

# LAKE ECOSUMMARY

## Campbell Pond

The City of Tallahassee’s Lakes Monitoring group conduct chemical and biological sampling at Campbell Pond. Located just inside Capital Circle southeast, Campbell Pond is a relatively small, isolated waterbody that is rich with plant diversity and exhibits excellent water quality. Campbell Pond is situated largely within the Campbell Pond Park and is located south of the Cody Escarpment in the Woodville Karst Plain Physiographic Province. Soils in this physiographic province are characterized as loose quartz sands that thinly veneer limestone substrata. Dissolution of the underlying limestone has resulted in sinkhole sand dune topography. Campbell Pond may have originated from the dissolving of this relatively soluble limestone over a period of hundreds of years and appears as a shallow, vegetated sand-filled depression. The small pond has approximately 2 acres of open water and approximately 30-35 acres of total surface area. It receives inflow from over 1,000 acres of mostly urban watershed. The maximum depth at mean high water is approximately 12 feet, with an estimated average depth of five feet. The Lakes Monitoring Program has one monitoring station on this lake. However, during recent years, encroaching vegetation has prevented access to the open water sampling location and inhibited the ability to complete biological sampling. Overall, data indicate 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  $\leq 40$  PCU and alkalinity is  $\leq 20$  mg/L CaCO<sub>3</sub>), a healthy system is expected to have  $\leq 6$   $\mu$ g/L of chlorophyll-*a*. In colored ( $\geq 40$

PCU) lakes or clear, high alkalinity ( $\geq 20$  mg/L CaCO<sub>3</sub>) lakes, healthy systems are expected to have  $\leq 20$   $\mu$ 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 $\mu$ g/L	0.05 mg/L	1.27 mg/L
$\leq 40$ Platinum Cobalt Units and > 20 mg/L CaCO <sub>3</sub>	20 $\mu$ g/L	0.03 mg/L	1.05 mg/L	0.09 mg/L	1.91 mg/L
$\leq 40$ Platinum Cobalt Units and $\leq 20$ mg/L CaCO <sub>3</sub>	6 $\mu$ 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.** Abundant Lily Pads on Campbell Pond



**Figure 2. Lake map of Campbell Pond.** Sampling site located in center of pond. 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*

Since 2015, Campbell Pond has been sampled once, year 2019, and within that year, two quarters of data were collected. Lack of accessible entry due to vegetative overgrowth and very low water levels, has made sample collection very difficult. Due to the number of samples collected at this site, determining annual nutrient concentration trends are not feasible due to the statistically small sample size. Year 2019 data, with just 2 quarters sampled, is documented in **Table 1**.

The water quality samples generally meet water quality standards (**Table 1**). Campbell Pond nutrient concentrations typically have been well below its nutrient criteria category for

a high color (>40 PCU) waterbody. This high colored, fairly acidic pond meets the chlorophyll-*a* concentration standard of  $\leq 20 \mu\text{g/L}$ , the total nitrogen concentration standard of  $\leq 1.27 \text{ mg/L}$  and the total phosphorus concentration standard of  $\leq 0.05 \text{ mg/L}$ . Campbell Pond considered mesotrophic since the nutrient levels meet the applicable regulatory criteria. Mesotrophic lakes contain moderate amounts of nutrients and have a healthy, diverse population of aquatic flora and fauna. Additionally, Campbell pond water is clear, with Secchi readings of greater than 8 feet deep. **Table 1** shows the nutrient data, as applicable, for the past 10 years of sample collection.

Yearly Geomeans of FLDEP Nutrient Criterion Parameters Campbell Pond					
Year	Chlorophyll *	Color	Alkalinity	TN *	TP*
2011	3	43	6	0.59	0.010
2012	4	65	10	0.66	0.020
2013	5	62	8	0.41	0.020
2014	7	53	6	0.74	0.010
2015	3	52	4	0.57	0.010
2016	No water samples were collected during these 3 years due to low water levels and heavily vegetated surface prevented access. New equipment will ease current limitations.				
2017					
2018					
2019	3	11	3	0.37	0.015
2020	No data collected, due to drought conditions				

\*DEP’s Numeric Nutrient Criteria (Data based on annual geometric means calculated on minimum of 4 samples, note 2019 was only sampled twice)

*Lake Vegetation Index*

*The 2020 Lake Vegetation Survey was not performed due to low water levels and extreme aquatic macrophyte overgrowth. This has been the case since 2013 to 2020. (The 2012 LVI data is kept here in this summary to show typical aquatic macrophytes within Campbell Pond.)*

The 2012 LVI score for this lake was 80 out of a possible 100 points, corresponding with an "Exceptional" designation. **Table 2**, contains the species list and occurrence information for the survey. One invasive exotic plant (Chinese Tallow) was documented within the LVI survey and that was on the City Park bank. The plants observed are diverse, high scoring and indicative of good water quality. Campbell Pond has become “choked” with vegetation and, attempts to perform plant surveys during recent years have been unsuccessful. There is no “open water” area greater than 2 acres, which is required to perform a plant surveys as instructed by the FLDEP LVI protocols. Despite the vegetative overgrowth, the pond

continues to appear healthy with good water quality, and providing great habitat for wildlife.

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.



DEP publications on Best Management Practices and Environmental Stewardship and Education:

[https://ffl.ifas.ufl.edu/media/fflifasufledu/docs/GIBMP\\_Manual\\_Web\\_English.pdf](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>

**Table 2. Species list for the [year] LVI at Campbell Pond. An asterisk (\*) indicates an invasive exotic plant species. P = present, D = dominant, C = codominant.**

Campbell Pond Year 2012	Scientific Name	Common Name	Sections			
			1	4	7	10
	<i>Andropogon virginicus</i>	BROOMSEDGE BLUESTEM	P	P	P	P
	<i>Bacopa caroliniana</i>	LEMON BACOPA; BLUE WATERHYSSOP		P		
	<i>Cabomba caroliniana</i>	CAROLINA FANWORT	C	C	C	C
	<i>Cephalanthus occidentalis</i>	COMMON BUTTONBUSH				P
	<i>Cyrilla racemiflora</i>	TITI	P			P
	<i>Diodia virginiana</i>	VIRGINIA BUTTONWEED	P			P
	<i>Eleocharis baldwinii</i>	BALDWIN'S SPIKERUSH				P
	<i>Eupatorium capillifolium</i>	DOGFENNEL		P	P	
	<i>Eupatorium capillifolium</i>	Eupatorium capillifolium	P	P	P	P
	<i>Hypericum fasciculatum</i>	PEELBARK ST. JOHN'S-WORT	P			P
	<i>Juncus effusus</i>	SOFT RUSH				P
	<i>Ludwigia alata</i>	WINGED PRIMROSEWILLOW		P		
	<i>Ludwigia arcuata</i>	PIEDMONT PRIMROSEWILLOW		P	P	P
	<i>Ludwigia leptocarpa</i>	ANGLESTEM PRIMROSEWILLOW		P	P	P
	<i>Ludwigia repens</i>	CREEPING PRIMROSEWILLOW		P		
	<i>Magnolia virginiana</i>	SWEETBAY				P
	<i>Myrica cerifera</i>	SOUTHERN BAYBERRY; WAX MYRTLE	P			
	<i>Nuphar</i>	SPATTERDOCK; YELLOW POND LILY				P
	<i>Nymphaea odorata</i>	AMERICAN WHITE WATERLILY	C	C	C	C
	<i>Nymphoides aquatica</i>	BIG FLOATINGHEART	P	P	P	P
	<i>Panicum dichotomiflorum</i>	FALL PANICGRASS		P		
	<i>Panicum verrucosum</i>	WARTY PANICGRASS		P	P	
	<i>Polygonum hirsutum</i>	HAIRY SMARTWEED	P	P	P	P
	<i>Polygonum hydropiperoides</i>	MILD WATERPEPPER; SWAMP SMARTWEED	P			P
	<i>Pontederia cordata</i>	PICKERELWEED		P	P	
	<i>Rhynchospora inundata</i>	NARROWFRUIT HORNED BEAKSEDGE	P	P	P	P
	<i>Sacciolepis striata</i>	AMERICAN CUPSCALE	P	P	P	P
	<i>Sapium sebiferum</i>	CHINESE TALLOW				P
	<i>Utricularia floridana</i>	FLORIDA BLADDERWORT	P	P	P	
	<i>Xyris ambigua</i>	COASTALPLAIN YELLOWEYED GRASS	P	P	P	P