Ontario

Ontario Geological Survey

MAP P.3602

SURFICIAL GEOLOGY

WINISK LAKE AREA

Scale 1:100 000

2000 m 0 2 4 km

NTS References: 43 D/13, 14; 43 E/3, 4, 6; 53 A/16 and 53 H/1

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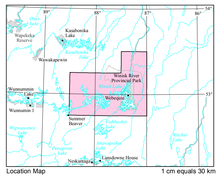
FAR NORTH GEOLOGICAL MAPPING INITIATIVE

Far North Geological Mapping Initiative (FNGMI) is a science-based, geological mapping or inventory initiative to better understand the geological history of the Far North and its mineral resources.



Location Map 1 cm equals 30 km

SYMBOLS

- Small bedrock outcrop; bedrock type undifferentiated
- Geological contact (interpreted)
- Crest of minor moraine
- Crest of esker ridge; direction of flow known or assumed
- Drumlin
- Flute
- Glacial striae
- Roads, trails
- Provincial Park
- First Nation community

LEGEND

PHANEROZOIC

CENOZOIC

QUATERNARY

RECENT

12 **Organic Deposits:** Peat, muck and/or marl deposited in fen wetlands.

11 **Organic Deposits:** Peat, muck and/or marl deposited in bog wetlands.

10 **Glaciomarine Deposits:** Stratified very fine- to coarse-grained sand; may include minor silt and gravel. Deposited primarily in the shore zone of a postglacial sea.

9 **Glaciolacustrine Deposits:** Stratified very fine- to coarse-grained sand and gravel; may include minor silt. Deposited primarily in the shore zone of a proglacial lake.

8 **Glaciolacustrine Deposits:** Stratified very fine- to medium-grained sand; minor silt. Deposited in the near-shore zone of a proglacial lake.

7 **Glaciofluvial Ice-Contact Deposits:** Stratified sand and gravel, including minor silt, clay, till and flowtill. Deposited in eskers and kames.

6 **Till Deposits:** Massive to bedded diamicton; sandy silt to clayey silt matrix, clast content low to moderate, moderate to high matrix carbonate content, may contain discontinuous layers or lenses of stratified gravel, sand, silt and/or clay, includes flowtills. Deposited as fluted ground moraine.

5 **Till Deposits:** Massive to bedded diamicton; stony, silty sand to sand matrix, clast content moderate to high, moderate to high matrix carbonate content, may contain discontinuous layers or lenses of stratified gravel, sand, silt and/or clay, includes flowtills. Deposited as hummocky ground moraine, Rogen or ribbed moraine.

4 **Till Deposits:** Massive to bedded diamicton; silty sand to sand matrix, clast content moderate to high, low to moderate matrix carbonate content, rare discontinuous layers or lenses of stratified gravel, sand, silt and/or clay, or flowtills. Deposited as ground moraine.

3 **Till Deposits:** Massive to bedded diamicton; silty sand to sand matrix, clast content moderate to high, low to high matrix carbonate content, rare discontinuous layers or lenses of stratified gravel, sand, silt and/or clay, or flowtills. Deposited as drumlinized ground moraine.

2 **Bedrock–Sediment Deposits:** Thin near-continuous cover of Quaternary sediments overlying undifferentiated bedrock. Quaternary sediments are commonly less than 1 m thick; however, areas of outcrop indicated on the map may contain small areas where the cover exceeds 1 m in thickness, but are too small to delineate at this map scale.

PRECAMBRIAN

1 **Bedrock:** Undifferentiated bedrock with a thin discontinuous cover of Quaternary sediments. Quaternary sediments rarely exceed 0.5 m in thickness; however, areas of outcrop indicated on the map may contain small areas where the cover exceeds 1 m in thickness, but are too small to delineate at this map scale.

SOURCES OF INFORMATION

Base map information derived from Ontario Land Information Warehouse, Land Information Ontario, Ontario Ministry of Natural Resources, scale 1:50 000.

Mapping conducted using UTM co-ordinates in North American Datum 1983 (NAD83), Zone 16.

Topography and wetland distribution from National Topographic Series (NTS) maps listed above.

Airphotos from the National Air Photo Library, Ottawa, Canada.

Outcrop locations from S. Buse (personal communications, 2007 and 2008) and Buse and Smar (2007).

Magnetic declination approximately 6°35' W in 2007 for centre of the map area.

Geology not tied to surveyed lines.

Metric Conversion Factor: 1 foot = 0.3048 m.

CREDITS

Geological mapping by P.J. Barnett in 2007.

Digital drafting by S. Evers.

Cartographic production by A. Evers.

Edited by M.G. Easton.

To enable the rapid dissemination of information, this map has not received a technical edit. Discrepancies may occur for which the Ontario Ministry of Northern Development and Mines does not assume liability. Users should verify critical information.

Issued 2008.

Information from this publication may be quoted if credit is given. It is recommended that reference to this map be made in the following form.

Barnett, P.J. 2008. Surficial geology of the Winisk Lake area, northern Ontario; Ontario Geological Survey, Preliminary Map P.3602, scale 1:100 000.

Users of OGS products are encouraged to contact those Aboriginal communities whose traditional territories may be located in the mineral exploration area to discuss their project.

Marginal Notes

Under the province's Far North Geoscience Mapping Initiative, the Ministry of Northern Development and Mines, Ontario Geological Survey's Sedimentary Geoscience Section undertook a study of the mineral aggregate resources and background chemistry and mineralogy of surficial sediments within the Winisk Lake area in 2007 (Barnett 2007). Observations made of the surficial sediments during these studies were combined with the interpretation of airphotos (scale ~1:60 000, National Air Photo Library) to produce this map. The delineation of the various streamlined landforms depicted on the map was accomplished through the study of shaded digital elevation models and Landsat 7 Enhanced Thematic Mapper (ETM) imagery.

The map is designed for use at 1:100 000 scale and covers the area of 7 1:50 000 scale National Topographic System map sheets: 43 D/13, 43 D/14, 43 E/3, 43 E/4, 43 E/6, 53 A/16 and 53 H/1. Mapped units are, for the most part, typical of surficial geology maps; however, areas of till have been mapped or grouped based on dominant landforms present, rather than different layers of till. This arose out of the basic lack of field checking required for differentiation of the possible 4 till layers in the area.

Field techniques included the observation of materials encountered in hand-dug sample pits and by hand auger. Observations were skewed toward the proximal end of drumlins (the target setting for till sampling), along rivers (stream sediment sampling sites) and in areas of suspected sand and gravel deposits.

Photo 1. A drumlin southwest of the community of Webequie (unit 3).

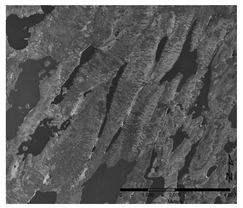


Photo 3. Example of drumlinized ground moraine (unit 3).

BEDROCK GEOLOGY

The Winisk Lake area is dominated by gneissic and granitoid rocks of granitic to tonalitic composition with limited exposures of greenstone in the northeastern edge of the map area (Buse and Smar 2007). The area has been mapped only at a reconnaissance scale (Thurston, Sage and Siragusa 1979; Buse and Smar 2007).

On the current map, bedrock is undifferentiated and is depicted where it is exposed at or very near surface (unit 1) or covered by a thin (usually less than 1 m) and discontinuous cover of surficial unconsolidated sediment (dominantly till)(unit 2). Outcrop locations (+) were taken from Buse and Smar (2007) in addition to those observed during field work. At a few locations, striations were recorded and are shown on the map using symbols.

QUATERNARY GEOLOGY

The landscape within the Winisk Lake area is a record of primarily subglacial deposition. The landscape is dominated by streamlined landforms, drumlins and flutes with a large part of the inter-drumlin areas occupied by large lakes. Areas of hummocky ground moraine and eskers complete the subglacial landscape.

At least, 3 distinct sets of streamlined forms exist. There is a set of low, broad drumlins with long axis trending to the southwest, a set of smaller, better-defined, drumlins oriented to the south-southwest and long linear flutes oriented to the south-southeast. The streamlined forms appear to be composed of till or, at least, till was the sediment encountered in all the relatively shallow (<1 m) test pits dug into these features. Till within drumlins, ranges from a stony, silty-sand to sand diamicton to a moderately stony, sandy silt to silt diamicton (unit 3) (Photo 1). The finer textured samples appear to contain greater amounts of carbonate rock fragments derived from the Hudson Bay Lowland.

Photo 2. Fluted terrain northeast of the community of Webequie (unit 6).

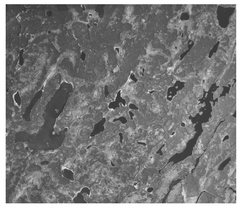


Photo 4. Example of hummocky ground moraine (unit 5).

A thin, discontinuous layer of slightly clayey, very fine-textured sandy silt to silt till appears to be associated with the areas of large flutes (unit 6) that occur in the eastern third of the map area (Photo 2), although, these landforms may be in part palimpsest. The finer grained till was observed to overlie coarser varieties of till at several places and may indicate that an older sandy till occurs beneath the surface till within areas of this map unit. In addition, the finer till was observed in isolated patches beyond the map area of flutings.

The set of low, broad drumlins appear to be older than the well-defined set. Extensive gullying and minor slumping is present on the surface of many of the drumlins within the older (7) drumlin set (Photo 3). Elsewhere, in several areas, drumlins have been modified by or possibly formed by subglacial meltwater. Some of the observed features include terraced and sculpted margins of the drumlins; lake-filled horseshoe-shape and spindle-shape depressions; channels carved around the drumlins containing extensive boulder gravel deposits; and, in places, enormous boulder gravel lags that occur over the entire drumlin form. In the western part of the map area, ground moraine with low relief is present (unit 4).

In addition to drumlins, some areas are dominated by hummocky ground moraine (Photo 4) consisting of poorly developed or immature rib or Rogen moraine. These areas are laterally adjacent to the drumlin fields and, in places, overlie some drumlins. The sediment appears to be stony till, for the most part, that is commonly mantled by large boulders (unit 5). The boulders occur in sheets or lags and consist of openwork boulder gravels of unknown thickness, but, where observed, were thin. These deposits likely formed as a result of subglacial meltwater discharges that flowed periodically in discontinuous sheets and channels.

During the latter stages of deglaciation, meltwater drainage was primarily confined to conduits within the glacier eventually producing eskers that are the main sources of sand and gravel in the area (unit 7). Both large and small esker systems exist. The largest crosses the entire Winisk Lake map area trending south-southwestward, west of Wapikopa Lake. A large esker also occurs adjacent to the southeast corner of Winisk Lake. Smaller esker systems occur throughout the area and 2 of them have been used as a source of sand and gravel for the community of Webequie in the past. However, where esker sediments were observed, they tend to be sandy with little crushable material present. Subglacial meltwater also flowed periodically in discontinuous sheets and channels modifying or forming some of the drumlins in the area and depositing openwork boulder gravels of unknown thickness, but, where observed, were thin.

Abandoned shoreline features (beaches, bars and spits) and deposits of glaciolacustrine (units 8 and 9) origin occur along the shore of the southeastern basin of Winisk Lake and possible abandoned glaciomarine shoreline features (unit 10) and associated deposits occur in the extreme northeast part of the map area. Both deposits have the potential for use for mineral aggregate.

Units 11 and 12 represent wetland areas and the accumulation of peat, and muck (bog and fen, respectively). The boundaries of these units were obtained from the data of the digital 1:50 000 scale National Topographic Series maps for the area.

ACKNOWLEDGMENTS

The author was ably assisted in the field by Cornelius Jacob, Ryan Mariotti and Roland Shewayb[illegible]. Janet Hill and Ryan Mariotti delineated the streamline landforms depicted on the map. The digital map and components were prepared by Shannon Evers, Ontario Geological Survey. The assistance of all the above is much appreciated.

REFERENCES

Barnett, P.J. 2007. Surficial mapping and sampling in the Webequie area, northwestern Ontario; *in* Summary of Field Work and Other Activities 2007, Ontario Geological Survey, Open File Report 6213, p.40-1 to 40-5.

Buse, S. and Smar, L. 2007. Geology of the Winisk Lake area, northwestern Ontario: a fresh look at a granitoid and gneissic terrane; *in* Summary of Field Work and Other Activities 2007, Ontario Geological Survey, Open File Report 6213, p.34-1 to 34-6.

Thurston, P.C., Sage, R.P. and Siragusa, G.M. 1979. Geology of the Winisk Lake area, District of Kenora, Patricia Portion; Ontario Geological Survey, Report 193, 169p.