LAKE ECOSUMMARY

Lake Kinsale

Lake Kinsale is in the Tallahassee Red Hills Physiographic Province, northeast of the Killearn Estates Subdivision and southwest of the Killearn Lakes Subdivision. Lake Kinsale is first, western-most lake within the Killearn Chain of Lakes. Lake Kinsale is the smallest of the three lakes with a surface area of approximately 14 acres. The lake is also a very shallow reservoir with a maximum depth of 5 feet and an average depth of 3 feet at the normal pool elevation. Historical records available indicate that the chain of lakes were at one time utilized by the owners of the former Velda Dairy Farm. When development occurred in the 1970's, the waterbodies were modified and subsequently pumped with groundwater for the purposes of maintaining the proper ecological balance. Today, the lake is surrounded by residential subdivisions with approximately 90% of its three-mile length shoreline developed. Kinsale receives runoff from two large upstream contributing drainage basins (Lake Tom John and Lake McBride) along with direct inputs from the surrounding community. The City of Tallahassee's Lakes Monitoring group conducts chemical and biological sampling at Lake Kinsale. Overall, the water quality data indicate that the lake fails to meet regulatory thresholds.

Background

Although healthy, well balanced lake communities may be maintained even with some level of human disturbance, excessive 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 conditions 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). Exceedances of these standards impede 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 $CaCO_3$), 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 $CaCO_3$) lakes, healthy systems are expected to have ≤ 20 µg/L of chlorophyll-*a*. Chlorophyll-*a* values greater than those referenced 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).

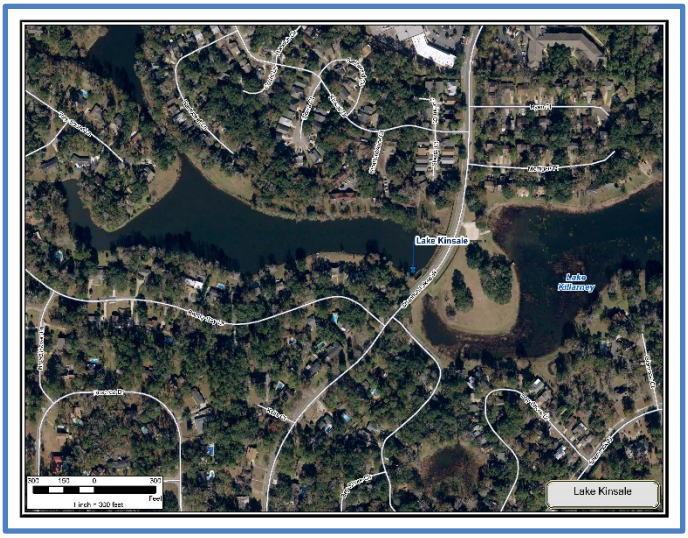
Below is the chart for the FL Department of Environmental Protection's Numeric Nutrient Criteria for the state's lakes.

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 basis each year. Surface water samples are collected for analysis [e.g. nutrients, chlorophyll *a*, color, etc.] following DEP Standard Operating Procedures (SOPs) and quality assurance/quality control (QA/QC) standards.

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; (43-77) Healthy; and (0- 42) Impaired. DEP's revised impairment threshold score of 43 and higher fully meet the expectation of a healthy, well balanced community, and scores at and below 42 are considered impaired. The LVI was sampled per DEP SOP FS7310 and calculated per DEP SOP LT7000.



Yearly Geomeans of FLDEP Nutrient Criterion Parameters Lake Kinsale					
Year	Chlorophyll*	Color	Alkalinity	TN*	TP*
2017	45	24	20	1.29	0.206
2018	13	25	17	0.67	0.078
2019	13	10	16	0.89	0.086
2020	26	15	18	1.01	0.041

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

Lake Vegetation Index

A lake vegetation survey has not been completed on Lake Kinsale because the lake does not have an access point to launch a boat, which is necessary to perform the survey. Additionally, Lake Kinsale has very limited aquatic vegetation, with most of the littoral zones being highly maintained residential lawns.

Results

Water Quality

Like Killarney & Kanturk, Kinsale also has very low nutrient criterion limit as the lake is classified by as a clear, low alkaline lake. Lake Kinsale must have a chlorophyll-a concentration ≤ 6 µg/L, a total nitrogen concentration ≤ 0.51 mg/L and a total phosphorus concentration ≤ 0.01 mg/L in order to meet the relevant lake criteria. The water quality samples generally exceed the applicable water quality standards (**Table 1**). City staff began sampling Lake Kinsale and documenting the water quality data for the lake in 2017. Chlorophyll-a values are well above the limit of 6 µg/L and both nitrogen and phosphorus are above their respective limits of 0.51 mg/L and 0.01 mg/L.

While water levels fluctuate within Lake Kinsale, the fluctuations are less substantial due to the large contributing drainage basin and shallow nature of the lake. As previously discussed, Lake Kinsale like Lake Killarney and Kanturk has been significantly modified through time and a large pump for augmenting the lake with groundwater is located on its shoreline. However, due to the high costs of operating and maintaining these pumps, they have not been in operation since the early 1990's.

2017 Lake Kinsale *Microcystis* algal bloom

Thank you for your interest in maintaining the water quality of City of Tallahassee area lakes. Visit the web-links below for more information on Florida natural water resources.

DEP publications on Best Management Practices and Environmental Stewardship and Education:
https://ffl.ifas.ufl.edu/media/fflifasufledu/docs/GIBMP_Manual_Web_English.pdf

DEP biological assessment resources:
https://floridadep.gov/dear/bioassessment/content/bioassessment-training-evaluation-and-quality-assurance#LVI

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

Freshwater Algal Bloom information:
https://floridadep.gov/AlgalBloom