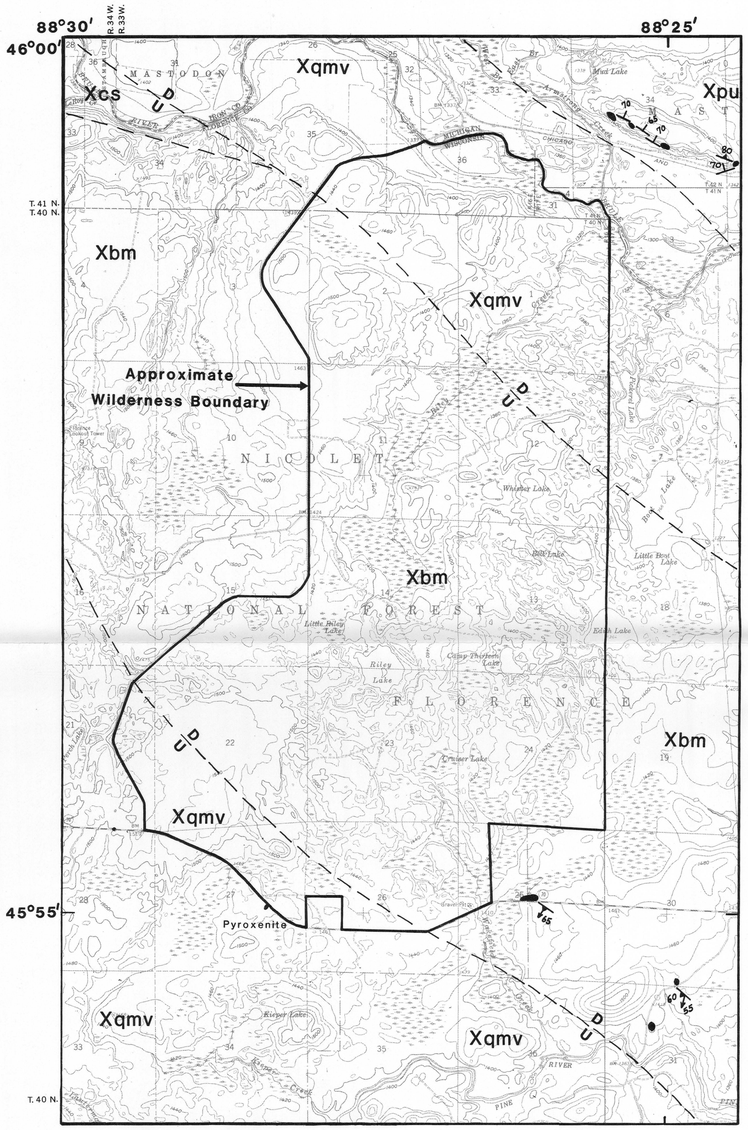
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF-1583



EXPLANATION OF MAP UNITS

Xpu	EARLY PROTEROZOIC
Xbm	
Xqmv	
Xcs	

DESCRIPTION OF MAP UNITS

Xpu Paint River Group (undivided)—Mainly slate and graywacke with interlayered iron-formations

Xbm Michigamme Formation—Mainly slate and quartz graywacke; some volcanic flows, pyroclastic rocks, iron-formation, and quartzitic conglomerate

Xqmv Mafic metavolcanic rocks (time-correlative with the Quinnesec Formation and similar-age volcanic rocks)—Chiefly amphibolite and hornblende schist. Southern belt contains minor felsic metavolcanic and metasedimentary rocks, and locally has small ultramafic and gabbroic bodies

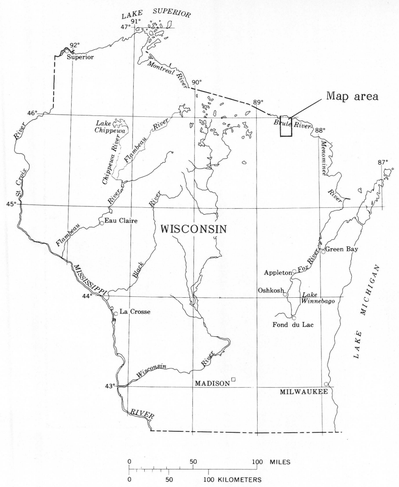
Xcs Saunders Formation—Silica rock (silicified dolomite), dolomite, and dolomitic slate

D/U Fault, indicating relative displacement. D, downfaulted; U, upfaulted

Strike and dip of bedding

Strike and dip of foliation or layering and plunge of lineation

Outcrop



INDEX MAP

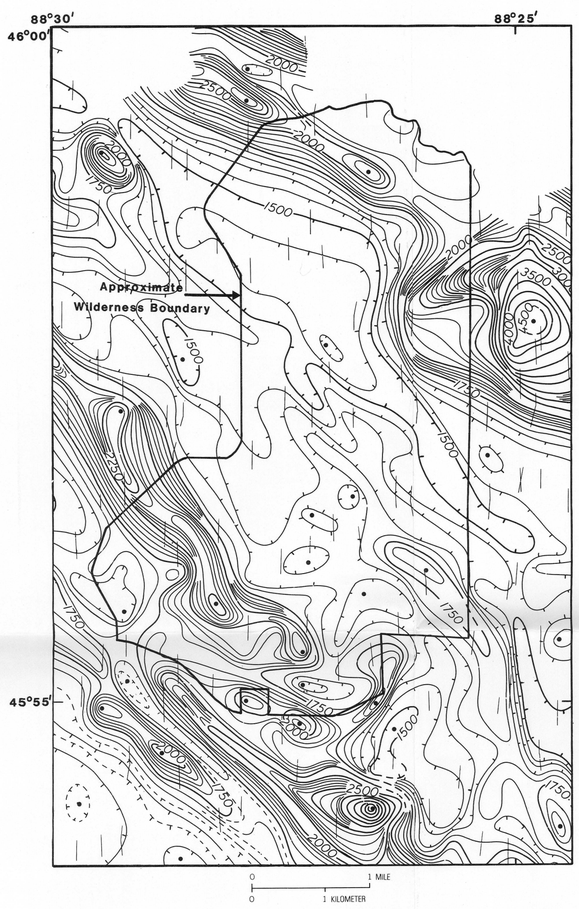


Figure 1.—Aeromagnetic map of the Whisker Lake Wilderness (part of a map by King and others, 1966). Contour intervals 50, 250, and 1,000 gammas in magnetically flat areas. Flight path shown by north-south dashes. Solid circles represent location of measured maximum or minimum intensity within closed high or closed low.

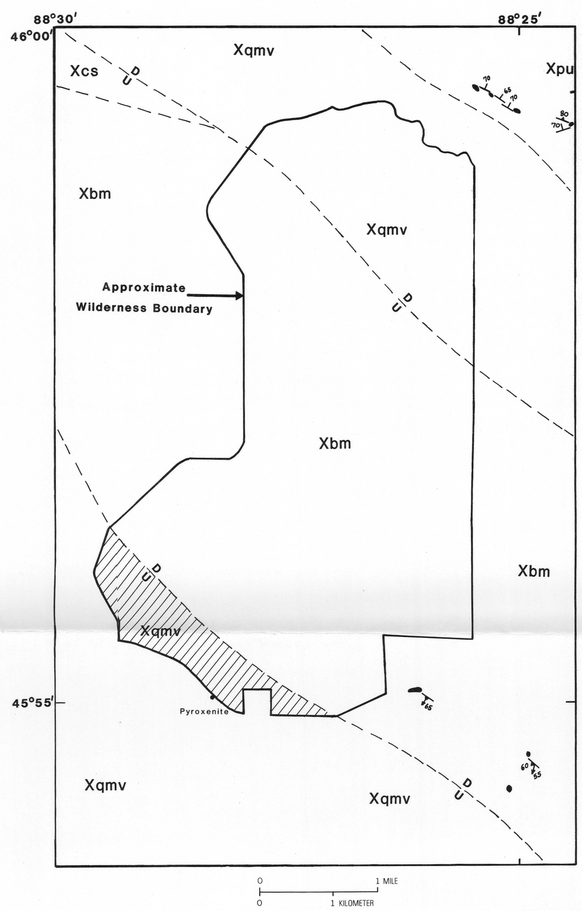


Figure 2.—Mineral resource potential map of the Whisker Lake Wilderness. Hachures show area of probable mineral resource potential within the wilderness.

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 survey of the Whisker Lake Wilderness in the Nicolet National Forest, Florence County, Wisc. The wilderness was established by Public Law 95-494, October 21, 1978.

SUMMARY

The mineral resource potential of the Whisker Lake Wilderness in the Nicolet National Forest, Florence County, northeastern Wisconsin, was evaluated in 1982. The bedrock consists of recrystallized and deformed volcanic and sedimentary rocks of Early Proterozoic age. Sand and gravel are the only identified resources in the Whisker Lake Wilderness. However, the area is somewhat isolated from current markets and both commodities are abundant regionally. The wilderness also has low potential for peat in swampy lowlands. The southwestern part of the wilderness has a low to moderate mineral resource potential for stratabound massive-sulfide (copper-zinc-lead) deposits.

INTRODUCTION

The Whisker Lake Wilderness comprises 6,145 acres of Nicolet National Forest land in Florence County, northeastern Wisconsin, and is about 6 mi west of Florence. State Highway 70 passes along the southern border of the wilderness, U.S. Forest Service road 2150 along the western border, and the Brule River along the northern border. Several forest trails also provide access to the wilderness.

The wilderness lies on the eastern edge of the lake country of northern Wisconsin and contains several small lakes. The area is heavily forested and has a hummocky topography with maximum relief of about 220 ft. Riley Creek flows north into the Brule River from Riley Lake in the south-central part of the wilderness, and Wakefield Creek flows south from the wilderness into the Pine River. The wilderness is covered by glacial outwash and ground moraine deposits, and no bedrock exposures are known to occur within it.

Previous Work

There are no known published reports describing the geology of the study area; however, it is included in the regional compilations of Dutton and Bradley (1970) and Morey and others (1982). The area east of the wilderness was mapped and described by Dutton (1971), and the area to the north by James and others (1968). Aeromagnetic data for the study area were published by King and others (1966).

Present Study

The author, assisted by Nadine Butcher, examined the wilderness in September 1982. No outcrops were found in the wilderness but scattered outcrops do occur nearby to the north, south, and east. Because of the limited bedrock exposure, this study has relied heavily on previous studies in the region. The aeromagnetic data of King and others (1966) were particularly useful in extrapolating formations and larger map units into the study area; however, uncertainties remain and the locations of faults and contacts between units shown on the geologic map may require revision should further data become available.

GEOLOGIC SETTING

The bedrock of the Whisker Lake Wilderness is believed to consist of recrystallized and deformed volcanic and sedimentary rocks which form part of a major volcanic-sedimentary terrane of Early Proterozoic age in northern Wisconsin. The formations have a regional northwest trend and are separated by steeply dipping faults. While layering and foliation generally parallel the regional trend and dip fairly steeply, complex folding has been observed within the units where they crop out to the east (Dutton, 1971) and north (James and others, 1968).

The oldest lithologic unit in the vicinity of the study area is the Saunders Formation, which is projected from outcrops northwest of the area, along and north of the Brule River. Where exposed, this unit consists largely of silica rock (silicrete) derived by silicification of dolomite (James and others, 1968). Dolomite with interlayered slate and dolomitic slate is also present. The Saunders is considered correlative with part of the Chocolay Group of upper Michigan (James and others, 1968).

Underlying the southwestern and northeastern parts of the study area is a sequence of dominantly mafic metavolcanic rocks believed to be at least time correlative with the Quinnesec Formation[1]. Where exposed east of the study area, the rocks consist mostly of amphibolite and hornblende schist in which pillow structures are locally preserved. Minor felsic metavolcanic rocks and metasedimentary units are also present within the southern belt of metavolcanic rocks, southeast of the study area (Dutton, 1971). Small ultramafic and gabbroic bodies are present locally in the southern belt; a small outcrop of pyroxenite is present near the southern border of the wilderness in the southeast quarter of section 27 (see map).

The Michigamme Formation, consisting of a sequence of slate and quartz graywacke, is interpreted to underlie the central part of the study area. East of the study area, the sequence also contains mafic volcanic flows, pyroclastics, iron-formation, and quartzitic conglomerate. Garnet and iron sulfides are locally abundant in outcrops of metasedimentary rock southeast of the study area along the Pine River. Other outcrops occurring southeast of the wilderness, in sections 25 and 31, consist of massive to banded amphibolite, while metasedimentary rocks crop out farther southeast and closer to the southern boundary fault juxtaposing unit Xqmv. The amphibolite probably represents a northwest continuation of the mafic metavolcanic unit within the Michigamme described by Dutton (1971) from the area to the southeast.

The youngest bedrock unit, occurring in the northeastern corner of the map area, is the Paint River Group. It consists of five formations (James and others, 1968), listed from oldest to youngest: (1) Dunn Creek Slate, (2) Riverton Iron-Formation, (3) Hiawatha Graywacke, (4) Stambaugh Formation, and (5) Fortune Lakes Slate. Small exposures of Dunn Creek Slate and Riverton Iron-Formation occur on the south slope of the large hill southeast of Mud Lake.

The wilderness and surrounding area are covered by a variable thickness of glacial outwash sands and gravels, and ground moraine. These were deposited by glacial ice and meltwaters during retreat of the last glacial ice about 10,000 years ago.

[1]It should be noted that mafic metavolcanic rocks in the northeastern portion of the area were correlated with Badwater Greenstone by Dutton (1971). Morey and others (1982) have revised this interpretation and suggested a correlation with the Quinnesec and volcanic rocks of similar age. This latter interpretation is followed here.

MINERAL RESOURCE POTENTIAL

Sand and gravel are the only identified resources in the Whisker Lake Wilderness. However, the area is somewhat isolated from current markets and both commodities are abundant regionally. The area also has low potential for peat in swampy lowlands.

The wilderness is on the southwestern edge of the Menominee iron-bearing district. East of the wilderness, iron ore was mined from several open pits and underground mines near the communities of Florence and Commonwealth until 1932 and briefly again from 1953 to 1960. Iron ore was also previously mined north of the area in the Crystal Falls-Iron River district. No significant iron-bearing units are known in the area of the wilderness, however.

No resources of nonferrous metallic minerals are known in the Whisker Lake Wilderness but the geologic relationships indicate that part of the area is favorable for the occurrence of massive-sulfide deposits. The volcanic rocks of the area are part of a volcanic terrane extending well beyond the wilderness, in which four massive-sulfide deposits of copper, zinc, lead, and precious metals have been discovered in the last 10 years. These deposits are sulfide-rich zones that are parallel to the primary layering of the enclosing rocks and are mostly associated with felsic volcanic rocks. Felsic volcanic rocks are not known in the wilderness; however, present information does not preclude their existence, particularly in the southwestern part of the area.

In the last five years, two areas adjacent to the wilderness, within the volcanic belt that underlies the southwestern corner, have been examined by mining companies. Geophysical surveys were followed by drilling in both areas. However, the results of these exploration efforts are not presently available. About 30 mi southeast of the wilderness, in Marinette County, an uneconomic massive-sulfide deposit consisting largely of pyrrhotite (iron sulfide), and having only trace amounts of base and precious metals, was discovered associated with mafic volcanic rocks (Hollister and Cummings, 1982). Massive-sulfide mineralization consisting of iron sulfide and base-metal sulfides has also been reported from the area of La Salle Falls (Pine Rapids) on the Pine River in Florence County, about 7 mi southeast of the wilderness, at the contact between felsic and mafic volcanic rocks (La Berge, 1983). These occurrences suggest that the volcanic rocks in the southwestern part of the wilderness could host massive-sulfide deposits.

The sedimentary belt (Xbm) in the central part of the wilderness probably has low potential for mineral deposits. Thin, lean iron-formation units occurring to the southeast in the belt were examined in the early 1900's, but no ore-grade material was found (Dutton, 1971). While iron-sulfide mineralization has been observed at scattered localities southeast of the wilderness, particularly near the major fault bounding the southern edge of the belt of sedimentary rocks, there is no evidence at present to suggest an association with a mineral deposit. To date, no mineral deposits have been identified within this sedimentary sequence in Wisconsin or upper Michigan.

On the basis of the features noted above, only the southwestern corner of the wilderness underlain by volcanic rocks is classed as having mineral resource potential. No known metallic mineral deposits exist within the area and further exploration would be required either to prove or disprove their existence. If mineral deposits do exist, they probably would be of the stratabound massive-sulfide type consisting of copper-zinc-lead sulfides.

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GEOLOGIC, AEROMAGNETIC, AND MINERAL RESOURCE POTENTIAL MAPS OF THE WHISKER LAKE WILDERNESS, FLORENCE COUNTY, WISCONSIN

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