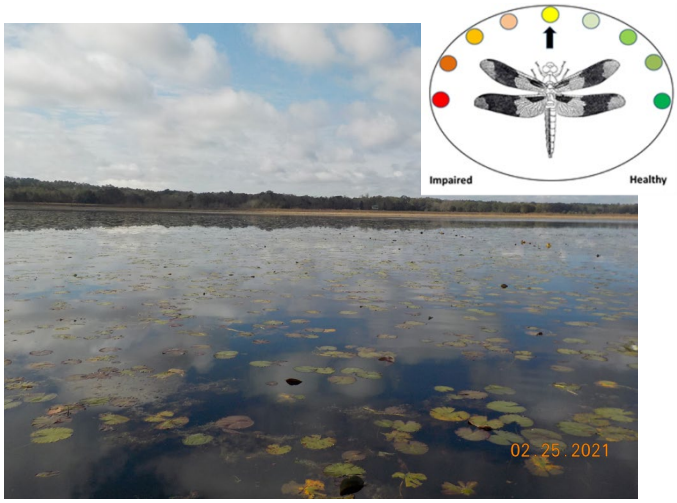
Waterbody: Lake Jackson

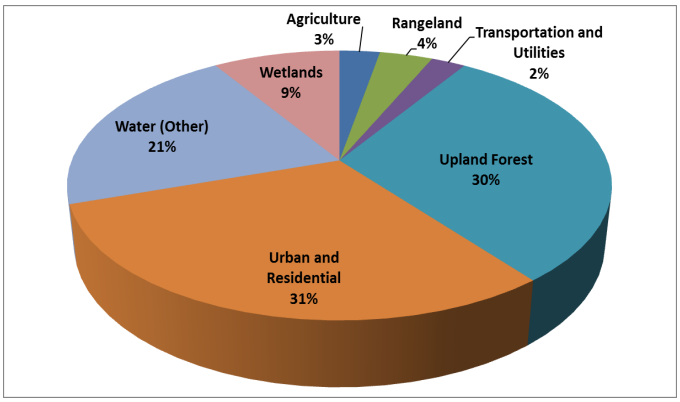


Basin: Lake Jackson

Lake Jackson is an approximately 4,254 acre, shallow, flat bottomed, prairie lake with two major sinkholes and is located north of the City of Tallahassee. Lake Jackson is a valuable biological, aesthetic, and recreational resource of Leon County and was designated (along with the neighboring Lake Carr and Mallard Pond) as an Aquatic Preserve in 1973 for the primary purpose of preserving and maintaining the biological resources in their natural condition.

The aforementioned sinkholes are the source of extreme water loss in the lake over the past several decades. Normally the sinkholes are plugged with sediments, but will collapse when groundwater levels drop, allowing the lake water to enter the aquifer, often dramatically lowering the water levels, most recently in 2021.

As shown in the following pie chart, approximately 40% of land use in the 27,096-acre Lake Jackson 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 waters 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 to determine the health of Lake Jackson and met the collection and analysis requirements of the Florida Department of Environmental Protection (FDEP).

Results

Nutrients

Low water levels caused by drought and sinkhole activity meant certain water quality stations could not be sampled during some months. The latest low water level event began in the latter half of 2020 with the lake completely draining through the Porter sinkhole in June 2021. Due to low water levels sampling did not occur for the last three quarters of 2021. Objective results of nutrient concentration continued to be skewed by water level fluctuations.

The effects of water level fluctuation continue to be documented.

The nutrient thresholds and results are found in Table 1. According to FDEP requirements, Numeric Nutrient Criteria (NNC) (expressed as an annual geometric mean) cannot be exceeded more than once in a three-year period. Chlorophyll-a, total phosphorus, and nitrogen levels were exceeded several times over the sampling period, with the latest occurring in 2020.

As mentioned in the previous year's report, while yearly total nitrogen and phosphorus levels were not substantially different when compared to each other, the 2019 geometric mean chlorophyll-a level is the highest recorded since Leon County sampling began. It is thought that due to the aggressive herbicide spraying on Lake Jackson and the dominance of the invasive exotic hydrilla on the southern side of the lake, native emergent and floating vascular plants are no longer present in the numbers needed to "shade out" phytoplankton, allowing phytoplankton numbers to increase and contributing to the elevated chlorophyll-a numbers. While the chlorophyll-a in 2020 exceeded the NNC, the result was substantially lower than the 2019 result. Leon County staff noted that in some areas, floating vegetation, specifically the native *Brasenia schreberi*, had repopulated the previous open water areas. This is thought to have "shaded out" phytoplankton, that in turn lowered chlorophyll-a levels.

Dissolved Oxygen

As Figure 1 shows, several Lake Jackson stations showed percent dissolved oxygen (DO) saturation values that did not meet Class III water quality criteria. This was not unexpected, since the Lake Jackson stations are shallow stations normally covered with vegetation, which prevents rapid water exchange with the larger area of the lake. Plant respiration (samples were often taken in the morning hours), in addition to organic rich sediments, also contributed to the low DO saturation values.

Fish Consumption Advisory

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

Click here for more information about fish consumption advisories.

Table 1. FDEP's chlorophyll-a, total nitrogen and phosphorus criteria for lakes applied to Lake Jackson. Results in bold signify exceedances of the State criteria. Due to low water, the Numeric Nutrient Criteria data requirements could not be calculated for years 2012-2013 and 2021.

Clear Lake, Low Alkalinity	Chlorophyll-a 6.0 µg/L	Total Nitrogen Threshold 0.51-0.93 mg/L	Total Phosphorus Threshold 0.01-0.03 mg/L
2004	2.2	0.33	0.01
2005	3.2	0.29	0.03
2006	3.0	0.63	0.03
2007	2.1	0.77	0.03
2008	5.7	0.60	**0.04**
2009	**8.4**	0.49	**0.02**
2010	3.2	0.58	0.02
2011	**6.9**	**0.61**	**0.02**
2012-2013	-	-	-
2014	2.6	0.69	0.02
2015	**9.2**	**0.54**	**0.03**
2016	**6.4**	0.47	**0.02**
2017	**6.5**	**0.56**	**0.02**
2018	6.0	0.50	0.02
2019	**11.4**	**0.54**	**0.03**
2020	**7.4**	**0.54**	**0.03**
2021	-	-	-

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 Jackson NNC for chlorophyll-a, total phosphorus, and nitrogen levels were exceeded several times over the sampling period. The exceedances in 2020 are thought to be at

least partially the result of plant management practices. Ongoing sampling showed percent dissolved oxygen (DO) saturation values did not always meet Class III water quality criteria. This was not unexpected, since the Lake Jackson stations are shallow stations normally covered with vegetation, preventing rapid water/atmospheric exchange. Plant respiration and organic-rich sediment also contributed to low DO saturation values. As of July 2022, lake levels continue to be very low, preventing water quality sampling.

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.LeonCountyWater.org

Click here to access the results for all water quality stations sampled in 2021.

Click here for a map of the watershed – Sample Sites J03, J05, J14 and J16.

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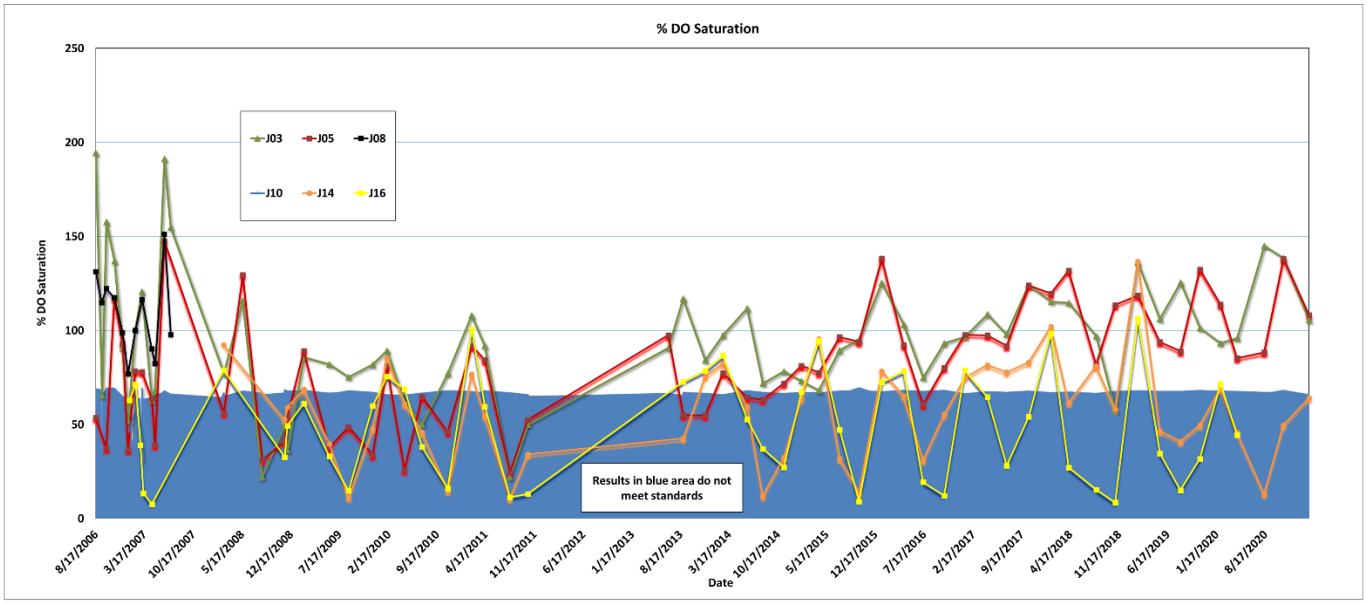

Figure 1. Dissolved Oxygen Percent Saturation results for Lake Jackson.