



NONPOINT SOURCE SUCCESS STORY

Mississippi

Implementing Best Management Practices Improved Lake Washington

Waterbody Improved

Lake Washington is a 2,965-acre oxbow lake formed by an abandoned meander of the Mississippi River. Sediment inputs from agricultural activities in the watershed contributed to an impairment of the lake for its designated use of aquatic life use support. Lake Washington was placed on Mississippi's 1996 Clean Water Act (CWA) section 303(d) list of impaired waters for being impaired by sedimentation. The local soil and water conservation district (SWCD) worked with partners to implement a series of erosion control best management practices (BMPs). Monitoring was conducted after the BMPs were implemented, and Lake Washington was assessed as attaining its aquatic life designated use in the 2018 CWA section 305(b) report.

Problem

The Lake Washington watershed is in Washington County near the Mississippi River in the Mississippi Delta, an area of the state that is very flat and has little to no relief (Figure 1). Before 2014, the Lake Washington watershed was delineated at a 27,861-acre HUC-10 scale due to the difficulty in defining flow paths and watershed boundaries. Later use of light detecting and ranging (LiDAR) remote sensing resulted in the identification of two HUC12 watersheds for Lake Washington—North Lake Washington (15,805 acres) and South Lake Washington (15,539 acres)—for a total of 31,344 acres.

According to the 2016 National Land Cover Dataset (NLCD), the combined land uses for the Lake Washington watersheds include 69 percent cropland, 16 percent wetlands, 11 percent water and 3 percent urban. The remaining 1 percent is made up of forestland, pastureland and scrub/barren land.

Lake Washington was monitored and assessed as not attaining its designated use classification of aquatic life support, which led to it being listed on Mississippi's 1996 CWA section 303(d) list of impaired waters. Further study showed that the impairment was due to sedimentation, and a Lake Washington Total Maximum Daily Load (TMDL) was developed and approved by the U.S. Environmental Protection Agency (EPA) in 2003. This TMDL stated that a 30 percent to 56 percent reduction in the amount of sediment loading would be needed for Lake Washington to attain its designated use classification.

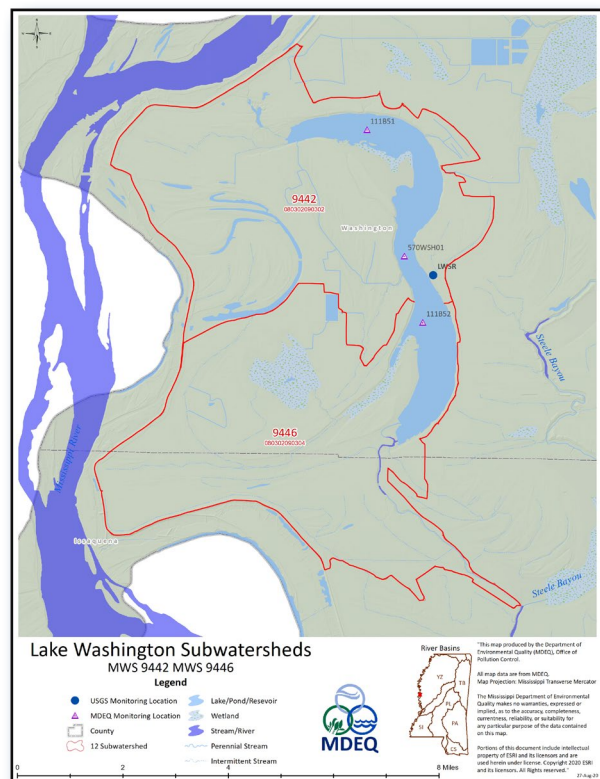


Figure 1. Lake Washington is in western Mississippi.

Story Highlights

In 2007 the Washington County SWCD developed a watershed plan. In 2008, the Mississippi Department of Environmental Quality (MDEQ) partnered with the Mississippi Soil and Water Conservation Commission and the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) to implement

BMPs within the Lake Washington watersheds to address sedimentation. BMPs were implemented between 2008 and 2011 and included the installation of 139,712 feet of dikes, 153 grade stabilization structures, 13 water control structures, and six rock outlet protection features (Figure 2).

MDEQ partnered with the U.S. Geological Survey (USGS) to conduct monitoring at a location downstream of BMPs within the watershed. This monitoring was intended to provide information on water quality at the edge of agricultural lands before the water flows into intermittent and perennial streams. The data were collected as part of a special study designed to evaluate BMP effectiveness on agricultural lands during storm flow events. USGS conducted monitoring before the implementation of the CWA section 319-funded BMPs to establish a baseline for water quality. Monitoring resumed after installation of the BMPs, and data were collected to determine if implementation of BMPs on the landscape had an impact on water quality.

Results

MDEQ's ambient monitoring program for lakes includes three monitoring locations on Lake Washington, one each in the northern (111B51), middle (570WSH01) and southern (111B52) parts of the lake. Monitoring is generally conducted in a manner that allows samples to be collected during the critical period for lakes in Mississippi, which is during the summer and fall (when temperatures are higher, there is less rainfall, and periods of stress due to low dissolved oxygen are more likely to occur). Data were evaluated at each monitoring location individually because they were determined to represent different portions of the lake and different potential influences to water quality as various landscape areas drain into the lake and mix. Using the data, Lake Washington was assessed as attaining its designated use classification of aquatic life use support in Mississippi's 2018 and 2020 section 305(b) water quality assessment reports.

As part of this project, USGS collected monitoring data before and after BMP implementation. Although



Figure 2. Four grade stabilization structures, including one antivortex structure.

some data were collected at baseflow, most of the sampling occurred during storm events. The results from the data collection and analysis were published in the *Journal of Soil and Water Conservation: Assessing water quality changes in agricultural drainages: Examples from oxbow lake tributaries in northwestern Mississippi, United States, and simulation-based power analysis* (Murphy, J.C.; Hicks, M.; & Stocks, S., 2020). The edge of field data showed that there was a "...35% or more decrease in event concentration [for more than half of the constituent measured] following a period of intense BMP implementation."

Partners and Funding

Because of a high level of stakeholder interest, the restoration project of Lake Washington was a collective effort between the Mississippi Soil and Water Conservation Commission, MDEQ, EPA, NRCS, and the Washington County SWCD. The total cost of the overall project was \$2,425,909, of which \$820,025 was comprised of CWA section 319 funds. Participating stakeholders contributed a total of \$1,605,884 towards the implementation of practices within this watershed. Additionally, NRCS funded \$980,814 of practices within the larger HUC 10 that encompasses both of the HUC 12s that surround Lake Washington.



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