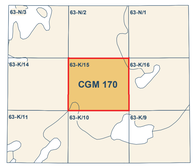
Abstract

Glacial sediments comprising lee-side till deposits and a discontinuous till veneer are widespread throughout the area above an elevation of 300 m asl. There, bedrock outcrops and till are interspersed with minor occurrences of Lake Agassiz offshore sediments, and organic deposits. The thickest till accumulations are found on the down-ice side of large bedrock obstructions and in structurally controlled bedrock depressions where thicknesses of 5 m or more may occur. Rare streamlined landforms and till plain have till thicknesses reaching 15 m. Below 300 m asl, mainly in the eastern part of the map area and in some lowlands around Elbow Lake, Lake Agassiz offshore sediments are more pervasive. In areas of high relief, till has undergone extensive washing and reworking during the regression of the post-glacial lake. Widespread nearshore and littoral sand and gravel occur within former glaciofluvial corridors in the northeast. Glacial striations in the Elbow Lake map area record ice flow towards the SSW (mainly ranging between 195°–208°). Age relationships were observed at one site southeast of North Star Lake where an early flow towards 192° preceded an advance towards 156°. These findings are related to the last cycle of glacial advance and retreat of ice originating from the Keewatin Sector to the north. Till sheets related to each of these events have not been recognized in the hand-dug pits or naturally exposed sections in the area. The geoscientific data presented on this map (till samples and ice-flow indicators) were collected as part of the Shield Margin NATMAP Project (Nielsen, 1992; McMartin et al., 1996). Air photo interpretation (1:60 000 scale aerial photographs) and map compilation were completed as part the TGI-3 Flin Flon Project from legacy work in 2012–2013.

Résumé

Des sédiments glaciaires comprenant des dépôts de till en aval glaciaire de buttes rocheuses et un till mince discontinu sont répandus dans toute la zone située au-dessus d'une altitude de 300 m asl. Là, les affleurements rocheux et le till sont entrecoupés d'occurrences mineures de sédiments fins du lac Agassiz, et de dépôts organiques. Le till le plus épais se trouve en aval glaciaire des plus hautes obstructions du socle rocheux et dans des dépressions rocheuses où peuvent survenir des épaisseurs de 5 m ou plus. De rares formes profilées et plaines de till ont une épaisseur pouvant atteindre 15 m. Au-dessous de 300 m asl, principalement dans la partie orientale de la carte et dans certaines basses terres autour du lac Elbow, les dépôts fins du lac Agassiz sont plus omniprésents. Dans les zones de haut-relief, la nappe de till a subi un vaste lavage et remaniement au cours de la régression du lac post-glaciaire. Des étendues de sable et de gravier littoraux et pré-littoraux sont concentrées dans les anciens couloirs fluvioglaciaires dans le nord-est de la carte. Les stries glaciaires mesurées dans la carte de Elbow Lake indiquent un écoulement glaciaire vers le SSO (principalement variant entre 195°–208°). Une relation d'âge a été observée sur un site au sud-est du lac de North Star où un écoulement précoce vers 192° a précédé une avance vers 156°. Ces résultats sont liés au dernier cycle d'avancée et de retrait glaciaire en provenance du secteur de Keewatin vers le Nord. Les nappes de till associées à chacun de ces événements n'ont pas été reconnues dans les tranchées creusées à la main ou le long de sections naturellement exposées. Les données géoscientifiques présentées sur cette carte (échantillons de till et indicateurs de l'écoulement glaciaire) ont été recueillies dans le cadre du projet CARTNAT de la Marge du Bouclier (Nielsen, 1992; McMartin et al., 1996). La photo-interprétation (échelle 1/60 000) et la compilation de la carte ont été effectuées dans le cadre du Projet IGC-3 Flin Flon lors d'un travail effectué en 2012–2013.



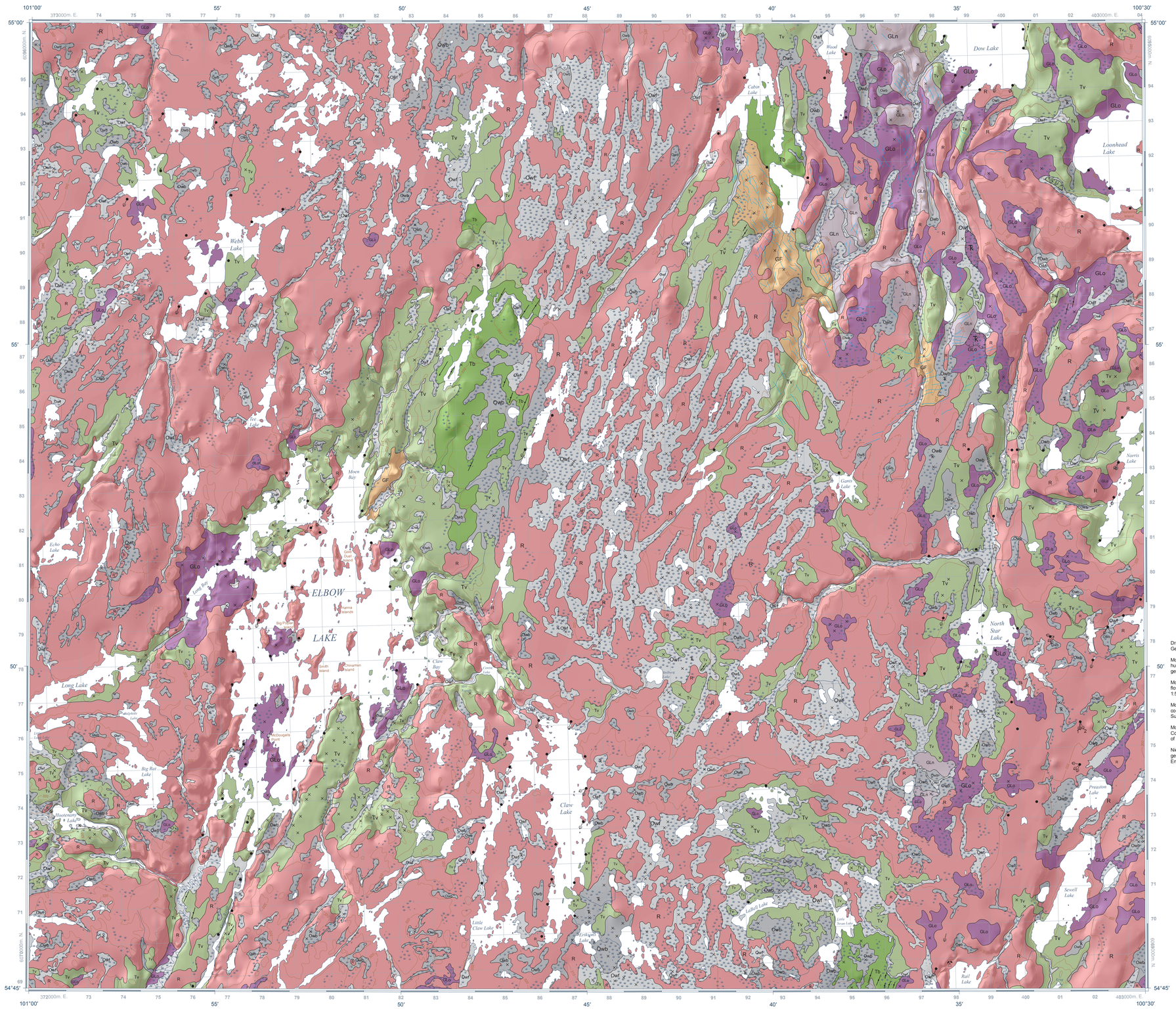
National Topographic System reference

Cover illustration
Area of fen peat and glaciolacustrine sediment veneer, near Dow Lake, Manitoba. Photograph by I. McMartin 1992. 2013-306

Catalogue No. M183-1/170-2013E-PDF
ISBN 978-1-100-22934-8
doi:10.4095/293407

Natural Resources Canada / Ressources naturelles du Canada

CANADIAN GEOSCIENCE MAP 170
SURFICIAL GEOLOGY
ELBOW LAKE
Manitoba
NTS 63-K/15
1:50 000



SURFICIAL DEPOSITS

QUATERNARY

NONGLACIAL ENVIRONMENT

ORGANIC DEPOSITS: peat, muck; 1 to 3 m thick; commonly underlain by fine grained glacial lake deposits; occurs in confined, low-lying, poorly drained parts of depressions and river valleys.

Owf — **Fen peat:** wet sedge and moss peat; includes string fen, floodplain and riverine marshes; occurs as flat grassy surfaces with few trees, and commonly visible surface waters; permafrost present in isolated palsa or small peat plateaus which occur within the fen.

Owb — **Bog peat:** moss and woody peat; occurs as raised irregular surfaces with an open to closed tree cover; derived from spruce forest vegetation; thermokarst depressions and ponds, wooded palsa and forested peat plateaus are common; contains some areas of collapse scar fens.

PROGLACIAL ENVIRONMENT

GLACIAL LAKE SEDIMENTS: massive to stratified clay, silt, sand, and gravel; thickness ranges from a thin veneer to several metres; derived from glacial sediments reworked by wave action in glacial Lake Agassiz, or carried to the basin in large part by glacial meltwater and deposited in deep water of Lake Agassiz.

GLn — **Nearshore and littoral sediments:** sand and gravel, moderately well sorted and commonly horizontally bedded; occur as blankets of sand, commonly less than 2 m thick, grade basinward into finer sediments.

GLo — **Offshore sediments:** clay, silt and silty sand; commonly less than 2 m thick; forms a discontinuous blanket mimicking underlying glacial and bedrock topography; also occurs in thicker deposits (< 10 m) in bedrock depressions overlain by thin peat.

GLACIAL ENVIRONMENT

GLACIOFLUVIAL SEDIMENTS: stratified sand and gravel, minor diamicton; sorted coarse grained sediment deposited by flowing glacial meltwater in contact with or near the glacier.

GF — **Undifferentiated glaciofluvial sediments:** well sorted fine sand or interstratified sand and gravel, minor diamicton; 1 to 20 m thick; deposits occur as outwash fans deposited in glacial Lake Agassiz at or near the retreating ice front by meltwater turbidity currents, or as ice-contact esker and crevasse ridges deposited by sub- or englacial meltwater streams.

GLACIAL SEDIMENTS: unsorted to poorly sorted diamictons deposited at the ice margin or beneath the glacier. Till is of northern provenance and generally sandy, permeable, non calcareous, and locally derived.

Tv — **Till veneer:** forms a moderately discontinuous cover, less than 2 m thick, reflecting underlying bedrock structure; commonly occurs on the down-ice (south) side of Precambrian bedrock outcrops; surface may be covered by a veneer of Lake Agassiz offshore sediments or littoral sand and gravel.

Tb — **Till blanket:** forms a continuous cover, 2 to several metres thick; locally up to 15 m thick in streamlined landforms, masking underlying bedrock topography; deposits form till plain or streamlined landforms.

PRE-QUATERNARY

BEDROCK

R — **Precambrian bedrock:** metavolcanic and metasedimentary rocks, associated intrusive bodies; glacially scoured outcrops forming roches moutonnées and striated or grooved surfaces; gently rolling topography with thin patchy drift cover.

Thermokarst depression (large)

Geological contact: defined

Esker ridge (sense known)

Crevasse ridge

Drumlinoid ridge

Fluted bedrock (sense known)

Crag-and-tail ridge

Thermokarst depression (small)

Palsa and peat plateau

Striae (ice flow direction known)

Crossed striae (1 = oldest)

Outcrop

Quarry

Till sample location

REFERENCES

Dredge, L.A. and McMartin, I., 2011. Glacial stratigraphy of northern and central Manitoba; Geological Survey of Canada Bulletin 600, 35 pages.

McMartin, I., Henderson, P.J., Nielsen, E., and Campbell, J.E., 1996. Surficial geology, till and humus composition across the Shield Margin, north-central Manitoba and Saskatchewan: geospatial analysis of a glaciated environment; Geological Survey of Canada, Open File 3277.

McMartin, I., Campbell, J.E., Dredge, L.A. and Robertson, L., 2010. A digital compilation of ice-flow indicators for central Manitoba and Saskatchewan: datasets, digital scalable maps and 1:500 000 scale generalized map; Geological Survey of Canada, Open File Report 6405.

McMartin, I., Campbell, J.E. Dredge, L.A., 2012. A trans-jurisdiction database of till composition across the Circum-Kissynew area, Manitoba and Saskatchewan; Geological Survey of Canada, Open File 7064.

McMartin, I., Campbell, J.E., Dredge, L.A., and Robertson, L., 2012. Surficial Geology Map Compilation of the TGI-3 Flin Flon Project area, Manitoba and Saskatchewan; Geological Survey of Canada, Open File 7089.

Nielsen, E. 1992. Surficial geology mapping and glacial dispersion studies as aids to geochemical exploration and mineral tracing in the Elbow Lake area (NTS 63K/15); in Manitoba Energy and Mines, Report of Activities, 1992, p. 52-55.

Recommended citation
Dredge, L.A. and McMartin, I., 2014. Surficial geology, Elbow Lake, Manitoba, NTS 63-K/15; Geological Survey of Canada, Canadian Geoscience Map 170 (preliminary), scale 1:50 000. doi:10.4095/293407

ess.nrcan.gc.ca

Canadian Geoscience Maps

Authors: L.A. Dredge and I. McMartin

Geology by L.A. Dredge and I. McMartin 2012–2013

Geomatics and cartography by L. Robertson

Map projection Universal Transverse Mercator, zone 14. 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

SURFICIAL GEOLOGY
ELBOW LAKE
Manitoba
NTS 63-K/15
1:50 000

1 0 1 2 3 4 km

Shaded relief image derived from the digital elevation model supplied by L. Robertson
Illumination: azimuth 315°, altitude 45°, vertical factor 3x

Mean magnetic declination 2014, 6°08′E, decreasing 11′ annually.

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

Data may include additional observations not portrayed on this map.
See documentation accompanying the data.

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

Preliminary publications in this series have not been scientifically edited.

Canada

CANADIAN GEOSCIENCE MAP 170
SURFICIAL GEOLOGY
ELBOW LAKE
Manitoba
NTS 63-K/15