LAKE ECOSUMMARY

Hampton Lake

June 10, 2013

DEP conducted water quality and biological assessment sampling at Hampton Lake in Nassau County on June 10, 2013 to assess attainment of designated uses (**Figure 1**). This lake was sampled for the Strategic Monitoring Plan for the Total Maximum Daily Load program. Overall, the water quality and plant community data indicated that the lake met expectations for a healthy, well-balanced lake.



Figure 1. Hampton Lake

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 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 $\leq$ 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

Hampton Lake was sampled on June 10, 2013 by the DEP Northeast Office in Jacksonville, FL. Surface water samples were collected for analysis of nutrients, chlorophyll *a*, color, chloride, biological oxygen demand, fecal coliform, fluoride, sulfate, total dissolved solids, total suspended solids, and turbidity, 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.

The LVI was conducted on June 10, 2013, by the DEP Northeast Office. 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 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.

Table 1. Water quality results, June 10, 2013, Hampton Lake.

Analyte	*Results*	*Applicable Class III Water Quality Criteria*
Field Temperature (°C)	*18.86*	
Field pH (SU)	*6.06*	
Field Dissolved Oxygen (mg/L)	*4.6*	*≥ 5*
Field Specific Conductance (µmhos/cm)	*69*	
Alkalinity (mg $CaCO_3$/L)	*5.7*	
Color (PCU)	*190*	
Chlorophyll a (µg/L)	*13*	*≤ 20 µg/l**
Total Phosphorus (mg/L)	*0.054*	*≤ 0.05 mg/l**
Nitrate+Nitrite (mg/L)		
Ammonia (mg/L)	*0.005*	
Total Kejldahl Nitrogen (mg/L)	*0.78*	
Total Nitrogen	*0.784*	*≤ 1.27mg/l**

U- Indicates that the substance was analyzed for but not detected
* numeric nutrient criteria for Florida lakes



Figure 2. Sampling map of Hampton Lake, Nassau County. Sections 2, 5, 8, and 11 were sampled for the Lake Vegetation Index. The water quality sample was collected from the center of the lake.

Site Information

Hampton Lake is a high-color small lake in Nassau County, which is fed by Pigeon Creek, and is surrounded mostly by privately owned land. In the 1960's, the stream was impounded and altered from a stream to a lake with a spillway at its northernmost end to control outflow into the St. Mary's River. The Lake Hampton Dam and outfall structure catastrophically failed on October 18, 2008, due to damage caused by Tropical Storm Fay, draining the lake. The dam was reconstructed and the impoundment was restored by April 2011.

Results

Water Quality

Hampton Lake has been listed as impaired for oxygen. Results from this study showed that the sample did not comply with the minimum dissolved oxygen saturation criterion of 34% (**Table 1**). Chlorophyll-*a* concentrations were below the threshold for colored lakes and exceeded the threshold for one event. The concentrations of total nitrogen and total phosphorus were below the state numeric nutrient criteria on all three dates (**Table 1**). Note that compliance with lake numeric nutrient criteria is determined based on an annual geometric mean of at least four samples, and is not based on single samples.

Lake Vegetation Index

The LVI score for this lake was 65 out of a possible 100 points, corresponding with an "Healthy" designation. **Table 2** contains the species list and occurrence information for this sampling event. The vegetation dominance for each section was as follows: Section 2 had co-dominance of *Leersia hexandra* and *Panicum repens*; *Cyrilla racemiflora* dominated Section 5, the dominate vegetation for Section 8 was *Sacciolepis striata*, and Section 11 was co-dominated by *Panicum repens* and *Nitella*, a macroalgae. *Nitella* has a positive effect because it absorbs nutrients and provides food for fish and invertebrates. A total of three invasive exotic plants were observed in the lake. Of the 62 different plants listed, approximately 93% of plants identified were native. The average number of taxa in each section was 34.

Table 2. Species list for the June 10, 2013 LVI at Hampton Lake. An asterisk (*) indicates an invasive exotic plant species. P = present, D = dominant, C = codominant.

Scientific Name	Common Name	Section			
		2	5	8	11
Acer rubrum	RED MAPLE	P	P		P
Alternanthera philoxeroides	ALLIGATOR WEED		P	P	
Andropogon	BUSHY BROOM GRASS		P		
Azolla caroliniana	MOSQUITO FERN	P			P
Bidens laevis	SMOOTH BEGGARTICKS	P	P	P	P
Boehmeria cylindrica	SMALLSPIKE FALSE NETTLE			P	
Cephalanthus occidentalis	BUTTON BUSH	P	P	P	P
Cyperus haspan	SHARP EDGE SEDGE				P
Cyperus odoratus	FLAT SEDGE	P			
Cyperus surinamensis	TROPICAL FLAT SEDGE	P		P	
Cyrilla racemiflora	SWAMP TITI	P	D		P
Decodon verticillatus	SWAMP LOOSESTRIFE	P	P	P	P
Eleocharis baldwinii	ROAD GRASS	P	P	P	P
Eleocharis interstincta	JOINTED SPIKERUSH				P
Eriocaulon decangulare	PIPEWORT				P
Eupatorium capillifolium	DOG FENNEL		P	P	P
Gordonia lasianthus	LOBLOLLY BAY	P	P		
Habenaria repens	WATER SPIDER ORCHID	P			
Hypericum fasciculatum	PEELBARK ST. JOHN'S WORT	P			P
Itea virginica	VIRGINIA WILLOW		P		
Juncus effusus	SOFT RUSH	P			P
Juncus megacephalus	LARGE-HEADED RUSH	P		P	
Juncus repens	CREEPING RUSH	P		P	
Lachnanthes caroliniana	REDROOT	P	P		
Leersia hexandra	SOUTHERN CUTGRASS	C	P	P	P
Liquidambar styraciflua	SWEETGUM				P
Ludwigia leptocarpa	SNGLESTEM PRIMROSE WILLOW				P
Ludwigia repens	RED LUDWIGIA				P
Luziola fluitans	WATER GRASS	P	P	P	P
Magnolia virginiana	SWEET BAY	P	P	P	
Micranthemum umbrosum	BABY TEARS	P		P	
Myrica cerifera	WAX MYRTLE	P	P	P	P
Lycopodiella alopecuroides	FOXTAIL CLUBMOSS				P
Lycopus americanus	AMERICAN WATER HOREHOUND	P	P	P	P
Dichanthelium scoparium	VELVET PANICUM	P	P		P
Ostrya virginiana	AMERICAN HOPHORNBEAM				P
Ptilimnium capillaceum	MOCK BISHOP'S WEED	P		P	
Galium tinctorium	STIFF MARSH BEDSTRAW	P		P	
Carex	CARIX SEDGES			P	
Nitella	STONEWORT				C
Nymphaea odorata	WATER LILY	P		P	P
Nyssa sylvatica biflora	SWAMP TUPELO			P	
Panicum hemitomon	MAIDENCANE	P		P	
Panicum repens	TORPEDOGRASS	C	P	P	C
Paspalum repens	WATER PASPALUM				P
Paspalum urvillei	VASEY GRASS			P	P
Pinus elliottii	SLASH PINE	P			
Polygonum hydropiperoides	SWAMP SMARTWEED	P		P	P
Rhexia virginica	VIRGINIA MEADOW BEAUTY			P	P
Rhynchospora microcephala	SMALLHEAD BEAKSEDGE			P	
Sacciolepis striata	AMERICAN CUPSCALE-GRASS	P	P	D	
Sagittaria latifolia	BROADLEAF ARROWHEAD	P		P	P
Salix caroliniana	CAROLINA WILLOW	P			P
Saururus cernuus	LIZARD'S TAIL	P			P
Scirpus cyperinus	WOOL GRASS	P		P	P
Solidago fistulosa	GOLDENROD				P
Taxodium	POND CYPRESS	P	P	P	
Triadenum virginicum	VIRGINIA MARSH ST. JOHN'S WORT	P	P	P	P
Typha	CATTAIL	P	P	P	P
Utricularia purpurea	EASTERN PURPLE BLADDERWORT	P			P
Woodwardia virginica	VIRGINIA CHAIN FERN	P			
Xyris	YELLOW-EYED GRASS			P	P

Landscape Development Index (LDI)

The intensity of human activities associated with land use surrounding a lake is assessed using the LDI calculations based on a scale of 1 – 10. A reference site with no human development will have a score of 1, whereas the highest intensity land use will score 10. The LDI score of Hampton Lake is 1.64, indicating little development present in the 100-meter buffer immediately around the lake.

Conclusion

Based on the three sample results described in this report, Hampton Lake does not appear to meet the state dissolved oxygen standard. The low dissolved oxygen may be due to natural oxygen consumption by phytoplankton, bacteria, and other algae. Hampton Lake meets Applicable Class III Water Quality Criteria for fish consumption, recreation, propagation and maintenance of a healthy, well-balanced population of fish and wildlife.

We will continue to monitor this lake through the end of the 2013 for low dissolved oxygen, although dark water lakes typically have low dissolved oxygen naturally. We will also evaluate the chlorophyll levels at that time so that Hampton Lake will continue to be a healthy, well-balanced lake.

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

Jann Gruentzel, Jann.Gruentzel@dep.state.fl.us

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/