2009 Lake Water Quality Summary

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

Introduction

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, and has been monitoring TCMA lakes since 1980. During the 1980s, the Council typically monitored about 10 to 30 lakes per year. In 1993, the Council initiated the Citizen-Assisted Monitoring Program (CAMP) to help expand coverage of lake monitoring in the TCMA and to provide information to support local water management efforts.

This highly successful program collects data on TCMA lakes each year through the efforts of trained, dedicated volunteers and their local sponsors. 2009 was the seventeenth year of the Council's volunteer program with 142 citizen volunteers participating in the CAMP. The volunteers were sponsored by local partners, including eleven watershed management organizations, twelve cities, three counties, one conservation district, and one basin planning group. By the dedicated efforts of the volunteers and local partners, a total of 203 sites on 189 lakes were monitored in 2009.

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 (Minnesota Statute 103F.721) 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, its partners, and citizen volunteers are used to identify pollution problems, support regional planning efforts, and meet federal and state regulations. This Lake Water Quality Summary provides an annual synoptic assessment of the water quality of many of the TCMA's lakes. Also, the Council will produce an annual River and Stream Assessment of the TCMA which will report, in a separate document, the water quality data of the region's rivers and streams.

Most of the lake monitoring efforts focus on the assessment of eutrophication, which is the process of nutrient enrichment. Eutrophication increases the biological productivity of a lake by enhancing the growth of algae and other

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plants. Human activities in the watersheds of lakes (e.g. non-point sources) increase the delivery of nutrients to lakes beyond what occurs naturally. This acceleration of nutrient enrichment by humans is called cultural eutrophication. During cultural eutrophication, the algal population increases and water clarity decreases. A variety of other problems may develop, including increases in nuisance algal blooms, odor problems, decreased desirability for recreation, decreased dissolved oxygen, fish kills, changes in the structure of fish and invertebrate communities toward low-oxygen tolerant species, and reductions in biodiversity. Furthermore, eutrophic lakes can develop blooms of toxic blue-green algae (cyano-bacteria), which can be a serious health concern for humans and animals (domesticated and wild). Cultural eutrophication is one of the leading water quality concerns facing the region.

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 at one station located over the deepest spot in the lake. Field measurements taken during each monitoring event typically include temperature and water clarity (measured with a Secchi disk). In addition, surface water samples are collected for lab analyses which 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.

Each lake is assigned a lake grade using an A through F grading system as originally developed by Council staff in 1989. The objective of the lake grade system is to provide a tool for assessing lakes on a regional basis. The grading system allows comparisons of lake water quality across the TCMA, yet is understandable to the public and non-technical audiences. The grading system uses percentile ranges of the summer-time (May-September) average values for three water quality indicators: total phosphorus, chlorophyll-a, and Secchi depth. Total phosphorus is a key nutrient measure; chlorophyll-a is a measure of algal abundance; and Secchi depth is a measure of water clarity. The lake's water quality grade is calculated as the average grade for the three individual parameter grades. Only lakes with a sufficient quantity of data are assigned a lake grade.

A more detailed description of CAMP methods and the lake grade system can be found in the Annual Lake Report at: http://www.metrocouncil.org/environment/RiversLakes/Lakes/index.htm

Results

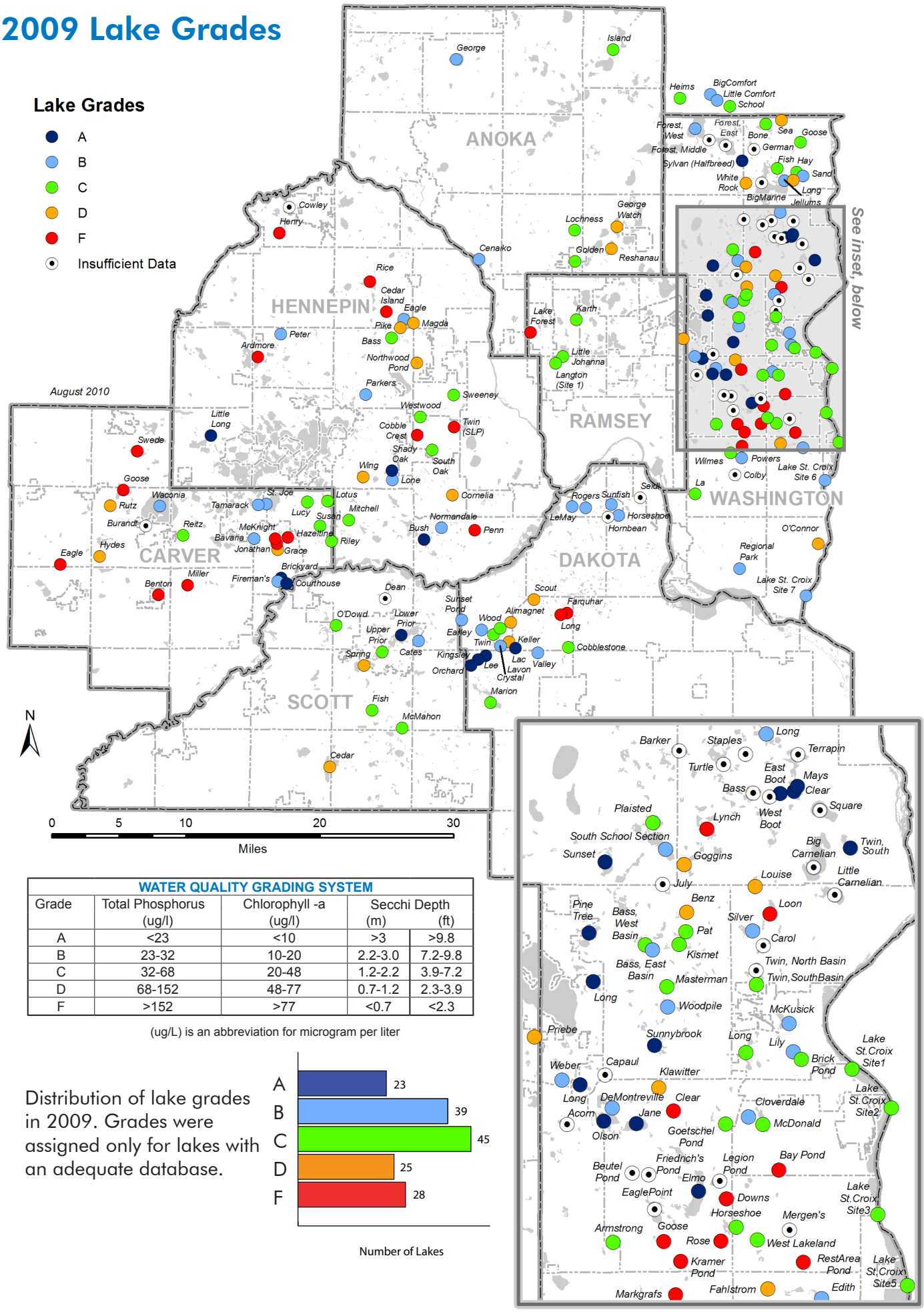
In 2009, 39% of the lake sites received a grade of "A" or "B", meaning that they had relatively good water quality. Another 28% of lakes received a water quality grade of "C". The remaining 33% of lakes received a water quality grade of "D" or "F", meaning that they had relatively poor water quality. Similar to that of past years, there was no distinct pattern within the TCMA as to where lakes with specific water quality are located.

The Council's lake monitoring program, especially the CAMP volunteers' monitoring efforts, has played a key role in the Council's use of satellite images to assess lake water clarity for the entire region. The CAMP 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 database could be used to detect if lake clarity has changed across space and time.

The Annual Lake Reports and the Annual Lake Water Quality Summary Reports can be accessed on-line at: http://www.metrocouncil.org/environment/RiversLakes/Lakes/index.htm

All of the Council's lake monitoring data can be accessed online using the Council's Environmental Information Management System, at: http://es.metc.state.mn.us/eims.

2009 Lake Grades



WATER QUALITY GRADING SYSTEM				
Grade	Total Phosphorus (ug/l)	Chlorophyll -a (ug/l)	Secchi Depth (m)	(ft)
A	<23	<10	>3	>9.8
B	23-32	10-20	2.2-3.0	7.2-9.8
C	32-68	20-48	1.2-2.2	3.9-7.2
D	68-152	48-77	0.7-1.2	2.3-3.9
F	>152	>77	<0.7	<2.3

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

Distribution of lake grades in 2009. Grades were assigned only for lakes with an adequate database.

2009 LAKE WATER QUALITY SUMMARY

(For lakes greater than or equal to 35 acres)

				Summertime Average			
				Secchi	Chl-a	TP	Lake
	Lake ID	Lake Name	Location	(m)	(ug/L)	(ug/L)	Grade
Best Ten	82-0045	Clear Lake	May Twp.	6.1	3.2	16.4	A
	82-0033	Mays Lake	May Twp.	5.8	2.8	17.7	A
	82-0080	Sylvan Lake	Forest Lake	5.0	2.7	15.3	A
	82-0118	Long Lake	Pine Springs	4.8	2.6	9.4	A
	82-0048	Twin Lake South	May Twp.	4.8	4.3	20.2	A
	82-0104	Jane Lake	Lake Elmo	4.5	3.8	14.2	A
	27-0179-01	Little Long Lake	Minnetrista	4.4	3.1	15.9	A
	82-0106	Lake Elmo	Lake Elmo	4.0	2.8	17.0	A
	27-0089-02	Shady Oak Lake	Minnetonka	4.0	3.3	14.9	A
	19-0446	Lac Lavon Lake	Apple Valley	3.8	4.0	12.6	A
Worst Ten	27-0175	Henry Lake	Hassan Twp.	0.4	80.6	245.0	F
	10-0089	Goose Lake	Waconia Twp.	0.4	106.0	104.0	F
	19-0022	Long Lake	Apple Valley	0.4	114.3	216.3	F
	10-0095	Swede Lake	Watertown Twp.	0.4	158.5	391.7	F
	82-0110	Downs Lake	Lake Elmo	0.3	74.6	205.8	F
	27-0119	Cedar Island Lake	Maple Grove	0.3	129.7	343.3	F
	82-0113	Goose Lake	Lake Elmo	0.3	196.2	300.4	F
	10-0014	Hazeltine Lake	Chaska	0.3	286.9	276.9	F
	10-0069	Benton Lake	Cologne	0.2	94.3	196.4	F
	82-0042	Lynch Lake	May Twp.	0.2	542.7	517.7	F

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