

# Bonita Peak Mining District

## Aquatic Baseline Ecological Risk Assessment

March 2019



### Background

The Bonita Peak Mining District (BMPD) consists of 48 historic mines or mining-related source areas within the Mineral Creek, Cement Creek, and Upper Animas River drainages, near Silverton, Colorado. These drainages join to form the Animas River, which is used for drinking water, recreation, and agricultural purposes. Mining-related activities have resulted in the generation of various types of solid wastes, such as tailings and waste rock piles. In addition, mine impacted water discharged from mine adits, as well as water that is contaminated by solid waste, can enter nearby creeks. BMPD also contains sources of naturally occurring metal in addition to metal from mine-related activities. Metals and low pH are the contaminants of potential ecological concern at the site.

### Introduction

The Environmental Protection Agency (EPA) conducted an Aquatic Baseline Ecological Risk Assessment (Aquatic BERA) to characterize exposure and risks under current conditions in the BPMD waterways to:

- Benthic macroinvertebrates (BMIs) (small organisms that live in or on the bottom sediments of rivers and streams) that are exposed to sediments and surface water.
- Fish and amphibians that are exposed to surface water.
- Wildlife that eat or drink surface water, sediments and food from the waterways.

### Assessment

The Aquatic BERA evaluated 27 exposure units (EUs) throughout the area. The EUs are sections of streams/tributaries that are chosen to represent unique local exposure conditions bracketed by major tributaries or other environmental features that could affect exposure. This Aquatic BERA focused on assessing risks in aquatic habitats located in the Animas River watershed upgradient from Silverton, the entire Mineral Creek watershed, and in an approximate 20-mile lower Animas River reach just above and through the City of Durango (Durango Reach). Risk characterization used exposure data obtained from sediment, pore water, surface water, and BMI and fish tissue samples collected from BPMD and Durango Reach EUs from spring 2009 to fall 2017.

This risk assessment built on the Upper Animas Baseline Ecologic Risk Assessment (Upper Animas BERA), which was drafted in April 2015. The Upper Animas BERA focused on aquatic habitats located in the Animas River from just upstream of Silverton downgradient to Bakers Bridge (the approximate beginning of the Durango Reach), and the mouths of Cement Creek, and Mineral Creek. The Upper Animas BERA has been finalized and attached to the current Aquatic BERA to provide continuous characterization of aquatic risks related to mine-related contamination from the headwaters of the BPMD to the city of Durango.

### Lines of Evidence

Analyses included predictive exposure/effects calculations, laboratory toxicity tests, and aquatic community and habitat field studies to assess risk to various aquatic groups. Comparison of concentrations of metals measured in EU-specific site media (i.e. waters, stream sediments, and organism tissues) with established ecological effects

thresholds (e.g. water quality criteria) allowed EPA to assess the potential impacts of individual metals and pH to aquatic communities. Toxicity testing allowed EPA to assess risk associated with complex mixtures of metals found in BPMD sediments and surface water to sensitive test organisms under controlled conditions. Finally, field studies allowed EPA to measure the health and habitat quality of current aquatic communities in each area.

## Results and Conclusions

### Benthic Macroinvertebrates

Community surveys of BMIs showed that many EUs within the BPMD watershed were impaired as determined by an aquatic life assessment tool created by the State of Colorado. BMIs are likely affected by high metals concentrations in both the sediments and the waters that these organisms are exposed to in the BPMD. BMI habitat was found to vary widely due to a large geographic area and variation in elevation across the many EUs.

### Fish

Evidence collected to evaluate potential negative effects on fish included: comparison of surface water metals concentrations to known toxic thresholds, tests exposing young trout to surface waters collected from EUs, and assessment of the presence/absence of fish and quality of existing fish habitats. The evidence gathered suggests that large sections of the BPMD do not currently support trout in large part due to toxic levels of metals and low pHs routinely measured in many EUs. While abandoned mines play a significant role in limiting fisheries within the BPMD, it should be noted that portions of the greater Animas River watershed may have never supported aquatic life communities prior to mining due to natural sources of acid rock drainage.

### Wildlife

Risks to potential aquatic-dependent wildlife communities foraging in the BPMD were evaluated by making conservative predictions of cumulative metal uptake through consumed items (water, food, and incidental sediment) and comparing those to uptake levels causing harmful effects. Based on this assessment, the highest risk to aquatic-dependent wildlife living in the BPMD area is lead exposure. Assessment of risk to additional wildlife species (non aquatic-dependent) is forthcoming in a separate terrestrial ecological risk assessment.

### Summary

The Aquatic BERA assesses community-level risks for invertebrates, fish and amphibians, and species-specific risks for five representative aquatic-dependent wildlife species. Together, the evidence gathered suggests that aquatic ecological receptors in many portions of the BPMD are at risk from low pH and elevated metal concentrations. The greatest risks to aquatic community receptors occurred in reaches that were downgradient from mine features and/or highly mineralized watersheds.

## For more information

- Read the Aquatic BERA here, <https://semspub.epa.gov/src/document/08/1915915>
- Visit the Bonita Peak Mining District Website, [www.epa.gov/superfund/bonita-peak](http://www.epa.gov/superfund/bonita-peak)
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