

5.1 Water Resource-related Categories – Existing Conditions

Stream section 3 begins near Bakerville and ends west of Silver Plume. Clear Creek flows easterly for approximately 3 miles adjacent to and south of I-70 for the entire length of the SS.

5.1.1 Water Quality

Water quality conditions of SS 3 are expected to be similar to those of SS 2. Please refer to Section 4.1.1 for water quality information pertinent to this SS.

The Brownsville Slide Area is located on the north side of I-70 immediately west of the town of Silver Plume. This area has historically been prone to landslides and debris flows. Historically, several people have perished as a result of these disturbances. Although not associated with I-70 development, during precipitation events this area can contribute suspended solids, sediment, and debris to Clear Creek.

Based on water quality analysis conducted by the Upper Clear Creek Watershed Association and CDOT, concentrations of zinc periodically exceed ambient water quality criteria at the upstream end of this SS near Bakerville. Water quality data are sparse for this SS.

The town of Silver Plume's municipal water supply is diverted from Clear Creek approximately one mile upstream from Silver Plume.

Disturbance to areas of this SS resulting from mining for mineral-rich ores or excavation activities not associated with mining expose these minerals to both oxidation and transport to receiving streams.

5.1.2 Hydrology/Hydraulics/Stream Morphology/Floodplains

Within SS 3, Clear Creek flows in an easterly direction through a narrow valley at a gradient of approximately 4 percent. No major perennial streams enter Clear Creek in this SS. Clear Creek is channelized throughout most of this SS between U.S. 6 and I-70.

5.1.3 Wetland and Riparian Ecosystems

Palustrine scrub/shrub wetlands occur sporadically through SS 3 in association with Clear Creek and intermittent tributaries and drainages entering Clear Creek within this SS. This wetland type occurs from MP-222 downstream to Silver Plume (MP-225), but only sporadically upstream from MP-221 to MP-222 adjacent to Clear Creek. No palustrine emergent wetlands or palustrine forested wetlands occur in this SS, and riparian areas are generally adjacent to Clear Creek.

5.1.4 Aquatic-dependent Communities

Based on results of CDOW studies in 1988 and subsequent stocking programs in the 1970s and 1980s, the fish populations with SS 3 are assumed to consist of rainbow trout, cutthroat trout, and hybrids of these species. SS-specific fish population data are lacking for this SS.

5.2 **Issues**

5.2.1 Historical Mining (Mineral) Influences

Abandoned mines in Grizzly Gulch and Stevens Gulch may be contributing metals loading to Clear Creek. The Hamell mine and Silver Cloud mine are also present in this SS. The Hamell and Silver Cloud mines both discharge; however, the discharge is not heavily mineralized and is directed through wetlands. Numerous adits exist west of the town of Silver Plume and north of I-70.

5.2.2 Adjacent Land Use

Adjacent land uses potentially affecting Clear Creek have not been identified for this SS.

5.2.3 Highway-related Construction, Operation, and Maintenance Activities

Accidents involving the transportation of hazardous materials on I-70 impact Clear Creek. Because I-70 is a designated hazardous materials transportation route the potential exists for such incidences to occur in this SS.

Highway runoff containing chemical deicers and traction sand used for winter maintenance on I-70 may be entering Clear Creek. The runoff affects the total dissolved solids, total suspended solids, and metals concentrations throughout SS 3. Data characterizing these sources are unavailable.

The east end of this SS (near Silver Plume) is located near the top of the mineralized portions of the watershed (UCCWAG, 2001). The excavation of mineralized geology in the vicinity of Silver Plume may contribute to increased metals concentrations in Clear Creek. Exposure of minerals may also be associated with construction of the I-70. Mineralized soils were used during the original construction of I-70.

Based on a review of current aerial photographs and wetland maps, construction of I-70 has eliminated or encroached upon approximately 29 acres of wetlands within SS 3.

The installation of culverts may have resulted in the dewatering of wetlands immediately upgradient to varying degrees in this SS and altering the natural regime of the surface water and groundwater supporting the wetlands. Additionally, the channelization of

Clear Creek within this SS may have reduced wetlands and riparian vegetation adjacent to the stream channel. Channelization has resulted in riprapped banks which precludes hydrologic support for wetlands and riparian vegetative growth. Channelization has also facilitated the conveyance of sediment immediately upstream from the town of Silver Plume. The suspended sediment eventually is deposited in the Silver Plume area and frequency of flooding in the area has been increased.

5.2.4 Sedimentation

Although no investigations have been conducted regarding the impacts of sedimentation to Clear Creek within this SS, visual observations indicate that Clear Creek has been primarily affected by sedimentation from the application traction sand on U.S. 6, I-70, runoff from parking areas associated with the ski areas, erosion of highway cut and fill slopes, or natural sources (Figure 5-2). This is evident at the Bakerville exit area near MP-221, where sediment deposition has been observed in the stream channel and throughout the riparian areas (based on observations made by R. Quinlan, J.F. Sato and Associates and M. Crouse, Clear Creek Consultants during a field reconnaissance, June, 2001).

Although wetland and riparian areas generally persist throughout this SS in association with Clear Creek, the construction of I-70 and continued operation and maintenance of I-70 has reduced these areas. Based on a review of current wetland and riparian delineations adjacent to I-70 and field observations, sediment has generally filled wetlands and riparian areas adjacent to Clear Creek.

Beaver ponds in this SS used to trap sediment; however, most of the ponds in Clear Creek are filled with sediment and have ceased to function as effective traps. Substrate is armored and the area is free of large cobble. Sedimentation has altered wetlands and riparian areas in this SS.

5.2.5 Channelization/Downcutting

Clear Creek has been locally channelized or encroached by U.S. 6 and I-70 construction (Figure 5-2). Of the 4 miles of Clear Creek in this SS, approximately 3 miles (75 percent) has been channelized or encroached on as a result of highway construction. The natural morphology of upper Clear Creek is described as a B2/B3 high gradient narrow mountain stream with coarse substrate and sinuosity typically greater than 1.2 (Rosgen, 1996). The current sinuosity estimated for SS 3 is 1.14, compared to the estimated historic sinuosity of 1.17; indicating a slight reduction from the natural sinuosity.

Drop structures were installed in the channel during I-70 construction to reduce energy and downcutting in channelized sections between U.S. 6 and I-70.

5.2.6 Habitat Reduction and Fragmentation

A review of infrared photographs indicates that construction of I-70 has removed or sporadically encroached upon approximately 29 acres of wetlands throughout this SS.

5.2.7 Water-based Recreation

Sedimentation from highway runoff appears to have affected the fishery (aquatic habitat) in SS 3. The embedded substrate resulting from the sedimentation has reduced cover and spawning habitat for fish that provide recreation for anglers.