GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF ENERGY, MINES AND RESOURCES

LEGEND

PROTEROZOIC

- 15 / 15 — *Diabase, gabbro; dykes and sills*

ET-THEN GROUP (13, 14)

- 14 — *PREBLE FORMATION: sandstone, quartzite; minor conglomerate*
- 13 — *MURKY FORMATION: conglomerate; minor sandstone*
- 12 — *Pegmatite, granite, diorite, granitized sediments; muscovite granite; younger than 5-7, age relative to 13, 14 unknown*

GREAT SLAVE GROUP (6-11)

- 11 — *PEARSON FORMATION: andesite, basalt, trachyte; some argillite*
- 10 — *TOCHATWI FORMATION: shale, argillite, sandstone*
- 9 — *STARK FORMATION: dolomite, limestone, breccia, shale*
- 8 — *PETHEI FORMATION: limestone and dolomite; in part argillaceous*
- 7 — *KAHOCHELLA FORMATION: shale, slate, argillite, arkose, iron-formation, limestone, tuff, breccia, agglomerate, andesite; **7a**, tuff, agglomerate, andesite*
- 6 — *SOSAN FORMATION: sandstone, quartzite, grit, conglomerate; **6a**, sandstone, younger than 1-4*
- 5 — *Granodiorite, quartz diorite; older than 6-11, age relative to 1-4 unknown*
- 4 — *Granite, granodiorite, and allied rocks in part gneissic and impure and gradational into 3; **4a**, muscovite granite, granodiorite, and pegmatite*

ARCHEAN

- 3 — *Gneissic complex: undifferentiated gneisses including impure and gneissic granitic rocks; mixed gneisses (migmatites) containing 25 to 75 per cent sedimentary and volcanic schists and gneisses in granitic material; 'granitized' paragneiss; mylonites. Gradational into 2 and 4*

UNION ISLAND GROUP

- B — *Dolomite, argillite, slate*

WILSON ISLAND GROUP

- A — *Phyllite, schist, quartzite, dolomite, iron-formation*

YELLOWKNIFE GROUP (1, 2)

- 2 — **2a**, *quartzite, grit, arkose, greywacke, chlorite schist;* **2b**, *knotted quartz-biotite schist and hornfels derived from and grading into greywacke and slate; minor siliceous argillite and volcanic schist;* **2c**, *paragneiss derived from 2b*
- 1 — *Andesite, dacite, basalt, tuff, agglomerate*

Geological boundary (defined, approximate, assumed)
Bedding, tops known (inclined, overturned)
Bedding, tops unknown (inclined, vertical)
Schistosity, gneissosity (inclined, vertical, dip unknown)
Fault (defined, approximate, assumed)
Anticline (approximate)
Syncline (approximate)
Glacial striae
Drift ridge
Esker, sand ridge
Area of abundant sand
Mineral prospect or occurrence Cu ×

MINERALS

Cobalt . . . . . Co
Copper . . . . . Cu
Nickel . . . . . Ni
Iron . . . . . Fe
Radioactive occurrence . . . ra

Geology by C. H. Stockwell, 1929, 1930, 1931; I. C. Brown, 1949; F. Q. Barnes, 1950, 1951; and G. M. Wright, 1950

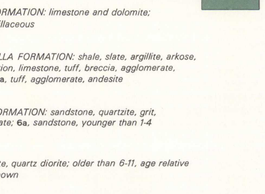
Geological cartography by the Geological Survey of Canada, 1968

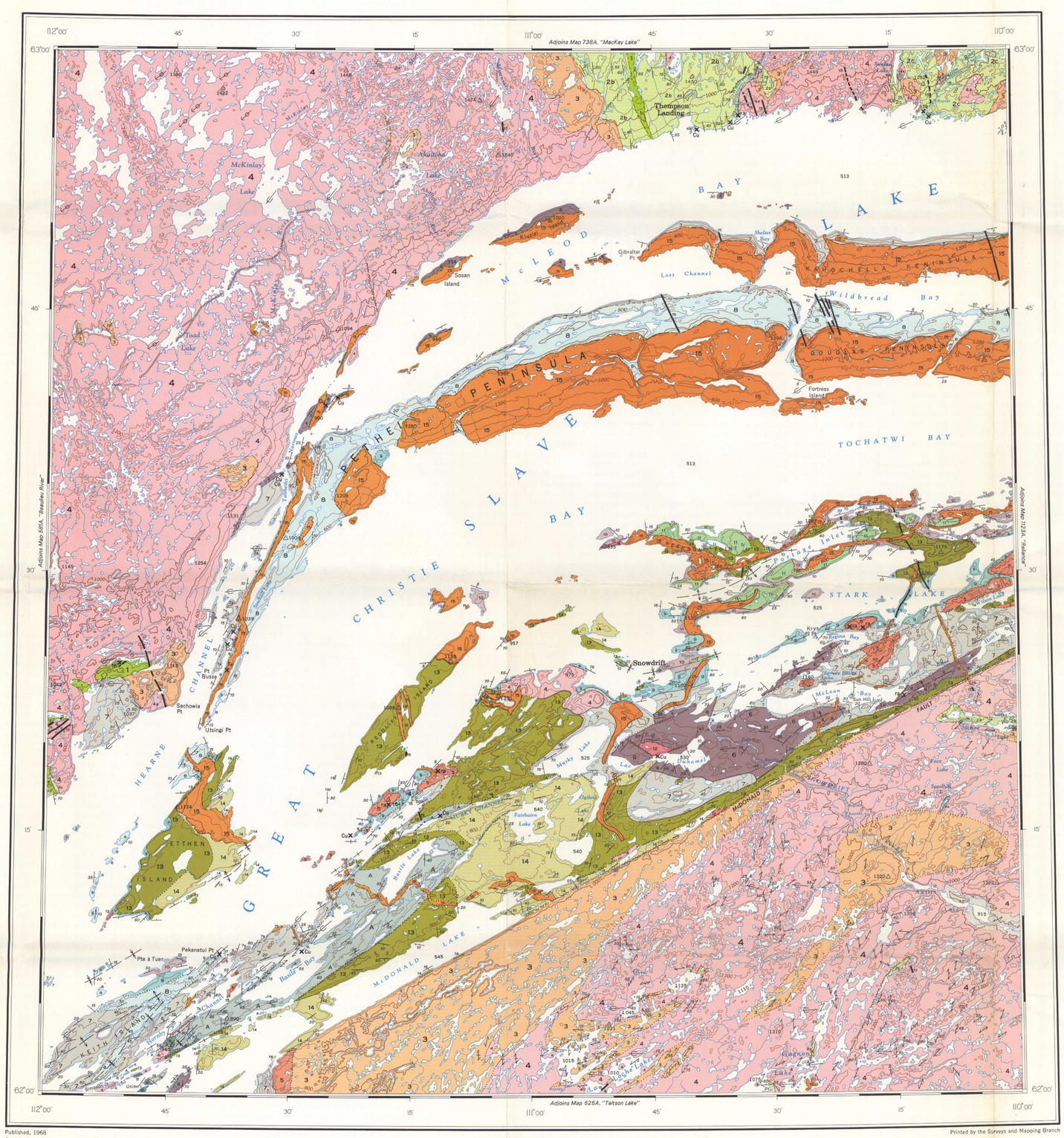
Building
Church
Horizontal control point
Falls and rapids
Sand
Contours (interval 200 feet)
Height in feet above mean sea-level . . . 1020

Base-map (Snowdrift, 75 L) compiled and drawn by the Surveys and Mapping Branch, 1964

Magnetic declination 1967 varies from 29°23′ easterly at centre of east edge to 30°44′ easterly at centre of west edge. Mean annual change, decreasing 6.2′

INDEX MAP





Published, 1968

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

Printed by the Surveys and Mapping Branch

MAP 1122A

GEOLOGY

CHRISTIE BAY

DISTRICT OF MACKENZIE

Scale 1:253,440
1 inch to 4 miles

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

DESCRIPTIVE NOTES

The general level of bordering lands and of numerous islands in peninsulas in Great Slave Lake rises gradually from 450 feet above the lake in the southwest corner of the area to 800 feet in the northeast part, and reaches elevations of 900 to 1,000 feet a few miles inland from the north shore of the lake. The granitic uplands bordering the lake basin present a monotonous succession of low rocky hills and ridges, with local relief rarely exceeding 200 feet. The upland, south of the basin, rises abruptly along a fault escarpment (McDonald Fault) 700 to 800 feet above the lake, whereas north of the lake rocky slopes rise gradually to plateau level at 1 mile to 4 miles inland. Rivers entering the lake basin follow either poorly defined valleys or deep gorges, and are unnavigable for 2 to 12 miles inland. The monotonous aspect of the bordering uplands contrasts sharply with the rugged and picturesque topography within the lake basin. In the northern part of the basin large peninsulas reflect the structure with steep north slopes and gentle dip slopes to the south. In the southern part of the basin structures are complex; vertical cliffs of conglomerate, limestone, and diabase in places rise several hundred feet from the water, or form cappings over steep slopes of softer rocks, particularly shale.

North and west of McKinlay Lake thick glacial deposits occur as irregular ridges and knobs, and elongated drumlins whose long axes trend southwest, parallel with the direction of glaciation. These hills are composed largely of unsorted, angular, granitic boulders and coarse gravel. Eskers composed of angular, poorly sorted, sand and gravel form ridges up to 40 feet high. Sand deposits of irregular form are scattered throughout the area. The largest lie around Austin Lake and along Snowdrift River.

Volcanic rocks of the Yellowknife Group (1) are dark to light green, fine-grained andesites, dacites, and basalts that have been recrystallized and are now composed of fresh, green hornblende, plagioclase and quartz. Pillows and ropy flow structures are well preserved, and some of the flows are amygdaloidal.

Sediments of the Yellowknife Group are divisible into relatively unaltered types (2a), knotted quartz biotite schists and hornfels (2b), and feldspathic paragneiss (2c). The less-altered types (2a) are restricted to a narrow band east of McLean Bay and their present classification is based solely on resemblance to Yellowknife sediments in other areas.

Rocks of the Wilson Island Group (A) are not in contact with typical Yellowknife Group rocks, but are older than the surrounding Proterozoic rocks. Their lithological character and degree of metamorphism is so markedly different from that of the Yellowknife Group rocks that they are not included with them though they may be of similar age.

The gneisses (3) are probably of complex origin and are gradational into the Yellowknife rocks (1, 2), and into the granitic rocks (4). The most common type is a migmatitic gneiss, partly granitic and partly sedimentary or, less commonly, partly volcanic. In some occurrences, the non-granitic members are clearly recognizable as sedimentary, but in many places alteration has produced a highly garneti ferous, contorted, banded gneiss of granitic aspect. Contacts drawn between areas of mixed gneisses (3) and granitic rocks (4), particularly where the latter are impure and gneissic, are arbitrary. Some of the rocks included in this group appear to be granitized paragneiss; others are fine-grained, banded, felsitic rocks that probably represent mylonitized granites.

Granitic rocks (4) grade into the gneissic complex (3) in many places. They are light grey to pink, medium to coarse grained, and are composed of quartz, plagioclase, microcline, and biotite, muscovite or hornblende. Biotite granite and granodiorite are the most common types; muscovite granite (4a) is not uncommon, but is not areally important. So far as is known, all the granite throughout the area cuts the rocks of the Yellowknife Group, but granite of more than one age is represented.

The granitic rocks (5) occur only within the lake basin and are reddish, massive, nearly equigranular, and medium to coarse grained. All contain some quartz, and vary in composition from hornblende granite and granodiorite to biotite granodiorite (most common) and biotite quartz diorite.

The Great Slave Group (6-11) was deposited on an erosion surface developed on granitic rocks (4, 5), and the upturned edges of the older sedimentary and volcanic rocks. It forms an asymmetrical synclinorium, 150 miles long, occupying almost the whole of the lake basin. The beds on the north limb commonly dip 5 or 10° S, but in the axial region and on the south limb they are generally folded into a more complex series of anticlines and synclines, with limbs commonly dipping from 30 to 70°.

The Sosan, Kahochella, and Pethei Formations are best exposed on the north limb of the synclinorium. There, the Sosan Formation (6) is perhaps, 3,000 feet thick, and consists of beds of sandstone, quartzite, and grit, with partings of shale. Where observed, the basal arkose and conglomerate members rest on granite, and are composed largely of detrital material derived from it. The Kahochella Formation (7) is composed of about 1,000 feet of shaly beds, with some laminated, argillaceous limestone, jasper and oolitic iron-formation associated with lava flows, tuff, volcanic breccia, and agglomerate. In some places, these volcanic rocks (7a) have been mapped separately. The Pethei Formation (8) comprises about 1,500 feet of limestone and dolomite, some of which contains considerable irregularly distributed argillaceous material. In places, notably near Taltheilei Narrows and northeast of Utsingi Point, impressive exposures of algal structures occur. The Pethei Formation is generally missing on the south limb of the synclinorium, and the rocks of the upper part of the Great Slave Group (9-11) rest on the Kahochella Formation, suggesting that there may be an erosional unconformity. However, this may be due to non-deposition of the Pethei Formation.

The Stark, Tochatwi, and Pearson Formations occupy the central part of the synclinorium. In ascending order are: the Stark Formation (9), consisting of possibly 1,000 feet of interbedded varicoloured dolomite, red shale, and limestone, in part much brecciated; the Tochatwi Formation (10), comprising a thick assemblage of shaly sedimentary rocks and massive sandstone; and the Pearson Formation (11) of lava flows, with interbeds of argillite. In the Portage Inlet area, the Pearson Formation forms vertical cliffs, which exhibit good columnar jointing and in outcrop resemble the sills of diabase (15). Remnants of pillows have been reported from this formation.

Most of the strata of the Great Slave Group are red or brown of various shades. Ripple-marks, crossbedding, and mud-cracks are common and concretions occur locally in shale and argillite.

Relations of the Union Island Group (B) and the Great Slave Group are unknown, but both were deposited after the erosion of the older granitic rocks and before deposition of the Et-Then Group.

North of Lac Duhamel, pegmatite, granite and dioritic intrusions (12) intimately mixed with sedimentary material are known to cut rocks up to the Kahochella Formation (7). The Et-Then Group was deposited on an erosion surface developed on the Great Slave Group and older rocks. The Murky Formation (13) of conglomerate, with irregular lenses of sandstone, forms the base of the group, and carries closely packed, round boulders of a great variety of rocks representing almost every member of the older groups. The conglomerate varies greatly in thickness up to probably several thousand feet, and is locally missing. It forms prominent cliffs. The sandstone, quartzite, and minor conglomerate of the succeeding Preble Formation (14) are buff-coloured, massive, coarse, feldspathic rocks, exhibiting excellent crossbedding and ripple-marks. Both formations are nearly flat-lying except in the vicinity of faults, where dips are up to 70°.

Dykes and sills of diabase (15) cut all other consolidated rocks and the large faults. A few narrow, steeply dipping dykes occur in the Archaean rocks, but they are not so numerous nor thick as those within the basin of the lake. Sills up to several hundred feet thick occur in the peninsulas of the northern part of the synclinorium. Their dip slopes are characteristically smooth and relatively flat; the forward slopes are cliffs exhibiting good columnar jointing. Locally, the sills are transgressive; on the north end of Et Then Island a 200-foot sill cuts upward through the Pethei limestone. In the southern part of the basin the diabase commonly occurs as moderately dipping dykes of irregular trend. Other dykes are vertical, strike slightly west of north and cut sediments and diabase sills as well as granitic rocks. The sills and moderately dipping dykes form prominent topographic features.

The diabase consists of a sub-ophitic, medium-grained aggregate of approximately equal amounts of pyroxene and labradorite with a little magnetite; quartz is not common. Edges of both sills and dykes are chilled to fine-grained basalt, whereas interiors of thick bodies approach coarse-grained gabbro.

The volcanic and sedimentary rocks of the Yellowknife Group are similar to those of the neighbouring Beaulieu River and MacKay Lake areas where many gold-bearing and several base-metal deposits have been found. Quartz veins are abundant in both volcanic and sedimentary rocks on the north shore of McLeod Bay and in the highly sheared green schists in Basille Bay. Lead and zinc minerals occur in knotted schist 6 miles northwest of Thompson Landing, just north of the area, and gold and silver have been reported from near Basile Bay. Quartz-calcite veins carrying disseminated chalcopyrite are found in Yellowknife sedimentary rocks and in muscovite granite west of the mouth of Waldron River, near Thompson Landing, and near the mouth of Barnston River. The same type of quartz-calcite vein with chalcopyrite occurs in granitic rocks at many points north of McLeod Bay. Nickel occurs in volcanic rocks 5 miles northwest of Sachowia Point. In general the Archaean rocks southwest of the lake basin appear to be mainly granitic and are not favourable for prospecting.

Veins of quartz occur in the Great Slave Group, in the dioritic intrusions (5), and in the Et-Then Group. They are not known to contain gold or more than a trace of silver, but many of them carry calcite, barite, and chalcopyrite. Copper minerals are found in brecciated sandstone and in fractures in diabase near Taltheilei Narrows and on the islands 6 miles northeast of the Narrows, on the south side of Tochatwi Bay, at the east end of Portage Inlet, on the north shore of Stark Lake, on Murky Channel near Pekanatui Point, and in carbonate veins cutting dioritic rocks at the southwest end of Et Then Island. Abundant copper stain can be seen on carbonatized volcanic rocks on the west side of the narrow bay a few miles north of Utsingi Point.

Cobalt bloom was observed on the west side of Taltheilei Narrows. Oolitic hematite beds as much as 30 feet thick are exposed 5 miles north of Utsingi Point; similar deposits up to 20 feet thick occur at several localities on Great Slave Lake but all are low grade.

Several occurrences of radioactive minerals are known. The small areas of dioritic rocks (5) appear to be favourable prospecting ground. Most of the known radioactive occurrences apparently contain uranium minerals and are in or near these rocks, but one large, low-grade, sedimentary deposit of thorium and uranium occurs in ferruginous dolomite near the east end of McLean Bay.

Note — Within the Snowdrift and McLean Bay map-areas (Barnes, 1951, 1952), no attempt has been made to show the detailed subdivisions of the Great Slave Group as these require changes that cannot be applied to adjoining areas without further mapping.

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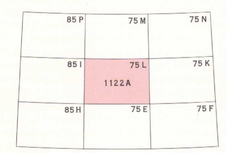

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