PRELIMINARY SERIES

SHEET 33 (PART OF)

LEGEND

CENOZOIC

PLEISTOCENE AND RECENT

5 Principal bogs, and areas of silt and clay; 5a, palsa bogs with large peat hummocks

4 Alluvial flats, includes some 2 and 3: mainly sand

3 Marine flats and beach ridges, includes some 2 and 4: mainly sand and boulders

2a Glaciofluvial features; includes eskers, pitted outwash, kames, and areas of sand associated with glacial drainage: gravel, sand

1 Morainic area of irregular hummocks and ridges: till, boulders, sand

R Undivided bedrock and formless-drift

Geological boundary (approximate)

Limit of geological mapping

Glacial striations and grooves, accompanied by miniature crag-and-tail forms, stoss slopes, etc.

Glacial striations and grooves (direction of movement unknown)

Crag-and-tail hills (where numbers indicated, 1 is the older)

Area of drumlins (trend indicated) (where numbers indicated, 1 is the older)

Superposed drumlins and crag-and-tail hills (where numbers indicated, 1 is the older)

Area of washboard moraines (trend indicated)

Limit of marine submergence (approximate only)

Abandoned channel

Magnetite-rich sands × mag

Geology by H.A. Lee, K.E. Eade, and W.W. Heywood, 1957

Airphoto interpretation map controlled by numerous ground observations

Trading post

Wireless station

Sand or mud

Marsh

Falls and rapids

Height in feet above mean sea-level .590

Approximate magnetic declination , 21° 40' West

Cartography by the Geological Survey of Canada, 1960

Air photographs covering this area may be obtained through the National Air Photographic Library, Topographical Survey, Ottawa

In response to public demand for earlier publication, Preliminary Series maps are issued in this simplified form and will be clearer to read if all or some of the map-units are hand-coloured

INDEX MAP

Vertical scale of feet

50 0 50 100

Datum, ground surface

Note: All islands in Hudson and James Bays lie within the District of Keewatin, N.W.T.

COLUMNAR SECTIONS 1-12

1 Alluvial sand; Slump; Marine clay; sand lenses

2 Alluvial cobbles and sand; Marine sand, silt and clay

3 Dune and marine sand

4 Alluvial sand and gravel; Marine sand and clay

5 Alluvial sand; Marine clay

6 Alluvial sand; Marine sand

7 Bore hole; Bedrock

8 Alluvial sand; Marine silt; Marine clay

9 Alluvial sand; Marine clay and silt

10 Alluvial sand and gravel; Marine silt and clay

11 Alluvial sand

12 Alluvial sand; Marine clay

GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF MINES AND TECHNICAL SURVEYS

MAP 52-1959
SURFICIAL GEOLOGY
SAKAMI LAKE
(FORT GEORGE-GREAT WHALE AREA)
NEW QUEBEC

Scale: One Inch to Eight Miles = 1/506,880

8 4 0 8 16 24 Miles

PUBLISHED, 1960
COPIES OF THIS MAP MAY BE OBTAINED FROM THE DIRECTOR, GEOLOGICAL SURVEY OF CANADA, OTTAWA

PRINTED BY THE SURVEYS AND MAPPING BRANCH

DESCRIPTIVE NOTES

Information for this map was obtained by helicopter reconnaissance and air-photo interpretation. The map shows surficial geology only; bedrock geology has been mapped separately[1].

This broad region has no roads except those in the settlements of Great Whale River and Fort George. The centre of the mapped area is about 270 miles northeast of Moosonee, Ontario, 330 miles northwest of Chibougamau, Quebec, and 400 miles west of Schefferville, Quebec. Bush aircraft can be chartered at all three places. For supplies, ship transportation is available during the summer from Moosonee to the coastal settlements of Great Whale River and Fort George. Two main canoe routes, Fort George and Great Whale Rivers and their tributaries, traverse the area eastward from the coast. Numerous rough rapids and falls on all rivers and streams make canoe travel difficult within the area. Forest cover changes from semi-barren lands in the north to open parkland in the central part, and to heavy coniferous forest in the southern part. Many patches of the heavily forested area have been extensively burnt exposing the land surface.

Topographically, the area is complex. The coastal landscape has been described by Bell[2], Low[3], and Kranck[4]. In general it has been noted that massive granites form the higher areas with numerous tectonic furrows occupied by lakes, and that gneisses occupy somewhat lower ground with a developed drainage system.

A composite stratigraphic section for the mapped area would include, from bottom to top, bedrock, till, glacio-fluvial gravel, marine clay and silt, alluvial gravel and sand, and peat. Few places, if any, have all these members present in a single section.

Transport of erratics in the area[5] was first easterly, and later westerly. The earlier transport is indicated by boulders dispersed inland in New Quebec, at distances of 6 miles and more from a source of sedimentary rocks outcropping on the off-shore Hudson Bay islands. The erratics are limestone, red siltstone, and basalt, and these are found on granite bedrock. The limestone is grey, highly calcareous, unfossiliferous, and has a fine, uniform texture. The basalt is greyish black and in some places scoriaceous. Dolomite erratics, with a different source area, are found at the mouth of Great Whale River where the bedrock is granite. The dolomite is green-grey and contains numerous small brachiopods which L. M. Cumming of the Geological Survey of Canada identified as Camarotechia sp. and Stegerhynchus?. Certain smooth-shelled ostracods with a denticulate hinge were identified by M. J. Copeland of the Geological Survey of Canada as a species of Leperditia (Herrmannina) Kegel 1933. These fossils were reported as Middle to Late Silurian in age. Outcrops of similar rock type and age are found bordering James Bay and Hudson Bay on the west and appear to extend out and under the bays[6].

Drumlins of the map-area are distinct ridges about 1/2 mile long, 25 to 75 feet high, and about 1/8 to 1/4 mile wide. In the western third of the map-area are two sets of drumlins, one on top of the other. In both, surface expression is well defined. The crest of top drumlin is about 5 to 20 feet above the crest of the lower one. The drumlins intersect at an angle of 5 to 15 degrees, with the top one more westerly. The mean intersecting angle is recorded in striations on the bedrock.

Washboard moraines (straight-ridged minor moraines, "beach-moraines", annual moraines) form a pattern of ridges spaced at about 800-foot intervals, with extremes of 100- and 1,000-foot intervals. A typical ridge is about 15 feet high, with a narrow rounded top, and a width at the base of about 100 feet. Two distinct elements characterise a profile transverse to a ridge: (a) a steep, wave-washed, boulder-strewn, west-facing slope and (b) a terrace near the bottom of the eastern slope. Between ridges there is generally a poorly drained clay area. Cuts through the ridges show bouldery and gravelly material on the west side and fine sand on the east. The ridges are superposed on drumlins. These washboard moraines are in general similar to those described by Mawdsley[6] and Norman[7] in the Chibougamau District of Quebec, but the Fort George moraines have additional units with a west-facing, boulder-strewn slope and a terrace on the east slope, as evidence of extensive wave action. They are not 'prominent marine and lacustrine strand lines' as shown on the Glacial Map of Canada, 1958[8].

Another type of moranic area (1), east of the limit of marine submergence, is characterized by a hummocky topography with short till ridges, and by giant dumps of boulders. The ridges and hummocks are about 20 to 60 feet high. On air photographs (approximately 1 mile to the inch), they show as very short crenulated lines with trends transverse to the direction of last ice-flow. The ridges and hummocks generally occupy valley bottoms and sides. The areas of the irregular moraine are commonly narrow and elongated, occurring along the two sets of meltwater drainage-ways, parallel to the last direction of glacier flow, and transverse to it. In origin, some ridges appear to be depositional and others erosional.

Eskers, plateaus and hills that are marked by kettle-holes are mapped as glacio-fluvial features (2). This unit also includes some sand flats that lack kettle-holes but border the areas of plateaux and eskers. Eskers oriented east-west are generally about 70 feet high; their surfaces are covered by bouldery, gravelly material. Lower sandy ridges, generally about 20 to 30 feet high, meet eskers at right angles. These ridges are in linear continuity with abandoned drainage channels that can be traced for several miles. The pattern formed by eskers and ridges suggests a fractured marginal zone of the ice-sheet as it wasted.

The highest former coastline, of the period of post-glacial marine submergence, is interpreted from strand lines that lie between 800 and 900 feet above present sea-level. Pro-glacial deltas lie a little below the upper coastline at elevations of 760 feet at 55°03'N, 76°38'W; 880 feet at 54°28'N, 76°35'W; 840 feet at 54°14'N, 75°50'W; and 840 feet at 54°09'N, 75°55'W. A wave-cut nick occurs in a soft zone of granite gneiss at an elevation of 830 feet at 55°15'N, 76°47'W and represents a stand-still of the sea. A cobble-beach ridge lies a few feet lower on the same hillside. Elsewhere in the formerly submerged area, there are extensive terraces composed of sand and pebbles. These areas have been reworked by sea action, and show a succession of strand lines.

Silt and clay containing marine shells and wood are seen in river-banks along most of the larger streams. Selected sections are shown on the map. South of the Roggan River and west of the belt of washboard moraines, the land surface changes from till on the crests of drumlins to clay and low bedrock knobs between the drumlins.

Alluvial sand (4) commonly overlies marine silt and clay.

Map-unit 5 represents poorly drained areas underlain by bog deposits or clay and silt. These two different deposits are grouped together because only in a few places could the areas of clay be readily differentiated from bog on air photographs.

Stable and active dunes are common. They consist of a blow-out basin with ridge deposition on the north, northwest and northeast sides.

On Fort George River, in the southeast quarter of the map-area there are several localities where considerable concentrations of magnetite sand occur along present river-shores; the extent and thickness of these beds was not determined. Further investigation might show other areas of magnetite concentration in some of the glacio-fluvial and marine sands.

Radiocarbon dates from samples collected in the map-area give some information on the rate of emergence of the land surface. The first locality to be considered is at Great Whale River settlement. The general geologic setting at this site is a prominent sand flat, 90 feet in elevation, that has been incised by the Great Whale River. Left along the present river is a narrow terrace cut at an elevation of 22 feet. A test pit was dug into this lower terrace under the direction of Mr. J.M. Whissell, who reported encountering a tree (personal communication). The pit was sampled and, from surface downwards, exposed up to 1 foot of peaty soil, and 1 foot to 6.6 feet of silt and minor twigs. At a depth of 6 feet marine shells were collected, and at 6.6 feet a tree branch was dug out. The radiocarbon age of the wood in the branch is 3,190± 90 years (L441A). If sea-level at that time were placed between 22 and 90 feet, the height of the terraces, then the rate of emergence was in the range of 0.7 foot to 3 feet per century during the past 3,000 years.

A second locality is along the Fort George River where landslides have exposed vertical sections through the drift. One such section, shown as number 8 on the map, contains wood. The stratigraphic succession from terrace-level downwards is: 15 feet of crossbedded sand, 50 feet of stony silt containing marine shells and wood, and 10 feet of black clay with marine shells. The radiocarbon age of the wood is 3,700± 130 years (L433A). If the top of the silt strata at an elevation of 175 feet is taken as an indication of sea-level at this time, then the rate of emergence was 5 feet per century for the past 4,000 years.

Material from a third locality, just east of the marine limit (53°34.6'N, 74°41'W), has an age of 5,475± 166 years (sample No. LG-27-57, Isotopes Inc.) for peat at the bottom of a bog. This date implies only that the site was free of glacier ice before this time.

West of Hudson Bay, the near-maximum extent of marine transgression[3] is dated from shells at 6,975± 250 years old. Applying this age to the height of the maximum marine transgression in this area gives a rate of emergence at 11 to 13 feet per century. Rates of emergence are summarised below:

Rates of emergence

7,000 to 3,700 years ago	19-22 ft./century
7,000 years ago to present	11-13 ft./century
3,700 years ago to present	5 ft./century
3,150 years ago to present	0.7-3 ft./century

Two assumptions are made in these computations; first that the material underlying the terraces dates the terraces, and second that the marine transgression at its maximum was synchronous east and west of Hudson Bay. Precise corrections are lacking for the two assumptions and the figures should be taken as giving only the relative rates of emergence.

[1] Eade, K.E., Heywood, W.W., and Lee, H.A.: Preliminary Map, Sakami Lake Area, New Quebec; Geol. Surv., Canada, Map 23-1957

[2] Bell, R.: Report on an Exploration of the East Coast of Hudson Bay; Geol. Surv., Canada, Rept. of Progress, 1877-78, No. 128, 1879

[3] Low, A.P.: Explorations of the East Coast of Hudson Bay from Cape Wolstenholm to the South End of James Bay; Geol. Surv., Canada, Ann. Rept. (new ser.), vol. 13, Rept. D., 1900

[4] Kranck, E.H.: On the Geology of the East Coast of Hudson Bay; Acta Geographica, 11, No. 2, 1951

[5] Lee, H.A.: Eastward Transport of Erratics from Hudson Bay; Geol. Soc. Amer., Bull. 7, pp. 219-222, 1959

[6] Mawdsley, J.B.: The Wash-board Moraines of the Opawica-Chibougamau Area, Quebec; Trans. Roy. Soc. Can., sec. IV, pp. 9-12, 1936

[7] Norman, G.W.H.: The Last Pleistocene Ice-front in Chibougamau District, Quebec; Trans. Roy. Soc. Can., sec. IV, pp. 69-85, 1938

[8] Glacial Map of Canada; Geol. Assoc. Can., 1958

[9] Lee, H.A.: Surficial Geology of Southern District of Keewatin and the Keewatin Ice Divide, Northwest Territories; Geol. Surv., Canada, Bull. 51, p. 25, 1959

MAP 52-1959
SAKAMI LAKE
NEW QUEBEC

5-1-9
A. Geol. Sakami Lake, New Quebec
Map 52-1959