

South Twin Lake

Mahnomen County

Sentinel Lakes

Minnesota Lake ID: 44-0014

Area: 1,118 acres

Watershed Area: 6,743 acres

Ecoregion: Northern Lakes and Forest (NLF)

Trophic State: Mesotrophic

Maximum Depth: 29 feet

Mean Depth: 12 feet

Mixing Status: Intermittently Stratified



Figure 1. South Twin Lake 3D depth contour

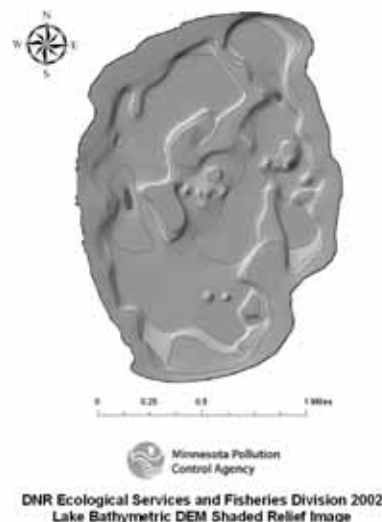


Figure 2. South Twin Lake Watershed land use

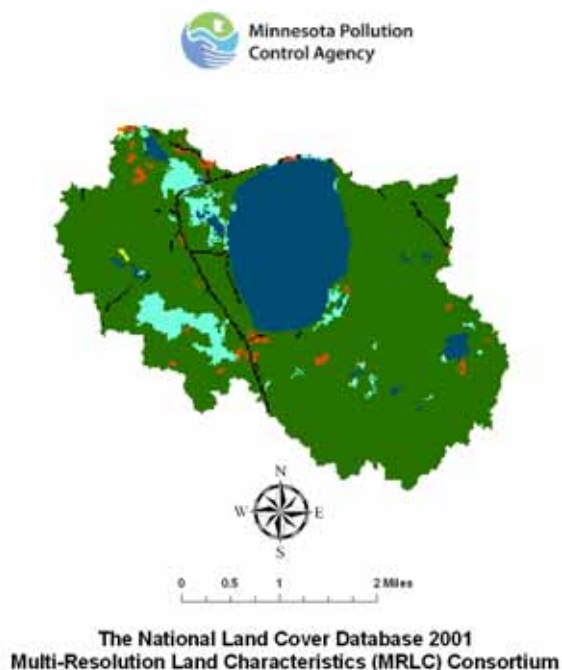


Table 1. Land use compositions

Land use	South Twin Lake land use percentage	NLF typical land use percentage
Developed	1	0 – 7
Cultivated (Ag)	0	<1
Pasture & Open	1	0 – 6
Forest	74	54 – 87
Water & Wetland	23	14 – 31
Feedlots (#)	0	

Table 2. South Twin Lake 2008 compared to typical range for NLF ecoregion reference lakes
MPCA data based on 2008 sample collections

Parameter	South Twin Lake	NLF
Number of reference lakes	-	32
Total Phosphorus (µg/L)	18	14 – 27
Chlorophyll mean (µg/L)	4	4 – 10
Secchi Disk (feet)	10.2	8 -15
(meters)	3.1	2.4 – 4.6
Total Kjeldahl Nitrogen (mg/L)	0.6	0.4 – 0.75
Alkalinity (mg/L)	170	40 – 140
Color (Pt-Co U)	5	10 – 35
pH (SU)	8.4	7.2 – 8.3
Chloride (mg/L)	2.7	0.6 – 1.2
Total Suspended Solids (mg/L)	1.6	<1 – 2
Total Suspended Inorganic Solids (mg/L)	0	<1 - 2
Conductivity (umhos/cm)	291	50 – 250
TN:TP ratio	33:1	25:1 - 35:1

µg/L = micrograms per liter

mg/L = milligrams per liter

umhos/cm = micromhos per centimeter

Pt-Co-U = Platinum Cobalt Units

SU = Standard Units

Figure 3. South Twin Lake 2008 temperature and dissolved oxygen profiles

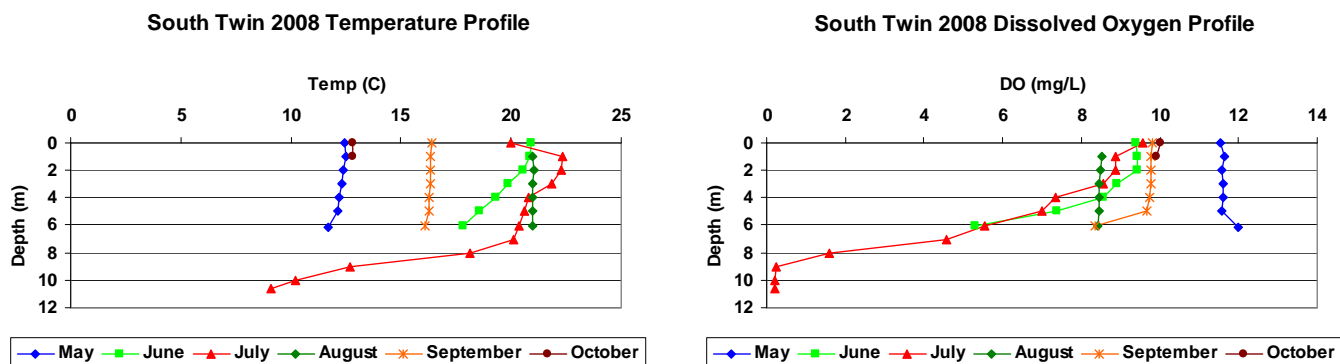


Figure 4. South Twin Lake summer mean secchi transparencies

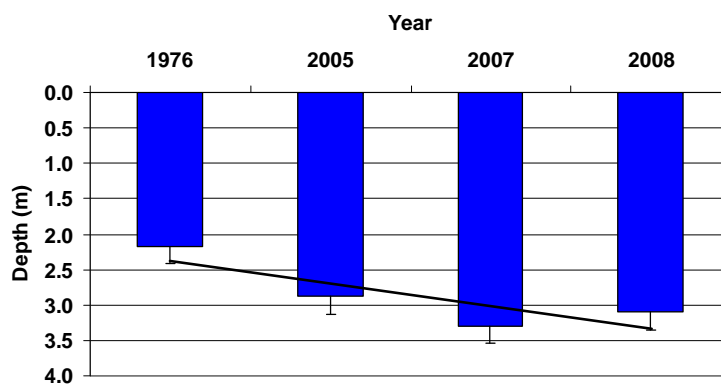
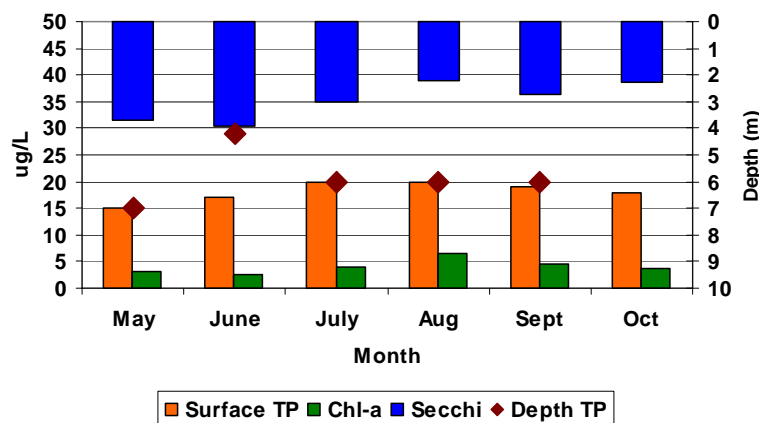


Figure 5. South Twin Lake 2008 TP, Chl-a, and secchi



Watershed and water quality summary

South Twin Lake is a shallow lake located within Nay-tah-waush, Minnesota. The lakeshore is fairly developed along the south, southwestern, and northern shores. South Twin's watershed is small relative to its surface area (6:1 ratio) and land use is dominated by forested, wetland and water land uses, which is typical for a lake in the Northern Lakes and Forests (NLF) ecoregion. South Twin Lake has previously been sampled by the White Earth Department of Natural Resources; however, historical data on South Twin is limited.

South Twin Lake was sampled six times during the summer of 2008 by Minnesota Pollution Control Agency (MPCA) staff. Secchi depth and temperature and dissolved oxygen (DO) profiles were collected by both staff and volunteer monitor Everett Kjelbertson. The lake was thermally stratified in mid-summer and mixed in the spring and fall. It should be noted that the July profile was taken during windy conditions and boat drifting occurred.

The trophic status indicators and other water quality data for South Twin Lake are within the typical range for minimally-impacted NLF ecoregion lakes (Table 2). Total phosphorus (TP) and Chlorophyll-a (Chl-a) increased throughout the summer months peaking in August and showing a decline in the fall. Secchi was variable, but tended to decline from a peak of 3.9 meters in June to a low value of 2.2 meters in August. Chl-a and TP values are within the expected NLF range with no algal blooms observed. A spike in depth TP was observed in June. This can be attributed to spring turnover when nutrients within the sediment were released.

Secchi disk data is available from 1976 and a notable improvement in clarity can be observed. Based on this record, summer-mean Secchi has improved by nearly 1 meter over the past 3 decades. Secchi transparencies for 2008 are well within the typical range for a lake in the NLF ecoregion. South Twin Lake has insufficient data for a complete trend analysis.

Fishery and aquatic plant survey summary

Table 3. Focal species captured during 2008 surveys and their size and abundance compared with other lakes in its lake class.

Species	Stocked	Abundance	Size	Trend
Walleye*	Y	High	Small-average	Increasing
Northern Pike*	N	Average	Small-average	Increasing
Yellow perch	N	Low	Small	Decreasing
Black Crappie	N	High	Large	Decreasing
Largemouth bass	N	Average	Small	Stable
Bluegill	N	Average	Average	Decreasing
Cisco	N	Average	Large	Increasing
White sucker	N	Average-high	Average	Increasing

*Management emphasis on these species

Table 4. Aquatic plant summary

Percent cover of aquatic plants \leq 15ft deep	94%
Lake depth beyond which most vegetation disappeared	14.5ft
Number of common species (i.e., \geq 10% cover)	9
Non-native plant infestation	NA
Frequency of <i>Chara</i>	76%

The fish community of South Twin Lake is diverse with substantial populations of cold, cool, and warm water species and several sensitive non-game species that are intolerant to disturbance. Currently, South Twin is managed primarily for walleye and northern pike and the walleye population is supplemented through biennial fingerling stocking. Past surveys show that northern pike abundance appears to be trending upward, while size may be trending downward. Yellow perch, an important cool-water forage fish, have declined in recent years; however, recruitment of this species has varied widely during the past two decades. Ciscos are present in South Twin and are an important cold-water forage fish. Cisco habitat is marginal because the lake is relatively shallow with little cold-water refuge during summer. Consequently, cisco populations in South Twin may be threatened by warmer water temperatures brought on by climate change. Nevertheless, for reasons uncertain, cisco numbers in South Twin have bucked a statewide trend of declining populations and have actually increased over time. Aquatic plants communities in South Twin are diverse with a high contribution of *Chara*, which is an important species for juvenile and non-game fish and is important for maintaining high water clarity. The “biotic integrity” score for South Twin was 101.6, which is average compared with other lakes in its lake class