Lake Water Quality

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

Why We Monitor

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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 TCMA lakes each year through the efforts of trained, dedicated volunteers. 2008 was the sixteenth year of the Council's volunteer program. Seventeen watershed management organizations, fourteen cities, two counties, one conservation district, and one basin planning group participated in the CAMP in 2008, monitoring a total of 202 sites on 192 lakes.

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 (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 and its partners are used to support regional planning efforts, identify pollution problems, and meet federal and state regulations.

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 of the lake. Field measurements taken during each monitoring event typically include temperature and water clarity (measured with a Secchi disk). Some volunteers measure dissolved oxygen as well. In addition, surface water samples are collected for lab analyses which includes 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 2008 was assigned a lake grade using an A through F grading system originally developed by Council staff in 1989. The grading system was "re-calibrated" with an expanded database in 2000. 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 transparency). The percentile ranges 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. The lake's water quality grade is calculated as the average grade for the three individual grades. Only lakes with a sufficient quantity of data are assigned a lake grade. The grading system allows comparisons of lake water quality across the TCMA.

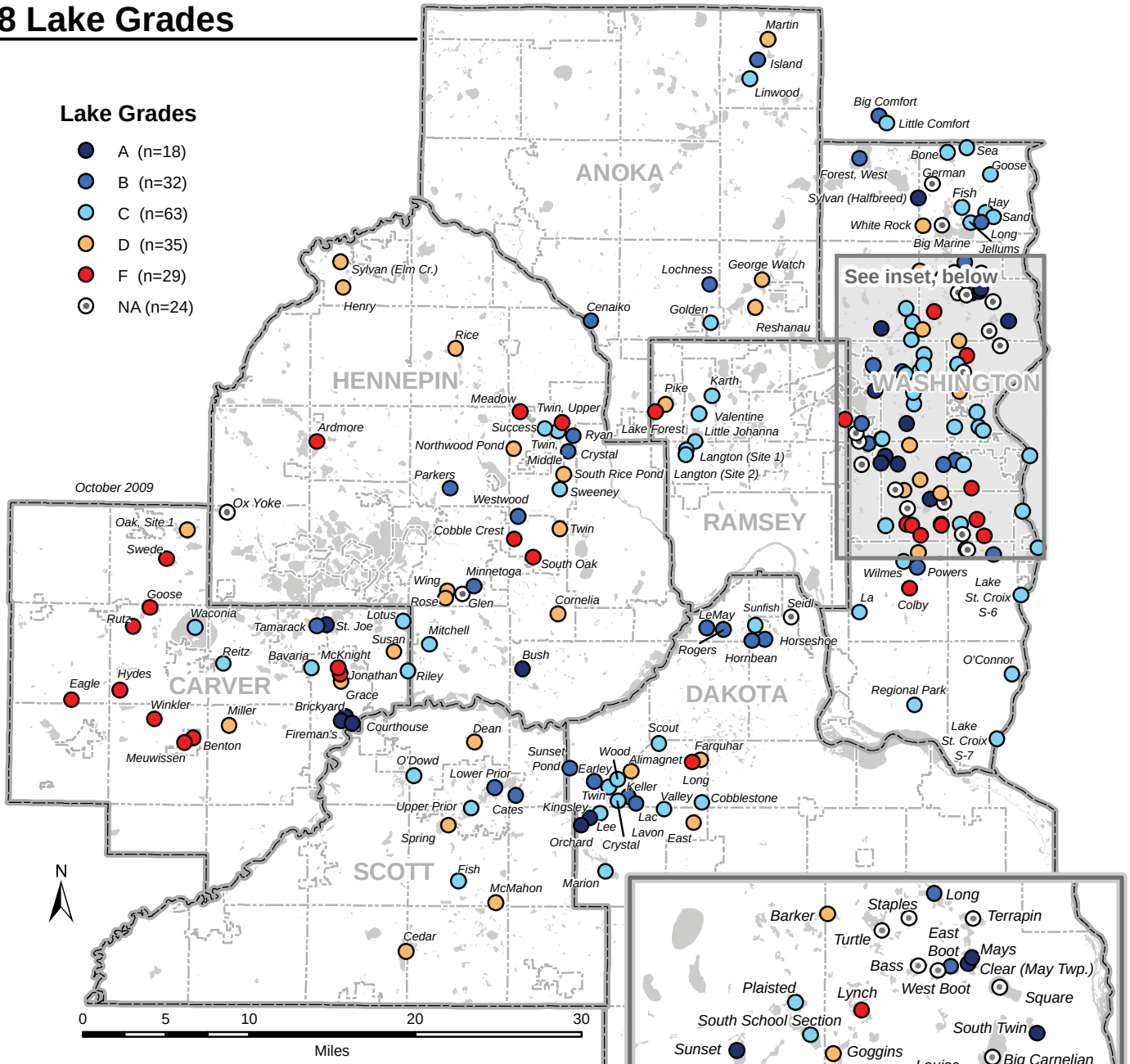
In 2008, 28% of the lake sites received a grade of "A" or "B", meaning that they had relatively minor recreational use impairment due to eutrophication. Another 36% of lakes received a water quality grade of "C". However, 36% of lakes received a water quality grade of "D" or "F", meaning that they have poor water quality. Similar to that of past years, there was no distinct pattern within the region as to where lakes with specific water quality are located.

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

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

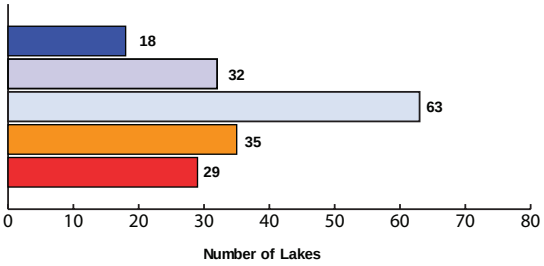
All of the Council's lake monitoring data can be accessed online using the Council's Environmental Information Management System.
http://es.metc.state.mn.us/eims.

2008 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	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)

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



Breakdown of lake grades of area lakes for 2008. The grades assessment was performed only for lakes with an adequate database.*

2008 LAKE WATER QUALITY SUMMARY (For lakes equal to or greater than 50 acres)				Summertime Average			
	Lake ID	Lake Name	Location	Secchi (m)	Chl-a (ug/L)	TP (ug/L)	Lake Grade
Best Ten	82-0019	South Twin Lake	Stillwater Twp.	5.0	4.6	17.3	A
	82-0080	Sylvan Lake	Forest Lake Twp.	4.7	2.6	12.9	A
	82-0104	Jane Lake	Lake Elmo	4.6	3.0	13.5	A
	82-0101	Demontreville Lake	Lake Elmo	3.6	4.4	16.3	A
	82-0106	Lake Elmo	Lake Elmo	3.3	3.2	14.7	A
	82-0153	Sunset Lake	Hugo	3.3	4.2	22.0	A
	27-0047	Bush Lake	Bloomington	3.1	5.4	15.9	A
	19-0031	Orchard Lake	Lakeville	3.1	10.1	22.5	A
	82-0103	Olson Lake	Lake Elmo	2.9	7.0	18.4	A
	82-0130	Long Lake	Mahtomedi	2.7	2.8	18.6	A
Worst Ten	10-0088	Hydes Lake	Waconia Twp.	1.2	81.4	156.8	F
	10-0066	Winkler Lake	Benton Twp.	0.6	77.2	379.6	F
	10-0121	Eagle Lake	Young America Twp.	0.6	82.3	182.8	F
	27-0042-01	Twin, upper Lake	Brooklyn Park	0.6	93.6	129.2	F
	10-0080	Rutz Lake	Waconia Twp.	0.5	50.8	168.8	F
	10-0089	Goose Lake	Waconia Twp.	0.5	118.3	111.9	F
	82-0015-02	Loon Lake	Stillwater Twp.	0.4	137.5	149.0	F
	10-0095	Swede Lake	Watertown Twp.	0.4	199.1	318.8	F
	82-0094	Colby Lake	Woodbury	0.3	53.1	167.5	F
	10-0069	Benton Lake	Benton Twp.	0.3	201.9	209.7	F

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