2004

Lake Water Quality

Lakes add to the quality of life and economic stability of the region

Methods

Monitored Lake Map

Water Quality Grading System

Overall Water Quality Grades

2004 Lake Water Clarity Grades

The Twin Cities Metropolitan Area (TCMA) is fortunate to have a large number of lakes. These lakes are important recreational, aesthetic, and ecological resources that add considerably to the quality of life and economic stability of the region. Protecting the water quality of our lakes is a significant citizen concern.

Many state and local agencies have a role in managing and monitoring lake water quality. The Metropolitan Council operates the most extensive lake monitoring program in the region. The Council has been monitoring lakes in the region since 1980. During the 1980s, the Council typically monitored about 10 to 30 lakes. In 1993, the Council initiated the Citizen-Assisted Monitoring Program (CAMP) to help provide a more complete picture of the water quality of the region's lakes and to provide information to support local water management efforts.

This highly successful program collects data on more than 100 lakes each year through the efforts of trained, dedicated volunteers. 2004 marked the twelfth year of the Council's volunteer program. Fourteen watershed management organizations, eleven cities, two counties and one environmental group participated in CAMP in 2004, monitoring a total of 132 lakes. Combined with 13 lakes monitored by Council staff, a total of 145 area lakes were monitored in 2004. This regional report card summarizes the results of the Council's lake monitoring efforts for 2004.

Most of this data collection effort focuses on assessment of lake eutrophication. Eutrophication is the process of accelerated plant growth, particularly algae fueled by nutrient enrichment. Eutrophication is one of the leading water quality concerns facing the region. Nutrients in lakes increase above natural levels as a result of human activities in the watersheds of lakes. Algae growth then increases and water clarity decreases. A variety of other problems may ensue, including increases in nuisance algae blooms, odor problems, decreased desirability for recreation, decreased dissolved oxygen, fish kills, and changes in the fish communities toward more pollution tolerant species such as carp and bullhead.

Metropolitan Council

Why we monitor

The Metropolitan Council is charged with developing a comprehensive regional development guide that minimizes the adverse impacts of growth, including adverse impacts on the environment. To help meet this goal, the Minnesota Legislature has mandated the Council to conduct an assessment of the waters (lakes, streams, and rivers) in the TCMA that have been polluted or that have potential for water pollution caused by non-point sources. The monitoring data collected by the Council and its partners is used to support regional planning efforts, identify pollution problems, and meet federal and state regulations. A Metropolitan Council survey of Twin Cities residents found that more than three out of four people consider water quality monitoring “very important”, making this the highest-ranking service provided by the Council for two years in a row.

Methods

Lakes monitored by Council staff and volunteers are typically sampled at two-week intervals from mid-April through mid-October. Most lakes are sampled from one station located at the deepest spot near the center of the lake. Field measurements taken during each monitoring event include temperature, dissolved oxygen, and water clarity (measured as Secchi disk transparency SDT). In addition, a surface water sample is collected for lab analyses that include total phosphorus (TP), total Kjeldahl nitrogen (TKN), and chlorophyll-a (Chl-a). The routine chemical analyses are performed at the Metropolitan Council Environmental Services (MCES) laboratory following U.S. EPA approved methods. A full description of each program’s methodology can be found at:
http://www.metrocouncil.org/environment/RiversLakes/Lakes/index.htm

Results

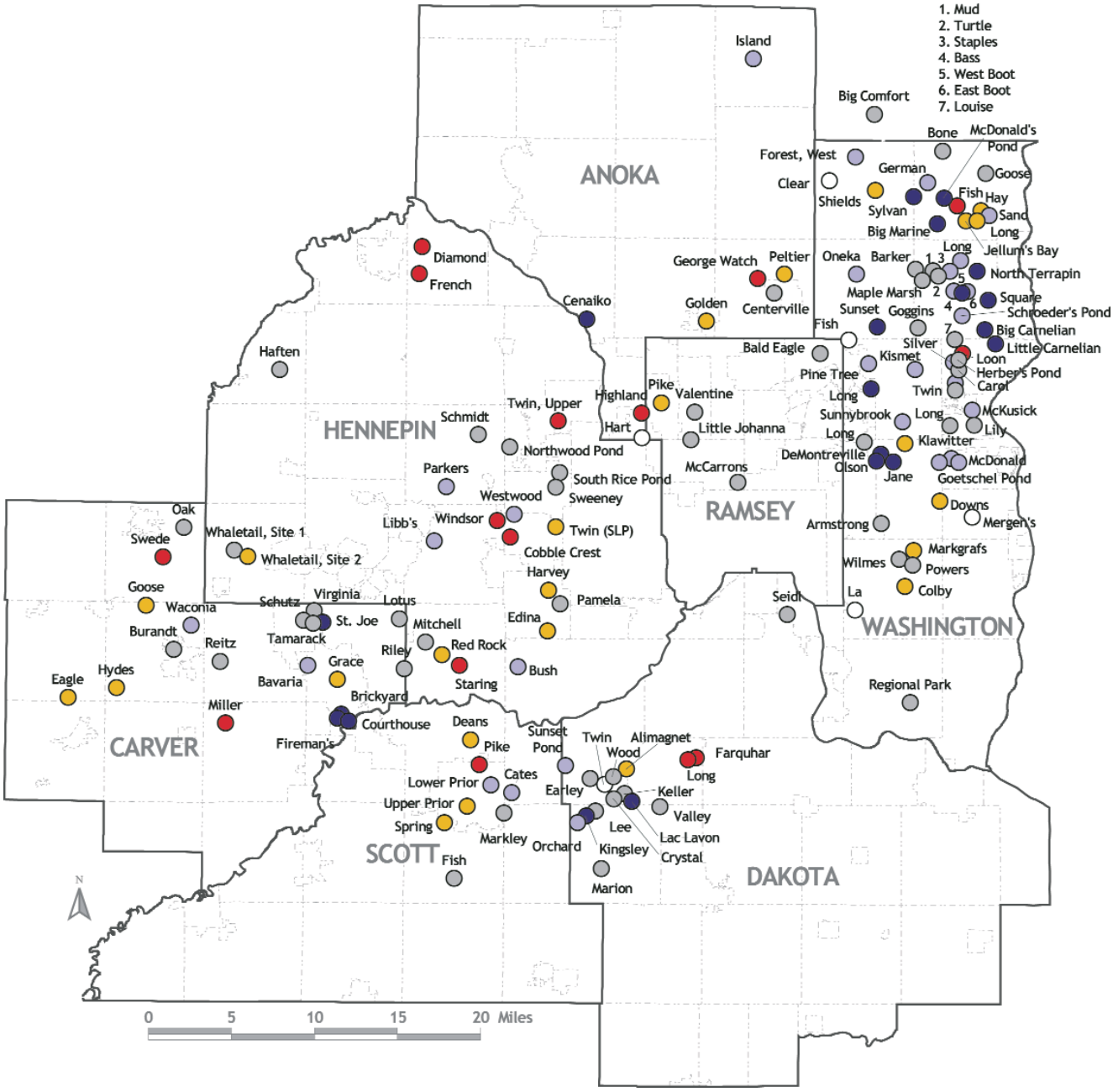
Each lake monitored in 2004 was assigned a water quality grade using an A through F grading system developed by Council staff in 1989. The grading system uses percentile ranges for three water quality indicators, summertime (May-September) average values for total phosphorus, chlorophyll-a, and Secchi depth transparency that were developed from the Council’s TCMA lake water quality database. Total phosphorus is a key nutrient measure, chlorophyll-a is a measure of algae abundance, and Secchi depth transparency is a measure of water clarity. An overall grade is calculated as the average grade for the three individual grades. The grading system allows comparisons of lake water quality across the TCMA.

In 2004, 35% of the assessed lakes had overall water quality grades of "A" or "B", meaning that they had relatively minor recreational use impairment due to eutrophication. Another 37% of lakes received a water quality grade of "C". However, 28% of lakes received a water quality grade of "D" or "F", meaning that they have poor water quality. There were 119 lakes monitored in both 2003 and 2004. Of these, lake grades were unchanged for 66%, increased for 26%, and decreased for 8%. Analysis of the repeat lakes indicates that the regions’ lakes experienced better water quality in 2004 as compared to that of 2003. Furthermore, data from the 2003 lake monitoring program revealed slightly better lake water quality in 2003 as compared to 2002. However, as in past years, analysis revealed no distinct spatial pattern for lake water quality across the region.

The Council’s lake monitoring programs have played a key role in recent efforts to use satellite images to assess lake water clarity for the region. 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. Results of the 2004 satellite assessment of the region revealed similar results to that found through the 2004 ground-based monitoring programs, that the region experienced better lake water quality in 2004 than that recorded in 2003. The complete results of the 2004 satellite analysis can be found at:
http://www.metrocouncil.org/planning/environment/TCWaterClarity2004.pdf.

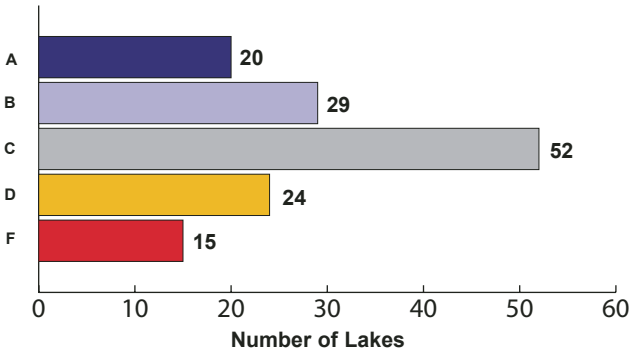
2004 LAKE GRADES

CAMP & Metropolitan Council Monitored Lakes



Water Quality Grading System				
Grade	Total Phosphorous (ug/L)	Chlorophylla (ug/L)	Secchi Depth (m)	(ft)
A	<23	<10	>3	(9.8)
B	23-32	10-20	3.0-2.2	(9.8-7.2)
C	32-68	20-48	2.2-1.2	(7.2-3.9)
D	68-152	48-77	1.2-0.7	(3.9-2.3)
F	>152	>77	<0.7	<(2.3)
NA				

(ug/L) is an abbreviation for microgram/liter



2004 Area Lakes - Overall Water Quality Grades *

*Assessment completed only for lakes with adequate database.

For more information visit
http://www.metrocouncil.org/environment/RiversLakes/Lakes/index.htm or call Randy Anhorn at (651) 602-8743

2004 LAKE WATER CLARITY GRADES (For lakes over 50 acres)				Summertime			
				TP	Chl-a	SDT	Overall
	Lake ID	Lake Name	CITY	(ug/L)	(ug/L)	(ft)	Grade
Best Ten	82001400	Little Carnelian Lake	Stillwater Twp.	12.6	2.5	20.0	A
	82004600	Square Lake	May Twp.	12.6	2.3	17.7	A
	82008000	Sylvan Lake	Forest Lake Twp.	19.9	3.3	16.7	A
	82010400	Jane Lake	Lake Elmo	10.6	3.1	16.1	A
	82004400	West Boot Lake	May Twp.	19.4	2.9	14.8	A
	82004900	Big Carnelian Lake	May Twp.	21.7	6.3	12.8	A
	82015300	Sunset Lake	Hugo	21.1	3.3	11.8	A
	82005200	Big Marine Lake	May Twp.	18.6	5.6	11.2	A
	19044600	Lac Lavon Lake	Apple Valley	12.9	4.6	10.2	A
	82010300	Olson Lake	Lake Elmo	17.8	7.2	9.8	A
Worst Ten	70007600	Pike Lake	Prior Lake	279.6	172.5	2.6	F
	10002900	Miller Lake	Dahlgren Twp.	191.2	49.0	2.3	F
	02000500	George Watch Lake	Lino Lakes	199.0	58.5	2.3	F
	27012700	French Lake	Dayton	164.5	107.2	2.3	F
	10009500	Swede Lake	Watertown Twp.	217.8	59.4	2.0	F
	27004203	Upper Twin Lake	Brooklyn Center	165.2	85.3	1.6	F
	82001500	Loon Lake	Stillwater Twp.	128.8	95.2	1.6	F
	27007800	Staring Lake	Eden Prairie	117.0	106.4	1.6	F
	27012500	Diamond Lake	Dayton	171.8	83.5	1.3	F
	19002300	Farquhar Lake	Apple Valley	205.6	148.5	1.3	F

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