Cottage

Cottage Overview

Volunteer monitoring began at Cottage Lake in 1995 and continued through 2004. The data indicate this lake is relatively high in primary productivity (eutrophic) with fair water quality. Enhancement of productivity through human impacts was verified in the lake management plan (King County, 1996).

Cottage Lake has no public access boat ramp, but car top boats may be launched through the county park. Residents should monitor aquatic plants growing near-shore to catch early infestations of Eurasian milfoil, Brazilian elodea, or other noxious aquatic weeds.

Physical Parameters

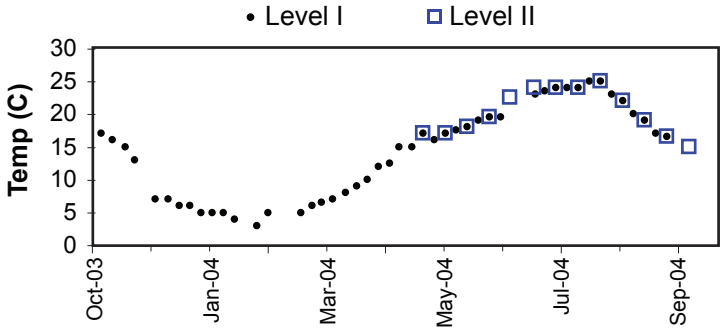
Secchi transparency ranged between 1.0 and 3.1 m during the year. The summer average was 2.1 m which placed it in the lower end of small lakes monitored in 2004. Surface water temperatures ranged from 3.0 to 25.0 degrees Celsius, putting it in the mid range for the group.

Excellent local precipitation and water level records were available for the year, showing that the lake level varied erratically through most of the year, relating to rainfall events in winter, but also remaining at high levels in summer, likely affected by both beaver and human activities.

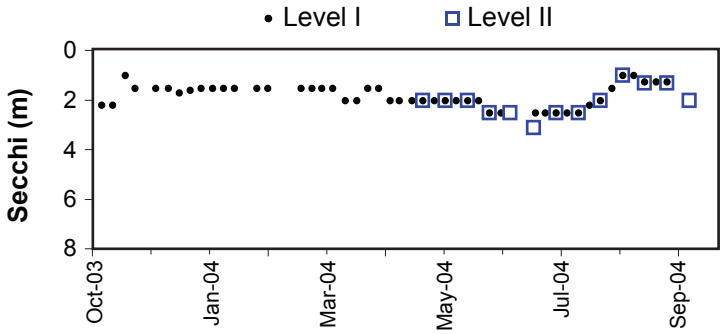
Nutrient Analysis and TSI Ratings

Total nitrogen declined through the spring, varied a little in summer, and increased in late October. Total phosphorus remained fairly steady until late October, when it also began to increase. The N:P ratio ranged from 12 to 70, averaging 28, with good conditions for nuisance bluegreen growth indicated beginning in August.

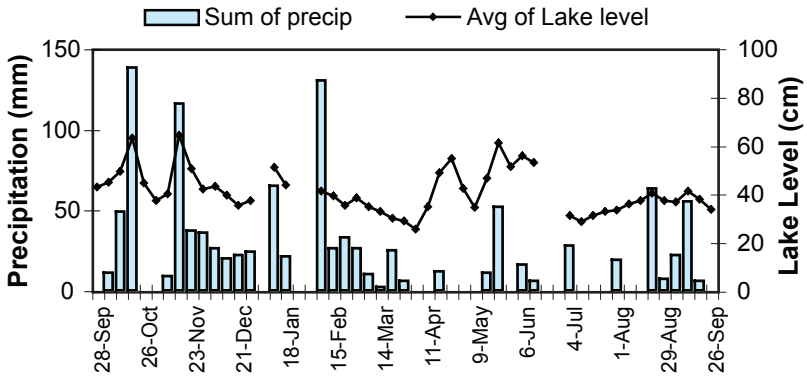
Lake Temperature



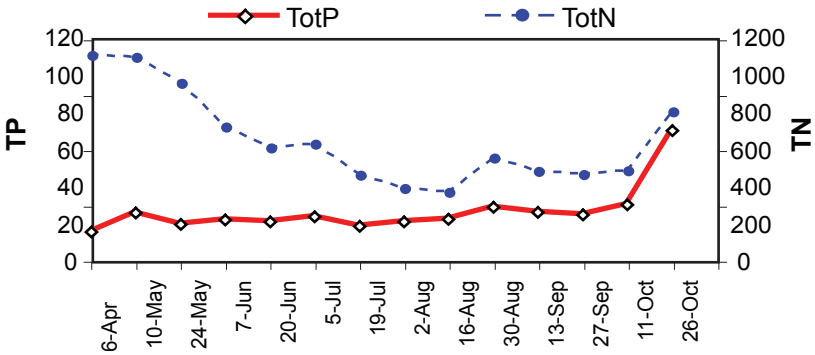
Secchi Depth



Lake Level and Precipitation



Nutrient Analysis



Profile data indicate that thermal stratification was present early in the season and persisted through the summer. High concentrations of phosphorus were found in the deep water in August, suggesting that anoxia could have triggered a release from the sediments. Chlorophyll data indicated that algae were higher in abundance in the middle of the water column, possibly around the thermocline.

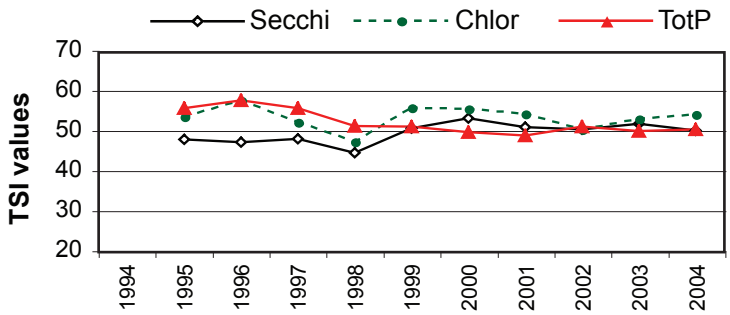
In 2004 TSI values for the three indicators were close to each other, above the threshold for eutrophic conditions, similar to recent years.

Chlorophyll Concentrations and Algae

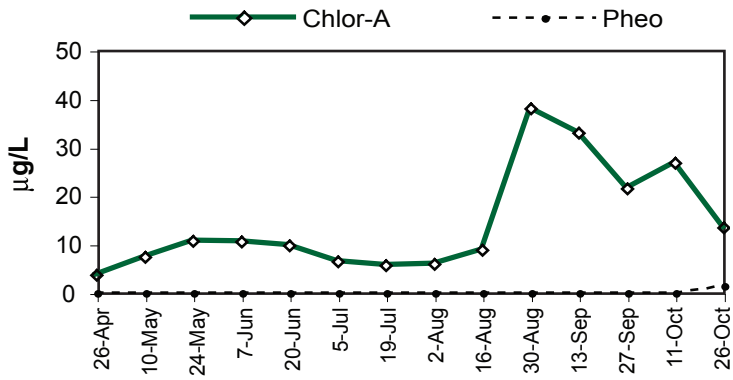
Chlorophyll content decreased from a minor increase in late May to low values that remained steady through summer and then increased greatly in late August, shortly after the drop in N:P ratios. For most of the sample season, the phytoplankton was dominated by the bluegreen *Aphanizomenon flos-aquae.* The diatoms *Tabellaria fenestrata*, *Asterionella formosa*, and *Fragilaria crotonensis* were also commonly found, in addition to a variety of cryptophyte and chrysophyte species.

Date	Secchi	depth-m	degC	Chlor-A	TP µg/L	TN µg/L
5/24/04	2.0	1	18.0	10.70	20.1	961
		3	15.0	17.80	24.5	1030
		6.5	8.0	13.60	54.9	644
8/30/04	1.0	1	22.0	38.00	29.2	562
		3	20.0	57.70	40.5	509
		6.5	11.0	34.30	561.0	2510

TSI Ratings



Chlorophyll a Concentrations (ug/L)



Common Algae

	Group
Aphanizomenon flos-aquae	Cyanobacteria
Tabellaria fenestrata	Bacillariophyta
Fragilaria crotonensis	Bacillariophyta

Cottage

2004 Level I Data

Daily Data Summary

Week of	Sum of precip. (mm)	# of days	Avg of lake level (cm)	# of days
28-Sep-03	0	5	42.8	5
5-Oct-03	11	7	44.9	7
12-Oct-03	53	7	50.9	7
19-Oct-03	134	7	61.0	7
26-Oct-03	0	5	44.8	5
2-Nov-03	0	4	37.3	4
9-Nov-03	17	7	40.9	7
16-Nov-03	108	7	66.3	7
23-Nov-03	37	7	47.9	7
30-Nov-03	38	7	41.9	7
7-Dec-03	29	7	42.7	7
14-Dec-03	16	7	38.4	7
21-Dec-03	31	7	35.7	7
28-Dec-03	14	5	36.4	5
4-Jan-04	40	1		1
11-Jan-04	30	7	49.4	7
18-Jan-04	16	5	43.4	5
25-Jan-04	0	0		0
1-Feb-04	126	1		1
8-Feb-04	9	7	40.3	6
15-Feb-04	21	7	38.7	7
22-Feb-04	33	7	35.3	7
29-Feb-04	29	7	37.9	7
7-Mar-04	7	7	34.0	7
14-Mar-04	2	7	32.3	7
21-Mar-04	25	7	29.4	7
28-Mar-04	6	7	28.4	7
4-Apr-04	0	7	25.0	7
11-Apr-04	0	7	36.9	7
18-Apr-04	12	7	50.4	7
25-Apr-04	0	7	53.1	7
2-May-04	0	7	40.4	7
9-May-04	3	7	35.1	7
16-May-04	8	7	48.3	7
23-May-04	52	7	63.0	7
30-May-04	0	6	48.3	7
6-Jun-04	22	7	57.7	7
13-Jun-04	0	3	49.3	3
20-Jun-04	0	0		0
27-Jun-04	0	0		0
4-Jul-04	28	7	30.7	6
11-Jul-04	0	7	28.3	7
18-Jul-04	0	7	31.7	7
25-Jul-04	0	7	32.4	7
1-Aug-04	19	7	33.6	7
8-Aug-04	0	7	36.0	7
15-Aug-04	44	7	37.9	7
22-Aug-04	19	7	39.6	7
29-Aug-04	7	7	37.0	7
5-Sep-04	28	7	36.9	7
12-Sep-04	51	7	41.1	7
19-Sep-04	4	7	36.9	7
26-Sep-04	0	4	33.0	4
Min	0.0		25.0	
Max	134.0		66.3	
Total	1129.0			

Weekly Data Summary

Sample date	Sample time	Secchi (m)	Temp (°C)	Algae* (Shore)	Algae* (at site)	Goose Count*
7-Oct-02	13:00	1.0	15.0	C3	C3	
14-Oct-02	13:00	1.0	13.0	C3	C3	
21-Oct-02	13:00	1.0	13.0	C3	C3	
28-Oct-02	13:00	2.0	12.0	C1	C1	
4-Nov-02	12:30	2.0	9.0	C1	C1	
12-Nov-02	12:30	2.0	9.0	C1	C1	
18-Nov-02	13:00	2.0	9.0	C1	C1	
25-Nov-02	13:00	2.0	8.0	C1	C1	
2-Dec-02	13:00	2.0	7.0			
9-Dec-02	13:00	2.0	7.0			
16-Dec-02	13:00	1.0	7.0			
23-Dec-02	13:00	1.5	6.0			
30-Dec-02	13:00	2.0	5.0			
6-Jan-03	13:00	1.5	5.0			
12-Jan-03	13:00	1.5	5.0			
20-Jan-03	13:00	1.5	6.0			
27-Jan-03	12:00	1.5	6.0			
3-Feb-03	13:00	1.5	5.5			
10-Feb-03	13:00	1.5	5.0			
17-Feb-03	13:00	1.8	5.5			
24-Feb-03	12:30	2.0	6.0			
3-Mar-03	13:00	1.5	6.0			
9-Mar-03	13:00	1.5	7.0			
17-Mar-03	13:00	1.5	9.0			
7-Apr-03	14:00	1.0	11.0	P1	P1	
13-Apr-03	14:30	1.0	11.5	P1	P1	
21-Apr-03	14:00	1.0	13.0	P1	P1	
28-Apr-03	12:30	1.5	14.0	P1	P1	
4-May-03	13:00	1.8	14.0	P1	P1	
12-May-03	13:00	1.5	17.0	P1	P1	
19-May-03	12:00	1.5	16.0	P1	P1	
27-May-03	13:00	1.5	18.0	P1	P1	
2-Jun-03	13:00	2.0	19.0	P1	P1	
9-Jun-03	13:00	2.0	23.0	P1	P1	
16-Jun-03	13:30	2.0	21.5	P1	P1	
23-Jun-03	13:00	2.0	18.0	P2	P2	
29-Jun-03	11:45	2.8	23.0	P2	P1	
7-Jul-03	13:30	2.5	23.0	P2	P1	
14-Jul-03	13:00	2.3	23.0	P2	P1	
21-Jul-03	14:00	2.5	25.0	P3	P1	
28-Jul-03	15:00	2.7	25.0	P3	P1	
4-Aug-03	14:00	2.7	25.0	P3	P1	
10-Aug-03	15:00	2.2	24.5	P3	P1	
18-Aug-03	13:00	1.5	23.0	P3	P2	
25-Aug-03	12:00	1.3	22.0	P3	P2	
1-Sep-03	12:00	1.2	22.0	P3	P2	
8-Sep-03	13:00	1.2	21.0	P3	P2	
15-Sep-03	13:00	1.2	18.0	P3	P2	
22-Sep-03	14:00	1.0	18.0	P3	P3	
29-Sep-03	12:00	1.3	18.0	P3	P3	
	Min	1.0	5.0			
	Max	2.8	25.0			

* See introduction for discussion of algae assessment and goose count methods.

2004 Level II Data

Date (2004)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI Secc	Calculated TSI chl-a	Calculated TSI TP
26-Apr	17.0	2.0	3.68	16.0	1110	2	69	50.0	43.4	44.1
10-May	17.0	2.0	7.37	26.3	1100	2	42	50.0	50.2	51.3
24-May	18.0	2.0	10.70	20.1	961	2	48	50.0	53.8	47.4
7-Jun	19.5	2.5	10.60	22.6	727	2	32	46.8	53.7	49.1
20-Jun	22.5	2.5	9.77	21.3	615		29	46.8	52.9	48.3
5-Jul	24.0	3.1	6.41	24.0	635		26	43.7	48.8	50.0
19-Jul	24.0	2.5	5.61	19.1	468	2	25	46.8	47.5	46.7
2-Aug	24.0	2.5	5.93	21.3	398	2	19	46.8	48.0	48.3
16-Aug	25.0	2.0	8.81	22.8	379	2	17	50.0	51.9	49.3
30-Aug	23.0	1.0	38.00	29.2	562	2	19	60.0	66.3	52.8
13-Sep	19.0	1.3	33.00	26.6	490	2	18	56.2	64.9	51.5
27-Sep	16.5	1.3	21.50	25.3	471	2	19	56.2	60.7	50.8
11-Oct	15.0	2.0	26.80	30.5	494	2	16	50.0	62.8	53.5
25-Oct	NR	NR	13.50	70.3	809		12		56.1	65.5

	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae	N:P	Calculated TSI Secc	Calculated TSI chl-a	Calculated TSI TP
Mean	20.3	2.1	14.4	26.8	658.5	2.0	28	50.2	54.4	50.6
Median	19.5	2.0	10.2	23.4	588.5	2	22	50.0	53.3	49.6
Min	15.0	1.0	3.7	16.0	379.0	2	12	43.7	43.4	44.1
Max	25.0	3.1	38.0	70.3	1110.0	2	69	60.0	66.3	65.5
Count	13	13	14	14	14	11	14	13	14	14

TSI Average = 51.7