



Section 319

NONPOINT SOURCE PROGRAM SUCCESS STORY

Missouri

Implementing Best Management Practices and Education Efforts Restores Lake

Waterbody Improved

Point source and nonpoint source pollution from agricultural and suburban land sources affected water quality in Fellows Lake, prompting the Missouri Department of Natural Resources (MDNR) to add the lake to Missouri's 1994 Clean Water Act (CWA) section 303(d) list of impaired waters for mercury and nutrients. The Watershed Committee of the Ozarks (WCO) launched outreach and education activities, worked with landowners to implement best management practices (BMPs) and conducted water quality monitoring. Water quality improved, and MDNR removed Fellows Lake from the state's 2004/2006 CWA section 303(d) list of impaired waters.

Problem

Fellows Lake (Figure 1) is an 826-acre lake in southwest Missouri's Greene County. It was formed when a dam was constructed on the upper Little Sac River in 1957. The lake serves as a drinking water supply for the city of Springfield, along with McDaniel Lake, Stockton Lake, the James River and Fulbright Spring. Fellows Lake and McDaniel Lake provided the city of Springfield with approximately 52 percent of its annual raw water in 2000.

Elevated nutrients in Fellows Lake supported excess algal production, which caused odor and taste problems in the finished drinking water. Mercury levels in fish tissue also showed mean values higher than the national tissue criterion of 0.3 milligrams (mg) per kilogram (kg). Further water quality concerns included potential pollution introduced via fissures and spaces in the underlying bedrock (characteristic of the region's karst geology), the large number of livestock in the watershed and possible biological impairment. Because of those problems, MDNR added Fellows Lake to the 1994 CWA section 303(d) impaired waters list for nutrients and mercury. The listing attributes the impairments to agricultural inputs from livestock, fertilizer, other farm practices and wildlife (e.g., geese).

Project Highlights

The WCO conducted outreach and education activities, monitored water quality and worked with landowners to implement BMPs. Water quality monitoring focused on determining pollutant contributions and measured BMP success with a cost-share program. Over a three-year period,

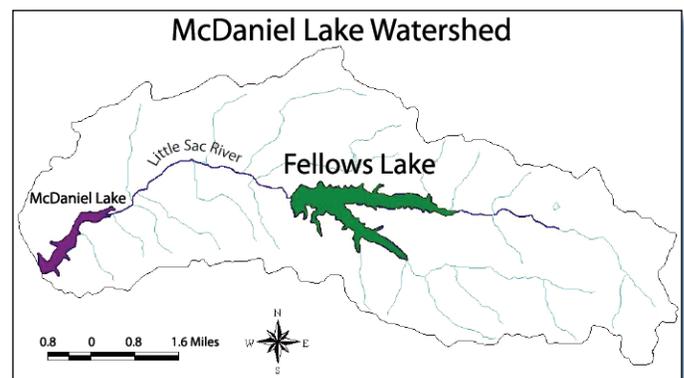


Figure 1. Fellows Lake is in the McDaniel Lake watershed.

sampling sites were monitored following a WCO-developed Quality Assurance Project Plan. The data show that the sources of phosphorus inputs were animal and human waste, fertilizers and certain insecticides.

Landowner cost-share practices were a major component of the project addressing pollution in the Fellows Lake watershed. WCO worked with landowners to restore riparian corridors and restrict livestock access to the waterbody, reducing soil erosion. The practices also reduced the chances of water being contaminated with sediment, nutrients and bacteria. The project educated livestock managers about management-intensive grazing systems, which involve rotating livestock between pastures. The systems increase grazing efficiency, reduce erosion by allowing minimal groundcover exposure, and spread the animal waste across the pasture instead of concentrating it near water sources. One dairy farmer implemented an animal waste containment

system. Before that, unroofed concrete lots and holding areas collected manure, which then washed off during rain events. Cost-share programs allowed the livestock producer to add roofs over the lots and improve manure holding areas. As a result, manure was not exposed to precipitation, decomposition could occur and manure-laden runoff was greatly reduced.

Other WCO projects included outreach and education targeting landowners, local schools and stream team volunteers. Water quality monitoring increased the awareness of problems connected to Fellows Lake and its tributaries and streams. Each landowner participating in the cost-share program learned more about nonpoint source pollution and BMPs that could improve water quality in local streams and lakes. The WCO also conducted agricultural field days, watershed festivals, greenway activities and other efforts to educate watershed citizens.

Fellows Lake is in the 1,981-square-mile Sac River watershed. Many CWA section 319-funded projects in the Sac River watershed helped to improve the lake's water quality. For example, the Polk County Soil and Water Conservation District conducted a series of grazing school classes north of Fellows Lake. Also, the WCO administered several projects that educated citizens in Springfield and surrounding areas, including the Show-Me Yards program and Neighborhood Eco-Tips radio broadcasts. WCO also helped Springfield develop a comprehensive, watershed-based management strategy for protecting Fulbright Spring, another public drinking water source.

Results

Stakeholders' efforts in the Fellows Lake watershed and the larger Sac River watershed combined to restore water quality in Fellows Lake. Data collected by the Missouri Department of Conservation (MDC), the U.S. Environmental Protection Agency (EPA) and MDNR in 2002 and 2006 show that mean mercury levels in fish tissue have declined and now fall below the national tissue criteria of 0.3 mg/kg (Table 1). Therefore, MDNR removed Fellows Lake from the 2004/2006 CWA section 303(d) list of impaired waters for mercury. It also removed Fellows Lake from the 2004/2006 list of impaired waters for nutrients on the basis of a time trend analysis showing very slight reductions in nitrogen and phosphorus. Moreover, Springfield's utilities recorded virtually no taste or odor complaints for several years before the delisting.

Partners and Funding

The WCO has managed several CWA section 319-funded projects in the watershed and surrounding areas, including one for \$276,500 that supported the main project responsible for restoring Fellows Lake. It has received technical assistance through partnerships with the U.S. Department of Agriculture Natural Resources Conservation Service, soil and water conservation districts, and MDC professionals. It continues to work to improve water quality in the watershed and reduce nonpoint source pollution.

Table 1. Fish tissue (fillet) data in Fellows Lake, 1993–2006

| Monitoring organization | Year | Species | # in sample | Weight (lbs) | Mean mercury levels (mg/kg) |
|-------------------------|------|-----------------|-------------|--------------|-----------------------------|
| MDC | 1993 | walleye | 4 | 2.1 | 0.272 |
| MDC | 1994 | largemouth bass | 5 | 2.2 | 0.404 |
| MDC | 1994 | walleye | 5 | 2.6 | 0.425 |
| MDC | 2001 | largemouth bass | 15 | 1.7 | 0.348 |
| MDC | 2002 | largemouth bass | 15 | 0.8 | 0.115 |
| EPA/MDNR | 2006 | largemouth bass | 5 | 2.3 | 0.190 |
| Average | | | | | 0.292* |

* EPA's guideline for mercury in fish tissue is 0.3 mg/kg (*Water Quality Criterion for Protection of Human Health: Methylmercury*. EPA-823-R-01-001, January 2001). The document states that this is a concentration that "should not be exceeded" based on a total consumption of 17.5 grams of fish per person per day. The 0.3 mg/kg criterion is also based on the assumption that the fish diet is composed of a mixture of fish from different trophic levels.



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

EPA 841-F-09-001HH
September 2009

For additional information contact:

Greg Anderson
Nonpoint Source Coordinator
Missouri Department of Natural Resources
573-751-7144 • greg.anderson@dnr.mo.gov