

The Lakes of Maple Grove

Lake Water Quality Report for 2009

Maple Grove Lake Quality Commission

**Prepared March 2010
by Steve McComas**

The Lakes of Maple Grove Status Report - 2009

Prepared for the Maple Grove Lake Quality Commission.

Commission Members - 2009

Karen Jaeger — Council Liaison
Nancy Bergstrand — Weaver Lake
James Erickson — Edward Lake
John Garritsen — Eagle Lake
Roger Granberg — City-at-Large
Steve Lane — Cedar Island Lake
Kurt Paulson — Pike Lake
George Schneider — Rice Lake
Doug Schon — Fish Lake
Catherine Thompson — City-at-Large
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March 2010

Introduction and Background

The City of Maple Grove has numerous lakes and smaller water bodies within the City limits. In 2009, nine 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)	Lake Classification (shallow or deep)
Fish	27-118	239	48*	19*	Elm Creek	1,990*	deep
Weaver	27-117	165	57*	21*	Elm Creek	510*	deep
Rice	27-116	333	11	5	Elm Creek	17,200	shallow
Edward	27-121	33	9.5	5.5	Elm Creek	102	shallow
Cook	27-120	16.5	20		Elm Creek		shallow
Eagle	27-111	285	37	12.6	Shingle Creek	3,220**	deep
Pike	27-111-02	75	25	6.7	Shingle Creek	919**	shallow
Cedar Island	27-119	80*	7.0*	4.6*	Shingle Creek	800**	shallow

* 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.

2009 Summer Sampling Results - Status Report

The objectives of the 2009 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. Fish and Weaver Lakes were monitored by Three Rivers Park District and Rice Lake was monitored by George Schneider as part of the CAMP program. The remaining lakes were monitored by Blue Water Science.

Weaver and South Arbor Lakes had the best transparency and Edward and Cedar Island had the lowest transparency in 2009 (Tables 2 and 3).

Significant construction occurred along the shoreland area of West Arbor Lake in August and September 2009. In September, phosphorus and chlorophyll levels were higher than normal and the Secchi disc was not as good compared to other years. When construction is completed, it is expected that West Arbor will return to normal conditions.

Table 2. Water chemistry summer averages for Maple Grove Lakes in 2009 (source: Three Rivers Park District collected data for Fish and Weaver Lakes. Other data collected by Blue Water Science).

	May - Sept Averages, 2009		
	Secchi Disc (ft)	Total Phosphorus (ppb)	Chl a (ppb)
Cedar Island	0.6	330	147
Cook	10.5	22.6	2.6
Eagle	5.7	44.2	29.5
Edward	2.3	149	81.7
Fish	4.6	57.9	16.5
Pike	3.5	80.6	19.9
Rice	3.5	395	151
Weaver	9.2	30.8	4.6
North Arbor	13.6	13.8	1.1
South Arbor	13.9	16.8	2.0
West Arbor	9.6	28.4	5.3

Water Quality Summaries

Secchi Disc, Phosphorus, and Chlorophyll a

A fifteen 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

Cedar Island Lake data: Met Council - 1995; MPCA - 1996; and Blue Water Science - 1997 through 2009.
Eagle, Fish, Pike, and Weaver Lake data collected by Three Rivers Park District.

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

Cedar Island Lake data: Met Council - 1995; MPCA - 1996; and Blue Water Science - 1997 through 2009

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
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	28.4	5.3	13.9	13.8	1.1	13.9	16.8	2.0

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

Secchi Disc Transparency Graphs

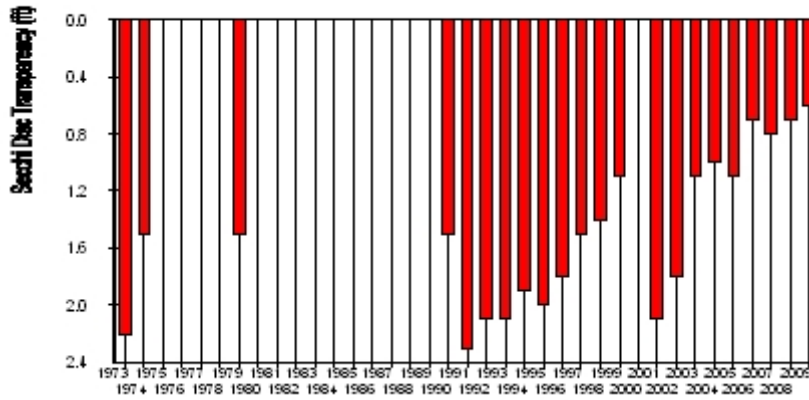
Graphs of average summer water transparency over the years for each of the major Maple Grove lakes are displayed on the next two pages. Eagle, Fish, and Weaver Lakes have summer water clarity averages generally over five feet. Cedar Island Lake generally has a summer average less than two feet. Pike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

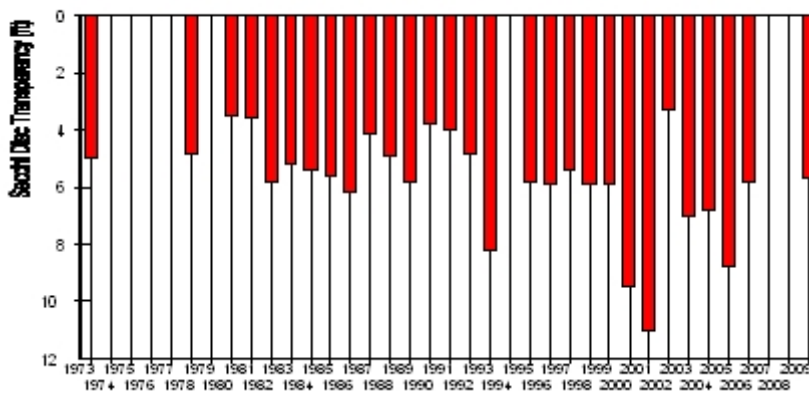
Graphs of average summer water total phosphorus for the major Maple Grove Lakes (not including the Arbor Lakes) are shown on pages 8 and 9. Weaver had the lowest summer phosphorus concentration of the lakes (although the Arbor Lakes also have low phosphorus concentrations). Rice Lake and Cedar Island Lake had the highest total phosphorus in 2009.

Shingle Creek Watershed District

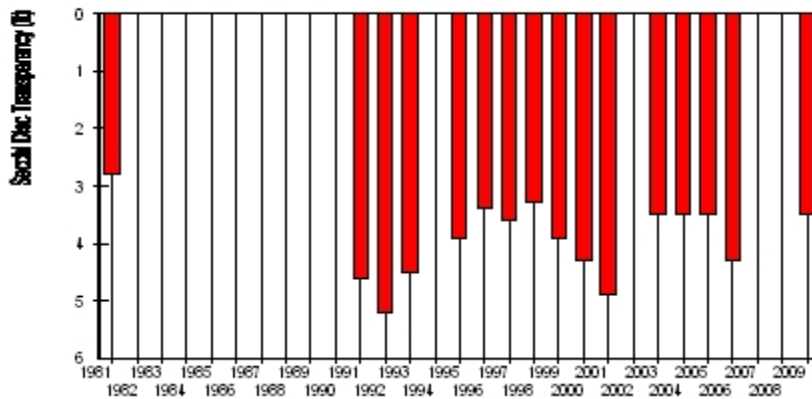
Cedar Island Lake



Eagle Lake



Pike Lake



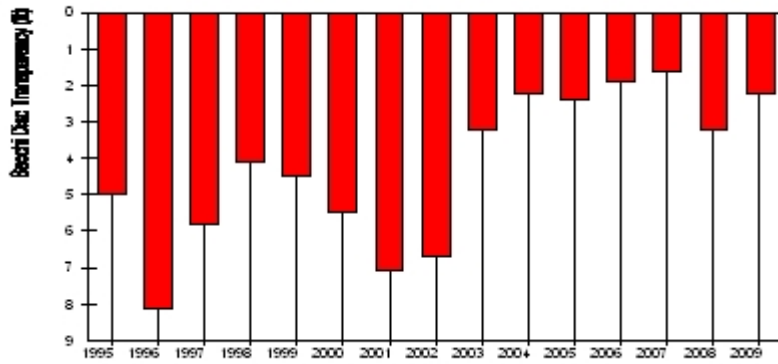


Secchi Disc Results

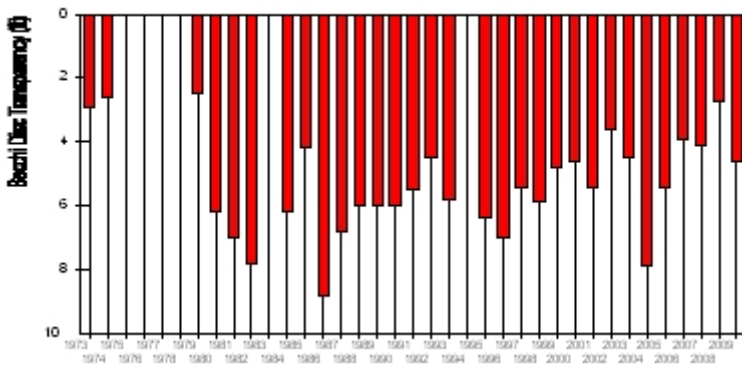
Cedar Island Lake has the lowest secchi disc transparency in Maple Grove. Transparency fluctuates in the remaining Maple Grove lakes. Aquatic plants could grow to twice the average seasonal secchi disc transparency. Aquatic plants are beneficial for lakes and help to maintain or improve water clarity.

Elm Creek Watershed District

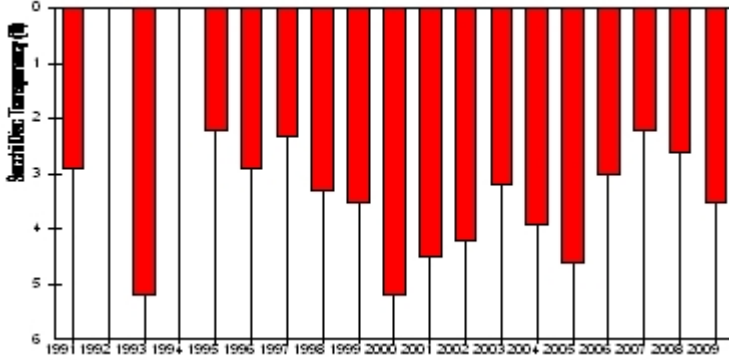
Lake Edward



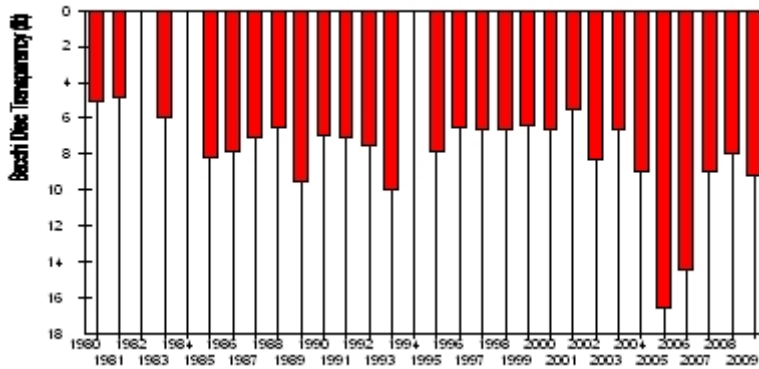
Fish Lake



Rice Lake

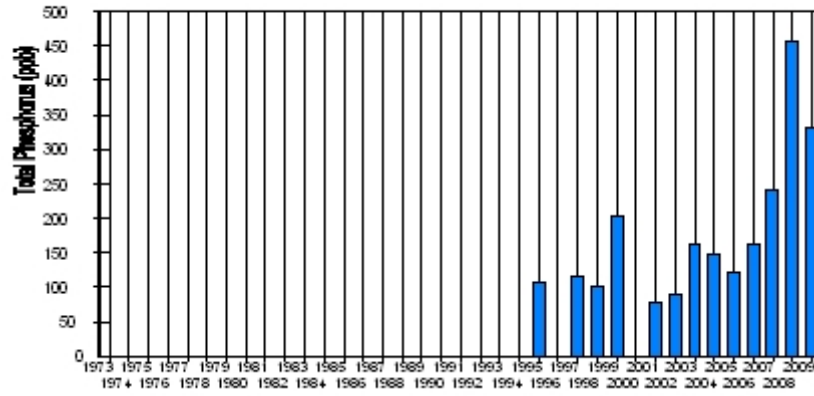


Weaver Lake

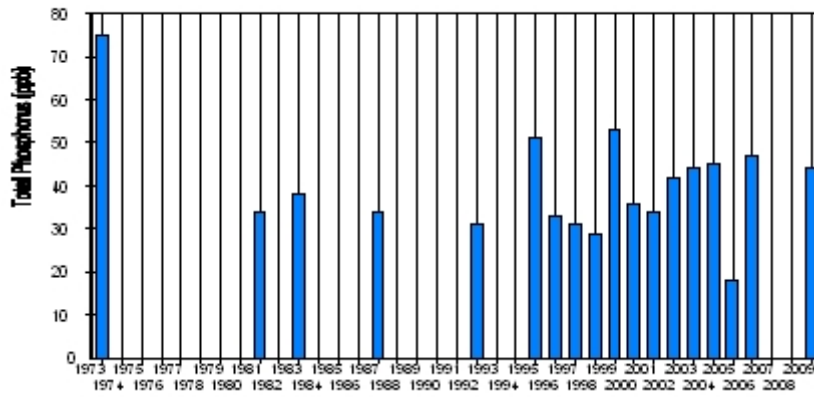


Shingle Creek Watershed District

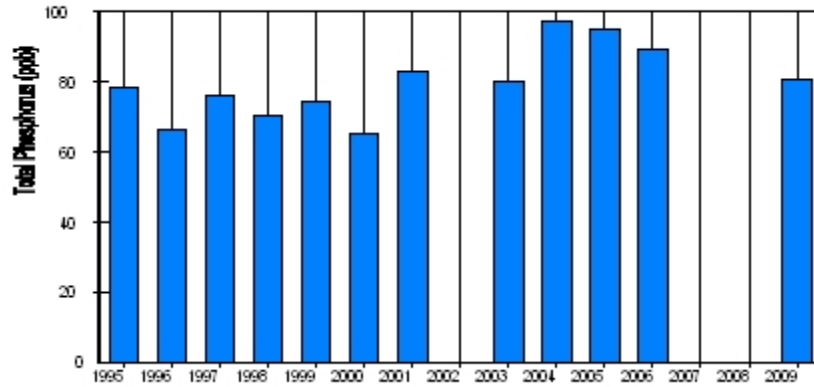
Cedar Island Lake



Eagle Lake

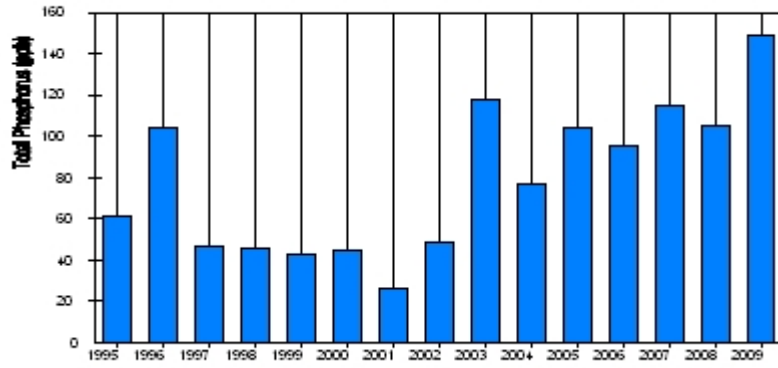


Pike Lake

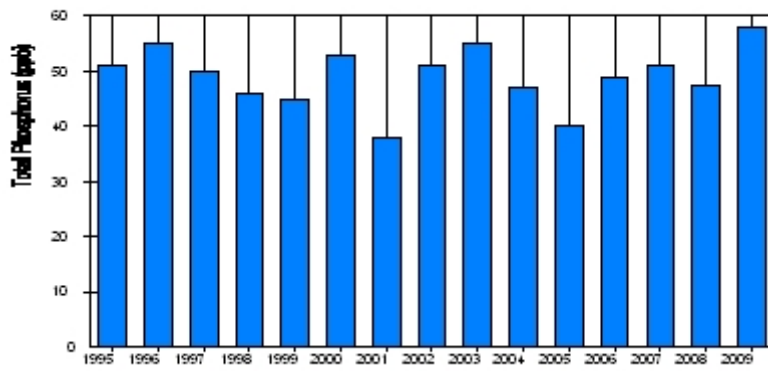


Elm Creek Watershed District

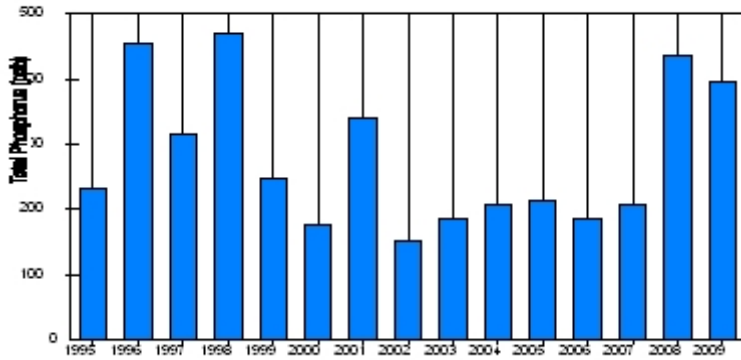
Lake Edward



Fish Lake



Rice Lake



Weaver Lake

