

Fourth Lake

Location

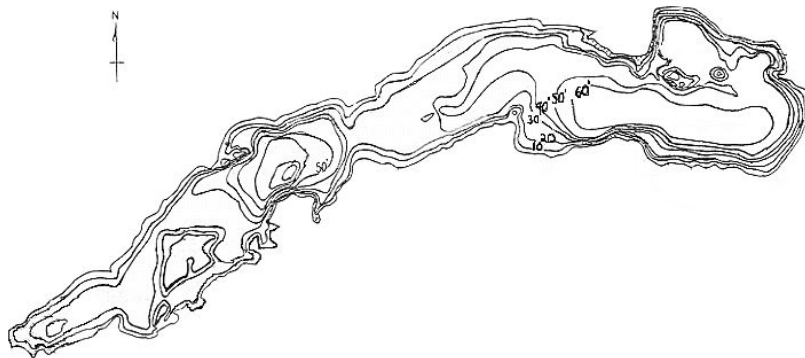
Pond Number: 040782D
Watershed: Black River
County: Hamilton
Topographic Quadrangle: Big
Moose

Sample Site

Latitude: 43° 45.446'
Longitude: 74° 47.945'

Morphometry

Surface Area: 2,138 Ac.
Mean Depth: 30 Ft.
Maximum Depth: 63 Ft.
Volume: 62,784 Ac./Ft.
Watershed Area: 12,805 Ac.
Hydraulic Retention Time: .96 Yr.
Shoreline Length: 16 Mi.
Elevation: 1707 Ft.
Water Quality Classification: A
Trophic State: Mesotrophic



Temperature and Dissolved Oxygen

Fourth Lake had a minimum DO of 1.0 mg/L (October 1998), with a minimum temperature of 6.1°C and a maximum temperature of 24.7°C. In general, the lowest DO values occurred during the months of August through October.

pH

Figure 54 presents the seasonal mean pH trend in Fourth Lake, while Table 41 presents descriptive statistics for pH in Fourth Lake. The pH in Fourth Lake exhibited an increasing trend over the study period, following a low during 1995 and 1996. The pH in Fourth Lake was similar to the county average.

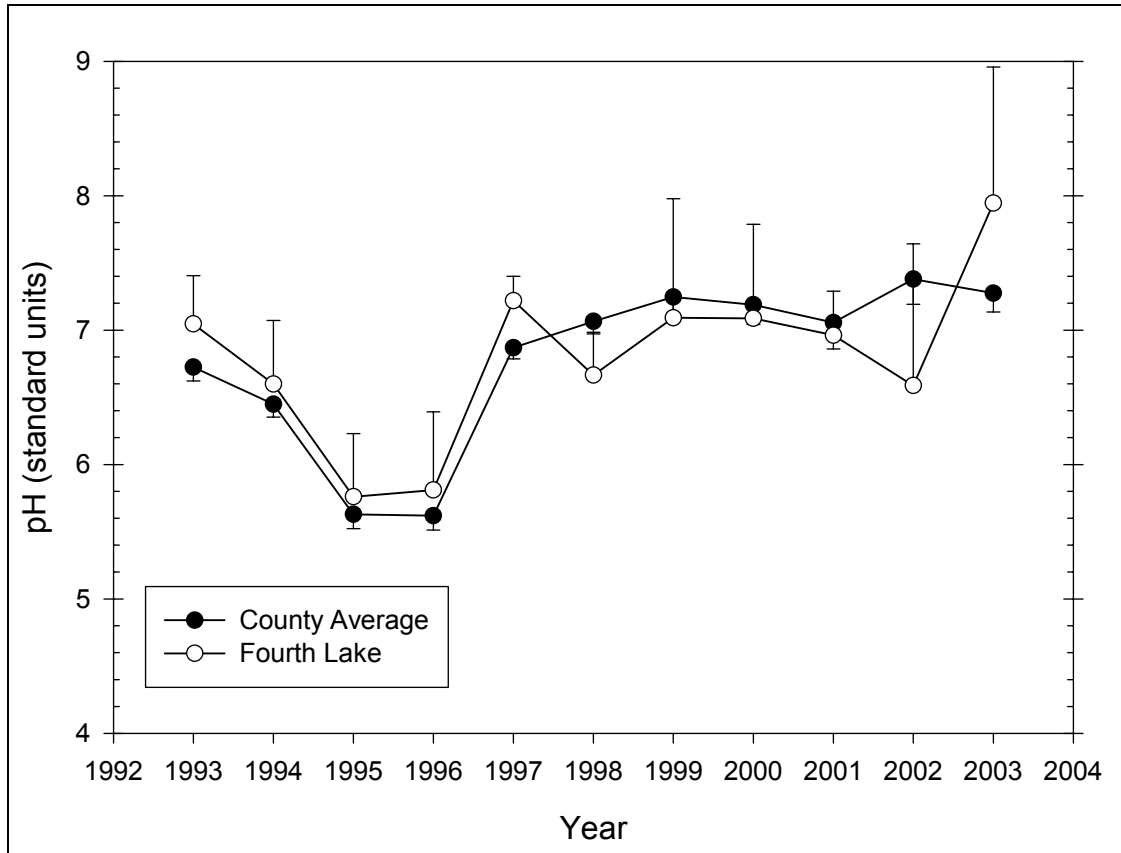


Figure 54 Seasonal mean pH trend in Fourth Lake

Table 41 – Descriptive Statistics for pH in Fourth Lake

Year	Size	Missing	Mean	Std Dev	Std. Error	C.I. of Mean
1993	6	1	7.046	0.289	0.129	0.359
1994	6	0	6.600	0.450	0.184	0.472
1995	6	0	5.760	0.449	0.183	0.471
1996	6	1	5.810	0.469	0.210	0.583
1997	6	0	7.220	0.172	0.0703	0.181
1998	6	0	6.665	0.304	0.124	0.319
1999	5	0	7.092	0.713	0.319	0.885
2000	6	0	7.088	0.666	0.272	0.699
2001	4	0	6.963	0.205	0.103	0.327
2002	4	0	6.587	0.663	0.331	1.055
2003	4	0	7.945	0.636	0.318	1.013
Year	Range	Max	Min	Median	25%	75%
1993	0.710	7.250	6.540	7.150	6.952	7.213
1994	1.180	6.970	5.790	6.720	6.480	6.920
1995	1.040	6.220	5.180	5.935	5.220	6.070
1996	1.280	6.490	5.210	5.880	5.495	6.033
1997	0.470	7.470	7.000	7.185	7.110	7.370
1998	0.840	7.200	6.360	6.575	6.460	6.820
1999	1.660	8.360	6.700	6.770	6.723	7.265
2000	2.000	7.980	5.980	7.080	6.940	7.470
2001	0.460	7.260	6.800	6.895	6.830	7.095

2002	1.490	7.560	6.070	6.360	6.205	6.970
2003	1.470	8.620	7.150	8.005	7.455	8.435
Year	Skewness	Kurtosis	K-S Dist.	K-S Prob.	Sum	Sum of Squares
1993	-2.006	4.177	0.361	0.032	35.230	248.565
1994	-1.387	1.786	0.255	0.249	39.600	262.371
1995	-0.692	-1.839	0.255	0.249	34.560	200.074
1996	0.357	0.919	0.241	0.396	29.050	169.661
1997	0.404	-0.761	0.213	0.470	43.320	312.919
1998	1.264	1.383	0.264	0.209	39.990	266.995
1999	2.174	4.764	0.406	0.007	35.460	253.515
2000	-0.609	1.431	0.245	0.294	42.530	303.687
2001	1.612	2.708	0.313	0.183	27.850	194.032
2002	1.733	3.286	0.373	0.054	26.350	174.899
2003	-0.447	-0.962	0.184	0.676	31.780	253.707

Alkalinity

Figure 55 presents the seasonal mean alkalinity trend in Fourth Lake, while Table 42 presents descriptive statistics for alkalinity in Fourth Lake. The alkalinity in Fourth Lake exhibited no significant trend. The alkalinity in Fourth Lake was slightly higher than the county average, though this difference was not statistically significant.

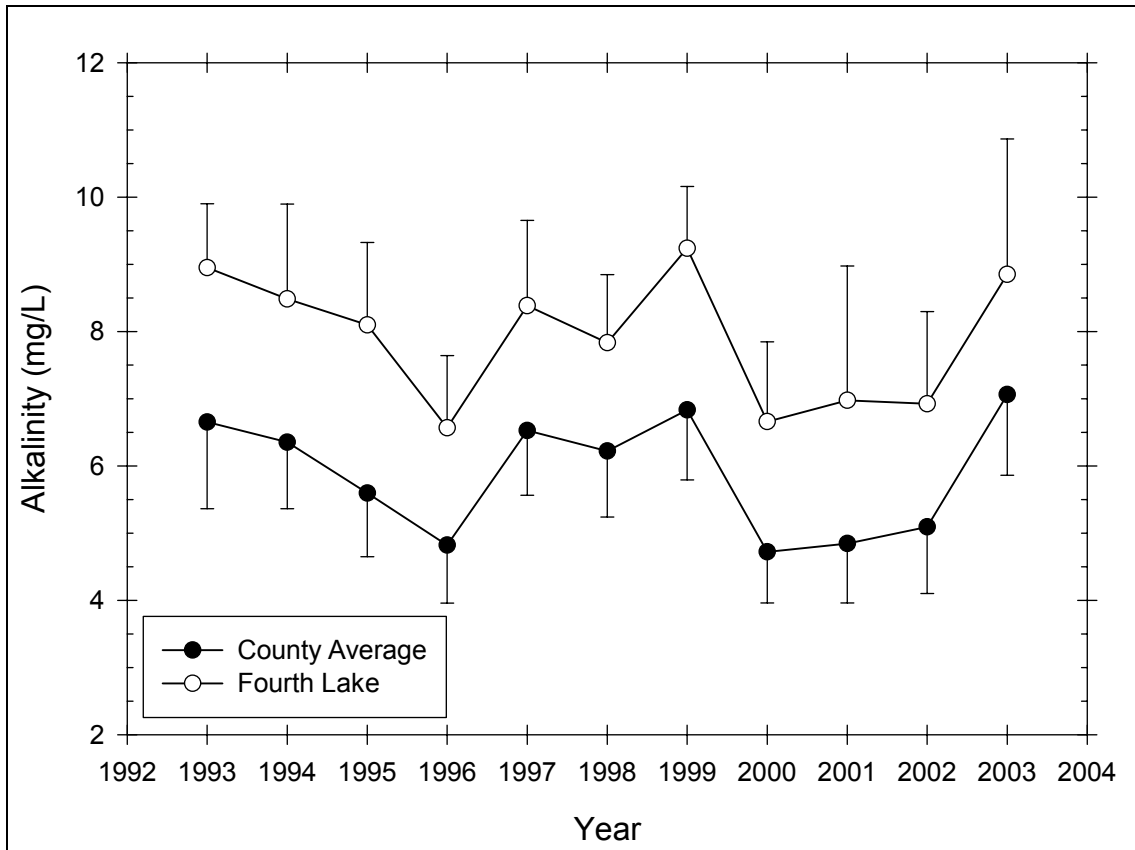


Figure 55 Seasonal mean alkalinity trend in Fourth Lake

Table 42 – Descriptive Statistics for Alkalinity in Fourth Lake

Year	Size	Missing	Mean	Std Dev	Std. Error	C.I. of Mean
1993	5	1	8.950	0.597	0.299	0.950
1994	6	0	8.483	1.345	0.549	1.412
1995	6	0	8.100	1.168	0.477	1.226
1996	6	0	6.567	1.023	0.418	1.074
1997	6	0	8.383	1.209	0.494	1.269
1998	6	0	7.833	0.967	0.395	1.015
1999	6	1	9.240	0.740	0.331	0.919
2000	6	1	6.660	0.956	0.427	1.186
2001	6	2	6.975	1.258	0.629	2.002
2002	6	2	6.925	0.862	0.431	1.371
2003	6	2	8.850	1.266	0.633	2.015
Year	Range	Max	Min	Median	25%	75%
1993	1.400	9.600	8.200	9.000	8.500	9.400
1994	4.000	10.700	6.700	8.350	7.900	8.900
1995	2.600	9.400	6.800	8.000	7.100	9.300
1996	2.700	7.500	4.800	7.000	5.900	7.200
1997	2.900	9.600	6.700	8.450	7.600	9.500
1998	2.800	9.500	6.700	7.650	7.300	8.200
1999	1.700	9.700	8.000	9.700	8.825	9.700
2000	2.600	7.700	5.100	6.800	6.300	7.175
2001	3.000	8.700	5.700	6.750	6.150	7.800
2002	1.900	8.200	6.300	6.600	6.450	7.400
2003	2.700	10.100	7.400	8.950	7.800	9.900
Year	Skewness	Kurtosis	K-S Dist.	K-S Prob.	Sum	Sum of Squares
1993	-0.423	-0.416	0.162	0.708	35.800	321.480
1994	0.607	1.131	0.212	0.476	50.900	440.850
1995	0.0814	-2.742	0.253	0.255	48.600	400.480
1996	-1.276	0.748	0.294	0.108	39.400	263.960
1997	-0.311	-2.051	0.250	0.269	50.300	428.990
1998	0.993	1.362	0.186	0.618	47.000	372.840
1999	-1.661	2.402	0.333	0.073	46.200	429.080
2000	-1.256	2.656	0.317	0.105	33.300	225.430
2001	1.007	1.829	0.274	0.328	27.900	199.350
2002	1.834	3.536	0.397	0.027	27.700	194.050
2003	-0.248	-3.694	0.249	0.437	35.400	318.100

Total Phosphorus

Figure 56 presents the seasonal mean total phosphorus trend in Fourth Lake, while Table 43 presents descriptive statistics for total phosphorus in Fourth Lake. The total phosphorus in Fourth Lake exhibited a decreasing trend from 1998 to 2002. The total phosphorus in Fourth Lake was similar to the county average.

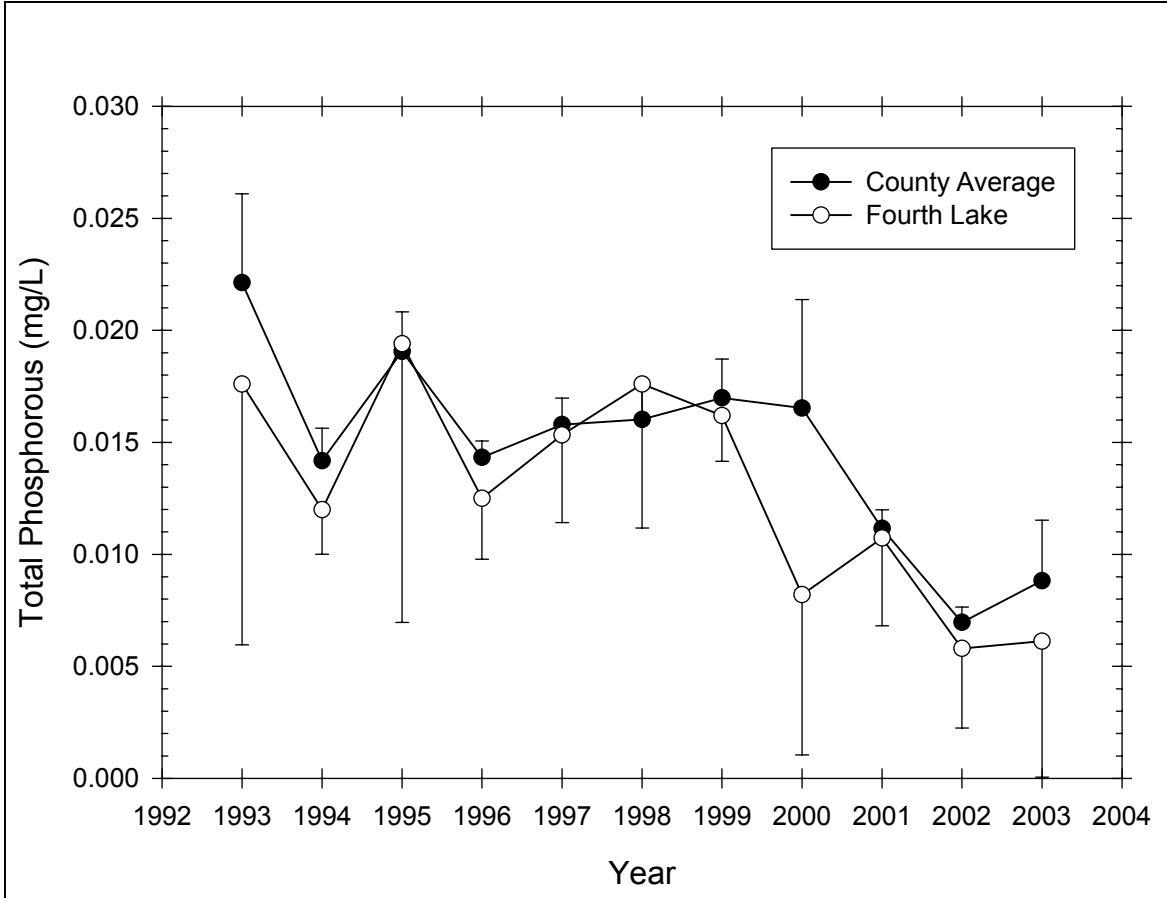


Figure 56 Seasonal mean total phosphorus trend in Fourth Lake

Table 43 – Descriptive Statistics for Total Phosphorus in Fourth Lake

Year	Size	Missing	Mean	Std Dev	Std. Error	C.I. of Mean
1993	6	1	0.0176	0.00937	0.00419	0.0116
1994	6	0	0.0120	0.00190	0.000775	0.00199
1995	5	0	0.0194	0.0100	0.00448	0.0124
1996	6	0	0.0125	0.00259	0.00106	0.00272
1997	6	0	0.0153	0.00372	0.00152	0.00391
1998	6	1	0.0176	0.00518	0.00232	0.00643
1999	6	1	0.0162	0.00164	0.000735	0.00204
2000	6	1	0.00820	0.00576	0.00258	0.00715
2001	6	2	0.0107	0.00246	0.00123	0.00391
2002	6	2	0.00580	0.00223	0.00112	0.00355
2003	6	2	0.00612	0.00382	0.00191	0.00607
Year	Range	Max	Min	Median	25%	75%
1993	0.0260	0.0310	0.00500	0.0170	0.0125	0.0227
1994	0.00500	0.0150	0.01000	0.0120	0.01000	0.0130
1995	0.0220	0.0310	0.00900	0.0220	0.00900	0.0273
1996	0.00700	0.0170	0.01000	0.0115	0.0110	0.0140
1997	0.0110	0.0210	0.01000	0.0155	0.0130	0.0170
1998	0.0130	0.0260	0.0130	0.0150	0.0145	0.0207
1999	0.00300	0.0180	0.0150	0.0150	0.0150	0.0180
2000	0.0140	0.0160	0.00200	0.01000	0.00275	0.0115

2001	0.00590	0.0140	0.00810	0.0104	0.00905	0.0124
2002	0.00440	0.00820	0.00380	0.00560	0.00390	0.00770
2003	0.00840	0.0104	0.00200	0.00605	0.00300	0.00925
Year	Skewness	Kurtosis	K-S Dist.	K-S Prob.	Sum	Sum of Squares
1993	0.203	1.328	0.199	0.602	0.0880	0.00190
1994	0.527	-0.0926	0.187	0.609	0.0720	0.000882
1995	-0.159	-2.602	0.250	0.348	0.0970	0.00228
1996	1.245	0.991	0.243	0.304	0.0750	0.000971
1997	0.130	0.586	0.161	0.722	0.0920	0.00148
1998	1.390	1.610	0.292	0.174	0.0880	0.00166
1999	0.609	-3.333	0.367	0.026	0.0810	0.00132
2000	0.234	-1.274	0.223	0.488	0.0410	0.000469
2001	0.746	1.330	0.238	0.486	0.0429	0.000478
2002	0.164	-4.986	0.290	0.263	0.0232	0.000150
2003	0.0725	-3.149	0.211	0.595	0.0245	0.000194

Nitrate

Figure 57 presents the seasonal mean nitrate trend in Fourth Lake, while Table 44 presents descriptive statistics for nitrate in Fourth Lake. The nitrate in Fourth Lake exhibited a decreasing trend from 1997 to 2002. The nitrate in Fourth Lake was slightly higher than the county average, though this difference was not statistically significant.

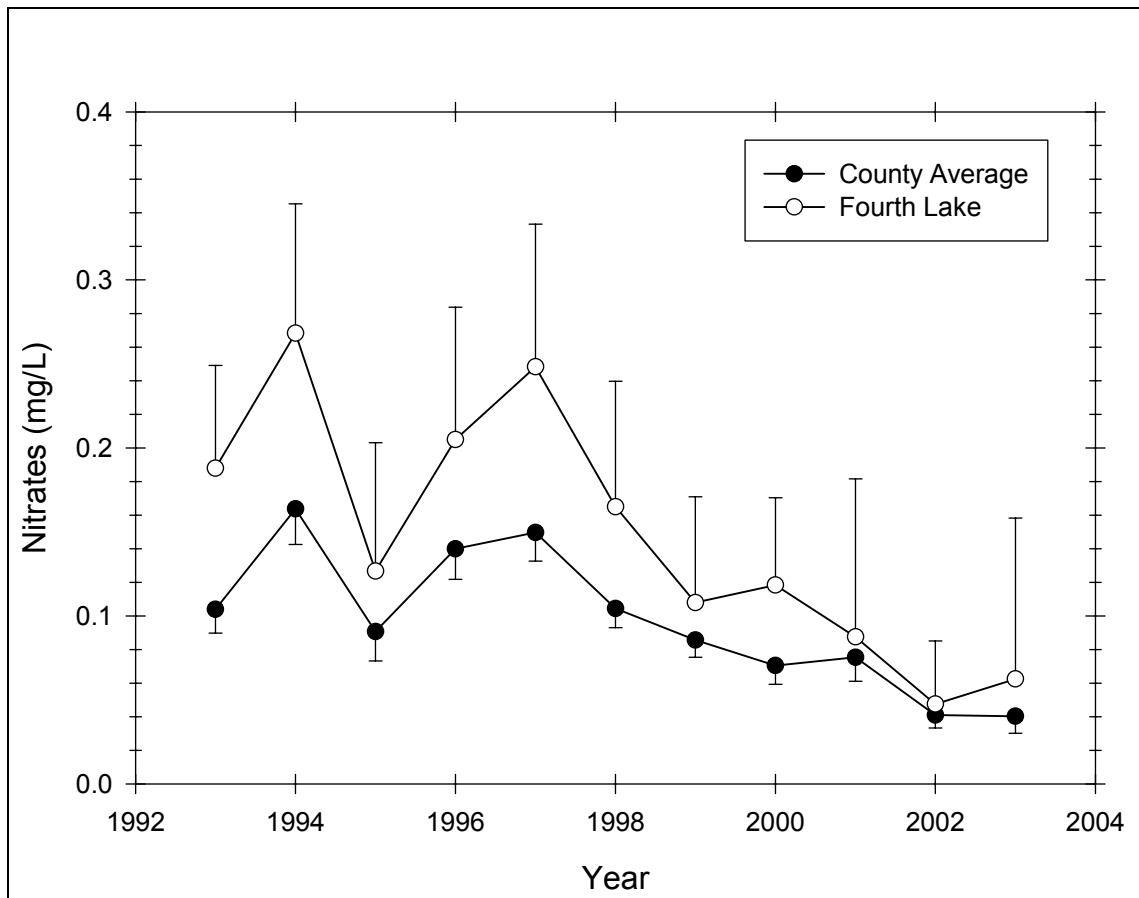


Figure 57 Seasonal mean nitrate trend in Fourth Lake

Table 44 – Descriptive Statistics for Nitrate in Fourth Lake

Year	Size	Missing	Mean	Std Dev	Std. Error	C.I. of Mean
1993	6	1	0.188	0.0492	0.0220	0.0611
1994	6	0	0.268	0.0733	0.0299	0.0770
1995	6	0	0.127	0.0728	0.0297	0.0764
1996	6	0	0.205	0.0750	0.0306	0.0787
1997	6	0	0.248	0.0808	0.0330	0.0848
1998	6	0	0.165	0.0712	0.0291	0.0747
1999	6	1	0.108	0.0507	0.0227	0.0629
2000	6	0	0.118	0.0496	0.0202	0.0520
2001	6	2	0.0875	0.0591	0.0295	0.0940
2002	6	2	0.0475	0.0236	0.0118	0.0376
2003	6	2	0.0625	0.0602	0.0301	0.0958
Year	Range	Max	Min	Median	25%	75%
1993	0.110	0.250	0.140	0.170	0.147	0.235
1994	0.180	0.370	0.190	0.260	0.200	0.330
1995	0.190	0.240	0.0500	0.1000	0.0800	0.190
1996	0.170	0.290	0.120	0.200	0.130	0.290
1997	0.220	0.380	0.160	0.230	0.190	0.300
1998	0.190	0.280	0.0900	0.140	0.120	0.220
1999	0.120	0.180	0.0600	0.110	0.0600	0.143
2000	0.130	0.200	0.0700	0.105	0.0800	0.150
2001	0.130	0.160	0.0300	0.0800	0.0400	0.135
2002	0.0500	0.0800	0.0300	0.0400	0.0300	0.0650
2003	0.130	0.140	0.01000	0.0500	0.0150	0.110
Year	Skewness	Kurtosis	K-S Dist.	K-S Prob.	Sum	Sum of Squares
1993	0.494	-2.581	0.243	0.385	0.940	0.186
1994	0.334	-1.816	0.199	0.545	1.610	0.459
1995	0.856	-0.726	0.257	0.238	0.760	0.123
1996	0.128	-2.083	0.205	0.516	1.230	0.280
1997	0.838	0.0129	0.182	0.634	1.490	0.403
1998	0.937	-0.222	0.250	0.271	0.990	0.189
1999	0.520	-0.860	0.228	0.460	0.540	0.0686
2000	0.947	-0.0160	0.216	0.451	0.710	0.0963
2001	0.483	-2.347	0.237	0.489	0.350	0.0411
2002	1.194	0.436	0.271	0.342	0.190	0.0107
2003	0.762	-1.571	0.260	0.388	0.250	0.0265

Chlorophyll a

Figure 58 presents the seasonal mean chlorophyll *a* trend in Fourth Lake, while Table 45 presents descriptive statistics for chlorophyll *a* in Fourth Lake. The chlorophyll *a* in Fourth Lake exhibited no significant trend, with stable concentrations from 1998 to 2003, preceded by a lower value in 1997. The chlorophyll *a* in Fourth Lake was similar to the county average.

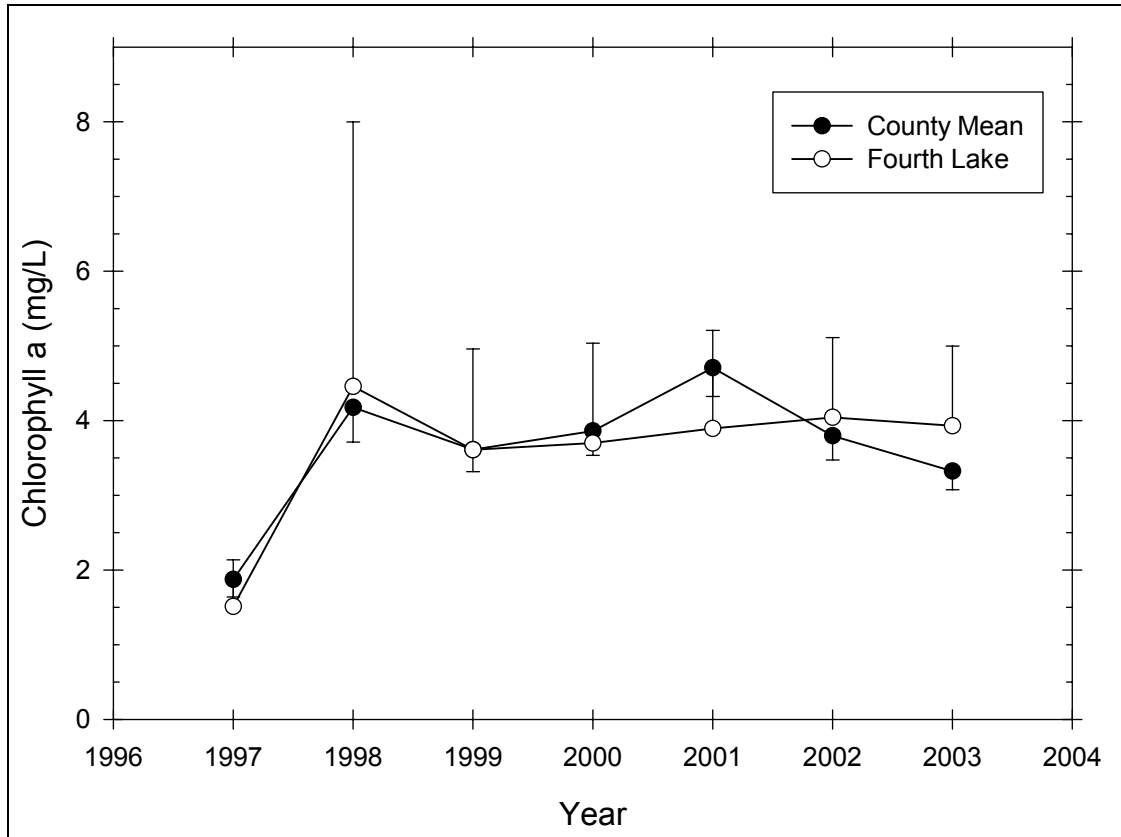


Figure 58 Seasonal mean chlorophyll a trend in Fourth Lake

Table 45 – Descriptive Statistics for Chlorophyll a in Fourth Lake

Year	Size	Missing	Mean	Std Dev	Std. Error	C.I. of Mean
1997	6	0	1.510	0.596	0.243	0.626
1998	6	0	4.458	3.374	1.378	3.541
1999	6	1	3.610	1.086	0.486	1.349
2000	6	0	3.700	1.272	0.519	1.335
2001	6	2	3.895	0.826	0.413	1.315
2002	6	2	4.043	0.671	0.336	1.068
2003	6	2	3.930	0.672	0.336	1.069
Year	Range	Max	Min	Median	25%	75%
1997	1.620	2.160	0.540	1.635	1.120	1.970
1998	8.370	9.940	1.570	3.130	1.800	7.180
1999	2.740	5.450	2.710	3.440	2.860	4.018
2000	3.410	5.560	2.150	3.710	2.520	4.550
2001	1.910	4.770	2.860	3.975	3.260	4.530
2002	1.540	4.980	3.440	3.875	3.575	4.510
2003	1.400	4.330	2.930	4.230	3.540	4.320
Year	Skewness	Kurtosis	K-S Dist.	K-S Prob.	Sum	Sum of Squares
1997	-0.835	0.0391	0.187	0.612	9.060	15.457
1998	1.055	-0.369	0.261	0.220	26.750	176.195
1999	1.675	3.098	0.326	0.089	18.050	69.880
2000	0.246	-0.850	0.157	0.734	22.200	90.232
2001	-0.461	-0.905	0.184	0.677	15.580	62.732

2002	1.252	1.531	0.251	0.425	16.170	66.720
2003	-1.916	3.693	0.378	0.046	15.720	63.132

Transparency

Figure 59 presents the seasonal mean transparency trend in Fourth Lake, while Table 46 presents descriptive statistics for transparency in Fourth Lake. The transparency in Fourth Lake exhibited a slight decreasing trend over the study period. The transparency in Fourth Lake was generally slightly higher than the county average, though this difference was not statistically significant.

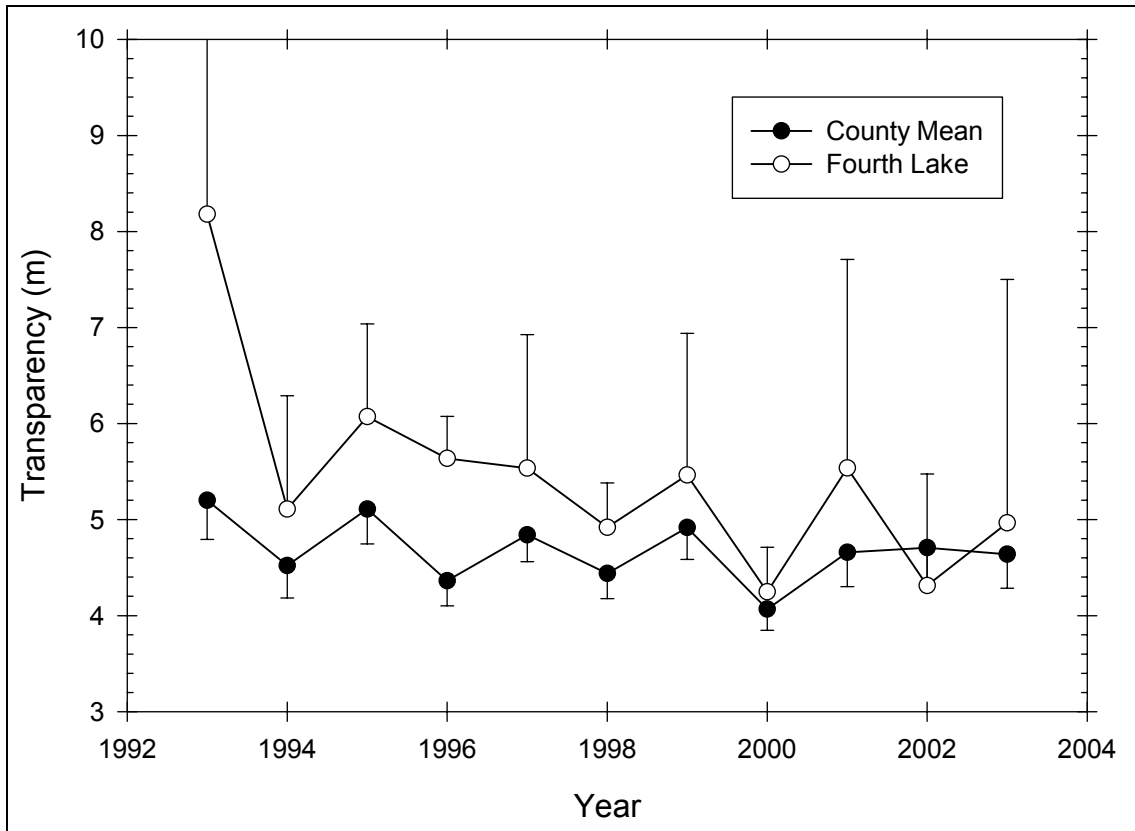


Figure 59 Seasonal mean transparency trend in Fourth Lake

Table 46 – Descriptive Statistics for Transparency in Fourth Lake

Year	Size	Missing	Mean	Std Dev	Std. Error	C.I. of Mean
1993	6	1	8.180	3.912	1.750	4.858
1994	6	0	5.108	1.125	0.459	1.181
1995	6	0	6.072	0.921	0.376	0.966
1996	6	0	5.637	0.417	0.170	0.438
1997	6	0	5.535	1.324	0.541	1.390
1998	6	0	4.920	0.439	0.179	0.461
1999	5	0	5.462	1.190	0.532	1.477
2000	6	0	4.247	0.442	0.180	0.464
2001	4	0	5.537	1.365	0.682	2.171
2002	4	0	4.313	0.731	0.365	1.163

2003	4	0	4.965	1.595	0.797	2.537
Year	Range	Max	Min	Median	25%	75%
1993	9.850	15.000	5.150	7.270	5.945	9.203
1994	3.050	7.250	4.200	4.850	4.300	5.200
1995	2.500	7.450	4.950	5.950	5.430	6.700
1996	1.000	6.100	5.100	5.635	5.250	6.100
1997	3.900	7.750	3.850	5.455	4.710	5.990
1998	1.160	5.710	4.550	4.790	4.610	5.070
1999	2.850	7.420	4.570	4.950	4.615	6.160
2000	1.140	4.910	3.770	4.150	3.900	4.600
2001	3.200	7.200	4.000	5.475	4.500	6.575
2002	1.550	5.350	3.800	4.050	3.800	4.825
2003	3.420	7.050	3.630	4.590	3.720	6.210
Year	Skewness	Kurtosis	K-S Dist.	K-S Prob.	Sum	Sum of Squares
1993	1.950	4.078	0.392	0.012	40.900	395.792
1994	1.771	3.445	0.301	0.096	30.650	162.903
1995	0.422	-0.826	0.196	0.565	36.430	225.430
1996	-0.0557	-1.677	0.200	0.541	33.820	191.501
1997	0.722	1.186	0.199	0.548	33.210	192.583
1998	1.386	1.744	0.245	0.293	29.520	146.203
1999	1.512	1.913	0.267	0.273	27.310	154.828
2000	0.595	-1.124	0.212	0.476	25.480	109.181
2001	0.230	-0.679	0.153	0.710	22.150	128.243
2002	1.448	1.659	0.258	0.394	17.250	75.992
2003	0.857	-1.186	0.266	0.363	19.860	106.232

TSI

Figure 60 presents the Carlson trophic state index trend in Fourth Lake. Chlorophyll *a* TSI values were in the eutrophic range while transparency TSI was in the oligotrophic range from 1993 to 1999 and mesotrophic in 2000, 2002 and 2003. Total phosphorus TSI was mesotrophic from 1993 – 1999 and then oligotrophic the remaining years 2000 – 2003.

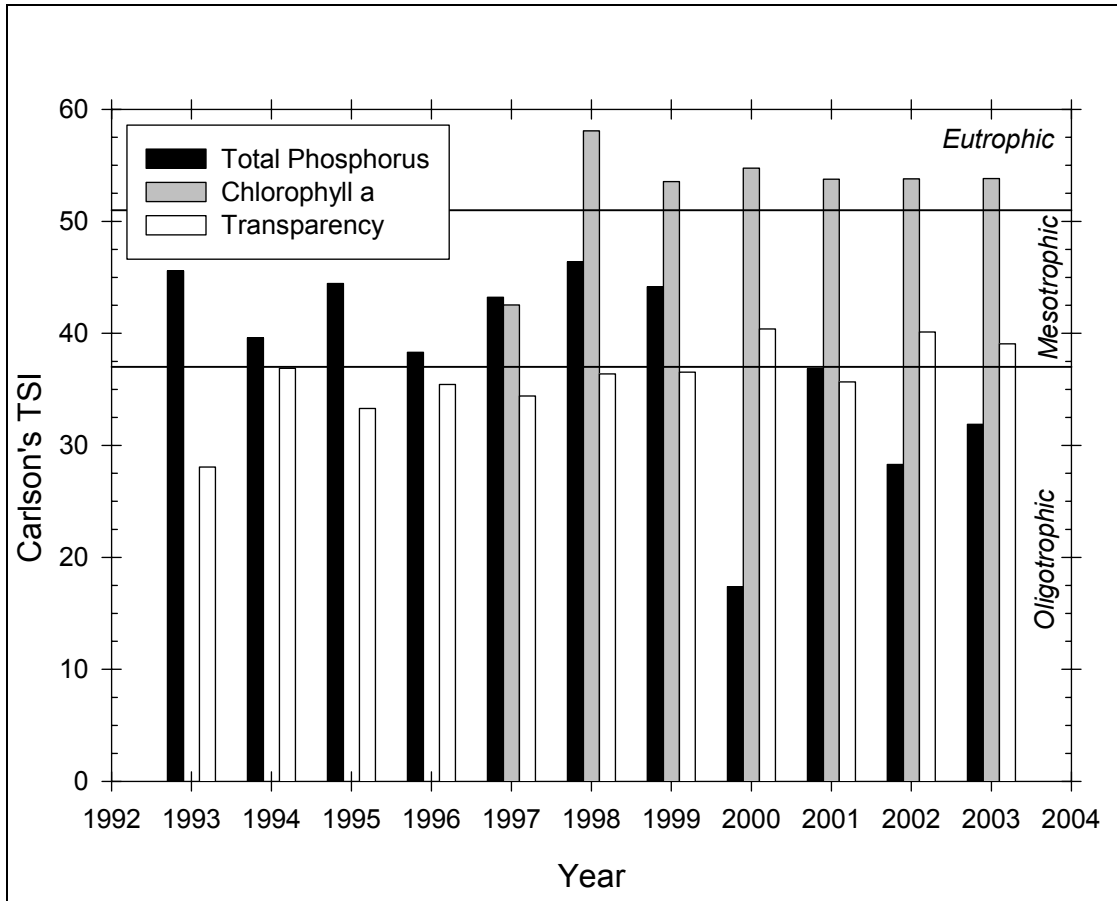


Figure 60 Carlson TSI trend in Fourth Lake

Aluminum

Figure 61 presents the seasonal mean aluminum trend in Fourth Lake, while Table 47 presents descriptive statistics for aluminum in Fourth Lake. The aluminum in Fourth Lake exhibited a stable trend. The aluminum in Fourth Lake was slightly lower than the county average, though this difference was not statistically significant.

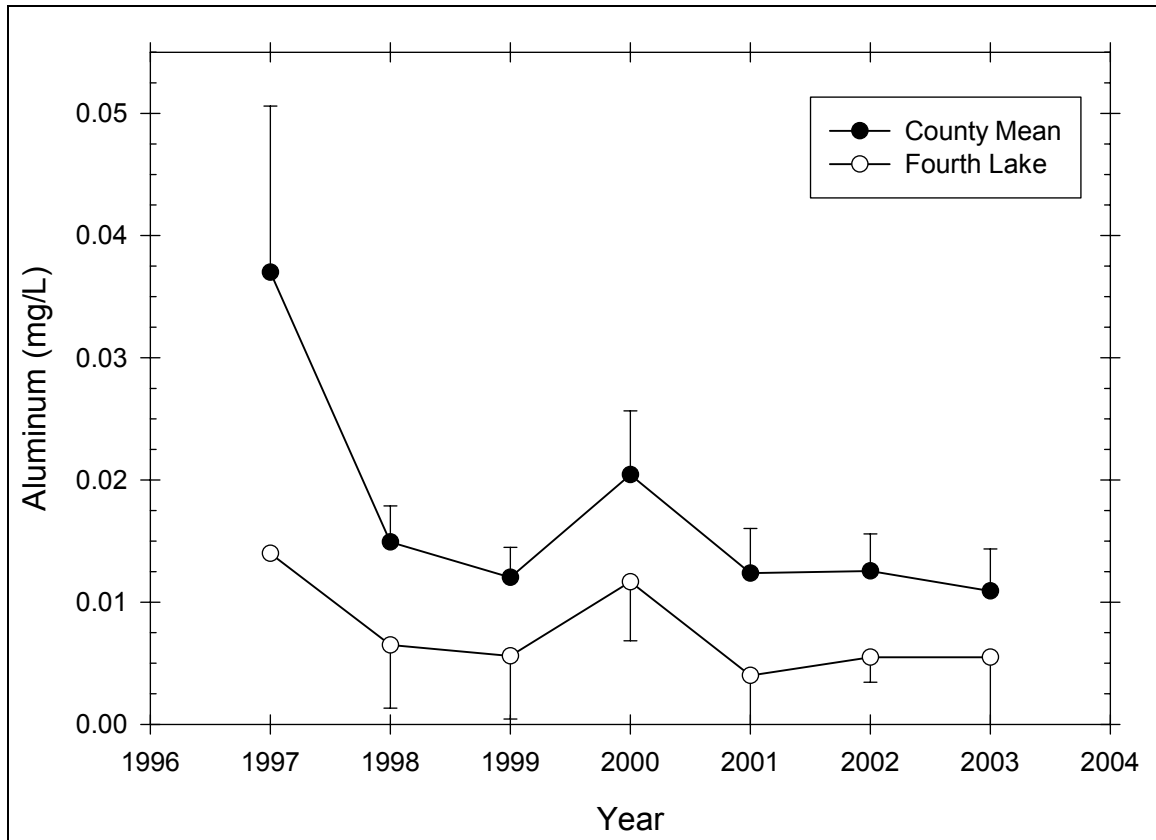


Figure 61 Seasonal mean aluminum trend in Fourth Lake

Table 47 – Descriptive Statistics for Aluminum in Fourth Lake

Year	Size	Missing	Mean	Std Dev	Std. Error	C.I. of Mean
1997	6	5	0.0140	--	--	--
1998	6	0	0.00650	0.00493	0.00201	0.00517
1999	6	1	0.00560	0.00416	0.00186	0.00516
2000	6	0	0.0117	0.00459	0.00187	0.00482
2001	6	2	0.00400	0.00283	0.00141	0.00450
2002	6	2	0.00550	0.00129	0.000645	0.00205
2003	6	2	0.00550	0.00370	0.00185	0.00588
Year	Range	Max	Min	Median	25%	75%
1997	0.000	0.0140	0.0140	0.0140	0.0140	0.0140
1998	0.0140	0.0140	0.000	0.00650	0.00300	0.00900
1999	0.01000	0.0120	0.00200	0.00500	0.00200	0.00825
2000	0.01000	0.0160	0.00600	0.0125	0.00700	0.0160
2001	0.00600	0.00800	0.00200	0.00300	0.00200	0.00600
2002	0.00300	0.00700	0.00400	0.00550	0.00450	0.00650

2003	0.00900	0.01000	0.001000	0.00550	0.00300	0.00800
Year	Skewness	Kurtosis	K-S Dist.	K-S Prob.	Sum	Sum of Squares
1997	--	--	--	--	0.0140	0.000196
1998	0.301	-0.147	0.139	0.767	0.0390	0.000375
1999	0.992	0.427	0.207	0.567	0.0280	0.000226
2000	-0.274	-2.556	0.266	0.200	0.0700	0.000922
2001	1.414	1.500	0.260	0.387	0.0160	0.0000880
2002	-2.665E-015	-1.200	0.151	0.710	0.0220	0.000126
2003	5.921E-016	1.139	0.196	0.644	0.0220	0.000162

Calcium

Figure 62 presents the seasonal mean calcium trend in Fourth Lake, while Table 48 presents descriptive statistics for calcium in Fourth Lake. The calcium in Fourth Lake exhibited a slight decreasing trend over the study period. The calcium in Fourth Lake was higher than the county average, though this difference may not be statistically significant for all years.

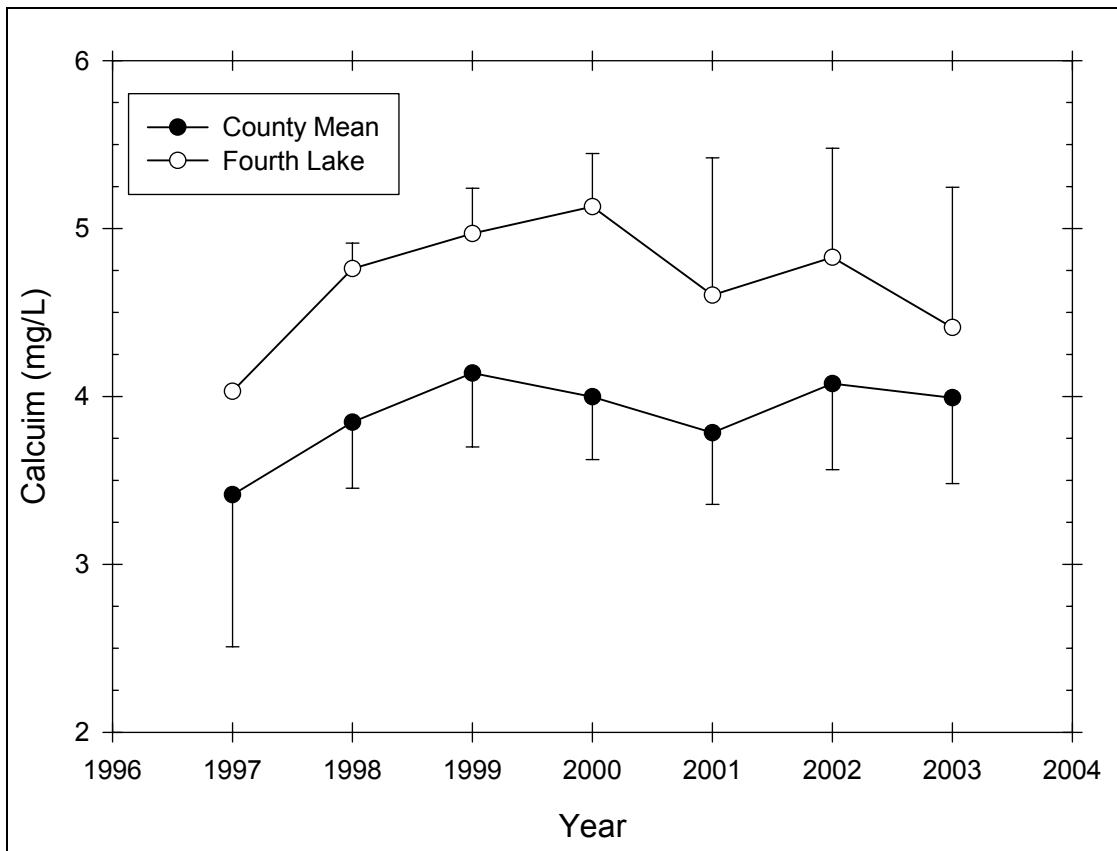


Figure 62 Seasonal mean calcium trend in Fourth Lake

Table 48 – Descriptive Statistics for Calcium in Fourth Lake

Year	Size	Missing	Mean	Std Dev	Std. Error	C.I. of Mean
1997	6	5	4.030	--	--	--
1998	6	0	4.760	0.146	0.0596	0.153
1999	6	1	4.970	0.217	0.0969	0.269

2000	6	0	5.130	0.301	0.123	0.316
2001	6	2	4.603	0.515	0.257	0.819
2002	6	2	4.828	0.409	0.205	0.651
2003	6	2	4.410	0.525	0.262	0.835
Year	Range	Max	Min	Median	25%	75%
1997	0.000	4.030	4.030	4.030	4.030	4.030
1998	0.380	4.960	4.580	4.720	4.670	4.910
1999	0.560	5.180	4.620	5.050	4.845	5.105
2000	0.730	5.670	4.940	4.955	4.950	5.310
2001	1.130	5.220	4.090	4.550	4.185	5.020
2002	0.930	5.170	4.240	4.950	4.560	5.095
2003	1.110	5.020	3.910	4.355	3.975	4.845
Year	Skewness	Kurtosis	K-S Dist.	K-S Prob.	Sum	Sum of Squares
1997	--	--	--	--	4.030	16.241
1998	0.451	-1.259	0.248	0.280	28.560	136.052
1999	-1.308	1.743	0.244	0.379	24.850	123.692
2000	1.535	1.425	0.380	0.007	30.780	158.355
2001	0.379	-2.712	0.234	0.501	18.410	85.527
2002	-1.512	2.467	0.301	0.222	19.310	93.721
2003	0.318	-3.653	0.260	0.390	17.640	78.619

Calcite Saturation Index

Figure 63 presents the calcite saturation index trend in Fourth Lake. There was no distinct trend in Fourth Lake.

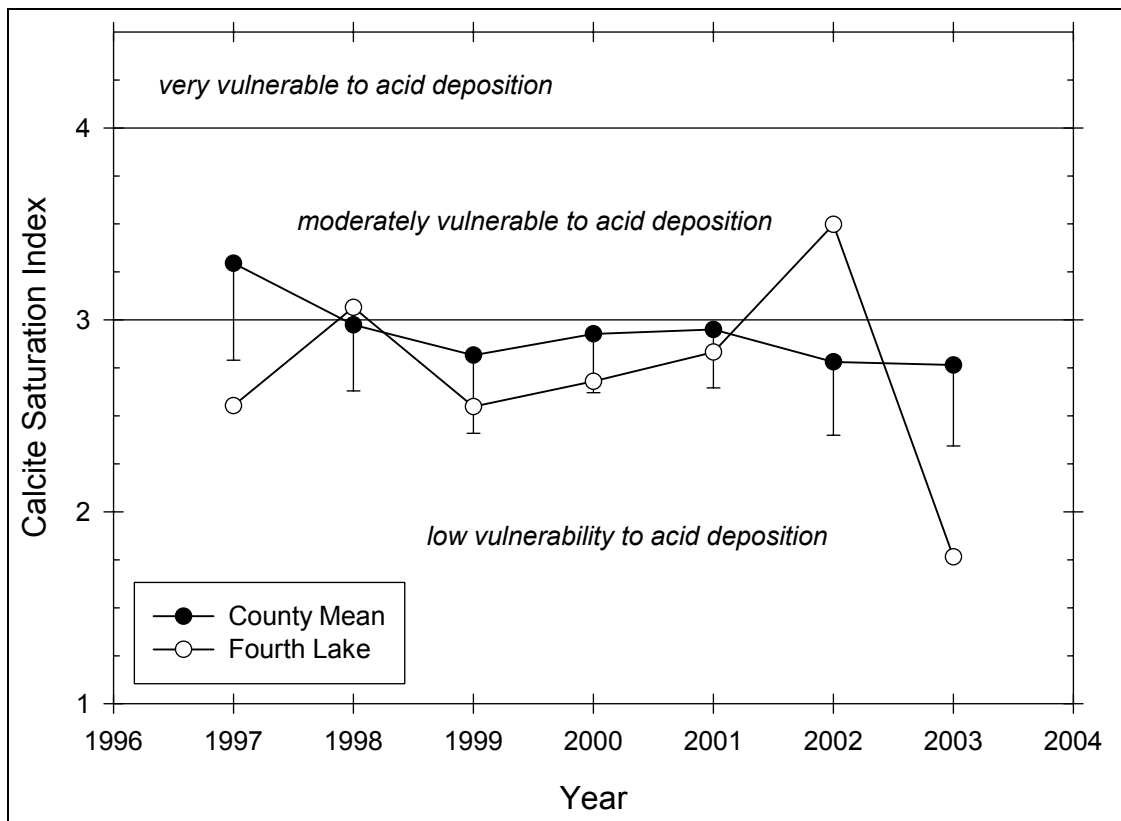


Figure 63 Seasonal mean CSI trend in Fourth Lake