

William Sullivant Vanderbilt Allen: *Evening By The Lake*, 1904

The Lakes of Maple Grove

Lake Status Report for 2003

Maple Grove Water Quality Commission

Prepared April 2004
by Steve McComas

The Lakes of Maple Grove Status Report - 2003

Prepared for the Maple Grove Lake Quality Commission.

Commission Members - 2003

Mike Amery — Council Liaison
James Erickson — Edward Lake
John Garritsen — Eagle Lake
Donald Helmeke — City-at-Large
James Johnson — City-at-Large
Ray Johnson — Weaver Lake
Jim Merickel — City-at-Large
Nicholas Negrini — City-at-Large
Kurt Paulson — Pike Lake
Joan Schaller — Rice Lake
Doug Schon — Fish Lake
Bill Schumacher — Cedar Island Lake
Catherine Thompson — City-at-Large
Nick Negrini
Roger Granberg

Ken Ashfeld, City Engineer, City of Maple Grove
Rick Lestina, Water Resources Engineer, City of Maple Grove
Sue Rice, Minutes Secretary

Prepared by Steve McComas, Blue Water Science

April 2004

Introduction and Background

The City of Maple Grove has seven lakes and numerous smaller bodies of water within the City limits. In 2003 the ten lakes were monitored over the summer months, including the three Arbor Lakes. This report summarizes the summer sampling data. A summary of general lake characteristics is shown in Table 1.

Table 1. General lake characteristics of Maple Grove Lakes.

Lake	State ID Number	Size (acres)	Maximum Depth (feet)	Mean Depth (feet)	Watershed District	Total Watershed Size (ac)
Fish	27-118	239	48*	19*	Elm Creek	1,990* (incl lake)
Weaver	27-117	165	57*	21*	Elm Creek	510* (incl lake)
Rice	27-116	333	11	5	Elm Creek	17,200 (incl lake)
Edward		33	9.5	5.5	Elm Creek	102 (incl lake)
Eagle	27-111	285	37	12.6	Shingle Creek	3,220**
Pike	27-111-02	75	25	6.7	Shingle Creek	919**
Cedar Island	27-119	80*	7.0*	4.6*	Shingle Creek	800** (incl lake)

* from Hennepin Conservation District

**from Met Council

Guide to Interpreting Water Quality Information

SD = secchi disc — a black and white disc lowered into the water until it can't be seen from the surface. This is the secchi disc transparency reading.

TP = total phosphorus — the fertilizing nutrient most responsible for causing excess algae to grow.

Chl a = chlorophyll a — the green pigment in algae that is analyzed in the laboratory. It is correlated to the amount of algae in a lake.

ppb = parts per billion — concentrations of phosphorus and chlorophyll are often reported in ppb.

Lake Goals

- secchi disc: 6-7 feet of transparency as a summer average.
- total phosphorus: try to keep phosphorus concentrations below 30 ppb as a summer average.
- chlorophyll a: try to keep chlorophyll concentrations below 18 ppb as a summer average.

2003 Summer Sampling Results - Status Report

The objectives of the 2003 water quality sampling program were to check the health of the lakes in the City of Maple Grove and to see if they were improving, degrading, or staying the same. Water quality parameters monitored included secchi disc (measure of water clarity), total phosphorus (measure of the amount of algae growth nutrients), and chlorophyll a (measure of the amount of algae in the water).

Water quality was checked monthly, May through September (Table 2). Typically Weaver or Eagle lake have the best transparency. Cedar Island had the lowest transparency in 2003 (Tables 2 and 3).

Table 2. 2003 Maple Grove water quality data. Results for secchi disc (SD) are in feet, total phosphorus (TP) are in ppb, and chlorophyll a (chl) are in ppb.

Lakes*	Cedar Island			Eagle			Edward			Fish			Pike			Rice			Weaver		
	SD	TP	Chl	SD	TP	Chl	SD	TP	Chl	SD	TP	Chl	SD	TP	Chl	SD	TP	Chl	SD	TP	Chl
April																					
week 3**				8.3	45	10				5.0	79	51	3.3	101	51				5.3	50	40
May																					
week 1				8.9	17	12				13.9	68	4	3.6	92	41						
week 2																			16.5		2
week 3	2.0	85	31	12.2	23	5	9.1	59	9	7.6	47	16	5.4	54	26	4.1	60	7	12.5	28	7
week 4																					
June																					
week 1				17.8	34	4				4.6	55	23	5.0	64	31				7.6	48	20
week 2																					
week 3				11.9	14	9				4.0	45	32	3.9	65	68				5.9	49	21
week 4	1.2	148	102				3.4	61	22							2.5	197	66			
July																					
week 1				4.3	53	39				2.6	71	45	2.5	107	90				3.3	72	40
week 2																					
week 3	0.9	188	189	3.6	53	48	1.8	82	67	3.0	42	53	1.7	89	133	2.4	175	74	2.6	53	65
week 4				3.3	50	50				2.3	40	53	2.1	92	89				2.6	37	71
August																					
week 1																					
week 2				3.3	45	48				1.7	44	52	2.6	89	43				1.7	46	58
week 3																					
week 4	0.6	239	186	2.3	54	54	0.6	206	285	2.0	47	72	2.1	81	62	1.5	315	39	2.6	49	49
September																					
week 1																					
week 2				3.3	72	39				2.0	49	53							3.6	35	23
week 3																					
week 4	1.0	157	73	3.0	75	47	0.9	182	127	3.6	94	17				5.5	176	10	9.6	72	11
May-September Average																					
	1.1	163	116	7.0	31	44	3.2	118	102	4.5	55	37	3.5	80	60	3.2	185	35	6.6	46	31

* Cedar Island, Edward and Rice Lakes were sampled by Blue Water Science and sponsored by the City of Maple Grove. Fish and Weaver Lakes were sampled by the Elm Creek Watershed District. Eagle and Pike Lakes were sampled by Shingle Creek W.D.

** Weeks: days 1-7 = week 1; days 8-14 = week 2; days 15-21 = week 3; days 22+ = week 4

Table 3. 2003 Water chemistry summer averages for Maple Grove Lakes.

	Averages		
	Secchi Disc (ft)	Total Phosphorus (ppb)	Chl a (ppb)
Cedar Island	1.1	163	116
Eagle	7.0	44	31
Edward	3.2	118	102
Fish	4.5	55	37
Pike	3.5	80	60
Rice	3.2	185	35
Weaver	6.6	46	31

	Maple Grove Range	Typical Range
SD= secchi disc	1.0-21.1	3.0-20 feet
TP = total phosphorus	17-260	10-200 ppb
Chl a = chlorophyll <u>a</u>	7-120	5-50 ppb

Eurasian Watermilfoil (EWM) Monitoring Summary

Eurasian watermilfoil (EWM) has been found in four lakes in Maple Grove -- Fish, Eagle, and Rice and a new addition was West Arbor. EWM in Fish Lake is past the point of eradication, but nuisance growth is limited to several shoreline areas. Eagle Lake has a small infestation but very little nuisance growth. Rice Lake had a new infestation in 1996 but milfoil was not found in 1997 and 1998. It was found in 1999, 2000, 2001, 2002, and 2003 in several small bunches. Observations are summarized in Table 4.

Curlyleaf pondweed, also an exotic plant, is found in seven of the lakes monitored in 2003 but not found in the Arbor Lakes.

Table 4. Summary of Eurasian watermilfoil observations for Maple Grove Lakes in 2003.

	2003 Summer
Fish Lake	scattered Eurasian watermilfoil, several locations had nuisance growth.
Eagle Lake	no Eurasian watermilfoil found
Weaver Lake	no Eurasian watermilfoil found
Rice Lake	scattered Eurasian watermilfoil, no nuisance growth was found.
Lake Edward	no Eurasian watermilfoil found
Cedar Island Lake	no Eurasian watermilfoil found

Water Quality Summaries

Secchi Disc, Phosphorus, and Chlorophyll a

A nine year summary of water quality results for Maple Grove Lakes is shown in Table 5. City lakes have been stable in regard to water quality except for Lake Edward and Rice Lake. Fluctuating clarity in Lake Edward may be influenced by a fish kill that occurred in 1995. Rice Lake may be impacted by the drawdown on 1997-1998. Rice and Cedar Island Lakes have the highest phosphorus concentrations in town and Eagle, Edward, Fish, and Weaver have the lowest. Pike is in the middle.

Table 5. Growing season averages for the Maple Grove Lakes (SD = secchi disc (ft), TP = total phosphorus (ppb), Chl a = chlorophyll a (ppb)).

	Cedar Island			Eagle			Edward			Fish			Pike			Rice			Weaver		
	SD	TP	Chl	SD	TP	Chl	SD	TP	Chl	SD	TP	Chl	SD	TP	Chl	SD	TP	Chl	SD	TP	Chl
1995	2.0	106	73	5.8	51	7	5.0	61	16	6.4	51	16	3.9	78	20	2.2	233	44	7.8	40	18
1996	1.8	--	--	5.9	33	9	8.1	104	2	7.0	55	9	3.4	66	23	2.9	453	37	6.5	35	6
1997	1.5	117	40	5.4	31	11	5.8	47	4	5.4	50	17	3.6	76	24	2.3	316	39	6.6	32	10
1998	1.4	102	44	5.9	29	11	4.1	46	11	5.9	46	13	3.3	70	31	3.3	469	20	6.6	40	14
1999	1.1	203	66	5.9	53	23	4.5	43	13	4.8	45	19	3.9	74	35	3.5	248	35	6.4	42	21
2000	--	--	--	9.5	36	5	5.5	45	6	4.6	53	19	4.3	65	30	5.2	175	23	6.6	43	15
2001	2.1	78	47	10.9	34	18	7.1	26	4	5.4	38	17	4.9	83	30	4.5	339	22	5.5	42	38
2002	1.8	90	55	3.3	42	67	6.7	48	13	3.6	51	26	--	--	--	4.2	152	18	8.3	43	20
2003	1.1	163	116	7.0	44	31	3.2	118	102	4.5	55	37	3.5	80	60	3.2	185	35	6.6	46	31

Cedar Island Lake data: Met Council - 1995; MPCA - 1996; and Blue Water Science - 1997 through 2003.

Report Card

Water quality data have been converted to grades based on a Met Council grading scale. Grades are shown in Table 6.

Table 6. Lake grades for Maple Grove Lakes.

	Cedar Island			Eagle			Edward			Fish			Pike			Rice			Weaver		
	SD	TP	Chl	SD	TP	Chl	SD	TP	Chl	SD	TP	Chl	SD	TP	Chl	SD	TP	Chl	SD	TP	Chl
1995	F	D	D	C	C	A	C	C	B	C	C	B	C	D	B	F	F	C	B	C	B
1996	F	--	--	C	B	A	B	D	A	C	C	A	D	D	C	D	F	C	C	C	A
1997	F	D	C	C	B	B	C	C	A	C	C	B	D	D	C	D	F	C	C	B	B
1998	F	D	D	C	B	B	C	C	B	C	C	B	D	D	C	D	F	D	C	C	B
1999	F	F	D	C	C	C	C	C	B	C	C	B	C	D	C	D	F	C	C	C	C
2000	--	--	--	B	C	A	C	C	A	C	C	B	C	C	C	C	F	C	C	C	B
2001	F	D	C	A	C	B	C	B	A	C	C	B	C	D	C	C	F	C	C	C	C
2002	F	D	D	D	C	D	C	C	B	D	C	C	--	--	--	C	D	B	B	C	B
2003	F	F	F	C	C	C	D	D	F	C	C	C	D	D	D	D	F	C	C	C	C

Cedar Island Lake data: Met Council - 1995; MPCA - 1996; and Blue Water Science - 1997 through 2003

Arbor Lakes

Results of Arbor Lake sampling are summarized in Tables 7, 8, and 9. All three have good water quality and low phosphorus concentrations.

Table 7. Arbor Lakes water quality data. Results for secchi disc (SD) are in feet, total phosphorus (TP) are in ppb, and chlorophyll a (chl) are in ppb.

Lakes*	West			North			South		
	SD	TP	Chl	SD	TP	Chl	SD	TP	Chl
1999									
August 17, 1999 - top - bottom	3.1	18 30	11	6.7	20	<1	5.4	13	<1
2001									
Sept 27, 2001	5.3			16.0			8.2		
2002									
July 25, 2002	9.3	12	1	8.6	10	3	15.8	<10	1
August 27, 2002	12.1	15	1	9.1	11	2	16.2	14	1
Sept 28, 2002	5.7	21	2		11	<1	8.0	12	1
2003									
May 15, 2003	3.0	27	<1	11.3	8	4	11.2	8	<1
June 23, 2003	7.2	16	<1	11.6	7	2	13.9	7	3
July 18, 2003	11.4	18	2	14.4	11	3	14.1	17	2
August 27, 2003	6.5	11	10	15.6	8	2	15.1	6	1
September 30, 2003	6.8	21	7	8.5	10	4	4.0	13	9

* Cedar Island, Edward and Rice Lakes were sampled by Blue Water Science and sponsored by the City of Maple Grove. Fish and Weaver Lakes were sampled by the Elm Creek Watershed District. Eagle and Pike Lakes were sampled by Shingle Creek W.D.

** Weeks: days 1-7 = week 1; days 8-14 = week 2; days 15-21 = week 3; days 22+ = week 4

Table 8. Growing season averages for the Arbor Lakes.

	West			North			South		
	SD	TP	Chl	SD	TP	Chl	SD	TP	Chl
May-September Average									
1999 (1 date - Aug)	3.1	18	11	6.7	20	<1	5.4	13	<1
2001 (1 date - Sept)	5.3			16.0			8.2		
2002 (3 dates)	9.0	16	1	8.9	11	2	13	12	1
2003 (5 dates)	7.0	19	4	12.3	9	3	11.7	10	3

Table 9. Lake grades for the Arbor Lakes.

	West			North			South		
	SD	TP	Chl	SD	TP	Chl	SD	TP	Chl
1999	D	A	B	C	A	A	C	A	A
2001	C			A			B		
2002	B	A	A	B	A	A	A	A	A
2003	C	A	A	A	A	A	A	A	A

Secchi Disc Transparency

Graphs of average summer water transparency over the years for each of the major Maple Grove lakes are displayed on the next page.

Eagle, Fish, Weaver, and Edward Lakes have summer water clarity averages generally over five feet. Cedar Island Lake generally has a summer average less than three feet. Pike and Rice Lakes averages are right around four to five feet. Transparency goals are for all lakes to average 5 to 7 feet over the summer.

(Table content is extremely faint and largely illegible)

Table 5 - Growing season averages for the Apple Lakes

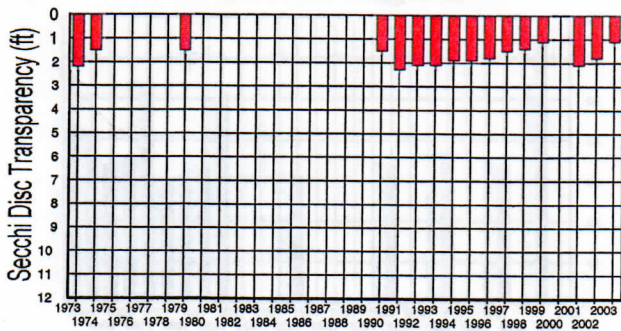
(Table content is extremely faint and largely illegible)

Table 6 - Lake grades for the Apple Lakes

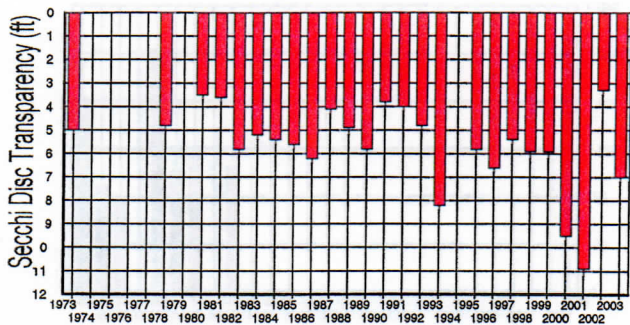
(Table content is extremely faint and largely illegible)

Shingle Creek Watershed District

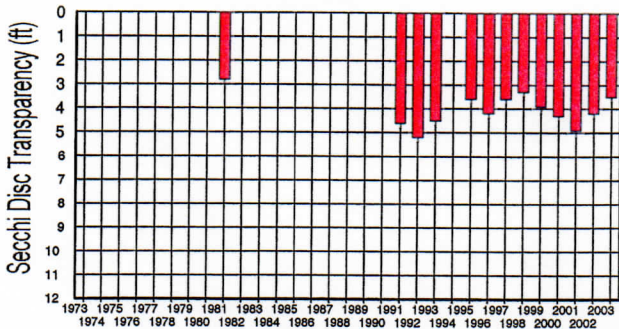
Cedar Island Lake



Eagle Lake



Pike Lake



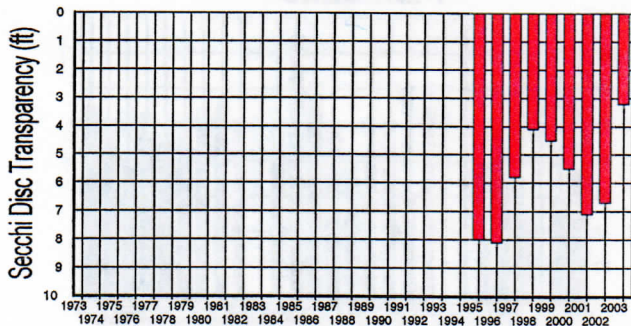


Secchi Disc Results

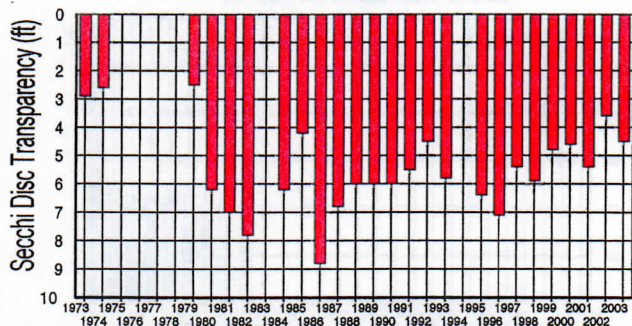
Cedar Island Lake has the lowest secchi transparency in Maple Grove while Eagle Lake and Weaver Lakes typically have the best clarity. Transparency fluctuates in Pike and Rice Lakes. Rice and Weaver Lakes have ongoing aquatic plant management projects.

Elm Creek Watershed District

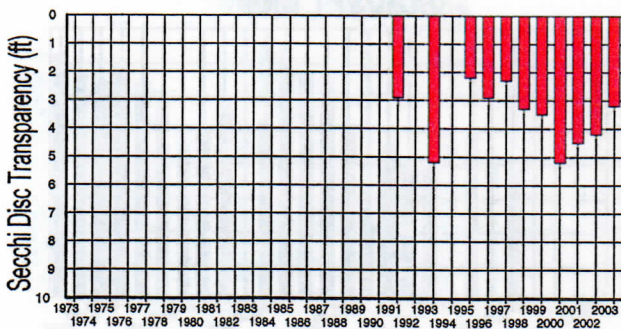
Lake Edward



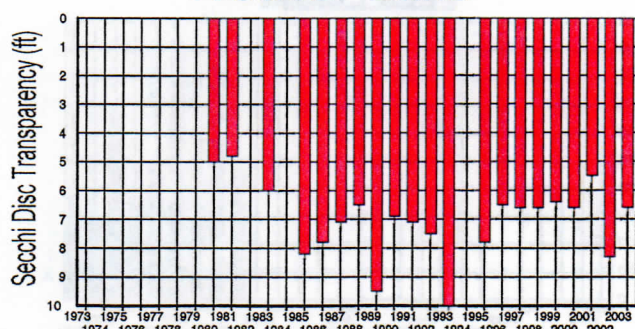
Fish Lake



Rice Lake

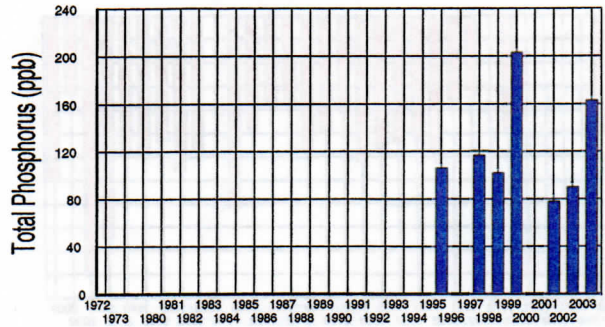


Weaver Lake

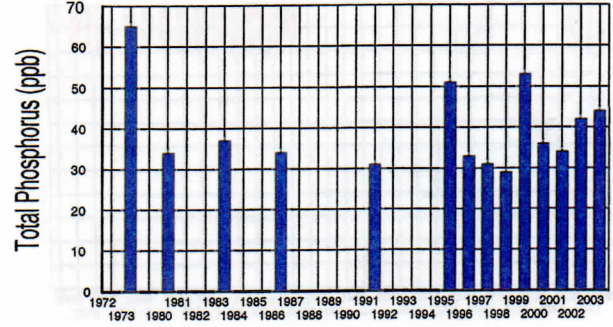


Shingle Creek Watershed District

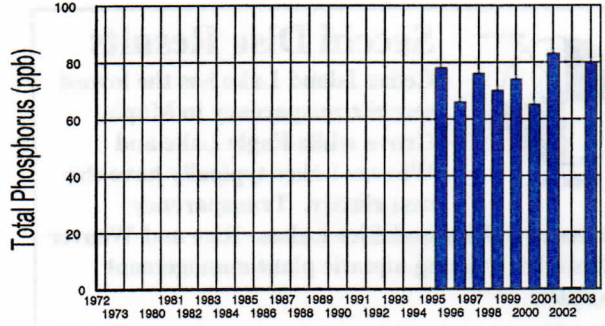
Cedar Island Lake



Eagle Lake

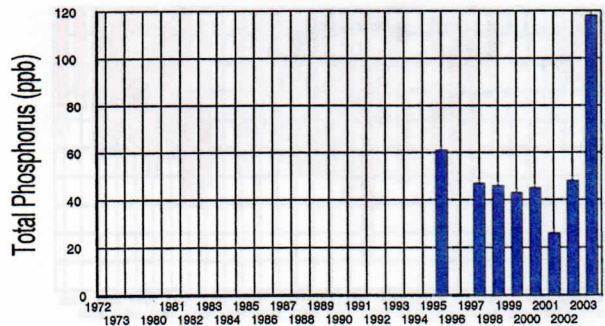


Pike Lake

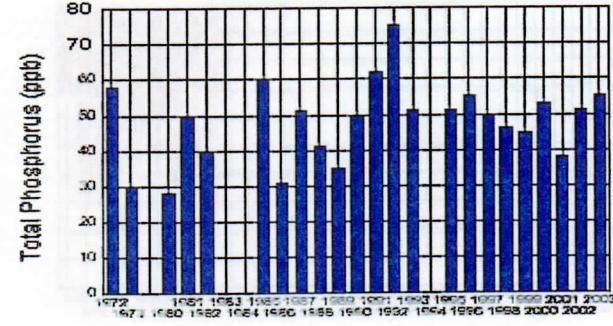


Elm Creek Watershed District

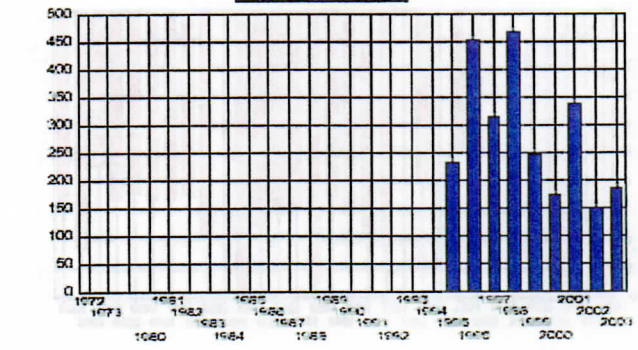
Lake Edward



Fish Lake



Rice Lake



Weaver Lake

