# 3.0 INDIVIDUAL WATERSHED DESCRIPTIONS & IMPAIRMENTS

TMDLs were developed for assessment units for which constituent (or pollutant) concentrations measured during the 1999 water quality survey, as combined with quality outside data, indicated impairment. Because characteristics of each watershed, such as geology, land use, and land ownership provide insight into probable sources of impairment, they are presented in this section for each of stream reaches. In addition, the 2004-2006 Integrated §303(d)/§305(b) listings within the Red River watershed are discussed (NMED/SWQB 2004a).

## 3.1 Red River

The headwaters of the 187 $mi^2$ Red River watershed originate in the Sangre de Cristo Range. The Red River has several perennial and ephemeral tributaries. As presented in Figure 2.2, land ownership is approximately 83% USFS, 8% Private, 4% BLM, 0.1% State, and <0.1% Tribal. Land use/land cover includes approximately 78% forest, 10% grassland, 8% shrubland, 2.5% mining, 0.5% agriculture, 0.4% built-up land, 0.3% barren land, and 0.05% water (Figure 2.1). The geology of the Red River watershed is predominantly comprised of Precambrian igneous and metamorphic basement rocks and Tertiary volcanic intrusives (Figure 2.3, see Section 2.2 for a more detailed description of the Red River Watershed geology).

**Photo 3.1 Red River below Molycorp Mine**

The Red River was divided into two assessment units (AUs). SWQB established several stations in each AU. Data from these stations were combined with readily available data from other sources that met quality control objectives, and assessed using established assessment protocols to determine whether or not designated uses were being met. As a result, the Red River (Rio

Grande to Placer Creek) was included on the 2004-2006 Integrated CWA §303(d)/§305(b) list for aluminum, and "sediment and water bioassays – chronic toxicity", and the Red River (Placer Creek to Headwaters) was included on the 2004-2006 Integrated CWA §303(d)/§305(b) list for aluminum (NMED/SWQB 2004a). The chronic aluminum TMDLs for both AUs will be prepared after a segment specific chronic aluminum is developed for the Red River. No TMDLs have previously been established for the Red River. Therefore, TMDLs were developed for inclusion in this document for the following assessment unit:

- ***Acute Aluminum***: Red River (Rio Grande to Placer Creek)

## 3.2 Bitter Creek

According to available Geographic Information System (GIS) coverages, the Bitter Creek watershed is approximately 10.6 $mi^2$ and there are no perennial tributaries or named ephemeral drainages along Bitter Creek. As represented in Figure 2.2, land ownership is approximately 97% USFS and 3% Private. Land use includes approximately 84% forest, 9% shrubland, 7% grassland, <1% commercial, <1% residential, and <1% water (Figure 2.1). The geology of the Bitter Creek watershed is consistent with the middle/upper portions of the Red River Watershed (Figure 2.3), and is comprised mainly of Precambrian igneous and metamorphic basement rocks and Tertiary volcanic intrusives. The lower portion of the canyon has an area with hydrothermal scars and a large associated debris apron which is contributing acid rock drainage and sediment to Bitter Creek. There were 20 historical mine sites identified within the Bitter Creek drainage *Preliminary Assessment/Site Inspection Bitter Creek Watershed* (Ecology and Environment, Inc. 2002a).

**Photo 3.2 Bitter Creek near the Headwaters**

One AU was established for Bitter Creek with a sampling station upstream of the confluence with the Red River (Figure 2.1). Data from this station was assessed using established

assessment protocols to determine whether or not designated uses were being met. As a result, Bitter Creek (Red River to Headwaters) was included on the 2004-2006 Integrated CWA §303(d)/§305(b) list for sedimentation/siltation (stream bottom deposits) and aluminum. No TMDLs have previously been established for this AU. Therefore, the following TMDLs were developed for this document:

- ***Acute Aluminum***: Bitter Creek (Red River to Headwater)
- ***Sedimentation/siltation***: Bitter Creek (Red River to Headwater)

## 3.3 Pioneer Creek

According to available GIS coverages, the Pioneer Creek watershed is approximately 5.3 $mi^2$ and there are no perennial tributaries or named ephemeral drainages along Pioneer Creek. As represented in Figure 2.2, land ownership is 92% USFS and 8% Private. Land use includes approximately 90% forest, 5.3% grassland, 4.8% shrubland, <1% commercial, and <1% residential (Figure 2.1). The geology of the Pioneer Creek watershed is consistent with the middle/upper portions of the Red River Watershed (Figure 2.3), and is comprised mainly of Precambrian igneous and metamorphic basement rocks and Tertiary volcanic intrusives. There were 24 historical mines identified in the *Preliminary Assessment/Site Inspection Pioneer Creek Watershed* (Ecology and Environment, Inc. 2002b). Potential impacts from these historical mines could include erosion of soil and mining waste and sedimentation of the creek.

Pioneer Creek was moved from its natural channel on the Red River floodplain and extended west along the valley slope. This extension of the channel has decreased the stream's gradient, reducing stream power, and caused the deposition of large amounts of sediment that would otherwise have flushed to the Red River. The loss of hydrologic competency brought about by this excess deposition causes Pioneer Creek to flood frequently; endangering the homes built near the new channel. These sediment deposits significantly contribute to the turbidity problem in Pioneer Creek.

One AU was established for Pioneer Creek with a sampling station near the confluence with Red River (Figure 2.1). Data from this station was assessed using established assessment protocols to determine whether or not designated uses were being met. As a result, Pioneer Creek (Red River to Headwaters) was included on the 2004-2006 Integrated CWA §303(d)/§305(b) list for turbidity. No TMDLs have previously been established for this AU. Therefore, the following TMDL was developed for this document:

- ***Turbidity***: Pioneer Creek (Red River to Headwater)

**Photo 3.3 Pioneer Creek in the Town of Red River (10/20/05)**

## 3.4 Placer Creek

According to available GIS coverages, the Placer Creek watershed is approximately 2.0 $mi^2$ and there are no perennial tributaries or named ephemeral drainages along Placer Creek. As represented in Figure 2.2, land ownership is 92% USFS and 8% Private. Land use includes approximately 93% forest, 4.5% shrubland, and 2.6% grassland (Figure 2.1). The geology of the Placer Creek watershed is consistent with the middle/upper portions of the Red River Watershed (Figure 2.3), and is comprised mainly of Precambrian igneous and metamorphic basement rocks and Tertiary volcanic intrusives. Historical mineral exploration is visible throughout the Placer Creek watershed in the form of waste piles, adits/shafts, trails, and remnants of structures such as cabins and mills. There were 17 historical mines identified in the *Preliminary Assessment/Site Inspection Placer Creek Watershed* (Ecology and Environment, Inc. 2002c).

One AU was established for Placer Creek with a sampling station near the confluence with the Red River (Figure 2.1). Data from this station was assessed using established assessment protocols to determine whether or not designated uses were being met. As a result, Placer Creek (Red River to Headwaters) was included on the 2004-2006 Integrated CWA §303(d)/§305(b) list for aluminum. No TMDLs have previously been established for this AU. Therefore, the following TMDL was developed for this document:

- ***Acute Aluminum***: Placer Creek (Red River to Headwater)

**Photo 3.4 Placer Creek near the Confluence with the Red River (10/20/05)**