LAKE ECOSUMMARY

Lake Louisa, October 26, 2011

DEP conducted water quality and biological sampling at Lake Louisa in Lake County on October 26, 2011 to assess attainment of designated uses. Overall, the water quality, plant community, and phytoplankton 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

Lake Louisa was sampled on October 26, 2011, by the DEP Central District Office. Surface water samples were collected for analysis of nutrients, chlorophyll *a,* color, and algal community composition 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 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; (38-77) Healthy; and (0-37) Impaired. DEP's new draft F.A.C. Chapter 62.302 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

Lake Louisa is located in central Florida about seven miles south of Clermont. It is approximately 3,573 surface acres according to Lake County Wateratlas. Surface water enters Lake Louisa from Big and Little Creek on the south side of the lake and exits north through the Palatlakaha River. A large portion of Lake

Louisa's watershed is located within Lake Louisa State Park. The remainder of the watershed is primarily low density residential with some agricultural use.

Results

Water Quality

The concentrations of Total Nitrogen (1.2 mg/L), Total Phosphorus (0.026 mg/L) and Chlorophyll *a* (5.7 µg/L) in the sample collected October 26, 2011, met proposed 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).

Phytoplankton

Chlorophyll *a* results did not indicate problematic levels of algal biomass in Lake Louisa. The algal community in the water column on October 26, 2011 consisted of 18.87% cyanobacteria (blue-green algae), 26.16% green algae, 44.7% diatoms, and 5.96% cryptomonads. 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.

Lake Vegetation Index

The LVI score for Lake Louisa was 71 out of a possible 100 points on October 26, 2011, corresponding with a Category II "Healthy" designation. Table 2 contains the species list and occurrence information for this sample event. A total of four invasive exotic species were observed in the lake during the October 26, 2011 sample event in sections 2, 5, 8, and 11.

Table 1. Water quality results for samples collected October 26, 2011, from Lake Louisa

Analyte	Results	Comments	Applicable Class III Water Quality Criteria
Field Temperature (°C)	22.3		
Secchi Depth (m)	0.7		
Field pH (SU)	5.5		+/- 1 SU of background
Field Dissolved Oxygen (mg/L)	8.45		≥ 5
Field Specific Conductance (µmhos/cm)	141		
Alkalinity (mg $CaCO_3$/L)	2.1	I	
Color (PCU)	180		
Chlorophyll a (µg/L)	5.7		20*
Total Phosphorus (mg/L)	0.026		≤0.16*
Nitrate+Nitrite (mg/L)	0.004	I	
Ammonia (mg/L)	0.010	U	
Total Kjeldahl Nitrogen (mg/L)	1.2		
Total Nitrogen (mg/L)	1.2		≤2.23*

*proposed 62-302 thresholds for Annual Geometric Mean Total

U - Material was analyzed for but not detected. The reported value is the method detection limit for the sample analyzed.

I – The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.

Figure 1. Sampling map of Lake Louisa. Sections 2,5,8,11 were sampled for the Lake Vegetation Index on October 26, 2011. The water quality sample was collected from the lake center.

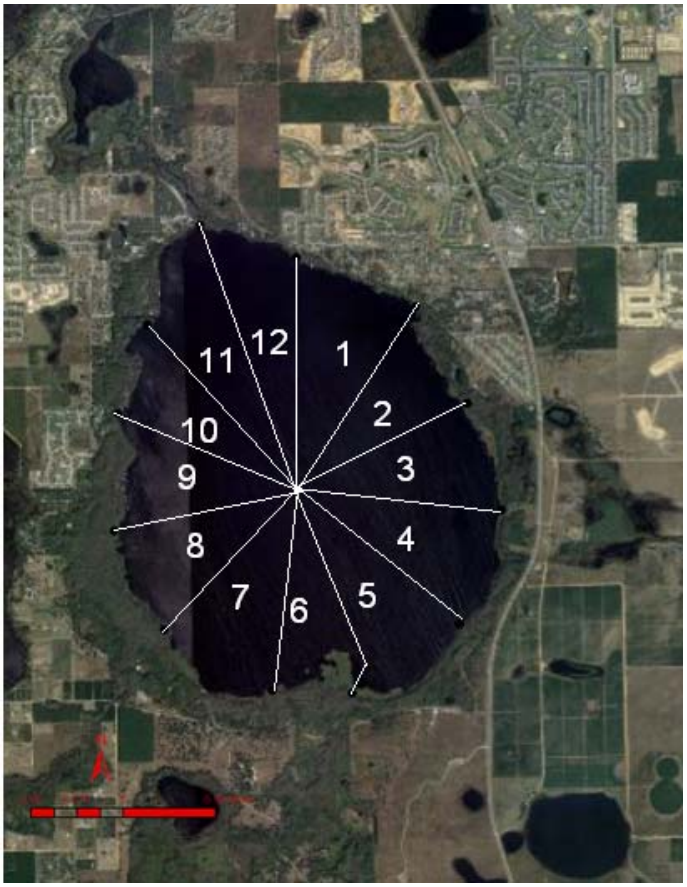


Table 2. Species list for the October 26, 2011, LVI at Lake Louisa. An asterisk (*) indicates an invasive exotic plant species. P = present, D = dominant, C = codominant.

Species	Common Name	Sections:	2	5	8	11
Acer rubrum	RED MAPLE					P
Andropogon glomeratus	BROOM GRASS		P	P		P
Aster carolinianus	CAROLINA ASTER			P		
Baccharis	SALT BUSH		P	P	P	P
Bidens mitis	SMALLFRUIT BEGGARTICKS		P		P	P
Cephalanthus occidentalis	COMMON BUTTONBUSH				P	
Cyperus lecontei	LECONTE'S FLATSEDGE		P	P		
Cyperus polystachyos	MANYSPIKE FLATSSEDGE		P	P	P	P
Eleocharis baldwinii	BALDWIN'S SPIKERUSH					P
Eupatorium capillifolium	DOGFENNEL		P			P
Eupatorium leptophyllum	FALSEFENNEL		P	P	P	P
Fuirena pumila	DWARF UMBRELLASEDGE		P	P		P
Fuirena scirpoidea	SOUTHERN UMBRELLASEDGE		P	P	P	P
Hydrocotyle	MARSHPENNYWORT		P			P
Ilex cassine	DAHOON				P	P
Imperata cylindrica *	COGON GRASS		P			
Juncus effusus	SOFT RUSH		P			P
Juncus marginatus	SHORE RUSH; GRASSLEAF RUSH			P	P	P
Juncus scirpoides	NEEDLEPOD RUSH		P			
Lachnanthes caroliniana	CAROLINA REDROOT			P		
Ludwigia octovalvis	MEXICAN PRIMROSEWILLOW		P	P	P	P
Ludwigia peruviana *	PERUVIAN PRIMROSEWILLOW		P		P	P
Ludwigia pilosa	HAIRY PRIMROSEWILLOW				P	
Lycopus rubellus	TAPERLEAF WATERHOREHOUND			P	P	
Mikania scandens	CLIMBING HEMPVINE		P			P
Myrica cerifera	WAX MYRTLE		P		P	
Nyssa sylvatica biflora	SWAMP TUPELO					P
Panicum hemitomon	MAIDENCANE		C	C	C	C
Panicum repens *	TORPEDO GRASS		P			P
Pluchea foetida	STINKING CAMPHORWEED			P	P	
Polypremum procumbens	RUSTWEED; JUNIPERLEAF			P		
Rhynchospora nitens	SHORTBEAK BEAKSEDGE			P	P	P
Sabatia grandiflora	LARGEFLOWER ROSEGENTIAN				P	P
Saccharum giganteum	SUGARCANE PLUMEGRASS		P		P	P
Sacciolepis striata	AMERICAN CUPSCALE				P	
Salix caroliniana	CAROLINA WILLOW				P	P
Sambucus canadensis	ELDERBERRY		P			
Schinus terebinthifolius *	BRAZILIAN PEPPER		P			
Schoenoplectus californicus	GIANT BULLRUSH		P			
Sesbania	RATTLEBOX		P			P
Setaria magna	GIANT BRISTLEGRASS		P	P		
Solidago	GOLDENROD		P	P	P	P
Syngonanthus flavidulus	YELLOW HATPINS		P	P	P	P
Taxodium	CYPRESS		C	C	C	C
Typha	CAT TAIL		P			P
Woodwardia virginica	FERN				P	
Xyris	YELLOW EYED GRASS		P	P	P	P

Summary

Lake Louisa's water quality, plant community, and phytoplankton data, as sampled on October 26, 2011 indicated that the lake met expectations for a healthy, well-balanced lake. Total Nitrogen, Total Phosphorus and Chlorophyll *a* concentrations were well below applicable state water quality criteria. An LVI score of 71, corresponding with the upper range of category II "Healthy" designation, indicates minimal disturbance to the plant community. Phytoplankton data indicated a balance in the algal community populations and little potential for a harmful algal bloom.

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

David Scharr david.scharr@dep.state.fl.us

DEP publications on Best 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