LAKE ECOSUMMARY

Eagle Lake

Eagle Lake is part of the City of Tallahassee's Spray-field Expansion. This lake is located approximately one third of a mile south of Tram Road and 1.5 miles west of W.W. Kelly Road. This lake is located in the Woodville Karst Plain Physiographic Province. Eagle Lake has a drainage basin of approximately 79 acres. The total surface area of Eagle Lake is approximately 26 acres, giving a drainage basin to surface area ratio of 3:1. The soils around the lake consist of Chipley fine sand, Leon sand, and Ortega sand. The maximum depth of Eagle Lake is approximately ten feet at mean pool elevation. City of Tallahassee Lakes Monitoring group conduct chemical and biological sampling at Eagle Lake. Impacts to this lake are limited due to its relative isolation and lack of development in its basin, and this is reflected in its water quality and biological diversity, which continue to be good. Overall, the water quality indicates that the lake meets its expectations for a healthy, well-balanced lake.

Background

Although healthy, well balanced lake communities may be maintained even 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 $\leq$ 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).

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 *a*	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 µg/L**	**0.05 mg/L**	**1.27 mg/L**	**0.16 mg/L[1]**	**2.23 mg/L**
≤ 40 Platinum Cobalt Units and > 20 mg/L $CaCO_3$	**20 µg/L**	**0.03 mg/L**	**1.05 mg/L**	**0.09 mg/L**	**1.91 mg/L**
≤ 40 Platinum Cobalt Units and ≤ 20 mg/L $CaCO_3$	**6 µg/L**	**0.01 mg/L**	**0.51 mg/L**	**0.03 mg/L**	**0.93 mg/L**

Methods

This lake is sampled on a quarterly time frame each year. Surface water samples are collected for analysis of [nutrients, chlorophyll *a*, color, etc.] following DEP Standard Operating Procedures (SOPs; see http://www.dep.state.fl.us/water/sas/qa/sops.htm) and met DEP quality assurance/quality control standards (seehttp://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 plans to propose 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 Eagle Lake map. Sampling site is located in center of the lake. Water quality samples are collected from each site along with water parameters such as Dissolved Oxygen, Conductivity, pH level, Temperature, Secchi Disk reading and depth.

Results

Water Quality

The water quality samples generally complied with water quality standards (Table 1).. Eagle Lake is a very high color, low alkaline lake that is expected to meet Chlorophyll standard of 20 ug/L and Total Nitrogen, Total Phosphorus standards of 1.27 mg/L and 0.057 mg/L respectively. With extremely high color water, Eagle Lake's chlorophyll values have never exceeded 10 ug/L. Sunlight penetration is absorbed by the tannins in the water negating chlorophyll production. Eagle Lake is an undisturbed water-body with no anthropogenic influences other than maybe slight spray-field seepage. Eagle Lake is not eutrophic but rather oligotrophic in that nutrient level's meeting the designated criterion.

Table 1. Water quality results from Eagle Lake.

Yearly Geomeans of Total Nitrogen and Total Phosphorus for Eagle Lake					
Year	Chlorophyll*	Color	Alkalinity	TN*	TP*
2011	6	82	2	0.56	0.008
2012	3	250	5	1.16	0.021
2013	6	215	5	0.77	0.022
2014	6	173	2	0.62	0.013
2015	5	141	2	0.68	0.013

*DEP's Numeric Nutrient Criteria (Data based on annual geometric means calculated on minimum of 4 samples).

Lake Vegetation Index

Unfortunately Eagle Lake hasn't had a plant survey done. The lake is heavily vegetated much like Campbell Pond and doesn't meet FLDEP's open water criteria for a survey. A lake or pond must have at least one acre of open water with no heavily choked vegetation. Many vegetated tussocks float on the surface creating numerous little islands for wildlife to habitat.

Photo above with Lily Pads choking the water's surface.

Thank you for your interest in maintaining the water quality of City of Tallahassee area lakes.

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