



Section 319

NONPOINT SOURCE PROGRAM SUCCESS STORY

Minnesota

Nutrient Concentrations in the Minneapolis Chain of Lakes Nearly Returned to Presettlement Conditions

Waterbody Improved

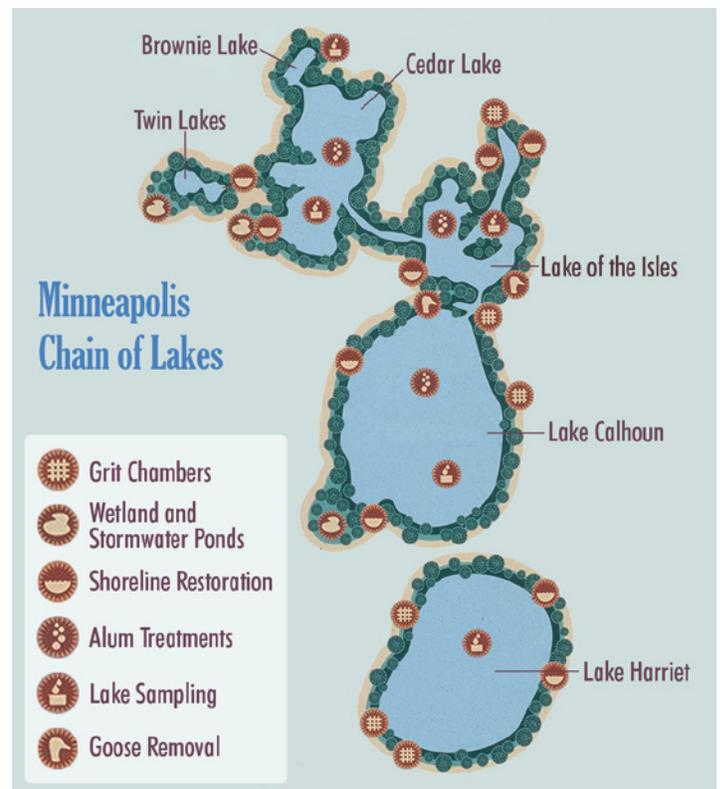
The Minneapolis Chain of Lakes, located two and a half miles southwest of downtown Minneapolis, Minnesota, receives urban runoff delivering high levels of phosphorus and sediment from its fully developed 7,000-acre watershed. Through implementing a widespread public education campaign, sediment control measures, and other practices throughout the watershed, the Minneapolis Chain of Lakes Clean Water Partnership achieved significant in-stream reductions in sediment and phosphorus which has helped most of the lakes stay off the state's 303(d) list and has also brought a listed stream close to meeting water quality standards.

Problem

The Minneapolis Chain of Lakes is the most visited natural resource in Minnesota, drawing more than 5.5 million visitors annually. Decades of intense recreational use and urban development was degrading water quality, contributing to algae blooms, and impacting recreational activities on the lakes. An extensive watershed and lake monitoring program identified total phosphorus and sediment as the pollutants of concern. Using innovative techniques to estimate the historical water quality of the lakes (based on readings of sediment cores), lake managers were able to identify presettlement phosphorus concentrations at less than 20 $\mu\text{g/L}$, which increased by the end of watershed development in the 1970s to values in excess of 50 $\mu\text{g/L}$.

Project Highlights

In 1990 citizens and interested groups formed the Minneapolis Chain of Lakes Clean Water Partnership (CWP) and started one of the largest urban lake restoration projects in the United States. CWP established nutrient reduction goals for each of the lakes in the chain, then set out to accomplish these goals through \$12.4 million of rehabilitation actions. On-the-ground practices were initiated in 1995 in the upper watershed reaches above Cedar Lake and then progressed down through the rest of the Chain of Lakes. Project activities focused on constructing sedimentation basins, wet detention ponds, and created wetlands to drain urban stormwater and intercept sediment and nutrient loads flowing



through the watershed. Projects included a two-cell wet pond at Cedar Lake and a three-cell sediment basin adjacent to Lake Calhoun. Other efforts focused on extensive shoreline erosion prevention measures from Cedar through Harriet Lakes, followed by the installation of numerous grit chambers, pocket wetlands, and improved street-sweeping practices. Alum treatments (using a nontoxic material to control internal

recycling of phosphorus from sediments on the lake bottom) were also implemented at Cedar and Lake of the Isles in 1996 and 1997, and completed in Lake Calhoun and Lake Harriet in 2001 with the support of section 319 funding. Other important measures included new regulatory controls and stepped up enforcement efforts to limit phosphorus in fertilizers.

A major education and awareness effort, beginning in 1993 and continuing to present, was also critical to the overall rehabilitation of the Chain of Lakes. The CWP increased public awareness through a marketing campaign that distributed bookmarks, table tents and paper placemats for restaurants, utility bill inserts, pet waste posters, billboards, newspaper articles, and lawn care mailings throughout the watershed.

Results

The education and awareness efforts targeting homeowner pesticide use appear to have quickly paid off with measurements of over 50 percent reduction in pesticides observed in stormwater runoff. Present efforts continue to focus on lawn and pesticide users.

Measurable improvements in water quality have also been documented throughout the Chain of Lakes, successfully meeting or exceeding CWP goals targeting presettlement phosphorus concentrations of less than 20 $\mu\text{g}/\text{L}$. The largest watershed changes occurred in the Lake Calhoun watershed with average total phosphorus values in the 20-25 $\mu\text{g}/\text{L}$ range (exceeding the CWP goal for Lake Calhoun of 25 $\mu\text{g}/\text{L}$). Measurable reductions also occurred in less than 3-4 years for Cedar Lake, with phosphorus concentration values decreasing from a range of 40 to 75 $\mu\text{g}/\text{L}$ to values of less than 30 $\mu\text{g}/\text{L}$. These reductions have been accompanied by reductions in chlorophyll *a* concentrations (from averages in the 15 to 25 $\mu\text{g}/\text{L}$ to about 5 $\mu\text{g}/\text{L}$), and increased transparency from pretreatment averages of 1 to 2 meters to values in excess of 2 to 3 meters. Lake Harriet, the furthest downstream lake with the best water quality when the CWP started, also showed improvement,

meeting the project goal of 20 $\mu\text{g}/\text{L}$ —similar to the presettlement condition.

Lake of the Isles—a shallow lake extensively dredged over time—has not experienced as great an improvement as the other lakes, and in 2002 was placed on the state's 303(d) list as impaired by nutrients. Phosphorus values now appear to have stabilized in the 25-50 $\mu\text{g}/\text{L}$ range, slightly exceeding the targeted value of 40 $\mu\text{g}/\text{L}$ for the Lake. A TMDL is currently under development for Lake of the Isles that addresses the unique challenges of this shallow lake. Through this effort, project partners—including the Minnesota Pollution Control Agency (MPCA), Minnehaha Creek Watershed District (MCWD), Minneapolis Park and Recreation Board (MPRB), and the City of Minneapolis—intend to establish goals that not only will result in a delisting of Lake of the Isles, but will also establish a policy for other shallow and urban lakes facing similar challenges.

As a result of the comprehensive, pro-active approach throughout the Minneapolis Chain of Lakes, all of the lakes have achieved significant reductions in sediment and phosphorus, helping most of the lakes stay off of the state's 303(d) list of impaired waters.

Partners and Funding

The Chain of Lakes Water Quality Management Citizens Advisory Committee is composed of 34 members from neighborhoods, neighborhood organizations, appointees, business owners, recreational use groups, and environmental organizations. The majority of the initiative was locally funded by the MPRB (\$1.5 million), MCWD (\$6.1 million), City of Minneapolis (\$2.6 million), City of St. Louis Park (\$663,000), and Hennepin County. Critical diagnostic and seed money was provided by the MPCA (\$1.2 million). The U.S. EPA section 319 funds totaled \$255,000 and were used to fund kick-off efforts for the education campaign, a demonstration project on Lake Calhoun showing the effects of alum treatments, and research on the interaction between alum and milfoil (an invasive species).



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