

Long Lake

Location

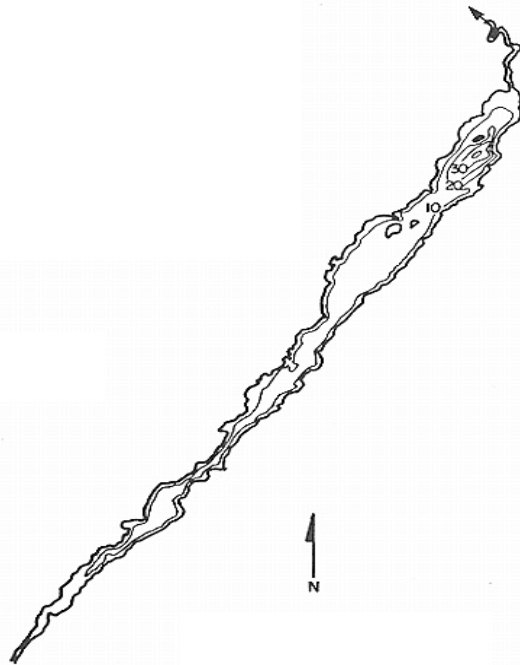
Pond Number: 060241
Watershed: St. Lawrence River
County: Hamilton
Topographic Quadrangle: Long Lake / Blue Mountain

Sample Site

Latitude: 44° 04.241'
Longitude: 74° 19.760'

Morphometry

Surface Area: 4,077 Ac.
Mean Depth: 13 Ft.
Maximum Depth: 43 Ft.
Volume: 53,001 Ac./Ft.
Watershed Area: 301,467 Ac.
Hydraulic Retention Time: 0.1 Yr.
Shoreline Length: 35.0 Mi.
Elevation: 1,627 Ft.
Water Quality Classification: B



Temperature and Dissolved Oxygen

Long Lake had a minimum DO of 0.2 mg/L (August 1998), with a minimum temperature of 4.0°C and a maximum temperature of 25.2°C. In general, the lowest DO values occurred during the months of August through September.

pH

Figure 134 presents the seasonal mean pH trend in Long Lake, while Table 105 presents descriptive statistics for pH in Long Lake. The pH in Long Lake exhibited an increasing trend from 1996 to 2002. The pH in Long Lake was similar to the county average from 1994 to 1998 and slightly higher than the county average from 1999 to 2003, though this difference was not statistically significant.

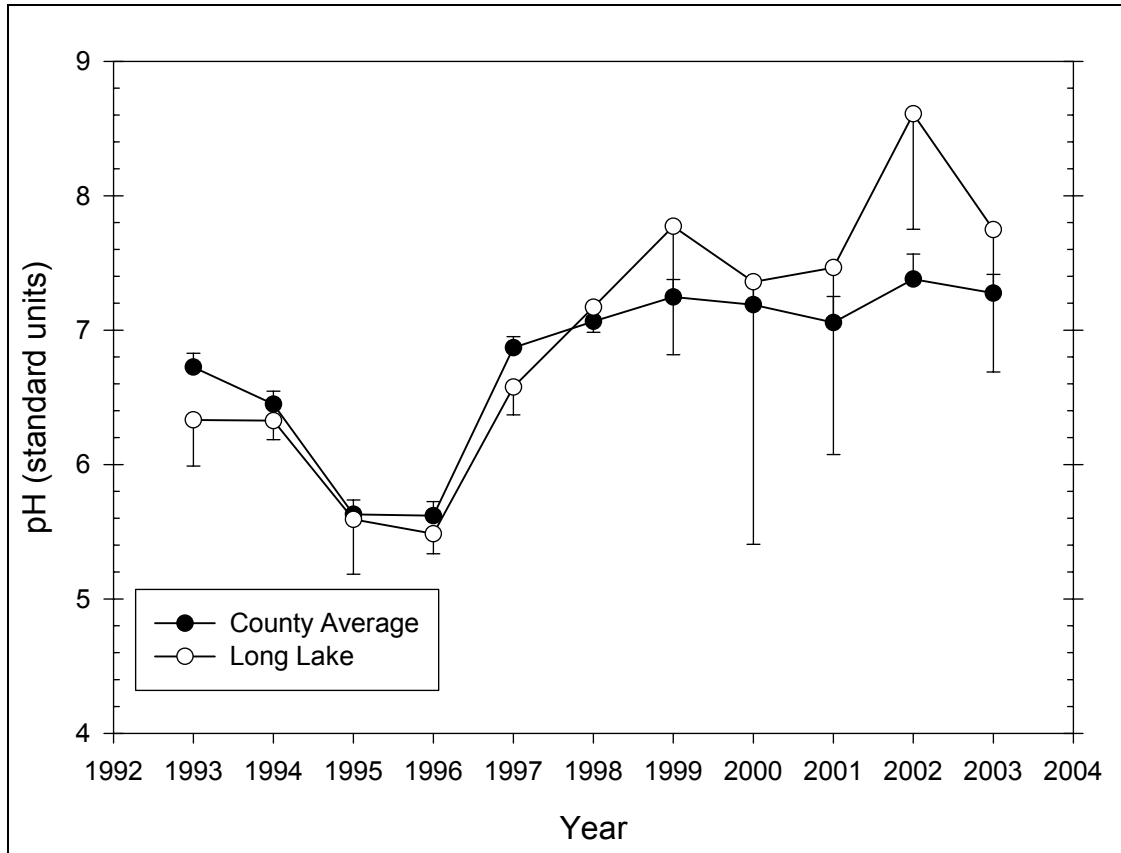


Figure 134 Seasonal mean pH trend in Long Lake

Table 105 – Descriptive Statistics for pH in Long Lake

Year	Size	Missing	Mean	Std Dev	Std. Error	C.I. of Mean
1993	6	1	6.332	0.276	0.124	0.343
1994	6	0	6.327	0.135	0.0553	0.142
1995	6	0	5.592	0.389	0.159	0.409
1996	6	0	5.485	0.141	0.0575	0.148
1997	6	0	6.577	0.198	0.0807	0.207
1998	6	0	7.170	0.177	0.0724	0.186
1999	5	0	7.772	0.768	0.344	0.954
2000	3	0	7.360	0.788	0.455	1.957
2001	4	0	7.465	0.874	0.437	1.390
2002	4	0	8.610	0.540	0.270	0.859
2003	4	0	7.748	0.665	0.333	1.058
Year	Range	Max	Min	Median	25%	75%
1993	0.670	6.800	6.130	6.210	6.152	6.470
1994	0.400	6.510	6.110	6.320	6.280	6.420
1995	1.070	6.050	4.980	5.540	5.460	5.980
1996	0.400	5.760	5.360	5.455	5.410	5.470
1997	0.480	6.790	6.310	6.580	6.420	6.780
1998	0.480	7.510	7.030	7.105	7.060	7.210
1999	1.860	8.550	6.690	8.110	7.125	8.317
2000	1.520	8.240	6.720	7.120	6.820	7.960
2001	2.060	8.370	6.310	7.590	6.835	8.095

2002	1.130	9.300	8.170	8.485	8.180	9.040
2003	1.520	8.610	7.090	7.645	7.240	8.255
Year	Skewness	Kurtosis	K-S Dist.	K-S Prob.	Sum	Sum of Squares
1993	1.728	2.902	0.271	0.256	31.660	200.776
1994	-0.399	0.850	0.199	0.550	37.960	240.252
1995	-0.389	0.0521	0.201	0.536	33.550	188.359
1996	1.963	4.386	0.376	0.008	32.910	180.611
1997	-0.177	-1.882	0.182	0.638	39.460	259.711
1998	1.866	3.592	0.299	0.096	43.020	308.611
1999	-0.718	-1.323	0.270	0.259	38.860	304.381
2000	1.244	--	0.286	0.366	22.080	163.750
2001	-0.756	0.609	0.202	0.626	29.860	225.195
2002	0.737	-1.898	0.282	0.296	34.440	297.403
2003	0.714	-0.606	0.205	0.618	30.990	241.422

Alkalinity

Figure 135 presents the seasonal mean alkalinity trend in Long Lake, while Table 106 presents descriptive statistics for alkalinity in Long Lake. The alkalinity in Long Lake exhibited no defined trend. The alkalinity in Long Lake was lower than the county average, though this difference may not be statistically significant for some years.

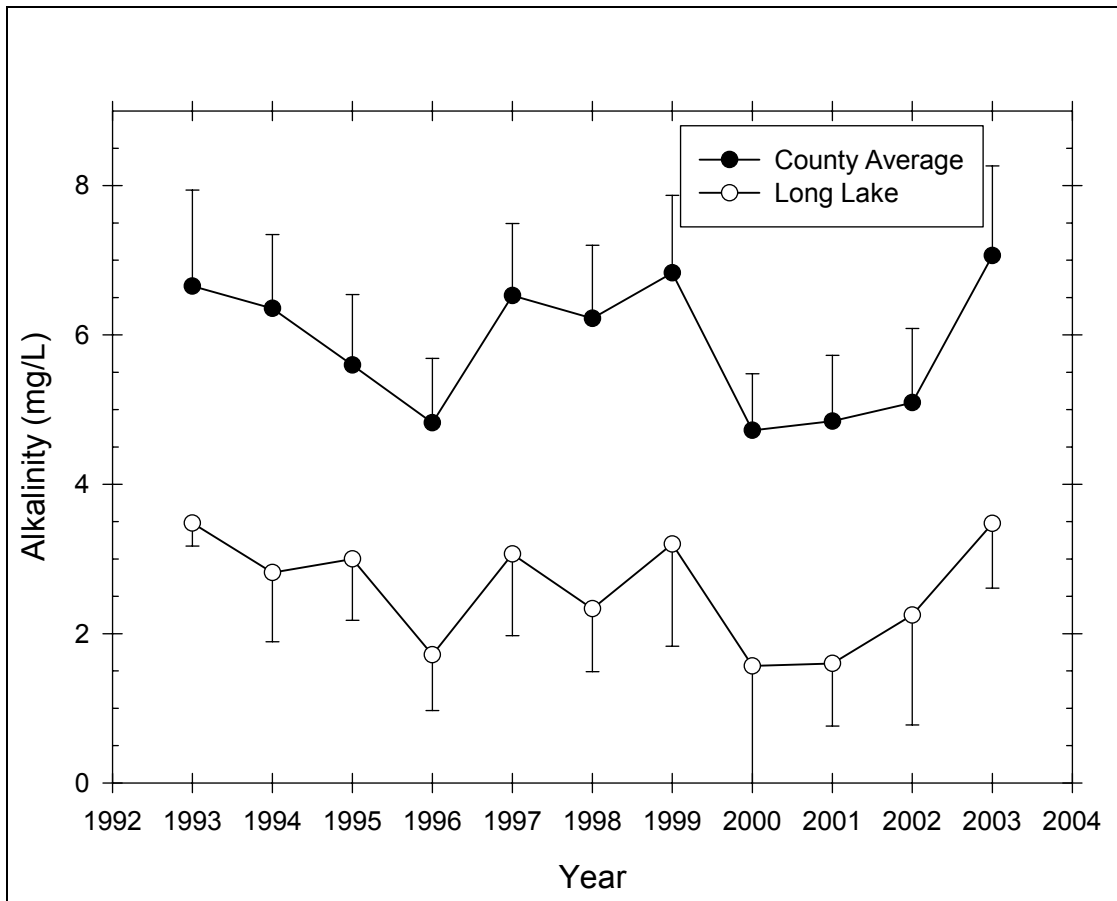


Figure 135 Seasonal mean alkalinity trend in Long Lake

Table 106 – Descriptive Statistics for Alkalinity in Long Lake

Year	Size	Missing	Mean	Std Dev	Std. Error	C.I. of Mean
1993	6	1	3.480	0.249	0.111	0.309
1994	6	0	2.817	0.882	0.360	0.925
1995	6	0	3.000	0.782	0.319	0.821
1996	6	0	1.717	0.711	0.290	0.746
1997	6	0	3.067	1.041	0.425	1.092
1998	6	0	2.333	0.804	0.328	0.844
1999	6	2	3.200	0.860	0.430	1.369
2000	6	3	1.567	0.666	0.384	1.654
2001	6	1	1.600	0.675	0.302	0.838
2002	6	2	2.250	0.926	0.463	1.473
2003	6	2	3.475	0.544	0.272	0.865
Year	Range	Max	Min	Median	25%	75%
1993	0.600	3.900	3.300	3.400	3.300	3.600
1994	2.200	4.000	1.800	2.800	1.900	3.600
1995	1.900	4.100	2.200	2.800	2.300	3.800
1996	2.000	3.100	1.100	1.550	1.300	1.700
1997	2.200	4.200	2.000	3.100	2.000	4.000
1998	1.900	3.300	1.400	2.250	1.600	3.200
1999	2.000	4.100	2.100	3.300	2.550	3.850
2000	1.300	2.300	1.000	1.400	1.100	2.075
2001	1.800	2.400	0.600	1.500	1.275	2.100
2002	2.000	3.000	1.000	2.500	1.550	2.950
2003	1.200	3.900	2.700	3.650	3.100	3.850
Year	Skewness	Kurtosis	K-S Dist.	K-S Prob.	Sum	Sum of Squares
1993	1.671	2.815	0.268	0.267	17.400	60.800
1994	0.138	-1.491	0.184	0.626	16.900	51.490
1995	0.609	-1.528	0.268	0.195	18.000	57.060
1996	1.943	4.260	0.343	0.026	10.300	20.210
1997	-0.0161	-2.975	0.260	0.228	18.400	61.840
1998	0.181	-2.068	0.193	0.581	14.000	35.900
1999	-0.572	-0.428	0.179	0.686	12.800	43.180
2000	1.056	--	0.265	0.442	4.700	8.250
2001	-0.578	0.667	0.241	0.394	8.000	14.620
2002	-1.059	-0.161	0.259	0.393	9.000	22.820
2003	-1.468	1.908	0.268	0.351	13.900	49.190

Total Phosphorus

Figure 136 presents the seasonal mean total phosphorus trend in Long Lake, while Table 107 presents descriptive statistics for total phosphorus in Long Lake. The total phosphorus in Long Lake was variable, but exhibited a general decreasing trend from 1997 to 2003, with a higher peak in 1999. The total phosphorus in Long Lake was similar to but more variable than the county average.

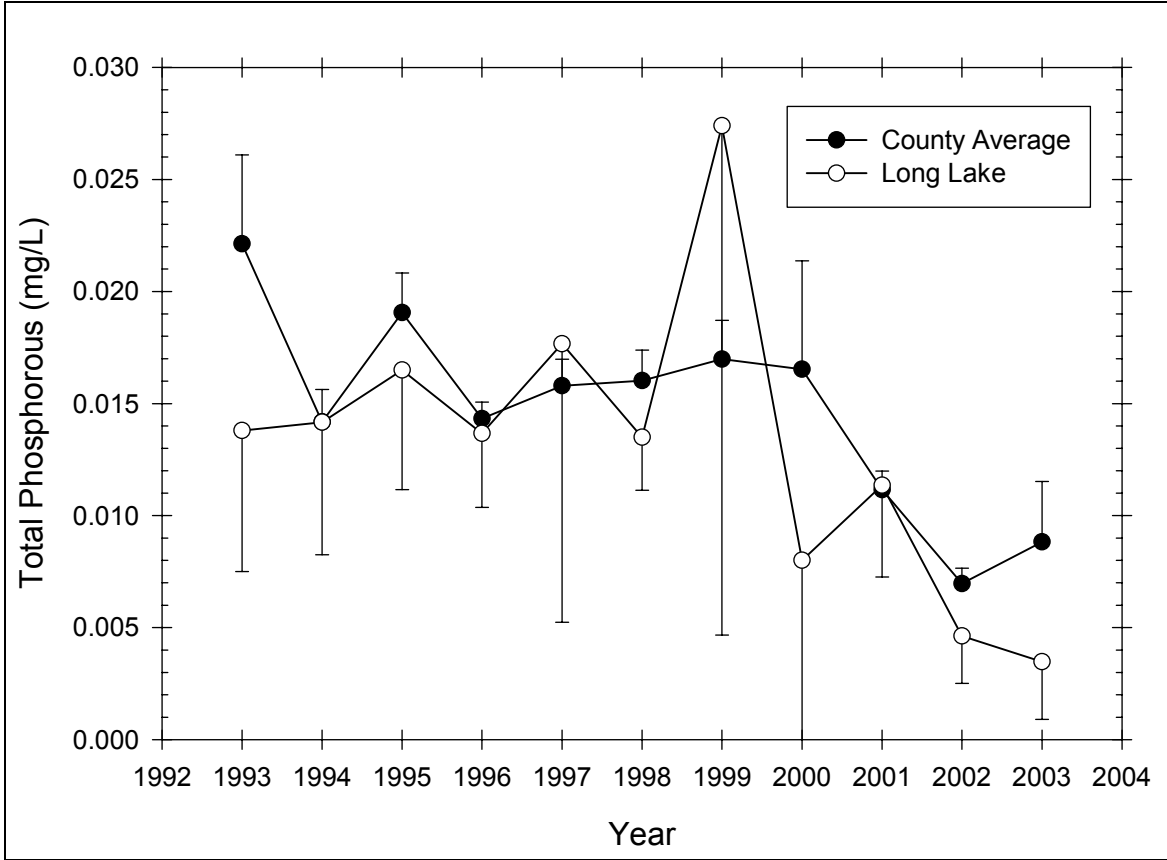


Figure 136 Seasonal mean total phosphorus trend in Long Lake

Table 107 – Descriptive Statistics for Total Phosphorus in Long Lake

Year	Size	Missing	Mean	Std Dev	Std. Error	C.I. of Mean
1993	6	1	0.0138	0.00507	0.00227	0.00629
1994	6	0	0.0142	0.00564	0.00230	0.00591
1995	6	0	0.0165	0.00509	0.00208	0.00534
1996	6	0	0.0137	0.00314	0.00128	0.00330
1997	6	0	0.0177	0.0118	0.00484	0.0124
1998	6	0	0.0135	0.00226	0.000922	0.00237
1999	6	1	0.0274	0.0183	0.00819	0.0227
2000	6	4	0.00800	0.00707	0.00500	0.0635
2001	6	2	0.0113	0.00257	0.00129	0.00409
2002	6	2	0.00463	0.00133	0.000666	0.00212
2003	6	2	0.00348	0.00162	0.000808	0.00257

Year	Range	Max	Min	Median	25%	75%
1993	0.0130	0.0180	0.00500	0.0150	0.0125	0.0165
1994	0.0160	0.0250	0.00900	0.0120	0.0120	0.0150
1995	0.0150	0.0230	0.00800	0.0175	0.0140	0.0190
1996	0.00900	0.0180	0.00900	0.0135	0.0120	0.0160
1997	0.0320	0.0400	0.00800	0.0135	0.01000	0.0210
1998	0.00600	0.0170	0.0110	0.0130	0.0120	0.0150
1999	0.0430	0.0600	0.0170	0.0190	0.0185	0.0315
2000	0.01000	0.0130	0.00300	0.00800	0.00300	0.0130
2001	0.00610	0.0140	0.00790	0.0118	0.00955	0.0132

2002	0.00280	0.00640	0.00360	0.00425	0.00360	0.00565
2003	0.00380	0.00500	0.00120	0.00385	0.00245	0.00450
Year	Skewness	Kurtosis	K-S Dist.	K-S Prob.	Sum	Sum of Squares
1993	-1.897	3.991	0.394	0.011	0.0690	0.00105
1994	1.849	3.845	0.316	0.061	0.0850	0.00136
1995	-0.765	1.147	0.206	0.510	0.0990	0.00176
1996	-0.120	-0.0342	0.131	0.771	0.0820	0.00117
1997	1.738	3.078	0.256	0.244	0.106	0.00257
1998	0.625	-0.750	0.247	0.287	0.0810	0.00112
1999	2.184	4.808	0.416	0.005	0.137	0.00509
2000	--	--	0.260	0.481	0.0160	0.000178
2001	-0.846	1.103	0.227	0.533	0.0454	0.000535
2002	0.975	-0.668	0.279	0.306	0.0185	0.0000909
2003	-1.277	2.303	0.305	0.207	0.0139	0.0000561

Nitrate

Figure 137 presents the seasonal mean nitrate trend in Long Lake, while Table 108 presents descriptive statistics for nitrate in Long Lake. The nitrate in Long Lake exhibited a decreasing trend from 1997 to 2002. The nitrate in Long Lake was similar to the county average.

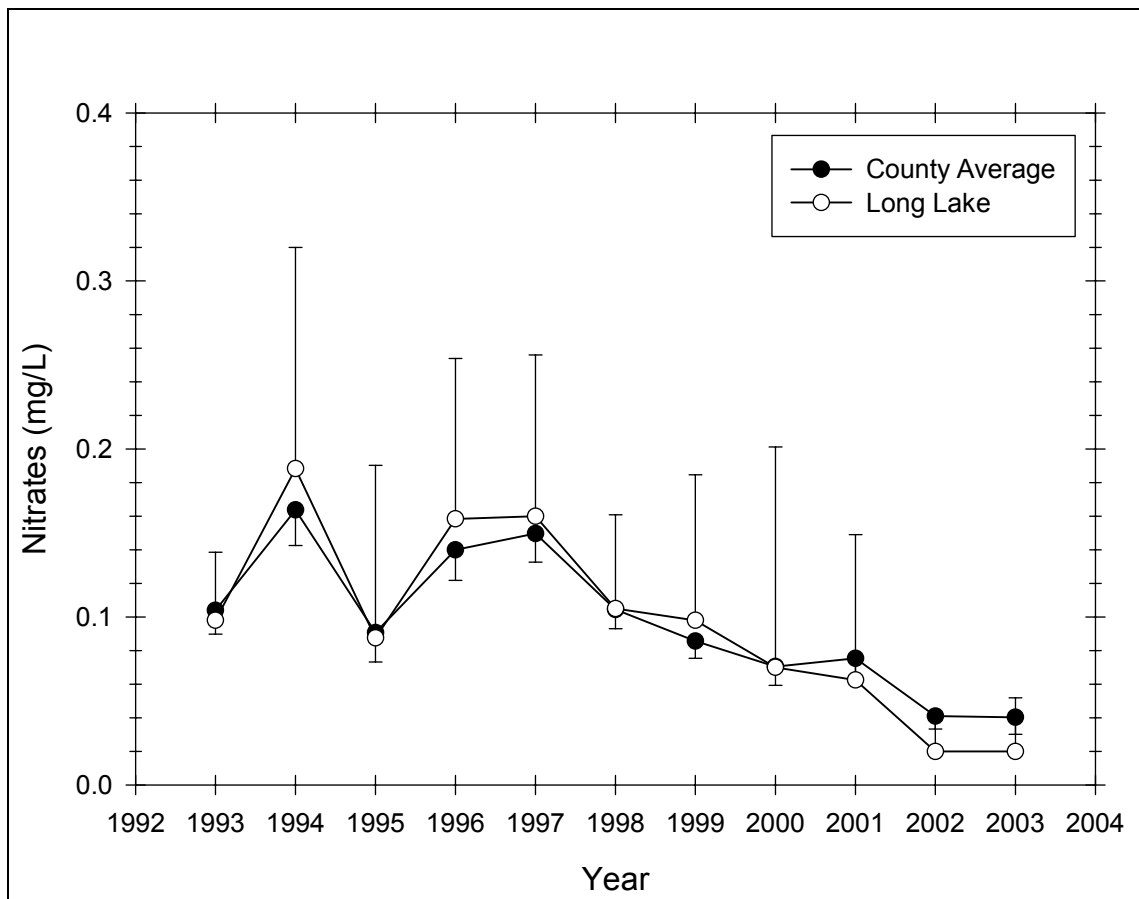


Figure 137 Seasonal mean nitrate trend in Long Lake

Table 108 – Descriptive Statistics for Nitrate in Long Lake

Year	Size	Missing	Mean	Std Dev	Std. Error	C.I. of Mean
1993	6	1	0.0980	0.0327	0.0146	0.0406
1994	6	0	0.188	0.125	0.0512	0.132
1995	6	0	0.0875	0.0979	0.0400	0.103
1996	6	0	0.158	0.0911	0.0372	0.0956
1997	6	0	0.160	0.0914	0.0373	0.0960
1998	6	0	0.105	0.0532	0.0217	0.0558
1999	6	1	0.0980	0.0698	0.0312	0.0866
2000	6	3	0.0700	0.0529	0.0306	0.131
2001	6	2	0.0625	0.0544	0.0272	0.0865
2002	6	2	0.0200	0.0141	0.00707	0.0225
2003	6	2	0.0200	0.0200	0.01000	0.0318
Year	Range	Max	Min	Median	25%	75%
1993	0.0800	0.130	0.0500	0.110	0.0725	0.123
1994	0.300	0.360	0.0600	0.170	0.0600	0.310
1995	0.240	0.240	0.000	0.0550	0.00500	0.170
1996	0.240	0.310	0.0700	0.145	0.0800	0.200
1997	0.230	0.300	0.0700	0.150	0.0800	0.210
1998	0.140	0.200	0.0600	0.0850	0.0700	0.130
1999	0.170	0.200	0.0300	0.0900	0.0375	0.148
2000	0.1000	0.130	0.0300	0.0500	0.0350	0.110
2001	0.120	0.140	0.0200	0.0450	0.0250	0.1000
2002	0.0300	0.0400	0.01000	0.0150	0.01000	0.0300
2003	0.0400	0.0500	0.01000	0.01000	0.01000	0.0300
Year	Skewness	Kurtosis	K-S Dist.	K-S Prob.	Sum	Sum of Squares
1993	-0.849	-0.666	0.243	0.384	0.490	0.0523
1994	0.392	-1.636	0.180	0.644	1.130	0.292
1995	0.860	-0.885	0.222	0.420	0.525	0.0938
1996	0.908	0.221	0.202	0.530	0.950	0.192
1997	0.579	-1.117	0.244	0.299	0.960	0.195
1998	1.387	1.524	0.245	0.297	0.630	0.0803
1999	0.716	-0.516	0.197	0.610	0.490	0.0675
2000	1.458	--	0.314	0.268	0.210	0.0203
2001	1.468	1.908	0.268	0.351	0.250	0.0245
2002	1.414	1.500	0.260	0.387	0.0800	0.00220
2003	2.000	4.000	0.441	0.006	0.0800	0.00280

Chlorophyll a

Figure 138 presents the seasonal mean chlorophyll *a* trend in Long Lake, while Table 109 presents descriptive statistics for chlorophyll *a* in Long Lake. The chlorophyll *a* in Long Lake exhibited an increasing trend from 1997 to 2001 and a decreasing trend from 2001 to 2003. The chlorophyll *a* in Long Lake was slightly higher than the county average, though this difference was not statistically significant.

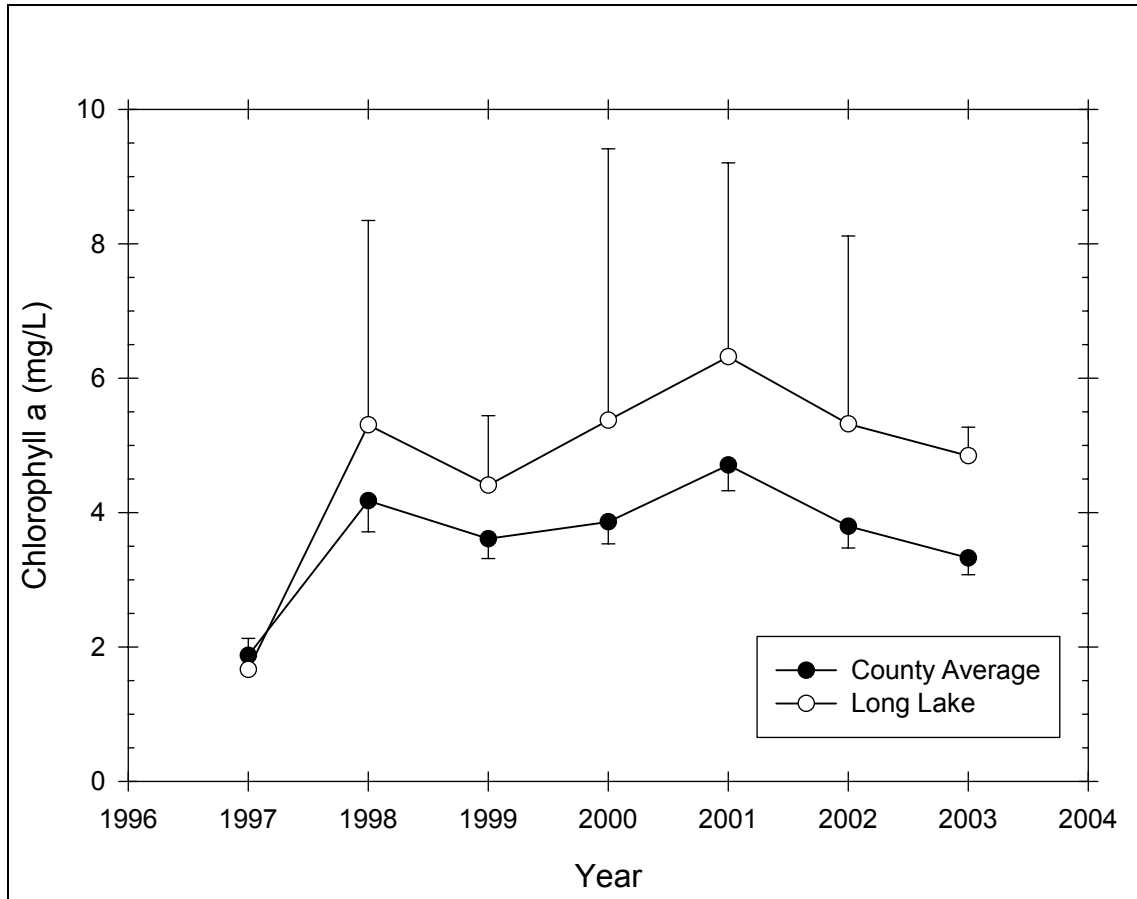


Figure 138 Seasonal mean chlorophyll a trend in Long Lake

Table 109 – Descriptive Statistics for Chlorophyll a in Long Lake

Year	Size	Missing	Mean	Std Dev	Std. Error	C.I. of Mean
1997	6	0	1.665	0.439	0.179	0.461
1998	6	0	5.305	2.900	1.184	3.043
1999	6	1	4.406	0.834	0.373	1.036
2000	6	3	5.373	1.629	0.941	4.048
2001	6	2	6.317	1.814	0.907	2.886
2002	6	2	5.317	1.759	0.879	2.798
2003	6	2	4.845	0.267	0.134	0.425
Year	Range	Max	Min	Median	25%	75%
1997	1.020	2.180	1.160	1.605	1.320	2.120
1998	6.860	9.240	2.380	4.260	3.210	8.480
1999	2.060	5.780	3.720	4.320	3.750	4.783
2000	3.170	6.740	3.570	5.810	4.130	6.508
2001	3.590	8.270	4.680	6.160	4.775	7.860
2002	3.830	7.780	3.950	4.770	4.055	6.580
2003	0.510	5.090	4.580	4.855	4.615	5.075
Year	Skewness	Kurtosis	K-S Dist.	K-S Prob.	Sum	Sum of Squares
1997	0.144	-2.466	0.249	0.275	9.990	17.597
1998	0.643	-1.834	0.240	0.321	31.830	210.897
1999	1.435	2.210	0.279	0.222	22.030	99.849

2000	-1.119	--	0.272	0.417	16.120	91.929
2001	0.164	-4.954	0.288	0.272	25.270	169.515
2002	1.327	1.160	0.245	0.455	21.270	122.381
2003	-0.0481	-5.599	0.289	0.265	19.380	94.111

Transparency

Figure 139 presents the seasonal mean transparency trend in Long Lake, while Table 110 presents descriptive statistics for transparency in Long Lake. The transparency in Long Lake was variable, but exhibited a slight decreasing trend from 1995 to 2002. The transparency in Long Lake was slightly lower than the county average, though this difference was not statistically significant.

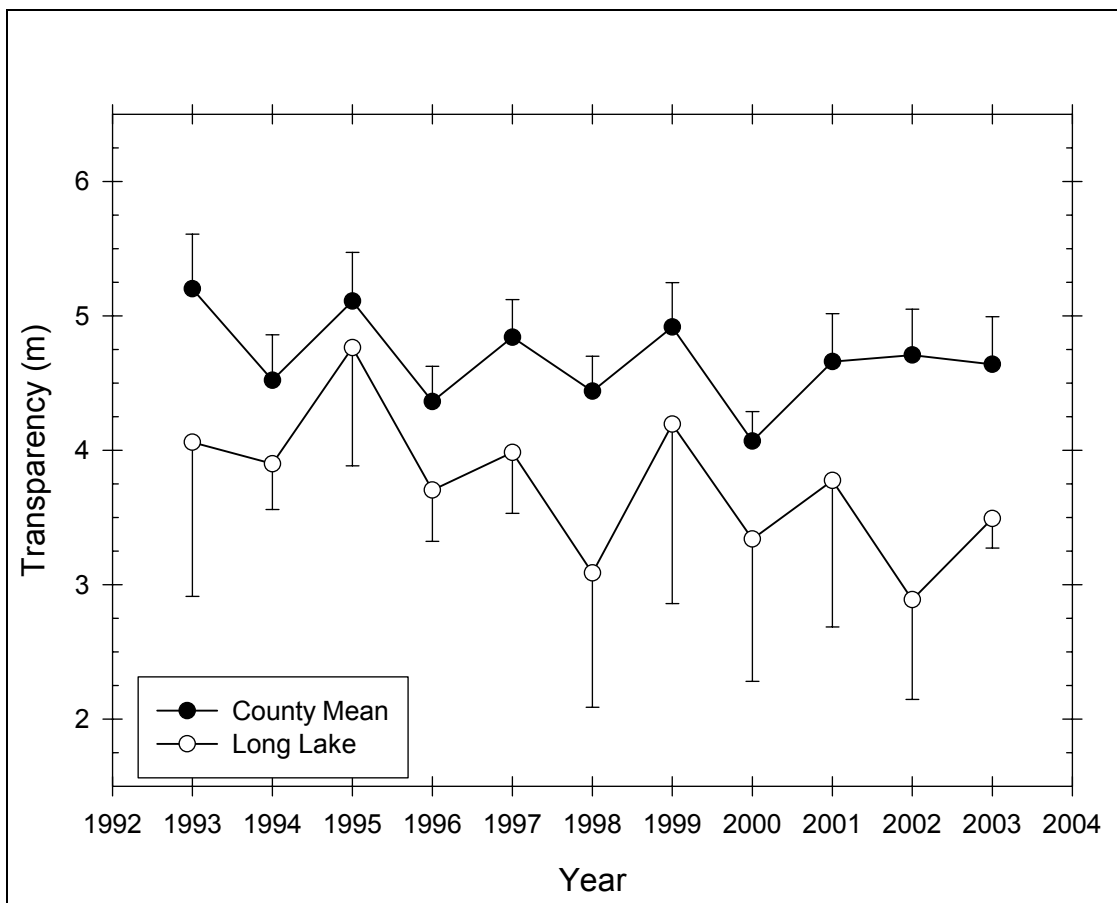


Figure 139 Seasonal mean transparency in Long Lake

Table 110 – Descriptive Statistics for Transparency in Long Lake

Year	Size	Missing	Mean	Std Dev	Std. Error	C.I. of Mean
1993	6	1	4.060	0.925	0.414	1.148
1994	6	1	3.900	0.274	0.122	0.340
1995	6	0	4.763	0.838	0.342	0.879
1996	6	0	3.703	0.364	0.149	0.382
1997	6	0	3.983	0.431	0.176	0.453

1998	6	0	3.087	0.952	0.389	0.999
1999	5	0	4.194	1.075	0.481	1.335
2000	3	0	3.340	0.428	0.247	1.062
2001	4	0	3.775	0.685	0.342	1.090
2002	4	0	2.888	0.466	0.233	0.742
2003	4	0	3.492	0.138	0.0692	0.220
Year	Range	Max	Min	Median	25%	75%
1993	2.120	5.150	3.030	3.940	3.255	4.925
1994	0.700	4.300	3.600	3.900	3.675	4.075
1995	2.100	5.750	3.650	4.675	4.130	5.700
1996	0.910	4.060	3.150	3.780	3.450	4.000
1997	1.200	4.600	3.400	4.050	3.600	4.200
1998	2.420	4.590	2.170	2.830	2.250	3.850
1999	2.560	5.710	3.150	3.750	3.382	5.103
2000	0.820	3.820	3.000	3.200	3.050	3.665
2001	1.500	4.300	2.800	4.000	3.300	4.250
2002	1.100	3.500	2.400	2.825	2.550	3.225
2003	0.300	3.660	3.360	3.475	3.380	3.605
Year	Skewness	Kurtosis	K-S Dist.	K-S Prob.	Sum	Sum of Squares
1993	0.161	-2.511	0.204	0.581	20.300	85.838
1994	0.609	-0.133	0.167	0.713	19.500	76.350
1995	0.0748	-1.395	0.202	0.533	28.580	139.644
1996	-0.613	-1.211	0.260	0.227	22.220	82.950
1997	-0.0303	-0.501	0.173	0.677	23.900	96.132
1998	0.849	-0.574	0.236	0.341	18.520	61.696
1999	0.743	-1.404	0.260	0.302	20.970	92.571
2000	1.316	--	0.295	0.334	10.020	33.832
2001	-1.463	1.829	0.265	0.368	15.100	58.410
2002	0.708	0.512	0.197	0.643	11.550	34.002
2003	0.445	-2.788	0.248	0.441	13.970	48.848

TSI

Figure 140 presents the Carlson trophic state index trend in Long Lake. Transparency TSI was in the mesotrophic range throughout the period of record, while the chlorophyll *a* TSI was in the eutrophic range with the exception of 1997, when it was mesotrophic. Total phosphorus TSI was in the mesotrophic range from 1993 to 1999, and well into the oligotrophic range in 2000, 2002, and 2003.

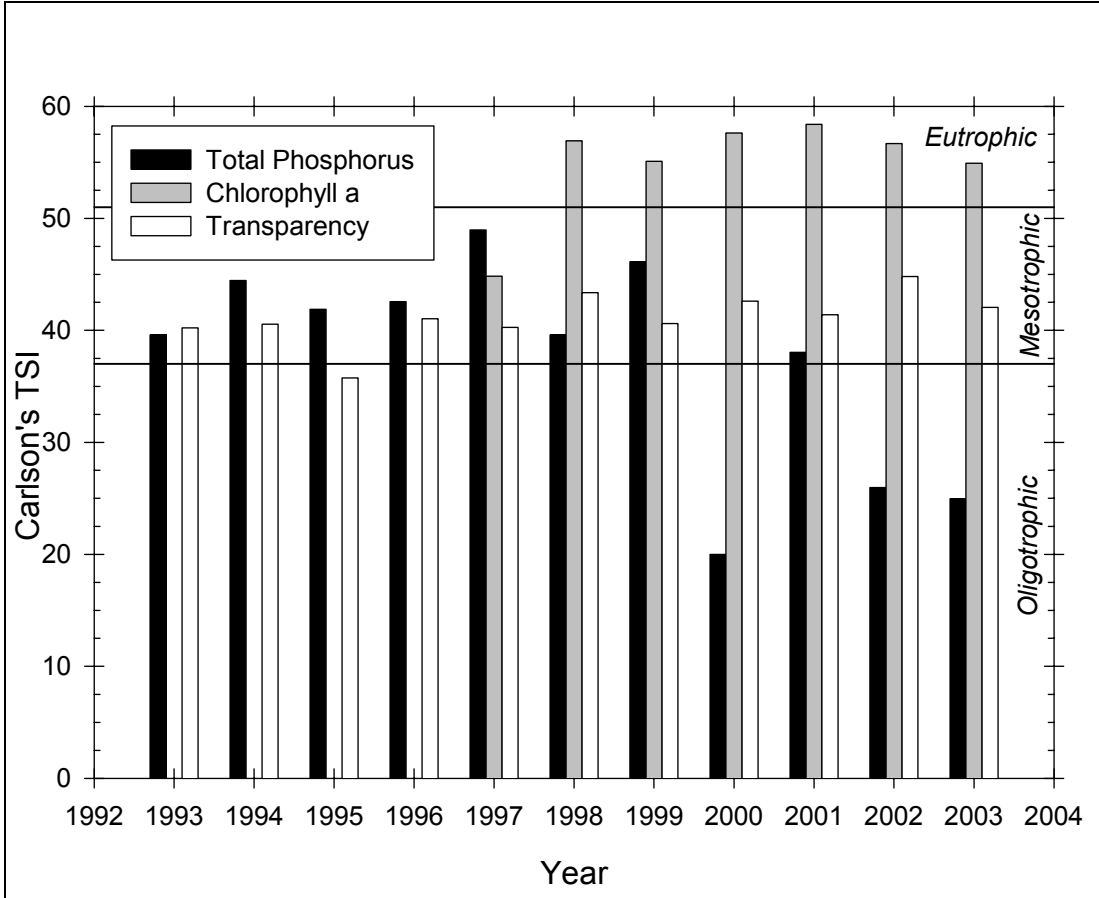


Figure 140 Carlson TSI trend in Long Lake

Aluminum

Figure 141 presents the seasonal mean aluminum trend in Long Lake, while Table 111 presents descriptive statistics for aluminum in Long Lake. The aluminum in Long Lake exhibited a general decreasing trend from 1997 to 2001, with stabilized values in 2001 to 2003. The aluminum in Long Lake was similar to the county average.

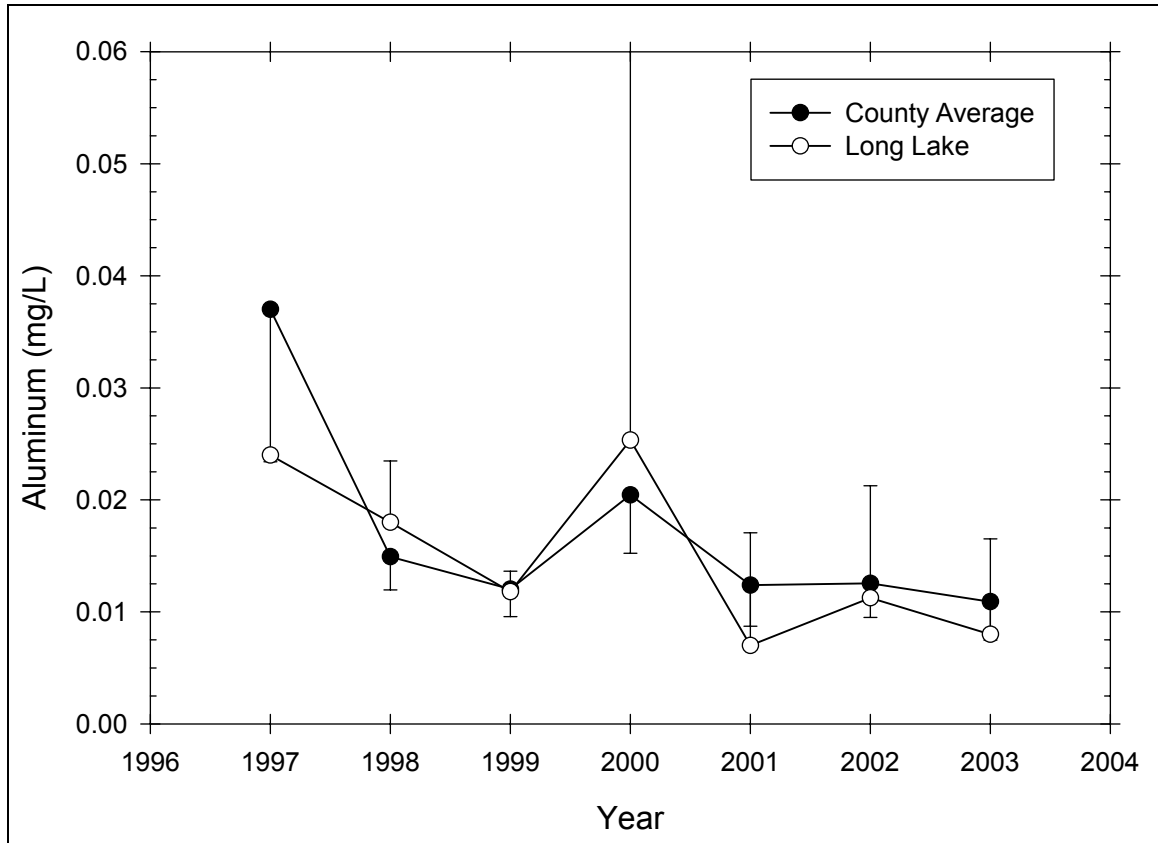


Figure 141 Seasonal mean aluminum trend in Long Lake

Table 111 – Descriptive Statistics for Aluminum in Long Lake

Year	Size	Missing	Mean	Std Dev	Std. Error	C.I. of Mean
1997	6	5	0.0240	--	--	--
1998	6	0	0.0180	0.00522	0.00213	0.00547
1999	6	1	0.0118	0.00148	0.000663	0.00184
2000	6	3	0.0253	0.0231	0.0133	0.0574
2001	6	2	0.00700	0.00632	0.00316	0.0101
2002	6	2	0.0113	0.00629	0.00315	0.0100
2003	6	2	0.00800	0.00535	0.00268	0.00852
Year	Range	Max	Min	Median	25%	75%
1997	0.000	0.0240	0.0240	0.0240	0.0240	0.0240
1998	0.0140	0.0220	0.00800	0.0200	0.0170	0.0210
1999	0.00400	0.0140	0.01000	0.0120	0.0108	0.0125
2000	0.0400	0.0520	0.0120	0.0120	0.0120	0.0420
2001	0.0140	0.0150	0.001000	0.00600	0.00200	0.0120
2002	0.0130	0.0170	0.00400	0.0120	0.00600	0.0165
2003	0.0110	0.0160	0.00500	0.00550	0.00500	0.0110
Year	Skewness	Kurtosis	K-S Dist.	K-S Prob.	Sum	Sum of Squares
1997	--	--	--	--	0.0240	0.000576
1998	-1.865	3.609	0.257	0.237	0.108	0.00208
1999	0.552	0.868	0.246	0.368	0.0590	0.000705
2000	1.732	--	0.385	0.089	0.0760	0.00299
2001	0.632	-1.700	0.236	0.492	0.0280	0.000316

2002	-0.316	-3.976	0.275	0.324	0.0450	0.000625
2003	1.955	3.836	0.396	0.028	0.0320	0.000342

Calcium

Figure 142 presents the seasonal mean calcium trend in Long Lake, while Table 112 presents descriptive statistics for calcium in Long Lake. The calcium in Long Lake was relatively stable throughout the period of record. The calcium in Long Lake was significantly lower than the county average.

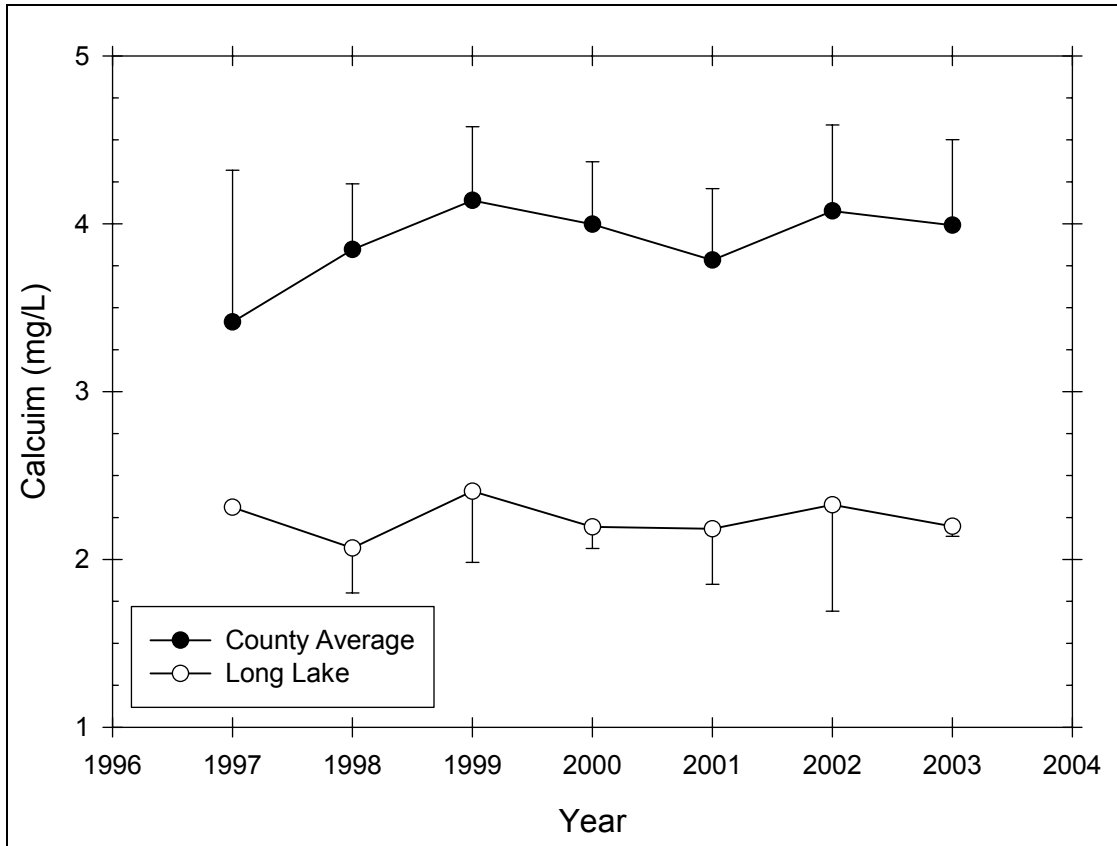


Figure 142 Seasonal mean calcium trend in Long Lake

Table 112 – Descriptive Statistics for Calcium in Long Lake

Year	Size	Missing	Mean	Std Dev	Std. Error	C.I. of Mean
1997	6	5	2.310	--	--	--
1998	6	0	2.068	0.255	0.104	0.267
1999	6	1	2.406	0.342	0.153	0.424
2000	6	3	2.193	0.0513	0.0296	0.127
2001	6	2	2.183	0.208	0.104	0.331
2002	6	2	2.325	0.398	0.199	0.634
2003	6	2	2.197	0.0377	0.0189	0.0601
Year	Range	Max	Min	Median	25%	75%
1997	0.000	2.310	2.310	2.310	2.310	2.310
1998	0.700	2.570	1.870	1.965	1.960	2.080
1999	0.770	2.780	2.010	2.320	2.138	2.750

2000	0.100	2.250	2.150	2.180	2.157	2.232
2001	0.490	2.380	1.890	2.230	2.050	2.315
2002	0.950	2.760	1.810	2.365	2.040	2.610
2003	0.0900	2.240	2.150	2.200	2.170	2.225
Year	Skewness	Kurtosis	K-S Dist.	K-S Prob.	Sum	Sum of Squares
1997	--	--	--	--	2.310	5.336
1998	2.088	4.609	0.317	0.060	12.410	25.992
1999	0.160	-2.559	0.236	0.420	12.030	29.411
2000	1.090	--	0.269	0.429	6.580	14.437
2001	-1.258	2.263	0.303	0.217	8.730	19.183
2002	-0.549	0.618	0.195	0.648	9.300	22.098
2003	-0.358	0.257	0.171	0.699	8.790	19.320

Calcite Saturation Index

Figure 143 presents the calcite saturation index trend in Long Lake. The CSI in Long Lake was variable but exhibited a general decreasing trend from 1997 to 2002, moving from the moderately vulnerable to acid deposition range into the low vulnerability to acid deposition range. The CSI in Long Lake was generally slightly higher than the county average, occasionally lower, though any differences were not statistically significant.

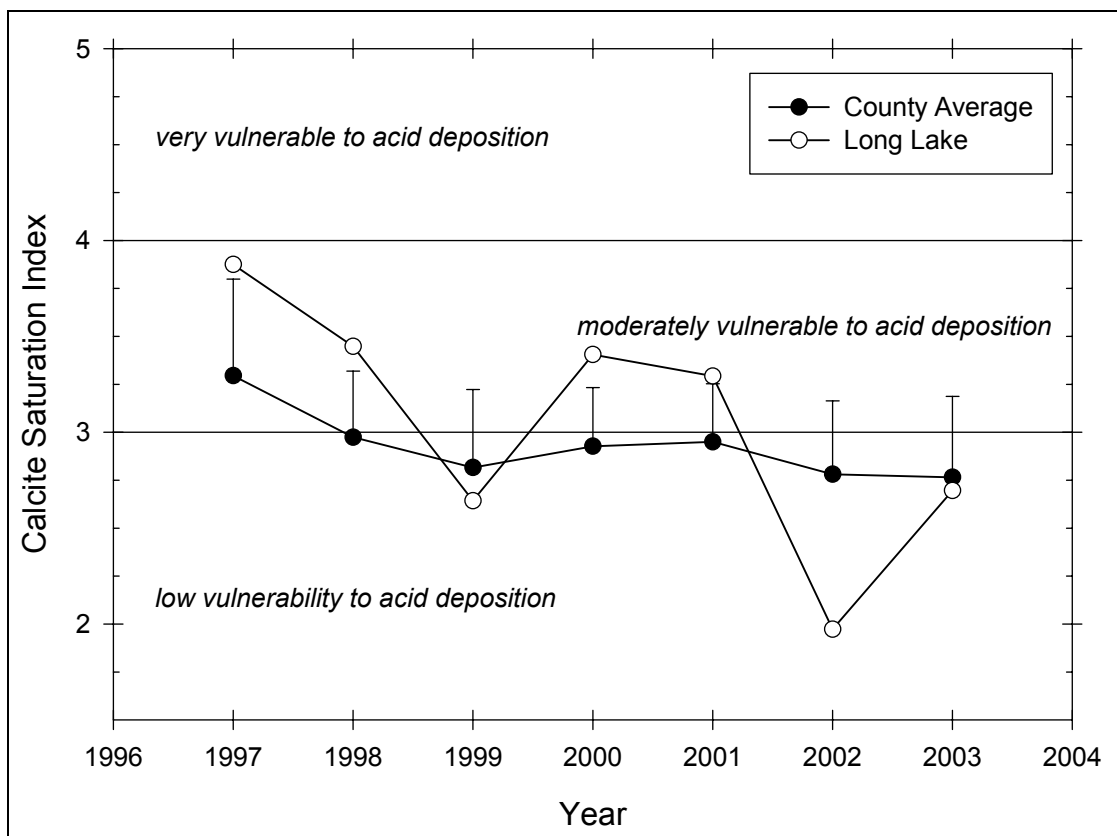


Figure 143 Seasonal mean CSI trend in Long Lake