NONPOINT SOURCE SUCCESS STORY

Arkansas

Reducing Agricultural Runoff Improves Water Quality in the Cache River

Waterbody Improved

High lead levels in sediment running off from row crop areas impaired Arkansas' Cache River. As a result, the Arkansas Department of Environmental Quality (ADEQ) added two segments of the stream (47.6 miles total) to the state's 2004 Clean Water Act (CWA) section 303(d) list of impaired waters and three segments (47.9 miles total) to the state's 2006 CWA section 303(d) list for lead impairment. Watershed partners initiated watershed assessments and implemented best management practices (BMPs) to abate sediment runoff from row crops in the watershed. Along with sediment reductions from the BMPs, lead levels in the Cache River also declined and fell below the water quality standard (WQS). Although the stream remains impaired for turbidity, ADEQ removed five segments from the 2016 CWA section 303(d) list for lead impairment.

Problem

The Cache River (Waterbody AR-4B-08020302) is a long, narrow watershed that includes parts of Greene, Craighead, Poinsett, Jackson, Woodruff, Monroe, Prairie, Lawrence and Clay counties (Figure 1). The Cache River begins in southern Missouri, flows 203 miles south through northeastern Arkansas, and empties into the White River near Clarendon, Arkansas. Bayou DeView is a major tributary to the Cache River.

Runoff from agricultural row crop fields was contributing excess lead to the Cache River as the sediments from these fields also contained high levels of lead from legacy agricultural practices. An October 1998–September 2003 ADEQ assessment (for the 2004 CWA section 303(d) list) found that reach 018 (25 miles long) and reach 020 (22.6 miles long) did not meet the state's WQS for lead. The next ADEQ assessment, conducted October 2000–September 2005 (for the 2006 CWA 303(d) list), found that reaches 017 (15.8 miles long), 019 (13.7 miles long), and 021 (18.4 miles long) also did not meet the state's WQS for lead. In Arkansas, the WQS for lead in a given stream reach is derived from the hardness index; therefore, it varies by region. In the Cache River, the WQS for lead is 2 micrograms per liter (µg/L). ADEQ found exceedances of the WQS when sampling during high-flow events. The samples were evaluated, and the five reaches were added to the state's 2004 and 2006 CWA section 303(d) lists of impaired waters for lead impairment. ADEQ subsequently completed draft total maximum daily loads for lead and total dissolved solids for the Cache River in 2012.

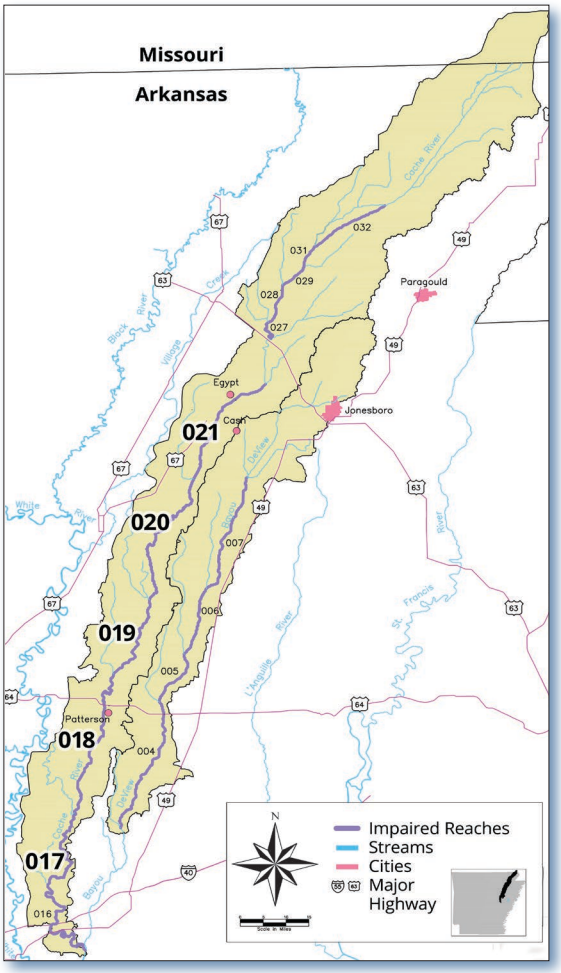

Figure 1. The Cache River is in northeast Arkansas. Lead impairment has been removed from stream reaches 017, 018, 019, 020 and 021.

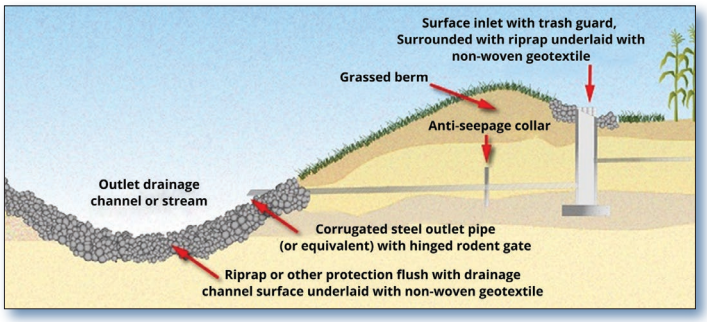

Figure 2. An illustration of a type of drainage water management system BMP implemented in the watershed.

Project Highlights

In 2001 the Jackson County Conservation District (JCCD) and The Nature Conservancy (TNC), using CWA section 319 funds provided by the Arkansas Natural Resources Commission (ANRC), began providing financial and technical assistance to help landowners implement drainage water management systems in runoff-prone agricultural fields (Figure 2). Many landowners took advantage of this opportunity; they installed 430 water control structures, preventing approximately 36,980 tons per year of soil from eroding and entering the Cache River. By controlling the rate, velocity and volume of field runoff, these BMPs help prevent sediment (which carries lead) from leaving agricultural fields and entering the stream.

In 2004, TNC used CWA section 319 funding from ANRC to propose a work plan for a series of integrated sediment, hydrological, geomorphological and biological monitoring surveys. The surveys culminated in a report and spatial relational database containing a priority ranking of the Cache River's tributary streams. Because of the short length of the study (one year), however, no flow regime or water quality trends could be established for statistical predictions.

From 2006 until 2009, TNC began a second phase of the project with funding assistance from ANRC through CWA section 319. This phase built upon the first TNC project by honing in on specific areas of concern in high-priority subwatersheds that were identified in phase I. Upon completion of the project, critical stream bank erosion areas were identified, ranked and prioritized based on the sediment contribution to the Cache River main stem. This information was used for future implementation projects that installed BMPs designed to reduce the sediment and lead contributions in the watershed; it also allowed for a system of ranking streams in the priority watershed. As a result, ANRC was able to make data-driven management decisions concerning funding allocation in the watershed.

The Cross County Conservation District (CCCD) installed water conveyance and control structures in the watershed from 2009 to 2011. A total of 13 water control structures were installed in the Cache River Watershed, which will prevent 3,805 tons of soil erosion per year. Moving forward, this project will continue to reduce the amount of lead and sediment entering the Cache River.

Results

ANRC and its partners successfully addressed erosion and excess lead from agricultural row crop sources through cost-effective targeting of CWA section 319 funds. As a result of the practices implemented in the watershed, both lead and sediment levels have decreased. The 2016 ADEQ water quality assessment showed that Cache River reaches 017, 018, 019, 020 and 021 now meet the state's WQS for lead. Therefore, ADEQ has removed these five reaches from Arkansas' 2016 CWA section 303(d) list for lead impairment. The stream remains listed as impaired for turbidity.

Partners and Funding

The following partners helped to restore the five reaches of the Cache River: local landowners in the watershed, JCCD, CCCD, TNC, ANRC, ADEQ, the U.S. Department of Agriculture's Natural Resources Conservation Service, and the U.S. Environmental Protection Agency (EPA). ANRC provided $994,751 of EPA CWA section 319 funds to watershed partners to support several projects. JCCD and TNC used $250,000 in CWA section 319 funds to help local landowners identify problem areas and purchase materials for implementing BMPs. JCCD and TNC also provided $200,400 in cash and in-kind match to purchase and install materials. CCCD used $450,000 in CWA section 319 funds to purchase BMP materials. CCCD also provided $450,000 in cash and in-kind match to purchase and install materials.

TNC used $294,751 in CWA section 319 funds to identify, quantify and rank stream segments for restoration. These data helped pinpoint projects where targeted BMPs could reduce sediment inputs in the watershed. TNC also provided $247,220 in cash and in-kind match to identify priority stream segments in the watershed and install monitoring stations.

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