Lake Water Quality

2005

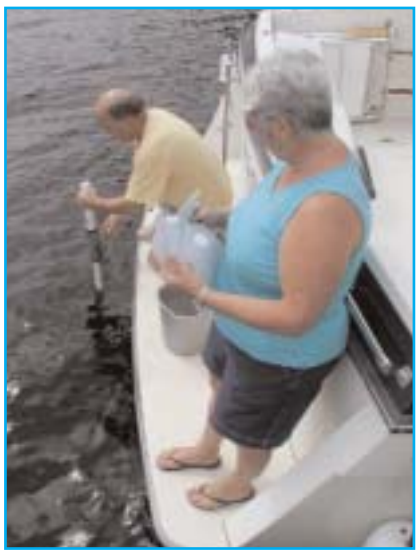
Lakes add to the quality of life and economic stability of the region

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. 2005 marked the thirteenth year of the Council's volunteer program. Sixteen watershed management organizations, twelve cities, two counties, one environmental group, one basin planning group, and one lake association participated in CAMP in 2005, monitoring a total of 160 lakes. Combined with 12 lakes monitored by Council staff, a total of 172 area lakes were monitored in 2005.

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 is 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 near the center of the lake. Field measurements taken during each monitoring event include temperature, dissolved oxygen, and water clarity (measured with a Secchi disk). 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 2005 was assigned a water quality grade using an A though F grading system originally developed by Council staff in 1989 and "re-calibrated" with an expanded database, in 2000. 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-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 2005, 26% 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 40% of lakes received a water quality grade of "C". However, 34% of lakes received a water quality grade of "D" or "F", meaning that they have poor water quality. There were 129 lakes monitored in both 2004 and 2005. Of these, lake grades were unchanged for 70%, increased for 11%, and decreased for 19%. Analysis of the repeat lakes indicates that the regions' lakes experienced slightly worse water quality in 2005 as compared to that of 2004. This after two years where the lake monitoring program revealed slightly better lake water quality as that recorded during the previous monitored years (2003 better than 2002, and 2004 better than 2003).

Similar to that of past years, analysis revealed no distinct pattern within the region as to where lakes with specific water quality are located. Nor were there clear-cut areas within the TCMA of better or worse water quality in 2005 as compared to 2004.

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 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.

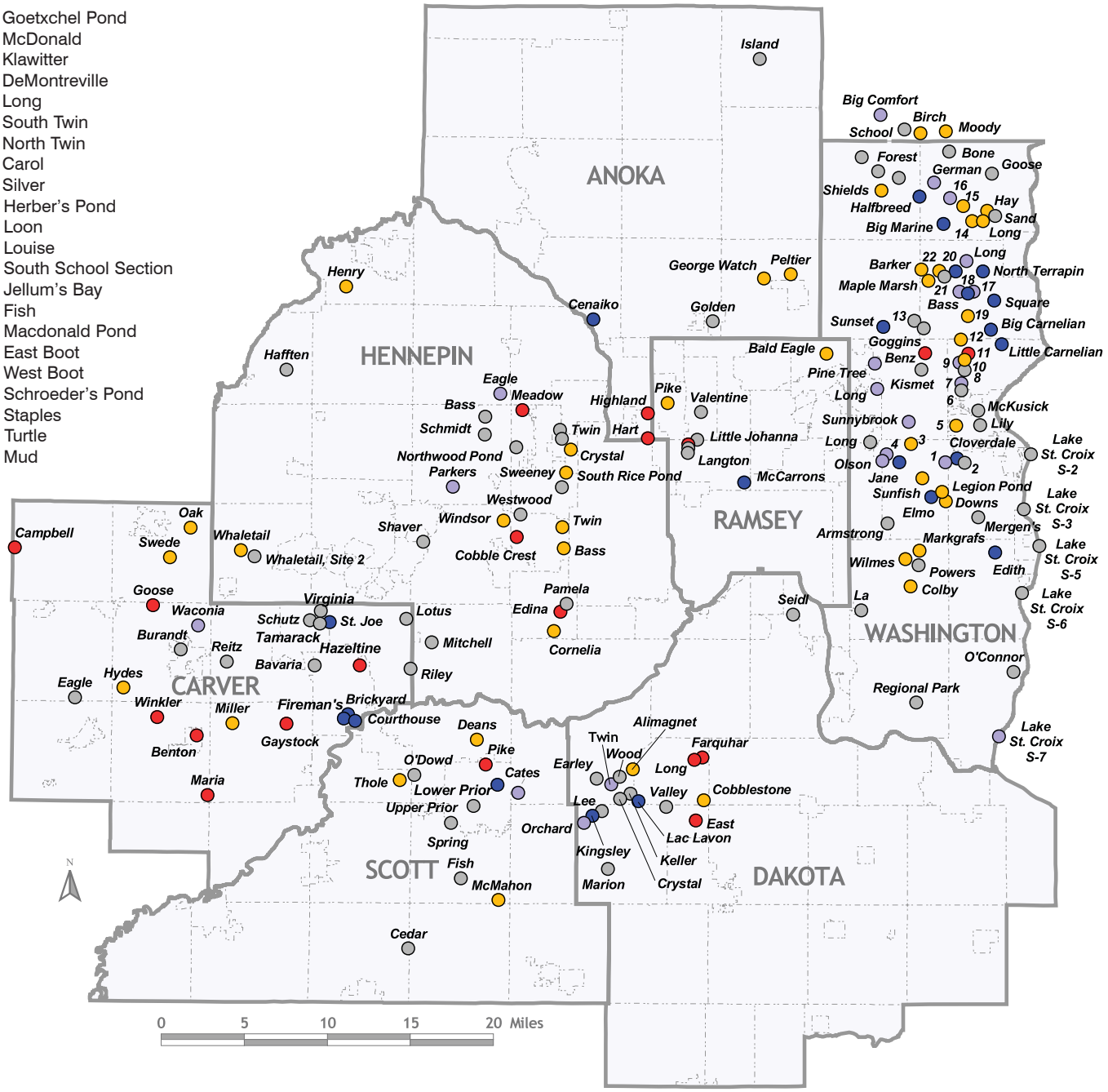
Results of the 2005 satellite assessment of the region revealed similar results to that found through the 2005 ground-based monitoring programs, that the region experienced slightly worse lake water quality in 2005 than that recorded in 2004. The complete results of the 2005 satellite analysis can be found at **http://www.metrocouncil.org/planning/environment/TCWaterClarity2005.pdf.**

All of the council's lake monitoring data can be accessed online at: **http://es.metc.state.mn.us/eims**

2005 LAKE GRADES

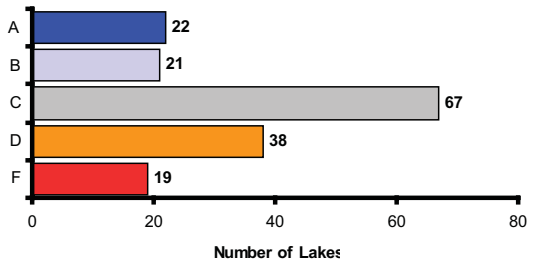
CAMP & Metropolitan Council Monitored Lakes

1. Goetxchel Pond
2. McDonald
3. Klawitter
4. DeMontreville
5. Long
6. South Twin
7. North Twin
8. Carol
9. Silver
10. Herber's Pond
11. Loon
12. Louise
13. South School Section
14. Jellum's Bay
15. Fish
16. Macdonald Pond
17. East Boot
18. West Boot
19. Schroeder's Pond
20. Staples
21. Turtle
22. Mud



Water Quality Grading System				
Grade	Total Phosphorous (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 overall lake water quality grades of area lakes for 2005.*
*Assessment was completed only for lakes with an adequate database.

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

2005 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.	13.6	2.8	22.6	A
	82010400	Jane Lake	Lake Elmo	13.2	3.0	17.4	A
	82004600	Square Lake	May Twp.	12.7	4.2	16.5	A
	82008000	Sylvan Lake	Forest Lake Twp.	20.6	3.6	14.8	A
	19044600	Lac Lavon Lake	Apple Valley	12.6	3.0	14.5	A
	82004900	Big Carnelian Lake	May Twp.	20.0	7.4	14.0	A
	82004400	West Boot Lake	May Twp.	19.5	4.2	14.0	A
	82010600	Elmo Lake	Lake Elmo	22.5	2.7	13.5	A
	70002600	Lower Prior Lake	Prior Lake	21.4	7.8	13.14	A
	82015300	Sunset Lake	Hugo	15.1	3.7	12.1	A
Worst Ten	82001502	Loon Lake	Stillwater Twp.	142.6	96.4	2.0	F
	19002300	Farquhar Lake	Apple Valley	171.5	56.0	2.0	F
	10006600	Winkler Lake	Benton Twp.	260.0	79.2	1.7	F
	70007600	Pike Lake	Prior Lake	273.7	101.4	1.6	F
	10008900	Goose Lake	Waconia Twp.	109.8	108.5	1.3	F
	27002800	Cornelia Lake	Edina	303.3	223.4	1.1	F
	10001400	Hazeltine Lake	Chaska	176.9	208.6	1.1	F
	10003100	Gaystock Lake	Dahlgren Twp.	217.0	187.5	1.0	F
	10012700	Campbell Lake	Hollywood Twp.	327.8	166.7	1.0	F
	10006900	Benton Lake	Benton Twp.	231.5	109.2	0.9	F

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