NONPOINT SOURCE SUCCESS STORY

Missouri

Local Group and Partners Implement Practices to Reduce Atrazine in Higginsville South Lake

Waterbody Improved

Heavy herbicide application on row crops and a golf course, combined with subsequent storm runoff, impaired water quality in Missouri's Higginsville South Lake. The lake, a drinking water source for several nearby towns and a three-county public water supply district, was placed on the 1998 Clean Water Act (CWA) section 303(d) list of impaired waters for high concentrations of atrazine. Through planning and outreach programs, farmers were encouraged to measure and time herbicide applications more carefully and implement best management practices (BMPs). The lake met water quality standards for atrazine in 2003 and was removed from the impaired waters list in 2004.

Problem

The 147-acre Higginsville South Lake provides drinking water for several towns and a rural water district in west-central Missouri (Figure 1). Located in Lafayette County within the Blackwater River Basin, the reservoir's subwatershed drains approximately 3,200 acres of primarily agricultural land.

State records indicate that elevated levels of atrazine existed in the lake beginning in 1994. Atrazine is commonly applied in Missouri on corn, sorghum and pastures to control broadleaf weeds. New atrazine label restrictions were added regarding application rates and required setbacks in 1993; however, atrazine continues to be used in Missouri. Atrazine is considered a human carcinogen and the state water quality standard for groundwater and drinking water supply is set at the maximum contaminant level (MCL) of 3 micrograms per liter (μg/L). Unlike many herbicides, atrazine is weakly adsorbed (attached) to soil particles and nearly all soils found in the Blackwater River watershed have moderate to severe potential for pesticide loss due to runoff or leaching. The local golf course was an additional source of the herbicide, where it was used to control broadleaf weeds. Runoff from the golf course flowed to Higginsville South Lake, increasing atrazine concentrations in the waterbody. According to Missouri Department of Natural Resources (DNR) data, in 1997 the lake contained atrazine concentrations of up to 6 μg/L. As a result, DNR added the Higginsville Lake South (segment (MO-7190-L) to the 1998 CWA section 303(d) list.

Figure 1. Higginsville South Lake is in Lafayette County in west-central Missouri.

A total maximum daily load (TMDL) information sheet was written by Missouri DNR in 2002 (and revised in 2004) in preparation for developing a TMDL to address the contaminated drinking water supply and beneficial use impairment by atrazine. The water was declared restored before a full TMDL could be developed.

Projects and Highlights

Average atrazine concentrations exceeded the MCL in Higginsville South Lake beginning in 1994. In response, the city of Higginsville applied to the Missouri DNR for an exemption to the atrazine MCL. In August 1995, an exemption was provided to allow up to 1 year for planning and implementing a permanent solution for the high atrazine concentrations.

As a result, in 1995 a watershed steering committee was formed to develop the *Higginsville City Lake Watershed Management Plan* to address atrazine and other potential drinking water contaminants in the lake.

A $214,000 CWA section 319 grant was provided from 1996–2000 to the Missouri Corn Growers Association, later associated with Syngenta Corporation, for the Watershed Research and Stewardship Project. The overall goal of the project was to continue to provide leadership in the water policy determination process and to assist Missouri's corn growers in water resource stewardship. Production practices were evaluated for their effect on water quality and economics. Practice evaluation included tillage practices and herbicide programs over a large area, which included Higginsville South Lake. Special emphasis was placed on increasing the effectiveness of buffer strips. The project also assisted with water quality monitoring and analyses.

The watershed steering committee worked with the Higginsville Country Club golf course to ensure the use of U.S. Environmental Protection Agency (EPA)-certified applicators and to help establish a policy for application, storage and handling of all chemicals on-site. Shoreline stabilization and clean-out of culverts and drainage ways were also performed. The U.S. Department of Agriculture's Natural Resource Conservation Service (NRCS) and Lafayette Soil and Water Conservation District (SWCD) worked extensively to install practices to reduce atrazine runoff from other areas of the watershed. Practices included grassed waterways, vegetated buffers, two-pass application systems, and increased use of no-till farming and alternative herbicides.

In 1999 a $4,000 CWA section 319 grant supported the Osage Valley Resource Conservation and Development's program providing portable table-sized watershed interactive models to help initiate water quality-related discussions and educational interactions at area schools and local civic group events.

In 2009 the Higginsville South Lake watershed plan was revised to address EPA's nine critical elements. These watershed efforts led to water quality improvement in Higginsville South Lake. Watershed information, outreach, planning, demonstration and implementation efforts were all a result of collaboration and partnership efforts.

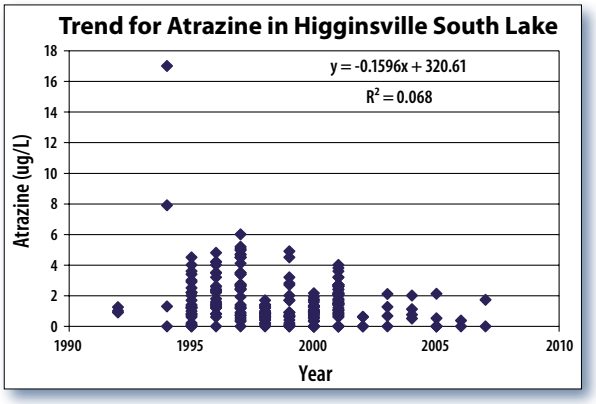

Figure 2. Atrazine levels in Higginsville South Lake have declined since 2000 and became undetectable after 2005.

Results

Monitoring results show that atrazine in the lake has declined since 2000 (Figure 2). Higginsville South Lake was determined to be attaining applicable water quality standards in 2003 and now fully supports its public drinking water supply designated use. In January 2004, the average in-lake concentration of atrazine was 2.09 µg/L. Quarterly samples collected from 2005 through 2007 showed that atrazine was no longer detected in the lake.

Partners and Funding

Monitoring of Higginsville South Lake began in 1992 through a partnership that included Novartis, Monsanto, Syngenta and the Missouri DNR. In February 1995 a public meeting was held to address the levels of atrazine and other contaminants in Higginsville South Lake. The meeting was hosted by the city of Higginsville, Lafayette County SWCD, Missouri Farm Bureau, Ciba Corporation, and DNR. Funding was provided by the NRCS, the University of Missouri Outreach and Extension, and the Missouri Department of Conservation. City residents, elected officials, farm owners and producers, representatives of agricultural businesses and manufacturers, and government agencies were recruited to participate in a steering committee. The watershed steering committee directed activities and developed a watershed management plan. Two CWA section 319 grant-funded projects (a total of $218,000 between 1996 and 2000) supported the watershed partners' improvement efforts. Other partners whose efforts contributed to this success story include the Corn Growers Association and the Higginsville Country Club.

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

EPA 841-F-15-001Q
February 2015

For additional information contact:

Colleen Meredith
Missouri Department of Natural Resources
Soil and Water Conservation Program
573-751-7143 • colleen.meredith@dnr.mo.gov