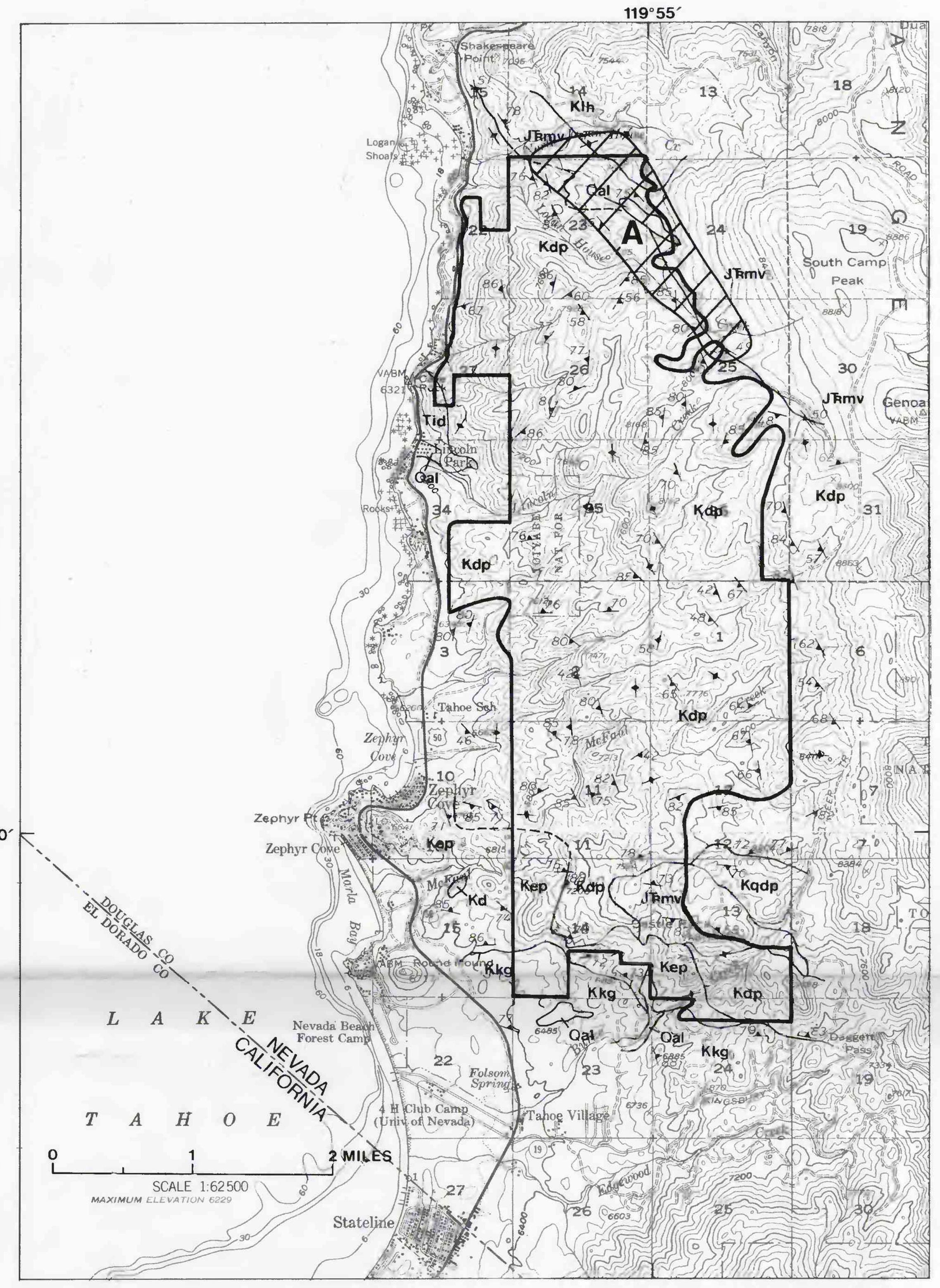
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF-1545



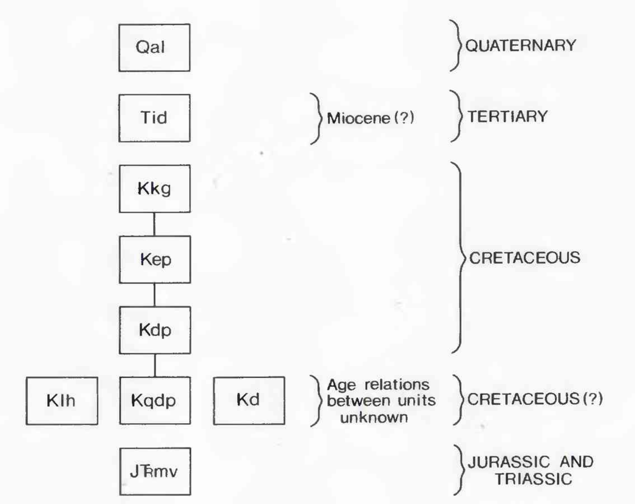
Base from U.S. Geological Survey Carson City, Freel Peak, 1956

Geology mapped by D. A. John, R. A. Armin, and S. J. Krohn, 1983; and from Armin and John (1983)

EXPLANATION

(A) AREA OF LOW POTENTIAL FOR SKARN-TYPE TUNGSTEN RESOURCES

CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS[1]

Qal ALLUVIUM, UNDIVIDED (QUATERNARY)

Tid INTRUSIVE DACITE (MIOCENE?)--Porphyritic dacite dike containing 5- to 7-mm phenocrysts of plagioclase, hornblende, and biotite in a microcrystalline groundmass

Kkg GRANODIORITE OF KINGSBURY GRADE (CRETACEOUS)--Medium-grained hornblende-biotite granodiorite characteristically containing 5 to 10 percent large (7-10 mm) anhedral biotite flakes

Kep GRANODIORITE OF EAST PEAK (CRETACEOUS)--Fine- to medium-grained well-foliated hornblende-biotite granodiorite commonly containing small (0.5- to 1.5 cm-long) poikilitic potassium feldspar phenocrysts, acicular hornblende crystals as long as 15 mm, and abundant fine-grained sphene

Kdp GRANODIORITE OF DAGGETT PASS (CRETACEOUS)--Medium- to coarse-grained, well foliated hornblende-biotite granodiorite. Hornblende crystals commonly have relict clinopyroxene cores

Klh GRANODIORITE OF NORTH LOGAN HOUSE CREEK (CRETACEOUS?)--Fine-grained sparsely porphyritic hornblende-biotite granodiorite with small (3-5 mm) phenocrysts of potassium feldspar and hornblende with clinopyroxene cores

Kqdp QUARTZ MONZODIORITE NORTH OF DAGGETT PASS (CRETACEOUS?)--Medium-grained locally strongly foliated hornblende-biotite quartz monzodiorite and quartz diorite

Kd DIORITE (CRETACEOUS?)--Fine-grained biotite-hornblende diorite

JTRmv METAVOLCANIC ROCKS (JURASSIC AND TRIASSIC)--The pendant at the north end of the roadless area consists of biotite-hornblende amphibolite, biotite schist and hornfels, and muscovite-biotite-quartz-feldspar schist probably derived from andesitic pyroclastic rocks and volcaniclastic sediments. The pendant underlying Castle Rock consists of rhyolitic pyroclastic rocks metamorphosed to amphibolite grade

[1]Plutonic rock names based on IUGS modal classification (Streckeisen, 1976).

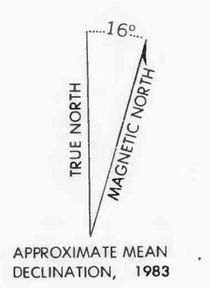
CONTACT --Dashed where approximately located

FOLIATION IN GRANITIC AND METAMORPHIC ROCKS

Inclined

Vertical

APPROXIMATE BOUNDARY OF LINCOLN CREEK ROADLESS AREA



APPROXIMATE MEAN DECLINATION, 1983

AREA OF MAP

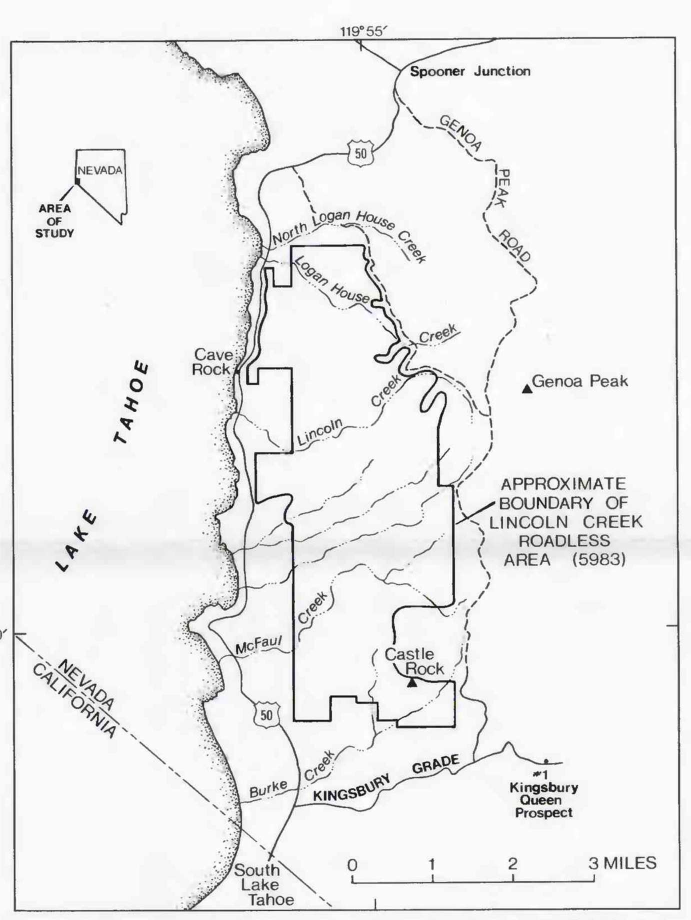


Figure 1.--Index map of the Lincoln Creek Roadless Area (5983) and vicinity, Douglas County, Nevada.

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 Lincoln Creek Roadless Area in the Toiyabe National Forest, Douglas County, Nevada. Lincoln Creek Roadless Area (5983) was classified as a further planning area during the Second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service, January 1979.

SUMMARY

The Lincoln Creek Roadless Area has low potential for skarn-type tungsten resources in area A (map), as indicated by the presence of geochemical anomalies; however, geologic evidence, the generally weak concentration of anomalous elements, and the lack of claim activity all suggest only a low potential in this area. No other mineral resources, and no oil, gas, coal, or geothermal resources exist within the roadless area.

INTRODUCTION

The Lincoln Creek Roadless Area (5983) comprises 10.3 mi^2 (26.7 km^2) on the generally heavily forested western slope of the Carson Range overlooking the southeast shore of Lake Tahoe in Douglas County, Nevada. The area is bounded by U.S. Highway 50 on the north and west, by Nevada Highway 19 (Kingsbury Grade) on the south, and by a U.S. Forest Service road on the east (fig. 1). Elevations range from 6,400 ft (1,950 m) at Cave Rock to 8,433 ft (2,570 m) near the east boundary.

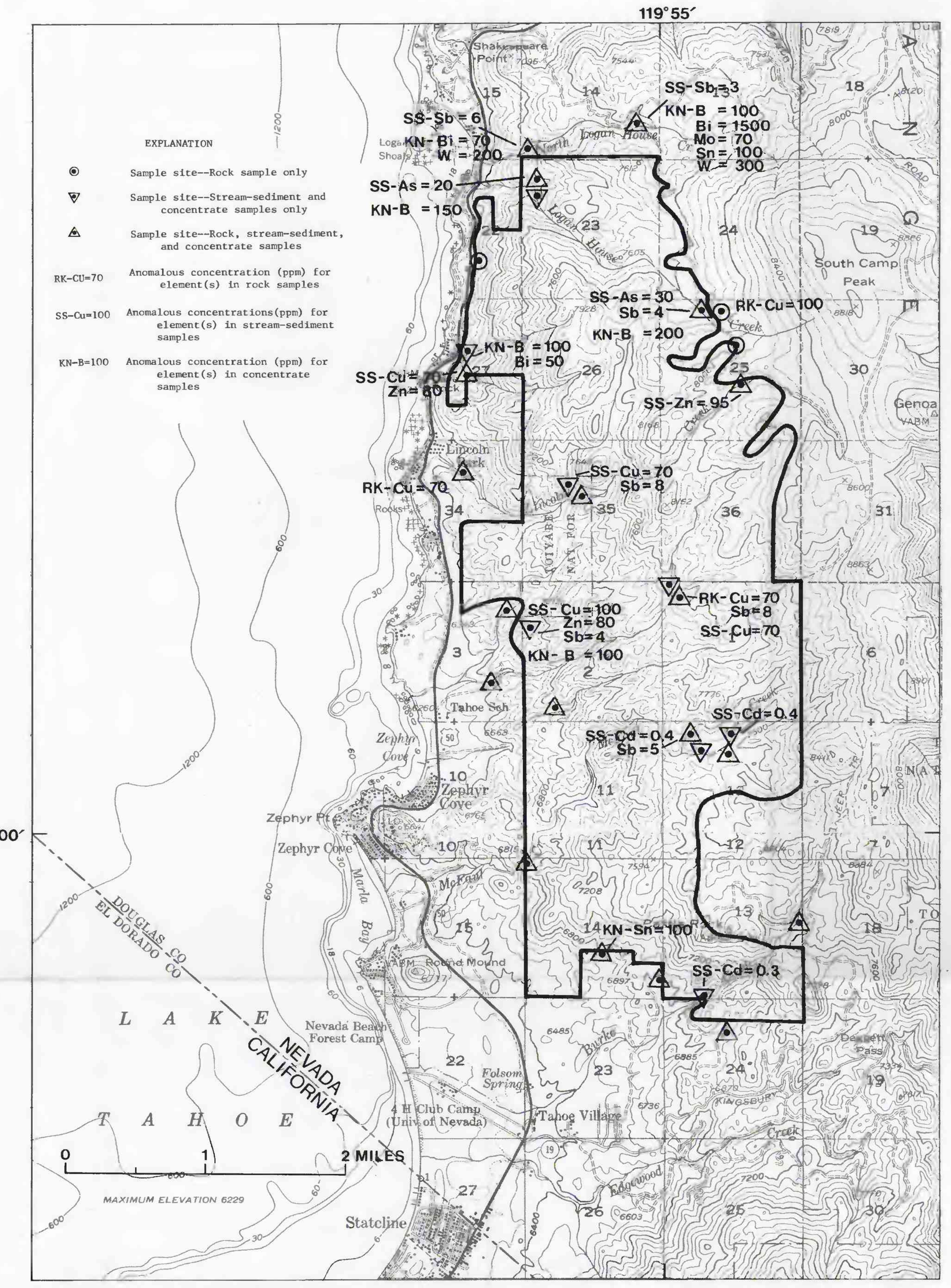


Figure 2.--Map showing anomalous elements and their concentrations in parts per million (ppm) for samples of rock (RK), minus 60-mesh (0.25-mm) stream sediment (SS), and nonmagnetic heavy-mineral concentrate (KN), Lincoln Creek Roadless Area, Douglas County, Nevada. See table 1 for element names and symbols.

GEOLOGIC SETTING

Rocks exposed in the Lincoln Creek Roadless Area consist predominantly of Late Cretaceous granitic rocks of the Sierra Nevada batholith. More than three-quarters of the area is underlain by the granodiorite of Daggett Pass, a medium- to coarse-grained hornblende-biotite granodiorite that is about 92 million years old (Armin and John, 1983). Small parts of four other plutons extend into the area near the southern and northern boundaries.

The granitic rocks intrude two pendants or septa of metavolcanic rocks of Triassic and Jurassic age. The northern pendant consists mainly of andesitic pyroclastic and volcaniclastic rocks that have been metamorphosed to biotite-hornblende amphibolite and biotite schist. Most of this pendant is exposed east of the roadless area and covers about 11.5 mi^2 (30 km^2). Moore (1969) assigned this pendant a Triassic and Jurassic age. The pendant underlying Castle Rock, near the southern boundary of the area, consists of metamorphosed rhyolitic rocks (Bonham and Burnett, 1976).

A dike of biotite-hornblende dacite intrudes the granodiorite of Daggett Pass at Cave Rock. This dike is the only evidence within the roadless area of the volcanic activity that pervaded much of the northern and central Sierra Nevada in late Tertiary time. More extensive exposures of Tertiary volcanic rocks occur about 1 mi (1.6 km) north of the area near Shakespeare Point and farther north across U.S. Highway 50.

Thin deposits of Quaternary alluvium form the valley floors of some of the major stream drainages within the area.

GEOCHEMICAL STUDIES

A total of 21 rock, 27 minus-60-mesh (0.25-mm) stream sediment, and 27 nonmagnetic heavy-mineral concentrate samples were processed for the geochemical investigation of the Lincoln Creek Roadless Area. All samples were analyzed for 31 elements using a six-step semiquantitative emission spectrographic method (Grimes and Marranzino, 1968). The rock and stream-sediment samples were also analyzed for five elements by atomic absorption spectrometry using a modification of the method of Viets (1978).

Two elements (copper and antimony) in the rock samples were selected as having anomalous concentrations that might be related to mineralization; in a similar manner, five elements (antimony, arsenic, cadmium, copper, and zinc) for the stream-sediment samples, and five elements (boron, bismuth, molybdenum, tin, and tungsten) for the concentrate samples were selected as possibly being related to mineralization. Anomalous concentrations for selected elements are shown by location in figure 2. On the basis of a technique called SCORESUM (Chaffee, 1983), anomalous concentrations for the individual selected elements in each sample were assigned anomaly scores (table 1) and these scores were then summed for each sample type at each site. The resulting Scoresums for the stream sediment and concentrate samples are listed by drainage basin on a geologic base map of the roadless area (fig. 3).

Geochemical anomalies

Scattered and generally weak geochemical anomalies are present in both stream-sediment and concentrate samples in a number of different drainage basins (fig. 3). The most significant anomaly is in North Logan House Creek in the northern part of the roadless area, where anomalous concentrations of antimony are present in the stream-sediment samples and anomalous concentrations of boron, bismuth, molybdenum, tin, and tungsten are present in one or both of the concentrate samples (fig. 2). This area is underlain by Mesozoic volcanic rocks that have been intruded and metamorphosed by the Cretaceous granodiorite of Daggett Pass. The anomalous element suite in the North Logan House Creek drainage is compatible with a contact-metasomatic (skarn) tungsten-deposit environment; however, the generally low element concentrations suggest only a very low potential for such a deposit. A similar statement can be made for the anomaly present in the upper part of the Logan House Creek drainage.

Sources of the other anomalies scattered throughout the roadless area are unknown. These anomalies are associated predominantly with the granodiorite of Daggett Pass, and none is thought to indicate any important mineral resource potential.

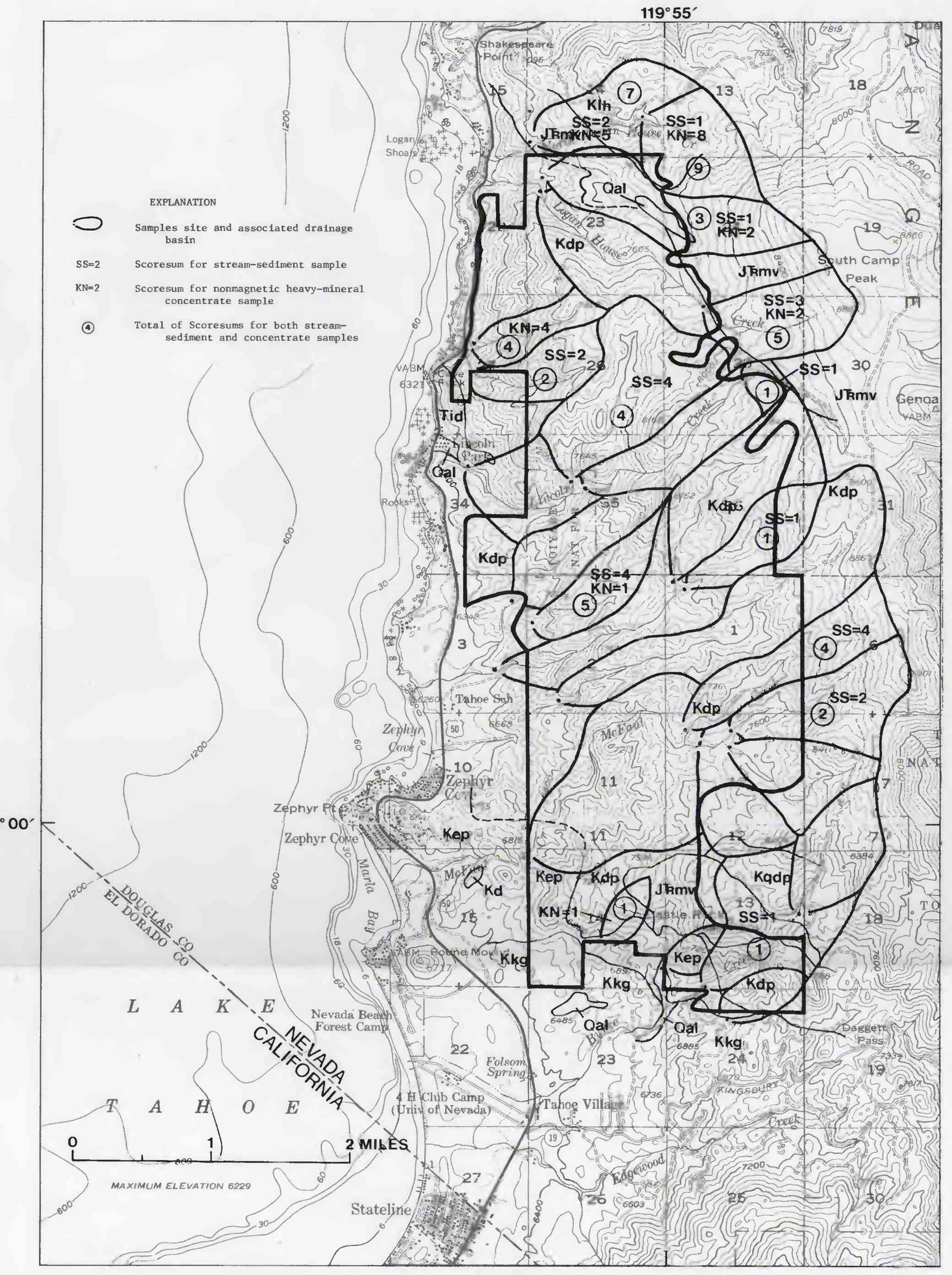


Figure 3.--Map showing Scoresums by drainage basins for samples of minus 60-mesh (0.25-mm) stream sediment (SS) and nonmagnetic heavy-mineral concentrate (KN), Lincoln Creek Roadless Area, Douglas County, Nevada. See text and table 1 for further explanation.

PROSPECTS AND MINERALIZED AREAS

Exploration and mining activity began in the Sierra Nevada as early as 1850, with the first recorded activity near the Lincoln Creek Roadless Area in 1901. The Genoa mining district, 3 mi (5 km) east of the roadless area, was organized in 1860. Results of prospecting for gold, silver, and copper in this district were discouraging (Smith and Vanderburg, 1932).

No claims have been located within the roadless area. Twelve claims were located near Spooner Junction (fig. 1) in 1901 for gold, and several claims were located along Kingsbury Grade in the 1950's for uranium. No visible signs of mining activity were observed during field investigations, and no production has been recorded.

The U.S. Bureau of Mines examined the Kingsbury Queen prospect located about 1.25 mi (2 km) southeast of the roadless area on Kingsbury Grade (No. 1, fig. 1). The Kingsbury Queen prospect is located on a 15-ft (4.6-m)-wide radioactive pegmatite dike that trends N. 15° E. and dips 25° SE. One sample of the dike contained <0.001 percent uranium oxide (U_3O_8). No radioactive pegmatite dikes were found in the study area.

Five rock samples and 11 placer samples were analyzed by the U.S. Bureau of Mines. The rock samples contained no anomalous quantities of gold, silver, or copper. One placer sample from an unnamed stream near Zephyr Cove contained 11 cents gold per yd^3, and another sample from North Logan House Creek contained 4 cents gold per yd^3 (at $400 per troy oz gold). The low gold values and small volumes of gravel suggest that these do not constitute a resource. The nine other placer samples from major drainages contained no gold.

ASSESSMENT OF MINERAL RESOURCE POTENTIAL

The Lincoln Creek Roadless Area has low potential for tungsten resources in area A, at the north end of the roadless area. Geochemical anomalies suggest that skarn-type tungsten mineralization may occur in the metamorphic septum between the granodiorites of Daggett Pass and North Logan House Creek in area A. However, the lack of known tungsten mineralization, the lack of known suitable host rocks for skarn mineralization in the metamorphic rocks, the lack of claim activity, and the generally weak geochemical anomalies suggest that only a low potential exists for tungsten resources in this area. No other mineral resources were identified by this study, and no oil, gas, coal, or geothermal resources exist within the study area.

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Table 1.--Summary of background and anomaly ranges for 21 rock samples and of background ranges and anomaly scores for selected anomalous elements in 27 -60-mesh stream sediment, and 27 nonmagnetic heavy-mineral-concentrate samples, Lincoln Creek roadless Area, Nevada.
[All concentrations are in parts per million. aa, atomic-absorption analysis; all other analyses are spectrographic. N, not detected at the lower limit of determination shown in parentheses; --, no samples in that category]. See figure 4 for location of anomalies].

Element	Background data: Range of values (ppm)	Background data: Percent of samples with background values	Anomaly data: Anomaly score=1 (ppm)	Anomaly data: Anomaly score=2 (ppm)	Anomaly data: Anomaly score=3 (ppm)
Rock samples					
Copper (Cu)	<5-50	96	70-100	--	--
Antimony (Sb)-aa	N(1)-1	96	8	--	--
Stream-sediment samples					
Copper (Cu)	15-50	85	70	100	--
Arsenic (As)-aa	N(10)-10	93	20	30	--
Zinc (Zn)-aa	15-75	86	80-95	--	--
Cadmium (Cd)-aa	N(0.10)	86	0.3	0.4	--
Antimony (Sb)-aa	N(1)-2	71	3-4	5-6	8
Heavy-mineral-concentrate samples					
Boron (B)	20-70	82	100	150-200	--
Bismuth (Bi)	N(20)	89	--	--	50-1,500
Molybdenum (Mo)	N(10)-20	96	70	--	--
Tin (Sn)	<20-70	93	100	--	--
Tungsten (W)	N(100)-100	93	200	300	--

Explanatory pamphlet accompanies map

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

MINERAL RESOURCE POTENTIAL MAP OF THE LINCOLN CREEK ROADLESS AREA, DOUGLAS COUNTY, NEVADA

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1983