40' 30' 20' 10' 84 86 88 90 92 94 96 98 400 02 04 06 08 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52

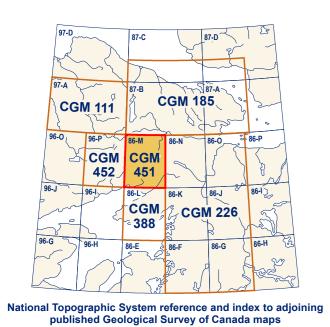
Craig, B.G., Davison, W.L., Fraser, J.A., Fulton, R.J., Heywood, W.W., and Irvine, T.N., 1960. Surficial geology, northcentral District of Mackenzie, Northwest Territories; Geological Survey of Canada, Preliminary Map 24-1960, scale 1:1 013 760. https://doi.org/10.4095/108725 Deblonde, C., Cocking, R.B., 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

Suggested Readings Prest, V.K., 1984. Glacial geology of the Bebensee Lake map-area, (NTS 86-M), Great Bear Lake region, Northwest Territories; in Contributions to the geology of the Northwest Territories, v. 2, (ed.) J.A. Brophy, Indian and Northern

St-Onge, D.A., 1980. Glacial Lake Coppermine, north-central District of Mackenzie, Northwest Territories: Canadian Journal of Earth Sciences, v. 17, p. 1310–1315. http://dx.doi.org/10.1139/e80-137. St-Onge, D.A. and Dredge, L.A., 1985. Northeast extension of Glacial Lake McConnell in the Dease River basin, District of Mackenzie; in Current Research, Part A; Geological Survey of Canada, Paper 85-1A, p. 181–186. https://doi.org/10.4095/120042

St-Onge, D.A., Geurts, M.A., Guay, F., Dewez, V., Landriault, F., and Léveillé, P., 1981. Aspects of the deglaciation of the Coppermine River region, District of Mackenzie; *in* Current Research, Part A; Geological Survey of Canada, Paper 81-1A, p. 327–331. https://doi.org/10.4095/109563

La cartographie préliminaire de la géologie des formations superficielles de la région cartographique de aériennes et une quantité limitée d'anciennes données de terrain, rend compte d'un paysage glaciaire complexe. Du till fortement profilé, une nappe de till, du till bosselé, un complexe morainique et du till à crêtes sont les unités dominantes. Du sable et du gravier fluvioglaciaires forment des eskers, des couloirs d'eaux de fonte sous-glaciaires, des dépôts juxtaglaciaires et des plaines d'épandage. Dans le sud de la carte, des sédiments glaciolacustres à grain fin se trouvent principalement dans les basses terres à moins de 250 m d'altitude et sont liés au Lac glaciaire McConnell. De multiples lobes de glace laurentidiens ont recouvert la région. Des formes de relief glaciaires reliques témoignent d'un écoulement plus ancien dans une direction variant de l'ouest à l'ouest-sud-ouest. Dans le sud-est, des cannelures de direction nord de formation subséquente se superposent à ces reliefs glaciaires, suivant une intensité qui diminue vers le nord, et tirent leur origine d'un lobe situé au sud de la région cartographique. Des formes profilées dans le till, liées à un troisième lobe tirant sa source à l'est et au nord-est de la région cartographique, indiquent que le dernier écoulement glaciaire était principalement dirigé vers l'ouest dans les régions du centre est, et vers le sudouest dans le nord et l'ouest. Pendant la déglaciation, du till bosselé a été déposé sur une vaste étendue, et des moraines et des complexes d'eskers majeurs se sont formés le long des bordures de deux lobes de



ISBN 978-0-660-42258-9 https://doi.org/10.4095/329456

Natural Resources Ressources naturelles Canada Canada

Preliminary surficial geology, based on airphoto interpretation and limited legacy field data of the

Bebensee Lake map area, records a complex glacial

landscape. Highly streamlined till, till blanket,

hummocky till, moraine complex, and ridged till are

dominant units. Glaciofluvial sand and gravel form

eskers, subglacial meltwater corridors, ice-contact

deposits, and outwash plains. Fine-grained glaciolacustrine sediments in the south occur

predominantly in lowlands below 250 m elevation,

relating to glacial Lake McConnell. Multiple lobes of

Laurentide ice glaciated the area. Relict glacial

southwestward ice flow. In the southeast, these are

strongly overprinted by subsequent north-oriented

flutings, decreasing in intensity northward, and

originating from a lobe south of the map area.

Streamlined till landforms, relating to a third lobe

originating east and northeast of the map region,

indicate the last ice flow was dominantly westward in

and west. During deglaciation, widespread hummocky

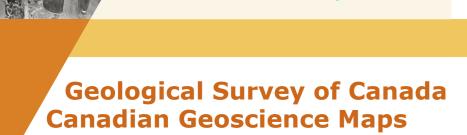
till was deposited, and major moraines and esker

complexes formed along the margins of two ice lobes.

landforms record older westward to west-

© His Majesty the King in Right of Canada, as represented by the Minister of Natural Resources, 2022

**CANADIAN GEOSCIENCE MAP 451** RECONNAISSANCE SURFICIAL GEOLOGY BEBENSEE LAKE Northwest Territories–Nunavut NTS 86-M 1:125 000



Author: D.E. Kerr Geology by D.E. Kerr, 2020 and 2021, based on airphoto interpretation of 1:70 000 scale NAPL airphotos taken in July, 1952; striations from Craig et al.,1960, and unpublished field manuscript by V.K. Prest, 1985 Geology conforms to Surficial Data Model v. 2.4.0 (Deblonde et al., 2019). Geomatics by L. Robertson Cartography by N. Côté

78 80 82 84 86 88 90

Scientific editing by L. Ewert Initiative of the Geological Survey of Canada, conducted under the auspices of the Supporting Adaptation in Coastal Studies project as part of Natural Resources Canada's Climate Change Geoscience 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

92 94 96 98 400 02 04

**RECONNAISSANCE SURFICIAL GEOLOGY BEBENSEE LAKE** Northwest Territories-Nunavut NTS 86-M 1:125 000

corner of the map. This map is not to be used for navigational purposes. National Air Photo Library. NAPL photo A14149-62

B E B E N S E E

(gscpublications-cgcpublications@nrcan-rncan.gc.ca). information about this publication. This publication is available for free download through GEOSCAN (https://geoscan.nrcan.gc.ca/).

Terraced sediments: silt, sand, and gravel; varied thickness; deposited by streams and rivers; forming raised terraces along active and inactive floodplains; surface may be vegetated. Alluvial sediments, undifferentiated: silt, sand, and gravel; varied thickness; deposited by modern streams and rivers; may include various alluvial environments LACUSTRINE SEDIMENTS: silt and sand, deposited in modern lakes and Lacustrine deltaic sediments: silt and sand; varied thickness; low-lying sediments infilling shoreline of modern lake at the mouth of a river. Lacustrine sediments, undifferentiated: silt and sand; varied thickness; associated with small drained, partially drained, or infilled lakes; may be vegetated, may exhibit thermokarst activity. LATE PLEISTOCENE (WISCONSIN GLACIATION) PROGLACIAL AND GLACIAL ENVIRONMENT GLACIOLACUSTRINE SEDIMENTS: sediments deposited at or beyond a retreating ice front by meltwater entering a glacial lake, including short-lived ice-dammed lakes; includes some lacustrine postglacial sediments associated with ancestral Great Slave Lake; may contain ground ice. Beach sediments: sandy gravel, may contain cobbles and boulders; varied thickness; derived mainly from reworked glaciofluvial sediments; forming raised beaches from 190 to 290 m elevation associated with glacial Lake McConnell in southern map area; beaches occurring elsewhere at other elevations relate to smaller, isolated glacial lakes. Deltaic sediments: silty clay to sand and gravel; varied thickness; associated with glacial Lake McConnell in the south, glacial Lake Coppermine in the northeast, and other smaller isolated lakes; forming a gently sloping delta deposited as proglacial outwash or ice-contact sediments by meltwater; between 195 and 680 m elevation; surfaces may exhibit paleochannels and patterned ground, and may contain ground ice. Littoral sediments: silt to sand with pebbles; 1 to 3 m or more thick; nearshore sediments; commonly draped over till; may include organic Glaciolacustrine veneer: silt to gravel; less than 2 m thick; may be overlain by organic material; generally overlies till in areas submerged by glacial Lake McConnell; may include thermokarst features and reworked till surfaces. Glaciolacustrine sediments, undifferentiated: silty clay to fine sand; varied thickness; deposited in nearshore to offshore environments; generally overlies till or bedrock in areas submerged by glacial lakes McConnell and Coppermine; may be overlain by organic or lacustrine sediments. GLACIOFLUVIAL SEDIMENTS: sand and gravel, may include minor silt and clay; deposited by meltwater flowing from, or in contact with, glacier ice; may contain ground ice; surface may be vegetated. Outwash plain sediments: sand and gravel; varied thickness; generally flat to gently undulating plain, may include minor terraces and ice-contact sediments; surfaces exhibit meltwater paleochannels and patterned ground. Terraced sediments: sand to cobbles; varied thickness; forming raised terraces above modern rivers; confined to valleys; surfaces may exhibit paleochannels and patterned ground. Outwash fan sediments: sand and gravel; varied thickness; forming proglacial outwash fans sourced from eskers and meltwater channels; surfaces exhibit meltwater paleochannels. irregular, hummocky surface; may contain kettles, collapse features where supporting ice was removed, and short eskers; may include kame-deltas and unmapped glaciolacustrine beaches southeast of Bebensee Lake. **Esker sediments:** sand and gravel to cobbles; varied thickness; deposited by glacial meltwater; forming flat-topped to peaked ridges deposited in tunnels, channels, or openings in glacier; may contain kettles; may exhibit beaches where submerged by glacial Lake McConnell or small, short-lived glacial lakes southeast of Bebensee Lake. Glaciofluvial sediments, undifferentiated: sand and gravel to cobbles; varied thickness; deposited by glacial meltwater; may form pitted or flat-topped ice-contact deposits of different depositional environments. **GLACIAL ENVIRONMENT** GLACIAL SEDIMENTS (TILL): unsorted glacial debris, diamicton; deposited beneath glacier ice as lodgment till, meltout till, and gravity-flow deposits; may **Hummocky till:** diamicton; varied thickness but greater than 2 m; deposited directly by stagnant glaciers throughout map area; forms small, low, subdued, circular to irregular hummocks and hills, locally steep-ridged mounds, dissected by meltwater channels; contains short, disorganized moraine ridges in northwestern map area; surface may be pitted with small ponds, thermokarst depressions, kettles, kames, and meltwater erosional depressions; may contain minor moraines; locally underlain by streamlined till Moraine complex: diamicton, sand, and gravel; varied thickness; generally north-trending recessional moraine ridges, up to 4 km long, associated with hummocky till; locally overlying glacial flutings with westward flow norththeast Ridged till: diamicton; varied thickness; areas of minor, irregular to sinous morainal and other undifferentiated ridges; orientations generally transverse to ice flow but varying to parallel to ice flow; may include scoured till, meltwater channels, kames, and eskers; ribbed moraine locally overlies till blanket in north-central map area. Streamlined till: diamicton; varied thickness; strongly fluted till in the southern map area defined by narrow, parallel drumlinoids, crag-and-tails, drumlins, and mega-scale glacial lineations up to 6 km long; may grade Till veneer: diamicton; less than 2 m thick but may be thicker locally; may be fluted and modified by glaciofluvial or glaciolacustrine processes locally; underlying bedrock is discernible; may contain small bedrock outcrops, glaciofluvial and glaciolacustrine veneer, and alluvial sediments in valleys. Till blanket: diamicton; greater than 2 m thick; occurs as a continuous, gently rolling to fluted surface; may include reworked cover or veneer of glaciolacustrine sediments in areas submerged by glacial lakes. Till, undifferentiated: diamicton; varied thickness but generally greater than 2 m thick; subdued to hilly topography with rare flutings; surfaces may be washed, and include glaciolacustrine silt and sand veneer below 290 m PRE-QUATERNARY Bedrock, undifferentiated: various lithologies; large areas of glacially fluted and meltwater-scoured bedrock; also exposed as smaller, isolated outcrops in Stratigraphic relationship: two map-unit designators separated by a slash (/) are used where a stratigraphic relationship is observed or confidently inferred (e.g. Th/Tb indicates glacial hummocky till overlying glacial sediments blanket). The map-unit polygon is coloured according to the overlying unit. Geological contact, defined Landslide scar, may include retrogressive thaw flow, may be active or stabilized, direction known Thermokarst depression # Patterned ground, ice-wedge polygons Terrace scarp Beach crest, depositional and erosional, trim line Limit of glaciolacustrine submergence Meltwater channel: Minor, direction unknown ------ Minor, direction known Meltwater erosional depression Moraine ridge: Minor, ribbed, may include other unspecified ridges ● ● ● ● ● Major, recessional, interlobate √ ∨ ∨ ∨ Ice-contact scarp <><><>< Direction unknown >>>>>> Direction inferred -->--> With beach ridges, direction inferred Drumlinoid ridge: --- Large, buried, poorly defined, 1 = oldest, 2 = youngest Large, well defined, 1 = oldest, 2 = youngest Drumlin ridge: — — ← — → Large, buried, poorly defined Crag-and-tail ridge: — — → — → Large, buried, poorly defined Large, well defined, 2 = youngest ⊢ − − − → Pre-crag ridge, large ————— Fluted drift, poorly defined, direction unspecified Fluted bedrock ridge: — — — → Poorly defined, direction known → Well defined, direction known Direction unknown Direction known × Small outcrop Station location (remote observation) Kerr, D.E., 2022. Reconnaissance surficial geology, Bebensee Lake, Northwest Territories-Nunavut, NTS 86-M; Geological Survey of Canada, Canadian Geoscience Map 451, scale 1:125 000. 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 454000 m E. 00' 50' 40' 30' 20' 10' https://doi.org/10.4095/329456

QUATERNARY

POSTGLACIAL ENVIRONMENT

Organic deposits, undifferentiated: fen, bog, and muskeg; 0.5 to 2 m thick

**Eolian sediments, undifferentiated:** fine to medium sand; varied thickness; may contain active and stabilized dunes and blowouts; sediments reworked or deposited by wind action; derived primarily from glaciofluvial and

**ALLUVIAL SEDIMENTS:** silt, sand, and gravel deposited by modern streams and rivers since deglaciation; inactive surfaces may be vegetated.

Floodplain sediments: silt, sand, and gravel; varied thickness; seasonally

Fan sediments: silt, sand, and gravel; varied thickness; forming a fan

deposited by past and present active or intermittent streams.

flooded by active streams and rivers; may include small fans; more elevated

or more; poor surface drainage; widespread, and commonly overlie

glaciolacustrine alluvial sediments and till.

inactive surfaces may exhibit paleochannels.

**CANADIAN GEOSCIENCE MAP 451** 

Mean magnetic declination 2022, 18°34′E, decreasing 16.2′ annually Readings vary from 18°55′E in the NW corner to 18°10′E in the SE Title photograph: Hummocky ground moraine in north half of image, with east-west oriented moraine ridge separating fluted till in south half, Northwest Territories and Nunavut. Photo from the

The Geological Survey of Canada welcomes corrections or additional Data may include additional observations not portrayed on this map. See map info document accompanying the downloaded data for more