LAKE ASSESSMENT REPORT FOR TWIN LAKE IN HILLSBOROUGH COUNTY, FLORIDA

Date Assessed: August 13, 2008
Assessed by: Grant Harley and David Eilers
Reviewed by: Jim Griffin, Ph.D.

INTRODUCTION

This assessment was conducted to update existing physical and ecological data for Twin Lake on the Hillsborough County Watershed Atlas (**http://www.hillsborough.wateratlas.usf.edu/**). 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's Northwest Hillsborough, Hillsborough River and Alafia River Basin Boards. 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. Photo of Twin Lake, taken August 13, 2008.

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)	1,109,771.28	103,142.14	25.48		
Mean Depth	9.00	2.74			
Maximum Depth	18.00	5.49			
Volume (cubic)	11,648,789.93	329,856.99		267.42	87,139,000
Gauge (relative)	31.26	9.53			

Figure 1. Contour map for Twin Lake created in 2006. The mapping technique used in 2008 employs a standard DGPS for horizontal position and a fathometer for depth.

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 Figure 3 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. Additionally, the presence or absence of submerged vegetation is validated using a Humminbird 797c side scanning sonar and a grass rake. The sites marked as "H" for Humminbird sites in Figure 3 indicate validation sites. See Appendix A for additional information. As depicted in Figure 3, ten 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 (Figure 6).

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. Tables 3 through 7 detail the results from the 2008 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 term invasive indicates the plant is commonly considered invasive in this region of Florida and the term "pest" indicates that the plant has a greater than 55% occurrence in the lake and is also considered a problem plant for this region of Florida, or in 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 (http://www.epchc.org/forms_documents.htm) permit from the Environmental Protection Commission of Hillsborough County and for management of in-lake vegetation outside the wetland fringe (for lakes with an area greater than ten acres), the property owner must secure a Florida Department of Environmental Protection permit (http://www.dep.state.fl.us/lands/invaspec).

Table 2. Total diversity, percent exotics, and number of Exotic Pests Plants Council pest plants.

Parameter	Lake	Watershed
Total Plant Diversity (# of Taxa)	57	64
% Non-Native Plants	21.05%	21.88%
Total Pest Plant Species	6	6

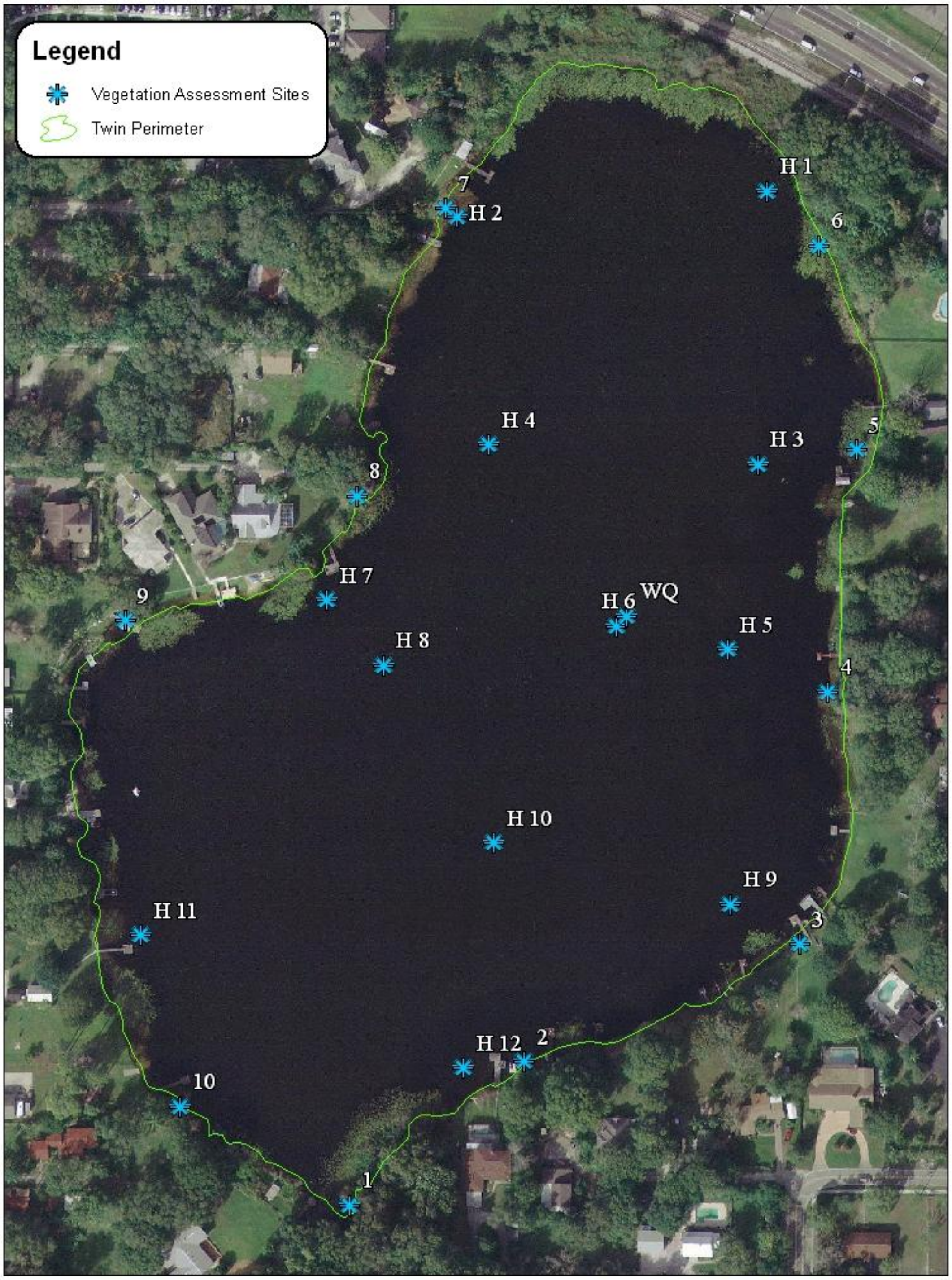


Figure 3. 2007 six-inch resolution aerial photograph showing location of vegetation assessment sites on Twin Lake. Major emergent and floating vegetation zones as well as structures are also observable in this aerial.

Table 3. List of Floating Leaf Zone Aquatic Plants Found.

Plant Species Code	Plant Species	Common Name	Sample Site										Percent Occurrence	(N) Native, (NN) Non-native, (I) Invasive, (P) Pest
NLM	*Nuphar lutea var. advena*	Spatterdock, Yellow Pondlily	1	1	1	1	1	1		1	1	1	90%	N,P
NOA	*Nymphaea odorata*	American White Water lily, Fragrant Water Lily	1	1	1		1	1	1	1	1	1	90%	N,P
HYE	*Hydrocotyl umbellata*	Manyflower Marshpennywort, Water Pennywort		1	1	1	1	1	1		1	1	80%	N
SMA	*Salvinia minima*	Water Spangles, Water Fern				1	1		1	1			40%	NN,I
NNA	*Nymphoides aquatica*	Banana Lily, Big Floatingheart				1			1		1		30%	N

Figure 4. Photograph of American White Water Lily, *Nymphea odorata*, on Twin Lake.

Table 4. List of Aquatic Zone Emergent Plants Found.

Plant Species Code	Plant Species	Common Name	Sample Site										Percent Occurrence	(N) Native, (NN) Non-native, (I) Invasive, (P) Pest
			1	2	3	4	5	6	7	8	9	10		
PRS	*Panicum repens*	Torpedo Grass		1	1	1	1	1	1	1	1	1	90%	NN,I,P
APS	*Alternanthera philoxeroides*	Alligator Weed		1	1	1	1		1		1	1	70%	NN,I,P
LPA	*Ludwigia peruviana*	Peruvian Primrosewillow	1	1		1	1	1	1	1			70%	N,P
FSR	*Fuirena scirpoidea*	Southern Umbrellasedge, Rush Fuirena		1		1	1			1	1	1	60%	N
TYP	*Typha spp.*	Cattails	1		1			1	1	1	1		60%	N,P
BOC	*Boehmeria cylindrica*	Bog Hemp, False Nettle	1		1	1					1		40%	N
DVA	*Diodia virginiana*	Buttonweed			1	1	1		1				40%	N
PHN	*Panicum hemitomon*	Maidencane	1					1			1	1	40%	N
PCA	*Pontederia cordata*	Pickerel Weed				1	1	1		1			40%	N
SAL	*Salix spp.*	Willow			1	1					1	1	40%	N
CCA	*Cinnamomum camphora*	Camphor-tree	1					1	1				30%	NN,I
STS	*Schinus terebinthifolius*	Brazilian Pepper	1					1		1			30%	NN,I
CYO	*Cyperus odoratus*	Fragrant Flatsedge			1	1	1						30%	N
FSC	*Fuirena spp.*	Rush Fuirena							1	1		1	30%	N
MSS	*Mikania scandens*	Climbing Hempvine				1	1		1				30%	N
NSS	*Nephrolepsis spp.*	Sword Fern	1							1	1		30%	N
SAM	*Sambucus canadensis*	Elderberry	1						1		1		30%	N
CEA	*Colocasia esculenta*	Wild Taro, Dasheen, Coco Yam							1	1			20%	NN,I
WTA	*Sphagneticola (Wedelia) trilobata*	Creeping Oxeye		1								1	20%	NN,I
BMI	*Bacopa monnieri*	Common Bacopa, Herb-Of-Grace			1		1						20%	N

Table 5. List of Aquatic Zone Emergent Plants Found.

Plant Species Code	Plant Species	Common Name	Sample Site										Percent Occurrence	(N) Native, (NN) Non-native, (I) Invasive, (P) Pest
			1	2	3	4	5	6	7	8	9	10		
BID	*Bidens spp.*	Bur Marigold				1			1				20%	N
COM	*Commelina spp.*	Dayflower				1			1				20%	N
OCA	*Osmunda cinnamomea*	Cinnamon Fern	1									1	20%	N
PNA	*Phyla nodiflora*	Frog-fruit, Carpetweed, Turkey Tangle Fogfruit			1				1				20%	N
POL	*Polygonum spp.*	Smartweed, Knotweed			1		1						20%	N
QLO	*Quercus laurifolia*	Laurel oak				1	1						20%	N
SLA	*Sagittaria lancifolia*	Bulltongue Arrowhead, Duck Potato				1			1				20%	N
CLA	*Casuarina equisetifolia*	Australian Pine						1					10%	NN,I
SSM	*Sapium sebiferum*	Popcorn Tree, Chinese Tallow Tree								1			10%	NN,I
URL	*Urena lobata*	Caesar's Weed					1						10%	NN,I
BLS	*Blechnum serrulatum*	Swamp Fern	1										10%	N
CAN	*Canna spp.*	Canna (exotic)									1		10%	NN
CRX	*Carex spp.*	Sedge				1							10%	N
CAA	*Centella asiatica*	Asian Pennywort, Coinwort, Spadeleaf		1									10%	N
CYP	*Cyperus spp.*	Sedge				1							10%	N
EAA	*Eclipta alba (prostrata)*	False Daisy, Yerba De Tajo							1				10%	N
EBI	*Eleocharis baldwinii*	Baldwin's Spikerush, Roadgrass			1								10%	N
JUM	*Juncus marginatus*	Shore Rush, Grassleaf Rush			1								10%	N
JMS	*Juncus megacephalus*	Bighead Rush								1			10%	N
PBA	*Persea borbonia*	Redbay	1										10%	N
PIN	*Pinus spp.*	Pine Tree										1	10%	N
SSP	*Scirpus validus*	Soft-stem Bulrush									1		10%	N
WAX	*Myrica cerifera*	Wax Myrtle	1										10%	N

Table 6. List of Aquatic Zone Emergent Plants Found.

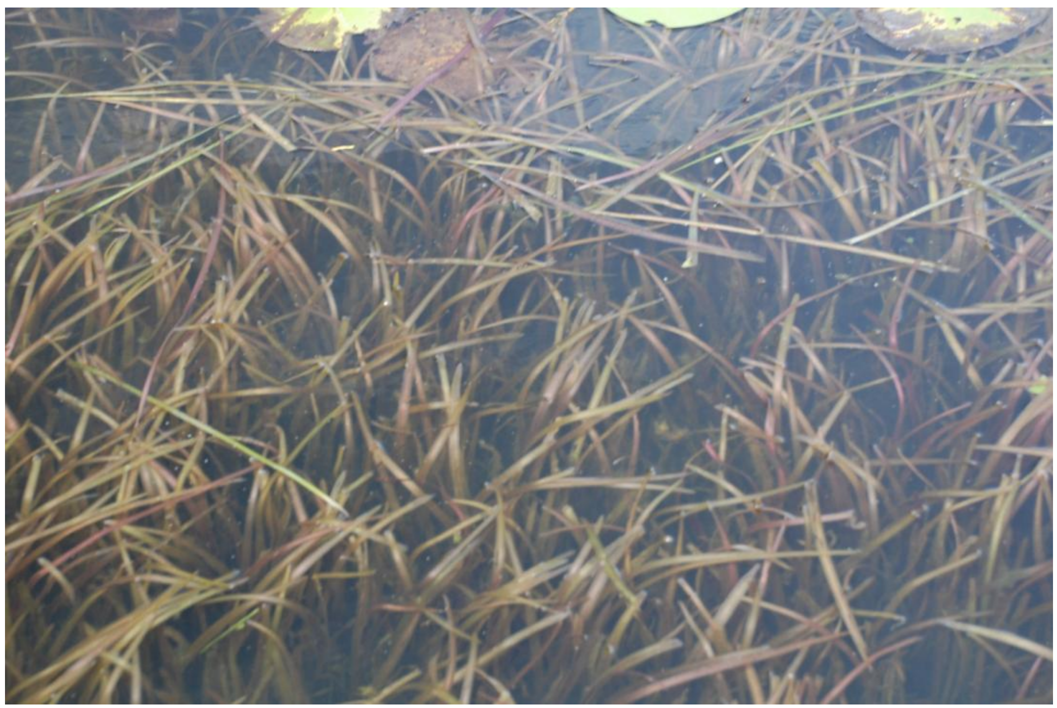
Plant Species Code	Plant Species	Common Name	Sample Site										Percent Occurrence	(N) Native, (NN) Non-native, (I) Invasive, (P) Pest
			1	2	3	4	5	6	7	8	9	10		
XYR	*Xyris spp.*	Yellow-eyed Grass			1								10%	N
EWI	*Echinochloa walteri*	Barnyard grass, coast cockspur grass			1								10%	N
PSM	*Pennisetum setaceum*	Fountain grass			1								10%	N
PFA	*Paederia foetida*	Skunk Vine							1				10%	NN,I
LGA	*Lindernia grandiflora*	Large-flowered False Pimpernel					1						10%	N
VRA	*Vitis rotundifolia*	muscadine grape					1						10%	N
SSA	*Sacciolepis striata*	American Cupscale Grass									1		10%	N

Figure 5. Photograph of Photograph of Cattails, *Typha spp*, on Twin Lake.

Table 7. List of Submerged Zone Aquatic Plants Found.

Plant Species Code	Plant Species	Common Name	Sample Site										Percent Occurrence	(N) Native, (NN) Non-native, (I) Invasive, (P) Pest
			1	2	3	4	5	6	7	8	9	10		
VAA	*Vallisneria americana*	Tapegrass	1	1	1	1	1	1	1	1	1	1	100%	N
ALG	*Algal Spp.*	Algal Mats, Floating		1		1	1		1			1	50%	N

Figure 6. Photograph of Photograph of Tapegrass, *Vallisneria Americana*, on Twin Lake, Submerged vegetation such as this native species improves water quality and provides habitat for native fish and invertebrates.



Section 3: Lake Water Chemistry

A critical element in any lake assessment is the long-term water chemistry data set. The primary source of water quality trend data for Florida Lakes is the Florida LAKEWATCH volunteer and the Florida LAKEWATCH water chemistry data. Hillsborough County is fortunate to have a large cadre of volunteers who have collected lake water samples for significant time period. These data are displayed and analyzed on the Water Atlas as shown in Figure 7 for Twin Lake. Additional data, when available, is also included on the Water Atlas; however, the LAKEWATCH data remains the primary source. By the trend data shown in the figure, the lake may be considered in fair condition in terms of the trophic state index. This lake is a clear water lake and as such it must maintain a TSI of below 40 to not be considered impaired by the State of Florida guidelines. The lake's long term water quality data indicates enough violations of these criteria to be classified by Florida DEP as impaired. The most recent water quality data as provided in Table 6, verifies this assessment.

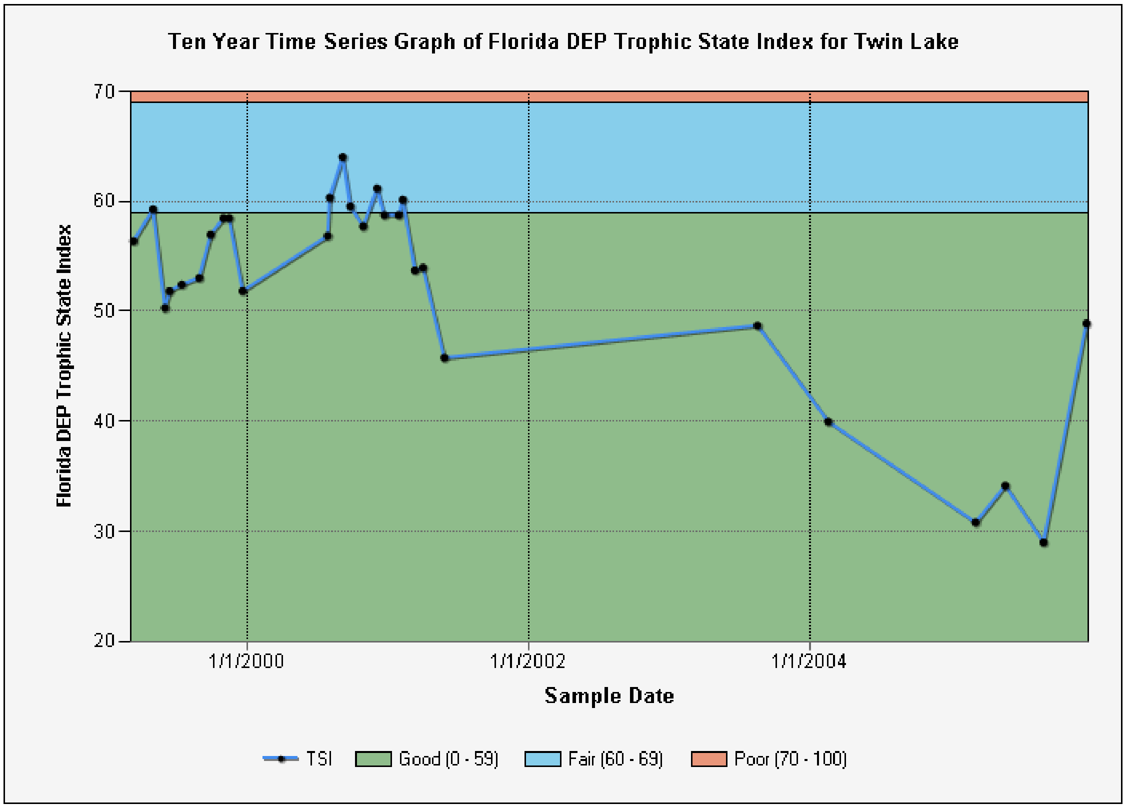


Figure 7. Recent Trophic State Index (TSI) graph from Hillsborough Watershed Atlas. For the latest data go to: (http://www.hillsborough.wateratlas.usf.edu/lake/waterquality.asp?wbodyid=5405&wbodyatlas=lake)
Note: The graph above includes benchmarks for using verbal descriptors of "good", "fair" and "poor". The verbal descriptors for these benchmarks are based on an early determination by stakeholders of the generally acceptable and understood terms for describing the state of lakes. The same benchmarks are used for nutrient graphs (Nitrogen and Phosphorus), chlorophyll graphs and trophic state index (TSI) graphs. The TSI is a calculated index of lake condition based on nutrient and chlorophyll (a) concentrations (please see "Learn more about Trophic State Index"). The benchmarks are established based on the TSI range that relates to a specific descriptor. The source for the TSI concentration relationships is the Florida Water Quality Assessment, 1996, 305(b) (Table 2-8).

As part of the lake assessment the physical water quality and chemical water chemistry of a lake are measured. These data only indicate a snap shot of the lakes water quality; however they are useful when compared to the trend data available from LAKEWATCH or other sources. Table 8 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. These data compare reasonably well with the mean data from the LAKEWATCH data set for the lake. The trophic state index (TSI) calculated from the sample data 53.08 indicates a significant increase over the more recent lake water quality data and is more indicative of lake conditions prior to 2002. These data also seem to agree with a trend towards higher TSI after 2004. Unfortunately, no additional data is available to verify this observation. It is highly recommended that a volunteer be recruited for this lake.

Table 8 also provides data derived from the vegetation assessment which is used to determine an adjusted TSI. This is accomplished by calculating the amount of phosphorus that could be released by existing submerged vegetation if this vegetation were treated with an herbicide or managed by the addition of Triploid Grass Carp (*Ctenopharyngodon idella*). 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 34% of the lake has submerged vegetation present and this vegetation represents about 15.46% of the available lake volume. The vegetation holds enough nutrients (nitrogen and phosphorus) to add about 6.06 mg/L and 4.5 µg/L of nitrogen and phosphorus respectively to the water column. The lake is balanced in terms of limiting nutrient and either increases of phosphorus or nitrogen could change the TSI and increase of decrease the potential for algal growth. It is estimated the that the nutrient contained in submerged vegetation, if released, would add 15.3 TSI units to the existing TSI value which would result in the lake moving close to the hypereutrophic or poor condition in terms of water quality. This would result in a reduction in the Secchi Disk depth which is presently 5.1 feet.

Table 8. Water Quality Parameters (Laboratory)

Lake Name	TWIN	
Parameter	Value	Comment
TP ug/L	39.00	
TN mg/L	0.76	
Chla ug/L	18.70	
Limiting Nutrient	Balanced	
Chla TSI	58.97	
TP TSI	49.74	
TN TSI	50.51	
Secchi Disk (ft)	5.10	
TSI	53.08	
PAC	34.00%	
PVI	16.46%	
Adj TP ug/L	43.50	
Adj TN mg/L	6.82	
Adj Chla ug/L	19.20	
Adj TSI	68.37	

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, dissolve oxygen (DO), percent DO (calculated from DO, temperature and conductivity) and turbidity. These data are listed for three levels in the lake and twice for the surface measurement. The duplicate surface measurement was taken as a quality assurance check on measured data. These data indicate a well mixed shallow lake with good concentrations of dissolved oxygen and an originated bottom layer.

Table 9. Water Quality Parameters (Field-YSI)

Sample Location	Sample Depth (ft)	Time	Temp (oC)	Conductivity (mS/cm3)	Dissolved Oxygen (%)	DO (mg/L)	PH (PH)	Tubidity (NTU)	Secchi Depth (ft)
Surface	1.217	12:19	30.2	0.237	102.5	7.71	7.1	1.9	5.1
Middle	3.465	12:21	30.22	0.237	102.5	7.71	7.21	2	5.1
Bottom	8.9	12:23	30.09	0.237	98	7.4	7.24	4	5.1
Surface	0.859	12:25	30.28	0.237	104.8	7.88	7.29	1.4	5.1
Mean Value	3.61025		30.1975	0.237	101.95	7.675	7.21	2.325	5.1

To better understand many of the terms used in this report, we recommend that the visit the Hillsborough Watershed Atlas (http://www.hillsborough.wateratlas.usf.edu) 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 website.

Section 4: Conclusion

Twin Lake is a (small) area (25.48 acre) lake that would be considered in the eutrophic (fair) category of lakes based on water chemistry. It has a normal and healthy concentration of aquatic vegetation. About 34% of the open water areas contain submerged vegetation. Vegetation helps to maintain the nutrient balance in the lake as well as provide good fish habitat. The lake has open water areas that 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, Ludwigia peruviana, Typha spp., Nuphar lutea* var. *advena and Nymphaea odorata.* For more information and recent updates please see the Hillsborough Watershed Atlas (water atlas) w*ebsite at: http://www.hillsborough.wateratlas.usf.edu* .

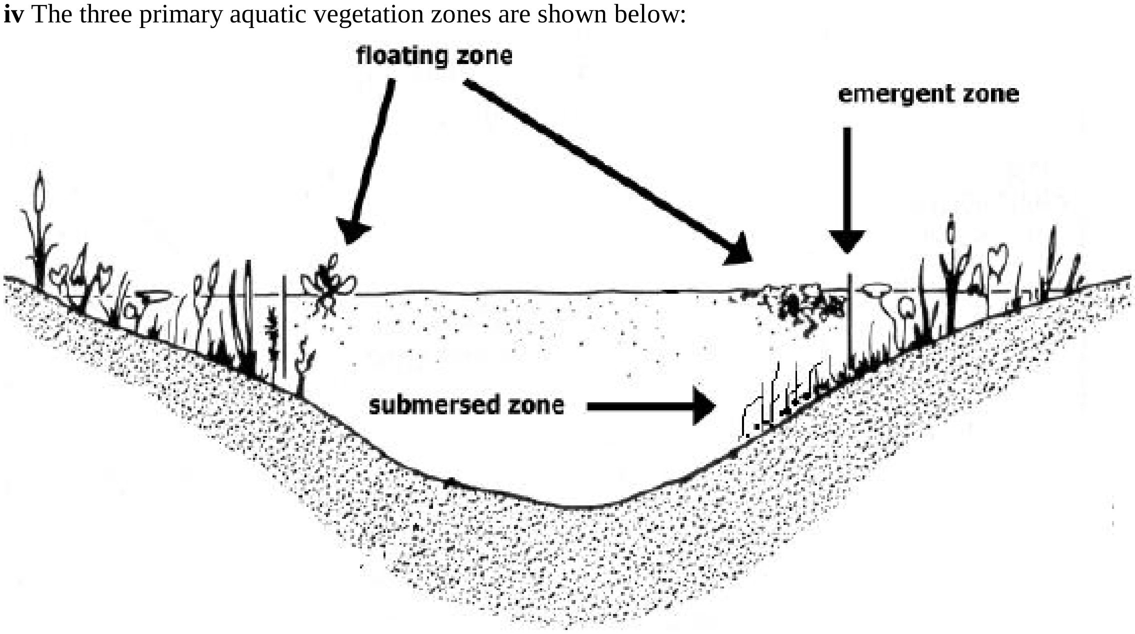
Lake Assessment Footnotes

i "Trophic" means "relating to nutrition." The Trophic State Index (TSI) takes into account chlorophyll, nitrogen, and phosphorus, which are nutrients required by plant life. For more information please see *learn more* at: http://www.hillsborough.wateratlas.usf.edu/shared/learnmore.asp?toolsection=lm_tsi
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. 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.

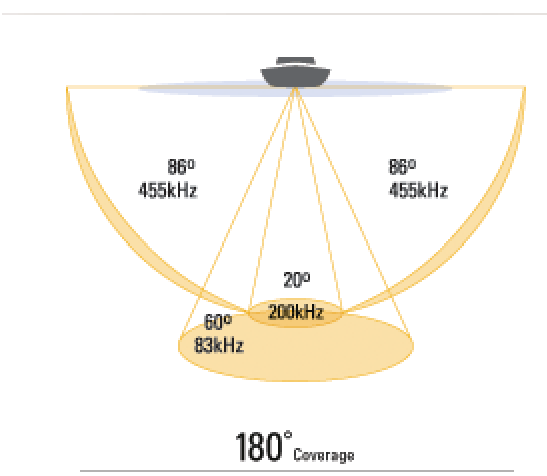
iv The three primary aquatic vegetation zones are shown below:



v A lake is impaired if " (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 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 than10 units over historical values. When evaluating the slope of mean TSIs over time, the Department shall 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." Excerpt from Impaired Water Rule (IWR). Please see: http://www.dep.state.fl.us/water/tmdl/docs/AmendedIWR.pdf

Appendix A: Humminbird Images

We use a Humminbird 797c GPS Chartplotter side scanning and bottom scanning sonar system to assist in the verification of vegetation present or absence. The "system uses a 200/83 kHz Dual Beam PLUS™ sonar system with a wide (60°) area of coverage. DualBeam PLUS™ sonar has a narrowly focused 20° center beam, surrounded by a second beam of 60°, expanding coverage to an area equal to lake depth. In 20 feet of water, the wider beam covers an area 20 feet wide. The 20° center beam is focused on the bottom, to show you structure, weeds and cover. The 60° wide beam is hunting for fish in the wide coverage area. DualBeam PLUS™ sonar returns can be blended together, viewed separately or compared side-by-side. DualBeam PLUS™ is ideal for a wide range of conditions - from shallow to very deep water in both fresh and salt water. Depth capability is affected by such factors as boat speed, wave action, bottom hardness, water conditions and transducer installation."[1]



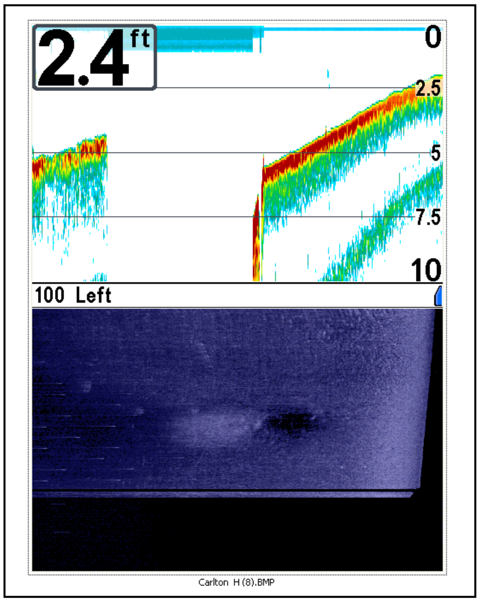


Figure A1. The display at the right shows a smooth bottom both in the vertical and side looking views (top/bottom). The lower image also indicates an object on the bottom by the brighter than background return and shadow. We use both views as well as a vegetation rake to verify presents and absence of vegetation. On the next page you will see the fourteen sites where vegetation verification was made and the associated Humminbird displays.

[1] 797C Manual, 2006 Humminbird®, Eufaula AL, USA

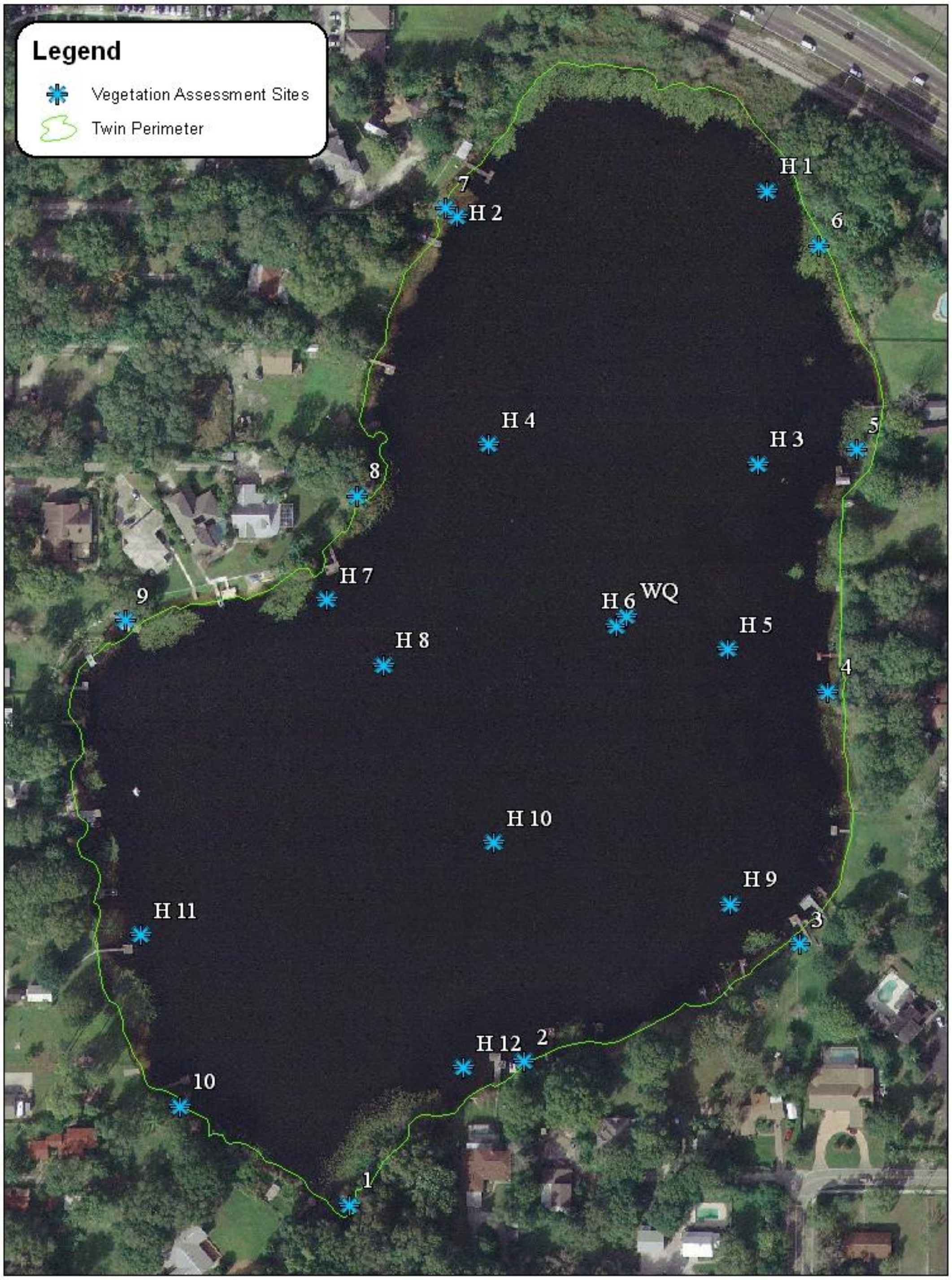


Figure A2. The sites marked as H (Humminbird) sites were used to validate (determine presents or absence of vegetation) submerged vegetation results. These results by site are shown on the next page.

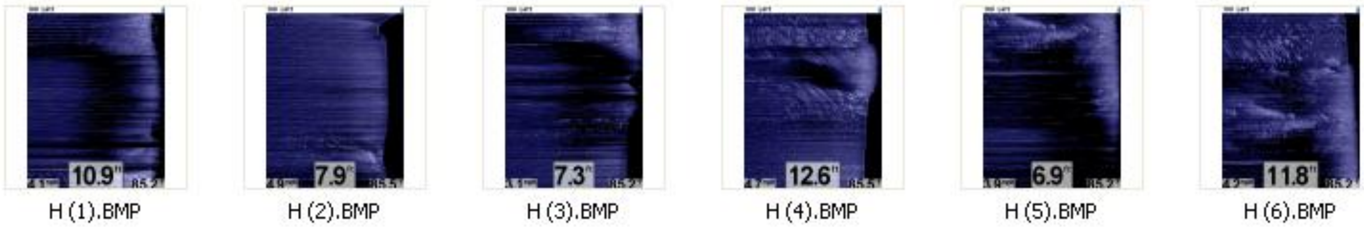


Figure A3. Side scan view showing bottom returns.

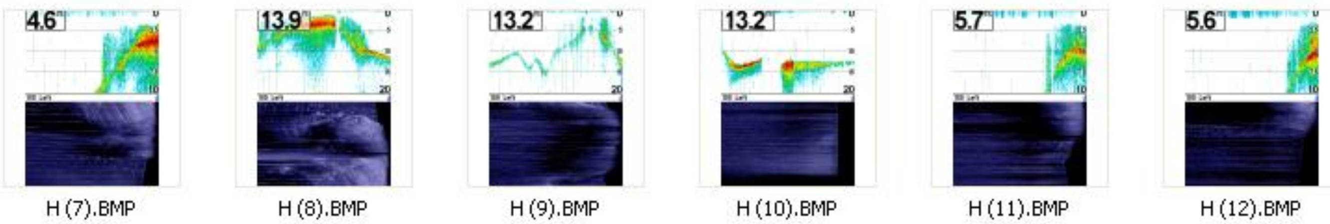
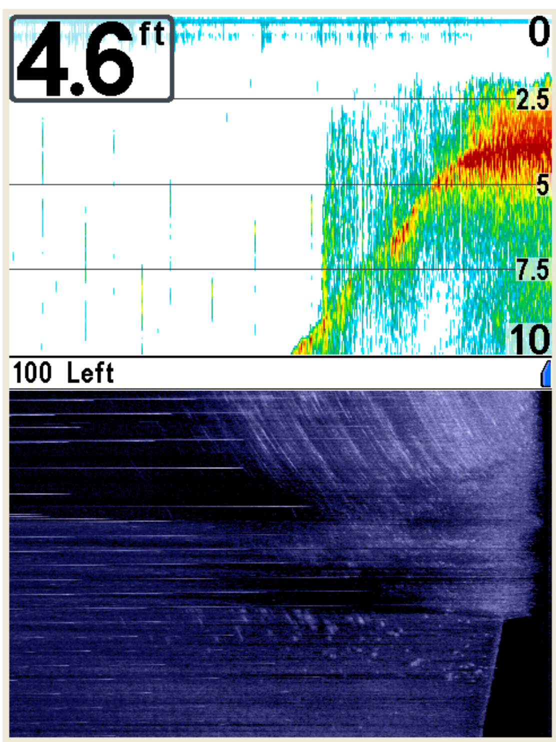
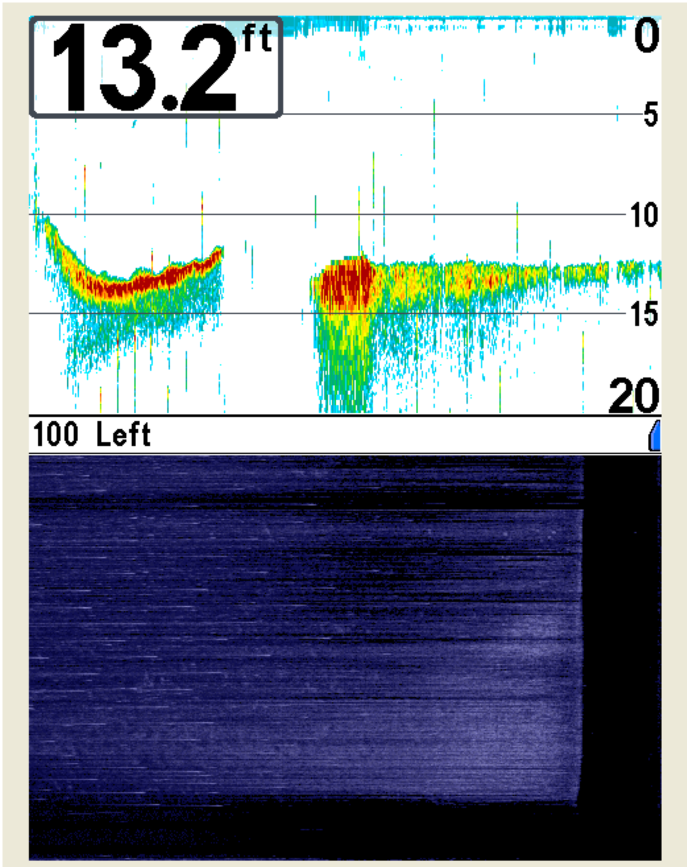


Figure A4. Side scan view and vertical view showing bottom returns.



Site H 7 showed presents of vegetation. The upper trace indicates vegetation returns from the vertical transducer form about 8 feet to surface, which is supported by the side scan below. Notice the bright return to the left of boat, this is a strong indication of vegetation being present in addition to the vertical returns.



Site H 10 showed absence of vegetation. The upper trace indicates noise but no returns from the vertical transducer and this is supported by the side scan below. Notice smooth return without any noticeable shadowing or bright spots.