

Permafrost Map for Northwestern Canada (Mackenzie Region), Version 1

USER GUIDE

How to Cite These Data

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1 DATA DESCRIPTION

1.1 Parameter

The permafrost map provides information about permafrost distribution across the Mackenzie region of Canada, including continuous, discontinuous, intermediate, sporadic, and isolated permafrost, and glaciers.

1.2 Format

The maps are in a vector format stored as ESRI Shapefile spatial data format. The Shapefiles are most easily imported into ESRI's ArcView, but most other GIS packages can import Shapefiles. ESRI also provides a free basic GIS package, ArcExplorer, on the ESRI web site.

ESRI Shapefiles for the permafrost map, a rivers map, and a lakes map are provided. The ArcView project file which was used to create the maps, `ggd630_project.apr`, is also provided.

The permafrost map was digitized from an original with scale 1:1,000,000. The units are meters. The rivers (drainage) map was extracted from 1:2 million scale digital maps provided by Geomatics Canada. All maps/layers are in the Lambert Conformal Conic projection with WGS 84 datum. Projection parameters are

Central Meridian: 130°W
Standard Parallels: 61°40 N and 68°20 N
Latitude of the origin: 59°N
X,Y shift = 0

1.3 File and Directory Structure

The directory contains the following files:

`ggd630_permafrost.jpg` - JPEG of permafrost map
`ggd630_legend.pdf` - Legend for permafrost map
`ggd630_project.apr` - ArcView project file
`ggd630_permafrost.tar.gz` - Shapefile files for permafrost map
`ggd630_lakes.tar.gz` - Shapefile files for lakes theme
`ggd630_rivers.tar.gz` - Shapefile files for rivers (drainage) theme

Each Shapefile theme has a minimum of three files associated with it: `.shp` (feature geometry), `.shx` (feature geometry index) and `.dbf` (dBASE format attribute data).

1.3.1 File Size

The ESRI Shapefiles range from 23 KB to 5.7 MB. The JPG version of the map is 306 KB.

1.4 Map Attributes

The river and lake maps have one attribute code each in ArcView. Codes for the river layer are set to *river* and codes for the lake layer are set to *lake*.

There is one attribute for the permafrost zone map. This code is *TAG* and contains alphanumeric codes that are described below.

CONTINUOUS PERMAFROST:

- 5MH Moderate to high ice content due to presence of ice lenses
- Alluvial terrace deposits: silt and silty clay
 - Colluvial blanket deposits: fine grained diamicton containing some lenses and beds of sand, gravel and rubble
 - Bedrock area of low resistance to erosion in unglaciated areas
- 5LH Low to high ice content in sandy sediments, as wedges; moderate to high ice content in silty and clayey sediments, as lenses and rectangular veins; massive ice commonly occurs at depth and in pingos
- Lacustrine and marine deposits as plains and intertidal lagoons: interbedded silt, clayey silt, and silty sand, locally underlain by diamicton
- 5LM Low to moderate ice content, as lenses and reticulate veins, higher ice content with depth; massive ice may be present at base of diamicton and in underlying sediments
- Alluvial deposits as fans, plains, and terraces: sands and isolated silty layers
 - Morainal and colluvial blanket deposits: stony clay diamicton; may overlie marine and glaciofluvial deposits(1,2)
 - Glaciated upland and piedmont complex: mainly till and disintergrated bedrock; overlies areas of moderate to low slope
 - Veneered bedrock: diamicton overlying low rounded hills and ridges of unglaciated bedrock
 - Exposed bedrock: varied bedrock types
- 5NL Nil to low ice content, as wedges
- Alluvial deposits: coarse sand and gravel(3)
 - Glaciofluvial deposits as outwash plains, kames, and eskers: sand and interbedded sand and gravel(1,4)
 - Colluvial deposits as blankets and veneers: coarse diamicton; may overlie areas of unglaciated bedrock
 - Glacially deformed marine deposits: clay and silt, thin beds of fine sand may be present

- 5N Ice content Nil
- Exposed bedrock: varied bedrock types
-

DISCONTINUOUS PERMAFROST:

- 4MH Moderate to high ice content where material frozen, as thin seams, reticulate veins, and wedges; massive ice may occur at depth
- Lacustrine and glaciolacustrine blanket deposits: primarily silt and silty clay with some fine sand and gravel; thermokarst depression common in areas of high ice content; locally underlain by diamicton(4,5,6)
- Alluvial deposits as floodplains and terraces: silty sand and silt; thermokarst depressions common in floodplains(5)
- 4LM Ice content low to moderate where material frozen, as thin seams, reticulate veins, lenses, and wedges; massive ice may occur at depth
- Morainial and colluvial deposits as veneers and blankets: diamicton
- Alluvial deposits as floodplains, terraces, and fans: fine grained sand and silt(1)
- Glaciofluvial and Glaciolacustrine deposits as outwash plains and terraces: gravel, sand, and silt(1,3,7)
- Glaciated upland and piedmont: disintergrated bedrock
- 4NL Nil to low ice content where material frozen
- Glaciofluvial deposits as terraces, eskers, and kames: gravel and sand(3)
- Landslide debris deposits: extremely variable textures
- Eroded and eroding river banks: surface colluvial materials on moderate to steep valley walls and scarps
- Alluvial terrace deposits: gravel(3)
- 4N Ice content nil where material frozen
- Talus aprons: cobbles and boulders
- Exposed bedrock: varied bedrock types(8)
- 4V Highly variable ice content where material frozen, depending on topographic positions: crest of prominent ridges are generally ice-free, intervening depressions have moderate to high ice content
- Hummocky, ridged moraine: clayey to gravelly sandy till

INTERMEDIATE:

- 3MH Moderate to high ice content where material frozen
- Lacustrine blanket deposits: silty clay, silt, and sand; locally underlain by diamicton
- 3LH Low to high ice content where material frozen, as thin seams, lenses, and reticulate veins
- Alluvial deposits as fans and terraces: mainly silt and

- fine sand, locally includes gravel and clay; may be underlain with colluvium
 - Glaciolacustrine plain deposits: fine sand, silt, and clay
- 3LM Low to moderate ice content where material frozen, as thin seams, lenses, and wedges
- Morainal and colluvial blanket deposits: diamicton
 - Alluvial deposits as floodplains, fans and aprons, deltas, and terraces, interbedded silt, sand, and gravel(1,3)
 - Glaciofluvial deposits as outwash plains, fans, and terraces: sand and gravel with veneer of silt or fine grained sand
 - Marine deposits as tidal flats: interbedded silt, clayey silt, and sand, generally high in organic content
- 3NL Nil to low ice content where material frozen, as thin seams
- Glaciofluvial deposits as outwash plains, kame terraces, and eskers: gravel and sand
 - Alluvial deposits as deltas, floodplains, terraces: predominantly gravel(3)
 - Veneered bedrock: poorly sorted diamicton
 - Eolian deposits: sand
- 3N Ice content nil where material frozen
- Exposed bedrock: varied bedrock types
 - Talus aprons: cobbles and boulders
- 3V Variable ice content where material frozen, depending on topographic position: crests of prominent ridges are generally ice free, intervening depressions have moderate to high ice content, as seams and lenses
- Hummocky, ridged moraine: clayey to gravelly sandy till
-
- SPORADIC:
- 2LM Low to moderate ice content where material frozen, as lenses and wedges
- Morainal and colluvial blanket deposits: diamicton
- 2L Low ice content where material frozen
- 2NL Nil to low ice content where material frozen
- Glaciofluvial as outwash plains, drumlins, kames, hummocks, and eskers: sand and interbedded sand and gravel
 - Veneered bedrock: colluvium
 - Alluvial deposits and fans, terraces and floodplains: gravel, sand, and silt
 - Landslide debris deposits: variable textures
 - Marine beach deposits as spits and bars: sand and gravel
- 2N Ice content nil where material frozen
- Exposed bedrock: varied bedrock types

- Alluvial deposits as plains, fans, and terraces:
gravel, sand, and silt(3)

ISOLATED PATCHES:

- 1L Low ice content where material frozen, as lenses
- Eolian deposits as dunes: sand; generally overlies glaciofluvial outwash and lacustrine deposits
 - Alluvial fan deposits: sand and gravel
 - Glaciofluvial deposits as outwash plains and kame terraces: gravel and sand with few beds of silt
- 1NL Nil to low ice content where material frozen
- Ridged glaciofluvial deposits such as eskers: gravel and sand
- 1N Ice content nil where material frozen
- Alluvial deposits as active floodplains, terraces, and fans: gravel, rarely sand and silt(9)
- MG Modern glaciers
- MGM Modern glaciers with moraine cover

NOTES:

- (1) Ice content locally higher in lenses of silt and clay
- (2) May have higher ice content where underlain with by marine sediments, especially in the northern part of the map area
- (3) Ice content locally high where silt, clay, and/or peat form veneers or fill depressions
- (4) In some areas, such as the Tuktoyaktuk Peninsula, may be covered by sand dunes consisting of fine to medium sand, in places silty, with isolated peaty layers; higher ice content in silt and peat
- (5) Ice content locally lower in lenses of coarser material
- (6) May have lower ice content in well drained areas lacking thermokarst depressions
- (7) Ice content very high where underlain by silt and clay
- (8) Possible low ice content in the northern part of the map area
- (9) May have ice content in some areas

1.5 Spatial Coverage

The maps cover the northwest area of Canada (Mackenzie Region), including most of the Yukon Territory and the western part of the Northwest Territory (60°-70° N, 120°-142° W). See Figure 1.

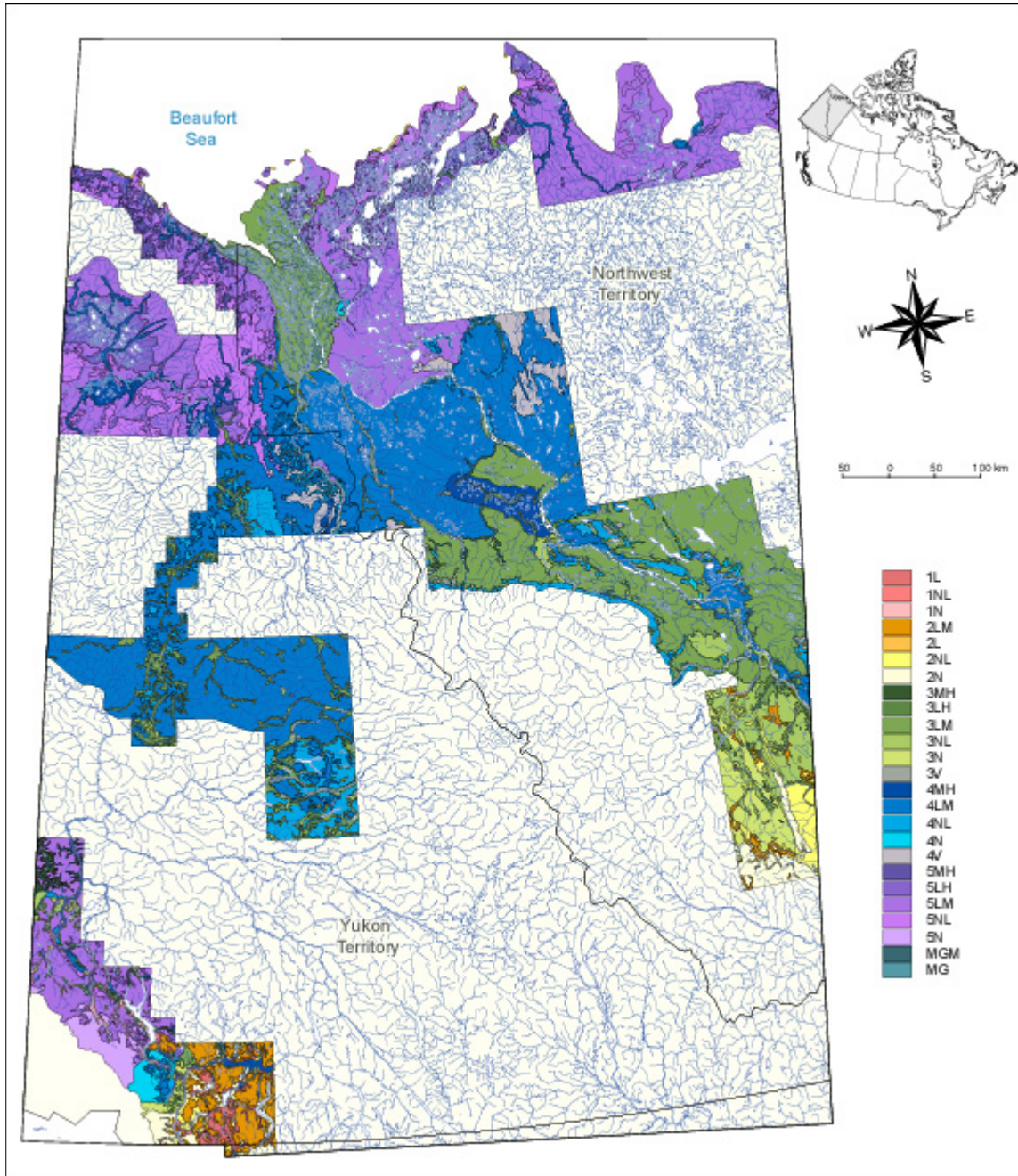


Figure 1. Map of study region

1.6 Temporal Coverage

1 January 1992 to 31 December 1992

2 CONTACTS AND ACKNOWLEDGMENTS

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3 REFERENCES

Heginbottom, J.A., M.A. Dubreuil and P.A. Harker (1995) Canada - Permafrost, in: National Atlas of Canada, 5th Edition, National Atlas Information Service, Natural Resources Canada, MCR 4177.

Heginbottom, J.A. and L.K. Radburn (comp). 1992. Permafrost and Ground Ice Conditions of Northwestern Canada / Conditions relatives au pergélisol et à la glace de sol du nord-ouest du Canada. Map 1691A. Scale 1:1,000,000. Energy, Mines and Resources Canada, Geological Survey of Canada, Ottawa, Canada.

4 DOCUMENT INFORMATION

4.1 Publication Date

March 24, 2003

4.2 Date Last Updated

February 2021