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CANADIAN GEOSCIENCE MAP 337

RECONNAISSANCE SURFICIAL GEOLOGY

HARDISTY LAKE

Northwest Territories
NTS 86-C

Map Information Document

Preliminary

Celebrating 175 yrs

Geological Survey of Canada
Canadian Geoscience Maps

2018

Canada

MAP NUMBER

Natural Resources Canada, Geological Survey of Canada
Canadian Geoscience Map 337 (Preliminary)

TITLE

Reconnaissance surficial geology, Hardisty Lake, Northwest Territories, NTS 86-C

SCALE

1:125 000

CATALOGUE INFORMATION

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ABSTRACT

The glaciated landscape of the Hardisty Lake region of the Northwest Territories exhibits striations and large ice-flow features such as drumlinoids, crag-and-tail features, and fluted bedrock that record westward to southwestward ice flow during the last glaciation. Glacially scoured bedrock, with till-veneer patches in depressions, dominates much of the map area, but extensive till deposits occur in the more elevated regions of the southwest. Glaciofluvial landforms, including eskers, kames, and outwash plains, are part of poorly defined meltwater corridors, and generally trend southwestward. During deglaciation of the map-sheet area, which began about 10.5 ka BP, a discontinuous line of recessional moraines was created east of Rebesca Lake. Glaciolacustrine sediments, associated with glacial Lake McConnell, were deposited in the central and western regions. Associated glaciolacustrine deltas and beaches occur between 210 m and 310 m elevation, but washing limits are found as high as 340 m locally on the eastern flanks of the till highlands.

RÉSUMÉ

Le paysage glaciaire de la région cartographique d'Hardisty Lake, dans les Territoires du Nord-Ouest, montre de grandes entités rendant compte d'un écoulement glaciaire, comme des drumlinoïdes, des structures en crag-and-tail et un substratum cannelé, qui témoignent, avec les stries, d'un écoulement glaciaire dans une direction variant de l'ouest au sud-ouest au cours de la dernière glaciation. Un substratum rocheux affouillé par les glaciers, avec de petites étendues de placage de till dans des dépressions, est le trait dominant de la plus grande partie de la région cartographique. Cependant, des dépôts de till de grande étendue sont présents dans les secteurs plus élevés au sud-ouest. Des formes fluvioglaciaires, dont des eskers, des kames et des plaines d'épandage, sont contenues dans des couloirs d'eau de fonte mal définis, qui sont généralement dirigés vers le sud-ouest. Lors de la déglaciation dans la région de la carte, qui a débuté vers 10,5 ka BP, une ligne discontinue de moraines de retrait s'est formée à l'est du lac Rebesca. Des sédiments glaciolacustres, associés au Lac glaciaire McConnell, se sont déposés dans les régions du centre et de l'ouest. Des deltas et des plages glaciolacustres associés à ce lac sont présents entre 210 et 310 m d'altitude, mais des limites de délavage ont été observées par endroits jusqu'à 340 m sur les flancs orientaux de hautes terres de till.

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SHEET 1 OF 1, RECONNAISSANCE SURFICIAL GEOLOGY

GENERAL INFORMATION

Authors: D.E. Kerr and H.B. O'Neill

Geology based on airphoto interpretation of 1:60 000 scale NAPL airphotos by D.E. Kerr and H.B. O'Neill, 2017. Striation measurements from Fraser, 1967; Lord and Wilson, 1942; Normandeau and McMartin, 2013.

Geology conforms to Surficial Data Model v. 2.3

Geomatics by L. Robertson

Cartography by N. Côté

Initiative of the Geological Survey of Canada, conducted under the auspices of the Mackenzie Region Project as part of Natural Resources Canada's GEM Program

Map projection Universal Transverse Mercator, zone 11. North American Datum 1983

Base map at the scale of 1:50 000 from Natural Resources Canada, with modifications. Elevations in metres above mean sea level

Mean magnetic declination 2018, 18°04'E, decreasing 24.3' annually. Readings vary from 18°37'E in the NW corner to 17°29'E in the SE corner of the map.

This map is not to be used for navigational purposes.

Title photograph: Perched erratic on bedrock. Photograph by P. Normandeau. 2017-078

The Geological Survey of Canada welcomes corrections or additional information from users.

Data may include additional observations not portrayed on this map. *See* map info document accompanying the downloaded data for more information about this publication.

This publication is available for free download through
GEOSCAN (http://geoscan.nrcan.gc.ca/).

This publication has been scientifically reviewed, but it has not undergone a formal edit.

Map Viewing Files

The published map is distributed as a Portable Document File (PDF), and may contain a subset of the overall geological data for legibility reasons at the publication scale.

Descriptive Notes

The study area was glaciated during the Late Wisconsin maximum (18 000–13 000 BP) and was likely entirely deglaciated by 10 000 BP (Dyke et al., 2003). Large ice-flow directional landforms (roches moutonnées, drumlinoids, crag-and-tails) were interpreted from airphotos. The landforms indicate the dominant and most recent ice flow to be westward in the northern portion of the map area, and southwestward in the central and southern regions of the area. Isolated measurements in the northern half of the map area record an older flow phase to the northwest. A number of striations were recorded from earlier studies (Fraser, 1967; Lord and Wilson, 1942). Kidd (1936) noted that in places, some striations vary considerably in direction with an average recording west-southwest ice flow. Rare crosscutting striations indicate more than one flow within the last ice-flow event, with a variable older flow phase to the northwest and southwest (Normandeau and McMartin, 2013).

Ice-marginal landforms are largely absent from the Hardisty Lake area, making the identification of former ice front positions difficult to ascertain. However, there are a few discontinuous moraine ridges first referred to as the Rebesca Moraine by Aylsworth and Shilts (1989). These have been mapped in greater detail in this study as a series of narrow minor end moraine ridges, extending for approximately 35 km east of Rebesca Lake. Similar moraines extend another 10 km to the southeast in the adjacent map sheet (Kerr and O'Neill, 2017).

Meltwater corridors extend in length up to 30 km or more, and are less than 1–2 km wide. These erosional corridors are generally parallel to the last ice flow, and consist of patches of bedrock, till veneer, and subglacial (i.e. eskers) and proglacial glaciofluvial outwash sediments.

During deglaciation, glacial Lake McConnell formed in the isostatically depression along the western margin of the easterly retreating Laurentide ice (Craig, 1965). Glaciolacustrine silts up to 30 m thick were reported by Kidd (1936), who also proposed fine-grained sediments were deposited by streams from the east and the west, from local ice caps. Raised beaches up to 305 m elevation in the Hardisty Lake area have been reported (Fraser, 1967), but beaches and deltas have been mapped in this study ranging from 210 m to about 310 m throughout the map area. The latter elevation is believed to be associated with the maximum extent of glacial Lake McConnell. On the eastern flanks of the till highlands in the southwest map area, deltas, beaches and trim lines occur up to 340 m or higher locally. They were likely formed in small, irregular short-lived ice marginal lakes fed by meltwater ponding between the easterly retreating ice front and the higher terrain to the west. The main glacial lake level then fell to 310 m based on the more widespread geographic distribution of these features.

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COORDINATE SYSTEM

Projection: Universal Transverse Mercator
Units: metres
Zone: 11
Horizontal Datum: NAD83
Vertical Datum: mean sea level

BOUNDING COORDINATES

Western longitude: 118°00’00”W
Eastern longitude: 116°00’00”W
Northern latitude: 65°00’00”N
Southern latitude: 64°00’00”N

SOFTWARE VERSION

Data has been originally compiled and formatted for use with ArcGIS™ desktop version 10.2.2 developed by ESRI®.

DATA MODEL INFORMATION

Surficial

The Geological Survey of Canada (GSC) through the Geo-mapping for Energy and Minerals Program (GEM) has undertaken the Geological Map Flow to develop protocols for the collection, management (compilation, interpretation), and dissemination of surficial and bedrock geology data and map information. To this end, a data model has been created.

The Surficial Data Model (SDM) was designed using ESRI geodatabase architecture. The XML workspace document provided can be imported into a geodatabase, and the geodatabase will then be populated with the feature datasets, feature classes, tables, relationship classes, subtypes, and domains.

Shapefile and table (.dbf) versions of the data are included within the data. Column names have been simplified and the text values have been maintained within the shapefile attributes. The direction columns are numerical, to display rotation for points, and the symbol fields will hold the correct values to be matched to the appropriate style file.

For a more in depth description of the data model please refer to the official publication:

Deblonde, C., Cocking, R.B., Kerr, D.E., Campbell, J.E., Eagles, S., Everett, D., Huntley, D.H., Inglis, E., Parent, M., Plouffe, A., Robertson, L., Smith, I.R., and Weatherston, A., 2017. Surficial Data Model, version 2.3.0: revisions to the science language of the integrated Geological Survey of Canada data model for surficial geology maps; Geological Survey of Canada, Open File 8236, 1 .zip file. https://doi.org/10.4095/302717