



SURFICIAL DEPOSITS

QUATERNARY

Holocene

NONGLACIAL ENVIRONMENT

- H** Anthropogenic deposits, undifferentiated; variable thickness, areas dominated by human development; lithologies and ages may also coincide with regions mapped as glacialic sediments.
- O** Organic deposits, undifferentiated; for: bog, variable thickness.
- Ap** Alluvial floodplain sediments; silty sand and gravel, variable thickness, may be seasonally flooded and overlain by organic, deposited along the Yellowknife River and its ancestral precursor.
- A** Alluvial sediments, undifferentiated; silty sand and gravel, variable thickness, commonly overlain by organic, deposited along the Yellowknife River and its ancestral precursor.

Holocene and Pleistocene

NONGLACIAL AND PROGLACIAL ENVIRONMENT

- GL** Glaciolacustrine sediments, undifferentiated; silty clay to fine sand, up to 10 m or more thick, commonly overlain by organic, deposited in glacial Lake McConnell and covered by sediments deposited in ancestral Great Slave Lake.
- GF** Glaciolacustrine sediments, undifferentiated; sand and gravel to cobble, variable thickness, includes subaqueous outwash fans and lacustrine deposits, may be overlain by glacial tillular or wave action, may include small areas of bedrock or glaciolacustrine sediments, the extent of some glaciolacustrine regions is based on interpretation of air photographs prior to human disturbance.

PRE-QUATERNARY

- R** Bedrock, undifferentiated; Slave Craton bedrock, locally striated and fluted, may be overlain by glaciolacustrine cover or glaciolacustrine veneer; thin glaciolacustrine sediments or till veneer.

Geological contact, defined

Geological contact, approximate

Terrace scarp, fluvial

Delta

Fluted bedrock, some known

Spation, some known

Small outcrop

Station location

NOTES

Surficial geology studies, through aerial photograph interpretation and limited legacy data, were undertaken in the greater Yellowknife area to provide an improved understanding of distribution and nature of surficial sediments. The Slave Craton is widely exposed throughout the map area and small exposures of discordance till veneer may occur along the edges of some outcrops and an isolated pocket at higher elevations (Stevens et al., 2012), and therefore has not been mapped at this 1:25 000 scale. The last glacial episode was the Lake Wisconsin glaciation, which reached its maximum extent about 18 000 years ago. The Yellowknife region was ice covered to about 11 000 BP and became ice-free by about 10 000 BP (Dyke and Prest, 1987). Ice flow was generally to the southwest, as evident by striations and fluted bedrock measurements (Kerr, 2006). With the retreat of ice in the region, a large glacial lake (Glacial Lake McConnell) occupied the Great Bear and Great Slave Basins, up to an elevation of about 200 m (Clegg, 1965; Smith, 1968). Subaqueous outwash sediments were deposited during this period, in the form of large sand and gravel complexes in the vicinity of the Yellowknife airport and downtown Yellowknife (Kerr, 2006). Fine-grained sediments, present in low lying areas, were deposited by both Glacial Lake McConnell and ancestral Great Slave Lake. Fluvial lake levels and drainage changes due to isostatic uplift have also resulted in widespread, even shallow bedrock and fluvial sediments. The natural drainage around Yellowknife has been influenced by the bedrock structure, and numerous small, elongated lakes have formed where weaker rocks have been preferentially glacially scoured along fault lines and joints. Most streams are shallow, and flow here cut into bedrock or surficial sediments. Much of the terrain is generally < 200 m above sea level, and is generally < 5 m and 20 m in areas of outcrops. Vegetation consists mainly of open to dense forests of black spruce, jack pine, and paper birch mixed with meadows, tundra and peat bogs in low lying areas. The region lies within the discontinuous zone of permafrost (Wolfe, 1996), where permafrost is commonly found as pockets in ground that is otherwise unfrozen.

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Abstract

Yellowknife Bay was covered by the Laurentide ice sheet, with generally southwesterly ice flow, during the Lake Wisconsin glaciation until about 10 000 BP. With ice retreat, Glacial Lake McConnell inundated the area, which was replaced by ancestral Great Slave Lake. The water levels declined. Surficial geology includes widely exposed bedrock and a dominance of fine-grained sediments within low-lying areas deposited within deep glaciolacustrine and shallow proglacial lake settings. Other sediments include extensive subaqueous outwash deposits of sand and gravel, reworked at the surface by wave-action. Wave-worked bedrock is also common, with occasional proglacial boulders on bedrock and till. If any exposed till, vegetation consists mainly of open to dense forests of black spruce, jack pine, and paper birch mixed with meadows, tundra and peat bogs in low-lying areas. Permafrost is extensive and discontinuous in the area, occurring within most organic deposits as well as alluvial and glaciolacustrine sediments.

Résumé

Pendant le Wisconsinien tardif jusqu'à environ 10 000 ans avant le présent, la baie de Yellowknife était recouverte par l'épaisse banquise avec écoulement glaciaire général vers le sud-ouest. Avec le retrait de la glace, le lac glaciaire McConnell inonda la région et, avec la baisse du niveau des eaux, fut remplacé par le proto-grand lac des Esclaves. La géologie de surface présente des affaissements rocheux étendus et, dans les terres basses, une prédominance de sédiments fins qui se déposèrent dans les environnements glaciolacustres profonds et des lacs proglaciaux peu profonds. Parmi les autres sédiments, se trouvent de grands dépôts sous-aquatins de sable et de gravier, retravaillés en surface par l'action des vagues. On voit occasionnellement des blocs erratiques sur les rochers et, occasionnellement, des blocs erratiques sur la roche nue et pas de 50 exposés. La végétation se compose principalement de forêts ouvertes ou denses d'épicéas, de pins gris et de bouleaux, au milieu de marais et de tourbières microtopographiques et ombrophiles dans les terres basses. Le pergélisol est discontinu et se trouve dans la plupart des dépôts organiques ainsi que dans les sédiments alluviaux et glaciolacustres.

CGM 183

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Cover illustration: City of Yellowknife, Northwest Territories, as viewed from Yellowknife Bay, Yellowknife, Northwest Territories. Photograph by S.A. Wolfe, 2014-025

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CANADIAN GEOSCIENCE MAP 183
SURFICIAL GEOLOGY
YELLOWKNIFE AREA
Northwest Territories
parts of NTS 85-J7, NTS 85-J8, NTS 85-J9,
and NTS 85-J10
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