



# Section 319

# NONPOINT SOURCE PROGRAM SUCCESS STORY

# Wyoming

## Coordinated Resource Management Restores Fish and Aquatic Life Habitat in Wyoming's Muddy and McKinney Creeks

### Waterbodies Improved

Unstable stream channels and a loss of riparian function in the upper Muddy Creek watershed threatened aquatic life and cold-water fisheries in the early 1990s. As a result, in 1996, the Wyoming Department of Environmental Quality (WDEQ) added one segment of Muddy Creek and one segment of McKinney Creek to the state's Clean Water Act (CWA) section 303(d) list of impaired waters for habitat degradation due to livestock grazing. The Little Snake River Conservation District (LSRCD) led efforts to implement best management practices (BMPs) to address sediment resulting from habitat degradation. Water quality has improved, prompting WDEQ to remove both segments from the state's 2012 list of impaired waters.

### Problem

Muddy Creek is in the Little Snake River Basin in south-central Wyoming (Figure 1). Both Muddy Creek and McKinney Creek (a Muddy Creek tributary) are protected by WDEQ for drinking water, cold-water game and nongame fisheries, fish consumption, aquatic life (other than fish), recreation, wildlife, industry, agriculture and scenic value uses.

The Muddy Creek watershed produces naturally high sediment loads because of its highly erodible soils. In addition, historical livestock grazing practices resulted in damaged riparian areas and stream banks, greatly increasing erosion and sediment loading in the lower watershed during precipitation events and periods of spring snowmelt. Biological and physical data collected in the mid-1990s indicated that excessive sedimentation was threatening the cold-water fisheries and aquatic life uses along a 5.1-mile section of McKinney Creek and an 11.4-mile section of Muddy Creek. WDEQ subsequently placed both creek segments on the CWA section 303(d) list of impaired waters in 1996 as threatened for their cold-water fish and aquatic life uses.

### Project Highlights

In 1992, LSRCD, the Bureau of Land Management (BLM), local landowners, grazing permittees, Wyoming Game and Fish Department (WGFD), and other stakeholders initiated a Coordinated Resource Management (CRM) process in the Muddy Creek watershed to address threats to water quality. As part of the CRM, LSRCD managed several CWA section 319 projects between 1993 and 2005 in the

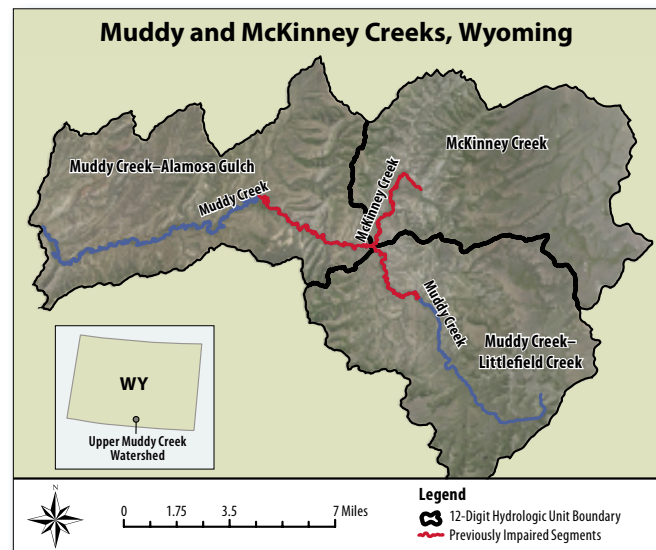


Figure 1. The upper Muddy Creek watershed.

upper Muddy Creek watershed. Project partners implemented agricultural BMPs aimed at reducing agricultural runoff, including upland water development, cross fencing, revegetation, road improvements, prescribed burning, brush management, and improved grazing management. WGFD worked with BLM, livestock grazing permittees and LSRCD to implement new grazing strategies, such as the use of herders in some allotments, deferred grazing, and rest-rotation grazing. BLM, in cooperation with Trout Unlimited, WGFD, LSRCD, a local school, and the Natural Resources Conservation Service (NRCS), removed a culvert, installed 14 grade control structures, reconstructed 0.75 mile of Muddy Creek

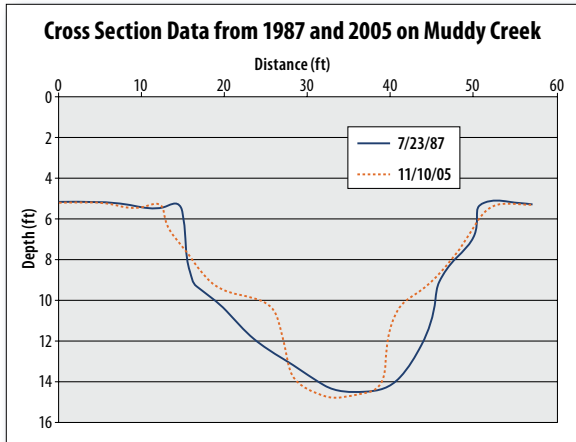


Figure 2. Muddy Creek cross section data.

in the upper watershed, and planted thousands of cuttings and bare-root woody riparian species to help stabilize stream banks.

## Results

Over the past two decades, various local, state and federal agencies have produced reports, theses, technical manuscripts and raw data relating to the Muddy Creek watershed. In 2010, WDEQ hired Timberline Aquatics, Inc., to review and summarize this information and to produce a report including trend analysis for the threatened reaches of Muddy Creek and McKinney Creek. WDEQ used physical, chemical and biological data summarized in the report to conclude that the upper Muddy Creek and McKinney Creek segments should no longer be listed as threatened on the 2012 CWA section 303(d) list of impaired waters.

The report indicated marked improvements in macroinvertebrate communities. Multi-metric index scores (representing combined scores of Taxa Richness, EPT Taxa, Shannon Diversity, Hilsenhoff Biotic Index, and Clinger Taxa) indicated that macroinvertebrate communities at sampling sites improved from a 1993 score of 36 to a 2004 score of 93.

In addition, the report showed improvements in stream channel structure. For example, a comparison of cross section data from Muddy Creek sites in 1987 and 2005 showed evidence of terrace formation, improved bank stability and channel deepening (Figure 2). Similar data from McKinney Creek showed narrowing and deepening of the stream channel. Channel stabilization has been enhanced by the recovery of the riparian community, as

documented through extensive photo-point monitoring (Figure 3).

Moreover, basic water quality parameters (pH, dissolved oxygen, turbidity, total dissolved solids, and temperature) were found to be within WDEQ's water quality standards, and values remained relatively constant from 2008 to 2010. On the basis of these data, WDEQ has removed the two segments (16.5 miles total) from the 2012 CWA section 303(d) list of impaired waters. The recovery of the creeks' ability to support cold-water fisheries has been further demonstrated by WGFD's reintroduction of native Colorado River cutthroat trout into the upper Muddy Creek watershed.



Figure 3. Photo-point monitoring shows Muddy Creek in 1989 (top) and 2005 (bottom).

## Partners and Funding

When Wyoming's Upper Muddy Creek CRM Project began, it was the largest watershed improvement project in the state, encompassing nearly 300,000 acres of mixed federal, state and private lands. In cooperation with CRM partners, LSRCD led restoration efforts in the Muddy Creek watershed. LSRCD managed a total of \$752,952 in CWA section 319 grants, which supported four project phases implemented between 1993 and 2005. In addition, a total of \$952,338 in non-federal matching funds and \$454,000 in other federal funding supported the implementation of BMPs, project effectiveness monitoring, and coordination of the CRM and stakeholder involvement.

Success in the Muddy Creek watershed is largely attributed to coordination between more than 30 members representing private landowners; federal, state and local agencies; environmental and conservation organizations; industry and the public. Major partners included the LSRCD, BLM, NRCS, WGFD, Trout Unlimited, Wyoming Department of Agriculture, WDEQ, Wyoming Water Development Commission, Wyoming Natural Resource Trust Fund, Rocky Mountain Elk Foundation, Ducks Unlimited, Wyoming Land Conservation Initiative, U.S. Fish and Wildlife Service, and numerous private landowners.



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