

Mercury Contamination in Water and Sediment Related to Historical Gold Mining, Sierra Nevada, CA

C. N. ALPERS¹, E. STUMPNER¹, J. L. ORLANDO¹,
J. A. FLECK¹ AND M. MARVIN-DIPASQUALE²

¹U.S. Geological Survey, California Water Science Center,
Sacramento, CA, USA cnalpers@usgs.gov,
estumpner@usgs.gov, jorlando@usgs.gov,
jafleck@usgs.gov

²U.S. Geological Survey, National Research Program, Menlo
Park, CA, USA mmarvin@usgs.gov

The unregulated use of mercury (Hg) for amalgamation of gold in both hard-rock and hydraulic mining over several decades (mid-1800s through mid-1900s) caused extensive Hg contamination in rivers draining the western slope of the north-central Sierra Nevada, California. Hg-contaminated sediment continues to be transported downstream to San Francisco Bay and the Sacramento-San Joaquin Delta, where methylmercury (MeHg) bioaccumulation has led to wildlife health effects [1]. Human-health advisories regarding consumption of sport fish have been issued both in the Bay-Delta and in Sierra Nevada rivers and reservoirs [2]. As part of a study focused on predicting water-quality impairment related to MeHg bioaccumulation in fish tissue, samples of water and sediment were collected at 28 river sites in the Sierra Nevada during low-flow conditions in late summer / autumn 2011 and 2012. Selected sites represent a wide range of historical gold-mining intensity. Total Hg (THg) and MeHg were determined in water (filtered and particulate) and in sediment (< 2 mm and < 0.063 mm fractions), along with ancillary constituents including trace metals and organic content. Concentrations of THg and organic matter in the < 0.063 mm sediment fraction were greater than those in the < 2 mm fraction by about 10 fold. THg in both sediment fractions showed significant correlation ($p < 0.05$) with density (mines /km²) of historical gold mines in the upstream watershed area.

[1] Ackerman *et al* (2008) *Ecotoxicology* **17**: 103–116 [2]
Calif. OEHHA (2014) <http://oehha.ca.gov/fish/hg/>