



Winslow Homer: *Eight Bells*, 1886

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# Chanhassen Water Quality Monitoring Results for Lakes Ann, Lucy, Rice Marsh, and Susan for 2003

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[Lake Sampling Conducted: May - September, 2003]

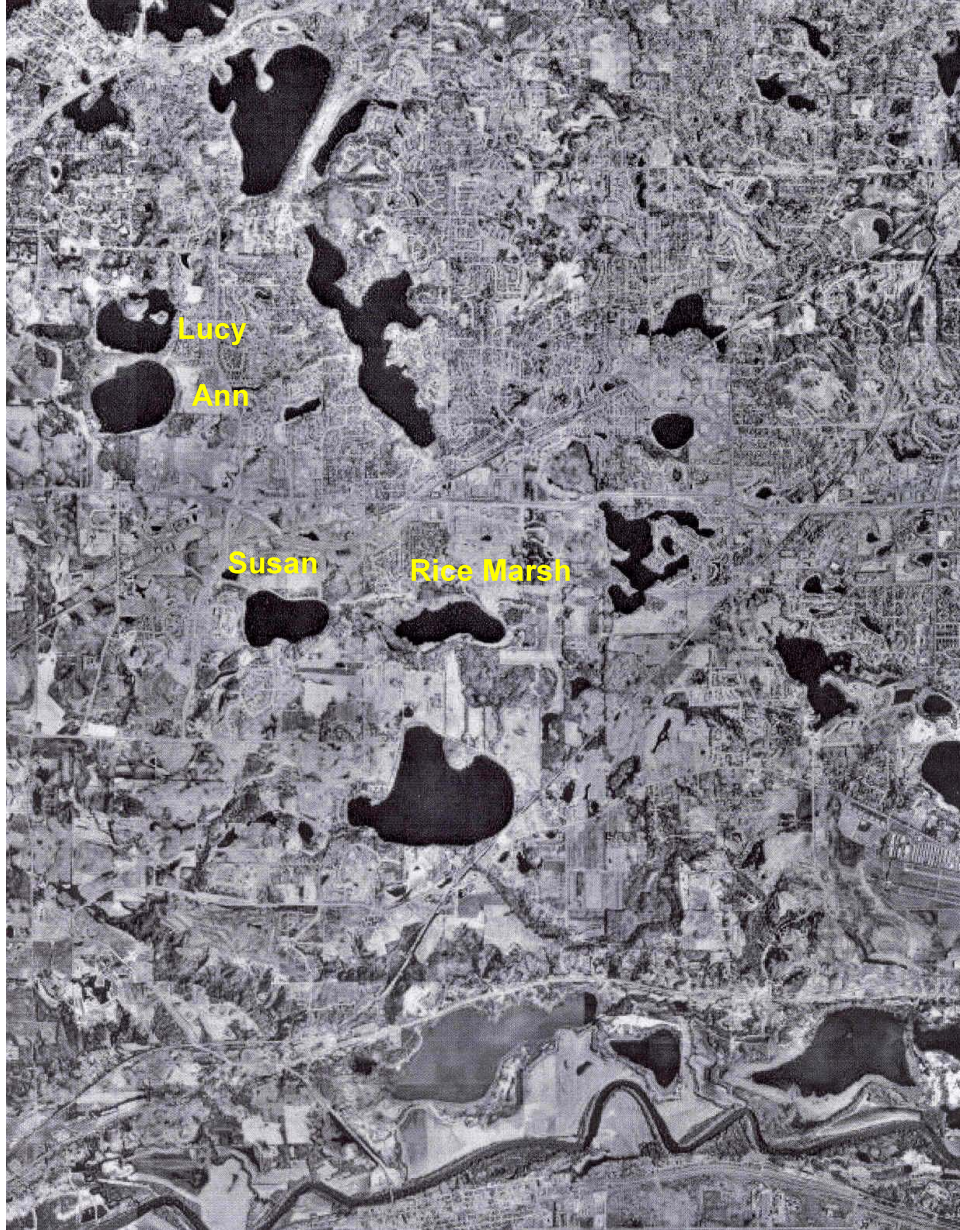
Prepared for:  
**City of Chanhassen**

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**Prepared January 2004**



## **Chanhassen Water Quality Monitoring for Lakes Ann, Lucy, Rice Marsh, and Susan in 2003**



**Lake locations for lakes monitored twice a month from May through September in 2003 are shown above. Samples were collected by Steve McComas, Blue Water Science, St. Paul, Minnesota and analyzed by MVTL, Inc, New Ulm, Minnesota.**

# Water Quality Summary

Four lakes were sampled for three water quality parameters twice a month from May through September, 2003. Results are shown in Table 1.

**Table 1. Summary Chanhassen Lakes water quality data 2003 for Lakes Ann, Lucy, Rice Marsh, and Susan (total phos = total phosphorus and chl a = chlorophyll a ).**

Date (2003)	Ann			Lucy			Rice Marsh			Susan		
	Secchi (ft)	Total Phos (µg/l)	Chl a (µg/l)	Secchi (ft)	Total Phos (µg/l)	Chl a (µg/l)	Secchi (ft)	Total Phos (µg/l)	Chl a (µg/l)	Secchi (ft)	Total Phos (µg/l)	Chl a (µg/l)
5.15	11.1	25	4	12.3	53	1	--	--	--	6.0	30	12
5.29	9.7	29	4	10.8	25	2	7.6	61	4	7.1	32	11
6.12	11.9	17	5	8.2	25	14	7.0+	68	5	5.2	26	8
6.27	11.1	11	3	5.9	22	2	7.5+	33	2	6.6	35	<1
7.16	11.1	12	3	4.9	32	19	7.0+	24	<1	5.4	49	26
7.30	13.8	9	3	7.0	28	8	8.0+	29	2	10.0	30	4
8.14	12.5	9	2	3.8	19	15	7.5+	15	2	5.6	29	13
8.27	12.2	14	3	4.4	33	12	6.0+	24	2	4.3	73	48
9.15	9.2	22	5	6.5	33	9	6.0+	23	<1	3.8	72	33
9.29	7.1	33	11	4.7	47	24	6.5+	22	4	3.9	69	39
<b>Avg</b>	<b>11.0</b>	<b>18</b>	<b>4</b>	<b>6.9</b>	<b>32</b>	<b>11</b>	<b>7.0</b>	<b>33</b>	<b>3</b>	<b>5.8</b>	<b>45</b>	<b>20</b>
<b>Met Council Grade</b>	<b>A</b>	<b>A</b>	<b>A</b>	<b>C</b>	<b>B-</b>	<b>B+</b>	<b>C+</b>	<b>C+</b>	<b>A</b>	<b>C</b>	<b>C+</b>	<b>B-</b>

The Metropolitan Council, a governmental unit that plans for metropolitan growth, has set-up grading criteria for metropolitan lakes. The grading criteria are based a range of data collected from metropolitan lakes. Three parameters are graded and include: total phosphorus and chlorophyll a concentrations, and secchi disc transparencies.

## Metropolitan Council Guidelines.

Grade	Total Phosphorus (µg/l)	Chlorophyll <u>a</u> (µg/l)	Secchi Disc (ft)
A	<23	<10	>10.0
B	23-32	10-20	7.25-10.0
C	32-68	20-48	4.0-7.25
D	68-152	48-77	2.3-4.0
F	>152	>77	<2.3

# Water Quality Overview

## Secchi Disc Transparency (feet)

Date (2003)	Ann	Lucy	Rice Marsh	Susan
5.15	11.1	12.3	--	6.0
5.29	9.7	10.8	7.6	7.1
6.12	11.9	8.2	7.0+	5.2
6.27	11.1	5.9	7.5+	6.6
7.16	11.1	4.9	7.0+	5.4
7.30	13.8	7.0	8.0+	10.0
8.14	12.5	3.8	7.5+	5.6
8.27	12.2	4.4	6.0+	4.3
9.15	9.2	6.5	6.0+	3.8
9.29	7.1	4.7	6.5+	3.8
<b>Avg</b>	<b>11.0</b>	<b>6.9</b>	<b>7.0</b>	<b>5.8</b>

Secchi disc transparency was fair to excellent for the four lakes. Clarity for Ann and Rice Marsh remained good throughout the summer. Lucy had periodic algae blooms and Susan had good clarity until blooms in late August and September.

## Total Phosphorus (µg/l)

Date (2003)	Ann	Lucy	Rice Marsh	Susan
5.15	25	53	--	30
5.29	29	25	61	32
6.12	17	25	68	26
6.27	11	22	33	35
7.16	12	32	24	49
7.30	9	28	29	30
8.14	9	19	15	29
8.27	14	33	24	73
9.15	22	33	23	72
9.29	33	47	22	69
<b>Avg</b>	<b>18</b>	<b>32</b>	<b>33</b>	<b>45</b>

Phosphorus concentrations in the four lakes were low to moderate. Lake Ann had the lowest summer average and Susan the highest. Lucy and Rice Marsh had fairly low growing season phosphorus averages.

## Chlorophyll a (µg/l) concentration.

Date (2003)	Ann	Lucy	Rice Marsh	Susan
5.15	4	1	--	12
5.29	4	2	4	11
6.12	5	14	5	8
6.27	3	2	2	<1
7.16	3	19	<1	26
7.30	3	8	2	4
8.14	2	15	2	13
8.27	3	12	2	48
9.15	5	9	<1	33
9.29	11	24	4	39
<b>Avg</b>	<b>4</b>	<b>11</b>	<b>3</b>	<b>20</b>

Chlorophyll concentrations in early summer were relatively low for all four lakes. Somewhat surprisingly, Rice Marsh maintained clear water and low chlorophyll all summer long. It's abundant plant growth was probably a key factor.



## ***Lake Ann (10-0012) City of Chanhassen***

Lake Ann was monitored 10 times between mid-May to late September, 2003. The water quality data and related graphs are presented on the information sheet on the following page.

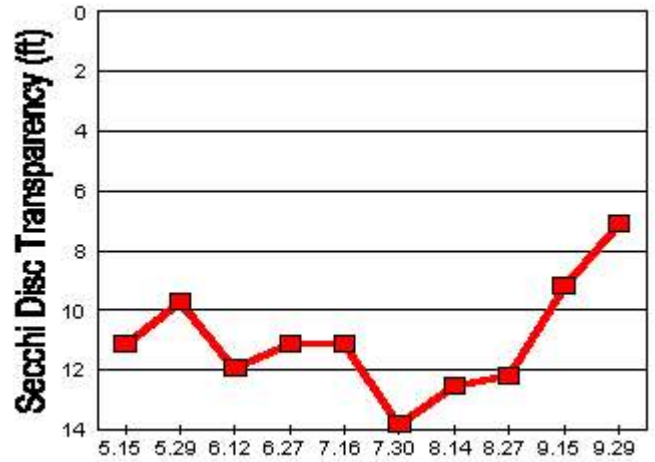
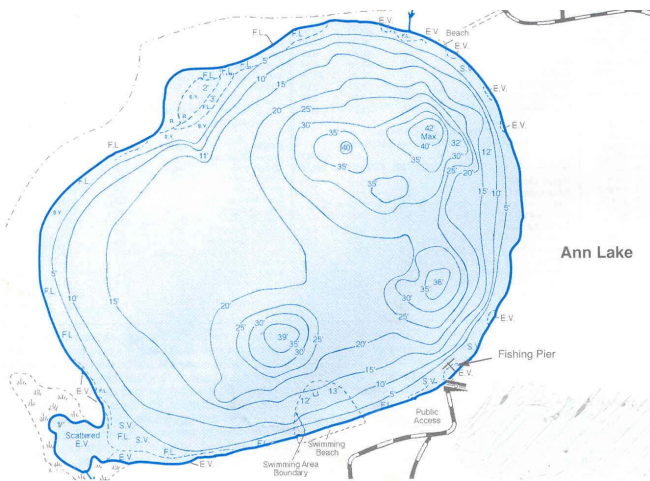
The summertime (May-September) mean total phosphorus concentrations of 18  $\mu\text{g/l}$  (minimum of 9  $\mu\text{g/l}$  and maximum of 33  $\mu\text{g/l}$ ) corresponded to a lake water quality grade of an A. The lake's 2003 Secchi disc transparency mean of 11.0 ft (minimum of 7.1 feet and maximum of 13.8 feet) was equal to a grade of A mean as was the chlorophyll *a* mean of 4 ppb (minimum of 2  $\mu\text{g/l}$  and maximum of 11  $\mu\text{g/l}$ ) which also fell within the A grading range. The overall lake quality grade for Lake Ann, determined from the three individual grades, was A.



**Lake Ann in June, 2003.**

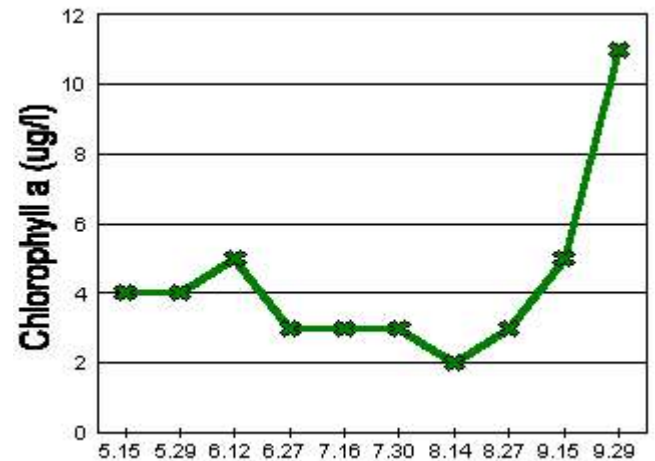
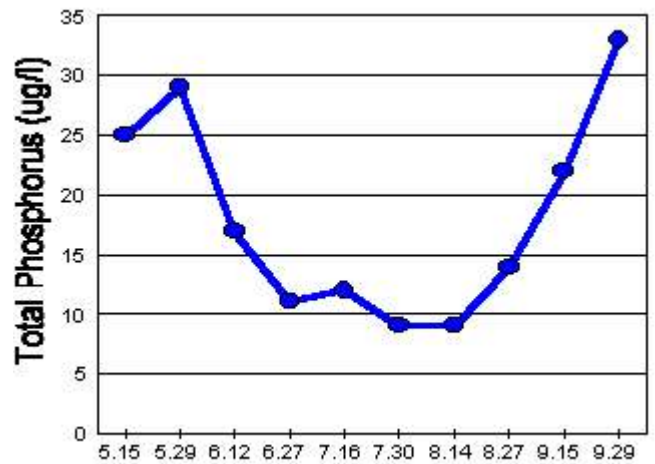
# Lake Ann

lake surface area: 116 acres



## 2003 Data

Date	Lake Ann		
	Secchi (ft)	TP (µg/l)	Chl a (µg/l)
5.15	11.1	25	4
5.29	9.7	29	4
6.12	11.9	17	5
6.27	11.1	11	3
7.16	11.1	12	3
7.30	13.8	9	3
8.14	12.5	9	2
8.27	12.2	14	3
9.15	9.2	22	5
9.29	7.1	33	11
Avg	11.0	18	4



## Lake Water Quality Grades Based on Summertime Averages (Met Council criteria)

	2003
Secchi disc	A
Total phosphorus	B
Chlorophyll a	A
<b>Overall</b>	<b>A</b>

## ***Lake Lucy (10-0007) City of Chanhassen***

Lake Lucy was monitored 10 times between mid-May to late September, 2003. The data and related graphs are presented on the information sheet on the following page.

The summertime (May-September) mean total phosphorus concentrations of 32  $\mu\text{g/l}$  (minimum of 19  $\mu\text{g/l}$  and maximum of 53  $\mu\text{g/l}$ ) corresponded to a lake water quality grade of a B mean. The lake's 2003 Secchi disc transparency mean of 6.9 ft (minimum of 4.4 feet and maximum of 12.3 feet) was equal to a grade of B-. The chlorophyll *a* mean of 11  $\mu\text{g/l}$  (minimum of 1  $\mu\text{g/l}$  and maximum of 24  $\mu\text{g/l}$ ) fell within the B grading range. The overall lake quality grade for Lake Ann, determined from the three individual grades, was B.

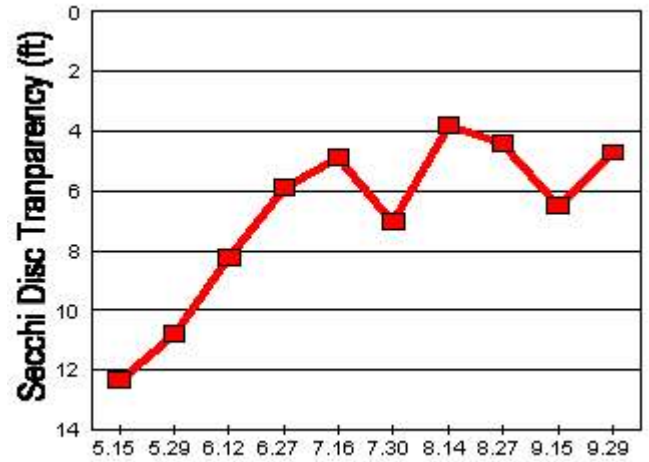
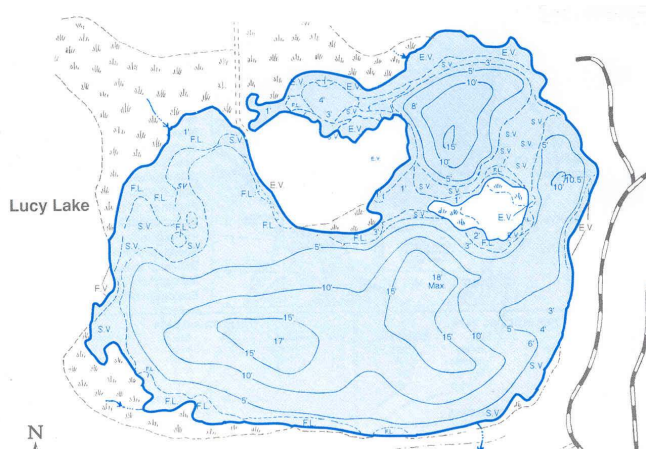


**Lake Lucy in July, 2003.**



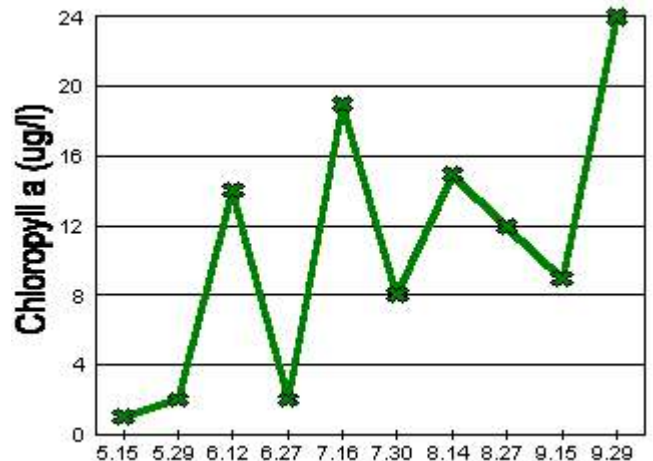
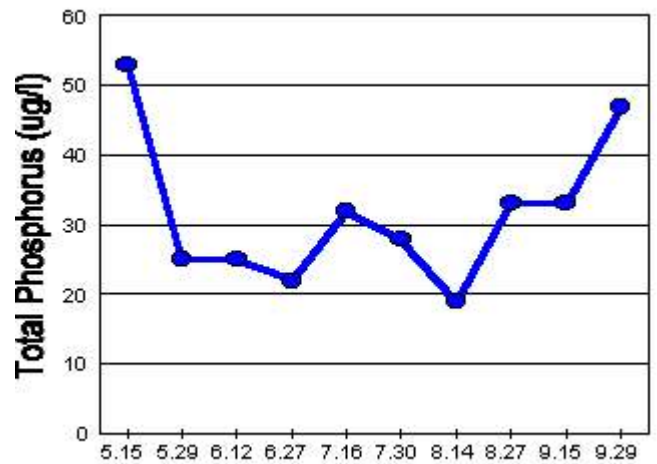
# Lake Lucy

Lake surface area: 135 ac



## 2003 Data

Date	Lake Lucy		
	Secchi (ft)	Total Phos (µg/l)	Chl a (µg/l)
5.15	12.3	53	1
5.29	10.8	25	2
6.12	8.2	25	14
6.27	5.9	22	2
7.16	4.9	32	19
7.30	7.0	28	8
8.14	3.8	19	15
8.27	4.4	33	12
9.15	6.5	33	9
9.29	4.7	47	24
Avg	6.9	32	11



## Lake Water Quality Grades Based on Summertime Averages (Met Council criteria)

	2003
Secchi disc	C
Total phosphorus	C
Chlorophyll a	B
<b>Overall</b>	<b>C</b>



## ***Rice Marsh Lake (10-00 01) City of Chanhassen***

Rice Marsh Lake was monitored 9 times between mid-May to late September, 2003. The data and related graphs are presented on the information sheet on the following page.

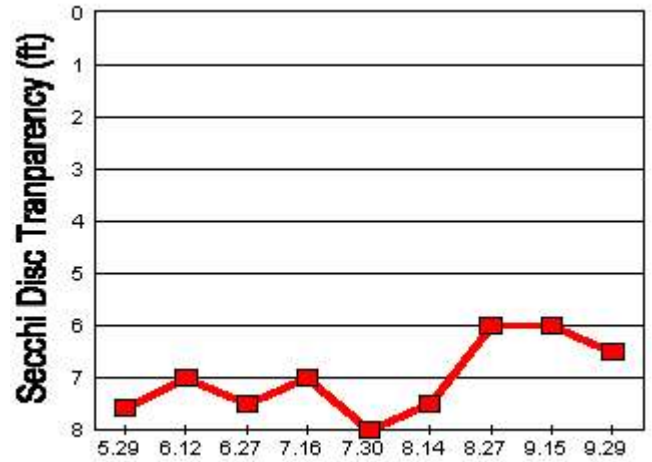
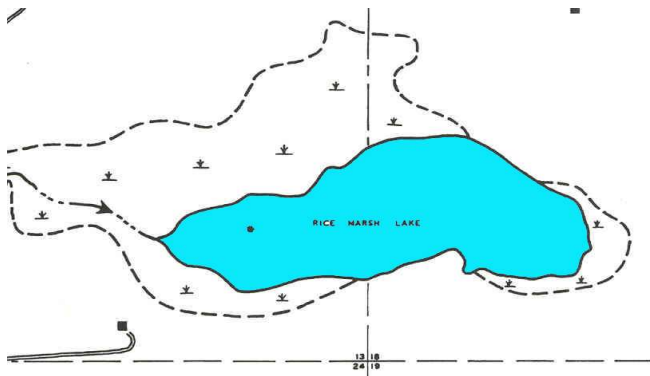
The summertime (May-September) mean total phosphorus concentrations of 33  $\mu\text{g/l}$  (minimum of 15  $\mu\text{g/l}$  and maximum of 68  $\mu\text{g/l}$ ) corresponded to a lake water quality grade of C as did the Secchi disc transparency with a mean of 7.0 ft (minimum of 6.0+ feet and maximum of 8.0 feet). However, on 8 out of 9 sample dates, the Secchi disc was visible on the lake bottom. Therefore, the actual summer transparency is somewhat misleading. After a month of elevated phosphorus concentrations in early summer, phosphorus levels and chlorophyll levels were low. The chlorophyll *a* mean of 3 ppb (minimum of <1  $\mu\text{g/l}$  and maximum of 5  $\mu\text{g/l}$ ) fell within the A grading range. The overall lake quality grade for Rice Marsh Lake, determined from the three individual grades, was B.



**Rice Marsh Lake in May, 2003.**

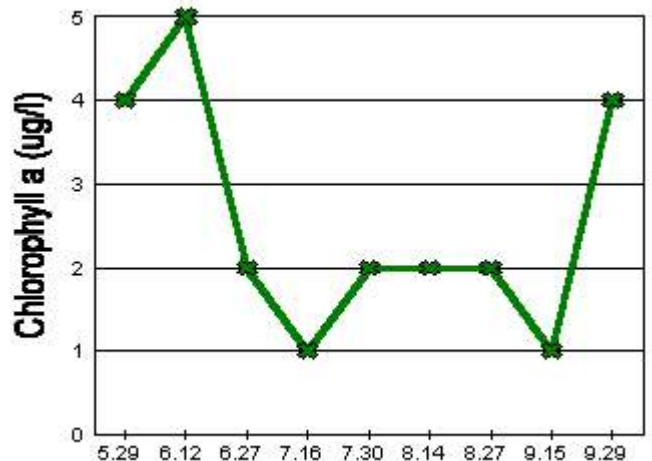
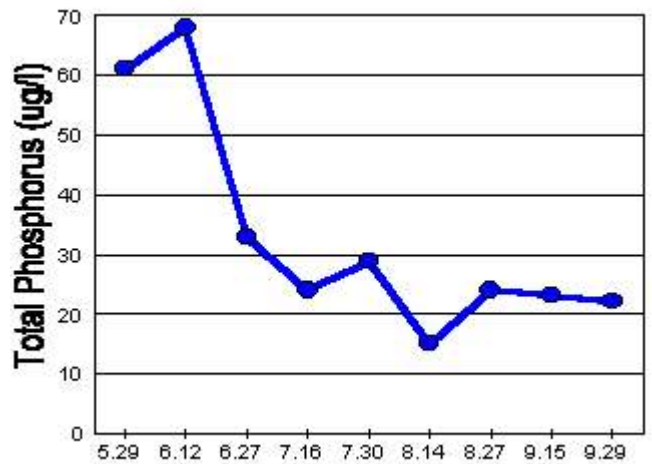
# Rice Marsh Lake

Lake surface area: 79 ac



## 2003 Data

Date	Rice Marsh		
	Secchi (ft)	Total Phos (µg/l)	Chl a (µg/l)
5.15	--	--	--
5.29	7.6	61	4
6.12	7.0+	68	5
6.27	7.5+	33	2
7.16	7.0+	24	<1
7.30	8.0+	29	2
8.14	7.5+	15	2
8.27	6.0+	24	2
9.15	6.0+	23	<1
9.29	6.5+	22	4
Avg	7.0	33	3



## Lake Water Quality Grades Based on Summertime Averages (Met Council criteria)

	2003
Secchi disc	C
Total phosphorus	C
Chlorophyll a	A
<b>Overall</b>	<b>B</b>

## ***Lake Susan (10-0013) City of Chanhassen***

Lake Susan was monitored 10 times between mid-May to late September, 2003. The data and related graphs are presented on the information sheet on the following page.

The summertime (May-September) mean total phosphorus concentrations of 45  $\mu\text{g/l}$  (minimum of 26  $\mu\text{g/l}$  and maximum of 72  $\mu\text{g/l}$ ) corresponded to a lake water quality grade of C mean as well as the Secchi disc transparency mean of 5.8 ft (minimum of 3.8 feet and maximum of 10.0 feet) was graded as C. The chlorophyll *a* mean of 20 ppb (minimum of <1  $\mu\text{g/l}$  and maximum of 48  $\mu\text{g/l}$ ) also fell within the B grading range. The overall lake quality grade for Lake Ann, determined from the three individual grades, was C.

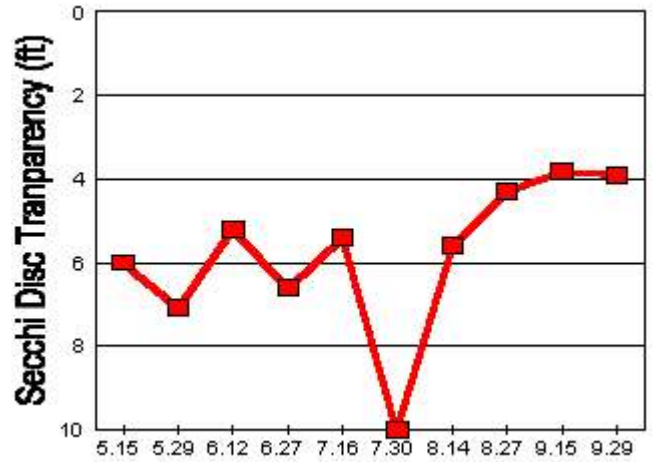
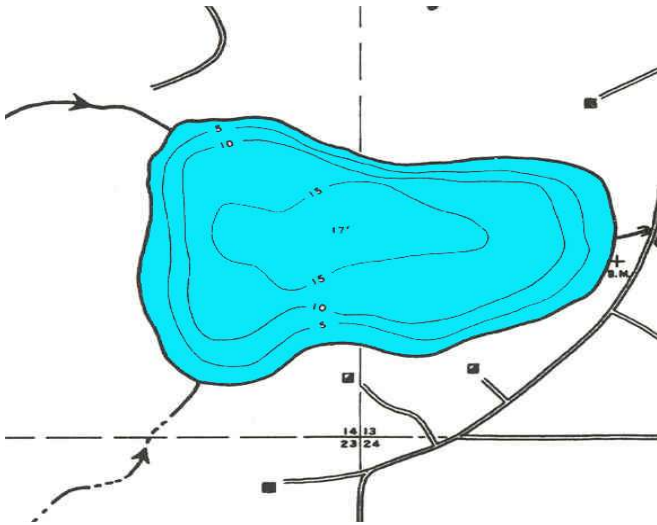


**Lotus lilies in Lake Susan in September, 2003.**



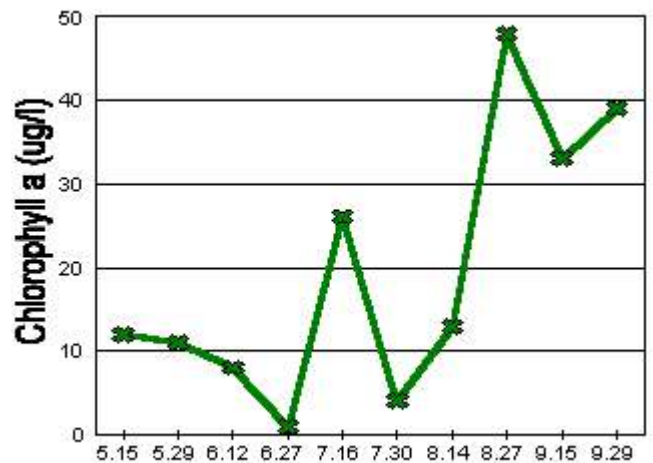
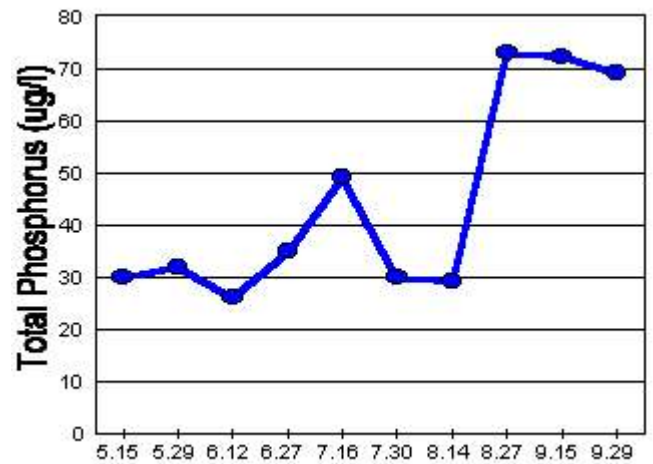
# Lake Susan

Lake surface area: 93 ac



## 2003 Data

Date	Susan		
	Secchi (ft)	Total Phos (µg/l)	Chl a (µg/l)
5.15	6.0	30	12
5.29	7.1	32	11
6.12	5.2	26	8
6.27	6.6	35	<1
7.16	5.4	49	26
7.30	10.0	30	4
8.14	5.6	29	13
8.27	4.3	73	48
9.15	3.8	72	33
9.29	3.9	69	39
Avg	5.8	45	20



## Lake Water Quality Grades Based on Summertime Averages (Met Council criteria)

	2003
Secchi disc	C
Total phosphorus	C
Chlorophyll a	B
<b>Overall</b>	<b>C</b>

