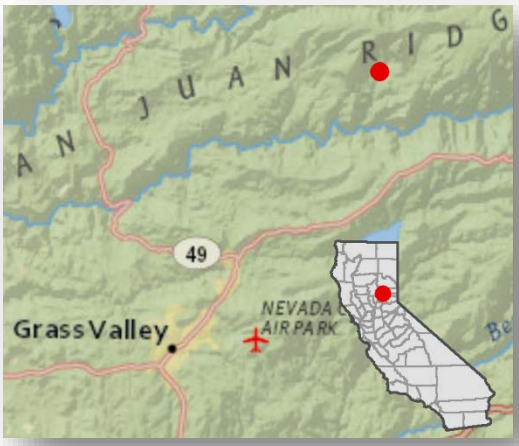
Humbug Creek Watershed Assessment – Malakoff Diggins



Name, Location, and Type of Mine: Malakoff Diggins Hydraulic Gold Mine is located in Malakoff Diggins State Historic Park north-east of Grass Valley, CA.

Project Cost: $600,000 through end of 2015

Remediation/Cleanup Funding Source: Department of Water Resources Proposition 84 grant, Department of Conservation.

Project Partners: The Sierra Fund, California Department of Parks and Recreation, United States Geological Survey, California Department of Conservation, Sonoma State University.

Mine History/Project Background

Located in the Humbug Creek Watershed, Malakoff Diggins is the largest of all of California's hydraulic mines. This type of mine used streams and water cannons to wash away entire mountains and recover the gold within. The main pit grew to as much as 3,000 feet wide and 7,000 feet long, and two tunnels were driven through bedrock to drain it. Hydraulic mining was abruptly curtailed in California in 1884 by the Sawyer Decision, which declared that these mines could no longer discharge massive amounts of damaging sediment into the Sacramento Valley.

Overview of Malakoff Diggins Pit. Photo: Jon Mistchenko, DOC (2014).

Challenges

The mine pit and two connected tunnels, including Hiller Tunnel, discharge sediment and metals (including mercury) into Humbug Creek, which feeds into the Yuba River. The source of the sediment and mercury in the discharge was not well understood, and the Park's historical context and cultural resources would need to be preserved throughout the project.

Remediation/Cleanup Approach

To define the sources of sediment and mercury, an aerial LiDAR scan was conducted and a detailed map of all drainages was created. The sediments in the pit walls were mapped and characterized, and the erosion potential of each is being determined by T-Lidar mapping of highwall erosion sites before and after rainy seasons. Water sampling and sediment characterization, including mineralogical fingerprinting, will be used to further quantify erosion within the pit. Extensive archaeological surveys were conducted to define resources present within the Park. Physical hazards (open vertical mine shafts) have been evaluated and will be mitigated by fencing and trail re-routing in 2016. The project is ongoing, and technical studies and feasibility analyses are scheduled into 2019.

Sediment-laden water discharging from Hiller Tunnel. Photo: Jon Mistchenko, DOC (2015).