

ABOUT WOLF CREEK

Geography and Biogeography

- The watershed, which encompasses about 78 square miles (~50,000 acres), is almost exclusively in the lower montane zone, with altitudes along the creek's 25-mile length ranging from 3000 feet at the headwaters to approximately 1200 feet at the confluence with the Bear River. Most other Sierran watersheds of at least this size originate at much higher elevations.
- The lower-montane altitude of the watershed means that snow constitutes a small—and declining—proportion of the precipitation falling in the watershed. In this way it models the future of watersheds such as Deer Creek and the Yuba, as the snow pack continues to recede toward the higher elevations.
- The Wolf Creek watershed occupies a narrow, biotically diverse band of elevation between the tule fog of the Central Valley and the alpine cold of the higher elevations. This is the zone where the blue oak and gray pine woodlands of the lower foothills gradually transition into the Ponderosa pine-dominated mixed evergreen forests that characterize the middle elevations of the Sierra Nevada.
- Unlike most other west-slope Sierran streams and rivers (which flow east to west), Wolf Creek flows primarily along a north–south axis. In comparison to east–west streams, this geographic positioning gives much more of the land a southern or partially southern exposure and thus the ability to support the most productive and diverse ecosystems.
- Populations of indigenous people in the Wolf Creek watershed were relatively high because of the land's productivity and biodiversity.
- In most watersheds that include urbanized areas, cities and towns are usually at the bottom end of the watershed, at elevations significantly lower than the head waters. The Wolf Creek watershed is unusual, therefore, in having its major urbanized area (Grass Valley) very close to its sources. This is particularly the case when Wolf Creek and its tributaries are considered as part of the upper portions of the Bear River watershed. Wolf Creek is a major tributary to the Bear River.
- The Bear River flows into the Feather River and then into the Sacramento River, whose waters ultimately flow to the San Francisco Bay

Geology & Soils

- A number of very different rock types underlie the landscape of the watershed, including mafic rocks such as gabbro, ultramafic rocks such as serpentine, granitic rocks such as quartz monzonite, and metavolcanic rocks.
- The different rock types of the watershed lead to different soil types, some of which (such as the soils derived from gabbro and serpentine) are chemically inhospitable to most plants and can support only those species that have evolved a tolerance to these soils. A disproportionate number of these species are sensitive, unusual, or endangered.

Biodiversity

- A relatively large number of rare, sensitive, threatened, and endangered species occur in the watershed. The table below lists many of these species.

Species known or believed to occur in the Wolf Creek watershed that have special status*

Animals	Plants
California spotted owl	Scadden Flat checkerbloom (CA Endangered)
California red-legged frog (Federal Threatened)	Brandegge's clarkia (CNPS listed)
Coast horned lizard (CDFG SC)	Brownish beaked-rush (CNPS listed)
Elderberry beetle	Red-anthered rush (CNPS listed)
Foothill yellow-legged frog (CDFG SC)	Red Hills soaproot (CNPS listed)
Great gray owl	Stebbins's morning-glory (Federal & CA Endangered listed)
Northern Goshawk (CDFG SC)	Follett's monardella (CNPS listed)
Northwestern pond turtle (CDFG SC)	Pine Hill flannelbush (Federal Endangered)
Pacific fisher, Federal Candidate (CDFG SC)	Norris's beard-moss (CNPS listed)
	Elongate copper-moss (CNPS listed)
	Cantelow's lewisia (CNPS listed)
	Butte County fritillary (CNPS listed)
	Bog club-moss (CNPS listed)

* Data from California Natural Diversity Database (CNDDDB)

- The Wolf Creek watershed boasts several good examples of low-altitude meadows, which are rare in the Sierra Nevada. One of these meadows is protected in Empire Mine State Historic Park; another is the large meadow at Loma Rica Ranch that is endangered by development.
- There are a number of plant communities found in the watershed, including: Annual Grassland, Blue Oak Woodland, Blue Oak–Foothill Pine Woodland, Closed Cone Pine–Cypress Woodland, Douglas Fir Forest, Mixed Chaparral, Montane Chaparral, Montane Hardwood Forest, Montane Hardwood–Conifer Forest, Montane Riparian, Ponderosa Pine Forest, Sierran Mixed Conifer Forest, and Wet Meadow.

History

- The Wolf Creek Watershed was home to a large number of indigenous Native American people when the European explorers arrived in California. The Tsi Akim Maidu tribe inhabited Wolf Creek and surrounding environs. These people are thought of today as a hunter/gatherer society, but in fact they practiced a highly effective, minimally perturbing form of proto-agriculture. The Nisenan and Tsi Akim Maidu communities that remain today has not yet gained formal recognition from the state or federal government, but they have gained some local recognition.
- Gold was discovered in the Wolf Creek watershed in what is now Grass Valley one year after the first gold discovery at Sutter's Mill. Subsequently, mines within the watershed became world-renowned for gold production.

Human Impacts

- Within the watershed as a whole, human population densities and land uses vary tremendously. The streams, therefore, range from highly impacted and urbanized to relatively wild and un-impacted. The headwaters of Wolf Creek and South Fork Wolf Creek, almost the entire watershed of South Wolf Creek, and the lower reaches of Wolf Creek all flow through lightly populated areas where land-use regimes tend towards ranching, farming, and forestry. In contrast, several reaches (notably Wolf

Creek in Grass Valley and Rattlesnake Creek in Alta Sierra) flow through urbanized and suburbanized areas, where they acquire pollutants and sediments.

- The Nevada Irrigation District uses Wolf Creek as a water-conveyance channel. One consequence of this fact is that the urban and mining-waste effluents that enter Wolf Creek and its tributaries in and around Grass Valley affect downstream farmers who use NID irrigation water that comes from Wolf Creek.
- Along the lower reach of Wolf Creek south of Grass Valley, the creek slowly recovers (biologically speaking) from the effects of urbanization in Grass Valley.
- The Wolf Creek watershed is the most populated sub-watershed of the Bear River, so it is the most impacted by human activities.
- The Wolf Creek watershed is one of the most heavily mined watersheds in the world, with the greatest concentration of large hard-rock mines of any watershed in California.
- Due to the diversity of the geologic substrata in this watershed, mining here liberated large amounts of a number of different heavy metals and toxins, including iron (and attendant sulfates from pyrites), arsenic, cadmium, chromium, aluminum, antimony, barium, cobalt, thallium, manganese, lead, zinc, and asbestos. Contaminants from the gold-separation processes used include mercury and cyanide. Some of these contaminants are present at high levels in tributaries of Wolf Creek (notably Magenta Drain, but we suspect that other sources exist).
- The mining that took place in the watershed between 1850 and 1950 released enormous amounts of persistent toxic contaminants such as mercury into the watershed, and these contaminants have been deposited into sediments stretching from above Grass Valley to the San Francisco Bay.

Restoration Opportunities

- Wolf Creek historically had a salmon population, and there is currently only one barrier (Camp Far West Reservoir on the Bear River) that isolates the Wolf Creek watershed from the Sacramento River. The potential for restoration of the historic salmon runs is very real, and would make a good focus of an implementation study.
- Despite the history of mining in the watershed, a remarkable biotic and ecological recovery has taken place since the mines closed in the 1950s.
- The reaches of Wolf Creek and South Fork Wolf Creek flowing through the city of Grass Valley offer opportunities for urban creek restoration that could include trails for recreation and transportation and urban re-development. Appropriately designed projects could provide economic and quality-of-life benefits while improving the creek's ecological condition.

Research Opportunities

- Wolf Creek and South Fork Wolf Creek have been heavily impacted by mining, urbanization, and agriculture. In contrast, South Fork Wolf Creek has, as far as we know, escaped many of these impacts. Because these are two main stems of the same watershed and share many of the same soil types and biota, they could be used as a model for studying how mining, urbanization, and other human activities impact Sierran creeks.

- The culverted stretches of Wolf Creek and South Fork Wolf Creek in Grass Valley may act as barriers isolating populations of fish, insects, and other life forms. Whether or not this isolation is resulting in genetic changes in the isolated populations is an interesting topic for research.