



NONPOINT SOURCE SUCCESS STORY

Arizona

Federal and State Efforts to Clean Up Historical Abandoned Mines in Central Arizona Reduce Copper in Pinto Creek

Waterbody Improved

A 15-mile segment of Pinto Creek in Gila County, Arizona, was designated as impaired for dissolved copper in 1998 on the Clean Water Act (CWA) section 303(d) list of impaired waters. This segment of Pinto Creek flows through Tonto National Forest. Between 2007 and 2022, the Arizona Department of Environmental Quality (ADEQ) and the United States Forest Service (USFS) implemented remedial actions at six abandoned mines that drain into this segment of Pinto Creek. The USFS remediated five abandoned mine sites, and ADEQ remediated one site. Currently, surface water samples in Pinto Creek are meeting water quality standards for dissolved copper.

Problem

Arizona has an estimated over 100,000 abandoned mines across the state. These sites pose public safety risks, and some discharge metals into nearby streams. In 1998, a 15-mile segment of Pinto Creek was listed as impaired for dissolved copper on the CWA section 303(d) list of impaired waters due to drainage from a nearby abandoned mine. This segment of Pinto Creek and the nearby Gibson Mine Tributary are primarily located on the Tonto National Forest land (Figure 1). The woodland and patchy shrubland is home to plants, animals, and a handful of ranches. Undisturbed forest areas provide critical habitat for the endangered Mexican Spotted Owl and the endangered Arizona hedgehog cactus.

Story Highlights

To tackle Arizona's widespread abandoned mine challenge, ADEQ partners with the USFS to collaborate and combine resources. The USFS has remediated five abandoned mine sites along Pinto Creek, including the closure of 10 adits, 12 shafts, and five onsite consolidation cells that hold a total of 8,000 cubic yards of waste rock. The Gibson Mine, which is situated near the Gibson Mine Tributary, was identified as the largest copper source in Pinto Creek and was remediated in phases by ADEQ (Figure 2).

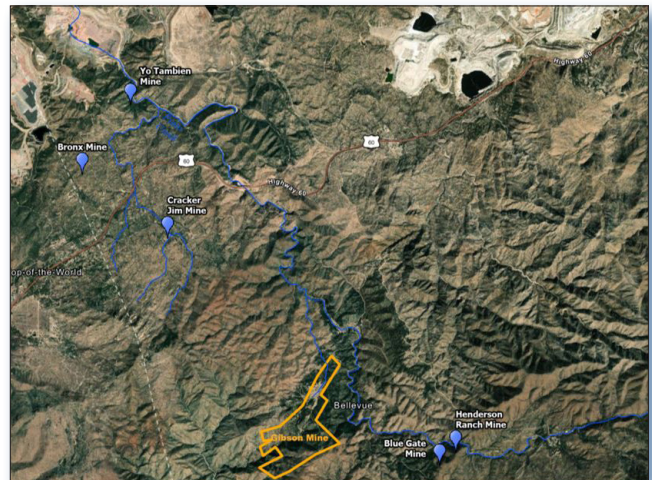


Figure 1. Aerial map of Pinto Creek and surrounding mine sites cleaned up by ADEQ and USFS. Map courtesy of the USFS, Tonto National Forest.

ADEQ's first remediation effort at Gibson Mine in 2007 removed 100,000 tons of mine-impacted soils from the site. This reduced dissolved copper concentrations by 50%, but surface water samples still did not meet dissolved copper water quality standards.

The second remediation effort in 2016 included implementing stormwater controls in which the site was divided into undisturbed and disturbed land areas.

Undisturbed land areas divert clean stormwater to a bypass culvert and into the ephemeral tributary to Pinto Creek. Disturbed land areas channel stormwater to impoundments to be retained on site. These practices reduced dissolved copper concentrations by 75%, but surface water samples still did not meet dissolved copper water quality standards.

The final remediation effort began in October 2022 and consisted of the excavation and on-site consolidation of “hot spot” areas. An x-ray fluorescence site assessment identified elevated concentrations of copper, allowing backfilling of hot spots with clean cover and vegetation. Other efforts included improving a bypass culvert headwall and installing a standpipe to prevent clogging, improving a v-ditch to convey clean stormwater, and installing a turf-reinforced mat to prevent erosion into the copper-rich bedrock.

Results

Surface water samples in Pinto Creek show that the waterbody is meeting water quality standards for dissolved copper (Figure 3). ADEQ is working to remove the Pinto Creek dissolved copper impairment from the CWA section 303(d) list of impaired waters. This

Photo: Arcadis



Figure 2. An aerial photo of the Gibson Mine site during active remediation conducted by ADEQ in 2022.

improvement in the water quality can only be attributed to the efforts of the USFS and ADEQ to identify, prioritize, and remediate discharging abandoned mines in the watershed.

Partners and Funding

Partners involved in Gibson mine remediation efforts include the U.S. Environmental Protection Agency (CWA section 319 nonpoint source funding), the USFS, and private landowners.

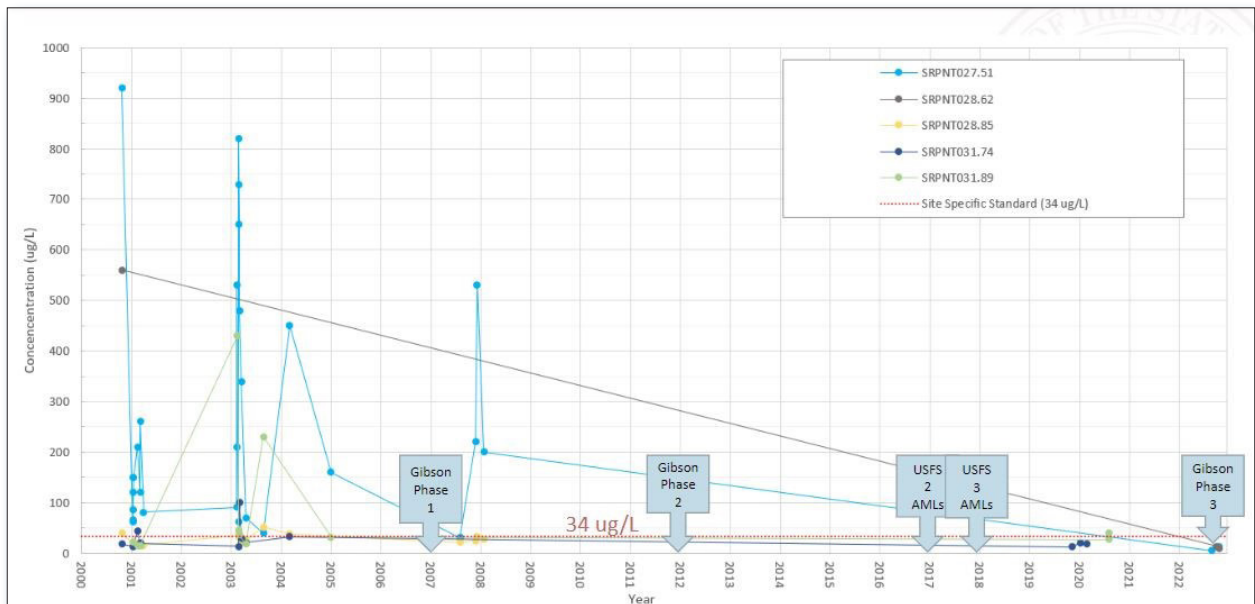


Figure 3. Dissolved copper concentrations in Pinto Creek (2000–2022).



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