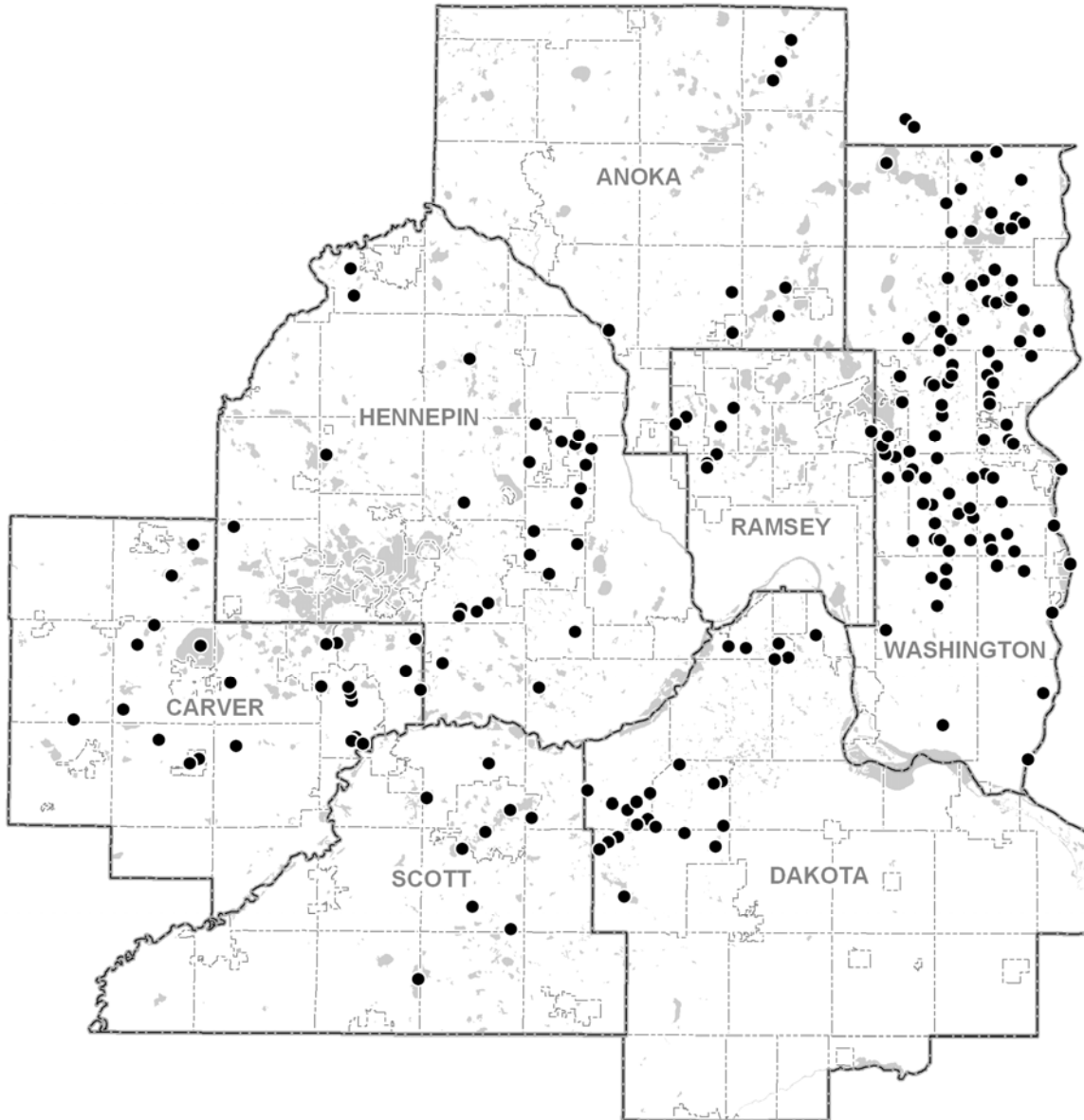


# 2008 Study of the Water Quality Of 192 Metropolitan Area Lakes



By  
**Brian Johnson**  
Senior Environmental Scientist  
Metropolitan Council Environmental Services  
October 2009



## EXECUTIVE SUMMARY

This 2008 report is the latest in a continuing series of reports summarizing results of the annual lake monitoring program of the Metropolitan Council (METC) in the Twin Cities seven-county metropolitan area (TCMA). The METC has collected water quality data on area lakes since 1980. This report contains data from a total of 202 lake sites on 192 lakes monitored in 2008. This year's monitoring program included 16 lakes never before monitored by the Council.

To date, the METC's lake monitoring program (including monitoring by METC staff and volunteers) has provided an important tool for making informed lake management decisions. Data from our regional lake monitoring program are frequently used to determine possible trends in lake water quality, estimate expected ranges in water quality of unmonitored lakes, examine intra-and inter-regional differences, determine potential impairments due to water quality, and investigate the relationships between land use and water quality.

The objectives of this program are:

1. Provide lake water quality data to lake, watershed and water resource managers.
2. Advise managers of known or suspected threats to lake water quality.
3. Continue to compile a water quality database on the five area lakes that support a trout fishery.

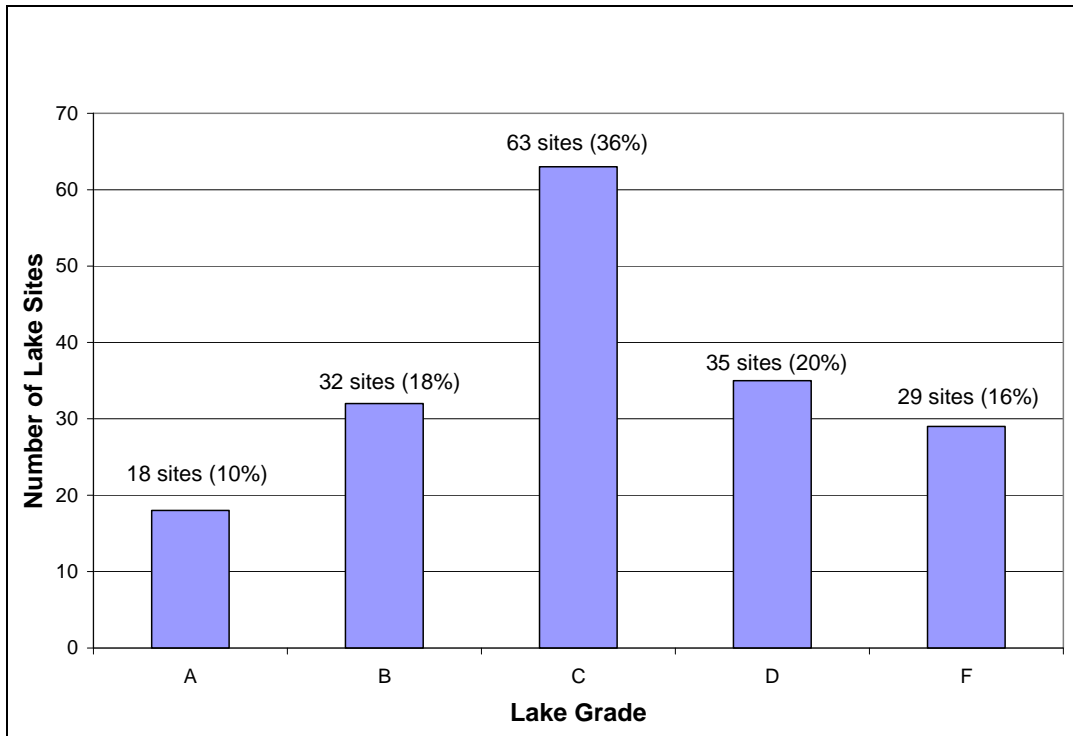
The year 2008 marked the sixteenth year that the Citizen-Assisted Monitoring Program (CAMP) was used to increase our knowledge of the water quality of area lakes. CAMP volunteers visited their assigned lake on a biweekly basis from mid April to mid October. The volunteers measured surface water temperature and water transparency, documented lake and weather conditions, and collected surface water samples. The samples were analyzed for total phosphorus, total Kjeldahl nitrogen, and chlorophyll-a by the METC's analytical laboratory located at the Metropolitan Wastewater Treatment Plant in St. Paul, MN. CAMP volunteers are sponsored by a local partner. In 2008, there were 35 sponsors who consisted of a mix of municipalities, watershed management organizations, watershed management districts, counties, and a basin water resources planning team.

Each lake was given a lake grade which was calculated on the basis of three parameters: total phosphorus, chlorophyll-a, and Secchi depth (water clarity). Not all lake sites received a lake grade because of insufficient quantity of data during the summer-time period of May through September. The distribution of lake grades for all the lake sites monitored in 2008 is shown in the following figure.

The greatest percentage of the lake sites received a lake grade of C. The water quality of these lakes is considered average as compared to other lakes in the TCMA. When comparing the percentage of above-average lakes, those receiving grades of A or B (28%), to below-average lakes, those receiving D or F (36%), more lakes were below average.

The 18 lake sites that received "A" lake grades include: Brickyard, Bush, Clear (May Township), Courthouse, DeMontreville, Elmo, Fireman's, Jane, Kingsley, Long (Mahtomedi), Mays, Olson, Orchard, St. Joe's, Sunnybrook, Sunset, Sylvan (Washington County), and Twin Lake south (Washington County).

The 29 lake sites receiving the lowest water quality grade "F" include: Ardmore, Bay Pond, Benton, Cobblecrest, Colby, Eagle (Carver County), Goose (Waconia), Goose [sites 1 & 2 (Washington County)], Hyde, Jonathan, Kramer, Long (Apple Valley), Lake Forest, Loon, Lynch, Meadow, Mergen's, Meuwissen, McKnight, Priebe, Rest Area Pond, Rose [sites 1 & 2 (Lake Elmo)], Rutz, South Oak, Swede, Twin [upper (Brooklyn Park)], and Winkler.



### Lake Grades for the 2008 Monitoring Season

Since 1980, 349 TCMA lakes have been monitored through the METC’s lake monitoring program. Since some of these lakes have multiple monitoring sites, a total of 379 lake sites have been monitored. The data from the METC’s lake monitoring program are permanently stored in the U.S. EPA’s national water quality data repository, called STORET (STORage and RETrieval). Data for all METC lake monitoring sites can also be conveniently obtained via the METC’s web-based Environmental Information Management System (EIMS), at: <http://es.metc.state.mn.us/eims/>. While the METC has done its best to enhance and expand the region’s lake water quality database, it is apparent that one of the most economical and efficient methods to expand knowledge of our lakes has been with the assistance of volunteers and the cooperation and financial support of local partners via the CAMP.

The METC’s lake monitoring program, especially the use of volunteer monitors through CAMP, has played a key role in the METC’s recent efforts to use satellite imagery to assess annual lake water clarity for the entire region. The monitoring program provides direct field measurements that are 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 beyond just the lakes involved in the METC monitoring program. The satellite-based information can be used to detect how lake water clarity conditions have changed over time and space in relation to changes in land-use and land-cover conditions.

If you have questions pertaining to the lake data or descriptions contained in this report, inquiries about CAMP, or suggestions of lakes the METC should consider monitoring in the future, please contact Brian Johnson of the Metropolitan Council at (651) 602-8743 or [brian.johnson@metc.state.mn.us](mailto:brian.johnson@metc.state.mn.us).

## ACKNOWLEDGMENTS

This report represents the coordinated efforts of many individuals. The author would like to acknowledge the following people for their technical and supportive contributions to the preparation of this report:

### CAMP Volunteers and Local Partners

The enthusiastic participation of local sponsors and volunteers help make the CAMP successful. A list of sponsors and volunteers is shown in Appendix C. The following volunteers are given added appreciation for their multiple years of service:

#### 16 years of service

Diane and Bob Coderre – Sunset Lake

#### 15 years of service

Washington CD – multiple lakes

#### 14 years of service

Bill Aamodt – Wilmes Lake

Carver Co. Env. Services – multiple lakes

#### 13 years of service

City of Circle Pines – Golden Lake

John Ritter – Lake Alimagnet

Wargo Nature Center – George Watch

#### 12 years of service

Anoka Co. Parks – multiple lakes

#### 11 years of service

Glen Gramse – Keller Lake

Wally Shaver – Lac Lavon Lake

#### 10 years of service

Philip Goodrich – Pike Lake

Lakeville – Valley and Lee lakes

John Ryski – Bavaria Lake

Westwood Nature Center – Westwood Lake

#### 9 years of service

Dave Hanson – Sweeney Lake

#### 8 years of service

Arnett Family – Crystal Lake

Gene Berwald – Pine Tree Lake

Kevin Bjork – Cloverdale Lake

Tom/Dorothy Goodwin – Orchard Lake

Wally Potter – Marion Lake

Rice Creek WD – Multiple

Terry Riley – Markgrafs Lake

Mike Shouldice – Tamarack Lake

Sly Family – Downs Lake

Streff Family – South Rice Lake

Bob Videen – Parkers Lake

#### 7 years of service

Bonnie Juran – Klawitter Lake

Al Kettlekamp – Long Lake

#### 7 years of service (continued)

Kris Mann – Twin, upper

Tom Sletta – Cates Lake

#### 6 years of service

Walt Burris – Lower Prior Lake

Conservation League of Edina – Cornelia Lake

Bill Feely – Long Lake

Kellogg Family – Cobblecrest Lake

Kitty Francy-Payton – Long Lake

#### 5 years service

David Bess – Wood Lake

David Florenzano – Riley Lake

Wayne Hubin – Swede Lake

Bob Kistler – Valentine Lake

Sue Morgan & Linda Scott – St. Joe Lake

Diane Stauner – Meadow Lake

Shelly Strohmaier – Lotus Lake

Chuck Taylor – Jane Lake

Gordan Warner – Mitchell Lake

#### 4 years service

Carpenter Nature Center – St. Croix Lake (site 7)

Marvin Groth – Bass Lake

Roberta & Jim Harper – St. Croix Lake (site 2)

Arnie Johnson – Sunnybrook Lake

Jeff Keene – O'Connor Lake

Sheryl & Rich Lindholm – St. Croix Lake (site 5)

Cecilia & Harry Martin – St. Croix Lake (site 3)

Rick Meierotto – St. Croix Lake (site 6)

Steve Pierson – Fish Lake

Stuart Rudd – Success Lake

#### 3 years service

Dick Bancroft – Sunfish Lake

David Bluhm – White Rock Lake

Bruce Cornwall – Twin Lake

Jerry Edberg – Cedar Lake

Dave Johnson – Hornbean Lake

Scott Knudson – Lake Elmo

Minnesota DOT – Rest Area Pond

Dave Nimmer – Edith Lake

Martha Popp – Lost Lake

Bob Schumacher – Eagle Point Lake

Jim Serley – Echo Lake

Mark Storck – Rose Lake

Gregg Thompson – Bush Lake

Dan Wallace – Sunset Pond

Joe Williamson – McMahan Lake

**Metropolitan Council Staff**

- The MCES Laboratory Services Section, for laboratory analysis of the lake samples.
- Craig Skone for support with data presentation and for developing all the graphics for this report.
- Jerry Saatzer for his assistance with preparation of CAMP equipment.

# CONTENTS

Executive Summary.....	i
Acknowledgments .....	iii
Introduction .....	1
Citizen-Assisted Monitoring Program (CAMP).....	3
CAMP Overview.....	3
Acknowledgments.....	5
CAMP Methods .....	5
Recruiting Volunteers.....	5
Training Volunteers .....	5
Monitoring Methods .....	6
Laboratory Analytical Methods .....	9
Data Management.....	9
Quality Assurance.....	9
Lake Quality Report Card.....	12
2008 Lake Grades.....	13
2008 Monitoring Results for Individual CAMP Lakes .....	15
Lake reports are placed in alphabetical order by lake name.	
Refer to Appendix A for a listing of lakes monitored in 2008 and previous years.	
References .....	435
Figures	
1. 2008 CAMP Study Lakes.....	4
2. CAMP Monitoring Form.....	8
3. Total Phosphorus Quality Control Data 2008.....	11
4. Chlorophyll-a Quality Control Data 2008.....	11
5. Secchi Transparency Quality Control Data 2008.....	11
6. Distribution of 2008 Lake Grades.....	13
Appendices	
A. Lakes Sampled by Metropolitan Council Staff and the CAMP, 1980 - 2008	
B. Lake Characteristics	
C. 2008 CAMP Volunteers and Sponsors	
D. 2008 CAMP Quality Control Data	