GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF MINES AND TECHNICAL SURVEYS

PRELIMINARY SERIES

SHEET 21 J/13

LEGEND

PLEISTOCENE AND RECENT

7 Swamp deposits: muck, peat, marl

GRAND FALLS DRIFT AND YOUNGER SEDIMENTS

6 Valley train outwash and terrace deposits: gravel and sand with well rounded stones, well sorted, numerous cut-and-fill channel structures

5 Rillwash: mixed sand and stones; reworked till, minor gravel, silt. Area includes minor bedrock

GRAND FALLS DRIFT AND OLDER SEDIMENTS

4 Glacio-lacustrine and alluvial deposits (in part older than 1); stratified sand and silt, interlayered clay and sand. (Exposed only in sections; selected exposures shown)

3 Glacial outwash in valley bottoms, pitted glacial outwash: gravel and sand with subrounded stones; moderate sorting, some cut-and-fill channel structures; includes areas of washed till, minor bedrock, alluvium

2 Kame and esker deposits: gravel and sand with rounded to subangular stones; occur as ridges with steeply dipping beds

1 Basal till: compact, silty, stony till with subrounded stones; and Ablation till; loose, stony till with dominantly angular stones. Area includes some colluvium, reworked till, minor alluvium, minor bedrock

CENOZOIC

BEDROCK OUTCROPS

PALAEOZOIC

× Bedrock outcrops: A. acid volcanics, B. red shale, red conglomerate, C. slate, limestone, D. gabbro, diorite

Geological boundary (defined, approximate, assumed)

Limit of geological mapping

Closed depression or kettle hole

Scarp usually bounded by a terrace on the river side

Base map is pre-flooding by Beechwood reservoir

Geology by Hulbert A. Lee, 1953 and 1956

Main highway

Other roads

Cart track

Trail or portage

Power transmission line

Post Office

International boundary

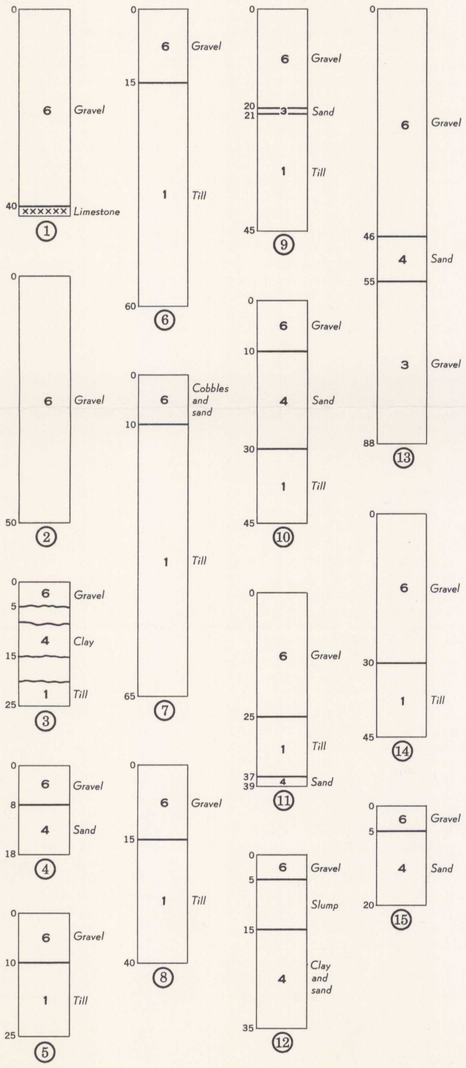
Parish boundary

Indian Reserve boundary

Intermittent stream

Cartography by the Geological Survey of Canada, 1959

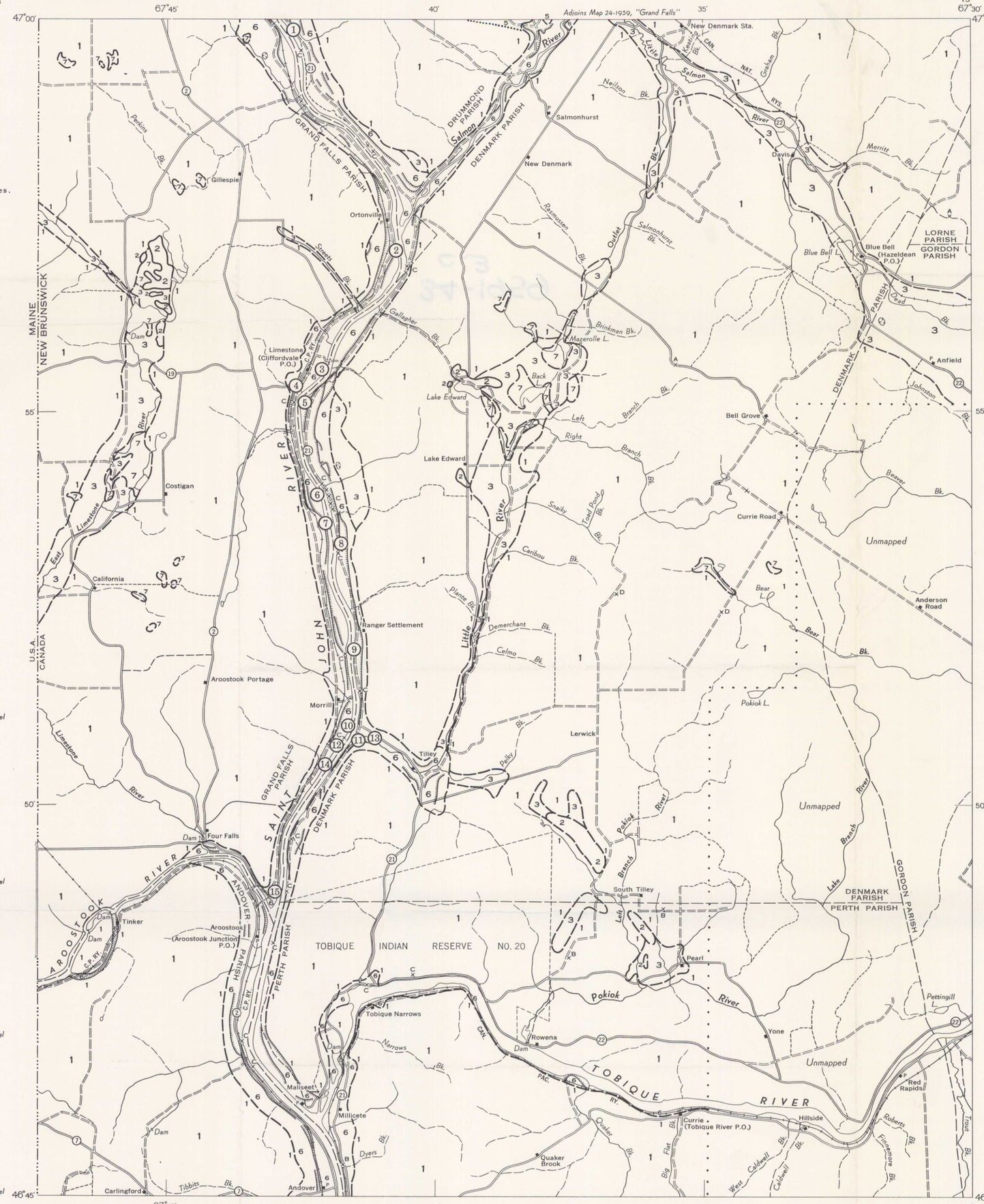
Approximate magnetic declination, 22° 09' West



COLUMNAR SECTIONS 1-15

Vertical scale of feet
10 0 10 20 30

Datum, ground surface



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MAP 34-1959
SURFICIAL GEOLOGY
AROOSTOOK
VICTORIA COUNTY
NEW BRUNSWICK

Scale: One Inch to One Mile = 1/63,360
Miles
1 1/2 0 1 2 3

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

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

In response to public demand for earlier publication, Preliminary Series maps are now being issued in this simplified form, thereby effecting a substantial saving in time. There is no loss of information, but the maps will be clearer to read if all or some of the map-units are hand-coloured.

DESCRIPTIVE NOTES

The most prominent glacial feature in the area is the valley-train outwash. It was deposited while the ice-margin lay at Grand Falls[1] a few miles north of the Aroostook map-area. There, the Grand Falls moraine marks an ice-frontal position of a major lobe of the Wisconsin ice-sheet in the Saint John River valley. Glacial rivers coming from the melting ice-sheet deposited the outwash chiefly in river valleys. The outwash gravels became terraced as the ancestral Saint John River eroded its way laterally and downwards to its present position. The numerous and prominent terraces along the northern part of the river mark the old slip-off slopes. A stretch of undissected outwash that contains kettle holes lies along the valley wall of the Saint John River a few miles south of Cliffordvale P. O.

Another important glacial feature in the area is ablation moraine. It is composed of loose and stony till with dominantly angular stones and minor fine material. It lies over the land surface in the area of high relief south of Tobique River. The topography north of Tobique River is more subdued as basal till fills many of the minor depressions in the bedrock surface. Basal till is exposed in many sections cut into the valley floor. This till has a distinct fabric that indicates former active plastic flow of the ice-sheet in that area. It is not overlain by ablation till. The change in nature of till from south to north over the area, suggests a stagnant ice periphery in the southern part and active flow further north behind the retreating ice-margin.

Radiocarbon dating of the basal beds of peat overlying Grand Falls drift along Green River, north of this area, shows the age of the Grand Falls drift to be greater than 10,200± 350 years[1].

The map shows only some of the bedrock outcrops, as only cursory attention was given to the bedrock geology.

Till (1) occurs on the higher land in patches 2 to 3 feet thick, but along the 'through-valley' of Saint John River it is locally as much as 55 feet thick. The orientation of long axes of pebbles in three superposed tills exposed near the mouth of Little River changes from westerly in the lower till to more southerly in the upper tills (see insert diagram). No weathering or leaching separates the tills. They may therefore have been deposited by the same ice-sheet. The change in direction of glacier movement may have been due to the increasing influence of topography as the ice-sheet thinned and waned. The earlier glacier movement was independent of Saint John River valley whereas later movements were more or less restricted to the valley.

Kame and esker deposits (2) occur as disconnected areas forming ridges on the higher land.

Glacial outwash in valley bottoms and pitted glacial outwash (3) are associated with the kames and eskers and represent in part gravels from meltwater that flowed away from the ice-sheet. The gravel blocked the old drainage courses and gave rise to ponds and small lakes. Moderate sorting of the gravels and a preponderance of subrounded stones imply a short transport.

Stratified sand, silt and clay of the glacio-lacustrine and alluvial deposits (4) are locally exposed near the mouths of streams entering Saint John River. They are underlain by gravel or till and overlain by other gravels. An exception to this sequence is an exposure of stratified sand that underlies till near the mouth of Little River. This sub-till sand may have been covered by till deposited during a minor glacial oscillation, or may be considerably older and represent an interstadial or interglacial period. Further investigation may assign a more precise date to this deposit.

An area of rillwash (5) lies at the northern border of the Aroostook map-area, and patterns in the rillwash are best developed just north of the map-area. Rill patterns lead southeastwards from the Grand Falls moraine and trend roughly at right angles to it. Individual rill channels may be up to half a mile long. They were probably formed by water coming from the melting ice-sheet as its margin occupied different positions during a slow retreat northwestward[1]. The rill patterns are distinct on aerial photographs, but not easily seen on the ground. Rill channels average about 6 feet in depth in the deeper portions and vary considerably in width to form braided patterns from 25 feet to half a mile wide. The rill channels commonly have a thin, basal, discontinuous layer of stony gravel and an infilling of sand. Depth of bedrock in this rillwash area averages 2 feet.

The valley-train outwash and terrace deposits (6) consist of gravels located along the Saint John River valley. These gravels are generally well sorted, have nearly horizontal bedding and numerous cut-and-fill channel structures. The gravels were primarily deposited from meltwater carried in the Saint John River valley. Considerable transport of the gravel beds has subsequently taken place. A thickness of about 200 feet of valley-train gravel is exposed near the southern limit of the town of Grand Falls a few miles north of the Aroostook map-area. This thickness decreases rapidly southwards.

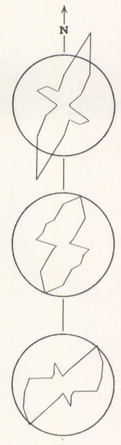
Swamp deposits (7) are mainly restricted to the area of outwash in valley bottoms and pitted glacial outwash. As noted above, the gravel partly blocked the old drainage and caused small lakes and ponds to be formed. Marl (or shelly gyttja) lies below peat in many of the bogs. Porous gravel and generally high relief permit easy water percolation and provide conditions for rapid leaching, ideal for marl formation. Limestone pebbles in the gravels provide a source of carbonates.

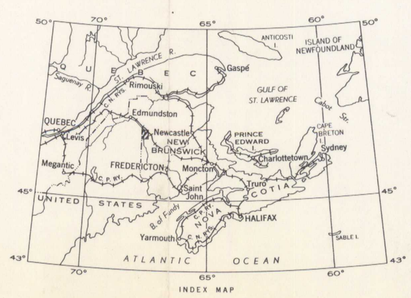
Gravel occurs in large quantities in kame and esker deposits (2), glacial outwash in valley bottoms and pitted glacial outwash (3), and in the valley-train outwash and terrace deposits (6).

[1]Lee, H.A.: Surficial geology of Grand Falls, Victoria and Madawaska Counties, New Brunswick; Geol. Surv., Canada, Preliminary Map 24-1959.

FABRIC DIAGRAMS OF 3 TILL LAYERS IN SECTION 11 NEAR MOUTH OF LITTLE RIVER

(Radius of circle indicates scale and corresponds with 10 pebble measurements)





INDEX MAP

MAP 34-1959
AROOSTOOK
NEW BRUNSWICK
SHEET 21 J/13

5.1.4
A1 Geol Aroostook, N.B. 34-1959