4.13. Little Lake Hamilton

Background

Physical and chemical characteristics specific to Little Lake Hamilton are presented here in the context of relevant regulatory criteria and requirements (Table 4-26). Little Lake Hamilton (WBID 15001) is located in the Northern Chain of the WHCL and is hydrologically connected to Lake Hamilton via a constructed navigable canal (Photo 4-16, Figure 4-51). In 2010, Little Lake Hamilton was declared verified impaired based on elevated TSI values (>40). A TMDL is required for Little Lake Hamilton to calculate load reductions necessary to satisfy the TSI criteria. The TP, TN, and chlorophyll *a* geometric mean for Little Lake Hamilton for the period of 1997 to 2007 and corresponding EPA NNC water quality targets are listed in Table 4-26. To comply with the NNC, concentration reductions a 15 percent for TP and 13 percent for TN are required.

A summary of water quality statistics for Little Lake Hamilton is presented in Table 4-27. The median TN and TP concentrations exceed the NNC targets provided by EPA but not chlorophyll *a*. Chlorophyll *a* concentrations in Little Lake Hamilton have fluctuated and values exceeded 20 µg/L intermittently (Figure 4-52). A statistically significant trend in chlorophyll *a* concentrations from 1991 to 2007 was not observed (seasonal Kendall-Tau, $p > 0.10$). No water quality improvement projects have been implemented in Little Lake Hamilton to restore water quality and *Hydrilla* infestations have not been problematic. Little Lake Hamilton is located adjacent to Lake Hamilton, which discharges water from the Northern Chain to the Peace Creek Drainage Canal and, as such, improvements in water quality of the lake would result in little benefit farther downstream.

The Little Lake Hamilton watershed is 1,148 acres in size and includes 199 acres (seven percent) of developed lands compared to 949 acres (83 percent) undeveloped lands (Table 4-26). The 2000-2007 median color value (38 PCU) was below 40 PCU indicating the lake is a clear (non-colored) lake and specific conductivity data indicate the lake is alkaline. The lake area, perimeter, water depth, and volume statistics are based on a water level elevation of 118 feet in February 2010. Bathymetry data are available for Little Lake Hamilton for the February 2010 water level elevation (Figure 4-53). Changes in overall surface area, water depth, and volume of the lake should be considered during the development and implementation of water quality restoration projects.

Water Quality Restoration Project Selection and Priorities

Based on Little Lake Hamilton water quality and the surrounding watershed characteristics, four potential water quality restoration projects were identified using the WHCL WQMP decision key (Figure 4-54). The decision key presents the factors on which yes/no decisions were based and used to identify and select water quality improvement projects. Projects to address water quality, nutrient and sediment loading, and reduced lake levels are proposed. The projects are listed in order of priority, based on expected water quality improvements. A detailed discussion of the potential water quality restoration implications for each project can be found in Section 3.0.

- Project 1: Stormwater Infiltration Areas (SIAs)
- Project 2: Sediment Removal/Inactivation
- Project 3: SAV Planting/Management or FTWs
- Project 4: EAV Planting/Management

Table 4-26. Physical, chemical, and regulatory characteristics of Little Lake Hamilton.

Physical			
Location in chain	Northern	**High infiltration soils (acres)**	938 (82 percent)
Relation to other lakes	Adjacent to Terminal	**Developed land (acres)**	199 (7 percent)
Watershed area (acres)	1,148	**Undeveloped land (acres)**	949 (83 percent)
Lake area (acres)*	351	**Median water depth (feet)***	7.0
Perimeter (feet)*	20,922	**Maximum water depth (feet)***	22.1
Surface area: lake volume ratio*	0.15	**Volume (acre-feet)***	2,336
Watershed to surface area ratio*	3.27		
Water Chemistry			
Locally-derived: acidic or alkaline	Alkaline	**Clear or colored**	Clear
Geometric mean chlorophyll *a* (µg/L)	18	**NNC chlorophyll *a* target (µg/L)**	20
Geometric mean TN (mg/L)	1.15	**NNC TN target (mg/L)**	1.00
Geometric mean TP (mg/L)	0.035	**NNC TP target (mg/L)**	0.03
Regulatory Data			
Impaired	Yes	**TMDL status**	Required
Chlorophyll *a* trend	No trend**	**TP concentration reduction required**	15 percent

*at a water level elevation of 118 feet
**presented in section 5.0

Photo 4-16. View of Little Lake Hamilton.

Table 4-27. Little Lake Hamilton water quality summary for 1997 to 2007.

Parameter	N	Minimum	Median	Maximum
Chlorophyll *a* (µg/L)	27	8	15	32
Color (PCU)	19	15	38	80
Conductivity (µmhos/cm)	20	222	241	280
Dissolved oxygen (mg/L)	20	5.75	8.31	10.21
pH	20	6.49	7.84	8.93
Secchi depth (feet)	27	1.8	3.2	5.8
Total nitrogen (mg/L)	27	0.86	1.11	1.74
Total phosphorus (mg/L)	24	0.011	0.035	0.070

Figure 4-51. Little Lake Hamilton and associated watershed.

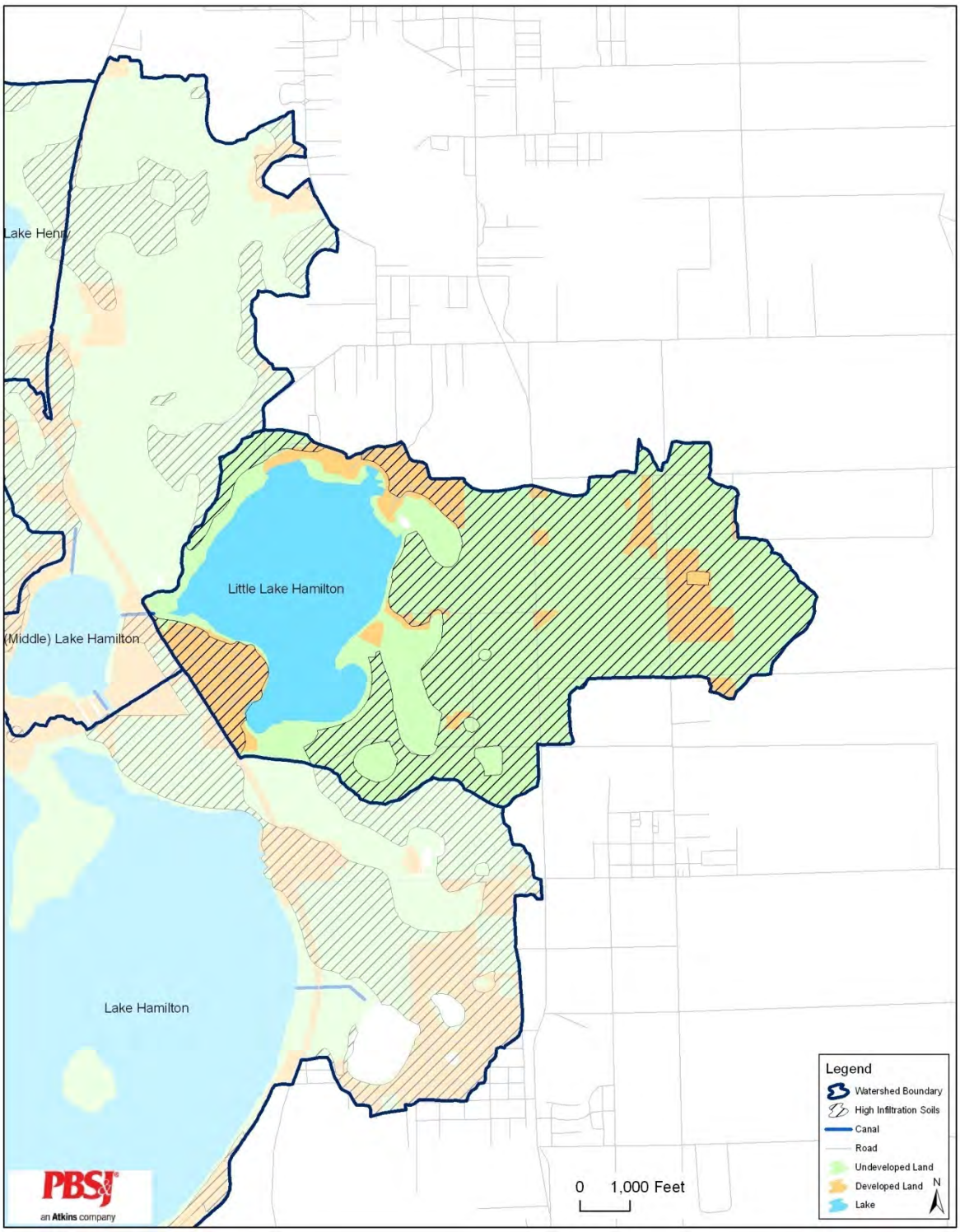


Figure 4-52. Little Lake Hamilton chlorophyll *a* concentrations using available data from 1990 to 2007.

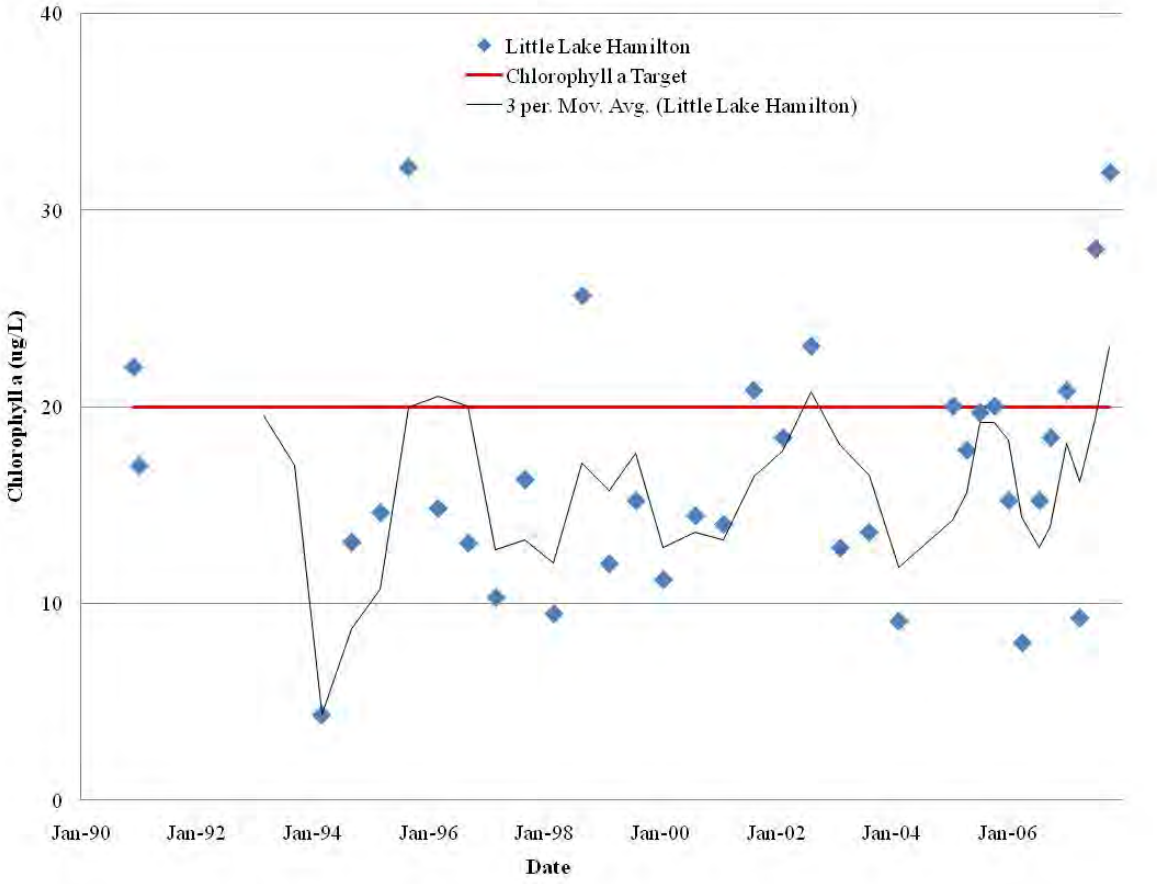


Figure 4-53. Little Lake Hamilton bathymetry (February 2010) at water level elevation = 118 feet (Polk County Water Atlas).

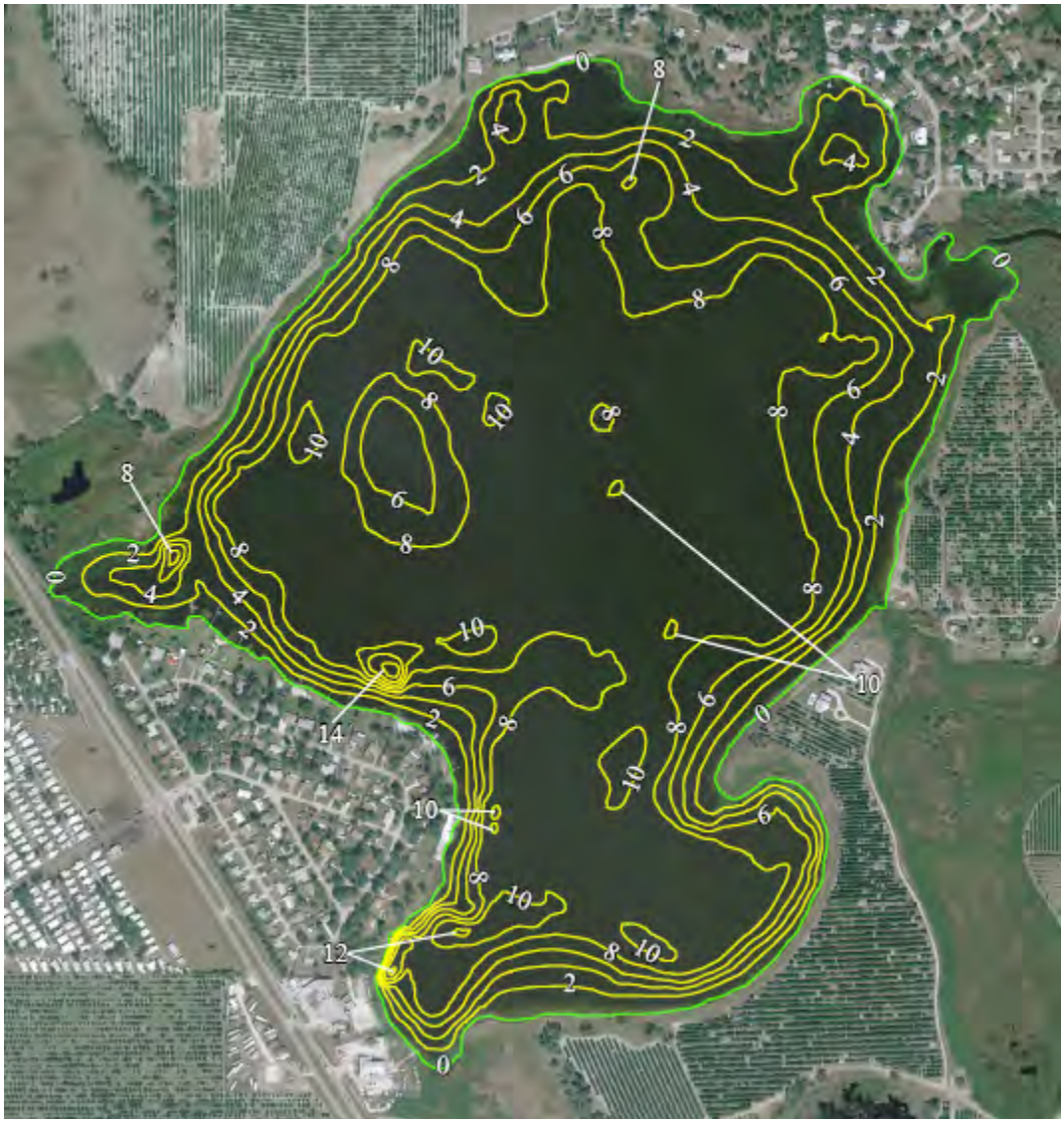
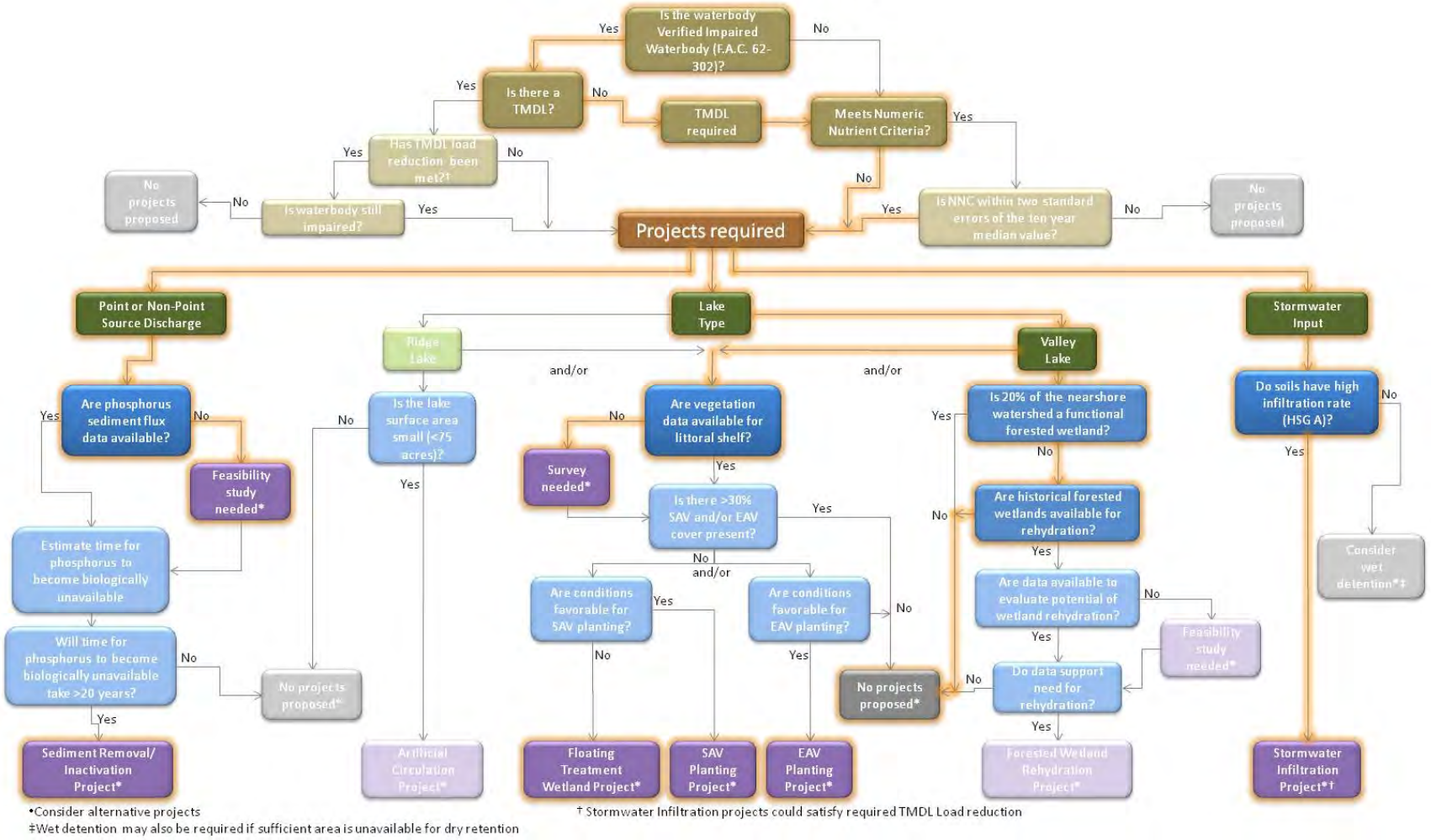


Figure 4-54. Little Lake Hamilton decision key: highlighted path shows decision process.



Project 1: Stormwater Infiltration Areas (SIAs)

The Little Lake Hamilton watershed has approximately 938 acres (82 percent of the watershed) classified as high infiltration soils. The Northern Chain was not included in the PLRG study (USF 2005), therefore a TMDL has not been completed for Little Lake Hamilton and data to estimate SIA acres for TP load reduction are not available at this time. SIA implementation could have the additional benefit of increasing storage to supplement dry season lake levels and a reduction in stormwater loads that can be later applied to the required TMDL TP load reduction. As such, SIA design should be focused on recharging the surficial aquifer.

Project 2: Sediment Removal/Inactivation

Non-point source discharges to Little Lake Hamilton may have resulted in substantial internal nutrient loads due to phosphorus release from sediments. Presently, sufficient data are not available to evaluate the internal phosphorus load and calculate the phosphorus decay rate and the time at which the phosphorus will ultimately become biologically unavailable in the lake sediments. A feasibility study is required to determine whether sediment removal/inactivation is necessary to reduce internal phosphorus loads to the lake.

Cost Estimate: $10,000.

Project 3: SAV Planting or FTWs

SAV Planting

Hydrilla infestations have not been a chronic problem in Little Lake Hamilton. A survey of existing SAV cover in Little Lake Hamilton is recommended due to the lack of sufficient data to calculate percent lake cover. Based on the results of the SAV survey, conclusions regarding SAV planting can be determined. If SAV cover is less than 30 percent, lake conditions should be evaluated to assess if additional SAV is viable based on the soil condition, water clarity and water depth.

Based on the median secchi depth (3.2 feet) from 1997-2007, plants would not be planted in water depths greater than 4 feet. The maximum planting effort for Little Lake Hamilton cannot be calculated until the electronic bathymetry data are acquired.

Cost Estimate: A cost estimate will be generated upon receipt of the bathymetry data.

FTWs

If the feasibility study indicates that more than 30 percent of Little Lake Hamilton has SAV cover, FTW may be considered. The installation of floating mats with appropriate aquatic vegetation would be expected to assimilate nutrients from the water column.

Project 4: EAV Planting

A survey of existing shoreline vegetation surrounding Little Lake Hamilton is recommended due to the lack of sufficient data at this time. Based on the results of the shoreline survey, conclusions and recommendations regarding emergent aquatic or woody vegetation planting can be determined. If limited shoreline vegetation is present, shoreline conditions should be evaluated to assess if vegetation planting is viable based on the soil conditions, slope, water level and inundation frequency and wave disturbance.