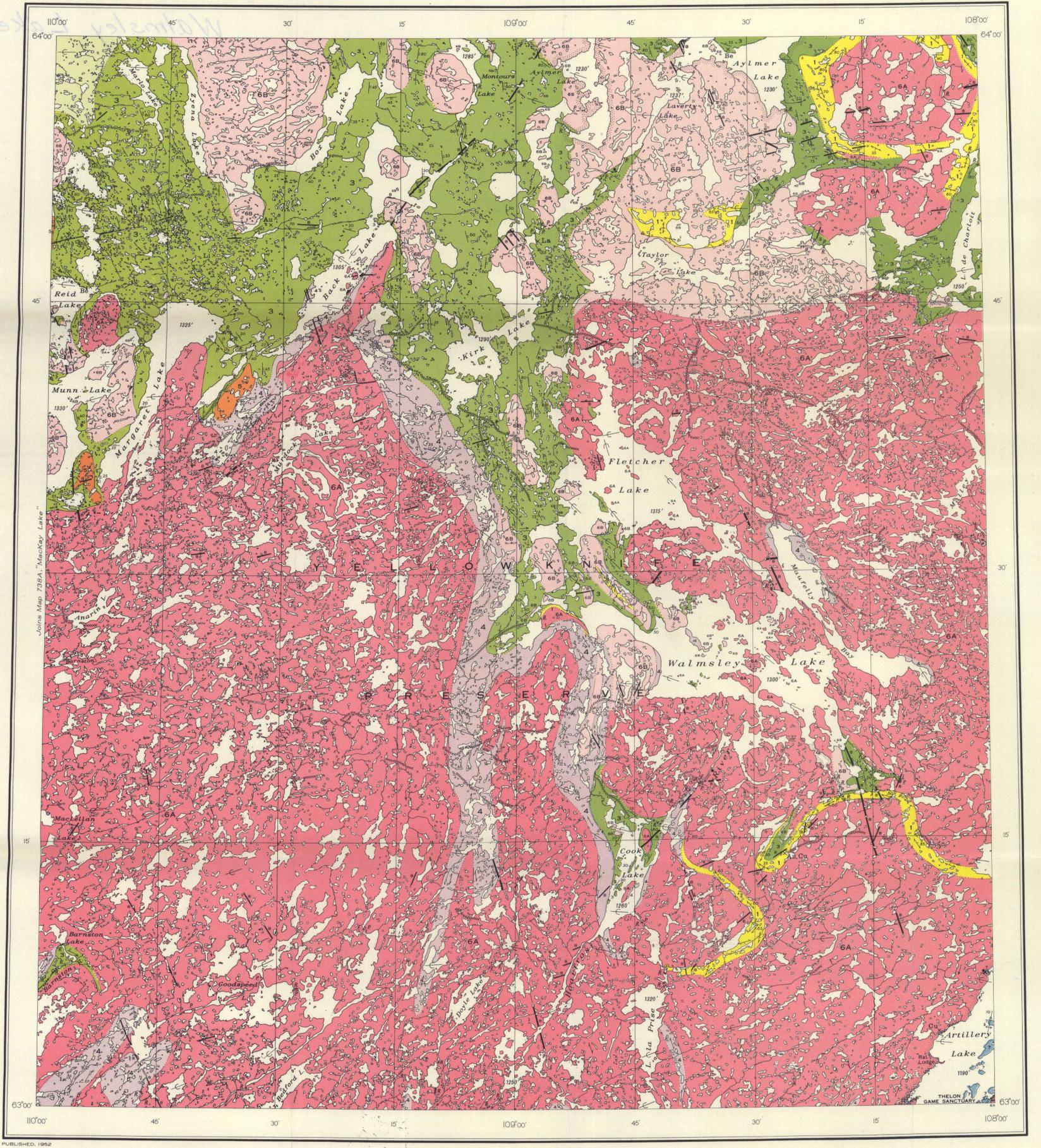
GEOLOGICAL SERIES

GEOLOGICAL SURVEY OF CANADA

SHEET 75 N



DESCRIPTIVE NOTES

Walmsley Lake map-area lies on the Precambrian upland north of the east arm of Great Slave Lake. This tableland is 700 to 1,000 feet above Great Slave Lake, and has a local relief of 20 to 300 feet. The northern third of the map-area drains into Aylmer Lake, and thence, by Lockhart River and Artillery Lake, to Great Slave Lake. Large, closely linked lakes of the northern and eastern parts of the area afford excellent canoe routes, but to the southwest many portages impede such travel.

The boundary between barren grounds on the northeast, and spruce, tamarack, and birch forest on the southwest, extends from Artillery Lake, through Cook Lake, to Margaret Lake. In the barren-ground lakes, ice breaks up 3 weeks after canoe travel is possible in the timbered area; in 1949 and 1950 it broke up during the first week in July, though the larger lakes remained ice-choked until July 25. Caribou migrate into this part of the barren lands late in August.

The percentage of rock outcrop varies with rock type and locality, and is much less in the barren-ground part of the map-area. The normal summer, southwestern front of the polar air mass lies along the edge of the barrens. During the closing stages of glaciation, rapid melting along this front resulted in the accumulation of a thick belt of marginal and recessional moraine. Though dotted with large erratic boulders, outcrops southwest of the morainal belt are almost continuous. Within the barren grounds less than 10 per cent of the area underlain by sedimentary rocks, and only 25 per cent of the parts underlain by volcanic rocks and granitic intrusions is exposed.

Within the barrens, the recorded movement of the glaciers is west and northwest towards the Coppermine River basin. In the southwest corner of the map-area, the latest glacial movement was west and southwest towards Great Slave Lake. The glaciers have polished and scoured rock outcrops, and have moulded thick ground and recessional moraine into swarms of drumlinoid hills. Glacial erratics from the late Precambrian dolomite of the Artillery Lake basin form a prominent boulder train, boulders covered with orange lichen dotting outcrops on the granitic upland as far west as Hoarfrost River.

During the closing stages of glaciation, fluvioglacial esker ridges, formed of sand, gravel, and boulders, accumulated at the bottom of under-ice rivers that flowed parallel with the latest glacial striae in the area. With the melting of the stagnant ice-sheet, these deposits were left in topographic relief and formed prominent landmarks. The pattern of these ridges is that of two great river systems, partly superimposed, one draining to the northwest, the other to the southwest. Certain areas near esker ridges have been washed free of drift by fluvioglacial stream action; the percentage of rock outcrop along esker routes is somewhat higher than average for the area.

The intruded rocks of the map-area occur as isolated inliers or roof pendants, surrounded by granitic intrusions, and are assigned to the Yellowknife group (1-3) on the bases of lithology and degree of metamorphism. They comprise an older volcanic series (1) and a younger sedimentary series (2, 3), now largely altered to schists and gneisses. The volcanic rocks (1) occur in belts, 15 to 25 miles long and 1 mile to 3 miles wide, and were originally mainly pillowed and massive basalts and related, coarse-grained flows or sills. Pillow structure and attitude can be observed in the basal flows, which are steeply dipping, except on the crests of plunging folds where dips may be as low as 30 degrees and, in consequence, width of outcrop of the belt greater. The basalts have been altered to fine-grained, dark, hornblende-garnet schists, the sills to hornblende-garnet gneisses, and the upper flows and tuffs to banded, light to dark green, hornblende-biotite schists. The sedimentary rocks (2) were argillites, slates, and greywackes of Yellowknife types. A small, poorly exposed area of original slate and greywacke in the northwest corner of the map-area has been mainly altered to phyllite and fine-grained, schistose greywacke. Elsewhere, the degree of thermal metamorphism is greater; the sedimentary rocks have been changed to nodular or knotted quartz-mica schists (3) on whose exposed surfaces bundles of white, fibrous sillimanite, square, purple prisms of andalusite, oval lumps of grey cordierite, and oblique-angled brown crystals of staurolite commonly weather in relief. Small, red garnets occur in the sedimentary schists in a few places. Thin sections of the sedimentary schist (3) almost invariably show sillimanite in a cordierite groundmass; these two minerals are typical products of extreme thermal metamorphism of aluminous sediments. The sedimentary schists preserve bedding up to the sillimanite schist zone of metamorphism; within this zone, structures such as folds can be detected on air photographs, but bedding is no longer evident in the outcrops. The sillinanite schists grade into injection gneiss (4). At this stage of metamorphism, the assimilation of the sediment is almost complete; the sedimentary schists begin to deform plastically, and are intruded lit-par-lit by granodiorite to produce a lenticularly banded, twisted gneiss. In thin section, the darker bands are seen to represent relict sedimentary rock, and are rich in biotite, sillimanite, and cordierite, indicative of the aluminous nature of the original sediment; the lighter bands, rich in oligoclase feldspar, appear to represent addition of igneous material. The biotite contains abundant inclusions of zircon or monazite marked by prominent pleochroic haloes.

The intrusive rocks include a wide variety of granitic types ranging from hornblende diorite to muscovite pegmatite. Three small bodies of pyritized hornblende diorite and hornblende-quartz diorite (5), believed to be the oldest intrusive rocks, intrude sedimentary schists and gneisses (3, 4) of the Yellowknife group in the northwestern part of the maparea. The dioritic intrusions have pitted, decomposed, weathered surfaces. Microscopic examination indicates that they consist of 50 per cent andesine feldspar, 40 per cent hornblende and chloritized biotite, and 5 to 10 per cent quartz. Small pyrite crystals are a characteristic accessory, and account for the typical rusty-weathered surface.

The quartz diorite bodies are cut by dykes of granodiorite (6A) and muscovite pegmatite (6B). The biotite granodiorites (6A) are of two types, and possibly represent two ages of intrusion. The 'older' type is commonly gneissic and hornblendic. It appears to have consolidated at great depths, for it has few related pegmatites. It may be related to the hornblende diorites (5) and is commonly found in contact with the basal volcanic rocks of the Yellowknife group, or, where found in contact with sedimentary beds, has altered them to a granite-like injection gneiss. The 'younger' granodiorite is a fresh, massive rock; muscovite is a characteristic accessory mineral, and near sedimentary contacts the rock grades into muscovite-biotite granite and pegmatite (6B). The contact between biotite granodiorite (6A) and muscovite granite (6B) was established in the field at the point where muscovite ceased to be a varietal mineral, readily observed in the hand specimen. The muscovite granite (6B) shows primary foliation near the border of the intrusion. It is a white weathering rock consisting of 30 per cent smoky quartz, 60 per cent white albite, oligoclase, and microcline feldspar, and 10 per cent mica, mostly muscovite; blue-green apatite is a characteristic accessory mineral. Many of the pegmatites and smaller bodies of granite related to the muscovite granite (6B) contain tourmaline crystals, and a few pegmatites contain beryl, spodumene, and lazulite. Very large areas of red weathering, porphyritic biotite granite occur southwest of Walmsley Lake. Although distinctive, this granite contains belts of injection gneiss and no related pegmatites and, accordingly, has been mapped as a rock allied to the biotite granodiorite (6A).

Artillery Lake lies in a basin representing a structural continuance of the east arm of Great Slave Lake and, like the east arm, is occupied by late Precambrian rocks (7), presumably of the Great Slave group. These rocks are well exposed on the islands in Artillery Lake, where they consist of very fine-grained, siliceous and argillaceous dolomite and limestone, medium grey or pale red on the fresh surface, and weathering greyish orange or light brown. Quartz veinlets and stringers cut the dolomites and weather into fretwork relief. The attitude of the massive dolomites is seldom determinable, but on one island the rocks are seen to lie nearly horizontally, with a minor, sharp fold plunging gently to the north. On the west shore of Artillery Lake, a zone of brecciated and carbonated granodiorite (6A) is in fault contact with brecciated dolomite (7); banded agate veins, fault conglomerate, and crustified comb-quartz occur within the fault zone.

Dykes of brown weathering diabase and gabbro (8) are probably the youngest rocks in the map-area, though they were not observed cutting the Great Slave group dolomites (7). Three dyke sets are represented, one set striking north 80 degrees east; a second set, north 20 to 30 degrees west, and the third set about northeast. The dykes are composed of equal amounts of labradorite feldspar and pyroxene, with accessory magnetite and quartz and a little secondary hornblende, zoisite, and epidote. The northeast trending dyke on Back Lake is cut by, and therefore older than, dykes of the other two sets.

Probably the first gold discovery in Walmsley Lake map-area was that made in 1948 by J. D. Williamson in an area of sedimentary schists (3) south of Box Lake. There, a brecciated, mineralized, light-coloured, fine-grained, aplitic dyke, 60 to 120 feet wide, can be traced cutting across the sedimentary schists at a small angle for 2½ miles. Quartz stringers, filling fractures in the dyke, are erratically mineralized with arsenopyrite, galena, and sphalerite, and in one quartz lens particles of visible gold were observed.

The most favourable places for further prospecting are believed to be the belts of volcanic rocks and along the volcanic-sedimentary contacts. Quartz veins were observed along these contacts, and south of Walmsley Lake a sample obtained from a gossan zone in volcanic rocks close to the sedimentary contact assayed 0.30 ounce of gold to the ton and 0.10 per cent copper. Unleached material contained less gold but more copper. The mineralized area is small. North of Rat Lodge on Artillery Lake, two parallel quartz veins occur in the fault zone along the contact between granite and dolomite. These veins are 1 foot wide, 7 feet apart, and can be traced for 350 feet. Chalcopyrite fills vugs in the banded, comb-quartz veins. In places the veins may contain as much as 10 per cent copper, but their average content is probably less than 0.5 per cent.

MAP IOI3A

WALMSLEY LAKE DISTRICT OF MACKENZIE NORTHWEST TERRITORIES

Scale: One Inch to Four Miles = $\frac{1}{253,440}$ Miles

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NOV I BES

LEGEND

6A. Biotite granodiorite, biotite-hornblende

6B. Muscovite-biotite granite, pegmatite

rnblende diorite and quartz diorite

njection gneiss: sedimentary schist (3))

njected and assimilated by intrusive rock (6A)

dular quartz-mica schist derived from 2

Basalt, andesite, minor tuff; derived schists

GREAT SLAVE GROUP (7)

granodiorite, and allied rocks

YELLOWKNIFE GROUP (1-3)

and gneisses

Bedding (vertical; direction of dip known,

Schistosity, gneissosity (inclined, vertical,

Anticlinal axis (arrow indicates direction

upper side of bed unknown).

dip unknown).

Mineral occurrence.

Glacial striæ

Esker

Portage.

Survey monument

Fall and rapid

Sand or gravel

Cabin

Marsh .

of pitch of axis).

Copper

Lazulite .

Preserve and Sanctuary boundary

Lake and stream (position approximate)

Height in feet above mean sea-level (approx.)..

Base-map compiled by the Topographical Survey 1941,

from aerial photographs taken by the Royal Canadian Air Force in July, 1936.

Cartography by the Geological Mapping Division

Approximate magnetic declination, 31°30' East

INDEX MAP

Beryl......
Spodumene

. Greywacke, slate, phyllite

MINERAL SYMBOLS

Geology by R.E. Folinsbee, 1949, 1950

imestone, dolomite