

LAKE MONITORING PROGRAM

Haften Lake

Haften Lake, located in Greenfield, has public access on the eastern side of the lake. The 43-acre lake has a maximum depth of 13.4 m (approximately 44 feet). Roughly 60% of the lake's surface area is considered littoral zone (the 0-15 foot depth area of aquatic plant dominance). The lake was monitored by CAMP volunteers 15 times from mid-April to mid-October, 2005.

While this was the first year that Haften Lake was monitored through CAMP, the lake has been monitored by Metropolitan Council staff in the past (most recently in 2004). A search of the STORET nationwide water quality database for data on the lake revealed a limited database with nutrient and Secchi transparency data available in 2000-2001, and 2004-2005.

2005 summer (May-September) data summary

Parameter	Mean	Minimum	Maximum	Grade
TP ($\mu\text{g/l}$)	48.6	31.0	86.0	C
CLA ($\mu\text{g/l}$)	20.9	4.0	98.0	C
Secchi (m)	1.9	0.8	3.4	C
TKN (mg/l)	1.33	1.00	1.70	
			Overall Grade	C

While the lake's 2005 overall grade is the same as those recorded in 2000-2001 and 2004, the individual parameter means seem to indicate that 2005 represents the lake's best monitored water quality year to date.

Throughout the monitoring period, the volunteer's opinion of the lake's physical and recreational conditions was ranked on a 1-to-5 scale. The mean physical condition ranking was 2.6 (between 2- "some algae present" and 3- "definite algae present"), while the mean recreational suitability ranking was 3.4 (between 2- "minor aesthetic problem" and 3- "swimming slightly impaired").

Because 2000-2001 and 2004-2005 are the only years of available data, no long-term trends can be determined. On the short-term, however, the lake's overall water quality seems to be well represented by an overall grade of C. To better understand the quality of the lake and what direction it may be heading, more years of data collection are needed.

Lake Independence

Lake Independence is located within the municipal boundaries of Independence and Medina. The Three Rivers Park District established an in-lake phosphorus concentration goal for Lake Independence of 36 $\mu\text{g/L}$ to support direct contact recreational use. Total phosphorus concentrations decreased from 82 $\mu\text{g/L}$ in 1995 to 35 $\mu\text{g/L}$ in 2001. Lake Independence achieved the in-lake water quality goal in 2001 for the first time since 1988. However, water quality conditions degraded from 2001 through 2004. The mean phosphorus concentration increased from 56 $\mu\text{g/L}$ in 2002 to 83 $\mu\text{g/L}$ in 2004.

Despite the degraded water quality, the water quality conditions improved in 2005. The mean phosphorus concentration for 2005 decreased to 53 µg/L, which is similar to conditions in 2002. Although phosphorus concentrations decreased in 2005, the excessive nutrients within Lake Independence were conducive for development of algae blooms.

The average chlorophyll-a concentration was 25 µg/L with values ranging between 2.1 µg/L and 50.6 µg/L. The chlorophyll-a concentration in 2005 improved in comparison to conditions observed from 2001 through 2004. However, the abundance of algae contributed to poor water clarity conditions. The average secchi depth transparency was 2.5 m with values ranging between 1.0 m and 6.0 m.

The decrease in phosphorus concentration in 2005 may be due to variations in precipitation relative to previous years. Although the amount of precipitation in 2005 was similar to 2004, storm events in 2005 did not have the high intensity rainfall that was observed during 2004. Consequently, there may have been less watershed nutrient loading in 2005, resulting in decreased in-lake phosphorus concentrations. Since the watershed nutrient loading was not monitored, it is difficult to determine the potential impact that watershed nutrient loading may have had on the water quality of Lake Independence.

The phosphorus concentrations in the spring are further impacted by the senescence of curlyleaf pondweed that occurs at the end of June through the beginning of July. Lake Independence can often have extensive growth of curlyleaf pondweed that potentially inhibits recreational use. The phosphorus concentration increased 17 µg/L after the senescence of curlyleaf pondweed in 2005. There was an increase in chlorophyll-a concentration and a decrease in water clarity that corresponded to the time period of curlyleaf pondweed senescence. However, the amount of curlyleaf pondweed may not have been as significant for 2005 in comparison to previous years. Consequently, variations in curlyleaf pondweed density may influence in-lake water quality conditions.

A Lake Independence Diagnostic Feasibility Study was completed in 2004. The study identifies potential nutrient sources that have contributed to poor in-lake water quality. There has been a considerable amount of nutrient loading from the watershed as well as an in-lake internal loading component. The Pioneer - Sarah Creek Watershed Management Organization implemented rules and regulations to limit the nutrient loading to Lake Independence. However, improving the water quality of Lake Independence will require additional management efforts from both an in-lake and watershed perspective. The study identified several best management practices that could be implemented to further improve Lake Independence water quality.

Lake Sarah

Lake Sarah is located in the cities of Greenfield and Independence. The Three Rivers Park District established an in-lake phosphorus concentration goal for Lake Sarah of 36 µg/L to support direct contact recreational use. The average phosphorus concentration for Lake Sarah has been considerably higher than the in-lake water quality goal during the past ten years. There appears to be an increase in the average phosphorus concentration from 2000 (74 µg/L) to 2004 (138 µg/L). These phosphorus concentrations are similar to those observed in 2005 (95 µg/L).

The high phosphorus concentrations are partly due to the senescence of curlyleaf pondweed. Lake Sarah has a considerable amount of curlyleaf pondweed that inhibits potential recreational use. In 2005, total phosphorus concentrations increased from 66 µg/L at the end of June to 137 µg/L in early July. The phosphorus concentration increase caused severe algae blooms. Consequently, the chlorophyll-a concentration increased from 32 µg/L to 52 µg/L due to the senescence of curlyleaf pondweed in 2005. The severe algae blooms resulted in poor water clarity conditions. After the senescence of curlyleaf pondweed, secchi depth transparency ranged between 0.45 m to 0.93 m throughout the remaining portion of the summer.

Despite poor water clarity conditions after the senescence of curlyleaf pondweed, the average secchi depth transparency in 2005 (1.83 m) was relatively high in comparison to previous years. This was due to a clear water phase that occurred in early May that contributed to a secchi depth transparency of 5.0 m. Typically, the clear water phase occurs within lakes that have similar eutrophic conditions. This clear water phase often occurs in the spring during periods of high zooplankton density that reduces the amount of algae within the lake.

Spurzem Lake

Spurzem Lake, located in the City of Medina, was identified in the *Lake Independence Diagnostic Feasibility Study* as a potential source of nutrients that may impact downstream water quality. Spurzem Lake has excessive nutrients that contribute to poor water quality conditions. The average total phosphorus concentration in 2005 was 116 µg/L with values ranging between 61 µg/L and 177 µg/L. These concentrations are similar to those observed in 2003 and 2004.

The high phosphorus concentrations are partly due to the senescence of curlyleaf pondweed. The phosphorus concentrations increased 65 µg/L during the time period of curlyleaf pondweed senescence. The increase in the amount of phosphorus caused algae blooms that persisted throughout the summer.

The average chlorophyll-a concentration in 2005 was 73 µg/L. The severe algae blooms on Spurzem Lake resulted in poor water clarity conditions. The water clarity conditions ranged between 0.4 to 2.4 m with an average secchi depth transparency of 1.25 m. The water clarity conditions in 2005 were similar to those observed for 2003 & 2004.

The Three Rivers Park District established water quality goals for Spurzem Lake to support indirect contact recreational use. Currently, the water quality conditions are considerably higher than these water quality goals. The excess nutrients in Spurzem Lake have caused poor water quality conditions that potentially inhibit recreational use. The water quality conditions in 2005 are similar to conditions observed in previous years. Consequently, it is important to improve the water quality of Spurzem Lake to improve recreational use and reduce potential downstream impacts to Lake Independence. The *Lake Independence Diagnostic Feasibility Study* identifies potential sources that impact the water quality of Spurzem Lake, and should be considered relative to implementing best management practices to improve water quality.

Lake and Watershed Characteristics

Lake	Size (acres)	Max Depth (feet)	Mean Depth (feet)	Watershed Size (acres)	Watershed Land Use Characteristics
Haften	43	44	12	1,600	agricultural, hobby farms, rural residential
Independence	844	58	18	8,512	agricultural, hobby farms, rural residential
Sarah	552	60	18	4,530	agricultural, rural residential
Spurzem	73	36	13	3,136	agricultural, hobby farms, rural residential

For more information regarding the 2005 monitoring of Haften Lake or CAMP, contact Randy Anhorn, Metropolitan Council, at randy.anhorn@metc.state.mn.us or (651) 602-8743.

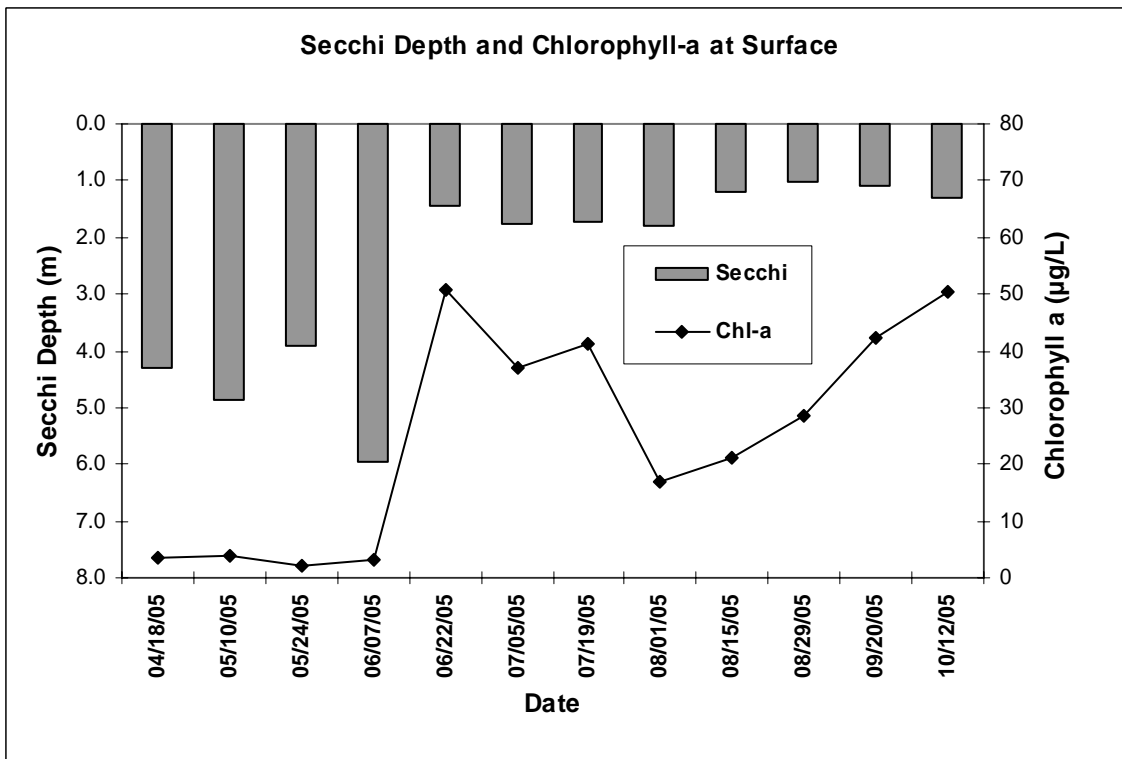
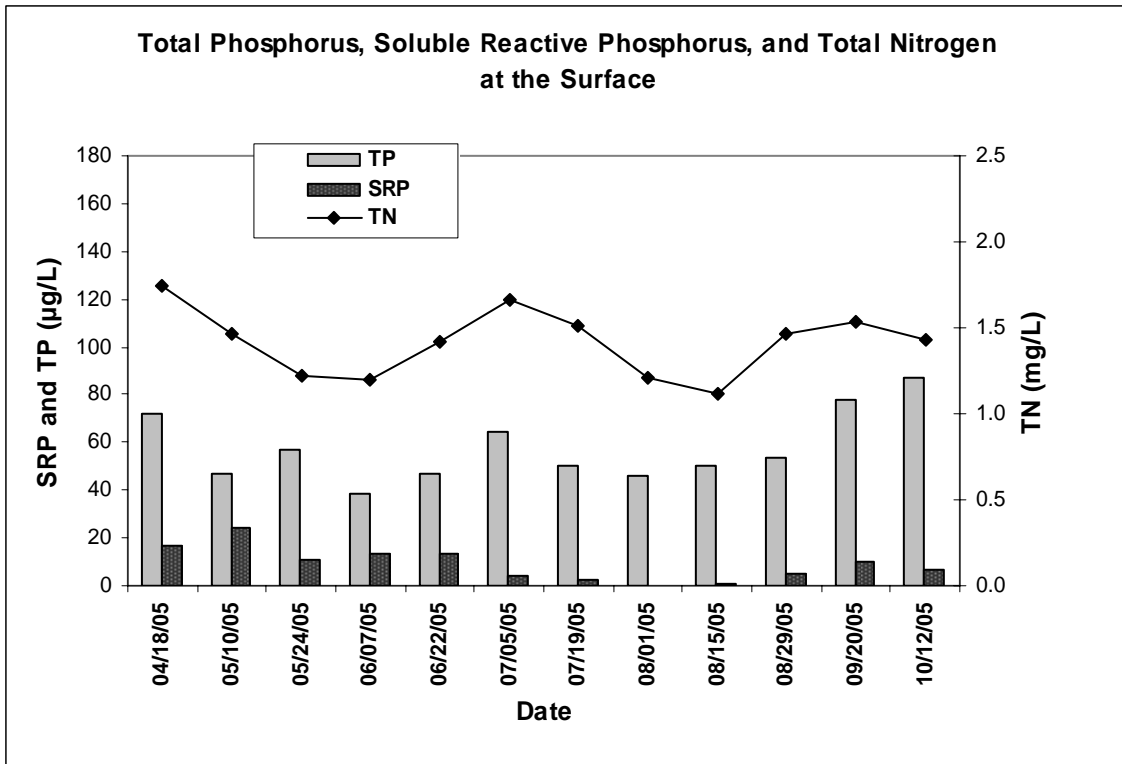
To learn more about the 2005 monitoring of Independence, Sarah and Spurzem Lakes, contact John Barten, Three Rivers Park District, jbarten@threeriversparkdistrict.org, or (763) 694-7841.

Lake Monitoring History

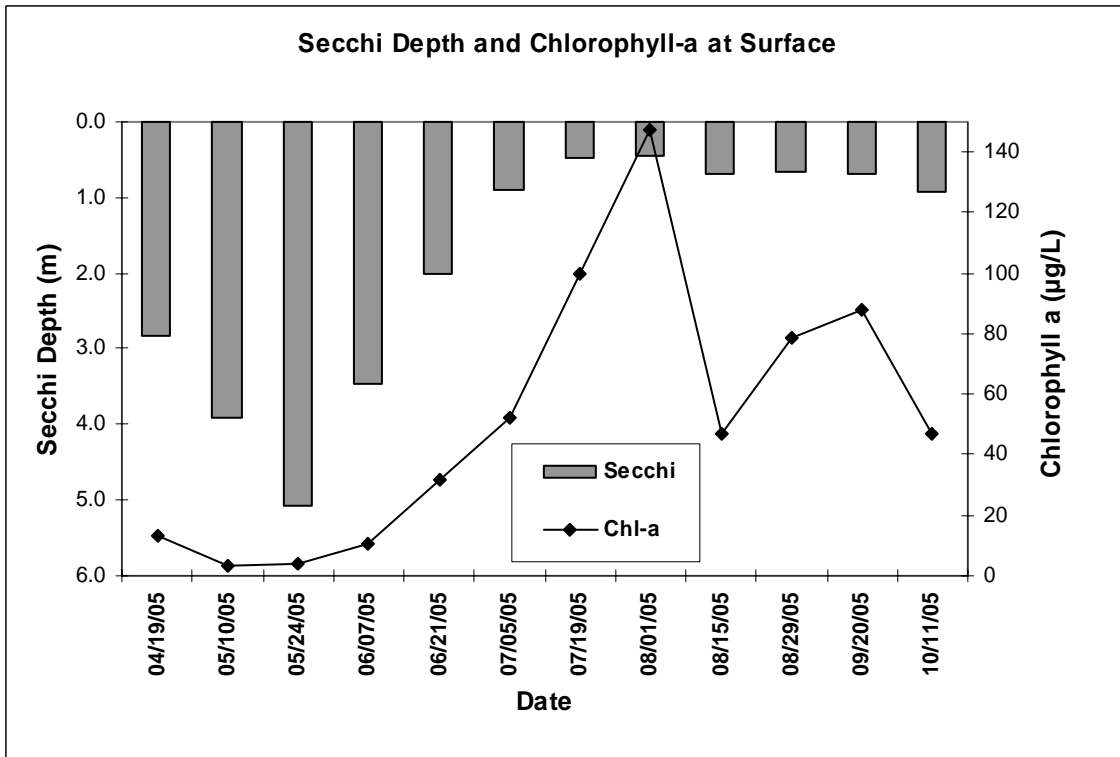
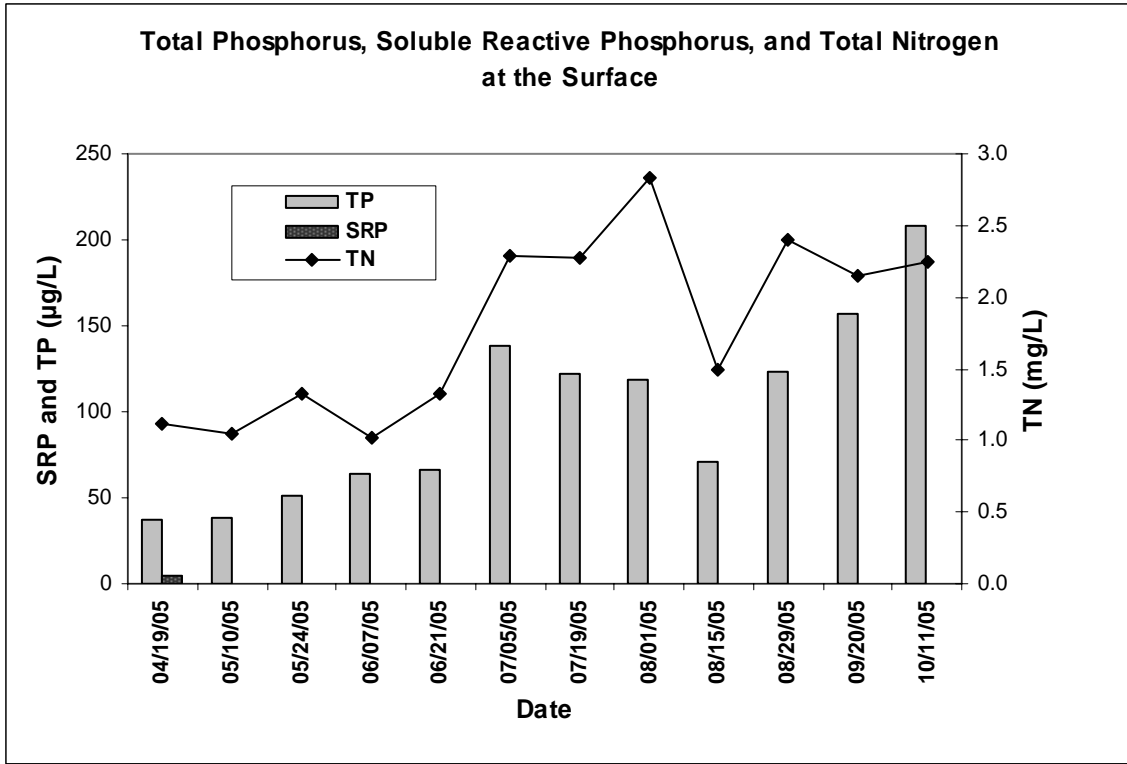
Lake	City	2005	2004	2003	2002	2001	2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990	1989	1988
Ardmore	Loretto															X			
Hafften	Greenfield	*	◆			◆	◆		X		X								
Haughey	Independence				*														
Independence	Independence Medina	X	X		X								*	*					X
Little Long	Minnetrista		X	◆	X	◆	X	X	◆		X			X		X		X	
Peter	Medina							X			X		X		X		X		X
Rebecca	Greenfield Independence				X														
Robina	Independence								X										
Sarah	Greenfield Independence	X	X		X	X	X		X				X		X			X	X
Schendel	Greenfield							X											
Spurzem	Medina	X	X	X														X	
Swede Lake	Watertown		*	*	*	◆	X												
Whaletail	Minnetrista		◆	X		◆	X		◆		X			X			X		
Winterhalter	Medina																		X

X = monitored by Three Rivers Park District/Hennepin Parks
 * = monitored through the CAMP program
 ◆ = monitored by Metropolitan Council

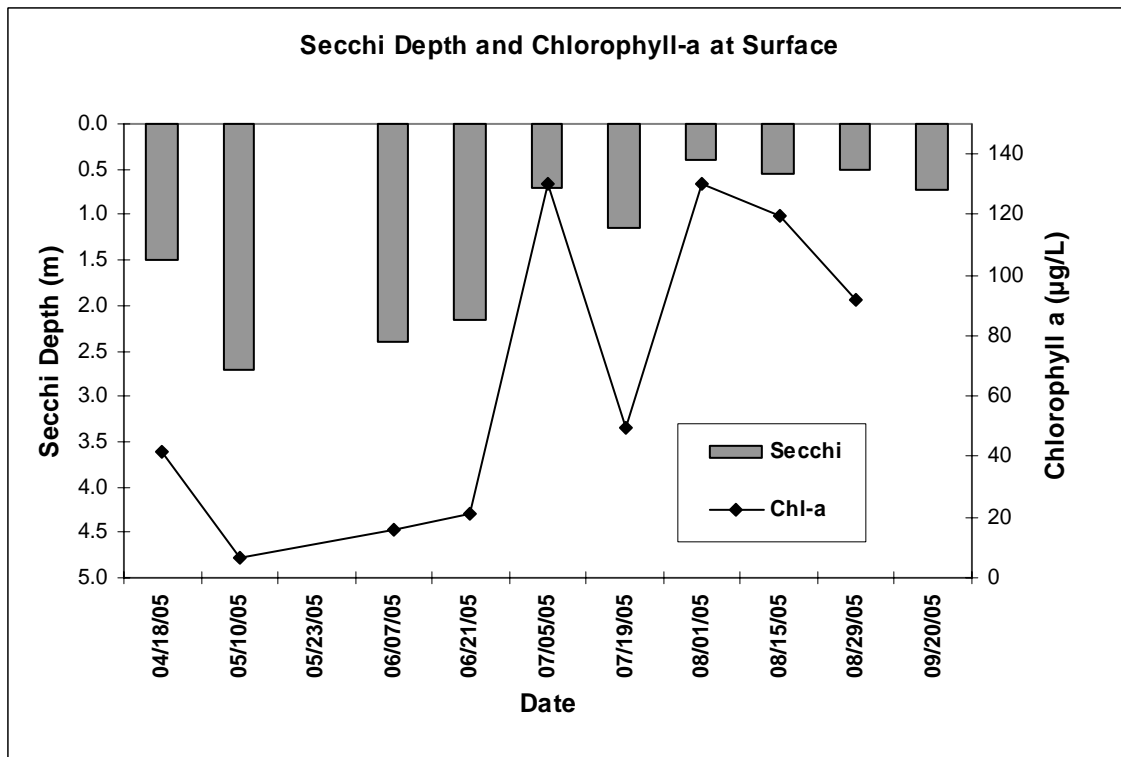
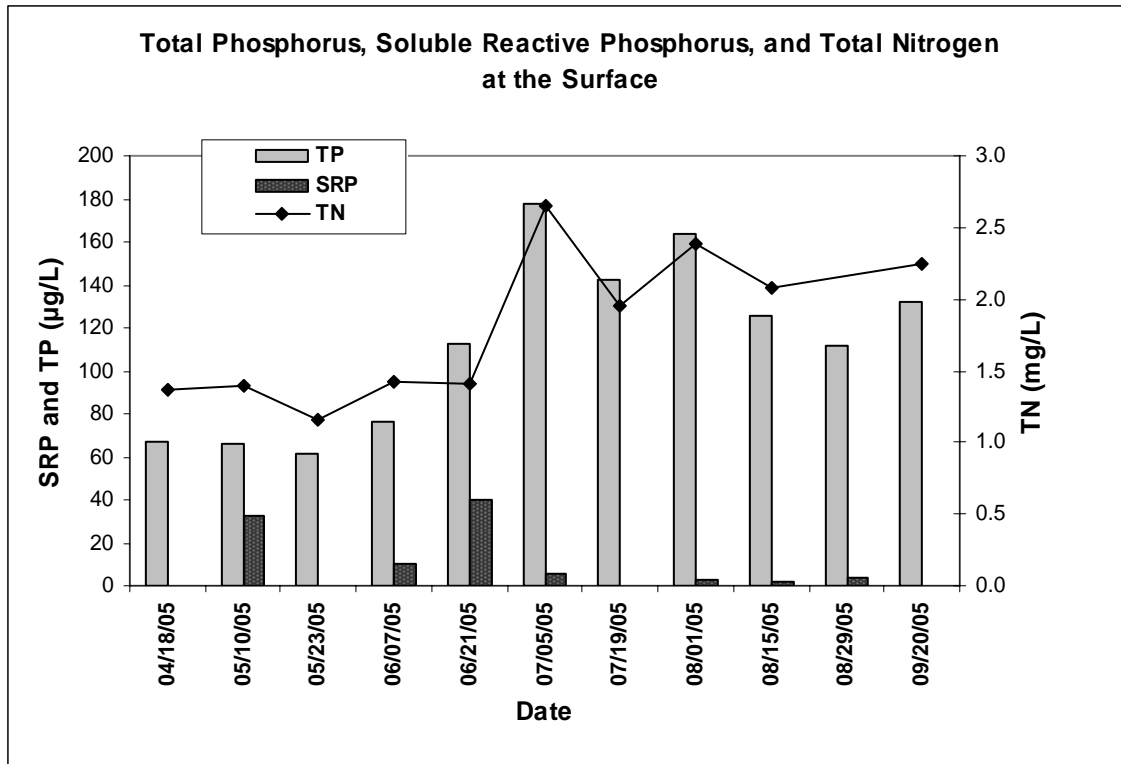
Lake Independence



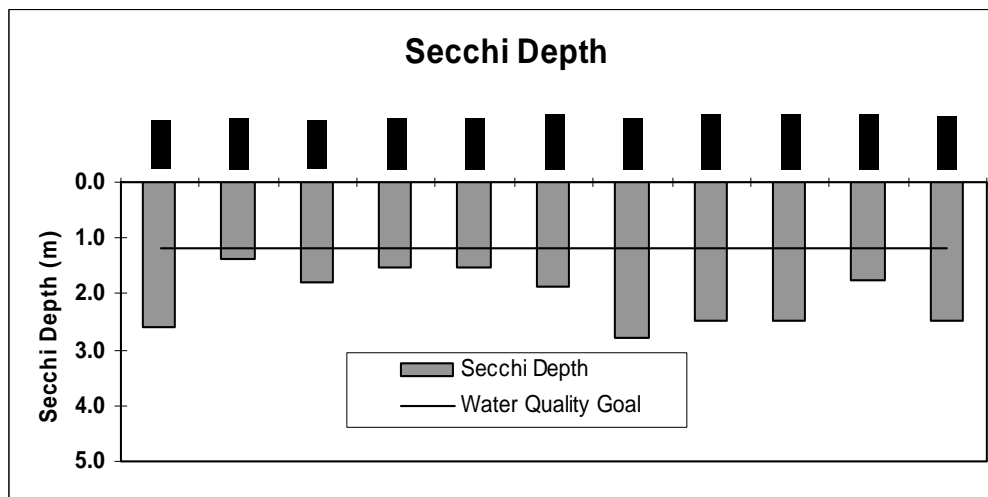
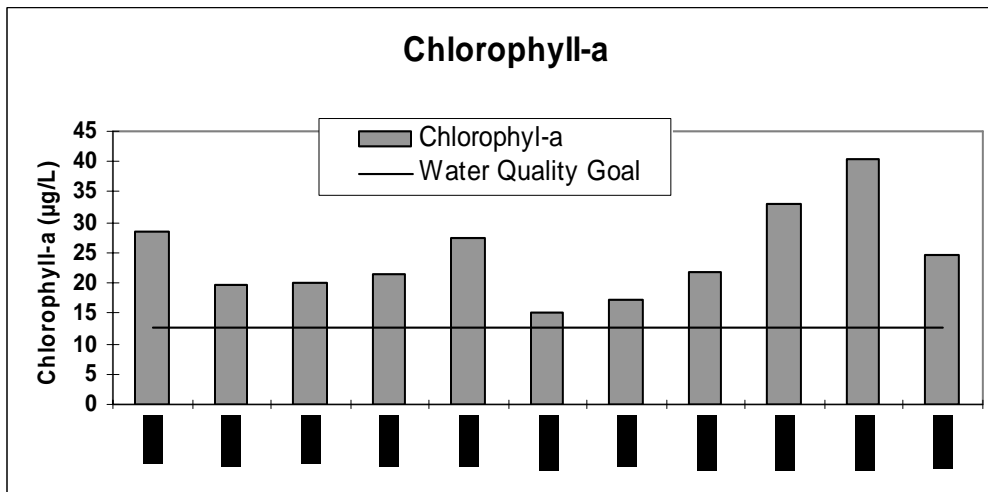
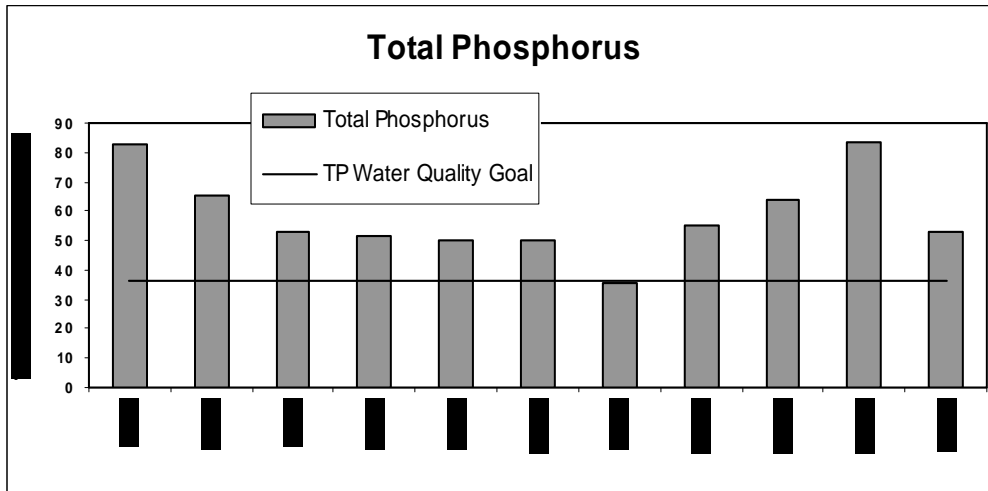
Lake Sarah



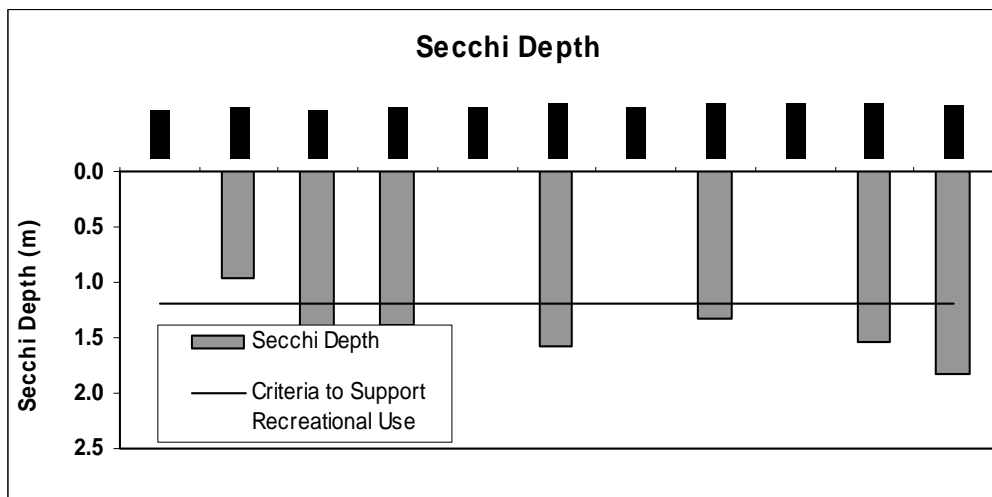
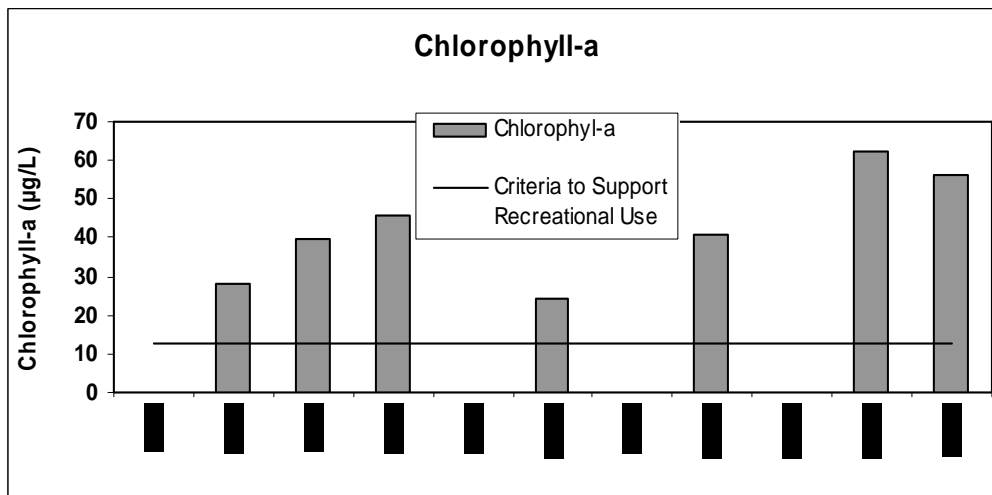
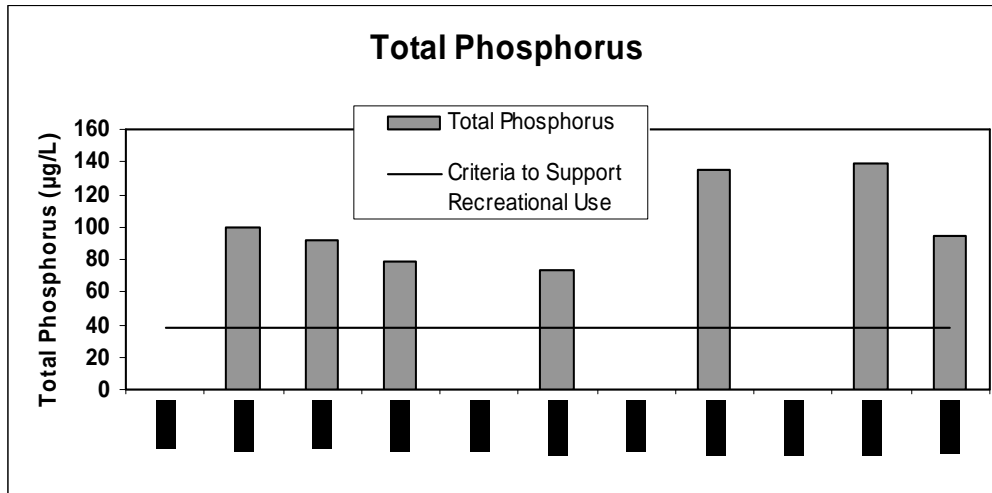
Spurzem Lake



Lake Independence Historical Data



Lake Sarah Historical Data



Spurzem Lake Historical Data

