

### 4.5. Lake Fannie

#### Background

Physical and chemical characteristics specific to Lake Fannie are presented here in the context of relevant regulatory criteria and requirements (Table 4-9). Lake Fannie (WBID 14882) is located in the Northern Chain of the WHCL and is hydrologically connected to Lakes Smart and Hamilton via constructed canals, however, water control structures regulate the passage of water through the canals (Photo 4-5, Figure 4-17) and the canals are not navigable. Initially, Lake Fannie was declared verified impaired based on elevated TSI values (>40). Later in 2005, a paleolimnological review of Lake Fannie supported the decision to remove the lake from the impaired list based on the evidence that the lake was historically eutrophic and assigned a revised TSI threshold of 60. No TMDL is required for Lake Fannie because it is not identified as an impaired waterbody. The TP, TN, and chlorophyll *a* geometric mean for Lake Fannie for the period of 1997 to 2007 and corresponding EPA NNC water quality targets are listed in Table 4-9. Concentrations reductions in chlorophyll *a*, TN, or TP are not required to comply with the NNC.

A summary of water quality statistics for Lake Fannie is presented in Table 4-10. Median chlorophyll *a*, TN and TP concentrations do not exceed the NNC targets provided by EPA for Lake Fannie. Chlorophyll *a* concentrations in Lake Fannie have fluctuated substantially however, values have remained below 20 µg/L sufficiently to maintain an unimpaired status (Figure 4-18). A statistically significant trend in chlorophyll *a* concentrations from 1986 to 2007 was not observed (seasonal Kendall-Tau,  $p > 0.10$ ). No water quality improvement projects have been implemented in Lake Fannie to restore water quality. However, several *Hydrilla* infestation eradication projects have been performed in the last ten years. Due to the hydrologic isolation of Lake Fannie from the Northern Chain by gated structures, improvements in water quality of the lake would result in little benefit farther downstream.

The Lake Fannie watershed is 1,534 acres in size and includes 443 acres (29 percent) of developed lands compared to 1,091 acres (71 percent) of undeveloped lands. Approximately 46 percent of the land cover within the 500 foot buffer surrounding Lake Fannie is classified as wetlands using the 2006 FLUCS data. Forested wetlands encompass ten percent of the total wetland area, which satisfies the recommended forested wetland cover required to maintain color levels above 50 PCU. The hydrologic connection between Lake Fannie and adjacent forested wetlands should be maintained to preserve the elevated color levels and resulting beneficial attributes. The 2000-2007 median color value (55 PCU) was above 40 PCU indicating the lake is a colored lake. Using the adopted EPA NNC for Florida lakes, characterization of alkalinity or acidity is not necessary based on the colored classification of Lake Fannie. The lake area, perimeter, water depth, and volume statistics are based on a water level elevation of 122 feet in July 2007. Bathymetry data are available for Lake Fannie for the July 2007 water level elevation (Figure 4-19). A water level of 121 feet was reported in August 2010, reflecting a 1.0 feet decrease in water elevation when compared to 2007.

## Lake-Specific Restoration Projects

### Water Quality Restoration Project Selection and Priorities

Based on Lake Fannie water quality and the surrounding watershed characteristics, no water quality restoration projects were identified using the WHCL WQMP decision key (Figure 4-20). The decision key presents the factors on which yes/no decisions were based and used to identify and select water quality improvement projects. Continued water quality monitoring is recommended for the ongoing evaluation of water quality status and trends.

**Table 4-9. Physical, chemical, and regulatory characteristics of Lake Fannie.**

Physical			
Location in chain	Northern	High infiltration soils (acres)	823 (54 percent)
Relation to other lakes	Isolated	Developed land (acres)	443 (29 percent)
Watershed area (acres)	1,534	Undeveloped land (acres)	1,091 (71 percent)
Lake area (acres)*	805	Median water depth (feet)*	5.2
Perimeter (feet)*	35,750	Maximum water depth (feet)*	14.1
Surface area to lake volume ratio*	0.23	Volume (acre-feet)*	3,486
Watershed to surface area ratio*	1.9		
Water Chemistry			
Locally-derived: acidic or alkaline	NA	Clear or colored	Colored
Geometric mean chlorophyll <i>a</i> (ug/L)	12	NNC chlorophyll <i>a</i> target (ug/L)	20
Geometric mean TN (mg/L)	0.93	NNC TN target (mg/L)	2.25
Geometric mean TP (mg/L)	0.035	NNC TP target (mg/L)	0.157
Regulatory Data			
Impaired	No	TMDL status	NA
Chlorophyll <i>a</i> trend	No trend**	TP concentration reduction required	NA

\*at a water level elevation of 122 feet

\*\*presented in section 5.0

NA= not applicable

**Photo 4-5. North view of Lake Fannie.**



**Table 4-10. Lake Fannie water quality summary for 1997 to 2007.**

Parameter	N	Minimum	Median	Maximum
Chlorophyll <i>a</i> (µg/L)	87	1	14	46
Color (PCU)	12	5	55	80
Conductivity (µmhos/cm)	19	202	239	368
Dissolved oxygen (mg/L)	19	3.84	7.67	10.3
pH	19	6.59	7.5	8.37
Secchi depth (feet)	80	0.9	2.8	5.5
Total nitrogen (mg/L)	91	0.37	0.84	1.75
Total phosphorus (mg/L)	89	0.01	0.029	0.121



Figure 4-17. Lake Fannie and associated watershed.

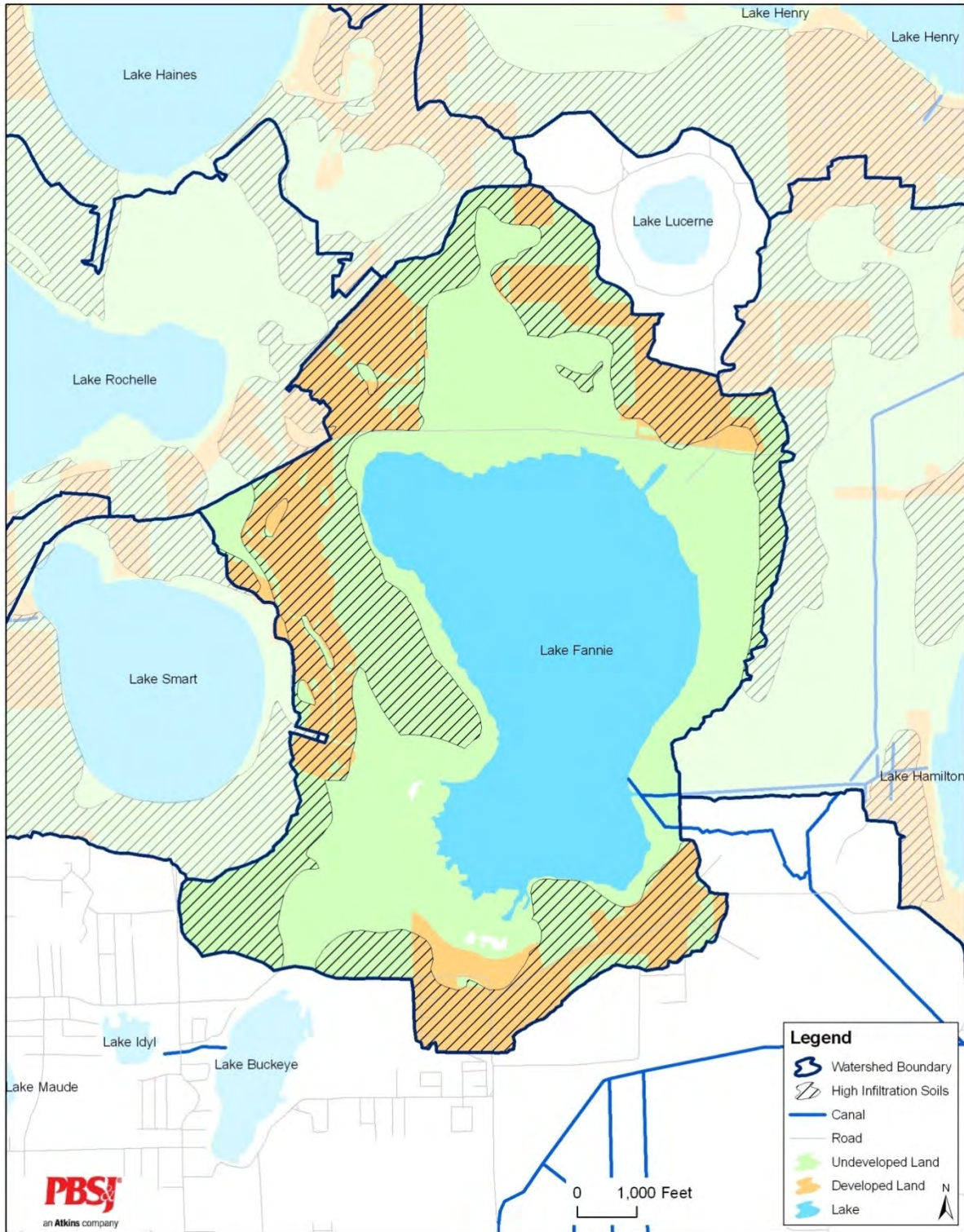


Figure 4-18. Lake Fannie chlorophyll *a* concentrations and *Hydrilla* treatment history using available data from 1986 to 2007.

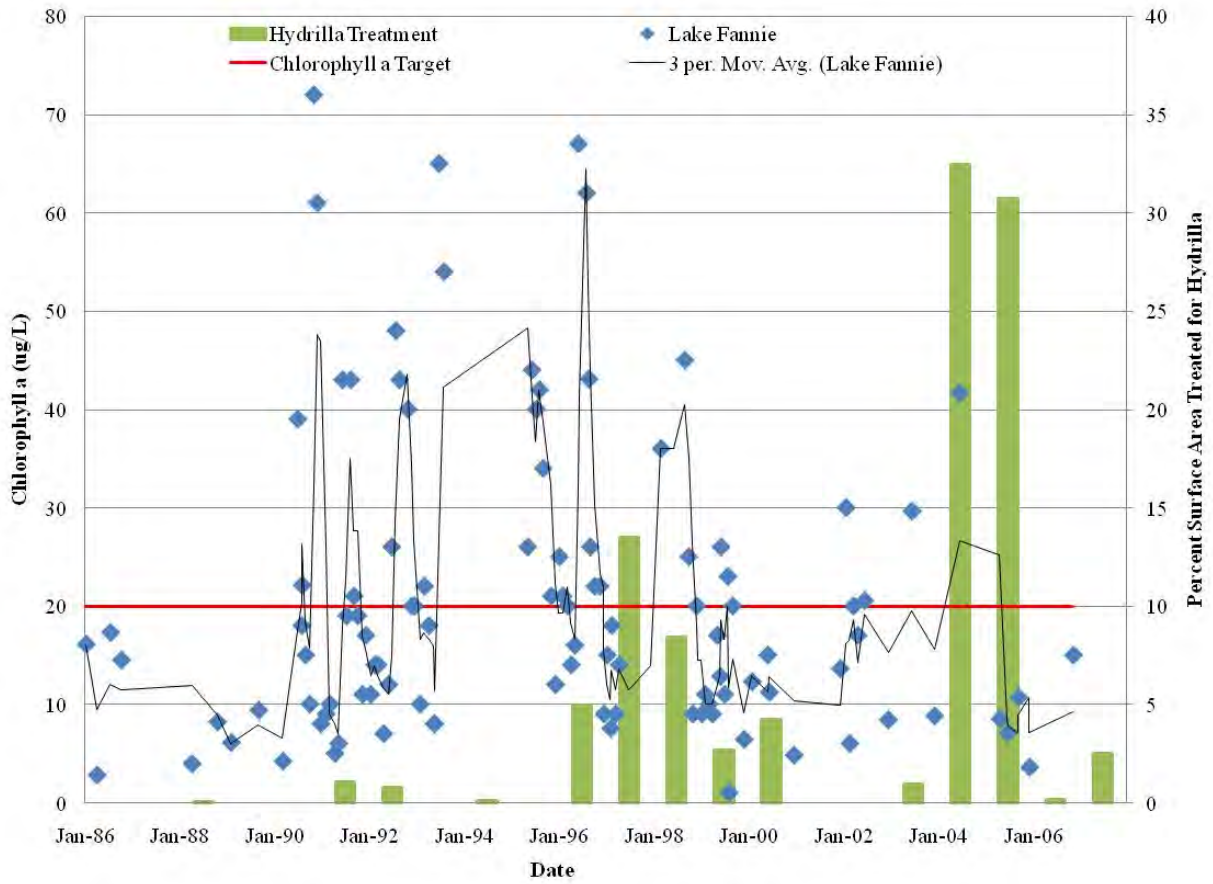
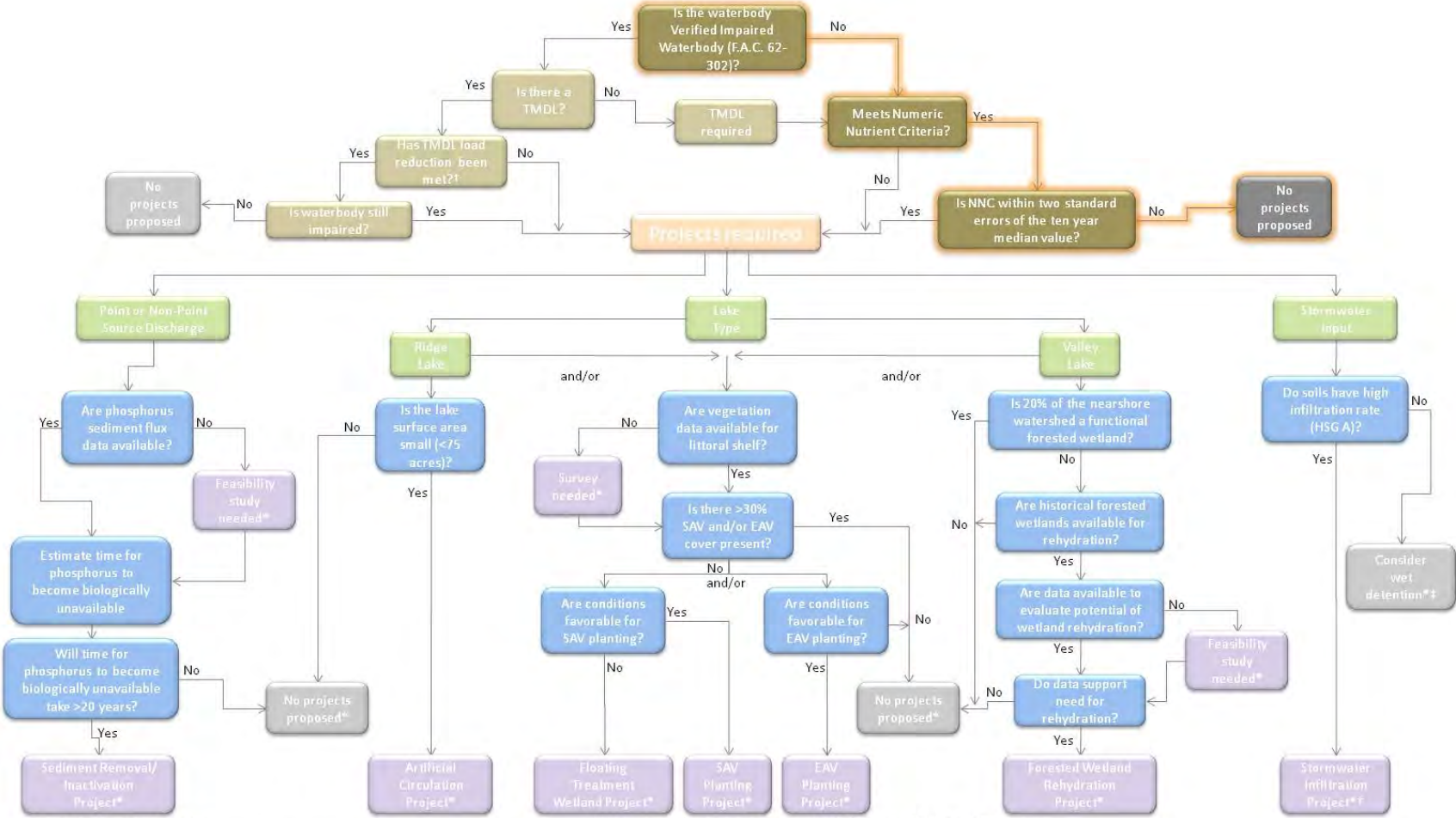




Figure 4-19. Lake Fannie bathymetry (July 2007) at water level elevation = 122 feet (Polk County Water Atlas).



Figure 4-20. Lake Fannie decision key: highlighted path shows decision process.



\*Consider alternative projects  
 ‡Wet detention may also be required if sufficient area is unavailable for dry retention

† Stormwater Infiltration projects could satisfy required TMDL Load reduction