

Clear Creek. Any exposure to minerals would be associated with the construction of the Johnson-Eisenhower Memorial Tunnel and the I-70 rock cuts and the natural weathering and erosion of the mineralized geology. The tunnels were constructed through the Continental Divide and completed in 1979. During the excavation of a pilot bore of the tunnel, the U.S. Geological Survey (USGS) evaluated the bedrock influence on water quality. Although the USGS did not specifically analyze groundwater samples for metals, the resulting report (Hurr and Richards, 1974) indicates that pH levels ranged from 7.5 to 9.3. If metals were present within the bedrock associated with the tunnels, the high pH of these waters precludes acid rock drainage or the dissolution and mobilization of metals (if present).

3.2.2 Adjacent Land Use

The Loveland Ski Area is located south and adjacent to Clear Creek. Runoff associated with any development may result in increasing water quality impacts to Clear Creek. Discharge from the Loveland Ski Area and CDOT (Eisenhower Tunnel) WWTPs may contribute pollutant (nutrient) loading to Clear Creek. Ski area operations and maintenance, including parking lots, may contribute to pollutant loading in Clear Creek. Additionally, the Loveland Basin and Loveland Valley ski areas operate water supply intakes on Clear Creek within this SS.

Based on a review of current aerial photographs and wetland maps, ski area development has eliminated portions of wetlands adjacent to the Loveland Ski Area parking lot and along Clear Creek. Within SS 1, approximately 10 acres of wetlands adjacent to Clear Creek have been eliminated by ski area development.

3.2.3 Highway-related Construction, Operation and Maintenance Activities

Vehicles transporting hazardous materials on I-70 are required to avoid the Eisenhower Tunnel and use U.S. 6 (Loveland Pass). This designated hazardous materials transportation route has been identified as an area of concern regarding traffic safety and accident frequency. Associated with increased accident frequency is the increased likelihood of accidental spills potentially draining to Clear Creek. Spills also occur on I-70 which is in close proximity to Clear Creek. Winter road conditions (ice and snowpack) are considered responsible for frequent accidents within this SS.

Hydrocarbon compounds resulting from past accidents may be seeping from past spills on the east side of Loveland Pass (Figure 3-2). Although not documented as leakage or observed entering this SS, hydrocarbon odors have been detected in the area during runoff conditions.

Highway runoff containing chemical deicers and traction sand used for winter maintenance on I-70 and U.S. 6, enters Clear Creek. The runoff may affect the total

dissolved and suspended solids, metals concentrations, and sedimentation of the stream channel throughout SS 1. Studies investigating the affects of deicers are ongoing. Current water quality monitoring by CDOT in SS 1 is designed to assess the potential concentrations of constituents (contained in the chemical deicers) and suspended sediment in the creek during snow melt/storm events, which is when it is believed these constituents are transported to the stream.

Based on a review of current aerial photographs and wetland maps, construction of I-70 has eliminated wetlands along Clear Creek. Within SS 1, an estimated 12 acres of wetlands adjacent to Clear Creek have been eliminated or encroached upon by I-70 construction.

The installation of culverts immediately downstream from wetlands may have resulted in the dewatering of wetlands in SS 1 and alterations in the natural regime of the surface water and groundwater supporting the wetlands.

3.2.4 Sedimentation

SS 1 has been affected by sedimentation originating from parking lots and the application of traction sand on I-70 (Figure 3-2). The Loveland Ski area parking lot and I-70 generate substantial volumes of sediment that accumulate at the downgradient end of the parking lots. Although control methods intended to stabilize the parking lot have been implemented (e.g., coarse-mesh fencing materials), sediment continues to enter Clear Creek and has created embedded substrate in the creek (field reconnaissance observations by R. Quinlan, J.F. Sato and Associates and M. Crouse, Clear Creek Consultants). Sand from CDOT winter maintenance on U.S. 6 (Loveland Pass) and I-70 also contribute to the sediment load in Clear Creek in this area.

Although wetlands and riparian areas generally persist throughout SS 1 in association with Clear Creek, ongoing sedimentation from the operation and maintenance of I-70 and ski areas appears to have reduced wetland areas. Vegetation that characterizes both wetlands and riparian areas has been observed to be continually buried with sediment (Figure 3-2).

In this area, sediment enters Clear Creek from highway construction, cut and fill erosion, and operation and maintenance practices and from the operation of ski area parking lots and unprotected banks. Beaver ponds occur in the lower portion of SS1 and serve as sediment traps; however, most ponds within Clear Creek have been observed to be full of sediment and, as such, have ceased to function as traps or beaver habitat. Substrate is occasionally armored with fine sediment, and large cobble is absent (field reconnaissance observations by R. Quinlan, J.F. Sato and Associates and M. Crouse, Clear Creek Consultants).

Although sedimentation within upper Clear Creek has been investigated by the USFS (2000 unpublished report), the contributions of sediment from the ski area have not been

quantified. Furthermore, the affects of sedimentation to aquatic resources (e.g., impact to the benthic invertebrate populations) within this SS have not been studied.

3.2.5 Channelization/Downcutting

Clear Creek has occasionally been channelized or encroached by ski area development and construction of I-70 (Figure 3-2). Of the 4 miles of Clear Creek within SS 1, approximately 1.0 mile (25 percent) has been channelized or encroached on from ski area development, and approximately 0.25 mile (1 percent) has been channelized or encroached on due to highway development. 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 for SS 1 is estimated at 1.23, compared to the estimated historic sinuosity of 1.23. Although channelization has occurred within this SS, the overall sinuosity has been relatively unaffected.

3.2.6 Habitat Reduction and Fragmentation

Aquatic habitat has been disturbed in this SS due to the construction of access roads and ski slopes associated with the Loveland Ski Area and the construction and operation of I-70. However, the extent of this disturbance has not been quantified. As previously mentioned, ski area development and highway construction have impacted local wetlands. An estimated 12 acres of wetlands have been removed or encroached upon by highway development while ski area development has removed or encroached upon approximately 10 acres of wetlands.

3.2.7 Water-based Recreation

Sedimentation from highway and ski area parking lot runoff appears to have affected the aquatic habitat in SS 1 due to sedimentation and the resultant embedded substrate have reduced cover and spawning habitat for trout. Additionally, the embedded substrate limits habitat for the fish-food organisms (benthic invertebrates).

4.0 CLEAR CREEK STREAM SEGMENT 2: DRY GULCH TO BAKERVILLE

SS 2 begins near Dry Gulch (MP 217) and extends east to the town of Bakerville (MP 221.3) (Figure 4-1). Issues identified for SS 2 according to water resource-related category are listed below:

Water Quality

- Historical Mining (Mineral) Influences
- Adjacent Land Uses
- Highway-related Construction, Operation, and Maintenance Activities
- Sedimentation

Hydrology/Hydraulics/Stream Morphology/Floodplains

- Channelization/Downcutting

Wetland and Riparian Ecosystems

- Highway-related Construction, Operation, and Maintenance Activities
- Sedimentation
- Habitat Reduction and Fragmentation

Aquatic-dependent Communities

- Sedimentation
- Habitat Reduction and Fragmentation
- Water-based Recreation