

Figure 1.—Index map showing location of the Snowbird Roadless Area, the Ducktown, Fontana, and Hazel Creek mines, and references to published geologic mapping in adjacent areas.

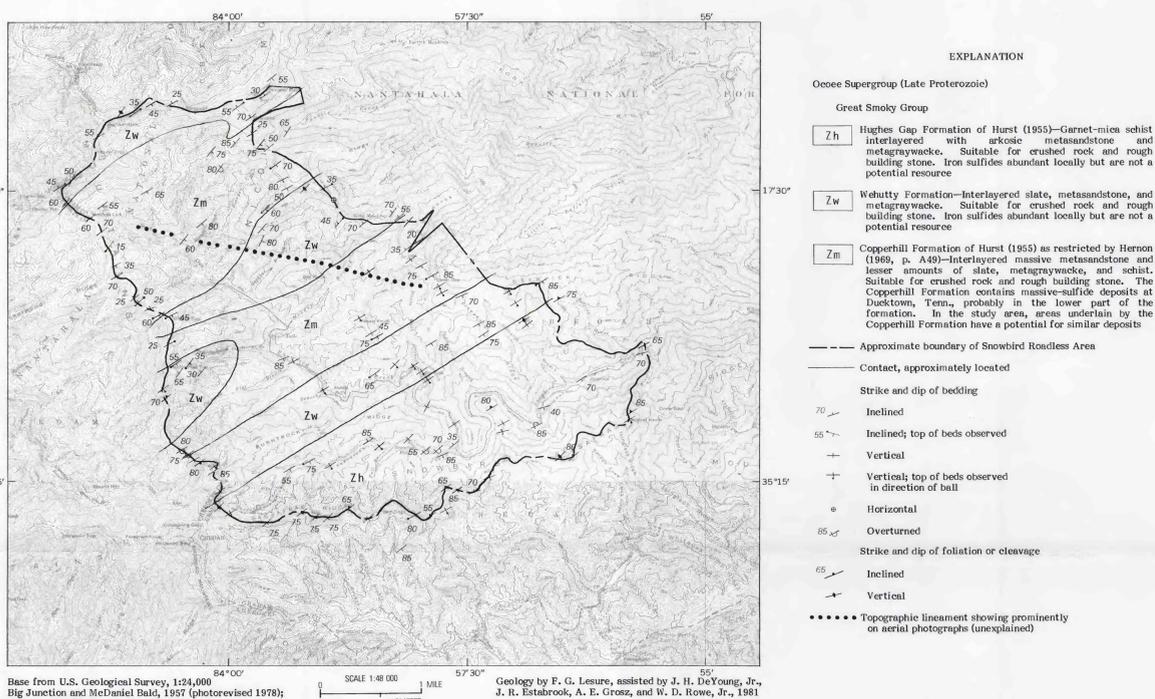


Figure 3.—Geologic map describing mineral resource potential for each geologic unit in the Snowbird Roadless Area.

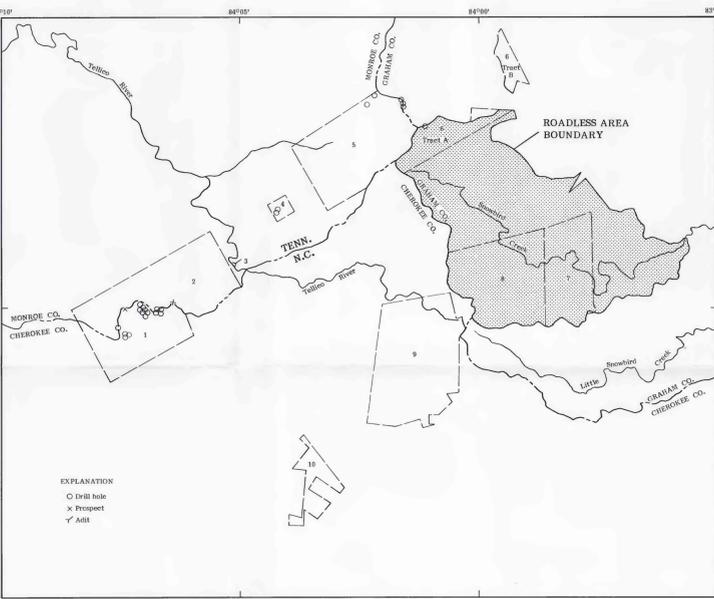


Figure 2.—Map showing base- and precious-metal prospects and prospect permit areas. See table 1 for details.

Table 1.—Base- and precious-metal prospecting in and near the Snowbird Roadless Area

[Data from files of U.S. Bureau of Land Management (BLM); Cities Service Co., Copperhill, Tenn.; and Cohen (1944). Localities shown in figure 2.]

Prospect permit area name and locality number	BLM lease or application no.	Size in acres	Status	Commodity	Description of work
1) Beaverdam Bald, NC	A-024390	1220	Permit relinquished 1954	Cu, Fe, Zn	Dip-needle magnetic survey, 1930-31; Hotchkiss Superdip magnetic survey and core drilling (13 holes totalling 3,812 ft, maximum 500 ft); prospect includes Title-Woodbury and Davis tracts.
2) Beaverdam Bald, TN	A-024399	1730	do	Cu and other metal sulfides	Dip-needle magnetic survey, 1930-31; two small prospect pits dug by T. J. McDonald, Coker Creek, Tenn., 1938-40; Hotchkiss Superdip magnetic survey and core drilling (2 holes, 329 ft and 285 ft) in early 1950's. Prospect pits in thin gossan derived from disseminated amounts of massive iron sulfides in dark slate.
3) Unnamed adit	--	--	--	Probably Cu and other metal sulfides	Adit, 25 ft, opened probably before 1930
4) Ellis Tunnel	A-024856	92	Permit relinquished 1954	Cu and other metal sulfides	180-ft adit opened prior to 1930; dip-needle magnetic survey, 1930-31; Hotchkiss Superdip magnetic survey and core drilling (2 holes, 300 ft and 212 ft), early 1950's. Prospect pits in thin gossan derived from disseminated amounts of massive iron sulfides.
5) Haw Knob Prospect	A-024857	1900	do	do	Dip-needle magnetic survey, 1930-31; Hotchkiss Superdip magnetic survey and core drilling (6 holes totalling 2000 ft, maximum 500 ft), early 1950's. Core in 4 holes consists of interlayered dark slate, metagraywacke, and metasediments containing disseminated amounts of massive iron sulfides.
6) Big Junction Prospect	A-24858	Tract A 543.6 Tract B 227.7	do	Cu, Fe, Zn	Dip-needle magnetic survey, 1930-31; Hotchkiss Superdip magnetic survey and core drilling (2 holes, 300 ft and 212 ft), early 1950's. 500 acres of tract A is in Snowbird Roadless Area.
7) Unnamed prospect	ES-28274	1252.68	Permit request filed 6/14/81; not issued as of 9/9/82	Cu, Pb, Zn, Au, Ag	Includes U.S. Tract N-3561 and south-east part of Tract N-252-J.
8) Unnamed prospect	ES-28273	1895	do	do	Includes southwest part of U.S. Tract N-252-J.
9) Unnamed prospect	ES-28269	2502.84	do	do	Includes part of Nature Conservancy Tract N632-3
10) Unnamed prospect	ES-28273	401	do	do	Includes U.S. Tract 796-3

Exploration by Tennessee Copper Co., Knoxville, Tenn.
Exploration by Tennessee Corp., Knoxville, Tenn.
Exploration by Gulf Oil Corp., Denver, Colo.

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 discusses the results of a mineral resource potential survey of the Snowbird Roadless Area (08-061), Nantahala National Forest, Graham County, North Carolina. The area 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 Snowbird Roadless Area includes 8490 acres of rugged wooded terrain in the Nantahala National Forest, Graham County, N.C. The area is underlain by folded metasedimentary rocks of the Great Smoky Group of Late Proterozoic age, and has a low potential for mineral resources. Abundant stone suitable for rough building stone and crushed rock is the only identified mineral resource. Undiscovered oil and gas and massive-sulfide deposits might be in the subsurface, but the likelihood of their occurrence is unknown. All surface and mineral rights are under Federal ownership.

Gold, silver, and uranium are present in trace amounts in some of the rocks in the area, but the potential for finding minable concentrations of these elements is low.

INTRODUCTION

The Snowbird Roadless Area includes all of the drainage basin in the upper reaches of Snowbird Creek and its tributaries for about 11 mi upstream from the parking lot at Junction, which is about 5.5 mi by gravel road from the intersection of Snowbird and Little Snowbird (fig. 1). The area contains about 8490 acres of rugged ridges and narrow stream valleys in the Unicoi Mountains of southwestern North Carolina, about 6.5 mi west of Robbinsville, Graham County, N.C.

The Federal Government owns all surface and mineral rights for the study area. Recent oil and gas lease applications filed with the U.S. Bureau of Land Management include the entire roadless area. None had been approved as of July 1981. A base-metals prospecting permit (BLM-A-024858) covering 500 acres of the northern part of the study area was relinquished in 1954 after preliminary exploration. Two base- and precious-metals prospecting permits, which are in the Snowbird Roadless Area (fig. 2 and table 1), have been applied for by Gulf Oil Corp., Denver, Colo.

GEOLOGY

The Snowbird Roadless Area contains garnet-grade metasedimentary rocks of the Great Smoky Group of Precambrian (Late Proterozoic) age (Lesure, in press [a, b]). These rocks are divided into three mapping units (fig. 3) that are tentatively correlated with units to the south described by Hurst (1955) and Heron (1965). The oldest unit consists of 2000 ft or more of metasediments interlayered with lesser amounts of dark-gray slate, mica schist, and metagraywacke, which may correlate with the Copperhill Formation of Hurst (1955) as restricted by Heron (1969, p. A49). The amounts of dark-gray graphitic or carbonaceous slate and metagraywacke increase upward as this unit grades into the overlying Whetty Formation. The youngest unit of the Great Smoky Group in the study area consists of several thousand feet of garnet-mica schist and interlayered metasediments and metagraywacke probably correlated with the Hughes Gap Formation of Hurst (1955). The metasedimentary rocks of the Snowbird area are folded

and have a well-developed cleavage or foliation. No obvious large-scale faulting was observed. Several relatively broad upright to slightly overturned folds trend northeast across the northern part of the area and plunge to low angles either northeast or southwest.

GEOCHEMICAL SURVEY

The U.S. Geological Survey (USGS) made a reconnaissance geochemical survey of the Snowbird Roadless Area (Lesure, in press [b]) to test for indistinct or unexposed mineral deposits that might be recognized by their geochemical halo or by the patterns formed by the distribution of trace elements. Similar geochemical surveys based on trace-element analysis have been credited with the discovery of many types of mineral deposits (Hawkes and Webb, 1962). Analyses of the samples collected suggest that the rocks in the area contain generally normal amounts of the 32 elements for which they were tested. The analytical data are not indicative of any areas of potential metallic-mineral resources.

The metals cobalt, copper, lead, and zinc, commonly associated with massive-sulfide deposits like those at Ducktown, Tenn., are present in normal concentrations in samples from the Snowbird Roadless Area. Uranium is present in amounts ranging from less than 0.05 parts per million (ppm) U to 3.5 ppm U, which is about average for the rock types in the area.

MINERAL PROSPECTING

Prospecting has been active in and near the Snowbird Roadless Area during the last 50 years (table 1), but no mining has been done there (Chatman, 1982, p. 8). The roadless area was included in a program of systematic prospecting for metal-sulfide deposits by reconnaissance magnetic surveying in 1930-31 and by further magnetic surveying, supplemented by core drilling, in the early 1950's. The surveys were conducted between the Fontana mine and Ducktown by the Tennessee Copper Co. and the Tennessee Corp. This work outlined magnetic anomalies related to minor concentrations of magnetite in graphitic slate at the north end of the Snowbird Roadless Area and on lands to the north and west. Analyses of mineralized rock from the cores show that sulfur content does not exceed 7.5 percent and copper content does not exceed 0.11 percent. The exploration program was abandoned in 1954. Recently, Gulf Oil Corp. conducted geophysical and geochemical exploration on several areas in the region and has applied for prospecting permits on four areas in and near the Snowbird Roadless Area (fig. 2 and table 1).

MINERAL RESOURCE POTENTIAL

Stone suitable for use as rough building stone and crushed rock is the only identified mineral resource in the Snowbird Roadless Area (fig. 3). Similar stone, however, is abundant throughout the region in areas where it is more readily available.

A potential for oil and gas exists but is untested. Oil and gas lease applications have been made for much of the National Forest land in western North Carolina, including all of the roadless area. Although no anomalous concentrations of metals were found in the geochemical studies, the Copperhill Formation, which is the host rock of massive-sulfide deposits at Ducktown, may contain analogous deposits at depth within the study area. This potential has not been tested. Deposits of gold, silver, or uranium are unlikely.

Oil and Gas

Recent seismic studies indicate that the Blue Ridge of North Carolina contains a thick sequence of younger sedimentary rocks beneath the metamorphosed rocks exposed at the surface (Cook and others, 1979;

Harris and others, 1981). This inverted rock sequence is the result of thrusting of the old metamorphic rocks westward at least 100 mi over the younger rocks, which have an unknown potential for oil and gas (Harris and others, 1981, p. 2504; Hatcher, 1982, p. 980). The Snowbird Roadless Area is 14 mi south of an exposure of some of the younger sedimentary rocks in a window or hole eroded through the thrust fault, and is 15 mi southeast of the eroded western edge of the thrust plate of older rocks. Further seismic work and deep exploratory drilling are needed to evaluate the oil and gas potential of the western edge of the overthrust belt of which the Snowbird area is a part.

The potential for oil and gas accumulations in the younger sedimentary rocks buried beneath the thrust sheet has resulted in speculative leasing (Cook and others, 1980). Oil and gas lease applications have been filed on 228,000 acres in western North Carolina including the entire Snowbird Roadless Area.

Massive-Sulfide Deposits

The Snowbird area lies between the massive-sulfide deposits of Ducktown, Tenn., and the Fontana copper mine, Swain County, N.C. (fig. 1). The Copperhill Formation, exposed in the northern half of the study area, is the host rock of the massive-sulfide deposits at Ducktown. The metasedimentary rocks that contain the ore at the Fontana and Hazel Creek mines are part of a phyllite or slate unit that may also correlate roughly with the Copperhill Formation. Regional mapping by Heron (1968) and detailed work by the Tennessee Copper Co. (Magee, 1968, p. 218-219) suggest that the Ducktown deposits are stratigraphically several thousand feet below the contact between the Copperhill and the overlying Whetty Formation. Similarly, the phyllite at the Fontana and Hazel Creek mines also may be stratigraphically low. Although only the upper part of the Copperhill is exposed in the Snowbird Roadless Area, the area must be considered to have a potential for massive-sulfide deposits at depth even though our geochemical sampling does not show anomalous amounts of the metals commonly associated with such deposits. Detailed geophysical studies might be of use in evaluating the potential for massive-sulfide deposits at depth.

Gold, Silver, and Uranium

Gold is a widespread trace element in rocks of the Ocoee Supergroup in southwestern North Carolina and southeastern Tennessee (Lesure and others, 1979, p. 23-27; Slack and others, 1979, p. 24-28; Hale, 1974). Small deposits of gold have been mined in the Coker Creek district of Tennessee (Hale, 1974) and along the Valley River in Cherokee County, N.C. (Blake, 1869; Nitze and Hanna, 1956, p. 192-193). The rocks of the Coker Creek district have been correlated with the Snowbird Group, which is older than the Great Smoky Group (Merschhat and Hale, in press); the rocks along the Valley River are part of the Murphy Syncline and are younger than the Great Smoky Group (Hart, 1955; Keith, 1907). Only small placer deposits and isolated traces of gold have been reported from rocks of the Great Smoky Group. Small amounts of gold were recovered in the late 19th century from placers along Long Hungry Branch and West Buffalo Creek near Santeetlah Lake, about 5 mi northeast of the Snowbird Roadless Area (John Parris, *The Asheville Citizen*, April 23, 1882). U.S. Mint records show a production of 9.954 oz gold and 1.42 oz silver in 1896 and 4.419 oz gold and 0.39 oz silver in 1897 from Graham County, N.C., the first and only recorded production for the county between 1880 and 1978 (Arday, 1888, p. 181-187; Clanton, 1886, p. 191-199; J.H. DeYoung, Jr., USGS, oral commun., 1982). Most of the recorded gold production from rocks of the Great Smoky Group, however, is by-product gold recovered from the massive-sulfide deposits at the Ducktown, Fontana, and Hazel Creek mines, all of which contain traces of gold and silver. The average grade of ore mined at the Fontana mine, 1931-1942, was 7.37 percent copper, 2.11

percent zinc, 0.0072 oz gold per ton (0.2 ppm), and 0.385 oz silver per ton (13 ppm) (Espenshade, 1965, p. 128).

Only two samples out of the 295 collected by the USGS in the Snowbird Roadless Area contain detectable gold, and only three samples have traces of silver (Erickson and others, 1983). Thirteen rock samples collected by the U.S. Bureau of Mines contain detectable gold and 20 contain detectable silver (Chatman, 1982, p. 13-14). None of the panned concentrates contain visible gold. The gold and silver potential in the study area is low.

The graphitic slate of the Whetty Formation is slightly more radioactive than the other rocks in the study area. Traverses made using hand-held four-channel gamma-ray scintillometers showed consistent readings of 15 to 30 counts per second (cps) in areas of metasediments, 25 to 40 cps in areas of mica schist, and 30 to 50 cps in areas of graphitic slate. Analyses of slate from areas having higher background readings show a range in uranium content from 1 to 6 ppm and a thorium content that does not exceed 22 ppm. The potential for uranium deposits in the Snowbird Roadless Area is low.

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MINERAL RESOURCE POTENTIAL MAP OF THE SNOWBIRD ROADLESS AREA, GRAHAM COUNTY, NORTH CAROLINA

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