

LEGEND

- CENOZOIC**
- PLEISTOCENE AND RECENT**
- 9 Drift
 - 8 Massive, fine- to medium-grained, leucocratic granite, and minor quartz monzonite, granodiorite
 - 7 Massive to slightly foliated, fine- to medium-grained granodiorite and quartz monzonite
 - 6 Porphyroblastic and porphyritic granodiorite, quartz monzonite, and granite
- PRECAMBRIAN**
- 5a Foliated, medium- to coarse-grained quartz diorite, granodiorite, and minor diorite, syenodiorite; 5a, massive
 - 4 Gabbro, diorite, probably of several ages; 4a, ultramafic rocks
 - 3 Iron-formation, interbedded with 1 and 2
 - 2 Sedimentary rocks, derived schists and gneisses; in part probably older than 1; 2a, migmatitic
 - 1 Volcanic rocks, amphibolite, and undifferentiated mafic intrusions; 1a, includes abundant, undifferentiated metasedimentary rocks

- Sand
- Geological boundary (approximate, assumed)
- Bedding, tops known (inclined, vertical)
- Pillowed volcanic layers (inclined, overturned)
- Foliation (inclined, vertical, dip unknown)
- Lineament, structure trend (from aerial photographs)
- Joint (inclined, vertical)
- Glacial striae (direction of ice-movement known)
- Drumlin, drift ridge
- Esker
- Glacial-lake beaches, kame terraces (from aerial photographs)
- Major moraine
- Area of small moraines
- Mine (abandoned)

Geology by Ontario Department of Mines (see references):
J. A. Donaldson, 1960; G. D. Jackson, 1962

Compiled by J. A. Donaldson, 1963

Geological cartography by the Geological Survey of Canada, 1967

- Trail or portage
- Intermittent stream
- Marsh, muskeg
- Falls and rapids
- Contours (interval 100 feet)
- Height in feet above mean sea-level

Base-map compiled and drawn by the Surveys and Mapping Branch, 1963

Magnetic declination 1967 varies from 02°52' easterly at centre of east edge to 05°34' easterly at centre of west edge. Mean annual change, decreasing 0.7'



DESCRIPTIVE NOTES

The map-area can best be reached from Red Lake, 75 miles south of McInnes Lake, or from Pickle Lake, 115 miles southeast of MacDowell Lake. McInnes, Flanagan, Dawson, Roseberry, MacDowell, and Kishikias Rivers are good canoe routes, but few other rivers and streams are navigable. Most waterways in the area belong to the Severn River system which drains northeast to Hudson Bay. Shorelines of Northwind, Cellist, and Whitehorn Lakes are flooded because of two dams on Flanagan River.

Glacial striae record only one major glaciation, with ice-movement towards the southwest. Ground moraine is thick south and east of MacDowell River, and sand outwash covers much of the bedrock in the south-central part of the map-area, but elsewhere outcrops are relatively abundant. Calcareous varved clays occur in low areas north of North Spirit Lake, and particularly good sections are exposed on the shores of Sandy, Favourable, Northwind, and Whitehorn Lakes. Pebbles and cobbles of Palaeozoic limestone are locally abundant in drift near Northwind Lakes and Rathouse Bay.

Meta-basalt and meta-andesite compose most of map-unit 1. They are fine-grained, greyish green to dark green amphibole-plagioclase rocks, commonly containing minor amounts of epidote, sphene, quartz, magnetite, and pyrite. Fine-grained amphibolites, consisting almost entirely of blue-green hornblende, are included in this map-unit. Acid volcanic rocks occur northeast of North Spirit Lake and east of Borthwick Lake.

Schists and gneisses of sedimentary origin are the most abundant rocks of map-unit 2. They consist mainly of quartz biotite, and plagioclase, with or without cordierite and/or garnet. Quartzite, slate, argillite, and conglomerate are abundant south of North Spirit Lake. At least some quartzites were derived from sandstones composed of well-sorted, well-rounded quartz grains cemented by silica and calcite, but shearing has fractured many of the grains and increased the apparent matrix-to-grain ratio so that the rocks resemble greywackes. Graded bedding, crossbedding, and ripple-like structures probably formed by soft-sediment deformation are locally well preserved. Thin beds of crystalline limestone occur west shore of Borthwick Lake, along Setting Net Creek, and on the south shore of Hewitt Lake.

Iron-formation (3) typically consists of alternate magnetite-rich and quartz-rich layers less than 1 cm. thick. Banded ferruginous chert outcrops on the north shore of Hewitt Lake, and many slaty beds within map-unit 2 are slightly magnetic.

Massive, mesocratic to melanocratic, medium- to coarse-grained diorite and gabbro (4) form plugs and sill-like bodies of various ages. Ultramafic rocks (4a) include massive, dark green serpentinite on the east shore of MacDowell Lake and mottled, brown-weathering, greenish black amphibole-serpentine rocks that form sill-like bodies in the vicinity of Hornby Lake.

Of the granitoid rocks, medium- to coarse-grained, grey to pinkish grey quartz diorite, granodiorite, and syenodiorite (5) show the most distinct foliation. These rocks contain 10 to 40% hornblende and biotite, 40 to 60% plagioclase, 0 to 30% potash feldspar, 0 to 20% quartz, and minor apatite and magnetite. Massive, mesocratic to melanocratic, medium- to coarse-grained diorite and gabbro (4) form plugs and sill-like bodies of various ages. Ultramafic rocks (4a) include massive, dark green serpentinite on the east shore of MacDowell Lake and mottled, brown-weathering, greenish black amphibole-serpentine rocks that form sill-like bodies in the vicinity of Hornby Lake.

The rocks of units 5, 6, and 7 show an increase in the potash-feldspar-to-plagioclase ratio, a decrease in mafic content, and (with the exception of 5a) a decrease in intensity of foliation. These trends suggest large-scale granitization, but the existence of at least some granite melt is indicated by the abundance of apite and pegmatite dykes identical in composition to unit 8. Attitudes within the belts of sedimentary and volcanic rocks indicate tight folding about axes generally parallel with the trends of the belts. In the North Spirit belt, where pillows and primary sedimentary structures are well preserved, both north-west- and northeast-trending synclinal axes can be traced. Fold-like trends in granite south of Setting Net Lake suggest granitization of a belt that formerly was continuous between Favourable and North Spirit Lakes.

No major faults were recognized, but shearing in a wide zone extending southwestward from Favourable Lake through Bearhead Lake may mark the location of a large fault. Regional joints and possibly some faults show as strong lineaments in aerial photographs. Northwest- and northeast-trending joints are most prominent in outcrops.

Gold and silver are associated with galena, sphalerite, and pyrite at the abandoned Berens River Mines. Gold occurs with pyrite and arsenopyrite in the North Spirit-MacDowell belt, and chalcocite occurs in fracture zones along the shore of the central part of McInnes Lake. Stringers of pyrite and pyrrolite are locally abundant in both the Hornby Lake belt and the Favourable Lake-North Spirit Lake belt. Migmatites (2a) and coarse biotite granites that contain uranium minerals have been trenced and drilled near the south shore of Bearhead Lake. Voglite was identified in a sample collected from one of the trenches. Parts of the iron-formation south of North Spirit Lake have been investigated by ground magnetic surveys and diamond-drilling.

About 20% of the map-area has been mapped and described by the Ontario Department of Mines, and aeromagnetic maps for the entire area are available.

Bateman, J. D.: Geology of the North Spirit Lake area; Ont. Dept. Mines, vol. 47, pt. 7, (1939).

Hurst, M. E.: Recent developments in the Favourable Lake area; Ont. Dept. Mines, vol. 47, pt. 7, (1939).

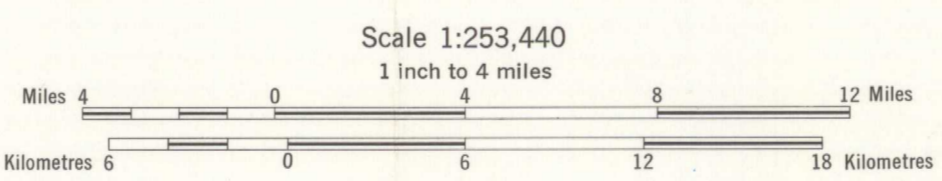
Hurst, M. E.: Geology of the area between Favourable Lake and Sandy Lake, District of Kenora; Ont. Dept. Mines, vol. 38, pt. 2 (1930).

Satterly, J.: Geology of the Sandy Lake area; Ont. Dept. Mines, vol. 47, pt. 7, (1939).

Geology of the Windigo - North Caribou Lakes area; Ont. Dept. Mines, vol. 46, pt. 9 (1941).

Aeromagnetic Series Geophysical Papers: Papers 856G-859G, 866G-869G, 876G-879G, 886G-889G; Ont. Dept. Mines and Geol. Surv. Can. (1960).

MAP 1201A
GEOLOGY
NORTH SPIRIT LAKE
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GEOLOGICAL SURVEY

MAP 1201A
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1201A

Ontario, North Spirit Lake
1 inch to 4 miles
Map 1201A
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