Leon County Lakes Ecology

Lake Miccosukee

McGlynn Labs Inc.

5.2.1: Lake Miccosukee

Surface Area: 6312 acres @ 80' MSL
Number of Stations:1
Duration of monitoring:10/99-06/06

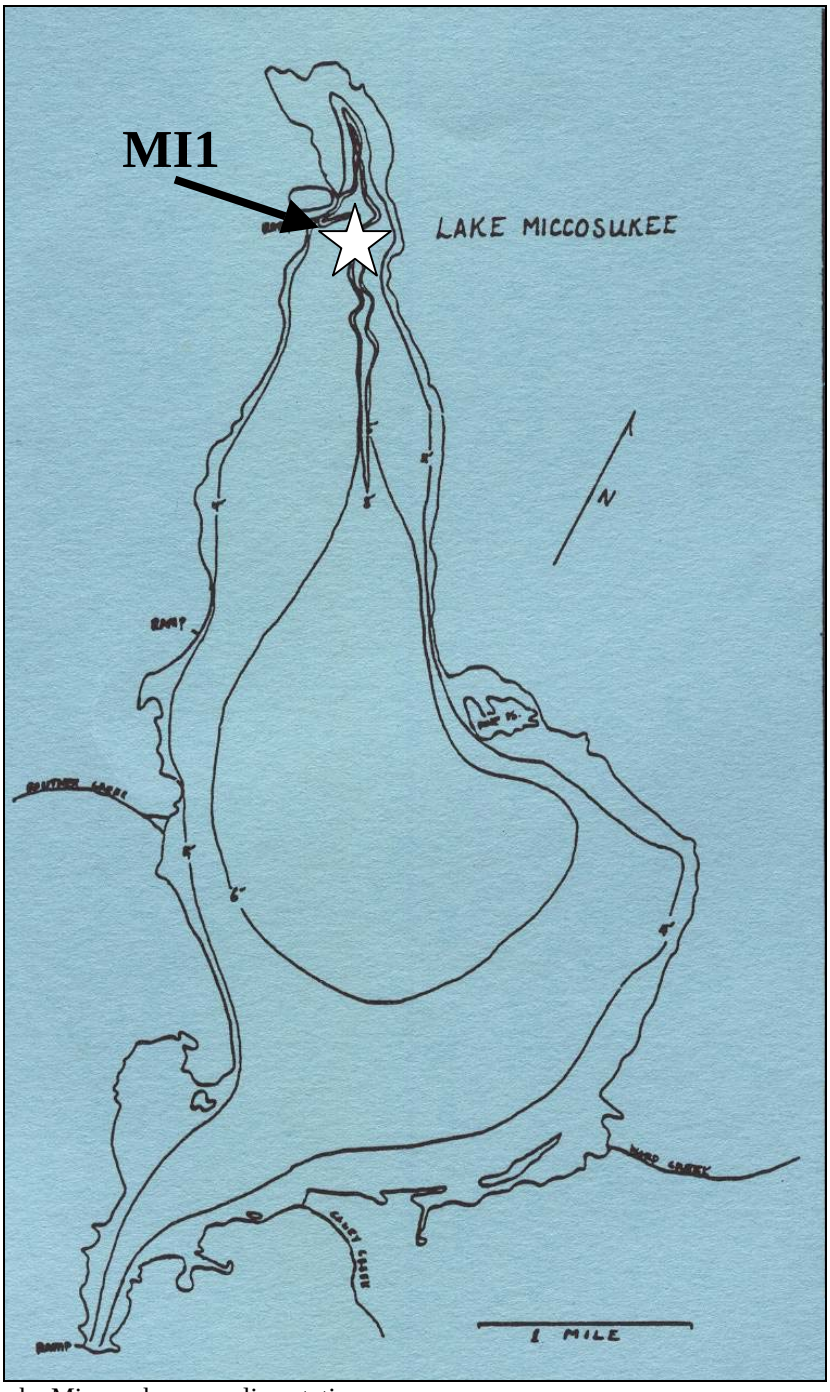

Figure 5.2.1: Lake Miccosukee sampling stations

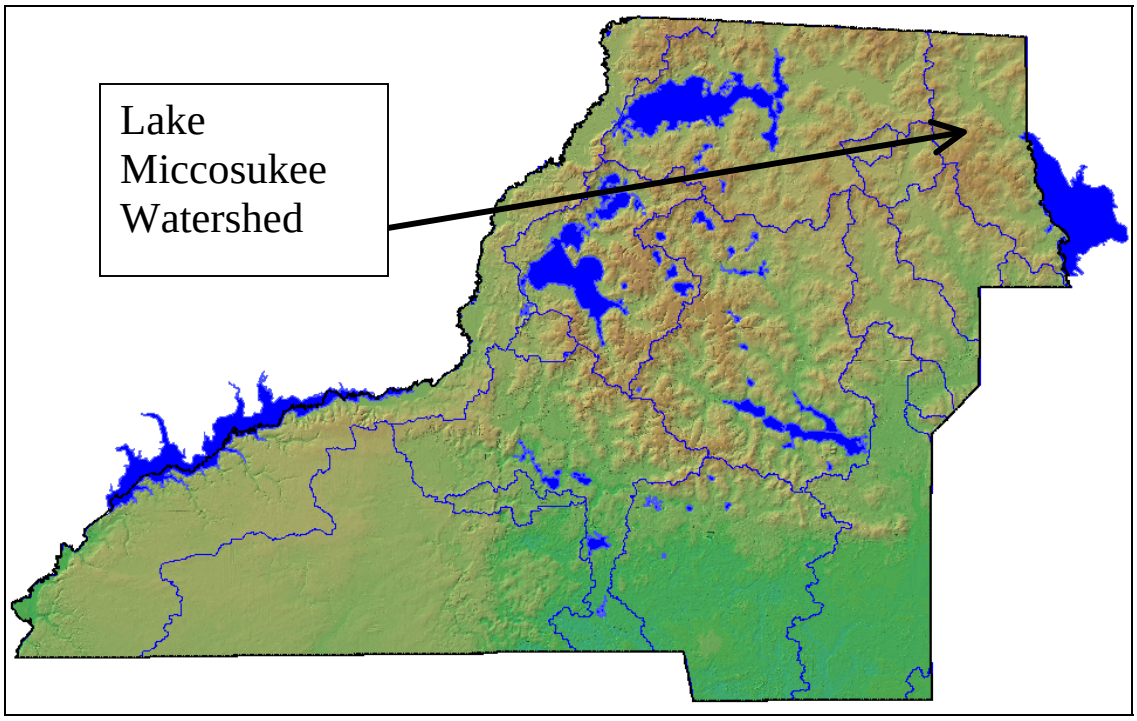

Figure 5.2.2: Map by Greg Mauldin, Tallahassee-Leon County GIS

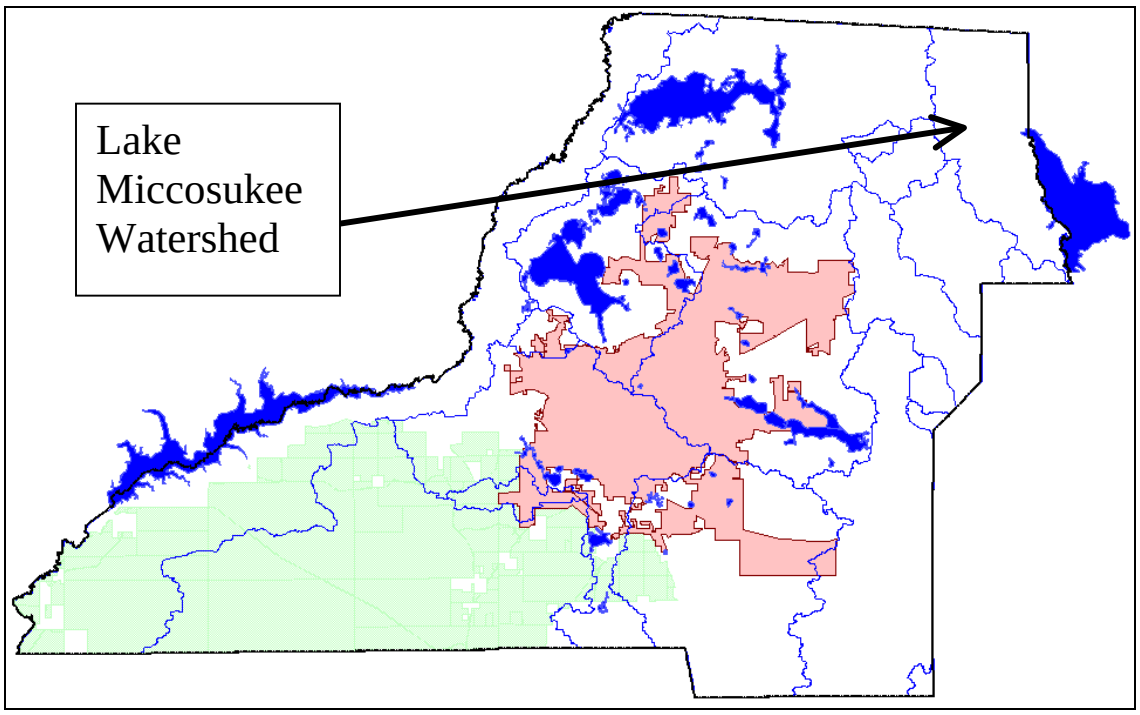

Figure 5.2.3: Map by Greg Mauldin, Tallahassee-Leon County GIS

Lake Miccosukee lies between Jefferson and Leon Counties. It is a large lake with sinks at both ends and represents the northern extremity of the Eastern Sinks region of Leon County. This region also includes Bird, Patty, Copeland, Wood, and Hammock sinks, among others. This region of sinks may be the source of the St. Marks River. The water in the sinks represents the potentiometer surface of the aquifer. For example, the caverns beneath the sinks reach into the aquifer. If a cup of water is poured into the surface of the sink, another cup of water enters the aquifer. The water level in the sink remains unchanged.

Aquatic plant cover has historically varied on Lake Miccosukee due to fluctuating water levels. This lake used to drain and fill on what appears to have been a 10-year cycle. Descriptions of Lake Miccosukee have varied over time, particularly in regard to coverage of the lake's surface with aquatic plants. Like Lake Lafayette, Lake Miccosukee was a 'Prairie Lake'. In 1876 a plant-clogged Lake Miccosukee was described as being "covered by maidencane, flag and bonnets with broad white flowers" (Rigby, 1876). However, in 1914 considerable open water was noted as the lake was "covered with water to a depth of 2 to 5 feet and toward the southern end grass and button bushes projected above the water" (Sellers, 1914).

Over fifty years ago, before walling off the sinkhole with earthen dikes stabilized water levels, aquatic plant coverage of the lakes surface varied between hydrological cycles in the basin. After refilling, much of the lake was open water. As aquatic vegetative grew back the percent coverage of open water gradually decreased. Fire within the lake basin as well as grazing herbivores helped control aquatic plant populations during dry periods.

An earthen dike and a concrete spillway were built around the sinkhole at the northern end of the lake in 1954 to 'keep the water in'. A wooden weir was built at the southern end of the lake to keep the water from disappearing into Lloyd Sink. From 1954-1988 water levels were stabilized to such an extent that the bottom was exposed only twice, in 1977 and 1988 for a total of 6 months (Cooksey, 1989).

Eventually, the lake could reach the state it was in at the beginning of this century. After 50 years of stabilized water levels, most of the lake was totally covered with aquatic plants, and as a contemporary descriptions stated, 'much of Lake Miccosukee was and is a marsh' (Cooksey, 1989). Aerial photographs taken in 1976 and again in 1988 depict a plant-clogged lake, with only 19.4% of the lakes's surface area considered open water. Marshy lakes such as this have poor sport fish populations but are good habitats for aquatic plants, waterfowl, and alligators (Cooksey, 1988). Alligator (*Alligator mississippiensis*) harvests on the lake net almost $30,000 annually, with an estimated population of 1200. Starvation and cannibalism reduce stocks after drawdowns. One endangered species of plant, the Miccosukee Gooseberry (*Ribes echinellum*) exists only in three localities in the world, two of which are on the shores of Lake Miccosukee.

Figure 5.2.4: Postcard from 1912…

The gate in this structure was opened during the Drought of 1999. The lake was allowed to drain in a natural manner into Miccosukee Sink and the Floridan Aquifer like the other karst lakes of the region. The lake went dry except for its central valley, which was kept full of water to preserve the fish population. During the 1999 Dry Event we measured an acceptance rate of 60 cfs at the sinkhole, measured after a rainstorm partially filled the lake basin (April 2000). Michael Hill of the Florida Fish and Wildlife Conservation Commission closed and re-opened the control structure at Miccosukee Sink to give us a chance to measure the acceptance rate of the sink. At higher water levels, when there is greater head pressure the acceptance rate could be larger. The shallow bathymetry of Lake Miccosukee, coupled with the large acceptance rate of the sinkhole has caused the formation of a very pronounced ravine through the center of the lake. This underwater valley meanders for over 2 miles, with depths of over 14 feet.

Figure 5.2.5: View of Lake Miccosukee. Published in 1912 by Elias Sellards.

While the lake was dry several restoration methods were utilized. Several areas of the lake were scraped with mechanical devices and removed up to three feet of sediment and vegetation. Most of the lake bottom was also burned during the drawdown, which was accomplished with very superficial fires. These lake bottom fires had to be extinguished every evening. Permits could not be obtained from the Forestry Service to allow fires to burn into the muck deposits within the lake; although this would have created deep areas within the lake and future open water habitats. The Forestry Service did not want the smoke from the fires since it could have caused traffic accidents on Highway 90 to the south of Lake Miccosukee.

These superficial fires seemed to have promoted the growth of maidencane. The fires burned only the dry vegetation, which released the nutrients bound within the vegetative material and promoted seed bed germination. Maidencane, normally a beneficial aquatic grass, covered the lake bottom as a luxuriant mat of new growth. Perhaps in an earlier version of Lake Miccosukee, herbivores would have eaten this tender new growth. Instead, after the lake refilled, the maidencane rose thicker than before above the waters, giving Lake Miccosukee the appearance of dry land. A hotter fire burning down into the

sediments could possibly have destroyed the seedbed and suppressed the growth of this grass. Large herbivores that once roamed our land would have made short work of the new growth after a burn, but these animals are no longer with us.

It soon became apparent during the burn that cypress trees are not very resistant to fire. The Spanish moss which hangs low on its branches tends to behave as a fire ladder, rapidly catching fire from the shorter grasses and conducting the flames to the crown of the tree where the entire tree became a torch. The bases of the trees continued to smoke and smolder for weeks. It was evident that even superficial fires can heavily damage cypress trees. Other lakes like Lower Lake Lafayette, where fire is totally suppressed, are filling with cypress and could benefit from even a minimal burn. However, Lake Miccosukee does not appear to have benefited from the recent controlled burnings.

Lake Miccosukee filled during the late summer of 2001 following tropical storms Allison and Barry, both of which dumped over 10 inches of rain on Leon County. Lake Miccosukee was one of our finest lakes before the drawdown, and it is quickly returning to that status. The lake is now full of juvenile fish, and has some of the finest duck hunting. It is one of our truly scenic lakes.

The Leon County Lakes ecology program has monitored Lake Miccosukee since 1999. Much of the data we have are from drought periods. While this lake has an obvious macrophytes problem, its TSI, averaged over the past three years is 56, just under the threshold of 60 that denotes impairment for tannic lakes, and is not considered impaired. Lake Miccosukee does have problems with low dissolved oxygen concentrations. This problem is probably due to the growth of aquatic plants that cover the lake and shade its waters, suppressing any photosynthetic activities within the water column.

Figure 5.2.6: Drought of 1999 photos: Top left: Fishing in Miccosukee Sink; Top Right: the central valley, all that remained of lake Miccosukee during the drought; Bottom Right: The lake and sinkhole at full stage; Bottom Left: The lake and sinkhole at draw down

Figure 5.2.7: Lake Drain Sink on the southern side of Lake Miccosukee (12/04)

Figure 5.2.8: Looking up Lake Miccosukee, note the thick growth of Maidencane which currently obscures the water, which is 4 feet deep, on the average. (August 2001, photo by Michael Hill, GFC).

Figure 5.2.9: Looking down Lake Miccosukee, note the thick growth of Maidencane which currently obscures the water, which is 4 feet deep, on the average. (August 2001, photo by Michael Hill, GFC).

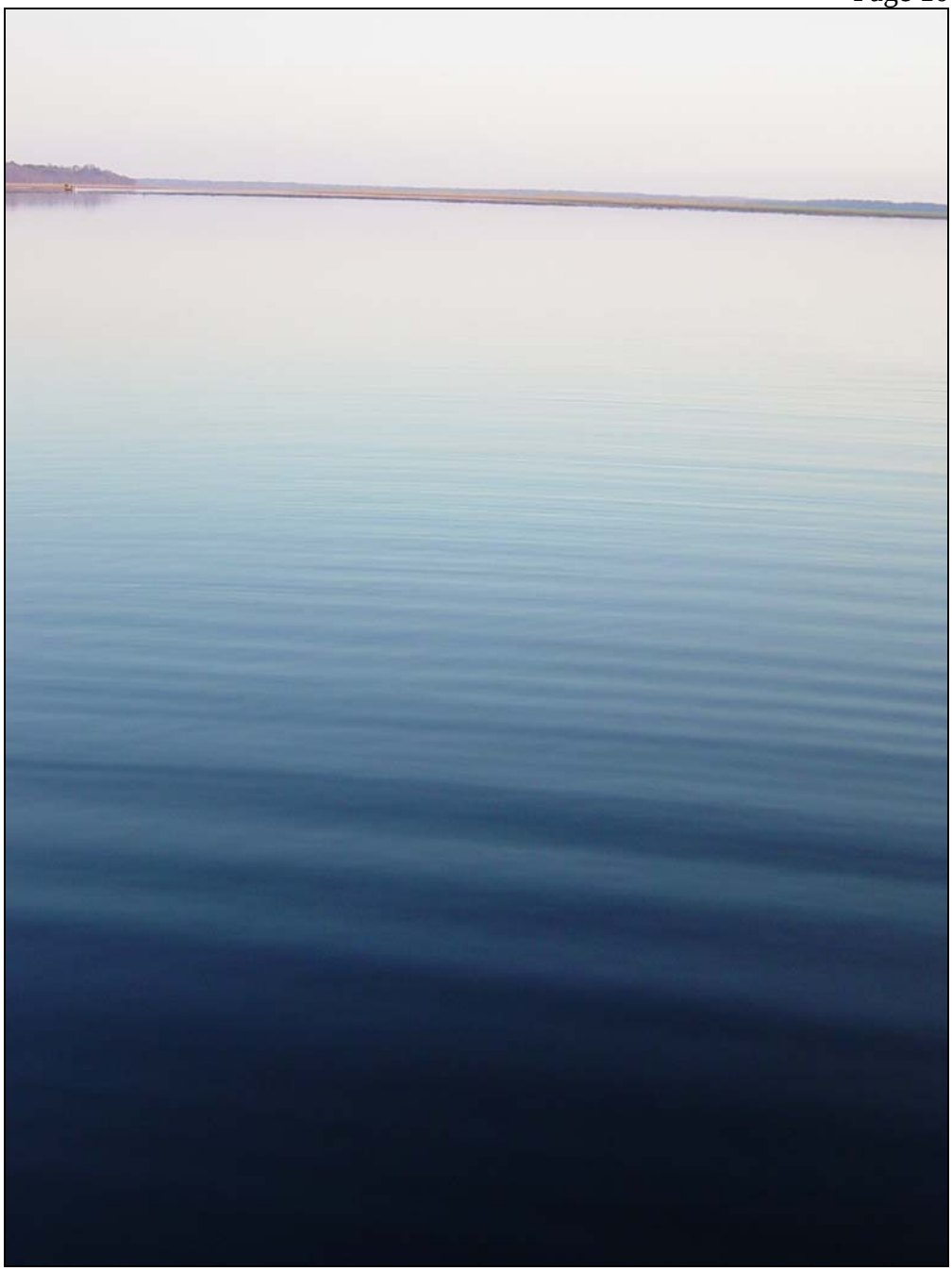

Figure 5.2.10: Large open water habitat in the northern end of Lake Miccosukee near Miccosukee Sink, February 2003. Such areas are important to support the diversity of wildlife in Lake Miccosukee.

Figure 5.2.11: Lake Miccosukee with Jesse VanDyke and his airboat. This picture was taken after the controlled burn in May 2001. Note the thick growth of Maidencane and the basal burning on the cyrpress trees. Cypress proved to be less fire resistant than previously thought. Spanish moss on their branches acted as a fire ladder carrying the flames to the crown of the trees (photo by Michael Hill, GFC).

Figure 5.2.12: A part of lake Miccosukee where sediment was removed during the drought by the Florida Game and Fresh Water Fish Commission. These techniques were utilized during the drought to try to improve the lake by creating open water habitats (August 2001, photo by Michael Hill, GFC).

Figure 5.2.13: The northern dam on the sinkhole at lake Miccosukee failed. The old control structure rusted through and was replaced. The GFC repaired it. Lake water levels are normal (photo by Michael Hill, July 2004)

Figure 5.2.14: While inspecting the dam at Lake Miccosukee looting of the archaeological site was discovered. Digging had been going on almost continuously for 3 months. 30 lbs or arrowheads, pipes and pottery were recovered by GFC (photo by Michael Hill, January 2004)

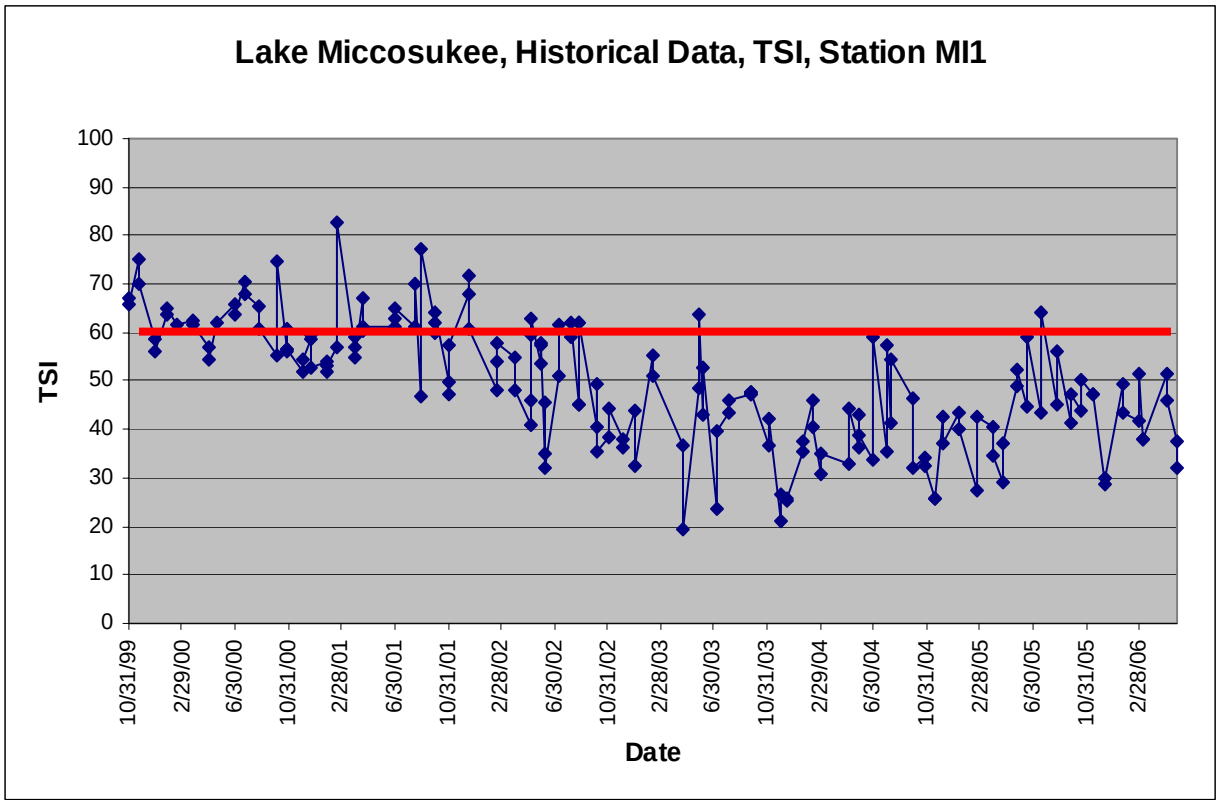

Figure 5.2.15: Lake Miccosukee,
Station MI1,
Tannic lake,
According to FDEP criteria this lake would be impaired at TSIs greater than 60 units,
Data duration:10/99-06/06,
Data source LCL Data (McGlynn Laboratories Inc).

*** Result: not impaired.**