Steel

Steel Overview

Volunteer monitoring began at Steel Lake in the 1980s and has continued through 2004, with a gap from1991 -1993. The data indicate this city lake (Federal Way) is relatively low in primary productivity (low mesotrophic) with very good water quality.

Steel Lake has a public access boat launch, and the lake has been recently treated for a pioneering Eurasian milfoil infestation, with a long-term plan adopted for control, including funding through the formation of a Lake Management District.

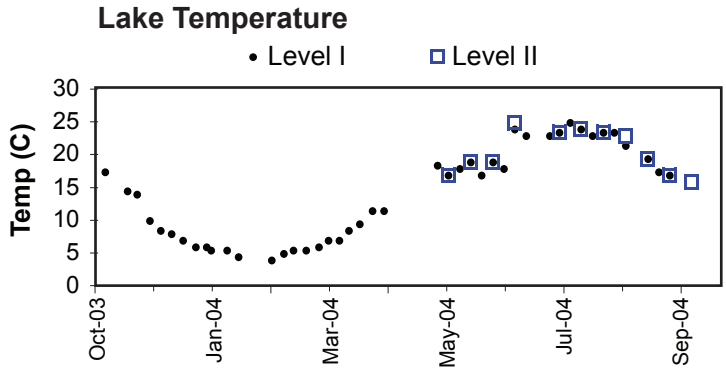
Physical Parameters

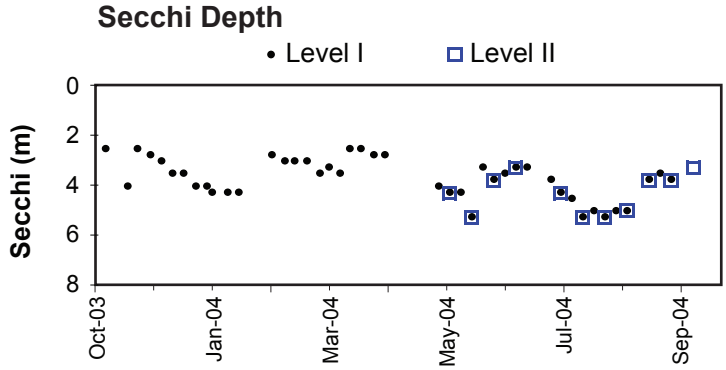
Secchi transparency ranged from 2.5 to 5.3 m through the year. The summer average of 4.3 m placed it among the upper mid range of small lakes monitored in 2004. Annual water temperatures ranged from 4.0 to 25.0 degrees Celsius, placing it in the mid range for maximum temperature recorded.

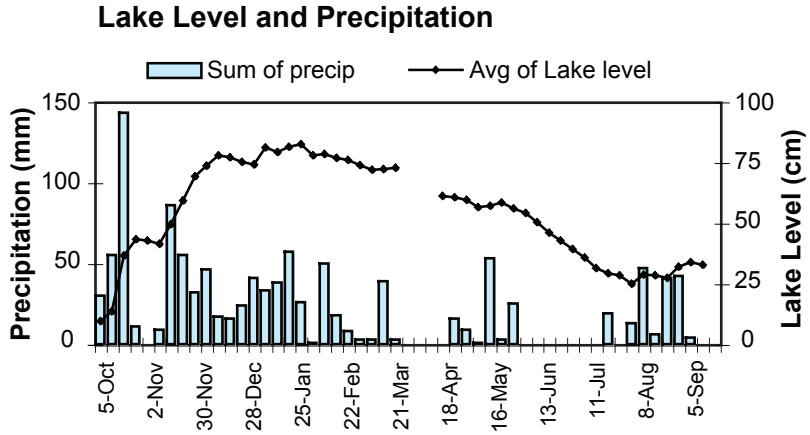
Nearly complete records were reported for lake level and precipitation. The lake level followed the regional pattern of winter high - summer low stands, with some sensitivity to very large rain events.

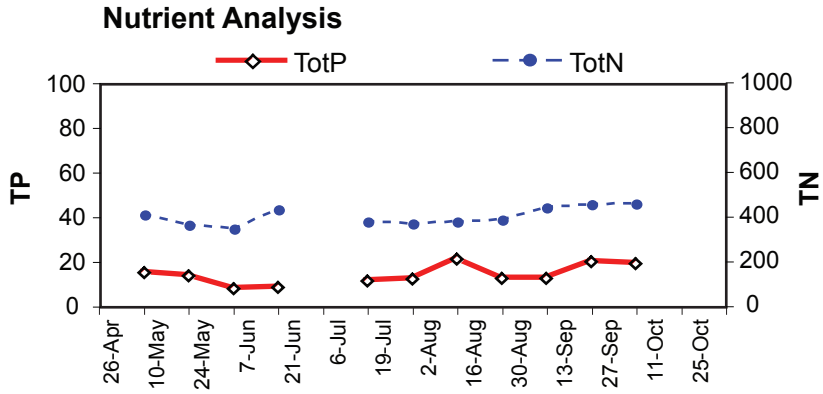
Nutrient Analysis and TSI Ratings

Total phosphorus and total nitrogen remained in stable proportion to each other through the sampling period, both increasing slightly in fall. The N:P ratio ranged from 18 to 50, averaging 31 which suggested poor conditions for nuisance bluegreens for much of the period.









Profile data indicate thermal stratification was not strongly maintained, although phosphorus was slightly higher in deep water through the summer. Chlorophyll data indicated that algae were more abundant in the deeper water on both profile dates.

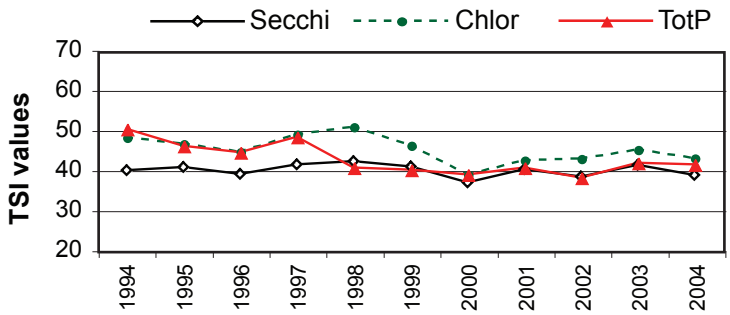
In 2004 the TSI indicators were close together just above the threshold between oligotrophy and mesotrophy, similar to recent years.

Chlorophyll Concentrations and Algae

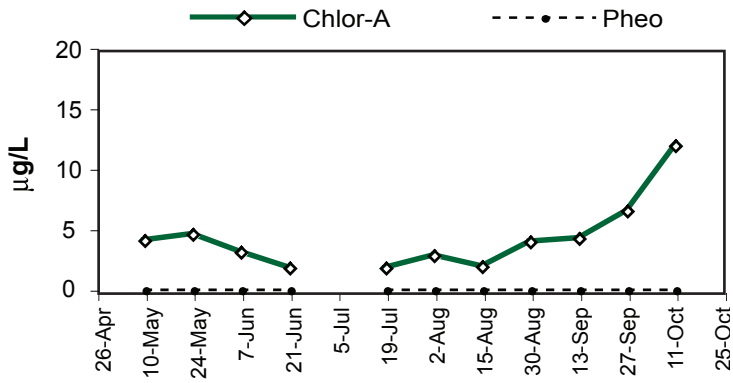
Chlorophyll concentrations at 1m were moderately low through much of the season, increasing in late August to a high value on the last sample date. Spring phytoplankton were characterized by the colonial chrysophyte *Gloeobotrys* and an unidentified species, while the colonial bluegreen *Woronichinia* was also prominent. The fall bloom was dominated by the chrysophyte *Dinobryon*, accompanied by the colonial bluegreen *Snowella*.

Date	Secchi	depth-m	degC	Chlor-A	TP µg/L	TN µg/L
5/24/04	5.3	1	19.0	4.65	13.7	369
		6	16.0	17.10	45.1	563
8/30/04	5.0	1	23.0	4.00	12.7	393
		6	22.0	2.40	28.7	617

TSI Ratings



Chlorophyll a Concentrations (ug/L)



Common Algae

	Group
Dinobryon sp	Chrysophyta
Gloeobotrys sp	Chrysophyta
Woronichinia sp	Cyanobacteria

Steel

2004 Level I Data

Daily Data Summary					Weekly Data Summary						
Week of	Sum of precip. (mm)	# of days	Avg of lake level (cm)	# of days	Sample date	Sample time	Secchi (m)	Temp (°C)	Algae* (Shore)	Algae* (at site)	Goose Count*
28-Sep-03	0.0	4	9.5	4							
5-Oct-03	30.0	7	9.6	7	6-Oct-03	16:30	2.5	17.5	P2	P2	0
12-Oct-03	55.0	7	13.6	7							
19-Oct-03	143.0	7	36.4	7	20-Oct-03	12:00	4.0	14.5	P1	P1	0
26-Oct-03	11.0	7	43.3	7	26-Oct-03	15:30	2.5	14.0	P2	P2	0
2-Nov-03	0.0	7	42.6	7	3-Nov-03	15:30	2.8	10.0	P3	P3	0
9-Nov-03	9.0	7	41.4	7	10-Nov-03	13:30	3.0	8.5	P3	P3	22
16-Nov-03	86.0	7	49.6	7	17-Nov-03	12:00	3.5	8.0	P3	P3	
23-Nov-03	55.0	7	59.3	7	24-Nov-03	13:00	3.5	7.0	P3	P3	
30-Nov-03	32.0	7	69.1	7	2-Dec-03	12:00	4.0	6.0	P2	P2	20
7-Dec-03	46.1	7	73.5	7	9-Dec-03	13:30	4.0	6.0	P2	P2	
14-Dec-03	17.0	7	77.7	7	15-Dec-03	11:00	4.3	5.5	P2	P2	
21-Dec-03	16.0	7	77.0	7	22-Dec-03	11:00	4.3	5.5	P2	P2	
28-Dec-03	24.0	7	75.1	7	29-Dec-03	12:30	4.3	4.5	P2	P2	
4-Jan-04	41.0	7	74.0	2	5-Jan-04						0
11-Jan-04	33.1	7	81.0	6	12-Jan-04	11:00			P2		0
18-Jan-04	38.0	7	79.3	7	19-Jan-04	12:00	2.8	4.0	P3	P3	0
25-Jan-04	57.0	6	81.3	7	27-Jan-04	12:00	3.0	5.0	P3	P3	0
1-Feb-04	26.0	7	82.4	7	2-Feb-04	12:00	3.0	5.5	P3	P3	0
8-Feb-04	1.0	7	77.9	7	10-Feb-04	12:00	3.0	5.5	P3	P3	0
15-Feb-04	50.0	7	78.4	7	18-Feb-04	12:00	3.5	6.0	P2	P2	0
22-Feb-04	18.0	7	76.7	7	24-Feb-04	14:00	3.3	7.0	P2	P2	10
29-Feb-04	8.0	7	75.9	7	2-Mar-04	12:00	3.5	7.0	P2	P2	2
7-Mar-04	3.0	7	73.7	7	8-Mar-04	14:00	2.5	8.5	P3	P3	0
14-Mar-04	3.0	7	72.0	7	15-Mar-04	14:00	2.5	9.5	P3	P3	0
21-Mar-04	39.0	7	72.3	7	23-Mar-04	15:00	2.8	11.5	P3	P3	4
28-Mar-04	3.0	4	72.7	3	30-Mar-04	13:00	2.8	11.5	P3	P3	0
4-Apr-04											
11-Apr-04											
18-Apr-04											
25-Apr-04	0.0	1	61.0	1							
2-May-04	16.0	7	60.6	7	3-May-04	15:00	4.0	18.5	P2	P2	0
9-May-04	9.0	7	59.6	7	10-May-04	13:00	4.3	17.0	P2	P2	1
16-May-04	1.0	7	56.4	7	17-May-04	13:30	4.3	18.0	P1	P1	0
23-May-04	53.0	7	57.0	7	24-May-04	14:30	5.3	19.0	P1	P1	11
30-May-04	3.0	7	58.4	7	31-May-04	13:00	3.3	17.0	P2	P2	0
6-Jun-04	25.0	7	56.0	7	7-Jun-04	12:00	3.8	19.0	P2	P2	0
13-Jun-04	0.0	7	54.1	7	14-Jun-04	12:30	3.5	18.0	P2	P2	0
20-Jun-04	0.0	7	50.1	7	21-Jun-04	15:30	3.3	24.0	P2	P2	0
27-Jun-04	0.0	7	46.0	7	28-Jun-04	15:30	3.3	23.0	P2	P2	0
4-Jul-04	0.0	7	42.7	7							
11-Jul-04	0.0	7	39.3	7	13-Jul-04	16:00	3.8	23.0	P2	P2	0
18-Jul-04	0.0	7	35.7	7	19-Jul-04	16:00	4.3	23.5	P1	P1	0
25-Jul-04	0.0	7	31.4	7		16:00	4.5	25.0	P1	P1	11
1-Aug-04	19.0	7	29.1	7	2-Aug-04	12:00	5.3	24.0	P1	P1	0
8-Aug-04	0.0	7	28.3	7	9-Aug-04	12:00	5.0	23.0	P1	P1	6
15-Aug-04	13.0	7	24.9	7	16-Aug-04	12:00	5.3	23.5	P1	P1	0
22-Aug-04	47.0	7	28.7	7	23-Aug-04	14:30	5.0	23.5	P2	P2	0
29-Aug-04	6.1	7	28.3	7	30-Aug-04	12:30	5.0	21.5	P2	P2	0
5-Sep-04	41.0	7	27.4	7							
12-Sep-04	42.0	7	31.9	7	13-Sep-04	11:30	3.8	19.5	P2	P2	6
19-Sep-04	4.0	7	33.7	7	20-Sep-04	11:45	3.5	17.5	P3	P3	0
26-Sep-04	0.0	5	32.8	5	27-Sep-04	12:00	3.8	17.0	P3	P3	8
Min	0.0		9.5			**Min**	2.5	4.0			
Max	143.0		82.4			**Max**	5.3	25.0			
Total	1123.2										

* 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										
10-May	17.0	4.3	4.17	15.3	415	2	27	39.0	44.6	43.5
24-May	19.0	5.3	4.65	13.7	369	1	27	35.9	45.6	41.9
7-Jun	19.0	3.8	3.20	8.0	353	2	44	40.7	42.0	34.1
21-Jun	25.0	3.3	1.90	8.7	438	2	50	42.8	36.9	35.4
6-Jul										
19-Jul	23.5	4.3	1.90	11.4	383	1	34	39.0	36.9	39.3
2-Aug	24.0	5.3	2.88	12.3	375	2	30	35.9	40.9	40.4
16-Aug	23.5	5.3	2.00	21.4	384	1	18	35.9	37.4	48.3
30-Aug	23.0	5.0	4.01	12.7	393	2	31	36.8	44.2	40.8
13-Sep	19.5	3.8	4.33	12.8	448	2	35	40.7	44.9	40.9
27-Sep	17.0	3.8	6.57	20.2	461	3	23	40.7	49.0	47.5
11-Oct	16.0	3.3	12.00	19.3	465	3	24	42.8	54.9	46.9
25-Oct										
	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	20.6	4.3	4.3	14.2	407.6	1.9	31	39.1	43.4	41.7
Median	19.5	4.3	4.0	12.8	393.0	2	30	39.0	44.2	40.9
Min	16.0	3.3	1.9	8.0	353.0	1	18	35.9	36.9	34.1
Max	25.0	5.3	12.0	21.4	465.0	3	50	42.8	54.9	48.3
Count	11	11	11	11	11	11	11	11	11	11

TSI Average = 41.4