Gornto Lake

LAKE HABITAT ASSESSMENT, LAKE VEGETATION IDEX, SUBMERGED VEGETATION SURVEY AND WATER QUALITY

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Methods

STUDY AREA ANALYISIS

The watershed containing Gornto Lake was analyzed using ESRI ArcGIS Pro. Using this software with 2022 ESRI Basemaps aerial, 2017 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 FDEP (https://floridadep.gov/dear/bioassessment/content/bioassessment-ldi-hdg-bcg). "The Landscape Development Intensity index (LDI) is an estimate of how much humans have altered an area of interest around a waterbody. Various land use types (low density residential, row crops, industrial, natural) are assigned coefficients of land use intensity based on estimates of the amount of human energy that is put into those land use types. The LDI is calculated by multiplying each land use coefficient by the percentage of the area of interest occupied by that land use, and then summing the results. The Florida Department of Environmental Protection (DEP) uses the LDI as a tool to estimate potential land use impacts on streams, lakes, and wetlands. For streams and rivers, DEP typically uses a LDI calculated for the 100 m buffer of the waterbody for 10 km upstream of the point of interest. For lakes and isolated wetlands, DEP typically uses a LDI calculated for the 100 m buffer around the waterbody. LDI values less than two (≤2) can be considered minimally disturbed."

LAKE BATHYMETRY AND MORPHOLOGICAL CHARACTERISTICS ASSESSMENT

The **Bathymetric Map**[1] provides the lake's morphologic parameters in various units. The bottom of the lake was mapped using a Lowrance Elite 7 Ti Wide Area Augmentation System (WAAS)[2] enabled Global Positioning System (GPS) with Totalscan transducer (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.

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[1] 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.

[2] WAAS is a form of differential GPS (DGPS) where data from 25 ground reference stations located in the United States receive GPS signals form 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 43.

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.
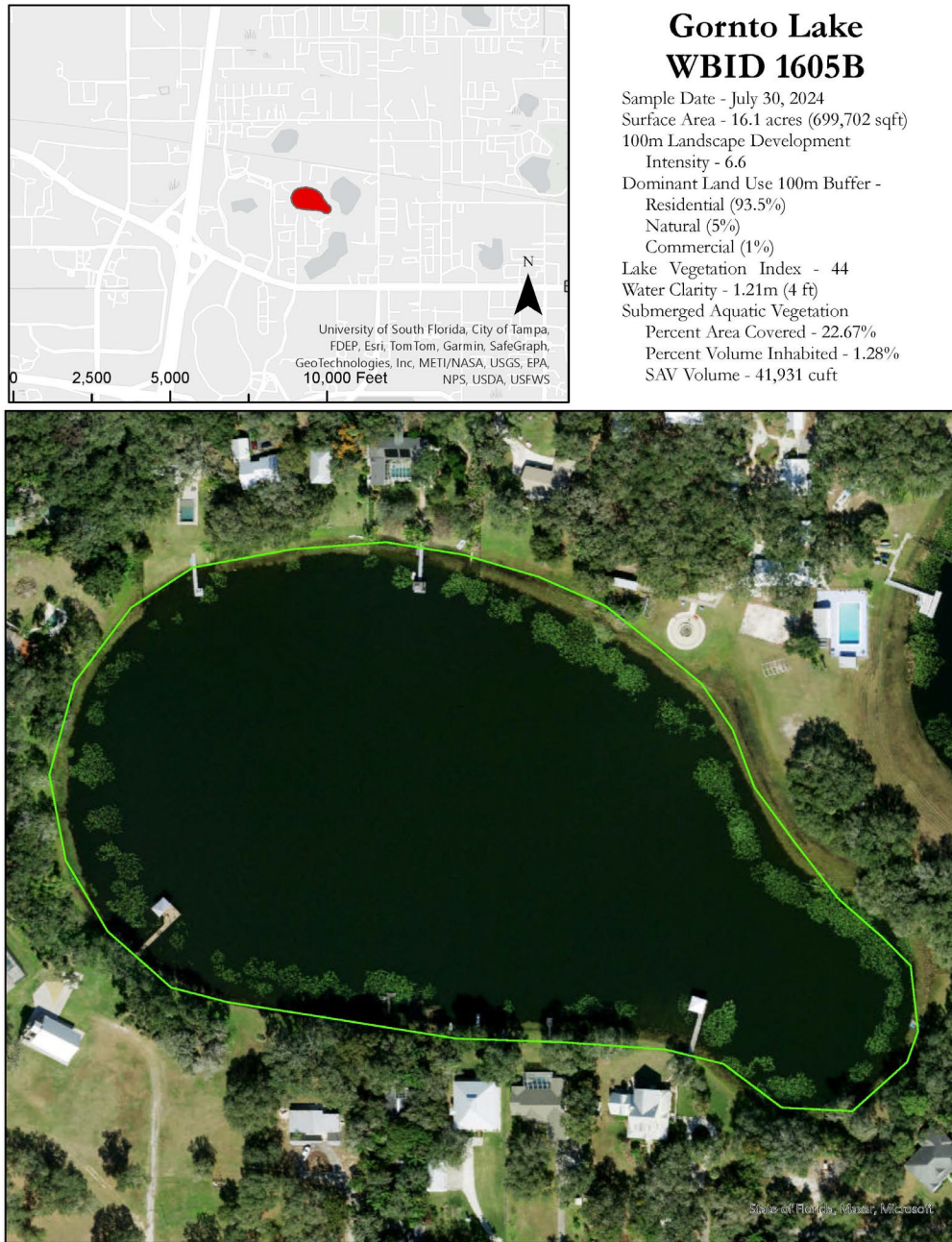
WATER QUALITY ASSESSMENT

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 Hillsborough County Public Utilities Laboratory Analysis include; Chlorophyll (a, b, c, t and corrected), Alkalinity, Color, E Coli, 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. Due to the lack of public access to the majority of lakes in Hillsborough County, the majority of available water quality samples are from the resident volunteer LAKEWATCH program. This data is being included in the analysis of Hillsborough County lakes.

Study Area

Gornto Lake is located in the Hillsborough Bay Watershed in central Hillsborough County, Florida. The Landscape Development Intensity Index of the 100 meter buffer around Gornto Lake is dominated by residential (93%) and natural 5%) land uses. The resulting LDI value for the 100 meter buffer around Gornto Lake is 6.59.

FIGURE 1: 2024 GORNTO LAKE ASSESSMENT STUDY AREA MAP

Gornto Lake
WBID 1605B

Sample Date - July 30, 2024
Surface Area - 16.1 acres (699,702 sqft)
100m Landscape Development
    Intensity - 6.6
Dominant Land Use 100m Buffer -
    Residential (93.5%)
    Natural (5%)
    Commercial (1%)
Lake Vegetation Index - 44
Water Clarity - 1.21m (4 ft)
Submerged Aquatic Vegetation
    Percent Area Covered - 22.67%
    Percent Volume Inhabited - 1.28%
    SAV Volume - 41,931 cuft

Lake Bathymetry and Morphological Characterization

At the time of the assessment, Gornto Lake was experiencing below normal water levels (33.32 feet NAVD88 on staff gauge) resulting in a 16.1 acre water body. Gornto Lake at the time of the assessment had a mean water depth of 4.7 feet and a maximum observed depth of 8.82 feet. The volume at this time was approximately 24,496,229 gallons. Figure 2 shows the resulting bathymetric contour map for Gornto Lake from data collected on July 30, 2024. The collected data has been overlain the 2022 ESRI Basemap aerials.

Table 1: Morphological Calculations for Gornto Lake

Parameter	Feet	Meters	Acres	Acre-Ft	Gallons
Surface Area (sq)	699,702	65,004	16.1		
Mean Depth	4.7	1.43			
Maximum Depth	8.82	2.69			
Volume (cubic)	3,274,647	92,727		75.2	24,496,229
Gauge (NAVD 88)	33.32	10.16			

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Figure 2: 2024 2-Foot Bathymetric Contour Map for Gornto Lake

Gornto Lake

Perimeter

Contour (ft)
— 1
— 2
— 3
— 4
— 5
— 6
— 7
— 8

EXPLANATION:
Survey Date: July 30, 2024
Water level was 33.32 ft NAVD88
at the time of the assessment.
Contours are expressed in absolute
depth below this level.

LAKE MORPHOLOGY:
Perimeter 3369 ft;
Area 16.1 Acres;
   (699,702 Sqft)
Mean Depth 4.7 ft;
Volume 75.2 Acre-ft,
   (24,496,229 gallons);
Deepest point 8.82 ft

DATA SOURCES:
2023 aerial photography provided by
ESRI.
Lake perimeter digitized from Hillsborough
County 2023 aerial photographs.
All contours generated by the USF Water
Institute from survey data collected by
USF Water Institute Lake and Stream
Assessment Program.

DISCLAIMER:
This map is for illustrative purposes only,
and should not be used for lake navigation.
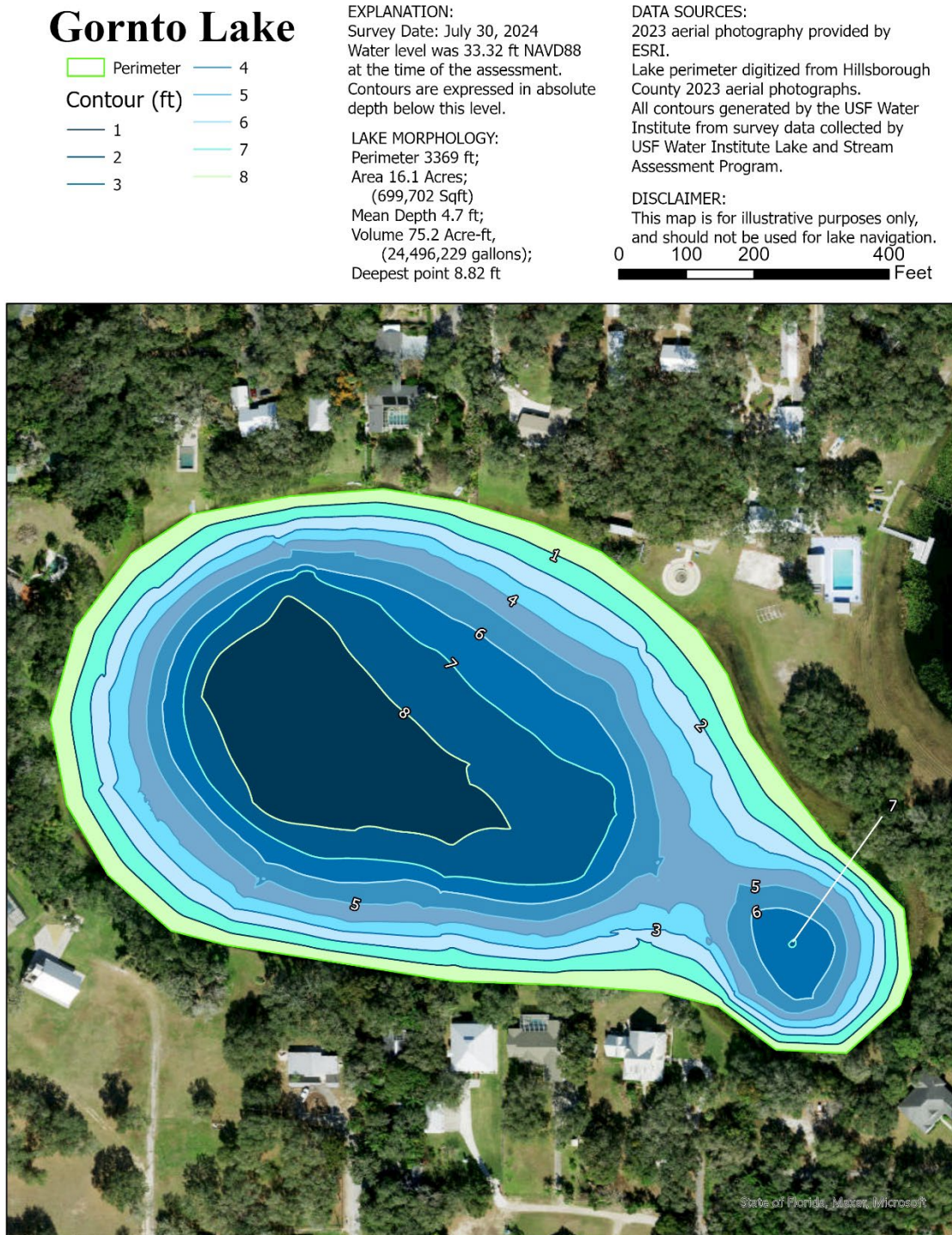
0   100   200   400
                          Feet

Figure 3 Overview photograph of Gornto Lake showing Nuphar which was present at all regions and dominant in 2 and 8

Lake Habitat and Lake Vegetation Index Assessment

The lake assessment for Gornto Lake was conducted on July 30, 2024. The water in Gornto Lake was characterized as green with slightly turbid water. The secchi disk depth was 1.22 meters allowing for the growth of submersed aquatic vegetation. The vegetation quality of the plants in and buffering Gornto Lake are predominantly native species with extensive growths of the non-native invasive species *Panicum repens* as it was present in all regions. The percentage of non-native FLEPPC 1 species ranged from 10% (regions 2 and 11) to 15.38% (region 8). Stormwater reaches the lake predominately via ditches, pipes, and cultivated vegetation and has none or ineffective BMPs. The development along the shoreline has maintained the nearshore *Taxodium* however the shrub and native ground cover communities have been maintained for residential turf grasses. The bottom substrate quality was dominated by sandy/silt and supported submersed vegetation.
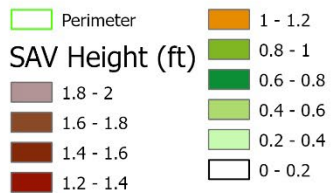
Figure 4 Gauge note height showing below normal levels at Gornto Lake

The Lake Vegetation Index identified 25 species of wetland vegetation growing in the four selected sections along Gornto Lake. The majority of these species (20) are native species. The remaining 5 species (*shown in **bold** in Table 2*) are non- native or invasive to this region. The vegetation community along the shorelines of Gornto Lake has been altered by lawn maintenance activities leaving a *Taxodium* canopy with a sparse shrub and ground cover community. The edges of the lake are dominated by species able to rapidly colonize following the frequent disturbance of mowing, such as *Panicum repens.* At the time of the assessment the water transparency was 1.22 m (4 ft). Low annual average secchi disk depths lead to a littoral zone being dominated by floating leaved vegetation. Three species of submersed aquatic vegetation were observed during the lake vegetation index, one submersed species found to be co-dominant was *Chara* The floating leaved vegetation community also had three species observed, two of which were found in all regions viewed being Hydrocotyle and Nuphar. Nuphar being co-dominant in regions 2 and 8.

By analyzing the collected sonar chart, submerged aquatic vegetation potentially covered approximately 22.67% of the surface area of Gornto Lake. This submerged vegetation inhabits an estimated 1.28% of the water volume in Gornto Lake. Figure 5 shows the results of the SAV analysis indicating the location and height of SAV estimated from collected sonar readings.

The calculated LVI score for Gornto Lake was 44, slightly above the impairment threshold of 43 indicating the vegetation community is not showing evidence of being "Impaired". Figure 6 shows the map of Gornto Lake detailing the LVI regions used for the assessment (Regions 2, 5, 8, 11) Table 2 details the species list results of the Lake Vegetation Index. Table 3 details the scoring result for the Lake Vegetation Index.

Gornto Lake

Perimeter

SAV Height (ft)

1.8 - 2	
1.6 - 1.8	
1.4 - 1.6	
1.2 - 1.4	

1 - 1.2	
0.8 - 1	
0.6 - 0.8	
0.4 - 0.6	
0.2 - 0.4	
0 - 0.2	

0   100   200   400
Feet

EXPLANATION:
Survey Date: July 30, 2024
Water level was 33.32 NAVD88
at the time of the assessment.
Submerged Aquatic Vegetation was
analyzed from collected sonar data.
The height of the SAV where present
is shown in 1 foot increments.

DATA SOURCES:
2023 aerial photography provided by
ESRI.
Lake perimeter digitized from Hillsborough
County 2023 aerial photographs.
All contours generated by the USF Water
Institute from survey data collected by
USF Water Institute Lake and Stream
Assessment Program

SAV STATISTICS:
Area 158,622 square ft; 3.6 Acres;
(22.67%) of Lake Surface Area)
Mean SAV Height 0.3 ft;
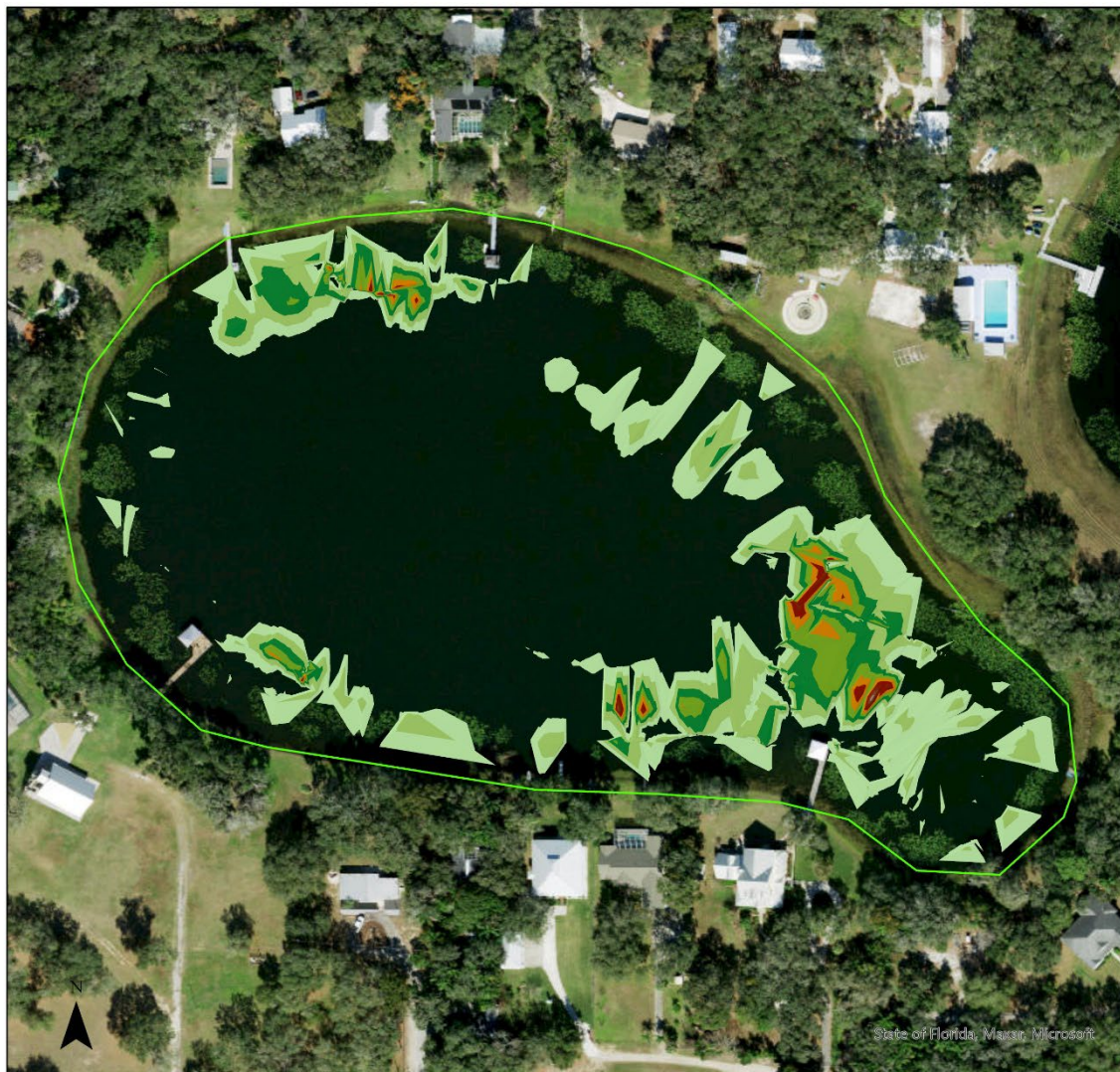Volume 41,931 Cubic ft, (313,669 gallons);
(1.28% of Lakes Volume)

Figure 5 Gornto Lake Submerged Aquatic Vegetation Assessment Results

Gornto Lake
WBID 1605B

- LVI Points
- LVI Regions

Sample Date - July 30, 2024
Regions Assessed - (2, 5, 8, 11)
Dominant Species Per Region -
  2 - Chara,
       Nuphar
  5 - Chara
  8 - Chara,
       Nuphar
  11 - Chara

Lake Description
  Water Clarity - 1.22 meters (4.0 ft)
                  - Slightly Turbid
  Color - Green
  Sediment Types
    Sand/Silt
      Vegetated
    Lake Vegetation Index - 44
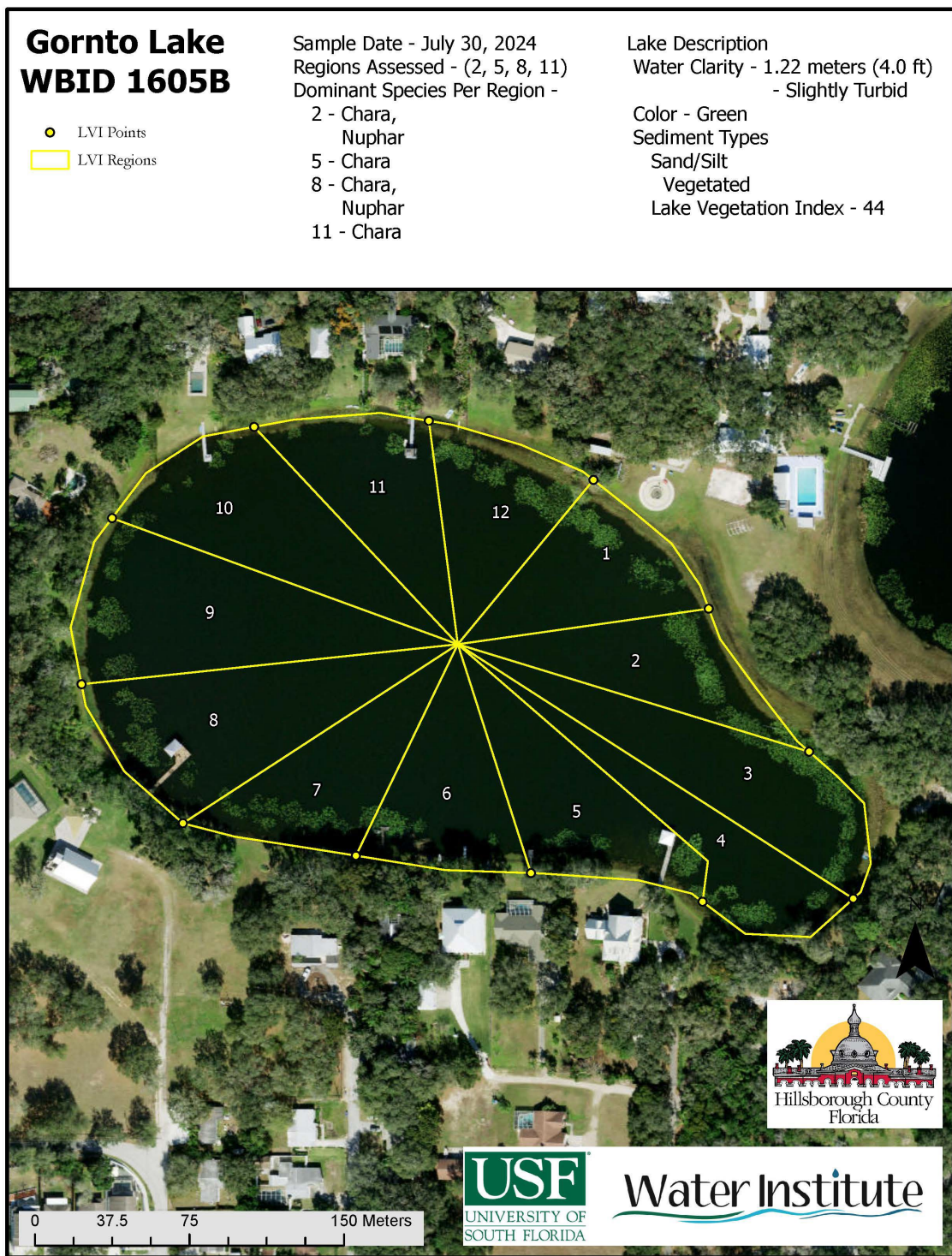
0   37.5   75   150 Meters

Figure 6: Lake Vegetation Index region map for Gornto Lake

Table 2: Lake Vegetation Index results for Gornto Lake July 30, 2024. In this table, "p" represents the taxa was present in the region while "c" and "d" denotes the taxa as being co-dominant or dominant in the vegetation region.

Taxon	Regions				Occurrences	C of C Score	FLEPPC Status	Wetland Status	Nativity
	2	5	8	11					
Aeschynomene indica	*p*				*1*	**0.49**	**Not Listed**	**FACW**	**Exotic**
Alternanthera philoxeroides			*p*	*p*	*2*	**0.00**	**Category 2**	**OBL**	**Exotic**
Chara	*c*	*d*	*c*	*d*	4	3.90	Not Listed	OBL	Native
Cyperus lecontei	*p*	*p*			2	2.33	Not Listed	FACW	Native
Cyperus odoratus	*p*	*p*	*p*		3	3.00	Not Listed	FACW	Native
Eleocharis baldwinii		*p*			1	2.82	Not Listed	OBL	Native
Eleocharis interstincta		*p*			1	7.80	Not Listed	OBL	Native
Eupatorium capillifolium		*p*		*p*	2	0.83	Not Listed	FAC	Native
Hydrocotyle	*p*	*p*	*p*	*p*	4	2.00	Not Listed	FACW	Native
Juncus marginatus	*p*				1	1.50	Not Listed	FACW	Native
Ludwigia arcuata		*p*		*p*	2	3.50	Not Listed	OBL	Native
Ludwigia erecta	*p*		*p*	*p*	3	2.55	Not Listed	OBL	Native
Ludwigia leptocarpa			*p*		1	3.00	Not Listed	OBL	Native
Ludwigia octovalvis	*p*	*p*	*p*	*p*	4	2.00	Not Listed	OBL	Native
Ludwigia peruviana			*p*		*1*	**0.00**	**Category 1**	**OBL**	**Exotic**
Ludwigia repens			*p*		1	3.20	Not Listed	OBL	Native
Mikania scandens		*p*			1	1.95	Not Listed		Native
Nitella			*p*		1	6.00	Not Listed	OBL	Native
Nuphar	*c*	*p*	*c*	*p*	4	3.50	Not Listed	OBL	Native

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Taxon	Regions				Occurrences	C of C Score	FLEPPC Status	Wetland Status	Nativity
	2	5	8	11					
Panicum repens	p	p	p	p	4	0.00	Category 1	FACW	Exotic
Pluchea baccharis		p			1	5.45	Not Listed	FACW	Native
Ruellia simplex		p			1	0.00	Category 1	FAC	Exotic
Sacciolepis striata			p		1	5.35	Not Listed	OBL	Native
Salix caroliniana		p			1	2.95	Not Listed	OBL	Native
Typha				p	1	1.00	Not Listed	OBL	Native

Table 3: Scoring Summary for the Lake Vegetation Index

LVI Sample Result:				44
Region	South			
Metric / Section	2	5	8	11
Total # Taxa	10	15	13	10
% Native Taxa	80%	87%	77%	80%
% FLEPPC 1 Taxa	10%	13%	15%	10%
% Sensitive Taxa	0	7%	0	0
Dom Taxa Count	2	1	2	1
CofC Dom Taxa	3.70	3.90	3.70	3.90
Section LVI	43	55	35	43

Water Quality Assessment

Limited long-term water quality data is available for Gornto Lake with sporadic sampling and no available data between 2017 and the assessment in 2024. The available data was collected by Lakewatch, Southwest Florida Water Management District, Florida Department of Environmental Protection and Hillsborough County Environmental Services. Table 4 provides a summary of the Physical/Chemical conditions recorded at the middle of the Gornto Lake during the assessment in 2024.

Table 4: Lake Gornto Water Quality 7/30/2024 (Field)

Meter Readings:	Depth (M)	Temp (°C)	pH (SU)	D.O (MG/L)	D.O Sat. (%)	Cond. (UMHO/CM)	Salinity (PPT)
Top:	0.5	31	7.32	7.32	92.3	179.4	0.08
Mid-Depth:	1.26	30.8	7	2.14	26.9	284.7	0.13
Bottom:	2.46	30.7	6.9	0.86	2.41	286.9	0.13

The chemical water quality analysis for Gornto Lake is shown in Table 5. These values are the geometric mean value of available data for each annual period as well as the period of record. The FDEP Numeric Nutrient Criteria splits lakes into separate types based on color at 40 PCU. The "clear" water lakes below this value are further split into alkaline and acidic based on an alkalinity value of 20mg/L CaCO3. The long term color data has a geometric mean value of 28 PCU, classifying it as a clear water lake (less than 40 PCU). Total Alkalinity period of record geometric mean value is 22 mg/L, classifying Gornto Lake as alkaline. The NNC thresholds for a clear-alkaline lake with insufficient data to calculate NNC (Previous three years with at least 4 samples per year in separate seasons) are 20 µg/L for Chlorophyll-a Corrected for Phaeophytin, 0.03 mg/L for Total Phosphorous and 1.05 mg/L for Total Nitrogen.

Geometric mean Chlorophyll-a corrected values for the 2024 sampling is below the threshold with annual geometric mean of 10.60 µg/L. The period of record geometric mean for chlorophyll-a corrected is 18.05 µg/L. Total Phosphorous geometric mean value for the most recent data was above of the nutrient threshold for clear-alkaline lakes in the peninsula region with sufficient data with a value of 0.068 mg/l. Total Nitrogen values were below the nutrient threshold for clear-alkaline lakes with insufficient data with a value of 0.916 mg/L. Table 6 includes this data in the numeric nutrient criteria framework using the data from this assessment and the previous 3 years of data collected by Hillsborough County.

Bacteria testing showed low levels of E. Coli (12.24 colonies/100ml) and Enterococci (7.6 colonies/100ml) below the rules set forth in FDEP 62-302.530 (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: Gornto Lake 2024 Hillsborough County Environmental Services Water Quality Results (Laboratory)

Parameter	2024	POR Mean Value	Units
Alkalinity	13.72	22	mg/LCaCO3
Color		28	PCU
E Coli	12.24	19.02	#/100ml
Enterococci	7.61	7.61	#/100 ml
Chlorophyll a	11.11	13.96	ug/L
Chlorophyll b	4.29	3.50	ug/L
Chlorophyll c	4.29	3.68	ug/L
Chlorophyll a Corrected	10.60	18.05	ug/L
Ammonia	0.073	0.073	mg/L
Nitrates/Nitrites	0.043	0.043	mg/L
Kjeldahl Nitrogen	0.890	0.890	mg/L
Total Nitrogen	0.916	0.846	mg/L
Total Phosphorus	0.068	0.037	mg/L

Table 6: Numeric Nutrient Criteria Framework

Parameter	Value
Geometric Mean Color (pcu)	28
Number of Samples	21
Geometric Mean Alkalinity (mg/L CACO3)	22
Number of Samples	17
Lake Type	Clear-Alkaline

Year (# of Samples)	Geomean Chla Corrected (µg/L)	Chlorophyll a Criteria (µg/L)	Geomean Total Phosphorous (mg/L)	Total Phosphorous Criteria (mg/L)	Geomean Total Nitrogen (mg/L)	Total Nitrogen Criteria (mg/L)
2022 (0)		< 20		< 0.03		< 1.05
2023 (0)		< 20		< 0.03		< 1.05
2024 (7)	10.60	< 20	0.068	< 0.03	0.916	< 1.05

Conclusion

Gornto Lake is a predominately residential lake in the Hillsborough Bay Watershed of Hillsborough County, Florida. The results of the assessment of Gornto Lake shows a potentially healthy lake based on Chlorophyll-a and Total Nitrogen and potentially impaired lake for Total Phosphorous concentrations according to the FDEP numeric nutrient criteria using the limited Hillsborough County Environmental Services datasets. Consistent sampling would need to occur over a three year period to properly calculate the standards.

The system shows borderline impairment in the vegetation communities according to the Lake Vegetation Index with few total taxa, several invasive species (5) and an overall LVI score of 44. The assessment also revealed a submerged aquatic vegetation community comprising 3 species occupying 22.67% of the surface area and 1.28% of the volume of Gornto Lake.