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ONTARIO
DEPARTMENT OF LANDS AND FORESTS

Map S265

THUNDER BAY

SURFICIAL GEOLOGY

Scale: $\frac{1}{506,880}$ or 8 miles to 1 inch

8 4 0 8 16 24

DESCRIPTIVE NOTES

Ground moraine (1) is the most widely distributed glacial deposit, forming a discontinuous mantle of till on bedrock. Generally it is sandy with large amounts of stones, boulders and gravel, and little clay (1a), but in the Lakehead area and in the northeast it contains much clay and few stones (1b). The sandy till is generally less than 3 feet thick in granitic bedrock areas and 8 feet thick in basaltic or Palaeozoic sedimentary bedrock areas. The thickness of clayey till averages about 15 feet.

End and interlobate moraines (2) consist of sand, gravel and boulders and their thickness may reach 200 feet. The unmodified moraines (2a) often have rough topography. The moraines modified by wave action (2c) occur in single ridges, often with level crests.

Glacio-fluvial deposits (3) occur in elongated esker complexes and in kames and were flattened by subsequent wave action in some areas. The thickness of sand and gravel in eskers and kames may attain 100 feet. Outwash deposits (5) are often associated with moraines and eskers and consist of sand with some gravel. The thickness of this deposit is variable, depending on bedrock topography and may reach 40 feet.

Glacio-lacustrine and lacustrine deposits (4) are mainly varved or massive clays (4a), occurring in lowlands, in valleys, or as a mantle over low rock knobs. They vary in thickness from 2 to 50 feet. Glacio-lacustrine or lacustrine fine sand (4b) and sand (4c) occur in similar positions mainly in the northern and eastern part of the area. Deltaic sand and valley train deposits (4d) occur in some valleys and mark the course of ancient rivers. Wave action removed most of the unconsolidated materials from rocky hills (7) in some areas.

A discontinuous, thin layer of loess (6), about 2 feet thick occurs in the western part of the area. It is composed of stonefree very fine sand and silt.

Organic deposits of peat and muck occupy many depressions or plains, but these are not shown on the map.

HISTORY

During the Wisconsin glaciation the area was covered by continental ice masses. Three ice masses were active in late-glacial times, moving in unison or, at times, independently of one another. One ice mass advanced in a south to southwesterly direction and its recessional or readvance stages are marked by moraines aligned in a southeasterly direction. Another ice mass moved to the south and west and its arcuate moraines lie in a south through to easterly direction. A smaller ice mass advanced to the west from the Lake Superior basin. In post-glacial times dunes were formed by wind action and the finer materials were deposited as a thin veneer of loess.

Glacial lakes were dammed in front of the ice masses. Lake Agassiz inundated the southwestern corner of the area first, but later, as ice disappeared from the northwestern part of the area, the lake occupied large areas there, draining into the Nipigon basin through various spillways. Lake Kelvin was established in the Lake Nipigon basin as it became free of ice and drained into the Lake Superior basin. A series of glacial and later post-glacial lakes occupied the Lake Superior basin, each at successively lower levels. In the northeast, Lake Nakina was dammed by ice and was a part of the lake in the Superior basin, but later became separated and drained into the Nipigon basin. Upon the withdrawal of the ice the level of Lake Nakina was lowered and Lake Ojibway was established in the northeastern part of the area. Smaller glacial lakes were dammed by ice in the Dog Lake and Black Sturgeon Lake areas, named Lake Kaministikwia and Lake Sturge.

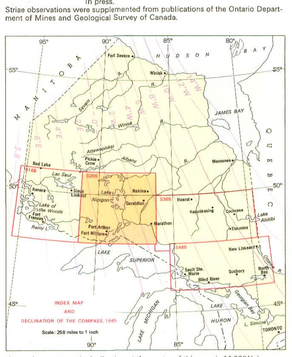
REFERENCES

Farrand, W. R., 1960 — Former shorelines in western and northern Lake Superior basin. Unpub. Ph.D. dissertation, Univ. of Michigan, Ann Arbor, 226 p.

Zoltai, S. C., 1963 — Glacial features of the Canadian Lakehead area. Can. Geogr., 7(3): 101-115

Zoltai, S. C., 1965 — Glacial features of the Quetico-Nipigon area, Ontario. In press.

Striae observations were supplemented from publications of the Ontario Department of Mines and Geological Survey of Canada.



Approximate magnetic declination at the centre of this map is 1° 00'W decreasing 30" annually. For magnetic declination at other locations on the map see inset above.

S.C.Zoltai: Glacial Features of the Quetico-Nipigon Area, CJES vol.2, pp.247-269, 1965.

LEGEND

1. Ground moraine.
   - 1a — *Silty to sandy till.*
   - 1b — *Clayey till.*
2. End moraine, interlobate moraine; sand, gravel and boulders.
   - 2a — *Unmodified by overriding or by lake action.*
   - 2b — *Modified by overiding.*
   - 2c — *Modified by lake action.*
3. Esker, esker complex, kame; sand, gravel, boulders.
   - 3a — *Unmodified by overriding or by lake action.*
   - 3b — *Modified by overiding.*
   - 3c — *Modified by lake action; esker and delta complex.*
4. Lacustrine deposits; varved or massive clay, silt, fine sand, sand.
   - 4a — *Varved or massive clay and silt.*
   - 4b — *Fine sand.*
   - 4c — *Sand.*
   - 4d — *Deltaic sand, valley train.*
5. Outwash deposits.
   - 5 — *Sand, fine sand, gravel.*
6. Aeolian deposits; fine sand, silt.
   - 6 — *Loess.*
7. Bare bedrock, eroded by lake action.
   - 7 — *Bare bedrock.*

SYMBOLS

- *Minor moraines, including washboard and ribbed moraines.*
- *Dune areas; symbol approximates orientation of individual dunes.*
- *Glacial Striae; older.*
- *Drumlin, drumlinoid ridge.*
- *Glacial fluting, linear drift pattern.*
- *Raised shorelines.*
- *Spillway channels.*

Surficial Geology by S. C. Zoltai, Research Branch, Ontario Department of Lands and Forests, 1958 to 1960.

Cartography by the Lands and Surveys Branch, Ontario Department of Lands and Forests, 1965.

The base used for this map was obtained from Map 23 "Thunder Bay" 1963 edition, published by the Ontario Department of Lands and Forests.