



NONPOINT SOURCE SUCCESS STORY

Colorado

Restoring Horse Creek and West Creek for Aquatic Life by Implementing Best Management Practices

Waterbodies Improved

Following the large Hayman fire in 2002, Horse Creek and West Creek in the Upper South Platte River basin were significantly impacted by nonpoint source pollutants such as sediment and debris from storm runoff. A water quality assessment that used a Multimetric Index (MMI) showed that these creeks failed to support aquatic life use for macroinvertebrates. The Water Quality Control Commission (WQCC) added Horse Creek and its tributaries, as well as West Creek, to the Clean Water Act (CWA) section 303(d) list of impaired waters in 2012 and 2016, respectively. Numerous innovative best management practices (BMPs) were implemented in collaboration with many partners through the Hayman Restoration Project. After BMP installation, monitoring data confirmed that water quality was successfully restored in these watersheds. In 2020, the WQCC removed these waterbodies from the 303(d) list for aquatic life.

Problem

Horse Creek and West Creek are in the Upper South Platte River basin, a major source of drinking water for Colorado's Front Range (Figure 1). In 2002, the Hayman fire burned over 137,000 acres within the Upper South Platte River watershed, with 50%–70% of the burn classified as moderate to high severity.

Post-fire flooding and erosion from the Hayman fire impaired aquatic habitat and resulted in the 303(d) listings in 2012 and 2016 for Aquatic Life for Horse Creek (COSPUS03_E) and West Creek (COSPUS03_F), respectively. Excessive sediment in runoff was exacerbated by highly erosive soils (decomposed granite). These loads heavily impacted Strontia Springs Reservoir, which provides 80% of Denver Water's raw water supply and 90% of Aurora Water's supply. Sediment in runoff also affected transportation infrastructure, closing State Highway 67 for three months. Sediment affected watershed health, reservoir storage capacity, cost of water supply to Colorado's Front Range, and fish and wildlife habitat—including habitat for Preble's Mouse, a threatened and endangered species.

A Watershed Analysis for River Stability and Sediment Supply (WARSSS) assessment for Trail Creek, a West Creek tributary, estimated that flooding events generated more than 60,000 tons of sediment per year.

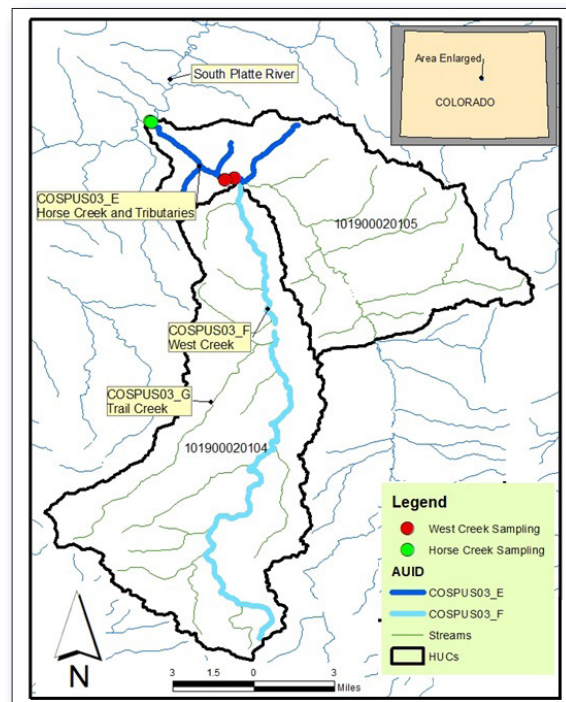


Figure 1. Horse and West creeks are in central Colorado.

In 2010, 8 years after the fire, a WARSSS assessment indicated that over 57,000 tons of sediment was still being delivered downstream to Horse Creek during high precipitation periods. Given the severity of the situation, collaboration with many partners was necessary to improve and protect waterbodies.

Story Highlights

The Hayman Restoration Partnership was formed between the National Park Service, the Coalition for the Upper South Platte, the National Forest Foundation, and many corporate partners and community groups in response to the Hayman fire. WARSSS assessments identified hot spots of sediment loading to help prioritize subwatersheds for restoration based on water quality impacts and flood risks. Due to the size of the watershed, a holistic watershed restoration approach was implemented to achieve water quality improvements through projects funded by various sources. These included six CWA section 319 grants (2006–2016) across the affected subwatersheds. This watershed-based approach focused on erosion control, revegetation, and stream channel reconstruction and restoration. BMPs included installing 21 sediment retention basins, rebuilding log erosion barriers, and reestablishing nine alluvial fans. Ponderosa pines were planted, willow cuttings were established along the riparian areas, and fencing was installed to reduce impacts from recreational use. Four miles of stream were restored by reestablishing a defined channel, armoring stream edges, and creating instream structures that included “rock and roll” log vanes, J-hook vanes, cross vanes, boulder and/or wood drop structures, log sills, toe wood pool features, and riparian benches. To decrease sediment loading, over 13 miles of roads and seven road crossings were decommissioned, and nine culverts or crossings were repaired or improved. A bridge was installed to improve river function.

Results

Water quality assessments were conducted after BMP installation for Horse Creek and West Creek using data from the Station ID 5971a1 (7/24/2017) and two U.S. Forest Service (USFS) stations (10/11/2017). MMI scores ranged from 63.5 to 71, an improvement from the pre-BMP MMI scores of 21.9–34.9 at the sampling sites. MMI values higher than the minimum threshold level of 34 indicate an acceptable water quality condition. Recent data show full attainment of aquatic life use for macroinvertebrates (Figure 2). As a result, Colorado removed the aquatic life use impairment for (1) Horse Creek and its tributaries and (2) West Creek in the 2020 Integrated Water Quality Monitoring and

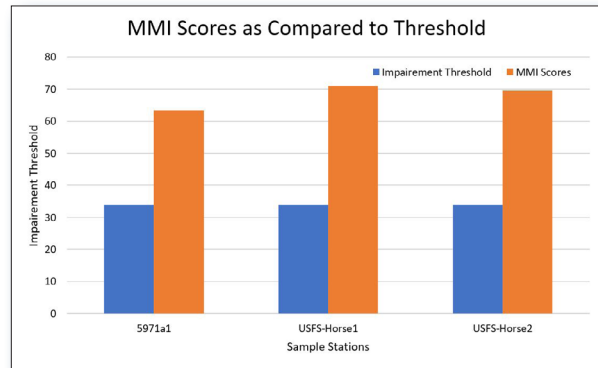


Figure 2. MMI scores for Horse and West creeks that led to removal from the 2020 impaired waters list.

Assessment Report. Additionally, after completing stream restoration work in Trail Creek, trout and beaver returned to Trail Creek, indicating that wildlife habitat had improved post-restoration. Lessons learned from Colorado’s first large-scale, post-wildfire watershed restoration work were applied to other areas of the state impacted by wildfire.

Partners and Funding

Primary partners in the Hayman Restoration Partnership were the Coalition for the Upper South Platte, National Forest Foundation, U.S. Department of Agriculture Natural Resources Conservation Service, USFS, Bureau of Land Management, Douglas County, Aurora Water, Denver Water, Vail Resorts as well as the Colorado Department of Public Health and Environment’s Nonpoint Source Program and Colorado Water Conservation Board’s Watershed Program. Additionally, thousands of volunteers through the Rocky Mountain Field Institute, Mile High Youth Corp, and an AmeriCorps National Civilian Community Corps crew assisted with trail and road work. In total, an estimated 2,739 volunteers contributed 22,422 hours to accomplish the on-the-ground work. Various entities invested more than \$40 million dollars for rehabilitation efforts in the watershed. CWA section 319 project funds supported the rehabilitation efforts for the Hayman Restoration Partnership (\$1.25 million total with reported matching funds of over \$1.3 million). Continued commitments from all partners for monitoring progress and maintenance of the BMPs is necessary to protect water quality in the Horse Creek watershed.



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