NONPOINT SOURCE SUCCESS STORY

Montana

Abandoned Mine Cleanup Reduces Metals in Cramer Creek

Waterbody Improved

Excess metal pollution in Cramer Creek caused by an abandoned mine drainage site impaired the stream's ability to support its beneficial uses. As a result, the Montana Department of Environmental Quality (DEQ) added Cramer Creek to the state's Clean Water Act (CWA) section 303(d) list of impaired waters in 2000. In 2005 the Bureau of Land Management (BLM) began mine reclamation efforts, and by 2014 Cramer Creek was removed from the impaired waters list for arsenic, lead and mercury.

Problem

Cramer Creek is a 12-mile tributary that joins the Clark Fork River about 25 miles east of Missoula, Montana (Figure 1). Between 1947 and 1955, the Linton mine (formerly known as the Blacktail mine) produced silver, lead, zinc and copper ores. DEQ identified this mine as a probable source of many impairments on the creek, including sediment in 1988; arsenic, copper, lead and mercury in 2000; physical substrate habitat alterations in 2006; and aluminum in 2014. In addition to mining, this 26.5-square-mile watershed has an ongoing history of timber harvest. These impairments caused the creek to fail to meet state water quality standards for recreation, drinking water or aquatic life uses.

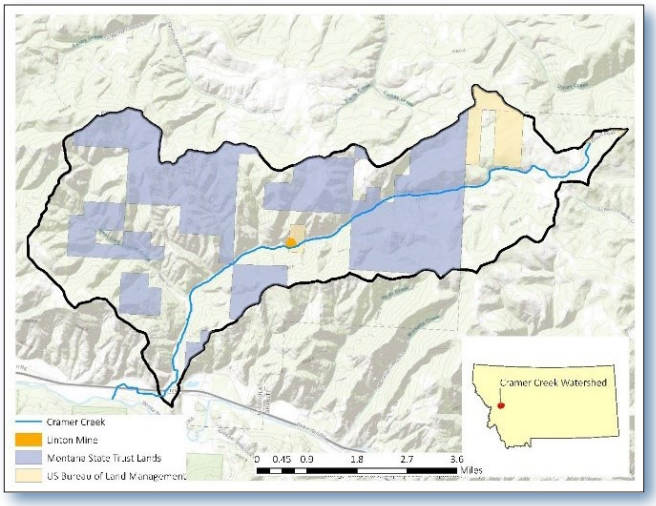

Figure 1. Cramer Creek is in western Montana.

Story Highlights

DEQ's Remediation Division included the Linton mine as a Priority Abandoned Mine and referred the project to the BLM, which manages the mine land. In 2004–2005, the BLM led reclamation activities that removed 130,000 cubic yards of mine waste from a 1,700-foot reach of floodplain and stream channel across public and private property (Figure 2). The mine waste was transported to a repository or used to fill open adits. Additionally, the BLM replaced a culvert with a bridge to aid in reducing road-related sediment inputs to Cramer Creek. In 2006, the BLM installed approximately 7,500 willow, alder and dogwood stakes along the project reach, and they used fascines to stabilize reconstructed banks. In 2007, large woody debris structures were added to the stream, and 350 potted trees and shrubs were planted along streambanks in the public portion of the project reach. Monitoring showed 80% survival of planted trees and shrubs after 2 years; by 2009, vegetation covered 60%–80% of streambanks along the reconstructed channel.

Total maximum daily load (TMDL) documents address the remaining impairments on Cramer Creek. The U.S. Environmental Protection Agency (EPA) approved the Bonita-Superior Metals TMDLs in 2013, which set target concentrations for Cramer Creek of 87 micrograms per liter (µg/L) aluminum, 5.6 µg/L lead during high flows and 8.38 µg/L lead during low flows. These targets correspond to 82%, 34%, and 46% reductions in metals concentrations, respectively.

Much of the land in the Cramer Creek watershed was formerly owned by Plum Creek Timber Company and has since been purchased by a partnership between The Nature Conservancy and Montana State Trust Lands. The purchase was part of the Montana Legacy

Project and includes Cramer Creek in a mosaic of more than 310,000 acres of land dedicated for preserving wildlife habitat and water resources and sustaining recreational and economic viability.

Results

DEQ last assessed Cramer Creek in 2013 using data collected in 2009–2011, just 2–4 years after the BLM completed revegetation efforts. The results prompted DEQ to remove arsenic, copper and mercury from the 2014 impairment list and link these achievements to reclamation activities (Table 1).

Cramer Creek remains impaired for aluminum and lead, and sampling distributions suggest lead pollution is linked to the mine. Therefore, lead concentrations in Cramer Creek may decrease as maturing vegetation continues to stabilize soil and intercept runoff. Aluminum exceedances only occur during runoff conditions, which suggests that this impairment cause is sediment related.

Photos: BLM, Missoula Field Office

Figure 2. Photos show the same area pre-project (top left), after waste removal in 2004 (top right), during seeding and mulching in 2004 (bottom left), and post-project in 2006 (bottom right).

Sediment impairments may be alleviated by changes in timber harvest practices. However, additional land management practices must be implemented to remove all impairments on Cramer Creek. Although the watershed has an ongoing history of logging, the passage of the Streamside Management Zone law in 1991 limited timber harvest within 50–100 feet of streams and within adjacent wetlands. The lower reach of Cramer Creek exhibits severe habitat impacts and sediment loading from bank erosion caused by grazing and from channelization to accommodate roads and irrigation. These impacts to stream morphology are likely limiting sediment transport and sorting.

Table 1. Cramer Creek metals levels (2009–2011 data, post-mine reclamation).

Parameter	Most stringent, hardness-adjusted standard	Maximum concentration detected (number of samples)
Arsenic	10 µg/L	3 µg/L (21)
Copper	8.61 µg/L	2 µg/L (21)
Mercury	0.05 µg/L	0.0089 µg/L (15)

EPA approved the Central Clark Fork Basin Tributaries TMDLs and Water Quality Improvement Plan in 2014, which established a 57% reduction in sediment loads in Cramer Creek. The TMDL plans included restoration strategies and a call for the development of a watershed restoration plan to identify continued water quality improvement activities.

Partners and Funding

Partners involved in the mine reclamation project include BLM, which manages the mine land; the U.S. Army Corps of Engineers, which administered the reclamation efforts; and private landowners in the watershed. BLM staff and volunteers completed revegetation on the reclamation project. Consultants on the project included Reclamation Research Group, LLC.; Pioneer Technical Services, Inc.; and Smith Contracting, Inc. BLM funded the reclamation, revegetation and fisheries improvements, totaling $1,900,000. Montana State Trust Lands and The Nature Conservancy continue to manage much of the land throughout the watershed. DEQ contributed staff time and resources to conduct monitoring and assessment activities and to develop the TMDLs.

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

EPA EPA 841-F-20-001Y
October 2020

For additional information contact:

Hannah Riedl
Montana Department of Environmental Quality
406-444-0549 • hannah.riedl@mt.gov