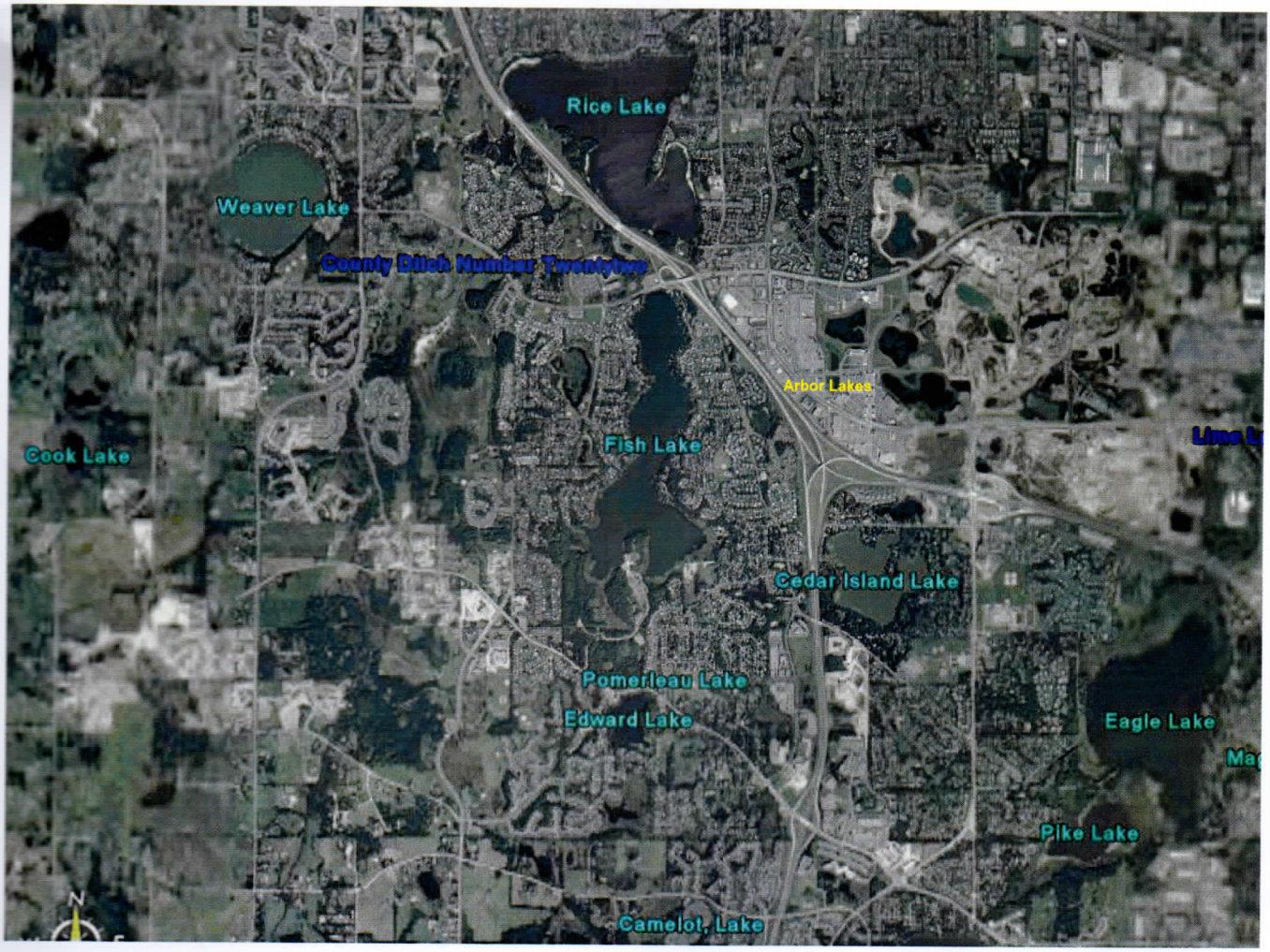

The Lakes of Maple Grove

Lake Status Report for 2005

Maple Grove Water Quality Commission

Prepared March 2006
by Steve McComas

The Lakes of Maple Grove
Status Report - 2005

Prepared for the Maple Grove Lake Quality Commission.

Commission Members - 2005

Karen Jaeger — Council Liaison
James Erickson — Edward Lake
John Garritsen — Eagle Lake
Roger Granberg — City-at-Large
Donald Helmeke — City-at-Large
Trish Lugtu — Weaver Lake
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Kurt Paulson — Pike Lake
Doug Schon — Fish Lake
George Schneider — Rice Lake
Steve Lane — Cedar Island Lake
Catherine Thompson — City-at-Large

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

Prepared by Steve McComas, Blue Water Science

March 2006

Introduction and Background

The City of Maple Grove has numerous lakes and smaller water bodies within the City limits. In 2005, eleven 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	27-121	33	9.5	5.5	Elm Creek	102 (incl lake)
Cook	27-120	16.5	20		Elm Creek	
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 (goals, based on North Central Hardwood Forest Ecoregion values)

- Secchi disc: 5-7 feet of transparency as a summer average.
- Total phosphorus: try to keep phosphorus concentrations below 40 ppb as a summer average for deep lakes and less than 60 ppb for shallow lakes.
- Chlorophyll a: try to keep chlorophyll concentrations below 18 ppb as a summer average.

2005 Summer Sampling Results - Status Report

The objectives of the 2005 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 primary nutrient that stimulates algal growth), and chlorophyll (measure of the amount of algae in the water).

Water quality was checked from May through September and results are shown in Table 2. Eagle, Fish, Pike, and Weaver Lakes were monitored by Three Rivers Park District. The remaining lakes were monitored by Blue Water Science.

Weaver and the Arbor Lakes had the best transparency and Cedar Island had the lowest transparency in 2005 (Tables 2 and 3).

Table 2. Maple Grove water quality data 2005. Results for secchi disc (SD) are in feet, total phosphorus (TP) are in ppb, and chlorophyll a (chl) are in ppb.

Lakes	West Arbor			North Arbor			South Arbor			Cedar Island			Cook			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	SD	TP	Chl	SD	TP	Chl	SD	TP	Chl	SD	TP	Chl
May																																	
week 1*																																	
week 2																7.3	48	9.4				10.0	45	12.3	4.8	69	19.9				33.5	17	1.6
week 3																																	
week 4	13.5	19	1.5	10.7	18	1.0	7.5	14	1.5	1.5	102	76.1	5.4	27	<1	15.2	28	6.7	4.1	41	19.1	15.2	39	6.8	3.9	61	15.6	8.1	41	3.7	26.7	24	0.5
June																																	
week 1																17.5	22	6.3				4.0	35	19.5	7.2	87	29.8				21.0	19	2.2
week 2																																	
week 3																13.5	30	6.2				4.9	43	21.5	5.1	95	21.1				22.1	20	1.9
week 4	11.2	18	5.8	6.4	17	6.2	11.1	14	1.2	1.0	124	115	4.0	27	2.2				1.9	97	63.7							6.0	270	15.9			
July																																	
week 1																8.8	41	10.0				4.3	44	26.5	3.3	107	33.1				11.4	38	6.5
week 2																																	
week 3																9.1	33	7.1				3.0	46	37.0	3.3	92	54.1				10.2	27	4.3
week 4	9.0	25	1.6	15.2	16	2.7	9.6	17	<1	0.8	137	186	7.4	25	<1				1.9	110	104							3.1	362	62.8			
August																																	
week 1																6.3	52	0.7				2.5	38	43.4	2.0	97	87.4				10.0	22	5.2
week 2																																	
week 3																4.1	42	33.5				2.6	33	33	1.6	89	101.3				8.6	21	8.4
week 4	13.3	38	<1	10.4	14	1.7	14.7	15	4.9	1.0	130	196	6.6	152	5.1	3.0	56	55.3	1.9	126	80.3	3.0	33	23.1	1.6	130	85.7	2.5	219	102	8.9	21	8.1
September																																	
week 1																																	
week 2																																	
week 3																3.6	62	48.7				4.4	43	34.4	1.9	112	92.8				13	19	5.0
week 4	6.3	40	2.2	10.1	19	1.7	--	26	1.1	1.0	123	96.8	9.6	26	<1				2.0	145	39.5							3.2	178	36			
May-September Average																																	
	10.7	28	2.4	13.2	17	2.7	10.7	17	1.9	1.1	123	134.0	6.6	51	2.1	8.8	18	20.3	2.4	104	61.3	5.4	40	25.7	3.5	95	54.2	4.6	214	44.1	16.5	23	4.4

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

Table 3. Water chemistry summer averages for Maple Grove Lakes in 2005.

	May - Sept Averages, 2005		
	Secchi Disc (ft)	Total Phosphorus (ppb)	Chl a (ppb)
Cedar Island	1.1	123	134.0
Cook	6.6	51	2.1
Eagle	8.8	18	20.3
Edward	2.4	104	61.3
Fish	5.4	40	25.7
Pike	3.5	95	54.2
Rice	4.6	214	44.1
Weaver	16.5	23	4.4

	Maple Grove Range	Typical Range
SD= secchi disc	0.8 - 33.5	3.0 - 20 feet
TP = total phosphorus	14 - 362	10 - 200 ppb
Chl a = chlorophyll a	<1 - 196	5 - 50 ppb

Eurasian Watermilfoil (EWM) Monitoring Summary

Eurasian watermilfoil (EWM) has been found in six lakes in Maple Grove -- Fish, Eagle, Rice and all three Arbor Lakes. EWM in all six lakes is past the point of eradication, but typically nuisance growth is limited to several shoreline areas. Eagle Lake has a small infestation and little nuisance growth. Rice Lake had a new infestation in 1996 but milfoil was not found in 1997 and 1998. It has been found in 1999 through 2005 in small bunches. Overall observations are summarized in Table 4.

Curlyleaf pondweed, also an exotic plant, is found in ten of the lakes monitored in 2005. It was not found in Cook Lake.

Table 4. Summary of Eurasian watermilfoil observations for Maple Grove Lakes in 2005.

	2005 Summer
Cook	no Eurasian watermilfoil found.
Arbor - North	Eurasian watermilfoil, found in 2003.
Arbor - South	Eurasian watermilfoil, found in 2004.
Arbor - West	Eurasian watermilfoil, found in 2002.
Fish Lake	scattered Eurasian watermilfoil, found in 1993.
Eagle Lake	scattered Eurasian watermilfoil, found in 1992.
Weaver Lake	no Eurasian watermilfoil found
Rice Lake	scattered Eurasian watermilfoil, found in 1996.
Lake Edward	no Eurasian watermilfoil found
Cedar Island Lake	no Eurasian watermilfoil found

Water Quality Summaries

Secchi Disc, Phosphorus, and Chlorophyll a

An eleven 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 fish kills that occurred in 1995 and 2000. Rice Lake may be impacted by the drawdown on 1997-1998. Rice and Cedar Island Lakes have the highest phosphorus concentrations in town and Cook, Eagle, Fish, and Weaver have the lowest. Pike and Edward 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			Cook			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	SD	TP	Chl
1995	2	106	73	--	--	--	5.8	51	7	5	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	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	--	--	--	11	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	44	31	3.2	118	102	4.5	55	37	3.5	80	60	3.2	185	35	6.6	46	31
2004	1	147	133	6.2	26	4	6.8	45	28	2.2	77	47	7.9	47	29	3.5	97	65	3.9	207	36	8.9	51	40
2005	1.1	123	134	6.6	51	2	8.8	18	20.3	2.4	104	61	5.4	40	25.4	3.5	95	54.2	4.6	214	44	16.5	23	4.4

Cedar Island Lake data: Met Council - 1995; MPCA - 1996; and Blue Water Science - 1997 through 2004.

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			Cook			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	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
2004	F	D	F	C	B	A	B	C	C	F	D	C	B	C	C	D	D	D	D	F	C	B	C	C
2005	F	D	F	C	C	A	B	A	B	D	D	D	C	C	C	D	D	D	C	F	C	A	B	A

Cedar Island Lake data: Met Council - 1995; MPCA - 1996; and Blue Water Science - 1997 through 2004

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

Table 7. 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	13.0	12	1
2003 (5 dates)	7.0	19	4	12.3	9	3	11.7	10	3
2004 (5 dates)	9.6	18	5	11.5	12	2	12.4	12	2
2005 (5 dates)	10.7	28	2.4	13.2	17	3	10.7	17	2

Table 8. 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
2004	A	A	A	A	A	A	A	A	A
2005	A	B	A	A	A	A	A	A	A

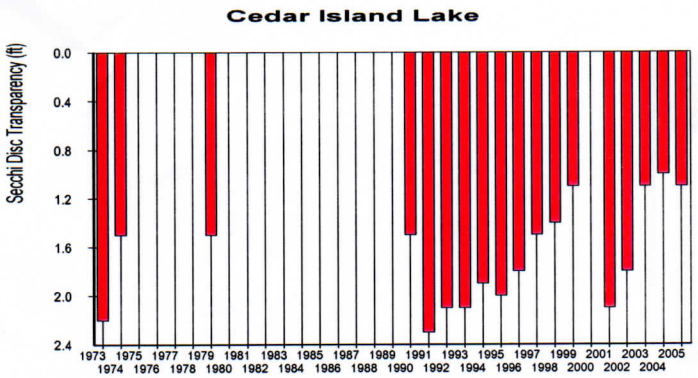
Secchi Disc Transparency Graphs

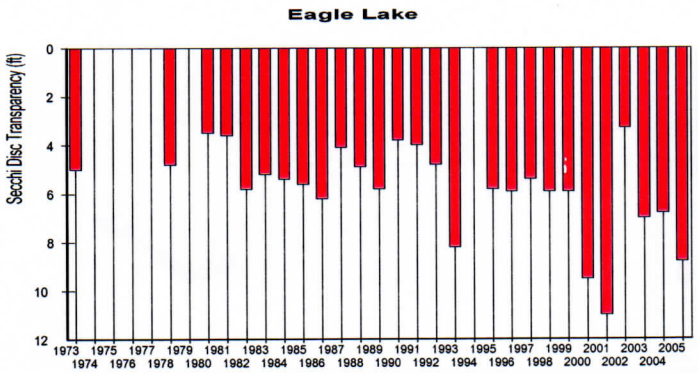
Graphs of average summer water transparency over the years for each of the major Maple Grove lakes are displayed on the next two pages. Eagle, Fish, Weaver, and Edward Lakes have summer water clarity averages generally over five feet. Cedar Island Lake generally has a summer average less than three feet. 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.

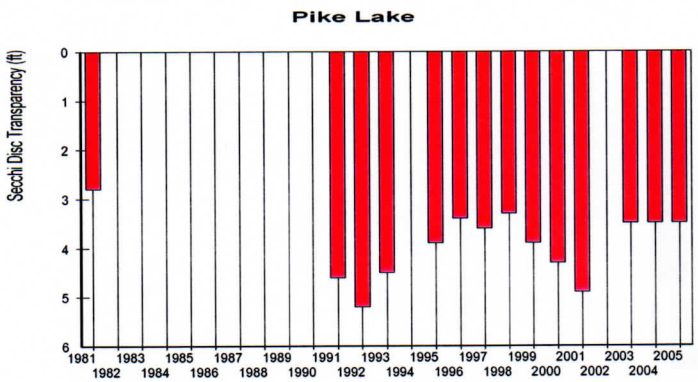
Total Phosphorus Graphs

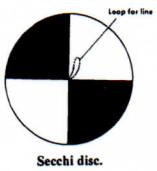
Graphs of average summer water total phosphorus for the major Maple Grove Lakes are shown on pages 8 and 9. Eagle and Weaver had the lowest summer phosphorus concentrations of the lakes although the Arbor Lakes also have low phosphorus concentrations. Rice Lake and Cedar Island Lake had the highest total phosphorus in 2005.

Shingle Creek Watershed District





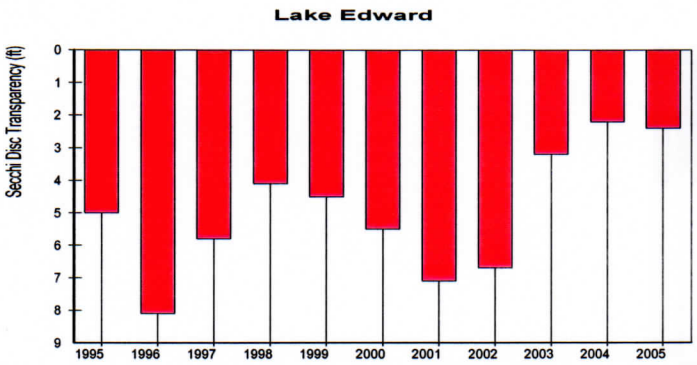


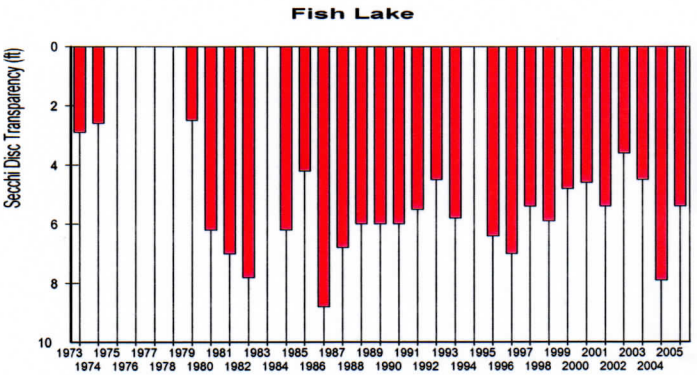


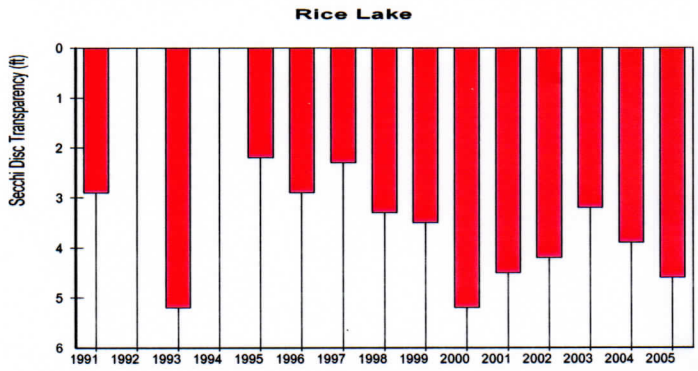
Secchi Disc Results

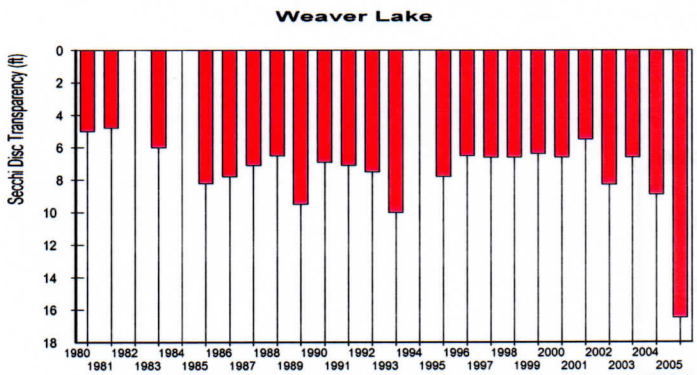
Cedar Island Lake has the lowest secchi transparency in Maple Grove while Weaver Lake had the best clarity. Transparency fluctuates in Eagle, Fish, Pike and Rice Lakes. Rice and Weaver Lakes have ongoing aquatic plant management projects.

Elm Creek Watershed District

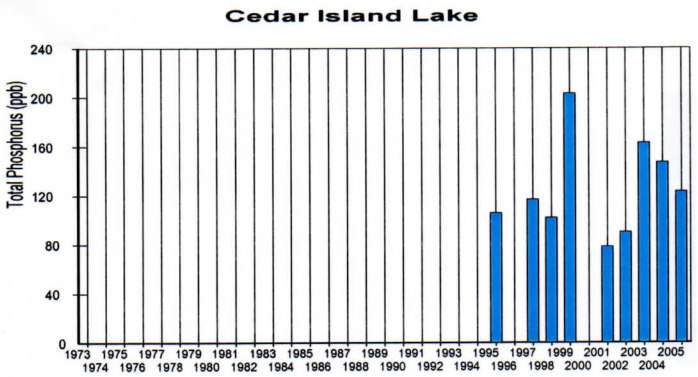


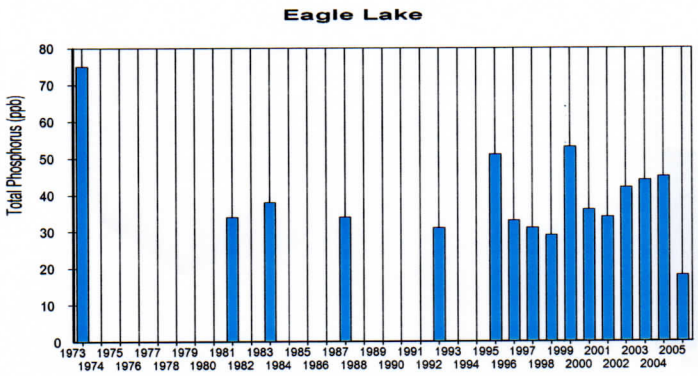


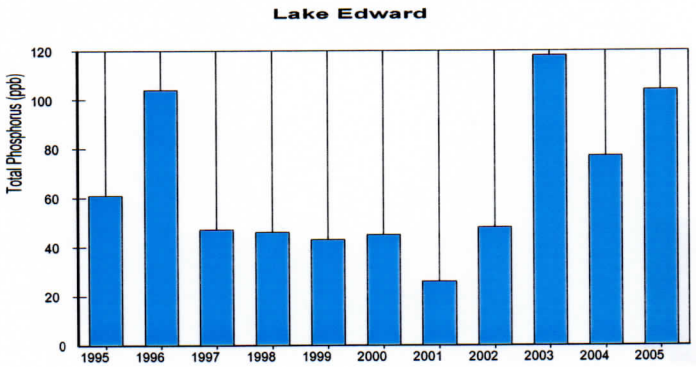




Shingle Creek Watershed District

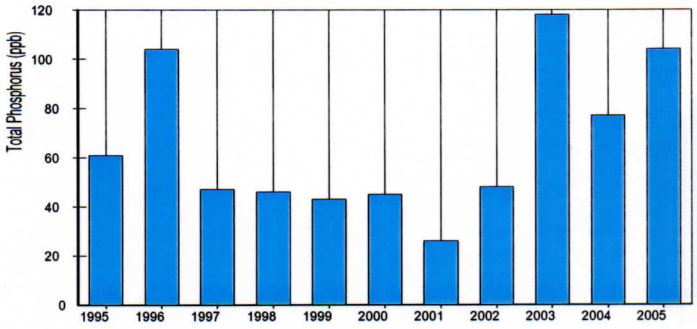




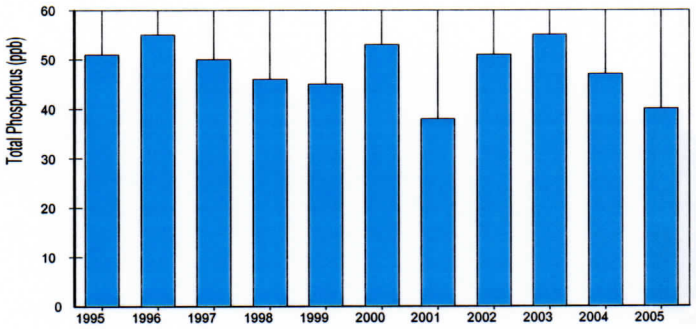


Elm Creek Watershed District

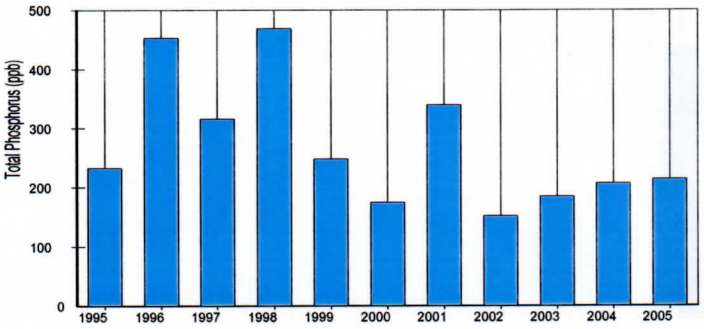
Lake Edward



Fish Lake



Rice Lake



Weaver Lake