4.11. Lake Idylwild

Background

Physical and chemical characteristics specific to Lake Idylwild are presented here in the context of relevant regulatory criteria and requirements (Table 4-22). Lake Idylwild (WBID 1521J) is located in the Southern Chain of the WHCL and is hydrologically connected to lakes Hartridge, Cannon, and Jessie via constructed navigable canals (Photo 4-13, Figure 4-43). In 2005, Lake Idylwild was declared verified impaired based on elevated TSI values (>60). A TMDL was adopted for the Southern Chain of the WHCL, including Lake Idylwild (FDEP 2007), and Lake Idylwild was subsequently delisted from impairment by FDEP in 2010. Based on the modeled external TP load to Lake Idylwild, a 43 percent reduction in TP load (39.5kg TP/year) is required to comply with the TSI criteria of 60 (FDEP 2007). The TP, TN, and chlorophyll *a* geometric mean for Lake Idylwild for the period of 1997 to 2007 and corresponding EPA NNC water quality targets are listed in Table 4-22. To comply with the NNC, concentration reductions of 33 percent for TP and 22 percent for chlorophyll *a* are required.

A summary of water quality statistics for Lake Idylwild is presented in Table 4-23. The chlorophyll *a* and TP concentrations exceed the NNC targets provided by EPA for Lake Idylwild. Chlorophyll *a* concentrations in Lake Idylwild fluctuate with values regularly elevated above 20 µg/L (Figure 4-44). A statistically significant trend in chlorophyll *a* concentrations from 1983 to 2007 was not observed (seasonal Kendall-Tau, $p > 0.10$). *Hydrilla* eradication projects have been implemented in Lake Idylwild consistently over the last 20 years with treatment over 40 percent of the lake surface areas on several occasions. No water quality improvement projects have been implemented in Lake Idylwild to restore water quality. Lake Idylwild is an intermediate lake; therefore, improvements in water quality of the lake could result in some benefit farther downstream.

The Lake Idylwild watershed is 267 acres in size and includes 227 acres (85 percent) of developed lands compared to 40 acres (15 percent) of undeveloped lands. The 2000-2007 median color value (20 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 130 feet in October 2006. Bathymetry data are available for Lake Idylwild for the October 2006 water level elevation (Figure 4-45). A water level of 130 feet was reported in August 2010, indicating similar water elevations compared to 2009. Changes in overall surface area, water depth, and volume of the lake due to water elevation fluctuations should be considered during the development and implementation of water quality restoration projects.

Water Quality Restoration Project Selection and Priorities

Based on Lake Idylwild water quality and the surrounding watershed characteristics, four potential water quality restoration projects were identified using the WHCL WQMP decision key (Figure 4-46). 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 4-22. Physical, chemical, and regulatory characteristics of Lake Idylwild.

Physical			
Location in chain	Southern	**High infiltration soils (acres)**	106 (40 percent)
Relation to other lakes	Intermediate	**Developed land (acres)**	227 (85 percent)
Watershed area (acres)	267	**Undeveloped land (acres)**	40 (15 percent)
Lake area (acres)*	102	**Median water depth (feet)***	3.1
Perimeter (feet)*	8,807	**Maximum water depth (feet)***	17.7
Surface area: lake volume ratio*	0.14	**Volume (acre-feet)***	747
Watershed to surface area ratio*	2.62		
Water Chemistry			
Locally-derived: acidic or alkaline	Alkaline	**Clear or colored**	Clear
Geometric mean chlorophyll *a* (µg/L)	26	**NNC chlorophyll *a* target (µg/L)**	20
Geometric mean TN (mg/L)	0.90	**NNC TN target (mg/L)**	1.00
Geometric mean TP (mg/L)	0.045	**NNC TP target (mg/L)**	0.030
Regulatory Data			
Impaired	Yes	**TMDL status**	Required†
Chlorophyll *a* trend	No trend**	**TP concentration reduction required**	33 percent

*at a water level elevation of 130 feet
**presented in section 5.0
†TMDL adopted

Photo 4-13. Lake Idylwild.

Table 4-23. Lake Idylwild water quality summary for 1997 to 2007.

Parameter	N	Minimum	Median	Maximum
Chlorophyll *a* (µg/L)	90	11	28	76
Color (PCU)	27	5	20	30
Conductivity (µmhos/cm)	35	179	205	256
Dissolved oxygen (mg/L)	35	5.06	8.47	11.35
pH	35	7.05	7.94	9.3
Secchi depth (feet)	115	1.5	2.3	3.9
Total nitrogen (mg/L)	91	0.48	0.93	1.57
Total phosphorus (mg/L)	87	0.01	0.041	0.09

Figure 4-43. Lake Idylwild and associated watershed.

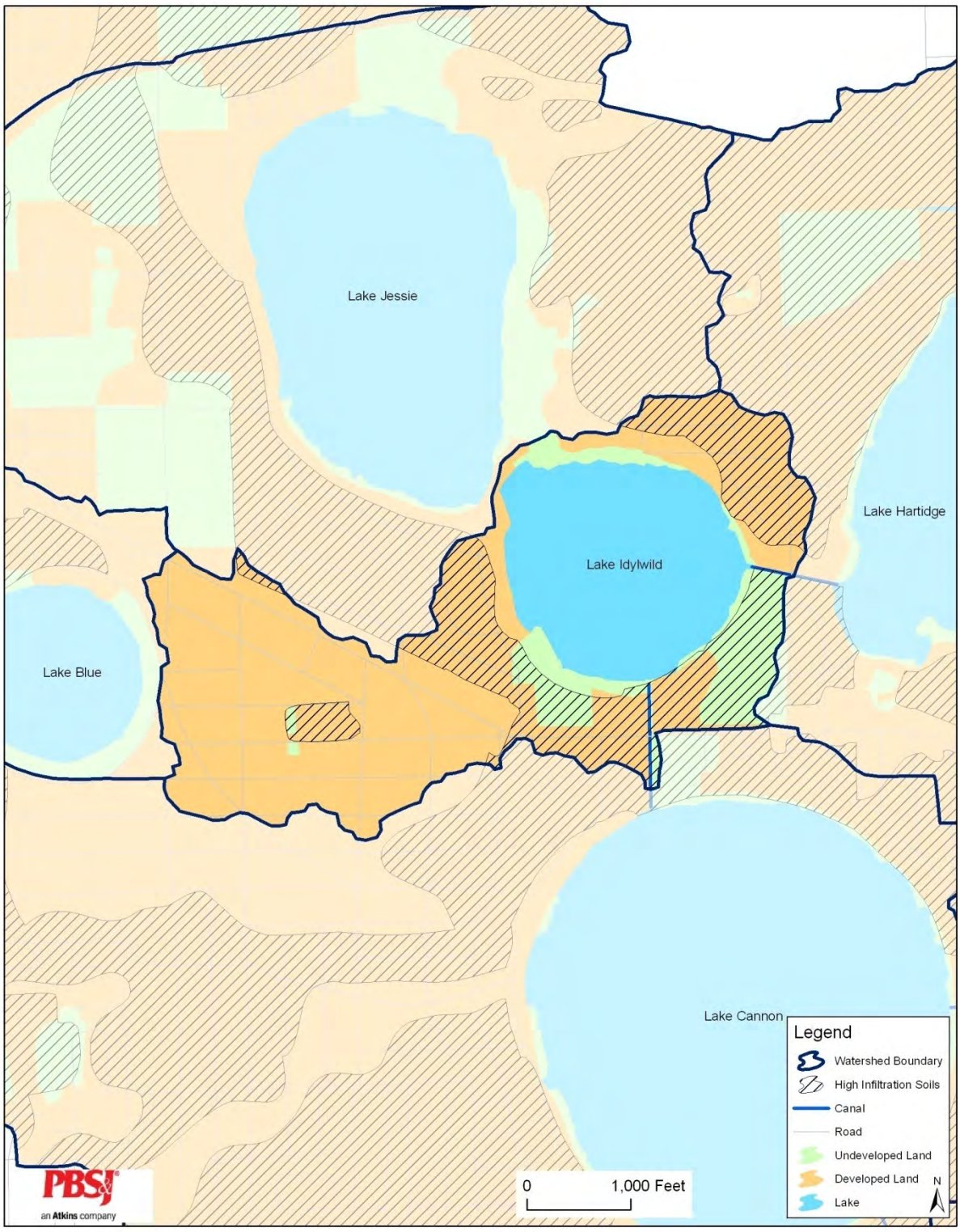


Figure 4-44. Lake Idylwild chlorophyll *a* concentrations and *Hydrilla* treatment history using available data from 1983 to 2007.

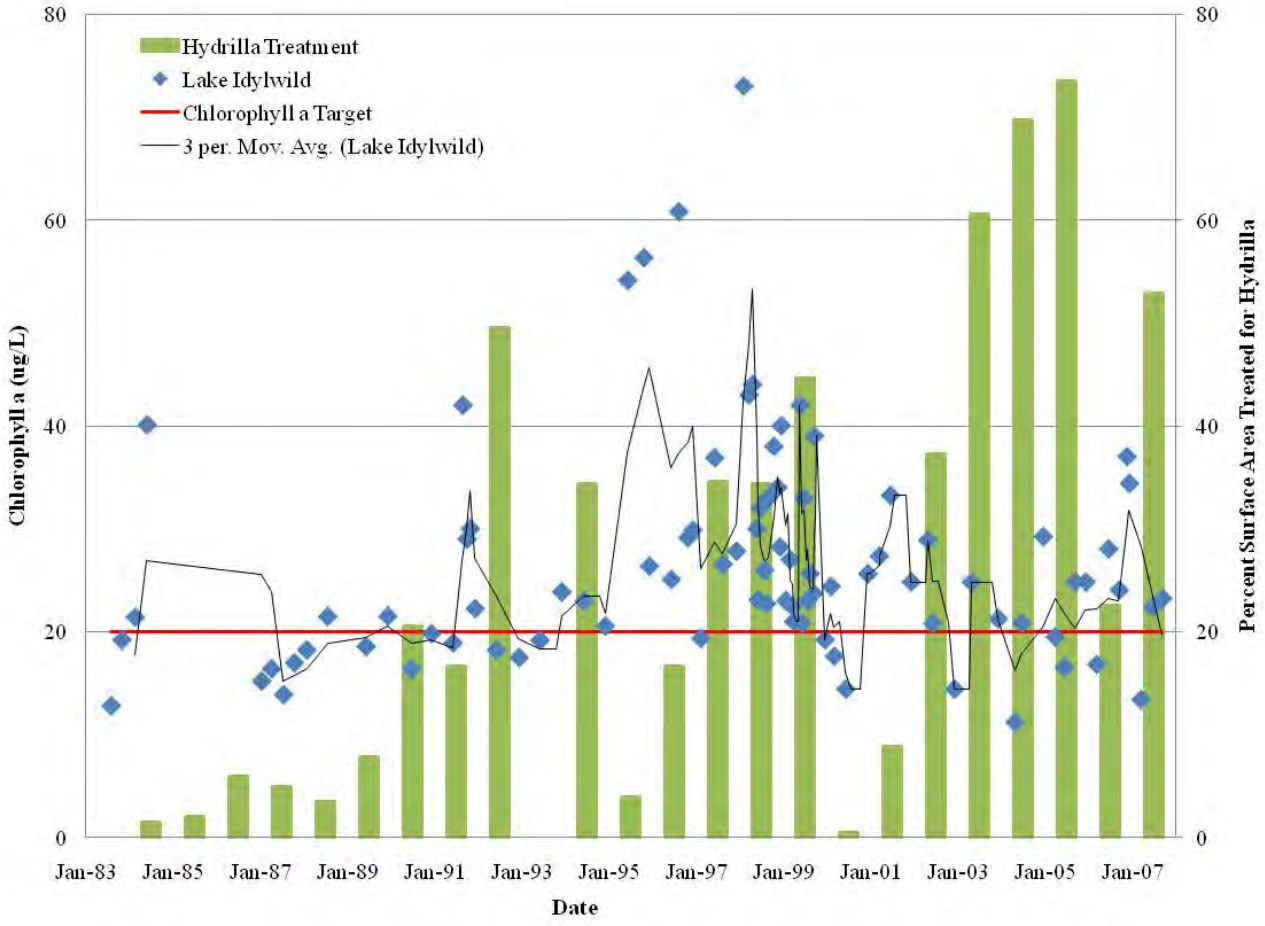
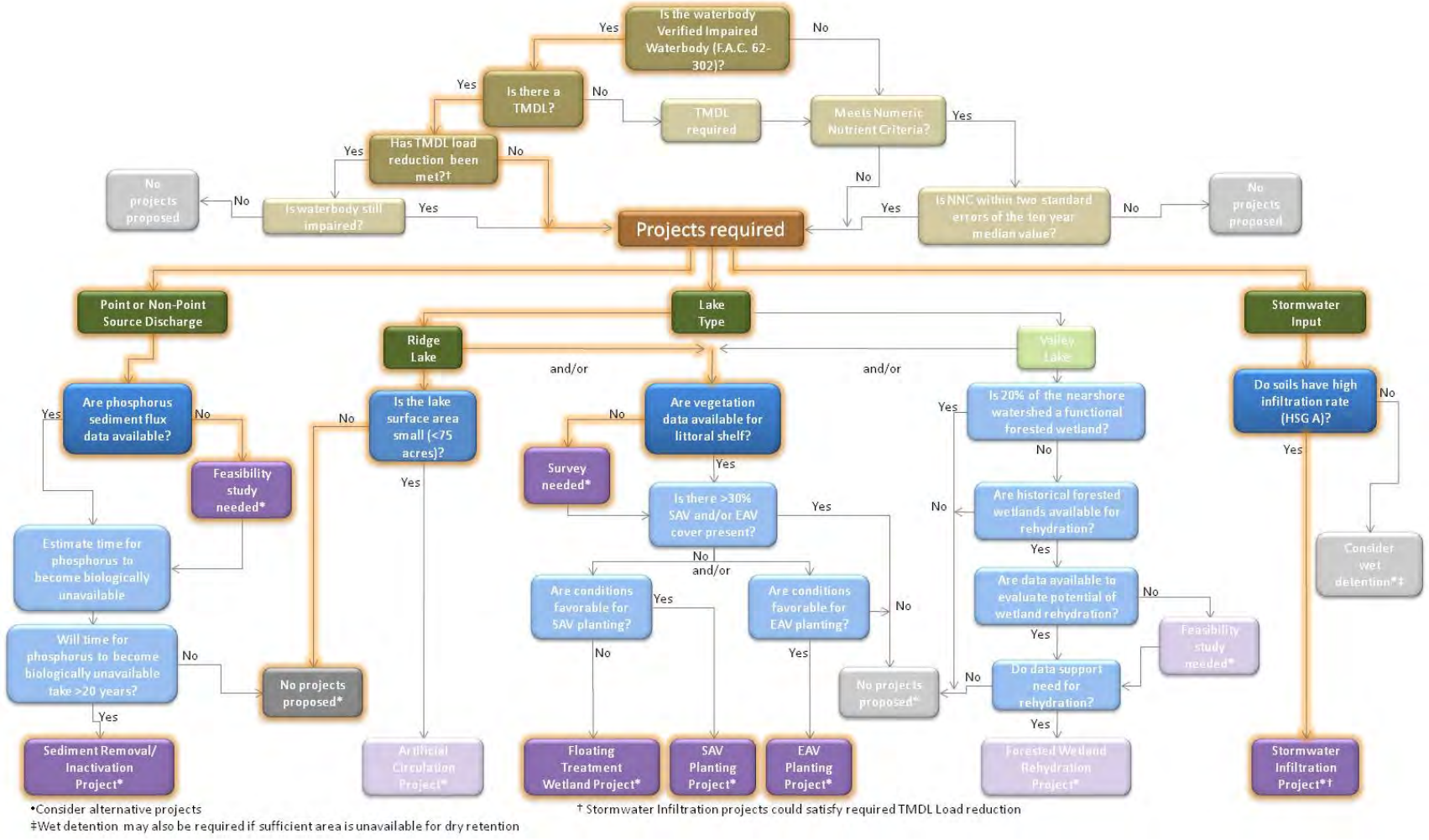


Figure 4-45. Lake Idylwild bathymetry (October 2006) at water level elevation = 130 feet (Polk County Water Atlas).

Figure 4-46. Lake Idylwild decision key: highlighted path shows decision process.



Project 1: Stormwater Infiltration Areas (SIAs)

The Lake Idylwild watershed has approximately 106 acres (40 percent of the watershed) classified as high infiltration soils. A TMDL has been established for Lake Idylwild, and as such, the SIA design should be focused on satisfying the TMDL requirements. SIA projects would need to encompass approximately 9 percent (24 acres) of the watershed in order to accomplish an annual 39.5 kg in TP loads to Lake Idylwild. Acres of SIA estimated to meet the TP NNC was 21 (8 percent of the watershed) for a 33 percent phosphorus reduction in Lake Idylwild to meet its NNC. Forty percent of the watershed is characterized by high infiltration soils; therefore, it may be feasible to satisfy the TMDL load reductions through SIA implementation.

Project 3: Sediment Removal/Inactivation

Non-point source discharges to Lake Idylwild 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 2: SAV Planting or FTWs

SAV Planting

In Lake Idylwild, *Hydrilla* eradication occurs frequently attributing to the continued degradation in water quality. A survey of existing SAV cover in Lake Idylwild 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. *Hydrilla* harvesting may be required for successful establishment of selected SAV plants.

The 1997-2007 median secchi depth in Lake Idylwild (2.3 feet) indicated that SAV planting should not occur in water depths greater than 2 feet. The maximum planting effort could result in vegetation cover of approximately 13 percent of the lake bottom (13 acres).

Cost Estimate: $85,000 (estimate based on previous purchase and installation cost of $0.90 per plant provided by EarthBalance®, additional funds included for maintenance)

FTWs

If the feasibility study indicates that more than 30 percent of Lake Idylwild 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 3: EAV Planting

A survey of existing shoreline vegetation surrounding Lake Idylwild is recommended due to the lack of sufficient data at this time. Based on the results of the shoreline survey, conclusions 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.