NONPOINT SOURCE SUCCESS STORY

Oklahoma

Restoration Efforts Reduce Bacteria in the Illinois River Watershed

Waterbodies Improved

High bacteria levels resulted in impairment of streams in the Illinois River Watershed and placement on Oklahoma's Clean Water Act (CWA) section 303(d) list of impaired waters in 2002. Pollution from grazing lands, animal waste management, urbanization, and recreation contributed to these impairments. Education and implementing conservation practice systems (CPs) to promote better land management decreased *Escherichia coli (E. coli)* and Enterococcus levels in the watershed. As a result, Oklahoma removed *E. coli* impairments on four streams and the Enterococcus impairment on the lower Barren Fork from its 2006 and 2016 CWA section 303(d) lists. The primary body contact (PBC) designated beneficial use is now supported in five segments: Lower Barren Fork Creek (full support), Lower Flint Creek (partial support), and Illinois River (three segments, partial support).

Problem

The Illinois River Watershed extends over 1,600 square miles in northwest Arkansas and northeast Oklahoma (Figure 1). The watershed attracts more than 500,000 visitors who invest an estimated $9 million annually into the local economy. Northwest Arkansas supports one of the nation's most rapidly growing urban areas, while land use in the Oklahoma portion is about 48 percent hay and grazing lands and 46 percent forested. The area also supports important poultry and cattle industries. Eutrophication in the watershed has been a challenge since the 1970s.

Further concerns were raised when nonpoint source pollution contributed to listing multiple segments as impaired for *E. coli* in 2002 when at least 28 percent of individual samples violated the individual sample maximum of 406 colony forming units per 100 milliliters (CFU/100 mL) during the recreation season. Barren Fork Creek was listed for Enterococcus in 2002 when 50 percent of samples violated the individual sample maximum of 108 CFU/100 mL. In 2002 the PBC designated use was considered impaired if more than 10 percent of samples exceeded individual sample maximums. The assessment method changed in 2008 and streams were considered to violate the standard if the recreation season geometric mean exceeded 126 CFU/100 mL for *E. coli* and 33 CFU/100 mL for Enterococcus. Oklahoma added segments OK121700030010_00 (Illinois River at Tahlequah), OK121700030350_00 (Illinois River Stateline),

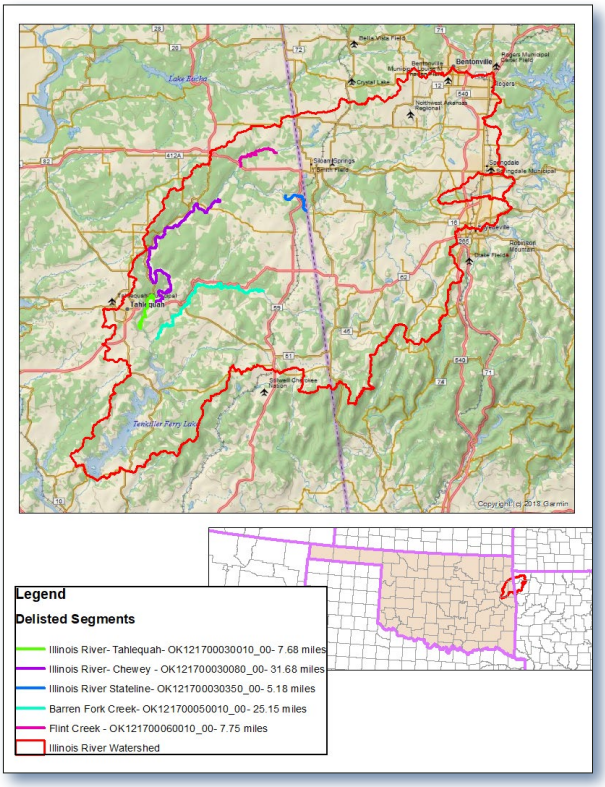

Figure 1. The Illinois River Watershed is in northeastern Oklahoma and northwestern Arkansas.

OK121700050010_00 (Lower Barren Fork Creek), and OK 1217000600_10 (Lower Flint Creek) to the 2002 and OK121700030080_00 (Illinois River at Chewey) to the 2006 CWA section 303(d) lists for nonattainment of the PBC designated beneficial use.

Story Highlights

U.S. Environmental Protection Agency (EPA) CWA section 319 projects began in 1990 that included developing recreational user restrooms and trash services, conducting water quality monitoring, offering education, and implementing CPs. Through many of these projects, landowners worked with the Delaware, Cherokee, and Adair county conservation districts in Oklahoma, as well as the Benton, Washington, and Crawford county conservation districts in Arkansas, the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS), the Oklahoma Conservation Commission (OCC), the Grand River Dam Authority (GRDA), and many others to implement CPs through Oklahoma NRCS's Illinois River/Eucha-Spavinaw Watershed Initiative Project (Initiative Project), CWA section 319 projects, GRDA's long-term riparian area easement program and many others.

CPs installed in the Oklahoma portion of the watershed between 2000 and 2018 focused on reducing erosion and pollutant runoff from grazing lands in the watershed. These programs focused on improving animal waste management, protecting riparian areas through long-term easements and stabilizing and restoring streambanks, improving grazing and pasture management, and updating aging and improperly designed septic systems. Specific practices implemented included prescribed grazing (57,495 acres [ac]), nutrient management (23,707 ac), critical area planting (19 ac), pasture and hayland planting (10,209 ac), livestock exclusion fencing (885,234 linear feet), heavy use area protection (246 ac), stream restoration (5,533 linear feet), wetland restoration (48 ac), and riparian buffer installation (1,117 ac). Project partners performed repairs or upkeep on 122 septic systems. Other new practices included 178 ponds, 120 water wells, and 91 waste storage facilities. In addition, education and enforcement of state poultry litter regulations by the Oklahoma Department of Agriculture, Food, and Forestry worked to decrease poultry litter application in the watershed from approximately 30,000 tons annually in 2000–2009 to 12,774 tons in 2018. Additional similar CPs were installed in the Arkansas portion of the watershed through NRCS, Arkansas Department of Natural Resource CWA section 319 projects, and other partners. Partners continue to work toward further water quality improvement in the Illinois River Watershed.

Results

The OCC, Oklahoma Water Resources Board (OWRB), GRDA and the U.S. Geological Survey (USGS) documented improved water quality in the Illinois River Watershed due to installation of CPs. By the 2016 assessment, bacteria levels declined. The *E. coli* geometric mean was between 39 and 112 CFU/100 mL in four segments (three on the Illinois River—at Stateline, Chewey and Tahlequah—and one on Lower Flint Creek), which meets the standard (i.e., less than 126 CFU/100 mL *E. coli*). Barren Fork Enterococcus had dropped to a geomean of 32 CFU/100 mL, which meets the standard (i.e., less than 33 CFU/100 mL Enterococcus). Based on these data, Oklahoma had removed these five segments in the Illinois River Watershed from the CWA section 303(d) list for *E. coli* or Enterococcus by 2016. Although 12 of the 22 assessed segments in the Oklahoma portion of the watershed remain listed for Enterococcus and therefore only partially support their PBC beneficial use, all but two segments in the watershed are now delisted for *E. coli*. Decreasing watershed phosphorus loads have also been documented; however, eight segments remain impaired for phosphorus.

Partners and Funding

Projects supported by EPA CWA section 319 funding (including nonfederal match) have invested at least $17.7 million in the Oklahoma portion of the Illinois River Watershed since 2000 for monitoring, outreach and implementation. EPA CWA State Revolving Fund Projects have invested an additional $2.05 million in the watershed on streambank stabilization since 2002. From 2000 to 2018, NRCS supplied more than $1.8 million for CP implementation in Oklahoma through the Environmental Quality Incentives Program. Additional funds were provided for other NRCS conservation programs, including over $21 million toward the Initiative Project, much of which was invested in the Arkansas portion of the Illinois River Watershed. In addition, many practices were funded by landowners based on recommendations through NRCS general technical assistance. Finally, the Arkansas Natural Resources Commission has supported at least $7.7 million worth of CWA section 319 projects in the watershed since 2010. Additional partners have contributed to water quality improvement as well, including GRDA, OWRB, USGS, the Cherokee Nation, and others.

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