

## GOLD



## CALIFORNIA STATE MINERAL

*The accidental discovery of gold in 1848 at Sutter's Mill in Coloma started a bonanza that brought California fame and gave it the title of the "Golden State." The Gold Rush of 1849 and the subsequent influx of settlers led to California becoming the 31st state in 1850.*

**NATURAL OCCURRENCES**

The concentration of gold ore, and the market value of gold determine whether a deposit is a mineable orebody. The highest grade deposits are associated with quartz veins. Gold also occurs as disseminated particles incorporated during magmatic rock formation or during subsequent chemical alteration of the host rock. Primary gold occurrences are termed lode deposits. Mineralized rock and gold-bearing veins release gold particles during the weathering process. Because of its high specific gravity and resistance to weathering, these sedimentary gold particles are easily concentrated by streams and rivers to form placer gold deposits.

**MINING METHODS**

There are three types of gold mining today: underground mining of high-grade lode and placer deposits, dredging of surface placer deposits, and

open-pit mining. A technique called heap leaching is commonly used to remove finely disseminated gold from low-grade ore. In this process, mounds of crushed ore are placed on an impermeable pad and sprayed with a dilute cyanide solution. The cyanide solution percolates through the ore and dissolves fine gold particles. The gold is then electrolytically recovered from solution and poured into ingots. Gold is also a byproduct of sand and gravel production and base metal (copper, lead and zinc) mining.

**GOLD DEPOSITS IN CALIFORNIA**

California's most important gold deposits have been found in the Sierra Nevada, Klamath Mountains and Mojave Desert. Significant deposits have also been developed in the Peninsular and Transverse Ranges and the northern Great Valley. Unmined low-grade deposits occur statewide. In the Coast Ranges, low-grade gold deposits are associated with low-temperature mercury mineralization.

**GOLD PRODUCTION IN CALIFORNIA-2001**

In 2001, California ranked fourth in the United States in gold production. Approximately 449,200 troy ounces were produced — worth about \$122.3 million.

**PROPERTIES AND USES**

*Gold is one of the earliest metals known and used by humans. It resists corrosion and chemical interaction. It will not disintegrate when exposed to oxygen, water, salt, or any other naturally-occurring material. Gold's durability accounts for the almost perfect condition of coins and artifacts fashioned from it thousands of years ago.*

Gold's most important use is in computers, weaponry and aerospace. It is used where consistent, reliable performance under all conditions is essential. The electronics industry has tried to find substitute metals and alloys, but gold's exceptional resistance to corrosion and tarnish is still unequalled.



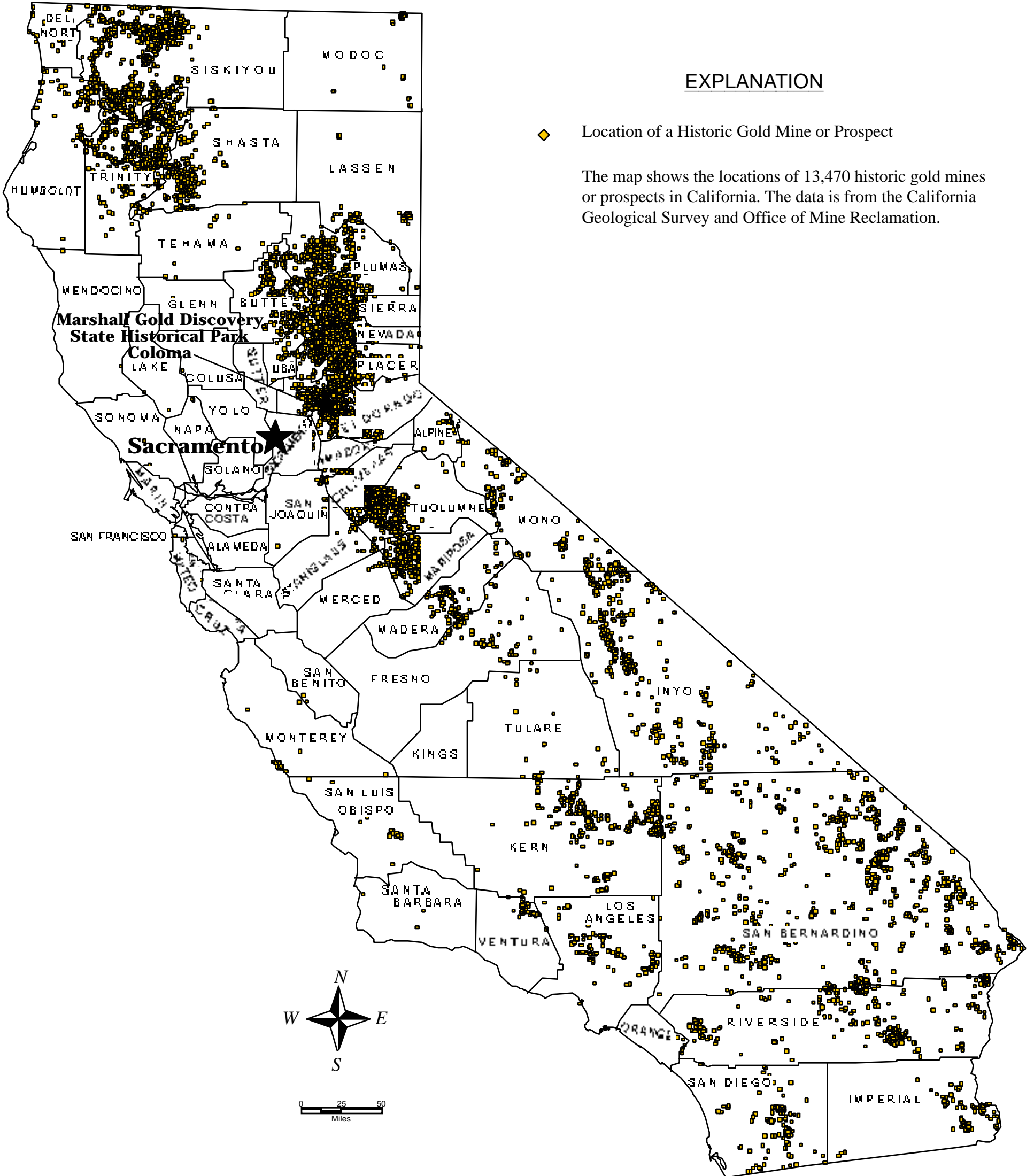
Revised 4/2002

©California Department of Conservation, California Geological Survey, 2002. Reproduction of this CGS Note for classroom or public education purposes is encouraged and does not require written permission. However, please cite California Geological Survey as source.

The Department of Conservation makes no warranties as to the suitability of this product for any particular purpose.

♻️ Printed with soy ink on recycled paper.

# HISTORIC CALIFORNIA GOLD MINES



To learn more about GOLD, visit our California Geological Survey Library in Sacramento.  
**California Geological Survey Library**  
 14th Floor  
 801 K Street, MS 14-34  
 Sacramento, CA 95814-3532  
 Open Monday-Friday 8am-5pm (closed on state holidays)  
 (916) 327-1850

Visit the California State Mining and Mineral Museum in Mariposa, along historic Highway 49.  
 P.O. Box 1192  
 Mariposa, CA 95338  
 (209) 742-7625



Two-inch piece of crystallized gold, Mariposa County. Photo by Jim Spriggs.

## GOLD FACTS

Chemical symbol: Au

Atomic number: 79

Atomic weight: 196.967

Specific gravity: 19.3 (Twice as heavy as lead; 1 cubic foot weighs over half a ton.)

Hardness: 2.5 to 3 on the Mohs hardness scale

Tensile strength: 19,000 pounds per square inch

Melting point: 1,945°F

Boiling point: 5,378°F

- Face centered-cubic crystalline structure.
- Most malleable and ductile of all metals.
- Inert, therefore does not corrode. (Referred to as a noble metal.)
- Good conductor of electricity.
- One ounce of gold can be stretched into a wire more than 40 miles long.
- Gold can be worked into a layer measuring 1 millionth of an inch.
- There are certain produced acid and alkaline compounds that will dissolve gold. The best known is *aqua regia*, a potent combination of hydrochloric and nitric acids.

## Selected Gold-Related Publications of the California Geological Survey

- CD98-001 *California Gold Mines: A Sesquicentennial Photograph Collection on CD-ROM*. 1998
- B193 *Gold Districts of California, Sesquicentennial Edition: California Gold Discovery to Statehood* (includes new mine list). Scale 1:1,000,000. 1998
- MM009 *Map of California Historic Gold Mines. The California Gold Discovery to Statehood Sesquicentennial (1998-2000) Edition*. Scale 1:1,500,000. 1998
- *The Elephant as They Saw It: A Collection of Contemporary Pictures and Statements on Gold Mining in California (1500-1860)*. 1997
- SP098 *Fluvial Geomorphology and River-Gravel Mining: A Guide for Planners, Case Studies Included*. 1990
- SP103 *Mines and Mineral Producers Active in California (1997-98)*. Scale 1:500,000. 1999
- SP034 *Geology of Placer Deposits*. 1970.
- SP041 *Basic Placer Mining*. 1946
- SP087 *Placer Gold Recovery Methods*. 1986

To order one of these publications (or any other California Geological Survey publication) call 916-445-6199.

Map compilation by Les G. Youngs. Graphics by Dinah D. Maldonado, California Geological Survey.

## Offices of the California Geological Survey

### Publications and Information Office

801 K Street, MS 14-33  
Sacramento, CA 95814-3532  
(916) 445-5716

### Southern California Regional Office

655 South Hope Street, Suite 700  
Los Angeles, CA 90017-3231  
(213) 239-0878

### Bay Area Regional Office

185 Berry Street, Suite 210  
San Francisco, CA 94107-1728  
(415) 904-7707

[www.conservation.ca.gov](http://www.conservation.ca.gov)

THE RESOURCES AGENCY  
MARY NICHOLS  
SECRETARY FOR RESOURCES

STATE OF CALIFORNIA  
GRAY DAVIS  
GOVERNOR

DEPARTMENT OF CONSERVATION  
DARRYL YOUNG  
DIRECTOR