

2025 Lakes Monitoring Annual Report

Lake Killarney

Lake Killarney is within the subdivision of Killearn Estates, located just north of Interstate-10 near Thomasville Road within the City of Tallahassee corporate limits. Lake Killarney resides downstream of Lake Kinsale and immediately west of Lake Kanturk.

- Lake Killarney Physiographic Province: Red Hills
- Publicly Accessible: No (Private)
- Surface Area: 80 acres
- Drainage Basin: 5,642 acres
- Maximum Depth: 8 feet
- Average Depth: 4 feet
- [Trophic Classification](#): Eutrophic
- [Fish Consumption Advisories](#): None
- Lake Type: Clear-Acidic
- Water Quality Conditions: Marginal
- Water Quality Impairments: 4e Restoration Plan (Chlorophyll, Total Nitrogen, & Total Phosphorus)
- Biological Health: Poor



Evaluation of Lake Health

Healthy lake systems often exhibit well-balanced populations of flora and fauna. While some level of disturbance can be tolerated, excessive human activities may result in lake degradation. Human stressors such as increased inputs of nutrients, sediments and pesticides from watershed runoff, undesirable removal of native shoreline and upland buffer vegetation, and introduction of nuisance (generally exotic) plants and animals all contribute to degradation of our water resources. The Florida Department of Environmental Protection (FLDEP) has methods to evaluate if anthropogenic 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. The most common criteria used by FLDEP to determine lake health is called “Numeric Nutrient Criteria” (NNC). FLDEP water quality standards are designed to protect the designated uses of waters of the state (*e.g.*, recreation, aquatic life support). This criterion will show exceedances of these standards that may impede the designated use of a particular waterbody. The Numeric Nutrient Criterion primarily evaluates Chlorophyll-*a*, Total Nitrogen and Total Phosphorus. Chlorophyll-*a* is a measure of algal biomass in a water column and is generally found in higher concentrations as a response to increased levels of nitrogen and/or phosphorus. In clear, low alkalinity lakes (a lake where color is ≤ 40 PCU and the alkalinity is ≤ 20 mg/L CaCO_3), a healthy system is expected to have < 6 $\mu\text{g/L}$ 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 $\mu\text{g/L}$ 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. **Table 1** below represents the FLDEP Numeric Nutrient Criteria for Florida lakes.

Table 1. Florida Numeric Nutrient Criteria

Long Term Geometric Mean Lake Color and Alkalinity	Annual Geometric Mean Chlorophyll <i>a</i>	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 $\mu\text{g/L}$	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 $\mu\text{g/L}$	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 $\mu\text{g/L}$	0.01 mg/L	0.51 mg/L	0.03 mg/L	0.93 mg/L

From a biological perspective on lake health, the Lake Vegetation Index (LVI) is utilized as the primary bioassessment tool. This rapid field method was developed by FLDEP to assess the lake’s plant community.

The lake is divided into twelve sections (**Figure 2**) with four of these sections chosen at random to be evaluated. The evaluation occurs during the summer months of the year when vegetation is actively growing. Criteria documented are 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 below 42 are considered impaired. The LVI was sampled per DEP SOP FS7310 and calculated per DEP SOP LT7000.

Lake Killarney does not maintain a consistent permanent pool of water, which is inconducive to water quality and biological monitoring activities. However, water quality data is available for Lake Killarney dating back to 1990 and biological monitoring has occurred since 2001. The following tables and charts provide water quality (annual geometric means) and biological results covering the time-period of 2011-2024. **Figures 1 & 2** display the water quality and biological monitoring locations within Lake Killarney.

Figure 1. Water Quality Monitoring Locations



Table 2. Water Quality Annual Geomeans

Yearly Geomeans of FLDEP Nutrient Criterion Parameters & Biological Health Lake Killarney						
Year	Chlorophyll *	Color	Alkalinity	TN *	TP*	LVI
2011	30	12	18	0.92	0.086	
2012	No samples collected due to dry lake bed					
2013	17	21	22	0.27	0.063	31
2014	9	18	18	0.33	0.037	
2015	9	18	16	0.22	0.024	
2016	7	18	19	0.59	0.020	
2017	3	14	18	0.33	0.030	
2018	15	10	16	0.39	0.030	
2019	2	9	21	0.46	0.030	
2020	5	15	35	0.61	0.010	
2021	13	13	22	0.89	0.040	
2022	4	8	20	0.46	0.020	
2023	5	10	21	0.65	0.044	
2024	12	12	23	0.55	0.039	

*2011 Year data based on one sampling event, *2016 data based on three sampling events. Killarney regularly drains and refills.

* 2013 The only year to date to conduct a LVI survey; all other years low lake water levels, vegetation overgrowth or dry lake bed has prevented a vegetation survey

*2018 Year data based on two sampling events. Killarney had drained, withstood terrestrial vegetation for 5 months before refilling in Summer of 2018.

*2020 Year data had just one site ("Killarney East") sampled during May and November due to very low water levels within Lake Killarney. Geomeans based on that data.

* 2021 Year data indicates Killarney "West" site being dry for the later half of the year. Terrestrial vegetation once again dominated the lake bottom on the western side.

Chart 1. Color

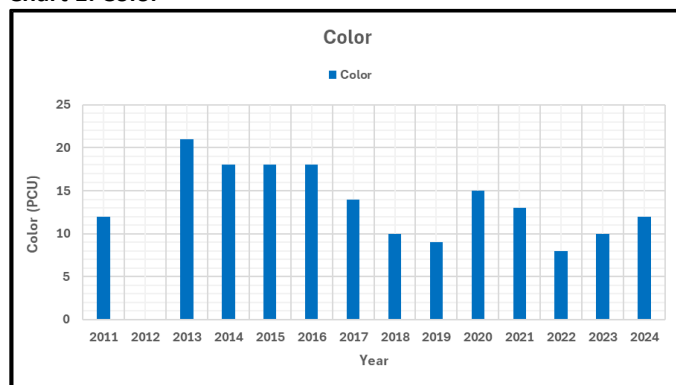


Chart 2. Alkalinity

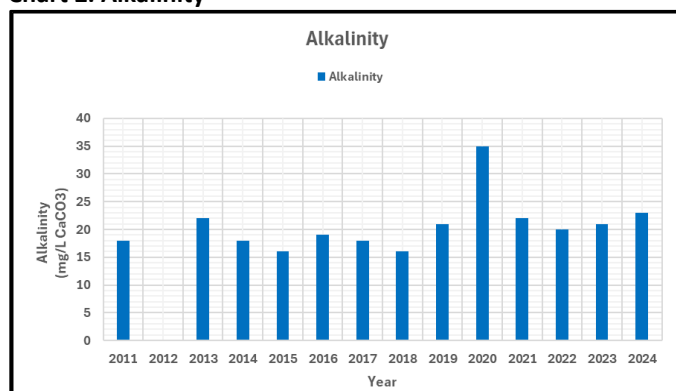


Chart 3. Chlorophyll

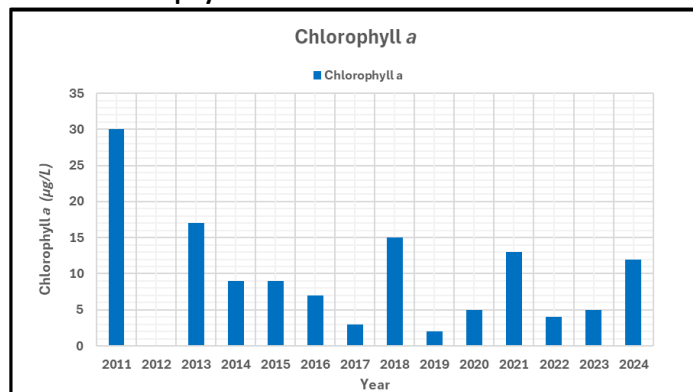


Chart 4. Total Nitrogen

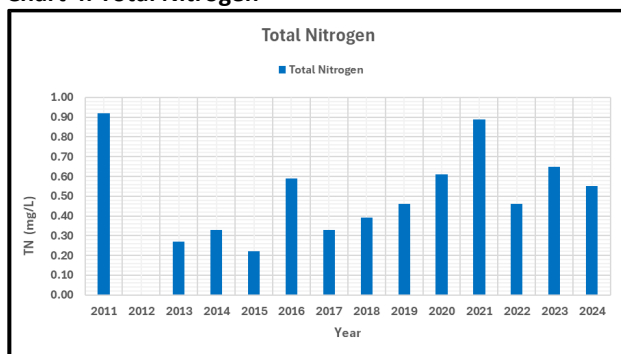


Chart 5. Total Phosphorus

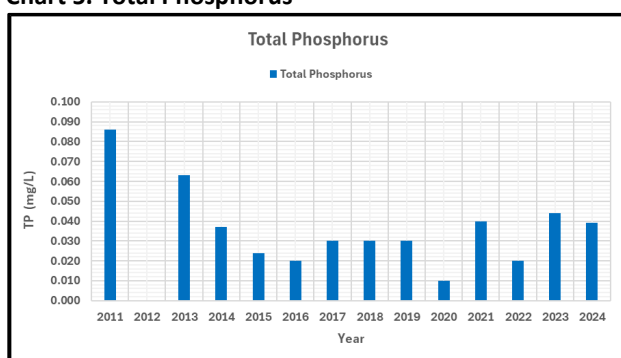


Figure 2. Biological Monitoring LVI Quadrants

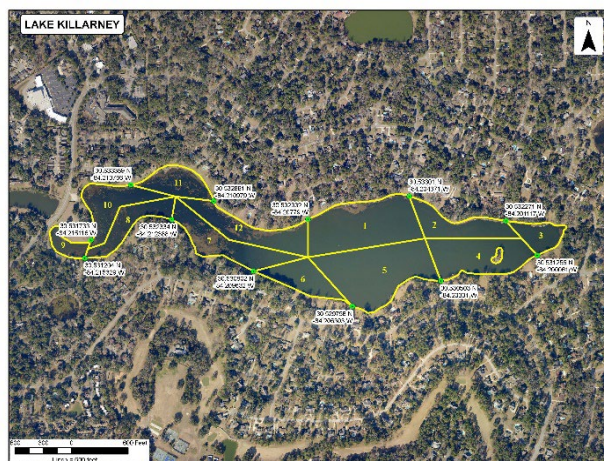


Photo 1. Native flowering Lotus re-establishing itself in Lake Killarney.

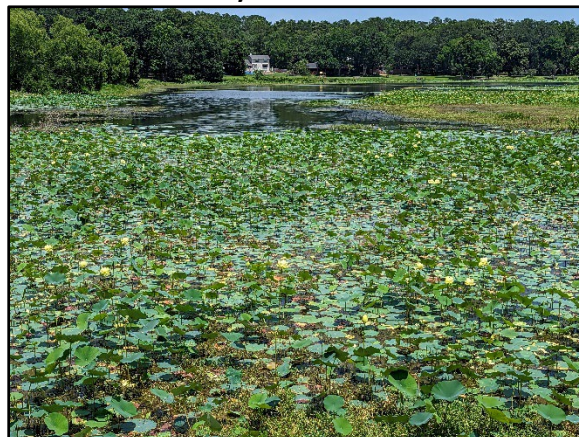


Chart 6. Lake Killarney Typical LVI Species List

Typical Aquatic Vegetation within Lake Killarney Year 2024	
Scientific Name	Common Name
<i>Acer rubrum</i>	RED MAPLE
<i>Alternanthera philoxeroides</i>	ALLIGATOR WEED
<i>Azolla caroliniana</i>	CAROLINA MOSQUITO FERN
<i>Bidens pilosa</i>	SPANISH NEEDLES
<i>Cephalanthus occidentalis</i>	COMMON BUTTONBUSH
<i>Ceratophyllum demersum</i>	COONTAIL
<i>Colocasia esculenta</i>	TARO; WILD TARO; ELEPHANT EAR
<i>Cyperus</i> sp.	SEDGES (MANY DIFFERENT SPECIES)
<i>Eichhornia crassipes</i>	WATER HYACINTH
<i>Eleocharis baldwinii</i>	BALDWIN'S SPIKERUSH; ROADGRASS
<i>Eupatorium capillifolium</i>	DOGFENNEL
<i>Hydrilla verticillata</i>	HYDRILLA
<i>Juncus marginatus</i>	SHORE RUSH; GRASSLEAF RUSH
<i>Liquidambar styraciflua</i>	SWEETGUM
<i>Ludwigia leptocarpa</i>	ANGLESTEM PRIMROSEWILLOW
<i>Myrica cerifera</i>	SOUTHERN BAYBERRY; WAX MYRTLE
<i>Myriophyllum aquaticum</i>	PARROT-FEATHER
<i>Najas guadalupensis</i>	SOUTHERN WATERNYMPH
<i>Nelumbo lutea</i>	AMERICAN LOTUS
<i>Nuphar</i> sp.	SPATTERDOCK
<i>Nymphaea odorata</i>	AMERICAN WHITE WATERLILY
<i>Panicum hemitomon</i>	MAIDENCANE
<i>Panicum repens</i>	TORPEDO GRASS
<i>Polygonum densiflorum</i>	DENSEFLOWER KNOTWEED
<i>Polygonum hydropiperoides</i>	MILD WATERPEPPER; SWAMP SMARTWEED
<i>Pontederia cordata</i>	PICKERELWEED
<i>Sagittaria latifolia</i>	BROADLEAF ARROWHEAD; COMMON ARROWHEAD; DUCK POTATO
<i>Sagittaria striata</i>	AMERICAN CUPSCALE
<i>Salix caroliniana</i>	CAROLINA WILLOW; COASTALPLAIN WILLOW
<i>Sambucus nigra canadensis</i>	AMERICAN ELDER; ELDERBERRY
<i>Sapium sebiferum</i>	CHINESE TALLOW
<i>Scirpus cubensis</i>	CUBAN BULRUSH

Data Discussion

The data within the above charts and tables is used to determine overall lake health and to assess whether any existing data trends are evident. The City's Lakes Monitoring Program utilizes the Mann-Kendall Statistical Trend Analysis to determine if trends are present and whether they are statistically significant.

Water quality conditions are best characterized as marginal, while the biological community, is poor. This characterization concurs with the FLDEP assessment of water quality where impairments are noted for chlorophyll-*a*, total nitrogen and total phosphorus. Based on Lake Killarney's alkalinity and color, the waterbody is assessed as a "clear-acidic" lake. However, over the past fourteen years, the Lake Killarney alkalinity geomean exceeds 20 mg/l CaCO₃, which indicates a potential clear-alkaline system, as opposed to clear-acidic. Such a change in waterbody type would result in Lake Killarney likely meeting the NNC criteria. Lake Killarney is a very shallow lake and more susceptible to desiccation during long periods of drought or below average rainfall. When the lake bottom is dry, terrestrial grasses and plants overtake a large portion of the lake bottom. As ample rainfall occurs to refill the lake system, established terrestrial plants die and decompose. This vegetative decomposition releases stored nutrients, which can lead to the production of severe algal blooms resulting in high chlorophyll-*a* concentrations. Additionally, the Red Hill clay soils within the Killarney Chain of Lakes drainage basin naturally contributes to elevated phosphorus levels.

The Chlorophyll-*a* data geomean for 2024 increased to 12 µg/L compared to the previous two years of

2022 (4 µg/L) and 2023 (5 µg/L). Total nitrogen and total phosphorus geomeans are 0.55 mg/L and 0.39 mg/L respectively. Urban housing developments surround Lake Killarney and the contributing drainage basin. Previous research shows that in place best management practices (BMP's) are effective at controlling nutrient inputs to the lake system and supplying necessary drainage volume to hydrate the lake. However, even under normal rainfall patterns the lake is unable to maintain its permanent pool volume. The cyclical pattern of the lake going dry, establishing terrestrial plants and the subsequent reflooding of the lake bottom, is the catalyst for nutrient exceedances for this lake.

Lake Killarney's vegetation community is diverse with native and exotic nuisance plant species. Due to low water and/or fluctuating lake levels for the past 11 years, an LVI plant survey has not been conducted. Year 2013 was the last LVI survey on Lake Killarney.

Chart 6 illustrates typical plant species that are commonly found within Lake Killarney. Unfortunately, *Hydrilla verticillata* has overtaken Lake Killarney's submerged vegetation and has spread to its connecting waterbody, Lake Kanturk. It can grow in almost any freshwater system including springs, lakes, marshes, ditches, rivers and tidal zones. Hydrilla can grow in water as shallow as a few inches and up to 20 feet deep or more. It can grow in as little as 1% of full sunlight. Each stem on a Hydrilla plant can grow 1-4 inches per day. Therefore, when hydrilla invades water bodies, ecologically important native submerged plants, such as pondweeds (*Potamogeton* spp.), tapegrass (*Vallisneria americana*) and coontail (*Ceratophyllum demersum*), are shaded out by hydrilla's thick mats, or are simply

outcompeted and eliminated. However, *Hydrilla* can support a healthy and vibrant biological population. By providing cover and foraging opportunities, aquatic invertebrates and small fish (shiners, minnows, bream) fuel fishing opportunities for Large-mouth bass. The plants listed in **Chart 6** (above) that are colored in red indicate, exotic nuisance vegetation that ideally should be targeted for removal. Removal methods could consist of; herbicide treatment, aquatic mechanical harvesting, or the application of triploid carp to control the vegetation.

December 2024, the Killlearn Homeowner Association (KHA) funded an extensive aquatic plant removal project by contracting a mechanical harvester. This is a giant step in the right direction to control the overgrowth of aquatic plants. The removal continued through February of 2025. Mechanical harvesting is the preferred method for large-scale vegetative removal, as it selectively targets species and removes the biomass from the lake. Moving forward (upon completion harvesting), it's anticipated an herbicidal treatment program will be used to target undesirable aquatic vegetation.

Photo 2. Example of how Lake Killarney when rainfall is sparse for an extended period.



Photo 3. Mechanical harvester unloading aquatic vegetation that has been removed from Lake Killarney. (December 2024)



Photo 4. Mechanical harvester removing vegetation along the lake's surface. (December 2024)



Photo 5. "East" sampling site where a kayak is the appropriate vessel to collect water samples on this day.



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 the City of Tallahassee, Leon County and Florida natural water resources.

City of Tallahassee Think About Personal Pollution (TAPP) Program

<https://tappwater.org/>

City of Tallahassee Stormwater Management

<https://www.talgov.com/you/stormwater>

Leon County Water Resources

<https://cms.leoncountyfl.gov/waterresource>

Best Management Practices for Protection for Water Resources

https://ffl.ifas.ufl.edu/media/fflifasufledu/docs/GIB_MP_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>

University of Florida / IFAS Lake Resources:

[Florida LAKEWATCH](#)