

Hutto Lake

Methods

Study Area Analysis

The watershed containing Hutto Lake was analyzed using ESRI ArcGIS 10.2. Using this software with 2014 Hillsborough County aerial, Land Use/ Land Cover (LULC), Landscape Development Intensity (LDI) Index values were calculated for the 100 meter buffer surrounding the lake following the procedures of Brown & Vivas 2003, 2005 (Brown & Vivas. 2003. A Landscape Development Intensity (LDI) Index. Center for Environmental Policy, Department of Environmental Engineering Sciences, University of Florida. Technical Report Submitted to the Florida Department of Environmental Protection) and (Brown & Vivas. 2005. Landscape development intensity index. Environmental Monitoring and Assessment 101: 289-309.) According to Brown and Vivas, "The intensity and aerial extent of human activities in a landscape may adversely affect the ecological processes of natural communities...the Landscape Development Intensity Index (LDI) functions as an objective measure of how human disturbance affects biological, chemical, and physical processes of aquatic systems. By incorporating non-renewable energy input expenditures... natural systems were assigned a non-renewable empowerment density of 1. The landscape development intensity (LDI) index is calculated as the percentage area within the catchment of a particular type of land use multiplied by the coefficient of energy use associated with that land use, summed over all land use types found in the catchment."

Lake Bathymetry and Morphological Characteristics Assessment

The **Bathymetric Map**ⁱ provides the lake's morphologic parameters in various units. The bottom of the lake was mapped using a Lowrance HDS 5 Gen 2 Wide Area Augmentation System (WAAS)ⁱⁱ enabled Global Positioning System (GPS) with fathometer (bottom sounder) to determine the boat's position, and bottom depth in a single measurement. The result is an estimate of the lake's area, mean and maximum depths, and volume and the creation of a bottom contour map. Besides pointing out the deeper fishing holes in the lake, the morphologic data derived from this part of the assessment can be valuable to overall management of the lake vegetation as well as providing flood storage data for flood models.

ⁱ A bathymetric map is a map that accurately depicts all of the various depths of a water body. An accurate bathymetric map is important for effective herbicide application and can be an important tool when deciding which form of management is most appropriate for a water body. Lake volumes, hydraulic retention time and carrying capacity are important parts of lake management that require the use of a bathymetric map.

ⁱⁱ WAAS is a form of differential GPS (DGPS) where data from 25 ground reference stations located in the United States receive GPS signals from GPS satellites in view and retransmit these data to a master control site and then to geostationary satellites. For more information, see end note 2.

Lake Vegetation Index Assessment

Hillsborough County requested the implementation of the Florida Department of Environmental Protection methods for Lake Vegetation Index (LVI 1000)

(<http://www.dep.state.fl.us/water/sas/sop/sops.htm>) using forms FD 9000-03 (Physical/Chemical Characterization), FD 9000-06 (Lake Habitat Assessment) FD 9000-27 (LVI Field Sheet) and FD 9000-31 (Lake Observation Field Sheet).

The Lake Vegetation Index (LVI) is a rapid assessment protocol in which selected sections of a lake are assessed for the presence or absence of vegetation through visual observation and through the use of a submerged vegetation sampling tool called a Frodus. The assessment results provide a list of species presents and the dominant and where appropriate co-dominant species that are found in each segment. These results are then entered into a scoring table and a final LVI score is determined. LVI scores provide an estimate of the vegetative health of a lake. Our assessment team was trained and qualified by FDEP to conduct these assessment as an independent team and must prequalify each year prior to conducting additional assessments. The LVI method consists of dividing the lake into twelve pie-shaped segments (see diagram below) and selecting a set of four segments from the twelve to include in the LVI. The assessment team then travels across the segment and identifies all unique species of aquatic plant present in the segment. Additionally, a Frodus is thrown at several points on a single five-meter belt transect that is established in the center of the segment from a point along the shore to a point beyond the submerged vegetation zone. For scoring, the threshold score for impairment is 37.

Four metrics are utilized in the Lake Vegetation Index Survey; Dominant Coefficient of Conservatism (CoC), Percent Florida Exotic Pest Plant Council Type 1 (% FLEPPC), Percent Native Taxa, Percent Sensitive Taxa.

The Dominant Coefficient of Conservatism (CoC) metric for the dominant or co-dominate species in each section. The CoC applies a score of 0-10 to each species based on its ecological tolerances and fidelity to pre-settlement conditions. Species with higher scores show a high fidelity to native, undisturbed habitats and are typically sensitive to alterations. Available CoC scores can be obtained from LT 7000 from the Florida Department of Environmental Protection at: <http://www.dep.state.fl.us/water/sas/sop/sops.htm>.

The percent FLEPPC (Florida Exotic Pest Plant Council) Category 1 invasive exotic taxa in a single sampling unit (pie slice) by dividing the number of FLEPPC Category I taxa by the total number of taxa in that sampling unit. Multiply result times 100. Refer to Appendix LVI 1000-1 to determine which plants are on the FLEPPC Category 1 list. Note that not all exotic taxa should be included in this metric, only those listed in Appendix LVI 1000-1 as Category 1 FLEPPC. If the FLEPPC updates their list of Category 1 exotics, those updates shall not be reflected in this calculation until they are included in Appendix LVI 1000-1.

The percent native taxa in a single sampling unit (pie slice) is calculated by dividing the number of native taxa by the total number of taxa in that sampling unit. Multiply result times 100. Nativity status is determined by the Plant Atlas from the Institute for Systematic Botany, and is listed in

Appendix LVI 1000-1. For informational purposes, visit the website <http://www.florida.plantatlas.usf.edu/>. Taxa that are native according to the Plant Atlas from the Institute for Systematic Botany but are not on the list in Appendix LVI 1000-1 may be included in this metric calculation, but inclusion of these additional taxa is not required.

The percent sensitive taxa in a single sampling unit by summing the number of taxa with a C of C (Coefficient of Conservatism) score ≥ 7 and then dividing by the total number of taxa in that sampling unit. Multiply result times 100. Refer to Appendix LVI 1000-1 for a list of C of C scores.

The collected bathymetric data is analyzed for submerged aquatic vegetation (SAV) calculations including the percentage of the surface area of the lake inhabited by SAV as well as an estimate of the percent volume of the lake inhabited by SAV. SAV is an important component to a lakes nutrient cycling as well as chlorophyll concentrations due to the SAV and phytoplankton competing for available nutrients in the water column. In addition SAV serves a vital role as habitat for many species of macroinvertebrates and fish as well as substrate for epiphytic algae.

Water Quality Assessment

Physical water quality samples were taken using a Eureka Manta Sub-2 multiprobe pre and post calibrated on the day of the assessment. Measurements taken with this device include: depth, conductivity, pH, Dissolved Oxygen (mg/l and % Saturation) and salinity. Chemical water parameters were collected and preserved on ice by USF Water Institute staff and analyzed at the Environmental Protection Commission of Hillsborough County Laboratory. Analysis include; Chlorophyll (a, b, c, t and corrected), Alkalinity, Color, Fecal Coliform, Enterococci, Ammonia, Nitrates/Nitrites, Total Phosphorous, Kjeldahl Nitrogen and Total Nitrogen. The results of the water quality sampling effort will be discussed in the framework of the FDEP Numeric Nutrient Criteria

Study Area

Hutto Lake is located between Boyette Road and Village Center Drive, south of Barrington Stowers Drive in Lithia, Florida. The Landscape Development Intensity Index of the 100 meter buffer around Hutto Lake is dominated by Cropland and Pastureland (63.10%) and Freshwater Marshes (33.08%) land uses. The resulting LDI value for the 100 meter buffer around Hutto Lake is 3.18. It should be noted that the area surrounding Hutto Lake is currently under construction for a residential community which may be captured in future Land Use/Land Cover datasets.

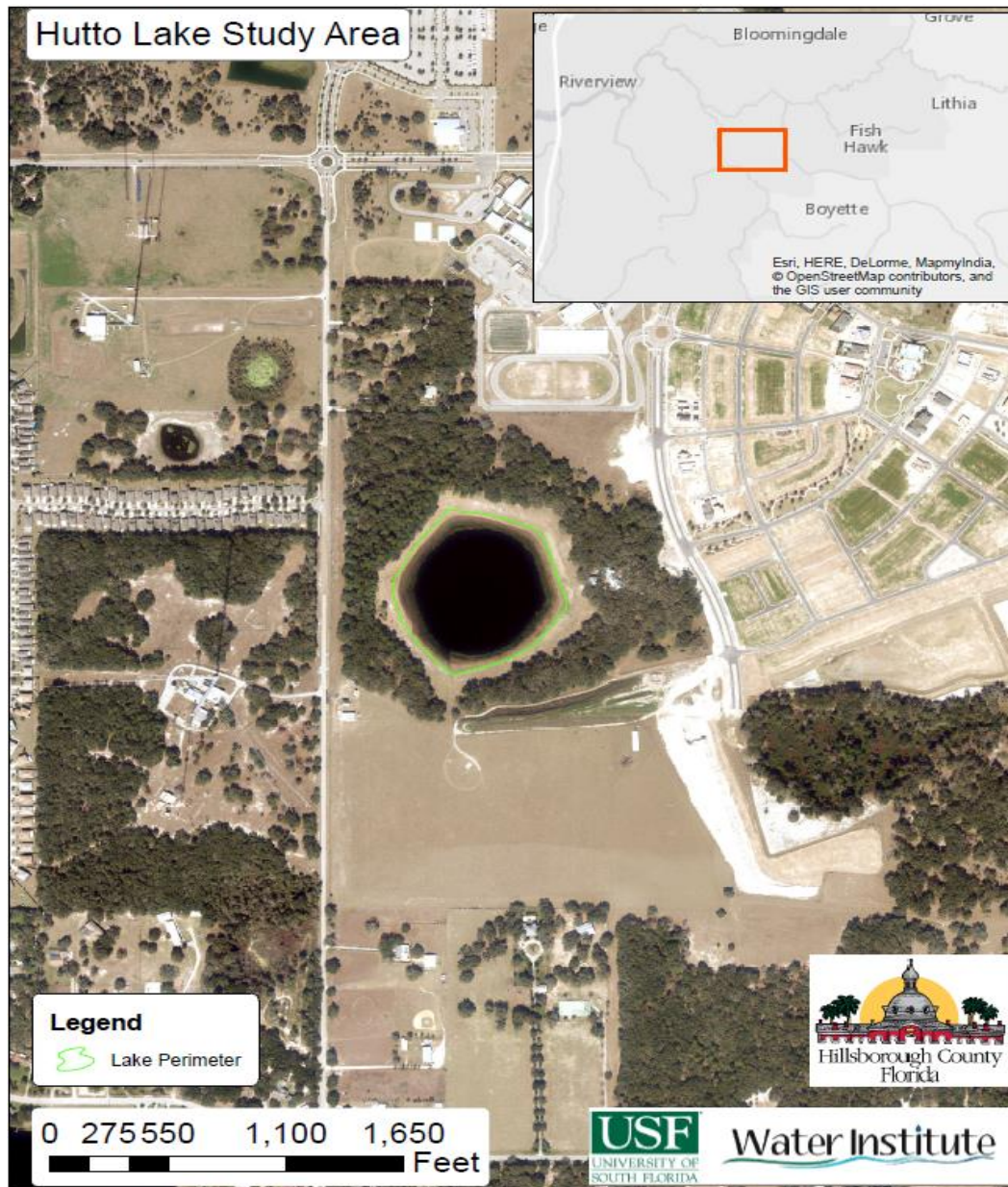


Figure 1 2016 Hutto Lake Assessment Study Area Map

Lake Bathymetry and Morphological Characterization

Hutto Lake is a relatively deep, isolated depression lake with a surface area of 10.12 acres. Hutto Lake at the time of the assessment had a mean water depth of 9.6 feet and a maximum observed depth of 18.22 feet. The volume at this time was approximately 31,685,733 gallons. Figure 2 shows the resulting bathymetric contour map for Hutto Lake from data collected on June 14, 2016. The collected data has been overlain the 2014 Hillsborough County aerals.

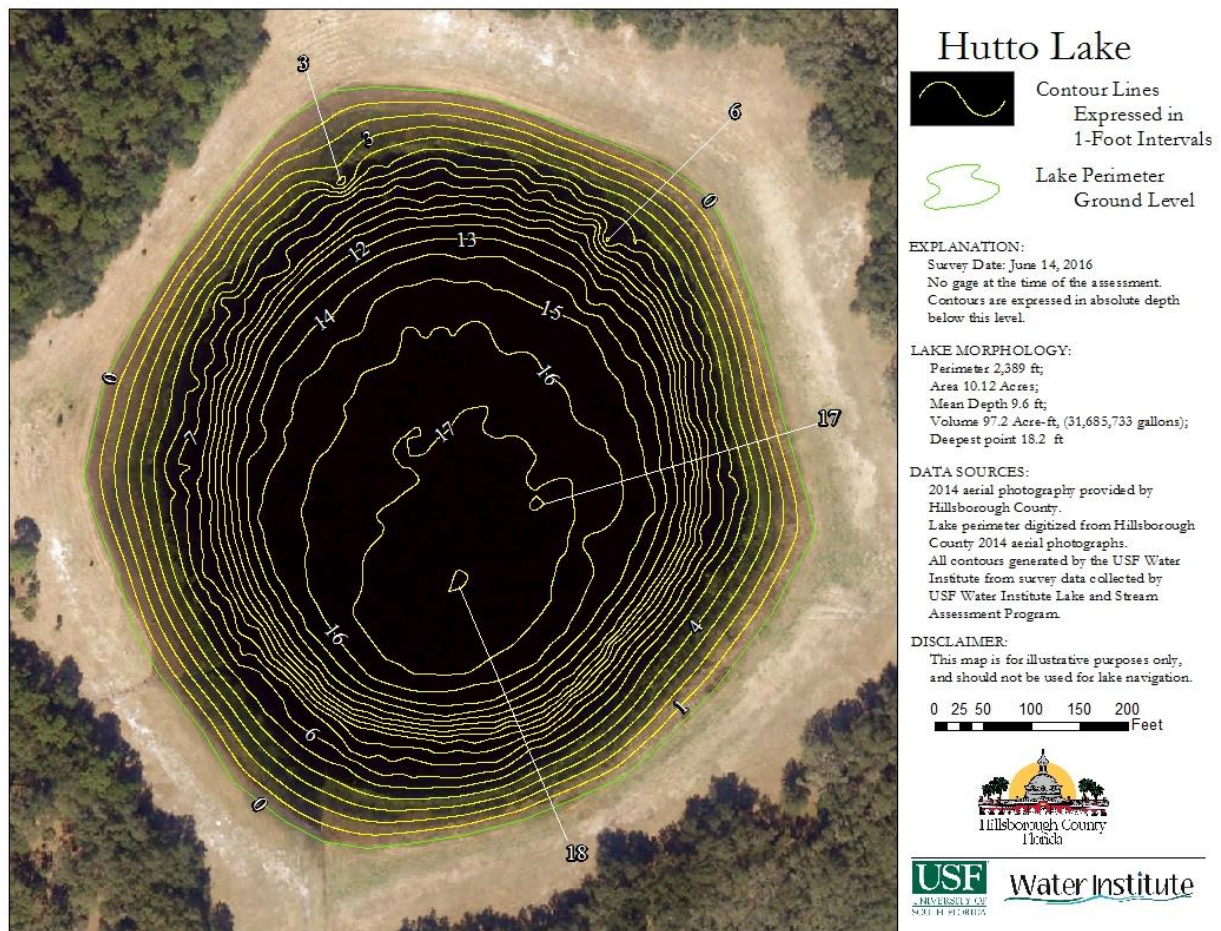


Figure 2 2016 1-Foot Bathymetric Contour Map for Hutto Lake

Table 1 Morphological Calculations for Hutto Lake

Parameter	Feet	Meters	Acres	Acre-Ft	Gallons
Surface Area (sq)	440,819	40,953	10.12	0	0
Mean Depth	9.6	2.69	0	0	0
Maximum Depth	18.2	5.1	0	0	0
Volume (cubic)	4,235,737	119,943	0	97.2	31,685,733
Gauge (relative)	0	0	0	0	0

Lake Vegetation Index Assessment



Figure 3 Overview photograph of Hutto Lake

The lake assessment for Hutto Lake was conducted on June 14, 2016. Hutto Lake received a lake habitat assessment (FEDP form FD 9000-6) score of 115 due to optimal scores for Secchi, Vegetation Quality, Stormwater Inputs, Bottom Substrate Quality, Upland Buffer Zone and Adverse Watershed Land Use. Suboptimal scores were recorded for Lakeside Adverse Human Alterations.



Figure 4 Hutto Lake had a buffering zone of emergent vegetation surrounding the lake containing a mixture of native and invasive species.

The Lake Vegetation Index identified 28 species of wetland vegetation growing in the four selected sections along Hutto Lake. The majority of these species (27) are native species. The remaining species (*Panicum repens*) is non-native and invasive to this region. The vegetation community along Hutto Lake is dominated by a variety of emergent species including *Fuirena scirpoidea*, *Panicum hemitomon* and *Sacciolepis striata* (Figure 5). The water's surface in Hutto Lake was dominated by *Nymphaeodes aquatica* (Figure 6). The calculated LVI score for Hutto Lake was 69, well above the impairment threshold of 37. Figure 7 shows the map of Hutto Lake detailing the LVI regions used for the assessment. Table 2 details the species list results of the Lake Vegetation Index. Table 3 details the scoring result for the Lake Vegetation Index. Submerged vegetation was dominated by *Eleocharis baldwinii* and *Utricularia gibba* during the assessment. By analyzing the collected sonar chart, the deep edge of submerged vegetation was 15.2 feet of depth. Submerged aquatic vegetation covered approximately 52% of the surface area of Hutto Lake. This submerged vegetation inhabits an estimated 12% of the water volume in Hutto Lake.



Figure 5 *Fuirena scirpoidea*, *Panicum hemitomon* and *Sacciolepis striata* on Hutto Lake



Figure 6 *Nymphoides aquatica* on Hutto Lake

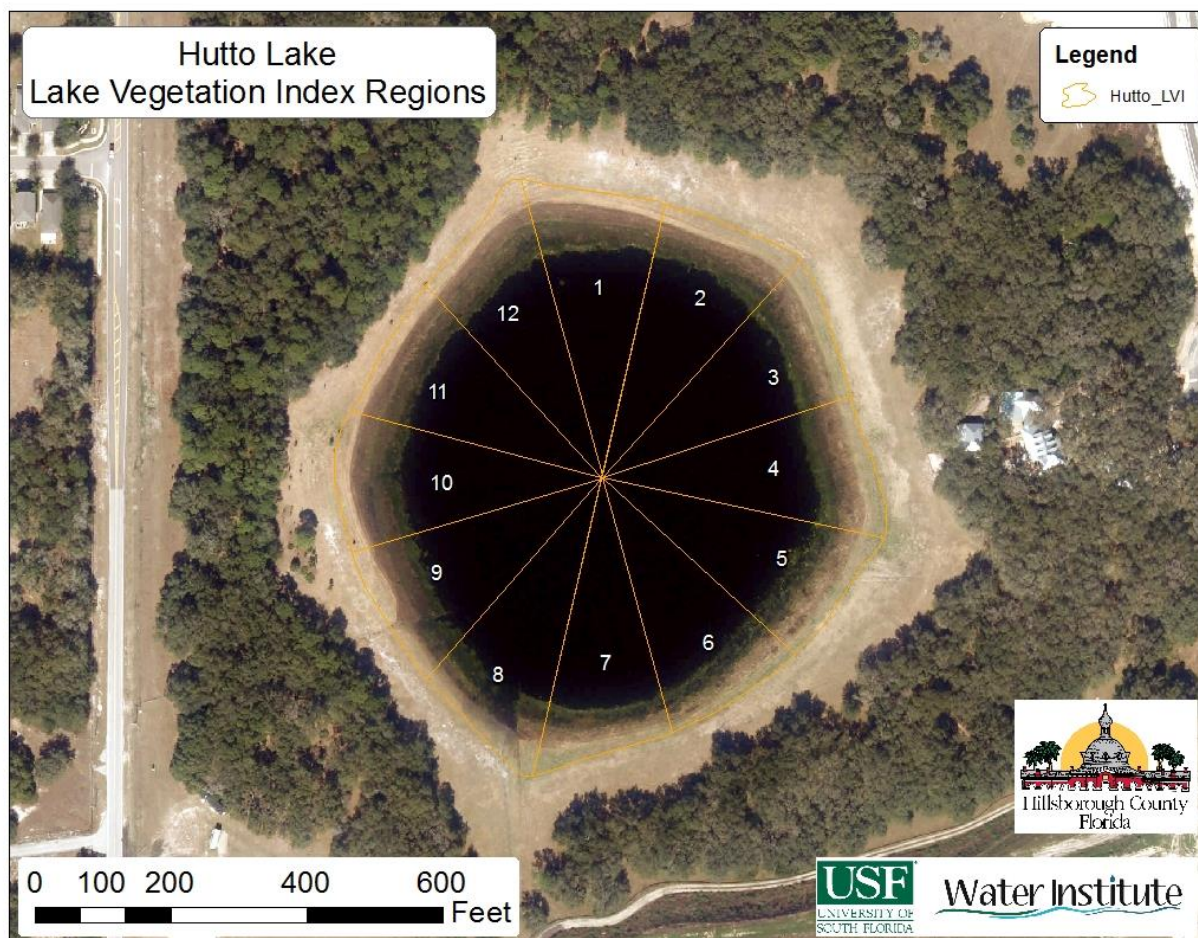


Figure 7 Lake Vegetation Index region map for Hutto Lake

Table 2 Lake Vegetation Index results for Hutto Lake 6/14/2016

SPECIES	Region				
	CofC	3	6	9	12
Eleocharis baldwinii	2.82	C	C	C	C
Fuirena scirpoidea	5.5	1	1	C	C
Hydrocotyle	2	1	1	1	1
Nymphoides aquatica	6.09	C	C	1	1
Panicum hemitomon	5.82	1	1	1	1
Sacciolepis striata	5.35	1	1	1	1
Utricularia gibba	6.37	1	1	1	1
Juncus marginatus	1.5	1		1	1
Mikania scandens	1.95	1	1	1	
Andropogon glomeratus	3	1			1
Habenaria repens	3.5	1			1
Lachnocaulon anceps	5.5			1	1
Ludwigia arcuata	3.5	1			1
Ludwigia octovalvis	2		1		1
Panicum repens	0		1	1	
Sabatia grandiflora	6			1	1
Sagittaria isoetiformis	7		1	1	
Cyperus polystachyos	1.56		1		
Cyperus surinamensis	2.03	1			
Eupatorium capillifolium	0.83	1			
Juncus effusus	2	1			
Lemna	1				1
Ludwigia leptocarpa	3	1			
Luziola fluitans	4				1
Myrica cerifera	2				1
Rhexia cubensis	7.22			1	
Salix caroliniana	2.95		1		
Xyris jupicai	3.51			1	

Table 3 Scoring Summary for the Lake Vegetation Index

LVI Score Summary	Region			
	3	6	9	12
Total # of taxa in sampling unit	16	13	15	17
% Native taxa in sampling unit	100	92.30769	93.33333	100
% FLEPPC CAT 1 taxa in sampling unit	0	7.692308	6.666667	0
% Sensitive taxa in sample unit	0	7.692308	13.33333	0
Dominant CoC in sample unit	4.45	4.45	4.16	4.16

Native Score $((x-62.5)/37.5)$ or $((x-66.67)/25.89)=$	1	0.990255	1	1
Invasive FLEPPC 1 Score $(1 - (x/30))=$	1	0.74359	0.777778	1
Sensitive Score $(x/(27.78 \text{ or } 20)) =$	0	0.384615	0.666667	0
Dominant CoC Score $(x/(7.91 \text{ or } 7)) =$	0.636429	0.636429	0.594286	0.594286
Raw Score Total = N+I+S+D =	2.636429	2.754888	3.03873	2.594286
Division Factor = (3 D=0 or 4) =	4	4	4	4
Average LVI dividend = Raw /DF	0.659107	0.688722	0.759683	0.648571
South				
LVI Score for sampling unit =	65.91071	68.87221	75.96825	64.85714
Total LVI SCORE =	69			

Water Quality Assessment

Long-term water quality data is not available for Hutto Lake. The available data was collected as part of this lake assessment. Table 4 provides a summary of the Physical/Chemical conditions recorded at the middle of Hutto Lake.

Table 4 Hutto Lake Water Quality (Field)

Depth (m)	Temp (C)	pH	DO (mg/L)	DO (% Sat)	Cond (umho/cm)	Salinity (ppt)	TDS (mg/L)	Secchi Depth (m)
0.28	31.37	5.8	8.05	107.2	75	0.04	48	3.1
2.5	30.03	5.09	2.81	36.6	77	0.04	49.2	
4.94	28.57	5.24	0	0	75.7	0.04	48.4	

The chemical water quality analysis for Hutto Lake is shown in Table 5 for the sample taken on June 15, 2016. Table 6 includes this data in the numeric nutrient criteria framework using the data from this assessment since geometric mean values for the past three years for available parameters are not available. Total Phosphorous values were below the nutrient threshold for clear acidic lakes with insufficient data developed by FDEP of 0.01 mg/l with a value of 0.008 mg/l. Total Nitrogen values were above the nutrient threshold for clear acidic lakes with insufficient data developed by FDEP of 0.51 mg/l with a value of 0.541 mg/l. Chlorophyll-a values are above the nutrient threshold for clear acidic lakes developed by FDEP of 6.0µg/l with a value of 9.6 µg/l.

Bacteria testing showed low levels of Fecal Coliform (< 10 colonies/100ml) below the rules set forth in FDEP 62-302.530. Enterococci colonies were measured at 150 colonies per 100ml.

(<https://www.flrules.org/gateway/RuleNo.asp?title=SURFACE%20WATER%20QUALITY%20STANDARDS&ID=62-302.500>) "Most Probable Number (MPN) or Membrane Filter (MF) counts shall not exceed a monthly average of 200, nor exceed 400 in 10% of the samples, nor exceed 800 on any one day. Monthly averages shall be expressed as geometric means based on a minimum of 10 samples taken over a 30 day period."

Table 5 Hendrics WestLake Water Quality Results from 7/27/2015(Laboratory)

Parameter	Value	Units
Alkalinity	12.0	mg/LCaCO ₃
Nitrates/Nitrites	0.003	mg/L
Fecal Coliform	<10	#/100 ml
Enterococci	150	#/100 ml
Chlorophyll a	8.0	ug/L
Chlorophyll b	2.7	ug/L
Chlorophyll c	2.6	ug/L
Chlorophyll t	13.3	ug/L
Chlorophylla Corr	9.6	ug/L
Chlorophyll-pheo	6.6	ug/L
Ammonia	0.011	mg/L
Kjeldahl Nitrogen	0.538	mg/L
Total Nitrogen	0.541	mg/L
Total Phosphorus	0.008	mg/L
Color(345)F.45	8.7	Pt/Co

Table 6 Numeric Nutrient Criteria Framework

Parameter	Value
Geometric Mean (Geomean) Color (pcu)	8.7
Number of Samples	1
Geometric Mean Alkalinity (mg/L CaCO ₃)	12.0
Number of Samples	1
Lake Type	Clear Acidic
Chlorophyll a Criteria (ug/L)	6
Insufficient for Geomean Criteria then P mg/L	0.01
Insufficient for Geomean Criteria then N mg/L	0.51
Geomean Chla ug/L	9.6
Geomean TP mg/L	0.008
Geomean TN mg/L	0.541
Number of Samples	1
Potential Impaired Chlorophyll a	Impaired
Potential Impaired TP	Not Impaired
Potential Impaired TN	Impaired

Conclusion

The results of the assessment of Hutto Lake shows impairment based on Total Nitrogen and Chlorophyll concentrations according to the FDEP numeric nutrient criteria using the single sample taken during this assessment. Long term sampling would be necessary to determine actual NNC values. The system shows healthy vegetation communities according to the Lake Vegetation Index with high overall species, low occurrences of non-native, invasive species and several sensitive plant species with an overall LVI score of 69. Bacteria sampling also revealed a low biomass of Fecal Coliform bacteria present at the time of the assessment.