

## Waterbody: Lake Miccosukee



## Basin: Lake Miccosukee

Lake Miccosukee is a 6,257-acre, phosphorus-limited lake that forms the northeastern border of Leon County. Lake Miccosukee is considered a shallow, prairie lake which historically drained via sinkholes becoming nearly dry in the process. The result of the natural drawdowns was a large reduction in the amount of organic matter content found in the bottom sediments.

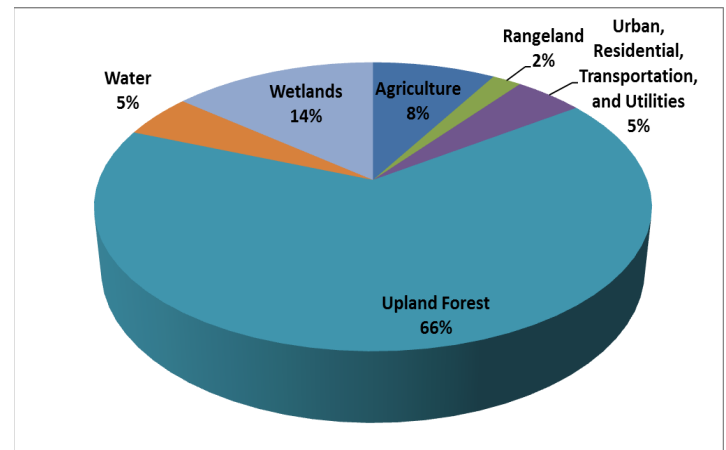
In 1954, a control structure was constructed around the northern sinkhole and a wooden weir constructed at the southern end of the lake to stabilize water levels. Water level stabilization led to increased emergent vegetation in the lake, so that vegetation covered as much as 80% of the lake's surface. By taking up space and decreasing oxygen levels, the increased vegetation also contributed to the diminishment of the fish population and increased the amount of organic material in the sediment.

Because of rising concerns about the health of the lake, the control structure gate was opened during the 1999 drought, allowing part of the lake to drain into the aquifer via the sinkhole. Several areas of the lake were excavated, and part of the lake bottom was burned during the drawdown. The burning and excavation led to increased lake volume and removed a portion of the organic rich sediment.

After tropical storms Allison and Barry passed through the area in 2001, Lake Miccosukee quickly refilled. A second drawdown was done in 2012. Prescribed burning was performed on a portion of the woody tussocks that float on the lake. The drawdown affected field operations with staff being unable to collect water samples for the 4<sup>th</sup> quarter of 2012.

In 2010, an additional sinkhole developed on the southeast side of the lake. While it's thought that this sinkhole won't completely drain the lake, it may keep the lake levels lower during dry periods.

As shown in the following pie chart, approximately 15% of land use in the 147,861-acre Lake Miccosukee basin is agriculture, rangeland, transportation, utilities, urban and residential. Increases in stormwater runoff and waterbody nutrient loads can often be attributed to these types of land uses.



### Background

Healthy, well-balanced lake communities may be maintained with some level of human activity, but excessive human disturbance may result in waterbody degradation. Human stressors may include increased inputs of nutrients, sediments, and/or other contaminants from watershed runoff, adverse hydrologic alterations, undesirable removal of habitat or riparian buffer vegetation, and introduction of exotic plants and animals. Water quality standards are designed to protect designated uses of the wa-

ters of the state (e.g., recreation, aquatic life, fish consumption), and exceedances of these standards are associated with interference of the designated use.

## Methods

Surface water and sediment sampling were conducted and met the collection and analysis requirements of the Florida Department of Environmental Protection (FDEP).

## Results

### Nutrients

The nutrient thresholds and results are found in Table 1. According to FDEP requirements, Numeric Nutrient Criteria (expressed as an annual geometric mean) cannot be exceeded more than once in a three-year period.

No exceedances were noted, but chlorophyll-*a* values and total nitrogen values were elevated in 2013, possibly as a result of nutrient fluxes associated with the most recent lake refilling. Values in 2014 were slightly lower, but chlorophyll-*a* and total phosphorus values increased in 2015. Sampling conditions prevented sampling during the 2<sup>nd</sup> quarter of 2016, but based on three samples, chlorophyll-*a* (13.0 µg/L) and total nitrogen (0.79 mg/L) levels were similar to what was seen in 2015. Total phosphorus levels (0.03 mg/L) had decreased to 2014 levels. Nutrient and chlorophyll-*a* levels in 2017 were similar to what was found in 2014 with lower or similar levels in 2018 and 2019. Changes in the area around the station may have contributed to changes in nutrient concentrations. Previously, the area in the vicinity of station MI2 was dominated by *Nymphaea odorata*, the fragrant water lily. Florida Fish and Wildlife (FWC) contractors enlarged an open water area adjacent to the station that has now encompassed the station area (Figure 1, photo two). More recently, floating tussock islands have formed, or floated into the sampling area (Figure 1, photo three). Because of the anthropogenic

disturbances to the vegetative community, fluctuating water chemistry results have continued to occur. Nutrient and chlorophyll-*a* results are generally appearing to improve.

**Table 1.** FDEP's chlorophyll-*a*, total nitrogen and phosphorus criteria for lakes applied to Lake Miccosukee.

Colored Lake	Chlorophyll- <i>a</i> 20.0 µg/L	Total Nitrogen Threshold 1.27-2.23 mg/L	Total Phosphorus Threshold 0.05-0.16 mg/L
2004	4.6	0.28	0.02
2005	6.1	0.40	0.03
2006	2.9	0.52	0.02
2007	2.3	0.69	0.02
2008	3.3	0.61	0.01
2009	3.5	0.42	0.02
2010	8.8	0.70	0.03
2011	5.8	0.82	0.04
2012	-	-	-
2013	11.7	1.05	0.04
2014	9.5	0.86	0.03
2015	11.6	0.78	0.06
2016	-	-	-
2017	10.5	0.83	0.03
2018	7.5	0.68	0.02
2019	7.7	0.63	0.03

### Dissolved Oxygen (DO)

As Figure 2 shows, the Lake Miccosukee stations showed percent DO saturation values that did not

meet Class III water quality criteria. Staff considers the low DO normal for this lake because the stations are shallow and normally covered with vegetation, preventing rapid water exchange with the larger area of the lake. Plant respiration (samples were often taken in the morning hours) and organic sediments also contributed to the low DO saturation values. Because station MI2 has become less vegetated, more water circulation is occurring along with less plant respiration, thus allowing DO saturation values to increase.

### **Fish Consumption Advisory**

The Florida Department of Health has issued consumption limits for certain fish in Lake Miccosukee due to elevated levels of mercury.

[Click here for more information about fish consumption advisories in Leon County.](#)

### *Other Parameters*

Other water quality parameters appear to be normal for the area and no other impairments were noted.

### **Conclusions**

Based on ongoing sampling, Lake Miccosukee met the nutrient thresholds for the East Panhandle Region. Changes in the plant community are influencing nutrient, chlorophyll-*a* and percent DO saturation values levels at station MI2. Other water quality parameters appear to be normal for the area and no other impairments were noted.

Thank you for your interest in maintaining the quality of Leon County's water resources. Please feel free to contact us if you have any questions.

### **Contact and resources for more information**

[www.LeonCountyFL.gov/WaterResources](http://www.LeonCountyFL.gov/WaterResources)

[Click here to access the results for all water quality stations sampled in 2019.](#)

[Click here for a map of the watershed – Sample Site MI2.](#)

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**Figure 1.** Station MI2. Note the open water surrounding the station in the second photo and the floating tussock islands in the third photo.

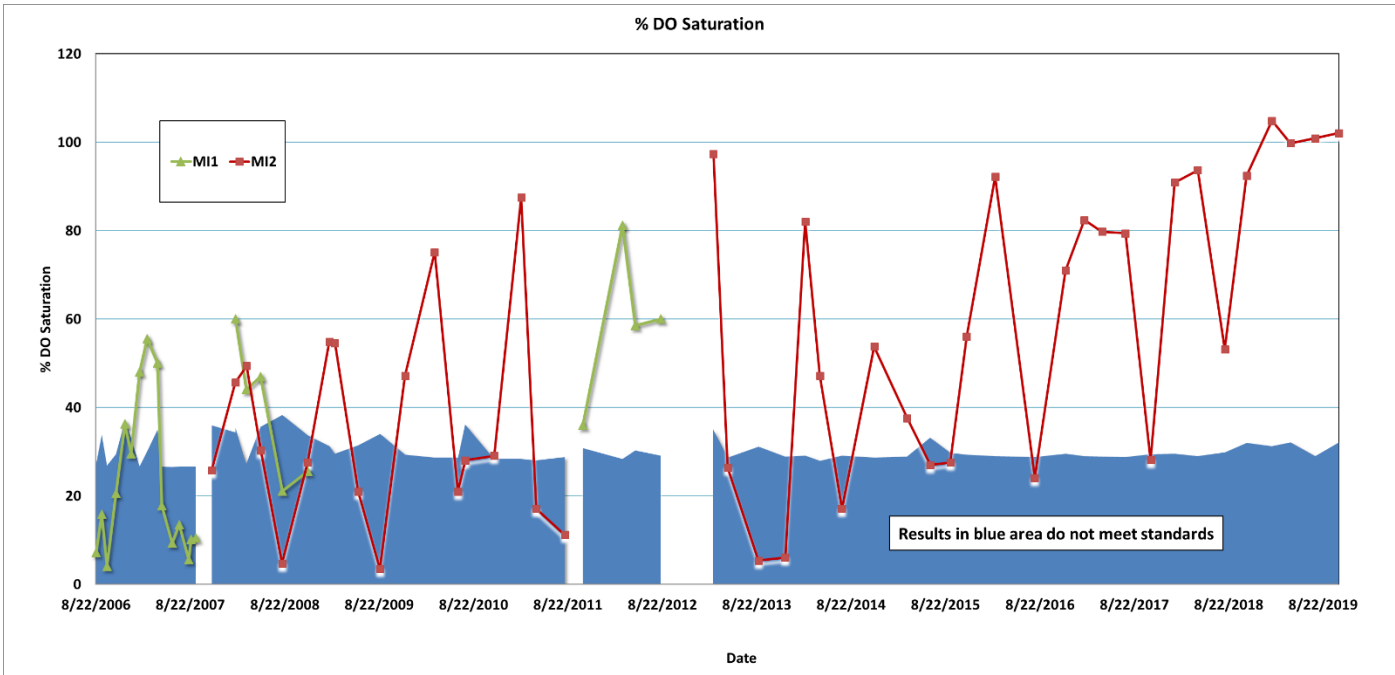


Figure 2. Dissolved Oxygen Percent Saturation results for Lake Miccosukee. Gaps in the data are due to low water, preventing sampling.