



# Section 319

# NONPOINT SOURCE PROGRAM SUCCESS STORY

# Kansas

## Cooperative Watershed Management Reduces Bacteria Levels in the Cottonwood River

### Waterbodies Improved

Bacteria in runoff from cattle grazing and stream access contributed nonpoint source pollution to Kansas' Cottonwood River, violating the state's water quality standard for bacteria. As a result, the Kansas Department of Health and Environment (KDHE) added the Cottonwood River to its Clean Water Act (CWA) section 303(d) list of impaired waters in 1998 for bacteria. Agricultural best management practices (BMPs) were implemented in the watershed, and water quality monitoring data collected since 2003 show that the Cottonwood River now meets the state's water quality standard for bacteria. As a result, KDHE has removed nine segments (128.11 stream miles) of the Cottonwood River from the state's 2010 (from SC627 to Neosho River) and 2012 (from Marion Reservoir to SC627) list of impaired waters for *Escherichia coli* impairments.

### Problem

The Cottonwood River is in the 1,085,373-acre Lower Cottonwood watershed in east-central Kansas, part of the Neosho River Basin. The Cottonwood River originates in Marion County, flowing east until merging with the Neosho River and draining to John Redmond Reservoir (Figure 1).

Used for grazing cattle, the majority of the Lower Cottonwood watershed is grassland, covering 68 percent of the land area. Much of the grassland is stocked with summer stock calves from May to June. Cropland is the second most prominent land use (26 percent), with the remaining comprised of urban, woodlands, water, and other uses. The Cottonwood River is designated as a Primary Recreation Class B water, indicating that the public has widespread access to the stream for swimming and other activities involving full body immersion in the water.

Due to exceeding the state criterion for primary contact recreation of 200 colony forming units per 100 milliliters (CFU/100 mL) of fecal coliform bacteria, the Cottonwood River was placed on the state's CWA section 303(d) list of impaired waters for bacteria in 1998. Specifically, nine segments of the Cottonwood River were listed as impaired, representing 128.11 stream miles from the Marion Reservoir to the Neosho River. In 2003 the bacteria standard changed from fecal coliform to *E. coli* and the determination for violating state standards

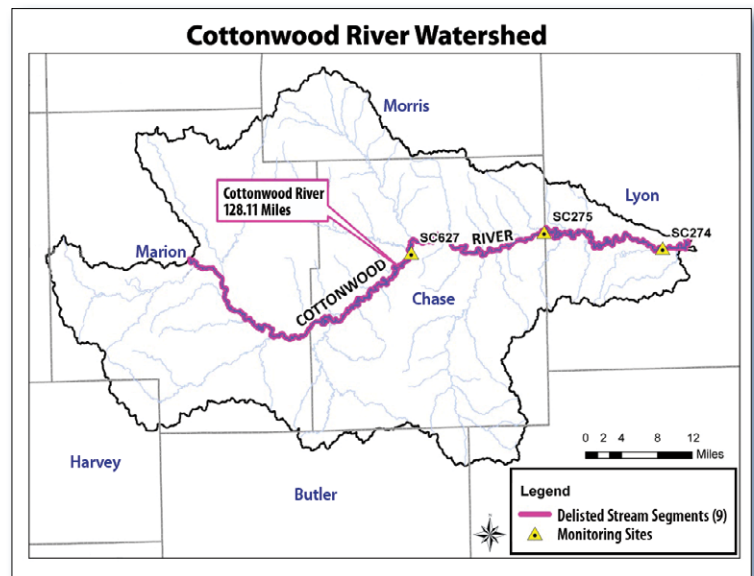


Figure 1. The Cottonwood River is in east-central Kansas.

became five samples collected within 30 days exceeding the geometric mean of 262 CFU/100 mL. The Cottonwood River remained on the impaired waters list for bacteria for segments near Elmdale, Plymouth, and Emporia, Kansas. A total maximum daily load (TMDL) for bacteria was developed and approved by the U.S. Environmental Protection Agency (EPA) in 2002 to direct efforts to reduce the bacteria impairments in the watershed. The TMDL for the Cottonwood River identified small, unpermitted

livestock operations and rural residential areas along the river as potential nonpoint sources of bacteria.

## Project Highlights

Following approval of the TMDL by EPA in 2002, the Marion, Chase, and Lyon county conservation districts; the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS); local landowners; and the Cottonwood Watershed Restoration and Protection Strategy (WRAPS) partners have implemented agricultural and livestock BMPs throughout the Lower Cottonwood River watershed. The BMPs have included implementing 2,673 acres of access control, 584 acres of critical area planting to reduce runoff into the river, 5,147 feet of fence, 22 acres of filter strips, 16,772 feet of pipeline, construction/repair of 13 ponds, 10,633 acres of prescribed grazing, 285 acres of range planting, two stream crossings, 27 alternative water systems, 198 acres of wetland enhancement and restoration, one relocated livestock feedlot, 2.4 acres of vegetation treatment areas, and repairs/replacements of 13 onsite wastewater systems that were contributing bacteria to the river.

## Results

Between 2003 and 2013, three water quality sampling stations on the Cottonwood River near the cities of Elmdale, Plymouth, and Emporia were routinely sampled. Water quality data obtained through that sampling show that although episodes of high bacteria were occasionally present, the geometric mean did not violate the state's criterion (Figure 2). Intensive sampling on the Cottonwood River occurred four times during the primary recreation season (April – October) in 2006 at Emporia and in 2007 at Plymouth and Elmdale. In 2011 all three stations were sampled. None of the resulting geometric means exceeded the criterion of 262 CFU/100 mL. As a result, KDHE removed a total of nine segments (128.11 stream miles) of the Cottonwood River from Kansas's CWA section 303(d) list of impaired waters (Figure 3).

## Partners and Funding

Success of the delisting and water quality improvements can be attributed to several local, state, and federal partners including the Cottonwood WRAPS; Kansas State University (KSU); KSU Research and Extension—Marion, Chase, and Lyon counties; Kansas Department of Agriculture's Division of Conservation; the Marion, Chase, and Lyon county conservation districts; Kansas Water Office;

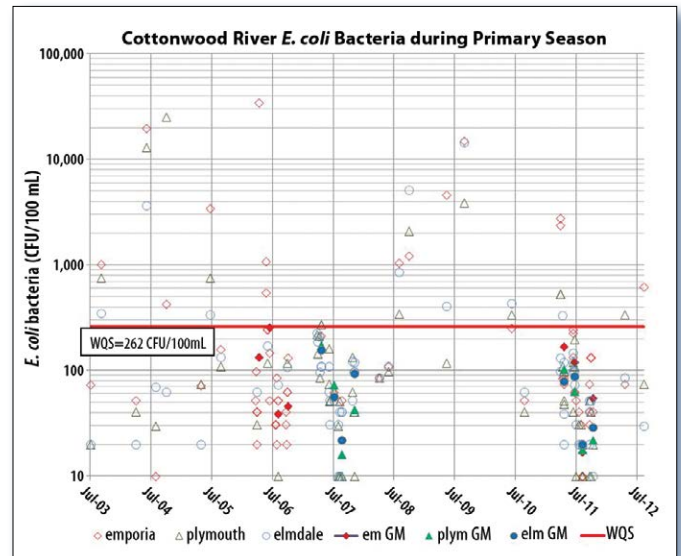


Figure 2. Data show that the geometric mean of sampling sites at Elmdale, Plymouth, and Emporia from 2003 to 2013 met water quality standards. (Open symbols represent individual water quality samples; solid symbols represent the geometric mean (GM) of those data points.)



Figure 3. Nine segments of the Cottonwood River were removed from the state's list of impaired waters for bacteria.

EPA Region 7; NRCS; KDHE; and participating landowners.

The Cottonwood WRAPS project was supported by CWA section 319 funds (\$24,792 for assessment/planning and \$101,600 for implementation) as well as additional support from the Kansas Department of Agriculture's Division of Conservation, NRCS, and local landowners.



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

EPA 841-F-14-001N  
April 2014

## For additional information contact:

Ann D'Alfonso  
Kansas Bureau of Water  
785-296-3015 • AD'Afonso@kdheks.gov