

2012

Lake Water Quality Summary

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

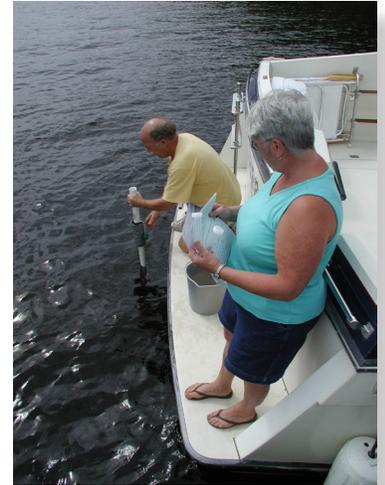
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INTRODUCTION

The Twin Cities metropolitan area 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 metro area lakes since 1980. During the 1980s, the Council typically monitored about 10 to 30 lakes per year. Metropolitan Council staff monitored 9 lake-sites on 9 lakes in 2012.

In 1993, the Council initiated the Citizen-Assisted Monitoring Program (CAMP) to help expand coverage of lake monitoring in the metro area and to provide information to support local water management efforts. This highly successful program collects data on the lakes each year through the efforts of trained, dedicated volunteers and their local sponsors. 2012 was the 20th year of the Council's volunteer program, with 125 citizen volunteers participating in the CAMP. The volunteers were sponsored by local partners, including 12 cities, 9 watershed management organizations and watershed districts, 3 counties, and 1 conservation district. Through the dedicated efforts of the volunteers and local partners a total of 171 lake-sites on 162 lakes were monitored in 2012 through the CAMP. Three of the lakes monitored by the CAMP also were monitored by Metropolitan Council staff (but for different parameters), so the total number of lakes monitored by the Metropolitan Council's lake monitoring program was 168 in 2012.



WHY WE MONITOR

The Metropolitan Council is charged with creating 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, by (Minnesota Statute 103F.721), to conduct an assessment of the waters (lakes, streams, and rivers) in the metro area 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 metro area's lakes. Also, the Council produces an annual River and Stream Assessment of the metro area which will report, in a separate document, the water quality data of the region's rivers and streams.



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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 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 population of algae 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 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 metro area, 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://es.metc.state.mn.us/eims/related_documents/view_documents.asp

RESULTS

In 2012, 33% of the lake sites received a grade of "A" or "B", meaning that they had relatively good water quality. Another 31% of lakes received a water quality grade of "C". The remaining 36% 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 Report and the Annual Lake Water Quality Summary Report can be accessed online at: http://es.metc.state.mn.us/eims/related_documents/view_documents.asp

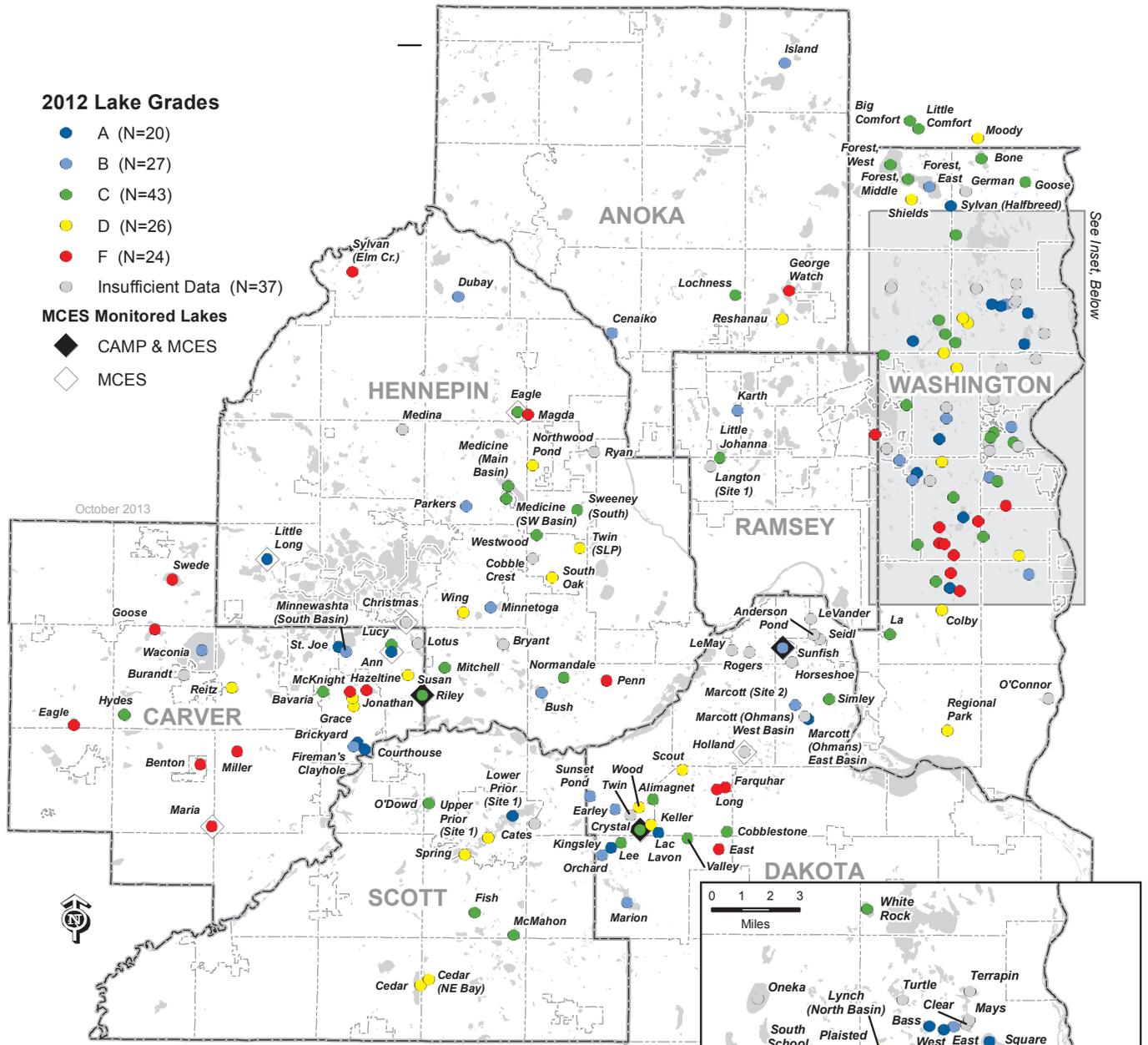
All of the Council's lake monitoring data can be accessed online using the Council's Environmental Information Management System, at: <http://es.metc.state.mn.us/eims>.

2012 Lake Grades

- A (N=20)
- B (N=27)
- C (N=43)
- D (N=26)
- F (N=24)
- Insufficient Data (N=37)

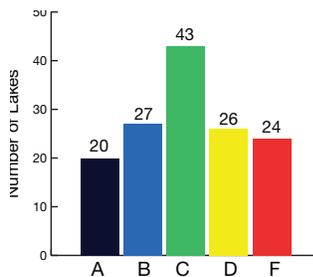
MCES Monitored Lakes

- ◆ CAMP & MCES
- ◇ MCES

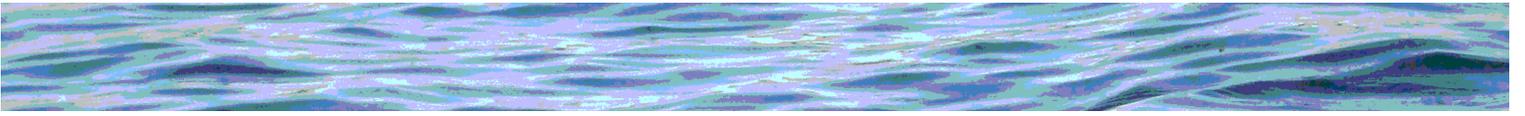


WATER QUALITY GRADING SYSTEM			
Grade	Total Phosphorus (ug/l)	Chlorophyll -a (ug/l)	Secchi Depth (ft)
A	<23	<10	>3
B	23-32	10-20	2.2-3.0
C	32-68	20-48	1.2-2.2
D	68-152	48-77	0.7-1.2
F	>152	>77	<0.7

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



Distribution of lake grades in 2012. Grades were assigned only for lakes with an adequate database.



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