



NONPOINT SOURCE SUCCESS STORY

Minnesota

Restoration Efforts Improve First Fulda Lake

Waterbody Improved

Nutrient inputs from agricultural and urban runoff led to multiple impairments in First Fulda Lake. The basin was originally listed in 2008 as impaired because total phosphorus (TP), chlorophyll (Chl *a*) and Secchi disk levels exceeded the applicable trophic state thresholds. Many improvement projects were completed over nine years to address impairments in First Fulda Lake, thanks to the efforts of numerous governmental agencies and landowners. Restoration work included a temporary lake drawdown, agricultural practice implementation in the lake's watershed, shoreline restorations and urban stormwater best management practice (BMP) implementation. These practices helped to improve water quality; as a result, First Fulda Lake was removed from the state's Clean Water Act (CWA) section 303(d) list in 2018.

Problem

First Fulda Lake is in the 472-square-mile Heron Lake watershed, which empties into the West Fork Des Moines River in southwestern Minnesota (Figure 1). The watershed includes the Heron, Graham and Fulda lake systems and drains portions of Jackson, Nobles, Murray and Cottonwood counties. These lakes, particularly the Heron Lake system (which includes the 3,204-acre North Heron Lake and the 2,641-acre South Heron Lake) and the Fulda Lake system (which includes the 182-acre interconnected First Fulda and Second Fulda lakes) have elevated phosphorus levels. These high levels are attributed to agricultural (cropland and pastureland) sediment eroded from streambanks (including highly erodible channels that feed directly into the lake), atmospheric deposition and urban runoff.

Monitoring in 1997–2002 showed that levels of TP and Chl *a* in the Fulda lakes exceeded Minnesota's water quality standards. The standards, established for the Western Corn Belt Plains (WCBP) ecoregion, require that the summer (June–September) average for TP concentration be 90 micrograms per liter ($\mu\text{g/L}$) or less and that the Chl *a* concentration be 32 $\mu\text{g/L}$ or less. On the basis of these data, the Minnesota Pollution Control Agency (MPCA) added First Fulda Lake (waterbody ID 51-0021-00) to the CWA section 303(d) list of impaired waters in 2008 for failing to support its aquatic life designated uses and for nutrients and biological indicators.

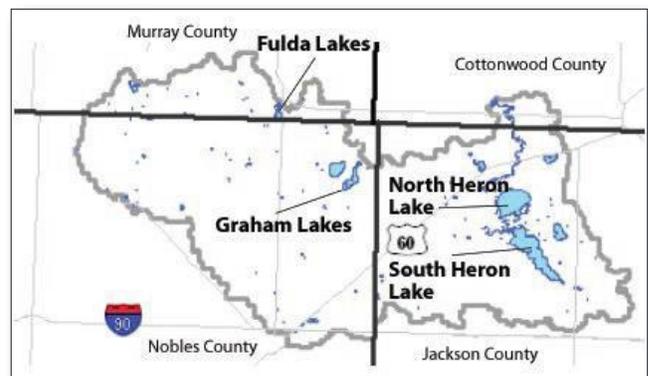


Figure 1. First Fulda Lake is in the Heron Lake watershed in southwest Minnesota.

Story Highlights

Fulda townspeople noticed the degradation of two beautiful natural resources located within city limits: First and Second Fulda lakes. Residents wanted improved water quality and a return of the lakes to a natural, unpolluted state. Through strong partnerships, what were once grassroots ideas turned into reality. The Heron Lake Watershed District (HLWD) applied for funds based on the needs described by local landowners. Their participation was a key factor in project initiation.

Over a nine-year period beginning in 2006, significant steps were taken to restore this lake and its watershed. In 2008, the Minnesota Department of Natural Resources (MDNR) and local units of government conducted a temporary drawdown of First and

Second Fulda lakes. The lakes are connected; Second Fulda Lake drains to the south into First Fulda Lake. Concurrently, a CWA section 319 grant workplan established and implemented a plan to install critical area plantings (two), restore the shoreline (320 feet), and incentivize farm operators to practice conservation tillage (5,828.5 acres). Three highly erodible channels were reshaped, widened and seeded with permanent vegetation. Farmers were asked to maintain 55 percent residue cover on cornfields and 30 percent cover for soybeans (70 acres).

In addition to the multiple agricultural practices, urban stormwater control measure were also implemented. One of these measures, a settling pond, was created between fall 2009 and spring 2010 (Figure 2). Furthermore, in 2011 the stormwater outlet from the city of Fulda was rerouted from a straight-pipe drain to the lake to a rock-armored outwash area to prevent erosion. Additionally, six rain gardens were installed within the city of Fulda in 2011–2015 to control stormwater.

Many education and outreach events were held throughout the implementation phases to promote stakeholder ownership of the lakes' restoration.

Results

Fulda Lake data collected in 2006–2015 show significantly lower Chl *a* concentrations and improved Secchi disk transparency as compared to the original listing data set (1997–2006 data); both pollutants are now meeting their respective standards (Figure 3). There is a large standard error around the average, showing that this lake is highly variable. Although the TP seasonal average still exceeds the 90 µg/L criteria, levels have declined overall. As a result of management activities and improved Chl *a* levels, First Fulda Lake was removed from the 2018 Impaired Waters List.

Partners and Funding

Partners include the HLWD, MDNR, USFWS, Fulda Fish and Game Club, Murray County, Bondin Township, Heritage Society members, City of Fulda, landowners, nonprofit and local organizations, and MPCA. HLWD received \$55,800 for the Fulda Lakes BMP Project from a U.S. Environmental Protection Agency (EPA) 319 grant in February 2007 through the MPCA. HLWD



Figure 2. Fulda lakes system before (left) and after (right) installation of a stream settling pond near the lakes' connecting point.

Figure 3. First Fulda Lake datasets from 1997–2006 and 2006–2015 as compared to water quality criteria.

		TP (µg/L)	Chl <i>a</i> (µg/L)	Secchi (meters)
WCBP ecoregion listing criteria	WCBP trophic state thresholds for impairment (pre-2010)	< 90	< 32	> 0.7
	WCBP aquatic recreation use (Class 2B) shallow lake criteria	< 90	< 30	> 0.7
First Fulda Lake data	1997–2006 (original listing dataset)	110	45.9	0.4
	2006–2015 (most recent dataset)	104	27	0.8

staff worked with Murray Soil and Water Conservation District (SWCD), Nobles SWCD, and MDNR staff. HLWD provided \$20,328 cash and \$19,875 in-kind contributions. Additional in-kind contributions came from Murray SWCD (\$480), Nobles SWCD (\$85) and MDNR (\$16,084). HLWD received \$12,600 for the Fulda Phosphorus Reduction Initiative through an EPA 319 grant in January 2011 through the MPCA. The HLWD worked with nonprofit groups and local organizations. The HLWD contributed \$11,200 (cash and in-kind, with nonprofit and local organizations contributing \$1,371 in-kind).



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

EPA 841-F-20-001N
September 2020

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