

LAKE ECOSUMMARY

Lake Hiawatha

The City of Tallahassee’s Lakes Monitoring group conduct chemical and biological sampling at Lake Hiawatha. Located just inside Capital Circle Southwest and between Lake Bradford and Lake Cascade, Lake Hiawatha is the middle lake in the Bradford Brook Chain of Lakes. Lake Hiawatha, has a surface area of approximately 40 acres, with a maximum depth at mean high water of nine feet and an estimated average depth of five feet. Lake Hiawatha receives inflow from Lake Cascade via a culvert beneath Capital Circle Southwest that originates from the Apalachicola National Forest. However, during times of drought, flows are occasionally reversed and Lake Hiawatha flows into Lake Cascade while Lake Bradford flows back into Lake Hiawatha. Residential dwellings are present along much of the northern shoreline of this lake. Maximum depth at mean high water is nine feet, and the estimated average depth is five feet. Due to their shared basin and rather unusual hydrology, the fate of these lakes is closely intertwined. The Lakes Monitoring Program has one monitoring station on this lake. Overall, the water quality and plant community data indicates that the lake meets expectations for a healthy, well-balanced lake.

Background

Although healthy, well balanced lake communities may be maintained even with some level of human disturbance, excessive human activities may result in lake degradation. Human stressors include increased inputs of nutrients, sediments and/or pesticides from watershed runoff, undesirable removal of native shoreline and/or upland buffer vegetation, and introduction of nuisance (generally exotic) plants and animals. DEP has methods to evaluate if human activities have resulted in conditions where a particular waterbody has exceeded water quality criteria (Chapter 62-302, Florida Administrative Code), including whether adverse impacts to biological communities have occurred. DEP water quality standards are designed to protect designated uses of the waters of the state (e.g., recreation, aquatic life support). Exceedances of these standards impede the designated use. Chlorophyll-*a* is a measure of algal biomass in the water column. In clear, low alkalinity lakes (lakes where color is ≤ 40 PCU and alkalinity is ≤ 20 mg/L CaCO₃), a healthy system is expected to have ≤ 6 μ g/L of chlorophyll-*a*. In colored (≥ 40 PCU) lakes or clear, high alkalinity (≥ 20 mg/L CaCO₃) lakes, healthy systems are expected to have ≤ 20 μ g/L of chlorophyll-*a*. Chlorophyll-*a* values greater than those referenced may result in unwanted shading of aquatic plants and/or greater

potential for harmful algal blooms. The Lake Vegetation Index (LVI) assesses how closely the plant community of a lake resembles a native undisturbed community. These tools are often used in conjunction with one another because it is possible to detect imbalance in the plant community while the algal community appears healthy (and vice versa).

Below is the chart for the FL Department of Environmental Protection’s Numeric Nutrient Criteria for the state’s lakes.

Long Term Geometric Mean Lake Color and Alkalinity	Annual Geometric Mean Chlorophyll <i>a</i>	Minimum calculated numeric interpretation		Maximum calculated numeric interpretation	
		Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen	Annual Geometric Mean Total Phosphorus	Annual Geometric Mean Total Nitrogen
		> 40 Platinum Cobalt Units	20 μ g/L	0.05 mg/L	1.27 mg/L
≤ 40 Platinum Cobalt Units and > 20 mg/L CaCO ₃	20 μ g/L	0.03 mg/L	1.05 mg/L	0.09 mg/L	1.91 mg/L
≤ 40 Platinum Cobalt Units and ≤ 20 mg/L CaCO ₃	6 μ g/L	0.01 mg/L	0.51 mg/L	0.03 mg/L	0.93 mg/L

Methods

This pond is sampled on a quarterly basis each year. Surface water samples are collected for analysis [e.g. nutrients, chlorophyll *a*, color, etc.] following [DEP Standard Operating Procedures \(SOPs\) and quality assurance/quality control \(QA/QC\) standards](#).

For the LVI, species lists were developed for four of twelve sections of the lake (**Figure 1**), and the following information was derived from those lists: percent native species, percent invasive exotic species, percent sensitive species, and the coefficient of conservatism (C of C; a measure of how tolerant a species is to disturbance) of the dominant species. According to DEP SOP LT 7000, the LVI score ranges and categories are: (78-100) Exceptional; (43-77) Healthy; and (0-42) Impaired. DEP’s revised impairment threshold score of 43 and higher fully meet the expectation of a healthy, well balanced community, and scores below 42 are considered impaired. The LVI was sampled per DEP SOP FS7310 and calculated per DEP SOP LT7000.



Figure 1. Lake Hiawatha during the Fall

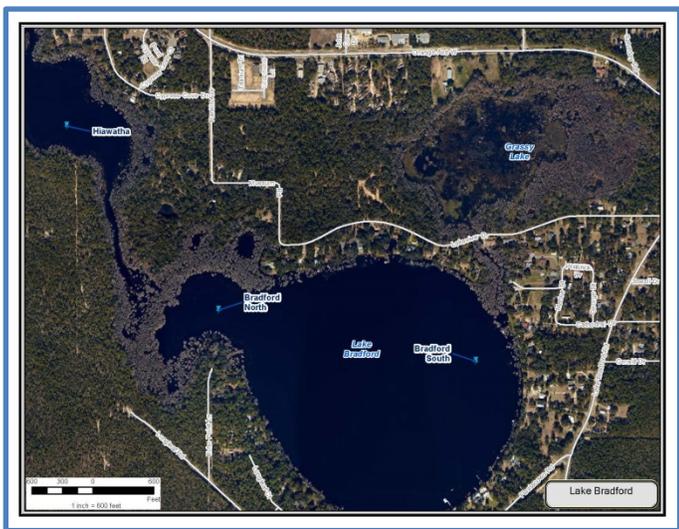


Figure 2. The lake map of Lake Hiawatha. The sampling site is located at the upper corner of the map. Water quality samples are collected from this site along with water parameters such as Dissolved Oxygen, Conductivity, pH level, Temperature, Secchi Disk reading and depth.

Results

Water Quality

Lake Hiawatha is oligotrophic and exhibits nutrient levels well below (**Table 1**) the established standards for high colored (>40 PCU) lakes, which are chlorophyll-a <20 ug/L, total nitrogen < 1.27 mg/L and total phosphorus < 0.05 mg/L. Due to the high color values, submerged vegetation cannot sustain itself as sunlight does not penetrate the water column to allow vegetative growth.

Like many other lakes in our area, Lake Hiawatha's water level fluctuates significantly based on rainfall, which on occasion will prevent monitoring staff from collecting samples representative of lake conditions. This was the case during late

summer of 2020 and samples were unable to be collected. Hence, only 3 quarters of data are calculated for Year 2020. Of note, TN (Total Nitrogen) and color values increased significantly in 2020, due primarily to an increase in the organic, total Kjeldhal nitrogen (TKN) concentration and tannins within the lake's water column. This is likely a result of low waters resulting in an increase in the desiccation of vegetation.

Table 1. Water quality results from Lake Hiawatha.

Yearly Geomeans of FLDEP Nutrient Criterion Parameters Lake Hiawatha					
Year	Chlorophyll *	Color	Alkalinity	TN *	TP*
2011	3	110	2	0.14	0.02
2012	Low water levels prevented sampling				
2013	7	234	3	0.24	0.020
2014	5	224	2	0.72	0.020
2015	2	214	2	0.67	0.010
2016	5	162	2	0.75	0.020
2017	10	85	2	0.62	0.020
2018	9	141	2	0.62	0.020
2019	6	138	2	0.64	0.020
2020*	5	157	2	1.02	0.010

* Year 2020 had 3 sampling quarters. Low water levels prevented 1 quarter where accessibility was not feasible.

*DEP's Numeric Nutrient Criteria (Data based on annual geometric means calculated on minimum of 4 samples.

Lake Vegetation Index

The 2020 Lake Vegetation Survey was not performed due to low water levels and Covid protocols, which inhibited coordinated efforts to complete the survey. An LVI is scheduled to be performed in 2021 as water levels have improved for mobility and access.

The 2019 LVI score for this lake was 95 out of a possible 100 points, corresponding with an "Exceptional" designation. Although the plant taxa are somewhat limited and not very diverse, the vegetation is of "good quality", indicative of a healthy lake. On the page below, Table 2 contains the species list and occurrence information for this sampling event. No invasive exotic plants were documented within the LVI survey.

Table 2. Species list for the 2019 LVI at Lake Hiawatha. An asterisk (*) indicates an invasive exotic plant species. P = present, D = dominant, C = codominant.

Lake Hiawatha Year 2019	LVI Score: 95 "Exceptional"	Sections			
Scientific Name	Common Name	1	4	7	10
<i>Acer rubrum</i>	RED MAPLE	P	P		P
<i>Cephalanthus occidentalis</i>	COMMON BUTTONBUSH	P	P	P	P
<i>Cyrilla racemiflora</i>	TITI	P	P	P	P
<i>Liquidambar styraciflua</i>	SWEETGUM		P		
<i>Magnolia virginiana</i>	SWEETBAY	P	P	P	P
<i>Mayaca fluviatilis</i>	STREAM BOGMOSS	P			
<i>Nyssa sylvatica biflora</i>	SWAMP TUPELO	P	P	P	P
<i>Panicum hemitomon</i>	MAIDENCANE	P	P	P	P
<i>Sacciolepis striata</i>	AMERICAN CUPSCALE	C	C	C	C
<i>Paspalum repens</i>	WATER PASPALUM		P	P	P
<i>Taxodium c.f. ascendens</i>	BALD CYPRESS (Pond)	C	D	C	C

The 2 photos below show the low water levels during the Summer of 2020, which precluded both water quality and biological sampling efforts.



Hiawatha boat launch with sandy conditions.



Thank you for your interest in maintaining the water quality of City of Tallahassee area lakes. Visit the web-links below for more information on Florida natural water resources.

Best Management Practices for Protection for Water Resources

https://ffl.ifas.ufl.edu/media/fflifasufledu/docs/GIBMP_Manual_Web_English.pdf

DEP biological assessment resources:

<https://floridadep.gov/dear/bioassessment/content/bioassessment-training-evaluation-and-quality-assurance#LVI>

FWCC Aquatic Plant Management:

<http://myfwc.com/wildlifehabitats/habitat/invasive-plants/aquatic-plant/>

Freshwater Algal Bloom information:

<https://floridadep.gov/AlgalBloom>