MINERAL RESOURCE POTENTIAL OF THE BALD ROCK AND MIDDLE FORK FEATHER RIVER ROADLESS AREAS, BUTTE AND PLUMAS COUNTIES, CALIFORNIA

SUMMARY REPORT

By

Martin L. Sorensen and Andrew Griscom
U.S. Geological Survey

and

Martin D. Conyac, Alan R. Buehler, Donald E. Graham, and Thomas M. Sweeney
U.S. Bureau of Mines

STUDIES RELATED TO WILDERNESS

Under the provisions of the Wilderness Act (Public Law 88-577, September 3, 1964) and related acts, the U.S. Geological Survey and the U.S. Bureau of Mines have been conducting mineral surveys of wilderness and primitive areas. Areas officially designated as "wilderness," "wild," or "canoe" when the act was passed were incorporated into the National Wilderness Preservation System, and some of them are presently being studied. The act provided that areas under consideration for wilderness designation should be studied for suitability for incorporation into the Wilderness System. The mineral surveys constitute one aspect of the suitability studies. The act directs that the results of such surveys are to be made available to the public and be submitted to the President and the Congress. This report discusses the results of a mineral resource survey of the Bald Rock (5160) and Middle Fork Feather River (5167) Roadless Areas, Plumas National Forest, Butte and Plumas Counties, California. The Bald Rock and Middle Fork Feather River Roadless Areas were classified as further planning areas during the Second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service, January 1979.

SUMMARY

The U.S. Geological Survey and the U.S. Bureau of Mines have conducted a survey to determine the mineral resource potential of the Bald Rock and Middle Fork Feather River Roadless Areas, Butte and Plumas Counties, Calif. The results of this survey indicate several areas within the Middle Fork Feather River Roadless Area that have mineral resource potential. A moderate potential for chromite resources exists in tracts of the Middle Fork Feather River Roadless Area underlain by the Melones ultramafic body. A moderate to low resource potential for placer gold deposits exists at various localities, both in areas covered by Tertiary volcanic rocks and in small streams that drain into the Middle Fork of the Feather River. In the east end of the Middle Fork Feather River Roadless Area, the Wilson-Gomez mine has about 1,900 tons of vein quartz averaging 0.15 oz gold per ton, and a moderate potential exists for further resources. There is a moderate potential for the occurrence of gold-bearing quartz veins that may extend into the Middle Fork Feather River Roadless Area from several nearby mines. There is moderate to low potential for lead-silver resources at the east end of the Middle Fork Feather River Roadless Area. There is no evidence of a potential for coal, oil, gas, or geothermal energy in the study area.

INTRODUCTION

Field investigations during 1980-82 consisted of geologic mapping (Sorensen and Pietropaoli, 1982) and geochemical sampling (Sorensen and others, 1982) by the U.S. Geological Survey and a survey of mines, prospects, and mineralized areas by the U.S. Bureau of Mines (Buehler, 1983; Conyac and others, 1983). Mineral properties in the Wild and Scenic River corridor were not studied. The U.S. Bureau of Mines examined the records of Plumas and Butte Counties to determine mining claim locations, and checked Bureau of Mines files for information on known mines and prospects; regional offices of the U.S. Forest Service and U.S. Bureau of Land Management were contacted to determine if mineral and fuel leases or applications were filed for the study area. This report summarizes the findings of the investigations and includes a map showing mineral resource potential in the roadless areas. The majority of the geologic mapping and stratigraphic descriptions are generalized from Hietanen (1973, 1976, 1981a, 1981b).

LOCATION, SIZE, AND GEOGRAPHIC SETTING

The Bald Rock Roadless Area covers an area of 3,850 acres in Butte County, Calif., and the Middle Fork Feather River Roadless Area 29,300 acres in Butte and Plumas Counties, Calif. Both roadless areas are in the Plumas National Forest on the western slope of the Sierra Nevada 5 to 28 mi south to southwest of Quincy, county seat of Plumas County, Calif. (fig. 1). The roadless areas are aligned along the Middle Fork of the Feather River and several tributary drainages. The canyon bottom of the Middle Fork of the Feather River is classified as a National Wild and Scenic River and, although surrounded by the roadless areas, was not authorized by the U.S. Forest Service to be evaluated during the mineral resource surveys. Access to the roadless areas is by roads and jeep trails that traverse the ridges and uplands flanking the canyon of the Middle Fork. Graded roads offer direct access to the Middle Fork of the Feather River at Nelson Point and Millsap Bar; rough jeep trails end at river level at two other locations in the Middle Fork Feather River Roadless Area. Elevations range from approximately 800 ft in the canyon of the Middle Fork to 6,800 ft at the northwest corner of the area. Exfoliation surfaces form large areas of bare outcrop in the vicinity of Bald Rock Dome; elsewhere, the canyon bottoms and sidewalls are covered by dense growths of timber, manzanita, and other plants of the chaparral assemblage.

GEOLOGIC SETTING

The Bald Rock and Middle Fork Feather River Roadless Areas are in the northern part of the western Sierra
Nevada metamorphic belt. Steeply dipping faults divide the region into four north- to northwest-trending belts of Paleozoic and Mesozoic metasedimentary and metavolcanic rocks that have been intruded by Mesozoic granitoid plutons and partially covered by Cenozoic volcanic rocks (Sorensen and Pietروpoli, 1982).

The Shoo Fly Complex is Ordovician (?) to Devonian (?) and is the oldest unit exposed in the area of this report. In the exposures at the east end of the Middle Fork Feather River Roadless Area, the Shoo Fly is dominantly phyllite with interbedded quartzite, but includes several small lenses of dolomitic marble and a large sill of metabasalt.

The Shoo Fly is bordered on the west by ultramafic rocks coincident with the Melones fault zone. West of the Melones fault zone are several sequences of upper Paleozoic and lower Mesozoic metasedimentary and metavolcanic rocks (Hietanen, 1981a). The easternmost of these sequences is the Calaveras Formation, a dominantly metasedimentary unit that has been determined to be Pennsylvanian in age in this region (Hietanen, 1981a, p. 17). West of the Calaveras is the Franklin Canyon Formation, a series of mostly metavolcanic rocks considered to be late Paleozoic and Triassic (?) in age. The westernmost sequence of upper Paleozoic rocks is the Permian (?) Horseshoe Bend Formation, consisting of interbedded sandstone, shale, and possibly tectonically interleaved metasedimentary, metavolcanic, and ultramafic rocks.

In a summary of the tectonic history of this area, Hietanen (1981b) suggests that the Calaveras Formation was deposited in a marine basin between the continent (Shoo Fly Complex) and a late Paleozoic volcanic island arc (Franklin Canyon Formation). Most of the basin and its deposits were thrust beneath the continent during Paleozoic subduction along the Melones fault zone; remnant basin-floor material is preserved as ultramafic rocks coincident with the present Melones fault zone. Later subduction along a zone west of the island arc resulted in the tectonic mixing of marine sedimentary deposits and oceanic crustal material as suggested by lithologies and structures in the Horseshoe Bend Formation.

The accreted metasedimentary, metavolcanic, and ultramafic rocks were intruded by granitoid plutons during middle and late Mesozoic time. The area was elevated above sea level, eroded, and to some degree covered by volcanic deposits by late Tertiary time. In places, the Tertiary volcanic rocks cover gravels that were deposited in early Tertiary streambeds and that locally contain placer gold.

GEOLOGY, GEOCHEMISTRY, AND GEOPHYSICS
PERTAINING TO MINERAL RESOURCE ASSESSMENT

GEOLOGY

Several geologic terranes of potential interest were delineated during the current study.

Ultramafic rocks

Tracts underlain by ultramafic rocks have been extensively prospected for chrome deposits. Ryerson (1953) lists 15 chrome properties comprising 33 individual claims in or near the roadless areas (fig. 2) that have produced a total of approximately 1,000 long tons of medium-grade chrome ore, generally from lenticular pods within shear zones. Individual deposits are small although one group of claims produced 500 long tons of ore, the average production for the 13 properties is approximately 70 long tons (Ryerson, 1953, p. 292-299). All deposits but two are in ultramafic rocks within the Melones ultramafic body.

Stream deposits

Gold has been recovered by both drift and hydraulic mining methods from Tertiary and Quaternary stream deposits at various localities along the Middle Fork and its tributaries, including workings at Hartman Bar, Nelson Point, and along Onion Valley Creek. Tertiary stream deposits do not form mappable outcrops within the roadless areas, but are present north and south of the study area where they are locally auriferous. Tertiary stream deposits may be present as small unmapped areas along the trends of ancestral Tertiary drainages and may also be present beneath overlying upper Tertiary volcanic rocks within and adjacent to the study area (fig. 2).

Within the study area, modern river deposits that may contain gold reworked from Tertiary stream deposits are at or very near the level of the Middle Fork and are within tracts designated as Wild and Scenic River and so are not described in this report.

Metamorphic bedrock

The Calaveras, Franklin Canyon, and Horseshoe Bend Formations and the Shoo Fly Complex form the pre-plutonic metamorphic bedrock in the roadless areas and contain various lode deposits. Some prospects near large bodies of ultramafic rocks have been claimed for chrome and a few scattered prospects have been for copper, but none has recorded substantive production. Most prospects within or adjacent to the roadless areas have been located on small potentially auriferous quartz veins that intrude the metasedimentary, metavolcanic, and ultramafic bedrock. Four lode mines—Belfrin (no. 7), Belfrin Extension (no. 8), Wilson-Gomez (no. 11), and Crescent Hill (no. 14)—lie along the Melones fault mainly in rocks of the Shoo Fly Complex. This formation also hosts deposits at the Sugar Pine (no. 1) and Five Bear (no. 4) mines. The Butte Bar (no. 26) mine and Yellow Jacket (no. 40) prospect are in rocks of the Calaveras, Franklin Canyon, and Horseshoe Bend Formations, respectively. Brannerite (uranium-titanium oxide) with gold has been reported at the Butte Bar mine (Paiset and Stinson, 1960, p. 2071). Copper and lead minerals found at the Quartz Point (no. 2) prospect support geochemical data of Sorensen and others (1982) that indicate a low-grade silver-copper-lead-zinc anomaly in the Shoo Fly Complex.

High-calcium, low-magnesium limestone deposits occur in both the Calaveras and Horseshoe Bend Formations. The limestone is suitable for construction materials and may have high enough CaO content to be used in cement and for chemical and metallurgical uses.

GEOCHEMISTRY

A geochemical sampling program was conducted as an aid in the mineral resource evaluation of the roadless areas. A total of 157 rock samples and 454 panned concentrates of stream-sediment samples was collected from the Bald Rock and Middle Fork Feather River Roadless Areas and the nearby (20 mi north) Bucks Lake and Chips Creek Roadless Areas and analyzed by atomic-absorption (fire assay) and semiquantitative spectrographic methods (Sorensen and others, 1982). Although the geochemical data for rocks and stream-sediment concentrates from the Bald Rock and Middle Fork Feather River Roadless Areas indicate local high values for various trace elements, most of the high values are ascribed to higher-than-average background values in the nearby bedrock. Four samples of phyllite, gossan, and carbonate rock collected over a distance of 3 mi in the northeast corner of the Middle Fork Feather River Roadless Area (fig. 2) form a north-northwest trend through Rich Bar and the Five Bear (no. 4) mine. Analyses of these samples show slightly anomalous values for lead and silver and may indicate a zone of low-grade mineralization in the Shoo Fly Complex.

GEOPHYSICS

Aeromagnetic and gravity maps of the Bald Rock and Middle Fork Feather River Roadless Areas were prepared to aid in the evaluation of the mineral resource potential. The magnetic anomalies and patterns on the aeromagnetic map are caused by variations in the amount of magnetic minerals, commonly magnetite, in the rock units and are closely related to geologic features. The anomalies and patterns on the gravity anomalies are caused by variations in density between the rock units and are also closely related to geologic features.

Examination of the aeromagnetic map (Andrew Griessam, U.S. Geological Survey, unpub. data, 1982) indicates
that most of the magnetic anomalies and irregularities in magnetic patterns occur over the fault-bounded ultramafic rocks and ultramafic rocks. The granitoid, metasedimentary, and metavolcanic rocks are generally one of low-amplitude anomalies and relatively smooth magnetic field. The magnetic patterns reflect closely the rock units on the geologic map and do not provide any specific information for the identification of additional mineral prospects.

The gravity map of the region (Oliver and others, 1982) displays a large gravity low of at least 50 mGal associated with the granitoid plutons in the southwestern third of the roadless areas. This gravity low indicates that these plutons probably extend to depths of 7 to 10 km below the surface and that their densities are relatively constant. A gravity gradient of about 25 mGal extends up from the Shoo Fly Complex to the Calaveras Formation in the northeastern third of the map. These rock units are predominantly metasedimentary and are unlikely to have significantly different densities, so the gravity gradient may imply denser basement rocks beneath the Calaveras Formation, an implication supporting the conclusion by Hietanen (1981b) that the Shoo Fly was deposited on continental crust and the Calaveras on oceanic crust.

MINES, PROSPECTS, AND MINERALIZED AREAS

The Bald Rock and Middle Fork Feather River Roadless Areas are near the north end of the principal zone of placer gold deposits of the western Sierra Nevada. The roadless areas include parts of the Gibsonville, Meadow Valley, Mooreville Ridge, and Quincy mining districts. The production of gold from these districts has been substantial (approximately 11,300 oz since 1891) but most production has been from deposits outside the roadless areas. Tertiary and Quaternary placer deposits in and near the study area have been mined by hydraulic and drift methods since the mid-19th century and currently are the focus for recreational gold panning and dredging. Chromite has been mined intermittently since World War I from a number of small deposits in ultramafic rocks mostly within the Melones fault zone (Rynearson 1953). In areas underlain by the Calaveras, Franklin Falls, and Horseshoe Bend Formations, claims have been staked for chromite, copper, gold, and silver.

The patented mining claims in the Bald Rock Roadless Area include unpatented placer mining claims in and adjacent to the Bald Rock Roadless Area were examined during this study (table 1). Samples from two of the claims did not contain gold. Samples from the other claims contained gold values ranging from $0.01 and $3.68 per cubic yard ($400 per ton by ounce gold price). Samples from two claims contained average gold values of $1.69 and $1.86 per cubic yard. All of the unpatented placer claims appear to be within the Franklin Falls Scenic Area.

In March 1982, there were 204 currently held claims in the Middle Fork Feather River Roadless Area; 112 were placer claims and 22 were lode claims. Table 2 summarizes data for 19 mines and prospects in and near the Middle Fork Feather River Roadless Area that were examined during this study and information obtained from previous studies of nine additional properties. Ten of the 28 mines and prospects in table 2 are in the Middle Fork Feather River Roadless Area. Within the Middle Fork Feather River Roadless Area, the Wilson-Gomez (Oversight) (no. 11) mine has produced 62 oz of gold and 11 oz of silver. The Cloverleaf (no. 15), Fido (no. 19), and Diamond (no. 20) mines produced 25.3, an unspecified quantity, and 22.3 long tons, respectively, of chromium ore.

Outside of the Middle Fork Feather River Roadless Area, the Belfrin (no. 7) and Crescent Hill (no. 14) mines have a combined production record of 495 oz of gold and 158 oz of silver. The Belfrin Extension (Plumas Bonanza) (no. 9) mine, also outside the roadless-area boundary, reportedly had gold ore averaging 11 oz of gold per ton (944.155), but production figures are not known. The Greenbower (no. 32) mine, a drift mine in Tertiary river-channel gravel just outside the boundary, has recorded production of 626 oz of gold and 55 oz of silver.

The Five Bear (no. 4) mine, located on the boundary between the Wild and Scenic River area and the roadless area, has recorded production of 260 oz of gold and 55 oz of silver. Gold production from numerous gravel bars along the Middle Fork Feather River has come from the Wild and Scenic River area near the roadless areas. Production is known from Hansons Bar (no. 39), Hartman Bar (no. 35), Horsehead Mineral Bar, and additional 61 oz of gold and 11 oz of silver from 1920 to 1937 (Bureau of Mines files). The McCarth (no. 17) mine produced 150 long tons of chromite ore between 1917 and 1949 (Rynearson, 1953, p. 296-297).

Within the Middle Fork Feather River Roadless Area, identified resources occur at the Wilson-Gomez (fig. 3, no. 11) mine where 1,900 tons of auriferous vein quartz averaging 0.15 oz gold per ton is present. Nearby, but outside of the roadless area, 71,000 tons of subeconomic resources averaging 0.05 oz gold per ton occurs at the Crescent Hill (no. 14) mine, 9,100 tons of auriferous vein quartz averaging 0.22 oz gold per ton occurs at the Sugar Pine (no. 1) mine, and 2,560 tons of auriferous vein quartz averaging 0.07 oz gold per ton occurs at the Belfrin Extension (no. 9) mine. Six hundred tons of auriferous vein quartz averaging 0.12 oz gold per ton occurs at the Yellow Jacket (no. 40) prospect, adjacent to the western part of the Middle Fork Feather River Roadless Area.

Thirteen drainages tributary to the Middle Fork Feather River within the Middle Fork Feather River Roadless Area were examined for placer gold deposits (fig. 3), and the resulting data are also presented in table 4. Because the volume of sand and gravel in these tributaries is small, testing was limited to reconnaissance samples from banks adjacent to the streams and by suction dredging in the active channels. Sample data for auriferous alluvium, therefore, is reported as either presence (or absence) of gold in pan concentrates or amount of gold in suction-dredge samples related to operating time. These factors may indicate areas of possible interest for recreational panning and suction dredging.

ASSESSMENT OF MINERAL RESOURCE POTENTIAL

Results of the present study indicate several areas with mineral resource potential. The mineral resource potential of an area is classified as high, moderate, or low, and is based on the results of geologic, geochemical, and geophysical investigations conducted during this study, and on the history of mining and mineral exploration. A high mineral resource potential exists where all or most conditions of a geologic environment favorable for ore accumulations in an area are met. Such areas may include known mining districts, as well as other areas where geologic, geochemical, and other data demonstrate or suggest a high probability that mineralized rock exists. Moderate mineral resource potential exists where a favorable geologic model has been identified or may reasonably be interpreted to occur but where evidence for mineralization is less clearcut or has not yet been found. Areas without high or moderate resource potential are considered to have a low mineral resource potential. Mineral resource potential within the roadless areas is summarized in figure 3 and shown on the accompanying map.

CHROMITE

A moderate potential for chromite resources exists near the east end of the Middle Fork Feather River Roadless Area where approximately 6 m^2 are underlain by ultramafic rocks coincident with the Melones fault zone. Small deposits in ultramafic rocks within the Melones fault zone near the Middle Fork of the Feather River have generated less than 50 long tons of chromite each, and have produced a total of approximately 1,000 long tons of chromite since World War I. It is probable that any new deposits will be small, pod-shaped, and confined to shear zones within the Melones...
A moderate to low potential for placer gold resources exists west of the Melones fault zone where Tertiary volcanic rocks are exposed over approximately 2 mi² and may overlie Tertiary auriferous stream deposits. Haley (1923) concluded that an early Tertiary stream probably trended northwest near the present location of Onion Valley Creek (fig. 2). Thus, upper Tertiary volcanic rocks at the southeast corner of the Middle Fork Feather River Roadless Area may overlie concealed auriferous stream deposits, as similar volcanic rocks exposed 5 mi to the northwest. Small unmapped remnants of once continuous Tertiary stream deposits may be present along the trends of Tertiary stream courses as determined by Haley (1923, pl. VII), so a moderate to low potential for placer gold in Tertiary stream deposits is recognized near Hartman Bar, in Bear and Onion Valley Creeks, and southeast of Claremont Peak.

Gold is reported present in sediments collected from small streams that drain into the Middle Fork of the Feather River in the Middle Fork Feather River Roadless Area (Sorensen and others, 1982; fig. 3, table 2, this report), including Bachs (no. 8), Bear (no. 28), Claremont, Dejonah (no. 29), Dogwood (no. 27), Onion Valley (no. 25), and Winters (no. 6) Creeks, as well as drainages near Hansons and Hartman Bar and along Little North Fork (no. 41). The presence of gold in many of the analyzed samples indicates a moderate potential for placer gold deposits, but the steep gradient of the drainages from which the samples were collected suggests that any such deposits are probably very small. Small amounts of gold are present in samples collected at two localities (nos. 4, 5) in the Bald Rock Roadless Area (table 1), but the volume of potentially auriferous material is small.

A moderate to low potential for lead-silver resources exists at the east end of the Middle Fork Feather River Roadless Area. Analyses of four samples show slightly anomalous values for lead and silver and suggest local lead-silver mineralization. The sample localities form a north-northwest linear trend through the Five Bear (no. 4) mine.

U.S. Bureau of Mines sample data indicate the presence of about 1,000 tons of vein quartz averaging 0.15 oz gold per ton at the Wilson-Gomez (no. 11) mine and a moderate potential exists for further gold resources. There is also a moderate potential for the occurrence of gold-bearing quartz veins that may extend into the study area from the Belfrin (no. 7), Belfrin Extension (no. 9), Crescent Hill (no. 14), and Sugar Pine (no. 1) mines and Yellow Jacket (no. 40) prospect.

Low-magnesium limestone (greater than 50 percent CaO) that may be of sufficiently high grade for industrial use occurs at two localities (nos. 24, 38) in the study area. Access to the limestone is very limited. Similar-grade limestone probably is more easily accessible outside the study area in extensions of these same limestone units.

Sand, gravel, and limestone deposits present within the study area have not been used for construction purposes, as adequate supplies are more easily available closer to existing markets. There is no evidence of a potential for energy resources in the study area.

REFERENCES


Mac Boyle, Errol, 1918, Mines and mineral resources of Plumas County: California State Mining Bureau, Nineteenth Report of the State Mineralogist, 188 p.


Figure 1.—Location of Bald Rock (5169) and Middle Fork Feather River (5167) Roadless Areas, Butte and Plumas Counties, Calif. Boundaries of roadless areas include areas classified as National Wild and Scenic River.
Figure 2.—Approximate location of Tertiary stream courses (Haley, 1923), chromite claims (Rynearson, 1953), and Shoo Fly bedrock samples with anomalous lead, silver, and zinc (Sorensen and others, 1982) in and near Bald Rock (5169) and Middle Fork Feather River (5167) Roadless Areas.
Figure 3.—Bald Rock (5169) and Middle Fork Feather River (5167) Roadless Areas showing areas of mineral resource potential and mines, prospects, and drainages with placer gold.
<table>
<thead>
<tr>
<th>Map No.</th>
<th>Name</th>
<th>Summary</th>
<th>Workings</th>
<th>Sample data</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Unknown (outside study area)</td>
<td>Fluvial gravel bars 1,500 ft long by 18 ft wide by 0.5 ft thick on quartz diorite and tonalite bedrock. Estimated total of 500 yd³.</td>
<td>None</td>
<td>One pan sample from gravel bar in stream channel containing gold valued at $0.01 per yd³ and a trace of zircon.</td>
</tr>
<tr>
<td>2</td>
<td>North Awahnee prospect</td>
<td>Minor accumulations of fluvial sand and gravel (600 ft long by 8 ft wide by 0.5 ft thick) on an ultramafic and metasedimentary bedrock. Estimated total of 100 yd³.</td>
<td>None</td>
<td>One pan sample from gravel bar in stream channel containing gold valued at $0.05 per yd³ and traces of garnet, zircon, and chromite.</td>
</tr>
<tr>
<td>3</td>
<td>White Rock prospect</td>
<td>Accumulation of fluvial sand and gravel (1,500 ft long by 11 ft wide by 2 ft thick) on trondhjemite bedrock. Estimated total of 1,200 yd³.</td>
<td>None</td>
<td>One channel sample from the bank of each creek just above the confluence of Brush and Adams Creeks contained traces of zircon. No gold recovered.</td>
</tr>
<tr>
<td>4</td>
<td>Cascade prospect</td>
<td>Accumulation of fluvial sand and gravel, averaging 0.5 ft thick over 16 acres on trondhjemite and metasediments and ultramafic bedrock. Estimated total of 13,000 yd³.</td>
<td>None</td>
<td>Two channel samples from the bank contained gold valued at $3.68 and $0.03 per yd³.</td>
</tr>
<tr>
<td>5</td>
<td>Fall River prospect</td>
<td>A 0.4-acre bench placer averaging about 0.5 ft thick approximately 30 ft above Lake Oroville. Previously worked; less than 300 yd³ estimated remaining. Production unknown.</td>
<td>Pits excavated to bedrock</td>
<td>Three channel samples taken from around boulders. Values of gold at each site range between $0.32 to $2.08 per yd³ and average $1.59 per yd³.</td>
</tr>
<tr>
<td>6</td>
<td>Unknown</td>
<td>Minor accumulation of fluvial sand and gravel (1,500 ft long by 4 ft wide by 0.5 ft deep) on trondhjemite bedrock. Estimated total of 100 yd³.</td>
<td>None</td>
<td>Trace of zircon; no gold recovered.</td>
</tr>
<tr>
<td>7</td>
<td>Unknown</td>
<td>Minor accumulations of fluvial sand and gravel (1,500 ft long by 8 ft wide by 0.5 ft thick) on trondhjemite bedrock. Estimated total of 200 yd³.</td>
<td>None</td>
<td>One pan sample from gravel bar in stream channel containing gold valued at $0.08 per yd³ and a trace of zircon.</td>
</tr>
<tr>
<td>8</td>
<td>Dummy's Diggings</td>
<td>Minor accumulations of fluvial sand and gravel (1,500 ft long by 8 ft wide by 0.5 ft thick) on trondhjemite bedrock. Estimated total of 200 yd³.</td>
<td>None</td>
<td>One pan sample from gravel bar in stream channel containing gold valued at $.044 yd³ and a trace of zircon.</td>
</tr>
</tbody>
</table>
Table 2.—Mines, prospects, and auriferous gravels in the Middle Fork Feather River Roadless Area and vicinity

<table>
<thead>
<tr>
<th>Map no.</th>
<th>Name (commodity)</th>
<th>Summary</th>
<th>Workings and production</th>
<th>Sample and resource data</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sugar Pine mine (gold)</td>
<td>A 15-ft-thick zone of massive milky-white quartz veins as much as 2 ft thick is in phyllite of the Shoo Fly Complex. Veins and country rock trend generally northwest and dip steeply northeast and southwest.</td>
<td>A crosscut adit 270 ft long intersects a quartz-rich zone at 140 ft and has 85- and 35-ft drifts along the zone. An upper adit is 50 ft long and has a 13-ft crosscut at the face.</td>
<td>About 9,100 tons of vein quartz averaging 0.02 oz gold per ton is in the 270-ft adit. Twenty-three samples: a select sample from a 2-ton stockpile of quartz had 0.23 oz gold per ton and 0.1 oz silver per ton; a sample from another stockpile showed no significant mineral values. One of two chip samples of quartz from the 50-ft adit showed 0.008 oz gold per ton; of 19 samples taken from the longest working, four from the drifts had gold values ranging from 0.02 to 0.05 oz per ton. Potential is moderate for gold resources.</td>
</tr>
<tr>
<td>2</td>
<td>Quartz Point prospect (silver-copper-lead)</td>
<td>Vuggy, iron oxide-stained quartz occurs near an outcrop of siliceous rock. Quartz on stockpile shows copper and lead minerals not found in outcrop.</td>
<td>Workings consist of two caved adits and a 12-ft-long trench. Adits were probably less than 100 ft long.</td>
<td>Three samples: a select sample of quartz with malachite stain showed 0.5 oz silver per ton, 0.46 percent copper, and 0.12 percent zinc.</td>
</tr>
<tr>
<td>3</td>
<td>Little Volcano prospect (limestone)</td>
<td>A prominent limestone outcrop covering about 1/10 mi² trends northwest and dips moderately northeast in the Shoo Fly Complex.</td>
<td>No workings were found.</td>
<td>Eight chip samples of limestone from various outcrops averaged 23 percent CaO, 12.5 percent MgO, 1.33 percent Al₂O₃, 0.54 percent FeO, 0.22 percent Fe₂O₃, and 5.5 percent SiO₂ (excluding a sample with 53 percent SiO₂). The limestone is too impure to use other than as stone.</td>
</tr>
<tr>
<td>4</td>
<td>Five Bear mine (gold)</td>
<td>Several massive quartz veins as much as 1 ft thick and 300 ft long (Averill, 1937, p. 106) trend northwest and dip steeply in phyllites of the Shoo Fly Complex which strike N. 40° W. and dip steeply northeast to near vertically.</td>
<td>A five-stamp mill was operated for one winter (Averill, 1937, p. 106). An adit 53 ft long and two pits 8 ft in diameter and 7 ft deep were found. From 1935 to 1941, 1,100 tons of ore yielded 260 oz of gold and 55 oz of silver. Workings examined were not large enough to support this production total.</td>
<td>Three samples: two chip samples of quartz from the adit and one chip sample across a quartz vein 50 ft downslope. One sample from the adit assayed 0.04 oz gold per ton.</td>
</tr>
<tr>
<td>5</td>
<td>Unnamed prospect</td>
<td>Soft, serpentinized, ultramafic country rock probably contains minor quartz veins.</td>
<td>A fully timbered adit is caved at 56 ft. Eighty feet southeast about 220 ft of bulldozer cuts are near an inaccessible adit. From this adit, a series of depressions trend uphill S. 55° E. for 400 ft and appear to be a surface expression of underground caving.</td>
<td>One sample of quartz from the muck pile at the caved end of the accessible adit contained no significant mineral values.</td>
</tr>
<tr>
<td>Map no.</td>
<td>Name and Location (commodity)</td>
<td>Summary</td>
<td>Workings and production</td>
<td>Sample and resource data</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>6</td>
<td><em>Winters Creek</em> (placer gold)</td>
<td>Drains an area of Tertiary channel deposits which are locally auriferous and capped by volcanic rocks (Haley, 1923, pl. III).</td>
<td>Outcrops of channel deposits above Winters Creek were hydraulicked in late 1800's; Winters Creek has been worked by small-scale placer methods.</td>
<td>A 2 1/2-in. suction dredge was used to sample the gravel. Four dredge samples from the present channel of Winters Creek contained 4, 28, 72, and 76 cents worth of gold. Dredging times and gold recovered for these samples was: 75 min. (0.0001 oz); 60 min. (0.0007 oz); 90 min. (0.0018 oz); 90 min. (0.0019 oz), respectively.</td>
</tr>
<tr>
<td>7</td>
<td><em>Belfrin mine</em> (gold-silver)</td>
<td>A 130-ft quartz vein 5 in. thick strikes west, with various south dips; another quartz vein 7 in. thick strikes N. 57° W., dips 37° SW., and is exposed for 47 ft downdip. Dark aphanitic country rock has minor disseminated pyrite.</td>
<td>A 215-ft adit connects to an 87-ft inclined shaft; a 47-ft inclined shaft and two small pits are nearby. In 1933-1934, 100 tons of ore yielded 11.01 oz of gold.</td>
<td>Sixteen samples taken from the largest workings: three of seven quartz samples had 0.114, 0.010, and 0.008 oz gold per ton, and one of three samples of wallrock with disseminated pyrite assayed 0.008 oz gold per ton; two of six quartz samples from the 47-ft inclined shaft had 0.006 and 0.012 oz gold per ton, another had 4.0 oz silver per ton. The property has low potential for gold-silver resources.</td>
</tr>
<tr>
<td>8</td>
<td><em>Bachs Creek</em> (placer gold)</td>
<td>Drains area underlain by the Shoo Fly Complex and Tertiary lava that might cap undiscovered auriferous gravel deposits. Quartz veins in the vicinity trend northwest and are as much as 4 ft thick.</td>
<td>No workings were observed.</td>
<td>Five pan-sized reconnaissance samples were taken of alluvium; three contained gold. Four chip samples of vein quartz contained no significant mineral values.</td>
</tr>
<tr>
<td>9</td>
<td><em>Belfrin Extension</em> (Plumas Bonanza) mine (gold)</td>
<td>A 20-ft-thick quartz vein exposed for 600 ft strikes N. 45° to 85° E. and dips moderately northwest. The vein is vuggy with many well-formed quartz crystals. Host rock is metagabbro and siliceous, impure marble. Small shears strike northwesterly and dip steeply northeast.</td>
<td>Underground workings are a 20-ft adit adjacent to a 50-ft inclined shaft with a 50-ft drift (main working), and 132-ft and 96-ft adits. Surface workings include eight small hand-dug pits and two 140-ft-long bulldozer cuts.</td>
<td>About 2,500 tons of vein quartz averaging 0.07 oz gold per ton is in the inclined shaft and 50-ft drift. Forty-five samples: from the main workings, 8 of 18 samples had from 0.016 to 0.168 oz gold per ton; of 27 samples taken from all other workings, three samples had from 0.020 to 0.032 oz gold per ton. Potential is moderate for gold resources.</td>
</tr>
<tr>
<td>10</td>
<td><em>Unnamed prospect</em> (gold-silver)</td>
<td>Country rock is soft, weathered, metasedimentary rocks of the Shoo Fly Complex, with abundant iron- and manganese-oxide stain. Country rock strikes north-northeast, dips 45° SE., and contains small discontinuous veins of iron oxide-stained quartz.</td>
<td>A 77-ft adit driven perpendicular to the strike of the country rock is partially caved at the portal and face. Six small pits trend uphill S. 65° E. from the adit for about 500 ft.</td>
<td>Seven samples: two of four samples of iron oxide-stained quartz stockpiled at the small pits assayed 0.154 and 0.214 oz gold per ton. Three samples from the 77-ft adit showed no significant mineral values.</td>
</tr>
</tbody>
</table>
Quartz veins trend north-northeast and dip steeply west to near vertically. One vein is exposed for 240 ft and is about 2.5 in. thick in phyllite. Another quartz vein as much as 5 ft thick and 73 ft long is along a contact between serpentinite and phyllite, and contains minor amounts of mariposite (MacBoyle, 1918, p. 151) and pyrite.

Placer mine on Middle Fork Feather River which was reportedly worked by Scott Beaser in 1911 (MacBoyle, 1918, p. 177).

Ultramafic country rock associated with the Melones fault zone.

Property was patented in 1910. A quartz vein discordantly cuts phyllite of the Shoo Fly Complex which trends northwesterly and dips from steeply east to near vertically. Vein trends north to northeast and dips from 45° W. to near vertically; it is estimated to be continuous for at least 800 ft along strike and 300 ft vertically. In adit drifts, the vein averages 2.6 ft in thickness.

A chromite deposit is in serpentinized rocks of the ultramafic body associated with the Melones fault zone. The property was not visited for this study.

A chlromite deposit is in serpentinized rocks of the ultramafic body associated with the Melones fault zone. The property was not visited for this study.

Drifts are 25 ft in diameter and 10 and 15 ft deep, respectively. There are remnants of a 5-stamp mill and a tramway which leads downhill to a ruined Chilean mill. From 1910 to 1913, 1,145 tons of ore produced 484 oz of gold and 158 oz of silver.

Three dumps may represent two obliterated adits and a shaft; three sloughed trenches, each is about 80 ft long, 20 ft wide.

Ten samples from the dumps and two samples of float rock contained no significant mineral values.

No samples were collected.

No samples were collected. Low potential for chromium resources.

No samples were collected.
<table>
<thead>
<tr>
<th>Map no.</th>
<th>Name (commodity)</th>
<th>Summary</th>
<th>Workings and production</th>
<th>Sample and resource data</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>Unnamed prospect (nickel-cobalt-chromium)</td>
<td>In an ultramafic body along the Melones fault zone. Weathering has created a rusty-red lateritic-soil cover approximately 5 ft thick over about one-half acre.</td>
<td>One 8-ft-diameter pit about 4 ft deep was dug in the laterite.</td>
<td>One grab sample of soil contained 0.58 percent nickel, 0.05 percent cobalt, and 0.36 percent chromium. This laterite occurrence is too small to constitute a resource.</td>
</tr>
<tr>
<td>19</td>
<td>Fido mine (chromium)</td>
<td>In an ultramafic body associated with the Melones fault zone. The property was not visited for this study.</td>
<td>About 15 to 20 long tons of ore was reportedly stockpiled on the claim in 1943; shipments were reported in 1918 (Rynearson, 1953, p. 297).</td>
<td>No samples were taken.</td>
</tr>
<tr>
<td>20</td>
<td>Diamond mine (chromium)</td>
<td>In an ultramafic body associated with the Melones fault zone. The property was not visited for this study.</td>
<td>In 1944, 22.3 long tons of ore containing 46 percent Cr$_2$O$_3$ and 11 percent Fe with a Cr:Fe ratio of 2.74 was shipped (Rynearson, 1953, p. 298).</td>
<td>No samples were taken. Low potential for chromium resources.</td>
</tr>
<tr>
<td>21</td>
<td>Horseshoe Bend mine (placer gold)</td>
<td>Drift mine developed a gravel bench on the Middle Fork Feather River. Patent issued in 1928.</td>
<td>Eleven oz of gold and 1 oz of silver were produced in 1937.</td>
<td>No samples were taken.</td>
</tr>
<tr>
<td>22</td>
<td>Last Chance Creek (placer gold)</td>
<td>The drainage is underlain principally by metasedimentary rocks of the Calaveras Formation.</td>
<td>No workings were found.</td>
<td>A reconnaissance pan-sized sample of recently deposited gravel showed gold present.</td>
</tr>
<tr>
<td>23</td>
<td>Williams and Dorf prospect (placer gold)</td>
<td>A drift mine explores a Tertiary stream channel.</td>
<td>One caved adit.</td>
<td>Three samples of the dump and one pan-sized reconnaissance sample of a well-cemented Tertiary conglomerate showed no gold.</td>
</tr>
<tr>
<td>24</td>
<td>Unnamed prospect (limestone)</td>
<td>A limestone ridge is along the west side of Fish Creek near Onion Valley Creek. A coarse- to medium-grained limestone layer in the Calaveras Formation trends north-northeast and crops out over a distance of several miles.</td>
<td>Fifteen-foot adit trends S. 28° E. into west side of outcrop.</td>
<td>A random chip sample from near the adit assayed 56.5 percent CaO, 0.48 percent MgO, 0.05 percent Al$_2$O$_3$, 0.04 percent FeO, 0.03 percent Fe$_2$O$_3$, and 0.06 percent SiO$_2$. One million tons of limestone would be present per 1,000 ft of strike length for an outcrop 125 ft wide, assuming the limestone persists to a depth of 100 ft. There is a moderate potential for limestone resources.</td>
</tr>
<tr>
<td>25</td>
<td>Onion Valley Creek (placer gold)</td>
<td>Near the study area, the creek drains several areas of locally auriferous Tertiary conglomerate which is capped by volcanic rocks. About one-fourth of the 20 mi$^2$ of drainage lies within the study area.</td>
<td>A few cabins remain from past operations. Local prospectors report that the length of the creek has been worked by small-scale placer methods.</td>
<td>Twenty-six pan-size reconnaissance samples of alluvium were taken from 25 sites; gold was found at 22 sites. Six suction-dredge samples were taken from three sites in the present stream channel; all contained gold. Values ranged from $0.08 (0.0002 oz) to $1.80 (0.0045 oz) in 1.33 to 1.5 hr of dredging time.</td>
</tr>
</tbody>
</table>
26 **Butte Bar Property** (gold)

Property was patented in 1908. A quartz-filled fissure vein, 6- to 15-ft thick and 3,000 ft long, carries free gold, galena, copper sulfides, and possibly tellurides. Footwall is diorite porphyry; hanging wall is mica schist. Average strike is N. 30° W., dip is 70° to 75° NE. (MacBoyle, 1918, p. 102). Other quartz veins on the property, reportedly with gold, are the Little Nell and Bluebird veins located several hundred feet east (MacBoyle, 1918, p. 141). Brannerite with gold, in a 5-ft-thick albitite dike, occurs in the Little Nell "mine" (Pabst and Stinson, 1960, p. 2071). This "mine" refers to an adit driven on the Little Nell vein.

27 **Dogwood Creek** (placer gold)

Drains an area underlain principally by metasedimentary rocks of the Calaveras Formation in fault contact with metavolcanic rocks of the Franklin Canyon Formation, plus minor areas of dioritic intrusives and Tertiary volcanic rocks.

28 **Bear Creek** (placer gold)

The creek drains an area underlain principally by metasedimentary rocks of the Calaveras Formation, plus minor areas of Jurassic and Cretaceous plutonic rocks.

29 **Dejonah Creek** (placer gold)

The creek drains an area of metavolcanic rocks with some quartz veins of the Franklin Canyon Formation, Jurassic serpentinitized ultramafic rocks, and Tertiary volcanic lavas. A prospect outside the study area at the head of the drainage is in Tertiary gravel capped by lava.

30 **Little Bear Creek** (placer gold)

The creek drains an area of Tertiary sedimentary and volcanic units. Alluvium is locally auriferous.

31 **Little California prospect** (gold)

A 2-ft-thick quartz vein exposed underground strikes N. 80° W. and dips 66° NE. Country rock is metasedimentary and metavolcanic rocks of the Franklin Canyon Formation.

32 **Greenbower mine** (placer gold)

An auriferous Tertiary river channel is capped by a volcanic flow. In 1920, the property owner estimated 500,000 yd³ of gravel workable by hydraulic methods (Logan, 1920).

33 **Unnamed creek** (placer gold)

A minor tributary of the Middle Fork Feather River drains an area underlain by metasedimentary rocks of the Horseshoe Bend Formation and, near the study area, Tertiary lava that might cap auriferous Eocene gravel.

---

This property was partially examined because part of the claim group extends into the study area. Eight samples were taken from the albitite dike and its contacts at the stopes, and six samples were taken from shears, wallrock, and quartz veins in two of the three short adits. No sample showed significant mineral values.

No workings were observed.

No workings were observed.

There are no workings.

Currently worked by small suction-dredge methods.

No workings were found.

Five pan-size reconnaissance samples of alluvium: one contained gold.

Two samples from quartz veins had no significant mineral values.

No samples were taken.

One pan-size reconnaissance sample of recently deposited gravel had gold. One suction-dredge sample recovered $0.84 in gold (0.0021 oz) in two hours.

Four pan-size reconnaissance samples of alluvium and two suction-dredge samples: two of the pan samples showed gold; one dredge sample yielded $9.84 (0.0246 oz) of gold in 70 min. dredging time; the other yielded a trace of gold in 70 min. dredging time.

Three pan-size reconnaissance samples were taken of recent flood gravels; two samples showed gold. A chip sample across an 8- to 10-in.-thick quartz vein exposed in the creek bed assayed 0.012 oz gold per ton.

Approximately 614 oz of gold and 64 oz of silver were produced from 1905 to 1911. At the time of Logan's report, the mine was just beginning to reopen, and only ditches, a sluice, and a bunkhouse existed. In 1929, 1,600 yd³ yielded 12 oz of gold and 1 oz of silver.

No samples were taken.

One pan-size reconnaissance sample of alluvium showed gold is present.
<table>
<thead>
<tr>
<th>Map no.</th>
<th>Name</th>
<th>Summary</th>
<th>Workings and production</th>
<th>Sample and resource data</th>
</tr>
</thead>
<tbody>
<tr>
<td>34</td>
<td>Willow Creek</td>
<td>The creek drains an area underlain principally by metasedimentary and metavolcanic rocks of the Horseshoe Bend Formation, with minor amounts of Devonian to Jurassic ultramafic rocks and metagabbro.</td>
<td>There are no workings.</td>
<td>Five pan-size reconnaissance samples of alluvium contained no gold; one dredge sample yielded a trace of gold in 105 min. dredging time. The creek reportedly receives gold from perched gravels at higher elevations (Haley, 1923, p. 105).</td>
</tr>
<tr>
<td>35</td>
<td>Hartman Bar mine</td>
<td>Placer mine on Middle Fork Feather River. Not visited for this report.</td>
<td>About 128 oz of gold were produced from 1897 to 1935.</td>
<td>No samples were collected.</td>
</tr>
<tr>
<td>36</td>
<td>Catrell Creek</td>
<td>The creek drains an area of metasedimentary and volcanic rocks of the Horseshoe Bend Formation. Alluvium is locally auriferous.</td>
<td>Near an old cabin, a minor amount of surface gravel appears to have been worked.</td>
<td>Two pan-size reconnaissance samples of recently deposited gravel; one sample contained gold.</td>
</tr>
<tr>
<td>37</td>
<td>Hunters Ravine</td>
<td>The stream drains an area of metasedimentary and volcanic rocks of the Horseshoe Bend Formation. Alluvium is locally auriferous.</td>
<td>No workings were found.</td>
<td>One pan-size reconnaissance sample showed gold is present.</td>
</tr>
<tr>
<td>38</td>
<td>Unnamed prospect</td>
<td>Ridge along north edge of Deadman Gulch is an outcrop of coarse- to medium-grained limestone and calcareous phyllite of the Horseshoe Bend Formation.</td>
<td>There are no workings.</td>
<td>The assays from two samples of limestone averaged 51.5 percent CaO, 3.05 percent MgO, 0.32 percent Al₂O₃, 0.18 percent FeO, 0.11 percent Fe₂O₃, and 0.86 percent SiO₂. One million tons of limestone is present per 100 ft of thickness assuming the 1,000-ft-long outcrop is persistent for an average width of 125 ft. There is a moderate potential for limestone resources.</td>
</tr>
<tr>
<td>39</td>
<td>Hansons Bar mine</td>
<td>Placer mine on Middle Fork Feather River. Not visited for this report.</td>
<td>In 1947, 3,000 yd³ of gravel mined in 90 days of work produced 9 oz of gold and 3 oz of silver. In 1948, 2 oz of silver was produced.</td>
<td>No samples were collected.</td>
</tr>
<tr>
<td>40</td>
<td>Yellow Jacket prospect</td>
<td>Several quartz veins, averaging from 8.5 to 11.5 in. thick, strike N. 65° to 80° E., dip steeply northwest and southeast, and are exposed for approximately 400 ft on the surface. Country rock is metavolcanic rocks, phyllite, and quartzite of the Horseshoe Bend Formation.</td>
<td>Two adits, 45 and 30 ft long; four shallow pits approximately 25 ft long and 5 ft or less deep.</td>
<td>Approximately 600 tons of vein quartz averaging 0.12 oz gold per ton is at the 30-ft adit. Nine samples were from underground workings and four were from shallow pits. Three of four samples from the 30-ft adit assayed 0.316, 0.144, and 0.030 oz gold per ton. One sample from a pit assayed 0.054 oz gold per ton. Potential is moderate for gold resources.</td>
</tr>
<tr>
<td>41</td>
<td>Little North Fork</td>
<td>The stream drains an area of metasedimentary and metavolcanic rocks of the Horseshoe Bend Formation and Jurassic and Cretaceous intrusive rocks.</td>
<td>No workings or production are known.</td>
<td>One pan-size reconnaissance sample of alluvium from near the mouth of the creek contained gold. Upstream 1,000 ft from the mouth, two suction-dredge samples had $2.04 and $5.44 in gold. Dredging times and amounts of gold recovered were: 2 hr (0.0051 oz) and 1.5 hr (0.0136 oz), respectively.</td>
</tr>
</tbody>
</table>

1 The property is outside the roadless and Wild and Scenic River areas.
2 The property is in the Wild and Scenic River corridor.