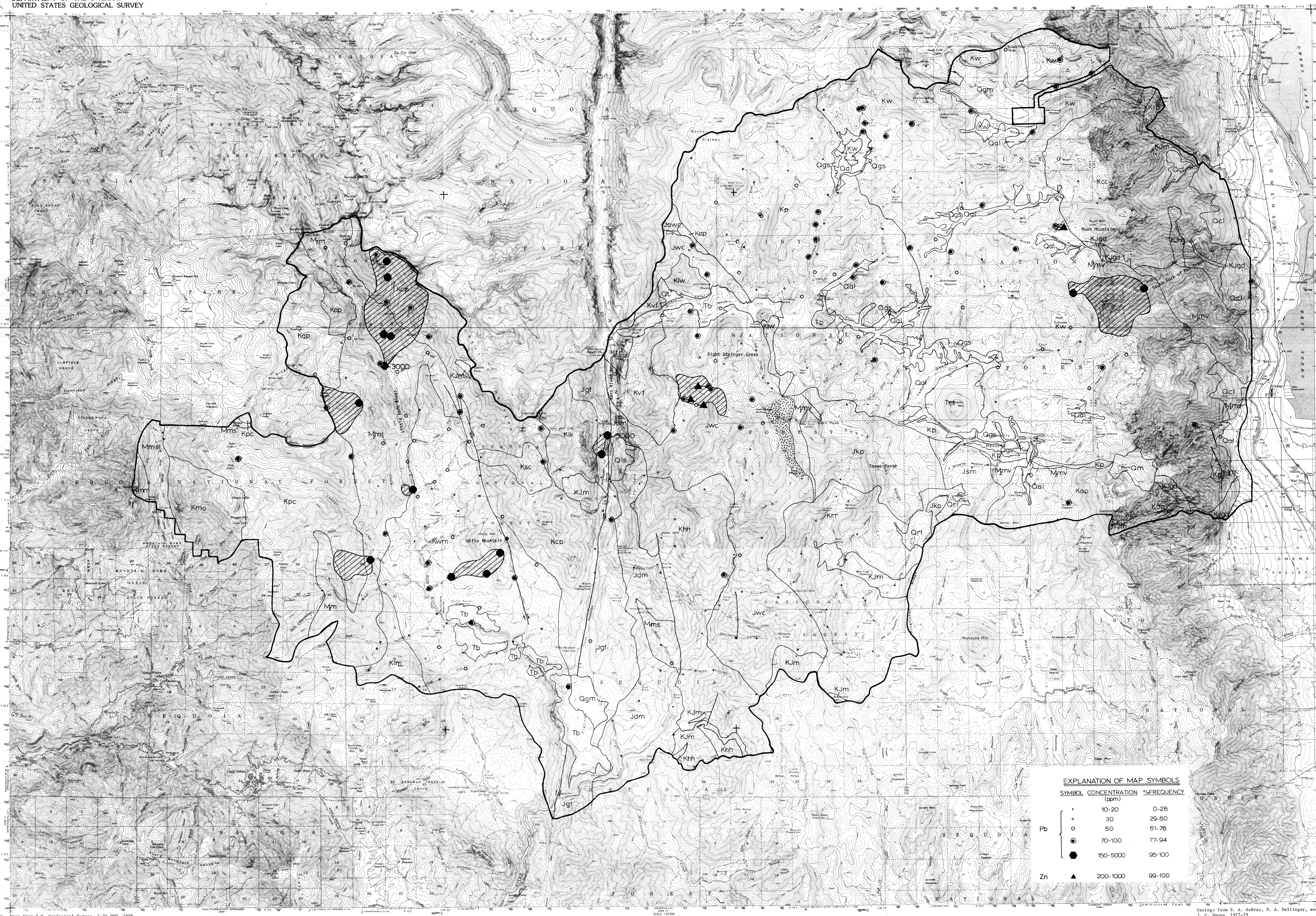
OPEN-FILE REPORT
81-757



EXPLANATION OF MAP SYMBOLS

	SYMBOL	CONCENTRATION (ppm)	%FREQUENCY
Pb	+	10-20	0-28
	○ (small)	30	29-60
	⬡	50	61-76
	⬡ (with dot)	70-100	77-94
	⬢	150-5000	95-100
Zn	▲	200-1000	99-100

Base from U.S. Geological Survey, 1:24,000, 1956
Camp Nelson; Hockett Peak; Kern Peak;
Mineral King; Monache Mtn; Olancha

Geology from E. A. duBray, D. A. Dellinger, and J. G. Moore, 1977-79

SCALE 1:62500

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

UTM GRID AND 1956 MAGNETIC NORTH

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards. Any use of trade names is for descriptive purposes only and does not imply endorsement by the USGS.

MAP SHOWING DISTRIBUTION OF Pb AND Zn IN HEAVY-MINERAL CONCENTRATES FROM THE GOLDEN TROUT WILDERNESS, CALIFORNIA

By
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1981

INTRODUCTION

This map shows the distribution of Pb and Zn in the nonmagnetic heavy-mineral concentrates of stream sediments collected from the Golden Trout Wilderness, California, in the summers of 1979 and 1980. Sites were selected on first- or second-order drainages as defined by 1:62,500 topographic maps. All sites on second order drainages were chosen at least 100 m below any first order stream junction. The sample sites were selected at a density of one site per cell, each cell having an area of approximately one square mile (2.6 km^2). Some cells do not contain a sample because of various factors such as lack of small order stream drainages, extreme relief, or insufficient sample of the heavy-mineral separate. At each site, five grab samples of stream sediment were collected along 10 meters of active stream channel and composited into a single sample. From the composited stream sediment sample, a heavy-mineral concentrate was collected using a standard gold pan. Commonly, 3 to 4 kg of composited sediment were necessary to yield the desired amount of concentrate. At the laboratory, the sample was air dried, and the highly magnetic material was removed by a magnet. Any light-weight material remaining in the concentrate was then separated by allowing the heavier fraction to settle through bromoform (specific gravity 2.82). The resulting heavy-mineral fraction was then separated into a nonmagnetic and magnetic fraction using a Frantz Isodynamic Separator[1] at a setting of 0.6 ampere, with 15° forward and 15° side setting.

The nonmagnetic fraction was then analyzed semiquantitatively for 31 elements using an optical emission spectrograph, according to the method outlined by Grimes and Marranzino (1968). A complete tabulation of the data for each sample collected in the Golden Trout Wilderness is given in Leach and others (1981). This report also presents a more detailed discussion of the sampling, analytical methods, and includes statistical summaries of the data.

RESULTS

The Pb content of the nonmagnetic heavy-mineral concentrates analyzed in this study may reflect the distribution of various lead sulfides, carbonates, molybdates, sulfosalts, sulfates, or other heavy-mineral capable of carrying Pb in lattice positions. The zinc content may reflect the distribution of various zinc sulfides, carbonates, or other heavy nonmagnetic minerals capable of carrying Zn in lattice positions. However, some of the zinc occurring as Fe-rich sphalerite may have been removed with the magnetic fraction.

A histogram of the Pb concentrations is shown in fig. 1 and some statistical estimates are given in table 1. The concentration ranges used to plot the Pb data were arbitrarily selected to approximate the top 5 percentile, 95-75 percentile, 75-50 percentile, 50-25 percentile, and the lower 25 percentile. Because the spectrographic concentrations are reported as geometric midpoints of ranges in concentration, it is not possible to precisely divide the data into the desired percentiles. Therefore, the 5 symbols used on the map represent slightly different percentile ranges. Most of the samples contained Zn below the detection limit; therefore, only samples that contained detectable Zn in the range 200-1000 ppm were plotted. To avoid overlap of the concentration symbols, the Zn symbols were offset from the Pb symbol which overlies the correct location of the sample.

Because the data consists of a number of populations derived from a variety of rock types, we arbitrarily chose the anomalous samples to approximate as closely as possible the top 5 percentile of the data. Therefore, we define the anomalous concentration of Pb to be 150-5000 ppm; the top 5 percentile of the data. Anomalous concentrations of zinc are defined as 200-1000 ppm (top 1 percentile of the data--which corresponds to all of the detectable Zn).

On the map, we have outlined the stream catchment areas that may have contributed material for the anomalous metal concentrations. Within the Little Kern River watershed, there are five stream catchment areas that contain anomalous Pb concentrations. Four of these anomalous areas contain significant exposures of the Mineral King roof pendant; the northern area also contains alaskite of Coyote Pass. One sample (# 053) in this area contains a very high concentration of Pb (3000 ppm) together with high Ag (2 ppm). The other anomalous area, located approximately 1 km south of White Mountain, is located in the granite of White Mountain. There is a Pb anomaly in the small stream catchment area on the western side of the Kern River Canyon, located in granite of Grasshopper Flat where numerous xenoliths and basic dikes are present. One of these samples (# 033) contains the highest concentration of Pb (5000 ppm) observed in the Golden Trout Wilderness. This sample also contains anomalous Cu (1000 ppm) and Sn (150 ppm). Two samples with anomalous Pb concentrations are located near the headwaters of the South Fork of Ash Creek along the eastern Sierra range front. These anomalous concentrations occur in the Cretaceous Whitney Granodiorite, adjacent to the contact with a roof pendant of metavolcanic rocks.

A zinc anomaly occurs near the headwaters of Right Stringer Creek, west of the Toowa Range in the granite of Window Cliffs. This area contains numerous small xenoliths of metavolcanic material. In addition to the Zn anomaly near Right Stringer Creek, one anomalous concentration of zinc is located in the Whitney Granodiorite, 2 km west of Muah Mountain.

[1]The use of trade names in this report is for descriptive purposes only and does not constitute endorsement by the U.S. Geological Survey.

REFERENCES CITED

duBray, E. A., and Dellinger, D. A., 1981, Geologic map of the Golden Trout Wilderness Southern Sierra Nevada, California: U.S. Geological Survey miscellaneous Field Studies Map 1231-A.
Grimes, D. J., and Marranzino, A. P., 1968, Direct-current arc and alternating-current spark emission spectrographic field methods for semi-quantitative analysis of geologic materials: U.S. Geological Survey Circular 591, 6 p.
Leach, D. L., Goldfarb, R. J., and Domenico, J. A., 1981, Basic data report and geochemical summary for stream sediments, heavy-mineral concentrates, rocks, and waters from the Golden Trout Wilderness, California: U.S. Geological Survey Open-File Report 81-752.

LIST OF MAP UNITS

SURFICIAL DEPOSITS

Qal	Alluvium
Qcl	Colluvium
Qgm	Glacial Moraine
Qt	Talus
Qg	Gravel
Qls	Landslide Deposit
Qgs	Grus and Sand

VOLCANIC ROCKS

Qrl	Rhyolite of Long Canyon
Tb	Basalt
Trt	Rhyolite of Templeton Mountain

GRANITOID ROCKS (WESTERN REGION)

Kmm	Alaskite of Moses Mountain
Kma	Alaskite of Maggie Mountain
Kqp	Granodiorite of Quinn Peak
Kpc	Granodiorite of Peck's Canyon

GRANITOID ROCKS (CENTRAL REGION)

Kwm	Granite of White Mountain
Ksc	Granodiorite of Sheep Creek
Kvf	Granodiorite of Volcano Falls
Ktr	Granodiorite of Tower Rock
Klm	Granodiorite of Loggy Meadow
Kcp	Alaskite of Coyote Pass
Klk	Granite of Little Kern Lake Creek
Khh	Alaskite of Hell's Hole
Jgf	Granite of Grasshopper Flat
Jdm	Granodiorite of Doe Meadow
Jwc	Granite of Window Cliffs

GRANITOID ROCKS (EASTERN REGION)

Klw	Granite of Little Whitney Meadow
Kw	Whitney Granodiorite
Kib	Intrusion Breccia of Timosea Peak
Kp	Paradise Granodiorite

GRANITOID ROCKS (EASTERN REGION (CONT'D))

Kcc	Granite of Carroll Creek
Krr	Granodiorite of Redrock Meadow
Kop	Alaskite of Olancha Peak
Jawc	Alaskite of Window Cliffs
Jwc	Granite of Window Cliffs (patterned area is a mafic phase)
Jkp	Alaskite of Kern Peak
Jsm	Granodiorite of Schaeffer Meadow

IGNEOUS ROCKS (OF UNCERTAIN TEMPORAL & GENETIC AFFINITIES)

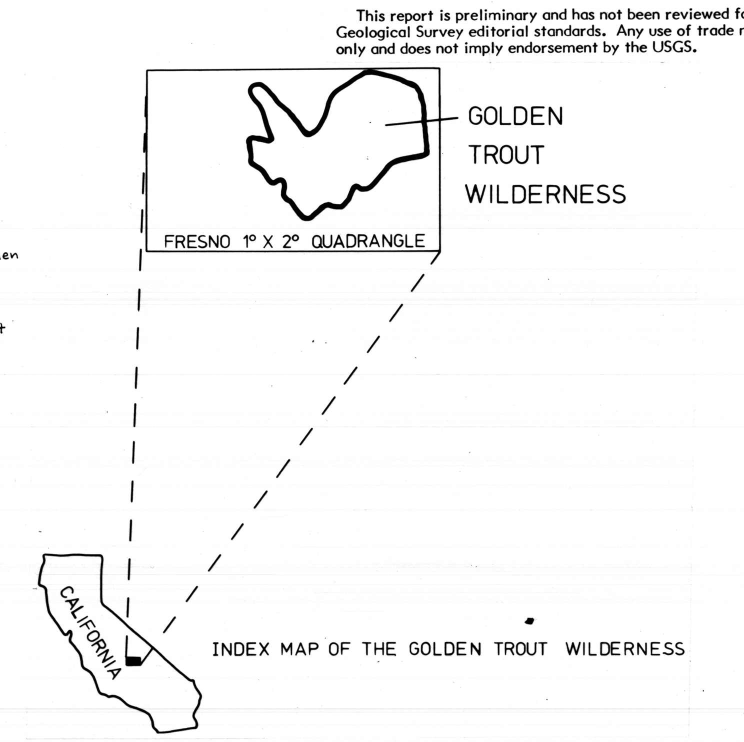
Kap	Aplite
KJm	Mafic Plutonic Rock
KJgd	Granodiorite

METAMORPHIC ROCKS

Mzms	Metasedimentary Rocks
Mzm	Metamorphic Rocks, Undifferentiated
Mzmv	Metavolcanic Rocks

Boundary of Golden Trout Wilderness
Geologic Contact
Fault

(Geology from duBray and Dellinger, 1981)



INDEX MAP OF THE GOLDEN TROUT WILDERNESS

Studies Related to Wilderness

The Wilderness Act (Public Law 88-577, Sept. 3, 1964) and related Acts require the U.S. Geological Survey 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 geochemical survey of the Golden Trout Wilderness, California.

Table 1. Statistical summary of Pb concentrations.

*Detection Ratio	1.00
Geometric Mean (ppm)	37
Geometric Deviation (ppm)	2.1
Expected Range for 95% of Data (ppm)	8.1-171
Arithemitic Mean	50

*Number of uncensored values divided by the total number of samples

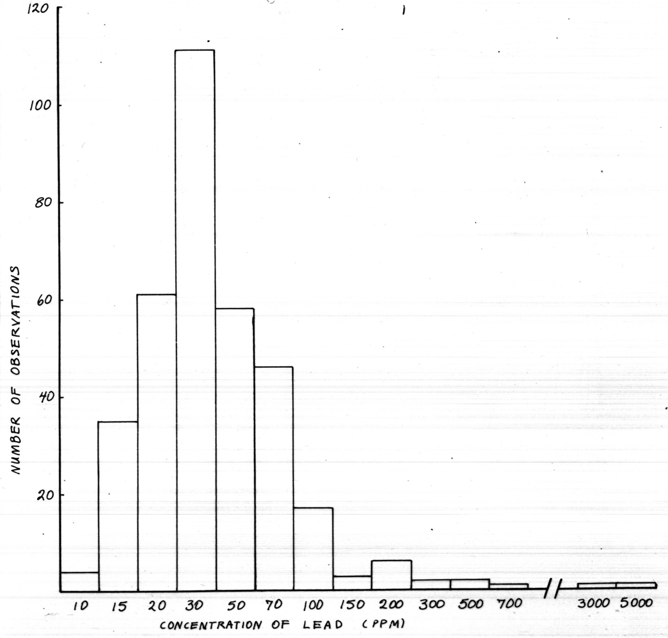


FIGURE 1: HISTOGRAM OF LEAD IN HEAVY MINERAL CONCENTRATES