



## Section 319

# NONPOINT SOURCE PROGRAM SUCCESS STORY

# Wyoming

## Improving Irrigation Efficiency and Land Management Reduces Sediment Loads

### Waterbody Improved

Excess sediment eliminated important streambed habitats and threatened aquatic life in Wyoming's Rock Creek. As a result, the Wyoming Department of Environmental Quality (WDEQ) placed Rock Creek on Wyoming's 1996 Clean Water Act section 303(d) list of impaired waters. Landowners implemented best management practices (BMPs) specifically designed to improve irrigation efficiency. Project partners held an educational workshop aimed at improving landowners' pasture and hay culture management in the watershed. These efforts successfully reduced sediment loads, prompting WDEQ to remove Rock Creek from the state's 2004 303(d) list of impaired waters.

### Problem

Rock Creek originates in Wyoming's Bighorn Mountains, along the northwestern boundary of the Powder River Basin. The creek flows southeast for approximately 15 miles before it joins Clear Creek near the town of Buffalo. WDEQ classifies Rock Creek as a type 2AB water, and thus it is protected for drinking water, coldwater game and nongame fisheries, fish consumption, aquatic life other than fish, recreation, wildlife, industry, agriculture and scenic value uses. Excess sediment caused physical degradation in 8 miles of Rock Creek, making the creek unable to support its aquatic life designated use. Consequently, WDEQ added an 8-mile segment of Rock Creek to the state's 1996 303(d) list.

The Lake DeSmet Conservation District (LDCD) conducted a planning and assessment project in 1997 to determine the source of the excess sediment. Their investigation suggested that the major sources of sediment included a combination of heavy cattle and horse grazing operations and inefficient irrigation systems in the watershed.

### Project Highlights

In 1999 the LDCD received section 319 project funding to address these water quality issues as part of a cooperative effort among the LDCD, U.S.



Figure 1. This is a post-project view of Rock Creek. The sediment load has declined, and the creek once again supports its aquatic life use.

Department of Agriculture (USDA) and private landowners. The project's primary goals and objectives included implementing BMPs that improve irrigation infrastructure and application methods. Landowners improved irrigation efficiency by burying pipelines and installing modern sprinkler systems. LDCD supplemented these structural changes with a 2001 educational workshop that helped watershed landowners find ways to improve pasture and hay culture management practices.

## Results

The LDCD conducted BMP effectiveness monitoring at several study sites between 1999 and 2001. Data show that implementing BMPs improved irrigation efficiency in the watershed from approximately 12 percent (pre-project) to 40 percent (post-project). This monitoring also found that application efficiency increased from approximately 18 percent to 41 percent and water conveyance efficiency increased from approximately 46 percent to 99 percent. In addition, water usage decreased from approximately 19,978 acre-feet to 6,011 acre-feet, which means that more water remains in the creek channel to support aquatic life uses and less excess pollutant-carrying irrigation water returns to the stream. While these results clearly illustrate a marked improvement in the irrigation efficiency in the watershed, the corresponding effectiveness monitoring data collected by LDCD were determined to be inconclusive because the data were collected during the term of the project and not after installing all structural improvements.

Total suspended solids (TSS) data in pre-project irrigation return flow show wide seasonal and discharge-related variability. However, concentrations for irrigation return flows into Rock Creek and similar adjacent watersheds typically exhibit mean

TSS values near 15 milligrams per liter (mg/L). An annual irrigation efficiency-induced reduction of 13,967 acre-feet of return flows with a mean TSS concentration of 15 mg/L would equal an annual reduction of almost 285 tons of sediment kept out of the creek.

The inability to draw immediate conclusions from the LDCD report prompted WDEQ to reevaluate the stream in 2003. This post-project effectiveness monitoring found the substrate in Rock Creek to be relatively free of sediment (Figure 1) with its ability to support aquatic life uncompromised. Therefore, WDEQ determined that Rock Creek fully supports its aquatic life uses and, thus, removed it from Wyoming's 2004 303(d) list.

## Partners and Funding

The section 319 program contributed a total of \$178,743 in federal funds to this project, which was awarded to LDCD to address these water quality issues as part of a cooperative effort among the LDCD, USDA and private landowners. In addition, the partners conducted a section 319 planning and assessment project and held an educational workshop for landowners to educate them on BMPs. Partners contributed a total of \$85,687 in nonfederal match.



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

EPA 841-F-08-001CC  
September 2008

## For additional information contact:

**Jack Smith**  
Wyoming Department of Environmental Quality  
307-673-9337 • [jsmith@wyo.gov](mailto:jsmith@wyo.gov)

**Nikki Lohse**  
Lake DeSmet Conservation District  
307-684-2526 • [nikki.lohse@wy.nacdnet.net](mailto:nikki.lohse@wy.nacdnet.net)