



Base from U.S. Geological Survey
Emigrant Gap, Donner Pass, 1955;
Colfax, Duncan Peak, 1952; Granite
Chief, 1953

Geology from D.S. Harwood, 1980



EXPLANATION

<p>Tv Volcanic rocks</p> <p>KJg Granodiorite and related granitic rocks</p> <p>Jmp Jmi Mafic pyroclastic rocks Mafic intrusive rocks</p> <p>Mzsp Serpentine</p> <p>Jsc Sailor Canyon Formation</p> <p>Tl Limestone and chert breccia</p> <p>MzPzv Greenstone and minor slate</p> <p>PCp Intermediate to mafic pyroclastic rocks</p> <p>Pcc Chert, chert conglomerate, and minor pellic rock</p> <p>Ss Shoo Fly Formation</p>	<p>CRETACEOUS TERTIARY AND JURASSIC</p> <p>JURASSIC</p> <p>TRIASSIC(?)</p> <p>PERMIAN OR CARBONIFEROUS</p> <p>SILURIAN</p>	<p>Area of historic lode gold and silver production with mineral resource potential in those commodities</p> <p>Area of historic chrome production with chromic resource potential</p> <p>Area of gold-bearing placer deposits</p> <p>Contact</p> <p>Fault</p> <p>Gold mine or prospect</p> <p>Chrome mine or prospect</p>
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STUDIES RELATED TO WILDERNESS

The Wilderness Act (Public Law 88-577, September 3, 1964) and related Acts require the U.S. Geological Survey and the U.S. Bureau of Mines to survey certain areas of Federal lands to determine their mineral resource potential. Results must be made available to the public and be submitted to the President and the Congress. This report evaluates the mineral resource potential of the North Fork of the American River Wilderness Study Area, Tahoe National Forest, Placer County, California. This area was classified as a further planning area (5-262) in the Second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service in January 1979.

MINERAL RESOURCE POTENTIAL SUMMARY

Total estimated resources of the study area, shown in Table 1, are about 7.9 million tons (7.2 million metric tons) of gold-bearing material in and near five lode mines, and 7.6 million cubic yd (5.7 million cubic m) in placer deposits. Approximately 1.4 million tons (1.3 million metric tons) of the lode resources averaging from 0.04 to 0.22 troy oz per ton (1.4 to 7.5 grams gold per metric ton) are at the Rawhide, Southern Cross, and Black Hawk mines in the Humbug area. These mines are part of a more-or-less continuous mineralized zone that has an estimated additional 6.0 million tons (5.4 million metric tons) of resources averaging about 0.10 troy oz per ton (3.4 grams gold per ton) in the area between the mines. Approximately 7.5 million cubic yd (5.7 million cubic m) of gold-bearing placer resources are in benches and terraces along the river. Gold values range from \$0.04 to \$4.22 per cubic yd (\$0.05 to \$5.52 per cubic meter) in fifteen bench and terrace deposits, calculated at \$500 per troy oz, \$16.08 per gram.

GEOLOGY

The proposed wilderness area is located in the northern part of the Sierra Nevada, a faulted and westward-titled range extending nearly the length of eastern California. The eastern slope of the range is fault controlled and precipitous, whereas the western slope is less steep but deeply incised by major river systems that produce generally parallel, west-trending deep canyons interspersed with relatively flat-topped interfluvial capping in the northern Sierra by Tertiary volcanic rocks. The canyon of the North Fork of the American River exposes a wide variety of metamorphosed sedimentary and volcanic rocks of Paleozoic and Mesozoic age that are intruded by granitic rocks of the Sierra Nevada batholith in the eastern part of the area. These rocks have been described by Harwood (1980). Granitic rocks of the batholith dominate the Sierra Nevada to the south where they extend well into the western foothills of the range. Metamorphic rocks, like those in the study area, dominate the range to the north and form the framework for small scattered granitic plutons.

GEOCHEMICAL STUDIES

The results of a geochemical study of grab samples of stream sediment and panned concentrates of stream sediment are given by Harwood (1981). That geochemical study failed to identify any new ground of potentially favorable mineralized areas. The geochemical survey did show gold anomalies in the Humbug area and chromium anomalies in the streams, draining the serpentine body that underlies the Green Valley area. Gold was detected in most of the samples from the Humbug area in Humbug Canyon and from the eastern part of that area near the Marris mine. Silver was detected in the stream-sediment samples from drainages that cross the lens of Triassic(?) limestone in the Snow Mountain area.

AEROMAGNETIC INTERPRETATION

In the Humbug area a magnetic lineament is parallel to the Rawhide-Pioneer zone of quartz veins that has in the past been mined for gold and silver. The Rawhide-Pioneer zone contains the Rawhide, Black Hawk, Southern Cross, and Pioneer mines, all of which were major gold producers.

The zone is associated with hydrothermal alteration and that extends pyrite and is also associated with a local linear magnetic low that extends entirely across the wilderness study area. The magnetic interpretation supports the conclusion that substantial inferred gold resources may be located along the Rawhide-Pioneer zone within the wilderness study area.

In the Snow Mountain area three stippled regions on the map show those areas containing gold and silver in quartz veins. The three areas are all located on the sides of prominent subcircular magnetic anomalies, 1 to 2

mi (2 to 3 km) in diameter, that are interpreted as caused by concealed plutonic rocks of the Sierra Nevada batholith. These inferred stocks offer an explanation for the presence of the mineral deposits, which are commonly associated with the top of stocks. As yet undiscovered areas of mineralization may be associated at depth with these subcircular magnetic anomalies.

In the Green Valley area the magnetic data do not appear to provide any information concerning the location of possible additional chromite deposits other than to identify the area of serpentine.

MINERAL RESOURCES

Because the study area covers a number of mining districts, some known by several names, this report divides the study area into three geographic subareas, shown on the map as the Green Valley, Humbug, and Snow Mountain. These geographic subareas are discussed below in decreasing order of their mineral resource potential.

Humbug Area

The Humbug area extends eastward along the North Fork of the American River from Euche Bar to the Marris mine and includes the lower part of the North Fork of the North Fork of the American River. This area has the greatest historic production of gold and silver and it also contains the most gold resources in the wilderness study area.

Since 1866, about 450 lode and 250 placer claims and relocations have been located in the Humbug area. According to Bureau of Mines mineral production records and other published sources, between the late 1800's and 1940 lode and placer mines in the Humbug area produced approximately 39,000 troy oz (1,200,000 grams) of gold, 4,000 troy oz (120,000 grams) of silver and 19,000 lb (8,600 kg) of copper. More than 85 percent of the gold and silver was produced at the Rawhide mine. In addition, the Pioneer mine, which is located within the Humbug area, but is just outside the proposed wilderness area boundary, produced 50,000 troy oz (1,600,000 grams) of gold and 9,000 troy oz (280,000 grams) of silver between 1889 and 1922.

Bedrock in the Humbug area is interbedded quartzite and slate of the Shoo Fly Formation (see Harwood, 1980, for detailed description). Within the north-northwest-trending zone between the Pioneer and Rawhide mines, rocks of the Shoo Fly are altered, sheared, and injected by scattered quartz veins of variable thickness. Quartz veins and country rock within the altered zone contain disseminated pyrite, pyrrhotite, and arsenopyrite. Stream-sediment samples from Humbug Canyon and from drainages south of the Marris mine contain detectable gold and silver and anomalous concentrations of arsenic, zinc, and lead (Harwood, 1981).

The Rawhide, Black Hawk, Southern Cross, and Pioneer mines lie along a north-northwest-trending aeromagnetic low that apparently reflects alteration of the Shoo Fly within the zone of disseminated sulfide minerals and gold-bearing quartz veins. The magnetic low and, by inference, the alteration and associated mineral resources, extend 1.2 mi (2 km) outside the wilderness study area north of the Rawhide mine.

The mineral resource potential of the Humbug area is high based on its historic production, tightly-grouped geochemical anomalies, and pronounced linear aeromagnetic expression of the Rawhide-Pioneer zone of alteration and mineralized rock. It is estimated that 1.4 million tons (1.3 million metric tons) of lode resources averaging between 0.04 to 0.22 troy oz per ton (1.4 to 7.5 grams per metric ton) of gold occur at and near the Rawhide, Black Hawk, and Southern Cross mines. It is possible that as much as an additional 5 million tons (4.4 million metric tons) of undiscovered resources averaging about 0.10 troy oz per ton (3.4 grams per ton) of gold occur in the zone of mineralized rock between the Rawhide and Pioneer mines. Bench gravel contains about 500,000 cubic yd (400,000 cubic m) of gold-bearing material. Gold values at six localities range from \$0.16 to \$4.22 per cubic yd (\$0.21 to \$5.52 per cubic m), calculated at \$500 per troy oz (\$16.08 per gram).

Snow Mountain Area

The Snow Mountain area includes all of the wilderness study area east of the Marris mine. Since the 1850's approximately 450 lode and 500 placer claims and relocations have been recorded in the Snow Mountain area.

Bureau of Mines production records show that 5,000 troy oz (160,000 grams) of gold, 730 troy oz (22,700 grams) of silver, and 480 lbs (220 kg) of copper have been produced from lode deposits primarily at the Lost Emigrant, La Trinidad, and Wubena mines. Recorded placer production is 340 troy oz (10,600 grams) of gold from Tadpole Creek, but actual placer production was probably much higher.

The mines in the area occur in either pyritic slate and calcareous graywacke of the Jurassic Sailor Canyon Formation or in unnamed metamorphosed mafic pyroclastic and intrusive rocks that occur east and stratigraphically above the Sailor Canyon Formation. Gold production was from quartz veins, some of which are associated with small dikes of granodiorite such as at La Trinidad mine.

Stream-sediment samples from Sailor Canyon and New York Canyon contain anomalous concentrations of arsenic, lead, zinc, and copper related to the mineral deposit at La Trinidad mine in Sailor Canyon and a possible extension of that zone of mineralized rock into New York Canyon. Three widely separated stream-sediment samples in the area contained detectable gold, and two other samples contained silver, but the low concentration of these elements and wide dispersion of the samples do not point to a potential target, but rather suggest these metals are disseminated widely in the rocks of the area. Pyritic slate from the Sailor Canyon Formation, for example, contained 0.2 ppm (parts per million) silver, 250 ppm zinc, and 70 ppm copper.

La Trinidad mine, the Walker and Wildcat Canyon prospects, and the Wubena and Lost Emigrant mines are located on the sides of prominent subcircular magnetic anomalies, 1 to 2 mi (2 to 3 km) in diameter, that are interpreted to be caused by concealed plutonic rocks of the Sierra Nevada batholith (Harwood, 1980; Section 8-59). This spatial relationship suggests that concentrations of metals in this area occur within aureoles above plutonic bodies of the batholith; a conclusion strengthened by the association of a granodiorite dike and gold-bearing quartz veins at La Trinidad mine.

Based on moderate historic production and the absence of diagnostic geochemical anomalies, except near existing mines, we consider the mineral resource potential of the Snow Mountain area to be moderate. Lost Emigrant and La Trinidad mines have an estimated 270,000 tons (240,000 metric tons) and 150,000 tons (140,000 metric tons) of gold resources with an average grade of 0.27 troy oz per ton (8.3 grams per metric ton) and 0.17 troy oz per ton (5.8 grams per metric ton), respectively. Placer deposits in six benches and terraces contain about 4 million cubic yd (3 million cubic m) of gold-bearing gravel. Weighted averages of samples from these deposits range in value from \$0.04 to \$4.08 per cubic yd (\$0.05 to \$5.34 per cubic m), calculated at \$500 per troy oz (\$16.08 per gram).

Green Valley Area

The Green Valley area extends from Euche Bar to the western boundary of the study area. It has a low resource potential for chrome. Since 1866, 200 lode and 150 placer claims and relocations have been recorded in this area. Chromite deposits in and near the area produced about 1,400 tons (900 metric tons) of ore during the two World Wars with production from the Beat, North Fork Chrome, Jumbo, Lucky Strike, Dunbar Lease, and Scott mines in decreasing order of quantity.

The area is underlain by highly sheared serpentinite that contains disseminated magnetite and chromite and scattered small stringers and pods of chromite containing as much as 44 percent Cr₂O₃. There is no indication that the serpentinite body contains any greater concentration of chromite at depth than that found at and near the surface. Based on past production, therefore, the chrome resource potential is considered to be low in the Green Valley area.

Green Valley area gold resources, in three benches around Snakehead Point, total approximately 3 million cubic yd (2 million cubic m) with values ranging from \$0.40 - \$0.70 per cubic yd (\$0.52 to \$0.92 per cubic m), calculated at \$500 per troy oz (\$16.08 per gram).

REFERENCES CITED

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MINERAL RESOURCE POTENTIAL MAP OF THE NORTH FORK OF THE AMERICAN RIVER WILDERNESS STUDY AREA (RARE II NO.5-262), PLACER COUNTY, CALIFORNIA

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