NONPOINT SOURCE SUCCESS STORY

Minnesota

In-Lake Management Improves McMahon Lake Water Quality

Waterbody Improved

McMahon Lake is used for recreation (canoeing and fishing) and wildlife habitat. In 2002 the lake was listed on the Clean Water Act (CWA) section 303(d) list as impaired for exceeding Minnesota's water eutrophication criteria. To address this impairment, a total maximum daily load (TMDL) study was completed in 2012. This study called for an 81 percent reduction in phosphorus loads, predominantly from sources internal to the lake (decaying curlyleaf pondweed and sediment release). Water quality improved, thanks to the harvesting of curlyleaf pondweed and completion of multiple restoration projects. As a result, the lake has been proposed for removal from the impaired waters list in 2018.

Problem

McMahon Lake (MN70-0050), also known locally as Carl's Lake, is a 130-acre lake in Scott County, Minnesota, just southwest of Minneapolis (Figure 1). The lake is in the North Central Hardwood Forests (NCHF) ecoregion and is defined as a shallow lake, with a mean depth of 8.5 feet and a maximum depth of 14 feet. McMahon Lake is used primarily for canoeing and fishing, but also provides modest wildlife habitat. The 552-acre McMahon Lake watershed (including the lake surface area) has varied land uses, including forest, agriculture and rural residential areas.

The lake was listed as impaired in 2002 for exceeding eutrophication criteria. The shallow lake standards for the NCHF are growing season averages of 1-meter (m) Secchi disk depth and a phosphorus level of no more than 60 micrograms per liter (µg/L). A 2012 TMDL study was conducted using data from a 10-year period (1999–2008). The TMDL confirmed impairment. Data showed averages of 85 µg/L total phosphorus, 70 µg/L chlorophyll *a* and 0.9 m Secchi disk depth during the growing season.

The TMDL called for an overall phosphorus loading reduction of 81 percent and identified internal loading and watershed runoff to be the major source of excess phosphorus. The internal loading was determined to be primarily from decaying curlyeaf pondweed and sediment release. External loading (i.e., runoff) was identified as another source of phosphorus, albeit to a much lesser extent.

Figure 1. Shoreline stabilization projects helped improve water quality in McMahon Lake.

Story Highlights

Over the past 28 years, the land usage around this lake has changed from row crop agriculture to large-lot rural residential. Approximate 80 to 90 percent of the watershed is now covered with perennial vegetation (Figure 2). Several homes were added, wetlands were restored, and areas that were likely pastured in the past have been allowed to become forested.

The increased rainfall this area has experienced has fallen onto a stable, perennially vegetated watershed

Figure 2. A comparison of aerial views of McMahon Lake in 1980 (left) and 2018 (right) show an increase in perennial vegetation land cover.

with cleaner surface runoff combined with some dilution by the increased direct precipitation.

This story is an example of collaboration between private landowners and local units of government. Actions that contributed to declines in phosphorus levels include both in-lake management and external loading reduction by the Scott Water Management Organization (WMO) and Scott County Soil and Water Conservation District (SWCD).

The story of the restoration of McMahon Lake centers on working with landowners, networking, and the power of peers. During the development of the TMDL, Scott County encountered difficulty in bringing the landowners to the table to address the problems of McMahon Lake. A local group had taken a proactive stance. The local group offered to host a meeting of the lakeshore owners, leading to a successful working relationship. The first meeting, held at around a card table in the back of a local establishment, led to the first landowner making the connection to the Scott SWCD. The landowner's support and zeal for the project led to another 17 acres of cropland conversion. The power of the local connections and leadership from the community has led to powerful actions. Restoration efforts included the harvesting of curlyleaf pondweed, a 20-acre native grass planting project near the north shore adjacent to the lakeshore, two shoreline stabilization projects, and one shoreline restoration project (see Figure 1).

Results

Review of recent data (2010–2013) indicates growing season averages of 55 µg/L total phosphorus, 28 µg/L chlorophyll *a* and 1.2 m Secchi disk depth. With phosphorus levels meeting the standard of no more than 60 µg/L and at least one of the response variables (chlorophyll *a* or Secchi disk) meeting its criteria, the lake is proposed for delisting from the draft 2018 CWA list of impaired waters.

In-lake water quality monitoring will continue to evaluate trends over time and to inform the need for modifying in-lake management. Also, opportunities for additional watershed runoff control will continue to be explored.

Partners and Funding

This restoration was achieved through the networking and support of the Scott WMO, the Scott County SWCD, the New Market Sportsman's Club, and the landowners around McMahon Lake. Funding included a portion of a $2.2 million state Clean Water Fund grant provided to Scott WMO for the Sand Creek watershed. The work done shows how efforts between both public and private organizations can result in actions to restore water quality in an impaired lake and the importance of building these relationships.

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

EPA 841-F-19-001A
January 2019

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