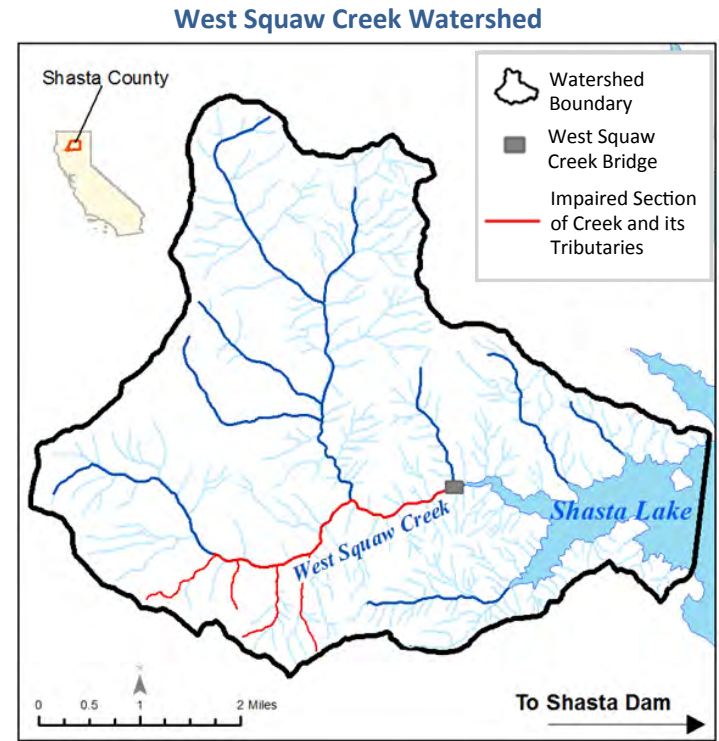


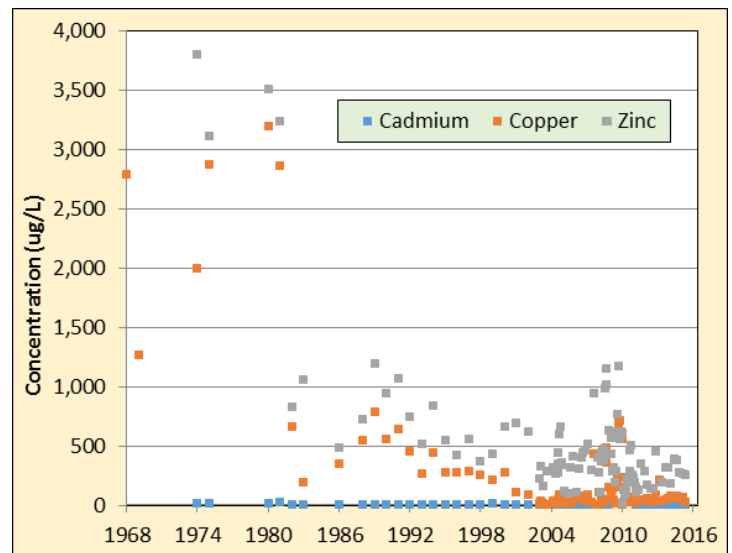
Water Quality Report Card		Cadmium, Copper, and Zinc in West Squaw Creek	
Regional Water Board:	Central Valley, Region 5	STATUS	<input type="checkbox"/> Conditions Improving <input type="checkbox"/> Data Inconclusive <input checked="" type="checkbox"/> Improvement Needed <input type="checkbox"/> Targets Achieved/Water Body Delisted
Beneficial Uses Affected:	WARM, COLD		
Implemented Through:	NPDES Permits, WDR Permits, Cease and Desist Order		
Effective Date:	2002	Pollutant Type:	<input checked="" type="checkbox"/> Point Source <input checked="" type="checkbox"/> Nonpoint Source <input checked="" type="checkbox"/> Legacy
Attainment Date:	To Be Determined	Pollutant Source:	Abandoned Mines

Water Quality Improvement Strategy

West Squaw Creek and its tributaries are located approximately three miles northwest of Shasta Dam, and flow into Shasta Lake, which then flows into the Sacramento River. West Squaw Creek was listed on the 303(d) List in 1990 as impaired for cadmium, copper, zinc, and pH. At least four historic mines (Early Bird, Keystone, Balaklala, and Shasta King) are located in the West Squaw Creek Watershed, with at least 14 associated portals (openings). Discharges of acidic metal-laden waters from these portals and water flowing through waste rock (unprocessed rock that is excavated to access valuable ore) have caused water quality impairments in the watershed. Acid mine drainage (AMD), the outflow of acidic water from mines, was first documented in this watershed in 1940 and is the main source of these metals in the Creek. At that time, average copper loading was estimated in excess of 500 pounds per day. Remediation efforts to reduce AMD impacts began in 1980 and include: bulkhead seals, which are concrete barriers at mine entrance tunnels to block AMD; [anaerobic wetlands](#), where the AMD is neutralized by bacteria in an engineered treatment system; installation of [anoxic limestone drains](#), where the AMD is routed through limestone channels to raise pH; and waste rock consolidation and capping. Most of the remediation projects were completed by 2003 and average metals concentrations have been reduced.



Reduced Metal Concentrations in West Squaw Creek



Metal Concentrations (ug/L) Before and After Remediation in West Squaw Creek

	Average Thru 2003	Average After 2003	Water Quality Objective	Percent Reduction
Cadmium	6.4	2.4	0.22	62
Copper	868	98	5.6	89
Zinc	1157	372	16	68

Water Quality Outcomes

- Major remediation actions have been implemented and completed by the responsible party, Mining Remedial Recovery Company, resulting in significant reductions in both metals concentrations and loadings from the West Squaw Creek Watershed. However, additional improvement is needed to meet water quality objectives.
- The pH measured at the West Squaw Creek Bridge has been trending toward neutral. Despite improvements in water quality, metal concentrations still exceed water quality objectives.
- Next steps include the continued implementation of remediation projects and the monitoring of water quality.