

# **The Lakes of Maple Grove**

## **Lake Water Quality Report for 2012**

---

**Maple Grove Lake Quality Commission**

**Prepared February 2013  
by Steve McComas**

## **The Lakes of Maple Grove Status Report - 2012**

**Prepared for the Maple Grove Lake Quality Commission.**

### **Commission Members - 2012**

Karen Jaeger — Councilmember  
Steve Lane — Cedar Island Lake  
Larry McGough — Eagle Lake  
James Erickson — Edward Lake  
Doug Schon — Fish Lake  
Kurt Paulson — Pike Lake  
George Schneider — Rice Lake  
Nancy Bergstrand — Weaver Lake  
Catherine Thompson — City-at-Large  
Jerry Schmitz — City-at-Large  
Liz Stout — City-at-Large  
Roger Granberg — City-at-Large

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

Prepared by Steve McComas, Blue Water Science

February 2013

# Introduction and Background

The City of Maple Grove has numerous lakes and smaller water bodies within the City limits. In 2012, a total of eleven lakes were monitored over the summer months, including the three Arbor Lakes. Three Rivers Park District sampled Fish and Weaver and Eagle Lakes. Blue Water Science sampled Edward, Cook, Cedar Island, Pike, Rice, and the three Arbor Lakes. This report summarizes the summer sampling data from May-September. A summary of general lake characteristics is shown in Table 1.

**Table 1. General lake characteristics of Maple Grove Lakes. Watershed acreage is from the 1996 Stormwater Management Plan.**

Lake	State ID Number	Watershed District	Size (acres)	Maximum Depth (feet)	Mean Depth (feet)	Total Watershed Size (ac)	Lake Classification (shallow or deep)	Lake Water Retention Time (years)
Fish	27-118	Elm Creek	239	48*	17.7	860	deep	9.1
Weaver	27-117	Elm Creek	165	57*	21*	320	deep	20
Rice	27-116	Elm Creek	333	11	6.6	13,400	shallow	0.3
Edward	27-121	Elm Creek	33	9.5	5.5	102	shallow	
Cook	27-0120	Elm Creek	16.5	20	8	196	shallow	2.3
Eagle	27-111	Shingle Creek	285	37	10.5	1,838	deep	3.1
Pike	27-111-02	Shingle Creek	75	25	4.9	746	shallow	1.0
Cedar Island	27-119	Shingle Creek	86	7.0*	4.3	389	shallow	1.8

\* 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 (based on eutrophication criteria for North Central Hardwood Forest Ecoregion)

- 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 14 ppb as a summer average for deep lakes and less than 20 ppb for shallow lakes.

## 2012 Summer Sampling Results - Status Report

The objectives of the 2012 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. North Arbor Lake had the best transparency and Cedar Island had the lowest transparency in 2012 (Tables 2 and 3).

**Table 2. Water chemistry summer averages for Maple Grove Lakes in 2012 (source: Three Rivers Park District collected data for Fish, Weaver, and Eagle Lakes. Other data collected by Blue Water Science).**

	May - Sept Averages, 2012		
	Secchi Disc (ft)	Total Phosphorus (ppb)	Chi a (ppb)
Cedar Island	0.9	130	58
Cook	5.0	34	3.1
Eagle	5.7	42	25
Edward	3.4	72	41
Fish	5.5	42	26
Pike	3.5	35	15
Rice	2.5	256	53
Weaver	7.6	31	11
North Arbor	14.5	12	6.1
South Arbor	13.0	15	5.3
West Arbor	6.6	26	9.4

**Table 3. Maple Grove water quality data 2012. Results for secchi disc (SD) are in feet, total phosphorus (TP) are in ppb, and chlorophyll *a* (chl) are in ppb. Data for Eagle, Fish, and Weaver are from Three Rivers Park District.**

Lakes	North Arbor			South Arbor			West 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			
<b>May</b>																																				
week 1*															10.8	32	8.8							12.7	32	8.4										
week 2															13.5	25	6.5																13.6	30.5	6.4	
week 3																								10.9	31	6.9										
week 4	7.3	10.8	23	14.8	11	1	7.1	28	12.4	0.8	58	34.4	4.8	30	3.8	9.2	29	13.5	5.4	67	19.2	8.7	31	15.3	4.7	32	6.1	3.6	75	23.5	8.5	44	17.1			
<b>June</b>																																				
week 1																																				
week 2																																				
week 3															5.3	37	18.6							5.3	35	18.2							6.4	33	14.9	
week 4	14.4	13	1.8	18.1	16	1.4	7.7	20	3.8	0.9	124	59.8	6.1	38	2.7	5.9	37	15.3	4.2	56	12.7	4.9	58	16.5	4.1	28	4.8	3.1	246	87.5	8.5	29	7.2			
<b>July</b>																																				
week 1																																				
week 2																																				
week 3																																				
week 4	14.2	10	2.1	16.1	10	2.9	3.7	26	14.4	0.9	122	70.1	4.3	48	5.3	3.0	42	35	2.9	57	36.9	1.6	42	62	3.2	32	19.2	2.4	511	74.4	4.4	29	17.3			
<b>August</b>																																				
week 1																																				
week 2																																				
week 3																																				
week 4	18.4	10	2.2	7.1	16	12.5	6.7	27	8.9	0.9	123	37.6	4.6	36	2.2				1.7	77	65.7				2.6	33	25.8	1.5	302	40.4						
<b>September</b>																																				
week 1																																				
week 2																																				
week 3																																				
week 4	18.2	12	1.6	8.8	24	8.7	7.9	29	7.7	0.9	221	90.3	5.4	16	1.6				2.6	104	68.5				3.1	49	19.2	1.9	148	38.3						
<b>May-September Average</b>																																				
	14.5	11.2	6.1	13.0	15.4	9.4	6.6	26	9.4	0.88	130	58.4	5.0	33.6	3.1	5.7	42	25	3.4	72.2	40.6	5.5	42	26	3.54	34.8	15.0	2.5	256	52.8	7.6	31	10.6			

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

## Eurasian Watermilfoil (EWM) Monitoring Summary

Eurasian watermilfoil (EWM) has been found in seven lakes in Maple Grove -- Fish, Eagle, Pike, Rice and all three Arbor Lakes. EWM in all seven 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, 1998, or after 2007. Overall observations are summarized in Table 4.

Curlyleaf pondweed, also a non-native plant, is found in all lakes monitored in 2012 except for Cook Lake.

**Table 4. Summary of Eurasian watermilfoil observations for Maple Grove Lakes in 2012.**

	2012 Summer
Arbor - North	Eurasian watermilfoil, found in 2003.
Arbor - South	Eurasian watermilfoil, found in 2004.
Arbor - West	Eurasian watermilfoil, found in 2002.
Cedar Island Lake	no Eurasian watermilfoil found
Cook	no Eurasian watermilfoil found.
Eagle Lake	scattered Eurasian watermilfoil, found in 1992.
Lake Edward	no Eurasian watermilfoil found
Fish Lake	scattered Eurasian watermilfoil, found in 1993.
Pike Lake	scattered Eurasian watermilfoil, found in 1992.
Rice Lake	scattered Eurasian watermilfoil, found in 1996.
Weaver Lake	no Eurasian watermilfoil found

# Water Quality Summaries

## Secchi Disc, Phosphorus, and Chlorophyll a

An eighteen 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 and Weaver have the lowest.

**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	2.0	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	--	--	--	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	--	--	--	7.0	44	31	3.2	118	102	4.5	55	37	3.5	80	60	3.2	185	35	6.6	46	31
2004	1.0	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
2006	0.7	161	173	7.5	22	33	5.8	47	36.3	1.9	95	55	3.9	49	28.6	4.3	89	46.7	3.0	187	50	14.4	25	6.6
2007	0.8	240	194	7.8	19	5.5	--	--	--	1.6	115	62	4.1	51	31	--	--	--	2.2	206	48	9.0	35	7
2008	0.7	455	226	8.0	20	2.4	--	--	--	3.2	105	67	2.7	47	17	--	--	--	2.6	436	51	8.0	30	7.7
2009	0.6	330	147	10.6	22.6	2.6	5.7	44.2	29.5	2.2	149	81.7	4.6	57.9	16.5	3.5	80.6	19.9	3.5	395	151	9.2	30.8	4.56
2010	0.7	143	67	7.4	18	3.4	5.9	50	20.9	3.6	88	57.5	4.9	48	14.0	3.9	89	28.8	3.4	227	57.3	13.1	31	5.4
2011	1.8	94	61.3	5.7	32	3	5.4	38	25.3	2.5	94	39.5	6.2	50	19	3.6	52	14.1	3.7	153	35.7	7.9	30	7.6
2012	0.88	130	58.4	5.0	33.6	3.1	5.7	42	24.6	3.4	72.2	40.6	5.5	42	26	3.5	34.8	15	2.5	256	52.8	7.6	31	10.6

Cedar Island Lake data: Met Council - 1995; MPCA - 1996; and Blue Water Science - 1997 through 2012.  
 Eagle, Fish, Pike, and Weaver Lake data collected by Three Rivers Park District.  
 Rice Lake data: Met Council.

## 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
2006	F	F	F	B	A	C	C	C	C	F	D	D	C	C	C	C	D	C	D	F	D	A	B	A
2007	F	F	F	B	A	A	--	--	--	F	D	D	C	C	C	--	--	--	F	F	C	B	C	A
2008	F	F	F	B	A	A	--	--	--	D	D	D	D	C	B	--	--	--	D	F	D	B	B	A
2009	F	F	F	A	A	A	C	C	C	F	D	F	C	C	B	D	D	C	D	F	F	B	B	A
2010	F	D	D	B	A	A	C	C	C	D	D	C	C	C	B	C	D	C	D	F	D	A	B	A
2011	F	D	D	C	B	A	A	C	C	D	D	C	C	C	B	D	C	B	D	F	C	B	B	A
2012	F	D	D	C	C	A	C	C	C	D	D	C	C	C	C	D	C	B	D	F	D	B	B	B

Cedar Island Lake data: Met Council - 1995; MPCA - 1996; and Blue Water Science - 1997 through 2012

**Arbor Lakes:** Results of Arbor Lake sampling are summarized in Tables 7 and 8 and Figure 1. All three have good water quality and relatively low phosphorus concentrations.

**Table 7. Growing season averages for the Arbor Lakes.**

	West			North			South		
	SD	TP	Chl	SD	TP	Chl	SD	TP	Chl
<b>May-September Average</b>									
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
2006 (5 dates)	9.7	23	2	13.8	13	2	7.9	29	17
2007 (5 dates)	9.4	19	2.6	12.1	9	2.2	11.3	15	5
2008 (5 dates)	8.4	24	7.0	14.3	12	3.7	10.2	16	4.4
2009 (5 dates)	9.6	28	5.3	13.9	14	1.1	13.9	17	2.0
2010 (5 dates)	7.9	36	11	13.8	9	1.7	13.4	14	1.7
2011 (5 dates)	7.1	27	12	12.7	12	4.4	12.4	14	2.6
2012 (5 dates)	6.6	28	12	14.5	11	6.1	13.0	15	5.3

**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
2006	B	B	A	A	A	A	B	B	B
2007	B	A	A	A	A	A	A	A	A
2008	B	B	A	A	A	A	A	A	A
2009	B	B	A	A	A	A	A	A	A
2010	B	C	B	A	A	A	A	A	A
2011	B	B	B	A	A	A	A	A	A
2012	C	B	B	A	A	A	A	A	A





## Arbor Lakes Secchi Disc and Total Phosphorus Data

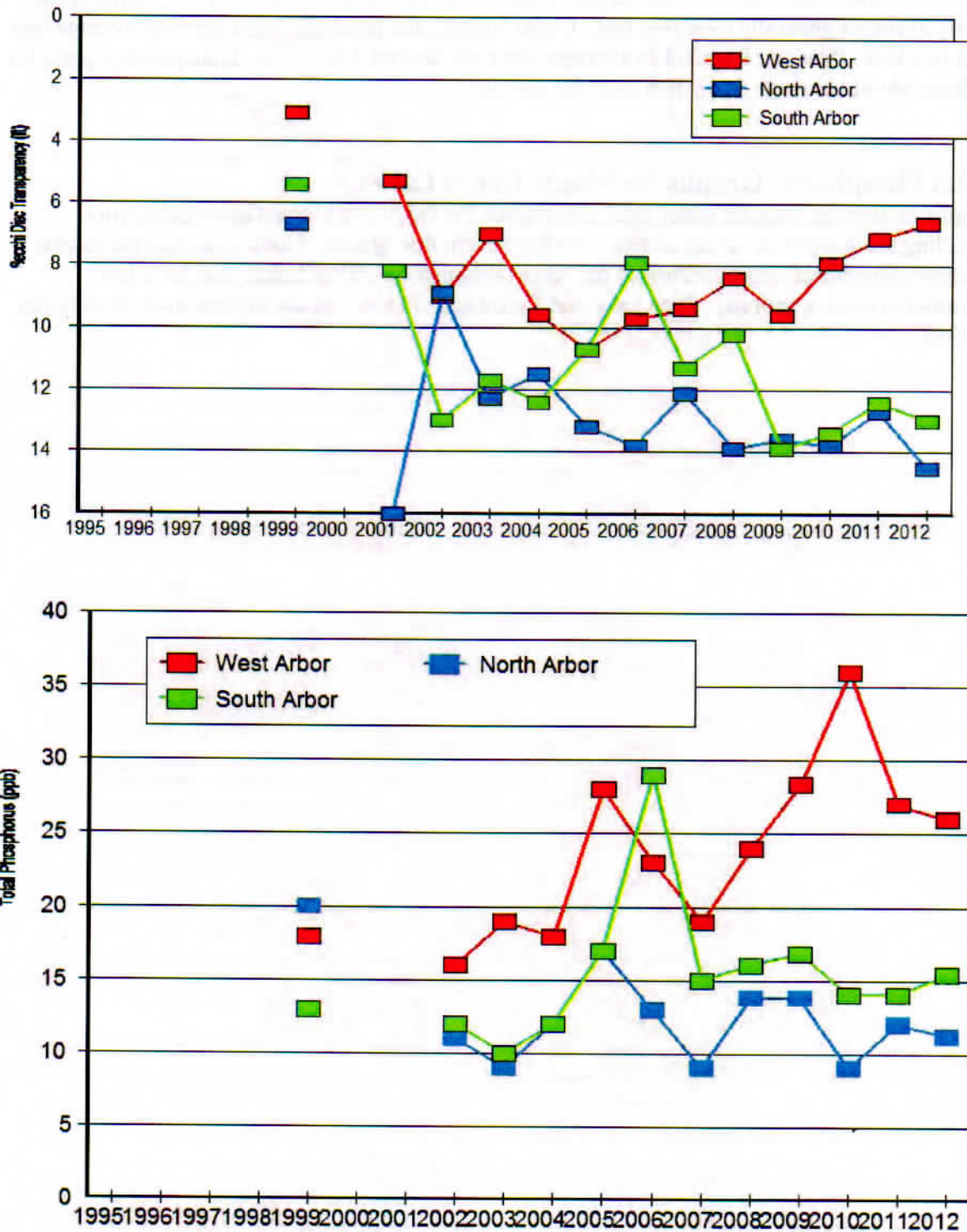


Figure 1. Secchi disc transparency (top) and total phosphorus concentrations (bottom) for the Arbor Lakes from 1999 - 2012.

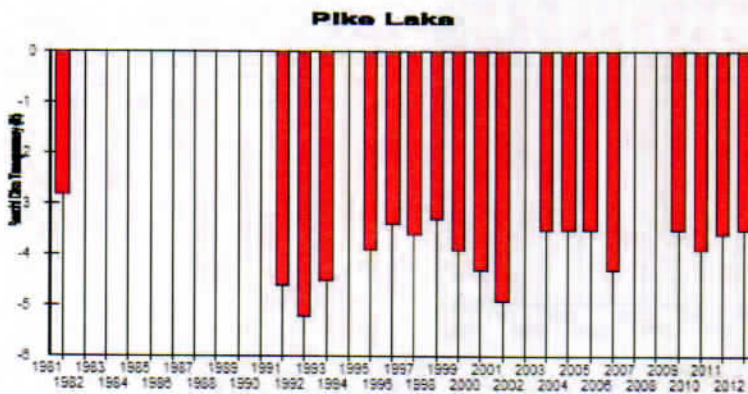
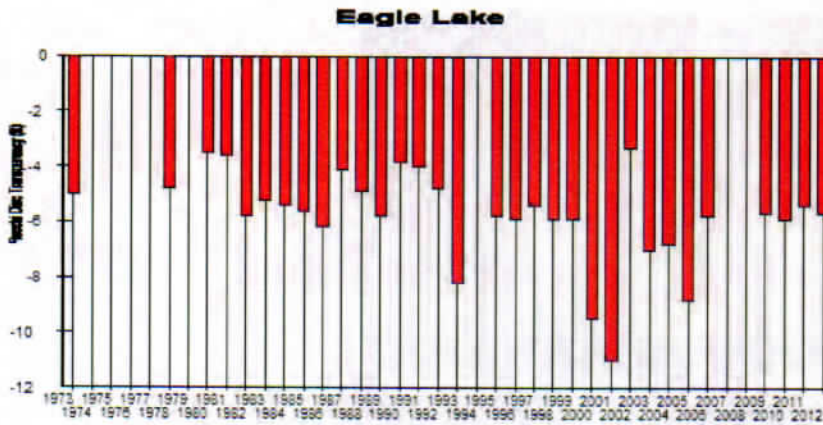
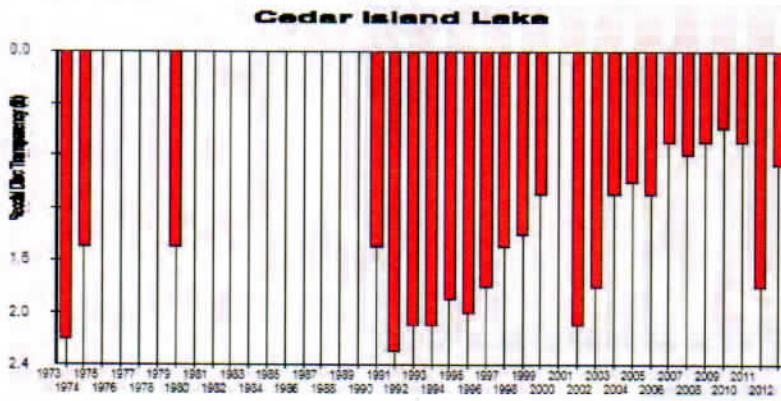
### **Secchi Disc Transparency Graphs for Maple Grove Lakes**

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, and Weaver Lakes have summer water clarity averages generally over five feet. Cedar Island Lake generally has a summer average less than two feet. Pike and Rice Lakes averages are right around 3 to 5 feet. Transparency goals for all lakes should average 5 to 7 feet over the summer.

### **Total Phosphorus Graphs for Maple Grove Lakes**

Graphs of average summer water total phosphorus for the major Maple Grove Lakes (not including the Arbor Lakes) are shown after the Secchi disc graphs. Cook Lake had the lowest summer phosphorus concentration of the lakes (although the Arbor Lakes also have low phosphorus concentrations). Rice Lake and Cedar Island Lake had the highest total phosphorus in 2012.

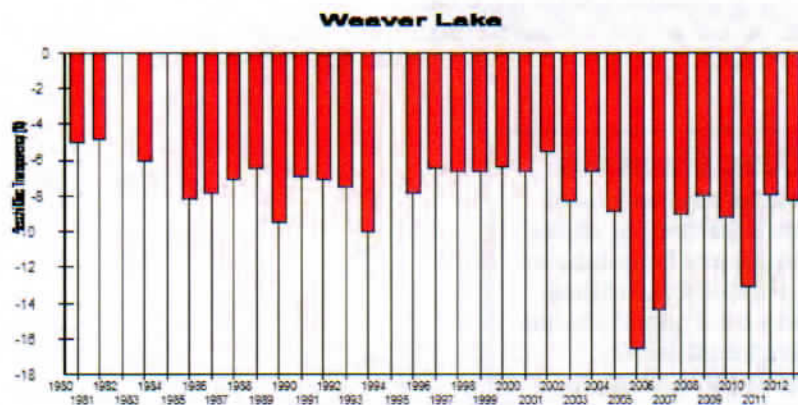
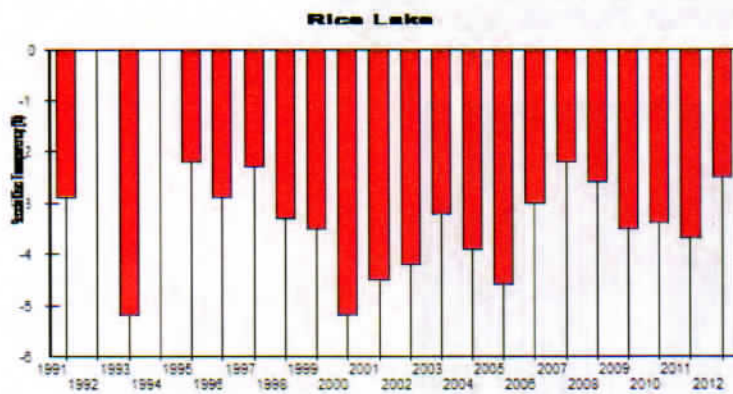
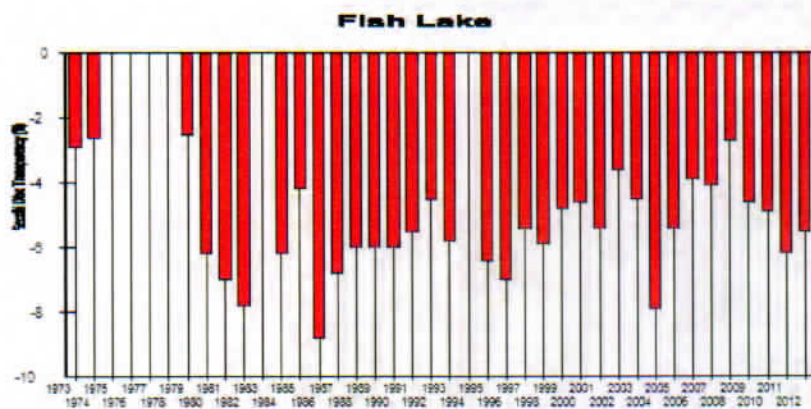
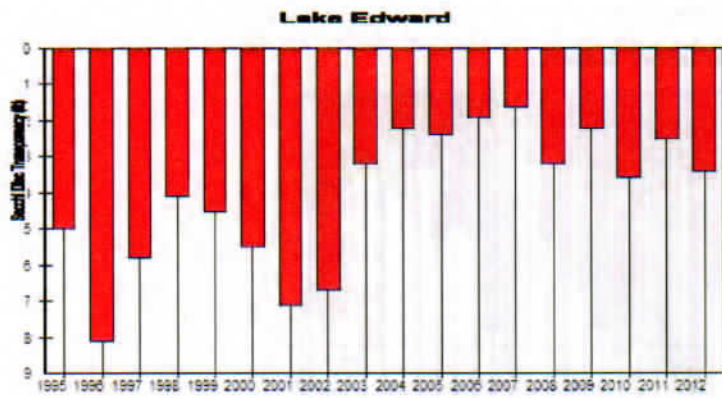
# Shingle Creek Watershed District - Secchi Disc Data



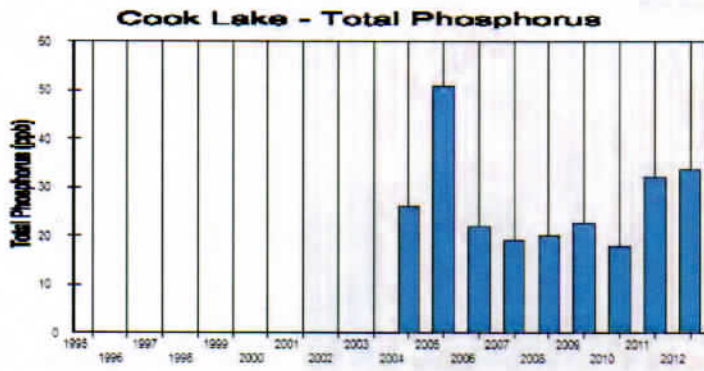
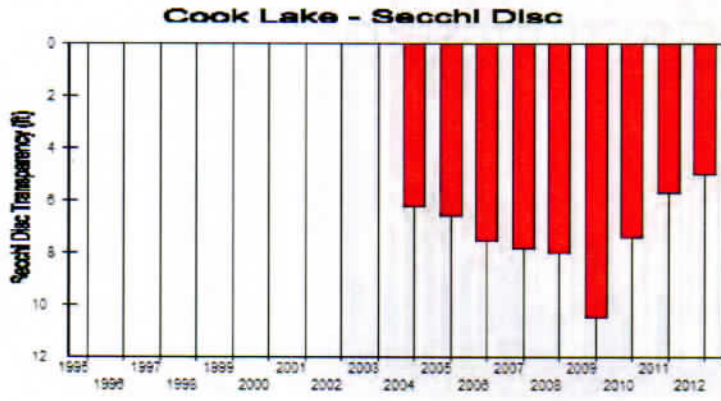


**Secchi Disc Results**  
 Cedar Island Lake has the lowest Secchi disc transparency in Maple Grove. Transparency fluctuates in the remaining Maple Grove lakes. Aquatic plants could grow to twice the average seasonal secchi disc transparency. Aquatic plants are beneficial for lakes and help to maintain or improve water clarity.

# Elm Creek Watershed District - Secchi Disc Data

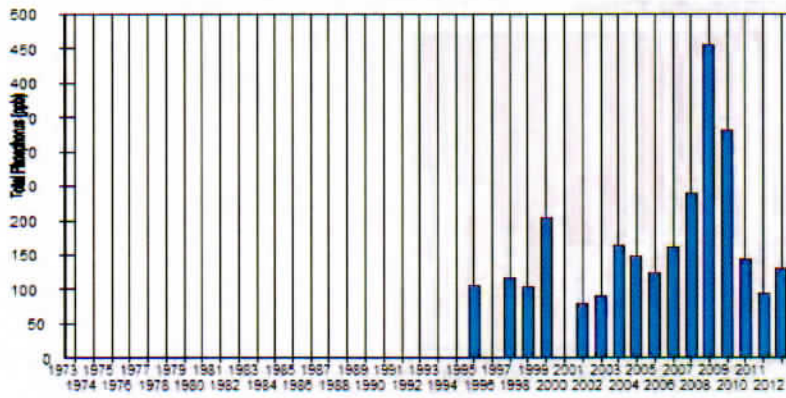


# Cook Lake Data

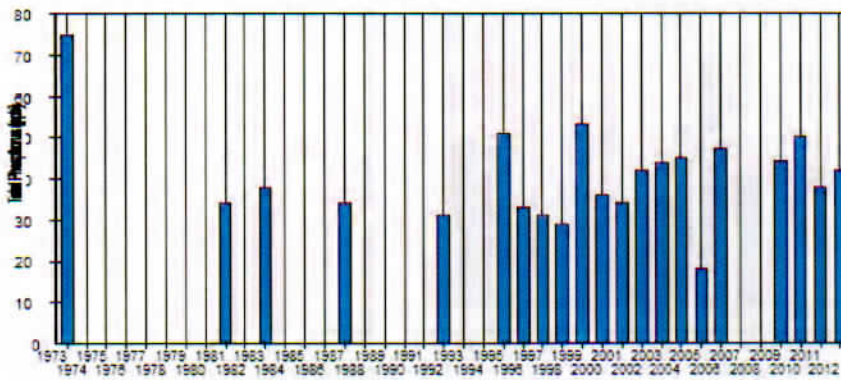


# Shingle Creek Watershed District - Total Phosphorus Data

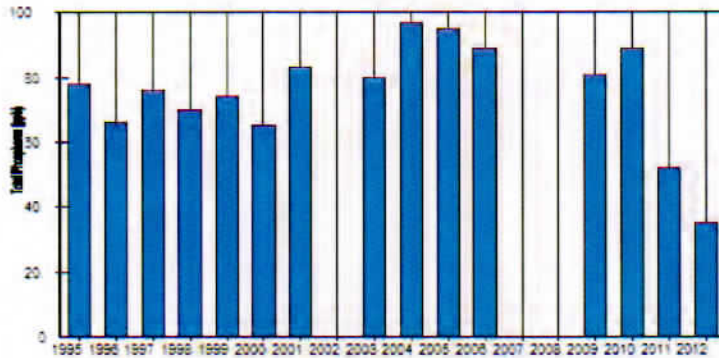
**Cedar Island Lake**



**Eagle Lake**



**Pike Lake**



# Elm Creek Watershed District - Total Phosphorus Data

