

Missouri: Dardenne Creek

Watershed Planning and On-the-Ground Implementation Improve Water Quality in Creek

Waterbody Improved



Studies conducted by the Missouri Department of Natural Resources (MDNR) between 1998 and 2002 showed poor aquatic habitat and elevated levels of sediment deposition in Dardenne Creek. Based on the study results, in 2002 the U.S. Environmental Protection Agency placed the creek on the Clean Water Act (CWA) section 303(d) list of impaired waters for failure to meet water quality standards for the aquatic life designated use because of unknown pollutants. A broad coalition of landowners and other stakeholders addressed runoff and erosion through both education and implementation of best management practices (BMPs). Recent data show declines in inorganic sediment levels and improvements in aquatic habitat, prompting MDNR to remove a six-mile-long segment of Dardenne Creek from the 2010 CWA section 303(d) list for sediment impairment.

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Figure 1. Dardenne Creek Watershed lies near the eastern border of Missouri.



Figure 2. Eastern Missouri's Dardenne Creek is a popular site for water-based recreation activities.

Problem

Dardenne Creek drains a 165-square-mile watershed in St. Charles County, Missouri, and flows northeast to the Mississippi River (Figure 1). Land use in the watershed consists of some agriculture mixed with rapidly developing suburban outgrowth from St. Louis. The creek is a popular site for water-based recreation activities (Figure 2).

Studies conducted by MDNR in 1998, 2000 and 2002 indicated poor water quality and poor aquatic habitat conditions in much of Dardenne Creek. In 2000 MDNR conducted macroinvertebrate sampling at five monitoring sites along the creek. The health of the biotic community was assessed on the basis of four primary biological metrics, which were compared to the state's numeric biological criteria for reference streams within the same ecological region as Dardenne Creek. The results indicated that four of the five sites achieved the status of partially biologically sustaining or non-biologically sustaining. Based on these data, in 2002 the U.S. Environmental Protection Agency determined that Dardenne Creek did not meet its aquatic life designated use and added the creek to the state's list of impaired waters for unknown pollutants from urban/rural nonpoint sources.

A 2000 study by the Greenway Network, Inc. (a regionally based grassroots, volunteer-based natural resources organization) and the Center for Agricultural, Resource and Environmental Systems (CARES) estimated that 62,509 tons of soil was eroding into Dardenne Creek annually. Subsequently (in 2002), MDNR conducted sediment studies at six sites along the creek. Across the study sites, the average percent fine sediment deposition (proportion of particles less than 2 millimeters in size) was 64.86 percent, 25 percent greater than the percent fine sediment deposition for control streams. While the state does not have a sediment deposition water quality standard, Missouri's 303(d) listing methodology document's (LMD) target value for median percent fine sediment deposition is no more than 20 percent greater than the median sediment deposition for control streams. As a result, MDNR added inorganic sediment as an additional pollutant to Dardenne Creek on the 2004/2006 CWA section 303(d) list. Much of this erosion was attributed to hydrologic alterations caused by channel modification and watershed urbanization.

Project Highlights

Projects to actively address sediment problems in the Dardenne Creek watershed have been under way since at least 1997. In 1997 the Dardenne Creek Watershed Alliance (the Alliance), composed of local citizens and representatives from 15 organizations, began developing the Dardenne Creek Wetlands and Watershed Protection and Restoration Plan. MDNR, CARES and the Greenway Network also provided support. Partners gathered public input, collected water quality data and used a geographic information system to develop a watershed decision support system. The plan, completed in 2000, outlined recommendations for protection and restoration on a watershed scale. Objectives of the plan included (1) improving public knowledge of water quality issues and protection; (2) reducing soil erosion on agricultural lands; (3) reducing stormwater runoff and urban erosion; (4) promoting comprehensive land use and watershed planning; and (5) promoting wetland protection, enhancement, management and mitigation. The plan continues to guide the efforts of the Alliance, the Greenway Network, city and county governments, and the St. Charles Soil and Water Conservation District (SWCD).

Since 2003, SWCDs in the watershed have implemented 21 agricultural BMPs, including tillage management, terraces, sod waterways and a reservoir to help stabilize stream erosion. The practices have prevented an estimated 2,786 tons of soil from entering Dardenne Creek.

St. Charles County used its Unified Development Ordinance to develop and modify ordinances that promote the protection of natural watercourses and riparian buffers, tree preservation, BMP inspection and wastewater disposal regulations. The county also stabilized stream banks and improved stormwater/sewer infrastructure. The cities of St. Charles and St. Peters implemented stormwater control projects such as construction and post-construction sediment control through Phase II municipal separate storm sewer system (MS4) permits.

The City of St. Peters and the SWCD, in coordination with the Alliance, supported the installation of two U.S. Geological Survey gauging stations in Dardenne Creek. The Alliance also led educational workshops for students, organized an annual "Dardenne Day" to educate the public about water quality, developed a website, and helped to organize a volunteer monitoring Stream Team.

Results

Sediment deposition in Dardenne Creek declined as a result of practices implemented throughout the watershed. A 2008 MDNR study found that median fine sediment deposition in the creek decreased from 25 percent above the median sediment deposition in a control stream in 2002 to 12.5 percent above the median sediment deposition (which meets the state's 303(d) LMD sediment target value). As a result, MDNR removed a six-mile-long segment of Dardenne Creek from the state's CWA section 303(d) list in 2010 for inorganic sediment impairment.

Partners and Funding

The Alliance developed the Wetland and Watershed Protection and Restoration Plan with \$112,470 from a CWA section 104 grant. CWA section 319 grant funding supported implementation of portions of the plan, including \$9,862 for the Alliance to conduct education and outreach and \$41,980 for the St. Charles SWCD to implement three nonpoint source projects in the Dardenne Creek watershed. SWCDs used \$21,390 in state cost-share funds to implement 21 agricultural BMPs. Landowners participating in cost-share provided 25 percent or more of the project costs, totaling more than \$5,348. St. Charles County received \$106,561 in State Revolving Fund grants to stabilize stream banks and improve stormwater and sewer infrastructure. State Revolving Fund grants also funded stormwater projects conducted by the cities of St. Charles (\$51,021) and St. Peters (\$43,460).