LAKE ECOSUMMARY

Lake Disston

October 9, 2012

DEP conducted water quality and biological sampling at Lake Disston in Flagler County on October 9, 2012 to assess attainment of designated uses. The lake was sampled as part of Northeast District's internal bioassessment program. Overall, the water quality and plant community data indicated that the lake was a healthy, well-balanced lake. The Lake Vegetation Index (LVI) determined the plant community to be a healthy balance of macrophytes; however the plant community indicated that the lake's water level was very low, during the earlier part of the year.

Background

Although healthy, well-balanced lake communities may be maintained with some level of human activities, such 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 water body 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 $\leq$ 6 µg/L of chlorophyll *a*. In colored ($\geq$ 40 PCU) lakes or clear, high alkalinity ($\geq$20 mg/L $CaCO_2$) lakes, healthy systems are expected to have $\leq$ 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

This lake was sampled on 10/09/2012 by the DEP Northeast District Office. Water quality samples were collected at middepth for analysis of nutrients, chlorophyll *a*, color, and alkalinity 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 has proposed a revised impairment threshold, in which scores of 43 and higher fully meet the expectation of a healthy, well balanced community, and scores below 43 are considered impaired. The LVI was sampled per DEP SOP FS7310 and calculated per DEP SOP LT7000.

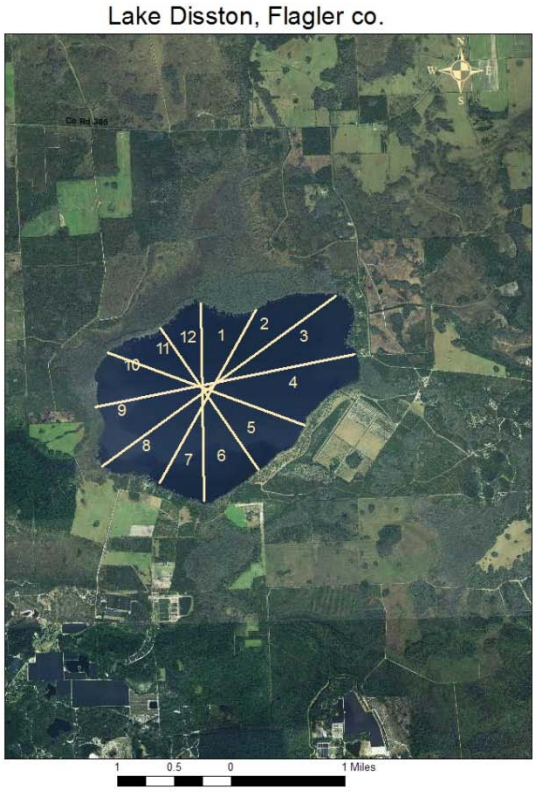


Figure 1. Sampling map of Lake Disston. Sections 3,6,9,12 were sampled for the Lake Vegetation Index. The water quality sample was collected from the lake center.



Figure 2. Photo of Lake Disston on October 9, 2012.

Site Information

Lake Disston is an 1800-acre lake in Southwest Flagler County. Little Haw Creek flows out of the north end of Lake Disston into Haw Creek which flows into Crescent Lake. Lake Disston is a natural lake with few residential uses around the lake, and a small citrus grove on the southern shore. The Landscape Development Intensity Index (LDI) for Lake Disston is 1.44. The low LDI score indicates low development and low potential for human disturbance to the lake. Lake Disston is a high color, low alkaline lake. Lake Disston is not listed as impaired for any water quality parameters under the Impaired Waters Rule. Lake Disston has been designated as an "Outstanding Florida Water body."

Results

Water Quality

The water quality samples complied with water quality standards (Table 1). The concentrations of total nitrogen and total phosphorus in the sample collected October 9, 2012 did not exceed the 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). The water sample had a low chlorophyll value of 3.8 µg/L, and the high color (360 PCU) suggests dystrophic conditions. The total nitrogen value of 1.9 mg/L is high, but is likely attributed to the natural process of plants breaking down in the surrounding swamp by tannins or humic acids.

Table 1. Water quality results from October 9, 2012 at Lake Disston.

Analyte	Result	Remark	Applicable Class III Water Quality Criteria
Field Temperature (°C)	27.3		
Field pH (SU)	5.18		
Field Dissolved Oxygen (mg/L)	6.0		≥ 5
Field Specific Conductance (µmhos/cm)	135	J	
Alkalinity (mg $CaCO_3$/L)	1.6		
Color (PCU)	360		
Chlorophyll *a* (µg/L)	3.8		*≤20
Total Phosphorus (mg/L)	0.064		*≤0.16
Nitrate+Nitrite (mg/L)	0.21		
Ammonia (mg/L)	0.15		
Total Kejldahl Nitrogen (mg/L)	1.7		
Total Nitrogen (mg/L)	1.91		*≤2.23

*Federally promulgated numeric nutrient criteria for Florida lakes

J - Estimated value.

Lake Vegetation Index

The LVI score for this lake was 59 out of a possible 100 points, corresponding with a "Healthy" designation. The LVI metrics for Lake Disston indicate that the four species comprised the dominant vegetation. The dominant plants C of C score ranged from 0.8 (*Eupatorium capillifolium*) to 7.2 (*Taxodium*). The Taxodium (cypress) value of seven indicates a sensitive plant, which is specifically adapted to minimal disturbance in a lake. *Eupatorium capillifolium* (dog fennel) is characteristically a "weedy" native plant, growing rapidly in disturbed areas, and displacing other plants. The dominance of dog fennel in some portions of the lake is likely related to natural disturbance associated with the drought conditions that prevailed from March to July. The drought lowered the water level creating large areas of sandy shoreline and propagation of dog fennel, by wind dispersed seeds. The water level had returned to normal during this sampling, which will decrease the survival of the dog fennel, and help return the lake to its natural floral community. There were five invasive exotics found in the LVI survey. A management planned designed to reduce these invasive taxa would further improve the lake's overall quality.

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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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

Table 2. Species list for the October 9, 2012 LVI at Lake Disston. An asterisk (*) indicates an invasive exotic plant species. P = present, D = dominant, C = codominant.

SCIENTIFIC NAMES	COMMON NAMES	1	2	3	4
Acer rubrum	RED MAPLE	P	P	P	P
*Alternanthera philoxeroides**	ALLIGATOR WEED*	P	P	P	P
Andropogon glomeratus	BUSHY BLUESTEM	P	P	P	P
Andropogon virginicus	BROOMSEDGE BLUESTEM	P	P	P	P
Aster dumosus	RICE BUTTON ASTER	P	P	P	P
Baccharis	SILVERSIDE		P	P	P
Bacopa monnieri	HERB-OF-GRACE	P			
Bidens laevis	BURRMARIGOLD; SMOOTH BEGGARTICKS		P	P	P
Centella asiatica	SPADELEAF	P			
Cephalanthus occidentalis	COMMON BUTTONBUSH	P	P	P	P
Cyperus odoratus	FRAGRANT FLATSEDGE	P	P		
Cyperus strigosus	STRAWCOLORED FLATSEDGE		P		
Cyperus surinamensis	TROPICAL FLATSEDGE	P	P		
*Eichhornia crassipes**	WATER HYACINTH*			P	
Eupatorium capillifolium	DOGFENNEL	C	D	P	P
Fuirena squarrosa	HAIRY UMBRELLASEDGE	P			
Hydrocotyle	MARSHPENNYWORT	P	P	P	P
Ilex cassine	DAHOON			P	P
Juncus marginatus	SHORE RUSH; GRASSLEAF RUSH	P			
Liquidambar styraciflua	SWEETGUM	P			
Ludwigia decurrens	WINGLEAF PRIMROSEWILLOW	P			P
Ludwigia leptocarpa	ANGLESTEM PRIMROSEWILLOW	P	P	P	P
Ludwigia linearis	NARROWLEAF PRIMROSEWILLOW		P		
*Ludwigia peruviana**	PERUVIAN PRIMROSEWILLOW*	P	P	P	P
Lycopus amplectens	CLASPING WATERHOREHOUND		P		
Micranthemum umbrosum	SHADE MUDFLOWER	P			
Mikania scandens	CLIMBING HEMPVINE	P	P	P	
Myrica cerifera	SOUTHERN BAYBERRY; WAX MYRTLE	P	P	P	P
Nelumbo lutea	AMERICAN LOTUS	P	P		
Nuphar	YELLOW POND-LILY	P	P	P	P
Nymphoides aquatica	BIG FLOATINGHEART	P		P	
Nyssa sylvatica biflora	SWAMP TUPELO	P	P	P	P
Osmunda regalis	ROYAL FERN			P	
Panicum dichotomiflorum	FALL PANICGRASS	P	P	P	
Panicum hemitomon	MAIDENCANE	P	P	P	P
Paspalum repens	WATER PASPALUM	P	P	P	P
Pinus elliottii	SLASH PINE		P	P	
*Pistia stratiotes**	WATER-LETTUCE*	P	P	P	P
Pluchea	CAMPHORWEED	P	P	P	
Polygonum densiflorum	DENSEFLOWER KNOTWEED		P		
Polygonum hydropiperoides	SWAMP SMARTWEED	P	P		
Pontederia cordata	PICKEREL WEED	P	P	P	P
Rhexia mariana	MARYLAND MEADOWBEAUTY	P	P		
Rhynchospora microcephala	SMALLHEAD BEAKSEDGE	P	P		
Sabal palmetto	CABBAGE PALM	P	P	P	
Sacciolepis striata	AMERICAN CUPSCALE	C	P	P	C
Sagittaria lancifolia	ARROWHEAD	P	P	P	
Salix caroliniana	COASTAL PLAIN WILLOW	P	P	P	P
*Salvinia minima**	WATER SPANGLES*	P		P	P
Schoenoplectus californicus	CALIFORNIA BULRUSH	P	P	C	P
Scirpus cubensis	CUBAN BULRUSH	P			P
Scirpus cyperinus	WOOLGRASS		P	P	P
Scoparia dulcis	LICORICE WEED	P	P	P	
Solidago canadensis	GOLDENROD	P	P	P	P
Symphyotrichum carolinianum	CLIMBING ASTER	P	P		P
Taxodium	CYPRESS	P	P	C	C
Typha	CATTAIL	P	P	P	P
Xyris	YELLOWEYED GRASS	P	P	P	