

Martin Lake

Linwood Township, Lake ID # 02-0034

Background

Martin Lake is located in the northeast portion of Anoka County. Martin Lake has a surface area of 223 acres and maximum depth of 20 ft (6.1 m). Public access is available on the southern tip of the lake. The lake is used moderately by recreational boaters and fishers, and would likely be used more if water quality were improved. Martin Lake is almost entirely surrounded by private residences. The 5402 acre watershed is 18% developed, with the remainder being vacant, agricultural, or wetlands.

Martin Lake, along with Typo Lake to its north, are currently the subject of a intensive study of water quality impairments. This TMDL study (total maximum daily load) will result in documentation of nutrient sources, the degree to which each is impacting the lake, and a remedial strategy. TMDL studies are required of the Minnesota Pollution Control Agency for all impaired waters. Martin and Typo Lakes are on the 303(d) impaired waters list.

2003 Results

In 2003 Martin Lake had poor water quality compared to other lakes in the North Central Hardwood Forest Ecoregion (NCHF), receiving a D letter grade. 2003 readings were similar to previous years, and within the amount of variation expected to occur naturally. This hypereutrophic lake has chronically high total phosphorus and chlorophyll-a, and some of the poorest water quality in the county. ACD staff's subjective perceptions of the lake's physical characteristics and recreational suitability were that only mild amounts of algae were present through June, but thereafter severe algae blooms excluded swimming and severely hampered boating activities. Very little aquatic vegetation is present in this lake, and recreational impairments are due to algae.

Trend Analysis

Seven years of water quality data have been collected by the Minnesota Pollution Control Agency (1983), Metropolitan Council (1998), and ACD (1997, 1999-2001, 2003). Citizens monitored Secchi depths 16 other years. Water quality has not significantly changed from 1983 to 2003 (repeated measures MANOVA with response variables TP, Cl-a, and Secchi depth; $F_{2,4}=2.11$, $p=0.24$). Some brief water quality improvements did occur in 1999, probably as a result of carp harvests during the previous two winters. Minnesota DNR fisheries data has anecdotal notes of algae blooms and lack of aquatic plants back to the earliest records in 1954.

Discussion

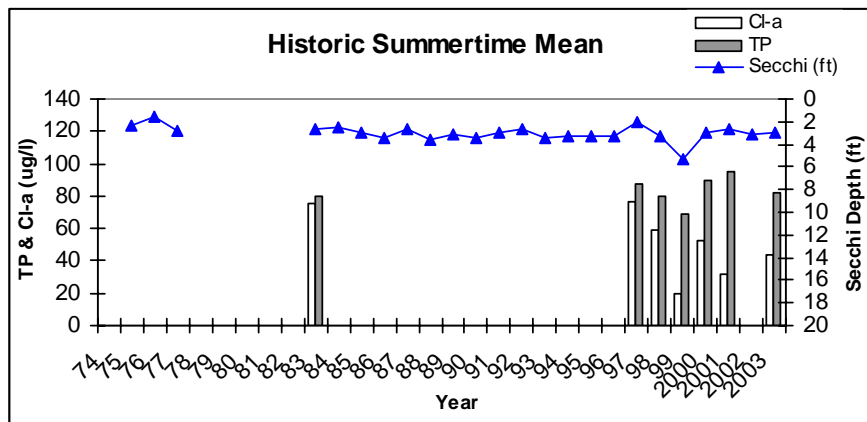
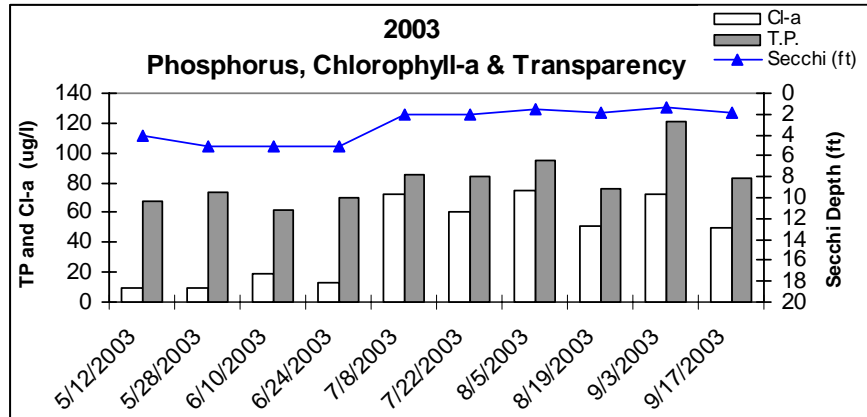
Updates on the Martin and Typo Lakes TMDL study can be found at www.AnokaNaturalResources.com. At this time, the study has revealed a number of factors impacting water quality on Martin Lake, including roughfish, shoreland management practices, and failing shoreland septic systems. Water entering Martin from Typo Lake is of special concern, as it is of extremely poor quality.

Refer to Chapter 1 for information on interpreting the information found in this section.

Table 2-3: 2003 Martin Lake Water Quality Data

Martin Lake		2003 Water Quality Data												Average	Min	Max
Units	R.L.*	5/12/2003	5/28/2003	6/10/2003	6/24/2003	7/8/2003	7/22/2003	8/5/2003	8/19/2003	9/3/2003	9/17/2003					
		Results	Results	Results	Results	Results	Results	Results	Results	Results	Results					
pH		0.1	7.86	8.01	7.94	7.91	9.03	8.75	8.90	9.02	8.95	8.95	8.53	7.86	9.03	
Conductivity	mS/cm	0.01	0.260	0.249	0.268	0.286	0.254	0.260	0.268	0.278	0.288	0.285	0.270	0.249	0.288	
Turbidity	NTU	1	4	2	2	2	9	7	8	6	8	7	6	2	9	
D.O.	mg/l	0.01	N/A	7.70	7.50	6.00	13.40	10.30	8.87	8.77	9.03	9.40	9.00	6.00	13.40	
Temp.	°C	0.1	13.7	19.7	19.7	24.0	26.5	24.1	24.3	27.3	22.4	21.0	22.27	13.70	27.30	
Temp.	°F	0.1	56.7	67.5	67.5	75.2	79.7	75.4	75.7	81.1	72.3	69.8	72	57	81	
Salinity	%	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	
Cl-a	ug/l	0.5	10.0	10.0	19.0	13.0	72.0	61.0	75.0	51.0	72.0	50.0	43.3	10.0	75.0	
T.P.	mg/l	0.01	0.068	0.074	0.062	0.070	0.086	0.084	0.095	0.076	0.121	0.083	0.082	0.062	0.121	
T.P.	ug/l	10	68.0	74.0	62.0	70.0	86.0	84.0	95.0	76.0	121.0	83.0	81.9	62.0	121.0	
T.S.S.	mg/l	5	11.0	9.0	< 5.0	6.0	16.0	21.0	14.0	15.0	27.0	16.0	15.0	6.0	27.0	
V.S.S.	mg/l	5	< 5.0	6.0	< 5.0	< 5.0	14.0	18.0	10.0	15.0	22.0	13.0	14.0	6.0	22.0	
Secchi	ft	0.1	4.0	5.0	5.1	5.0	2.1	2.0	1.5	1.9	1.4	1.9	3.0	1.4	5.1	
Secchi	m	0.1	1.2	1.5	1.6	1.5	0.6	0.6	0.5	0.6	0.4	0.6	0.9	0.4	1.6	
Field Observations																
Physical			2.0	2.0	2.0	3.0	4.0	4.5	5.0	4.0	5.0	4.5	3.6	2.0	5.0	
Recreational			2.0	2.0	2.5	2.5	4.0	4.0	5.0	4.0	4.0	4.0	3.4	2.0	5.0	
Trophic State Index																
TSIP			65	66	64	65	68	68	70	67	73	68	67	64	73	
TSIC			53	53	60	56	73	71	73	69	73	69	65	53	73	
TSIS			57	54	54	54	66	67	71	68	72	68	63	54	72	
Mean TSI			58	58	59	58	69	69	71	68	73	68	65	58	73	

Figure 2-18: Martin Lake Water Quality Results



Martin Lake Historical Summertime Mean Values

Agency	MPCA	ACD	MC	ACD	ACD	ACD	ACD
Year	83	97	98	99	2000	2001	2003
TP	79.6	88.0	80.0	61.7	89.4	95.4	81.9
Cl-a	75.4	77.0	58.8	18.0	52.5	31.4	43.3
Secchi (m)	0.78	0.61	0.97	1.80	0.88	0.78	0.90
Secchi (ft)	2.6	2.0	3.3	5.3	2.9	2.6	3.0
TSIP	67	69	67	64	68	69	68
TSIC	73	73	71	59	67	63	68
TSIS	64	67	60	52	63	65	62
TSI	68	70	66	58	66	66	66

Martin Lake Water Quality Report Card

Year	83	97	98	99	2000	2001	2003
TP	D	D	D	C	D	D	D
Cl-a	D	D	D	B	B	C	C
Secchi	D	F	D	C	C	D	D
Overall	D	D	D	C	C	D	D

Carlson's Trophic State Index

