

Affected Environment

As required by NEPA, this chapter briefly describes the physical, biological, and cultural environment that will be affected by the proposed restoration activities in the upper Arkansas River Basin.

4.1 Physical Environment

Proposed restoration activities will occur in the upper Arkansas River Basin, which includes the watershed of the upper Arkansas River downstream to the reservoir at Pueblo, Colorado. The Arkansas River headwaters are fed by runoff beginning as winter snowpack from a series of perennial and ephemeral drainages in the alpine and sub-alpine basins of the Mosquito and Sawatch mountains near Leadville, Colorado. The mainstem Arkansas River originates at an elevation of 10,100 feet just west of Leadville. From its origin, the Arkansas River flows through a broad mountain valley characterized by significant areas of wetland and floodplain meadows. In this upper reach, important land uses include irrigated pasture and haying operations, livestock production, recreation, and residential development. Approximately 12 miles downstream of Leadville, the Arkansas River enters a valley formed by the Mosquito Range and the Collegiate Peaks of the Sawatch Range. This stretch of the river is characterized by fast water and whitewater, attracting recreational kayakers, rafters, and anglers (Redente et al., 2002; Industrial Economics, 2006) (Figure 4.1). From this point, the Arkansas River flows approximately 160 miles, drains approximately 28,000 square miles, and loses about 5,000 feet of elevation before reaching the Pueblo Reservoir.

Important natural resources found throughout the upper Arkansas River Basin include surface water, riparian habitat, wetland meadow habitat, alluvial groundwater, and aquatic and terrestrial wildlife. In addition, livestock grazing is important in the irrigated meadows of the 11-mile reach.

The Trustees will prioritize projects occurring within the 11-mile reach but will consider projects throughout the upper Arkansas River Basin. The 11-mile reach extends 11-miles downstream in the Arkansas River from the confluence with California Gulch. Downstream of Pueblo, the Arkansas River flows through eastern Colorado and into Kansas, Oklahoma, and Arkansas before its confluence with the Mississippi River at the Arkansas-Mississippi border (Redente et al., 2002; Industrial Economics, 2006).

Currently, aquatic habitats are highly degraded throughout much of the 11-mile reach due to chemical contamination and

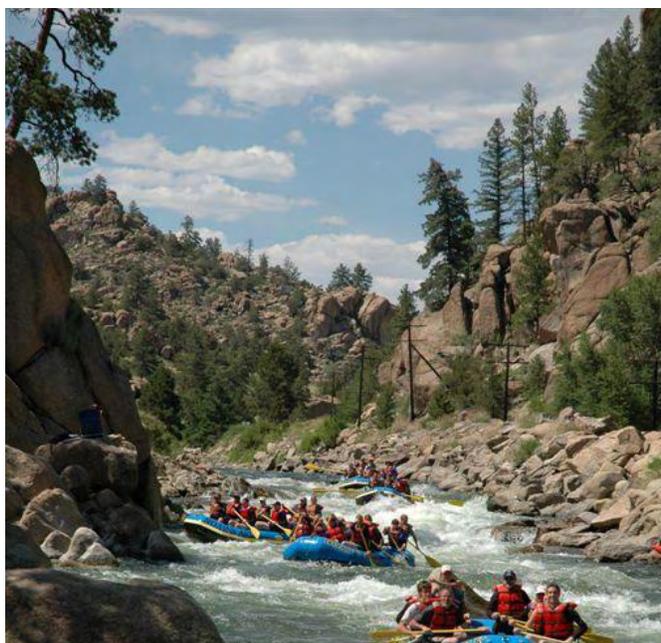


Figure 4.1. River rafting on the Arkansas River.
Photo source: Colorado State Parks, 2009.

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physical disturbance caused by fluvial deposits washed downstream from the Superfund Site. As described in Chapter 2, surface water in the Arkansas River exceeds Colorado acute and chronic water quality criteria for cadmium, copper, lead, and zinc. There are hundreds of abandoned mines, miles of underground tunnels and shafts, large waste rock and tailings deposits, and numerous historic processing facilities in the watershed. Wastes such as mill tailings, slag, and dust were historically deposited in piles, into waste ponds, or left in and around drainages in the Leadville mining district. These deposits washed downstream into the mainstem Arkansas River, causing the contamination apparent now. Throughout the upper Arkansas Basin, untreated mine wastes and abandoned mines that discharge acid mine drainage continue to release hazardous substances into the aquatic and terrestrial environments of the upper Arkansas River Basin (USFWS, 2009).

In addition to chemical contamination, historic mining operations caused significant physical damage to the river channel. Hydraulic placer mining removed large amounts of sediment and flushed them downstream, causing erosion and widening the channel. The over-wide channel of the 11-mile reach provides impoverished habitat for fish and remains vulnerable to erosion. Fluvial deposits washed in from the Site cause physical disturbance that impacts riparian and floodplain habitats, as well as being an ongoing source of water quality impairment. Remedial actions at the Site have improved conditions in the upper Arkansas River Basin, but habitat throughout the basin is still impacted by historic mine activities (Redente et al., 2000; Industrial Economics, 2006; USFWS, 2009) (Figure 4.2).

4.2 Biological Environment

Historically, the upper Arkansas River Basin was a highly productive ecosystem that supported a broad diversity of North American alpine flora and fauna. The pre-European Settlement environment consisted of primary producers, primary consumers, and predators in both the aquatic and terrestrial environments. The first European inhabitants were trappers, who negatively impacted populations of targeted species, such as beaver. As mining began, the mining settlers hunted extensively, damaging populations of deer, bison, elk, and wolves. Native fish populations were replaced by exotic fish, stocked for sport. Finally, as mining contamination increased and physical disturbance became more extensive, the vegetative communities also became degraded and no longer supported the remaining aquatic and terrestrial communities (Klima, 2000).

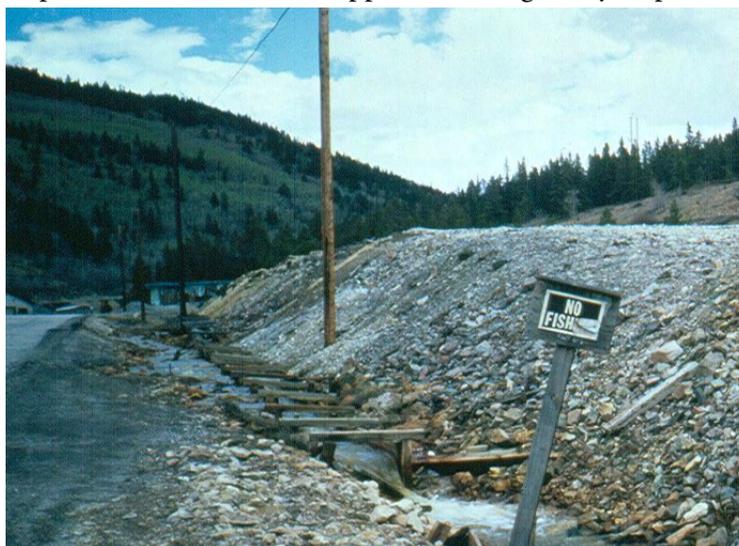


Figure 4.2. Abandoned mine waste in California Gulch.
Photo source: USGS, 2007.

Portions of the biological environment are recovering from mining and other

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anthropogenically caused environmental damages. Remediation work to remove hazardous substances from the river and work to stabilize the river banks have helped recovery. An elk herd has moved back into the upper Arkansas River Valley near Leadville, and native trout are making a comeback. However, the environment has been permanently altered and a directed effort to improve the most problematic damages (mine waste in and along waterways, denuded banks, the over-wide river channel, and enhancing riparian and upland vegetation) is required for the upper Arkansas River Basin to support self-sustaining, healthy ecosystems.

4.2.1 Aquatic Habitat

The upper Arkansas River Basin is a high-elevation mountain river supporting a cold-water trout fishery. The aquatic environment was historically characterized by a relatively narrow, meandering channel, fast-moving water, and diverse in-water habitat. The river supported a healthy benthic macroinvertebrate community and a robust cutthroat trout fishery, exemplified by the Colorado native greenback cutthroat trout (*Oncorhynchus clarkii stomias*) (Klima, 2000).

Coincident with the Leadville mining and population boom, stocking efforts introduced non-native trout species such as brown trout, rainbow trout, and salmon. The non-native species were extremely successful in their introduced environment, leading to a severe decline in greenback cutthroat trout populations in the Arkansas Basin and the extinction of yellowfin cutthroat trout (*Oncorhynchus clarkii macdonaldi*) in the Twin Lakes. As the impacts of mining accumulated, the quality of the aquatic environment declined and caused declines in the fisheries (Klima, 2000). Fish surveys in the 1990s found no fish in California Gulch and very small populations (and small individuals, where present) in downstream reaches. Recent remedial work has improved brown trout populations; however, populations and individual fish size are still small compared with reference sites (Industrial Economics, 2006).

4.2.2 Riparian Habitat

The glacial valleys in which the Arkansas River originates and through which the upper reaches of the river flow support high-elevation riparian ecosystems. Riparian areas and wetlands in the upper Arkansas River Basin are fed by surface runoff and groundwater flow. Herbaceous species, such as sedges and mesic grasses, along with willows, dominate the wetlands and riparian areas. In the dryer edges of the wetland, willows and mesic sedges and grasses are dominant (Klima, 2000; BLM, 2006b).

In high-elevation riparian habitat, bird diversity is typically low but the density of nesting birds can be high in dense willow thickets. Typical bird species in riparian habitat include the broad-tailed hummingbird (*Selasphorus platycercus*), dusky flycatcher (*Empidonax oberholeri*), yellow warbler (*Dendroica petachia*), MacGillivray's warbler (*Oporornis tolmiei*), Wilson's warbler (*Wilsonia pusilla*), Lincoln's sparrow (*Melospiza lincolnii*), song sparrow (*Melospiza melodia*), white-crowned sparrow (*Zonotrichia leucophrys*), and fox sparrow (*Passerella iliaca*) (Erik Brekke, Wildlife Biologist, BLM, personal communication, April 21, 2008).

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Healthy riparian habitat supports a diverse wildlife community including riparian specialists and both upland and aquatic inhabitants. Because it provides plentiful water, food, and shelter, riparian habitat is critical to the ecological health of a region. Historically, the upper Arkansas River Basin boasted a diverse biological community that included a balanced mix of upland, riparian, and aquatic biota. Some formerly common wildlife that are no longer present in the basin include bison (*Bison bison*) (which had extensive herds prior to European settlement) and wolf (*Canis lupus*). Other examples of historically abundant wildlife include wild turkey (*Meleagris gallopavo*), elk (*Cervus canadensis*), deer (*Odocoileus* spp.), bighorn sheep (*Ovis canadensis*), bear (*Ursus* spp.), mink (*Mustela vison*), raccoon (*Procyon lotor*), skunk (family *Mephitidae*), coyote (*Canis latrans*), fox (*Vulpes* spp.), bobcat (*Felis rufus*), mountain lion (*Felis concolor*), hares (*Lepus* spp.), shrews (family *Soricidae*), squirrels (*Sciurus fremonti* and *S. aberti*), chipmunks (*Tamias* spp.), and others (Klima, 2000).

4.2.3 Upland Habitat

The upper Arkansas River Basin is located in a high-elevation montane environment typical of the Rocky Mountains. These high elevation uplands are dominated by lodgepole pine, spruce/fir, and scattered stands of aspen (*Populus tremuloides*). Typical understory species include sagebrush (*Artemisia* spp.) and kinnikinnick (*Arctostaphylos uva-ursi*). Birds commonly found in this forest type include the gray jay (*Perisoreus canadensis*), mountain chickadee (*Poecile gambeli*), red-breasted nuthatch (*Sitta canadensis*), ruby-crowned kinglet (*Regulus calendula*), hermit thrush (*Catharus guttatus*), pine grosbeak (*Pinicola enucleator*), and pine siskin (*Carduelis pinus*) (Erik Brekke, Wildlife Biologist, BLM, personal communication, April 21, 2008).

4.3 Threatened and Endangered Species

T&E species whose historic range includes Lake County, Colorado, include the Canada lynx, greenback cutthroat trout, and Penland alpine fen mustard (*Eutrema penlandii*, threatened). Potential habitat for Uncompahgre fritillary butterfly (*Boloria acrocneuma*, endangered) is likely present in higher elevation alpine areas in Lake County. Gunnison's prairie dog (*Cynomys gunnisoni*) is a candidate for listing and is a known local resident. In 2009, there was a credible leopard frog (*Rana pipiens*) sighting documented in the vicinity of the Paddock State Wildlife Area and there are two breeding populations of boreal toad (*Anaxyrus boreas boreas*), also in the vicinity of the Paddock State Wildlife Area. Leopard frog are currently under review for listing and petitions for the listing of boreal toad have been submitted; neither species is currently listed as a federally threatened or endangered species. There is no designated critical habitat for any of these species in Lake County and areas potentially affected by the proposed restoration actions are not known to support populations of any of these species. Canada lynx could potentially use the project sites as a small part of a travel corridor when moving across the valley. The proposed restoration actions are unlikely to disrupt travel patterns of the Canada lynx because there are alternative routes available (Laura Archuleta, environmental contaminants specialist, USFWS, personal communication, April 25, 2008; Matt Comer, wildlife biologist, USFS, personal communication, December 28, 2009).

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In addition, any disturbances resulting from the construction activities at the restoration sites would be of relatively short duration (one to three years). These restoration projects would provide long-term benefits to habitat for any T&E species by either reducing exposure to hazardous substances or improving habitat conditions.

4.4 Cultural and Socioeconomic Environment

Leadville is located in Lake County, Colorado, at an elevation of approximately 10,150 feet. The city of Leadville was incorporated in February 1878 (Colorado State Archives, 2009). Leadville is the County Seat and the only municipality in Lake County. In 2008, the estimated population for the city of Leadville was 2,743 while Lake County had an estimated total population of 7,994 (City of Leadville, 2009; U.S. Census Bureau, 2009). According to the 2000 Census, the population was 54% male and 46% female; 78% of the population was classified as White; while populations classified as Black or African American, American Indian and Alaskan Native, Asian, and Native Hawaiian and Pacific Islander combined were less than 2% of the total population; 18% of the population was classified as “Some Other Race”; and 36% (of any race) was identified as Hispanic or Latino (U.S. Census Bureau, 2009). The median household income in Lake County is \$41,492, which is 75% of the median household income in Colorado (\$55,517); the median income in Chaffee County is \$42,464 (USDA Bureau of Labor Statistics, 2009).

The upper Arkansas River is an important component of the current economy in Lake County. The Arkansas River supports recreational fishing, rafting, and other outdoor activities. Commercial rafting on the Arkansas River is estimated to contribute \$352 per acre foot of water compared with \$145 per acre foot on the Poudre River and \$18 per acre foot of water on the Colorado River through Glenwood Canyon (Loomis, 2007).

4.5 Native American Religious Concerns

There is evidence that the Arkansas River was historically important for Native Americans. The Ute Indians used it as an important and productive hunting ground until the early to mid-1800s, when European settlers entered the region (Klima, 2000). Although aboriginal sites are present in the vicinity of the area of potential effect, there is no known evidence that suggests the project area currently holds special significance for Native Americans. In many of the project locations, the natural environment has been severely impacted and any aboriginal remains that might have been present before the mines were constructed likely were obliterated during the mining era.