NONPOINT SOURCE SUCCESS STORY

Minnesota

Coordinated Efforts Reduce Polluted Stormwater Runoff, Improving Water Quality in Lower Twin and Ryan Lakes

Waterbodies Improved

Nutrients in stormwater runoff led to eutrophic conditions in Lower Twin Lake and Ryan Lake in the Minneapolis metropolitan area. Because of these conditions, Minnesota added both lakes to its 2002 Clean Water Act (CWA) section 303(d) list of impaired waters for failing to attain their aquatic recreation designated uses. Implementing best management practices (BMPs) throughout the watershed decreased nutrient runoff and improved water quality in the lakes, allowing Minnesota to remove them from its impaired waters list in 2014.

Problem

Lower Twin Lake and Ryan Lake are in the Shingle Creek watershed in the northwestern Twin Cities metropolitan area in Minnesota (Figure 1). The lakes are part of the Twin Lake chain of lakes, which includes Upper Twin, Middle Twin, Lower Twin and Ryan lakes. The chain of lakes flows into Shingle Creek and ultimately the Mississippi River. The Shingle Creek Watershed Management Commission (SCWMC) is the local entity responsible for protecting the watershed's lakes, streams and wetlands.

The SCWMC contains nine cities, 16 lakes, seven streams and numerous wetlands. The majority of the Shingle Creek watershed is developed, with industrial, commercial and residential land uses present. The Lower Twin and Ryan lake subwatersheds are fully developed with single and multi-family residential land uses. Together, the lakes drain more than 8 square miles of land. The lakes are regularly used for recreational activities such as canoeing and fishing.

Minnesota water quality standards for aquatic life and recreation for shallow lakes in the summertime (June–September) require that (1) the average total phosphorus (TP) concentrations are equal to or less than (≤) 60 micrograms per liter (µg/L), (2) chlorophyll-*a* (chl-*a*) concentrations are ≤ 20 µg/L, and (3) Secchi disc (SD) transparency is at least 1.0 meter (3.3 feet). For deep lakes, the standards are more stringent, requiring that the summertime average TP concentrations are ≤ 40 µg/L, chl-*a* concentration are ≤ 14 µg/L, and SD transparency is at least 1.4 meters (4.6 feet).

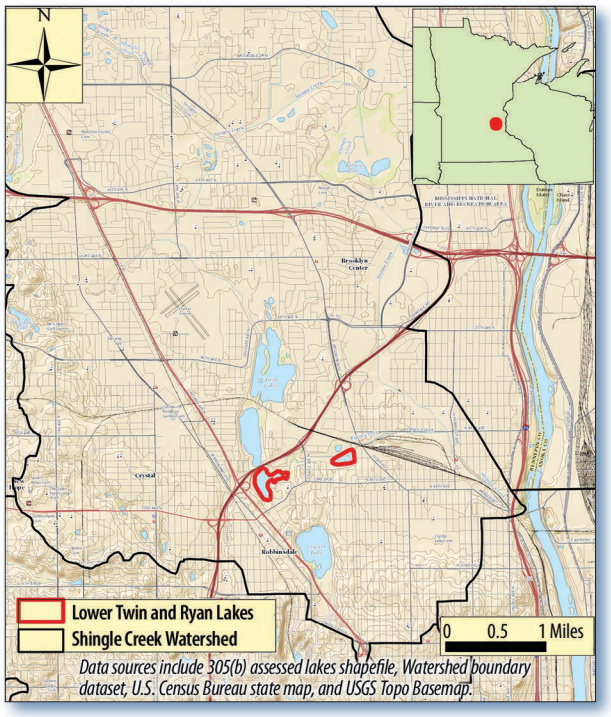

Figure 1. Lower Twin and Ryan lakes are in the Shingle Creek watershed in eastern Minnesota.

Historical water quality trends indicated that the lakes exceeded Minnesota Pollution Control Agency's (MPCA's) water quality standards until the 2000s for shallow lakes (i.e., Lower Twin Lake) and deep lakes (i.e., Ryan Lake). On the basis of these data, MPCA added the two lakes to the state's 2002 CWA section 303(d) list of impaired waters for excess nutrients/eutrophication. In 2007 MPCA finalized a phosphorus

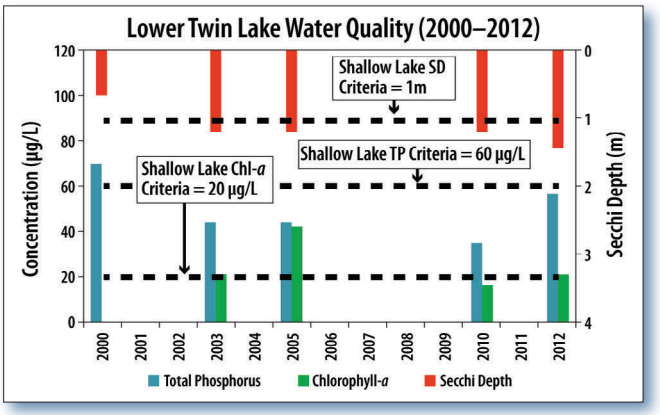

Figure 2. Data show that Lower Twin Lake has met all three shallow-lake water quality standards since 2010.

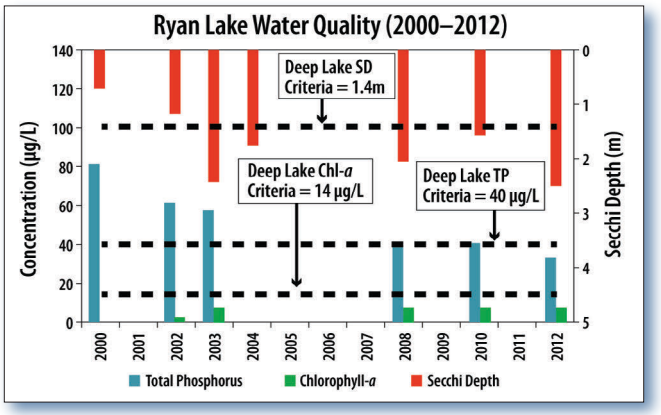

Figure 3. Data show that Ryan Lake has met all three deep-lake water quality standards since 2008.

total maximum daily load (TMDL) for the lakes and developed a TMDL implementation plan. The TMDLs indicated that to attain standards, phosphorus loads must be reduced by zero to 65 percent in Lower Twin Lake and by zero to 54 percent in Ryan Lake.

Project Highlights

Watershed stakeholders have cooperated on numerous projects to reduce nutrients in runoff. In the Lower Twin Lake watershed, the city of Robbinsdale increased street sweeping to four times per year and installed several rain gardens, stormwater ponds and grit chambers beginning in 2004. Also since 2004, Hennepin County and the Minnesota Department of Transportation installed numerous BMPs as part of highway reconstruction projects. In 2011 the city of New Hope expanded a stormwater pond to maximize the removal of sediment and phosphorus from runoff.

Similar efforts have occurred in the Ryan Lake watershed. Since 2004, the city of Brooklyn Center has installed five sump manholes that remove suspended sediment from runoff. In 2004 the Victory Neighborhood Association planted more than 6,000 native plants on an eroding shoreline, and then partnered with the city of Minneapolis in 2013 to install 15 rain gardens.

Both lakes have benefited from the ongoing efforts (since 2004) of the SCWMC and local partners to reduce phosphorus and improve water quality in upstream impaired lakes. In 2013 the SCWMC updated the Shingle Creek Watershed Management Plan and development rules to require higher stormwater infiltration capacity.

Results

Recent monitoring data indicate that water quality has improved in both lakes: TP and Chl-*a* concentrations have decreased, while SD transparencies (mean June–September) have increased. Lower Twin Lake has consistently met shallow-lake water quality standards since 2010 (Figure 2). Ryan Lake has met deep-lake water quality standards since 2008 (Figure 3). As a result of these improvements, MPCA removed Lower Twin Lake (MN27-0042-03; 30 acres) and Ryan Lake (MN27-0058-00; 15 acres) from the list of impaired waters in 2014.

Partners and Funding

The restoration of Lower Twin and Ryan lakes was supported by many partners and funding sources. Specific partners included SCWMC, the Minnesota Board of Water and Soil Resources, the National Park Service, Minnesota Department of Transportation, Minneapolis' Victory Neighborhood Association, the nonprofit Metro Blooms, Hennepin County, and the cities of New Hope, Minneapolis, Robbinsdale and Brooklyn Center.

Project funding included $6,200 in Hennepin County Natural Resources Incentives for Critical Habitat funds, $52,908 in SCWMC Capital Improvement Program funds, $160,000 in Clean Water Legacy Grant funds, $1,762 in funds from the city of New Hope, and $3,600 in National Park Service Challenge Cost Share funds. SCWMC served as the lead on these projects and the project manager was funded using CWA section 319 match funds.

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