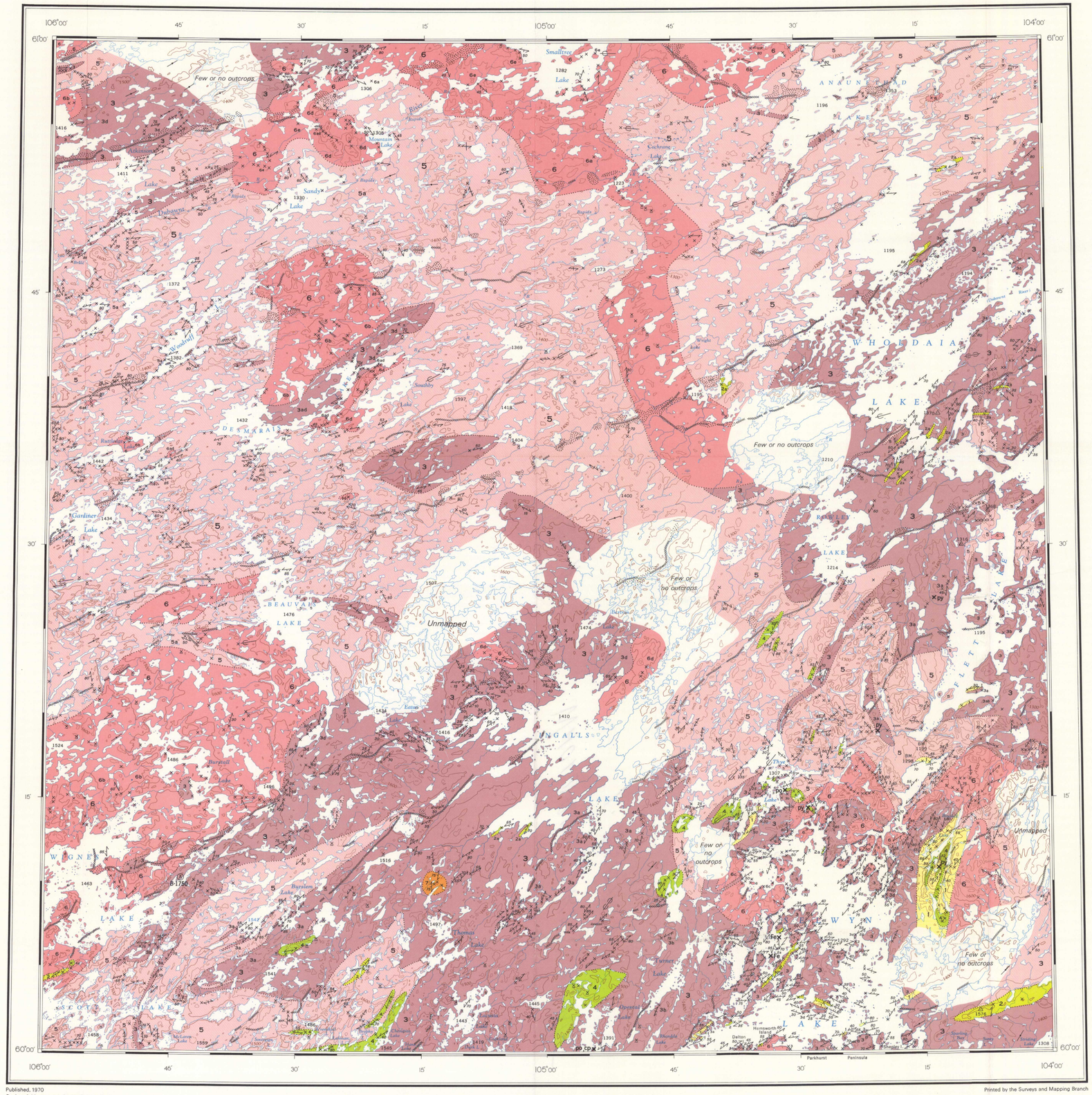
GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF ENERGY, MINES AND RESOURCES



LEGEND

PRECAMBRIAN

× 8	*Diabase, basalt*
7	*Nepheline syenite, syenite*
6	*Massive granitic rocks, granite, granodiorite, diorite, syenite;* 6a, *syenite;* 6b, *biotite granitic rocks;* 6c, *hornblende granitic rocks;* 6d, *sodic amphibole and pyroxene granitic rocks;* 6e, *inclusions of older rocks common*
5	*Gneissic granitic rocks, granite, granodiorite;* 5a, *inclusions of older rocks common, migmatite*
4	*Gabbro, diorite;* 4a, *mica peridotite*
3	*Paragneiss; biotite-quartz-feldspar gneiss, hornblende-quartz-feldspar gneiss, hornblende-biotite-quartz-feldspar gneiss, biotite-quartz gneiss;* 3a, *garnet common;* 3b, *sillimanite common;* 3c, *calcareous garnet-tremolite-quartz-feldspar gneiss;* 3d, *migmatite and lit-par-lit gneiss common*
2	*Hornblende-feldspar gneiss;* 2a, *amphibolite*
1	*Quartzite*

Outcrop (observed from air, examined on ground)
Geological boundary (assumed)
Bedding, tops unknown (inclined)
Gneissosity (horizontal, inclined, vertical, dip unknown)
Glacial striae (direction of ice movement known, unknown)
Drumlinoid ridge
Esker, sand, gravel
Isotopic age, K-Ar method, millions of years, (B-biotite) B 1750 Ⓐ
Mineral occurrence ×

MINERALS

Chalcopyrite	cp	*Pyrite*	py
Iron	Fe	*Pyrrhotite*	po

Geology by F.C. Taylor, 1958; H.H. Bostock and A.J. Baer, 1966

Geological cartography by the Geological Survey of Canada, 1969

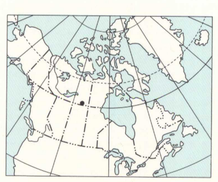
Horizontal control point △
Bench Mark BM 1298
Rapids
Contours (interval 100 feet)
Height in feet above mean sea-level 1400

Topographic base-map at the same scale published by the Army Survey Establishment R.C.E. 1955

Approximate magnetic declination 1969, 21°11' East decreasing 3.3' annually

Published, 1970
Copies of this map may be obtained from the Geological Survey of Canada, Ottawa

Printed by the Surveys and Mapping Branch

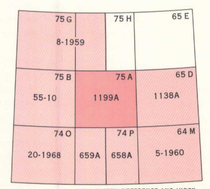


INDEX MAP

MAP 1199A
GEOLOGY
WHOLDAIA LAKE
DISTRICT OF MACKENZIE

Scale 1:250,000

Miles 4 0 4 8 12 Miles
Kilometres 6 0 6 12 18 Kilometres



NATIONAL TOPOGRAPHIC SYSTEM REFERENCE AND INDEX TO ADJOINING GEOLOGICAL SURVEY OF CANADA MAPS

WHOLDAIA LAKE
DISTRICT OF MACKENZIE

DESCRIPTIVE NOTES

The map-area lies about 140 miles east-northeast of Uranium City, Saskatchewan and 90 miles north-northeast of Stony Rapids, Saskatchewan. Large lakes, such as Selwyn, Wholdaia, Ingalls, Wignes and Anaunethad, provide ready access by water to large parts of the area but other parts are only easily reached by aircraft. Sites suitable for helicopter landing are available in most parts of the area except along the southwest border where coarse bouldery drift, thick forest cover, and greater than average relief sharply reduce the number of suitable clearings. The land surface is free of snow about the end of May and break-up of the larger lakes occurs early in June.

Local relief is commonly about 250 feet but in the northeast, relief is less and the land surface is only a few tens of feet above major lake levels. In general the surface is gently rolling but steep-sided bedrock hills occur here and there. The area is lightly forested with black spruce, tamarack and jack pine. Outcrop distribution ranges from poor in low lying areas to good in those parts with greater relief.

During the Pleistocene Epoch the area was covered by a westward to southwestward moving ice-sheet that produced widely distributed striae and drumlinoid ridges. Near Selwyn Lake and south of the drainage divide between Selwyn and Flett Lakes these features indicate a more southerly ice movement than those in the remainder of the area. Eskers, formed during retreat of the ice, cross the area from east-northeast to west-southwest and are distributed at intervals of from 5 to 15 miles.

The map-area lies entirely within the Churchill Province of the Canadian Shield and all the bedrock is Precambrian, probably Proterozoic in age. The rocks were metamorphosed during the Hudsonian orogeny as indicated by an isotopic age of 1,750 m.y. on biotite from a paragneiss at Wignes Lake (Stockwell, in Leech *et al.*, 1963).

Aeromagnetic maps 375G to 390G of the Geological Survey cover most of the map-area.

The oldest rocks are metamorphosed sedimentary and volcanic rocks now consisting of quartzite (1), hornblende-feldspar gneiss and amphibolite (2), and paragneiss (3). Quartzite is widely distributed within the paragneiss but only in Selwyn Lake area does it form a mappable unit. The quartzite is poorly bedded to massive, light to dark grey, medium-grained, and locally garnetiferous. Nowhere are primary structures other than bedding preserved. Locally, such as at the north end of Selwyn Lake, flakes of graphite are disseminated throughout the quartzite. Feldspathization is common and quartzites grade into gneissic granitic rocks (5).

Hornblende-feldspar gneiss and amphibolite (2, 2a) are also widely distributed but only locally form mappable units. Commonly these mafic rocks form inclusions of diverse shapes in the granitic rocks (5, 6). They are dark green, mainly well laminated with pronounced mineral banding. They are not known to show any primary volcanic structures and therefore some of them may have been intrusives, probably sills. Locally they are garnetiferous but on the whole consist primarily of hornblende and plagioclase in variable amounts with lesser quantities of biotite, chlorite, magnetite, and rarer pyrite.

The paragneiss (3), consists predominantly of quartz and feldspar with biotite as a mafic constituent but locally with hornblende or both mafic minerals. In some places feldspar content is low and the rock is a biotite-quartz gneiss. Garnet is locally common (3a) and sillimanite (3b) is present in a few places particularly west and northwest of Selwyn Lake. Thin bands composed mostly of medium-grained sillimanite were noted in drill core from paragneiss surrounding gabbro at Tha Lake. A medium-to coarse-grained, grey to dark grey rock is most characteristic of unit (3). Gneissosity, which is probably relict bedding, is well developed in most outcrops. A few outcrops in the northeast part of Wholdaia Lake consist of a greenish grey, medium-grained calcareous gneiss (3c) with tremolite, garnet and serpentine forming a significant part of the rock. A poorly exposed body of dark green, fine-grained, tremolite-actinolite rock with minor disseminated carbonate is present at the south border of the map-area on an island in Opescal Lake. Elsewhere diopside is present in similar rocks especially in Selwyn Lake area. These rocks were probably derived from impure calcareous sediments.

Erratically but widely distributed throughout the paragneiss are *lit-par-lit* gneiss and migmatite (3d). With an increase in the feldspar content the paragneiss grades into gneissic granite (5).

Unit 4 includes foliated to massive basic and ultrabasic plutonic rocks possibly of mixed origin. Most prominent is a series of gabbroic rocks, including diorite and some peridotite, that stretches from Tha Lake to the south border of the map-area at Opescal Lake. These bodies are chiefly medium to coarse grained and some contain hypersthene in addition to monoclinic pyroxene. At Bouskill Lake massive garnet-bearing gabbroic to amphibolitic rocks appear to form sills that dip gently southeastward in metaquartzite. Elsewhere unit 4 includes plagioclase-rich gneiss and garnet-bearing gabbroic rocks possibly in part derived from unit 2.

The granitic rocks are divided into two units on the basis of whether they are chiefly gneissic (5) or chiefly massive (6). The presence of massive granite sills and dykes (6) cutting the gneissic granitic rocks (5) shows that, in part at least, the massive rocks are younger than the gneisses. Both rock units are chiefly pink to pinkish grey or pale red with local grey elements. The gneissic granitic rocks (5) almost invariably contain biotite but locally hornblende is present as well. They are primarily granodiorite but granite is present also. Changes in composition of the gneissic granitic rocks occur both along strike and across it and they commonly grade into other rocks, especially paragneiss. It is probable that they were derived from older rocks by granitization.

The massive granitic rocks (6) show a wider range in composition than the gneissic granitic rocks, and include both syenite and diorite. Mafic constituents are variable but some plutons or parts of plutons are dominantly biotite-bearing (6b) or hornblende-bearing (6c). Other plutons (6d) are characterized by the presence of sodic amphibole and pyroxene (arfvedsonite and aegirine). Unit 6d appears to grade into normal granite in some places, such as west of Mountain Lake where sodic granite and syenite grade into a massive granite which in that area contains blue quartz. At other places the sodic granitic rocks, particularly the syenites, form discrete intrusive stocks such as the stock west of Southby Lake. All the sodic granitic rocks contain appreciably more sphene and apatite than the normal massive granitic rocks. The massive granitic rocks are predominantly medium grained and equigranular but some phases, particularly the syenites (6a) tend to be coarse-grained.

Alkaline syenite (7) is poorly exposed about 4 miles southwest of Ingalls Lake. This body is associated with a strong, nearly circular aeromagnetic anomaly, which is taken to define its limits. Of three outcrops examined two consist of a medium-grained, moderately well foliated nepheline syenite that weathers white except for dark weathering biotite flakes that appear to be wrapped around the felsic minerals. The rock is granular and besides nepheline consists of orthoclase, cancrinite, and small amounts of albite, green biotite, sphene, apatite, and rare arfvedsonite and aegirine-augite. Magnetite is present as trace amounts only. The third outcrop contains no nepheline and consists dominantly of plagioclase and porphyroblastic flame perthite. Lesser amounts of biotite, blue-green amphibole, apatite, epidote, magnetite and carbonate are present. Plagioclase is in two generations, one cosisting of large subhedral to anhedral andesine crystals containing abundant inclusions (partly epidote) and rimmed by clear oligoclase and the other consisting of smaller clear oligoclase anhedra.

The youngest rocks, a few dykes of basalt (8), outcrop at the southern end of Selwyn Lake. They are commonly a foot or less thick and intrude feldspathized paragneiss (3) and quartzite (1). Their relationship to the other rock types is unknown but in the adjoining map-area to the east diabase and basalt dykes post-date the granitic rocks (Taylor, 1963) and are assumed to have the same relationship in Wholdaia Lake map-area. A few lamprophyre dykes up to 8 feet thick and intrusive into quartzite (1) are also present at the southern end of Selwyn Lake. These are possibly related to the granitic rocks (6).

The main structural trend is northeast. East of Wignes Lake, complex folding within the main trend is visible on air photographs but for the most part drift is too extensive to reveal similar structure elsewhere. In some places where rocks are well exposed intricate small scale folds are a common feature. This type of structure is probably general throughout the map-area but in most places it is obscured by overburden.

No major faults were mapped but some lineaments visible on air photographs may be loci of faults although those examined proved to be joints. Near Bouskill Lake, fault planes and small crush zones commonly follow the contacts between quartzite (1) and gabbroic rocks (4). Northwest of Selwyn Lake minor northeast-trending faults along which separations of several feet or less have occured, are commonly accompanied by drags showing right lateral displacement. Such displacement has also been suggested by Taylor (1963) along a major fault and mylonite zone stretching northeastward from near Striding Lake to northeast of Snowbird Lake in the map-area to the east.

The most promising part of the area for prospecting appears to be that associated with the belt of gabbroic bodies stretching from Opescal Lake to Tha Lake. Diamond drilling has been done on claim groups owned by Canadian Nickel Company at both ends of this belt. At Tha Lake disseminated sulphides, chiefly pyrrhotite, occur in association with gabbro. At Opescal Lake disseminated pyrrhotite and some chalcopyrite are visible in tremolite-actinolite rock. Basic igneous rocks may be present near by. Rusty zones occur along quartzite-gabbro contacts near Bouskill Lake, and in paragneiss (3) in the Selwyn-Flett Lake area. The latter are caused by minor disseminated pyrite and probably are not of economic significance.

On an island in Selwyn Lake two showings of iron-formation are present both of which are small and apparently not economically important. Extensive drift makes prospecting difficult but magnetic anomalies such as that associated with the nepheline syenite (7) are probably worthy of the prospector's attention.

Leech, G.B., Lowdon, J.A., Stockwell, C.H., and Wanless, R.K.
Age determinations and geological studies; Geol. Surv. Can., Paper 63-17. 1963:

Taylor, F.C.
Snowbird Lake map-area; Geol. Surv. Can., Mem. 333. 1963: