



NONPOINT SOURCE SUCCESS STORY

Florida

Stormwater Retrofit Projects Help Reduce Nutrient Pollution in Lake Conine

Waterbody Improved

Water quality impacts from nutrient loading and polluted runoff from nonpoint sources led the Florida Department of Environmental Protection (DEP) to add Lake Conine to Florida's Verified List and the Clean Water Act (CWA) section 303(d) list of impaired waters for nutrients. In response, DEP developed a nutrient total maximum daily load (TMDL) that was adopted by rule in 2018. Project partners implemented nonpoint source pollution management strategies, including the Lake Hartridge Stormwater Treatment Facility, the South Lake Conine Stormwater Treatment Project, and the implementation of a community-wide educational campaign. As a result of these activities, chlorophyll α , total nitrogen (TN), and total phosphorus (TP) levels have improved, demonstrating that these projects have had a positive impact on water quality within Lake Conine.

Problem

Lake Conine (WBID 1488U) is in the Group 3 Sarasota Bay – Peace – Myakka watershed in north-central Polk County within the city of Winter Haven in central Florida (Figure 1). It is a Class III Lake waterbody designated for recreation and the propagation and maintenance of a healthy, well-balanced fish and wildlife population. The predominant land uses in the Lake Conine watershed are 55% medium-density residential; 11% wetlands; 26% water; and 6% transportation, communication, and utilities. Lake Conine has an area of roughly 213 acres, and the surrounding watershed drains an area of roughly 589 acres. The average depth of the lake is 9.9 feet (3.0 meters), with a maximum depth of 20.0 feet (6.1 meters).

In 2005, DEP placed Lake Conine on the state's Verified List and the CWA section 303(d) list of impaired waters for nutrients. There are no point sources within the Lake Conine watershed; nonpoint pollution sources include septic systems, surface water runoff, groundwater seepage and precipitation. Additionally, the Lake Conine watershed is within an area identified as a disadvantaged community on the Council on Environmental Quality's draft Climate and Economic Justice Screening Tool.

In 2018 DEP wrote a nutrient TMDL for Lake Conine that calls for a 36% reduction in the TN load and a 57% reduction in the TP load entering the lake. One of the primary sources of pollutants contributing to Lake Conine's declining water quality is nonpoint source



Figure 1. Aerial view of Lake Conine and the adjacent Lake Hartridge in central Florida. The two lakes are connected by the Conine-Hartridge Canal (red circle).

pollution carried in stormwater runoff from a 328-acre drainage area on the south side of Lake Conine. Based on stormwater sampling, the runoff from this area has a high concentration of nutrients.

Story Highlights

The City of Winter Haven was awarded CWA section 319(h) Fiscal Year (FY) 2002 grant funds to treat water from an 89.02-acre drainage basin south of Lake Hartridge, the northernmost lake in the hydraulically

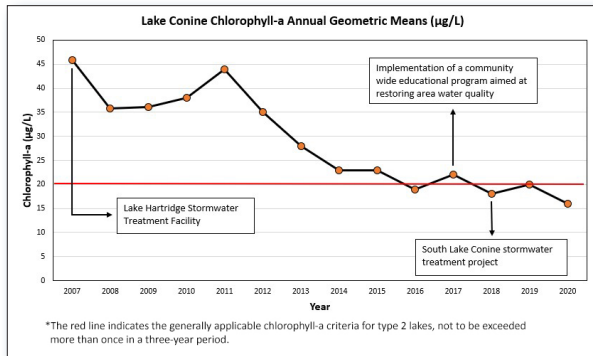


Figure 2. Lake Conine chlorophyll *a* annual geometric means (2007–2020).

connected Southern Winter Haven Chain of Lakes that flows to the Peace River System. Lake Hartridge is directly upstream of Lake Conine, and the two lakes are connected to each other via the Conine-Hartridge Canal. The project included construction of a sediment sump, a 4-acre wetland detention area, and an outfall skimmer to treat nonpoint source pollutant runoff. The project also included public education signage about the project’s environmental benefits along the walking/jogging trails. This system helped reduce TN and TP levels from stormwater runoff by 93% and 97%, respectively.

In 2016 the City of Winter Haven was awarded legislative funds to design and produce a stormwater master plan to outline capital improvement projects aimed at performance enhancements for the Chain of Lakes. The City was also awarded a CWA section 319(h) FY 2015 grant for a community education program to guide development and implementation of green infrastructure projects, including four community workshops for public and private stakeholders and five land planning development reviews. These efforts resulted in the creation of enhanced stormwater permit design and management procedures being developed and implemented to increase performance of stormwater systems within the City of Winter Haven.

In 2018 the City of Winter Haven was awarded a grant for the South Lake Conine Stormwater Treatment Project, which included constructing stormwater treatment ponds and a series of wetland marsh chambers to treat runoff from the surrounding drainage network before it enters Lake Conine. Work included selective dredging of organic soils, creating berms, removing

invasive exotic vegetation, and establishing desirable aquatic vegetation. Public education will be provided about the project’s environmental benefits with signage, kiosks, brochures, and post cards. The estimated load reduction from this project for TN and TP are 65% and 36%, respectively.

Results

The restoration projects have had a positive impact on water quality. Nutrient concentrations within Lake Conine have been reduced to below the state’s numeric nutrient criteria for type 2 lakes. Chlorophyll *a* annual geometric means collected at two monitoring stations show that concentrations decreased from a maximum value of 46 micrograms per liter (µg/L) in 2007 to a value of 16 µg/L in 2020 year (Figure 2). Post-project annual geometric means have consistently remained below state’s impairment threshold of >20 µg/L since 2018. Similar improvements have also been observed for TN and TP annual geometric mean concentrations in Lake Conine. TN and TP levels have declined from maximum values of 1.65 milligrams per liter (mg/L) TN in 2011 and 0.07 mg/L TP in 2007, down to post-project (2019) values of 0.91 mg/L TN and 0.02 mg/L TP.

Data show that the upstream Lake Hartridge is not yet meeting water quality standards; however, chlorophyll *a* concentrations are decreasing (31 µg/L in 2013, down to 25 µg/L in 2019), which demonstrates a positive trend in water quality likely linked to watershed restoration efforts.

Partners and Funding

The City of Winter Haven conducted water quality monitoring and implemented projects that reduce and treat nonpoint source pollution and educate the public. Funding sources for these efforts included two CWA section 319 grants in FYs 2002 and 2015 (total of \$424,250 with \$980,250 local match from the City of Winter Haven). Additionally, the State of Florida provided legislative appropriation funding of \$400,000 in FY 2016–2017. Finally, the State of Florida Nonpoint Source Management Program provided a Water-Quality Assistance Grant of \$750,000 in FY 2015–2016, with \$750,000 in local matching funds provided by the City of Winter Haven.



U.S. Environmental Protection Agency
Office of Water
Washington, DC

EPA 841-F-24-001K
April 2024

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