LAKE ECOSUMMARY

Blue Cypress Lake, August 8, 2012

DEP conducted water quality and biological sampling at Blue Cypress Lake in Indian River County on August 8, 2012 to assess attainment of designated uses. Because compliance with lake numeric nutrient criteria involves annual geometric means, and is not based on single samples, no definitive conclusions regarding compliance can be made at this time; however, two of three nutrient parameters (TN and chlorophyll) met the annual targets. Plant community data indicated that the lake met expectations for a healthy, well-balanced lake.

Background

Although healthy, well-balanced lake communities may be maintained with some level of human disturbance, 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 the condition 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), and exceedances of these standards are associated with interference with 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 $CaCO_2$), a healthy system is expected to have ≤6 µg/L of chlorophyll *a*. In colored (≥40 PCU) lakes or clear, high alkalinity (≥ 20 mg/L $CaCO_2$) lakes, healthy systems are expected to have ≤20 µg/L of chlorophyll *a*. Chlorophyll *a* values greater than those shown above 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).

Methods

Blue Cypress Lake was sampled on August 8, 2012, by the DEP Central District Office. Surface water samples were collected for analysis of nutrients, chlorophyll *a,* and color following DEP Standard Operating Procedures (SOPs; see http://www.dep.state.fl.us/water/sas/qa/sops.htm). Sampling and analyses met DEP quality assurance/quality control standards (see http://www.dep.state.fl.us/water /sas/qa/index.htm). For the LVI, species lists were developed for four of twelve sections of the lake (Figure 2), 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; (38-77) Healthy; and (0-37) Impaired. DEP's revised F.A.C. Chapter 62.302.800 requires at least two temporally independent LVIs with an average score of 43 or above in order to meet the expectation of a healthy, well balanced community. The LVI was sampled per DEP SOP FS7310 and calculated per DEP SOP LT7000.

Site Information

Blue Cypress Lake is approximately 6627 surface acres located in Indian River County and is part of the Upper St. Johns Basin (Figure 1). Surface water enters Blue Cypress Lake through Blue Cypress Creek located on the west side of the Lake and from Padgett Branch on the south side of the lake. Surface water also enters the lake from wetlands on the south and east side of the lake. Surface water exits the lake through a canal

located on the northeast corner as it travels to Farm 13, or Stick Marsh. Blue Cypress Lake's watershed is predominantly natural consisting of mostly wetlands with improved cattle fields present to the west beyond an extensive wetland buffer. A small "fish camp" community is located along a canal on the west shore of the lake representing the only residential area with potential impact to the lake.

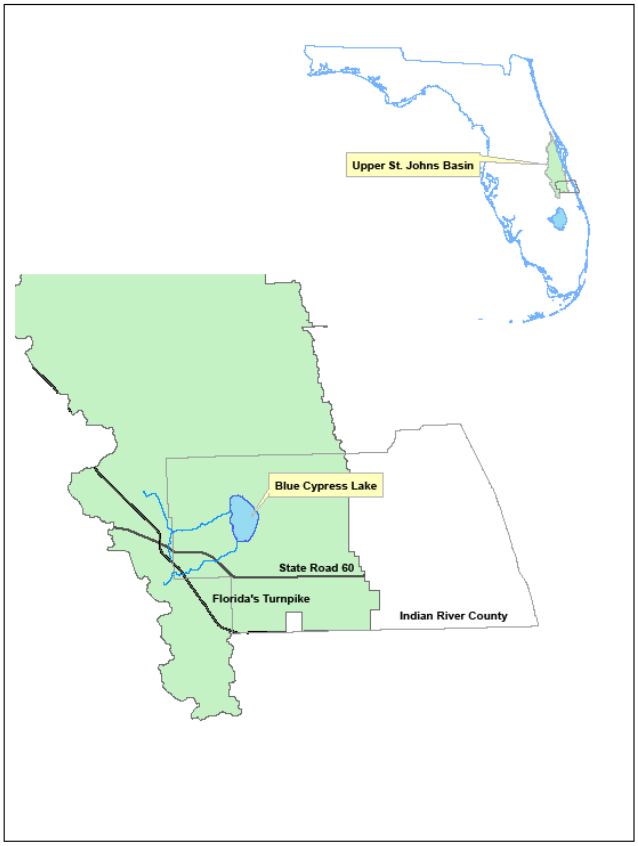


Figure 1. Location Map of Blue Cypress Lake

Results

Water Quality

The concentration of total phosphorus (0.18 mg/L) exceeded newly adopted water quality criteria. Total nitrogen (1.2 mg/L), dissolved oxygen (6.85), chlorophyll *a* (6.1 µg/L) and other parameters in the sample collected August 8, 2012, met adopted state water quality criteria (Table 1). Note that compliance with lake numeric nutrient criteria involves an annual geometric mean, and is not based on single samples.

Lake Vegetation Index

The LVI score for Blue Cypress Lake was 56 out of a possible 100 points on the August 8, 2012, sample event corresponding with a "Healthy" designation. Table 2 contains the species list and occurrence information for this sample event. A total of 7 invasive exotic plants were observed in the lake during the August 8, 2012, sample event in sections 10, 1, 4 and 7, but they were not considered dominant.

Table 1. Water quality results August 8, 2012 for Lake Blue Cypress

Analyte	Results 8/8/2012	Applicable Class III Water Quality Criteria
Field Temperature (°C)	29.7	
Secchi Depth (m)	0.6	
Field pH (SU)	7.5	
Field Dissolved Oxygen (mg/L)	6.85	≥ 5
Field Specific Conductance (µmhos/cm)	226	
Alkalinity (mg $CaCO_3$/L)	37	
Color (PCU)	190	
Chlorophyll a (µg/L)	6.1	≤20*
Total Phosphorus (mg/L)	0.18	≤0.16*
Turbidity (NTU)	5.8	
Ammonia (mg/L)	0.034	
Nitrate+Nitrite (mg/L)	0.035	
Total Kjeldahl Nitrogen (mg/L)	1.2	
Total Nitrogen (mg/L)	1.2	≤2.23*

*newly adopted 62-302 thresholds for Annual Geometric Mean Total

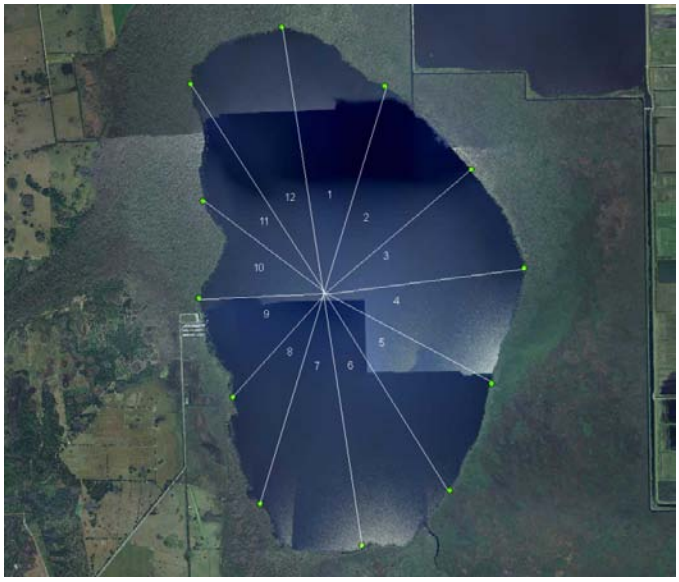


Figure 2. Sampling map of Blue Cypress Lake. Sections 10,1,4,7 were sampled for the Lake Vegetation Index on August 8, 2012. The water quality sample was collected from the lake center.

Phytoplankton

The algal community in the water column consisted of 64% diatoms, 16% cryptomonads, 12% cyanobacteria (blue-green algae), 7% green algae, and <1% euglenoids. Dominance in algal groups varies naturally throughout the year, but prolonged dominance of cyanobacteria may be associated with a higher risk for harmful algal blooms. During the August 8, 2012, sample event, the Blue Cypress Lake algal community had little potential for a harmful algal bloom.

Table 2. Species list for the August 8, 2012, LVI at Blue Cypress Lake. An asterisk (*) indicates an invasive exotic plant species. P = present, D = dominant, C = codominant.

Species	Common Name	Sections:	10	1	4	7
Acer rubrum	RED MAPLE		P	P		
Acrostichum danaeifolium	GIANT LEATHER FERN			P		
Alternanthera philoxeroides*	ALLIGATOR WEED		P	P	P	
Amaranthus	PIG WEED			P		
Annona glabra	POND APPLE		P	P	P	P
Apios americana	GROUNDNUT		P			
Aster carolinianus	CLIMBING ASTER		P	P		
Blechnum serrulatum	SWAMP FERN		P			
Boehmeria cylindrica	FALSE NETTLE; BOG HEMP		P			
Carya aquatica	WATER HICKORY		P	P		P
Colocasia esculenta*	TARO; WILD TARO		P	P	P	
Eichhornia crassipes*	WATER HYACINTH		P	P	P	P
Eupatorium capillifolium	DOGFENNEL		P			
Ficus aurea	STRANGLER FIG; GOLDEN FIG		P	P	P	
Hydrocotyle	MARSHPENNYWORT		P	P	P	P
Ipomoea aquatica	WATER SPINACH			P		
Kosteletzkya	VIRGINIA SALTMARSH MALLOW			P		
Landoltia punctata*	DOTTED DUCKWEED			P		
Lemna	DUCK WEED		P	P		P
Ludwigia leptocarpa	ANGLESTEM PRIMROSEWILLOW		P	P	P	P
Ludwigia octovalvis	MEXICAN PRIMROSEWILLOW		P			
Ludwigia peruviana*	PERUVIAN PRIMROSEWILLOW		P			
Mikania scandens	CLIMBING HEMPVINE		P			
Myrica cerifera	SOUTHERN BAYBERRY; WAX MYRTLE			P		P
Nuphar	COW LILY		P	P	P	P
Panicum hemitomon	MAIDENCANE		C	P	C	C
Paspalidium geminatum	KISSIMMEEGRASS		P	P	C	C
Phragmites australis	COMMON REED		P			P
Pistia stratiotes*	WATER-LETTUCE		P	P	P	P
Polygonum densiflorum	DENSEFLOWER KNOTWEED		P	P		
Sabal palmetto	CABBAGE PALM			P		
Sacciolepis striata	AMERICAN CUPSCALE		P	P	P	P
Salix caroliniana	CAROLINA WILLOW			P	P	P
Salvinia minima	WATER SPANGLES		P	P		P
Schinus terebinthifolius*	BRAZILIAN PEPPER			P	P	P
Schoenoplectus californicus	GIANT BULRUSH		P		P	P
Scirpus cubensis	CUBAN BULRUSH			P		
Taxodium	CYPRESS		C	C	P	P
Thalia geniculata	ALLIGATORFLAG; FIREFLAG		P	P	P	P
Toxicodendron radicans	POISON IVY		P			
Typha	CAT TAIL		P	P	P	P
Vitis	GRAPE VINE		P	P		
Zizania aquatica	WILDRICE			P	P	

Summary

Blue Cypress Lake's water quality data met some, but not all water quality standards. Total phosphorus (0.18 mg/L) measured during this sampling event exceeded 0.16 mg/L, which is the applicable numeric interpretation of the numeric nutrient criteria, expressed as an annual geometric mean value not to be exceeded more than once in a three year period (Paragraph 62-302.530 (47) (b), F.A.C.). Additional sampling would be needed to assess compliance with the annual geometric mean. Total nitrogen (1.2 mg/L) and chlorophyll *a* (6.1 µg/L) values during this sampling met applicable Class III Water Quality Standard;

however, additional sampling would also be needed to assess compliance with the annual geometric mean.

Blue Cypress Lake's LVI score of 56 corresponded with a "Healthy" designation. On October 1, 2008, FDEP staff Sampled Blue Cypress Lake and a LVI score of 59 was calculated, suggesting a stable, healthy plant community.

Blue Cypress Lake would continue to benefit from a management plan designed to control submersed and emergent exotic vegetation.

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

Contact and resources for more information

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Management Practices and Environmental Stewardship and Education:
http://www.dep.state.fl.us/water/nonpoint/pubs.htm

DEP biological assessment resources:
http://www.dep.state.fl.us/water/bioassess/index.htm

FWCC Aquatic Plant Management:
http://myfwc.com/wildlifehabitats/habitat/invasive-plants/aquatic-plant/

Freshwater Algal Bloom information:
http://www.dep.state.fl.us/labs/biology/hab/index.htm