

1.0 Introduction

1.1. Project Objective

This report presents a Water Quality Management Plan (WQMP) for the Winter Haven Chain of Lakes (WHCL). The WQMP relies heavily on the results of work performed for three previously completed tasks: a summary and analysis of existing water quality data (WHCL pre-BMAP Assessment, PBS&J 2008), development of criteria for Best Management Practices (BMPs) (WHCL Interim Report, PBS&J 2010), and development of a lake-specific conceptual restoration plan (WHCL Conceptual Restoration Plan, PBS&J 2010). This WQMP was developed with cooperative funding from the Peace River Basin Board of the Southwest Florida Water Management District (SWFWMD) and the City of Winter Haven.

This WQMP describes the link between water quality issues and lake-specific water quality restoration projects in the context of state and federal regulations and documents the process and science by which lake specific restoration projects were selected. More specifically, this WQMP:

- Characterizes water quality issues associated with lakes in the WHCL
- Identifies restoration projects to address specific water quality issues
- Links restoration projects to lakes based on individual water quality needs of each lake
- Provides recommendations for lake restoration priorities

Lake restoration project recommendations were developed to meet the requirements of the federal Clean Water Act and the Florida Department of Environmental Protection's (FDEP) Total Maximum Daily Load (TMDL) program. A TMDL establishes the allowable loadings to a watershed that are necessary for the lake to meet the applicable water quality standards for an identified parameter of concern (e.g. nutrients). Restoration projects and water quality improvements anticipated as a result of the proposed projects, as well as planning level cost estimates for the recommended projects, are included in this WQMP. The WQMP is consistent with the *Winter Haven Chain of Lakes Surface Water Improvement and Management (SWIM) Plan*, as well as the *Winter Haven Chain of Lakes Pre-BMAP (Basin Management Action Plan) Assessment* (PBS&J 2008) prepared for the FDEP. Lakes in the WHCL are mapped in Figure 1-1 and identified as to whether a TMDL has been developed/adopted (based on Florida's Trophic State Index, TSI) and if the lake is a designated SWIM waterbody. The WQMP is presented in seven sections, listed below.

Section 1. Introduction. The introduction outlines the purpose of the WQMP and presents an overview of the WHCL, including location and physical characteristics.

Section 2. Water Quality Issues Associated with the WHCL. A water quality characterization for the WHCL and the implications of relevant state and federal regulations due to water quality issues are presented in this section.

Section 3.0. Restoration Projects to Address Water Quality Issues. Restoration projects developed to address water quality issues specific to the WHCL and the science on which the projects are based are presented in Section 3.0.

Section 4. Lake-specific Water Quality Improvement Projects. Restoration project recommendations on a lake by lake basis, with more specific details if available (including planning level cost estimates), are presented in this section.

Section 5. Priorities for Lake Restoration Projects. In Section 5, the approach used to develop recommendations and priority restoration projects for lakes are presented.

Section 6. Conclusions and Recommendations. Conclusions and recommendations developed in previous sections of the WHCL WQMP are summarized in Section 6.

Section 7. Literature Cited. Scientific literature and previously prepared reports used to develop this WQMP are documented in the Literature Cited section.

1.2. Project Area

The WHCL is a priority waterbody identified in the SWFWMD SWIM Plan and consists of two “chains” of lakes – the Southern and Northern Chains (Figure 1-1). The watersheds of the Southern and Northern Chains make up approximately 18 and 14 square miles, respectively, of the 32 square mile WHCL watershed (FDEP 2007). The watershed of the WHCL is part of the Peace Creek sub-basin of the Peace River Watershed and is at the headwaters of the 110 mile long Peace River. Water from the Peace River eventually flows into Charlotte Harbor and then the Gulf of Mexico.

The Northern Chain of Lakes includes nine lakes. Water levels in lakes Haines, Rochelle, Conine, and Smart are maintained at the same elevation by a control structure at Lake Smart. Only Lakes Fannie, Henry and Hamilton do not have navigable canals to other lakes. Lake Fannie water level elevations are maintained by water control structures on the canal draining to Lake Fannie from Lake Smart and from Lake Fannie to Lake Hamilton. Water levels in lakes Hamilton, Middle Hamilton, and Little Hamilton are controlled at the same elevations with a structure at the outfall from Lake Hamilton. The outflow from Lake Hamilton begins the Peace Creek Drainage Canal. Lake Henry is also connected to Lake Hamilton via a gated structure, but is not navigable.

The Southern Chain includes lakes Hartridge, Jessie, Idylwild, Cannon, Mirror, Spring, Howard, May, Shipp, Lulu, Roy, Eloise, Little Eloise, Summit, Winterset, and Little Winterset. Lakes Blue and Mariana are connected to the other lakes in the Southern Chain only when seasonal high waters exceed the lake operational levels (i.e. no navigable canals). Little Eloise and Little Winterset lakes were not evaluated separately from Lakes Eloise and Winterset for this report. Sixteen lakes are controlled by one control structure at Lake Lulu. A gated control structure between Lake Blue and Cannon isolates Lake Blue from the Southern Chain. The Southern Chain eventually flows into the Wahneta Farms Drainage Canal and then to the Peace Creek Drainage Canal. However, water discharges infrequently from Lake Lulu, resulting in an extended residence time in the Southern Chain lakes. During periods of discharge, water in the Wahneta Farms Drainage Canal flows to the Peace Creek Drainage Canal and then to the Peace River, although anecdotal evidence indicates that the canal has discharged water from the Southern Chain only three times in the past 25 years.

1.3. Project Area Description

The WHCL watershed is part of the rapidly urbanizing area of central Florida. The City of Winter Haven includes approximately 90 percent of the WHCL watershed. Other cities, including Auburndale, Lake Alfred, Haines City, and Dundee have jurisdiction in the watershed. Prior to urban development, citrus and agriculture (improved pasture) were the predominant land uses in the watershed.

High sandy ridges and lower ‘valleys’ characterize the WHCL watershed. Historically, virtually all of the rainwater that fell on the sandy ridge areas percolated into the soils that are characterized by high infiltration rates (approximately 6.0 inches/hour, USDA/SCS Polk County Soil Survey 1990), while excess water was stored in the lower valley wetlands. During the dry season, ridge lakes were historically maintained by ground water from the sandy surficial aquifer, which is one of the highest recharge zones for the Floridan aquifer in the Southern West Central Ground Water Basin. Urban development in the WHCL occurred primarily on soils that have high infiltration rates (Figure 1-2). Consequently, rainfall that formerly infiltrated these high recharge areas is now surface water runoff. In contrast, the valley areas were historically characterized by forested and marshy shorelines, the largest of which is Lake Hamilton.

Figure 1-1. TMDL status (adopted or still required) and designated SWIM waterbodies in the WHCL.

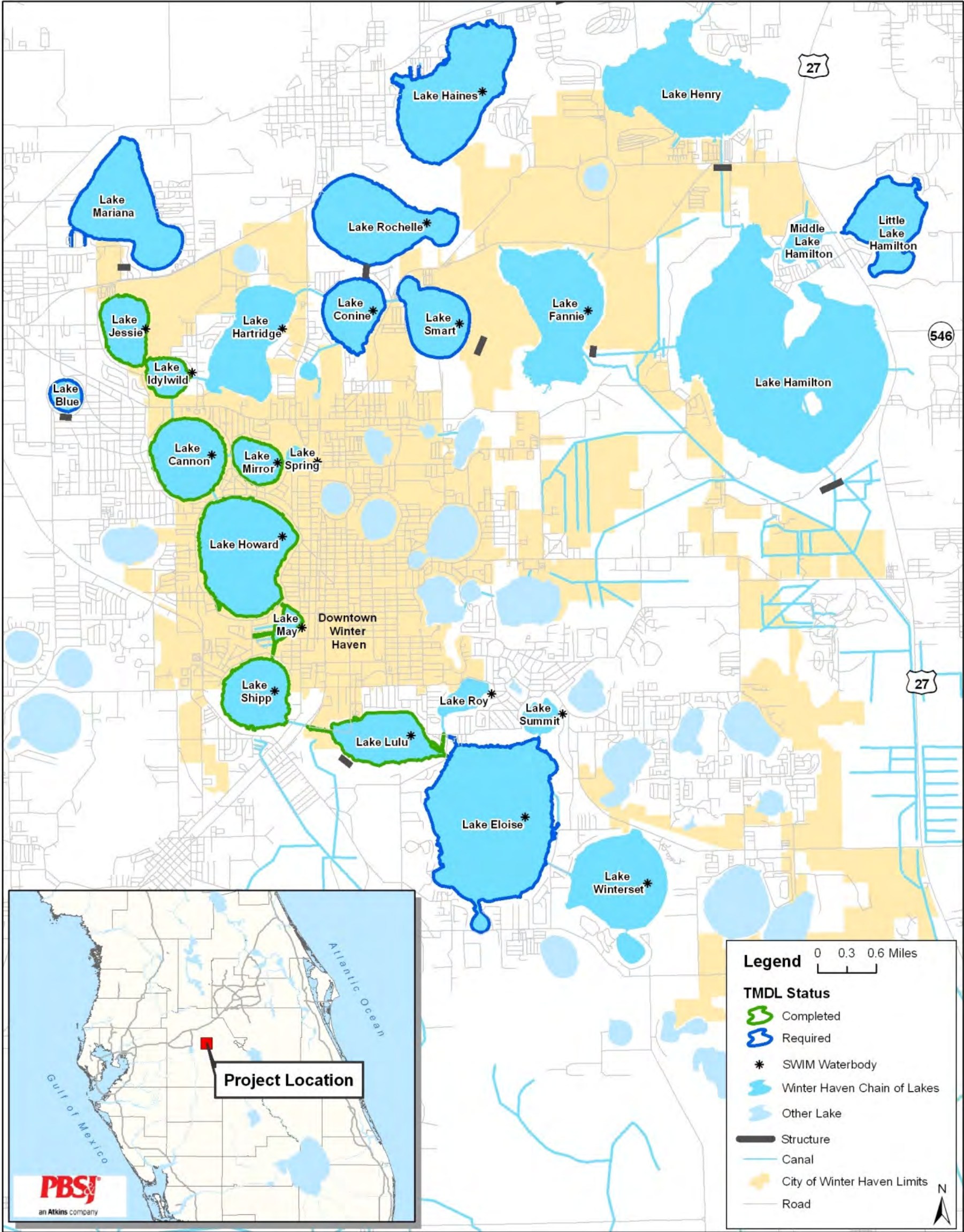
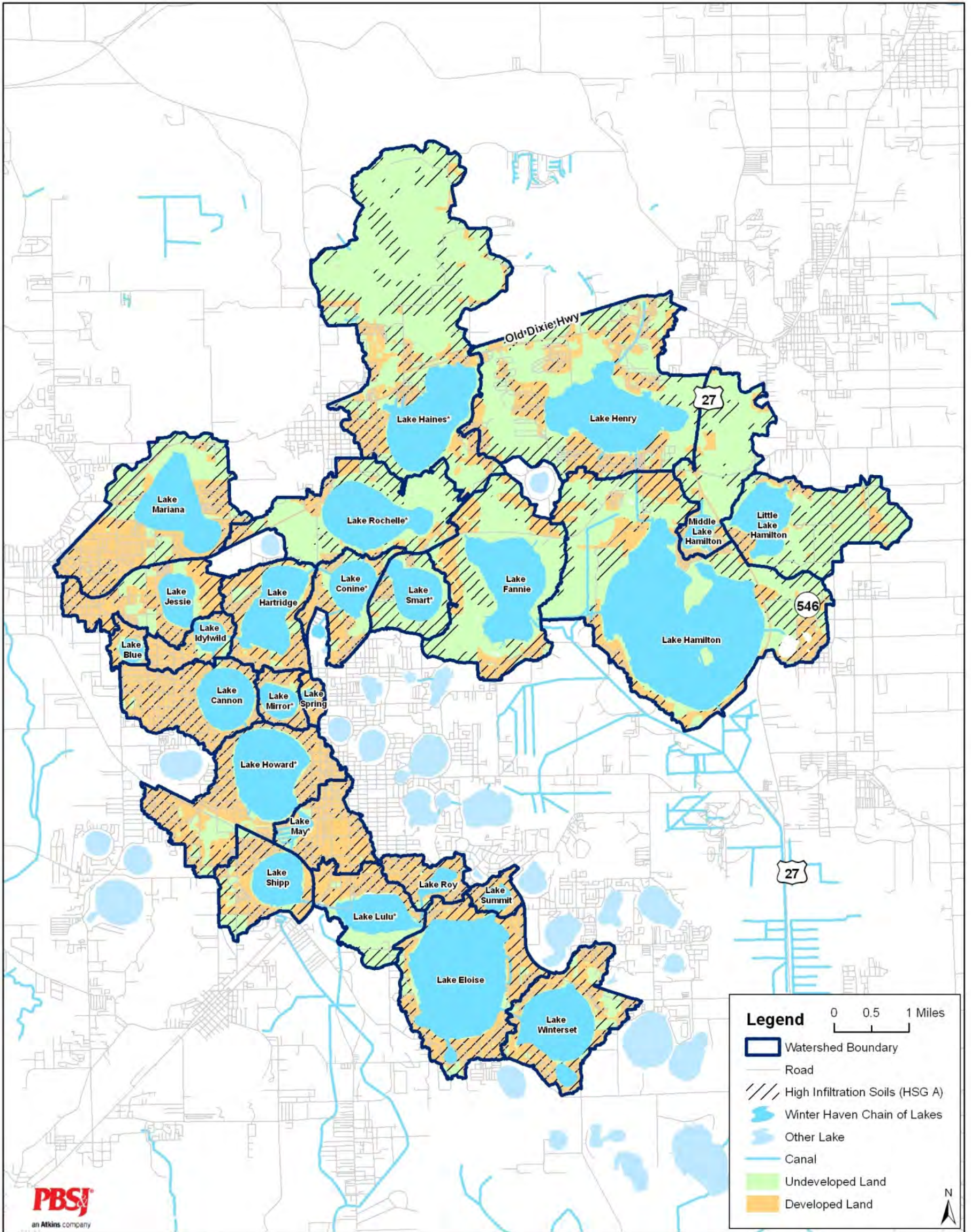


Figure 1-2. Developed and undeveloped areas in the WHCL watershed and high infiltration soils (potential recharge areas).



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