



Section 319

NONPOINT SOURCE PROGRAM SUCCESS STORY

Montana

Implementing Erosion Control and Stream Restoration Projects Improves Aquatic Habitat in Big Creek

Waterbody Improved

Sediment from forest logging roads and other ground-disturbing activities degraded water quality in Montana's Big Creek. As a result, the Montana Department of Environmental Quality (MDEQ) added Big Creek to the state's Clean Water Act (CWA) section 303(d) list of impaired waters in 1992. A number of public and private partners collaborated to implement erosion control best management practices (BMPs) and other stream restoration projects in the Big Creek watershed. Recent monitoring data from Big Creek show improvements in aquatic life and overall water quality. On the basis of these data, MDEQ will remove the segment from the state's list of impaired waters for sediment in 2012.

Problem

The Big Creek watershed, in the Rocky Mountains of northwestern Montana, includes Upper and Lower Big Creek, Hallowat Creek and Skookoleel Creek (Figure 1). Big Creek is a 15.7-mile-long tributary of the North Fork of the Flathead River. The stream is designated for aquatic life and cold-water fishery use and includes important spawning habitat for the endangered bull trout.

Extensive logging activities on public and private lands in the watershed (largely in the 1950s and 1960s) generated excessive sediment loading in the creek through the late 1970s and 1980s. Increased runoff following the timber harvest caused stream bank instability and increased stream channel erosion in Big Creek and its tributaries. In 2001, the Moose Fire burned through much of the watershed, further altering sediment and water dynamics. The development of ski runs in the watershed's headwaters also contributed to sediment loading.

MDEQ used the Pfankuch Stream Channel Rating, a measure of stream bank stability based on 15 stability indicators, to assess the overall condition of the stream's characteristics. Segments of Big Creek were rated as "good" in the late 1970s, but many segments received a "fair" or "poor" rating in 1982. MDEQ also used the riffle stability index (RSI), a measure of the percentile of mobile particles in the riffle section of the stream, to estimate sediment loading in the waterbody. A score of 70 or greater indicates that a stream is losing stability. In 1993 several samples from Big Creek had scores greater than 70, including three above 90. Between 1980

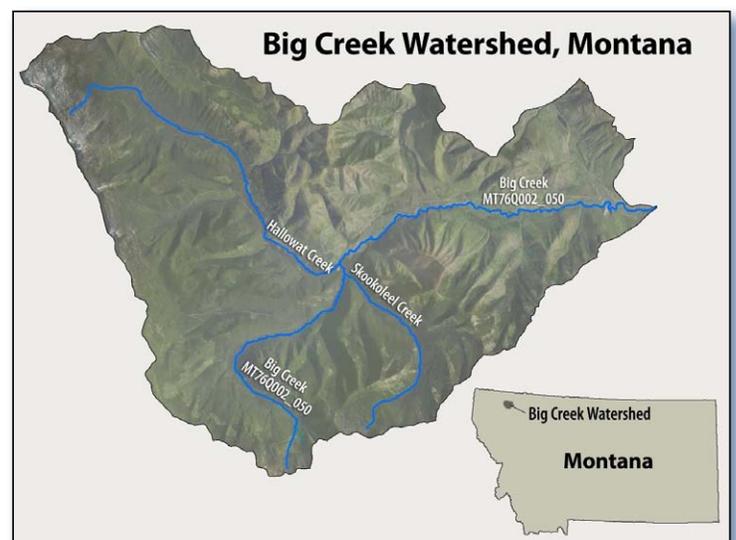


Figure 1. The Big Creek Watershed is in Montana's Rocky Mountains.

and 1990, the percentage of fine sediments in the streambed increased from 23 to 53 percent, indicating an increase in sediment loading. Based on these and other water quality data, MDEQ added Big Creek to the state's 1992 CWA section 303(d) list as impaired by sediment.

Project Highlights

In the 1980s and 1990s the U.S. Forest Service (USFS) acquired all private lands in the upper watershed. Early watershed planning efforts led the USFS Glacier View–Hungry Horse Ranger District staff to develop a document titled *Environment*

Evaluation at the Watershed Scale in 1999. This planning approach identified key action items for restoration, specifically aimed at reducing sediment levels in bull trout spawning areas; it also provided the basis for the Big Creek Watershed Restoration Plan developed in 2003.

MDEQ submitted the Big Creek Watershed Restoration Plan to EPA to fulfill requirements for a total maximum daily load (TMDL) in 2003. The Restoration Plan/TMDL sediment target required that channel substrate core samples contain less than 30 percent fines smaller than 6.35 millimeters. The Restoration Plan/TMDL also outlined three major criteria for assessing water quality improvement: (1) determine whether sediment reduction activities have been implemented as outlined in the TMDL; (2) show that water quality standards for sediment are being met; and (3) demonstrate that the aquatic life use is no longer impaired.

Over the past 15 years, USFS implemented a number of restoration activities aimed at reducing sediment loading in Big Creek. Between 1995 and 2008, it decommissioned 60.6 miles of road and removed 47 culverts. Between 2002 and 2005, it implemented BMPs on 89 miles of road in accordance with both Montana's and the U.S. Fish and Wildlife Service's Inland Fish Strategy standards, enlarged 16 culverts, installed three new arch culverts, and built two new bridges to replace culverts.

To prevent erosion in disturbed riparian areas, project partners planted vegetation on stream terraces to help secure eroding banks. During the 1990s, the Montana Department of Fish, Wildlife and Parks (MFWP) added large logs to the headwater tributaries to help restore natural stream functions, further reducing erosion and sediment input into the stream. The Montana Conservation Corps also stabilized 34 acres of upland eroding areas.

Results

MDEQ, USFS and MFWP have assessed post-project water quality and aquatic life health according to five parameters related to sediment conditions—residual pool depth, composition of stream bottoms as measured by pebble count, stability of stream bottoms, amount of fine sediment in bull trout spawning areas, and ecological health of aquatic insect communities. Three of the parameters (residual pool depth, composition of stream



Figure 2. This stretch of Upper Big Creek now supports healthy bull trout spawning habitat.

bottoms, and macroinvertebrate sampling) indicate that fine sediment is no longer limiting the viability of aquatic life communities in Big Creek.

While Big Creek does not yet meet the fine sediment TMDL target (samples must contain less than 30 percent fine sediment), subsurface fine sediment data indicate water quality improvement. The current 5-year running median is 32.3 percent, and the most recent annual fine sediment value (2009) is 31.4 percent, similar to values expected in reference, undeveloped watersheds. These current percent fine sediment data are below the 35 percent threshold at which FWP and USFS consider bull trout spawning threatened. The state has concluded that subsurface fine sediment is no longer limiting the fishery and aquatic life beneficial uses (Figure 2). As a result, MDEQ will remove Big Creek from the state's 2012 list of impaired waters for sediment.

Partners and Funding

Partners included USFS, MFWP, MDEQ, Montana Conservation Corps, Hungry Horse–Glacier View Ranger District Planning Team, and the public. Each partner contributed funds and staff time toward the restoration of Big Creek. Because the Big Creek watershed is managed by USFS, that agency contributed the greatest amount of time and funding for restoration projects. MDEQ used CWA section 319 funds and contributed staff time and resources to develop the TMDL and to conduct monitoring and assessment activities.



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