Mountain Studies Institute
SAN JUAN MOUNTAINS, COLORADO

# Gold King Mine Release - Benthic Macroinvertebrate Report Summary

The Gold King Mine release occurred on August 5th, 2015 and caused mine wastewater to enter Cement Creek and ultimately the Animas and San Juan Rivers. The release caused a severe, but brief spike in metal concentrations in the Animas River, raising concerns about potential impacts to aquatic life. The incident occurred in a highly mineralized zone of the San Juan Mountains where high metal concentrations from natural and mine-related sources have contributed to a long history of degraded water quality in the Animas River watershed.

Mountain Studies Institute (MSI) surveyed benthic macroinvertebrate (BMI) populations along the Animas River from Silverton to Durango and analyzed potential impacts to these populations at two temporal scales. First, we assessed the immediate survival of BMI populations at three locations on the Animas River. Then, using data from fifteen locations in the Animas River watershed, we compared observations of BMI populations from the fall of 2014, prior to the Gold King Mine release, to observations from the fall of 2015, approximately two months after the release.

Our objective was to determine whether BMI populations in the Animas River were impacted by the Gold King Mine release. Specifically, we investigated: 1) whether the Gold King Mine release negatively affected BMI community composition; 2) whether species known to be sensitive to metal contamination were impacted as a result of the Gold King Mine release; and 3) whether the Gold King Mine release caused a change in metal concentrations in the tissue of BMIs.

Our data suggest:

- During the Gold King Mine release, aluminum concentrations in the Animas River in Durango surpassed the Colorado Department of Health and Environment (CDPHE) acute (short-term) water quality standard for aquatic life (MSI 2016). However, BMI populations in the Animas River from Silverton to Durango appear to have largely survived exposure to high metal concentrations associated with the Gold King Mine release. Additionally, Colorado Parks and Wildlife data indicate that fish populations in the Animas River were not impacted by the Gold King Mine release (White 2016).

- We found no evidence that BMI families known to be sensitive to metal contamination (Heptageniidae, Ephemerellidae, and Taeniopterygidae) were extirpated as a result of the Gold King Mine release.

- BMI community composition and structure do not appear to have been altered by the Gold King Mine release. We found no statistically significant difference in any BMI community health metric between 2014 and 2015, indicating that the Gold King Mine release did not consistently alter BMI community structure at surveyed sites in the Animas River.

- The Gold King Mine release does not appear to have caused an increase in the macroinvertebrate tissue concentration of most metals and minerals. However, copper tissue concentrations were higher in 2015 than in 2014 at all sites affected by the Gold King Mine release. Additionally, at a sampling site below Silverton on the Animas River (site A72), aluminum and iron tissue concentrations were higher in 2015 than in 2014.

In conclusion, the 2015 BMI data do not indicate that there were substantial impacts to BMI communities from the Gold King release, with the exception of elevated tissue concentrations of copper, aluminum, and iron at some sites. However, these findings should be interpreted within the historical context of metal contamination within the Animas River watershed. BMI communities have long been stressed by long-term exposure to mine-related impacts and other factors prior to the Gold King Mine release (EPA 2015). BMI species that are most sensitive to metal contamination (Heptageniidae, Ephemerellidae, and Taeniopterygidae) are either absent or occur at a low diversity in large portions of the Animas River, which reduces the ability to detect an impact from the Gold King Mine release. It is possible that we could have seen a greater impact to aquatic life from the Gold King Mine release in parts of the Animas River if the resident aquatic life had not already been impacted by long-term exposure to metals. Although we found no evidence of lethal impacts to aquatic life, sub-lethal impacts, such as reduced reproduction potential are possible and should be examined by assessing the survival of subsequent generations of fish and BMIs.