CANADA
DEPARTMENT OF MINES AND RESOURCES
MINES AND GEOLOGY BRANCH
BUREAU OF GEOLOGY AND TOPOGRAPHY

GEOLOGICAL SURVEY

LEGEND

PROTEROZOIC (LATE PRECAMBRIAN)

- 11 — Diorite, gabbro
- 10 — Diorite, syenite

GREAT SLAVE GROUP

- 9 — STARK FORMATION: dolomite, limestone, breccia, shale
- 8 — PETHEI FORMATION: limestone, dolomite
- 7 — KAHOCHELLA FORMATION: shale, slate, argillite, limestone, tuff, breccia, agglomerate, andesite
- 6 — SOSAN FORMATION: sandstone, quartzite

ARCHEAN (EARLY PRECAMBRIAN)

- 5 — Granite, granodiorite and allied rocks
- 4 — Diorite, gabbro, anorthosite

YELLOWKNIFE GROUP

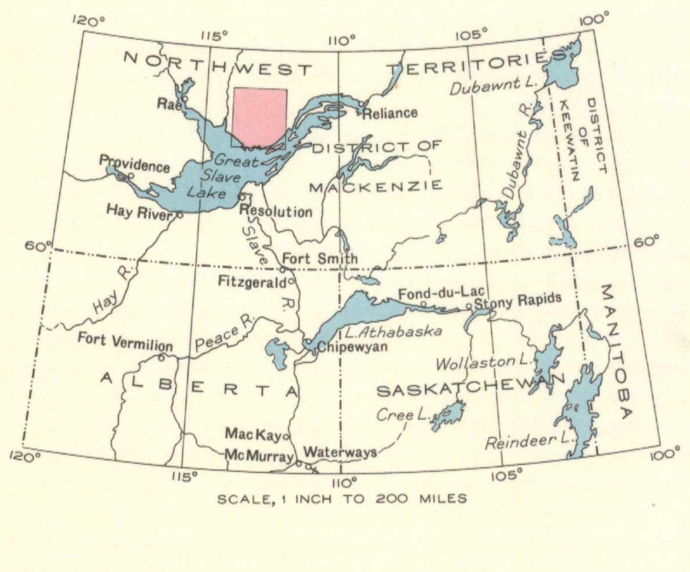
- 3 — Greywacke, slate, impure arkose and quartzite
- 2 — Knotted quartz-mica schist and hornfels derived from and grading into greywacke, slate and the other sediments of the Yellowknife group
- 1 — Basalt, andesite, dacite, rhyolite, tuff, agglomerate

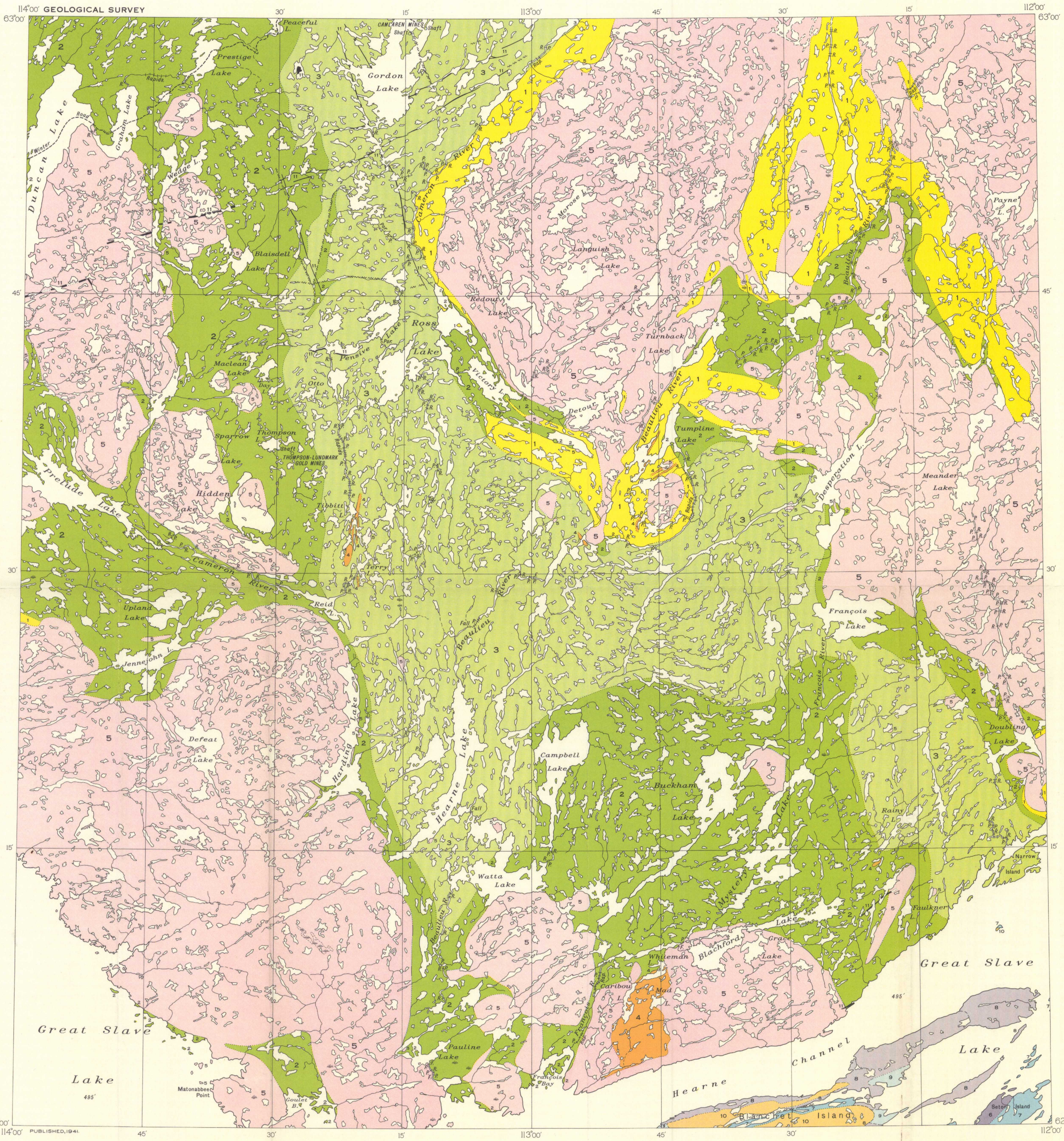
Geological boundary (defined, assumed)
Fault (assumed)
Mine shaft

Winter road
Portage
Lake and stream (position approximate)
Fall and rapid
Marsh
Height in feet above Mean sea-level ... 495'

Geology by J.F. Henderson, 1937, 1938, and by A.W. Jolliffe, 1937; the islands in Great Slave Lake from Map 377A, published in 1936.

Base-map prepared by the Topographical Survey, 1938, from Federal Government map since published in 1939. Cartography by the Drafting and Reproducing Division, 1940.





MAP 581A

BEAULIEU RIVER

DISTRICT OF MACKENZIE
NORTHWEST TERRITORIES

Scale, 1/253,440 or 1 Inch to 4 Miles

Miles 4 0 4 8 12

Approximate magnetic declination, 34° to 38° East.

DESCRIPTIVE NOTES

The country appears flat when viewed from the top of the higher hills but in detail is rugged with rocky hills and ridges rising abruptly from lake or muskeg to heights of more than 200 feet. Throughout most of the area the bedrock has been swept clean of overburden by the last ice sheet and the surface is almost continuous rock outcrop. The country is well wooded but the trees for the most part are small; the greater part of the area has been burned over within the last 40 years.

The Yellowknife group of volcanic and sedimentary rocks are the oldest known rocks within the area. The volcanic rocks (1) which for the most part are older than the sediments are predominantly light to dark green dacites, andesites, and some basalts with associated breccias, tuffs, and agglomerates. Light grey weathering more acid flows ranging in composition from rhyolite to dacite are also common particularly south and west of Tumpline lake. Not all the rhyolites are flow rocks; some occur as dykes and small irregular bodies cutting both acid and basic flows; much of the intrusive rhyolite is porphyritic (quartz porphyry).

The sediments of the Yellowknife group are divisible into two groups: relatively unaltered sediments (3) and knotted quartz-mica schist and hornfels (2). This division is based on degree of metamorphism and is entirely arbitrary; a complete gradation exists between the two types. The relatively unaltered sediments (3) consist mainly of well bedded greywacke, impure arkose and quartzite, slate and argillite. The beds average 1 to 2 feet in thickness although locally in the coarser greywackes and impure quartzites the beds are 10 feet or more thick. Slaty beds are much thinner ranging from a small fraction of an inch to six inches. The various types are interbedded with one another, and although one type may predominate in one locality a large proportion of the others is usually present. The greywackes are largely recrystallized and now consist mainly of quartz, some feldspar, and 20 to 30 per cent light and dark micas. The impure quartzites and arkoses have a smaller content of mica and a larger content of quartz and feldspar. The slates are coal black to grey, thinly bedded rocks with pronounced cleavage. Many of the beds of greywacke and impure quartzite show a gradation in size of grain within single beds from coarse at the bottom to fine at the top. A narrow band of conglomerate containing granite pebbles occurs at the base of the sediments along the contact with the volcanic rocks east of the south end of Ross lake. Its presence suggests that a period of erosion may have separated the volcanic from the sedimentary rocks in at least some localities but there is no apparent structural discordance between them. Interbedding of flows, tuffs and sediments at many contacts suggests that the period of vulcanism gave place to the period of sedimentation with little or no intervening period of erosion.

The sediments of the Yellowknife group have been altered over large areas to knotted quartz-mica schists and hornfels (2). The degree of alteration appears to be determined to a large extent by the positions of the sediments relative to that of the larger granite batholiths. Increasing alteration is marked by gradual increase in number and size of the mica flakes along cleavage planes so that these planes acquire glistening micaceous surfaces. In the more massive sandy beds, although micas tend to develop with their flat surfaces parallel to one another, the rock does not cleave readily. This type, with little or no cleavage, is a quartz-mica hornfels. In the more highly altered phase spherical or ovoid knots of harder material develop. The knots may be very small, or 2 or more inches in length, but the average diameter is $\frac{1}{4}$ to $\frac{1}{2}$ inch. They are usually more resistant than the rest of the rock and stand out conspicuously on the weathered surface, but in some beds they are less resistant and weather out to give the rock a pitted appearance. The knots vary from an early stage of indefinite shadowy aggregation visible only on the weathered surface to the advanced stage in which crystals of chiastolite, cordierite, etc., are well formed. The knotted micaceous schists and hornfels retain original sedimentary structures to a remarkable degree. Bedding is perfectly preserved and gradation in size of grain can be recognized in some of the coarser, sandy beds.

The sedimentary rocks of the Yellowknife group lie in a series of closely spaced, isoclinal folds and the dip of the strata is consequently steep to vertical in most parts of the area and in many places the beds are overturned. The axial trend of the folds varies in different parts of the area. Thus the axes of the folds and general strike of the beds at and to the east of Gordon lake is northeast, to the north of Pensive lake is west and between Hearne and Tibbitt lakes is north. The volcanic rocks dip at steep to vertical angles but in general the folds within them are not as closely spaced as those within the sediments.

The body of basic intrusive rocks (4) $\frac{1}{2}$ mile north of the shore of Great Slave lake east of François river, is a complex of gabbro, diorite and anorthosite, all of which are probably differentiation products of the same parent magma. The dykes and sills of diorite and gabbro (4) in the vicinity of Tibbitt and Tumpline lakes are composed of dark green hornblende and altered plagioclase. The François river basic intrusive and the dykes southeast of Tumpline lake are cut by the nearby granitic rocks.

The granitic intrusives (5) include a wide variety of rocks. They are light grey to pink, of medium to coarse grain, and composed of quartz, feldspar, and biotite, muscovite or hornblende. Biotite granite and muscovite granite are the two most common types. As far as is known all the granites throughout the area intrude the rocks of the Yellowknife group but granite of more than one age may be present. The granite northeast of Ross lake is cut by hundreds of hornblende gabbro dykes from 2 to 50 feet or more wide.

The Great Slave group of sedimentary and volcanic rocks form Blanchet and Seton islands in Great Slave lake. They were deposited on an erosion surface crossing granitic intrusives and the upturned edges of the older sediments. The Sosan formation (6) consists of sandstone and quartzite. The Kahochella formation (7) consists largely of argillites, laminated limestones, and volcanic flows. The volcanic rocks are well developed on Seton and nearby islands where some of the flows have pillow structure and are associated with tuff, agglomerate, and volcanic breccia. The Pethei formation (8) consists of limestone and dolomite and is characterized in some horizons by the presence of algal structures such as are exposed on the east end of Blanchet island. The Stark formation (9) consists of interbedded vari-coloured dolomite, shale, limestone and breccia. All members of the Great Slave group are cut by dykes, sills, and stocks of dioritic and syenitic rocks (10).

Basic dykes (11) ranging in composition from diorite to gabbro cut the rocks of the Yellowknife group and the granite. They weather a characteristic rusty reddish brown, are composed of about equal amounts of plagioclase and augite and commonly have a well developed ophitic texture. The dykes are similar in appearance to those that cut the late Precambrian sediments in Great Slave lake; they are probably of late Precambrian age.

Gold-quartz veins have been found throughout the area within the sedimentary and volcanic rocks of the Yellowknife group. The character and mineralization of veins in the sediments ranges from high temperature quartz-feldspar-tourmaline veins in the knotted schist and hornfels, as at Thompson lake, to lower temperature quartz-carbonate veins in the least altered sediments such as underlie Gordon lake. The common sulphide minerals in the veins include arsenopyrite, pyrrhotite, pyrite, chalcopyrite, sphalerite and galena. Gold has been found in veins of all types and hence all ground underlain by sediments, irrespective of the degree of metamorphism, must be regarded as potentially favourable for the occurrence of gold.

The localization of quartz veins within the sediments is mainly controlled by structures formed when the sediments were folded. Structures favourable for the occurrence of quartz bodies include axial parts of isoclinal folds where the quartz may form saddle reefs or lenticular masses within the ruptured and sheared beds along the crests and troughs of the folds. Faulted drag folds and sheared and washed slaty beds between more massive beds of greywacke and arkose may also contain much quartz. In many places veins follow bedding planes or lie parallel to them. Gold quartz veins also occur within shear zones in the volcanic rocks in the northeastern part of the area.

In addition to gold-quartz veins a copper-zinc deposit has been found near the northwest end of Turnback lake within highly altered sediments near a granite contact. Two narrow veins of massive niccolite with some smaltite and chloanthite in carbonate gangue occur within augite diorite east of François river, about $1\frac{1}{2}$ miles south of Caribou lake.

581A
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