.1	140		4.4	1	1
5/30/06	21.76		9.77		3	44		3.9	1	1
6/14/06	21.89		7.86		4	18		4.1	1	1
6/28/06	24.02		9.65		6.2	51		2.4	2	2
7/10/06	24.72		9.01		7.3	20		2	2	2
7/25/06	27.06		13.05		120	120		1.3	3	3
8/9/06	25.84		6.63		57	45		1.3	3	3
8/25/06	23.24		6.62		42	41		1.2	2	2
8/31/06	22.85		8.57		44	61		1	3	3
9/19/06	17.27		8.08		30	43		1.3	2	2
10/4/06	15.65		9.25		16	40		2.1	2	2
10/17/06	9.15		9.03		13	23		2	2	1

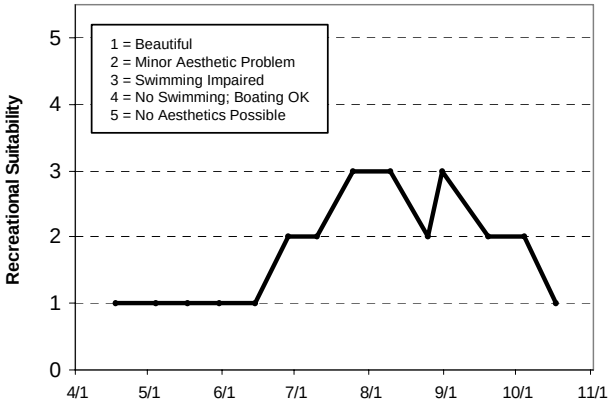


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus	C	B				B							
Chlorophyll a	C	B				B					C		
Secchi Depth	C	C	C	C	D	C	C	C	D	C	C	C	C
Overall	**C**	**B**				**B**							

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus		A	A	B	B	C	C	C	C	B	C	B	B	C
Chlorophyll a		A	B	B	B	B	B	B	B	B	B	B	B	C
Secchi Depth	C	A	B	C	C	C	C	C	B	B	C	C	A	B
Overall		**A**	**B**	**B**	**B**	**C**	**C**	**C**	**B**	**B**	**C**	**B**	**B**	**C**

Source: Metropolitan Council and STORET data



Weber Lake (82-0119) *Valley Branch Watershed District*

Weber Lake is a 7.5-acre lake located within the City of Mahtomedi (Washington County). The maximum depth of the lake is 1.5 m (roughly 5 feet) and 8.5 m (almost 30 feet), respectively. Because of the shallowness of the lake, its entire surface area is considered littoral, the shallow (0-15 foot depth) area is 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 lake's surface area and watershed size (141 acres) translates to a 19:1 watershed-to-lake size ratio. Generally the larger the ratio, the greater the potential stress on the lake from surface runoff.

This was the first year that Weber Lake has been involved in CAMP. A search through the STORET nationwide water quality database for historic data on the lake came up empty. Therefore, the 2006 CAMP data are the only nutrient data available for the lake. 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 lake was monitored 12 times between mid-April and early-October, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	69.3	25.0	166.0	D
CLA (µg/l)	7.4	3.3	16.0	A
Secchi (m)	0.9	0.6	1.1	D
TKN (mg/l)	1.41	0.82	1.90	
			Overall Grade	C

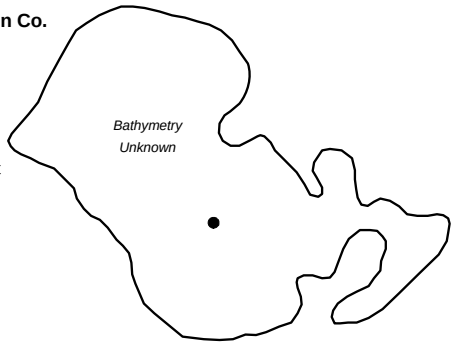
As mentioned earlier, there are no nutrient data available for Weber Lake other than the 2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

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 1.9 for physical condition (between 1- "crystal clear" and 2- "some algae present"), and 4.0 for recreational suitability (4- "no swimming – boating ok").

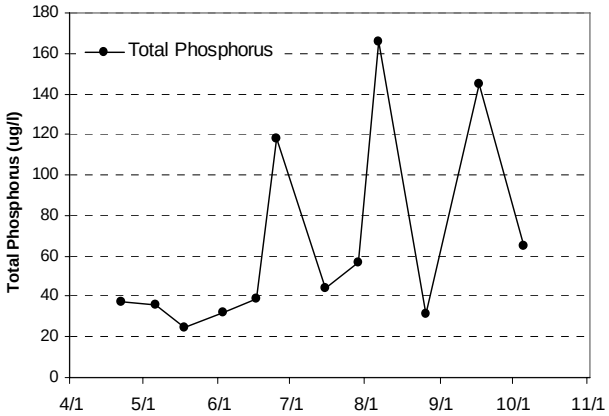
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

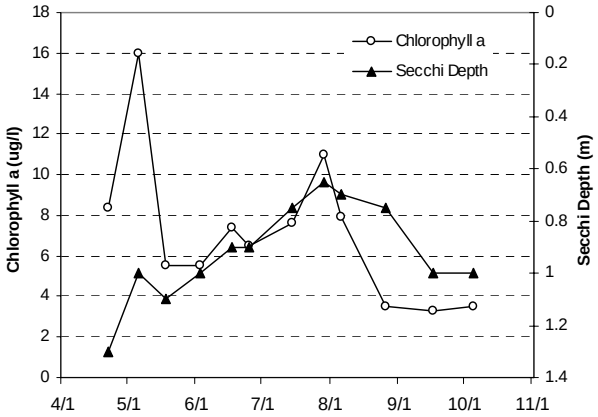
Weber Lake
Mahtomedi, Washington Co.

Lake ID: 820119
WD: Valley Branch
Volunteer: Denise Post



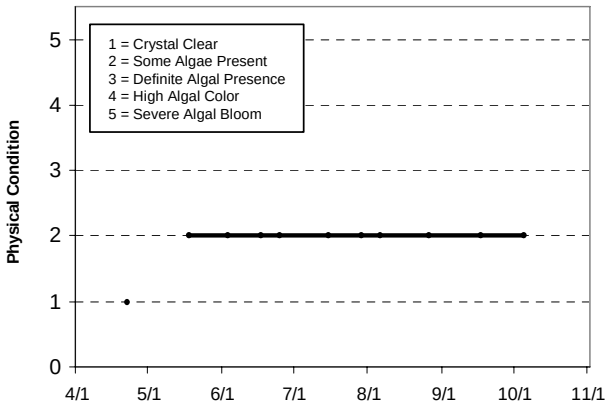
● Sampling site
Contours in meters





2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/22/06	15.1				8.4	37		1.3	1	4
5/6/06	17.9				16	36		1		
5/18/06	19.6				5.5	25		1.1	2	
6/3/06	28.8				5.5	32		1	2	4
6/17/06	26.1				7.4	39		0.9	2	4
6/25/06	26.5				6.5	118		0.9	2	4
7/15/06	30.3				7.6	44		0.75	2	4
7/29/06	29.1				11	57		0.65	2	4
8/6/06	28.6				7.9	166		0.7	2	4
8/26/06	25.8				3.5	31		0.75	2	4
9/17/06	21.3				3.3	145		1	2	4
10/5/06	17.7				3.5	65		1	2	4

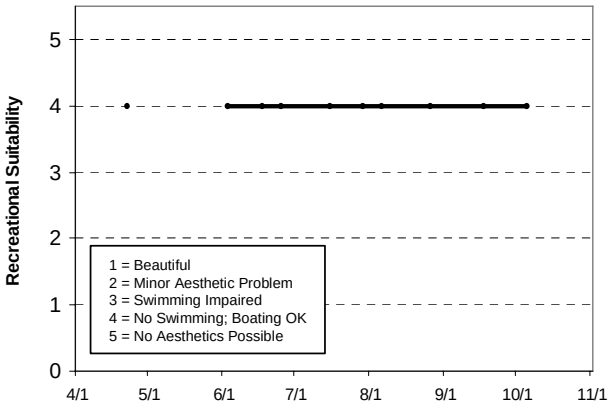


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus														D
Chlorophyll a														A
Secchi Depth														D
Overall														**C**

Source: Metropolitan Council and STORET data



West Boot Lake (82-0044) *Carnelian - Marine Watershed District*

This was the sixth year of CAMP monitoring in West Boot Lake which is located in May Township (Washington County). A search through the STORET nationwide water quality database revealed a moderate amount of data on the lake over the past 10+ years (1991 and 1996-1999 and the 2000-2005 CAMP data). 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. Roughly 56 percent of the lake's area is considered littoral zone (the 0-15 foot depth area dominated by aquatic vegetation). The lake's 209-acre immediate watershed translates to a 2:1 watershed-to-lake size ratio (the greater the ratio, the greater the potential stress on the lake from surface runoff).

The lake was monitored seven times between mid-May and mid-October, 2006. Results are presented on graphs and data tables on the following page. During each monitoring event, the lake was monitored for TP, CLA, TKN, Secchi transparency, as well as the perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	21.2	14.0	29.0	A
CLA (µg/l)	4.4	1.5	13.0	A
Secchi (m)	3.4	2.4	4.7	A
TKN (mg/l)	0.78	0.65	0.89	
			Overall Grade	A

The lake's 2006 overall grade is identical to those recorded in 1999-2005. No statistically significant long-term trend is evident from the lake's overall water quality database, in the short-term however, the lake seems to have a wide range of fluctuation (overall grade of B in 1996 and 1998, C in 1997, and A's in 1999-2006). A recent MPCA conducted trend analysis on the lake's Secchi transparency data, however, revealed a statistically significant improvement in recent water clarity. To better understand the lake's overall water quality and where it may be heading, continued monitoring is suggested.

Throughout the summer, the volunteer ranked the lake's perceived physical condition on a 1-to-5 scale (see lake information sheet). The mean physical condition ranking was 2.1 (between 2- "some algae present" and 3- "definite algae present"), while the mean 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) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

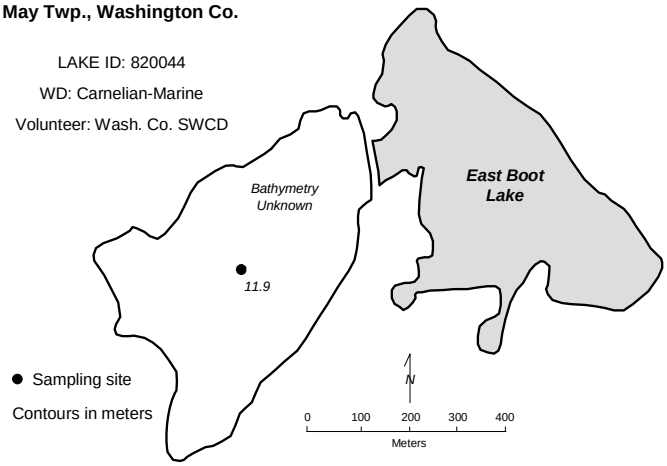
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

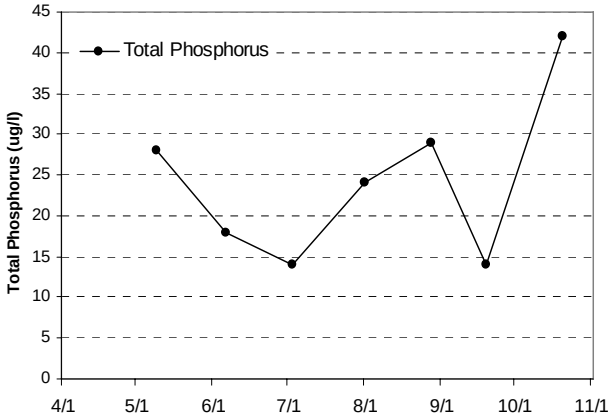
West Boot Lake
May Twp., Washington Co.

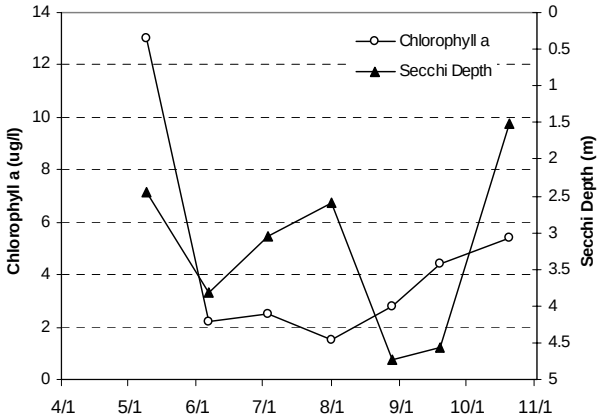
LAKE ID: 820044

WD: Carnelian-Marine

Volunteer: Wash. Co. SWCD

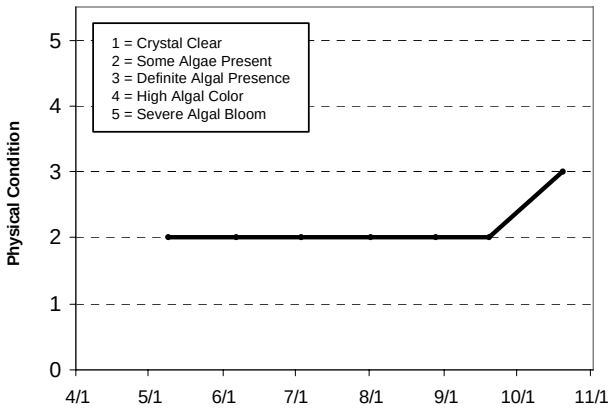






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/9/06	18.1	4.6	8.01	0.28	13	28		2.438	2	3
6/6/06	25		5.18		2.2	18		3.81	2	2
7/3/06	27.4	5.1	8.49	0.09	2.5	14		3.048	2	2
8/1/06	29.2	5.3	6.64	0.07	1.5	24		2.591	2	1
8/28/06	23	5.5	6.04	0.06	2.8	29		4.724	2	2
9/19/06	17.5	5.8	8.61	0.06	4.4	14		4.572	2	2
10/20/06	8.2	5.8	8.2	0.05	5.4	42		1.524	3	3

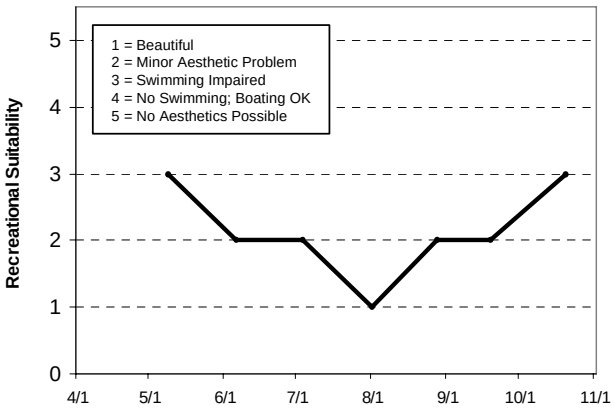


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth												C	
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus				B	C	A	A	A	A	A	B	A	A	A
Chlorophyll a				A	B	C	A	A	A	A	A	A	A	A
Secchi Depth				B	C	B	A	A	A	A	A	A	A	A
Overall				**B**	**C**	**B**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**

Source: Metropolitan Council and STORET data



Westwood Lake (27-0711) *Bassett Creek Watershed Management Organization*

This was the eighth year of CAMP monitoring in Westwood Lake (1993 and 2000-2005 being the others), which is located in the City of St. Louis Park (Washington County). The 41-acre lake has a maximum depth of 2.0 m (six-and-a half feet). Because of the shallowness of the lake, it is entirely considered littoral zone (the 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).

Westwood Lake was monitored eight times between mid-April and mid-September, 2006. Results from the monitoring are presented on the information sheet on the next page.

2005 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	148.0	30.0	374.0	D
CLA (µg/l)	13.6	5.9	35.0	B
Secchi (m)	1.3	0.7	1.5	C
TKN (mg/l)	1.70	1.20	2.20	
			Overall Grade	C

Because there is a limited amount of historic data available for Westwood Lake, it is not possible to determine any long-term trends. In the short-term however, the lake's water quality shows a wide range of fluctuation (overall grade of D in 1982, C in 1993, 2001-2002, 2005 and 2006, and B in 2000 and 2003-2004). To better understand the lake's water quality and where it may be heading, continued monitoring is suggested.

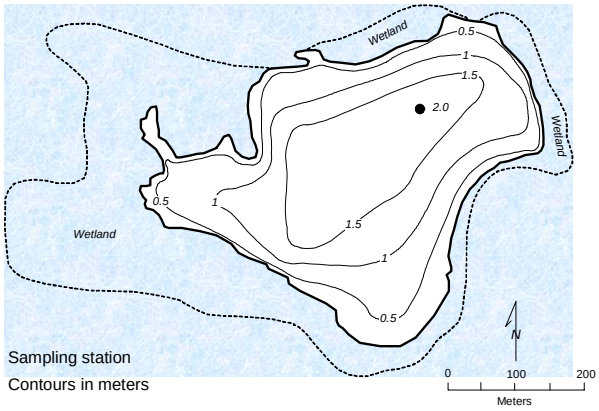
Throughout the monitoring period, the volunteers' opinion of the lake's physical and recreational conditions were ranked on a 1-to-5 scale. These user perception rankings are shown on the lake information sheet. The average user perception rankings, on a 1-to-5 scale, were 2.0 for physical condition (2- "some algae present"), and 3.6 for recreational suitability (between 3- "swimming slightly impaired" and 4- "no swimming – boating ok").

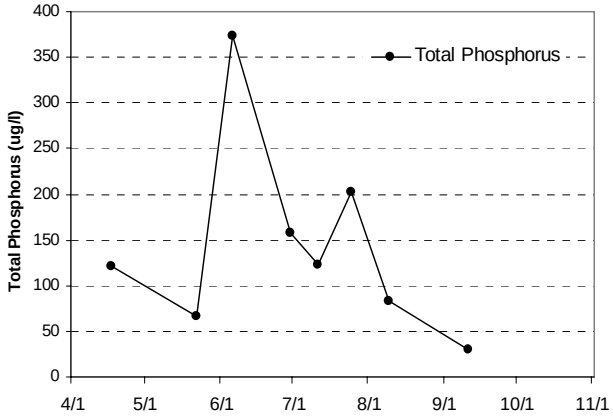
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

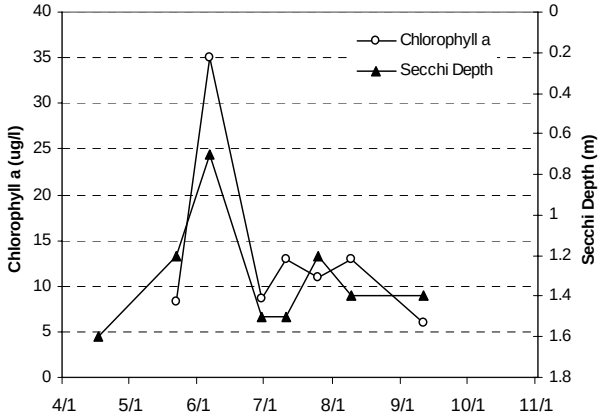
Lake ID: 270711
WMO: Bassett Creek

Volunteers: The Westwood Nature Center

Westwood Lake,
St. Louis Park, Hennepin Co.

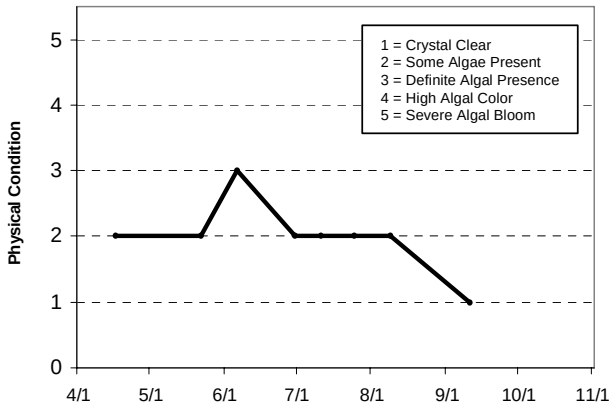






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/17/06	16					121		1.6	2	1
5/22/06	19				8.3	66		1.2	2	4
6/6/06	25				35	374		0.7	3	4
6/30/06	28				8.7	158		1.5	2	4
7/11/06	25.9				13	122		1.5	2	4
7/25/06	27.8				11	203		1.2	2	4
8/9/06	25.7				13	83		1.4	2	4
9/11/06	16.6				5.9	30		1.4	1	4

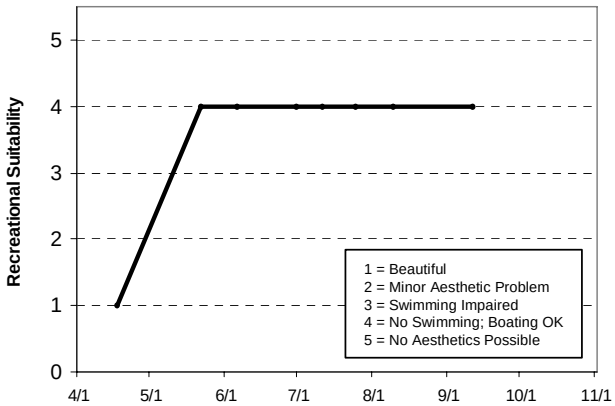


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus			F										
Chlorophyll a			C										
Secchi Depth			D										
Overall			**D**										

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus	C							B	B	C	C	C	D	D
Chlorophyll a	C							B	C	B	A	A	C	B
Secchi Depth	C							C	C	C	C	C	C	C
Overall	**C**							**B**	**C**	**C**	**B**	**B**	**C**	**C**

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 very little known morphological data available for the lake.

This was the first 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 no data, therefore 2006 is the only year of available water quality data for the lake.

As part of the watershed's involvement in CAMP in 2006, the lake was monitored 11 times between early-May and mid-October. During each sampling event the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	**Mean**	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	108.2	55.0	179.0	D
CLA (µg/l)	33.8	16.0	46.0	C
Secchi (m)	0.5	0.4	0.7	F
TKN (mg/l)	2.24	1.20	3.50	
			Overall Grade	D

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 2.3 for recreational suitability ranking (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

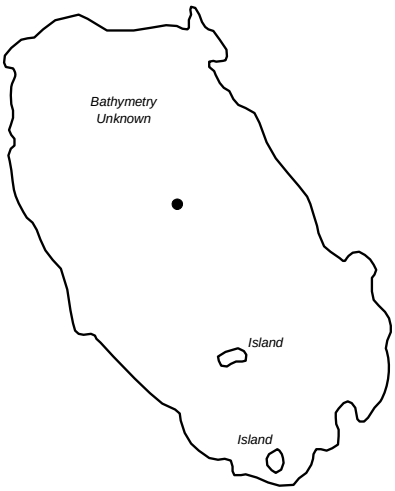
As mentioned earlier, there is very limited water quality data available for White Rock Lake. Therefore, it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

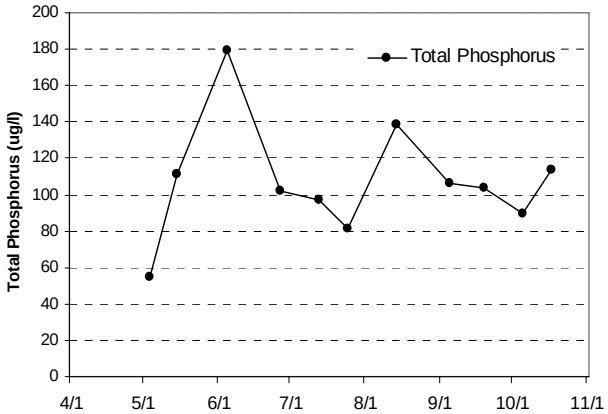
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

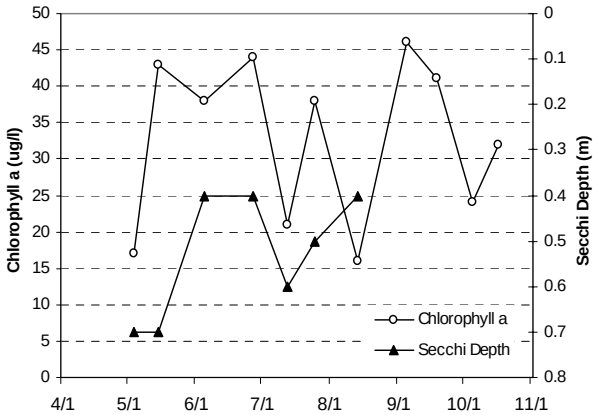
White Rock Lake,
New Scandia Twp., Washington Co.

Lake ID: 820072
WD: Rice Creek
Volunteer: David Bluhm

● Sampling station
Contours in meters

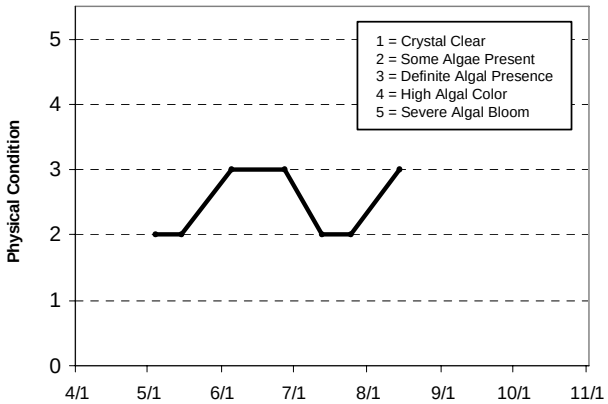






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
5/4/06	14.4				17	55		0.7	2	2
5/15/06	15				43	111		0.7	2	2
6/5/06	26.5				38	179		0.4	3	2
6/27/06	24.8				44	102		0.4	3	3
7/13/06	28.3				21	97		0.6	2	2
7/25/06	30.9				38	81		0.5	2	3
8/14/06	24.9				16	139		0.4	3	2
9/5/06					46	106				
9/19/06					41	104				
10/5/06					24	90				
10/17/06					32	114				

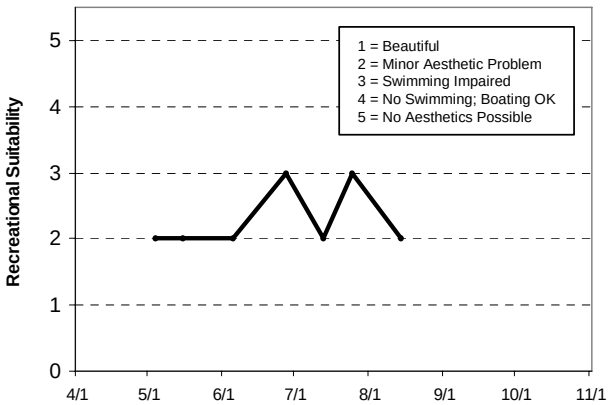


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus														D
Chlorophyll a														C
Secchi Depth														F
Overall														**D**

Source: Metropolitan Council and STORET data



Wilmes Lake (82-0090) *City of Woodbury*

Wilmes Lake, located in the City of Woodbury (Washington County) is classified as a minnow lake that experiences frequent fish kills. The lake has a surface area of 41 acres (1.3 miles around) and a maximum depth of 5.5 m (18 feet). While there is currently no public access to the lake, one is planned at the northern end of the lake. The lake's 2,247-acre watershed translates to a large watershed-to-lake size ratio of 55:1. The larger the ratio, the greater the potential stress on the lake quality from surface runoff.

The future "ultimate" land uses within the lake's contributing watershed are expected to be: 16.4 percent single-family residential, 4.5 percent multi-family residential, 10.5 percent commercial/retail, 3.7 percent parks/open space, 1.0 percent ponds/wetlands, and 63.9 percent indirect drainage (City of Woodbury 1994).

Wilmes Lake has been involved in CAMP since 1994. In 2006, the lake was monitored 12 times between mid-April and mid-October. During each monitoring event, the lake was monitored for TP, CLA, TKN, Secchi transparency, as well as the perceived physical condition and recreational suitability. Results are presented on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	80.6	43.0	140.0	D
CLA (µg/l)	21.8	8.3	47.0	C
Secchi (m)	1.3	0.9	1.9	C
TKN (mg/l)	1.52	0.90	2.30	
			Overall Grade	C

The lake's 2006 overall water quality grade of C is identical to those of 1995-1996, 1999-2000 and 2003-2004, better than the D's recorded in 1997-1998 and 2001-2002 and 2005, and worse than the B recorded in 1994.

With that said, the 1994 and 1995 CAMP data were actually collected in the northern basin of Wilmes Lake, while the 1996-2004 data were collected in the lake's south basin. For this reason, comparisons between the 1994-1995 database and the 1996-2006 database should not be made.

No statistically significant long-term trend is evident from the lake's water quality database, in the short-term however, the overall lake grade in the north basin seems to be C/B, while the overall grade of the south basin seems to be C/D+. To better understand the lake's water quality and where it may be heading, continued monitoring is suggested.

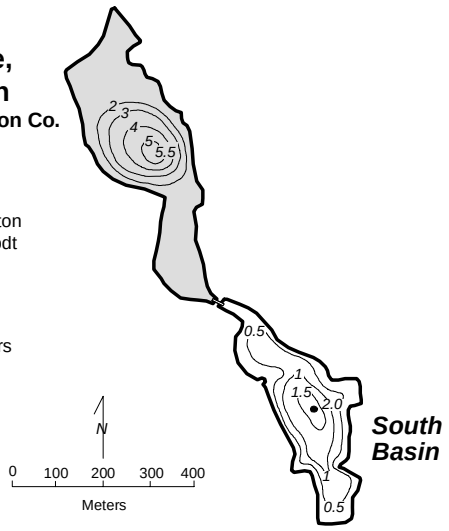
Throughout the monitoring period, the perceived physical condition and recreational suitability of the lake were ranked on a 1-to-5 scale by the volunteer monitors. These user perception rankings are presented in data tables and graphs on the information sheet. The mean physical condition ranking was 2.7 (between 2- "some algae present" and 3-"definite algae present"). The mean recreational suitability ranking was 2.6 (between 2- " minor aesthetic problem" and 3- "swimming slightly impaired").

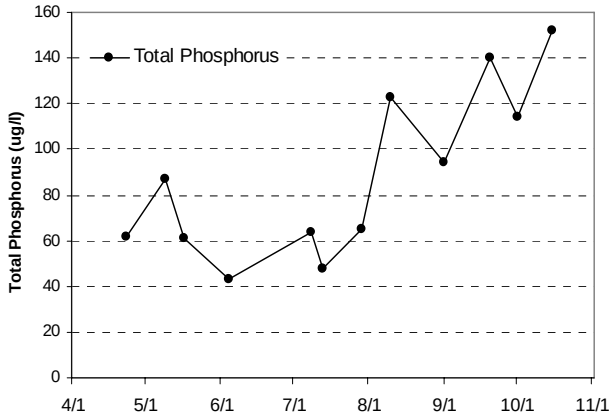
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

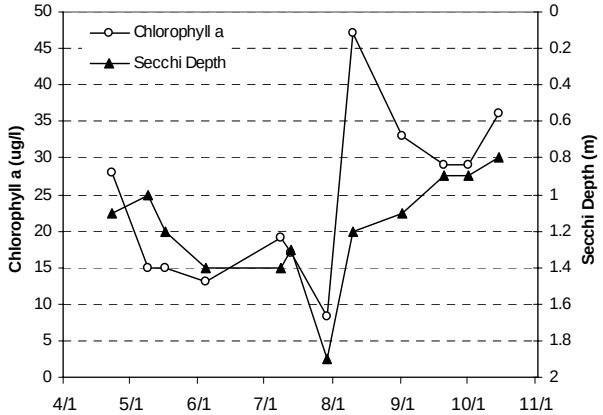
Wilmes Lake, South Basin
Woodbury, Washington Co.

Lake ID: 820090
WD: South Washington
Volunteer: Bill Aamodt

● Sampling site
Contours in meters

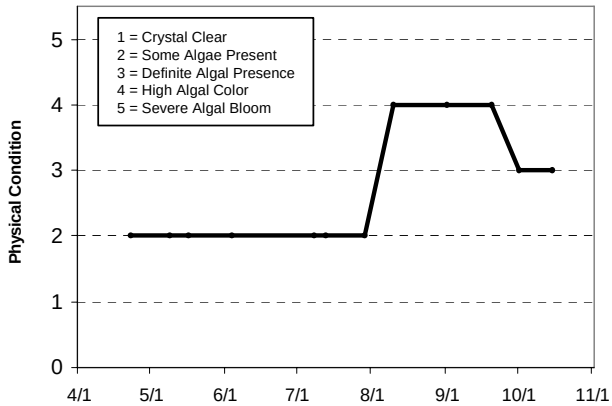






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/23/06	16.5				28	62		1.1	2	2
5/9/06	20.7				15	87		1	2	2
5/17/06	16.9				15	61		1.2	2	2
6/4/06	25.8				13	43		1.4	2	2
7/8/06	26.1				19	64		1.4	2	2
7/13/06	28.4				17	48		1.3	2	2
7/29/06	30				8.3	65		1.9	2	2
8/10/06	26.6				47	123		1.2	4	3
9/1/06	23.5				33	94		1.1	4	4
9/20/06	18.4				29	140		0.9	4	4
10/1/06	16.1				29	114		0.9	3	3
10/15/06	9.8				36	152		0.8	3	3

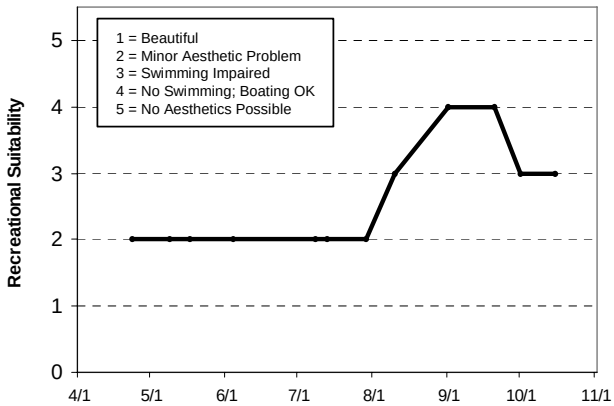


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus		C	D	D	D	D	D	D	D	D	D	C	D	D
Chlorophyll a		B	B	C	C	C	C	C	C	D	C	C	C	C
Secchi Depth		B	C	C	D	D	C	C	D	D	C	C	D	C
Overall		**B**	**C**	**C**	**D**	**D**	**C**	**C**	**D**	**D**	**C**	**C**	**D**	**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 very little known morphological data available for the lake.

This was the first year that Wing Lake has been involved in CAMP. A search through the STORET nationwide water quality database for data on the lake provided no data, therefore 2006 is the only year of available water quality data for the lake.

As part of the watershed's involvement in CAMP in 2006, the lake was monitored 14 times between mid-April and mid-October. During each sampling event the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

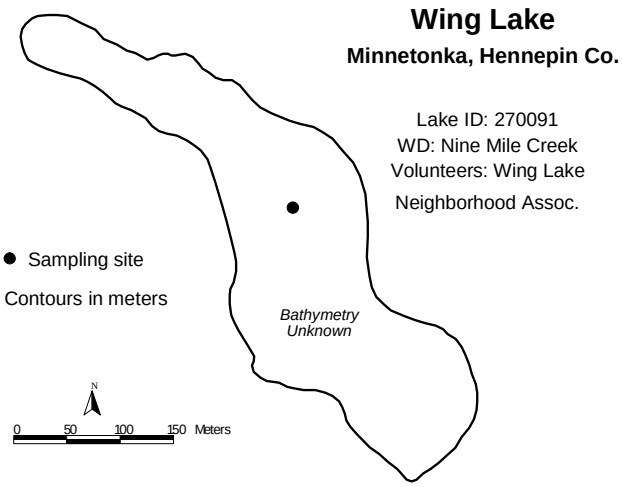
2006 summer (May-September) data summary

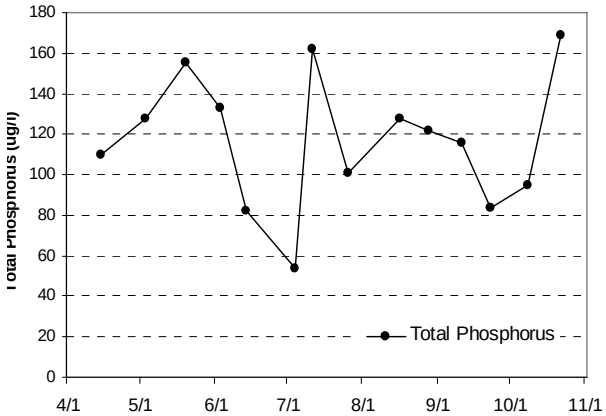
Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	115.0	54.0	162.0	D
CLA (µg/l)	32.2	5.6	77.0	C
Secchi (m)	1.0	0.5	1.4	D
TKN (mg/l)	1.47	1.00	1.90	
			Overall Grade	D

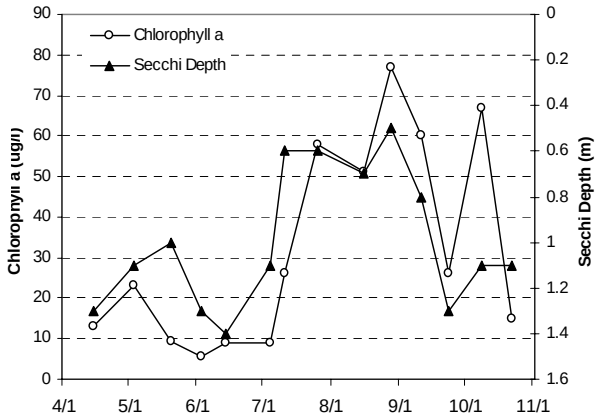
As mentioned earlier, there are no nutrient data available for Wing Lake other than the 2006 CAMP data. Therefore it is not possible to determine any long-term or short-term trends. To better understand the lake's water quality and where it may be heading, additional years of data collection are needed.

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 2.6 for physical condition (between 2- "some algae present" and 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

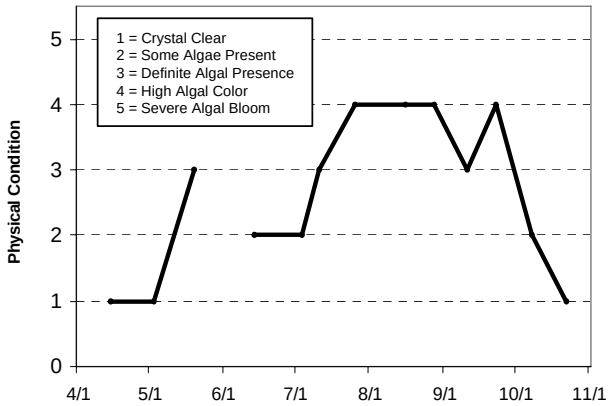






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/15/06	16.3				13	110		1.3	1	4
5/3/06	17.2				23	128		1.1	1	4
5/20/06	18.9				9.4	155		1	3	
6/3/06	24.3				5.6	133		1.3		
6/14/06	22.9				9	82		1.4	2	4
7/4/06	27.1				9	54		1.1	2	
7/11/06	27.7				26	162		0.6	3	
7/26/06	29.6				58	101		0.6	4	5
8/16/06	23.8				51	128		0.7	4	5
8/28/06	22.1				77	122		0.5	4	5
9/11/06	16.8				60	116		0.8	3	4
9/23/06	14.4				26	84		1.3	4	4
10/8/06	15				67	95		1.1	2	4
10/22/06	5.6				15	169		1.1	1	

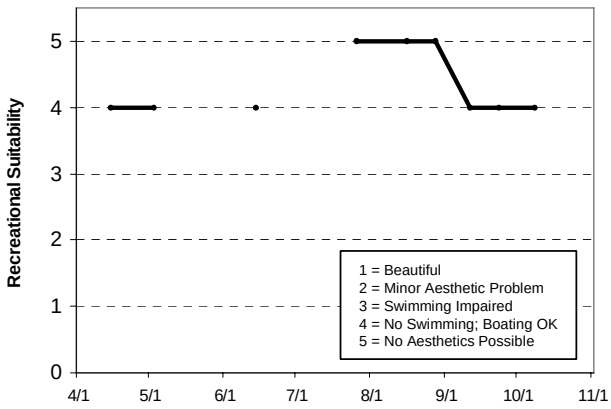


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus														D
Chlorophyll a														C
Secchi Depth														D
Overall														**D**

Source: Metropolitan Council and STORET data



Wood Lake [Burnsville] (19-0024) *Black Dog Watershed Management Commission*

Wood Lake is a 9-acre lake located within the City of Burnsville (Dakota County). The maximum depth of the lake is 4.5 m (14.7 feet). Because the maximum depth is only 4.5 m (almost 15 feet), the entire lake area is considered littoral zone (the area of aquatic vegetation dominance). The majority of the land within the lake's 157-acre immediate watershed is urban/developed. The resulting watershed-to-lake size ratio is 17:1. The greater the ratio, the greater the potential stress on the lake from surface runoff.

This was the eleventh year that Wood Lake has been involved in CAMP. The lake (which has been enrolled in CAMP since 1996) was monitored 13 times between mid-April and mid-October, 2006. The resulting data and graphs appear on the next page.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	74.4	22.0	179.0	D
CLA (µg/l)	23.9	3.3	66.0	C
Secchi (m)	1.2	0.4	2.4	C
TKN (mg/l)	1.84	0.92	2.80	
			Overall Grade	C

The 2006 overall lake quality grade for Wood Lake, calculated from the individual parameter grades, is C (similar to 1996, 1997, and 1999-2005, but worse than the B of 1998).

As mentioned in previous reports, an alum sulfate (alum) treatment in October of 1997 resulted in the lake's best water quality year in 1998. An alum treatment to a lake involves adding the chemical to bind and precipitate phosphorus, removing it from the water column, and sealing the bound phosphorus in the sediment rendering it inactive for release to the overlying water. By removing the phosphorus from the water column and locking it in the sediments, its availability for plant growth is reduced. The success of this treatment depends on the lake's residence time (the time it would take to entirely refill the lake basin with water if it were empty) and external phosphorus load. The shorter the residence time and the larger the external phosphorus load, the quicker new sources of phosphorus will replenish the water column. Since 1998, however, the lake's water quality has been more comparable to that of the pre-alum treatment years of 1996 and 1997 as opposed to that of 1998. For this reason it seems that the alum treatment has not been wholly successful.

Other than the data collected through CAMP, there are no historical water quality data available for Wood Lake. A search through STORET (EPA's nationwide water quality database) came up empty. Therefore the only summertime data available are those from 1996-2006. No statistically significant long-term trend is evident from the lake's water quality database, in the short-term however, the lake's water quality seems well represented by an overall grade of C. To better understand the water quality of the lake and determine in what direction the water quality is heading, additional years of data collection are needed.

The volunteer monitor's perception 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 average user perception rankings were 3.2 for physical condition (which falls between 3- "definite algae present" and 4- "high algal color"), and 4.0 for recreational suitability (4- "no swimming - boating ok").

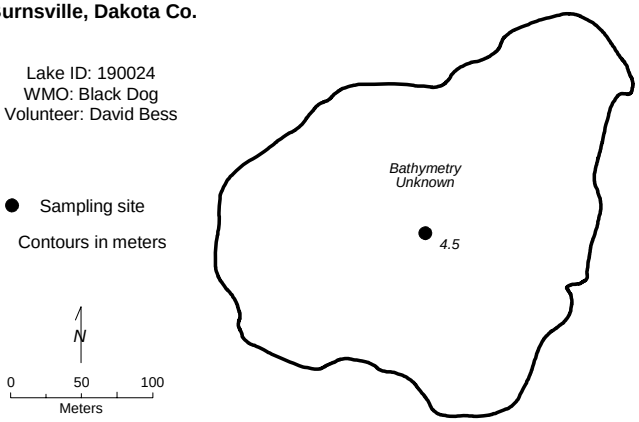
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 297-4916 or by downloading the information off the Internet at http://www.dnr.state.mn.us/lakefind/.

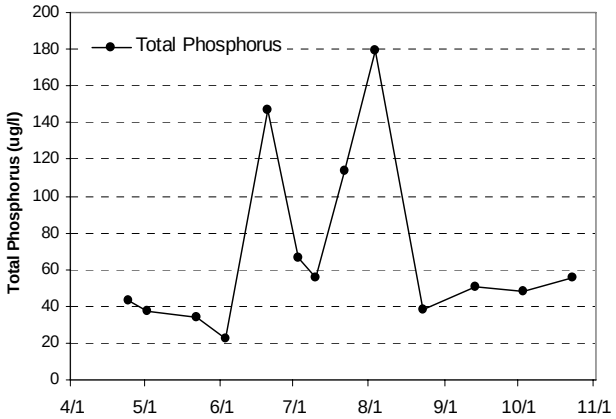
If you notice any errors in the lake's data or physical information, or are aware of any additional or missing information, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

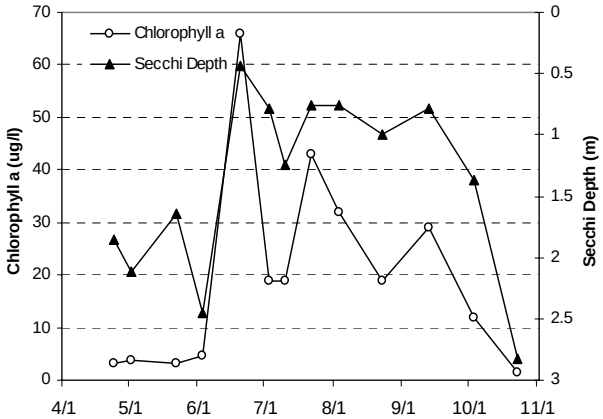
Wood Lake

Burnsville, Dakota Co.

Lake ID: 190024
WMO: Black Dog
Volunteer: David Bess

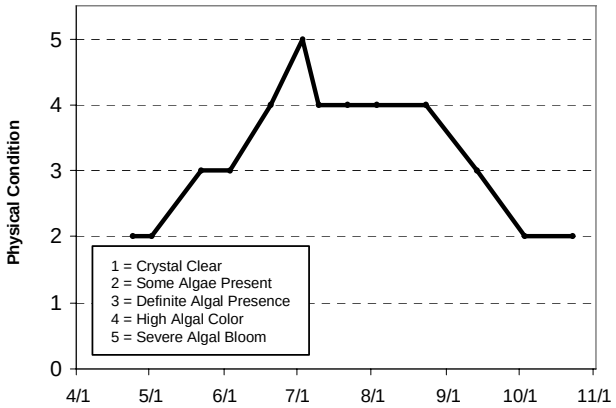






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/24/06	15.8				3.3	43		1.85	2	4
5/2/06	15.4				3.8	37		2.12	2	4
5/22/06	20				3.3	34		1.64	3	4
6/3/06	26.9				4.7	22		2.45	3	4
6/20/06	25.4				66	147		0.43	4	4
7/3/06	27.7				19	66		0.78	5	4
7/10/06	27.7				19	56		1.25	4	4
7/22/06	28.3				43	114		0.76	4	4
8/3/06	28.8				32	179		0.76	4	4
8/23/06	26.7				19	38		1	4	4
9/13/06	21				29	51		0.78	3	4
10/3/06	19.5				12	48		1.37	2	4
10/23/06	7.5				1.4	56		2.83	2	4

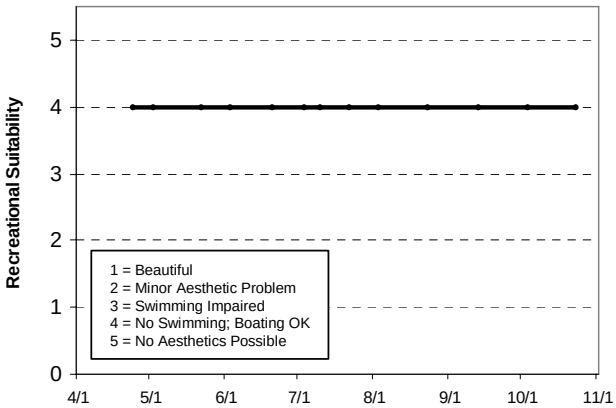


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus				C	C	B	C	C	C	C	C	C	C	D
Chlorophyll a				B	B	B	B	B	C	C	B	B	C	C
Secchi Depth				C	C	C	C	C	C	C	C	C	C	C
Overall				**C**	**C**	**B**	**C**	**C**	**C**	**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. There is very little known morphological data available for the lake.

This was the first year that Woodpile Lake has been involved in CAMP. A search through the STORET nationwide water quality database for data on the lake provided no data, therefore 2006 is the only year of available water quality data for the lake.

As part of the watershed's involvement in CAMP in 2006, the lake was monitored seven times between mid-April and late-September. During each sampling event the lake was monitored for TP, CLA, TKN, and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability.

2006 summer (May-September) data summary

Parameter	*Mean*	*Minimum*	*Maximum*	*Grade*
TP (µg/l)	75.7	50.0	122.0	D
CLA (µg/l)	16.5	4.8	28.0	B
Secchi (m)	1.4	0.9	2.1	C
TKN (mg/l)	1.22	1.00	1.40	
			Overall Grade	C

As mentioned earlier, there are no nutrient data available for Woodpile Lake other than the 2006 CAMP data. Therefore it is not possible to determine any long-term or short-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 3.3 for physical condition (between 3- "definite algae present" and 4- "high algal color"), and 3.7 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 Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

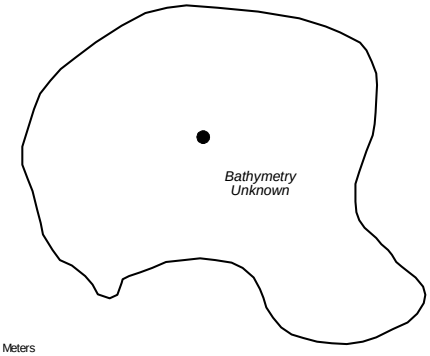
Woodpile Lake

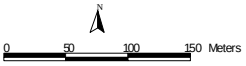
Grant, Washington Co.

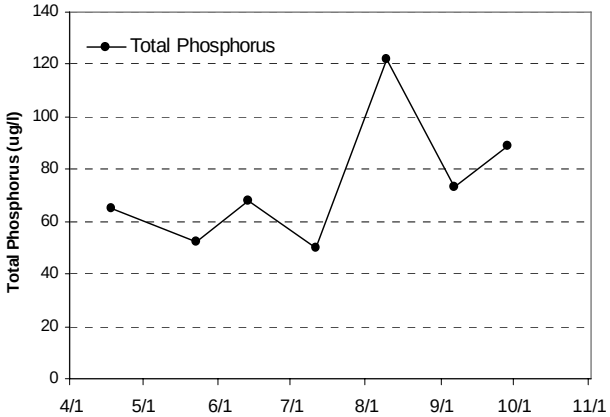
Lake ID: 820132
WD: Browns Creek
Volunteer: Washington Co. SWCD

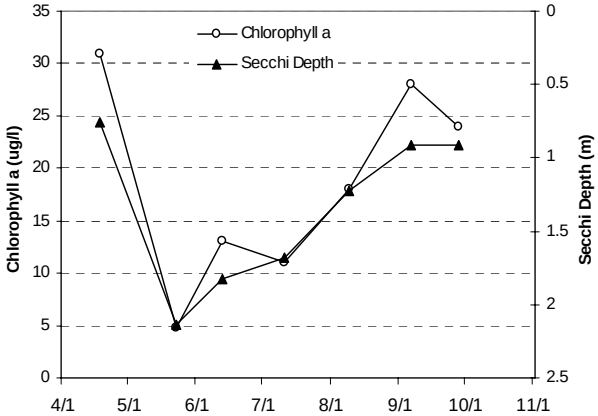
● Sampling site

Contours in meters



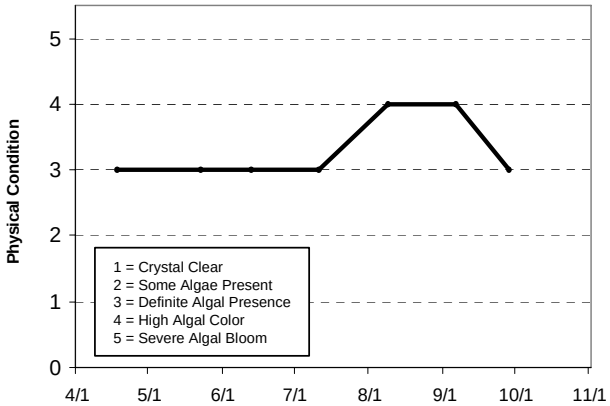






2006 Data

	Surf. Tmp	Bot. Tmp	Surf. DO	Bot. DO	CLA	Surf. TP	Bot. TP	Secchi	PC	RS
Date	C	C	mg/L	mg/L	ug/L	ug/L	ug/L	M	1 thru 5	1 thru 5
4/18/06	13.8	4.9	11.16	1.11	31	65		0.762	3	4
5/23/06	18.7	5.4	10.62	0.66	4.8	52		2.134	3	4
6/13/06	23.2	5.8	9.95	0.08	13	68		1.829	3	3
7/11/06	26	6	10.19	0.12	11	50		1.676	3	4
8/9/06	26.4	6.3	8.04	0.08	18	122		1.219	4	4
9/6/06	24.5	9.4	13.1	0.1	28	73		0.914	4	4
9/28/06	14.9	6.7	8.8	0.11	24	89		0.914	3	3

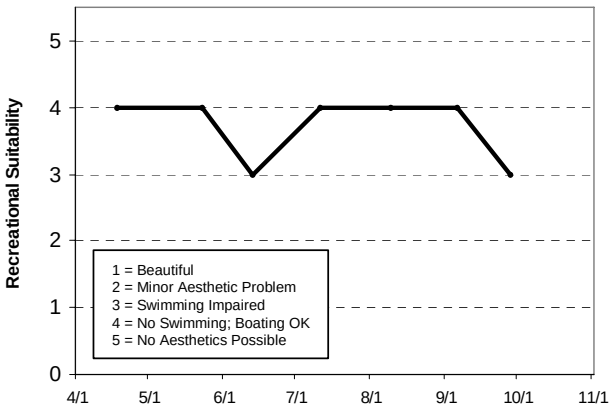


Lake Water Quality Grades Based on Summertime Averages

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total Phosphorus													
Chlorophyll a													
Secchi Depth													
Overall													

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Phosphorus														D
Chlorophyll a														B
Secchi Depth														C
Overall														**C**

Source: Metropolitan Council and STORET data



CONCLUSIONS

To date, the Metropolitan Council's lake monitoring programs (including the staff and volunteer monitoring programs) have provided an important tool for making informed lake management decisions. Data from our regional lake monitoring programs 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 landuse and water quality. In 2006, the Council's lake monitoring program collected data from 201 lake sites on 186 lakes, including 13 lake sites on 11 lakes monitored by the Council, and 188 lake sites on 178 lakes monitored by Citizen-Assisted Monitoring Program (CAMP) volunteers.

Seventy-six of the 186 lakes monitored in 2006 are listed by the MPCA as impaired waters due to excessive phosphorus which affects the lake's ability to support their designated recreational uses. Seventy-one of those lakes were monitored through CAMP, and five were monitored by Council staff. To learn more about the impaired lakes listings and potential next steps, see http://www.pca.state.mn.us/water/tmdl/index.html.

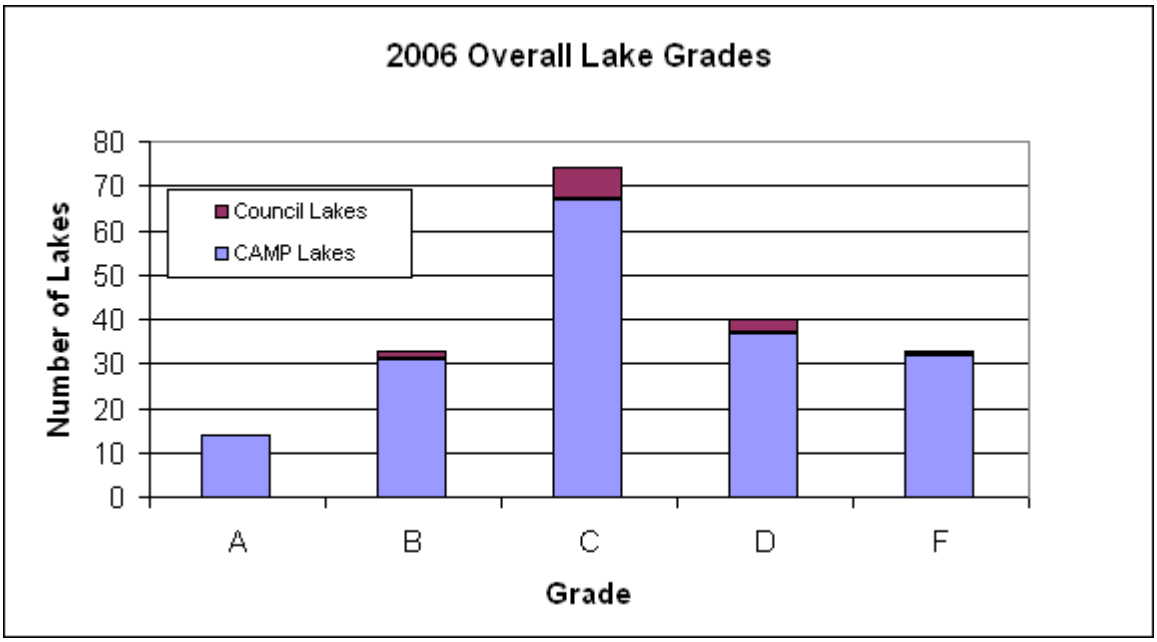
The year 2006 marked the fourteenth year that CAMP was used to increase our knowledge of the water quality of area lakes. Once again, volunteers measured surface water temperature and transparency, and collected surface water samples that were analyzed for total phosphorus, total Kjeldahl nitrogen, and chlorophyll-a on a biweekly basis from mid-April to mid-October (approximately 14 sampling events).

This year's monitoring program included 25 lakes never before monitored by the Council, and 141 lake sites that were previously monitored in 2005. The 2006 lake monitoring program included lake data from all 24 of the 26 watersheds/municipalities/counties represented in the 2005 program. Additionally, the 2006 CAMP program enrolled six new groups, continuing to expand the list of monitoring partners.

The greatest percentage of the lake sites monitored through CAMP in 2006 received an overall water quality grade of "C" (37 percent). When combining the CAMP and Council staff monitored lake site grades 38 percent of the lakes received an overall grade of "C". The water quality of these lakes is considered average as compared to others in the seven-county metropolitan area. When comparing the percentage of above-average lakes, those receiving grades of "A" or "B" (24 percent), to below-average lakes, those receiving "D" or "F" (38 percent), more lakes were below average. The complete 2006 CAMP lake report card grade tally (for those lakes with sufficient data) assigned "A's" to 14 lake sites (8 percent), "B's" to 31 lake sites (17 percent), "C's" to sixty-seven lake sites (37 percent), "D's" to 37 lake sites (20 percent), and "F's" to 32 lake sites (18 percent).

The 14 lake sites that received "A" grades, within the top 10-percentile range for Metro Area lakes include: Big Carnelian, Brickyard, Bass – West (Washington County), Bush, Cenaiko, Courthouse, Elmo, Jane, Lac Lavon, Little Carnelian, MacDonald's Pond, Square, Sunset, and West Boot Lakes.

The 32 lake sites receiving the lowest water quality grade "F" include: Alimagnet, Bay Pond, Campbell, Cedar Island, Cobblecrest, Colby, Cornelia, Cowley, Dean, Down, Eagle, Eagle Point, Friedrich's Pond, Gaystock, George Watch, Goose (Waconia), Hart, Hazeltine, Highland, Jonathan, July, Long (Apple Valley), Loon, Lynch, Magda, Mill, McKnight, Markgrafs, Oak – Site 1, Peltier, Swede, and Twin Upper Lakes.



Similar to past years, there is no distinct pattern as to where lakes with specific water quality were located. As observed in the past, the only similarity between the majority of the D and F grade lakes is their size and mean depth. These lakes are generally shallow with small surface areas. In some cases, the lakes are simply deep marshes with an excess of emergent and submergent vegetation. As mentioned in past reports, this distinction is important for three reasons: 1) deeper lakes have a greater ability to incorporate nutrients and trap them in the sediments, where they are not available for plant growth (macrophyte and/or algae), 2) shallow lakes typically do not stratify during the summer months, allowing the potential release of phosphorus from bottom sediments to rise through the water column and become available for plant growth, and 3) the small surface areas of these lakes generally result in higher watershed-to-lake ratios. Lakes with high watershed-to-lake ratios have to handle larger pollutant loads for their size than do larger lakes in a similar-sized watershed.

Similarly, the lake sites with above-average water quality (grades of “A” and “B”) were not area specific. They were located in all seven of the region’s counties. Lake sites receiving an “A” grade were found in five of the seven metropolitan counties. Common characteristics of the above-average lakes were: deeper maximum and mean depths, development of a thermocline, small contributing watersheds relative to the lake’s surface area, and little construction within the watershed.

In 2006, an analysis of the CAMP lake water quality nutrient data (TP and CLA) produced no “statistically significant” long-term water quality trends. Assessment of TP and CLA trends is difficult, since the majority of lakes in the Metropolitan Area have limited and/or fluctuating databases.

In many cases, however, lake Secchi transparency data are much more extensive than their related TP and CLA data, since it is much less expensive to make Secchi readings than it is to analyze water samples at a laboratory. In addition, the MPCA developed a volunteer Secchi transparency monitoring program in the early-1970’s. For these reasons, a few CAMP lake sites do have sufficient information to determine statistically significant trends in Secchi transparency. Of the CAMP lakes assessed in 2006 (those with sufficient data), 16 showed an improving trend in water clarity (Big Marine, Courthouse, DeMontreville, Elmo, Langton (south basin), Little Carnelian, Long (May Township), Long (Stillwater), McKusick,

Olson, Sunset, Upper Prior, Valentine, Valley, Waconia, and West Boot lakes) and six showed a negative trend (Bavaria, Cedar Island, Farquhar, Markgrafs, Seidl, and Square Lakes) (MPCA 2006).

Of the 141 lakes previously monitored in 2005, 36 had a worse overall water quality grade in 2006 (Alimagnet, Bass-West (Washington County), Big Comfort, Big Marine, Cedar (Scott County), Cloverdale, Colby, Dean, Downs, Eagle, Edith, Fireman's, George Watch, Goggins, Keller (Burnsville), Kingsley, Markgrafs, Miller, Mitchell, Northwood, Oak (Site 1), O'Dowd, Peltier, Prior Lake (Upper), Prior Lake (Lower), Seidl's, Silver (Washington County), South Twin, Staples, St. Joe's, Swede, Sweeney, Terrapin, Twin (Burnsville), Valley, and Waconia Lakes), 15 lakes had a better overall water quality grade in 2006 (Bavaria, Benz, Birch, Cobblestone, Earley, Farquhar, Hay, Henry, Herber's Pond, Long (Washington County), MacDonald's Pond, O'Connor, Riley, Schroeder's Pond, and Wilmes Lakes), and 90 lakes had the same overall water quality grade for both years.

The locations of the 36 lake sites with worse overall water quality grades in 2006, as compared to 2005, was: two in Anoka County, seven in Carver County, six in Dakota County, three in Hennepin County, 12 in Washington County, one in Chisago County and five in Scott County. The 15 lake sites with better water quality in 2006 were located in Chisago County (one), Carver County (two), Dakota County (three), Hennepin County (one), and Washington County (eight).

Water quality data from the 141 lake sites monitored in both 2005 and 2006 seem to indicate that the Metropolitan Area lakes experienced slightly worse water quality conditions in 2006 as compared to 2005. This continues a trend noted in 2005, when water quality was slightly worse than in 2004. A recently conducted statewide trend analysis by MPCA on lakes with extensive Secchi transparency databases revealed that, while the majority of statistically assessed lakes showed no trends in water clarity (either negative or improving), more lakes showed an improving trend than a negative trend (MPCA 2006).

Since 1980, 322 Metropolitan Area lakes have been monitored through the Council's lake monitoring program. Since some of the lakes have multiple monitoring sites, a total of 343 lake sites have been monitored. The list of lakes in the Council's monitoring database is shown in Appendix C. The resulting data from the Council's lake monitoring program are permanently stored in the U.S. EPA's national water quality data bank, STORET (STOrage and RETrieval). The majority of the 343 lake sites have been revisited on a rotating schedule throughout the past 27 years, to develop a working baseline to help determine possible water quality trends, and to aid lake and watershed managers in their decision making. While the Council 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 watershed management organizations, counties, and cities. So while the first 14 years of CAMP have been very successful, our future goal is to continue to expand the coverage of our lake monitoring program, in order to better understand and manage the area's water resources.

The Council's lake monitoring program, especially the use of volunteer monitors through CAMP, has played a key role in the Council's recent efforts to use satellite images to assess annual lake water clarity for the entire region. The monitoring program provides "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 region's lake water quality from just the lakes involved in our ground-based programs to all the lakes in the region. 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.

A satellite assessment of regional lake water quality could not be completed in 2006 due to the lack of a clear image. However, annual satellite assessment data for Metropolitan Area lakes are available for the 2003-2005 period.

If you have questions pertaining to the lake data or descriptions contained in this report, inquiries about CAMP, or suggestions of lakes the Council should consider monitoring in the future, please contact Kent Johnson of the Metropolitan Council at (651) 602-8117 or kent.johnson@metc.state.mn.us.

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APPENDIX A
2006 CAMP Lake/Watershed Characteristics

Lake DNR #	Surface Area(ac)	Watershed Area(ac)	Ratio	Max Depth(m)	Mean Depth(m)	Volume (ac-ft)	% Littoral	# Inlets	Therm o-cline?	Public Access	Shr Length (miles)	DNR Classification
Acorn 82-102	44	296	7:1	3.0	0.7	440	100	0	N			
Alimagnet 19-21	109	1,094	10:1	3.0	1.5	545	100	12	N	C	3.2	
Armstrong 82-116-02	39			1.5	1.0	128	100		N	N		
Barker 82-76	45	823	19:1	9.0	4.4	648			Y	N		
Bass (Henn) 27-98	194	3,100	16:1	9.4	3.1	1,979	82		Y	N	2.3	
Bass (StLP) 27-15	95											
Bass (Wash)82-35	81			4.3			100		N	N		
Bass (Wash)82-123							100		N	N		
Bavaria 10-19	200	711	3.5:1	18.3	5.6	3,674	40		Y	Y		Centrarchid
Bay Pond 82-11	10.2	849	9:1	1.1								
Benton 10-69	115	322	3:1	2.0			100		N	N		
Benz 82-120	36						100		N	N		
Big Carnelian 82-49	455	1,900	4:1	20.0	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	1.5:1	15.2	7.6	42,527	67		Y	Y		
Birch 13-42	65											
Bone 82-54	212	5,177	24:1	9.8	3.7	2,820	59	3	Y	Y		
Brickyard 10-225	17			13.1			35		Y	N		

Lake DNR #	Surface Area(ac)	Watershed Area(ac)	Ratio	Max Depth(m)	Mean Depth(m)	Volume (ac-ft)	% Littoral	# Inlets	Therm o-cline?	Public Access	Shr Length (miles)	DNR Classification
Burandt 10-84	93			7.3			72		Y	N		
Bush 27-47	172			8.5			64		Y	Y		
Campbell 10-127	72			2.0			100		N	N		
Carol 82-17	63	375	6:1	1.8	0.9	186	100		N	N		
Cates 70-18	27			4.0			100		N	N		
Cedar (Scott) 70-91	742	11,104	14:1	4.7	2.1	5,194	100		N	Y		
Cedar Island 27-119	80	800	10:1	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
Cloverdale 82-9	45	819	18:1	8.5	3.0	450	86		Y	N		
Cobblecrest 27-53	10									N		
Cobblestone19-456												
Colby 82-94	71	8,088	114:1	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(Bnsv)9-27	292	2,001	7:1	11.3	3.1	2,920	72		Y	Y		Panfish - Fishing Pier
Crystal(rob) 27-34	76	1,272	17:1	10.4	3.7	917	68		Y	Y	1.4	Centrarchid - Fishing Pier
Dean 70-74	128						100		N	N		
DeMontreville82-101	160	1,108	7:1	7.3	2.4	1,280	90		Y	Y		
Downs 82-110	35	2,400	69:1	2.1	1.5	175	100		N	N		
Eagle(Crv)10-121	233	1,050	4.5:1	4.0	1.2	920	100		N	Y		Natural Environment

Lake DNR #	Surface Area(ac)	Watershed Area(ac)	Ratio	Max Depth(m)	Mean Depth(m)	Volume (ac-ft)	% Littoral	# Inlets	Therm o-cline?	Public Access	Shr Length (miles)	DNR Classification
Eagle(m.g.) 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	96:1	1.8	1.0	360	100		N	N		
Earley 19-33	29	1,629	56:1							N		
East 19-349	40											
East Boot 82-34	47	93	2:1	8.2	0.9	282	84		Y	Y		
Echo 82-135	41	194	4.7:1	1.8	0.8	107	100		N	N		
Edina 27-29				1.0			100		N	N		
Edith 82-4	81	1,576	19:1	13.0					Y			
Elmo 82-106	284	1,191	4:1	41.7			22		Y			
Farquhar 19-23	63	353	6:1	3.0	1.4	290	100		N	N		
Fireman's 10-226	8			7.0			88		Y			
Fish (Grant) 82-137	21			10.4			67		Y			
Fish(Scott) 70-69	171	660	4:1	8.5	4.4	2,468	43		Y	Y		Centrarchid
Fish (Wash) 82-64	72	683	9.5:1	3.0	1.5	360	100		N	N		
Forest 82-159	2,249	4,285	2:1	11.5	3.4	24,986	68	14	Y	Y		
Friedrich's 82-108	14.5	360	25:1									
French 27-127	352	870	4:1	1.0					N	Y		
Gaystock 10-31	105			5.0			100		N	N		
George Watch 2-5	528			2.0	1.5	2,587	100		N	Y		
German 82-56	109											
Glen 27-93	98			7.6			91			N		
Goetschel 82-313	22	2,812	122:1	4.2	1.2	88	100		N	N		

Lake DNR #	Surface Area(ac)	Watershed Area(ac)	Ratio	Max Depth(m)	Mean Depth(m)	Volume (ac-ft)	% Littoral	# Inlets	Therm o-cline?	Public Access	Shr Length (miles)	DNR Classification
Goggins 82-77	11						100		N	N		
Golden 2-45	57	7,680	135:1	7.3	2.5	463	90	1	Y	Y	1.5	
Goose (Scndia) 82-59	83			7.6	2.4	664	55			Y		
Goose(Wac)10-89	407	1,100	27:1	3.0	1.5	2,035	100		N	C		Natural Environment
Grace 10-218	22			6.7			79					
Hafften 27-199	43		13.4				60		Y	Y		
Half Breed 82-80	75	303	4:1	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			2.0			100		N	N		
Henry 10-175	77			1.5			100		N	N		
Herbers Pnd 82-15-01				2.0			100		N	N		
Highland 2-79	22			1.0			100		N	N		
Hornbean 19-47	22											
Horseshoe 19-51	16											
Hydes 10-88	215	430	2:1	5.5	3.0	2,150	88		Y	Y		
Island 2-22	67			6.7			87		Y	N		
Jane 82-104	155	1,402	9:1	12.0	3.7	1,860	72		Y	Y		
Jellum's 82-5202	72	333	4.6:1	4.9	2.4	569	100		N	N		
Jonathon 10-217												
July 82-318												

Lake DNR #	Surface Area(ac)	Watershed Area(ac)	Ratio	Max Depth(m)	Mean Depth(m)	Volume (ac-ft)	% Littoral	# Inlets	Therm o-cline?	Public Access	Shr Length (miles)	DNR Classification
Keller (Brn)19-25	60			2.5	1.5	300	100		N	N		
Kingsley 19-30	44	193	4:1	4.0			100		N	N	1.7	
Kismet 82-333										N		
Klawitter 82-368	4.5	168	37:1				100					
La 82-97	35			3.5			100		N	N	1.3	
Lac Lavon19-446	69	306	4:1	9.8			26		Y	N	2.3	Stocked w/Trout - Fishing Pier
Langton 62-49	30	257	9:1	1.5	1.2	120	100		N			
Lee 19-29	25	324	13:1	5.2			100		N	N	1.0	
Legion Pond 82-462	16	224	14:1									
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	3.5:1	21.3	10.7	5,686			Y	N	1.7	
Little Comfort 13-54	36			17.0			44		Y	N		
Little Johanna 62-58	35			12.0			67		N	N		
Little Long 27-179	108			23.2			49		Y	Y		
Long(ap val)19-22	36			3.5			100		N	N		
Long(Maht) 82-130	48			7.7			92		Y	N		
Long (May)82-30	88			3.7			100		N	Y		
Long (P.S.) 82-118	62	2,060	33:1	10.4	3.6	744	55		Y	N		
Long(Still) 82-21	71			6.7			96		N	N		
Long (Wash) 82-68	35	381	11:1	2.1	1.1	126	100		N	N		
Loon 82-15	64	407	6.4:1	4.9	2.4	206	100		N	N		

Lake DNR #	Surface Area(ac)	Watershed Area(ac)	Ratio	Max Depth(m)	Mean Depth(m)	Volume (ac-ft)	% Littoral	# Inlets	Therm o-cline?	Public Access	Shr Length (miles)	DNR Classification
Lost 82-134	9.1			7.9			82					
Lotus 10-6	246	1,033	4:1	8.8	4.3	3,500	74		Y	Y		
Louise 82-25	48	616	13:1	3.7	1.8	283	100		N	N		
Lynch 82-42	43											
MacDonald Pnd 82-62	12			2.7			100		N	N		
Magda 27-65	15											
Maple Marsh 82-38	38	148	4:1	3.4	1.7	212	100		N	N		
Maria 10-58	169			1.0			100		Y	N		
Marion 19-26	560			6.4			81		Y	Y		
Markgrafs 82-89	46	413	10:1	2.4			100		N	N	2.6	Rearing
Markley 70-21	27			3.7			100		N	N		
Masterman 82-126	45											
McDonald 82-10	54	1,051	19:1	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	11:1	1.2			100		N	N	0.7	
Mergen's 82-482	12	1,383	115:1	1.3			100		N	N		
Miller 10-29	145	16,701	115:1	4.3	3.1	1,479	100		N	N		
Mitchell 27-70	112			5.8			97		N	Y		
Moody 13-23	35			14.6			63		Y	N		
Mud 82-26-02	62	899	15:1	2.1	1.1	224	100		N	N		

Lake DNR #	Surface Area(ac)	Watershed Area(ac)	Ratio	Max Depth(m)	Mean Depth(m)	Volume (ac-ft)	% Littoral	# Inlets	Therm o-cline?	Public Access	Shr Length (miles)	DNR Classification
Normandale 21-1045	103			3.7			100		N			
North Twin 82-18	69	187	3:1	1.8	0.9	207	100		N	N		
Northwood 27-627	15	1,341	89:1	1.5	0.8	41	100		N	N		
Oak 10-93	339			3.4			100		N	N		
O'Connor 82-2	38									N		
O'Dowd 70-95	258			6.7			91		Y	Y		
Olson 82-103	89	200	2:1	4.5	2.1	623	100		N	Y		
Oneka 82-140	381			2.1	1.2	1,524	100		N	N		Wildlife
Orchard 19-31	250	2,012	8:1	10.0	3.0	2,500	75		Y	Y		Centrarchid
Pamela 27-675	18			1.5			100		N	N		
Parkers 27-107	97	950	10:1	11.3	3.7	1,164	70		Y	Y		
Pat 82-125	13											
Peltier 2-4	174	68,082	391:1	4.9	2.1	3,255	100		N	Y		Gamefish
Pike(m.g.) 27-111	59	919	16:1	11.9	2.0	395	95		Y	Y	1.5	Centrarchid
Pike(ramsy)62-69	35			4.9	2.1	252	100		N	N		Gamefish
Pike (scott) 70-76	57	1,991	35:1	2.7			100		N	N		
Pine Tree 82-122	174			7.9	3.0	1,740	91		Y	N		Centrarchid
Powers 82-92	57	1,238	22:1	12.5			57	2	Y	N	1.8	Centrarchid
Prior(lower)70-26	827	19,560	24:1	18.3	4.1	11,120	46	1	Y	Y		Centrarchid
Prior(upper)70-72	340	16,460	48:1	15.2	3.1	3,460	93	2	Y	Y		Centrarchid
Region Prk 82-87	16	600	38:1	5.8			100		N	N		
Reitz 10-52	79	3,711	47:1	11.0	4.0	1,027	58		Y	Y		

Lake DNR #	Surface Area(ac)	Watershed Area(ac)	Ratio	Max Depth(m)	Mean Depth(m)	Volume (ac-ft)	% Littoral	# Inlets	Therm o-cline?	Public Access	Shr Length (miles)	DNR Classification
Reshnanau 2-9												
Rest Area 82-0514	12.6	17,781	157:1									
Riley 10-2	297	4,796	16:1	15.0	6.6	6,429	34		Y	Y	2.9	
Rose 27-92	17											
Ryan 27-58	20	5,510	157:1	10.7	64.8	312	56		Y	N	0.6	
Sand 82-67	46			5.5	2.4	368	46	2		N	1.8	
Schmidt 27-102	37	190	4:1	9.1	1.5	207	92		Y	N	1.6	
School 13-57	48											
Schutz 10-18	105	943	9:1	15.0	6.0	2,100	27		Y	N		
Schroeder Pnd 82-301				3.0			100		N	N		
Seidl's 19-95	14	415	30:1	5.0			100	5	N	N		Rearing
Shaver 27-86	11									N		
Shields 82-162	27			8.2			85		Y	N	0.8	
Silver 82-16	98	455	4.6:1	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	20:1	2.5	0.5	5.4	100		N	N		
S. School Section 82-151	125			8.0			41					
South Twin 82-19	54	63	1.2:1	4.0	2.0	356	100		N	N		
Spring (Scott)70-54	630	13,500	21:1	11.3	5.6	11,500	50	2	Y	Y	5.0	
Square 82-46	193	782	4:1	20.7	9.0	5,694	65	5	Y	Y	2.2	Stocked w/Trout
Staples 82-28	24	127	5.3:1	4.3	2.1	165	100		N	N		

Lake DNR #	Surface Area(ac)	Watershed Area(ac)	Ratio	Max Depth(m)	Mean Depth(m)	Volume (ac-ft)	% Littoral	# Inlets	Therm o-cline?	Public Access	Shr Length (miles)	DNR Classification
St. Croix 82-1	8,600	4,918,790		23.8					Y	Y		
St. Joe 10-11	14			15.9			46		Y	Y		
Success 27-634												
Sunfish 19-50	49											
Sunfish 82-107	50	526	11:1							N		
Sunnybrook 82-133	16	630	39:1	6.1	2.0	104			Y	N		
Sunset 82-153	124			5.2			100		N	N	2.3	Gamefish
Sunset Pnd19-451	60			3.7			100		N	N	1.9	
Susan 10-13	93			5.2			81			Y		
Swede 10-95	376			4.0			100		N	Y		
Sweeney 27-35	66	2,400	36:1	8.0	3.6	790	52		Y	N		Panfish
Tamarack 10-10	24			20.0			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	16:1	2.4	1.2	172	100		N	N		
Twin(Bnsv)19-28	11						100					
Twin(U)(b.p.)27-42	137	3,657	31:1	2.4	0.9	397	100		Y	N	2.8	Centrarchid
Twin(M)(cry)27-42	69	4,053	72:1	14.0	4.9	918	57		Y	Y	1.4	Centrarchid
Twin(L)(rob)27-42	46	5,322	176:1	6.7	2.3	340	83		Y	Y	1.2	Centrarchid
Twin(StLP) 27-656										N		
Valentine 62-71	60	2,237	37:1	4.0	1.5	300	100		N			
Valley 19-348	8	117	8:1	3.2			100	1	N	N		

Lake DNR #	Surface Area(ac)	Watershed Area(ac)	Ratio	Max Depth(m)	Mean Depth(m)	Volume (ac-ft)	% Littoral	# Inlets	Therm o-cline?	Public Access	Shr Length (miles)	DNR Classification
Virginia 10-18	110	772	7:1	10.4	3.3	1,210	88		Y	Y		
Waconia 10-59	3,000	7,880	4:1	11.3	4.0	38,632	53		Y	Y	6.8	Centrarchid
Weber 82-119	7.5	1.4	19:1	1.5			100		N	N		
West Boot 82-44	110	209	2:1	11.9	5.9	2,090	56		Y	Y		
West Lakeland 82-488	27	1,139	347:1						N	N		
Westwood 27-711	41			2.0			100		N	N		
White Rock 82-72	65											
Wilmes 82-90	41	2,247	55:1	5.5						Y	1.3	
Windsor 27-82	14									N		
Wing 27-91	11											
Winkler 10-66	129	2,758	21:1									
Wood(Brns)19-24	9	157	17:1	4.5			100	1	N	N		Panfish
Woodpile 82-132	19											

APPENDIX B
2006 CAMP Volunteers

WMO/WD/City	Lake	DNR #	Volunteer
Anoka Co. Parks	Cenaiko	02-0654	Anoka Co. Parks
	Highland	02-0079	Anoka Co. Parks
	Island	02-0022	Anoka Co. Parks
Apple Valley	Cobblestone	19-0456	City of Apple Valley
	Farquhar	19-0023	Rick Bruneau
	Long (Apple Valley)	19-0022	Al Kettlekamp
	Aligmagnet	19-0021	John Ritter
Bassett Creek WMO	Northwood	27-0627	Steve Bur
	Parkers	27-0107	Bob Videen
	South Rice	27-0645	Steve Streff
	Sweeney (Site-1)	27-0035	Dave Hanson
	Westwood	27-0711	Westwood Nature Center
Black Dog WMO	Crystal	19-0027	Arnett Family
	Keller	19-0025	Glen Gramse
	Kingsley	19-0030	Green Family
	Lac Lavon	19-0446	Wally Shaver
	Orchard	19-0031	Tom/Dorothy Goodwin
	Sunset Pond	19-0451	Dan Wallace
Browns Creek WDO	Bass (East)	82-0123-01	Washington Co. SWCD
	Bass (West)	82-0123-02	Washington Co. SWCD
	Benz	82-0120	Washington Co. SWCD
	Goggins	82-0077	Washington Co. SWCD
	July	82-0318	Washington Co. SWCD
	Kismet	82-0333	Washington Co. SWCD
	Long (Stillwater)	82-0021	Washington Co. SWCD
	Lynch	82-0042	Washington Co. SWCD
	Masterman	82-0126	Washington Co. SWCD
	Pat	82-0125	Washington Co. SWCD
	South School Section	82-0151	Washington Co. SWCD
	Woodpile	82-0132	Washington Co. SWCD
Burnsville	Alimagnet	19-0021	John Ritter
	Earley	19-0033	John Saffert
	Twin (Burnsville)	19-0028	Brad Bobbitt/Brendon Dougherty
	Wood	19-0024	David Bess
Carnelian-Marine WD	Barker	82-0076	Washington Co. SWCD
	Bass	82-0035	Washington Co. SWCD
	Big Carnelian	82-0049	Washington Co. SWCD
	Big Marine	82-0052	Washington Co. SWCD
	Carol	82-0017	Washington Co. SWCD
	East Boot	82-0034	Washington Co. SWCD
	Fish	82-0064	Washington Co. SWCD
	German	82-0056	Washington Co. SWCD
	Herber's Pond	82-0015-01	Washington Co. SWCD
	Jellum's (Site-1)	82-0052-01	Washington Co. SWCD
	Little Carnelian	82-0014	Washington Co. SWCD
	Long	82-0068	Washington Co. SWCD
	Loon	82-0015-02	Washington Co. SWCD
	Louise	82-0025	Washington Co. SWCD
	MacDonald's Pond	82-0062	Washington Co. SWCD
	Maple Marsh	82-0038	Washington Co. SWCD
	Mud	82-0026	Washington Co. SWCD
	North Twin	82-0018	Washington Co. SWCD

WMO/WD/City	Lake	DNR #	Volunteer
Carnelian-Marine WD continued	Schroeder's Pond	82-0301	Washington Co. SWCD
	Silver	82-0016	Washington Co. SWCD
	South Twin	82-0019	Washington Co. SWCD
	Staples	82-0028	Washington Co. SWCD
	Turtle	82-0036	Washington Co. SWCD
	West Boot	82-0044	Washington Co. SWCD
Carver Co.	Bavaria	10-0019	John Ryski
	Brickyard	10-0025	Carver Co. Env. Services
	Campbell	10-0127	Carver Co. Env. Services
	Courthouse	10-0005	Carver Co. Env. Services
	Eagle	10-0121	Carver Co. Env. Services
	Fireman's	10-0226	Carver Co. Env. Services
	Gaystock	10-0031	Carver Co. Env. Services
	Goose (Waconia)	10-0089	Carver Co. Env. Services
	Grace	10-0218	Carver Co. Env. Services
	Hazeltine	10-0014	Carver Co. Env. Services
	Hydes	10-0088	Carver Co. Env. Services
	Jonathan	10-0217	Carver Co. Env. Services
	McKnight	10-0216	Carver Co. Env. Services
	Miller	10-0029	Carver Co. Env. Services
	Oak (Site-1)	10-0093-01	Carver Co. Env. Services
	Oak (Site-2)	10-0093-02	Carver Co. Env. Services
	Oak (Site-3)	10-0093-03	Carver Co. Env. Services
	Reitz	10-0052	Carver Co. Env. Services
	Rutz	10-0089	Carver Co. Env. Services
	Swede	10-0095	Wayne Hubin
	Waconia	10-0059	Carver Co. Env. Services
Chanhassen	Lotus	10-0006	Shelly Strohmaier
	Riley	10-0002	David Florenzano
	St. Joe	10-0011	Sue Morgan/Linda Scott
	Susan	10-0013	Tom Houston
Comfort Lk-Forest Lk WD	Big Comfort	13-0053	Washington Co. SWC
	Birch	13-0042	Washington Co. SWCD
	Little Comfort	13-0054	Washington Co. SWCD
	Moody	13-0023	Washington Co. SWCD
	School	13-0057	Washington Co. SWCD
	Shields	82-0162	Washington Co. SWCD
Eden Prairie	Mitchell	27-0070	Gordon Warner
Elm Creek WMC	Cowley	27-0169	Steve Swanson
	Henry	27-0175	Tom Hoverson
IGH/SSP	Seidl's	19-0025	Harv Bartz
Lakeville	East	19-0349	Jerry Garati
	Lee	19-0029	City of Lakeville
	Marion	19-0026	Wally and Ardyce Potter
	Valley	19-0348	City of Lakeville
Lower St. Croix Valley	O'Connor	82-0002	Ken Nieman

WMO/WD/City	Lake	DNR #	Volunteer
Marine/St.Croix WD	Goose (New Scandia)	82-0059	Washington Co. SWCD
	Hay	82-0065	Washington Co. SWCD
	Long (May)	82-0030	Washington Co. SWCD
	Sand	82-0067	Washington Co. SWCD
	Square	82-0046	Washington Co. SWCD
	Terrapin	82-0031	Washington Co. SWCD
Mahtomedi	Lost	82-0134	Lost Lake Homeowners Group
Middle St. Croix WMO	McKusick	82-0020	Washington Co. SWCD
Minnehaha Creek WD	Tamarack	10-0010	Mike Shouldice
Minnetonka	Shaver (Site-1)	27-0086-01	Davis Family
	Rose	27-0092	Nancy Scheel/Mark Storck
Nine Mile Creek WD	Bush	27-0047	Gregg Thompson/Gordy Bratsch
	Cornelia	27-0028	Conservation League of Edina
	Glen	27-0093	Friends of Glen Lake
	Normandale	27-1045	Jane Ladky and Mani Hassan
	Wing	27-0091	Wing Lake Neighborhood Association
Pioneer-Sarah WMC	Hafften	27-0199	Todd Fellman/Jim Van Someren
	Little Long	27-0179-02	Voyageur Environmental Center
Prior Lake	Markley	70-0021	City of Prior Lake
Prior Lake-Spring Lake	Cates	70-0018	Tom Sletta
	Fish	70-0069	Steve Pierson
	Prior (Lower) (Site-1)	70-0026-01	Walt Burris
	Prior (Upper) (Site-1)	70-0072-01	Madison Groves
	Spring	70-0054	Bill Tisdell
Rice Creek WD	George Watch	02-0005	Wargo Nature Center
	Golden	02-0045	City of Circle Pines
	Hart	02-0081	Ray Muno
	Langton(Site-1)	62-0049-01	Yul Yost
	Langton(Site-2)	62-0049-02	Yul Yost
	Little Johanna	62-0058	NW College
	Long (Mahtomedi)	82-0130	Kitty Francy-Payton
	Peltier	02-0004	Wayne LeBlanc
	Pike	62-0069	Philip Goodrich
	Pine Tree	82-0122	Gene Berwald
	Reshanau	02-0009	Fossey Family
	Sunset	82-0153	Diane and Bob Coderre
	Valentine	62-0071	Bob Kistler
	White Rock	82-0072	David Bluhm
St. Croix Basin Planning	Lake St. Croix(Bayport Pool; S-2)	82-0001	Jim and Roberta Harper
	Lake St. Croix(Troy Beach Pool: S-3)	82-0001	Cecilia and Harry Martin
	Lake St. Croix(Troy BeachPool: S-5)	82-0001	Richard and Sheryl Lindholm
	Lake St. Croix(Black Bass Pool; S-6)	82-0001	Rick Meierotto
	Lake St. Croix(Kinnickinnic Pool; S-7)	82-0001	Carpenter Nature Center
Saint Louis Park	Bass	27-0015	Jason Westrum
	Cobblecrest	27-0053	Jim and Grahamm Kellogg
	South Oak	27-0661	Andrea Anderson
	Twin (St. Louis Pk)	27-0656	Megan and Bruce Cornwall

WMO/WD/City	Lake	DNR #	Volunteer
Scott Co. WMO	Cedar	70-0091	Jerry Edberg
	McMahon	70-0050	Joe Williamson
	Thole	70-0120	Darrell Jahn
Shakopee	Dean	70-0074	Gerlach Family
	O'Dowd	70-0095	Peggy Turnwall
Shaver Lake Preservation .	Shaver (Site-2)	27-0086-02	Davis Family
Shingle Creek WMC	Cedar Island	27-0119	Steve Lane
	Magda	27-0065	Carolyn Dindorf
	Success	27-0634	Stuart Ruud
	Twin (Upper)	27-0042-01	Kristen Mann
South Washington WD	Armstrong	82-0116	Washington Co. SWCD
	Powers	82-0092	Washington Co. SWCD
	Regional Park	82-0087	Washington Co. SWCD
Stillwater	Lily	82-0023	Washington Co. SWCD
Sunfish Lake	Hornbean	19-0047	Dave Johnson
	Horseshoe	19-0051	Gary Sommerland
	Sunfish	19-0050	Dick Bancroft
Valley Branch WD	Acorn	82-0102	Steven Yahr
	Bay Pond	82-0011	Todd Erickson
	Cloverdale	82-0009	Kevin Bjork
	DeMontreville	82-0101	Washington Co. SWCD
	Downs	82-0110	Wesley Sly Family
	Eagle Point	82-0109	Bob Schumacher
	Echo	82-0135	Jim Serley
	Edith	82-0004	David Nimmer
	Elmo	82-0106	Terry Bouthilet
	Friedrich's Pond	82-0108	Todd Erickson
	Goetschel	82-0313	Nancy Van Cleve
	Jane	82-0104	Chuck Taylor
	Klawitter	82-0368	Bonnie Jurand
	Legion Pond	82-0462	Molly Winkels
	Long (Pine Springs)	82-0118	Bill Feely
	McDonald	82-0010	Steve Groves
	Olson	82-0103	Washington Co. SWCD
	Rest Area Pond	82-0514	MN DOT
	Silver	62-0001	Dr. Mike Manthei
	Sunfish	82-0107	William Friederichs
	Sunnybrook	82-0133	Arnie Johnson
	Weber	82-0119	Denise Post
Woodbury	Colby	82-0094	Beth and Luke Hvass
	La	82-0097	City of Woodbury
	Markgrafs	82-0089	Terry Riley
	Wilmes	82-0090	Bill Aamodt

APPENDIX C

Lakes Sampled by the Metropolitan Council and CAMP, 1980 - 2006

(Numbers indicate sampling visits per year, while ^{v} denotes volunteer monitoring)

LAKE	ID #	'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
Acorn	82-102																											$^{v}14$
Alimagnet	19-21																$^{v}12$	$^{v}10$	$^{v}10$	$^{v}10$	$^{v}10$	$^{v}10$	$^{v}8$	$^{v}9$	$^{v}12$	$^{v}10$	$^{v}10$	$^{v}8$
Ann	10-12						5				13													13				
Armstrong	82-116 -02																			$^{v}15$	$^{v}10$	$^{v}13$	$^{v}14$	$^{v}15$	$^{v}14$	$^{v}14$	$^{v}14$	$^{v}7$
Assumption	10-63																				$^{v}1$							
Auburn-East	10-44				10																							
Auburn-West	10-44				10			17	18				12			13												
Aue	10-28																				$^{v}1$							
Bald Eagle (Site-1)	62-2	4	5		5																					13	13	
Bald Eagle (Site-2)	62-2																									13	13	
Barnes	10-109																				$^{v}1$							
Barker	82-96																					$^{v}5$	$^{v}5$	$^{v}7$	$^{v}7$	$^{v}7$	$^{v}7$	$^{v}7$
Bass	27-98	4														$^{v}16$			$^{v}15$		$^{v}15$		$^{v}13$		$^{v}9$		$^{v}15$	
Bass (East Basin)	82-126-01																											$^{v}7$
Bass (West Basin)	82-126-02																											$^{v}7$
Bass (St. Louis Park)	27-15																							$^{v}12$			$^{v}12$	$^{v}2$
Bass (Washington Co.)	82-35																					$^{v}14$	$^{v}5$	$^{v}7$	$^{v}7$	$^{v}7$	$^{v}7$	$^{v}7$
Battle Creek	82-91														$^{v}14$	$^{v}13$	$^{v}11$	$^{v}13$										
Bavaria	10-19				5			17	18							13		$^{v}11$	$^{v}12$	$^{v}15$	$^{v}12$	$^{v}14$	$^{v}14$	$^{v}14$	$^{v}19$	$^{v}16$	$^{v}18$	$^{v}16$
Bay Pond	82-11																											$^{v}14$

LAKE	ID #	'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
Benton	10-69																				^{v}13	^{v}14	^{v}14		^{v}15		^{v}14	
Benz	82-120																			^{v}8							^{v}14	^{v}14
Berliner	10-103																				^{v}1							
Big Carnelian	82-49					5					13					13			13			^{v}14	^{v}7	^{v}14	^{v}14	^{v}14	^{v}14	^{v}7
Big Comfort	13-53																			^{v}3		^{v}14	^{v}14	^{v}14	^{v}14	^{v}14	^{v}13	^{v}14
Big Marine	82-52	4	5			5					13					13			13			^{v}14	^{v}7	^{v}14	^{v}14	^{v}14	^{v}14	^{v}7
Birch	13-42																										^{v}10	^{v}7
Birch	62-24	2																									^{v}14	
Bluebill Bay	19-449																		^{v}8									
Bone	82-54					5					13				^{v}7		^{v}14		^{v}14	^{v}14	^{v}14		^{v}14	^{v}14	^{v}14	^{v}14	^{v}14	13
Brand	10-110																				^{v}1							
Braunworth	10-107																				^{v}1							
Brickyard	10-225																							^{v}14	^{v}13	^{v}14	^{v}14	^{v}14
Bryant	27-67	2	5	16		5					13	13	12															
Burandt	10-84																				^{v}7	^{v}13	^{v}9			^{v}18	^{v}22	
Bush	27-47					5									13	13					13		13			13		^{v}13
Byllesby	19-6														^{v}14	^{v}14	^{v}13											
Calhoun	27-31		5			5																						
Campbell	10-127																				^{v}2	^{v}14		^{v}10			^{v}14	^{v}14
Carol	82-17																					^{v}5	^{v}5	^{v}7	^{v}7	^{v}7	^{v}7	^{v}7
Carver	82-166									20					^{v}15	^{v}15	^{v}16	^{v}9										

LAKE	ID #	'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
Cates	70-18																							v14	v13	v15	v13	v14
Cedar (Minneapolis)	27-39					5																						
Cedar (Scott Co.)	70-91	4	5			5						13			14					13			13				13	v14
Cedar Island	27-119																v13						v13		v11			v9
Cenaiko	2-654																		v12	v11	v13	v11	v13	v12	v12	v14	v14	v14
Centerville	2-6	4	5		5																	13	13/ v4	v1	13	13		
Charley	62-62						5																					
Christmas	27-137	4	5				5												13	13	13			13	13			
Chub	19-20	2													v14	v14	v11											
Clear (Forest Lake)	82-163	4				5						13			v11	v12	v12	v11	v10	v11	v10	v9	v12	v12	v12	v6		13
Cleary	70-22					5																						
Cloverdale	82-9																						v10	v10	v11	v13	v12	v11
Cobblecrest	27-53																							v4		v14	v16	v13
Cobblestone	19-456																										v14	v14
Colby	82-94															v13	v14	v13	v13	v12	v12	v9	v10	v10	v10	v10	v6	v7
Comfort	13-53																		v3									
Coon	2-42	4				5										13			13									
Cornelia	27-28																								v7		v11	v14
Courthouse (Chaska)	10-5																	v2	v14	v13	v13	v14	v14	v14	v14	v14	v14	v13

LAKE	ID #	'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
Cowley	27-169																	$^{v}12$										$^{v}10$
Crane	27-734														$^{v}9$													
Crooked	2-84				5						13				$^{v}15$	$^{v}15$	$^{v}14$	$^{v}14$	$^{v}12$	$^{v}14$	$^{v}14$							
Crystal (Burnsville)	19-27	2			5						13					13	13	13	13	13	$^{v}12$	$^{v}10$	$^{v}14$	$^{v}15$	$^{v}15$	$^{v}15$	$^{v}16$	13/ $^{v}14$
Crystal (Robbinsdale)	27-34							17	19	19						$^{v}15$			$^{v}11$				$^{v}8$				$^{v}7$	
Crystal (Spring Lake)	70-61																		$^{v}12$		$^{v}11$							
Cynthia	70-52	2																										
Dan Patch	70-16																		$^{v}15$									
Dean	70-74																							$^{v}7$	$^{v}7$	$^{v}6$	$^{v}7$	$^{v}8$
Deeg	19-117																						$^{v}12$					
Deep	62-18						5																					
DeMontreville	82-101	4				5							12		$^{v}15$		14					13			13	$^{v}14$	$^{v}7$	$^{v}7$
Diamond (Dayton)	27-125	2														$^{v}13$										13		
Downs	82-110																				$^{v}14$		$^{v}9$	$^{v}9$	$^{v}6$	$^{v}7$	$^{v}9$	$^{v}7$
Dutch	27-181					5																						
Eagle (Maple Grove)	27-111-01	4			5			17	18				11		$^{v}15$			$^{v}14$	$^{v}14$	$^{v}14$		$^{v}6$		$^{v}4$			$^{v}6$	
Eagle (Young America)	10-121	4	5				5											12		$^{v}15$	$^{v}14$	$^{v}14$	$^{v}12$	$^{v}14$	$^{v}14$	13	$^{v}14$	$^{v}14$
Eagle Point	82-109			2											$^{v}14$													$^{v}5$
Earley	19-33															$^{v}10$	$^{v}11$	$^{v}9$	$^{v}10$	$^{v}10$	$^{v}9$	$^{v}8$	$^{v}6$	$^{v}10$	$^{v}9$	$^{v}6$	$^{v}7$	$^{v}9$
East	19-349																										$^{v}13$	$^{v}6$
East Boot	82-34																					$^{v}14$	$^{v}14$	$^{v}14$	$^{v}14$	$^{v}14$	$^{v}14$	$^{v}7$
East Twin	2-133	2	5		5						13						13			13								

LAKE	ID #	'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
Echo	82-135																											v10
Edina	27-29																									v10	v10	
Edith	82-4																										v6	v12
Egg	82-147																						v3					
Elmo	82-106	4	5	16		5				19			12			v11											v9	v8
Farquhar	19-23	4														v15	v16	v14	v15		v15	v13	v11	v13	v14	v14	v15	v13
Fireman's	10-226																						v12	v14	v14	v14	v14	v13
Fish (Eagan)	19-57										13																	
Fish (Grant Twnsp)	82-137																							v5	v5	v4		
Fish (Maple Grove)	27-118	4	5	16			5					13																
Fish (Scott County)	70-69	4				5						13					13		v2	v13	v8	v12	v9	v14	v13	v11	v13	v11
Fish (Washington Co.)	82-64																					v5	v14	v7	v7	v7	v7	v7
Forest - East (3)	82-159	4				5						13			v7			v12						13			13	13
Forest - Middle (2)	82-159					5						13			v7			v12						13			13	13
Forest - West (1)	82-159					5						13			v7			v12	v14	v15	v14	v14	v14	v14	v14	v14	v14	13
French	27-127																						v11	v10	v7	v7		
Friedrich's Pond	82-108																											v13
Gables	82-82																			v8	v5							
Gaystock	10-31																				v2	v14	v14				v14	v14
George	2-91	4	5	16		5					13					13				13								
George Watch	2-5																	v14	v12	v11	v11	v6	v7	v8	v9	v10	v12	v7

LAKE	ID #	'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
German	82-56																							v7	v7	v7	v7	v7
Gervais	62-7						5																					
Glen	82-93																											v13
Goetschel	82-313																							v11	v9	v4	v15	v9
Goggins	82-77																				v13	v14	v14	v14	v14	v14	v14	v14
Golden	2-45	2											12		14			v13	v11	v15	v13	v13	v12	v11	v11	v10	v11	v11
Goose (Lakeville)	19-360																v13	v13										
Goose (New Scandia)	82-59															v15	v15	v13	v13	v15						v7	v7	v7
Goose (Waconia)	10-89																v9	v7	v15	v15	v14	v11	v14	v14	v14	v14	v14	v14
Grace	10-218																							v11	v14	v14		v14
Grass	27-681																		v12									
Hafften	27-199																					13	13			13	v15	v13
Half Breed (Sylvan)	82-80														v7			v14		v15	v14	v14	v14	v14	v14	v14	v14	
Ham	2-53					5									v15	v13		v13	v9	v14								
Harriet	27-16					5																						
Hart	2-81																									v6	v4	v8
Harvey	27-???																									v10		
Haughey	27-187																							v4				
Hay	82-65																			v14	v13	v14	v14	v4	v7	v7	v7	v7
Hazeltine	10-14																				v1	v14	v14				v14	v14

LAKE	ID #	'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
Henry	27-175																$^{v}10$										$^{v}11$	$^{v}11$
Herber's Pond	82-15-01																									$^{v}14$	$^{v}14$	$^{v}7$
Highland	2-79																				$^{v}13$	$^{v}11$	$^{v}13$	$^{v}12$	$^{v}12$	$^{v}14$	$^{v}14$	$^{v}14$
Holland	19-65				10	16	15			20					13						13							
Hornbean	19-47																											$^{v}11$
Horseshoe (Wash. Co.)	82-74																				$^{v}1$							
Horseshoe (Dakota Co.)	19-32																$^{v}11$	$^{v}10$										
Horseshoe (Sunfish Lake)	19-51																											$^{v}11$
Hydes	10-88						5						12		13			12			$^{v}11$	$^{v}4$	$^{v}9$	$^{v}14$	$^{v}15$	$^{v}14$	$^{v}14$	$^{v}14$
Independence	27-176	4	5		5							13			$^{v}14$	$^{v}15$												
Isabelle	19-4															$^{v}14$												
Island (Linwood)	2-22				7																				$^{v}12$	$^{v}14$	$^{v}14$	$^{v}14$
Jane	82-104					5		17	18				12			$^{v}12$						13				$^{v}15$	$^{v}13$	$^{v}10$
Jellum's (Site-1)	82-52-01																					$^{v}14$	$^{v}14$	$^{v}12$	$^{v}14$	$^{v}14$	$^{v}14$	$^{v}7$
Jellum's (Site-2)	82-52-02																							$^{v}11$	$^{v}11$			
Johanna	62-78		5				5				13																	
Jonathan	10-217																							$^{v}13$				$^{v}14$
Josephine	62-57						5				13																	
Jubert	27-165																					$^{v}11$						
July	82-318																											$^{v}7$

LAKE	ID #	'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
Keller (Burnsville)	19-25																	13	13	v13	v15	v14	v12	v13	v15	v15	v14	13/v14
Keller (Maplewood)	62-10						5																					
Kingsley	19-30														5		v11	v10	v9			v14	v14	v15	v14	v15	v16	v14
Kismet	82-333																			v14	v13	v14	v14	v14	v14	v14	v13	v14
Klawitter	82-368																							v13	v13	v14	v13	v12
Kohlman	62-6						5																					
La	82-97															v13	v11	v13	v11	v10	v10	v8	v6	v5	v6	v3	v13	v12
Lac Lavon	19-446																		v11	v10	v10	v9	v2	v7	v12	v12	v12	v12
Laddie	2-72	4													v13	v14	v12					v13	v13	v14	v10			
Langdon	27-182					5																						
Langton (Site-1)	62-49-01																										v14	v7
Langton (Site-2)	62-49-02																										v14	v13
Langton (North Basin)	62-204																										v14	
Lee	19-29															v14	v15	v14	v13			v12	v13	v11	v9	v15	v9	v14
Legion Pond	82-462																										v14	v10
Libbs	27-85																									v10		
Lily	82-23																v15	v14	v14	v15	v13	v14	v14	v14	v7	v7	v7	v7
Linwood	2-26	4	5		7						13					13			13									
Lippert	10-104																				v1							
Little Carnelian	82-14																					v14	v7	v14	v14	v14	v14	v7

LAKE	ID #	'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
Little Comfort	13-54																											v14
Little Johanna	62-58																						v12	v16	v15	v8	v6	v3
Little Long	27-179-01	4				5						13								13			13		13			v11
Long (Apple Valley)	19-22																		v16					v11	v13	v12	v15	v14
Long (Carver Co.)	10-16																				v2		v13		v5			
Long (Mahtomedi)	82-130																								v11	v9	v12	v10
Long (May Twnsp)	82-30														v14	v14	v14	v13	v14		v14	v14	v14	v14	v14	v7	v7	v7
Long N (New Brighton)	62-67						5																					
Long S (New Brighton)	62-67						5																					
Long (Orono)	27-160				5																							
Long (Pine Springs)	82-118														v14										13	v15	v14	v14
Long (Stillwater)	82-21																v14	v7		v14	v13	v14	v14	v14	v14	v14	v14	v14
Long (Washington Co.)	82-68																					v5	v14	v7	v7	v7	v7	v7
Loon	82-15																					v14	v14	v7	v7	v7	v7	v7
Lost	27-103														v13													
Lost (Mahtomedi)	82-134																											v13
Lotus	10-6						5					13									13	13			v5	v10	v8	v11
Louise	82-25																					v5	v5	v7	v7	v7	v7	v7
Lucy	10-7						5																					
Lynch	82-42																											

LAKE	ID #	'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
MacDonald's Pond	82-1501																									$^{v}14$	$^{v}14$	$^{v}7$
Magda	27-65																				$^{v}14$	$^{v}13$			$^{v}11$			$^{v}12$
Maple Marsh	82-38																					$^{v}5$	$^{v}5$	$^{v}7$	$^{v}7$	$^{v}7$	$^{v}7$	$^{v}7$
Marcott (site 1)	19-263																$^{v}15$											
Marcott (site 2)	19-41																$^{v}15$	$^{v}13$	$^{v}10$	$^{v}10$	$^{v}12$	$^{v}10$	$^{v}6$	$^{v}5$				
Maria	10-58																				$^{v}2$	$^{v}14$	$^{v}14$				$^{v}13$	
Marion (Lakeville)	19-26	2	5		5						13					$^{v}15$					$^{v}15$	$^{v}14$	$^{v}13$	$^{v}14$	$^{v}14$	$^{v}15$	$^{v}16$	$^{v}15$
Markgrafs	82-89															$^{v}15$	$^{v}11$	$^{v}12$	$^{v}10$	$^{v}15$	$^{v}10$	$^{v}10$	$^{v}9$	$^{v}13$	$^{v}14$	$^{v}14$	$^{v}14$	$^{v}15$
Markley	70-21																		$^{v}11$	$^{v}13$	$^{v}12$	$^{v}14$	$^{v}13$	$^{v}9$	$^{v}6$	$^{v}4$		$^{v}10$
Marsh	10-54																				$^{v}1$							
Marshan	2-7																	$^{v}10$	$^{v}13$	$^{v}10$	$^{v}9$	$^{v}8$	$^{v}7$					
Martin	2-34				7															13								
Masterman	82-126																											$^{v}14$
McCarrons	62-54					12	20	17	18	19	13	13	12		14	13	16	13			18	13	13	13		13	13	
McDonald	82-10																				$^{v}11$		$^{v}14$	$^{v}9$	$^{v}12$	$^{v}12$	$^{v}14$	$^{v}10$
McDonough	19-76						5														13							
McKnight	10-216																											$^{v}14$
McKusick	82-20															$^{v}14$	$^{v}14$	$^{v}14$	$^{v}14$	$^{v}14$	$^{v}13$	$^{v}14$	$^{v}14$	$^{v}14$	$^{v}14$	$^{v}14$	$^{v}14$	$^{v}14$
McMahon (Carls)	70-50	2				5											13			13			13				13	$^{v}14$
Meadow	27-57																	$^{v}12$			$^{v}12$			$^{v}9$			$^{v}10$	

LAKE	ID #	'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
Medicine	27-104	4	5		10							13	12															
Mergen's	82-482																					$^{v}10$			$^{v}3$	$^{v}2$	$^{v}6$	
Meuwissen	10-70																				$^{v}1$							
Miller	10-29																	$^{v}6$	$^{v}13$		$^{v}12$	$^{v}14$	$^{v}13$	$^{v}13$	$^{v}14$	$^{v}14$	$^{v}14$	$^{v}12$
Minnetonka (Lower)	27-133	4	5																									
Minnetonka (Upper)	27-133	2	5																									
Minnewashta	10-9					5						13			13				13	13	13			13	13			
Mitchell	27-70																13				13	13			13	$^{v}14$	$^{v}14$	$^{v}14$
Moody	13-23																										$^{v}14$	$^{v}14$
Mooney	27-134														$^{v}14$	$^{v}10$												
Moore	2-75																				$^{v}14$							
Mud	82-26-02																					$^{v}5$	$^{v}5$	$^{v}7$	$^{v}7$	$^{v}7$	$^{v}7$	$^{v}7$
Myers	10-68																				$^{v}1$							
Nokomis	27-19	4				5																						
Normandale	27-1045																											$^{v}5$
North Twin	82-18																					$^{v}5$	$^{v}5$	$^{v}7$	$^{v}7$	$^{v}7$	$^{v}7$	$^{v}7$
Northwood	27-627																					$^{v}12$	$^{v}10$	$^{v}13$	$^{v}12$	$^{v}12$	$^{v}10$	$^{v}10$
Oak (Site 1)	10-93																				$^{v}2$		$^{v}14$	$^{v}13$	$^{v}12$	$^{v}14$	$^{v}14$	$^{v}14$
Oak (Site 2)	10-93																											$^{v}10$
Oak (Site 3)	10-93																											$^{v}10$

LAKE	ID #	'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
O'Connor	82-2																										$^{v}8$	$^{v}15$
O'Dowd	70-95					5										13			13			13		13			13	$^{v}12$
Olson	82-103												12		$^{v}15$		14					13			13	$^{v}14$	$^{v}7$	$^{v}7$
Oneka	82-140																				$^{v}13$	$^{v}11$	$^{v}11$	$^{v}9$	$^{v}6$	$^{v}5$		
Orchard	19-31	4	5		5						13				13					13	$^{v}15$	$^{v}13$	$^{v}13$		$^{v}14$	$^{v}14$	$^{v}14$	13/ $^{v}14$
Otter	2-3	2			5																							
Owasso	62-56	4			5																							
Pamela	27-675																										$^{v}10$	
Parkers	27-107	4										13					13				13	$^{v}12$		$^{v}14$	$^{v}15$	$^{v}15$	$^{v}15$	$^{v}14$
Parley	10-42					5		17	18				12					12			13		13		13			13
Pat	82-125																											$^{v}7$
Patterson	10-86																				$^{v}2$							
Peltier	2-4				5										$^{v}14$	$^{v}16$	$^{v}15$	$^{v}14$	$^{v}14$	$^{v}13$	$^{v}13$	$^{v}14$	$^{v}13$	$^{v}17$	$^{v}15$	$^{v}15$	$^{v}16$	$^{v}17$
Phalen	62-13	4	5				5																					
Pickerel	2-103	2															13											
Pierson	10-53	2	5		5						13						13						13	13	13			13
Pike (Maple Grove)	27-111-02																	$^{v}14$	$^{v}15$	$^{v}13$		$^{v}13$						
Pike (Ramsey Co.)	62-69																				$^{v}14$	$^{v}10$	$^{v}14$	$^{v}14$	$^{v}14$	$^{v}15$	$^{v}15$	$^{v}11$
Pike (Scott Co.) [Site-1]	70-76-1																		$^{v}9$		$^{v}10$	$^{v}9$	$^{v}9$	$^{v}11$	$^{v}15$	$^{v}15$	$^{v}13$	
Pike {Scott Co.} [Site-2]	70-76-2																							$^{v}11$				
Pine Tree	82-122						5								$^{v}14$	$^{v}14$	$^{v}16$	$^{v}14$	$^{v}15$	$^{v}15$	$^{v}13$	$^{v}14$	$^{v}9$	$^{v}12$	$^{v}7$	$^{v}8$	$^{v}12$	$^{v}10$

LAKE	ID #	'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
Pleasant (New Prague)	70-98														13													
Pleasant (North Oaks)	62-46						5																					
Pomerleau	27-100																	$^{v}9$			$^{v}10$		$^{v}6$		$^{v}3$			
Powers	82-92															$^{v}12$	$^{v}13$	$^{v}13$	$^{v}12$	$^{v}9$	$^{v}10$	$^{v}8$	$^{v}5$	$^{v}7$	$^{v}14$	$^{v}14$	$^{v}14$	$^{v}14$
Prior (Lower) [Site-1]	70-26-1					5						13						13	$^{v}15$	$^{v}14$	$^{v}13$	$^{v}9$	$^{v}14$	$^{v}16$	$^{v}13$	$^{v}12$	$^{v}12$	$^{v}12$
Prior (Lower) [Site-2]	70-26-2																			$^{v}14$	$^{v}13$	$^{v}9$	$^{v}14$	$^{v}15$				
Prior (Upper) [Site-1]	70-72-1	4	5			5						13						13	$^{v}15$	$^{v}14$	$^{v}13$	$^{v}9$	$^{v}14$	$^{v}12$	$^{v}13$	$^{v}10$	$^{v}9$	$^{v}9$
Prior {Upper} [Site-2]	70-72-2																							$^{v}12$				
Raven	19-369																$^{v}13$	$^{v}6$	$^{v}8$									
Rebecca	27-192				10	12	12																					
Red Rock	27-76																				12	13			13	13		13
Regional Park	82-87																			$^{v}12$	$^{v}14$	$^{v}12$	$^{v}13$	$^{v}14$	$^{v}15$	$^{v}15$	$^{v}14$	$^{v}7$
Reitz	10-52						5						12		13						$^{v}15$	$^{v}13$	$^{v}7$	$^{v}13$	$^{v}14$	$^{v}14$	15	$^{v}14$
Reshanau	2-9	2																			$^{v}7$	$^{v}1$	$^{v}6$					$^{v}13$
Rest Area Pond	82-0514																											$^{v}13$
Rice	10-78	2																			$^{v}1$							
Riley	10-2	2	5	16			5	17	18			13	12		13				13			13		13	$^{v}14$	$^{v}15$	$^{v}14$	$^{v}10$
Rose	27-92																											$^{v}14$
Rutz	10-89																				$^{v}1$	$^{v}14$	$^{v}14$	$^{v}14$				$^{v}14$
Ryan	27-58																	$^{v}14$		$^{v}5$		$^{v}9$		$^{v}4$	$^{v}6$			

LAKE	ID #	'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
Sand (New Scandia)	82-67														$^{v}7$	$^{v}14$	$^{v}14$	$^{v}13$						$^{v}14$	$^{v}7$	$^{v}7$	$^{v}7$	$^{v}7$
Sarah	27-191	4			5																							
Scheuble	10-85																				$^{v}1$							
Schmidt (Smith)	27-102																$^{v}14$			$^{v}12$		$^{v}12$	$^{v}9$			$^{v}14$	$^{v}9$	
School	13-57																										$^{v}14$	$^{v}7$
Schroeder's Pond	82-301																									$^{v}14$	$^{v}14$	$^{v}7$
Schultz	19-75					5	5														13							
Schutz	10-18					5																$^{v}6$	$^{v}10$	$^{v}6$	$^{v}8$	$^{v}9$	$^{v}11$	
Seidl's	19-95																$^{v}15$	$^{v}14$	$^{v}14$	$^{v}15$	$^{v}16$	$^{v}14$	$^{v}14$	$^{v}15$	$^{v}8$	$^{v}14$	$^{v}14$	$^{v}14$
Shaver (Site 1)	27-86																										$^{v}14$	$^{v}13$
Shaver (Site 2)	27-86																											$^{v}6$
Shields	82-162														$^{v}6$	$^{v}14$	$^{v}14$	$^{v}13$	$^{v}13$	$^{v}14$	$^{v}14$	$^{v}14$	$^{v}14$	$^{v}14$	$^{v}14$	$^{v}14$	$^{v}14$	$^{v}14$
Silver (Washington Co.)	82-16																					$^{v}14$	$^{v}5$	$^{v}7$	$^{v}7$	$^{v}7$	$^{v}7$	$^{v}7$
Sliver (North St. Paul)	62-1																											$^{v}12$
Simley	19-37																$^{v}10$	$^{v}16$	$^{v}14$	$^{v}15$	$^{v}16$	$^{v}14$	$^{v}12$	$^{v}14$				
Snail	62-73	4					5																					
South Oak	27-661																							$^{v}12$	$^{v}15$			$^{v}9$
South Rice	27-645																					$^{v}9$	$^{v}14$	$^{v}15$	$^{v}14$	$^{v}14$	$^{v}15$	$^{v}14$
South School Section	82-151																$^{v}14$	$^{v}7$		$^{v}14$							$^{v}14$	$^{v}14$
South Twin	82-19																					$^{v}5$	$^{v}5$	$^{v}7$	$^{v}7$	$^{v}7$	$^{v}7$	$^{v}7$
Spring (Anoka Co.)	2-71																						$^{v}11$					

LAKE	ID #	'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
Spring (Prior Lake)	70-54	4	5	16		5						13						13	v12			v6	v11	v13	v14	v14	v13	v9
Square	82-46	4	5	16	6	7	7				13				v11	v14	v14	v13	v14	19	v14	v14	v15	v14	v14	v14	v14	v14
Staring	27-78	4					5										13				13		13			13		13
Staples	82-28																					v14	v5	v7	v7	v7	v7	v7
Steiger	10-45					12					13						13											
St. Croix (Upper Basin S-1)	82-1																											v2
St. Croix (Upper Basin S-2)	82-1																										v10	v10
St. Croix (Mid Basin S-3)	82-1																										v11	v9
St. Croix (Mid Basin S-5)	82-1																										v8	v10
St. Croix (Lower Basin S-6)	82-1																										v11	v10
St. Croix (Lower Basin S-7)	82-1																										v8	v8
St. Joe	10-11																									v17	v8	v9
Success	27-634																	v10							v11			v11
Sucker	62-28						5																					
Sullivan	2-80														v14	v14	v15		v15	v14	v13	v11	v11	v12	v12			
Sunfish (Lake Elmo)	82-107																					v10					v13	v11
Sunfish (Sunfish Lake)	19-50																											v13
Sunnybrook	82-133																				v14		v13	v10	v12	v10	v16	v14
Sunset	82-153					5									v14	v14	v12	v13	v16	v12	v10	v13	v13	v18	v20	v15	v17	v12

LAKE	ID #	'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
Sunset Pond	19-451															v14	v14	v14	v12	v10		v13	v11	v10	v12	v11		v14
Susan	10-13																											v7
Swan	10-82																				v1							
Swede	10-95	2																13					13	v14	v16	v13	v14	v14
Sweeney (South) [Site-1]	27-35																					v11	v9	v14	v13	v14	v11	v10
Sweeney (North) [Site-2]	27-35																					v11	v9					
Tamarack	10-10																						v10	v11	v12	v11	v11	v13
Tanners	82-115	2								20					v14	v13	v12	v14										
Terrapin	82-31																									v7	v7	v7
Thole	70-120-01					5										13			13			13		13			13	v14
Thomas	19-67	2																										
Tiger	10-108																				v1							
Turtle	62-61	4	5		5																							
Turtle (Washington Co.)	82-36																					v5	v5	v7	v7	v7	v7	v7
Twin (Burnsville)	19-28																				v6		v13	v11	v6	v2	v11	v8
Twin-Lower (Robbinsd.)	27-42-03												12		v14			13		v5		13			v13		v8	
Twin-Middle (Crystal)	27-42-02						5						12					13	v11		v13	13			v13		v8	
Twin-Upper (Br. Center)	27-42-01												12		v14			11		v15		v11		v13		v14		v13
Twin-South (May Twnsp)	82-48																		v13	v13								
Twin (St. Louis Park)	27-656																							v12	v14	v14	v11	v14
Vadnais	62-38						5																					

LAKE	ID #	'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
Valentine	62-71																						[v]14	[v]13	[v]12	[v]12	[v]9	[v]10
Valley	19-348																[v]15	[v]14	[v]11		[v]8	[v]14	[v]14	[v]14	[v]14	[v]14	[v]13	[v]14
Virginia	10-15																					[v]11	[v]12	[v]14	[v]12	[v]15	[v]13	
Wabasso	62-82	4	5		5						12																	
Waconia	10-59	4	5				5					13				[v]16	[v]13	[v]15	[v]17	[v]15	[v]14	[v]14	[v]14	[v]15	[v]14	12	[v]14	[v]14
Wasserman	10-48				5			17	18							13			13	13	13			13	13			13
Weaver	27-117				5			17	18																			
Weber	82-119																											[v]12
West Boot	82-44																					[v]14	[v]14	[v]14	[v]14	[v]14	[v]14	[v]7
West Lakeland	82-488																					[v]2						
Westwood	27-711														[v]13							[v]15	[v]14	[v]10	[v]9	[v]7	[v]7	[v]8
Whaletail (Site-1)	27-184-01																									13	13	
Whaletail (Site-2)	27-184-02	4				5														13			13			13	13	
White Bear	82-167	4	5			5																						
White Rock	82-72																											[v]11
Wilmes	82-90															[v]14	[v]15	[v]14	[v]15	[v]15	[v]14	[v]13	[v]13	[v]10	[v]12	[v]12	[v]10	[v]12
Windsor	27-82																									[v]12	[v]14	
Wing	27-91																											[v]14
Winkler	10-66																				[v]8	[v]6	[v]6		[v]13		[v]14	
Wolsfeld	27-157	4																										

LAKE	ID #	'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
Wood (Burnsville)	19-24																	[v]10	[v]14	[v]15	[v]15	[v]14	[v]13	[v]14	[v]14	[v]14	[v]14	[v]13
Woodpile	82-132																											[v]7
Young America	10-105																				[v]1							
Zumbra	10-41					5						13												13				