



Section 319

NONPOINT SOURCE PROGRAM SUCCESS STORY

KANSAS

Cooperative Watershed Management Improves Dissolved Oxygen Levels in Fall River

Waterbody Improved

Nonpoint source pollution from grazingland affected water quality in the upper Fall River watershed, prompting the Kansas Department of Health and Environment (KDHE) to add the river to the state's 1998 Clean Water Act (CWA) section 303(d) list of impaired waters for low levels of dissolved oxygen (DO). In cooperation with the local Kansas Watershed Restoration and Protection Strategy (KS WRAPS) Upper Fall River Project, project partners in Greenwood County implemented several agricultural best management practices (BMPs) throughout the watershed. River monitoring data collected between 2000 and 2011 show that waterbodies in the upper Fall River watershed now meet the DO criteria required to protect the aquatic life support designated use. As a result, KDHE removed one segment (composed of nearly 144 miles of streams) in the upper Fall River watershed from the 2010 list of impaired waters for the DO impairment.

Problem

The headwaters of Fall River (East and West branches) originate in the upper northwest corner of Greenwood County in southeastern Kansas. The river flows southeast, draining numerous tributaries before merging with the Verdigris River near the city of Neodesha (Figure 1). In addition to the waterbody's aquatic life support designated use, KDHE has designated the East and West branches of Fall River as "Exceptional State Waters," defined as any surface waters or surface water segments of remarkable quality or of significant ecological or recreational value. The state affords such waters the highest level of water quality protection.

Grazingland or grassland is the predominant land use in the Fall River watershed, covering 93 percent of the drainage area. The grazing density in the watershed, 30 to 45 animals units per square mile, is considered "medium."

According to the state's standard, the concentration of DO in surface waters must not fall below 5.0 milligrams per liter (mg/L). Water quality monitoring data collected throughout the 1990s showed that DO levels in a 143.52-mile-long segment of Fall River exceeded the criteria set to protect the waterbody's aquatic life designated use. As a result, KDHE added this segment of Fall River to the state's 1998 CWA section 303(d) list of impaired waters for DO. KDHE also listed the segment as impaired for fecal coliform (FC) bacteria. This impaired segment of Fall River lies above the Fall River Reservoir and drains approximately 334 square miles within the Flint Hills ecoregion.

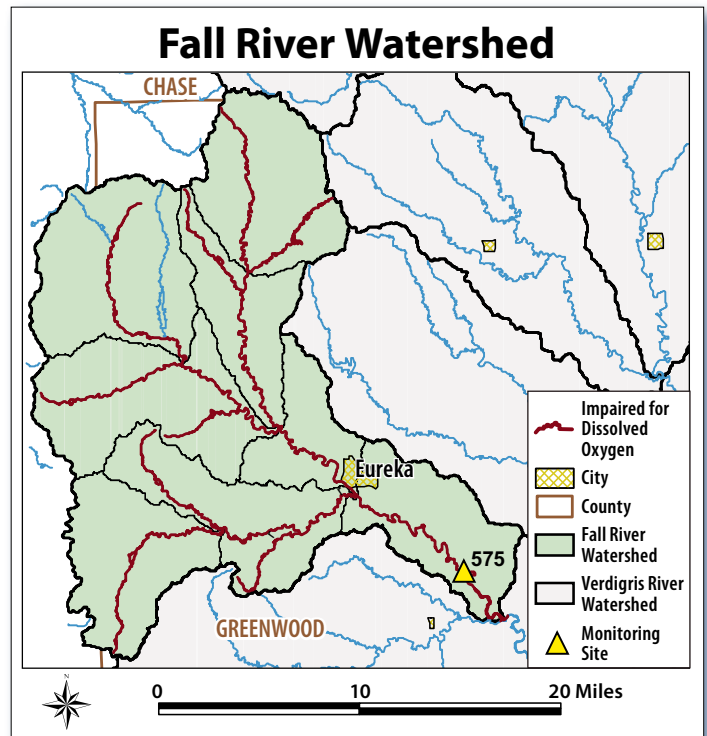


Figure 1. The Fall River watershed is in southeast Kansas.

KDHE completed total daily maximum loads (TMDLs) for DO and FC bacteria (approved by EPA in 2002). Primary contributing factors for the low DO levels included excess nutrients in the water (leading to possible algae blooms), lack of riparian area shading, shallow water and lack of stream flow. The TMDLs found that small, unpermitted livestock

operations and rural homesteads and farmsteads along the river were suspected nonpoint sources of the FC bacteria and DO impairment.

Project Highlights

In October 2002, KDHE provided CWA section 319 funds to Kansas State University to conduct a monitoring study to better assess potential sources of FC bacteria and other nonpoint source pollutants. During the project, University staff identified several manure stockpiles in close proximity to waterways at the Eureka Downs Horse Racetrack. Local agencies worked with the racetrack owner to move the manure stockpiles to an off-site composting site. Since 2003, the Greenwood County Conservation District, United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), and Upper Fall River WRAPS have worked with local landowners to implement agricultural BMPs throughout the watershed, many of which have been aimed at managing livestock, a nonpoint source contributor to Fall River's DO and FC bacteria

impairments. The BMPs have included implementing 2,122 acres of prescribed grazing and 1,174 acres of pest management; repairing/restoring 14 agricultural ponds, which serve as alternative watering sources for livestock; and installing 13,537 linear feet of livestock fencing, seven water supply units and 5,681 linear feet of pipeline to facilitate alternative livestock watering systems (Figure 2).



Figure 2. Local landowners implemented agricultural BMPs such as developing prescribed grazing plans and installing livestock fences.

Results

Between 1990 and 1999, KDHE collected 54 water quality samples at a monitoring station on Fall River. Four of the samples showed DO levels at or below the state's DO water quality standard of 5 mg/L. In contrast, all 67 samples collected between 2000 and 2011 met the state's water quality standards. To account for any potential impact of Fall River's flow rate on DO concentrations, KDHE calculated the long-term median flow between 1970 and 2011. KDHE then calculated the proportion of median flow occurring for each month in which a DO sample was taken (Figure 3). Despite reduced flow during

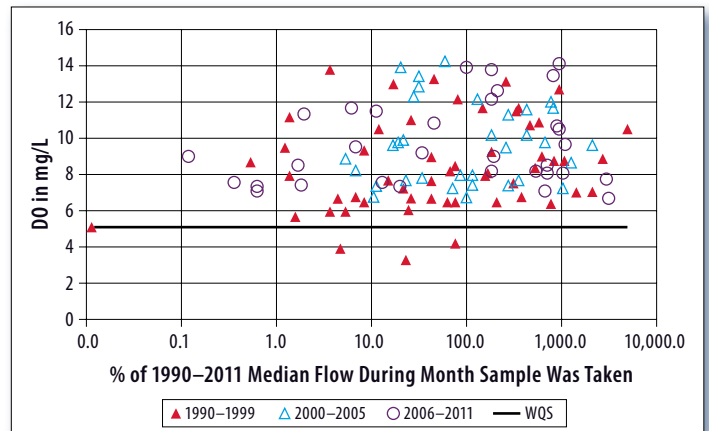


Figure 3. Dissolved oxygen levels on Fall River between 1990 and 2011, relative to flow condition.

recent DO sampling conducted between 2006 and 2011, water quality (as measured by DO concentrations) improved relative to similar flow conditions in the 1990-1999 sampling period.

As a result of restoration efforts, total phosphorus and total suspended solids concentrations have also declined throughout the watershed, indicating water quality improvement. Although project partners have worked to reduce bacteria loading, Fall River remains listed as impaired for FC bacteria.

Partners and Funding

The success of this project can be attributed to a number of local, state and federal partners, including Greenwood County Conservation District; Greenwood County NRCS office; Kansas Water Office; Flint Hills Resource Conservation and Development Council; Kansas Forest Service; Kansas Department of Agriculture, Division of Conservation; Kansas State University; U.S. Environmental Protection Agency, Region 7; Kansas Rural Center; Kansas Alliance for Wetlands and Streams; U.S. Army Corps of Engineers; and Kansas Department of Wildlife and Parks.

The project was supported by CWA section 319 funds, specifically a 2003 Upper Fall River WRAPS Development grant (\$34,950), a 2004 Upper Fall River WRAPS Assessment and Planning grant (\$49,850) and two Upper Fall River WRAPS Implementation grants in 2006 and 2007 (totaling \$119,200). Additional support was provided by the Kansas Department of Agriculture's Division of Conservation, USDA NRCS and local landowners.



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