

2004 Water Quality Monitoring Report



Wenck File #0002-66

Prepared for:

**CLEARWATER RIVER WATERSHED
DISTRICT**

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Prepared by:

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January 2005



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1.0 Introduction

The Clearwater River Watershed District has conducted a stream, precipitation, and lake monitoring program since 1980. The monitoring program has focused on collecting baseline data to assess long-term water quality trends within the District. In the past few years the monitoring plan was expanded to add more fecal coliform and phosphorus monitoring in the watershed. Beginning in 2003, the District returned to baseline monitoring. A Total Maximum Daily Load (TMDL) study is under way for the Clearwater River between Clear Lake and Lake Betsy for dissolved oxygen and bacteria, and for nutrients in Lake Louisa. The potential for additional funding through the Minnesota Pollution Control Agency to address these issues has allowed the District to focus on baseline water quality, preparing for the TMDL.

In 2004, the Clearwater River was monitored at two long-term stations (CR-28.2 and CR-10.5). Warner Creek was monitored near its inflow to Clearwater Lake at WR-0.2. CR-10.5 and the Clearwater River at County Road 40 were also monitored for fecal coliform bacteria.

The nine lakes monitored were Clearwater (East and West basins), Caroline, Cedar, Marie, Nixon, Otter, Pleasant, School Section, and Scott. Cedar Lake, its tributaries, and outflow were monitored more frequently during 2004 in response to high total phosphorus concentrations observed in 2003. Citizen precipitation recorders collecting data in Kimball, Watkins, and Annandale comprise the precipitation records. Citizen volunteers also collect Secchi depths for numerous lakes.

An increased total phosphorus reading in Cedar Lake during 2003 combined with citizen concerns over nuisance algal blooms prompted the District to look more closely at the nutrient balance for Cedar Lake. As such, inflows and outflows to that lake were sampled during 2004. Figure 1.1 shows the monitoring locations for 2004, Appendix A gives the monitoring plan.

Figure 1.1 2004 Monitoring Locations

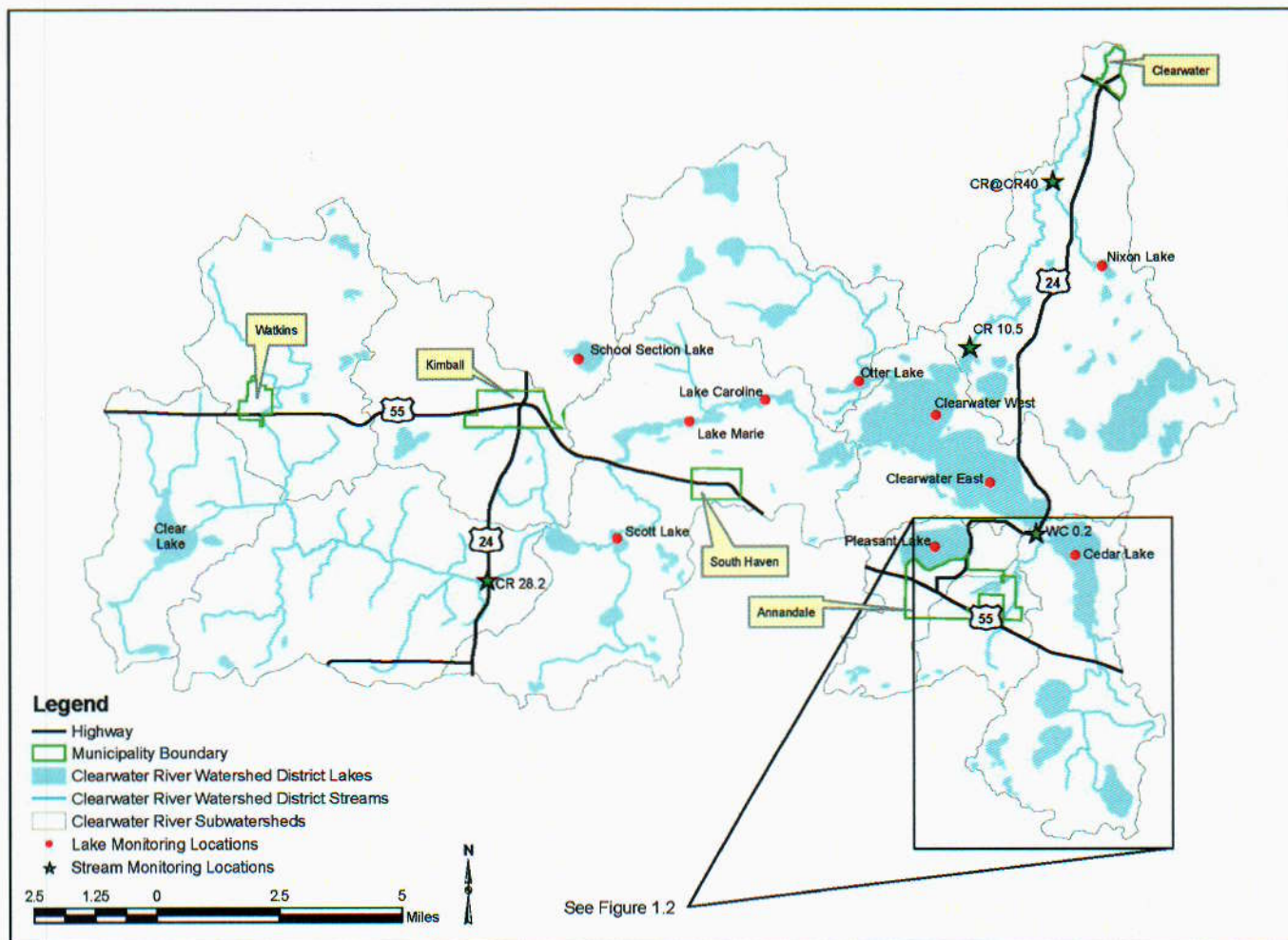
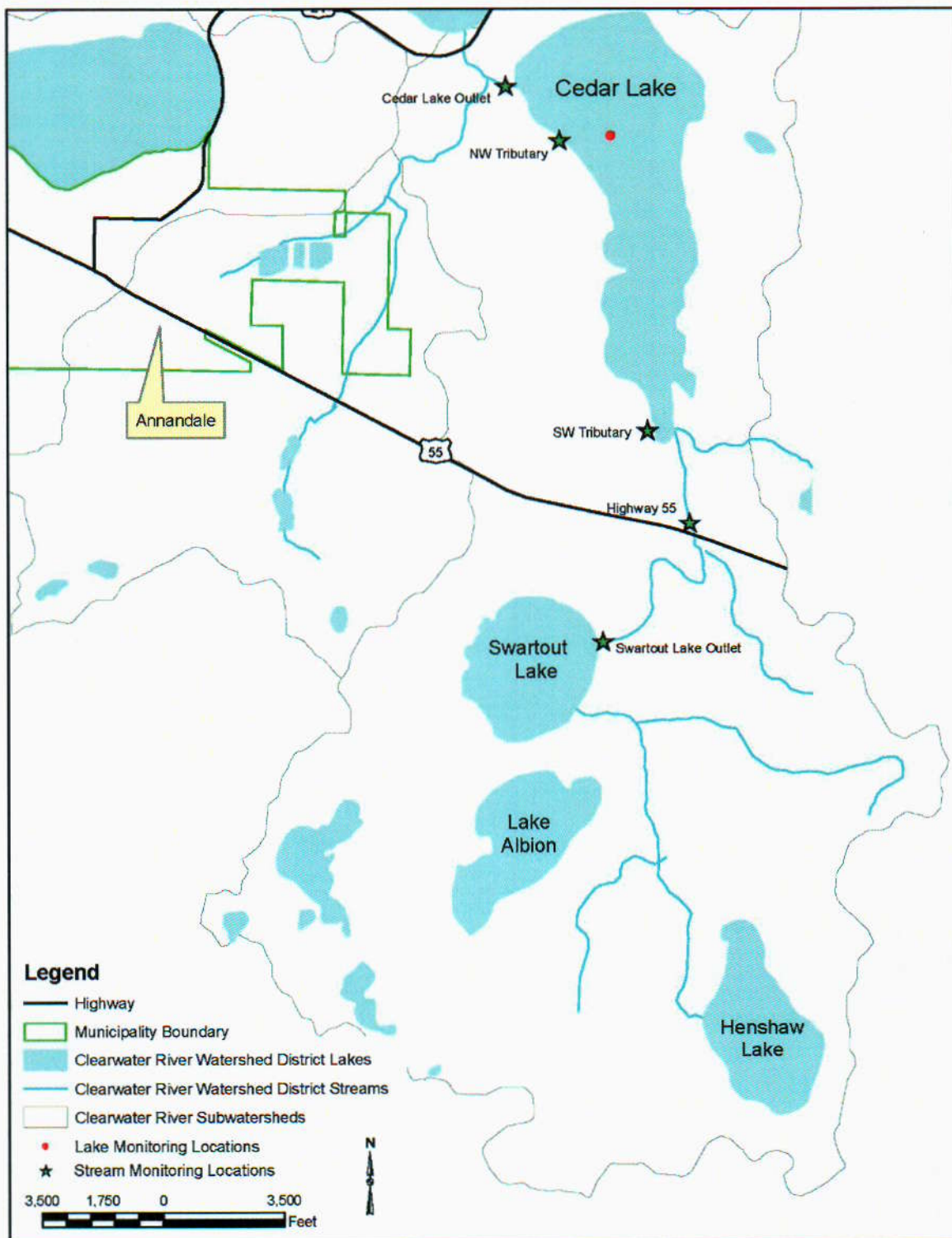


Figure 1.2 2004 Monitoring Locations, Cedar Lake Area



2.0 Precipitation

Precipitation during 2004 was above normal. The Annandale station recorded 31.67 inches for the year (2.61 inches above normal), the Watkins station recorded 33.58 inches (5.02 inches above normal), and the Kimball station recorded 29.94 inches (2.81 inches above normal).

Table 2.1 and Figures 2.1, 2.2 and 2.3 show the volunteer precipitation records for the CRWD (Appendix B).

Table 2.1 Clearwater River Watershed 2004 Volunteer Precipitation Records and Normals (inches)

	Kimball (Stearns)	St. Cloud (Stearns)	1971-2000 Normal (St. Cloud)	Watkins (Meeker)	1971-2000 Normal (Litchfield)	Annandale/ Corinna (Wright)	1971-2000 Normal (Cokato)
January	1.18	0.72	0.76	0.60	0.79	0.60	0.93
February	1.48	1.24	0.59	1.01	0.67	1.52	0.70
March	0.40	1.42	1.50	1.43	1.55	1.62	1.69
April	1.22	1.00	2.13	1.51	2.35	1.33	2.33
May	6.98	7.42	2.97	7.30	3.37	6.46	3.30
June	3.01	3.66	4.51	2.95	4.89	4.59	4.62
July	3.77	4.30	3.34	4.04	4.02	3.15	4.04
August	2.22	1.47	3.93	2.52	3.67	2.46	4.00
September	4.79	6.52	2.93	7.86	2.92	5.08	2.78
October	4.05	3.21	2.24	3.62	2.15	4.05	2.23
November	0.73	0.71	1.54	0.52	1.50	0.75	1.73
December	0.12	--	0.69	0.22	0.68	0.06	0.71
Total	29.94	--	27.13	33.58	28.56	31.67	29.06

Figure 2.1 2004 Kimball Citizen Precipitation Record, St. Cloud Precipitation Record, and Normal Precipitation Record (inches)

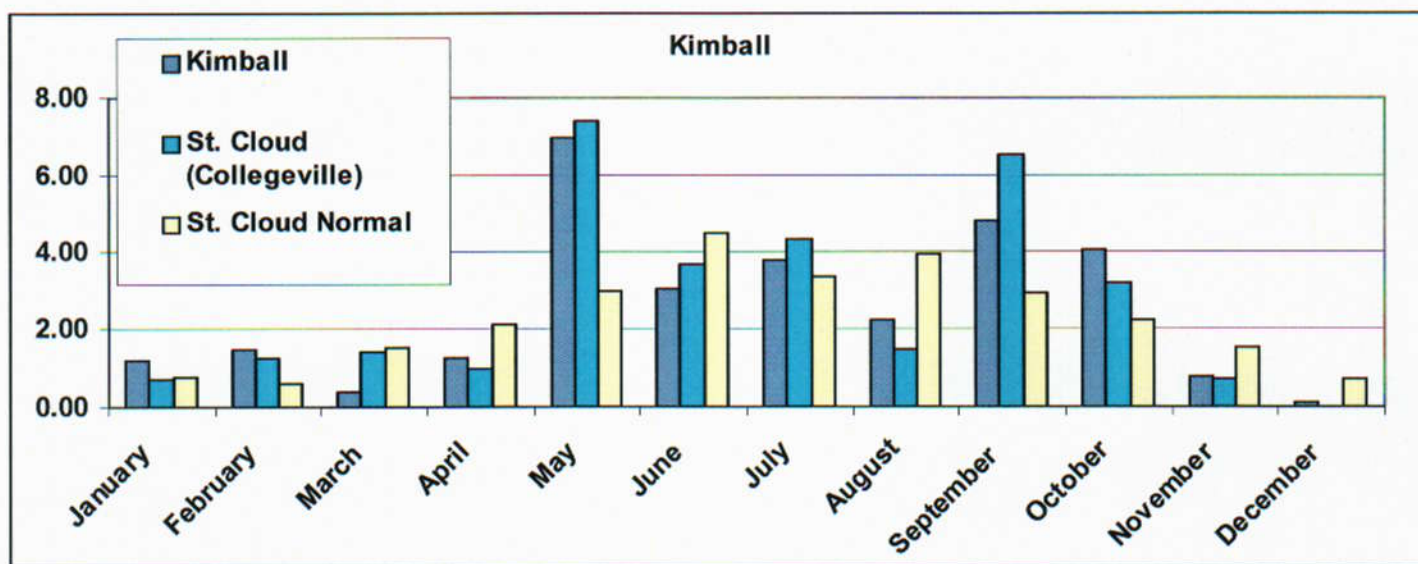


Figure 2.2 2004 Watkins Citizen Precipitation Record and Normal Precipitation Record (inches)

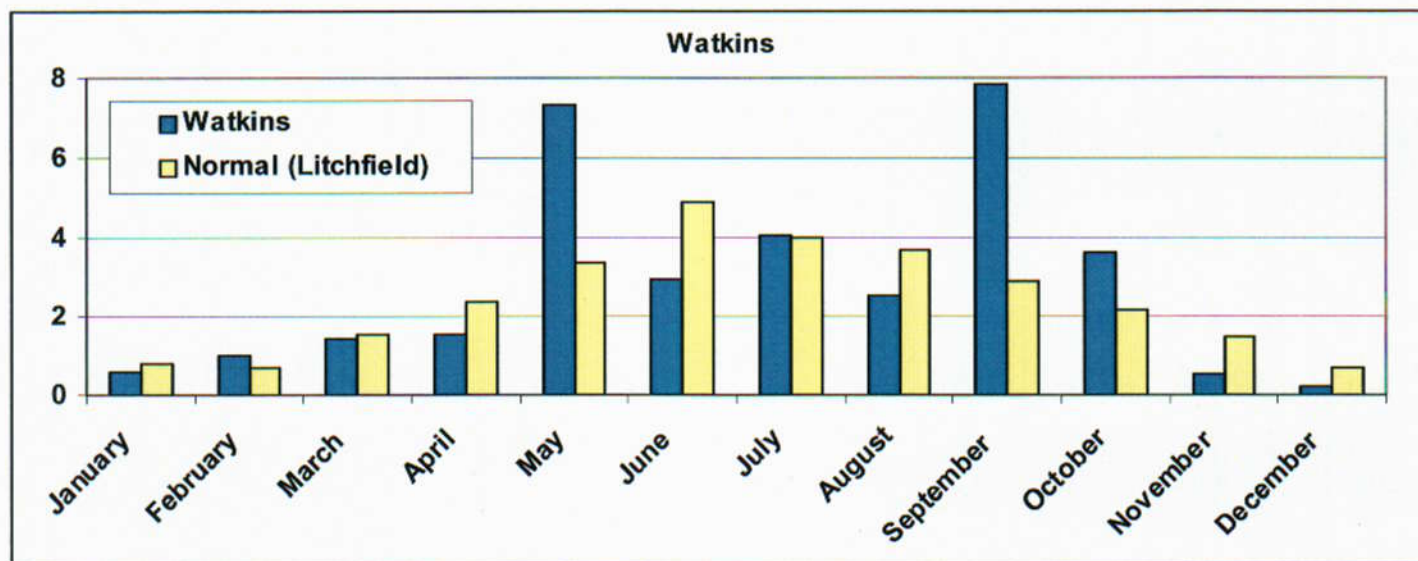
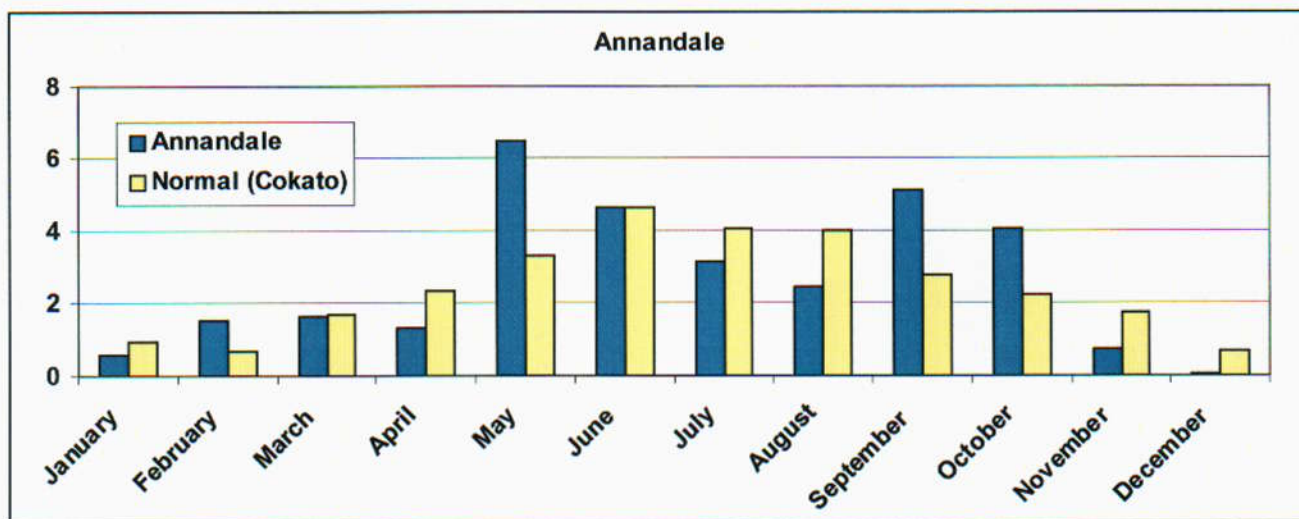


Figure 2.3 *2004 Annandale Citizen Precipitation Record and Normal Precipitation Record (inches)*



Appendix B contains citizen precipitation records.

3.0 Streams

3.1 RUNOFF AND DISCHARGE

Average stream flow at the outlet of Clearwater Lake (station CR 10.5) was about 32.2 cubic feet per second in 2004, or 2.8 inches of runoff over the 155-square mile watershed. Table 3.1 shows historic annual precipitation and runoff in the District.

Table 3.1 Annual Precipitation and Runoff

YEAR	Precipitation (inches of water)					Runoff (inches)
	Watkins	Kingston	Maine Prairie	Corinna	Area-Weighted Precipitation Average	
1981	--	--	--	--	19.76	(1) 3.6
1982	--	--	--	--	24.58	(1) 6.8
1983	46.54	--	42.32	35.02	41.78	17.4
1984	32.23	30.13	32.37	36.07	32.95	13.3
1985	40.72	39.49	45.28	--	42.22	12.0
1986	40.02	35.63	39.68	33.40	37.26	16.0
1987	18.97	15.40	19.41	16.16	17.52	1.4
1988	16.57	18.98	15.96	15.01	16.48	0.7
1989	22.13	22.68	21.80	16.96	20.68	3.0
1990	40.35	39.18	41.36	32.18	37.94	11.7
1991	41.30	45.11	43.41	36.28	41.01	20.7
1992	23.06	18.41	20.47	24.35	22.01	12.9
1993	40.17	35.27	(2) 37.54	(2) 33.33	36.71	15.5
1994	34.77	--	30.13	30.26	31.98	9.0
1995	33.80	--	33.65	28.66	32.21	8.8
1996	31.31	--	24.32	(2) 26.13	(2) 27.59	4.8
1997	24.18	--	21.90	27.37	24.43	6.3
1998	30.03	--	29.39	27.43	(2) 29.05	5.5
1999	22.08	--	22.31	(2) 27.71	23.84	3.9
2000	23.83	--	20.56	19.91	21.22	1.0
2001	31.00	--	33.56	29.57	31.28	2.8
2002	37.50	--	40.27	44.72	40.57	7.6
2003	22.63	--	21.34	26.77	(2) 23.02	6.5
2004	33.58	--	33.58	31.67	33.10	2.8
Mean					29.55	8.1
Std. Dev.					8.3	5.7

Table 3.1 Notes: Whole watershed runoff is based on time-weighted average flow at Clearwater Lake outlet (station CR 10.5), and total drainage area of 155 square miles.

1. Data for single gauge in east-central part of watershed (Camp Heritage on Lake Caroline).
2. Average values of other stations in District were used to fill in missing data.

3.2 TOTAL PHOSPHORUS

Baseline Monitoring:

Baseline phosphorus levels in the Clearwater River remain low, especially as compared with conditions monitored in the early 1980s. The upstream station, CR 28.2, had a flow-weighted mean total phosphorus (TP) concentration of 166 $\mu\text{g/l}$ (micrograms per liter, or parts per billion). Historically this has ranged from 740 to 1,400 $\mu\text{g/l}$ in the early 1980s. Sites WR-0.2 and CR-10.5 had very low flow-weighted mean concentrations of 63 $\mu\text{g/l}$ and 22 $\mu\text{g/l}$, respectively. The phosphorus loadings were 2,751 pounds at CR-28.2, and 172 and 1,409 pounds, respectively, at WR-0.2 and CR-10.5.

Soluble reactive phosphorus (SRP) (dissolved form of phosphorus easily utilized by algae) was also monitored. It represents 60%, 45%, and 24 % of the total phosphorus value at the three stations CR-28.2, WR-0.2 and CR-10.5 respectively (based on flow-weighted mean averages). The higher value at CR-28.2 may be indicative of agricultural sources. The SRP/TP ratios were lower (22%) at WR-0.2 during 2002, and 2003. The increased ratio during 2004 may be an indicator that the phosphorus assimilation capacity of the upstream wetlands is reduced. Figures 3.1 to 3.3 shows historical phosphorus loadings, the values are tabulated in Appendix C.

Figure 3.1 Historical Total Phosphorus Loading and Mean Concentration at CR 28.2

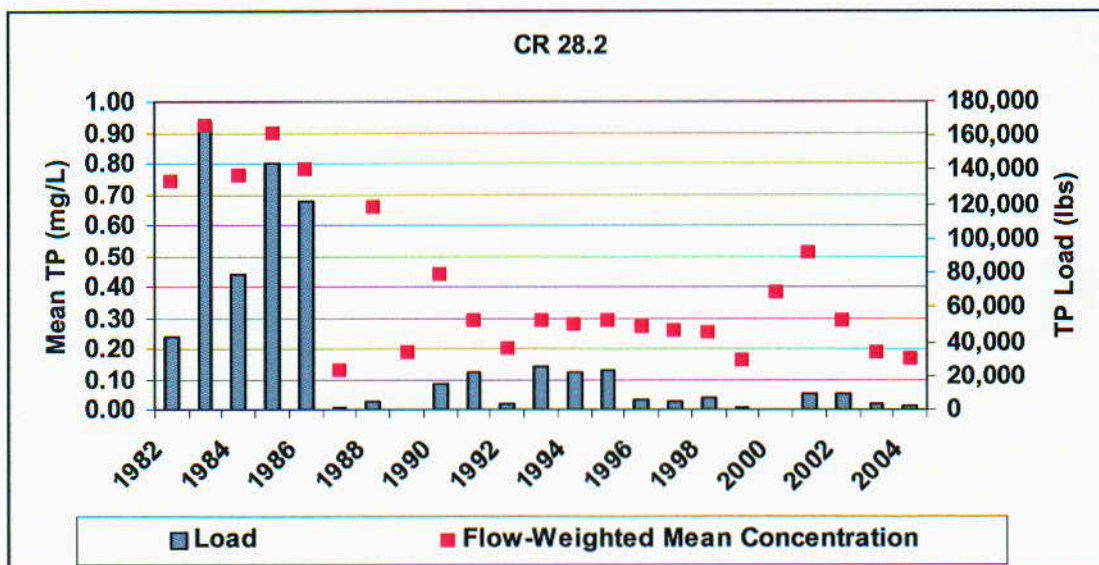


Figure 3.2 Historical Total Phosphorus Loading and Mean Concentration at CR 10.5

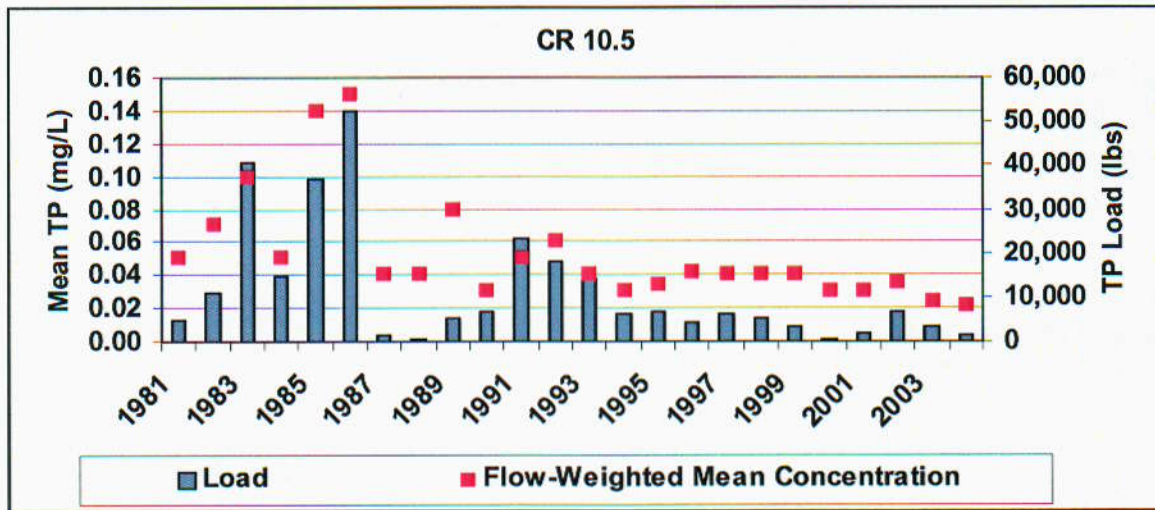
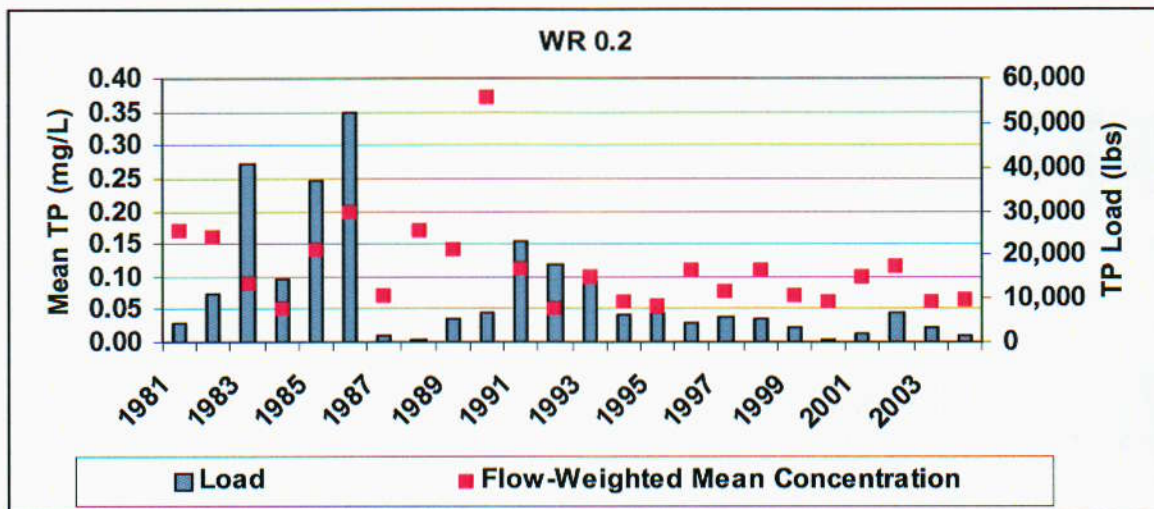


Figure 3.3 Historical Total Phosphorus Loading and Mean Concentration at WR 0.2

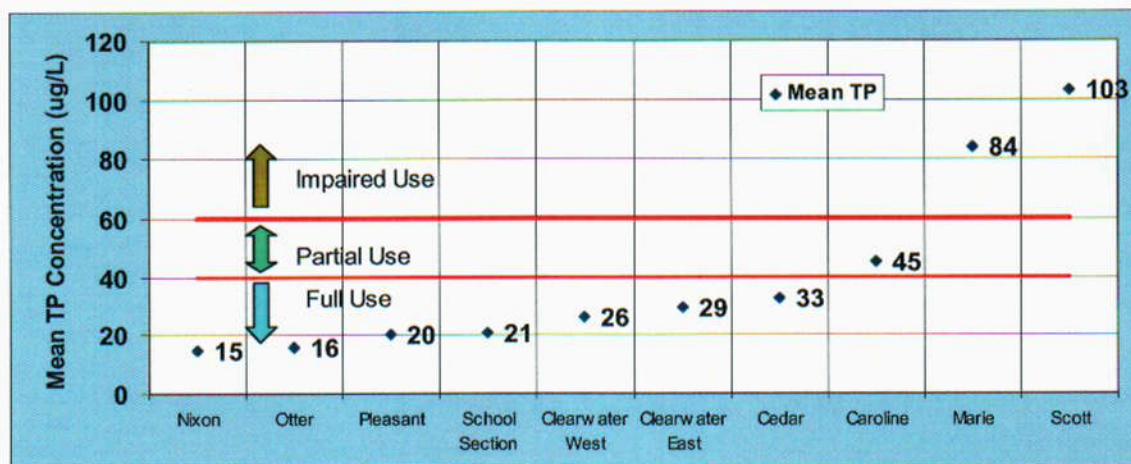


4.0 Water Quality of Lakes Sampled in Year 2004

Ten lake sites were sampled four times in 2004. The sites included the east and west bays of Clearwater Lake, as well as Nixon, Otter, Pleasant, School Section, Cedar, Caroline, Marie, and Scott Lakes. Parameters analyzed include total phosphorus, soluble reactive phosphorus, chlorophyll-*a* and a field reading of secchi depth.

Lake water quality in 2004 was generally good. Compared with the MPCA's guidelines on lake impairment based on ecoregion*, Nixon, Otter, Pleasant, School Section, Clearwater, and Cedar lakes are all considered "full use" because the average TP concentrations are below 40 ug/L. Lake Caroline is considered partial use, and Lakes Marie, and Scott are considered impaired (Figure 4.1).

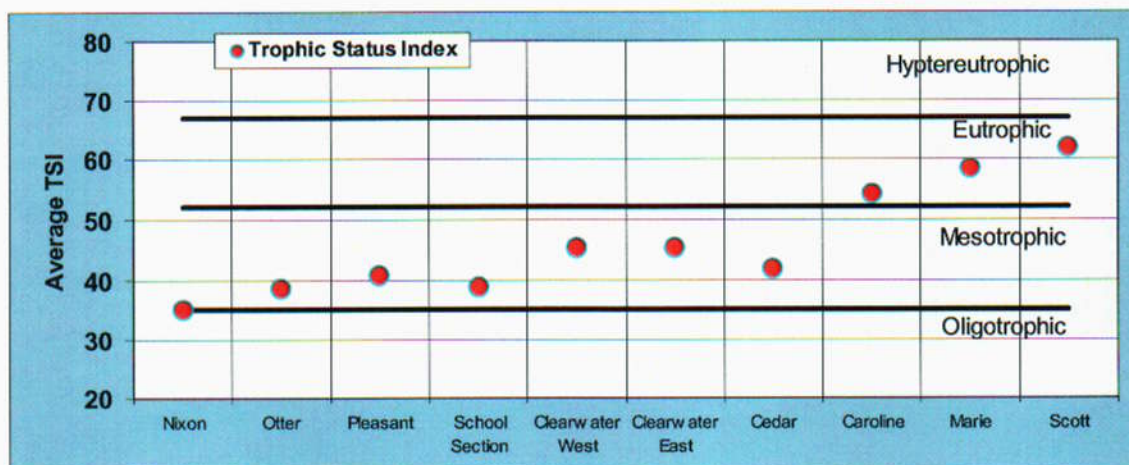
Figure 4.1 2004 Average Total In-Lake Phosphorus



The Carlson Tropic Status Index for lakes monitored in 2004 is generally mesotrophic, except for Lakes Caroline, Marie and Scott which are eutrophic (Figure 4.2).

* The MPCA uses total phosphorus as the criteria for swimability. This is called the "Swimable Use Support Classification". The TP values are different Ecoregions for different regions. For the North Central Hardwood Forest Ecoregion (where CRWD is located), TP concentrations below 40 ug/L are considered "full use"

Figure 4.2 2004 Mean Trophic Status Index



Figures 4.3 and 4.4 show summer mean chlorophyll-*a* concentration, and Secchi depth (water clarity, or transparency) for these lakes. Table 4.1 below shows a comparison for the three parameters and the historical range of values.

Figure 4.3 2004 Mean Chlorophyll-*a* Concentrations

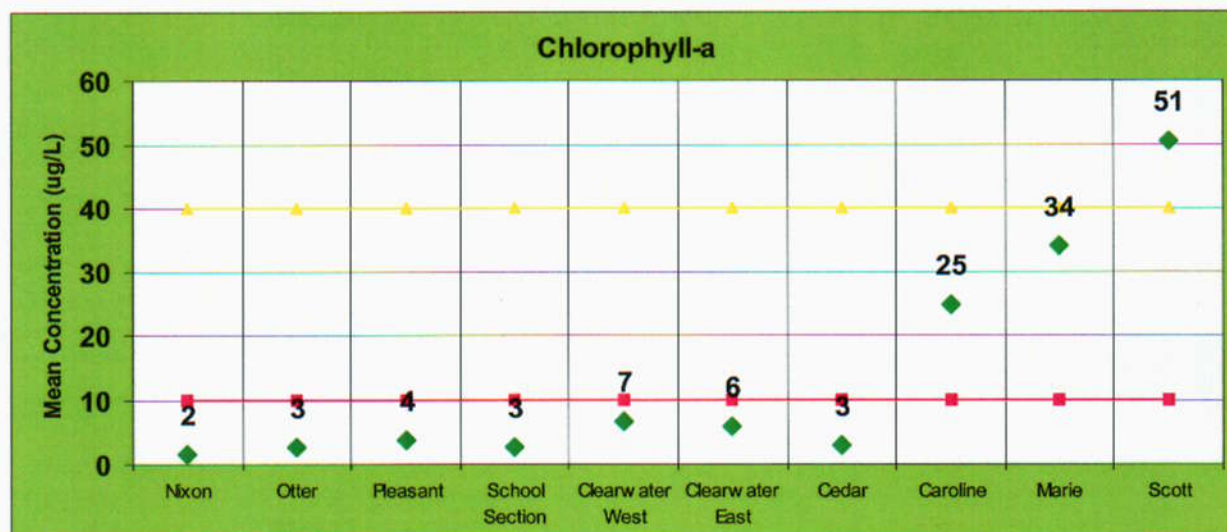


Figure 4.4 2004 Mean Secchi Depth

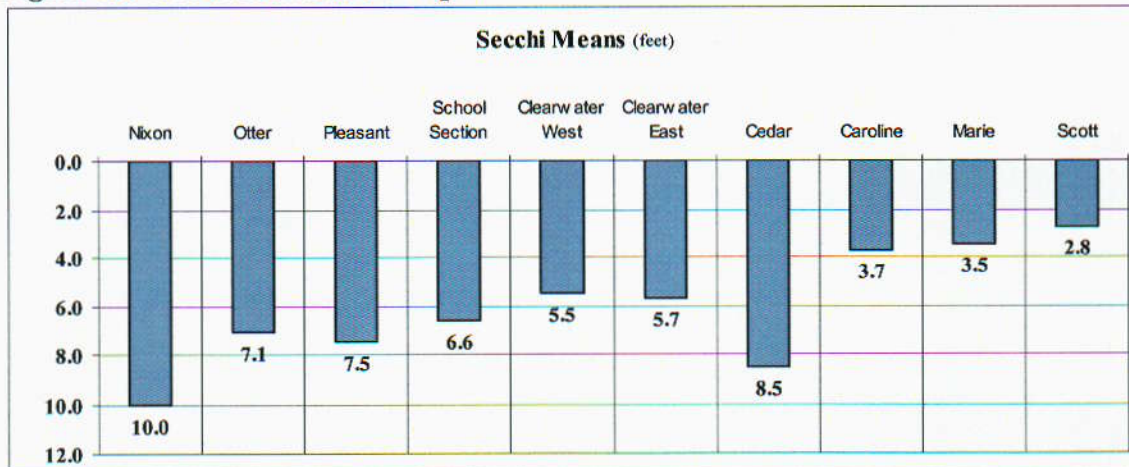


Table 4.1 2004 Mean In-Lake Total Phosphorus, Chlorophyll-a, and Secchi Depth, and Historical Ranges

Lake	Total Phosphorus $\mu\text{g/l}$		Chlorophyll-a $\mu\text{g/l}$		Secchi Depth (feet)	
	2004 Mean	Historical Range Mean	2004 Mean	Historical Range Mean	2004 Mean (Citizen Reading)	Historical Range Mean
Caroline	45	40-300	25	3-55	3.7	2.6-5.9
Cedar	33	26-52	3	5.9-13.3	8.5 (8.5)	3.6-9.8
Clearwater East	29	22-130	6	3-85	5.7 (3.2)	3.9-9.7
Clearwater West	26	26-160	7	4-77	5.5 (2.4)	4.5-8.6
Marie	84	70-360	34	4-153	3.5	1.4-7.6
Scott	103	103-660	51	3-223	2.8	1.6-6.2
School Section	21	21-50	3	3-14	6.6	1.0-2.2
Nixon	15	15-39	2	2-7	10.0 (11.6)	1.8-3.3
Otter	16	13-34	3	3-8	7.1	1.9-3.0
Pleasant	20	15-51	4	4-12	7.5 (8.8)	2.0-3.0

Figures showing historical lake data and trends are shown in Appendix D. Citizen Secchi depths are shown in Appendix E. Water quality lab reports are in Appendix F, and field notes are in Appendix G.

4.1 CEDAR LAKE SPECIAL MONITORING

In addition to regular monitoring on Cedar Lake, a special synoptic survey was conducted in and around Cedar Lake during 2004 to ascertain the reason for relatively high TP concentrations observed in Cedar Lake during 2003. Inflows to and outflow from Cedar Lake were monitored along with regular stream monitoring stations. Results of the special monitoring are discussed in this section.

First, total phosphorus concentrations in the lake were within normal ranges (about 0.30 mg/L), except one reading of 0.55 mg/L in June. This high reading coincided with an algal bloom, which was observed by citizens, District, and Wenck staff.

Table 4.2 shows that singular high TP readings in 2003, and 2004 skewed the average value. The rest of the measured TP values were closer to the historical average of around 0.30 mg/L. This indicates that the water quality problem in Cedar Lake is episodic in nature.

Table 4.2 2003 and 2004 Total Phosphorus in Cedar Lake

<u>Date</u>	<u>Total Phosphorus (mg/L)</u>	<u>Soluble Reactive Phosphorus (mg/L)</u>	<u>Chlorophyll-<i>a</i> (µg/L)</u>	<u>Secchi Depth (ft)</u>
6/17/2003	0.033	<0.005	7	10.5
7/9/2003	0.028	<0.005	12	4.5
8/20/2003	0.033	<0.005	6	--
9/17/2003	0.112	<0.005	18	--
2003 Average	0.0515	<0.005	11	7.5
6/22/2004	0.055	<0.005	5.87	
7/20/2004	0.031	<0.005	1.07	
8/11/2004	0.025	<0.005	<0.200	8.5
9/16/2004	0.021	<0.005	2.14	
2004 Average:	0.033	<0.005	3	NA

The episodic nature of the high phosphorus readings, in combination with the low watershed loads observed during 2004 due to dry conditions might indicate internal loading. However, we would expect to see also high soluble reactive phosphorus (SRP) in these samples. SRP is below

detection limits and thereby a small fraction of the TP (below 4 to 10%) for all measurements. Low SRP coupled with low chlorophyll-*a* indicates that the phosphorus in the sample is particulate, which may indicate a non-representative sample, or some other, yet unidentified mechanism.

Large precipitation events occurred one to two weeks prior to the two sampling events during which the high TP was observed. If these events caused discharge from Swartout Lake, the discharge would have been high in TP concentration. The water may also have been warm enough, due to the shallow nature of Swartout Lake, to spread across the top of Cedar Lake, causing a briefly stratified layer of high TP concentration water at the top. These conditions may be suitable to cause algal blooms such as those observed in Cedar Lake. However, high SRP and chlorophyll-*a* concentrations would be expected in this case as well.

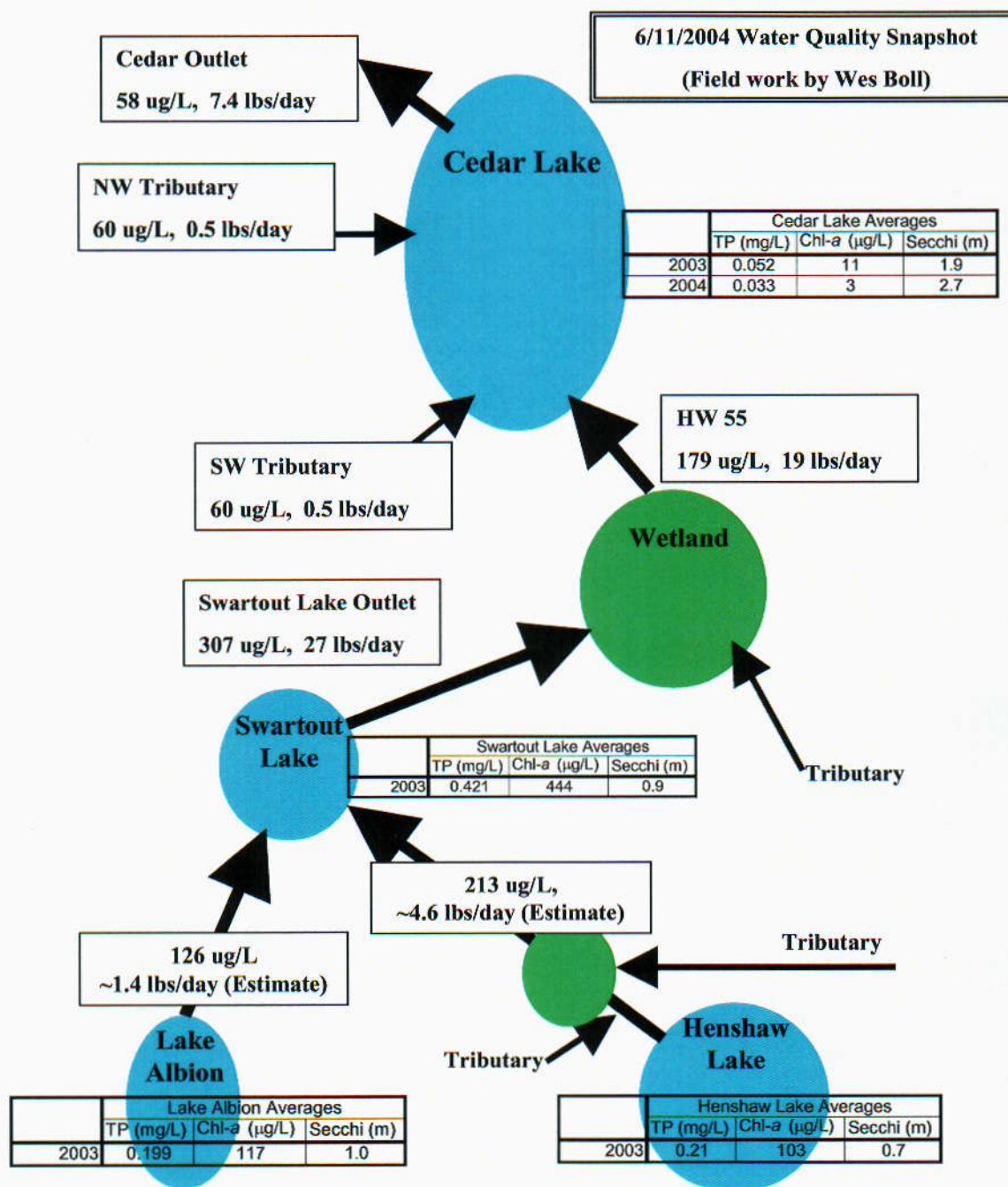
The synoptic surveys during 2004 showed high total phosphorus concentrations in discharge from Swartout Lake (0.307 mg/L). This was higher than observed at any other location during the synoptic survey. Total phosphorus in outflow from Henshaw Lake was also high, 0.213 mg/L. Total phosphorus concentrations in other tributaries to Cedar Lake were comparatively small. Loads were small due that fact, coupled with low flow during 2004. Many of the tributaries were not flowing for the majority of the year. Figure 4.5 shows the results of the synoptic survey. Results of Cedar Lake tributary monitoring are included as Appendix H.

The potential causes of algal blooms in Cedar Lake may include:

- Storm event loadings from Swartout Lake causing warm water to wash into Cedar Lake and float over the top of the lake.
- Internal loading.
- Wind effects causing thermocline tip.
- Watershed loading.

The data available does not support one cause.

Figure 4.5 Cedar Lake Water Quality Snapshot



5.0 Conclusions

1. Annual precipitation for 2004 was above normal. Annandale and Kimball stations were 2.6 and 2.8 inches, respectively above normal for the year, while Annandale was 5.02 inches above normal for the year.
2. Dry conditions late in 2003 contributed to lower runoff in 2004: 2.8 inches. This is over 5 inches below the 20-year average.
3. The Clearwater River phosphorus load was about 2,751 pounds at CR-28.2, significantly lower than previous years due primarily to lower flow conditions.
4. The water quality of Nixon, Otter, Pleasant, School Section, Clearwater, and Cedar Lakes was good, water quality in Lake Caroline was fair. Water quality in Lakes Marie, and Scott were poor.
5. Potential causes of episodic nuisance algal blooms in Cedar Lake include:
 - a. Storm event driven discharge from Swartout Lake discharging warm water that floats on the surface of Cedar Lake causing an algal bloom.
 - b. Wind effects that tip the thermocline and push water from the hypolimnion closer to the water surface.
 - c. In-lake loading.
 - d. Watershed runoff.

Appendix A

2004 Monitoring Plan

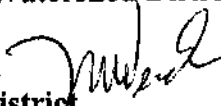


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E-mail: wenckmp@wenck.com

MEMORANDUM

TO: Clearwater River Watershed District Board of Managers

FROM: Norman C. Wenck 
Engineer for the District

DATE: February 18, 2004

RE: Proposed 2004 Water Quality Monitoring Program

Introduction

The Clearwater River Watershed District conducts annual water quality monitoring at selected lakes and selected locations on streams. The District is working with the MPCA on a Phase I TMDL program which will move into Phase II (data collection) in 2004. The District's proposed 2004 program is intended to provide data throughout the District while the TMDL is focused on the impaired reaches.

Lake monitoring follows the long-term plan shown in Table 1, and stream monitoring sites together with laboratory and field parameters are shown in Table 2.

Lake Monitoring

The schedule for 2004 has Clearwater East and West being monitored and the additional main stem lakes of Caroline and Scott. Pleasant, School Section, Nixon and Otter Lakes will also be monitored. Cedar Lake is proposed to be monitored again in 2004 to assess the increased phosphorus levels that were apparent in 2003. The total number of lakes is 8 but 9 stations are monitored since Clearwater Lake has two stations and the parameters to be monitored are shown on Table 2. Citizens monitor approximately 14 lakes for secchi depth also.

Stream Monitoring

The Clearwater River will be monitored at station CR10.5, Warner Creek will be monitored at WR 0.2 and three Cedar Lake tributaries will be monitored. These stations will be monitored six times for water quality and flow. Parameters are total phosphorus and soluble reactive phosphorus.

Cost

This proposed basic program is estimated to cost \$12,600.

Summary

The proposed monitoring program continues the program in place since 1981. The remaining options are progressive and additive and can be modified as desired after you have an opportunity to review this proposal. It is requested that a decision on the scope of the program be made at the March 10, 2004 meeting. Please feel free to call me with any questions or comments that you may have before the meeting.

TABLE 1
PROPOSED LONG-TERM WATER QUALITY MONITORING PLAN FOR CRWD LAKES

LAKE STATIONS⁽¹⁾	1997	1998	1999	2000	2001	2002	2003	2004
Clearwater Lake:								
Clearwater East	X	X	X	X	X	X	X	X
Clearwater West	X	X	X	X	X	X	X	X
Main Stem Lakes:								
Augusta	X		X		X		X	
Louisa	X		X		X		X	
Caroline		X				X		X
Scott		X	X			X		X
Marie		X		X		X		X
Betsy	X		X		X		X	
Other Lakes:								
Cedar			X		X		X	
Pleasant	X		X	X				X
School Section	X		X	X				X
Nixon	X		X		X			X
Otter	X		X		X			X
Bass		X	X		X			
Clear		X	X	X			X	
Union		X	X			X		
Henshaw		X	X			X		
Little Mud			X			X		
Wiegand			X			X		
Swart Watts			X				X	
Albion			X				X	
Grass			X				X	

Note:

⁽¹⁾ Lake selection based on total lake size ranking scores (Lake Priority Ranking, 1990)

TABLE 2
Proposed 2004 CRWD Monitoring Plan Summary

Category	Schedule	Station	Parameters
Lakes:	May 15 - June 5	Clearwater-East	Field: Secchi, DO and temperature profiles
	June 24 - July 5	Clearwater-West	
	Jul 25 - Aug 4		Lab: Total phosphorus, soluble reactive phosphorus and Chlorophyll-a
	Aug 26 - Sep 11		
		Caroline	
		Scott	
		Cedar	
		Pleasant	
		School Section	
		Nixon	
		Otter	
			Citizen Secchi: Fourteen Sites
Streams:	April		Field: Flows, DO and temperature
	May	WRO.2	
	June	CR10.5	Lab: Total phosphorus, soluble reactive phosphorus
	July	3 Cedar Lake Tributaries	
	August		
	September		
	Weekly	River Stage at CR10.5	
Precipitation:	Daily at three sites (Watkins, Maire Prairie and Corrinna)		

Citizen Precipitation Records

			51
			TOTALS

MINNESOTA CLIMATOLOGICAL NETWORK

04	02		am	86	121	27	17	1
Year	Month	Ob	Time	County	Township	Range	Section	

Name Viola Novotne	County Name Wright	Township Name Corinna
Address 9214 Kilbury Avenue NW, Annandale, MN 55302		Telephone No. (320) 274-5179

24-HOUR AMOUNTS

At the end of each month, forward forms to:
Office of State Climatology
Department of Natural Resources
University of Minnesota, 279 North Hall
St. Paul, Minnesota 55108

REMARKS:
Give times and comments
about events.
(Temperature and Phenology
Items are very useful).

Type of Gauge: (Check One)

Cyl.	<input checked="" type="checkbox"/> Test Tube
Wedge	Other

RAIN MELTED SNOW, ETC (INS & HOTH)	SNOW (INS & TENTHS)	SNOW ON GROUND (INCHES)
--	---------------------------	----------------------------------

90	6.5	19
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.13	2.0	21
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.13	2.0	21
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.11	2.0	21
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.12	3.0	24
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.11	2.0	18
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TOTALS

MINNESOTA CLIMATOLOGICAL NETWORK

04	03		am	86	121	27	17	1
Year	Month	Ob	Time	County	Township	Range	Section	

Name Viola Novotne			County Name Wright		Township Name Corinna	
Address 9214 Kilbury Avenue NW, Annandale, MN 55302			Telephone No. (320) 274-5179			
24-HOUR AMOUNTS			At the end of each month, forward forms to: Office of State Climatology Department of Natural Resources University of Minnesota, 279 North Hall St. Paul, Minnesota 55108		REMARKS: Give times and comments about events. (Temperature and Phenology Items are very useful).	
RAIN MELTED SNOW ETC. (INS & HDTHS)	SNOW TINS & TENTHS	SNOW ON GROUND (INCHES)			Type of Gauge: (Check One) Cyl. <input checked="" type="checkbox"/> Test Tube <input type="checkbox"/> Wedge <input type="checkbox"/> Other <input type="checkbox"/>	
			01			
			02			
			03			
.17	-	4	04			
.16	4.	5	05			
			06			
			07			
.11	1.5	2	08			
			09			
			10			
			11			
			12			
			13			
			14			
			15			
			16			
.09	1.	2	17			
.28	1.	2	18	rain + snow mix		
			19			
			20			
			21			
			22			
			23			
			24			
			25			
.25	-	-	26	FIRST THUNDER STORM		
			27			
.56			28			
			29			
			30			
			31			
			TOTALS			

MINNESOTA CLIMATOLOGICAL NETWORK

04	04		am	86	121	27	17	1
Year	Month	Ob	Time	County	Township	Range	Section	

Name Viola Novotne	County Name Wright	Township Name Corinna
Address 9214 Kilbury Avenue NW, Annandale, MN 55302		Telephone No. (320) 274-5179

24-HOUR AMOUNTS

At the end of each month, forward forms to:

Office of State Climatology
Department of Natural Resources
University of Minnesota, 279 North Hall
St. Paul, Minnesota 55108

REMARKS:

Give times and comments
about events.
(Temperature and Phenology
Items are very useful).

Type of Gauge: (Check One)

Cyl.	<input checked="" type="checkbox"/> Test Tube
Wedge	Other

RAIN MELTED SNOW ETC (INS & HOTH)	SNOW (INS & TENTHS)	SNOW ON GROUND (INCHES)
---	---------------------------	----------------------------------

			01	
			02	
			03	
			04	
			05	
			06	
			07	
			08	
			09	
			10	
			11	
			12	
			13	
			14	
			15	
			16	
			17	
.04			18	
.10			19	
.43			20	
.36			21	
			22	
			23	
			24	
.35			25	
			26	
			27	
			28	
			29	
.05			30	
			31	
			TOTALS	

1.33

MINNESOTA CLIMATOLOGICAL NETWORK

04	05	<input checked="" type="checkbox"/> am <input type="checkbox"/> pm	86	121	27	17	1
Year	Month	Ob Time	County	Township	Range	Section	

Name Viola Novotne			County Name Wright		Township Name Corinna	
Address 9214 Kilbury Avenue NW, Annandale, MN 55302					Telephone No. (320) 274-5179	
24-HOUR AMOUNTS			At the end of each month, forward forms to: Office of State Climatology Department of Natural Resources University of Minnesota, 279 North Hall St. Paul, Minnesota 55108		REMARKS: Give times and comments about events. (Temperature and Phenology items are very useful).	
RAIN MELTED SNOW ETC. INS & HDTHS)	SNOW INS & TENTHS	SNOW ON GROUND (INCHES)			Type of Gauge (Check One) Cyl. <input checked="" type="checkbox"/> Test Tube <input type="checkbox"/> Wedge <input type="checkbox"/> Other <input type="checkbox"/>	
			01			
			02			
			03			
.08			04			
			05			
			06			
			07			
			08			
.80			09			
			10			
			11			
			12			
			13			
			14			
			15			
			16			
1.66			17			
			18			
			19			
			20			
.30			21			
.15			22			
1.20			23			
.10			24			
			25			
			26			
.61			27			
			28			
.65			29			
.81			30			
.10			31			
TOTALS						

6.46

MINNESOTA CLIMATOLOGICAL NETWORK

04	06	<input checked="" type="checkbox"/> am <input type="checkbox"/> pm	86	121	27	17	1
Year	Month	Ob Time	County	Township	Range	Section	

Name Viola Novotne			County Name Wright		Township Name Corinna	
Address 9214 Kilbury Avenue NW, Annandale, MN 55302					Telephone No. (320) 274-5179	
24-HOUR AMOUNTS			At the end of each month, forward forms to Office of State Climatology Department of Natural Resources University of Minnesota, 279 North Hall St. Paul, Minnesota 55108		REMARKS: Give times and comments about events. (Temperature and Phenology items are very useful).	
RAIN MELTED SNOW ETC INS & HDTHS)	SNOW INS & TENTHS	SNOW ON GROUND (INCHES)			Type of Gauge: (Check One) Cyl. <input checked="" type="checkbox"/> Test Tube <input type="checkbox"/> Wedge <input type="checkbox"/> Other <input type="checkbox"/>	
			01			
			02			
			03			
			04			
.07			05			
.56			06			
			07			
.70			08			
1.55			09			
			10			
.60			11			
.64			12			
			13			
.05			14			
			15			
			16			
			17			
			18			
			19			
			20			
.02			21			
			22			
.16			23			
			24			
			25			
			26			
.14			27			
.10			28			
			29			
			30			
			31			
			TOTALS			

MINNESOTA CLIMATOLOGICAL NETWORK

04	07	am	86	121	27	17	1
Year	Month	Ob Time	County	Township	Range	Section	

Name Viola Novotne			County Name Wright		Township Name Corinna					
Address 9214 Kilbury Avenue NW, Annandale, MN 55302					Telephone No. (320) 274-5179					
24-HOUR AMOUNTS			At the end of each month, forward forms to: Office of State Climatology Department of Natural Resources University of Minnesota, 279 North Hall St. Paul, Minnesota 55108		REMARKS: Give times and comments about events. (Temperature and Phenology items are very useful).					
RAIN MELTED SNOW ETC (INS & HDTHS)	SNOW (INS & TENTHS)	SNOW ON GROUND (INCHES)					Type of Gauge: (Check One) <table border="1"> <tr> <td>Cyl.</td> <td>X</td> <td>Test Tube</td> </tr> <tr> <td>Wedge</td> <td></td> <td>Other</td> </tr> </table>		Cyl.	X
Cyl.	X	Test Tube								
Wedge		Other								
			01							
			02							
			03							
			04							
			05							
			06							
.62			07							
			08							
			09							
			10							
.85			11							
			12							
			13							
			14							
			15							
			16							
			17							
			18							
.62			19							
			20							
			21							
			22							
			23							
			24							
			25							
			26							
			27							
.38			28							
.19			29							
.47			30							
.02			31							
			TOTALS							



MINNESOTA CLIMATOLOGICAL NETWORK

04	08		am	86	121	27	17	1
Year	Month	ObTime		County	Township	Range	Section	

Name Viola Novotne	County Name Wright	Township Name Corinna
Address 9214 Kilbury Avenue NW, Annandale, MN 55302		Telephone No. (320) 274-5179

24-HOUR AMOUNTS

RAIN MELTED SNOW ETC INS & HDTHS)	SNOW INS & TENTHS.	SNOW ON GROUND (INCHES)
---	--------------------------	----------------------------------

At the end of each month, forward forms to:
Office of State Climatology
Department of Natural Resources
University of Minnesota, 279 North Hall
St. Paul, Minnesota 55108

REMARKS:
Give times and comments
about events.
(Temperature and Phenology
Items are very useful).

Type of Gauge (Check One)

Cyl.	<input checked="" type="checkbox"/>	Test Tube	
Wedge		Other	

			01	
25			02	
09			03	
			04	
			05	
			06	
50			07	
			08	
			09	
			10	
			11	
			12	
			13	
			14	
			15	
40			16	
			17	
			18	
			19	
			20	
62			21	
			22	
			23	
			24	
04			25	
45			26	
			27	
			28	
05			29	
06			30	
			31	
			TOTALS	

MINNESOTA CLIMATOLOGICAL NETWORK

04	09	11	am	86	121	27	17	1
Year	Month	Ob Time		County	Township	Range	Section	

Name Viola Novotne			County Name Wright		Township Name Corinna	
Address 9214 Kilbury Avenue NW, Annandale, MN 55302			Telephone No. (320) 274-5179			
24-HOUR AMOUNTS			At the end of each month, forward forms to: Office of State Climatology Department of Natural Resources University of Minnesota, 279 North Hall St. Paul, Minnesota 55108		REMARKS: Give times and comments about events. (Temperature and Phenology items are very useful).	
RAIN MELTED SNOW ETC (INS & HDTHS)	SNOW (INS & TENTHS)	SNOW ON GROUND (INCHES)			Type of Gauge (Check One)	
					Cyl.	X Test Tube
					Wedge	Other
			01			
			02			
			03			
			04			
.25			05			
.85			06			
			07			
			08			
			09			
			10			
.02			11			
.40			12			
.10			13			
			14			
1.06			15			
			16			
			17			
			18			
			19			
			20			
1.70			21			
			22			
			23			
.50			24			
			25			
			26			
			27			
			28			
			29			
.20			30			
			31			
TOTALS						

5.08

MINNESOTA CLIMATOLOGICAL NETWORK

04	10		am	46	121	27	17	1
Year	Month	Ob Time		County	Township	Range	Section	

Name Viola Novotne	County Name Wright	Township Name Corinna
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Address 9214 Kilbury Avenue NW, Annandale, MN 55302	Telephone No. (320) 274-5179
--	---------------------------------

24-HOUR AMOUNTS			At the end of each month, forward forms to Office of State Climatology Department of Natural Resources University of Minnesota, 279 North Hall St. Paul, Minnesota 55108	REMARKS: Give times and comments about events. (Temperature and Phenology Items are very useful).	Type of Gauge (Check One)		
RAIN MELTED SNOW ETC. (INS & HDTHS)	SNOW INS & TENTHS.	SNOW ON GROUND (INCHES)			Cyl.	<input checked="" type="checkbox"/> X	Test Tube
					Wedge		Other

			01	
			02	
			03	
			04	
			05	
			06	
.13			07	
			08	
			09	
			10	
			11	
			12	
			13	
			14	
			15	
.35			16	
			17	
.15			18	
			19	
			20	
			21	
			22	
			23	
.12			24	
			25	
			26	
			27	
			28	
3.20			29	
			30	
.10			31	

TOTALS

4.05

MINNESOTA CLIMATOLOGICAL NETWORK

Year: 04 Month: 11 ObTime: 12 am/pm County: 86 Township: 121 Range: 27 Section: 17 1

Name: Viola Novotne County Name: Wright Township Name: Corinna

Address: 9214 Kilbury Avenue NW, Annandale, MN 55302 Telephone No.: (320) 274-5179

24-HOUR AMOUNTS At the end of each month, forward forms to:
 Office of State Climatology
 Department of Natural Resources
 University of Minnesota, 279 North Hall
 St. Paul, Minnesota 55108

REMARKS:
 Give times and comments about events.
 (Temperature and Phenology items are very useful).

Type of Gauge: (Check One)
 Cyl. ☒ Test Tube ☐
 Wedge ☐ Other ☐

			01	
.10			02	
			03	
			04	
			05	
			06	
			07	
			08	
			09	
			10	
			11	
			12	
			13	
			14	
			15	
			16	
			17	
			18	
			19	
.54			20	
			21	
			22	
			23	
			24	
			25	
.10			26	
.01	.2	-	27	
			28	
			29	
			30	
			31	

TOTALS

2.75

MINNESOTA CLIMATOLOGICAL NETWORK

04	12	6	am	86	121	27	17	1
Year	Month	Ob Time		County	Township	Range	Section	

Name Viola Novotne			County Name Wright		Township Name Corinna							
Address 9214 Kilbury Avenue NW, Annandale, MN 55302					Telephone No. (320) 274-5179							
24-HOUR AMOUNTS			At the end of each month, forward forms to Office of State Climatology Department of Natural Resources University of Minnesota, 279 North Hall St. Paul, Minnesota 55108		REMARKS: Give times and comments about events. (Temperature and Phenology items are very useful).							
RAIN MELTED SNOW ETC (INS & HOTH)	SNOW (INS & TENTHS)	SNOW ON GROUND (INCHES)			Type of Gauge: (Check One) <table border="1"> <tr> <td>Cyl.</td> <td><input checked="" type="checkbox"/></td> <td>Test Tube</td> <td></td> </tr> <tr> <td>Wedge</td> <td></td> <td>Other</td> <td></td> </tr> </table>		Cyl.	<input checked="" type="checkbox"/>	Test Tube		Wedge	
Cyl.	<input checked="" type="checkbox"/>	Test Tube										
Wedge		Other										
			01									
			02									
			03									
			04									
			05									
.06	.5	-	06	<i>Rain snow mid snow melts quickly</i>								
			07									
			08									
			09									
			10									
			11									
			12									
			13									
			14									
			15									
			16									
			17									
			18									
			19									
			20									
			21									
			22	<i>drifting of snow not measurable</i>								
			23									
			24									
			25									
			26									
			27									
			28									
			29									
			30									
			31									
			TOTALS									

MINNESOTA CLIMATOLOGICAL NETWORK

04	01		am					1
Year	Month	Ob Time		County	Township	Range	Section	

Name Richard Eckman			County Name Stearns		Township Name							
Address 7905 - 137 th Street, Kimball, MN					Telephone No. (320) 398-7455							
24-HOUR AMOUNTS			At the end of each month, forward forms to: Office of State Climatology Department of Natural Resources University of Minnesota, 279 North Hall St. Paul, Minnesota 55108		REMARKS: Give times and comments about events. (Temperature and Phenology items are very useful).							
RAIN MELTED SNOW ETC (INS & HDTHS)	SNOW (INS & TENTHS)	SNOW ON GROUND (INCHES)					Type of Gauge (Check One) <table border="1"> <tr> <td>Cyl.</td> <td><input checked="" type="checkbox"/></td> <td>Test Tube</td> <td></td> </tr> <tr> <td>Wedge</td> <td></td> <td>Other</td> <td></td> </tr> </table>		Cyl.	<input checked="" type="checkbox"/>	Test Tube	
Cyl.	<input checked="" type="checkbox"/>	Test Tube										
Wedge		Other										
			01									
			02									
			03									
			04									
			05									
			06									
			07									
			08									
			09									
			10									
			11									
			12									
			13									
			14									
			15									
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			22									
			23									
			24									
			25									
			26									
			27									
			28									
			29									
			30									
			31									
11.75			TOTALS									

MINNESOTA CLIMATOLOGICAL NETWORK

04	02		am					1
Year	Month	Ob Time		County	Township	Range	Section	

Name Richard Eckman			County Name Stearns		Township Name												
Address 7905 - 137th Street, Kimball, MN					Telephone No. (320) 398-7455												
24-HOUR AMOUNTS			At the end of each month, forward forms to: Office of State Climatology Department of Natural Resources University of Minnesota, 279 North Hall St. Paul, Minnesota 55108		REMARKS: Give times and comments about events. (Temperature and Phenology items are very useful).												
<table border="1"> <tr> <td>RAIN MELTED SNOW ETC INS & HDTHS)</td> <td>SNOW INS & TENTHS</td> <td>SNOW ON GROUND INCHES</td> </tr> </table>			RAIN MELTED SNOW ETC INS & HDTHS)	SNOW INS & TENTHS	SNOW ON GROUND INCHES	Type of Gauge (Check One)		<table border="1"> <tr> <td>Cyl.</td> <td><input checked="" type="checkbox"/></td> <td>Test Tube</td> <td></td> </tr> <tr> <td>Wedge</td> <td></td> <td>Other</td> <td></td> </tr> </table>		Cyl.	<input checked="" type="checkbox"/>	Test Tube		Wedge		Other	
RAIN MELTED SNOW ETC INS & HDTHS)	SNOW INS & TENTHS	SNOW ON GROUND INCHES															
Cyl.	<input checked="" type="checkbox"/>	Test Tube															
Wedge		Other															
	4.00		01														
	1.00		02														
			03														
			04														
	.50		05														
			06														
			07														
	3.00		08														
			09														
			10														
	3.00		11														
			12														
			13														
			14														
			15														
			16														
			17														
			18														
			19														
	3.00		20														
			21														
	1.25		22														
			23														
			24														
			25														
			26														
			27														
			28														
			29														
			30														
			31														
14.75			TOTALS														

MINNESOTA CLIMATOLOGICAL NETWORK

04	03		am					1
Year	Month	Ob Time		County	Township	Range	Section	

Name Richard Eckman			County Name Stearns		Township Name					
Address 7905 - 137 th Street, Kimball, MN					Telephone No. (320) 398-7455					
24-HOUR AMOUNTS			At the end of each month, forward forms to: Office of State Climatology Department of Natural Resources University of Minnesota, 279 North Hall St. Paul, Minnesota 55108		REMARKS: Give times and comments about events. (Temperature and Phenology items are very useful).					
RAIN MELTED SNOW ETC (INS & HDTHS)	SNOW INS & TENTHS	SNOW ON GROUND (INCHES)					Type of Gauge: (Check One) <table border="1"> <tr> <td>Cyl.</td> <td><input checked="" type="checkbox"/></td> <td>Test Tube</td> </tr> <tr> <td>Wedge</td> <td></td> <td>Other</td> </tr> </table>		Cyl.	<input checked="" type="checkbox"/>
Cyl.	<input checked="" type="checkbox"/>	Test Tube								
Wedge		Other								
			01							
			02							
			03							
			04							
			05							
			06							
			07							
			08							
			09							
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			21							
			22							
			23							
			24							
120			25							
			26							
120			27							
			28							
			29							
			30							
			31							
140			TOTALS							

MINNESOTA CLIMATOLOGICAL NETWORK

04	04		am					1
Year	Month	Ob	Time	County	Township	Range	Section	

Name Richard Eckman	County Name Stearns	Township Name
------------------------	------------------------	---------------

Address 7905 - 137 th Street, Kimball, MN	Telephone No. (320) 398-7455
---	---------------------------------

24-HOUR AMOUNTS RAIN MELTED SNOW ETC INS & HDTHS)	SNOW INS & TENTHS	SNOW ON GROUND INCHES	At the end of each month, forward forms to: Office of State Climatology Department of Natural Resources University of Minnesota, 279 North Hall St. Paul, Minnesota 55108	REMARKS: Give times and comments about events. (Temperature and Phenology items are very useful).	Type of Gauge (Check One) Cyl. <input checked="" type="checkbox"/> Test Tube <input type="checkbox"/> Wedge <input type="checkbox"/> Other <input type="checkbox"/>
---	-------------------------	--------------------------------	---	--	---

			01	
			02	
			03	
			04	
			05	
			06	
			07	
			08	
			09	
			10	
			11	
			12	
			13	
			14	
			15	
			16	
			17	
1.20			18	
			19	
			20	
1.71			21	
			22	
			23	
1.31			24	
			25	
			26	
			27	
			28	
			29	
			30	
			31	

1.22			TOTALS
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MINNESOTA CLIMATOLOGICAL NETWORK

04	05		am					1
Year	Month	Ob Time		County	Township	Range	Section	

Name Richard Eckman	County Name Stearns	Township Name
Address 7905 - 137 th Street, Kimball, MN		Telephone No. (320) 398-7455

24-HOUR AMOUNTS

RAIN MELTED SNOW ETC. INS & HOTS)	SNOW INS & TENTHS	SNOW ON GROUND (INCHES)
---	-------------------------	----------------------------------

At the end of each month, forward forms to:
 Office of State Climatology
 Department of Natural Resources
 University of Minnesota, 279 North Hall
 St. Paul, Minnesota 55108

REMARKS:

Give times and comments
 about events.
 (Temperature and Phenology
 Items are very useful).

Type of Gauge. (Check One)

Cyl.	<input checked="" type="checkbox"/>	Test Tube	
Wedge		Other	

			01	
			02	
			03	
			04	
			05	
			06	
			07	
			08	
1.03			09	
			10	
			11	
1.06			12	
			13	
			14	
			15	
1.56			16	
			17	
			18	
			19	
			20	
.56			21	
.08			22	
1.56			23	
			24	
			25	
.30			26	
.68			27	
			28	
.60			29	
.38			30	
.17			31	
6.98			TOTALS	

MINNESOTA CLIMATOLOGICAL NETWORK

04	06		am					1
Year	Month	Ob Time		County	Township	Range	Section	

Name Richard Eckman			County Name Stearns		Township Name	
Address 7905 - 137 th Street, Kimball, MN					Telephone No. (320) 398-7455	
24-HOUR AMOUNTS			At the end of each month, forward forms to: Office of State Climatology Department of Natural Resources University of Minnesota, 279 North Hall St. Paul, Minnesota 55108		REMARKS: Give times and comments about events. (Temperature and Phenology Items are very useful).	
RAIN MELTED SNOW ETC. (INS. & HOTHES)	SNOW (INS. & TENTHS)	SNOW ON GROUND (INCHES)			Type of Gauge: (Check One)	
					Cyl.	<input checked="" type="checkbox"/> Test Tube
					Wedge	Other
			01			
			02			
			03			
			04			
1.13			05			
			06			
			07			
.77			08			
1.05			09			
			10			
.56			11			
			12			
			13			
			14			
.04			15			
			16			
			17			
			18			
			19			
			20			
			21			
			22			
.16			23			
			24			
			25			
			26			
.15			27			
.15			28			
			29			
			30			
			31			
3.01			TOTALS			

MINNESOTA CLIMATOLOGICAL NETWORK

04	07		am					1
Year	Month	Ob Time		County	Township	Range	Section	

Name Richard Eckman			County Name Stearns		Township Name	
Address 7905 - 137 th Street, Kimball, MN					Telephone No. (320) 398-7455	
24-HOUR AMOUNTS			At the end of each month, forward forms to: Office of State Climatology Department of Natural Resources University of Minnesota, 279 North Hall St. Paul, Minnesota 55108		REMARKS: Give times and comments about events. (Temperature and Phenology Items are very useful).	
RAIN MELTED SNOW ETC INS & HOTH)	SNOW INS & TENTHS	SNOW ON GROUND (INCHES)				
					Cyl.	X Test Tube
					Wedge	Other
			01			
			02			
			03			
			04			
2			05			
160			06			
125			07			
			08			
			09			
			10			
90			11			
			12			
			13			
			14			
			15			
			16			
			17			
			18			
36			19			
			20			
			21			
			22			
			23			
			24			
			25			
			26			
			27			
144			28			
184			29			
138			30			
			31			
3.77			TOTALS			

MINNESOTA CLIMATOLOGICAL NETWORK

04	08		am					1
Year	Month	Ob Time		County	Township	Range	Section	

Name Richard Eckman	County Name Stearns	Township Name
Address 7905 - 137 th Street, Kimball, MN		Telephone No. (320) 398-7455

24-HOUR AMOUNTS

At the end of each month, forward forms to:
 Office of State Climatology
 Department of Natural Resources
 University of Minnesota, 279 North Hall
 St. Paul, Minnesota 55108

REMARKS:

Give times and comments
 about events.
 (Temperature and Phenology
 items are very useful).

Type of Gauge (Check One)

Cyl.	<input checked="" type="checkbox"/>	Test Tube	
Wedge		Other	

RAIN MELTED SNOW ETC INS & HDTHS)	SNOW INS & TENTHS	SNOW ON GROUND (INCHES)
---	-------------------------	----------------------------------

3			01	
.45			02	
.08			03	
			04	
			05	
			06	
.54			07	
			08	
			09	
			10	
			11	
			12	
			13	
			14	
			15	
.42			16	
			17	
			18	
			19	
			20	
			21	
.31			22	
			23	
			24	
.29			25	
.03			26	
			27	
			28	
.10			29	
			30	
			31	
.222			TOTALS	

MINNESOTA CLIMATOLOGICAL NETWORK

04	09		am					1
Year	Month	Ob Time		County	Township	Range	Section	

Name Richard Eckman			County Name Stearns			Township Name		
Address 7905 - 137 th Street, Kimball, MN						Telephone No. (320) 398-7455		
24-HOUR AMOUNTS			At the end of each month, forward forms to: Office of State Climatology Department of Natural Resources University of Minnesota, 279 North Hall St. Paul, Minnesota 55108			REMARKS: Give times and comments about events. (Temperature and Phenology items are very useful).		
RAIN MELTED SNOW ETC INS & HDTHS)	SNOW INS & TENTHS	SNOW ON GROUND INCHES						
						Cyl.	<input checked="" type="checkbox"/> X	Test Tube
						Wedge		Other
			01					
			02					
			03					
2			04					
1.65			05					
			06					
			07					
			08					
			09					
1/2			10					
			11					
			12					
			13					
			14					
1.86			15					
			16					
1.25			17					
			18					
			19					
			20					
1.60			21					
			22					
1.21			23					
			24					
			25					
			26					
			27					
			28					
			29					
1.10			30					
			31					
4.79			TOTALS					

MINNESOTA CLIMATOLOGICAL NETWORK

04	10		am					1
Year	Month	Ob Time		County	Township	Range	Section	

Name Richard Eckman			County Name Stearns		Township Name	
Address 7905 - 137 th Street, Kimball, MN					Telephone No. (320) 398-7455	
24-HOUR AMOUNTS			At the end of each month, forward forms to: Office of State Climatology Department of Natural Resources University of Minnesota, 279 North Hall St. Paul, Minnesota 55108		REMARKS: Give times and comments about events. (Temperature and Phenology items are very useful).	
RAIN MELTED SNOW ETC INS & HDTHS	SNOW INS & TENTHS	SNOW ON GROUND (INCHES)			Type of Gauge (Check One) Cyl. <input checked="" type="checkbox"/> Test Tube <input type="checkbox"/> Wedge <input type="checkbox"/> Other <input type="checkbox"/>	
170			01			
			02			
			03			
			04			
109			05			
			06			
			07			
			08			
			09			
			10			
			11			
			12			
			13			
			14			
133			15			
			16			
			17			
11			18			
			19			
			20			
			21			
152			22			
			23			
			24			
			25			
			26			
			27			
230			28			
			29			
			30			
			31			
405			TOTALS			

MINNESOTA CLIMATOLOGICAL NETWORK

04	11		am					1
Year	Month	Ob Time		County	Township	Range	Section	

Name Richard Eckman			County Name Stearns		Township Name					
Address 7905 - 137 th Street, Kimball, MN					Telephone No. (320) 398-7455					
24-HOUR AMOUNTS			At the end of each month, forward forms to: Office of State Climatology Department of Natural Resources University of Minnesota, 279 North Hall St. Paul, Minnesota 55108		REMARKS: Give times and comments about events. (Temperature and Phenology Items are very useful).					
RAIN MELTED SNOW ETC INS & HDTHS)	SNOW INS & TENTHS	SNOW ON GROUND (INCHES)					Type of Gauge (Check One) <table border="1"> <tr> <td>Cyl</td> <td><input checked="" type="checkbox"/></td> <td>Test Tube</td> </tr> <tr> <td>Wedge</td> <td></td> <td>Other</td> </tr> </table>		Cyl	<input checked="" type="checkbox"/>
Cyl	<input checked="" type="checkbox"/>	Test Tube								
Wedge		Other								
			01							
.30			02							
			03							
			04							
			05							
			06							
			07							
			08							
			09							
			10							
			11							
			12							
			13							
			14							
			15							
			16							
			17							
			18							
.38			19							
			20							
			21							
			22							
			23							
			24							
			25							
.05			26							
			27							
			28							
			29							
			30							
			31							
.73			TOTALS							

MINNESOTA CLIMATOLOGICAL NETWORK

04	12		am					1
Year	Month	Ob Time		County	Township	Range	Section	

Name Richard Eckman	County Name Stearns	Township Name
Address 7905 - 137 th Street, Kimball, MN		Telephone No. (320) 398-7455

24-HOUR AMOUNTS

At the end of each month, forward forms to:
 Office of State Climatology
 Department of Natural Resources
 University of Minnesota, 279 North Hall
 St. Paul, Minnesota 55108

REMARKS:

Give times and comments
 about events.
 (Temperature and Phenology
 items are very useful).

Type of Gauge (Check One)

Cyl.	<input checked="" type="checkbox"/>	Test Tube	
Wedge		Other	

RAIN MELTED SNOW ETC. (INS & HDTHS)	SNOW (INS & TENTHS)	SNOW ON GROUND (INCHES)
---	---------------------------	----------------------------------

			01	
			02	
			03	
			04	
			05	
102	125		06	
			07	
			08	
			09	
			10	
			11	
			12	
			13	
			14	
			15	
			16	
			17	
			18	
			19	
			20	
			21	
			22	
			23	
			24	
			25	
			26	
			27	
			28	
110			29	
			30	
			31	
112			TOTALS	

CLEARWATER RIVER WATERSHED DISTRICT

MINNESOTA CLIMATOLOGICAL NETWORK



04 01 12:00 am 47 121 32 03 1
 Year Month Ob Time County Township Range Section

Name **Clarence and Luella Klein** County Name **MEEKE R** Township Name **FOREST PRAIRIE**
 Address **417 Luella Street, Unit 8** Telephone No. **(320) 764-7395**
Watkins, MN 55389

24-HOUR AMOUNTS			At the end of each month, forward forms to: Office of State Climatology Department of Natural Resources University of Minnesota, 279 North Hall St. Paul, Minnesota 55108		REMARKS: Give times and comments about events. (Temperature and Phenology Items are very useful).	Type of Gauge: (Check One)		
RAIN MELTED SNOW ETC (INS & HDTHS)	SNOW (INS & TENTHS)	SNOW ON GROUND (INCHES)	Cyl.	<input checked="" type="checkbox"/> Test Tube		Wedge	Other	
			01					
			02					
T	2	T	03					
			04					
			05					
			06					
			07					
			08					
			09					
			10					
			11					
			12					
			13					
			14					
			15					
			16					
			17					
			18					
T	1	1	19					
			20					
			21					
			22					
			23					
			24					
↓	6		25					
↓	5	3	26					
		9	27					
			28					
			29					
			30					
T	2	7	31					
↓	5	14	TOTALS					

CLEARWATER RIVER WATERSHED DISTRICT

MINNESOTA CLIMATOLOGICAL NETWORK

Department of  Natural Resources

Division of Waters

04	02	4000	am	47	121	32	03	1
Year	Month	ObTime		County	Township	Range	Section	

Name	Clarence and Luella Klein 417 Luella Street, Unit 8 Watkins, MN 55389	County Name	MEEKER	Township Name	FOREST PRAIRIE
Address		Telephone No.	(320) 767-7395		

24-HOUR AMOUNTS			At the end of each month, forward forms to: Office of State Climatology Department of Natural Resources University of Minnesota, 279 North Hall St. Paul, Minnesota 55108		REMARKS: Give times and comments about events. (Temperature and Phenology Items are very useful).		Type of Gauge: (Check One)	
RAIN MELTED SNOW ETC (INS & HDTHS)	SNOW (INS & TENTHS)	SNOW ON GROUND (INCHES)					Cyl.	Test Tube
							Wedge	Other
↓	2	8	01					
↓	7		02					
			03					
↓	1	8	04					
↓	T	8	05					
↓	T	8	06					
↓	1	8	07					
↓	5	12	08					
↓	1		09					
↓	T	12	10					
T	2	13	11					
			12					
			13					
			14					
			15					
			16					
			17					
			18					
			19					
			20					
			21					
			22					
			23					
			24					
			25					
			26					
			27					
			28					
			29					
			30					
			31					
58	19	0	TOTALS					



Department of Natural Resources
Division of Waters

MINNESOTA CLIMATOLOGICAL NETWORK

04	03	10:00	am	47	121	32	03	1
Year	Month	Ob Time		County	Township	Range	Section	

Name	Clarence and Luella Klein 417 Luella Street, Unit 8 Watkins, MN 55389	County Name	Meeker	Township Name	Forest Prairie
Address	Watkins, MN 55389			Telephone No.	(620) 764-7395

24-HOUR AMOUNTS			At the end of each month, forward forms to: Office of State Climatology Department of Natural Resources University of Minnesota, 279 North Hall St. Paul, Minnesota 55108	REMARKS: Give times and comments about events. (Temperature and Phenology Items are very useful).	Type of Gauge: (Check One)		
RAIN MELTED SNOW ETC (INS & HOTH)	SNOW (INS & TENTHS)	SNOW ON GROUND (INCHES)			Cyl.	<input checked="" type="checkbox"/> Test Tube	Other
			01				
			02				
T	T		03				
			04				
	↓ 5		05				
↓	T		06				
↓ 62	T		07				
			08				
			09				
			10				
			11				
			12				
			13				
			14				
			15				
			16				
			17				
			18				
↓ 19			19				
			20				
			21				
			22				
			23				
			24				
			25				
			26				
↓ 70			27				
			28				
			29				
			30				
			31				
151	7	0	TOTALS				

04 04 No on am
 Year Month Ob Time
 47 121 32 03 1
 County Township Range Section

Name Clarence and Luella Klein 417 Luella Street, Unit 8 Watkins, MN 55389		County Name MEeker		Township Name FOREST PRAIRIE		
Address		Telephone No. (320) 764-7395				
24-HOUR AMOUNTS			At the end of each month, forward forms to: Office of State Climatology Department of Natural Resources University of Minnesota, 279 North Hall St. Paul, Minnesota 55108		REMARKS: Give times and comments about events. (Temperature and Phenology Items are very useful).	
RAIN MELTED SNOW ETC (INS & HDTHS)	SNOW (INS & TENTHS)	SNOW ON GROUND (INCHES)			Type of Gauge: (Check One)	
					Cyl.	<input checked="" type="checkbox"/> Test Tube
					Wedge	Other
			01			
			02			
			03			
			04			
			05			
			06			
			07			
			08			
T	T	T	09	SNOW FLURRIES		
			10			
			11			
			12			
			13			
			14			
			15			
			16			
			17			
.5			18			
			19			
			20			
.7			21			
			22			
			23			
.3			24			
			25			
			26			
			27			
			28			
			29			
			30			
			31			
.15		0	TOTALS			



MINNESOTA CLIMATOLOGICAL NETWORK

04	05	NOON	am	47	121	32	03	1
Year	Month	Ob Time		County	Township	Range	Section	

Name Clarence and Luella Klein 417 Luella Street, Unit 8 Watkins, MN 55389	County Name MEeker	Township Name FOREST PRAIRIE
Address	Telephone No. (320) 764-7395	

24-HOUR AMOUNTS

RAIN MELTED SNOW ETC (INS & HDTHS)	SNOW (INS & TENTHS)	SNOW ON GROUND (INCHES)
--	---------------------------	----------------------------------

At the end of each month, forward forms to:
Office of State Climatology
Department of Natural Resources
University of Minnesota, 279 North Hall
St. Paul, Minnesota 55108

REMARKS:
Give times and comments
about events.
(Temperature and Phenology
Items are very useful).

Type of Gauge: (Check One)

Cyl.	<input checked="" type="checkbox"/>	Test Tube	
Wedge		Other	

	01	
	02	
	03	
	04	
	05	
	06	
	07	
	08	
8.5	09	
	10	
	11	
.1	12	
	13	
	14	
	15	
1.8	16	
	17	
	18	
	19	
	20	
.4	21	
.2	22	
1.7	23	
	24	
	25	
.7	26	
	27	
.7	28	
.53	29	
1.2	30	
.2	31	
	TOTALS	

6.45

MINNESOTA CLIMATOLOGICAL NETWORK

04	06	NOON	am	47	121	32	03	1
Year	Month	Ob Time		County	Township	Range	Section	

Name	Clarence and Luella Klein 417 Luella Street, Unit 8 Watkins, MN 55389	County Name	MEeker	Township Name	FOREST PRAIRIE
Address		Telephone No.	(320) 764-7395		

24-HOUR AMOUNTS

At the end of each month, forward forms to:
Office of State Climatology
Department of Natural Resources
University of Minnesota, 279 North Hall
St. Paul, Minnesota 55108

REMARKS:
Give times and comments
about events.
(Temperature and Phenology
Items are very useful).

Type of Gauge: (Check One)

Cyl.	<input checked="" type="checkbox"/>	Test Tube	
Wedge		Other	

RAIN MELTED SNOW ETC (INS & HDTHS)	SNOW (INS & TENTHS)	SNOW ON GROUND (INCHES)
--	---------------------------	----------------------------------

.04			01	
			02	
			03	
			04	
.18			05	
			06	
.8			07	
.75			08	
			09	
.4			10	
			11	
.20			12	
			13	
			14	
			15	
			16	
			17	
			18	
			19	
			20	
			21	
			22	
.24			23	
			24	
			25	
.15			26	
.19			27	
			28	
			29	
			30	
			31	
2.95			TOTALS	

Year: 04 Month: 07 Ob Time: Noon am/pm County: 47 Township: 121 Range: 32 Section: 03 1

Name	Clarence and Luella Klein 417 Luella Street, Unit 8 Watkins, MN 55389	County Name MEEKER COUNTY	Township Name FOREST PRAIRIE
Address			Telephone No. (320) 764-7395

24-HOUR AMOUNTS			At the end of each month, forward forms to: Office of State Climatology Department of Natural Resources University of Minnesota, 279 North Hall St. Paul, Minnesota 55108		REMARKS: Give times and comments about events. (Temperature and Phenology Items are very useful).		Type of Gauge: (Check One)		
RAIN MELTED SNOW ETC (INS & HDTHS)	SNOW (INS & TENTHS)	SNOW ON GROUND (INCHES)					Cyl.	<input checked="" type="checkbox"/> Test Tube	
							Wedge		Other
			01						
.04			02						
.13			03						
.03			04						
.73			05						
.3			06						
			07						
			08						
			09						
.9			10						
.2			11						
			12						
			13						
			14						
			15						
			16						
			17						
.56			18						
			19						
			20						
			21						
			22						
			23						
			24						
			25						
			26						
.4			27						
.71			28						
			29						
.45			30						
			31						
4.02			TOTALS						

MINNESOTA CLIMATOLOGICAL NETWORK

04	08	NOON	am	47	121	32	03	1
Year	Month	Ob Time		County	Township	Range	Section	

Name Clarence and Luella Klein 417 Luella Street, Unit 8 Watkins, MN 55389	County Name MEeker	Township Name FOREST PRAIRIE
Address	Telephone No. (320) 764-7395	

24-HOUR AMOUNTS

RAIN MELTED SNOW ETC (INS & HOTH)	SNOW (INS & TENTHS)	SNOW ON GROUND (INCHES)
---	---------------------------	----------------------------------

At the end of each month, forward forms to:
Office of State Climatology
Department of Natural Resources
University of Minnesota, 279 North Hall
St. Paul, Minnesota 55108

REMARKS:
Give times and comments
about events.
(Temperature and Phenology
items are very useful).

Type of Gauge: (Check One)

Cyl.	<input checked="" type="checkbox"/> Test Tube
Wedge	Other

05			01	
			02	
			03	
09			04	
			05	
			06	
			07	
			08	
43			09	
			10	
			11	
			12	
07			13	
			14	
4			15	
			16	
			17	
			18	
			19	
49			20	
			21	
			22	
03			23	
			24	
81			25	
			26	
			27	
			28	
12			29	
04			30	
			31	
2.48			TOTALS	

MINNESOTA CLIMATOLOGICAL NETWORK

04	9	1	am	47	121	32	03	1
Year	Month	Ob Time		County	Township	Range	Section	

Name Clarence and Luella Klein 417 Luella Street, Unit 8 Watkins, MN 55389	County Name Meeker	Township Name Forest Prairie
Address Watkins, MN 55389	Telephone No. (620) 764-7395	

24-HOUR AMOUNTS			At the end of each month, forward forms to: Office of State Climatology Department of Natural Resources University of Minnesota, 279 North Hall St. Paul, Minnesota 55108	REMARKS: Give times and comments about events. (Temperature and Phenology Items are very useful).	Type of Gauge: (Check One)		
RAIN MELTED SNOW ETC. (INS & HDTHS)	SNOW (INS & TENTHS)	SNOW ON GROUND (INCHES)			Cyl.	<input checked="" type="checkbox"/> Test Tube	Other
			01				
			02				
			03				
.31			04				
2.01			05				
			06				
			07				
			08				
			09				
.11			10				
			11				
			12				
1.5			13				
.70			14				
.37			15				
.30			16				
			17				
			18				
			19				
			20				
1.55			21				
			22				
.35			23				
			24				
			25				
			26				
			27				
			28				
			29				
.66			30				
			31				
7.86			TOTALS				

MINNESOTA CLIMATOLOGICAL NETWORK

Year: 04 Month: 10 Ob Time: No ON am/pm: County: 47 Township: 121 Range: 32 Section: 03 1

Name: Clarence and Luella Klein County Name: Meeker Township Name: Forest Prairie
 Address: 417 Luella Street, Unit 8, Watkins, MN 55389 Telephone No.: (320) 764-7395

24-HOUR AMOUNTS

At the end of each month, forward forms to:
 Office of State Climatology
 Department of Natural Resources
 University of Minnesota, 279 North Hall
 St. Paul, Minnesota 55108

REMARKS:
 Give times and comments
 about events.
 (Temperature and Phenology
 Items are very useful).

Type of Gauge: (Check One)

RAIN MELTED SNOW ETC. INS & HDTHS)	SNOW INS & TENTHS	SNOW ON GROUND INCHES	
			01
			02
			03
			04
			05
.03			06
			07
			08
			09
			10
			11
			12
			13
↓ .17			14
			15
			16
.05			17
			18
			19
			20
T			21
.30			22
.25			23
			24
			25
			26
			27
2.30			28
			29
			30
0.20			31
TOTALS			

MINNESOTA CLIMATOLOGICAL NETWORK

04	11	Noon	am	47	121	32	03	1
Year	Month	Ob Time		County	Township	Range	Section	

Name Clarence and Luella Klein	County Name Meeker	Township Name Forest Prairie
Address 417 Luella Street, Unit 8, Watkins, MN 55389		Telephone No. (320) 764-7395

24-HOUR AMOUNTS			At the end of each month, forward forms to Office of State Climatology Department of Natural Resources University of Minnesota, 279 North Hall St. Paul, Minnesota 55108	REMARKS: Give times and comments about events. (Temperature and Phenology Items are very useful).	Type of Gauge: (Check One)			
RAIN MELTED SNOW ETC. INS & H2O THS)	SNOW INS & TENTHS	SNOW ON GROUND (INCHES)			Cyl.	<input checked="" type="checkbox"/> X	Test Tube	
					Wedge		Other	
			01					
			02					
			03					
			04					
			05					
			06					
			07					
			08					
			09					
			10					
			11					
			12					
			13					
			14					
			15					
.16			16					
			17					
			18					
.27			19					
			20					
			21					
			22					
			23					
			24					
			25					
			26					
.09	1 INCH		27					
			28					
			29					
			30					
			31					
TOTALS								

MINNESOTA CLIMATOLOGICAL NETWORK

04	12	NO ON	am pm	47	121	32	03	1
Year	Month	Ob Time		County	Township	Range	Section	

Name Clarence and Luella Klein	County Name Meeker	Township Name Forest Prairie
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Address 417 Luella Street, Unit 8, Watkins, MN 55389	Telephone No. (320) 764-7395
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24-HOUR AMOUNTS <table border="1"> <tr> <td>RAIN MELTED SNOW ETC (INS & HDTHS)</td> <td>SNOW (INS & TENTHS)</td> <td>SNOW ON GROUND (INCHES)</td> </tr> </table>	RAIN MELTED SNOW ETC (INS & HDTHS)	SNOW (INS & TENTHS)	SNOW ON GROUND (INCHES)	At the end of each month, forward forms to Office of State Climatology Department of Natural Resources University of Minnesota, 279 North Hall St. Paul, Minnesota 55108	REMARKS: Give times and comments about events. (Temperature and Phenology Items are very useful).	Type of Gauge: (Check One) <table border="1"> <tr> <td>Cyl.</td> <td><input checked="" type="checkbox"/></td> <td>Test Tube</td> <td></td> </tr> <tr> <td>Wedge</td> <td></td> <td>Other</td> <td></td> </tr> </table>	Cyl.	<input checked="" type="checkbox"/>	Test Tube		Wedge		Other	
RAIN MELTED SNOW ETC (INS & HDTHS)	SNOW (INS & TENTHS)	SNOW ON GROUND (INCHES)												
Cyl.	<input checked="" type="checkbox"/>	Test Tube												
Wedge		Other												

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.21	2.5	TOTALS
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This application creates annual summaries of precipitation data gathered by volunteer-based observation network. The data presented are monthly totals and the data are grouped by county. Observer locations are described using section numbers.

Annual report STEARNS 2004

CC	ttt	rr	ss	00000000	nnnn	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
73	121N	29W	1		SWCD				*	7.37	3.50	3.77	2.38				
73	123N	30W	15		SWCD	.69	1.24	1.43	1.07	7.28	3.83	3.37	2.65	6.43	3.29		
73	123N	32W	6		SWCD				*	7.10	4.16	5.60	.06	6.01			
73	123N	35W	14		SWCD				*	5.54	3.77	5.76	2.51				
73	124N	28W	4		SWCD				*	8.25	4.00	3.49	1.28	6.85	3.20		
73	124N	28W	13		BYRG	.42	.78	1.31	1.29	7.68	3.38	4.22	1.00	5.04	3.29	*	26
73	124N	28W	31		SWCD	.23	.38	.81	1.12	6.62	3.49	4.39	1.16	6.64			
73	124N	30W	1	COLLEGEV	NWS	.72	1.24	1.42	1.00	7.42	3.66	4.30	1.47	6.52	3.21	.71	27
73	125N	28W	5		SWCD	.45	*	.57	1.03	6.35	3.78	3.01	2.28	5.30	2.82		
73	125N	30W	6		SWCD	1.40	1.00	.78	1.05	5.24	3.62	3.41	1.46	5.64	3.53		
73	125N	33W	1		SWCD	.59	1.17	1.33	.79								
73	126N	33W	34	MELROSE	NWS	.55	.64	1.38	*	4.69	5.00	3.71	2.06		*		
73	126N	33W	34		SWCD				.70	4.18		3.34	1.20	6.09	2.50		
73	126N	34W	30		SWCD	.86	1.40	1.49		3.67							
County averages						.66	.98	1.17	1.01	6.26	3.93	3.92	1.66	6.00	3.07	.71	27
# of obs						9	8	9	8	13	12	13	13	10	8	1	0

- Data as received and digitized on or before 1/11/2005. **All values are in inches.**
- 'cc tt rr ss' is county-township-range-section number, 'oooooooo' is community name (where applicable), 'n' is number of years of record.
- 'AGR', 'HYD', and 'ANN' are 12 month precipitation totals starting in Sep 2003, Oct 2003, and Jan 2004, respectively. 'MAY' is the May-June-July-Aug-Sept-Oct-Nov-Dec (JJASND) growing season (May 2004 thru Sep 2004) precipitation total.
- '**' denotes a partial monthly record, 'e' denotes that value is wholly or partially estimated.
- Prepared by: State Climatology Office - DNR Waters, phone: 651-296-4214, web: <http://climate.umn.edu>

For some purposes, **daily** precipitation data are required. The precipitation data archive allows a user to [interactiv](#) precipitation data from the site nearest to a target.

Obtaining Data for Legal Purposes



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Comments/Questions

URL: <http://climate.umn.edu/HIDENannual>

Annual Reports of Monthly Precipitation Totals

This application creates annual summaries of precipitation data gathered by volunteer-based observation network. The data presented are monthly totals and the data are grouped by county. Observer locations are described using section numbers.

Choose a county and year, then click on "Annual report".

Annual report

2004 MEEKER Monthly Precipitation, Totals

cc	ttt	rr	ss	oooooooo	nnnn	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
47	118N	30W	31		SWCD	.67	.97	1.56	1.26	6.23	4.73	4.24	2.06	5.15	3.29	.75	28
47	119N	29W	27	DASSEL	NWS	.38	.71	.28	1.38	6.14	5.60	4.18	2.39	5.91	3.03		28
47	119N	31W	11	LITCHFIE	NWS	.48	.50	2.20	*	6.54	4.96	3.85	2.14	4.82	3.56	.31	
47	119N	31W	24		SWCD	.63	1.04		1.79	6.38	5.29	3.70	2.42	7.79	3.84		
47	120N	29W	35		SWCD			1.36	1.19	5.37							
47	121N	30W	3		SWCD	1.70	1.53	1.77	1.51	6.94	2.32	4.53	2.51	8.41	3.15	.51	28
county averages						.77	.95	1.43	1.43	6.27	4.58	4.10	2.30	6.42	3.37	.52	27
# of obs						5	5	5	5	6	5	5	5	5	5	3	0

- Data as received and digitized on or before 1/11/2005. **All values are in inches.**
- 'cc ttt rr ss' is county-township-range-section number, 'oooooooo' is community name (where applicable), 'n' denotes a partial monthly record, 'e' denotes that value is wholly or partially estimated.
- 'AGR', 'HYD', and 'ANN' are 12 month precipitation totals starting in Sep 2003, Oct 2003, and Jan 2004, respectively. 'e' denotes a partial monthly record, 'e' denotes that value is wholly or partially estimated.
- Prepared by: State Climatology Office - DNR Waters, phone: 651-296-4214, web: <http://climate.umn.edu>

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Comments/Questions

URL: <http://climate.umn.edu/HIDENannual/HIDENannual.asp>

Last modified: August 21, 2003

This application creates annual summaries of precipitation data gathered by volunteer-based observation network. The data presented are monthly totals and the data are grouped by county. Observer locations are described using section numbers.

Annual report **WRIGHT** 2004

CC	ttt	rr	ss	00000000	nnnn	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
86	118N	25W	12	DELANO	NWS	*	1.36	.83	2.14	4.51		3.64	1.39	7.09	3.75	.25	
86	118N	27W	14		SWCD	.40	.99	1.78	1.89	6.63	4.21	2.58	2.16	5.54	3.06		25
86	118N	27W	36		SWCD	2.20	2.02	2.42	1.70	7.31	4.14	1.99	3.95	6.15	1.92	.54	31
86	119N	24W	29	ROCKFORD	NWS	.45	1.07	1.38	2.10	5.78	7.62	2.82	1.68	6.58	3.07	.59	28
86	119N	25W	7		BYRG	.52	1.29	1.96	2.51	7.32	4.44	2.42	2.34	6.86	3.66	1.03	.41
86	119N	26W	33		SWCD	1.00	1.70	1.63	2.15	6.29	3.07	2.51	4.12	6.41	3.29	.88	27
86	120N	25W	19	BUFFALO	NWS	.60	1.13	1.31	1.92	4.26	4.08	2.46	.64	4.41	3.23	.65	22
86	120N	25W	29		SWCD				2.53	7.46	3.73	2.31	1.73	6.07	2.83		
86	121N	25W	18		SWCD	.91	2.58	1.91	1.66	7.29	3.62	2.91	2.61	6.86	5.46	1.05	30
86	121N	25W	19	IDZIOREK	MOSQ				1.69	6.44	2.33	3.37	1.67	5.44	3.94		
86	121N	26W	6		BYRG				1.84	6.83	4.84	3.42	2.48	5.76	4.80		
86	121N	28W	33		SWCD	.79	2.00	1.33	1.09	5.69	3.76	2.49	2.05	5.59	3.46	.23	25
86	122N	27W	32		SWCD	.72	1.13	.89	1.62	7.05	5.34	4.04	1.70	4.14	2.99	.78	28
county averages						.84	1.53	1.54	1.91	6.37	4.27	2.84	2.19	5.92	3.50	.67	.41
# of obs						9	10	10	13	13	12	13	13	13	13	9	1

- Data as received and digitized on or before 1/11/2005. **All values are in inches.**
- 'cc tt rr ss' is county-township-range-section number, 'oooooooo' is community name (where applicable), 'n' is number of years of record.
- 'AGR', 'HYD', and 'ANN' are 12 month precipitation totals starting in Sep 2003, Oct 2003, and Jan 2004, respectively. 'MAY' is the May-June-July (growing season (May 2004 thru Sep 2004) precipitation total.
- '*' denotes a partial monthly record, 'e' denotes that value is wholly or partially estimated.
- Prepared by: State Climatology Office - DNR Waters, phone: 651-296-4214, web: <http://climate.umn.edu>

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Last modified: August 21, 2003

Appendix C

Historical Mean Flow, Mean Phosphorus, and Phosphorus Loading

TABLE 1
HISTORICAL SUMMARY OF STREAM FLOWS, PHOSPHORUS CONCENTRATIONS, AND LOADINGS

Clearwater River Watershed District

Station	Year	Average Stream Flow		Average Total Phosphorus Concentration (mg/l)	Total Phosphorus Load	
		(cu m/sec)	(cfs)		(kg)	(lb)
Main Stem: CR 28.2	1981 (1)	--	--	1.40	--	--
	1982 (1)	0.93	32.8	0.74	19,700	43,500
	1983	2.62	92.6	0.92	76,000	168,000
	1984	1.49	52.6	0.76	35,700	78,800
	1985	2.32	81.9	0.90	65,500	144,000
	1986	3.20	113	0.78	55,200	122,000
	1987	0.11	3.90	0.13	460	1,020
	1988	0.09	3.12	0.66	1,850	4,080
	1989	0.02	0.72	0.19	120	260
	1990	0.51	18.0	0.44	7,040	15,500
	1991	1.11	39.1	0.29	10,200	22,500
	1992	0.26	9.30	0.20	1,660	3,650
	1993	1.28	45.2	0.29	11,600	25,600
	1994	1.17	41.2	0.28	10,100	22,300
	1995	1.15	40.4	0.29	10,400	22,900
	1996	0.33	11.7	0.27	2,860	6,300
	1997	0.27	9.36	0.26	2,170	4,790
	1998	0.41	14.4	0.25	3,190	7,020
	1999	0.08	2.78	0.16	400	870
	2000	0.02	0.72	0.38	240	530
	2001 (4),(5)	0.27	9.46	0.51	4,309	9,500
	2002	0.47	16.50	0.29	4,290	9,460
	2003	0.28	9.92	0.19	1,710	3,770
	2004	0.48	17.04	0.17	1,248	2,751
CR 10.5	1981 (1)	1.15	40.6	0.05	2,060	4,550
	1982 (1)	2.20	77.8	0.07	4,990	11,000
	1983	5.64	199	0.10	18,500	40,800
	1984	4.28	151	0.05	6,620	14,600
	1985	3.88	137	0.14	16,700	36,800
	1986	5.52	195	0.15	23,700	52,300
	1987	0.46	16.2	0.04	600	1,320
	1988	0.23	7.95	0.04	260	580
	1989	0.97	34.2	0.08	2,340	5,150
	1990	3.77	133	0.03	3,060	6,750
	1991	6.68	236	0.05	10,500	23,200
	1992	4.16	147	0.06	8,090	17,800
	1993	5.01	177	0.04	6,330	14,000
	1994	2.92	103	0.03	2,850	6,290
	1995	2.83	100	0.03	3,040	6,710
	1996	1.53	54.2	0.04	1,970	4,350
	1997	2.06	72.8	0.04	2,690	5,940
	1998	1.78	63.0	0.04	2,330	5,120
	1999	1.25	44.1	0.04	1,520	3,350
	2000	0.31	10.8	0.03	280	610
	2001 (4),(5)	0.90	31.7	0.03	850	1,873
	2002	2.46	87.0	0.04	2,950	6,500
	2003	2.11	74.6	0.024	1,590	3,500
	2004	1.66	58.8	0.022	639	1,409

TABLE 1
HISTORICAL SUMMARY OF STREAM FLOWS, PHOSPHORUS CONCENTRATIONS, AND LOADINGS

Clearwater River Watershed District

Station Tributaries:	Year	<u>Average Stream Flow</u>		Average Total Phosphorus Concentration (mg/l)	<u>Total Phosphorus Load</u>	
		(cu m/sec)	(cfs)		(kg)	(lb)
WR 0.2 (2)	1981 (1)	0.07	2.60	0.17	390	860
	1982 (1)	0.23	8.20	0.16	780	1,720
	1983	0.47	16.50	0.09	1,270	2,800
	1984	0.60	21.20	0.05	950	2,100
	1985	0.48	17.10	0.14	2,130	4,700
	1986	0.86	30.40	0.20	4,630	10,200
	1987	0.04	1.50	0.07	100	230
	1988	0.01	0.40	0.17	60	130
	1989	0.03	1.19	0.14	80	180
	1990	0.06	2.28	0.37	750	1,660
	1991	0.26	9.22	0.11	860	1,900
	1992	0.11	4.02	0.05	170	370
	1993	0.24	8.59	0.10	760	1,670
	1994	0.18	6.34	0.06	320	700
	1995	0.12	4.27	0.05	210	460
	1996	0.05	1.78	0.11	180	380
	1997	0.09	3.15	0.08	220	480
	1998	0.09	3.11	0.11	290	650
	1999	0.06	2.03	0.07	130	280
	2000 (3)	0.01	0.44	0.06	25	56
	2001 (4),(5)	0.08	2.88	0.10	257	567
	2002	0.26	9.17	0.11	930	2,060
	2003	0.16	5.79	0.062	320	710
	2004	0.07	2.6	0.06	78	172

NOTES:

Flow values are time-weighted averages unless otherwise noted.

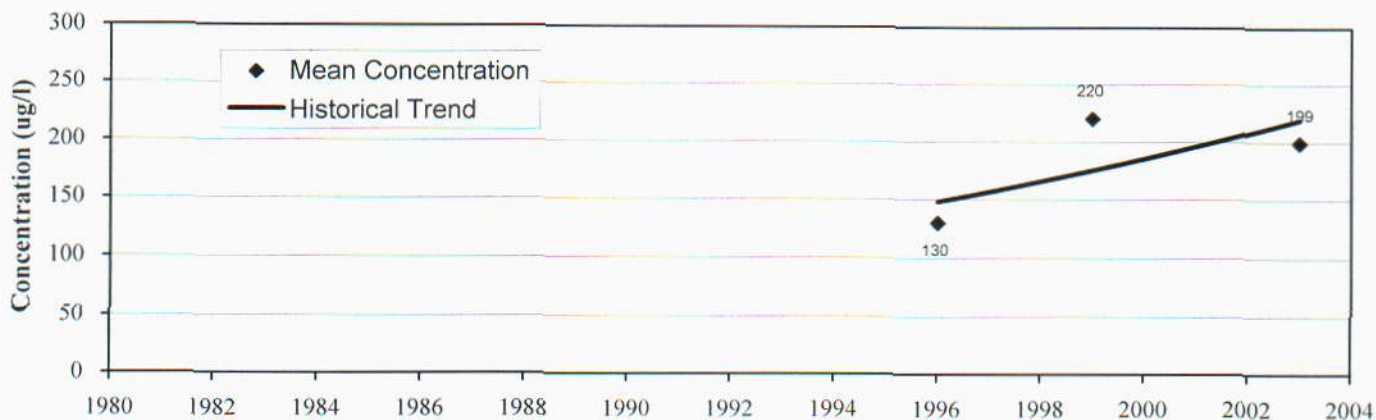
Total phosphorus values are flow- and time-weighted averages unless otherwise noted.

- (1) Values in 1981 and 1982 are arithmetic means
- (2) Station WR 0.2 was designated Station WC 0.2 in 1981-1983
- (3) Phosphorus values in 2000 are flow-weighted and adjusted per log-log regression on flow so as to correspond to annual mean flows.
- (4) 2001 Flow and total phosphorus values are arithmetic averages.
- (5) 2001 total phosphorus loads estimated from arithmetic averages of flow and total phosphorus values.

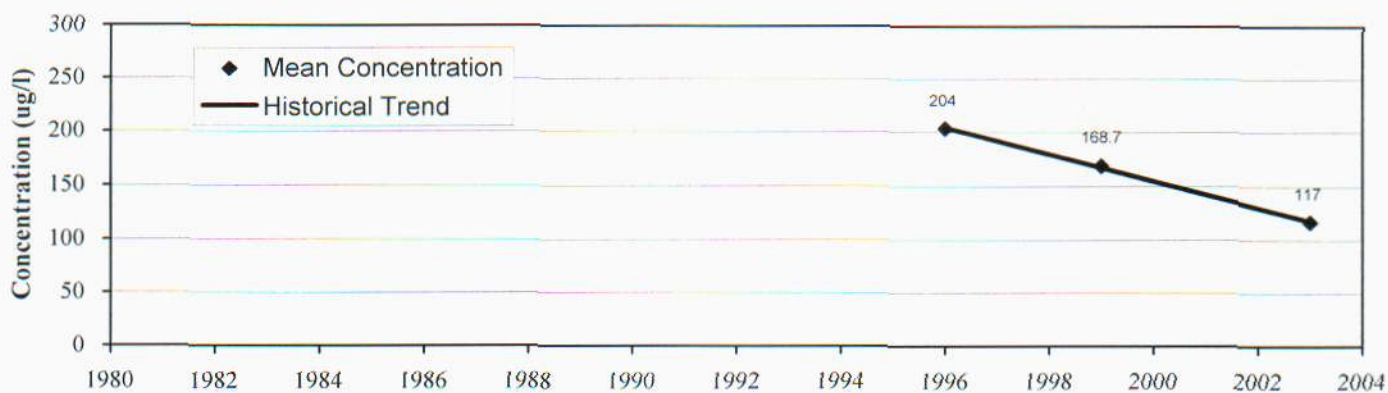
Appendix D

Lake Historical Data

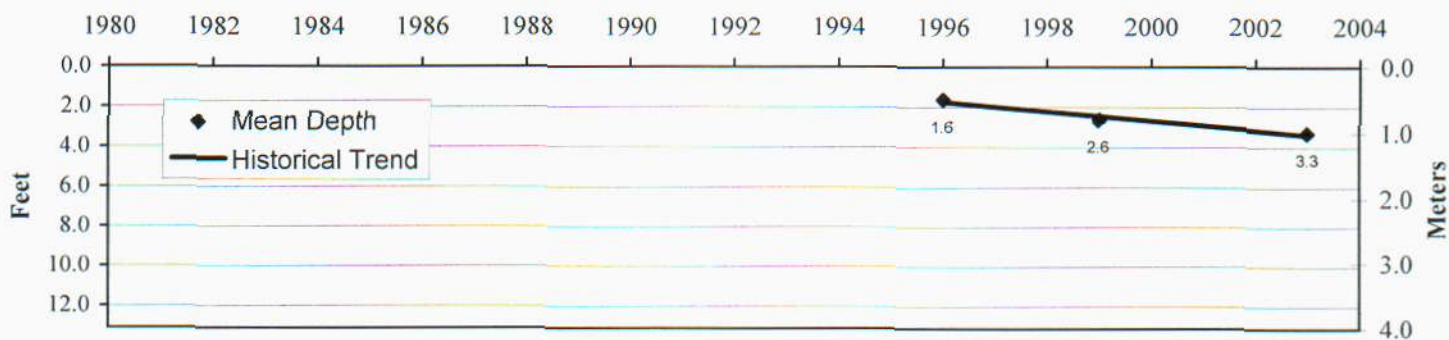
Total Phosphorus



Chlorophyll-a



Secchi Depth



Clearwater River Watershed District

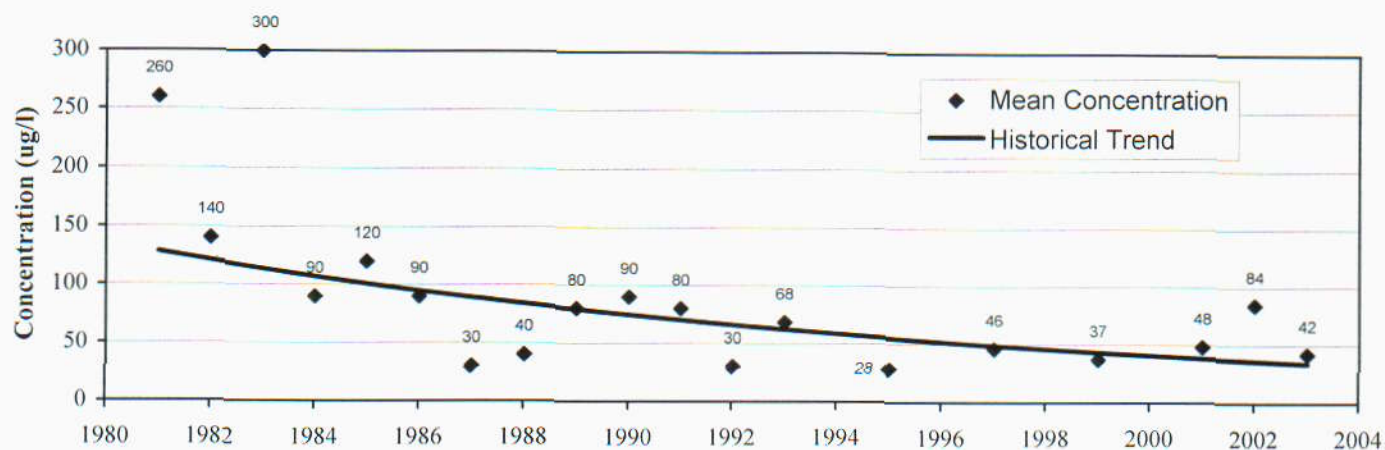
Lake Albion Historical Data

Wenck
 Wenck Associates, Inc. 1800 Pioneer Creek Center
 Environmental Engineers Maple Plain, MN 55359

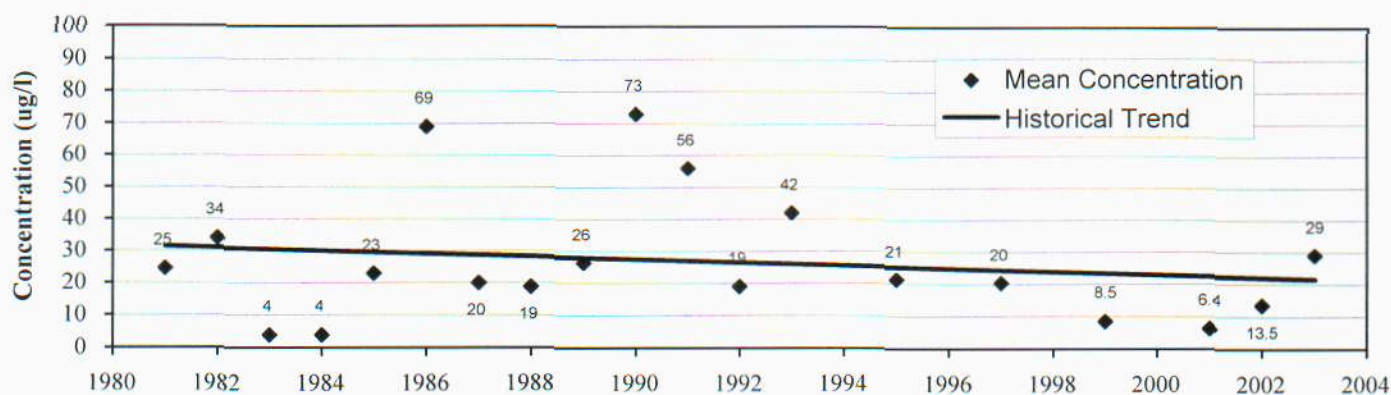
Jan 2004

Figure 1

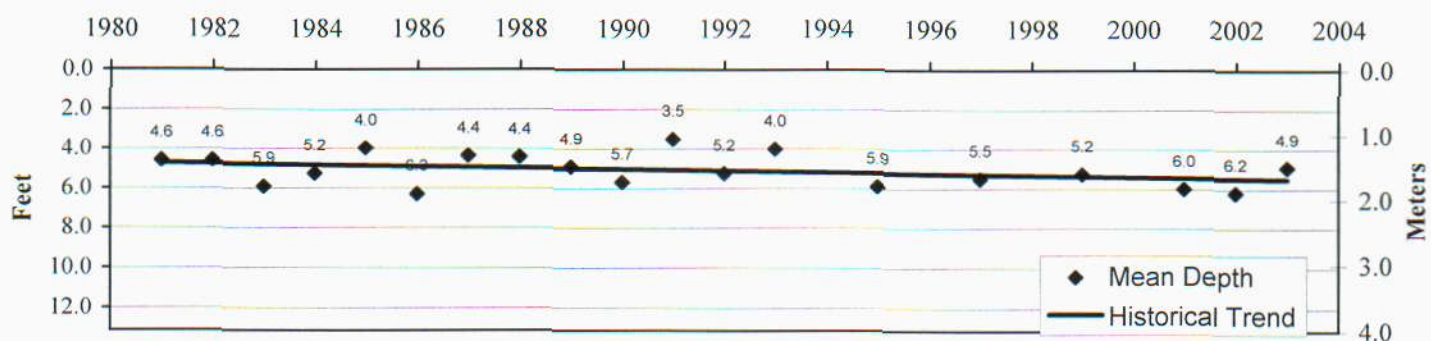
Total Phosphorus



Chlorophyll-a



Secchi Depth



Clearwater River Watershed District

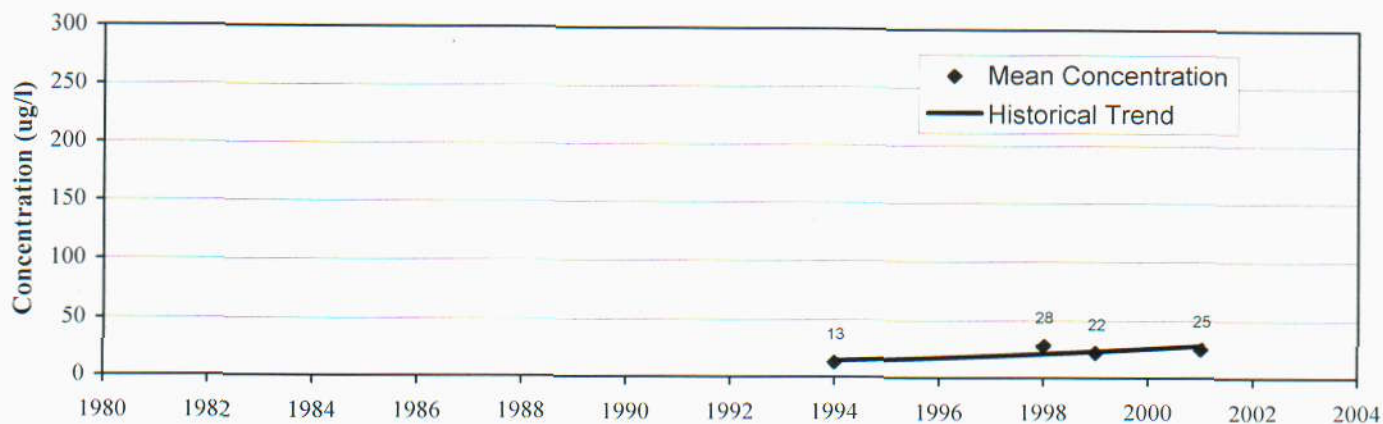
Lake Augusta Historical Data

Wenck
Wenck Associates, Inc. 1800 Pioneer Creek Center
Environmental Engineers Maple Plain, MN 55359

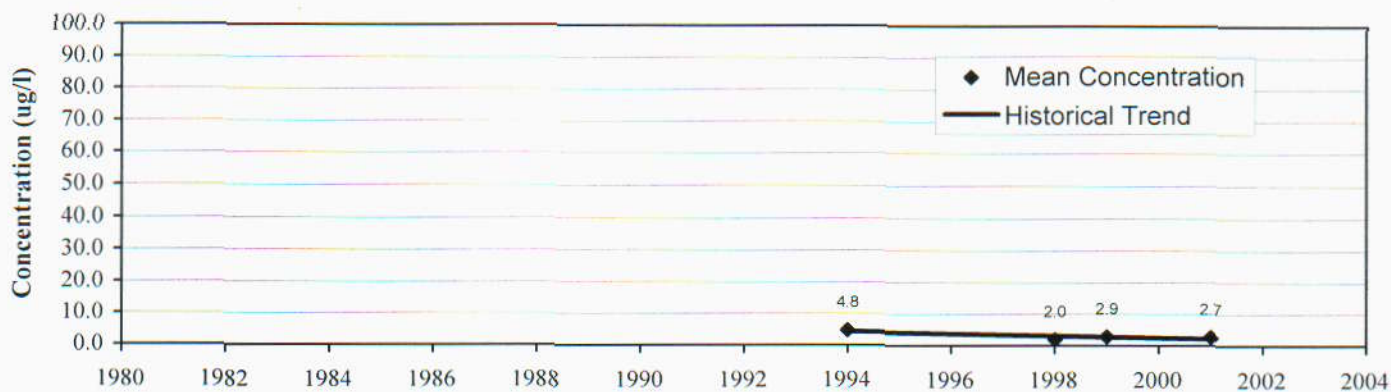
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Figure 2

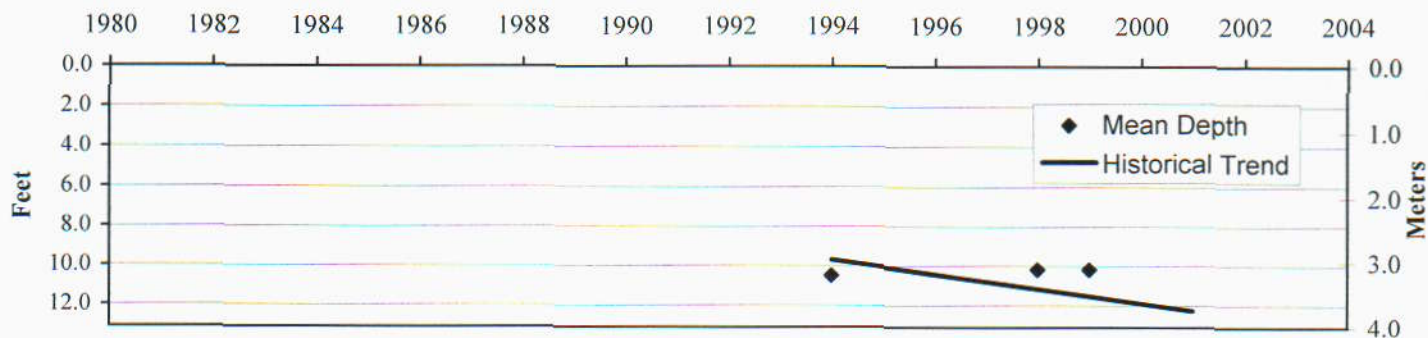
Total Phosphorus



Chlorophyll-a



Secchi Depth



Clearwater River Watershed District

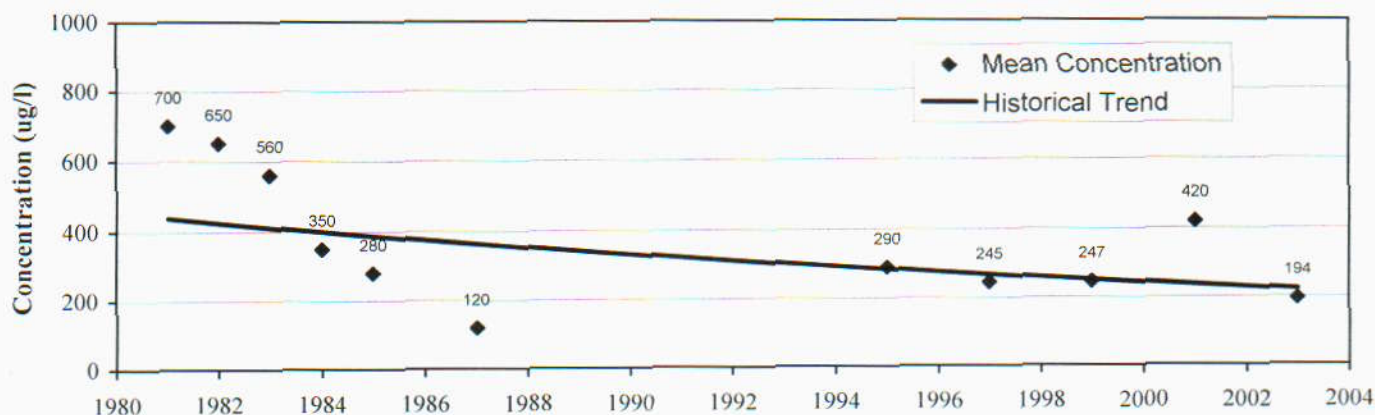
Bass Lake Historical Data

Wenck
Wenck Associates, Inc. 1800 Pioneer Creek Center
Environmental Engineers Maple Plain, MN 55359

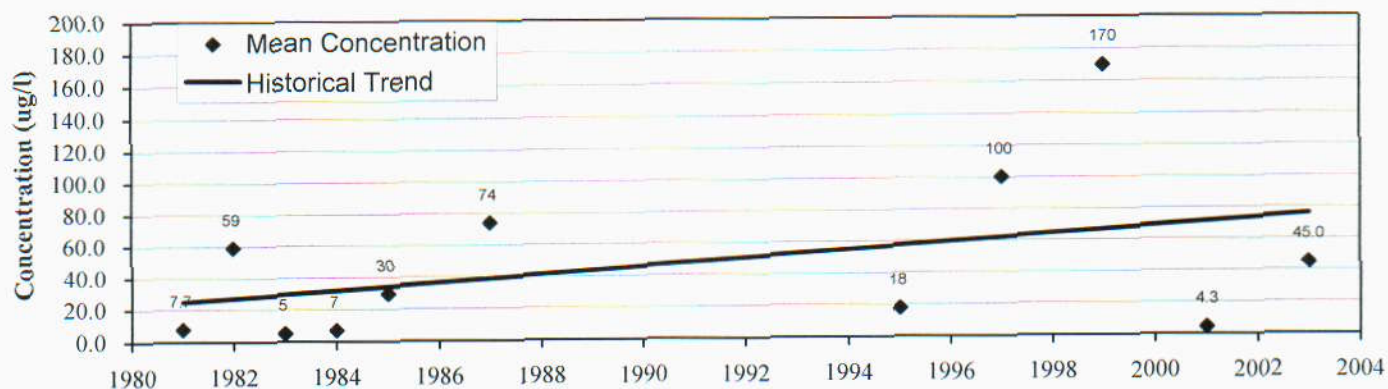
Jan 2004

Figure 3

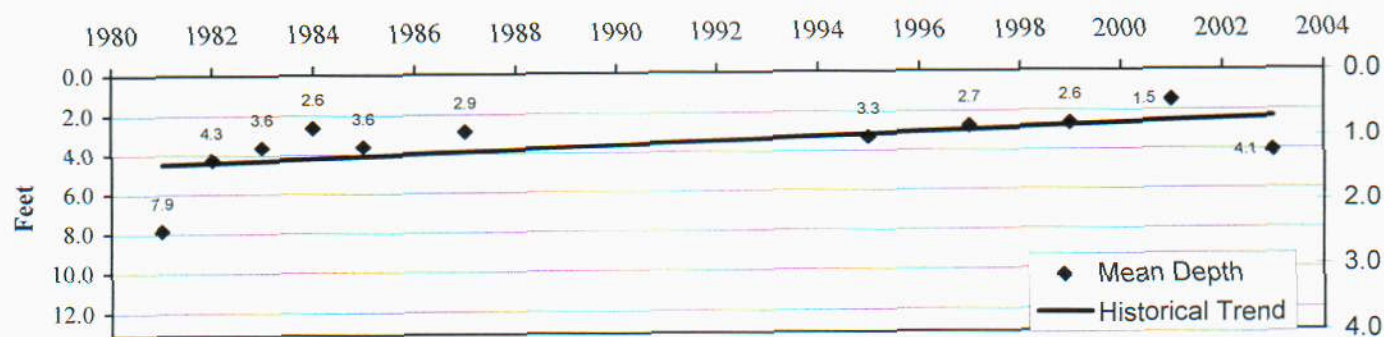
Total Phosphorus



Chlorophyll-a



Secchi Depth



Clearwater River Watershed District

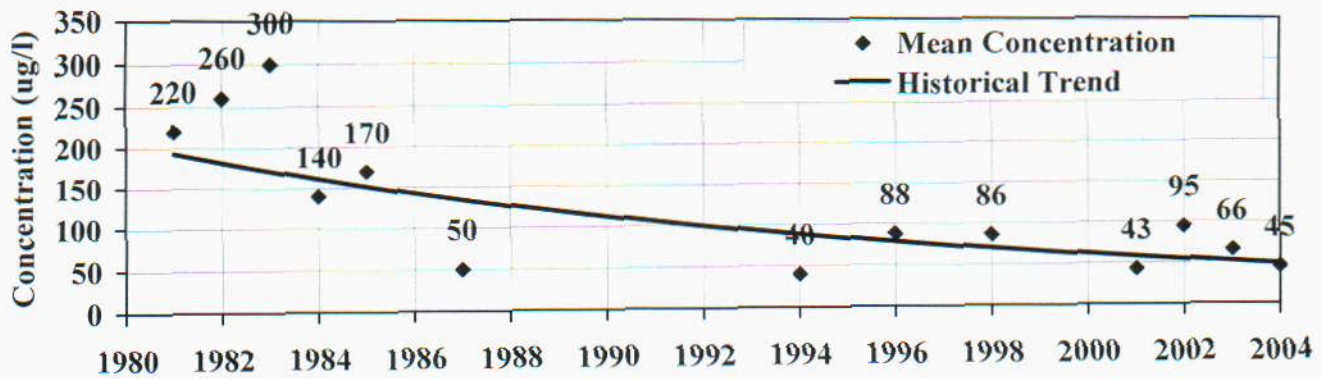
Lake Betsy Historical Data


Wenck
 Wenck Associates, Inc. 1800 Pioneer Creek Center
 Environmental Engineers Maple Plain, MN 55359

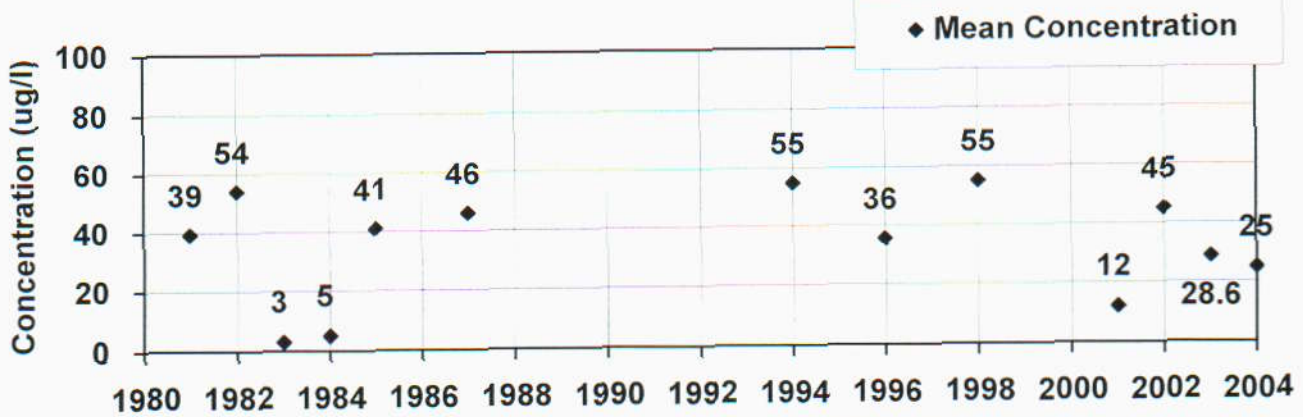
Jan 2004

Figure 4

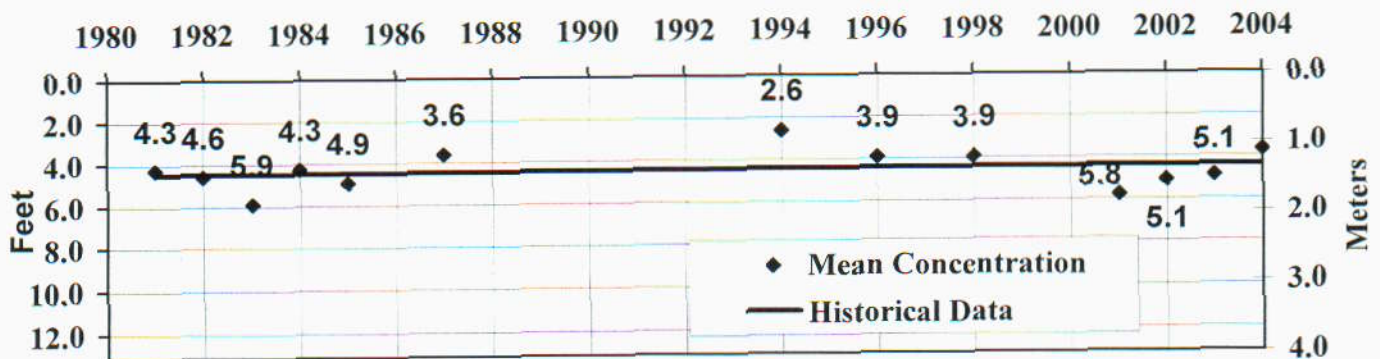
Total Phosphorus



Chlorophyll-a



Secchi Depth



Clearwater River Watershed District

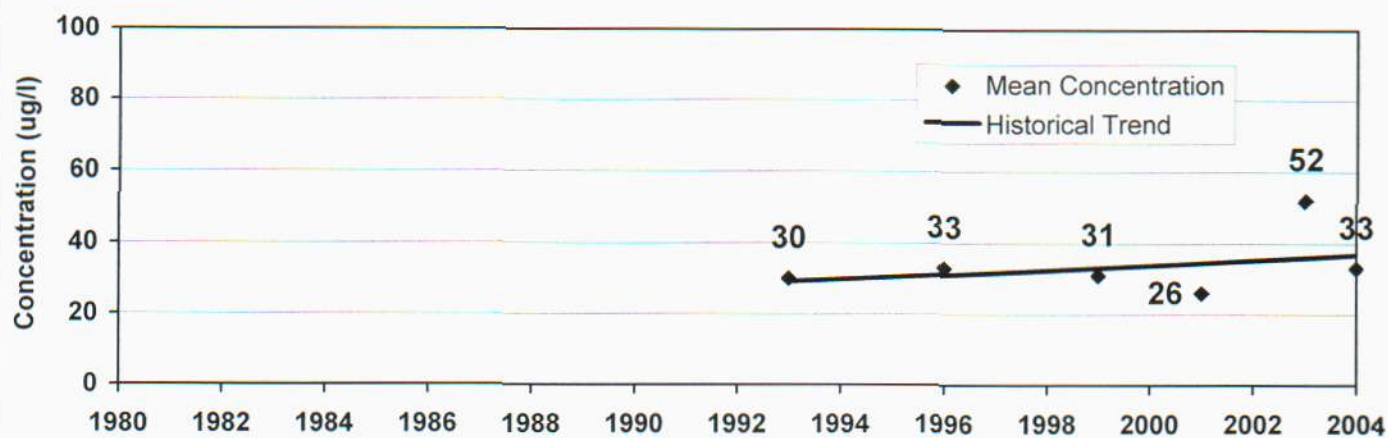
Lake Caroline Historical Data

Wenck
Wenck Associates, Inc. 1800 Pioneer Creek Center
Environmental Engineers Maple Plain, MN 55359

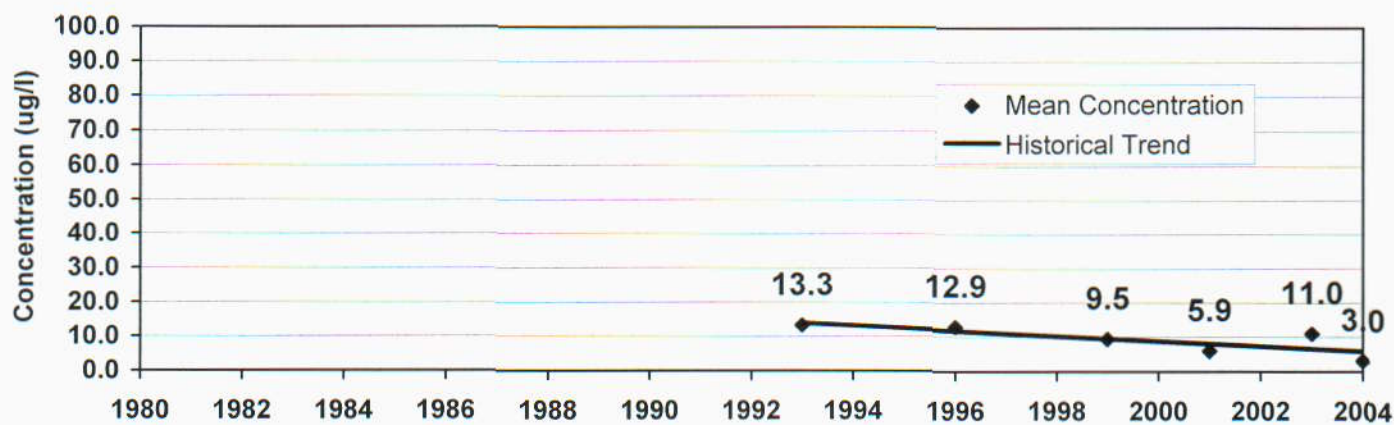
Nov. 2004

Figure 5

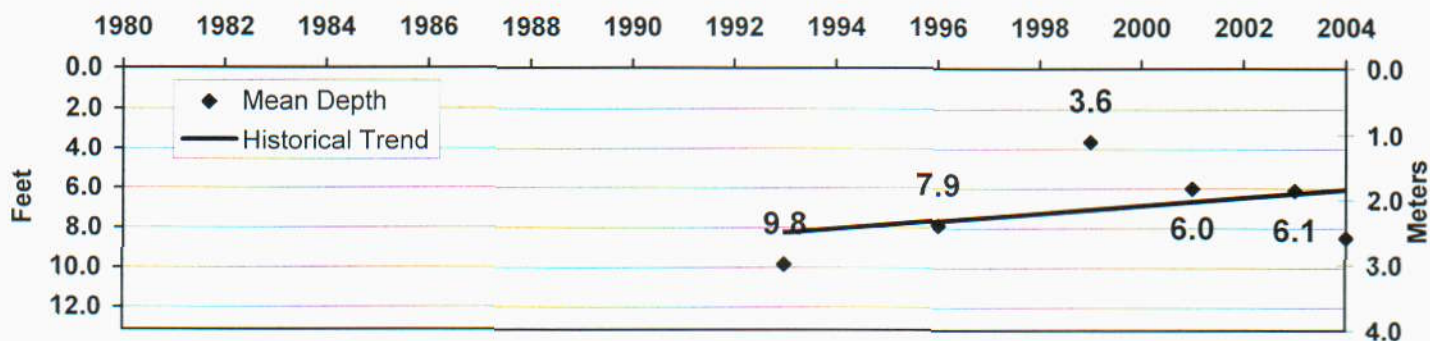
Total Phosphorus



Chlorophyll-a



Secchi Depth



Clearwater River Watershed District

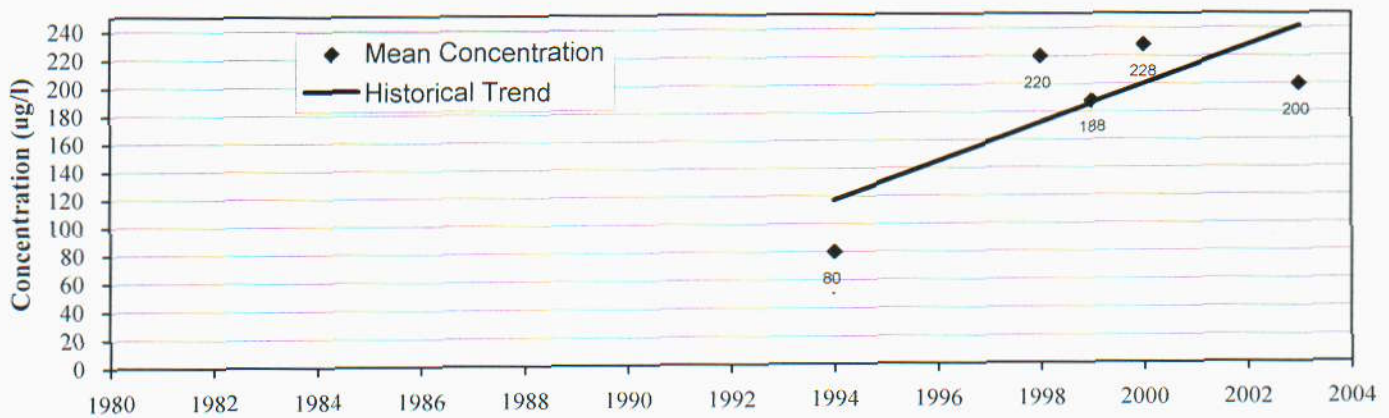
Cedar Lake Historical Data

Wenck
 Wenck Associates, Inc. 1800 Pioneer Creek Center
 Environmental Engineers Maple Plain, MN 55359

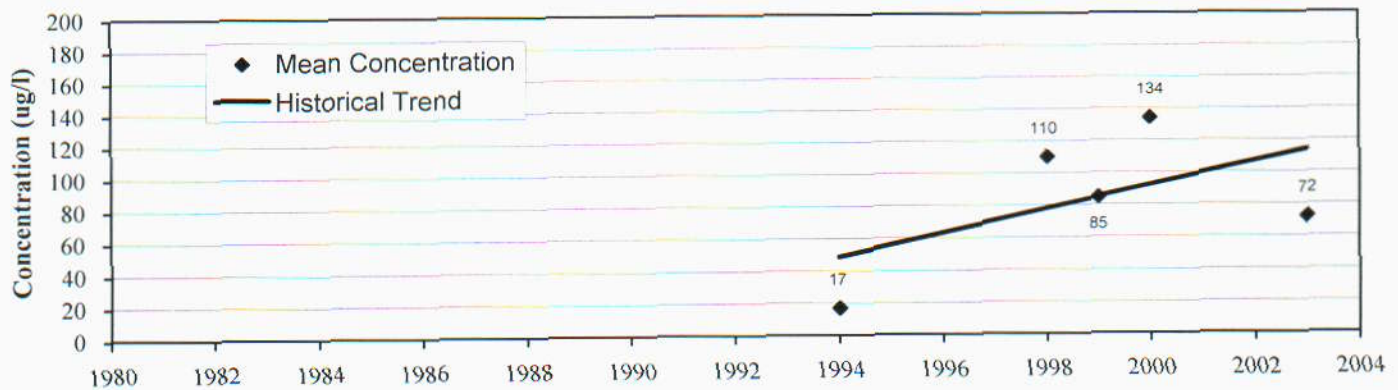
Nov 2004

Figure 6

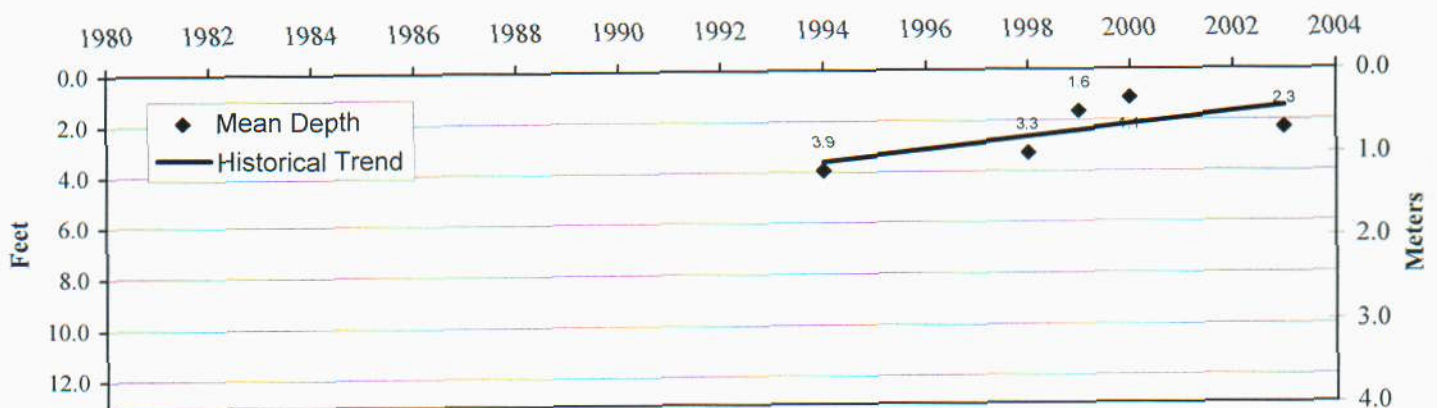
Total Phosphorus



Chlorophyll-a



Secchi Depth



Clearwater River Watershed District

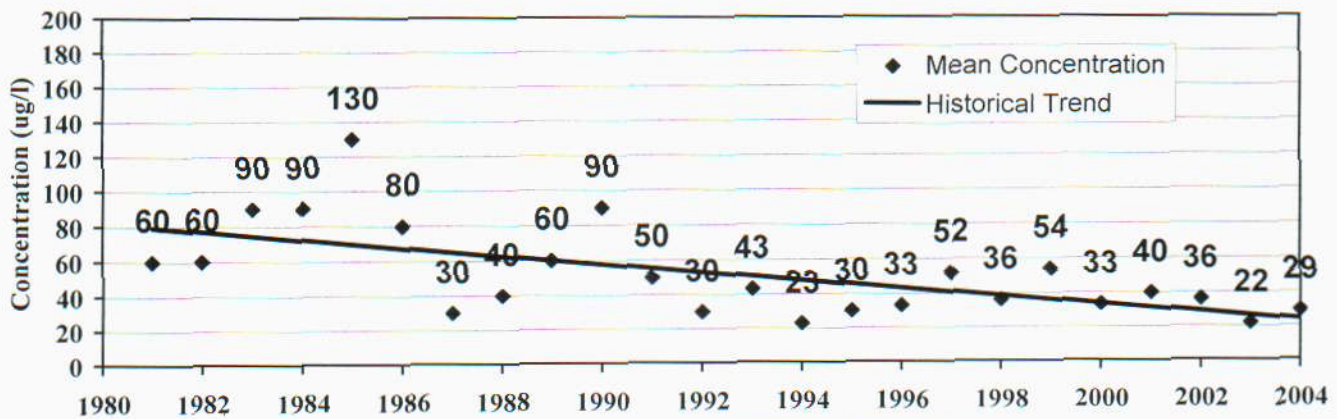
Clear Lake Historical Data

Wenck
Wenck Associates, Inc. 1800 Pioneer Creek Center
Environmental Engineers Maple Plain, MN 55359

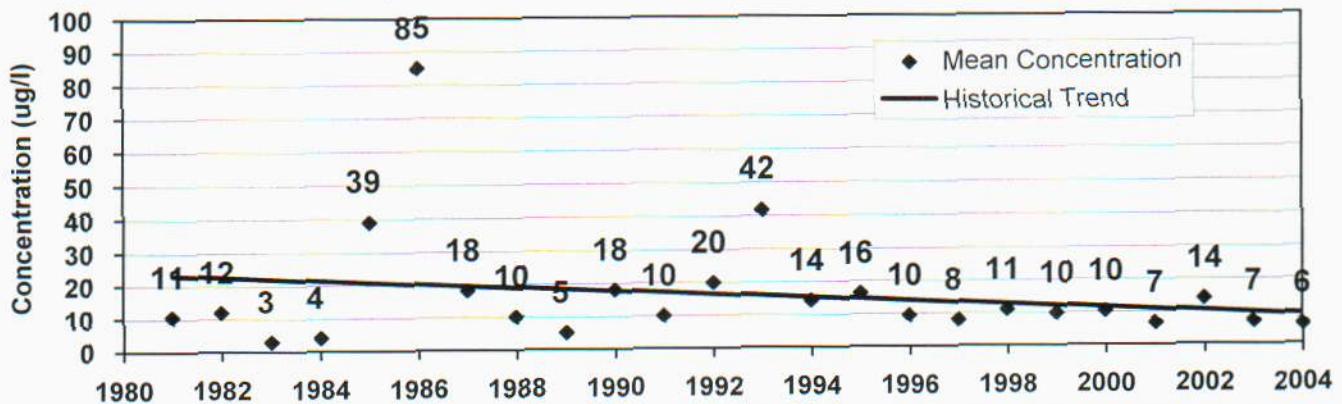
Jan 2004

Figure 7

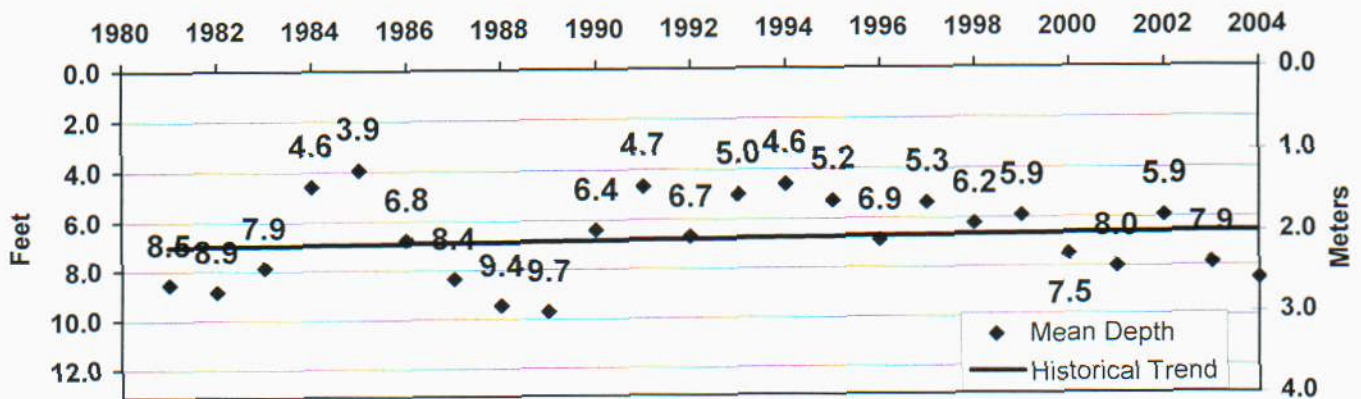
Total Phosphorus



Chlorophyll-a



Secchi Depth



Clearwater River Watershed District

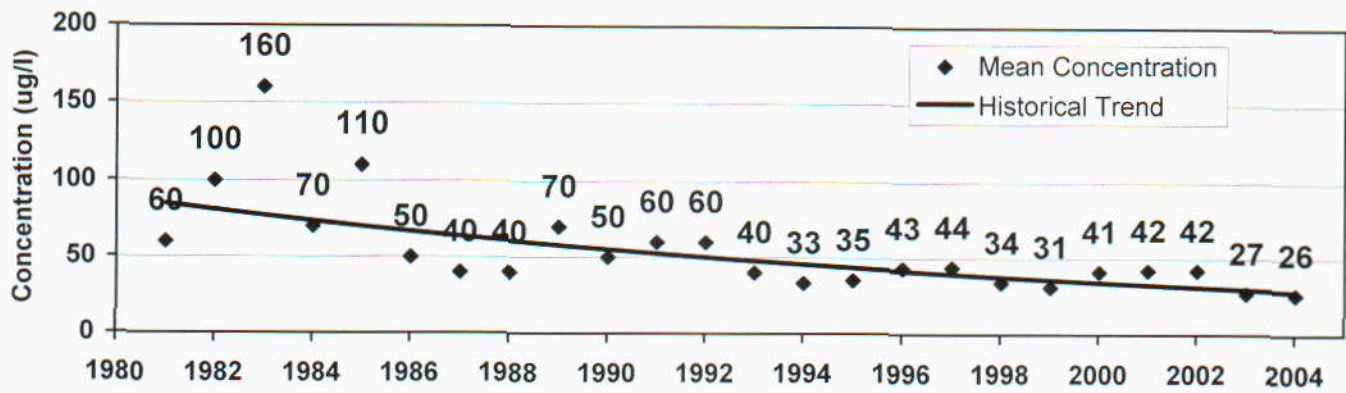
Clearwater Lake East Historical Data

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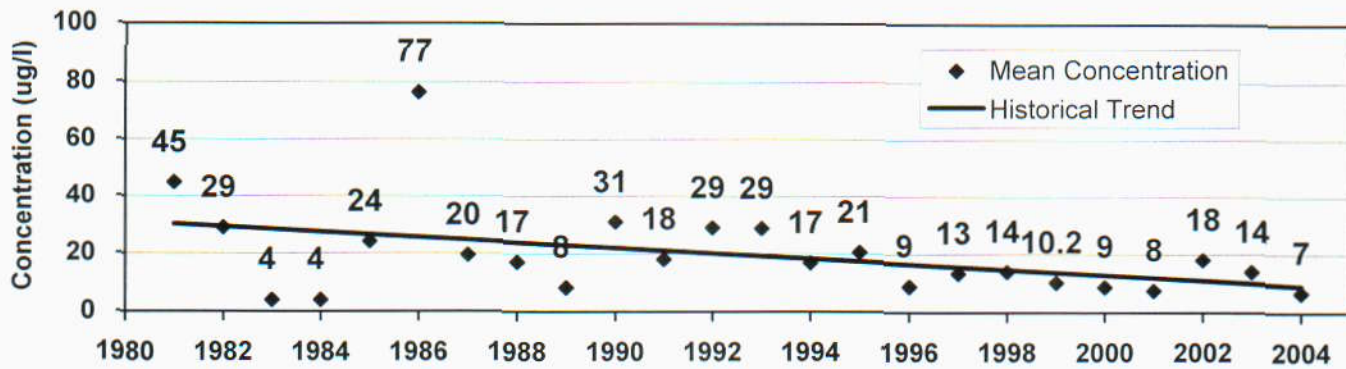
Nov 2004

Figure 8

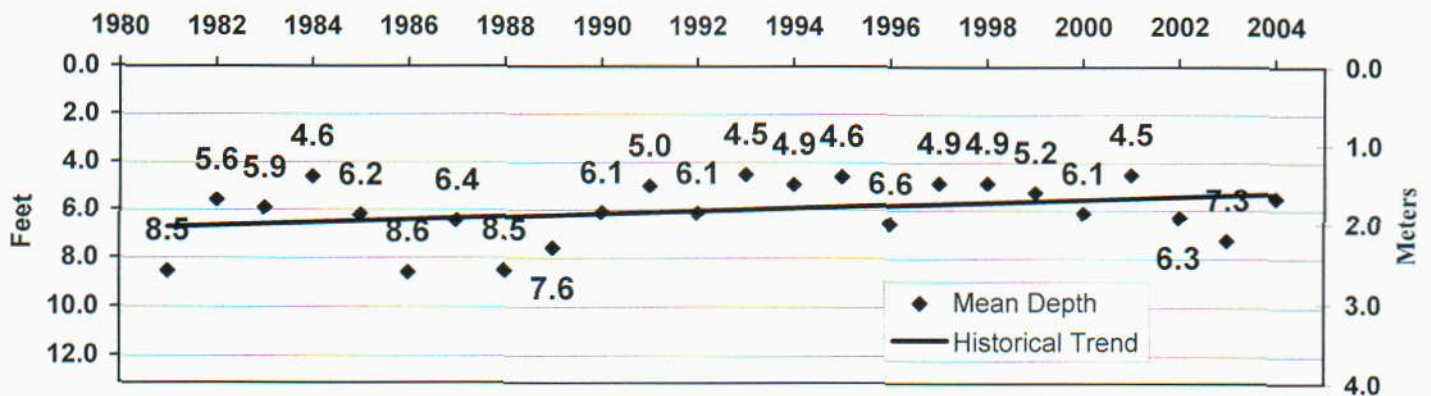
Total Phosphorus



Chlorophyll-a



Secchi Depth



Clearwater River Watershed District

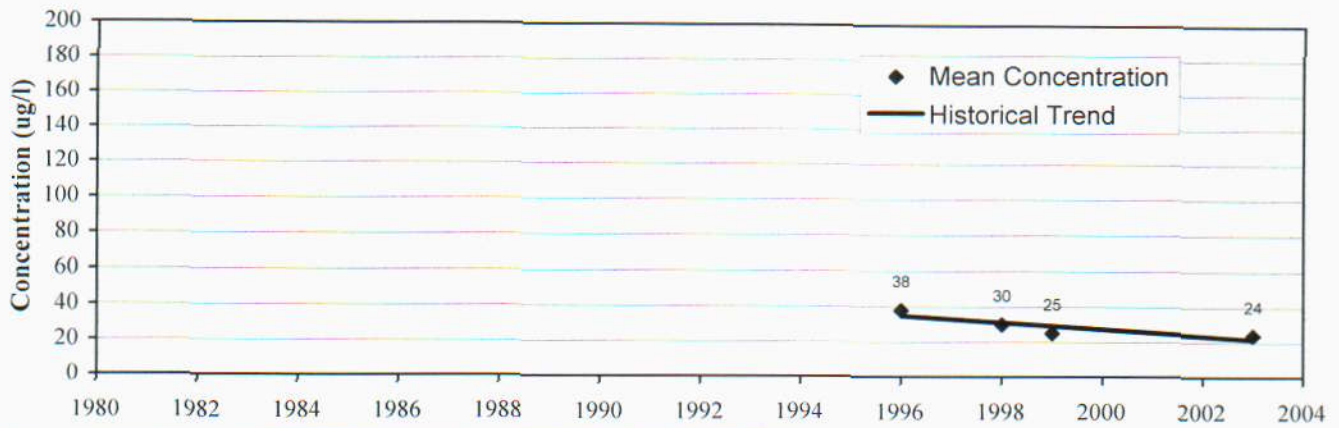
Clearwater Lake West Historical Data

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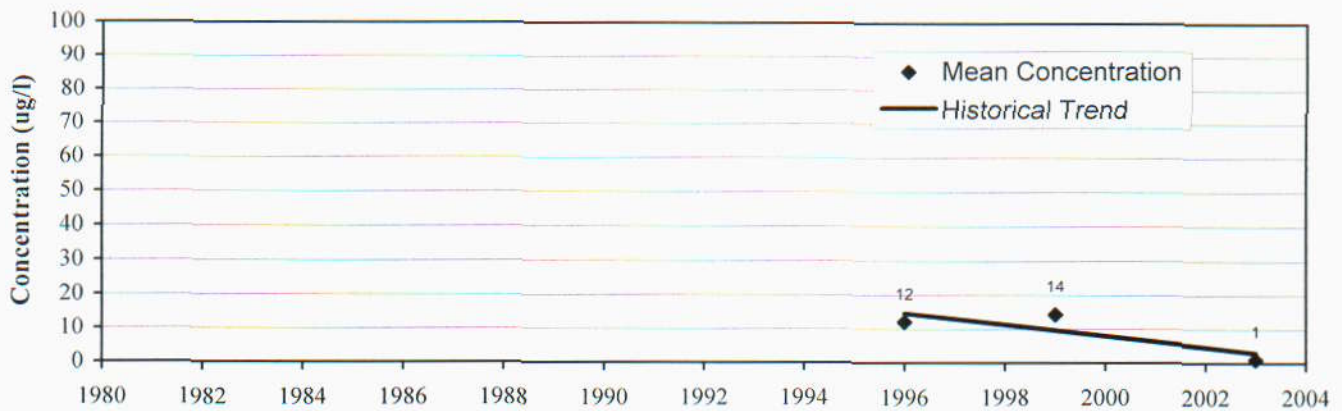
Nov 2004

Figure 9

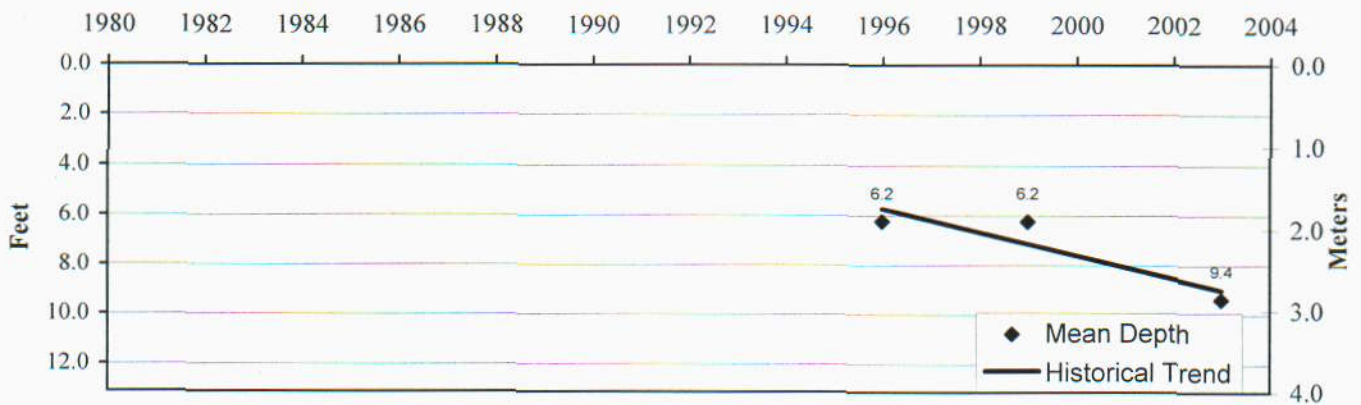
Total Phosphorus



Chlorophyll-a



Secchi Depth



Clearwater River Watershed District

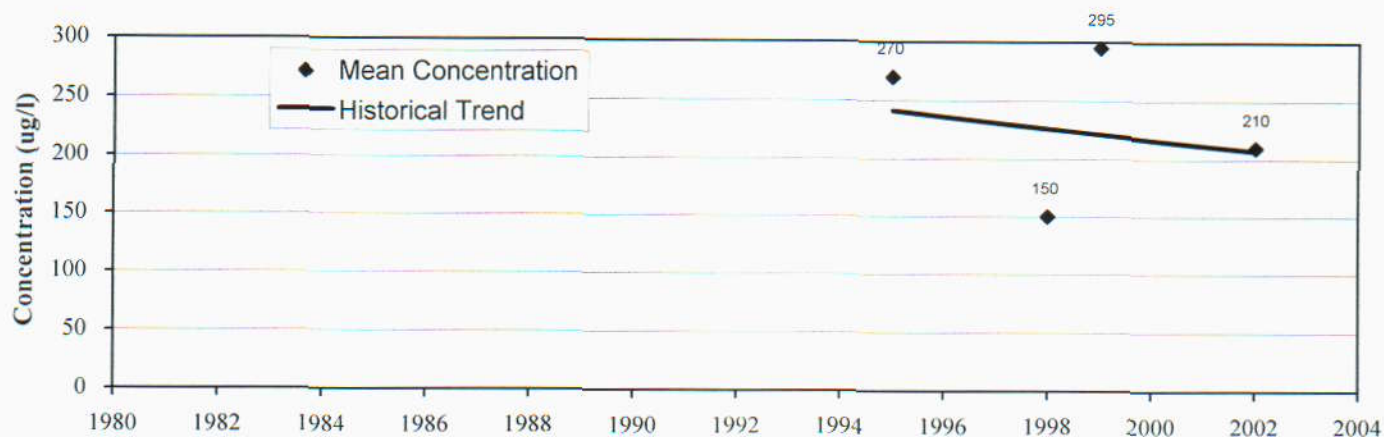
Grass Lake Historical Data


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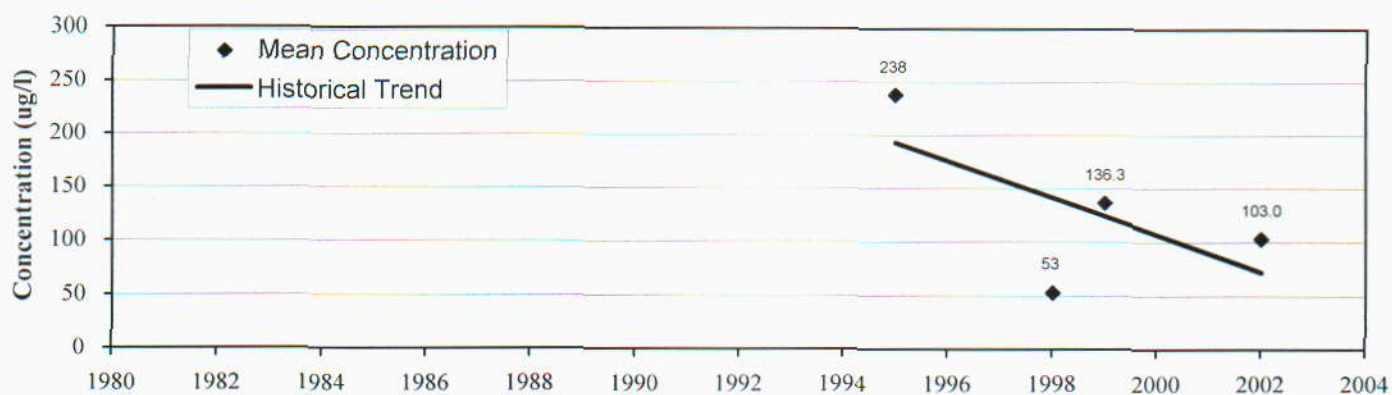
Jan 2004

Figure 10

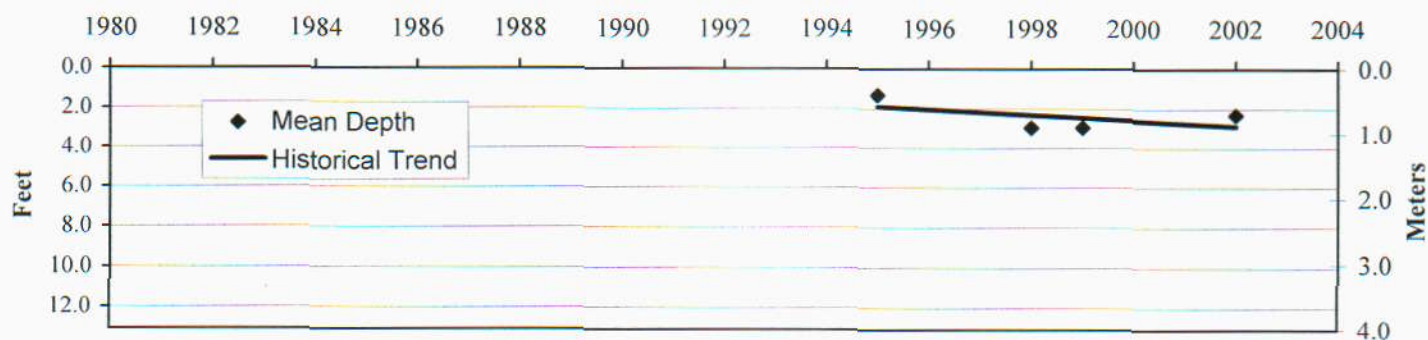
Total Phosphorus



Chlorophyll-a



Secchi Depth



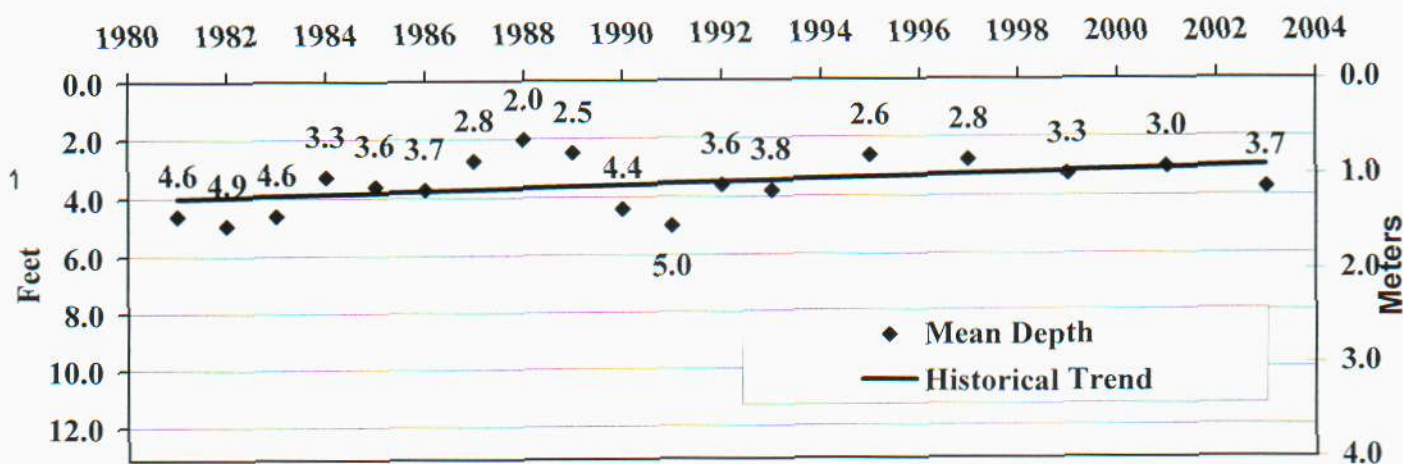
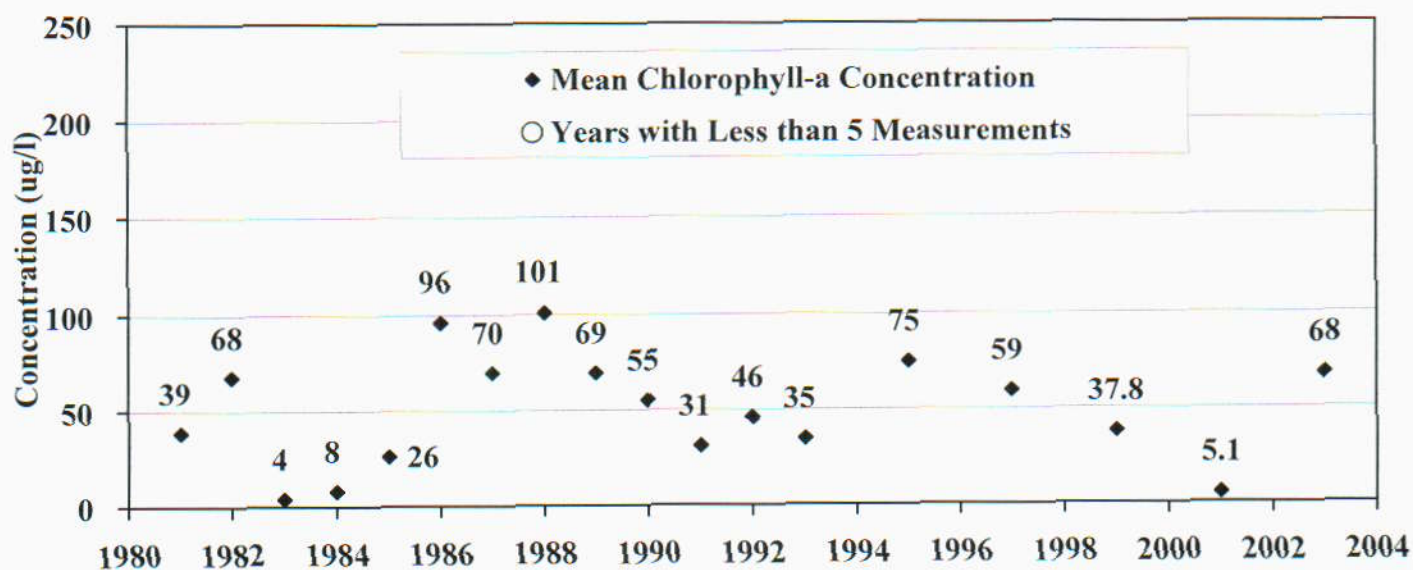
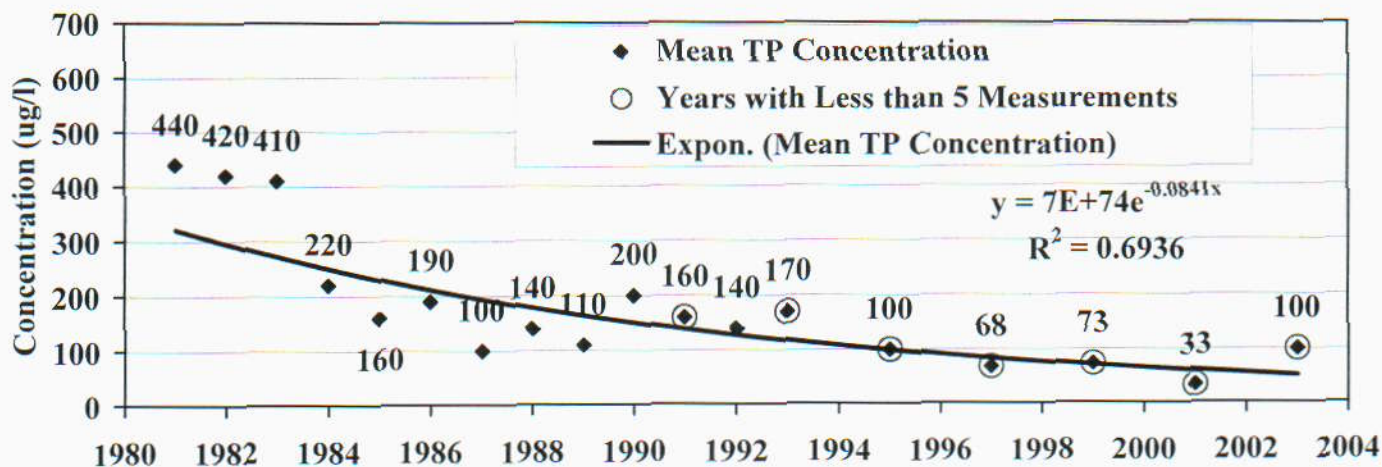
Clearwater River Watershed District

Henshaw Lake Historical Data


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Figure 11



Clearwater River Watershed District

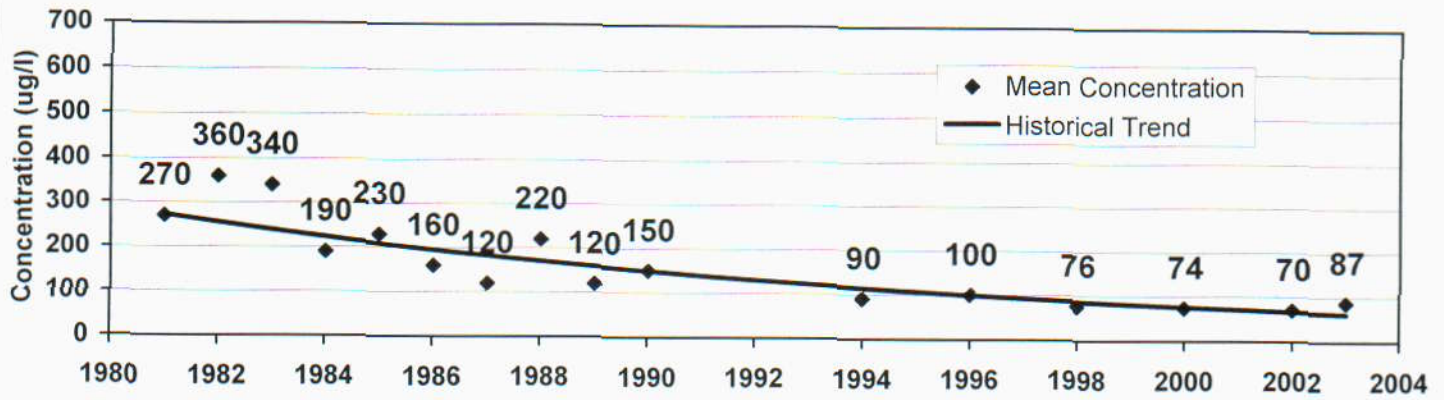
Lake Louisa Historical Data

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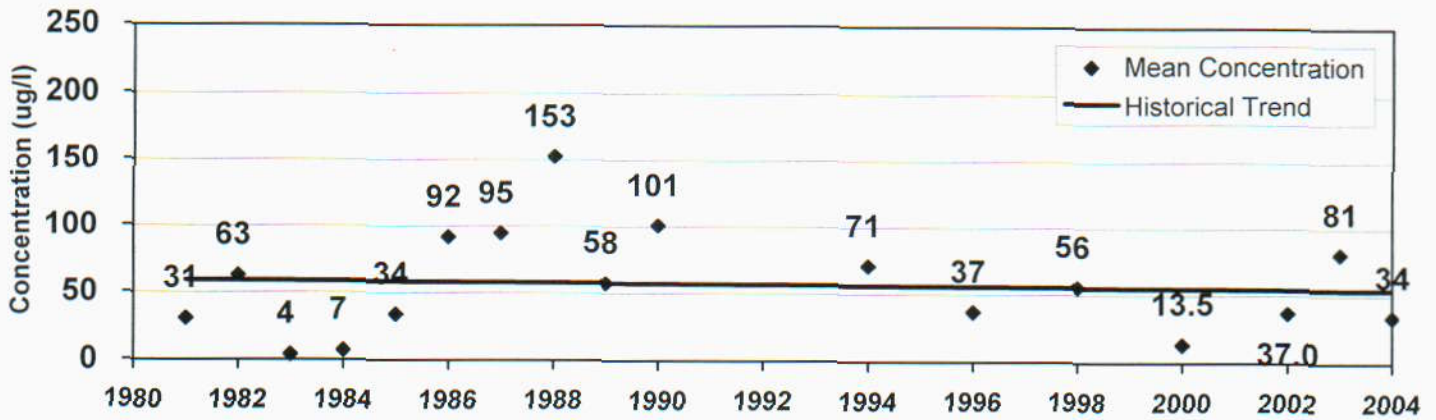
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Figure 12

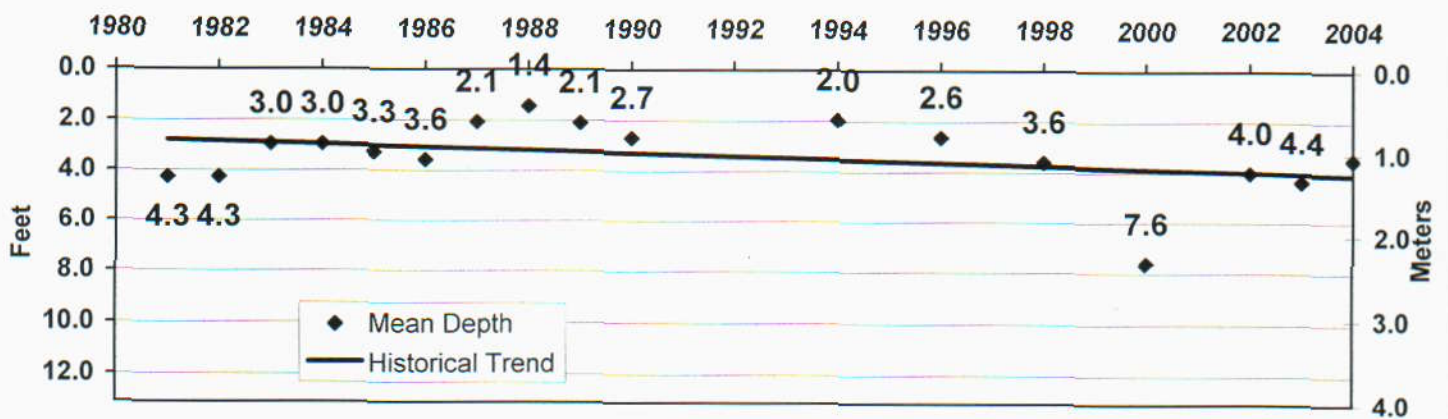
Total Phosphorus



Chlorophyll-a



Secchi Depth



Clearwater River Watershed District

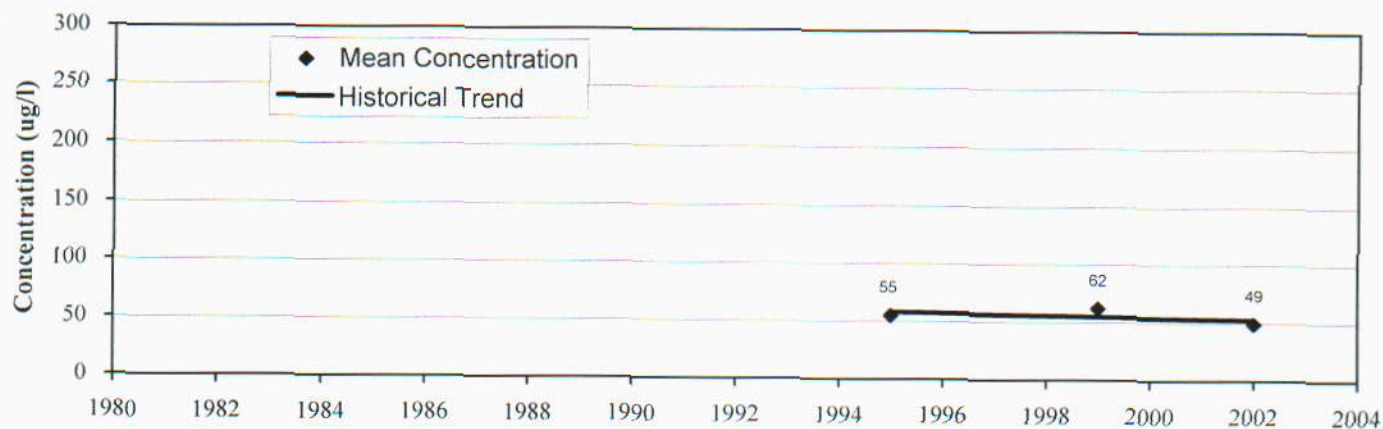
Lake Marie Historical Data

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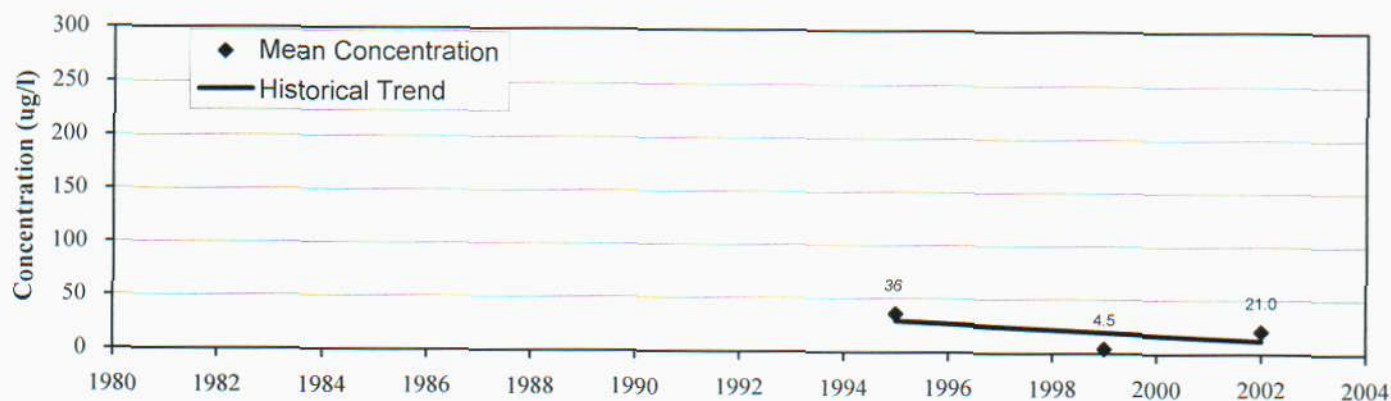
Nov 2004

Figure 13

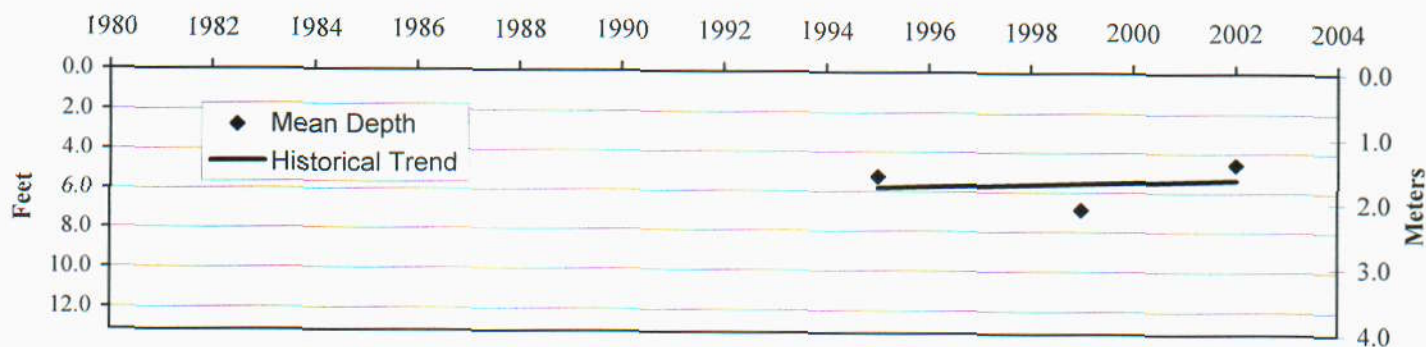
Total Phosphorus



Chlorophyll-a



Secchi Depth



Clearwater River Watershed District

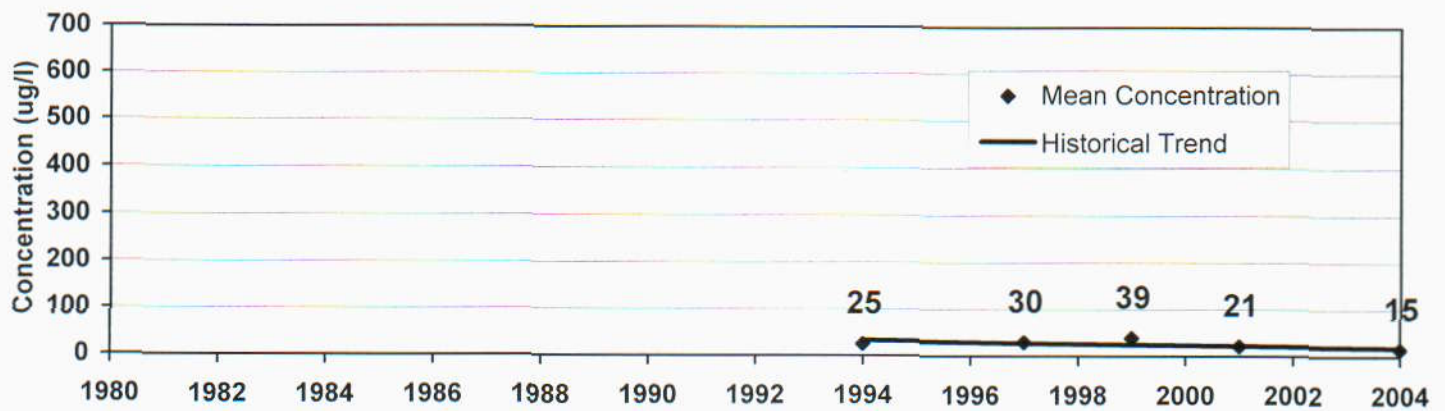
Little Mud Lake Historical Data


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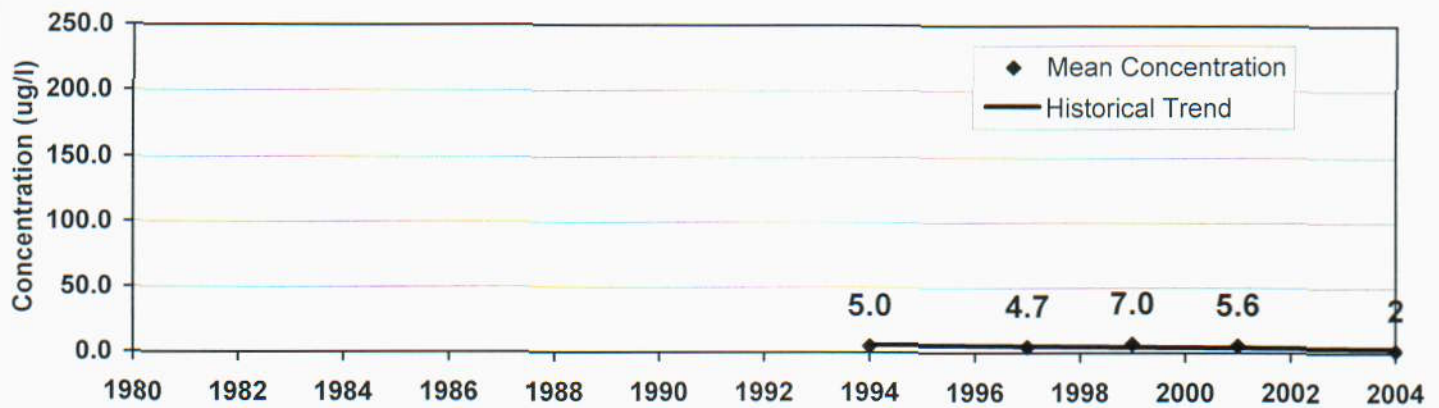
Jan 2004

Figure 14

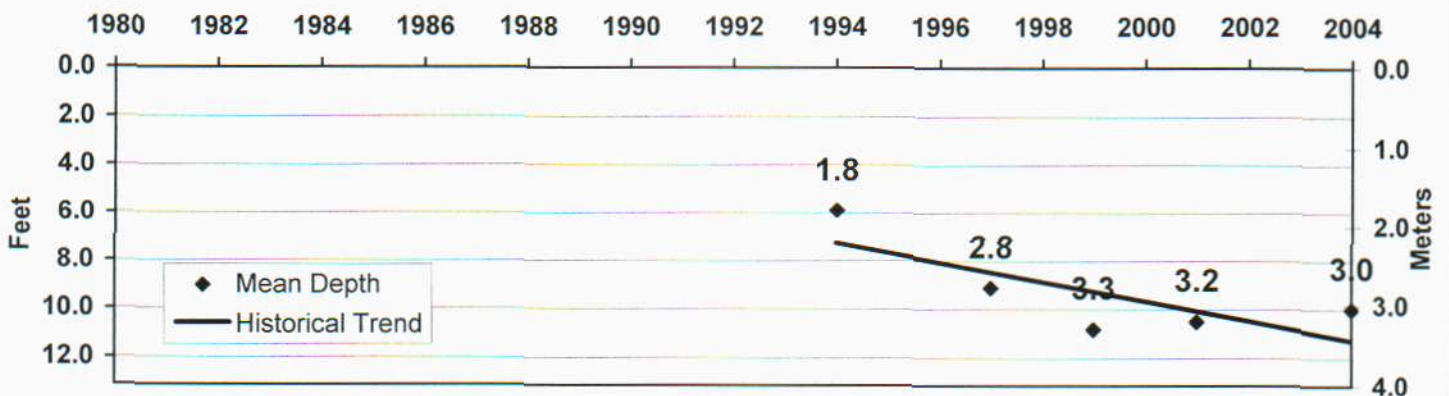
Total Phosphorus



Chlorophyll-a



Secchi Depth



Clearwater River Watershed District

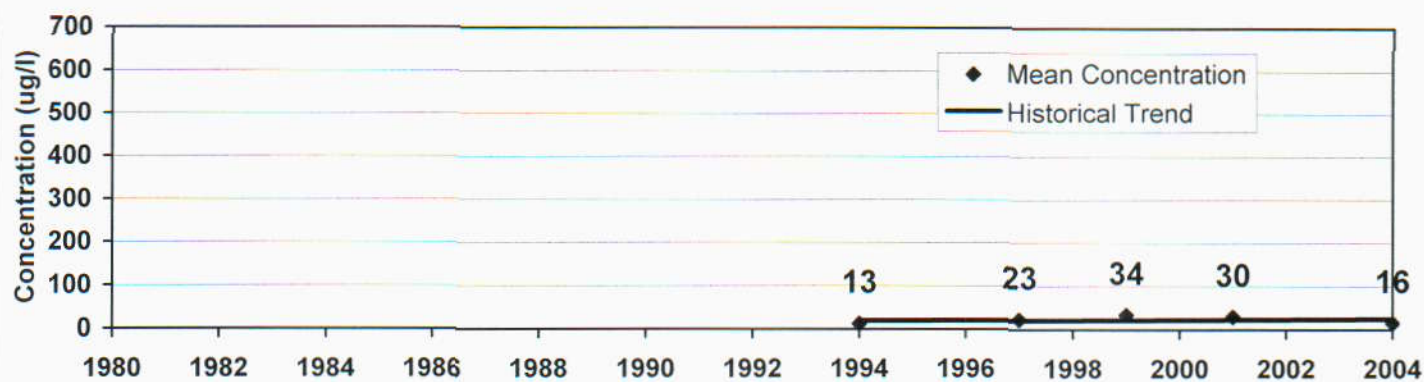
NixonLake Historical Data

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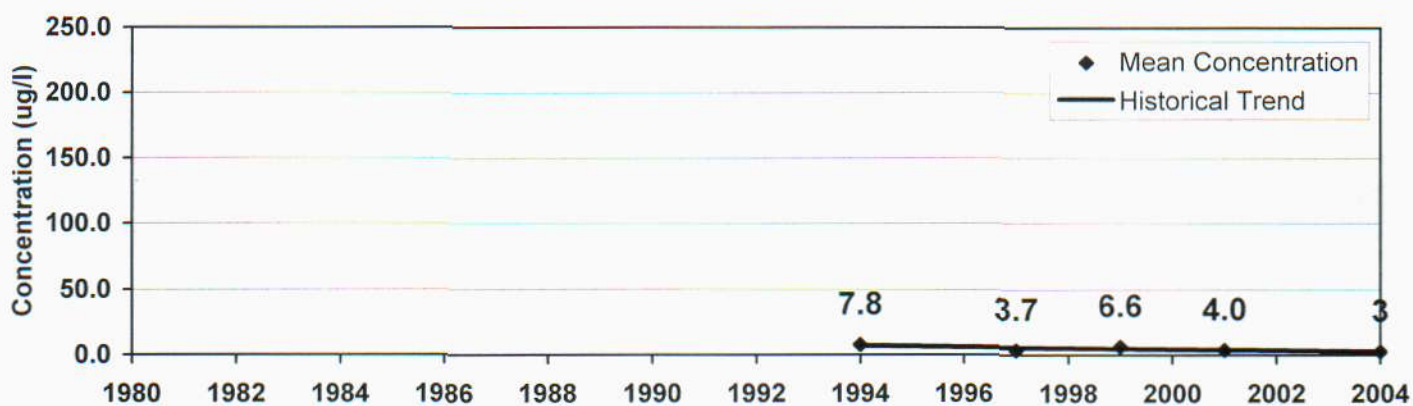
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Figure 15

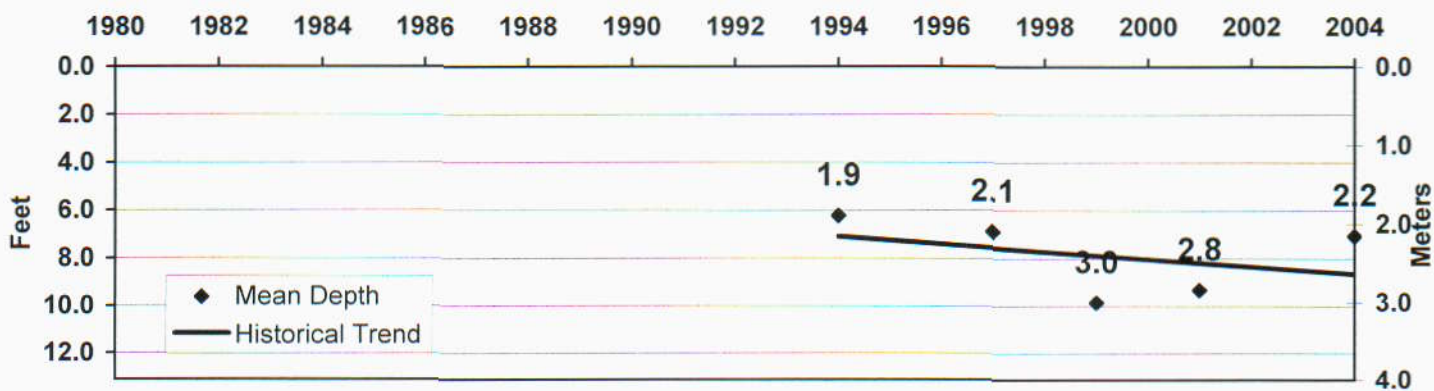
Total Phosphorus



Chlorophyll-a



Secchi Depth



Clearwater River Watershed District

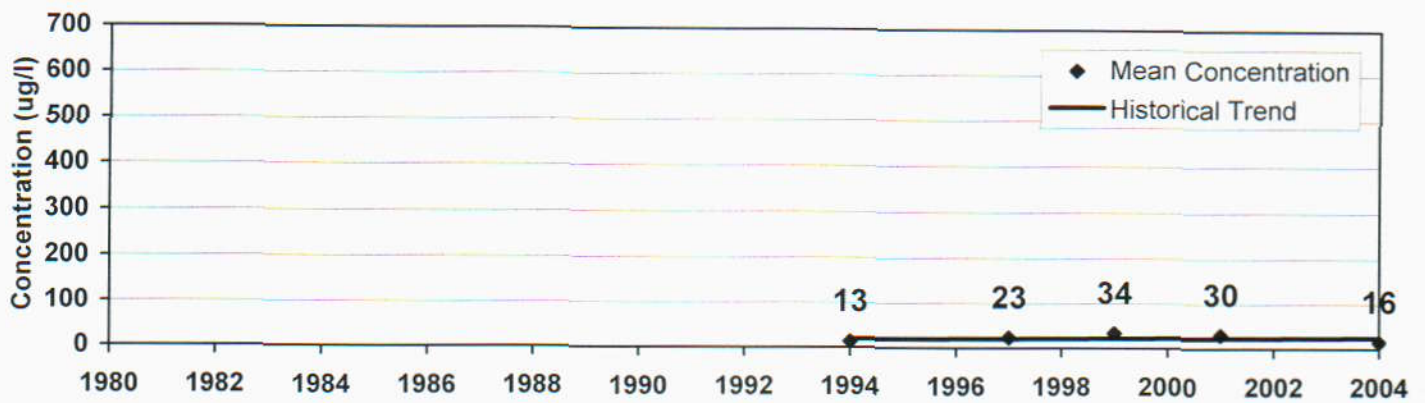
Otter Lake Historical Data


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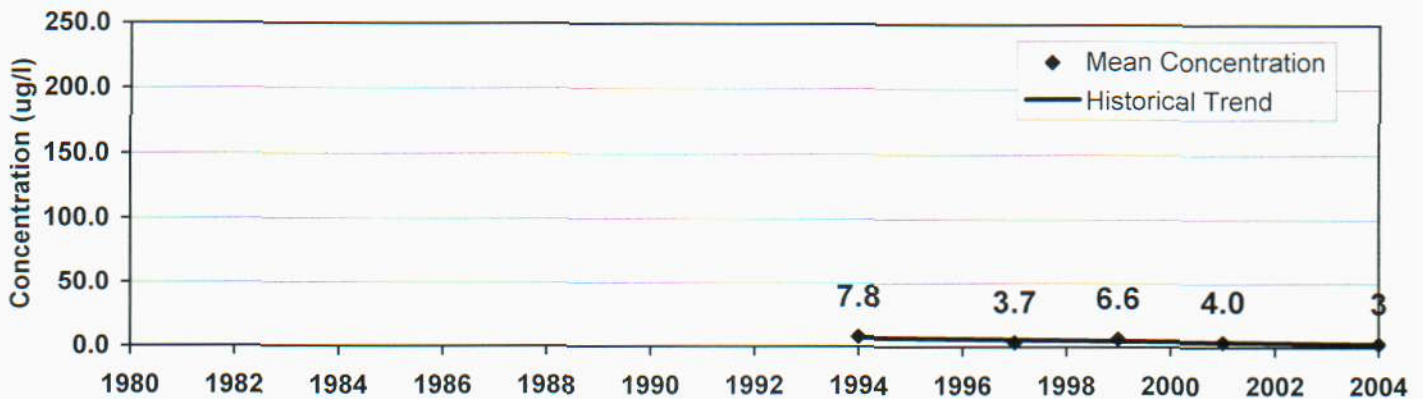
Nov 2004

Figure 16

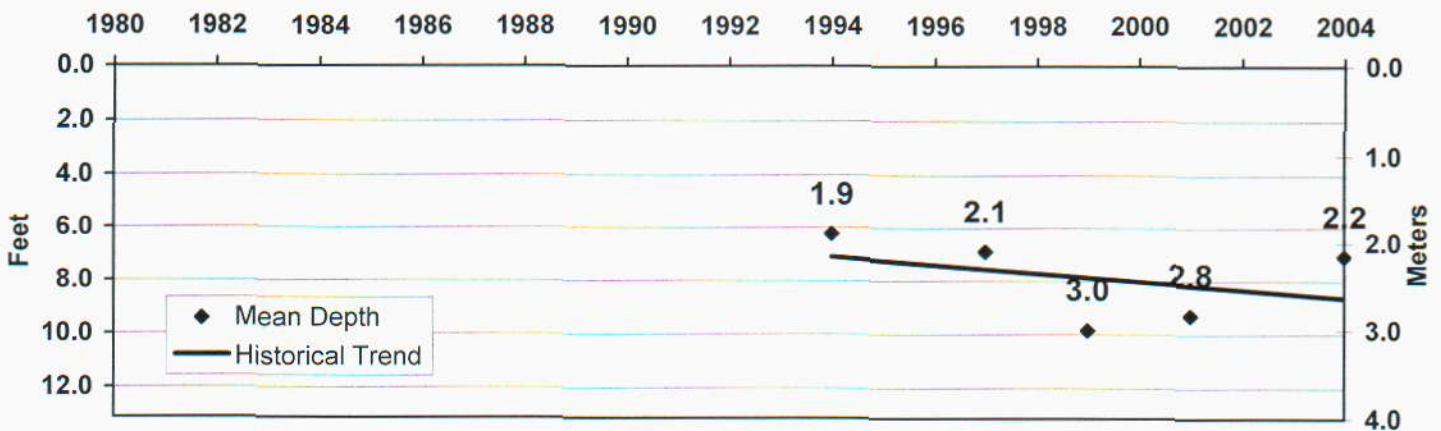
Total Phosphorus



Chlorophyll-a



Secchi Depth



Clearwater River Watershed District

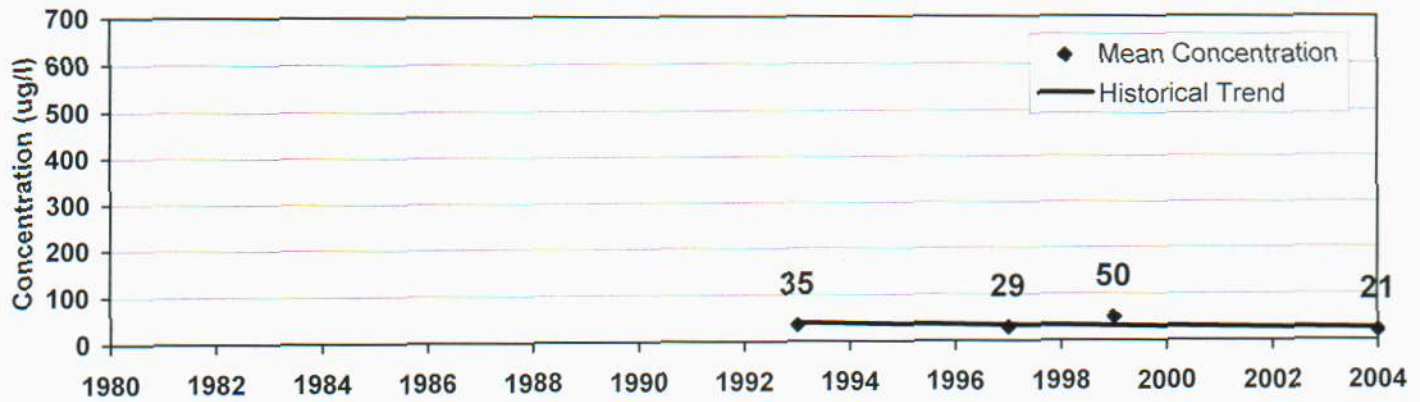
Pleasant Lake Historical Data

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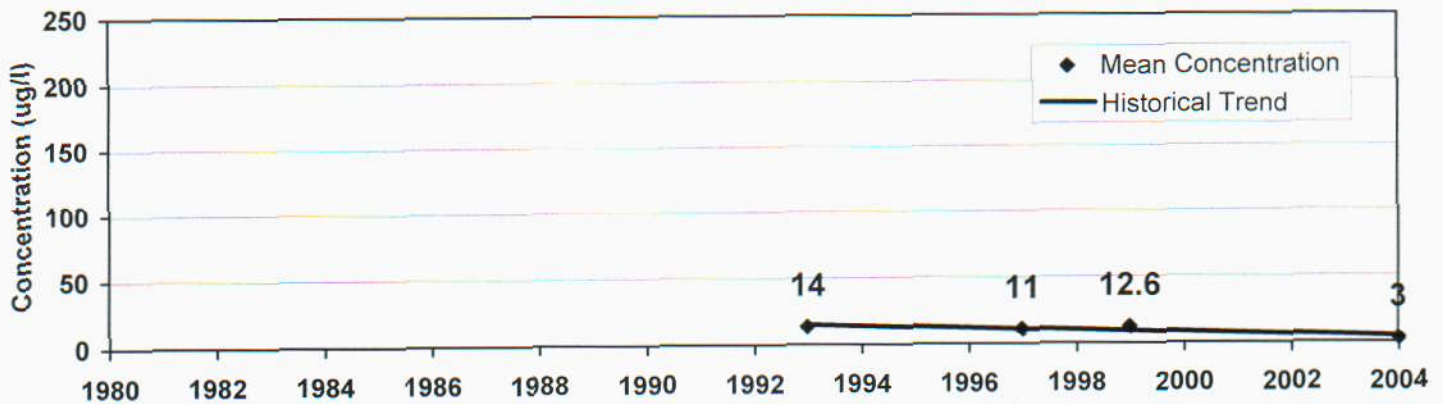
Nov 2004

Figure 17

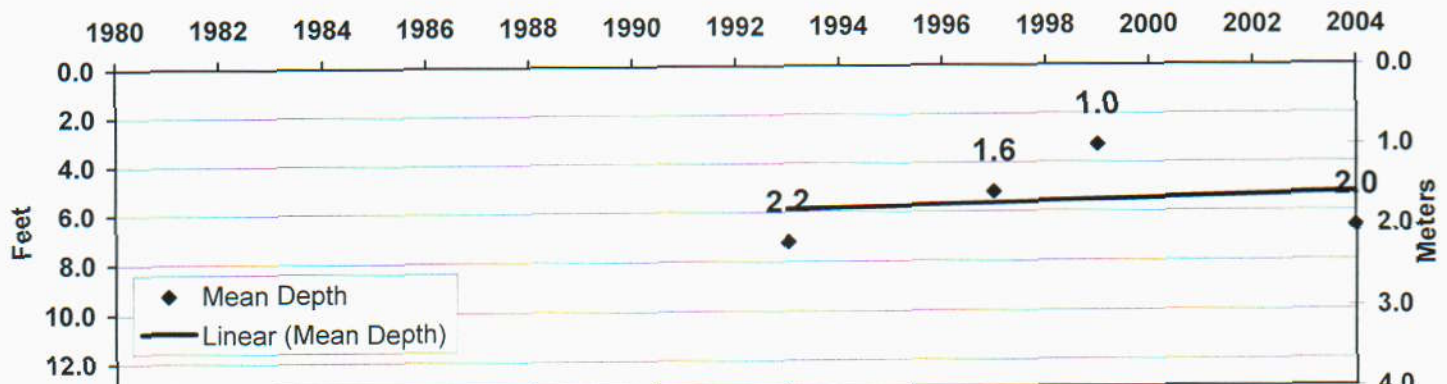
Total Phosphorus



Chlorophyll-a



Secchi Depth



Clearwater River Watershed District

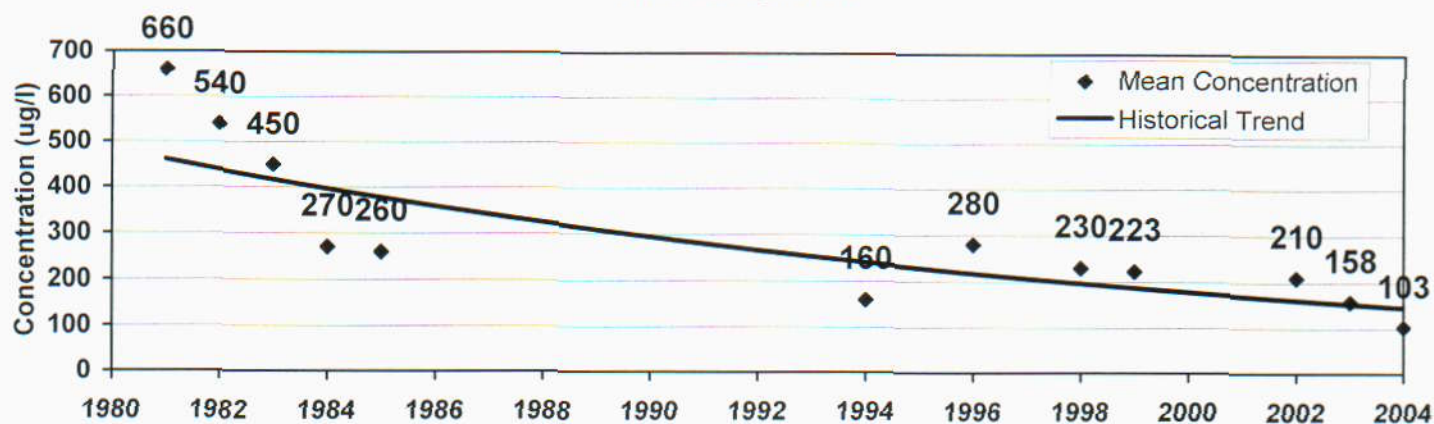
School Section Lake Historical Data


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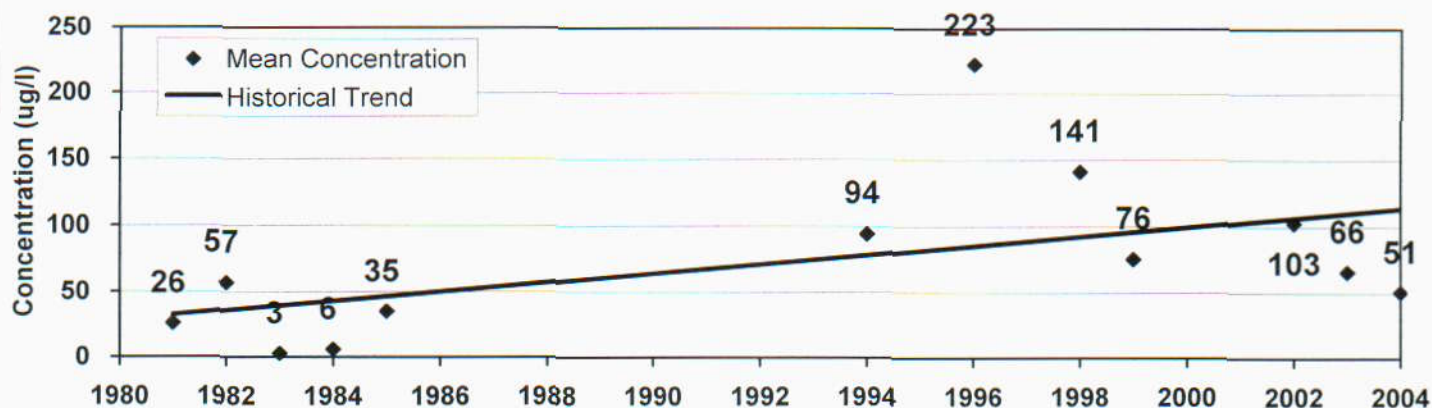
Nov 2004

Figure 18

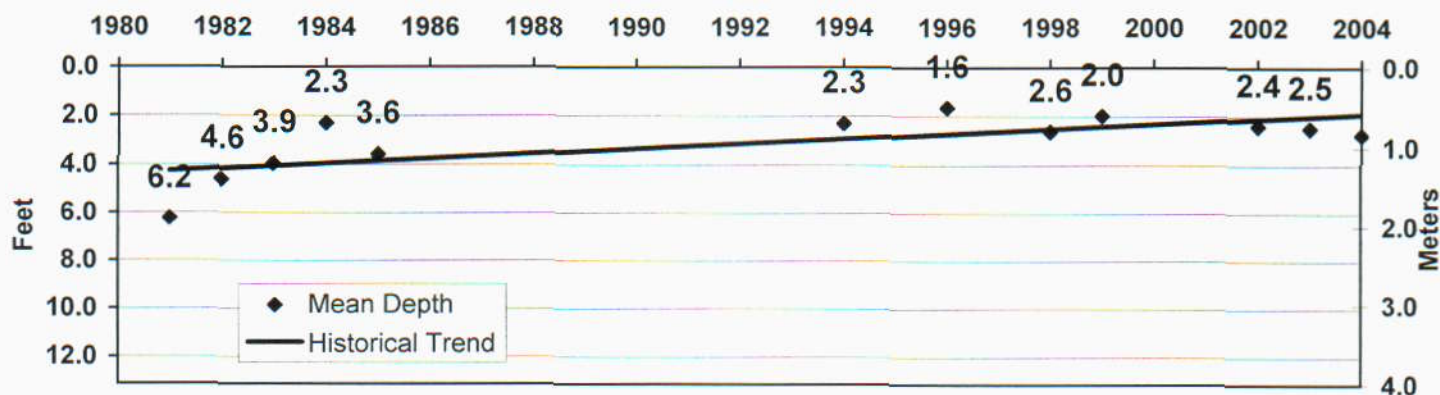
Total Phosphorus



Chlorophyll-a



Secchi Depth



Clearwater River Watershed District

Scott Lake Historical Data



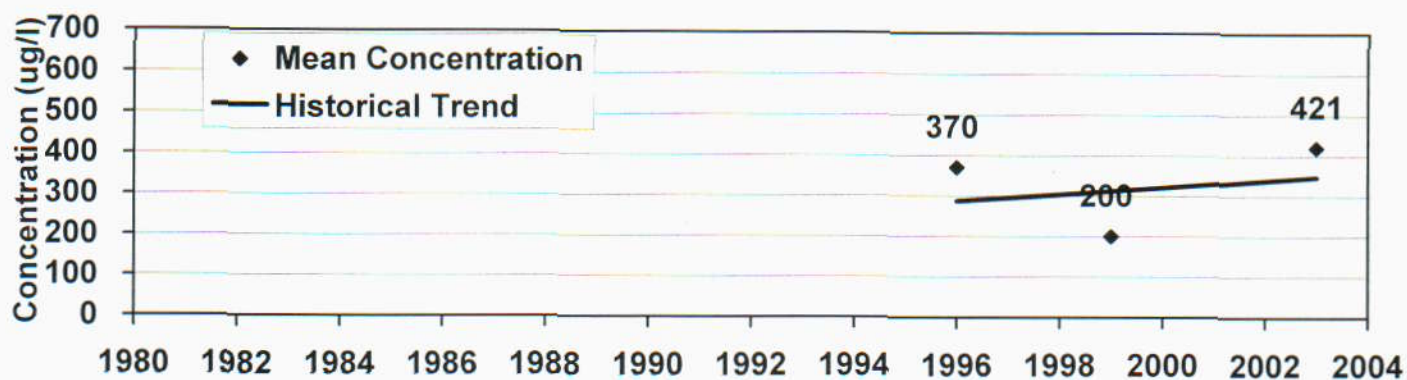
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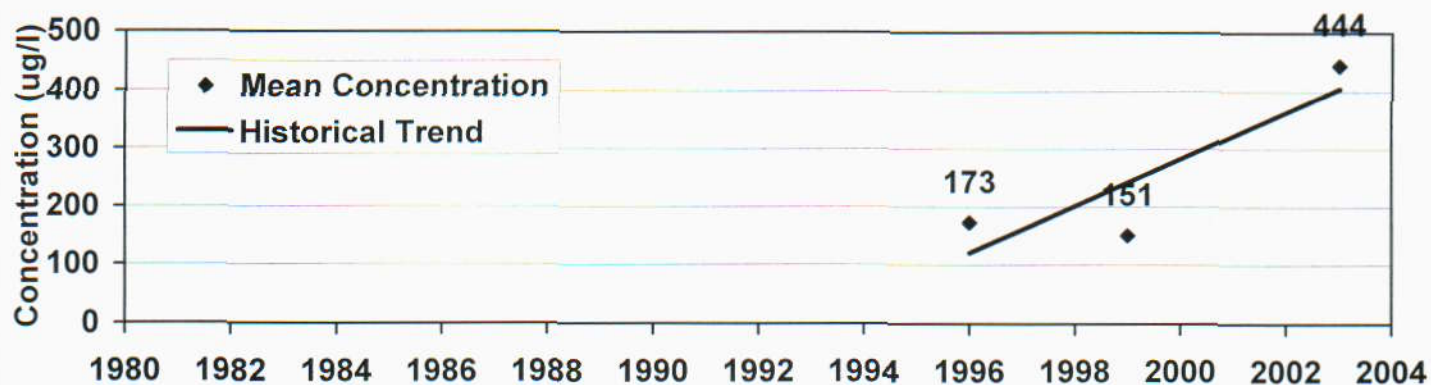
Nov 2004

Figure 19

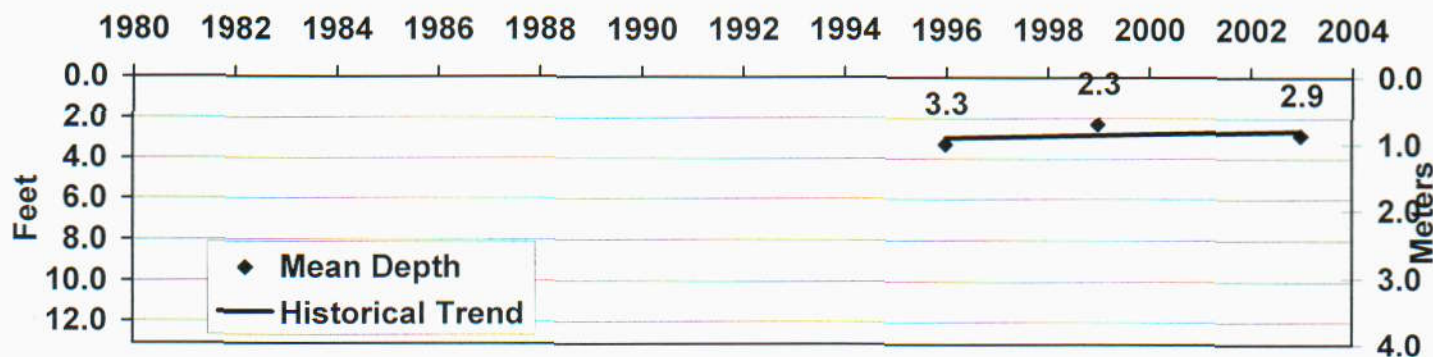
Total Phosphorus



Chlorophyll-*a*



Secchi Depth



Clearwater River Watershed District

Swart Watts Lake Historical Data



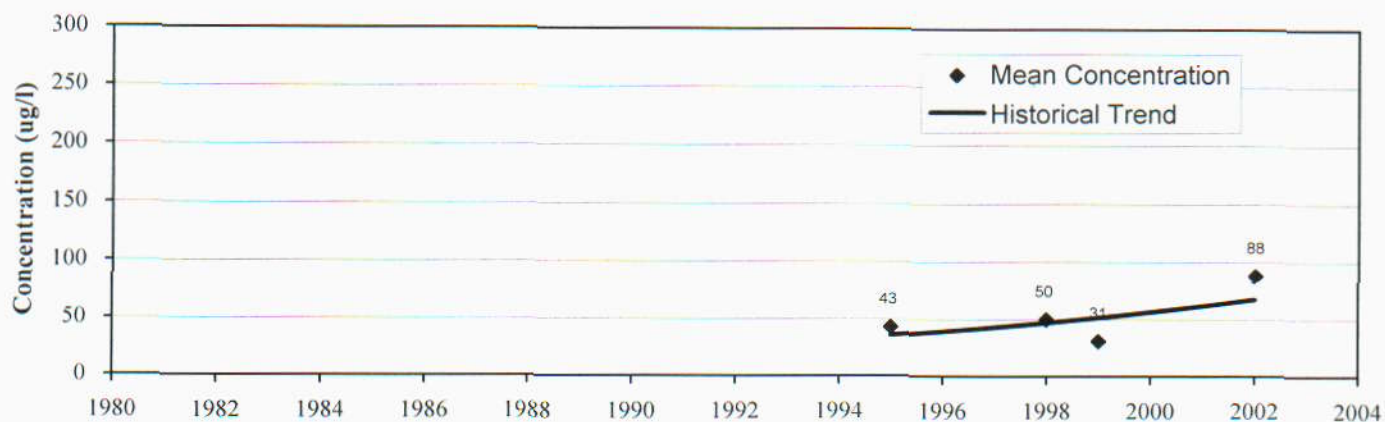
Wenck

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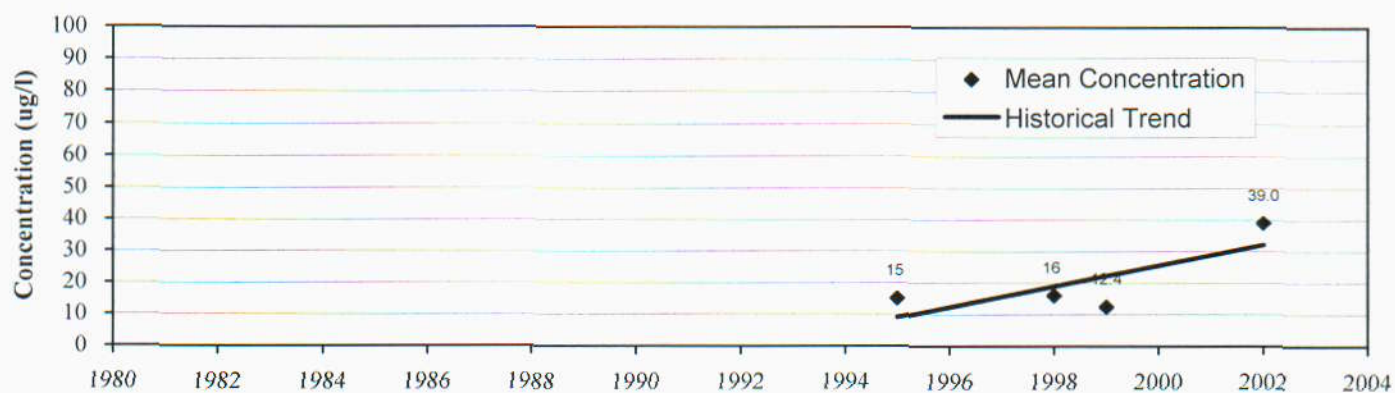
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Figure 20

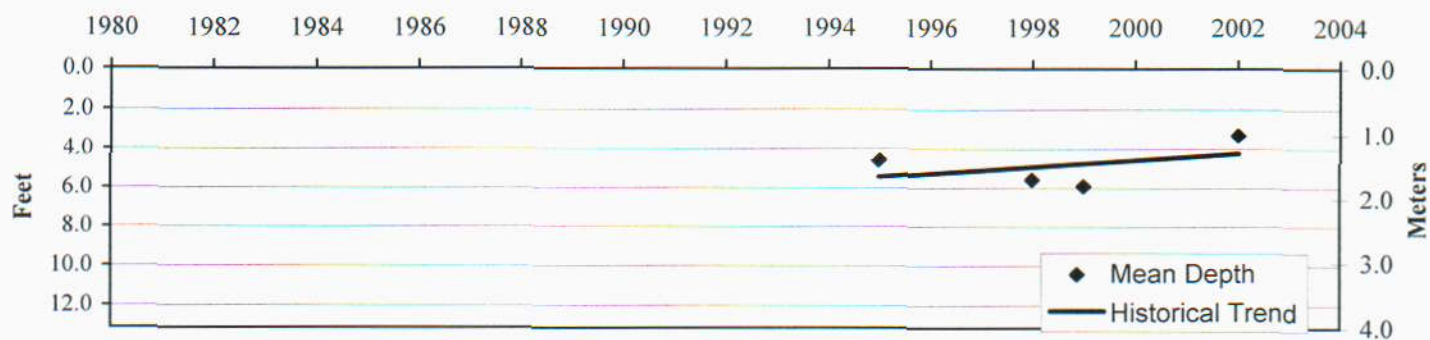
Total Phosphorus



Chlorophyll-a



Secchi Depth



Clearwater River Watershed District

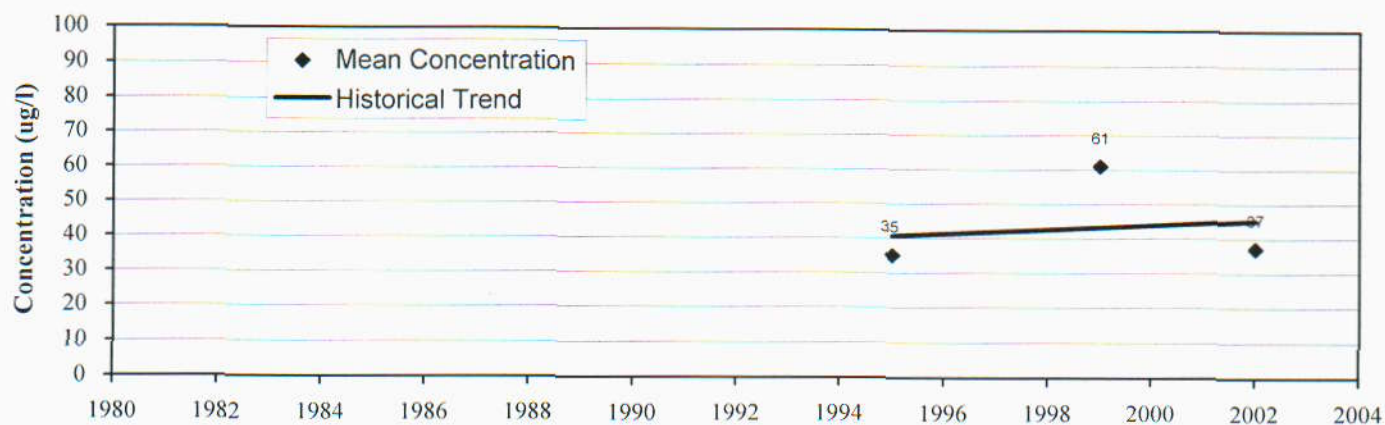
Union Lake Historical Data


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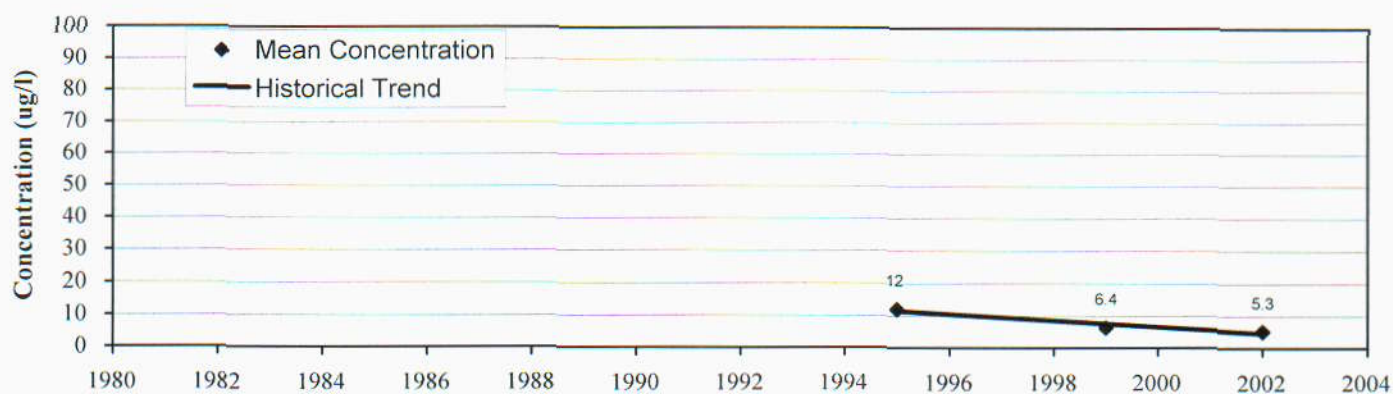
Jan 2004

Figure 21

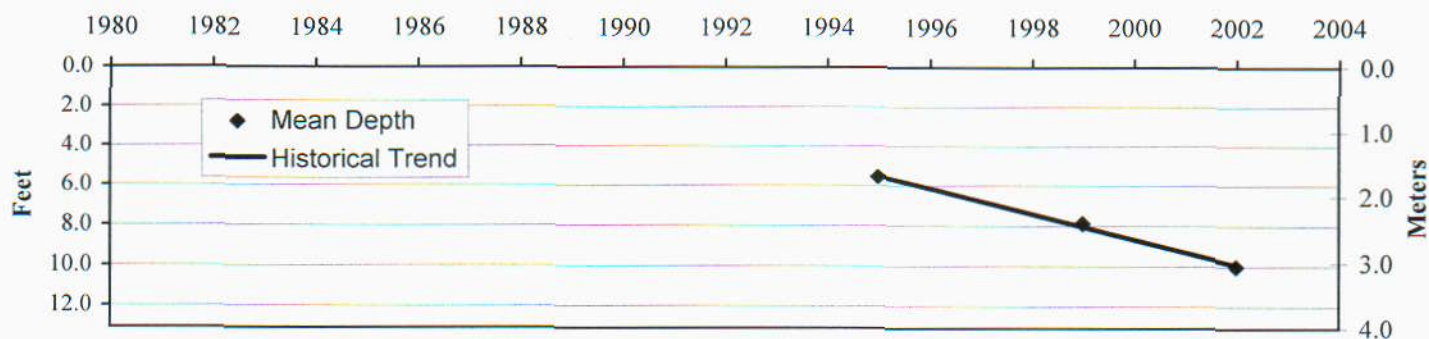
Total Phosphorus



Chlorophyll-a



Secchi Depth



Clearwater River Watershed District

Wiegand Lake Historical Data

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Figure 22

TABLE 1
HISTORICAL SUMMARY OF LAKE WATER QUALITY DATA
Summer (June-September) Epilimnetic Means

Clearwater River Watershed District

	Number of Samples	Total Phosphorous (ug/l)		Chlorophyll-a (ug/l)		Secchi Disk Transparency (m)	
		Mean (3)	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
<u>ALBION</u>							
1996	4	130	24	204	224	0.5	0.3
1999	4(5)	220	65	168.7	72	0.8	0.0
2003	4	199	78	117	73	1.0	
Mean		183	56	163	123	0.8	0.1
<u>AUGUSTA</u>							
1981	7	260	400	25	14	1.4	0.3
1982	7	140	120	34	21	1.4	0.6
1983	7	300	90	4	3	1.8	1.0
1984	7	90	30	4	2	1.6	0.8
1985	7	120	120	23	12	1.2	0.2
1986	6	90	40	69	91	1.9	0.5
1987	7	30	10	20	12	1.3	0.3
1988	5	40	10	19	6	1.4	0.3
1989	6	80	30	26	40	1.5	0.4
1990	5	90	20	73	105	1.7	0.7
1991	3	80	40	56	73	1.1	0.4
1992	8	30	20	19	6	1.6	0.7
1993	4 (1)	68	20	42	19	1.2	0.4
1995	4 (2)	28	(4) 15	21	12	1.8	0.7
1997	4	46	(4) 13	20	(5) 1	1.7	0.2
1999	4(6)	37	4	8.5	2.7	1.6	0.2
2001	2	48	6	6.4	0.0	1.8	0.0
2002	SWCD	84.3		13.5		1.9	
2003	3	42	15	29	23	1.5	
Mean		90	56	27	25	1.5	0.4
<u>BASS</u>							
1994	4	13	(4) 14	4.8	0.8	3.2	0.4
1998	4	28	11	2.0	1.0	3.1	0.6
1999	3	22	5	2.9	1.4	3.1	0.7
2001	2	25	4	2.7	1.0	4.2	1.8
Mean		22	9	3.1	1.1	3.4	0.9
<u>BETSY</u>							
1981	7	700	190	7.7	5.6	2.4	1.1
1982	7	650	90	59	50	1.3	0.7
1983	7	560	270	5	4	1.1	1.3
1984	7	350	160	7	5	0.8	0.2
1985	7	280	230	30	26	1.1	0.6
1987	2	120	0	74	35	0.87	0.41
1995	4 (2)	290	183	18	13	1.0	0.34
1997	4	245	108	100	(5) 98	0.83	0.05
1999	3(8)	247	110	170	85	0.8	0.2
2001	2	420	368	4.3	1	0.46	0.0
2003	4	194	78	45.0	52.0	1.3	
Mean		369	162	47	34	1.1	0.5

TABLE 1
HISTORICAL SUMMARY OF LAKE WATER QUALITY DATA
Summer (June-September) Epilimnetic Means

Clearwater River Watershed District

		Total Phosphorous (ug/l)		Chlorophyll-a (ug/l)		Secchi Disk Transparency (m)	
Number of Samples		Mean (3)	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
<u>CAROLINE</u>							
1981	7	220	100	39	33	1.3	0.3
1982	7	260	140	54	35	1.4	0.8
1983	7	300	140	3	3	1.8	1.1
1984	7	140	50	5	2	1.3	0.3
1985	7	170	150	41	46	1.5	0.6
1987	2	50	10	46	30	1.1	0.4
1994	4	40	18	55	16	0.8	0.2
1996	4	88	33	36	12	1.2	0.2
1998	4	86	24	55	43	1.2	0.1
2001	(SCWD) 5	43	18	12	10	1.8	0.8
2002		95		45		1.6	
2003	(SCWD) 5	66		28.6		1.5	
2004	4	45	8	25	18	1.1	0.0
Mean		123	63	34	23	1	0
<u>CEDAR</u>							
1993	4	30	10	13.3	5.9	3.0	0.4
1996	4	33	8	12.9	6.5	2.4	0.3
1999	4	31	8	9.5	4.4	1.1	0.2
2001	2	26	5	5.9	1.0	1.8	1.4
2003	4	52	41	11.0	6	1.9	
2004	4	33	15	3.0	3	2.6	1 reading
Mean		34	15	9	4	2	1
<u>CLEAR</u>							
1994	4	80	24	17	8	1.2	0.3
1998	4	220	141	110	141	1.0	0.1
1999	4	188	43	85	47	0.5	0.0
2000	4	228	30	134	42.6	0.3	0.1
2003	4	200	52	72	23	0.7	
Mean		183	58				
<u>CLEARWATER EAST</u>							
1981	7	60	20	11	8	2.6	0.7
1982	7	60	30	12	9	2.7	1.6
1983	7	90	50	3	2	2.4	1.8
1984	7	90	40	4	2	1.4	0.2
1985	7	130	60	39	28	1.2	0.3
1986	6	80	40	85	132	2.1	0.8
1987	7	30	10	18	20	2.6	1.2
1988	5	40	10	10	5	2.9	1.8
1989	6	60	20	5	4	3.0	1.9
1990	5	90	100	18	9	2.0	0.6
1991	3	50	20	10	7	1.4	0.2
1992	8	30	10	20	10	2.0	0.6
1993	4 (1)	43	15	42	38	1.5	0.8
1994	4	23	5	14	9	1.4	0.2
1995	4 (2)	30	8	16	10	1.6	0.4
1996	4	33	8	10	3	2.1	0.3
1997	4	52	17	8	(5) 2	1.6	0.2
1998	4 (6)	36	18	11	3	1.9	0.4
1999	4	54	6	10	2.1	1.8	0.2
2000	4	33	18	10	3.4	2.3	1.0
2001	2	40	25	7	0.0	2.4	0.7
2002		36		14		1.8	
2003	3	22	5	7	6	2.4	
2004	4	29	13	6	3	2.6	0
Mean		51.7	23.8	16.2	13.7	2.1	0.7

TABLE 1
HISTORICAL SUMMARY OF LAKE WATER QUALITY DATA
Summer (June-September) Epilimnetic Means

Clearwater River Watershed District

	Number of Samples	Total Phosphorous (ug/l)		Chlorophyll-a (ug/l)		Secchi Disk Transparency (m)	
		Mean (3)	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
<u>CLEARWATER WEST</u>							
1981	7	60	20	45	71	2.6	0.9
1982	7	100	60	29	25	1.7	0.7
1983	7	160	100	4	5	1.8	1.4
1984	7	70	30	4	2	1.4	0.2
1985	7	110	80	24	17	1.9	1.3
1986	6	50	20	77	137	2.6	1.0
1987	7	40	10	20	12	2.0	0.4
1988	5	40	10	17	10	2.6	1.2
1989	6	70	10	8	4	2.3	0.9
1990	5	50	20	31	15	1.9	0.8
1991	3	60	40	18	12	1.5	0.0
1992	8	60	70	29	24	1.9	0.6
1993	4 (1)	40	0	29	6	1.4	0.3
1994	4	33	15	17	8	1.5	0.2
1995	4 (2)	35	11	21	10	1.4	0.3
1996	4	43	11	9	2	2.0	0.3
1997	4	44	3	13	6	1.5	0.1
1998	4 (7)	34	11	14	3	1.5	0.1
1999	4(6)	31	4	10.2	2.0	1.6	0.3
2000	4	41	31	9	2.9	1.9	0.4
2001	2	42	11	8	1.0	1.4	0.0
2002		42		18		1.9	
2003	3	27	9	14	9	2.2	
2004	4	26	8	7	4	1.7	0.0
Mean		55	25	20	17	2	1
<u>GRASS</u>							
1996	4	38	26	12	5	1.9	0.5
1998	1	30	0				
1999	4	25	2	14	9.3	1.9	0.4
2003	2	24	2	1	1	2.9	
Mean		29	8	13	7	1.9	0.4
<u>HENSHAW</u>							
1995	4	270	58	238	67	0.4	0.1
1998	4 (5)	150	48	53	22	0.9	0.2
1999	4	295	156	136.3	166	0.9	0.1
2002		210		103.0		0.7	
Mean		238	87	142	85	0.7	0.1
<u>LITTLE MUD</u>							
1995	4	55	50	36	38	1.6	0.5
1999	3	62	42	4.5	4	2.1	0.1
2002		49		21.0		1.4	
Mean		55	46	20	21	1.7	0.3

TABLE 1
HISTORICAL SUMMARY OF LAKE WATER QUALITY DATA
Summer (June-September) Epilimnetic Means

Clearwater River Watershed District

	Number of Samples	Total Phosphorous (ug/l)		Chlorophyll-a (ug/l)		Secchi Disk Transparency (m)	
		Mean (3)	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
<u>LOUISA</u>							
1981	7	440	110	39	29	1.4	0.4
1982	7	420	140	68	26	1.5	0.5
1983	7	410	170	4	4	1.4	1.4
1984	7	220	80	8	6	1.0	0.1
1985	7	160	100	26	17	1.1	0.3
1986	6	190	50	96	86	1.1	0.1
1987	7	100	10	70	44	0.8	0.2
1988	5	140	60	101	39	0.6	0.3
1989	6	110	40	69	78	0.8	0.5
1990	5	200	80	55	35	1.3	0.5
1991	3	160	70	31	18	1.5	0.3
1992	8	140	140	46	22	1.1	0.3
1993	4 (1)	170	40	35	13	1.2	0.2
1995	4 (2)	100	36	75	27	0.8	0.2
1997	4	68	7	59	(5) 8	0.9	0.2
1999	4	73	29	37.8	20	1	0.1
2001	2	33	30	5.1	4	0.9	
2003	3	100	13	68	28.0	1.1	
Mean		180	67	50	28	1.1	0.3
<u>MARIE</u>							
1981	7	270	130	31	19	1.3	0.5
1982	7	360	120	63	57	1.3	0.6
1983	7	340	160	4	4	0.9	0.3
1984	7	190	60	7	5	0.9	0.3
1985	7	230	210	34	14	1.0	0.2
1986	6	160	30	92	91	1.1	0.1
1987	7	120	30	95	30	0.6	0.1
1988	5	220	80	153	91	0.4	0.1
1989	6	120	40	58	54	0.6	0.4
1990	5	150	60	101	33	0.8	0.2
1994	4	90	99	71	19	0.6	0.1
1996	4	100	39	37	5	0.8	0.1
1998	4	76	15	56	12	1.1	0.1
2000	4	74	18	13.5	7.7	2.3	1.0
2002		70		37.0		1.2	
2003	3	87	50	81	67	1.3	
2004	4	84	45	34	16	1.1	0.0
Mean		166	76	58	34	1.0	0.3
<u>NIXON</u>							
1994	4	25	(4) 25	5.0	(4) 3.4	1.8	0.7
1997	4	30	8	4.7	(5) 1.5	2.8	0.2
1999	4	39	17	7.0	8.7	3.3	0.5
2001	2	21	1	5.6	3.0	3.2	(8)
2004	4	15	4	2	1	3.0	0.1
Mean		26	11	5	3	3	0

TABLE 1
HISTORICAL SUMMARY OF LAKE WATER QUALITY DATA
Summer (June-September) Epilimnetic Means

Clearwater River Watershed District

	Number of Samples	Total Phosphorous (ug/l)		Chlorophyll-a (ug/l)		Secchi Disk Transparency (m)			
		Mean (3)	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.		
<u>OTTER</u>									
1994	4	13	(4)	4	7.8	1.8	1.9	0.3	
1997	4	23		10	3.7	(5)	1.5	2.1	0.3
1999	4	34		5	6.6		4.8	3.0	0.4
2001	2	30		22	4.0		1.0	2.8	0.4
2004	4	16		10	3		2	2.2	0.0
Mean		23		10	5		2	2	0
<u>PLEASANT</u>									
1993	4	15	(4)	9	12		8	2.0	0.6
1997	4	51		31	9	(5)	2	2.4	0.6
1999	4(6)	25		5	9.1		5.8	3.0	0.9
2004	4	20		9	4		1	2.3	0.0
Mean		27.8		13.5	8.4		4.3	2.4	0.5
<u>SCHOOL SECTION</u>									
1993	4	35	(4)	38	14		9	2.2	0.8
1997	4	29		9	11	(5)	5	1.6	0.4
1999	4(5)	50		12	12.6		10	1.0	0.5
2004	4	21		9	3		2	2.0	0.0
Mean		38		20	12.4		7.8	1.6	0.6
<u>SCOTT</u>									
1981	7	660		340	26		27	1.9	0.9
1982	6	540		220	57		39	1.4	0.7
1983	7	450		170	3		3	1.2	1.4
1984	7	270		100	6		5	0.7	0.1
1985	7	260		280	35		29	1.1	0.5
1994	4	160		117	94		71	0.7	0.1
1996	4	280		174	223		68	0.5	0.1
1998	4 (5)	230		176	141		77	0.8	0.1
1999	3	223		163	76		30	0.6	0.1
2002		210			103			0.7	
2003	4	158		52	66		33	0.8	
2004	4	103		20	51		4	0.8	0.0
Mean		295		165	73		35	0.9	0.4
<u>SWART WATTS</u>									
1996	4	370		181	173		164	1.0	0.7
1999	4(6)	200		75	151		91	0.7	0.2
2003	4	421		293	444		524	0.9	
Mean		330		183	256		260	0.9	0.5

TABLE 1
HISTORICAL SUMMARY OF LAKE WATER QUALITY DATA
Summer (June-September) Epilimnetic Means

Clearwater River Watershed District

UNION	Number of Samples	Total Phosphorous (ug/l)		Chlorophyll-a (ug/l)		Secchi Disk Transparency (m)	
		Mean (3)	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
1995	4	43	15	15	1	1.4	0.3
1998	4 (5)	50	27	16	9	1.7	0.4
1999	3	31	15	12.4	10	1.8	0.9
2002		88		39.0		1.0	
Mean		41	19	14	7	2	1
WIEGAND							
1995	4	35	5	12	2	1.7	0.2
1999	4(5)	61	44	6.4	1.1	2.4	0.6
2002		37		5.3		3.0	
Mean		44	25	8	2	2.4	0.4

Notes:

- (1) The fourth sample was collected on October 6, 1993.
- (2) The fourth sample was collected on October 2 or 3, 1995
- (3) Starting in 1993, Total phosphorus means are rounded to two significant figures. Prior to 1993, the mean values were rounded to the nearest 10 ug/l.
- (4) Values reported as "Less than" the detection limit were estimated as half of the detection limit.
- (5) Three samples were analyzed for chlorophyll-a.
- (6) Three samples were analyzed for total phosphorus.
- (7) Three secchi disk readings were recorded.
- (8) One secchi disk reading was recorded.

Appendix E

Secchi Data from Citizen's Lake Monitoring Program

MEMO

To: Rebecca Kluckhohn
From: Merle Anderson
Subject: 2004 Secchi Disk Readings
Date: November 1, 2004

Rebecca, attached are the 2004 Secchi Disk Reports.

John Tracy estimates his readings on Millpond should be 1.5 ft average for the season.

Tony Bechtold lost his report for Caroline; but, remembers the range of 3-8 ft. for his lake.

MPCA Citizen Lake-Monitoring Program 2004 Secchi Data Sheet

Year: Name: Mark Rampa

Address: 13934 101st St. NW

South Fork, MN 55382-3304

- Use a separate data sheet for EACH site.
- If disk is on lake bottom, mark "B" next to Secchi.
- PC = Physical Condition; RC = Recreational Suitability
- Record carefully: 6 ft & 9 in is 6.75 ft - NOT 6.9 ft.
- For NEW sites, send in your lake map.

Lake Name: Lake Augusta

County: Wright

Location of Lake: 5 miles NW of Annandale

Phone: (320)-274-5332 = summer; () = winter.

Is this the same sampling site YOU monitored last year? YES Lake depth at sampling site: 32 ft.

Line #	2004 Date	Time	Secchi (nearest 1/2 ft)	*B	PC	RC	Color of Water	Data Entered Online?	Other Notes
II Sampling					I Sampling				
1	6/24	2:30 AM	5.5 ft						Sunny
2	7/1	4:30 AM	3.5 ft						Sunny
3	7/13	7:00 AM	4 ft						Sunny
4	8/29	4:30 AM	6.5 ft						partly cloudy
5	9/6	6:00 AM	9 ft						partly cloudy
6	9/12	1:30 AM	9 ft						partly cloudy
7	9/19	4:00 AM	7 ft						Sunny
8	10/9	4:00 AM	8 ft						Sunny
9	10/24	1:00 AM	8 ft						cloudy
10	11/6	2:00 AM	8 ft						partly cloudy
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

At the end of your sampling season, please return the top page of this form by November 15, 2004

MPCA Citizen Lake-Monitoring Program 2004 Secchi Data Sheet

Your Name: _____

Address: DONALD C. BADGER
8010 IRVINE AVE. N.W.
ANNANDALE, MN 55302

- Use a separate data sheet for EACH site.
- If disk is on lake bottom, mark "B" next to Secchi.
- PC = Physical Condition; RC = Recreational Suitability
- Record carefully: 6 ft & 9 in is 6.75 ft - NOT 6.9 ft.
- For NEW sites, send in your marked lake map.

Lake Name: CEDAR County: Wright

Location of Lake: 3 miles East of Annandale

Phone: (320)-274-5823 = summer; ()- - same = winter.

Is this the same sampling site YOU monitored last year? YES Lake depth at sampling site: 15 ft.

Line #	2004 Date	Time	Secchi (nearest 1/2 ft)	*B	PC	RC	Color of Water	Data Entered Online?	Other Notes
1	4-30	Noon a.m.	5.5 ft		1	1	Clear		
2	5-17	" a.m.	20 ft		1	1	"		
3	5-27	6:00 a.m.	21 ft		1	1	"		
4	6-3	6:00 a.m.	17.5 ft		1	1	"		
5	6-14	11:00 a.m.	4.5 ft		1	1	"		
6	6-23	10:00 a.m.	14 ft		1	1	"		
7	7-8	1:00 a.m.	16 ft		1	1	"		
8	7-13	Noon a.m.	10 ft		1	1	"		
9	8-11	" a.m.	8.5 ft		1	1	"		
10	8-25	2:00 a.m.	7.5 ft		1	1	"		
11	9-5	1:00 a.m.	6 ft		1	1	"		
12	9-16	2:00 a.m.	5.5 ft		1	1	"		
13	10-5	3:00 a.m.	10 ft		1	1	"		
14		a.m.	ft						
15		a.m.	ft						
16		a.m.	ft						
17		a.m.	ft						
18		a.m.	ft						
19		a.m.	ft						
20		a.m.	ft						
21		a.m.	ft						
22		a.m.	ft						
23		a.m.	ft						
24		a.m.	ft						
25		a.m.	ft						

At the end of your sampling season, please return the top page of this form by November 15, 2004

MPCA Citizen Lake-Monitoring Program 2004 Secchi Data Sheet



Your Name: _____

Address: _____

DONALD C. BADGER
8010 IRVINE AVE. N.W.
ANNANDALE, MN 55302

- Use a separate data sheet for EACH site.
- If disk is on lake bottom, mark "B" next to Secchi.
- PC = Physical Condition; RC = Recreational Suitability
- Record carefully: 6 ft & 9 in is 6.75 ft - NOT 6.9 ft.
- For NEW sites, send in your marked lake map.

Lake Name: Cedar

County: Wright

Location of Lake: 3 miles East of Annandale

Phone: (320)-274-5823 = summer; ()- - same = winter.

Is this the same sampling site YOU monitored last year? yes Lake depth at sampling site: 15 ft.

Line #	2004 Date	Time	Secchi (nearest 1/2 ft)	*B	PC	RC	Color of Water	Data Entered Online?	Other Notes
1	4-30	Noon a.m.	5.5 ft		1	1	clear		
2	5-17	" a.m.	20 ft		1	1	"		
3	5-27	6:00 a.m.	21 ft		1	1	"		
4	6-3	6:00 a.m.	17.5 ft		1	1	"		
5	6-14	11:00 a.m.	4.5 ft		1	1	"		
6	6-23	10:00 a.m.	14 ft		1	1	"		
7	7-8	1:00 a.m.	15 ft		1	1	"		
8	7-13	Noon a.m.	10 ft		1	1	"		
9	8-11	" a.m.	8.5 ft		1	1	"		
10	8-25	2:00 a.m.	7.5 ft		1	1	"		
11	9-5	1:00 a.m.	6 ft		1	1	"		
12	9-16	2:00 a.m.	5.5 ft		1	1	"		
13	10-5	3:00 a.m.	10 ft		1	1	"		
14		a.m.	ft						
15		a.m.	ft						
16		a.m.	ft						
17		a.m.	ft						
18		a.m.	ft						
19		a.m.	ft						
20		a.m.	ft						
21		a.m.	ft						
22		a.m.	ft						
23		a.m.	ft						
24		a.m.	ft						
25		a.m.	ft						

At the end of your sampling season, please return the top page of this form by November 15, 2004

MPCA Citizen Lake-Monitoring Program 2004 Secchi Data Sheet



CLMP3615

86-0227

Robert B. Johnson

Box 755

Annandale, MN 55302

- Use a separate data sheet for EACH site.
- If disk is on lake bottom, mark "B" next to Secchi.
- PC = Physical Condition; RC = Recreational Suitability
- Record carefully: 6 ft & 9 in is 6.75 ft - NOT 6.9 ft.
- For NEW sites, send in your marked lake map.

Lake Name: CEDAR LAKE County: WRIGHT
 Location of Lake: 3 miles N.E. of ANNANDALE
 Phone: (320) - 274 - 8356 = summer; (520) - 625 - 5867 = winter.
 Is this the same sampling site YOU monitored last year? Yes Lake depth at sampling site: 20 ft.

Line #	2004 Date	Time	Secchi (nearest 1/2 ft)	*B	PC	RC	Color of Water	Data Entered Online?	Other Notes
1	5/6	1:30 p.m.	7.0 ft		2	2	lt. green	NO	Sunny; Slight breeze
2	6/18	12:15 p.m.	8.0 ft		2	2	"	"	"
3	7/3	1:20 p.m.	11.0 ft		2	2	"	"	Overcast - "
4	7/20	12:20 p.m.	9.5 ft		2	2	"	"	Overcast - still
5	7/29	1:00 p.m.	7.5 ft		2	2	"	"	Sunny - Slight breeze
6	8/12	12:06 p.m.	9.5 ft		2	2	"	"	"
7	8/30	12:05 p.m.	8.0 ft		2	2	"	"	"
8	9/7	12:05 p.m.	6.0 ft		2	2	"	"	"
9	9/15	1:10 p.m.	9.0 ft		2	2	"	"	"
10	9/14	1:10 p.m.	11.0 ft		2	2	"	"	"
11	10/16	12:30 p.m.	10.0 ft		2	2	"	"	Overcast, "
12		a.m.	ft						
13		a.m.	ft						
14		a.m.	ft						
15		a.m.	ft						
16		a.m.	ft						
17		a.m.	ft						
18		a.m.	ft						
19		a.m.	ft						
20		a.m.	ft						
21		a.m.	ft						
22		a.m.	ft						
23		a.m.	ft						
24		a.m.	ft						
25		a.m.	ft						

At the end of your sampling season, please return the top page of this form by November 15, 2004

MPCA Citizen Lake-Monitoring Program 2004 Secchi Data Sheet



CLMP3615

86-0227

Robert B. Johnson

Box 755

Annandale, MN 55302

- Use a separate data sheet for EACH site.
- If disk is on lake bottom, mark "B" next to Secchi.
- PC = Physical Condition; RC = Recreational Suitability
- Record carefully: 6 ft & 9 in is 6.75 ft - NOT 6.9 ft.
- For NEW sites, send in your marked lake map.

Lake Name: CEDAR LAKE County: Wright
 Location of Lake: 3 miles N.E. of ANNANDALE
 Phone: (320)-244-5356 = summer; (520)-625-5867 = winter.
 Is this the same sampling site YOU monitored last year? yes Lake depth at sampling site: 30 ft.

Line #	2004 Date	Time	Secchi (nearest 1/2 ft)	*B	PC	RC	Color of Water	Data Entered Online?	Other Notes
1	5/6	1:40 p.m.	6.5 ft		2	2	At green	NO	Sunny, slight breeze
2	6/18	12:30 p.m.	7.5 ft		2	2	"	"	" "
3	7/6	1:30 p.m.	11.0 ft		2	2	"	"	Overcast - "
4	7/20	12:10 p.m.	9.0 ft		2	2	"	"	Overcast - still
5	7/29	1:10 p.m.	7.0 ft		2	2	"	"	Sunny - slight breeze
6	8/12	12:15 p.m.	9.0 ft		2	2	"	"	" "
7	8/30	12:10 p.m.	7.5 ft		2	2	"	"	" "
8	9/07	12:15 p.m.	6.0 ft		2	2	"	"	" "
9	9/25	1:15 p.m.	9.0 ft		2	2	"	"	" "
10	10/4	1:20 p.m.	10.5 ft		2	2	"	"	" "
11	10/16	12:15 p.m.	10.0 ft		2	2	"	"	Overcast "
12		a.m. p.m.	ft						
13		a.m. p.m.	ft						
14		a.m. p.m.	ft						
15		a.m. p.m.	ft						
16		a.m. p.m.	ft						
17		a.m. p.m.	ft						
18		a.m. p.m.	ft						
19		a.m. p.m.	ft						
20		a.m. p.m.	ft						
21		a.m. p.m.	ft						
22		a.m. p.m.	ft						
23		a.m. p.m.	ft						
24		a.m. p.m.	ft						
25		a.m. p.m.	ft						

At the end of your sampling season, please return the top page of this form by November 15, 2004

MPCA Citizen Lake-Monitoring Program 2004 Secchi Data Sheet



CLMP5168
George Saukkola
73880 - 362nd St.
Kimball, MN 55353

47-0042

- Use a separate data sheet for **EACH** site.
- If disk is on lake bottom, mark "B" next to Secchi.
- PC = Physical Condition; RC = Recreational Suitability
- Record carefully: 6 ft & 9 in is 6.75 ft - NOT 6.9 ft.
- For NEW sites, send in your marked lake map.

Lake Name: LAKE BETSY County: _____
Location of Lake: 3 miles 50 of SIMLAKE NW
Phone: (320)-398-6941 = summer; (204)- _____ = winter.
Is this the same sampling site YOU monitored last year? _____ Lake depth at sampling site: _____ ft.

Line #	2004 Date	Time	Secchi (nearest 1/2 ft)	*B	PC	RC	Color of Water	Date Entered Online?	Other Notes
1	5-15	a.m. p.m.	5.5 ft				Cloudy		overcast
2	5-20	a.m. p.m.	6.0 ft				Cloudy		overcast
3	5-30	a.m. p.m.	4.0 ft				Cloudy		overcast
4	6-7	a.m. p.m.	7.0 ft				overcast		Summer
5	6-15	a.m. p.m.	3.5 ft				overcast		Summer
6	6-15	a.m. p.m.	1.0 ft				overcast		Summer
7	6-22	a.m. p.m.	1.5 ft				overcast		Summer
8	6-29	a.m. p.m.	2.0 ft				overcast		Summer
9	7-6	a.m. p.m.	1.5 ft				overcast		Summer
10	7-15	a.m. p.m.	2.0 ft				overcast		Summer
11	7-20	a.m. p.m.	1.0 ft				overcast		Summer
12	8-5	a.m. p.m.	1.0 ft				overcast		Summer
13	8-19	a.m. p.m.	1.5 ft				overcast		Summer
14	8-30	a.m. p.m.	2.5 ft				overcast		Summer
15	9-17	a.m. p.m.	2.5 ft				overcast		Summer
16	9-29	a.m. p.m.	1.5 ft				overcast		Summer
17	10-6	a.m. p.m.	2.5 ft				overcast		Summer
18	10-22	a.m. p.m.	2.5 ft				overcast		Summer
19		a.m. p.m.	ft						
20		a.m. p.m.	ft						
21		a.m. p.m.	ft						
22		a.m. p.m.	ft						
23		a.m. p.m.	ft						
24		a.m. p.m.	ft						
25		a.m. p.m.	ft						

At the end of your sampling season, please return the top page of this form by November 15, 2004

MPCA Citizen Lake-Monitoring Program 2004 Secchi Data Sheet

Your Name: RICHARD BRANDENBURG

Address: 36849-657TH AVE

WATKINS MN.

55389-5848

- Use a separate data sheet for EACH site.
- If disk is on lake bottom, mark "B" next to Secchi.
- PC = Physical Condition; RC = Recreational Suitability
- Record carefully: 6 ft & 9 in is 6.75 ft - NOT 6.9 ft.
- For NEW sites, send in your marked lake map.

Lake Name: CLEAR

County: MEEKER

Location of Lake: _____ miles _____ of _____

Phone: (320) - 764 - 9328 = summer; (24) - _____ = winter.

Is this the same sampling site YOU monitored last year? YES Lake depth at sampling site: 12 ft.

Line #	2004 Date	Time	Secchi (nearest 1/2 ft)	*B	PC	RC	Color of Water	Data Entered Online?	Other Notes
1	6-10	1:00 a.m.	2		2	2	Green		Sunny
2	6-17	1:00 a.m.	1 1/2		2	3	"		"
3	6-24	1:00 a.m.	1 1/2		2	3	"		"
4	7-1	1:00 a.m.	1 1/2		2	3	"		"
5	7-8	1:00 a.m.	1 1/2		2	3	"		"
6	7-15	1:00 a.m.	1 1/2		2	3	"		"
7	7-22	1:00 a.m.	2 1/2		2	3	"		"
8	7-29	1:00 a.m.	1 1/2		2	3	"		"
9	8-5	1:00 a.m.	1 1/2		2	3	"		"
10	8-12	1:00 a.m.	1 1/2		2	3	"		"
11	8-20	1:00 a.m.	1		2	3	"		"
12	8-27	1:00 a.m.	1		2	3	"		"
13	9-3	1:00 a.m.	1		2	3	"		"
14	9-10	1:00 a.m.	1		2	3	"		"
15	9-17	1:00 a.m.	1		2	3	"		"
16	9-24	1:00 a.m.	1		2	3	"		cloudy
17	10-1	1:00 a.m.	1		2	3	"		Sunny
18	10-9	1:00 a.m.	1		2	3	"		"
19		a.m.							
20		a.m.							
21		a.m.							
22		a.m.							
23		a.m.							
24		a.m.							
25		a.m.							

At the end of your sampling season, please return the top page of this form by November 15, 2004

MPCA Citizen Lake-Monitoring Program 2004 Secchi Data Sheet



CLMP5410

86-0282

Donn R. Driver
12862 Ashview Road
South Haven, MN 55382

- Use a separate data sheet for EACH site.
- If disk is on lake bottom, mark "B" next to Secchi.
- PC = Physical Condition; RC = Recreational Suitability
- Record carefully: 6 ft & 9 in is 6.75 ft - NOT 6.9 ft.
- For NEW sites, send in your marked lake map.

Lake Name: LOUISA County: STEARN
Location of Lake: 1 miles WEST of KILBALL
Phone: (320) 398-6409 = summer; (320) 398-6409 = winter.
Is this the same sampling site YOU monitored last year? Y Lake depth at sampling site: ft.

Line #	2004 Date	Time	Secchi (nearest 1/2 ft)	*B	PC	RC	Color of Water	Data Entered Online?	Other Notes
1	5-18	2:30 a.m.	10 ft		2	1	CLEAR	NO	CLOUDY
2	6-4	1:30 p.m.	7 ft		3	3	GREEN	"	SUNNY
3	6-18	3:00 p.m.	8 ft		3	3	GREEN	"	SUNNY
4	7-4	2:00 p.m.	5.5 ft		3	3	GREEN	"	SUNNY
5	7-16	2:30 p.m.	3.5 ft		4	4	GREEN	"	SUNNY
6	8-15	1:30 p.m.	3.5 ft		4	4	GREEN	"	PARTLY CLOUDY
7	8-23	2:00 p.m.	4.5 ft		3	3	BROWN	"	PARTLY CLOUDY
8	9-6	1:00 p.m.	4.5 ft		3	3	BROWN	"	SUNNY
9		a.m.							
10		p.m.							
11		a.m.							
12		p.m.							
13		a.m.							
14		p.m.							
15		a.m.							
16		p.m.							
17		a.m.							
18		p.m.							
19		a.m.							
20		p.m.							
21		a.m.							
22		p.m.							
23		a.m.							
24		p.m.							
25		a.m.							

At the end of your sampling season, please return the top page of this form by November 15, 2004

MPCA Citizen Lake-Monitoring Program 2004 Secchi Data Sheet

Your Name: Don Ross

Address: 10151 120th Street NW
South Haven, MN 55382

- Use a separate data sheet for EACH site.
- If disk is on lake bottom, mark "B" next to Secchi.
- PC = Physical Condition; RC = Recreational Suitability
- Record carefully: 6 ft & 9 in is 6.75 ft - NOT 6.9 ft.
- For NEW sites, send in your marked lake map.

Lake Name: BASS County: Wright

Location of Lake: 6 miles N of Annandale

Phone: (320)-274-8067 = summer; ()- - = winter.

Is this the same sampling site YOU monitored last year? Yes Lake depth at sampling site: 33 ft.

Line #	2004 Date	Time	Secchi (nearest 1/2 ft)	*B	PC	RC	Color of Water	Data Entered Online?	Other Notes
1	5-16	1:30 <small>a.m.</small>	13.0 ft		1	1	dk grn		Cloudy & windy
2	6-4	12:00 <small>a.m.</small>	14.0 ft		2	2	dk grn		Lots of stuff in water
3	6-13	2:30 <small>a.m.</small>	13.5 ft		2	2	dk grn		Lots of stuff in water
4	7-4	12:30 <small>a.m.</small>	15.5 ft		1	1	" "		Cloudy/Windy
5	7-11	1:00 <small>a.m.</small>	15.5 ft		1	1	" "		Breezy
6	7-18	3:00 <small>a.m.</small>	17.5 ft		1	1	" "		Sunny nice
7	8-7	1:30 <small>a.m.</small>	13.5 ft		1	1	dk grn		Sunny
8	8-19	12:30 <small>a.m.</small>	12.5 ft		1	1	dk grn		Sunny
9	8-29	12:45 <small>a.m.</small>	12.0 ft		1	1	dk grn		Sunny
10	9-6	2:30 <small>a.m.</small>	14.5 ft		1	1	dk grn		Cloudy S. wind
11	9-26	3:00 <small>a.m.</small>	11.0 ft		2	2	green		Much algae
12		<small>a.m.</small>	ft						
13		<small>a.m.</small>	ft						
14		<small>a.m.</small>	ft						
15		<small>a.m.</small>	ft						
16		<small>a.m.</small>	ft						
17		<small>a.m.</small>	ft						
18		<small>a.m.</small>	ft						
19		<small>a.m.</small>	ft						
20		<small>a.m.</small>	ft						
21		<small>a.m.</small>	ft						
22		<small>a.m.</small>	ft						
23		<small>a.m.</small>	ft						
24		<small>a.m.</small>	ft						
25		<small>a.m.</small>	ft						

At the end of your sampling season, please return the top page of this form by November 15, 2004

MPCA Citizen Lake-Monitoring Program 2004 Secchi Data Sheet



CLMP4571

86-0252

Delores Roeder

463 Beachwood Rd

South Haven, MN 55382-9294

Site 211



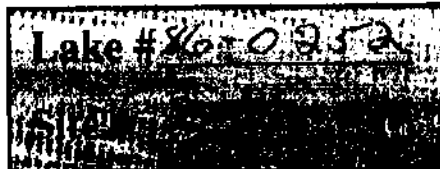
- Use a separate data sheet for EACH site.
- If disk is on lake bottom, mark "B" next to Secchi.
- PC = Physical Condition; RC = Recreational Suitability
- Record carefully: 6 ft & 9 in is 6.75 ft - NOT 6.9 ft.
- For NEW sites, send in your marked lake map.

Lake Name: ClearwaterCounty: WrightLocation of Lake: 7 miles N of AnnandalePhone: (320)-274-2272 = summer; ()-same = winter.Is this the same sampling site YOU monitored last year? yes Lake depth at sampling site: 30 ft.

Line #	2004 Date	Time	Secchi (nearest 1/2 ft)	*B	PC	RC	Color of Water	Data Entered Online?	Other Notes
1	5/8	11:15 a.m.	15 ft		2	2	yellow/green		Windy - Bery sun
2	5/18	11:30 a.m.	17 ft		3	3	green		Sunny - calm
3	5/28	11:30 a.m.	13 ft		3	3	green		Windy - Bery sun
4	6/3	12:30 p.m.	7.5 ft		4	4	green		lots of rain - Bery sun
5	6/12	1:45 p.m.	8.5 ft		3	3	green		Sunny
6	6/20	10:15 a.m.	5.0 ft		3	3	green		Sunny - Very windy
7	6/29	12:00 p.m.	5.5 ft		2	3	greenish		Windy - Bery sun
8	7/9	2:15 p.m.	6.0 ft		3	3	green		Partly cloudy
9	7/16	5:45 p.m.	4.5 ft		3	3	"		" " Bery sun
10	7/25	11:45 a.m.	5.0 ft		3	3	"		Sunny - calm
11	7/29	10:45 a.m.	5.0 ft		3	3	"		Sunny - Bery sun
12	8/15	1:30 p.m.	5.5 ft						
13	8/24	11:30 a.m.	6.0 ft		3	3	"		partly cloudy
14	9/12	10:30 a.m.	4.5 ft		2	3	greenish		Sunny - Bery sun
15		a.m.	ft						
16		p.m.	ft						
17		a.m.	ft						
18		p.m.	ft						
19		a.m.	ft						
20		p.m.	ft						
21		a.m.	ft						
22		p.m.	ft						
23		a.m.	ft						
24		p.m.	ft						
25		a.m.	ft						

At the end of your sampling season, please return the top page of this form by November 15, 2004

MPCA Citizen Lake-Monitoring Program 2004 Secchi Data Sheet



CLMP4571

86-0252

Delores Roeder
463 Beachwood Rd
South Haven, MN 55382-9294

- Use a separate data sheet for **EACH** site.
- If disk is on lake bottom, mark "B" next to Secchi.
- PC = Physical Condition; RC = Recreational Suitability
- Record carefully: 6 ft & 9 in is 6.75 ft - NOT 6.9 ft.
- For NEW sites, send in your marked lake map.

Lake Name: Clearwater County: Wright
Location of Lake: 1 miles N of Annandale
Phone: (320) 274-7272 summer; () - winter.
Is this the same sampling site YOU monitored last year? yes Lake depth at sampling site: 20 ft.

Line #	2004 Date	Time	Secchi (nearest 1/2 ft)	*B	PC	RC	Color of Water	Data Entered Online?	Other Notes
1	5/8	11:00 a.m.	13 ft		3	3	greenish		Windy - Hazy Sun
2	5/18	11:15 a.m.	16.5 ft		3	2	green		Clear - calm
3	5/28	11:15 a.m.	13 ft		3	3	green		Hazy sun - calm
4	6/3	12:45 p.m.	8.5 ft		4	4	green		lots of rain last 10 days - calm
5	6/12	1:30 p.m.	9.5 ft		3	3	green		Sunny
6	6/20	10:00 p.m.	8.5 ft		3	3	green		Sunny - very windy
7	6/29	11:45 a.m.	7.5 ft		2	3	greenish tan		Idly sun - breezy
8	7/7	2:00 p.m.	8.5 ft		3	3	" "		Partly cloudy
9	7/16	2:00 p.m.	7.5 ft			3	" "		" "
10	7/25	11:30 a.m.	9.5 ft		2	2	" "		Sunny - calm
11	7/29	10:30 a.m.	10.0 ft		2	2	" "		Sunny - Breezy
12	8/13	7:15 a.m.	9.5 ft						
13	8/27	11:15 a.m.	9.0 ft		2	2	" "		Partly cloudy
14	9/12	10:15 a.m.	13.0 ft		2	2	yellow		" "
15	10/7	10:30 a.m.	13.5 ft		2	2	" "		" "
16		a.m.	ft						
17		a.m.	ft						
18		a.m.	ft						
19		a.m.	ft						
20		a.m.	ft						
21		a.m.	ft						
22		a.m.	ft						
23		a.m.	ft						
24		a.m.	ft						
25		a.m.	ft						

At the end of your sampling season, please return the top page of this form by November 15, 2004

MPCA Citizen Lake-Monitoring Program 2004 Secchi Data Sheet



CLMP5522

86-0251

Jim Peterson

Box 21

Annandale, MN 55302

- Use a separate data sheet for EACH site.
- If disk is on lake bottom, mark "B" next to Secchi.
- PC = Physical Condition; RC = Recreational Suitability
- Record carefully: 6 ft & 9 in is 6.75 ft - NOT 6.9 ft.
- For NEW sites, send in your marked lake map.

Lake Name: Pleasant County: Wright

Location of Lake: _____ miles of In Annandale

Phone: (320)-274-5043 = summer; (____) - _____ = winter.

Is this the same sampling site YOU monitored last year? yes Lake depth at sampling site: 15 ft.

Line #	2004 Date	Time	Secchi (nearest 1/2 ft)	*B	PC	RC	Color of Water	Data Entered Online?	Other Notes
1	4-27	8:00 a.m.	10.5	ft	2	1	Clear		Calm-No Sun
2	5-17	6:00 a.m.	10.5	ft	2	1	Clear		Calm-No Sun
3	5-31	7:45 a.m.	11	ft	2	1	Clear		Calm-No Sun
4	6-6	3:15 p.m.	10	ft	3	1	Clear/Green		Sunny Hot
5	6-29	2:30 a.m.	10	ft	2	1	Clear		Sunny calm
6	7-18	3:30 a.m.	8.5	ft	3	2	Clear		Hazy Cloudy NoSun
7	8-5	3:30 a.m.	7.5	ft	3	2	ClearGreen		Sunny Clear Calm
8	8-25	1:00 a.m.	6.5	ft	3	2	ClearGreen		NoSun Lt Breeze Humid
9	9-4	12:15 a.m.	8	ft	3	2	ClearGreen		Sunny Lt. Breeze
10	9-28	5:30 a.m.	6.5	ft	3	3	Green		Sunny Clear
11	10-9	3:00 a.m.	8	ft	3	3	Green		Sunny Calm
12	10-14	10:30 p.m.	8 1/2	ft	3	3	Green Clear		NoSun Lt Breeze 45°
13		a.m.		ft					
14		p.m.		ft					
15		a.m.		ft					
16		p.m.		ft					
17		a.m.		ft					
18		p.m.		ft					
19		a.m.		ft					
20		p.m.		ft					
21		a.m.		ft					
22		p.m.		ft					
23		a.m.		ft					
24		p.m.		ft					
25		a.m.		ft					

At the end of your sampling season, please return the top page of this form by November 15, 2004

MPCA Citizen Lake-Monitoring Program 2003 Secchi Data Sheet



CLMP5076

86-0243

Virl Liebrez

229 Alder Rd

South Haven, MN 55382

Lake # _____

Site # _____

- Use a separate data sheet for EACH site.
- If you can see the disk on the lake bottom, mark a "B" in the column following the "Secchi" column.
- PC = Physical Condition; RS = Recreational Suitability
- Record all values carefully: 6 feet and 9 inches is 6.75 feet - NOT 6.9 ft.
- For NEW sites, also send in your marked lake map.

Lake Name: CRASS County: STEARNS

Location of Lake: _____ miles of _____

Phone: (320)-274-4232 = summer; (04)-_____ = winter.

Is this the same sampling site YOU monitored last year? yes Lake depth at sampling site: 30-32 ft.

Line #	2003 Date	Time	Secchi (nearest 1/2 ft)	*B	PC	RS	Color of Water	Data Entered Online?	Other Notes
Ex.	5-20	2:00 <u>a.m.</u>	7.5' ft		2	2	clear	yes	Sunny, slight breeze
1	6-4	11 <u>a.m.</u>	8' ft				milky		31' 66.5° north
2	6-12	12 <u>p.m.</u>	6' ft				clear		32' 68.6°
3	7-2	1:45 <u>a.m.</u>	8' ft				" "		33' 77.9°
4	7-10	4:30 <u>a.m.</u>	8' ft				" "		30' 76.1° calm
5	7-25	1:23 <u>a.m.</u>	8' ft				clear		30'
6	8-16	10:00 <u>a.m.</u>	8' ft				clear		31' 64.5° calm
7	8-26	10:30 <u>a.m.</u>	8' ft				clear	cloudy	31' 64° breeze
8	9-12	1:30 <u>a.m.</u>	10' ft				clear	clear	70.8° breeze
9	10-2	10:30 <u>a.m.</u>	9 1/2' ft				" "		32' 58.1° calm
10		<u>a.m.</u>	ft						
11		<u>a.m.</u>	ft						
12		<u>a.m.</u>	ft						
13		<u>a.m.</u>	ft						
14		<u>a.m.</u>	ft						
15		<u>a.m.</u>	ft						
16		<u>a.m.</u>	ft						
17		<u>a.m.</u>	ft						
18		<u>a.m.</u>	ft						
19		<u>a.m.</u>	ft						
20		<u>a.m.</u>	ft						
21		<u>a.m.</u>	ft						
22		<u>a.m.</u>	ft						
23		<u>a.m.</u>	ft						
24		<u>a.m.</u>	ft						
25		<u>a.m.</u>	ft						

At the end of your sampling season, please return the top page of this form by November 14, 2003

MPCA Citizen Lake-Monitoring Program 2004 Secchi Data Sheet

Your Name: William A Lee

Address: 14451 HUBER AVE NW
ANNANDALE
MINN 55302

- Use a separate data sheet for EACH site.
- If disk is on lake bottom, mark "B" next to Secchi.
- PC = Physical Condition; RC = Recreational Suitability
- Record carefully: 6 ft & 9 in is 6.75 ft - NOT 6.9 ft.
- For NEW sites, send in your marked lake map.

Lake Name: Nixon 86-0238 County: Wright

Location of Lake: 4 miles south of Clearwater

Phone: (820)-558-6394 = summer; () = winter.

Is this the same sampling site YOU monitored last year? Yes Lake depth at sampling site: 30 ft.

Line #	2004 Date	Time	Secchi (nearest 1/2 ft)	*B	PC	RC	Color of Water	Data Entered Online?	Other Notes
1	5-18	3:00 a.m.	13. ft		1	1	Clear	NO	
2	5-25	a.m.	14. ft		1	1	Clear		
3	6-1	a.m.	13. ft		1	1	Clear		
4	6-8	a.m.	11. ft		1	1	Clear		
5	6-15	a.m.	11. ft		1	1	Clear		
6	6-22	a.m.	10.5 ft		1	1	Clear		
7	6 week	vacation	ft						
8	8-3	a.m.	10.5 ft		1	1	Clear		
9	8-11	a.m.	10.5 ft		1	1	Clear		
10	8-18	a.m.	11.0 ft		1	1	Clear		
11	8-26	a.m.	11. ft		1	1	Clear		
12	9-2	a.m.	11.5 ft		1	1	Clear		
13	9-14	a.m.	11. ft		1	1	Clear		
14	9-21	a.m.	11.5 ft		1	1	Clear		
15	9-28	1:00 a.m.	13. ft		1	1	Clear	NO	Very Calm + sunny
16		a.m.	ft						
17		a.m.	ft						
18		a.m.	ft						
19		a.m.	ft						
20		a.m.	ft						
21		a.m.	ft						
22		a.m.	ft						
23		a.m.	ft						
24		a.m.	ft						
25		a.m.	ft						

At the end of your sampling season, please return the top page of this form by November 15, 2004

MPCA Citizen Lake-Monitoring Program 2004 Secchi Data Sheet

Your Name: Richard Eckman

Address: 7905 137th St

Kimball Minn

55353

- Use a separate data sheet for **EACH** site.
- If disk is on lake bottom, mark "B" next to Secchi.
- PC = Physical Condition; RC = Recreational Suitability
- Record carefully: 6 ft & 9 in is 6.75 ft - NOT 6.9 ft.
- For NEW sites, send in your marked lake map.

Lake Name: School Section

County: Stearns

Location of Lake: 2 1/2 miles N.E. of Kimball

Phone: () - - = summer; () - - = winter.

Is this the same sampling site YOU monitored last year? yes Lake depth at sampling site: ft.

Line #	2004 Date	Time	Secchi (nearest 1/2 ft)	*B	PC	RC	Color of Water	Data Entered Online?	Other Notes
1	5-17	a.m.	9.0	ft		2	2	Clear	
2	6-15	a.m.	8.5	ft		2	2	Clear	
3	7-16	a.m.	8.0	ft		2	2	Clear	
4	8-19	a.m.	8.0	ft		2	2	Clear	
5	9-28	a.m.	9.0	ft		2	2	Clear	
6	10-17	a.m.	9.0	ft		2	2	Clear	
7		a.m.		ft					
8		a.m.		ft					
9		a.m.		ft					
10		a.m.		ft					
11		a.m.		ft					
12		a.m.		ft					
13		a.m.		ft					
14		a.m.		ft					
15		a.m.		ft					
16		a.m.		ft					
17		a.m.		ft					
18		a.m.		ft					
19		a.m.		ft					
20		a.m.		ft					
21		a.m.		ft					
22		a.m.		ft					
23		a.m.		ft					
24		a.m.		ft					
25		a.m.		ft					

At the end of your sampling season, please return the top page of this form by November 15, 2004

Appendix F

2004 Water Quality Laboratory Reports and Data

<p>This information is not included in the on-line report. Please visit the Clearwater River Watershed District office to review this data.</p>

Appendix G

Field Notes and Measurements

<p>This information is not included in the on-line report. Please visit the Clearwater River Watershed District office to review this data.</p>

Appendix H

Cedar Lake Monitoring Results

Table 1

Stream Monitoring Results, Tabulated

Date	Site	Q (cfs)	TP (mg/L)	TP (lbs/day)	TP (lbs/yr)	SRP (mg/L)
5/12/2004	CR 28.2	10.91	0.212	12.48	4,556	0.111
6/2/2004		72.1	0.149	57.97	21,159	0.085
7/22/2004		6.1	0.282	9.29	3,390	0.258
8/16/2004		0	0.227	0.00	0	0.153
9/20/2004		0	0.246	0.00	0	0.197

Date	Site	Q (cfs)	TP (mg/L)	TP (lbs/day)	TP (lbs/yr)	SRP (mg/L)	FC (CFU/100 mL)
5/12/2004	CR 10.5	45	0.025	6.09	2,223	0.005	--
6/2/2004		193	0.022	22.89	8,354	<0.005	--
7/22/2004		61	0.02	6.55	2,391	<0.005	<10
8/16/2004		16	0.023	2.02	736	<0.005	30
9/20/2004		21	0.018	2.00	728	0.01	4

Date	Site	Q (cfs)	TP (mg/L)	TP (lbs/day)	TP (lbs/yr)	SRP (mg/L)	FC (CFU/100 mL)
5/12/2004	WC 0.2	2.3	0.073	0.92	335	0.039	
6/2/2004		6.0	0.063	2.03	743	0.024	
7/22/2004		4.6	0.059	1.47	538	0.024	
8/16/2004		0.5	0.057	0.15	54	0.034	
9/20/2004		0.5	0.068	0.19	68	0.064	

Date	Site	Q (cfs)	Fecal Coliform (CFU/100 mL)
5/12/2004	Clearwater River at CR 40	75.89	--
6/2/2004		111.53	5
7/22/2004		43.95	--
8/16/2004		23.38	37
9/20/2004		not gauged	28

Date	Site	Q (cfs)	TP (mg/L)	TP (lbs/day)	TP (lbs/yr)	SRP (mg/L)	FC (CFU/100 mL)
5/12/2004	Annandale Wetland	--	--	--	--	--	--
6/2/2004		--	--	--	--	--	28
7/22/2004		--	0.652	--	--	0.194	--
8/16/2004		0	0.16	--	--	--	160
9/20/2004		--	--	--	--	--	93

Table 1

Cedar Lake Monitoring Results

Profile:

Date	Site	Q (cfs)	TP (mg/L)	TP (lbs/day)	TP (lbs/yr)	SRP (mg/L)
6/11/2004	SE Inlet to Swart Watts	4	0.213	4.60	1,678	0.157
6/11/2004	SW Inlet to Swart Watts	2	0.126	1.36	496	0.08
6/11/2004	Hwy 55	20	0.179	19.31	7,049	0.09
6/11/2004	Cedar Outlet	24	0.058	7.37	2,690	0.006

Date	Site	Q (cfs)	TP (mg/L)	TP (lbs/day)	TP (lbs/yr)	SRP (mg/L)
5/12/2004	Northwest Tributary to Cedar Lake (North of 79th, east of 6)	0.03	0.166	0.03	11	0.019
6/2/2004		0.07	0.154	0.03	10	
6/11/2004		0.6	0.143	0.46	169	0.12
7/22/2004		0	--	--	--	--
8/16/2004		0	--	--	--	--
9/20/2004		0	--	--	--	--

Date	Site	Q (cfs)	TP (mg/L)	TP (lbs/day)	TP (lbs/yr)	SRP (mg/L)
5/12/2004	Southwest Tributary to Cedar Lake (off 70th Street)	0.16	0.098	0.08	31	0.138
6/2/2004		1.89	0.074	0.76	276	--
6/11/2004		3.0	0.089	1.45	529	0.061
7/22/2004		BDL	0.121	--	--	0.008
8/16/2004		0.0	--	--	--	--
9/20/2004		0.0	--	--	--	--

Date	Site	Q (cfs)	TP (mg/L)	TP (lbs/day)	TP (lbs/yr)	SRP (mg/L)
6/2/2004	Swart Watts Outlet	6	0.254	8.28	3,023	0.016
6/11/2004		16	0.307	27.22	9,934	0.014
7/22/2004		0	--	--	--	--
8/16/2004		0	--	--	--	--
9/20/2004		0	--	--	--	--