Canada
Department of Mines
Hon. T. A. Crerar, Minister; Charles Camsell, Deputy Minister
BUREAU OF ECONOMIC GEOLOGY
GEOLOGICAL SURVEY
Issued 1936

MAP 377A

EASTERN PORTION OF
GREAT SLAVE LAKE
(WEST HALF)

DISTRICT OF MACKENZIE
NORTHWEST TERRITORIES

Scale, 25/140 or 1 Inch to 4 Miles
Miles 0 4 8
Kilometres 0 5 10

LEGEND

PROTEROZOIC (LATE PRECAMBRIAN)

- 16 — Diabase (sills and dykes)
- ET-THEN SERIES
- 15 — PREBLE FORMATION: sandstone, quartzite
- 14 — MURKY FORMATION: conglomerate
- 13 — Diorite, quartz diorite, granodiorite, syenite
- 10 — TOCHATWI FORMATION: shale, argillite, sandstone
- 9 — STARK FORMATION: dolomite, limestone, breccia, shale
- GREAT SLAVE GROUP (UPPER PART)
- 8 — PETHEI FORMATION: limestone, dolomite
- 7 — KAHOCHELLA FORMATION: shale, slate, argillite, iron formation, limestone, tuff, breccia, agglomerate; andesite
- 6 — SOSAN FORMATION: conglomerate, sandstone, quartzite
- GREAT SLAVE GROUP (LOWER PART)
- 12 — Limestone, slate, argillite, lava — UNION ISLAND GROUP

ARCHEAN (?) (EARLY PRECAMBRIAN)

- 5 — Granite, granodiorite, quartz diorite
- 4 — Sedimentary gneiss and granitic rocks
- 3 — Chloritized granite
- 2 — Diorite, gabbro
- 1 — 1a: WILSON ISLAND PHASE, rhyolite, trachyte, conglomerate, arkose, quartzite, iron formation, dolomite, phyllite, sedimentary gneiss and schist
  1b: POINT LAKE PHASE, sedimentary gneiss and schist — POINT LAKE-WILSON ISLAND GROUP

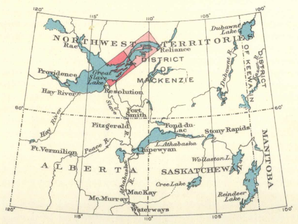
Glacial drift, sand, mud

Geological boundary (approximate, assumed)
Bedding (inclined, vertical, overturned)
Bedding contorted (inclined)
Synclinal axis (approximate)
Anticlinal axis (approximate)
Fault (approximate)
Glacial striae
Survey monument

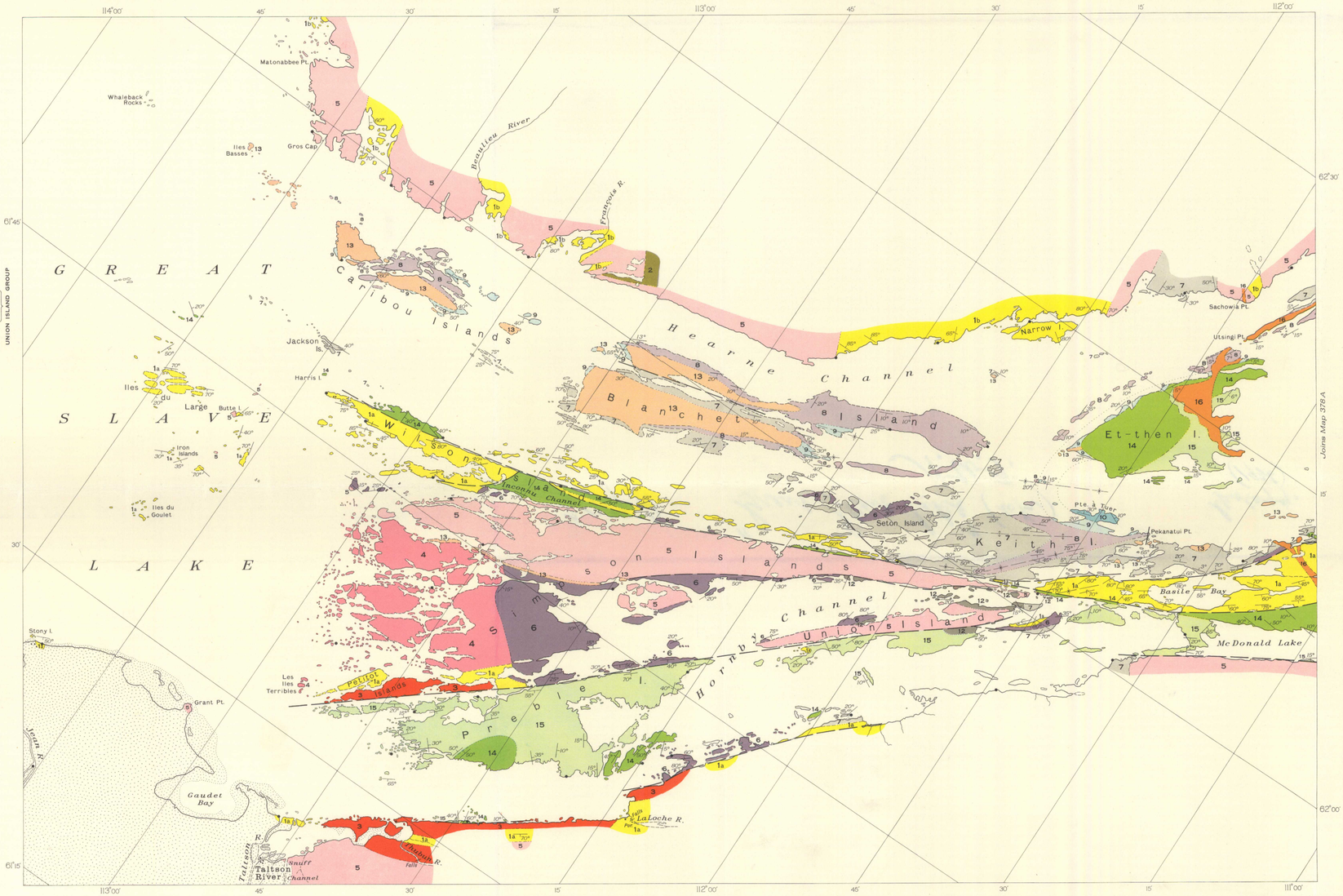
Geology by C.H. Stockwell, 1929, 1930 and 1931.

Base-map prepared from information supplied by the Topographical and Air Survey Bureau, Department of the Interior.

Approximate magnetic declination, 35° to 38° East.



Scale, 1 Inch to 200 Miles



PHYSICAL FEATURES

The main body of Great Slave lake crosses the boundary between the Canadian shield and the bordering area of Palaeozoic rocks and the east arm of the lake extends at right angles to the contact for 175 miles into the Shield. The basin of the arm owes its existence to deep erosion of a belt of mixed hard and soft rocks that is bordered on three sides by uniformly more resistant formations, generally granitic. Within the present map-area, which covers the west half of the east arm, the general level of the bordering lands and of numerous islands and peninsulas in the lake rises gradually from lake level at the entrance to the arm to elevations of 450 to 550 feet above the lake in the east part of the area, with the result that the country becomes progressively more rugged and picturesque toward the east. At many localities along the shore of Blanchet, Seton, and Et-then islands, high cliffs of soft rocks are capped by more resistant formations.

Glacial boulders are scattered over much of the country but thick deposits of moraine are rare. Since the retreat of the continental ice sheet a large delta has formed at the mouths of rivers flowing into the southwest corner of the area. The delta and some other lowlands and islands are well timbered but much of the higher, rocky country is sparsely wooded.

GENERAL GEOLOGY

Two major unconformities are easily recognized within the succession of Precambrian rocks in the map-area and these naturally divide the formations into three main groups. Surficial rocks of each group were invaded by igneous intrusives, and those of the first two groups were highly folded, were probably mountain built, and were deeply eroded to a nearly level plain before subsequent formations were laid down.

The Point Lake-Wilson Island Group (1) of sediments and volcanics are the oldest rocks recognized. They are divided on the basis of marked differences in lithological character and structure into two parts, of unknown relation to one another and called the Point Lake phase and the Wilson Island phase.

Rocks of the Point Lake phase (1b) comprise highly metamorphosed, feldspathic, sedimentary gneiss and schist. Bedding planes strike northerly and dip steeply but the nature of the folding has not been determined. These sediments may be correlated with similar rocks on Yellowknife river, 35 miles to the northwest.

The Wilson Island phase (1a) is typically developed on Wilson island and on nearby small islands to the southwest and northeast. Here the strata are probably considerably more than 11,000 feet thick and comprise acidic lava flows interlayered with conglomerate and arkose, overlain by cross-bedded and ripple-marked quartzite with dolomite and schist, which in turn are followed by phyllite and schist with a few beds of quartzite. Similar sediments are found east and west of Basile bay and on Iles du Large where quartzose sedimentary gneiss and specularite iron formation also occur. Acidic lavas outcrop south and west of La Loche river. The strata generally strike easterly. At Wilson island and vicinity the beds form an overturned monocline, whereas, west of Basile bay they have been closely compressed into a synclinal fold. These rocks may be the same age as the Tazin series as developed in several areas between Great Slave lake and Lake Athabaska.

Granitic Rocks (5) are widespread within and adjacent to the lake basin and some of the larger bodies as well as dykes of granite and pegmatite are known to invade the Point Lake-Wilson Island group. On many of the islands, granitic rocks (4) hold numerous patches of garnetiferous, sedimentary gneiss that is much granitized and cut by dykes of granite. A body of diorite and gabbro (2) on the north mainland east of François river may be older than surrounding granite. Other granitic bodies, including a chloritized granite, are of unknown relationship to the old sediments and volcanics. The chloritized granite (3) is a pale to dark green rock whose minerals are much crushed and broken and the granite is cut by dykes of red granite.

The Great Slave Group of sediments and volcanics was deposited on an old erosion surface crossing granitic intrusives and the upturned edges of the older sediments. The younger rocks form, for the most part, a large asymmetrical synclinorium 150 miles long. Only the west half of this fold lies within the present map-area where it extends from Caribou islands eastward to Keith and Et-then islands. Smaller areas of the same group of rocks lie to the south. The group is divided into two parts, a lower part and an upper part, that may be separated from one another by an erosional unconformity.

The lower part is divided into three formations, named, in ascending order, the Sosan, Kahochella, and Pethei formations. The Sosan formation (6) consists of sandstone and quartzite, locally with conglomerate at the base. Where observed, the base rests on granite or sedimentary schist and the granite immediately beneath the unconformity is soft and disintegrated as if deeply weathered before the overlying rocks were deposited. The Kahochella formation (7) consists largely of argillites and laminated limestones locally with oolitic iron formation and volcanic rocks. 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 volcanic rocks here and on small islands east of Keith island are associated with intrusive bodies of porphyry that are probably closely related to the surface flows. The Pethei formation (8) consists of limestone and dolomite and is characterized in some horizons by the presence of algal structures, as exposed on the east end of Blanchet island and on small islands west of Et-then island.

The upper part of the Great Slave group is poorly developed in the map-area and consists in ascending order of: the Stark formation (9) of interbedded vari-coloured dolomite, shale, limestone and breccia; the Tochatwi formation (10) of shale and sandstone; and the Pearson formation of lava flows. The last named formation occurs a few miles east of the map-area.

The majority of the clastic sediments of the Great Slave group are red or brown and many beds show ripple-marks and cross-bedding. Concretions are locally developed in shale and argillite. The Great Slave group resembles the limestone and associated strata on Belcher islands in Hudson bay and may be about the same age as the Animikie rocks of the Lake Superior region.

The Union Island Group (12) is of unknown age relation to the Great Slave group but, like it, was deposited in the time interval that followed the erosion of the granite and preceded the deposition of the Et-then series. The base of the group is well exposed on Union island where dolomite, holding angular blocks and small fragments of disintegrated granite, rests on an old brecciated granite surface. The dolomite is stratigraphically overlain by interbedded, vari-coloured dolomites, red argillite, and black slate.

Dioritic Intrusives (13). All members of the Great Slave group as well as granite and sediments older than granite are cut by dykes, sills, and stocks of dioritic and syenitic rocks. These intrusives outcrop at intervals along and near the west half of the synclinorium.

The Et-then Series of coarse, clastic sediments were laid down on an old erosion surface crossing dioritic and older rocks. The Murky formation (14) of conglomerate makes up the base of the series and carries closely packed, round boulders of a great variety of rocks representing practically every member of the older groups. The conglomerate is 400 feet thick on Et-then island and, elsewhere, varies greatly in thickness up to several thousand feet, probably, and is locally missing, where sandstone and quartzite of the Preble formation (15), that normally overlie the conglomerate, are represented at the base. The sandstone and quartzite are coarse, feldspathic rocks exhibiting excellent cross-bedding and ripple-marks. The Et-then series is correlated with the Athabaska series as developed at Lake Athabaska and may be Keweenawan in age. The conglomerate and sandstone are nearly flat lying except in the vicinity of faults where dips are up to 70 degrees. These faults are of great magnitude and commonly strike northeasterly. They have displaced the Et-then series and all older rocks.

Diabase (16) dykes and sills cut the Et-then series and older rocks and are later than the large faults. They are seen in the east part of the area where a gently-dipping, sill-like body forms a prominent topographic feature on Et-then island and a few dykes dip vertically and strike slightly west of north. In both forms of intrusive the diabase shows excellent columnar jointing.

ECONOMIC GEOLOGY

Areas underlain by sediments and lavas of the Point Lake-Wilson Island group are considered to be favourable prospecting territory, particularly for gold. Quartz veins are widely distributed in these rocks and are known to carry gold on Outpost and Wilson islands. Low grade, sedimentary iron deposits have been discovered on Iles du Large. The granite bodies are locally crossed by quartz veins but these are not known to carry gold. Small veins of nickel and cobalt cut diorite three miles east of François river.

Veins of quartz cut the Great Slave group, the dioritic intrusives, and the Et-then series. Although these veins are not known to carry gold or more than a trace of silver, they should not be neglected by prospectors. Iron deposits in the Great Slave sediments are not known to be of economic value. Since the large faults, as well as the Et-then rocks are later than both the granitic and dioritic intrusives any mineral deposits that they might contain would likely originate in still later intrusives, of which only diabase is known. The diabase is like that at Cobalt and Thunder Bay where deposits of silver have been mined in and near diabase.