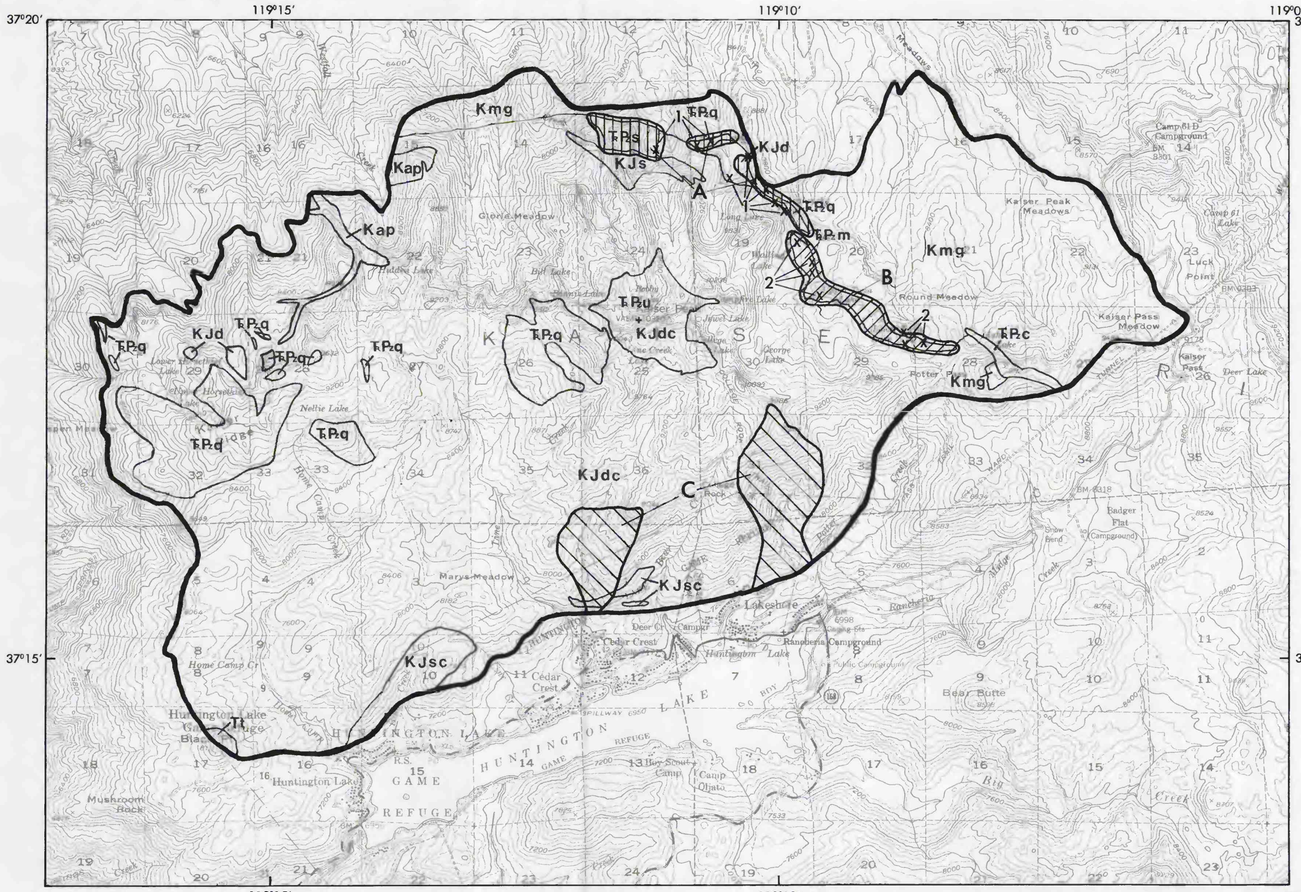
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY



Base from U.S. Geological Survey, 1:62,500, Huntington Lake, Kaiser Peak, Shaver Lake, 1953; Shuteye Peak, 1965

SCALE 1:62500

CONTOUR INTERVAL 80 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Geology from du Bray and Dellinger (1980); simplified by D. A. Dellinger, 1980

Explanatory pamphlet accompanies map

TRUE NORTH
MAGNETIC NORTH
APPROXIMATE MEAN DECLINATION, 1983

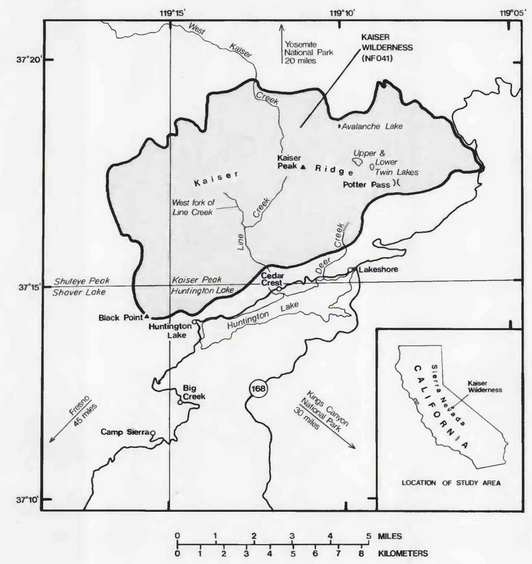
MINERAL RESOURCE POTENTIAL MAP OF THE KAISER WILDERNESS, FRESNO COUNTY, CALIFORNIA

By

E. A. du Bray[1], D. A. Dellinger[1],

Andrew Leszcykowski[2], Clayton Morlock[2], and Spencee Willett[2]

1983



Location of Kaiser Wilderness and surrounding area, showing the topographic 15-minute quadrangles covering the area

EXPLANATION

MINERAL RESOURCE AREAS

A — Area with tungsten resources and (or) low potential for resources

B — Area with calcitic and (or) dolomitic marble resources and (or) low potential for resources

C — Area with very low potential for gold resources

x-1 — WORKINGS--Number refers to workings listed in table 1

BOUNDARY OF KAISER WILDERNESS--Approximately located

CORRELATION OF MAP UNITS

VOLCANIC ROCKS		
Tt	Pliocene	TERTIARY
Unconformity		
GRANITIC ROCKS		
Kap, Kmg	Upper Cretaceous	CRETACEOUS
KJsc, KJs, KJdc, KJd		CRETACEOUS OR JURASSIC
METAMORPHIC ROCKS		
TRq, TRs, TRm, TRc, TRu		TRIASSIC OR PALEOZOIC

DESCRIPTION OF MAP UNITS

VOLCANIC ROCKS

Tt — TRACHYANDESITE (PLIOCENE)

GRANITIC ROCKS

Kap — APLITE DIKES (UPPER CRETACEOUS)--Probably offshoots from the Mount Givens Granodiorite

Kmg — MOUNT GIVENS GRANODIORITE (UPPER CRETACEOUS)--Medium-grained granodiorite and less abundant quartz monzonite; contains euhedral crystals of hornblende and sphene, and anhedral biotite

KJsc — QUARTZ MONZONITE OF SHEEPTHIEF CREEK (CRETACEOUS OR JURASSIC)--Medium grained, locally porphyritic. Intrudes granodiorite of Dinkey Creek

KJs — SHEARED AND LINEATED QUARTZ MONZONITE (CRETACEOUS OR JURASSIC)--Forms dikes in margins of granodiorite of Dinkey Creek

KJdc — GRANODIORITE OF DINKEY CREEK (CRETACEOUS OR JURASSIC)--Equigranular and generally foliated granodiorite

KJd — QUARTZ DIORITE AND MAFIC PLUTONIC ROCKS (CRETACEOUS OR JURASSIC)

METAMORPHIC ROCKS

TRq — QUARTZITE (TRIASSIC OR PALEOZOIC)

TRs — SCHIST AND HORNFELS (TRIASSIC OR PALEOZOIC)

TRc — CALC-HORNFELS (TRIASSIC OR PALEOZOIC)

TRm — MARBLE (TRIASSIC OR PALEOZOIC)

TRu — UNDIFFERENTIATED METAMORPHIC ROCKS (TRIASSIC OR PALEOZOIC)

CONTACT

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 on 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 presents the results of a mineral resource potential survey of the Kaiser Wilderness in the Sierra National Forest, Fresno County, California. Kaiser Wilderness (NF041) was established by Public Law 94-557, 1976.

SUMMARY

The Kaiser Wilderness occupies 22,500 acres (9,100 ha) in Sierra National Forest, Fresno County, Calif. Tungsten and metamorphosed limestone and dolomite are found in the Kaiser Wilderness. Tungsten occurs in pods of tactite located in calcareous metasedimentary rocks at their contacts with granitic rocks of the Sierra Nevada batholith. Very pure calcitic and dolomitic marbles occur in a massive lens-shaped outcrop about 3,000 ft (915 m) long and 500 ft (150 m) wide. Stream-sediment samples containing minor but anomalous amounts of gold were collected in the southern part of the wilderness. However, the potential for significant undiscovered mineral deposits is considered to be low. The area has no known potential for geothermal energy, coal, oil, or gas.

RESOURCE EVALUATION CRITERIA

Evaluation of the mineral resource potential of the Kaiser Wilderness is based upon a synthesis of geologic, geochemical, and mineral-deposit information that permits the designation of areas with mineral resource potential. Important indicators are the presence of known mineral occurrences, favorable host rocks, and drainage basins with groups of geochemically anomalous samples. The favorable host rocks in the area of study are calcareous metasedimentary rocks found in narrow bands between granitic plutons. Elsewhere in the Sierra Nevada, tungsten resources are often located at contacts between these rocks and granitic intrusive rocks. The Avalanche Lake-West Kaiser Creek and Potter Pass-Twin Lakes areas (areas A and B on map) are designated as having low potential for mineral resources on the basis of known mineral occurrences and the presence of calcareous metasedimentary rocks. The drainages of Deer Creek and the unnamed creek east of Line Creek (area C) are designated as having potential on the basis of geochemically anomalous stream-sediment samples; the weakness of the geochemical anomalies and lack of other indicators of economic potential, however, indicate that the potential for significant resources is very low in area C. Aeromagnetic studies did not indicate any areas of mineral resource potential.

GEOLOGY

Tungsten, the element most likely to be found in economic deposits in the Kaiser Wilderness, occurs as scheelite ($CaWO_4$) in thin bands and pods of tactite at contacts between granitic and calcareous metasedimentary rocks. Mining activity has been restricted to the tactite bodies. One metasedimentary body consists of high-purity calcitic and dolomitic marbles. Very low potential for gold is associated with quartz veins of minimal extent cutting the granodiorite of Dinkey Creek. Information about workings in the study area is summarized in table 1.

MISCELLANEOUS FIELD STUDIES MAP MF-1515

Metamorphic rocks account for about one percent of the rocks exposed in the wilderness; quartzite is the most abundant and occurs principally as isolated blocks and masses within the granodiorite of Dinkey Creek. Other metamorphic rock types (marble, including both metamorphosed limestone and dolomite, calc-hornfels, hornfels, and pelitic schist) are found chiefly in septa[1] between the granodiorite of Dinkey Creek and the Mount Givens Granodiorite (Hamilton, 1956). The metamorphic rocks are similar to rocks elsewhere in the Sierra Nevada that have associated metallic ore deposits. Areas containing metasedimentary rocks with known tactite mineralization have potential for further mineralization at depth; bodies of metasedimentary rocks without surface indications of tungsten mineralization are not considered indicative of mineral potential.

The two principal plutons in Kaiser Wilderness are the Mount Givens Granodiorite, which is one of the largest plutons in the Sierra Nevada (Lockwood and others, 1972), and the granodiorite of Dinkey Creek. Isotopic uranium-lead age determinations indicate that they crystallized 88-93 and 105 m.y. B. P., respectively (Stern and others, 1981). There are no known mineral resources within these granitic rocks in this wilderness.

Quaternary deposits include moraines and alluvium. The moraines consist of poorly sorted bouldery material, deposited as Pleistocene glaciers retreated. Much of the ore mined from the Lucky Blue group of claims was derived from glacial erratics near outcrops of tungsten-bearing tactite, but glacial deposits farther from mineralized bedrock are considered unlikely to contain significant resources.

GEOCHEMISTRY

The geochemical anomalies detected in the Kaiser Wilderness were described by du Bray and Dellinger (1980). The three stream-sediment samples collected in Deer Creek and one sample from the unnamed creek east of Line Creek (area C) are anomalous in gold; three samples from the west fork of Line Creek contain anomalous amounts of copper. Two samples anomalous with respect to molybdenum are associated with the marble unit near Lower Twin Lake (area B). No anomalous concentrations of tin, arsenic, silver, lead, zinc, nickel, chromium, niobium, vanadium, cobalt, or lanthanum were detected, indicating that deposits of these metals probably do not exist within the wilderness. Lockwood and others (1972) suggest that the copper anomaly on Line Creek is attributable to copper contained in concentrations of detrital magnetite. There is very low potential for small gold resources in area C.

GEOPHYSICS

The aeromagnetic map of the Kaiser Wilderness (du Bray and Dellinger, 1980) does not indicate the existence of concealed ore bodies within the wilderness. The single identified aeromagnetic anomaly is attributable to a body of mafic plutonic rocks located about one-half mile north of Long Lake.

MINES AND PROSPECTS

Many of the 49 recorded mining claims staked in the Kaiser Wilderness were not found, due mainly to vague location descriptions, rugged terrain, and dense vegetation. Known mineral resources in the study area are limited to the occurrence of tungsten in the area between Avalanche Lake and upper West Kaiser Creek (area A) and to calcitic and dolomitic marbles in the Potter Pass-Twin Lakes area (area B).

Tungsten occurs in scattered scheelite-bearing tactite pods and in glacial erratics composed of tactite. These bodies comprise the Lucky Blue group of claims (location 1), which was located in 1951. According to the claimant, as much as 200 tons (180 t) of ore, worth about $50,000, was produced between 1951 and 1956 (Lockwood and others, 1972). Most of the ore came from glacial erratics, but some was extracted from tactite pods in bedrock. An adit is being driven to explore at depth the tactite pods exposed at the surface. The small, widely spaced scheelite-bearing tactite pods occur over a lateral distance of about 7,000 ft (2,140 m) and over a vertical distance of about 600 ft (180 m). According to U.S. Bureau of Mines assay reports, the tungsten content is as high as 0.48 percent tungsten trioxide (WO_3), but most samples contain smaller concentrations. One sample obtained by the U.S. Geological Survey in 1969 contains 1 percent tungsten, but most samples contain much less (Lockwood and others, 1972). Tactite pods probably exist at depth, but their economic potential is probably limited by their small size and low scheelite content. Extensive detailed subsurface exploration would be necessary for a complete resource evaluation.

Calcitic and dolomitic marbles occur in a massive lens-shaped outcrop about 3,000 ft (910 m) long and 500 ft (150 m) wide. The lens is an isolated body in a metasedimentary complex that strikes northwesterly and is nearly vertical. Several claims have been filed for this area since 1930, most recently in 1959. The Larry No. 1 prospect (location 2) is in this area, but no production has been recorded and only discovery and exploration pits were found. Assay results indicate that the body is composed of high-purity calcitic and dolomitic marbles. The dolomitic material may be suitable for use as refractory dolomite, and the calcitic marble (strongly recrystallized limestone) for cement, sugar refining, steel flux, and chemical products. The lenticular body may contain as much as 60 million tons (54 million t) of calcitic and dolomitic marbles. Tonnage calculations were based on a lenticular body 3,000 ft long, 500 ft wide, and an estimated 1,500 ft deep (900 m x 150 m x 450 m). The proportion of calcitic to dolomitic marbles, and their distribution within this body, is unknown.

ASSESSMENT OF MINERAL RESOURCE POTENTIAL

The mineral resource potential of the Avalanche Lake-West Kaiser Creek and Potter Pass-Twin Lakes areas (A and B) cannot be estimated further without subsurface data. The persistence of scheelite-bearing tactite pods indicates potential for the existence of other pods at depth. However, the variable scheelite content, small size, and random occurrence of tactite pods exposed on the surface preclude estimation of subsurface resources, and suggest that tungsten could not be extracted economically. Some additional testing of the calcitic and dolomitic marbles might be warranted, but the inaccessibility of the body, its distance from potential markets, and the ready availability of these materials in areas closer to markets probably preclude economic exploitation of this deposit. Stream-sediment samples containing minor but anomalous amounts of gold were collected from the drainages of Deer Creek and the unnamed creek east of Line Creek (area C), but it is very unlikely that gold is present in sufficient concentrations to be economically developed. The area has no known potential for geothermal energy, coal, oil, or gas.

REFERENCES CITED

du Bray, E. A., and Dellinger, D. A., 1980, Geologic, aeromagnetic, and geochemical anomaly maps of the Kaiser Ridge Wilderness, central Sierra Nevada, California: U.S. Geological Survey Miscellaneous Field Studies Map MF-1181, scale 1:62,500 (2 sheets).

Hamilton, W. B., 1956, Geology of the Huntington Lake area, Fresno County, California: California Division of Mines and Geology Special Report 46, 25 p.

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Stern, T. W., Bateman, P. C., Morgan, B. A., Newell, M. F., and Peck, D. L., 1981, Isotopic U-Pb ages of zircon from the granitoids of the central Sierra Nevada, California: U.S. Geological Survey Professional Paper 1185, 17 p.

[1]"Septa" (sing. "septum"), as used here, refers to thin, markedly elongate, commonly discontinuous, downward projecting bodies of metamorphic rock that separate two plutonic bodies. They are presumed to be remnants of the roof of country rock intruded by the plutons.

Table 1.--Mines and prospects in the Kaiser Wilderness, California

Map number	Name	Workings	Resource data
1	Lucky Blue group	Pits	Scheelite in small scattered tactite pods and glacial erratics. Ore worth $50,000 reportedly produced. Samples contained as much as 0.48 percent WO_3.
2	Larry No. 1 and other prospects	Pits	Outcrop of potential commercial-grade calcitic and dolomitic marble.

[1]U.S. Geological Survey
[2]U.S. Bureau of Mines

Interior—Geological Survey, Reston, Va.—1983

For sale by Branch of Distribution, U.S. Geological Survey, Box 25286, Federal Center, Denver, CO 80225