



NONPOINT SOURCE SUCCESS STORY

Montana

U.S. Forest Service Improves Water Quality In Meadow Creek

Waterbody Improved

Excess sediment and habitat degradation in Meadow Creek caused by forestry activities, eroding forest roads, and grazing in riparian areas led to the stream not supporting its cold-water fisheries beneficial use. As a result, the Montana Department of Environmental Quality (MDEQ) added Meadow Creek to the state's Clean Water Act (CWA) section 303(d) list of impaired waters in 1996. Starting in the late 1990s, the U.S. Forest Service (USFS) implemented grazing best management practices, improved forestry practices, and upgraded roads to improve conditions in Meadow Creek. Recent data show that Meadow Creek now fully meets its cold-water fishery use, prompting MDEQ to remove it from the state's impaired waters list in 2014.

Problem

Meadow Creek (MT76H002 _ 030) is a headwater stream in the upper Bitterroot River watershed. It originates at an elevation of 8,400 feet and flows north for 10 miles before joining the East Fork of the Bitterroot River (Figure 1). The Meadow Creek subwatershed drains an area of 32 square miles. All of the lands within the subwatershed are managed by the USFS as part of the Bitterroot National Forest. Meadow Creek is home to bull trout (*Salvelinus confluentus*), an endangered species, and to the westslope cutthroat trout (*Oncorhynchus clarki lewisi*), a species of concern (as designated by the U.S. Fish and Wildlife Service).

Meadow Creek is impacted by sediment runoff from grazed areas and from eroding roads. Between 30 percent and 75 percent of the streambanks that were surveyed in 1996 and 1997 showed evidence of excessive trampling by livestock. In addition, most of the forest roads were built between the 1950s and the late 1960s and contribute to excessive erosion and runoff.

Montana has a narrative water quality standard for sediment. This means that a variety of data and observations are needed to determine if a stream is water quality impaired due to sediment. Early evaluations in 1988 by Bitterroot National Forest staff indicated that aquatic insect diversity and streambed composition, was lower than expected reference conditions due to a high percentage of sand in the streambed. On the basis of these observations, MDEQ placed Meadow Creek on the Montana's 1996 CWA section 303(d) list of impaired waters,

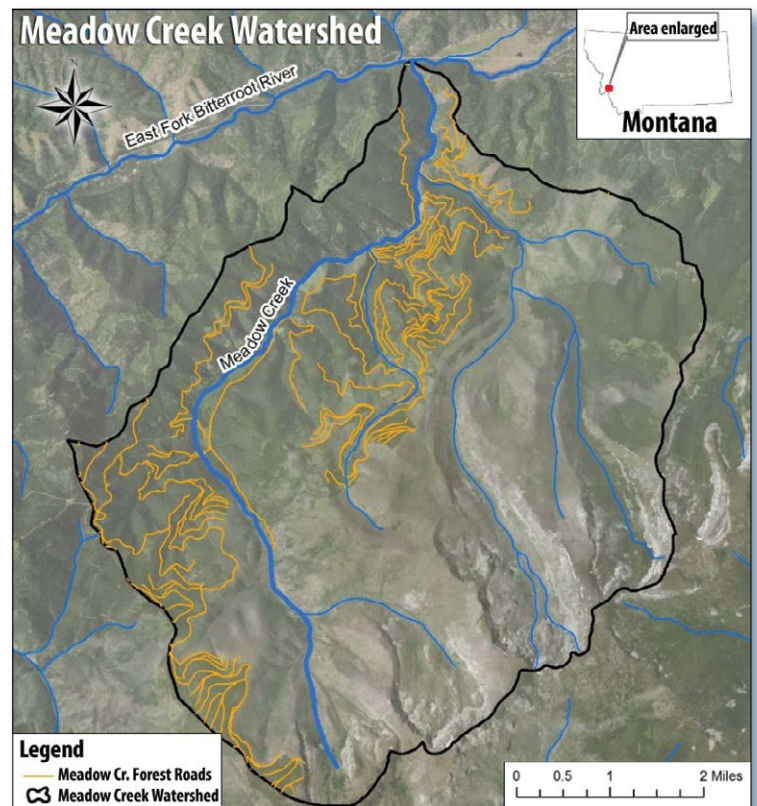


Figure 1. The Meadow Creek watershed is in the Bitterroot National Forest in southwestern Montana.

noting that it was threatened for support of its cold-water fishery beneficial use due to habitat alterations from rangeland and forest roads. Further sampling by the USFS in 2002 and 2003, and by MDEQ in 2006 indicated water quality improvement, but excess sediment was still present in the stream.



Figure 2. Livestock grazing in the riparian area caused damage in Meadow Creek (as seen on left, 2003). Partners installed fences to exclude livestock. Within two growing seasons, streambank vegetation had recovered (as seen on right, 2005).



Figure 3. Partners replaced a forest road culvert (left) with a new bridge (right) over Meadow Creek. The bridge allows unimpeded fish passage and reduces road-related sediment loads.

Project Highlights

USFS has conducted a significant number of improvement projects in the Meadow Creek watershed since the late 1990s to reduce streamside impacts of grazing cattle and improve water quality. These efforts included adding an initial half-mile of riparian fencing along Meadow Creek in 1996; fencing along Bugle Creek in 2000; 1,700 more feet of fencing in 2004; and 500 feet of fencing near Balsam Creek in 2005, with additions in 2007, and several slash fences created from cutting and felling large trees to prevent livestock access to sensitive Meadow Creek riparian areas (Figure 2). In addition, during the 2004 restoration a stream crossing in this area was hardened with logs, gravel and rock to reduce sedimentation from livestock access.

Other improvements to reduce erosion and improve habitat along Meadow Creek included road upgrades, culvert and bridge improvements or replacement, hardening of smaller stream crossings, and livestock fords. The main road in the Meadow Creek watershed was reconstructed in 2004 to improve drainage and reduce erosion by (1) adding gravel to the road surface for eight

miles where the stream closely paralleled Meadow Creek, (2) modifying the outslope and crown of the road to diffuse runoff, and (3) reseeding roadside disturbed areas to stabilize soils. Two culverts on Meadow Creek were also replaced with bridges (Figure 3) and an undersized culvert on Bugle Creek was replaced with a culvert sized to accommodate a 100-year flood. Lastly, several small crossings on Meadow Creek and headwater tributaries were hardened. Much of this work by the USFS was supported by the development of a 2008 restoration plan by MDEQ. This plan helped guide USFS restoration work in subsequent years.

Results

In 2013, EPA and MDEQ reassessed the watershed to determine if Meadow Creek was meeting its beneficial uses. Habitat and sediment sampling was conducted and it indicated that Meadow Creek was meeting beneficial uses. Data used included benthic macroinvertebrates, riffle pebble counts, grid toss fine sediment, residual pool depths and pool frequency. Sediment conditions within Meadow Creek have improved primarily due to road mitigation activities and additional grazing best management practices (BMPs) implemented by the USFS that addressed the remaining significant sediment sources. On the basis of this assessment, MDEQ removed Meadow Creek from the impaired waters list in 2014. Continued use of management-related BMPs, maintenance of existing on-the-ground BMPs, and monitoring of grazing allotment conditions by the USFS will help ensure conditions remain stable and continue to improve.

Partners and Funding

The USFS Bitterroot National Forest was the primary partner in this watershed restoration effort. They provided much of the planning, technical support, and implementation of BMPs in the watershed, totaling an approximate \$539,000 investment. MDEQ also organized water quality planning efforts using an initial \$53,437 in EPA CWA section 319 funds (2001). Trout Unlimited secured road BMP funding. Partners in the water quality planning efforts were USFS; MDEQ; Montana Department of Natural Resources and Conservation; EPA; Tri-State Water Quality Council; the Bitterroot Water Forum; Montana Fish, Wildlife and Parks; University of Montana; Ravalli County Planning Office and the Bitterroot Conservation District. A technical advisory committee was formed that consisted of representatives of these entities to help prioritize and guide restoration efforts.



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