

Horseshoe

Lake Overview

Volunteer monitoring began at Horseshoe Lake in water year 1999 and has continued through 2003. The data indicate that this rural lake is moderate in primary productivity (mesotrophic), with good water quality. Since the lake surface makes up approximately 5% of the drainage area, direct precipitation is less important than watershed inputs. Land use analysis of 2002 aerial photographs showed that 37% of the surrounding watershed has been developed for uses other than agriculture.

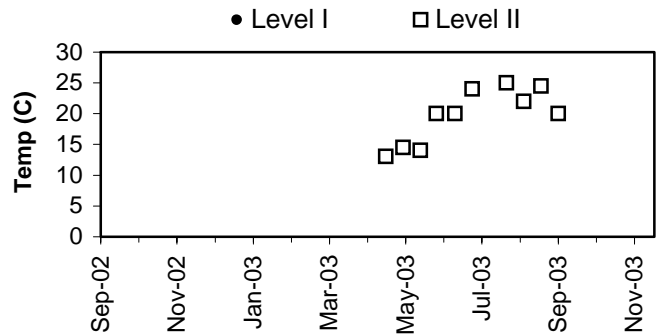
Horseshoe Lake has no public access boat launch, and widely fluctuating water levels may make invasion by noxious aquatic weeds unlikely over the long term.

Sampling was discontinued after early September in 2003 because the lake was too shallow to allow navigation to the sample site.

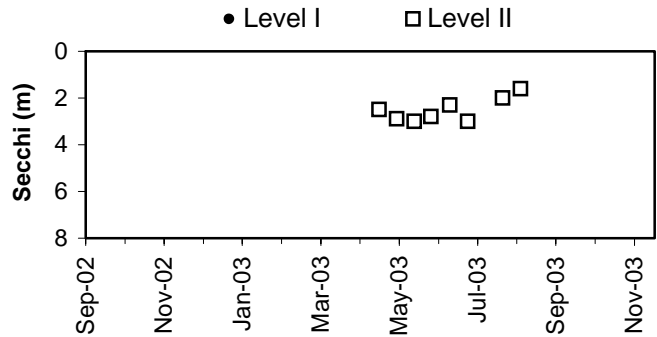
Physical Parameters

Secchi transparency ranged between 1.6 and 3.0m through the sampling season, while surface water temperatures ranged between 13.0 and 25.0 degrees Celsius. There were no precipitation or lake level records for the year.

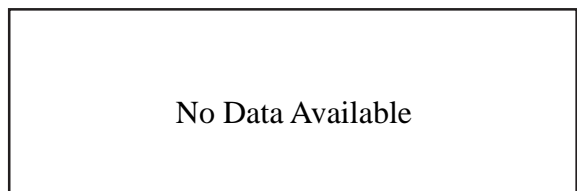
Lake Temperature



Secchi Depth

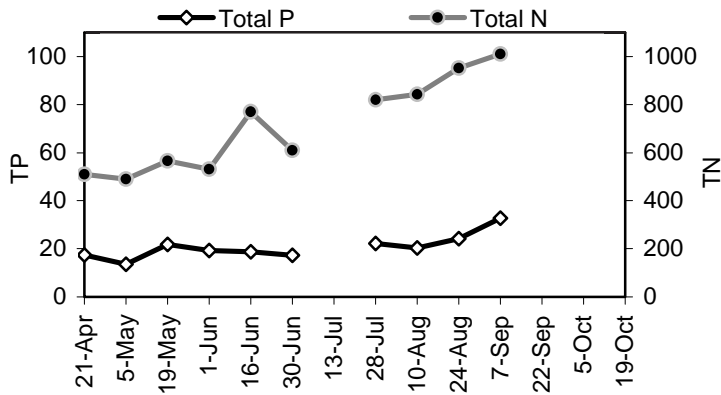


Lake Level and Precipitation

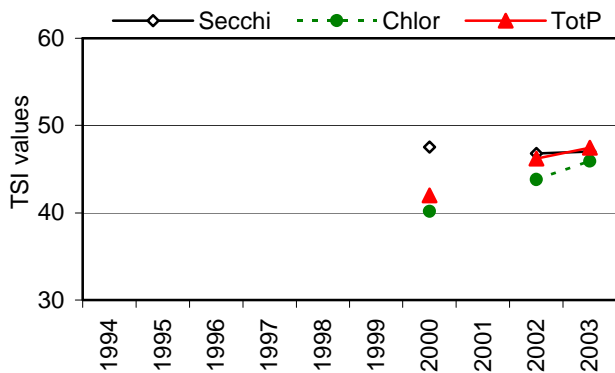


Horseshoe

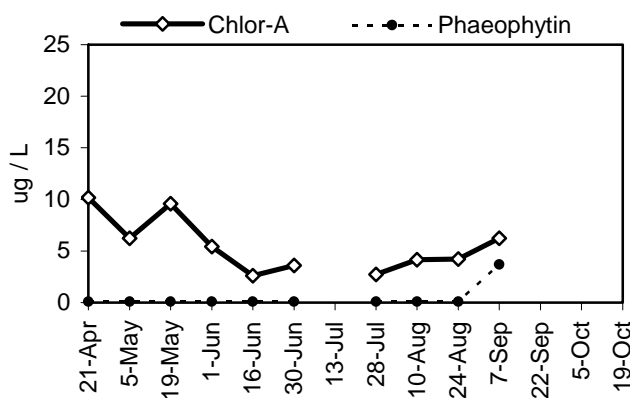
Nutrient Analysis



TSI Ratings



Chlorophyll a Concentrations (ug/L)



Nutrient Analysis and TSI Ratings

Total nitrogen rose steadily through the sample period, while total phosphorus remained steady until mid-August after which it also began to rise. The N:P ratio ranged from 26 to 42, generally unfavorable for bluegreen growth. The 2003 TSI indicators were very close to each other in the midrange for mesotrophy, very similar to 2002.

Chlorophyll and Algae

Chlorophyll content was higher in spring and declined to its minimum levels in early summer, beginning to rise again in early fall when sampling ceased. The dominant algae included several unidentified species of chrysophytes, the colony-forming chlorophyte *Botryococcus braunii* and the dinoflagellate *Ceratium*. Bluegreen algae were extremely rare.

Common algae	Group
unidentified species	chrysophyte
<i>Botryococcus braunii</i>	chlorophyte
<i>Ceratium hirundinella</i>	dinoflagellate

No Level I Data
Available For This Lake

Horseshoe

2003 Level II Data

Date (2003)	Temp (°C)	Secchi (m)	Chl-a (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
21-Apr	13.0	2.5	10.2	17.4	510	1	29	46.8	53.4	45.4	
5-May	14.5	2.9	6.3	13.5	490	1	36	44.6	48.5	41.7	
19-May	14.0	3.0	9.6	21.8	566	1	26	44.1	52.8	48.6	
1-Jun	20.0	2.8	5.4	19.2	531	1	28	45.1	47.1	46.8	
16-Jun	20.0	2.3	2.6	18.7	770	1	41	48.0	39.9	46.4	
30-Jun	24.0	3.0	3.6	17.2	610	1	35	44.1	43.1	45.2	
13-Jul											No sample.
28-Jul	25.0	2.0	2.7	22.2	819	1	37	50.0	40.4	48.9	
11-Aug	22.0	1.6	4.2	20.3	843	1	42	53.2	44.6	47.6	
25-Aug	24.5		4.2	24.1	952	1	40		44.7	50.1	
8-Sep	20.0		6.2	32.7	1010	1	31		48.5	54.5	
21-Sep											No sample.
5-Oct											No sample.
19-Oct											No sample.
	Temp (°C)	Secchi (m)	Chl-a (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			
								Secc	chl-a	TP	
Mean	19.7	2.5	5.5	20.7	710.1	1.0	34	47.0	46.3	47.5	TSI Average = 46.9
Median	20.0	2.7	4.8	19.8	690.0	1	36	46.0	45.9	47.2	
Min	13.0	1.6	2.6	13.5	490.0	1	26	44.1	39.9	41.7	
Max	25.0	3.0	10.2	32.7	1010.0	1	42	53.2	53.4	54.5	
Count	10	8	10	10	10	10	10	8	10	10	