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CANADIAN GEOSCIENCE MAP 455

SURFICIAL GEOLOGY

LA BICHE RIVER NORTHWEST

Yukon–Northwest Territories
NTS 95-C/11, 12, 13, and 14

Map Information Document

Geological Survey of Canada
Canadian Geoscience Maps

2022

Canada

MAP NUMBER

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Surficial geology, La Biche River Northwest, Yukon–Northwest Territories, NTS 95-C/11, 12, 13, and 14

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1:100 000

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ABSTRACT

This map is situated in the Hyland plateau, west of the Mackenzie Mountains, in southeast Yukon. The area was inundated by the Cordilleran Ice Sheet during the Late Wisconsinan glaciation. Ice advanced east to northeast across the rolling bedrock terrain, producing dense networks of sometimes crosscutting bedrock flutings and drumlinoid ridges. During deglaciation, ice flow became increasingly topographically constrained, shifting to more northward flow along major valleys. Meltwater flowing north initially crossed the drainage divide into the Nahanni River basin. Later, as ice retreated south and eastwards, ice-contact deltas and kame terraces formed along the retreating margins. The area is largely covered by till veneer, with bedrock exposed along most ridge crests and glacially incised valley walls. Shale units within the Besa River and Mattson formations are prone to failure, and large rotational landslides are common.

RÉSUMÉ

La présente carte couvre le plateau Hyland, à l'ouest des monts Mackenzie, dans le sud-est du Yukon. La région a été ensevelie sous l'Inlandsis de la Cordillère pendant la glaciation du Wisconsinien supérieur. La glace a progressé dans une direction variant de l'est au nord-est sur un relief rocheux et vallonné, produisant des réseaux denses de drumlinoïdes et de cannelures dans le substratum rocheux, qui affichent parfois des relations de recoupement. Pendant la déglaciation, l'écoulement glaciaire est devenu de plus en plus régi par la topographie, s'orientant davantage vers le nord le long des principales vallées. L'eau de fonte s'écoulant vers le nord a d'abord traversé la ligne de partage des eaux pour atteindre le bassin de la rivière Nahanni. Plus tard, lorsque la glace s'est retirée vers le sud et l'est, des terrasses de kame et des deltas juxtaglaciaires se sont formés le long des marges en retrait. La région est en grande partie recouverte d'un placage de till. Le substratum rocheux est exposé sur la plupart des crêtes et le long des parois des vallées entaillées par les glaciers. Les unités de shale des formations de Besa River et de Mattson semblent enclines à la rupture, et de grands glissements rotationnels sont courants.

SHEET 1 OF 1, SURFICIAL GEOLOGY

GENERAL INFORMATION

Author: I.R. Smith

Geology by I.R. Smith, based on fieldwork (1999 to 2001), and air photographs (1961, 1:60 000)

Geological compilation by I.R. Smith, 2000, 2001, and 2022

Geological data conforms to Surficial Data Model v. 2.4.0 (Deblonde et al., 2019)

Geomatics by L. Robertson and S. Eagles

Cartography by D. Viner

Scientific editing by L. Ewert

Joint initiative of the Geological Survey of Canada and the Yukon Geological Survey, conducted under the auspices of the Central Foreland NATMAP project, as part of Natural Resources Canada's National Mapping (NATMAP) program

Map projection Universal Transverse Mercator, zone 10
North American Datum 1983

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

Mean magnetic declination 2022, 19°05′E, decreasing 11.3′ annually
Readings vary from 18°59′E in the SE corner to 19°12′E in the NW corner of the map.

This map is not to be used for navigational purposes.

Title photograph: Twelve metre high section of frozen glaciolacustrine sediment exposed along the Whitefish River, beneath a glaciofluvial terrace, Yukon. Photograph by I.R. Smith. NRCan photo 2021-951

The Geological Survey of Canada welcomes corrections or additional information from users (gscpublications-cgcpublications@nrcan-rncan.gc.ca).

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 (https://geoscan.nrcan.gc.ca/).

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.

Cartographic Representations Used on Map

This map utilizes ESRI Cartographic Representations in order to customize the display of standard GSC symbols for visual clarity on the PDF of the map only. The digital data still contains the original symbol from the standard GSC symbol set. The following legend features have Cartographic Representations applied:

- Minor meltwater channel lines

Definition Queries Used on Map

This map utilizes definition queries in order to customize the display for visualization on the PDF of the map only and does not affect the digital data. The following features have a definition query applied:

- Field stations

Descriptive Notes

Field investigations within this map area involved a canoe traverse from Jackpine Lake down the Whitefish River in July 1999, with hiking traverses to inspect the surrounding terrain along the way. Other observations were made during helicopter overflights in the 2000 to 2002 field seasons.

The map area is broadly characterized as rolling bedrock ridge and valley topography of the Hyland plateau. Devonian to Carboniferous Besa River and Mattson formation shale and sandstone (Fallas et al., 2014) outcrop along ridge crests, and within the walls of deep, glacially incised river valleys. Large, rotational bedrock landslides are abundant in the eastern half of the map, and along incised valleys. Till veneer extensively covers the region, with localized thicker till blanket deposits in the south and west parts of the map area. Tills comprise a sandy-silt to clayey-silt matrix, and contain mostly locally derived clast lithologies (shale, sandstone, siltstone, and chert). A prominent northeast-trending dispersal train of igneous and volcanic erratics associated with Paleogene trachyte, syenite, and basalt outcrops south of the map area (syenite, basalt, tuffs, and pyroxene, orthoclase, and columnar quartz crystals) were found across the central and southern parts of the map area. This map area lies within the extensive discontinuous permafrost zone (Heginbottom et al., 1995). Fine-grained glaciolacustrine and glaciofluvial deposits in valley bottoms contain abundant ground ice, including segregated ice lenses up to 1 m thick. Slopes adjacent to the valley bottoms illustrate “drunken forest” morphologies, indicative of active permafrost degradation.

The northwest La Biche River map area was glaciated by the Cordilleran Ice Sheet during the last (Late Wisconsinan) glaciation, overtopping all summits (which range up to 1573 m above sea level). Ice flowed east to northeast across the map area, producing extensive areas of fluted and drumlinized bedrock and thin till veneer. Coalescence with the Laurentide Ice Sheet occurred east and south of this map area (Smith, 2003a, b, 2004a, b; Bednarski, 2008), and the progressive buttressing between the two ice sheets is recorded here by crosscutting and rotation of glacially streamlined landforms in progressively more northeastward directions. During deglaciation, as ice cover thinned and the Laurentide Ice Sheet retreated eastward, the remnants of Cordilleran ice became increasingly topographically confined, flowing northward along major valleys. At the north

end of this map area, meltwater drained northward across the regional topographic divide, into the Nahanni River basin. Ice-contact glacifluvial deposits that lead to deltas further north (within NTS 95-F) and east of this map area (95-C/15; Smith, in press), along with glaciolacustrine blankets, formed in glacial Lake Nahanni, which was impounded by the eastward retreating Laurentide Ice Sheet (Ford, 1976; Bednarski, 2008). Continued south and westward glacial retreat in this map area is constrained by ice-contact deltas and lateral kame terraces (often kettled) recording impoundment of southward drainage, and lateral meltwater channels recording both proglacial and ice-marginal drainage.

ACKNOWLEDGMENTS

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Author Contact

Questions, suggestions, and comments regarding the geological information contained in the data sets should be addressed to:

I.R. Smith
Geological Survey of Canada
601 Booth Street
Ottawa ON
K1A 0E8
rod.smith@NRCan-RNCan.gc.ca

Coordinate System

Projection: Universal Transverse Mercator
Units: metres
Zone: 10
Horizontal Datum: NAD83
Vertical Datum: mean sea level

Bounding Coordinates

Western longitude: 126°00'00"W
Eastern longitude: 125°00'00"W
Northern latitude: 61°00'00"N
Southern latitude: 60°30'00"N

Software Version

Data has been originally compiled and formatted for use with ArcGIS™ desktop version 10.8.2 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., 2019. Surficial Data Model: the science language of the integrated Geological Survey of Canada data model for surficial geology maps; Geological Survey of Canada, Open File 8236, ver. 2.4.0, 1 .zip file. https://doi.org/10.4095/315021