

**FIGURE 2-1 (DRAFT)**

**Water Resource-related Issues  
Stream and Wetland Ecological Enhancement Program (SWEEP) for Clear Creek  
(Eisenhower Tunnel to Floyd Hill)**

		Stream Segments							
		1 Clear Creek/Summit County Line to Dry Gulch (MP 214 to MP 217)	2 Dry Gulch to Bakerville (MP 217 to MP 221.3)	3 Bakerville to Silver Plume (MP 221.3 to MP 224.5)	4 Silver Plume to Georgetown Lake Dam (MP 224.5 to MP 229.3)	5 Georgetown Lake to Empire Junction (MP 229.3 to MP 231.7)	6 Empire Junction to Idaho Springs (MP 231.7 to MP 238.5)	7 Idaho Springs to Twin Tunnels (MP 238.5 to MP 242.1)	8 Twin Tunnels to Floyd Hill (MP 242.1 to MP 244.4)
<b>Water Resource</b>	<b>Water Quality</b>	<ul style="list-style-type: none"> <li>Chemical deicers and sand from highway and parking areas increase total dissolved solids and metals concentrations in Clear Creek.</li> <li>Runoff associated with the Loveland Ski Area development may be affecting Clear Creek water quality.</li> <li>Maintenance activities associated with the Eisenhower Tunnel may affect Clear Creek water quality.</li> <li>Accidents on U.S. 6 near Loveland Pass contribute petroleum contamination to Clear Creek.</li> <li>Sedimentation originating from parking areas and I-70/U.S. 6 winter maintenance has affected stream substrate and wetlands.</li> <li>Discharge from CDOT and Loveland Ski Area treatment plants contribute to the nutrient loading of Clear Creek.</li> </ul>	<ul style="list-style-type: none"> <li>Chemical deicers and sand from highway activities contribute total dissolved solids and possibly metals concentrations in Clear Creek.</li> <li>Sand and sediment originating from the highway and eroded slopes contribute to the sedimentation of Clear Creek.</li> </ul>	<ul style="list-style-type: none"> <li>Sand and debris originating from parking areas and I-70/U.S. 6 winter maintenance and the Brownsville Slide area have affected stream substrate and wetland functionality.</li> <li>Chemical deicers and traction sand contribute total dissolved solids and metals concentrations in Clear Creek.</li> <li>Mineralized rock exposed during historic mining activities contribute metals to Clear Creek.</li> <li>Excavation of mineralized rock associated with urban and I-70/U.S. 6 development in the Silver Plume area contribute metals to Clear Creek.</li> <li>Channelization has impacted sediment transport and deposition increasing flood frequency in the Silver Plume area.</li> </ul>	<ul style="list-style-type: none"> <li>Sand originating from urban development (Silver Plume) and I-70/U.S. 6 winter maintenance has affected stream substrate and wetlands in the upstream portion of this SS.</li> <li>Chemical deicers may be increasing total dissolved solids and metals concentrations in Clear Creek.</li> <li>Mineralized geology exposed during historic mining activities (Burleigh Tunnel and nonpoint sources) contribute to metals loading of Clear Creek.</li> <li>Excavation of mineralized rock associated with urban and I-70/U.S. 6 development in the Silver Plume/Georgetown area may be contributing to metals concentrations in Clear Creek and Georgetown Lake.</li> <li>Roadcuts through active mineral belt and draining adits contribute to metals loading.</li> </ul>	<ul style="list-style-type: none"> <li>Sand originating from I-70/U.S. 6 winter maintenance and natural debris flows affect stream substrate and wetland functionality.</li> <li>Chemical deicers may be increasing total dissolved solids and metals concentrations in Clear Creek.</li> <li>Discharge from the Georgetown Sewage Treatment Facility may be contributing pollutant loading to Clear Creek.</li> <li>In addition to mineralized geology exposed during historic mining activities.</li> <li>Excavation of mineralized rock associated with rural and I-70/U.S. 6 development may be contributing to metals concentrations in Clear Creek.</li> </ul>	<ul style="list-style-type: none"> <li>Sand originating from urban parking areas and I-70/U.S. 6/U.S. 40 winter maintenance has affected stream substrate and wetland functionality.</li> <li>Chemical deicers may be increasing total dissolved solids and metals concentrations in Clear Creek.</li> <li>Mineralized geology exposed during historic mining activities contribute to metals loading of Clear Creek.</li> <li>Excavation of mineralized rock associated with rural and I-70/U.S. 6 development may be contributing to metals concentrations in Clear Creek.</li> <li>Roadbed built on mill tailings.</li> </ul>	<ul style="list-style-type: none"> <li>Sand originating from urban parking areas and I-70/U.S. 6/U.S. 40 winter maintenance has affected stream substrate and wetland functionality.</li> <li>Chemical deicers may be increasing total dissolved solids and metals concentrations in Clear Creek.</li> <li>Mineralized geology exposed and mine materials produced during historic mining activities contribute to the metals loading of Clear Creek.</li> <li>Excavation of mineralized rock associated with rural and I-70/U.S. 6 development may be contributing to metals concentrations in Clear Creek.</li> <li>Roadbed built on existing tailings.</li> </ul>	<ul style="list-style-type: none"> <li>Sand originating from parking areas and I-70/U.S. 6/U.S. 40 winter maintenance has affected stream substrate and wetland functionality.</li> <li>Chemical deicers may be increasing total dissolved solids and metals concentrations in Clear Creek.</li> </ul>
		<b>Water Quality Standards Exceedance</b>							
		No Exceedence Identified	Zinc Periodically Exceeded	Zinc Periodically Exceeded	Zinc, Cadmium, and Lead Periodically Exceeded	Zinc and Cadmium Periodically Exceeded	Zinc, Cadmium, and Copper Periodically Exceeded	Zinc, Cadmium, and Copper Periodically Exceeded	Zinc, Cadmium, and Copper Periodically Exceeded
	<ul style="list-style-type: none"> <li>Historic Sinuosity = 1.23</li> <li>Current Sinuosity = 1.23</li> <li>Stream Channelization= 1 mile (25% of SS) from ski area; 0.25 mile (1% of SS) from highway development.</li> </ul>	<ul style="list-style-type: none"> <li>Historic Sinuosity = 1.26</li> <li>Current Sinuosity = 1.25</li> <li>Stream Channelization= 0.6 mile (15% of SS) from highway development.</li> </ul>	<ul style="list-style-type: none"> <li>Historic Sinuosity = 1.17</li> <li>Current Sinuosity = 1.14</li> <li>Stream Channelization= 3 miles (75% of SS) from highway development.</li> </ul>	<ul style="list-style-type: none"> <li>Historic Sinuosity = 1.29</li> <li>Current Sinuosity = 1.25</li> <li>Stream Channelization= 2.4 miles (50% of the SS) of which 0.2 mile is from mining (4% of SS); 1.1 miles is from highway development (22% of SS); and 1.1 miles is from the towns of Silver Plume and Georgetown (23 % of SS).</li> </ul>	<ul style="list-style-type: none"> <li>Historic Sinuosity = 1.22</li> <li>Current Sinuosity = 1.20</li> <li>Stream Channelization= 1.1 miles (37% of SS) from highway development.</li> <li>Downcutting of south-facing slopes.</li> </ul>	<ul style="list-style-type: none"> <li>Historic Sinuosity = 1.18</li> <li>Current Sinuosity = 1.14</li> <li>Stream Channelization= 6 miles (85% of SS) from highway development.</li> </ul>	<ul style="list-style-type: none"> <li>Historic Sinuosity = 1.18</li> <li>Current Sinuosity = 1.12</li> <li>Stream Channelization= 3 miles (97% of SS) of which 1.7 miles is from highway development (57% of SS) and 1.2 miles is from mining activities (40% of SS).</li> </ul>	<ul style="list-style-type: none"> <li>Historic Sinuosity = 1.26</li> <li>Current Sinuosity = 1.26</li> <li>Stream Channelization= 2.2 miles (88%) from highway development.</li> </ul>	
<b>Hydrology/ Hydraulics/Stream Morphology/ Floodplains</b>									

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		Stream Segments							
		1	2	3	4	5	6	7	8
		Clear Creek/Summit County Line to Dry Gulch (MP 214 to MP 217)	Dry Gulch to Bakerville (MP 217 to MP 221.3)	Bakerville to Silver Plume (MP 221.3 to MP 224.5)	Silver Plume to Georgetown Lake Dam (MP 224.5 to MP 229.3)	Georgetown Lake to Empire Junction (MP 229.3 to MP 231.7)	Empire Junction to Idaho Springs (MP 231.7 to MP 238.5)	Idaho Springs to Twin Tunnels (MP 238.5 to MP 242.1)	Twin Tunnels to Floyd Hill (MP 242.1 to MP 244.4)
Water Resource	<b>Wetland and Riparian Ecosystems</b>	<ul style="list-style-type: none"> <li>Sedimentation originating from the construction and operation of ski areas and I-70 has reduced wetlands and riparian areas.</li> <li>Approximately 12 acres of wetlands have been removed or encroached upon by I-70.</li> <li>Approximately 10 acres of wetlands have been removed or encroached upon by ski area development.</li> <li>Installation of culverts may be affecting hydrologic regime of tributaries entering Clear Creek.</li> </ul>	<ul style="list-style-type: none"> <li>Sedimentation originating from the construction and operation of I-70 has reduced wetlands and riparian areas.</li> <li>Approximately 38 acres of wetlands have been removed or encroached upon by I-70.</li> <li>Installation of culverts may be affecting hydrologic regime of tributaries entering Clear Creek.</li> </ul>	<ul style="list-style-type: none"> <li>Construction and operation of I-70 have reduced wetlands and riparian areas.</li> <li>Approximately 29 acres of wetlands have been removed or encroached upon by I-70.</li> <li>Installation of culverts affect hydrologic regime of tributaries entering Clear Creek.</li> <li>Debris flows from the Brownsville slide area have affected riparian and wetlands adjacent to Clear Creek.</li> </ul>	<ul style="list-style-type: none"> <li>Construction and operation of I-70 have reduced wetlands and riparian areas within the upper portion (near Silver Plume) of this SS.</li> <li>Approximately 13 acres of wetlands have been removed or encroached upon by I-70.</li> <li>Installation of culverts may be affecting hydrologic regime of tributaries entering Clear Creek.</li> </ul>	<ul style="list-style-type: none"> <li>Construction and operation of I-70 have reduced wetlands and riparian areas.</li> <li>Approximately 5 acres of wetlands have been removed or encroached upon by I-70.</li> </ul>	<ul style="list-style-type: none"> <li>Construction and operation of I-70 have reduced wetlands and riparian areas.</li> <li>Approximately 17 acres of wetlands have been removed or encroached upon by I-70.</li> </ul>	<ul style="list-style-type: none"> <li>Mining, milling, and highway and urban development have altered wetlands throughout the past 100 years.</li> <li>Less than 1 acre of wetlands have been removed or encroached upon by I-70.</li> </ul>	<ul style="list-style-type: none"> <li>Construction and operation of I-70 and U.S. 6 have reduced wetlands and riparian areas.</li> <li>Approximately 3 acres of wetlands have been removed or encroached on by I-70.</li> </ul>
	<b>Aquatic-dependent Communities</b>	<ul style="list-style-type: none"> <li>Clear Creek substrate has been affected by sediment, reducing aquatic (benthic invertebrate and fish) habitat.</li> <li>Wetlands and riparian areas have been affected.</li> <li>No fish population data are available.</li> <li>Sedimentation (embedded substrate) has negatively affected the fisheries resource.</li> </ul>	<ul style="list-style-type: none"> <li>Clear Creek substrate has been affected by sediment, reducing aquatic (benthic invertebrate and fish) habitat.</li> <li>Wetlands and riparian areas have been affected.</li> <li>No fish population data are available.</li> <li>Boreal Toad (candidate for federal listing) habitat has been reduced and fragmented.</li> <li>Sedimentation (embedded substrate) has negatively affected the fisheries resource.</li> </ul>	<ul style="list-style-type: none"> <li>Clear Creek substrate has been affected by sediment, reducing aquatic (benthic invertebrate and fish) habitat.</li> <li>Functionality of wetlands and riparian areas has been affected.</li> <li>No fish population data are available.</li> </ul>	<ul style="list-style-type: none"> <li>Clear Creek substrate (near Silverplume) has been affected by sediment, reducing aquatic (benthic invertebrate and fish) habitat.</li> <li>No fish population data are available for Clear Creek.</li> <li>Sedimentation is reducing Georgetown Lake pool depth necessary for cover and overwintering habitat.</li> <li>No fish population data are available for Georgetown Lake.</li> </ul>	<ul style="list-style-type: none"> <li>Although slightly affected by channelization, overall aquatic habitat appears to be good as reflected in relatively high numbers of fish per acre.</li> <li>Fish population estimates range from 270 to 650 fish per acre.</li> <li>Channelization at the extreme lower segment limits the fishery resource.</li> </ul>	<ul style="list-style-type: none"> <li>Channelization (85% of the SS) has affected fish habitat; however, conditions have been improved over those during mining.</li> <li>Fish population estimates range from 330 to 830 fish per acre upstream from Spring Gulch and from 100 to 270 fish per acre downstream from Spring Gulch.</li> <li>Sedimentation may be affecting the fishery resource.</li> <li>Channelization has enhanced the conditions for rafting and kayaking.</li> </ul>	<ul style="list-style-type: none"> <li>Channelization (97% of the SS) and possibly water quality (metals from mine materials) has negatively affected the fishery resource; however conditions have improved since the period of active mining.</li> <li>Fish population estimates ranged from 100 to 225 fish per acre upstream from Idaho Springs, from 30 to 80 fish per acre at Riverside Park, and from 10 to 70 fish per acre downstream from Idaho Springs.</li> <li>Sedimentation may be slightly affecting the fishery resource.</li> <li>Channelization has enhanced the conditions for rafting and kayaking.</li> </ul>	<ul style="list-style-type: none"> <li>Channelization (75% of the SS) has negatively affected fish habitat; however, conditions have been improved over those during mining.</li> <li>Fish population estimates range from 10 to 200 fish per acre, depending on year and season of sampling.</li> <li>Sedimentation may be slightly affecting the fishery resource.</li> <li>Channelization has enhanced the conditions for rafting and kayaking.</li> </ul>