Geophysical Research Abstracts
Vol. 21, EGU2019-11523, 2019
EGU General Assembly 2019

Metal concentrations in bed sediments and benthic macroinvertebrates, before and after the 2015 Gold King Mine Release (Colorado, USA)

Robert Runkel (1), Daniel Cain (2), and Scott Roberts (3)

(1) United States Geological Survey, Boulder Colorado, United States (runkel@usgs.gov), (2) United States Geological Survey, Menlo Park California, United States (djcain@usgs.gov), (3) Mountain Studies Institute, Durango Colorado, United States (scott@mountainstudies.org)

The 2015 Gold King Mine release sent 3 million gallons of acidic, metal-rich water down Cement Creek and the Animas River in southern Colorado (USA). Assessment of aquatic effects associated with the release is confounded by the fact that numerous mines in the Silverton, Colorado area have impacted receiving waters since the advent of mining in the 1870s. Proper assessment of aquatic effects requires data describing conditions before and after the release, and upstream and downstream of the release point. Herein we present bed sediment, water quality, and macroinvertebrate data that meet these assessment criteria.

Bed sediment samples were collected at two locations on the Animas River, upstream and downstream of Cement Creek, the receiving stream for the release. Sediment sampling was conducted both prior to the release (September 2014) and after (August and October 2015; October 2016; August 2017). Sediments were sieved through a 64-micron nylon mesh to reduce the effect of grain size on sediment metal concentrations. Sieved samples were subsequently decanted, dried, ground with mortar and pestle, acid digested, and analyzed using ICPOES. Bed sediment concentrations of Ag, As, Cu, Pb, and V increased following the release (August and October 2015) and gradually decreased from 2015 to 2017. Concentrations of other elements (Cd, Fe, Mn, Ni, Zn) either decreased or remained relatively unchanged from 2015 to 2017.

Increases in bed sediment copper concentrations are generally consistent with water quality and benthic macroinvertebrate data. With respect to water quality, a 2012 synoptic study indicates that 40% of copper loading in the Animas River below Silverton was attributable to the Gold King Mine, prior to the release. This copper signature is also evidenced by elevated copper concentrations macroinvertebrate tissues collected following the release. Despite these noted increases, the overall effect of the release appears to be minimal in light of long-term, widespread contamination within the watershed. Sediment concentrations for several metals appear to be unaffected, for example, and there were no detectable changes in macroinvertebrate diversity or abundance.