



NONPOINT SOURCE SUCCESS STORY

Oklahoma

Protecting and Restoring the North Canadian River, Oklahoma City's Water Supply, Through Voluntary Conservation Programs

Waterbody Improved

High bacteria concentrations resulted in the impairment of the North Canadian River and placement on Oklahoma's Clean Water Act (CWA) section 303(d) list of impaired waters in 2006. Pollution from grazing, hay production and cropland areas contributed to this impairment. Implementing conservation practice systems (CPs) to promote improved grazing and cropland management decreased bacteria levels in the creek. As a result, a segment of the North Canadian River was removed from Oklahoma's 2016 CWA section 303(d) list for *Escherichia coli*. Portions of the North Canadian River now partially support its primary body contact (PBC) designated use.

Problem

The North Canadian River is a 441-mile stream flowing from New Mexico and Texas before it flows into Lake Eufaula in eastern Oklahoma. Poor management of grazing and cropland contributed to listing a 105.34-mile segment as impaired for *E. coli* in 2006 when the geometric mean of samples collected during the recreational season was 135 colony forming units/100 milliliters (CFU/100 mL) (Figure 1). The PBC recreation designated use is impaired if the geometric mean of *E. coli* exceeds 126 CFU/100 mL. Oklahoma added this North Canadian River segment (OK520530000010_10) to the 2006 section 303(d) list for nonattainment of its PBC designated beneficial use.

Land use in the 760-square-mile watershed of the listed segment is approximately 41 percent row crop, which is used almost exclusively for winter wheat production. About 39 percent of the watershed is grazing lands for cattle and hay production and 15 percent is forested. Less than 5 percent of the watershed is urban land. The river provides approximately half of the drinking water for Oklahoma City. In addition, the river hosts boating and swimming events.

Story Highlights

A total maximum daily load and watershed-based plan were completed in 2008, but conservation districts asked the Oklahoma Conservation Commission (OCC) to work on water quality issues in the watershed in 2004. Landowners worked with the Blaine, Central North Canadian, East Canadian and Dewey county

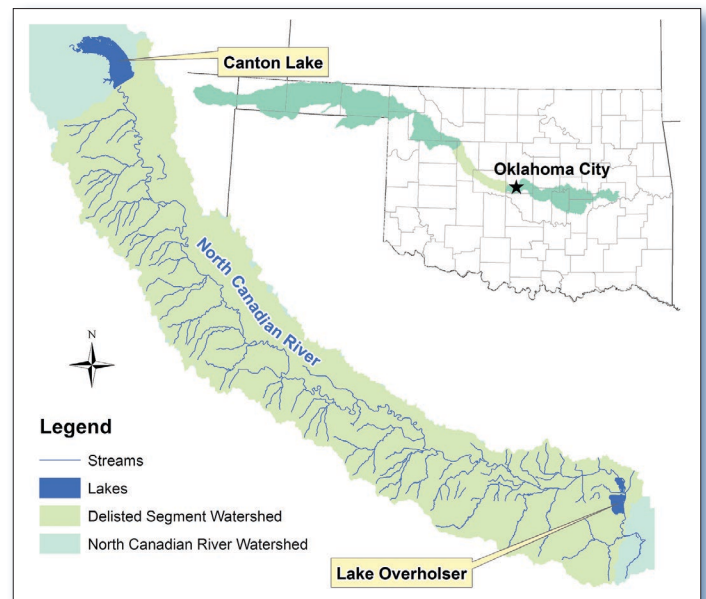


Figure 1. The North Canadian River is in central Oklahoma.

conservation districts, the U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS), USDA Farm Services Agency (FSA), and OCC to implement CPs through NRCS's Environmental Quality Incentives Program (EQIP), Conservation Security Program (CSP), Conservation Stewardship Program (CStWP), general conservation technical assistance program, and FSA's Conservation Reserve Program (CRP). The U.S. Environmental Protection Agency's (EPA's) CWA section 319 program provided funding for CPs from 2007 to 2015. Oklahoma's Locally Led Cost Share Program (LLCP) began funding practices in the watershed in 1998.

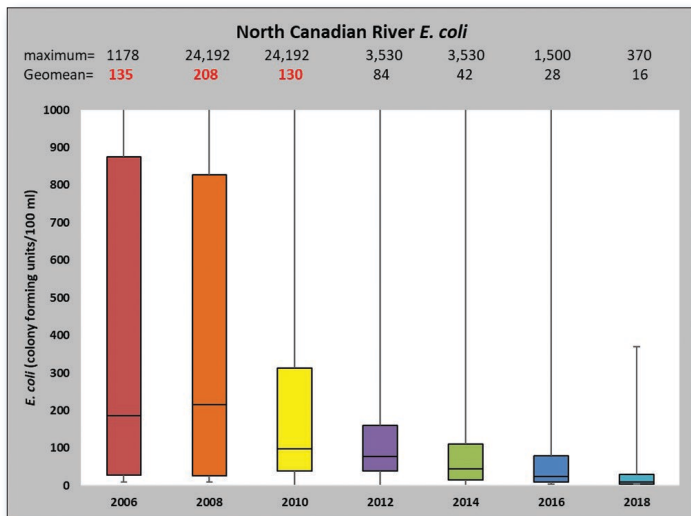


Figure 2. *E. coli* concentrations decreased with improved cropland and grazing land management in the watershed.

Through the installation of CPs, landowners improved many acres of grazing lands, which reduced runoff of bacteria and other pollutants. CPs installed between 2002 and 2017 include 49 water wells, 17 septic systems, 18 watering facilities, 43 ponds, 20 grade stabilization structures, 28 livestock pumping plants, riparian area protection (586 ac), riparian fencing (85,077 ft), cover crop (308 ac), livestock pipeline (7,422 ft), conservation crop rotation (7,815 ac), fence (71,214 ft), upland wildlife habitat management (2,783 ac), grassed waterways (214 ac), integrated pest management (23,857 ac), forage and biomass planting (6,548 ac), terraces (18,838 ft), contour farming (205 ac), deep tillage (1,397 ac), nutrient management (14,147 ac), rotation of supplement/feeding areas (351 ac), prescribed grazing (14,427 ac), no-till (42,417 ac), no-till/strip-till (1,261 ac), range planting (256 ac), brush management (3,412 ac), convert cropland to grass (1,345 ac), seasonal residue management (875 ac), reduced tillage (6,914 ac), prescribed burning (88 ac), conservation cover (659 ac), critical area planting (192 ac), diversion (6,441 ft) and grid soil sampling for nutrient management (11,710 ac).

Partners also worked through the Blue Thumb Education program to teach about problems and potential solutions in the watershed. The OCC worked with a producer in the watershed to establish a demonstration farm where CPs were installed and where Oklahoma State University Cooperative Extension scientists demonstrated cover crops and nutrient

management modified for the unique conditions of the watershed. Workshops and field events focused on soil health, water quality and improved management for producers, downstream citizens and other audiences.

Results

The OCC and the Oklahoma Water Resources Board documented decreased bacteria concentrations in the North Canadian River. Monitoring data showed that North Canadian River *E. coli* geomean concentrations dropped below the criteria by the 2012 assessment; however, much of these data were from a severe drought period. Therefore, OCC waited until data from a more normal period had been collected to recommend delisting (Figure 2). The segment was removed from the Oklahoma section 303(d) list for *E. coli* in 2016 after data from a wetter period confirmed that the river met standards. This change results in partial support of its PBC beneficial use.

In addition to water quality protection, CPs supported through the program also sequestered 3,193 metric tons carbon dioxide per year by reducing soil erosion and building soil organic matter. These carbon credits were purchased from cooperators by Western Farmers Electric Cooperative to further support establishment of water quality CPs.

Partners and Funding

The OCC contributed at least \$1,306,198 in EPA section 319 funds, matched by \$2,412,643 from state priority watershed funds and \$335,916 from landowners to install CPs and conduct education programs. Approximately \$240,000 additional section 319 dollars supported OCC water quality monitoring in the watershed. NRCS contributed more than \$470,000 through EQIP. Additional funds were provided through NRCS for CSP and CStwP and from FSA for CRP practices. In addition, landowners funded many practices based on recommendations through NRCS general technical assistance and conservation planning. Western Farmers Electric Cooperative provided \$50,000 to cooperating producers to support practices that sequestered carbon in soils. Finally, the Oklahoma LLC provided approximately \$227,695, matched by \$308,091 from landowners. Local conservation districts, Oklahoma's Association of Conservation Districts, Oklahoma State University Cooperative Extension, and others facilitated the restoration.



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