

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

Cates Lake is a 27-acre lake located in the City of Savage (Scott County). The maximum depth of the lake is 4.0 m (roughly 13 feet). Because of the shallowness of the lake, its entire area is considered littoral zone (the 0-15 foot depth area dominated by aquatic vegetation), and the lake does not maintain a thermocline (a density gradient owed to changing water temperatures throughout the lake's water column). The lake has no public access. The MN DNR has designated the lake as being infested with Eurasian water milfoil (*Myriophyllum spicatum*).

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

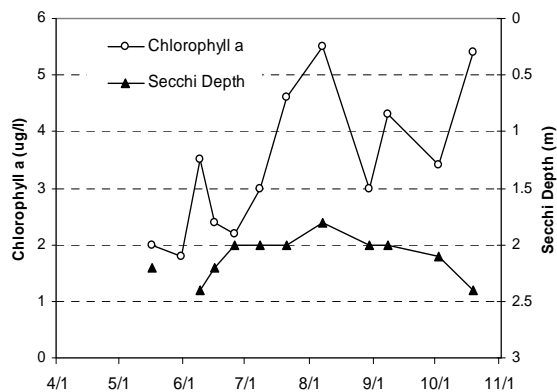
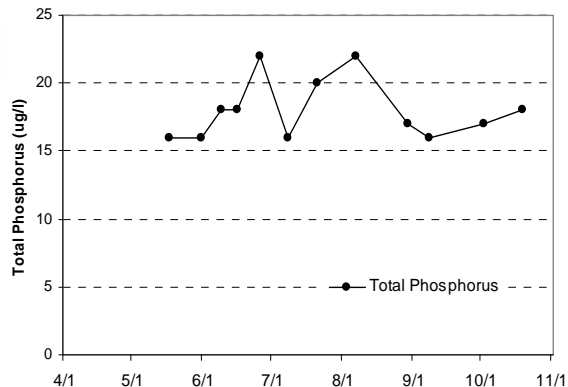
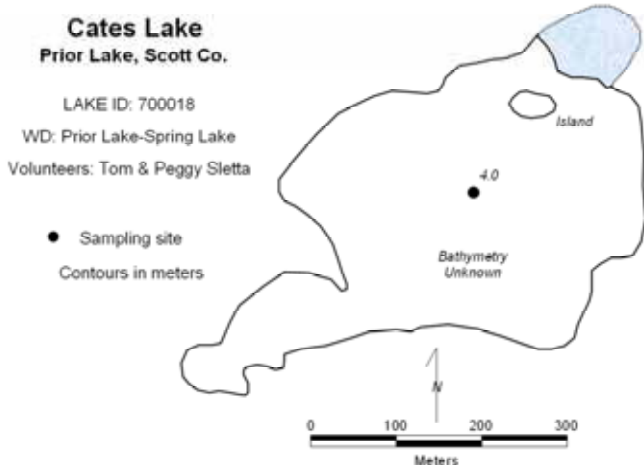
2008 summer (May-September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	18.1	16.0	22.0	A
CLA ($\mu\text{g/l}$)	3.2	1.8	5.5	A
Secchi (m)	2.1	1.8	2.4	C
TKN (mg/l)	1.16	0.62	1.40	
			Lake Grade	B

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

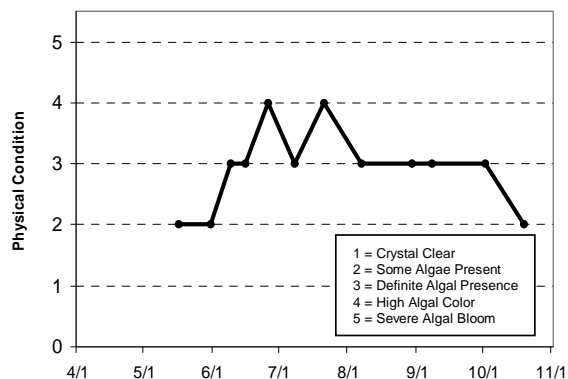
During each monitoring event, the volunteers' opinion of the lake condition was ranked on a 1-to-5 scale as shown on the lake information sheet. The average score for physical condition was 3.0 (3- "definite algae present"), and 4.0 for recreational suitability (4 - "no swimming – boating ok").

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



2008 Data

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



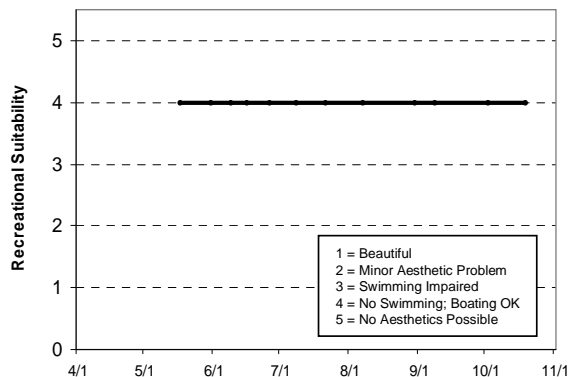
Lake Water Quality Grades Based on Summertime Averages

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

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

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

Source: Metropolitan Council and STORET data



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

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

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

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

2008 summer (May-September) data summary

<i>Parameter</i>	<i>Mean</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Grade</i>
TP ($\mu\text{g/l}$)	42.6	22.0	120.0	C
CLA ($\mu\text{g/l}$)	18.8	12.0	24.0	B
Secchi (m)	1.3	1.1	2.3	C
TKN (mg/l)	1.46	1.20	1.80	
			<i>Lake Grade</i>	C

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

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

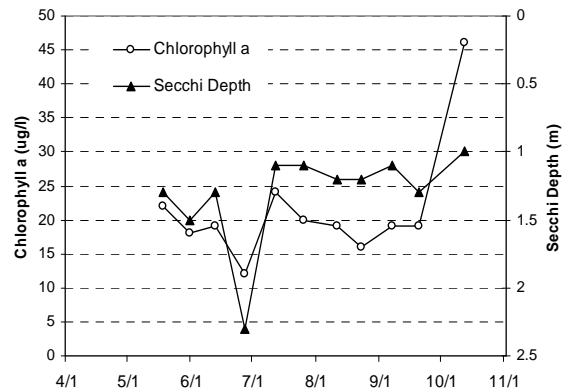
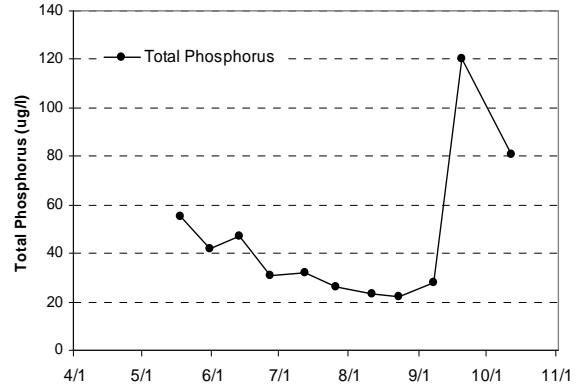
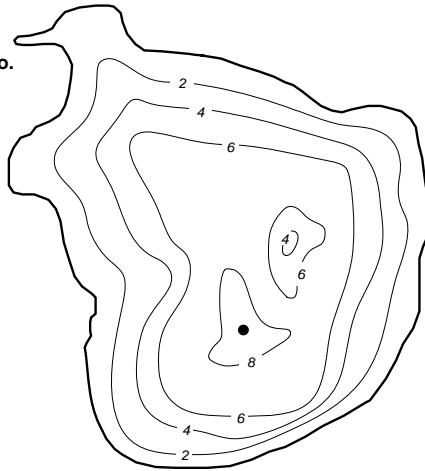
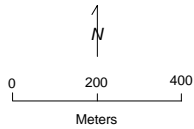
The Fisheries Section of the Minnesota Department of Natural Resources (MDNR) has conducted a fisheries survey on the lake. Information on the survey can be obtained through the MDNR Fisheries Section by calling (651) 259-5831 or by downloading the information off the Internet at <http://www.dnr.state.mn.us/lakefind/>.

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

Fish Lake
Spring Lake Twp., Scott Co.

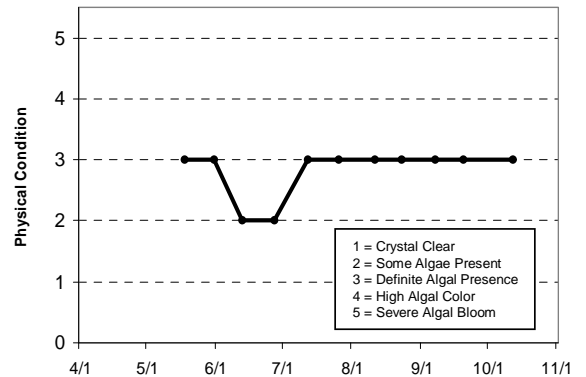
Lake ID: 700069
WD: Prior Lake-Spring Lake
Volunteer: Steve Pierson

● Sampling site
Contours in meters



2008 Data

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



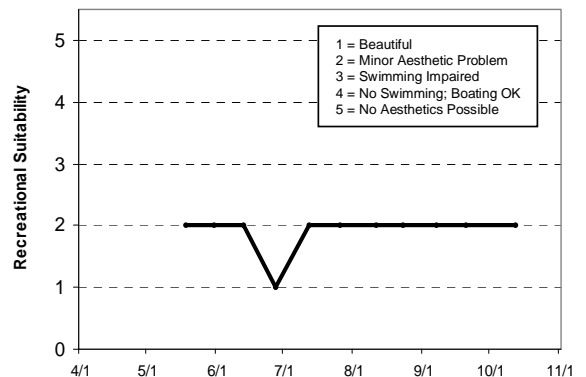
Lake Water Quality Grades Based on Summertime Averages

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

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

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

Source: Metropolitan Council and STORET data



Prior Lake [lower basin, site 1] (70-0026) Prior Lake - Spring Lake Watershed District

Prior Lake (lower basin) is located in the City of Prior Lake (Scott County). The lower basin is considered a Priority Lake by the Metropolitan Council for its high regional recreation value.

The lower basin has a surface area of 957 acres. The maximum and mean depths of the basin are 18.3 and 4.1 m (60 and 13 feet), respectively. Approximately 39 percent of the lake's surface area is considered littoral zone, which is the 0-15 feet depth zone of aquatic plant dominance. The lower basin's 2,090-acre watershed translates to a rather small watershed-to-lake area ratio of 2.5:1. The greater the ratio, the greater the potential stress on the lake from surface runoff. The lower basin has one inlet, which is the outlet from the upper basin of Prior Lake. The lower basin has one outlet. The outlet structure, located at the southwestern portion of the basin, was installed to regulate surface water elevations.

The MN DNR has designated the lower basin as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) and Zebra mussels (*Dreissena spp.*).

While the Metropolitan Council has monitored the lower basin of Prior Lake in the past, the basin has been a part of the CAMP since 1997. Lower Prior was monitored 12 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

2008 summer (May-September) data summary

<i>Parameter</i>	<i>Mean</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Grade</i>
TP (µg/l)	19.9	10.0	39.0	A
CLA (µg/l)	11.0	2.3	28.0	B
Secchi (m)	3.0	1.5	5.0	B
TKN (mg/l)	1.08	0.84	1.20	
			<i>Lake Grade</i>	B

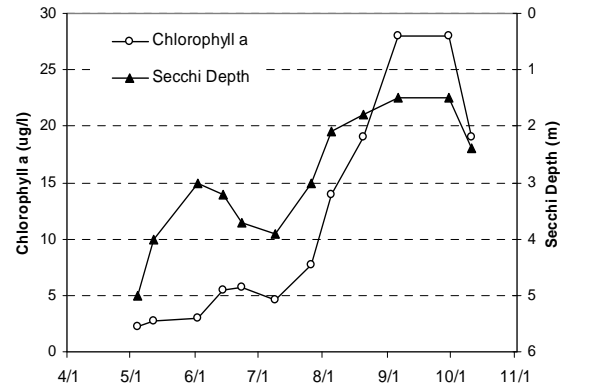
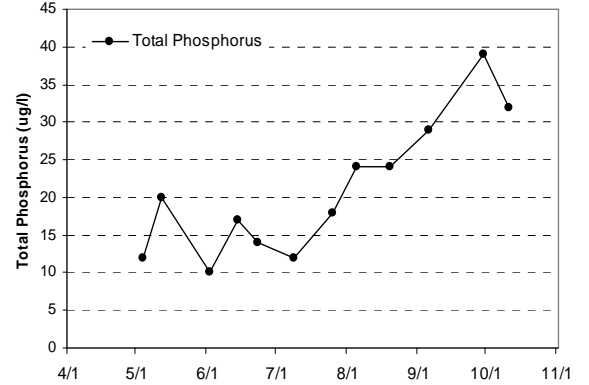
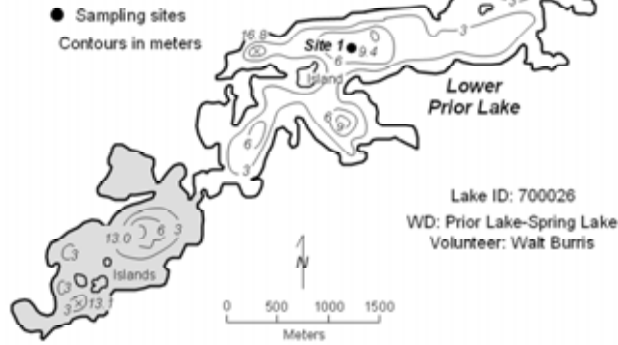
The lower basin received a lake grade of B for 2008. The historical lake grades appear to vary from A's to C's. With such variation, it is difficult to discern trends in the basin's water quality. Furthermore, a trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008).

The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.1 (between 2- "some algae present" and 3- "definite algae present"). The average recreational suitability ranking was 1.5 (between 1- "beautiful" and 2- "minor aesthetic problem").

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

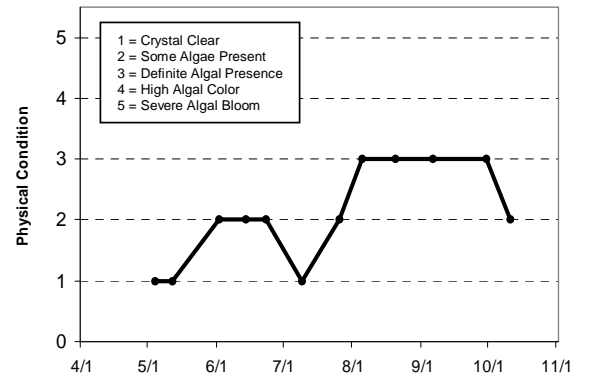
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Prior Lake, Lower Basin, Site 1
Prior Lake, Scott Co.



2008 Data

DATE	Surf Tmp (°C)	Bot Tmp (°C)	Surf DO (mg/L)	Bot DO (mg/L)	CLA (µg/L)	Surf TP (µg/L)	Bot TP (µg/L)	Secchi (m)	PC	RS
5/4	9.7				2.3	12		5	1	1
5/12	12.8				2.8	20		4	1	1
6/2	19.4				3	10		3	2	1
6/14	19.9				5.5	17		3.2	2	1
6/23	24.6				5.7	14		3.7	2	1
7/9	25.2				4.6	12		3.9	1	1
7/26	26				7.7	18		3	2	1
8/5	26.6				14	24		2.1	3	2
8/20	26.3				19	24		1.8	3	2
9/6	21.9				28	29		1.5	3	3
9/30	18.6				28	39		1.5	3	2
10/11	16.6				19	32		2.4	2	1



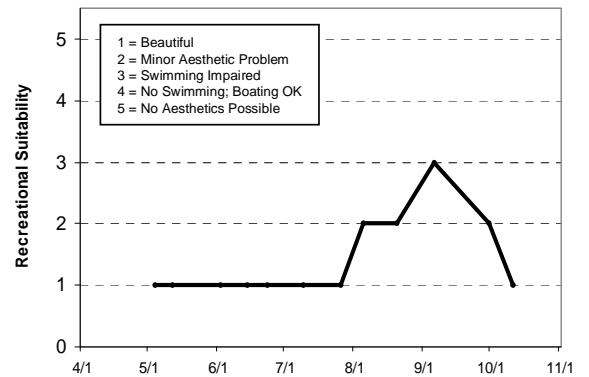
Lake Water Quality Grades Based on Summertime Averages

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

Year	1993	1994	1995	1996	1997	1998 Site 1	1998 Site 2	1999 Site 1	1999 Site 2	2000 Site 1	2000 Site 2	2001 Site 1	2001 Site 2
Total Phosphorus			C	A	A	B	A	C	B	B	B	A	B
Chlorophyll a			A	A	B	C	A	B	B	B	B	B	C
Secchi Depth	B	B	B	B	B	C	C	B	C	B	C	B	C
Lake Grade			B	A	B	C	A	C	B	B	B	B	C

Year	2002 Site 1	2002 Site 2	2003 Site 1	2004 Site 1	2005 Site 1	2006 Site 1	2007 Site 1	2008 Site 1
Total Phosphorus	B	C	C	B	A	C	A	A
Chlorophyll a	B	C	A	B	A	B	B	B
Secchi Depth	B	C	A	B	A	B	B	B
Lake Grade	B	C	B	B	A	B	B	B

Source: Metropolitan Council and STORET data



Prior Lake [upper basin, site-1] (70-0072) Prior Lake - Spring Lake Watershed District

Prior Lake (upper basin) is located in the City of Prior Lake (Scott County). The upper basin is considered a Priority Lake by the Metropolitan Council for its high regional recreation value.

The upper basin has a surface area of 386 acres. The maximum and mean depths of the upper basin of Prior Lake are 15.2 and 3.1 m (50 and 10 feet), respectively. Approximately 85 percent of the lake’s surface area is considered littoral zone, which is the 0-15 feet depth zone of aquatic plant dominance. The upper basin’s 3,430-acre watershed translates to a watershed-to-lake area ratio of 10:1. The greater the ratio, the greater the potential stress on the lake from surface runoff. The upper basin of Prior Lake has two natural inlets, inflow from Spring Lake and the inlet from Rice and Crystal Lake drainage.

The MN DNR has designated the upper basin as being infested with Eurasian water milfoil (*Myriophyllum spicatum*) and Zebra mussels (*Dreissena spp.*).

While the Metropolitan Council has monitored the upper basin of Prior Lake in the past, the basin has been a part of the CAMP since 1997. The upper basin of Prior Lake was monitored 12 times in 2008. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake’s perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

2008 summer (May-September) data summary

<i>Parameter</i>	<i>Mean</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Grade</i>
TP (µg/l)	55.5	19.0	91.0	C
CLA (µg/l)	54.8	2.0	110.0	D
Secchi (m)	1.5	0.7	4.6	C
TKN (mg/l)	1.82	1.30	2.40	
			Lake Grade	C

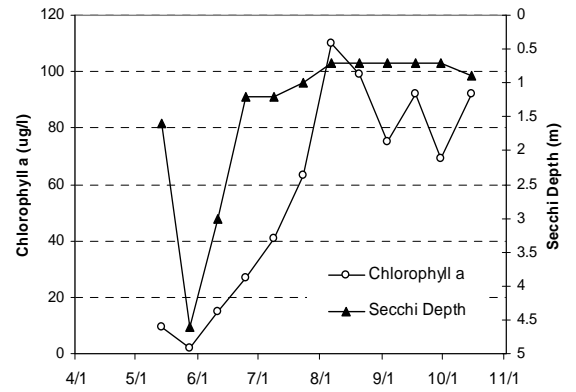
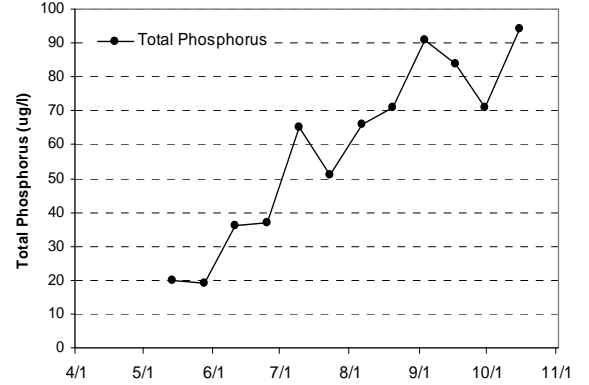
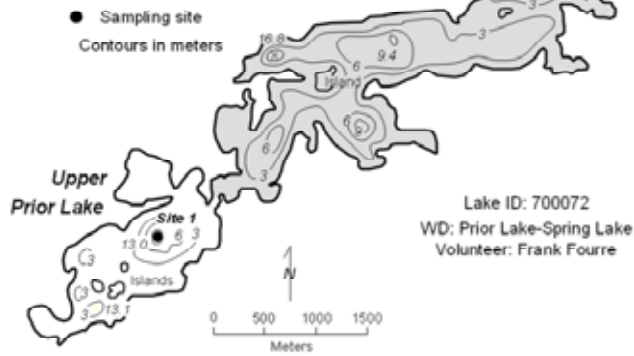
The upper basin received a lake grade of C for 2008. Historical data for the upper basin indicate that the water quality of the basin has varied between lake grades of C and D. A trend analysis conducted by the MPCA on the lake’s Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008).

The volunteer’s perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.1 (between 2- “some algae present” and 3- “definite algae present”). The average recreational suitability ranking was 1.8 (between 1- “beautiful” and 2- “minor aesthetic problem”).

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

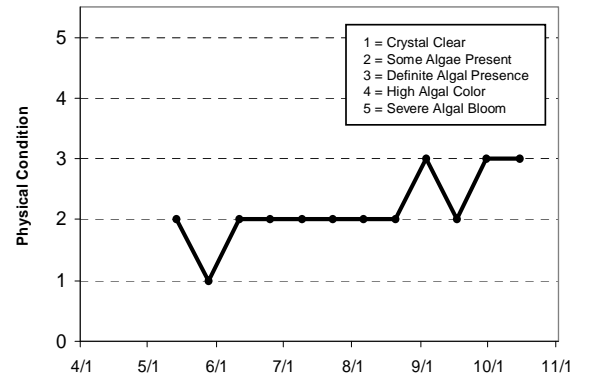
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Prior Lake, Upper Basin, Site 1
Prior Lake, Scott Co.



2008 Data

DATE	Surf Tmp (°C)	Bot Tmp (°C)	Surf DO (mg/L)	Bot DO (mg/L)	CLA (µg/L)	Surf TP (µg/L)	Bot TP (µg/L)	Secchi (m)	PC	RS
5/14	13				9.5	20		1.6	2	2
5/28	18				2	19		4.6	1	1
6/11	19.6				15	36		3	2	1
6/25	24.3				27	37		1.2	2	2
7/9	25				41	65		1.2	2	2
7/23	26.2				63	51		1	2	2
8/6	26.1				110	66		0.7	2	2
8/20	26				99	71		0.7	2	2
9/3	22.8				75	91		0.7	3	2
9/17	19				92	84		0.7	2	2
9/30	19.3				69	71		0.7	3	2
10/15	14.5				92	94		0.9	3	2



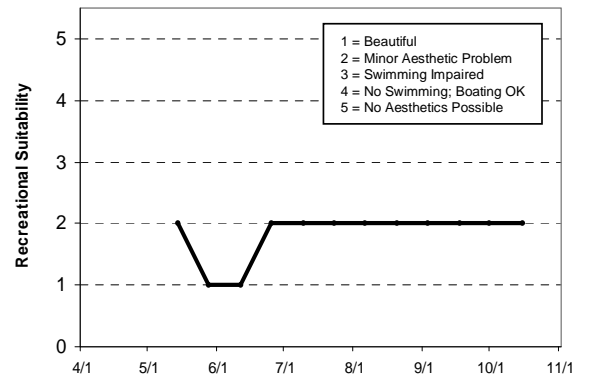
Lake Water Quality Grades Based on Summertime Averages

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

Year	1993	1994	1995	1996	1997	1998 Site 1	1998 Site 2	1999 Site 1	1999 Site 2	2000 Site 1	2000 Site 2	2001 Site 1	2001 Site 2
Total Phosphorus			C	C	C			D		D		D	
Chlorophyll a			C	C	D			D		D		F	
Secchi Depth	D	D	C	C	D	D		D		C		D	
Lake Grade			C	C	D			D		D		D	

Year	2002 Site 1	2002 Site 2	2003 Site 1	2004 Site 1	2005 Site 1	2006 Site 1	2007 Site 1	2008 Site 1
Total Phosphorus	D	D	C	D	C	D	C	C
Chlorophyll a	D	D	D	D	C	D	C	D
Secchi Depth	D	D	C	D	C	C	D	C
Lake Grade	D	D	C	D	C	D	D	C

Source: Metropolitan Council and STORET data



Spring Lake (70-0054) Prior Lake - Spring Lake Watershed District

Spring Lake is located in Spring Lake Township (Scott County). It is considered a Priority Lake by the Metropolitan Council for its high regional recreation value. The lake has a surface area of 630 acres. The maximum and mean depths of the lake are 11.3 and 5.6 m (37 and 18 feet), respectively. About 50 percent of the lake's area is considered littoral, which is the 0-15 feet depth area dominated by aquatic vegetation. The approximate volume of the lake is approximately 11,500 acre-feet (ac-ft). The lake has a 13,500-acre watershed. The lake and watershed areas translate to a watershed-to-lake area ratio of 21:1. The larger the ratio, the greater the potential stress on the lake's quality from surface runoff.

In an attempt to improve the lake's water quality, a ferric chloride (FeCl_3) addition system was constructed at the outlet of the Highway 13 wetland in 1998. Continuous operation started in 1999. The system was designed to enhance phosphorus (P) removal from the discharge of the wetland prior to entering the lake. The system consists of a dosing station at the outlet of the wetland, followed by a settling basin. The dosing station meters FeCl_3 into the wetland outlet. The FeCl_3 disassociates into free iron (Fe) where it combines with P to form an insoluble Fe-P complex called floc. The desiltation basin then provides an area where the floc can settle out and be removed. The watershed district continues to monitor the effectiveness of the system.

The lake has been monitored in the past by Metropolitan Council staff and via the CAMP. The lake was monitored 5 times in 2008 via the CAMP. On each sampling day the lake was monitored for total phosphorus (TP), chlorophyll-a (CLA), total Kjeldahl nitrogen (TKN), and Secchi transparency, as well as the lake's perceived physical condition and recreational suitability. The resulting data are summarized in tables and figures on the following page.

2008 summer (May-September) data summary

<i>Parameter</i>	<i>Mean</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Grade</i>
TP ($\mu\text{g/l}$)	58.6	48.0	65.0	C
CLA ($\mu\text{g/l}$)	59.6	55.0	63.0	D
Secchi (m)	0.9	0.6	1.4	D
TKN (mg/l)	1.92	1.70	2.20	
Lake Grade				D

The lake received a lake grade of D in 2008. The lake grades have varied from Cs to Ds since 1980. A trend analysis conducted by the MPCA on the lake's Secchi transparency data revealed no statistically significant trend in water clarity (MPCA 2008). Continued monitoring is suggested to provide water quality data for supporting the PLSLWD's efforts in managing Spring Lake.

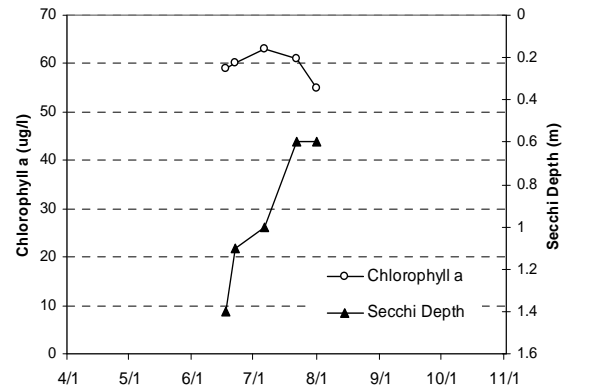
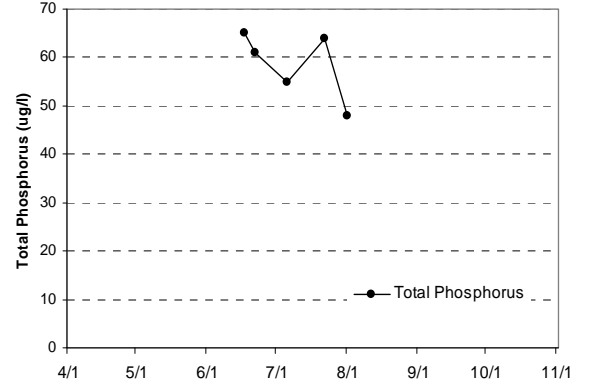
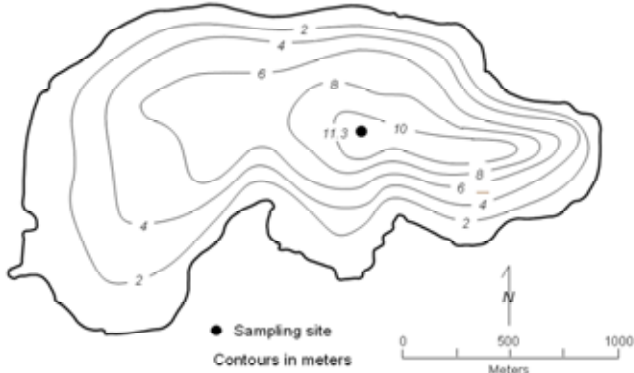
The volunteer's perceptions of the physical and recreational conditions of the lake are shown on the next page. Each of the conditions was ranked on a scale of 1 to 5. The average physical condition ranking was 2.0 ("some algae present"). The average recreational suitability ranking was 1.5 (between 1- "beautiful" and 2- "minor aesthetic problem").

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

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

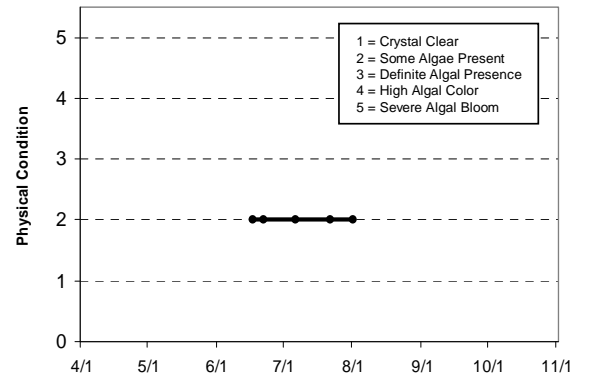
Spring Lake
Prior Lake/Spring Lake Twp., Scott Co.

Lake ID: 700054
WD: Prior Lake-Spring Lake
Volunteer: Lisa Kalberg



2008 Data

DATE	Surf Tmp (°C)	Bot Tmp (°C)	Surf DO (mg/L)	Bot DO (mg/L)	CLA (µg/L)	Surf TP (µg/L)	Bot TP (µg/L)	Secchi (m)	PC	RS
6/17	20.4				59	65		1.4	2	2
6/22					60	61		1.1	2	2
7/6	25.1				63	55		1	2	2
7/22	27.6				61	64		0.6	2	1
8/1	25				55	48		0.6	2	1



Lake Water Quality Grades Based on Summertime Averages

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

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

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

Source: Metropolitan Council and STORET data

