Lake Assessment Report for
Little Lake Wilson
in Hillsborough County, Florida

Date Assessed: May 31, 2011
Assessed by: David Eilers, Kris Caldwell and Alden Earle
Reviewed by: Jim Griffin

INTRODUCTION

This assessment was conducted to update existing physical and ecological data for Little Lake Wilson on the Hillsborough County & City of Tampa Water Atlas. The project is a collaborative effort between the University of South Florida's Center for Community Design and Research and Hillsborough County Stormwater Management Section. The project is funded by Hillsborough County and the Southwest Florida Water Management District. The project has, as its primary goal, the rapid assessing of up to 150 lakes in Hillsborough County during a five-year period. The product of these investigations will provide the County, lake property owners and the general public a better understanding of the general health of Hillsborough County lakes, in terms of shoreline development, water quality, lake morphology (bottom contour, volume, area, etc.) and the plant biomass and species diversity. These data are intended to assist the County and its citizens to better manage lakes and lake-centered watersheds.

Figure 1. . General photo of Little Lake Wilson featuring a feeding Osprey

The first section of the report provides the results of the overall morphological assessment of the lake. Primary data products include: a contour (bathymetric) map of the lake, area, volume and depth statistics, and the water level at the time of assessment. These data are useful for evaluating trends and for developing management actions such as plant management where depth and lake volume are needed.

The second section provides the results of the vegetation assessment conducted on the lake. These results can be used to better understand and manage vegetation in the lake. A list is provided with the different plant species found at various sites around the lake. Potentially invasive, exotic (non-native) species are identified in a plant list and the percent of exotics is presented in a summary table. Watershed values provide a means of reference.

The third section provides the results of the water quality sampling of the lake. Both field data and laboratory data are presented. The trophic state index (TSI)[i] is used to develop a general lake health statement, which is calculated for both the water column with vegetation and the water column if vegetation were removed. These data are derived from the water chemistry and vegetative submerged biomass assessments and are useful in understanding the results of certain lake vegetation management practices.

The intent of this assessment is to provide a starting point from which to track changes in the lake, and where previous comprehensive assessment data is available, to track changes in the lake's general health. These data can provide the information needed to determine changes and to monitor trends in physical condition and ecological health of the lake.

Section 1: Lake Morphology

Bathymetric Map[ii]. Table 1 provides the lake's morphologic parameters in various units. The bottom of the lake was mapped using a Lowrance LCX 28C HD Wide Area Augmentation System (WAAS)[iii] 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 (Figure 2). 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.

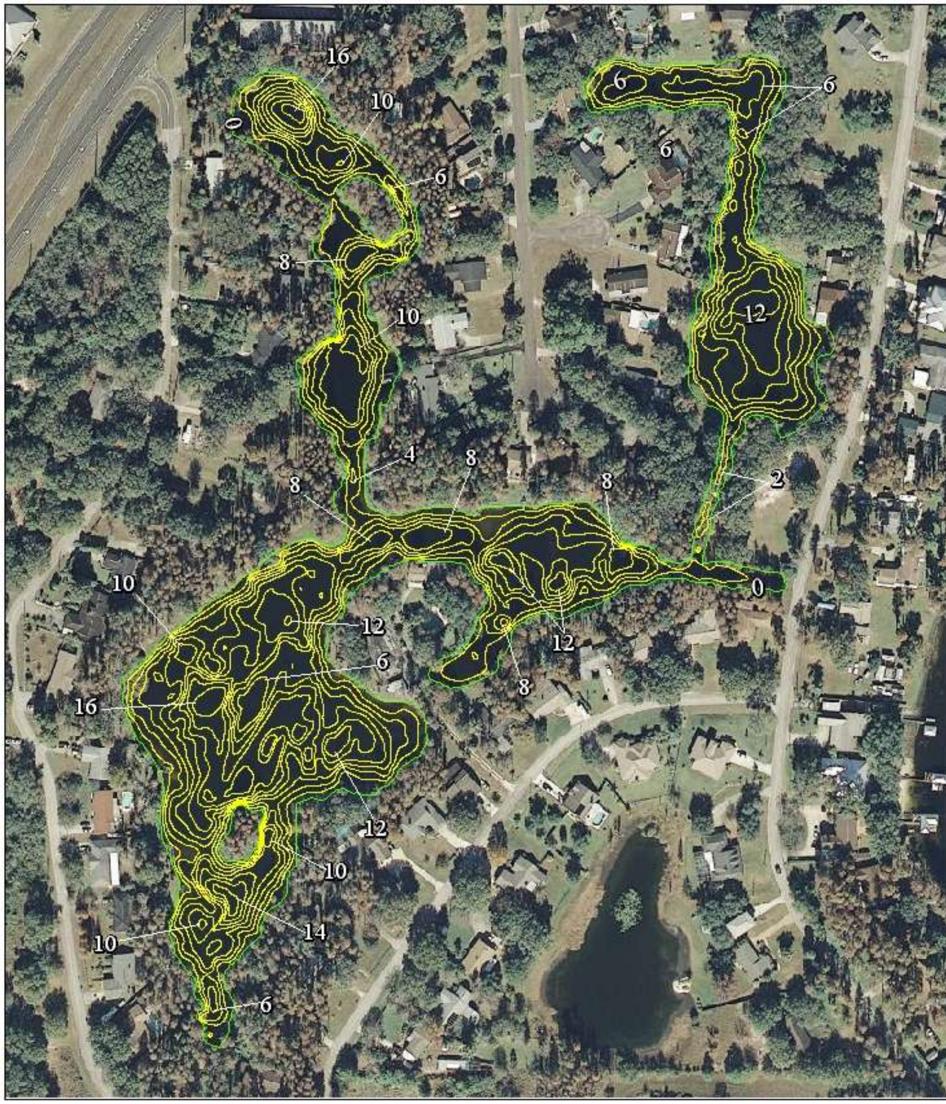
Table 1. Lake Morphologic Data (Area, Depth and Volume)

Parameter	Feet	Meters	Acres	Acre-Ft	Gallons
Surface Area (sq)	486,189.35	45,168.47	11.16		
Mean Depth	6.22	1.90			
Maximum Depth	16.88	5.15			
Volume (cubic)	2,853,951.51	80,814.91		65.52	21,349,187.8
Gauge (relative)	2.73	0.83			

[i] The trophic state index is used by the Water Atlas to provide the public with an estimate of their lake resource quality. For more information, see end note 1.

[ii] 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.

[iii] 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.



Little Lake Wilson

Section - Township - Range
10-27-18

Contour Lines
Expressed in
2-Foot Intervals

Lake Perimeter
Ground Level

EXPLANATION:
Survey Date: May 31, 2011
Lake water level was 2.73 ft (realative)
Contours are expressed in absolute depth
below this level.

LAKE MORPHOLOGY:
Perimeter: 9,614.38 ft;
Area 11.16 Acres
Mean Depth 6.22 ft;
Volume 65.52 Acre-ft, (21,349,187.82 gallons);
Deepest point 16.88 ft

DATA SOURCES:
2009 aerial photography provided by the
SWFWMD.
Lake perimeter digitized from SWFWMD
2009 aerial photographs.
All contours generated by the Florida Center
for Community Design and Research from
survey data collected by USF Lake and
Stream Assessment Program.

DISCLAIMER:
This map is for illustrative purposes only,
and should not be used for lake navigation.

Feet
0 125 250 375 500

Hillsborough County

FLORIDA CENTER
CD+R

Figure 2. 2011 2-Foot Bathymetric Contour Map for Little Lake Wilson

Section 2: Lake Ecology (Vegetation)

The lake's apparent vegetative cover and shoreline detail are evaluated using the latest lake aerial photograph as shown in and by use of WAAS-enabled GPS. Submerged vegetation is determined from the analysis of bottom returns from the Lowrance 28c HD combined GPS/fathometer described earlier. As depicted in Figure 3, 10 vegetation assessment sites were chosen for intensive sampling based on the *Lake Assessment Protocol* (copy available on request) for a lake of this size. The site positions are set using GPS and then loaded into a GIS mapping program (ArcGIS) for display. Each site is sampled in the three primary vegetative zones (emergent, submerged and floating)[iv]. The latest high resolution aerial photos are used to provide shore details (docks, structures, vegetation zones) and to calculate the extent of surface vegetation coverage. The primary indices of submerged vegetation cover and biomass for the lake, percent area coverage (PAC) and percent volume infestation (PVI), are determined by transiting the lake by boat and employing a fathometer to collect "hard and soft return" data. These data are later analyzed for presence and absence of vegetation and to determine the height of vegetation if present. The PAC is determined from the presence and absence analysis of 100 sites in the lake and the PVI is determined by measuring the difference between hard returns (lake bottom) and soft returns (top of vegetation) for sites (within the 100 analyzed sites) where plants are determined present.

Beginning with the 2010 Lake Assessments, the Water Atlas Lake Assessment Team has added the Florida Department of Environmental Protection (FDEP) Lake Vegetation Index (LVI)[v] method to the methods used to evaluate a lake. The LVI method was designed by DEP to be a rapid assessment of ecological condition, by determining how closely a lake's flora resembles that expected from a minimally disturbed condition.

The data collected during the site vegetation sampling include vegetation type, exotic vegetation, predominant plant species and submerged vegetation biomass. The total number of species from all sites is used to approximate the total diversity of aquatic plants and the percent of invasive-exotic plants on the lake (Table 2). The Watershed value in Table 2 only includes lakes sampled during the lake assessment project begun in May of 2006. These data will change as additional lakes are sampled. Table 3 through Table 5 detail the results from the 2011 aquatic plant assessment for the lake. These data are determined from the 10 sites used for intensive vegetation surveys. The tables are divided into Floating Leaf, Emergent and Submerged plants and contain the plant code, species, common name and presence (indicated by a 1) or absence (indicated by a blank space) of species and the calculated percent occurrence (number sites species is found/number of sites) and type of plant (Native, Non-Native, Invasive, Pest). In the "Type" category, the codes N and E0 denote species native to Florida. The code E1 denotes Category I invasive species, as defined by the Florida Exotic Pest Plant Council (FLEPPC); these are species "that are altering native plant communities by displacing native species, changing community structures or ecological functions, or hybridizing with natives." The code E2 denotes Category II invasive species, as defined by FLEPPC; these species "have increased in abundance or frequency but have not yet altered Florida plant communities to the extent shown by Category I species." Use of the term invasive indicates the plant is commonly considered invasive in this region of Florida. The term "pest" indicates a plant (native or non-native) that has a greater than 55% occurrence in the lake and is also considered a problem plant for this region of Florida, or is a non-native invasive that is or has the potential to be a problem plant in the lake and has at least 40% occurrence. These two terms are somewhat subjective; however, they are provided to give lake property owners some guidance in the management of plants on their property. Please remember that to remove or control plants in a wetland (lake shoreline) in Hillsborough County the property owner must secure an Application To Perform Miscellaneous Activities In Wetlands permit from the Environmental Protection Commission of Hillsborough County and for management of in-lake vegetation outside the wetland fringe (for lakes with an

[iv] See end note 3.
[v] See end note 4.

area greater than ten acres), the property owner must secure a Florida Department of Environmental Protection Aquatic Plant Removal Permit.

Table 2. Total Diversity, Percent Exotics, and Number of Pest Plant Species

Parameter	Lake	Watershed
Number of Vegetation Assessment Sites	10	225
Total Plant Diversity (# of Taxa)	68	197
% Non-Native Plants	28	17
Total Pest Plant Species	5	25

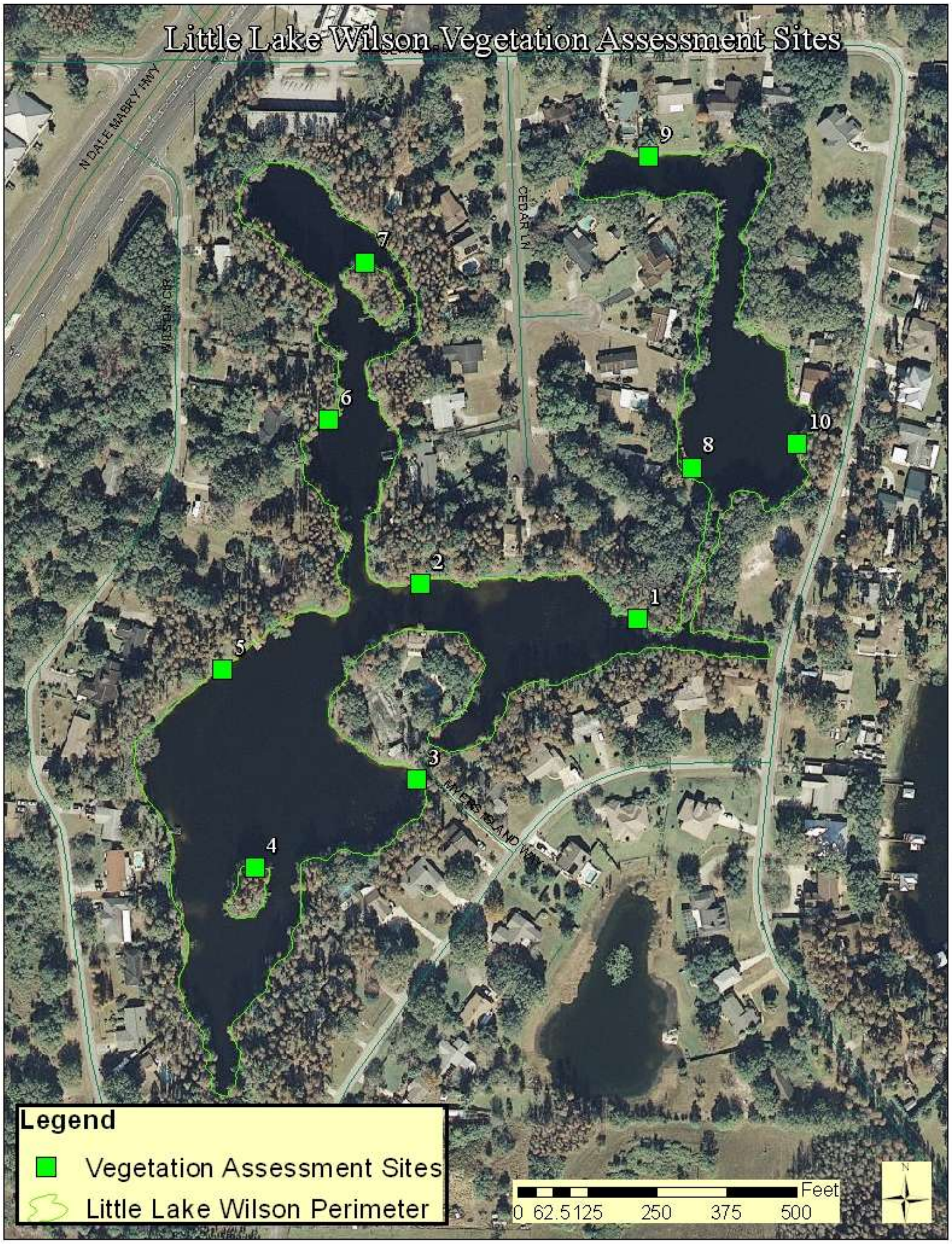


Figure 3. Vegetation Assessment Site Map for Little Lake Wilson

Table 3. List of Floating Leaf Zone Aquatic Plants Found

Plant Species Code	Scientific Name	Common Name	Percent Occurrence	Type
ALG	*Algal spp.*	Algal Mats, Floating	50%	
LEN	*Lemna spp.*	Duckweed	10%	N, E0
NLM	*Nuphar lutea*	Spatterdock, Yellow Pondlily	10%	N, E0
SPI	*Spirodela polyrhiza*	Giant Duckweed	10%	N, E0


Figure 4. Several emergent tree islands are present on Little Lake Wilson.

Table 4. List of Emergent Zone Aquatic Plants Found

Plant Species Code	Scientific Name	Common Name	Percent Occurrence	Type
APS	*Alternanthera philoxeroides*	Alligator Weed	100%	E2, P
PRS	*Panicum repens*	Torpedo Grass	100%	E1, P
TAS	*Taxodium acendens*	Pond Cypress	80%	N, E0
HYE	*Hydrocotyl umbellata*	Manyflower Marshpennywort, Water Pennywort	80%	N, E0
BLS	*Blechnum serrulatum*	Swamp fern, Toothed Midsorus Fern	70%	N
COS	*Cephalanthus occidentalis*	Buttonbush	70%	N, E0
EAA	*Eclipta alba*	Yerba De Tajo	70%	N, E0
STS	*Schinus terebinthifolius*	Brazilian Pepper	70%	E1, P
CEA	*Colocasia esculenta*	Wild Taro	70%	E1, P
LPA	*Ludwigia peruviana*	Peruvian Primrosewillow	60%	E0, P
CSS	*Cyperus surinamensis*	Sedge	50%	N, E0
BOC	*Boehmeria cylindrica*	Bog Hemp, False Nettle	50%	N, E0
CAA	*Centella asiatica*	Asian Pennywort, Coinwort	50%	N, E0
PCA	*Pontederia cordata*	Pickerel Weed	50%	N, E0
DVA	*Diodia virginiana*	Buttonweed	40%	N, E0
CPT	*Cyperus polystachyos*	Flat Sedge	40%	N, E0
AAA	*Ampelopsis arborea*	Peppervine	40%	N, E0
CYO	*Cyperus odoratus*	Fragrant Flatsedge	40%	N, E0
PBA	*Persea borbonia*	Redbay	40%	N, E0
TYP	*Typha spp.*	Cattails	40%	N, E0
PNA	*Phyla nodiflorea*	Frog-fruit, Carpetweed, Turkey Tangle Fogfruit	40%	N, E0
PFO	*Paederia foetida*	Skunkvine, Stinkvine	40%	E1
PHN	*Panicum hemitomon*	Maidencane	30%	N, E0
QLA	*Quercus laurifolia*	Laurel Oak; Diamond Oak	30%	N, E0
SLA	*Sagittaria lancifolia*	Duck Potato	30%	N, E0
MSS	*Mikania scandens*	Climbing Hempvine	30%	N, E0
JMS	*Juncus megacephalus*	Bighead Rush	30%	N, E0
JUM	*Juncus marginatus*	Shore Rush, Grassleaf Rush	20%	N, E0
IRI	*Iris spp.*	Flag	20%	E0
MVA	*Magnolia virginiana*	Sweetbay Magnolia	20%	N, E0
MEL	*Melaleuca quinquenervia*	Punk Tree, Melaleuca	20%	E1
PCM	*Ptilimnium capillaceum*	Mock Bishopsweed; Herbwilliam	20%	N, E0
FBA	*Furinea brevista*	Saltmarsh Umbrellasedge	20%	N, E0
GTM	*Galium tinctorium*	Marsh Bedstraw	20%	N, E0
WAX	*Myrica cerifera*	Wax Myrtle	20%	N, E0

Plant Species Code	Scientific Name	Common Name	Percent Occurrence	Type
QNA	*Quercus nigra*	Water Oak	20%	N, E0
RF	*Osmunda regalis*	Royal Fern	20%	N, E0
PHS	*Polygonum hydropiperoides*	MILD WATERPEPPER; SWAMP SMARTWEED	20%	N, E0
PLU	*Pluchea spp.*	Marsh Fleabane,Camphorweed	20%	N, E0
PGM	*Paspalidium geminatum*	Egyptian Paspalidium	10%	E0
RVS	*Rumex verticillatus*	Swamp Dock	10%	N, E0
SAM	*Sambucus canadensis*	Elderberry	10%	N, E0
SCA	*Salix caroliniana*	Carolina Willow	10%	N, E0
WTA	*Wedelia trilobata*	Creeping Oxeye	10%	E2
TDM	*Taxodium distichum*	Bald Cypress	10%	N, E0
SPO	*Sabal palmetto*	Sabal Palm, Cabbage Palm	10%	N, E0
SSM	*Sapium sebiferum*	Chinese Tallow Tree	10%	E1
PQA	*Parthenocissus quinquefolia*	Virginia Creeper, Woodbine	10%	N, E0
HCS	*Luziola fluitans*	Watergrass	10%	N, E0
GLS	*Gordonia lasianthus*	Loblolly Bay	10%	N, E0
DBA	*Dioscorea bulbifera*	Air Potato	10%	E1
EQS	*Erigeron quercifolius*	Oakleaf Fleabane	10%	N, E0
ACE	*Acer rubrum*	Southern Red Maple	10%	N, E0
CAM	*Crinum americanum*	Swamp lily	10%	N, E0
CFA	*Canna flaccida*	Golden Canna	10%	N, E0
NEA	*Nephrolepis exaltata*	Sword Fern, Wild Boston Fern	10%	N, E0
OCA	*Osmunda cinnamomea*	Cinnamon Fern	10%	N, E0
JES	*Juncus effusus var solutus*	Soft Rush	10%	N, E0
ICE	*Ilex cassine*	Dahoon Holly	10%	N, E0
LGA	*Lindernia grandiflora*	Savannah False Pimpernel	10%	N, E0
LIQ	*Liquidamber styraciflua*	Sweetgum	10%	N, E0

Figure 5. An example of the emergent vegetation community along Little Lake Wilson.

Table 5. List of Submerged Zone Aquatic Plants Found.

Plant Species Code	Scientific Name	Common Name	Percent Occurrence	Type
BMI	*Bacopa monnieri*	Common Bacopa	40%	N, E0
EBI	*Eleocharis baldwinii*	Baldwin's Spikerush, Roadgrass	20%	N, E0
CAB	*Cabomba caroliniana*	Fanwort	10%	N, E0

Figure 6. ***Colocasia esculenta*** **was the most commonly occurring non-native invasive species found on Little Lake Wilson**

Table 6. List of All Plants and Sample Sites

Plant Common Name	Found at Sample Sites	Percent Occurrence	Growth Type
Alligator Weed	1,2,3,4,5,6,7,8,9,10	100	Emergent
Torpedo Grass	1,2,3,4,5,6,7,8,9,10	100	Emergent
Manyflower Marshpennywort, Water Pennywort	1,2,3,5,6,7,8,9	80	Emergent
Pond Cypress	1,2,3,4,5,6,7,8	80	Emergent
Brazilian Pepper	1,5,6,7,8,9,10	70	Emergent
Buttonbush	1,2,4,5,6,7,9	70	Emergent
Swamp fern, Toothed Midsorus Fern	1,4,5,6,7,9,10	70	Emergent
Wild Taro	1,3,4,5,6,7,10	70	Emergent
Yerba De Tajo	2,3,5,6,8,9,10	70	Emergent
Peruvian Primrosewillow	2,3,5,6,7,9	60	Emergent
Algal Mats, Floating	2,3,5,9,10	50	Floating
Asian Pennywort, Coinwort	2,3,5,6,9	50	Emergent
Bog Hemp, False Nettle	2,3,5,6,10	50	Emergent
Pickerel Weed	2,3,5,9,10	50	Emergent
Sedge	2,3,5,8,9	50	Emergent
Buttonweed	3,7,8,9	40	Emergent
Cattails	2,4,9,10	40	Emergent
Common Bacopa	3,5,8,9	40	Submersed
Flat Sedge	2,3,5,9	40	Emergent
Fragrant Flatsedge	1,2,3,5	40	Emergent
Frog-fruit, Carpetweed, Turkey Tangle Fogfruit	3,5,8,9	40	Emergent
Peppervine	1,2,4,7	40	Emergent
Redbay	1,4,7,9	40	Emergent
Skunkvine, Stinkvine	2,5,6,7	40	Terrestrial
Bighead Rush	2,5,9	30	Emergent
Climbing Hempvine	2,3,5	30	Emergent
Duck Potato	2,5,10	30	Emergent
Laurel Oak; Diamond Oak	5,9,10	30	Emergent
Maidencane	2,7,10	30	Emergent
Baldwin's Spikerush, Roadgrass	2,8	20	Submersed
Flag	2,9	20	Emergent
Marsh Bedstraw	3,5	20	Emergent

Plant Common Name	Found at Sample Sites	Percent Occurrence	Growth Type
Marsh Fleabane,Camphorweed	2,3	20	Emergent
MILD WATERPEPPER; SWAMP SMARTWEED	3,5	20	Emergent
Mock Bishopsweed; Herbwilliam	2,3	20	Emergent
Punk Tree, Melaleuca	9,10	20	Emergent
Royal Fern	2,7	20	Emergent
Saltmarsh Umbrellasedge	2,3	20	Emergent
Shore Rush, Grassleaf Rush	3,9	20	Emergent
Sweetbay Magnolia	2,7	20	Emergent
Water Oak	1,10	20	Emergent
Wax Myrtle	1,4	20	Emergent
Air Potato	1	10	Emergent
Bald Cypress	2	10	Emergent
Carolina Willow	9	10	Emergent
Chinese Tallow Tree	4	10	Emergent
Cinnamon Fern	1	10	Emergent
Creeping Oxeye	3	10	Emergent
Dahoon Holly	6	10	Emergent
Duckweed	3	10	Floating
Egyptian Paspalidium	10	10	Emergent
Elderberry	2	10	Emergent
Fanwort	2	10	Submersed
Giant Duckweed	1	10	Floating
Golden Canna	2	10	Emergent
Loblolly Bay	7	10	Emergent
Oakleaf Fleabane	3	10	Terrestrial
Sabal Palm, Cabbage Palm	3	10	Terrestrial
Savannah False Pimpernel	3	10	Emergent
Soft Rush	2	10	Emergent
Southern Red Maple	2	10	Emergent
Spatterdock, Yellow Pondlily	2	10	Floating
Swamp Dock	3	10	Emergent
Swamp lily	2	10	Emergent
Sweetgum	10	10	Emergent

Plant Common Name	Found at Sample Sites	Percent Occurrence	Growth Type
Sword Fern, Wild Boston Fern	6	10	Terrestrial
Virginia Creeper, Woodbine	3	10	Emergent
Watergrass	3	10	Emergent

Section 3: Long-term Ambient Water Chemistry

A critical element in any lake assessment is the long-term water chemistry data set. These data are obtained from several data sources that are available to the Water Atlas and are managed in the Water Atlas Data Download and graphically presented on the water quality page for lakes in Hillsborough County. The Little Lake Wilson Water Quality Page can be viewed at http://www.hillsborough.wateratlas.usf.edu/lake/waterquality.asp?wbodyid=5067&wbodyatlas=lake).

A primary source of lake water chemistry in Hillsborough County is the Florida LAKEWATCH volunteer lake monitor and the Florida LAKEWATCH laboratory at the University of Florida. Little Lake Wilson is fortunate to have an active LAKEWATCH volunteer who has collected lake water samples for significant time period which allow an analysis of lake trends. Other source data are used as available; however these data can only indicate conditions at time of sampling.

These data are displayed and analyzed on the Water Atlas as shown in Figure 7Figure 7, Figure 8, and Figure 9 for Little Lake Wilson. The figures are graphs of: (1) the overall trophic state index (TSI)[i], which is a method commonly used to characterize the productivity of a lake, and may be thought of as a lake's ability to support plant growth and a healthy food source for aquatic life; (2) the chlorophyll *a* concentration, which indicates the lake's algal concentration, and (3) the lake's Secchi Disk depth which is a measure of water visibility and depth of light penetration. These data are used to evaluate a lake's ecological health and to provide a method of ranking lakes and are indicators used by the US Environmental Protection Agency (USEPA) and the Florida Department of Environmental Protection (FDEP) to determine a lake's level of impairment. The chlorophyll a and Secchi Disk depth graphs include benchmarks which indicate the median values for the various parameters for a large number of Lakes in Florida expressed as percentiles.

Based on best available data, Little Lake Wilson has a color value determined as a platinum cobalt unit (pcu) value of 26.7 and is considered a Clear lake (has a mean color in pcu equal to or below 40). The FDEP and USEPA may classify a lake as impaired if the lake is a dark lake (has a mean color in pcu greater than 40) and has a TSI greater than 60, or is a clear lake and has a TSI greater than 40. Little Lake Wilson has a TSI of 55 and meets the FDEP Impaired Waters Rule (IWR) criteria and could be classified as impaired. See also Table 7.

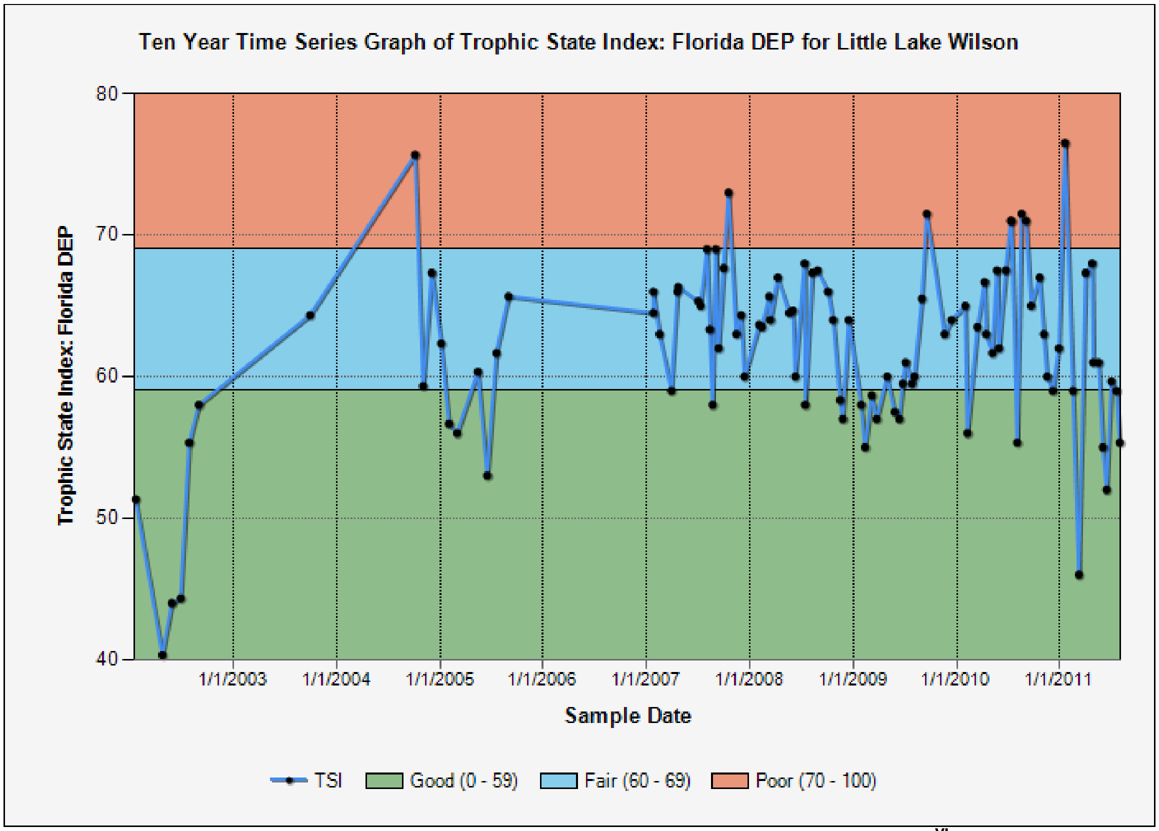


Figure 7. Recent Trophic State Index (TSI) graph for Little Lake Wilson[vi]

[vi] Graph source: Hillsborough County Water Atlas. For an explanation of the Good, Fair and Poor benchmarks, please see the notes at the end of this report. For the latest data go to: http://www.hillsborough.wateratlas.usf.edu/graphs20/graph_it.aspx?wbodyid=5067&data=TSI&datatype=WQ&waterbodyatlas=lake&ny=10&bench=1

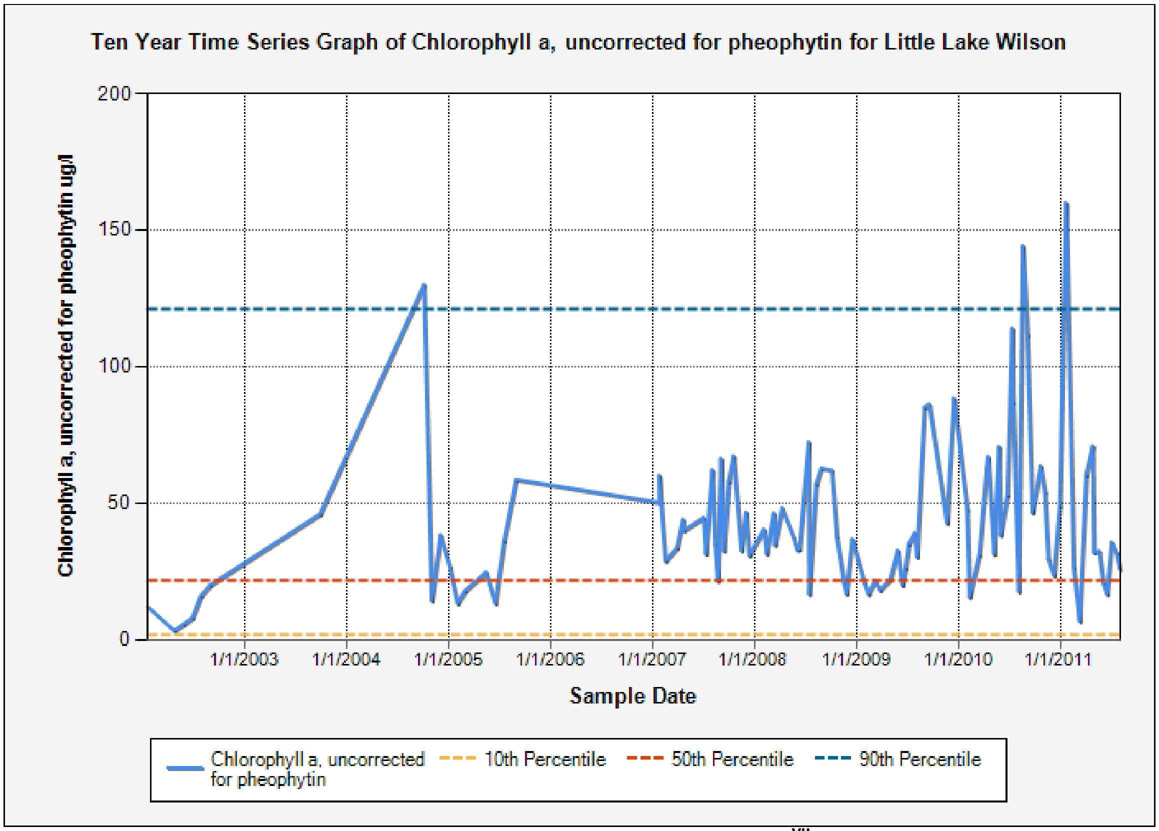


Figure 8. Recent Chlorophyll a graph for Little Lake Wilson[vii]

[vii] Graph Source: Hillsborough County Water Atlas. For the latest data go to http://www.hillsborough.wateratlas.usf.edu/graphs20/graph_it.aspx?wbodyid=5067&data=Chla_ugl&datatype=WQ&waterbodyatlas=lake&ny=10&bench=1

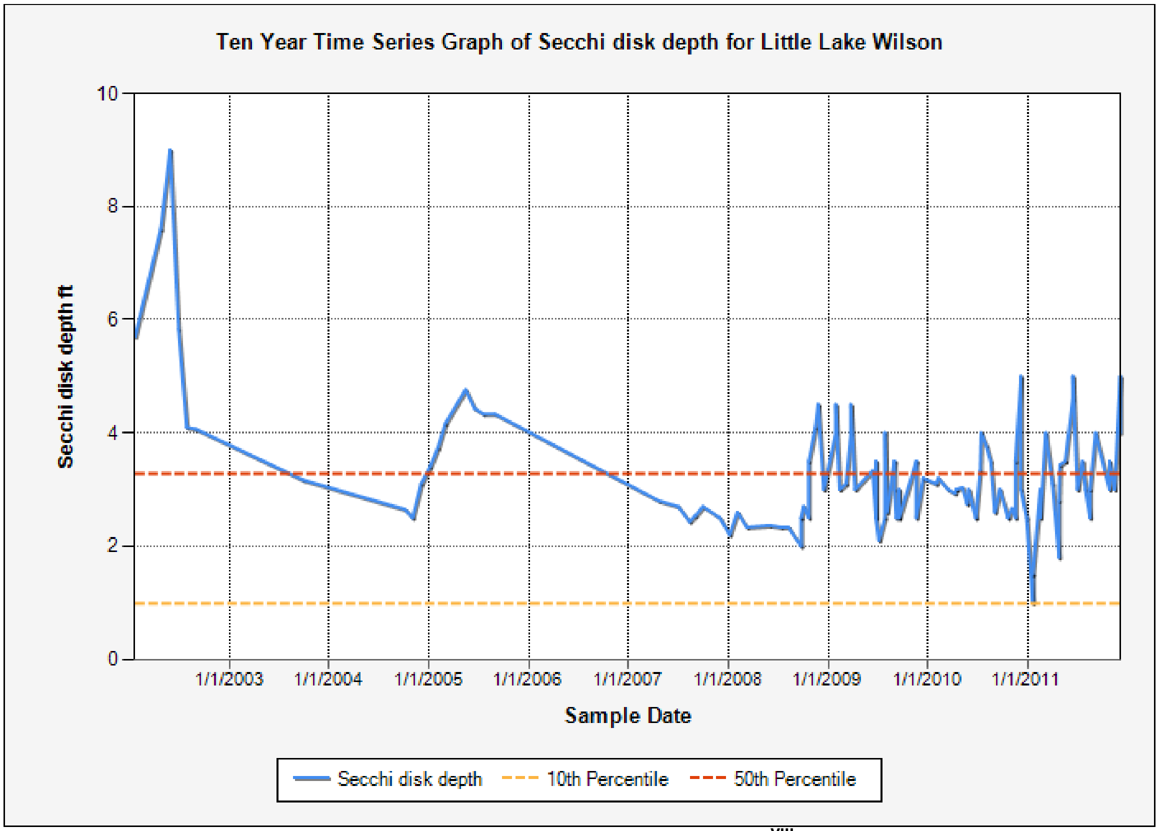


Figure 9. Recent Secchi Disk graph for Little Lake Wilson[viii]

As part of the lake assessment the physical water quality and chemical water chemistry of a lake are measured. These data only indicate a snapshot of the lake's water quality; however they are useful when compared to the trend data available from LAKEWATCH or other sources. Table 7 contains the summary water quality data and index values and adjusted values calculated from these data. The total phosphorus (TP), total nitrogen (TN) and chlorophyll *a* water chemistry sample data are the results of chemical analysis of samples taken during the assessment and analyzed by the Hillsborough County Environmental Protection Commission laboratory.

The growth of plants (planktonic algae, macrophytic algae and rooted plants) is directly dependent on the available nutrients within the water column of a lake and to some extent the nutrients which are held in the sediment and the vegetation biomass of a lake. Additionally, algae and other plant growth are limited by the nutrient in lowest concentration relative to that needed by a plant. Plant biomass contains less phosphorus by weight than nitrogen so phosphorus is many times the limiting nutrient. When both nutrients are present at a concentration in the lake so that either or both may restrict plant growth, the limiting factor is called "balanced". The ratio of total nitrogen to total phosphorous, the "N to P" ratio (N/P), is used to determine the limiting factor. If N/P is greater than or equal to 30, the lake is considered phosphorus limited, when this ratio is less than or equal to 10, the lake is considered nitrogen limited and if between 10 and 30 it is considered balanced.

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viii Graph Source: Hillsborough County Water Atlas. For the latest data go to http://www.hillsborough.wateratlas.usf.edu/graphs20/graph_it.aspx?wbodyid=5067&data=secchi_ft&datatype=WQ&waterbodyatlas=lake&ny=10&bench=1

Table 7. Water Quality Parameters (Laboratory) for Little Lake Wilson

Parameter	Value	Mean Value
Lake Area (Acres)	8.71	
Lake Area (m2)	35,248.00	
Lake Volume (m3)	71,855.00	
Number of Vegetation Sites	10	
Average Station SAV Weight	0.00	
Wet Weight of Vegetation (g)	0.00	
Dry Weight of Vegetation (g)	0.00	
Total Phosphorus (ug/L)	36.00	56.15
Total Nitrogen (ug/L)	889.00	1072.30
Chlorophyll a (ug/L)	20.70	35.20
TN/TP	24.7	19.1
Limiting Nutrient	Balanced	Balanced
Chlorophyll TSI	60	68
Phosphorus TSI	48	56
Nitrogen TSI	53	57
TSI	55	62
Color (PCU)	26.70	26.70
Secchi disk depth (ft)	4.80	3.68
Impaired TSI for Lake	40	40
Lake Status (Water Column)	Impaired	Impaired

The color of a lake is also important to the growth of algae. Dark, tannic lakes tend to suppress algal growth and can tolerate a higher amount of nutrient in their water column; while clear lakes tend to support higher algal growth with the same amount of nutrients. The color of a lake, which is measured in a unit called the “cobalt platinum unit (PCU)” because of the standard used to determine color, is important because it is used by the State of Florida to determine lake impairment as explained earlier. A new rule which is being developed by USEPA and FDEP, will use alkalinity in addition to color to determine a second set of “clear-alkaline lakes” which will be allowed a higher TSI than a “clear-acid” lake. This is because alkaline lakes have been found to exhibit higher nutrient and algal concentrations than acid lakes. Additionally, lakes connected to a river or other “flow through” system tend to support lower algal growth for the same amount of nutrient concentration. All these factors are important to the understanding of your lake’s overall condition. Table 7 includes many of the factors that are typically used to determine the actual state of plant growth in your lake. These data should be understood and reviewed when establishing a management plan for a lake; however, as stated above other factors must be considered when developing such a plan. Please contact the Water Atlas Program if you have questions about this part or any other part of this report.

At the time of the assessment, Little Lake Wilson had lower concentrations of phosphorous, nitrogen and chlorophyll-a than the mean value from samples during the previous 10 years. These levels of nutrients were still high enough to classify Little Lake Wilson as an impaired water body based upon the color parameter being in the clear water category.

Table 8 provides data derived from the vegetation assessment which is used to determine an adjusted TSI. This is accomplished by calculating the amount of phosphorus and nitrogen that could be released by existing submerged vegetation (Adjusted Nutrient) if this vegetation were treated with an herbicide or managed by the addition of Triploid Grass Carp (*Ctenopharyngodon idella*). The table also shows the result of a model that calculates the potential algae, as chlorophyll a (Adjusted Chlorophyll), which could develop due to the additional nutrients held within the plant biomass. While it would not be expected that all the vegetation would be turned into available phosphorus by these management methods, the data is useful when planning various management activities. Approximately 9.00 % of the lake has submerged vegetation present (PAC) and this vegetation represents about 1.64 % of the available lake volume (PVI). Please see additional parameters for adjusted values where appropriate in Table 8. The vegetation holds enough nutrients to add about 0 μg/L of phosphorus and 0 μg/L of nitrogen to the water column and increase the algal growth potential within the lake.

Little Lake Wilson is a balanced lake, in terms of limiting nutrient, and an increase in either phosphorus or nitrogen could change the TSI and increase the potential for algal growth.

Table 8. Field parameters and calculations used to determine nutrients held in Submerged Aquatic Vegetation (SAV) biomass.

Parameter	Value	Mean Value
% Area Covered (PAC)	9.0 %	
PVI	1.6 %	
Lake Vegetation Index	48	
Total Phosphorus - Adjusted (ug/L)	0.00	
Total Phosphorus - Combined (ug/L)	36	
Total Nitrogen - Adjusted (ug/L)	0.00	
Total Nitrogen - Combined (ug/L)	889	
Chlorophyll - Adjusted from Total Nutrients (ug/L)	0.08	
Chlorophyll - Combined (ug/L)	20.78	
Adjusted Chlorophyll TSI	60	
Adjusted Phosphorus TSI	48	
Adjusted Nitrogen TSI	53	
Adjusted TSI (for N, P, and CHLA)	55	
Impaired TSI for Lake	40	40

Little Lake Wilson is balanced in terms of nutrients. This means that any additional input of phosphorous or nitrogen would likely result in an increase in algal concentrations in the water column. Submerged aquatic vegetation was detected through the use of sonar equipment during bathymetric mapping of Little Lake Wilson; however during the vegetation assessment no submerged vegetation was present in the sampling quadrats. If the existing vegetation were to be treated in situ and allowed to decay, there would likely be little change to the TSI due to the relatively low submerged biomass. Increased nutrient inputs from outside of the lake would have the potential to elevate the TSI of the lake.

Table 9 contains the field data taken in the center of the lake using a multi-probe (we use either a YSI 6000 or a Eureka Manta) which has the ability to directly measure the temperature, pH, dissolved oxygen (DO), percent DO (calculated from DO, temperature and conductivity). These data are listed for three levels in the lake and twice for the surface measurement. The duplicate surface measurement is taken as a quality assurance check on measured data.

Table 9. Water Chemistry Data Based on Manta Water Chemistry Probe for Little Lake Wilson

Sample Location	Sample Depth (m)	Time	Temp (deg C)	Conductivity (mS/cm3)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	pH
Surface	0.87	6/2/2011 1:48:00 PM	28.84	0.256	56.38	4.43	7.06
Mean Value	2.26	6/2/2011 1:50:00 PM	26.59	0.268	48.10	3.91	6.97
Middle	2.27	6/2/2011 1:50:00 PM	27.52	0.258	45.99	3.69	6.97
Bottom	3.65	6/2/2011 1:52:00 PM	23.40	0.289	41.92	3.62	6.89

To better understand many of the terms used in this report, we recommend that the reader visit the Hillsborough County & City of Tampa Water Atlas and explore the “Learn More” areas which are found on the resource pages. Additional information can also be found using the Digital Library on the Water Atlas website.

Section 4: Conclusion

Little Lake Wilson is a small area (8.71-acre) lake that would be considered in the Eutrophic category of lakes based on water chemistry. It has a plant diversity of 68 species relative to the total watershed plant diversity of 197 species with about 9.00% percent of the open water areas containing submerged aquatic vegetation. Vegetation helps to maintain the nutrient balance in the lake as well as provide good fish habitat. The lake has few open water areas to support various types of recreation and has a good diversity of plant species. The primary pest plants in the lake include *Alternanthera philoxeroides*, *Panicum repens*, *Schinus terebinthifolius*, *Colocasia esculenta* and *Ludwigia peruviana*.

The lake vegetative assessment also was used to calculate a Lake Vegetative Index (LVI) for the lake (See Note 4). The LVI can be used to help determine if a lake is impaired in terms of types and quantities of vegetation found in and along the lake shore. An LVI threshold of 37 is used by FDEP to establish a point below which the lake could be considered heavily disturbed and possibly impaired. This threshold is intended to assist the analyst in classifying a lake as impaired when used with water quality data. For example, a clear water lake may have a TSI of 42 but have an LVI of 70. Since the LVI is significantly above the threshold and indicates low human disturbance, the analyst might declare the lake unimpaired even with a TSI slightly above the water quality threshold for a clear lake. Your lake has an LVI of 48 and would be considered not impaired based on LVI alone.

Although according to the LVI score Little Lake Wilson is not impaired, the vegetation communities along its shores would benefit from an extensive invasive species removal effort. Many of the emergent islands and much of the shoreline is dominated by invasive species such as; *Panicum repens*, *Schinus terebinthifolius* and *Colocasia esculenta*. It is suggested that any invasive species removal project be paired with a native planting of the area to prevent recolonization of freshly disturbed soils by invasive species.

This assessment was accomplished to assist lake property owners to better understand and manage their lakes. Hillsborough County supports this effort as part of their Lake Management Program (LaMP) and has developed guidelines for lake property owner groups to join the LaMP and receive specific assistance from the County in the management of their lake. For additional information and recent updates please visit the Hillsborough County & City of Tampa Water Atlas website.

Lake Assessment Notes

1. The trophic state index is used by the Water Atlas to provide the public with an estimate of their lake resource quality. A "Good" quality lake is one that meets all lake use criteria (swimmable, fishable and supports healthy habitat). Based on the discussion above, lakes that are in the oligotrophic through low eutrophic range, for the most part, meet these criteria. A trophic state below 60 indicates lakes in this range and these lakes are given the "Good" descriptor. A trophic state above 60 but below 70 can be considered highly productive and a reasonable lake for fishing and most water sports. This lake is considered "Fair", while a lake in the Hypereutrophic range with a TSI greater than 70 will probably not meet the lake use criteria and these lakes are considered to be poor. Please see Table 10 below.

Table 10. Comparison of Classification Schemes

Trophic State Index	Trophic State Classification	Water Quality
0 – 59	Oligotrophic through Mid-Eutrophic	Good
60 – 69	Mid-Eutrophic through Eutrophic	Fair
70 – 100	Hypereutrophic	Poor

Also see the Florida LAKEWATCH publication, "Trophic State: A Waterbody's Ability to Support Plants Fish and Wildlife" and the Trophic State Index Learn More page on the Hillsborough County & City of Tampa Water Atlas.

In recent years FDEP staff have encountered problems interpreting Secchi depth data in many tannic (tea or coffee-colored) waterbodies where transparency is often reduced due to naturally-occurring dissolved organic matter in the water. As a result, Secchi depth has been dropped as an indicator in FDEP's recent TSI calculations (1996 Water-Quality Assessment for The State of Florida Section 305(b) Main Report). This modification for black water TSI calculation has also been adopted by the Water Atlas.

Also, according to Florida LAKEWATCH use of the TSI is often misinterpreted and/or misused from its original purpose, which is simply to describe biological productivity. It is not meant to rate a lake's water quality. For example, higher TSI values represent lakes that support an abundance of algae, plants and wildlife. If you love to fish, this type of lake would not be considered to have "poor" water quality. However, if you are a swimmer or water skier, you might prefer a lake with lower TSI values.

The trophic state index is one of several methods used to describe the biological productivity of a waterbody. Two scientists, Forsberg and Ryding, 1980, developed another method that is widely used. It's known as the Trophic State Classification System. Using this method, waterbodies can be grouped into one of four categories, called trophic states:

Oligotrophic (oh-lig-oh-TROH-fik) where waterbodies have the lowest level of productivity;

Mesotrophic (mees-oh-TROH-fik) where waterbodies have a moderate level of biological productivity;

Eutrophic (you-TROH-fik) where waterbodies have a high level of biological productivity;

Hypereutrophic (HI-per-you-TROH-fik) where waterbodies have the highest level of biological productivity. The trophic state of a waterbody can also affect its use or perceived utility. Figure 10 illustrates this concept.

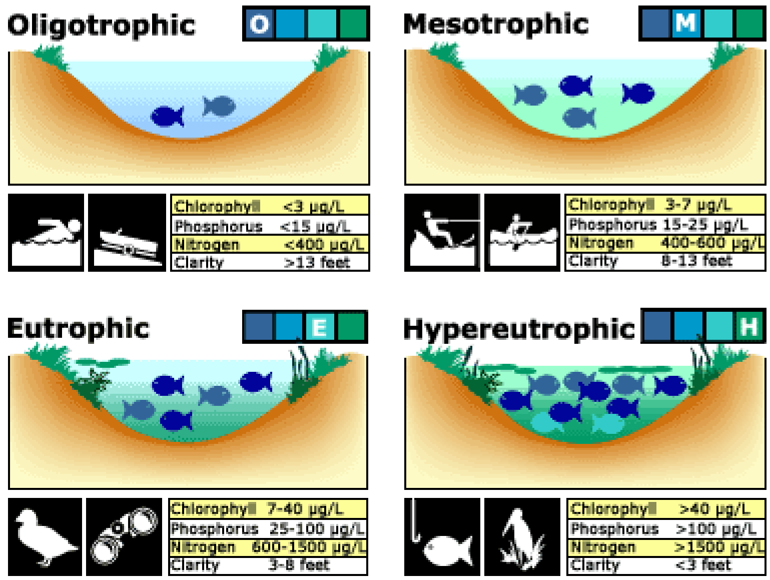
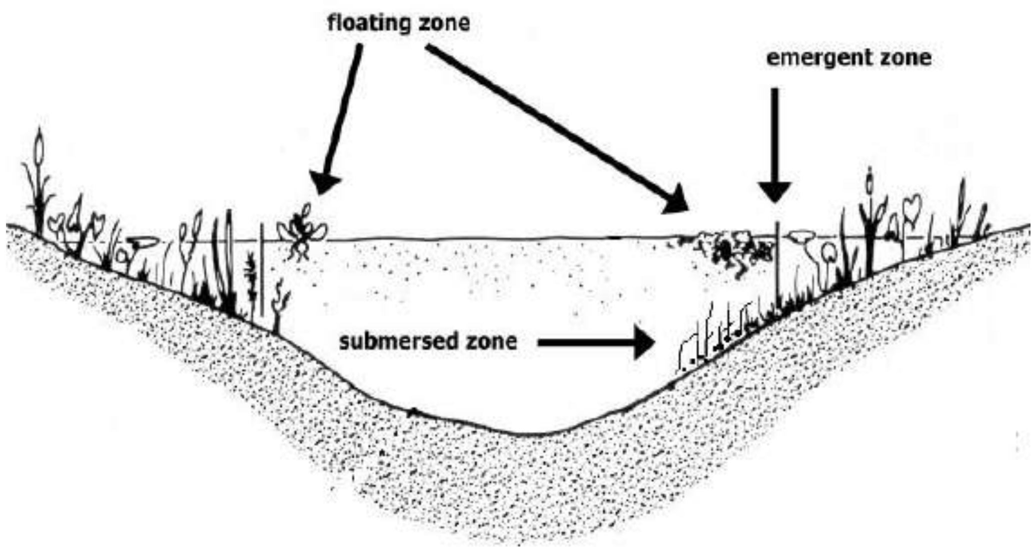


Figure 10. Tropic States

2. **Wide Area Augmentation System** (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. The geostationary satellites broadcast the information to all WAAS-capable GPS receivers. The receiver decodes the signal to provide real time correction of raw GPS satellite signals also received by the unit. WAAS-enabled GPS is not as accurate as standard DGPS which employs close by ground stations for correction, however; it was shown to be a good substitute when used for this type of mapping application. Data comparisons were conducted with both types of DGPS employed simultaneously and the positional difference was determined to be well within the tolerance established for the project.

3. The three primary aquatic vegetation zones are shown below:



4. 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. Below is a table of LVI scores recorded in Hillsborough County for comparison:

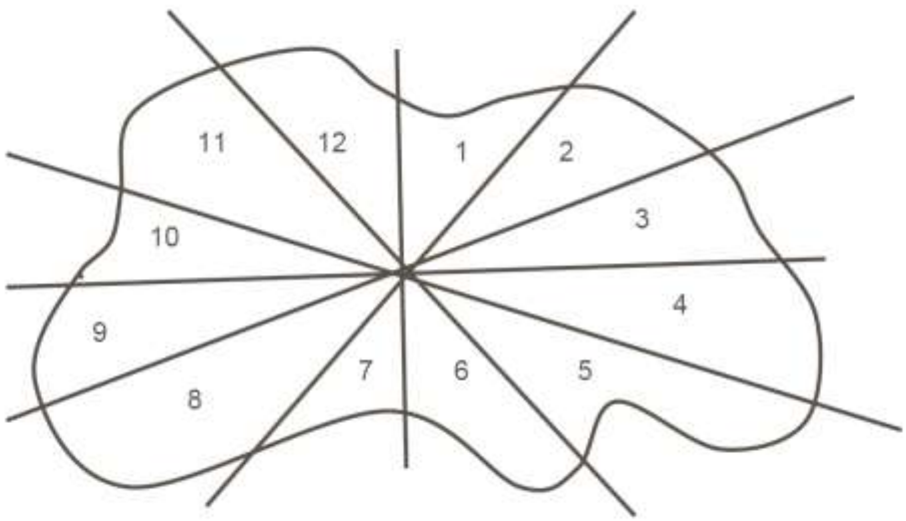
Lake Name	Sample Date	LVI Score
Lake Magdalene	5/26/2005	64
Lake Magdalene	10/20/2005	38
Burrell Lake, off Nebraska in Lutz area. Ambient Monitoring Program	8/4/2005	16
Silver lake just south of Waters between Habana and Himes Avenues, Tampa. Ambient Monitoring Program	7/29/2005	36
Unnamed lake on Forest Hills Drive south of Fletcher Avenue. Ambient Monitoring Program	8/3/2005	34
Hanna Pond, off Hanna Rd in Lutz. Ambient Monitoring Program	7/25/2005	38
Small lake, Lutz, just east pf Livingston. Ambient Monitoring Program	7/22/2005	39
Small lake, Lutz, adj to Lake Keene. Ambient Monitoring Program	8/5/2005	28
Unnamed small lake, Tampa, off Fowler behind University Square Mall. Ambient Monitoring Program	7/19/2005	16
Tiffany Lake, Lutz, north of Whittaker. Ambient Monitoring Program	7/25/2005	40
Cedar Lake, south of Fletcher, Forest Hills. Ambient Monitoring Program	7/22/2005	37
Unnamed small lake behind Natives Nursery, Lutz. Ambient Monitoring Program	8/5/2005	20
Unnamed lake on Curry Road off Livingston, Lutz. Ambient Monitoring Program	7/19/2005	46
Unnamed lake in Lutz. Ambient Monitoring Program	7/20/2005	45
Lake Josephine - HIL538UL	10/12/2006	40
Lake Magdalene - HIL546UL	10/18/2006	40
Starvation Lake - HIL540NL	9/28/2006	48
Egypt Lake - HIL556UL	10/31/2006	34
Unnamed Lake - HIL544UL	9/25/2008	58
Lake Rogers - L63P	7/22/2009	65
Lake Alice/Odessa, profundal zone	8/6/2009	71
Lake Carroll (Center)	7/15/2009	64
Unnamed Small Lake - Z4-SL-3011	7/21/2009	24
Unnamed Small Lake - Z4-SL-3020	7/21/2009	40
Lake Ruth - Z4-SL-3031	7/16/2009	71
Lake Juanita - Z4-SL-3036	7/20/2009	72
Chapman Lake	6/8/2009	42
Island Ford Lake	8/10/2010	50
Lake Magdalene	7/29/2010	56
Lake Stemper	7/13/2010	38
Lake Carroll	7/20/2010	57
Lake Virginia	5/17/2011	51
Lake Harvey	5/20/2011	48
Pretty Lake	5/24/2011	33
Cypress Lake	8/17/2011	66
Lake Armistead	6/3/2011	13
Little Lake Wilson	5/31/2011	48
Lake Taylor	6/24/2011	67
Valrico Lake	7/19/2011	25
Rogers Lake	7/22/2011	73
Lake Raleigh	7/29/2011	54
Lake Juanita	6/21/2011	63
Crescent Lake	7/26/2011	45
Lake Behnke	11/18/2011	41

5. Reference: "Assessing the Biological Condition of Florida Lakes: Development of the Lake Vegetation Index (LVI) Final Report", December, 2007, page 7. Prepared for: Florida Department of Environmental Protection, Twin Towers Office Building, 2600 Blair Stone Road, Tallahassee, FL 32399-2400, Authors: Leska S. Fore*, Russel Frydenborg**, Nijole Wellendorf**, Julie Espy**, Tom Frick**, David Whiting**, Joy Jackson**, and Jessica Patronis**

* Statistical Design

** Florida Department of Environmental Protection

Diagram showing the method used to divide a typical lake into 12 sections for replicate sampling:



6. A lake is **impaired** if: "For the purposes of evaluating nutrient enrichment in lakes, TSIs shall be calculated based on the procedures outlined on pages 86 and 87 of the State's 1996 305(b) report, which are incorporated by reference. Lakes or lake segments shall be included on the planning list for nutrients if:(1) For lakes with a mean color greater than 40 platinum cobalt units, the annual mean TSI for the lake exceeds 60, unless paleolimnological information indicates the lake was naturally greater than 60, or (2) For lakes with a mean color less than or equal to 40 platinum cobalt units, the annual mean TSI for the lake exceeds 40, unless paleolimnological information indicates the lake was naturally greater than 40, or (3) For any lake, data indicate that annual mean TSIs have increased over the assessment period, as indicated by a positive slope in the means plotted versus time, or the annual mean TSI has increased by more than 10 units over historical values. When evaluating the slope of mean TSIs over time, the Department shall require at least a 5 unit increase in TSI over the assessment period and use a Mann's one-sided, upper-tail test for trend, as described in Nonparametric Statistical Methods by M. Hollander and D. Wolfe (1999 ed.), pages 376 and 724 (which are incorporated by reference), with a 95% confidence level."

References: 62-303.352—Nutrients in Lakes. Specific Authority 403.061, 403.067 FS. Law Implemented 403.062, 403.067 FS. History - New 6- 10-02, Amended 12-11-06. Please see page 12 of the Impaired Waters Rule. Updated activity regarding impaired waters may be tracked at: http://www.dep.state.fl.us/water/tmdl/

7. An **adjusted chlorophyll a value** (µg/L) was calculated by modifying the methods of Canfield et al (1983). The total wet weight of plants in the lake (kg) was calculated by multiplying lake surface area (m^2) by PAC (percent area coverage of macrophytes) and multiplying the product by the biomass of submersed plants (kg wet weight m^2) and then by 0.25, the conversion for the 1/4 meter sample cube. The dry weight (kg) of plant material was calculated by multiplying the wet weight of plant material (kg) by 0.08, a factor that represents the average percent dry weight of submersed plants (Canfield and Hoyer, 1992) and then converting to grams. The potential phosphorus concentration (mg/m^3) was calculated by multiplying dry weight (g) by 1.41 mg TP g-1 dry weight, a number that represents the mean phosphorus (mg) content of dried plant material measured in 750 samples from 60 Florida lakes (University of Florida, unpublished data), and then dividing by lake volume (m^3) and then converting to µg/L (1000/1000). From the potential phosphorus concentration, a predicted chlorophyll a concentration was determined from the total phosphorus and chlorophyll a relationship reported by Brown (1997) for 209 Florida lakes. Adjusted chlorophyll a concentrations were then calculated by adding each lake's measured chlorophyll a concentration to the predicted chlorophyll a concentration.