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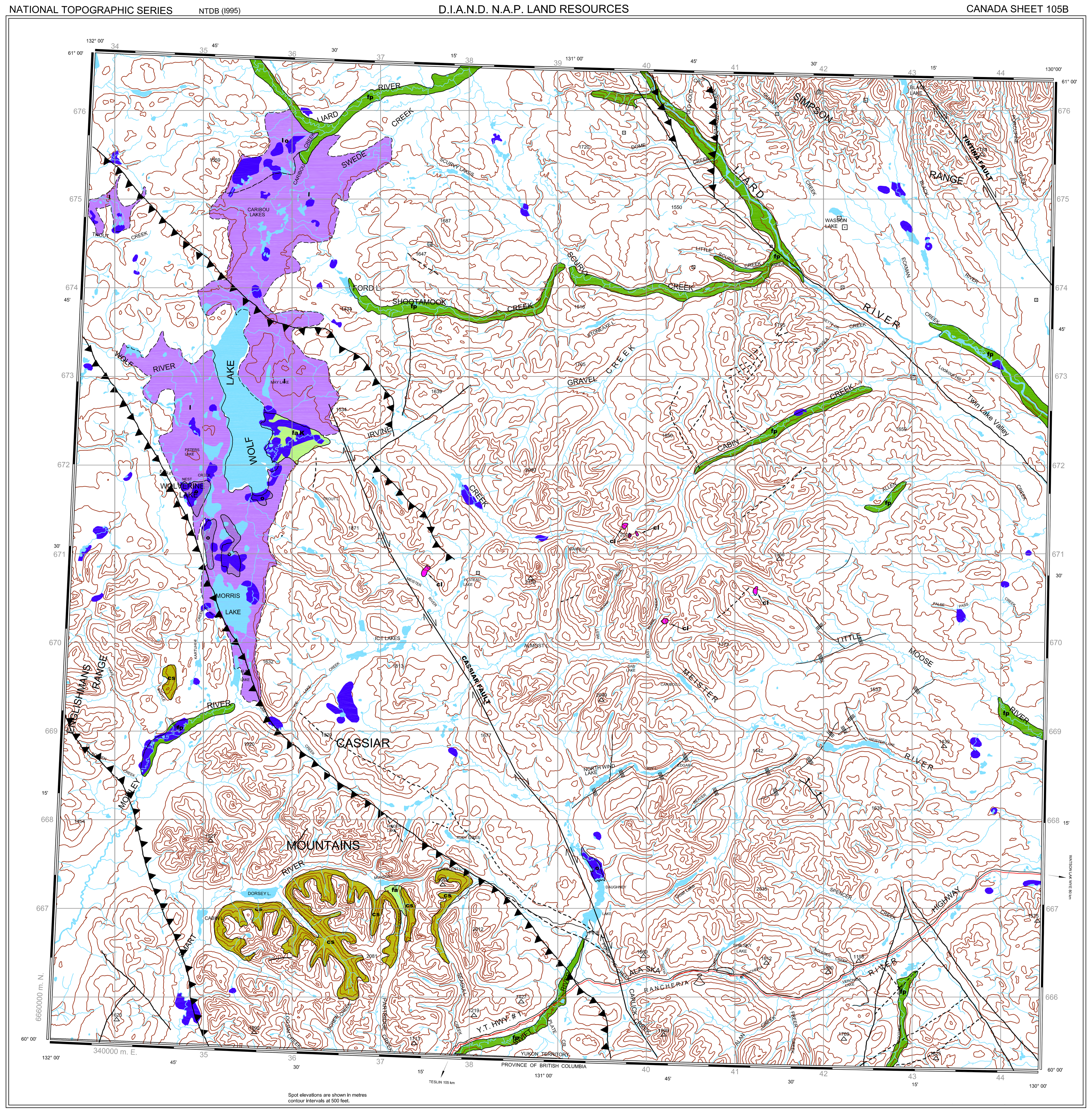


TEN THOUSAND METRE UNIVERSAL TRANSVERSE MERCATOR GRID NAD 83 ZONE 9

NOTE: THIS MAP HAS BEEN PRODUCED BY THE COMPILATION OF DATA FROM VARIOUS SOURCES. IT IS NOT TO BE USED TO DEFINE LEGAL BOUNDARIES.

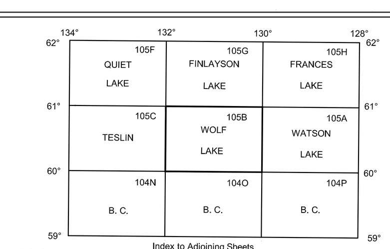
THIS MAP IS ISSUED AS A PRELIMINARY GUIDE FOR WHICH THE DEPARTMENT OF INDIAN AFFAIRS AND NORTHERN DEVELOPMENT WILL ACCEPT NO RESPONSIBILITY FOR ANY ERRORS, INACCURACIES OR OMISSIONS WHATSOEVER.

EDITION: 2 JULY 20, 1999

WOLF LAKE
YUKON TERRITORY
105B

Scale

CONTOUR INTERVAL 500 FEET Elevations in Feet above Mean Sea Level
North American Datum 1983 Transverse Mercator Projection
Universal Transverse Mercator Grid ZONE 9



GEOPROCESS FILE - SUMMARY REPORT

WOLF LAKE MAP AREA - NTS 105B

INTRODUCTION

The GEOPROCESS File is a compilation of information and knowledge on geological processes and terrain hazards, including mass movement processes, permafrost, flooding risks, faults, seismic activity and recent volcanism, etc. Please refer to the GEOPROCESS File User Guide for more in-depth information on how the maps were developed, which other GEOPROCESS File maps are available, how to utilize this inventory and how to interpret the legend. Special interest should be taken in the detailed description of the terrain hazard map units. Appendices in the User Guide include summary papers on the geological framework, permafrost distribution, and Quaternary geology in Yukon and a list of comprehensive GEOPROCESS File references.

This report includes a brief discussion of the scope and limitations of the GEOPROCESS File compilation maps followed by summaries of the bedrock geology, surficial geology and terrain hazards for this NTS map area, and a list of references.

Geological Processes and Terrain Hazard Compilation Maps

The GEOPROCESS File map units were drafted on the 1:250 000 topographic base maps through interpretation from bedrock geology maps, surficial geology maps and in some cases terrain hazard maps at various scales. The compilation maps have a confidence level reflecting the original source material. All materials used to produce the maps are listed in the references on each map. A file containing the documentation used to construct these maps is available at the Indian and Northern Affairs library in Whitehorse, Yukon. Areas for which no surficial geology or terrain hazard information is published were left blank. Summary reports on surficial geology and terrain hazards for these map sheets were written by extrapolating the data from adjacent map sheets or smaller scale maps. Information from small scale (e.g. 1:1 000 000) maps was used for the summary reports, but not redrafted onto the 1:250 000 GEOPROCESS File maps.

The GEOPROCESS File compilation maps are intended as a first cut planning tool; the legend on the maps describes the general aspects of terrain hazards (also see below) and associated geological processes. **These maps should never replace individual site investigations for planning of site specific features, such as buildings, roads, pits, etc.**

Bedrock Geology Summaries

Each 1:250 000 NTS map area is described according to morphogeological belts and terranes defined by Gabrielse et al. (1991) and Wheeler et al. (1991). Bedrock geology (including structure) and mineral occurrences are briefly described and taken largely from the referenced, most recent 1:250 000 geological map with additional contributions from Wheeler and McFeely (1991), and Yukon MINFILE (1993). A summary paper ("A Geological Framework for Yukon") in Appendix A of the User Guide provides a framework and context for each of the bedrock summaries.

The level of knowledge and understanding of Yukon geology is constantly evolving with more detailed mapping and development of geological models. Names, ages and terrane affinities of rock units on the most recent 1:250 000 geological maps may, in some cases, now be considered incorrect. Thus information contained within some of the bedrock geology summaries may be out of date. Although much of the information reflects the knowledge at the time that the source map was published, additional information has been inserted whenever possible to assist the user in merging the information with current geological maps, concepts and understanding. The age ranges for similar packages of rocks may also vary between map areas since the actual rocks, or at least the constraints on their age, may vary between map areas.

BEDROCK GEOLOGY

The Wolf Lake map area is entirely within the Omineca Belt. The mountainous terrain of the Cassiar Mountains occupies most of the southern part of the map area, whereas much of the northern half is underlain by low-lying regions of the Wolf Lake, Nisutlin Plateau and Liard Plain. The divide between the Yukon and Mackenzie River drainages follows an irregular line through the middle of the map area.

There are four main stratigraphic/tectonic packages of rocks in the Wolf Lake map area -- Slide Mountain, Dorsey, Cassiar and Yukon-Tanana Terranes. Rocks in the southwestern half of the map area include two northwest-trending belts of Slide Mountain Terrane volcanic rocks that are separated by the sedimentary rocks of Dorsey Terrane. Slide Mountain Terrane rocks include 400-340 million year old greenstone, chlorite schist, quartzite, phyllite, slate, argillite, chert, quartz-albite-mica gneiss, actinolite schist, limestone and dolomite. Dorsey Terrane rocks include 400-320 million year old chert, hornfels, argillite, slate, phyllite, quartzite, limestone, skarn, dolomite and conglomerate.

The central block, between Wolf Lake and the Liard River valley is dominated by Cassiar Terrane pre-570 million year old biotite schist, quartzite, marble, gneiss, slate, phyllite, quartz grit, conglomerate, hornfels, limestone and dolomite that are separated from younger 540-420 million year old Road River Group (also Cassiar Terrane) phyllite, limestone, hornfels and skarn and minor 390- 325 million year old Earn Group. Northeast of the Tintina Fault, Yukon-Tanana Terrane rocks are represented by biotite schist and gneiss.

Several, relatively small intrusions of 180 million year old diorite, granodiorite and quartz diorite occur in the southwestern part of the map area. Numerous very large, 100 million year old batholiths, and smaller plutons of biotite-quartz monzonite, granodiorite, and alaskite occur throughout the map area and are responsible for localized hornfels and doming of the metasedimentary rocks in the central Cassiar Terrane. There are also some small 50 million year old felsic intrusions in the southern part of the map area.

Several outcrops of recent, columnar-jointed olivine basalt belong to the Tuya lavas and are 200,000-800,000 years old.

Mineral Deposits and Occurrences

The Wolf Lake map area contains 141 mineral occurrences of which 103 host known mineralization. The area is known for its numerous occurrences (33) of silver-rich lead veins, skarns and replacement deposits which are concentrated near Rancheria in the southern part of the map area. The Logan deposit hosts 12.3 million tonnes of 6.17% zinc and 26 grams per tonne silver, and the Hart property contains 97,000 tonnes of 1025 grams per tonne silver. The southwestern portion of the map area hosts numerous tin-tungsten-molybdenum skarns, veins and porphyry deposits associated with granitic rocks. The largest of these deposits is the Logtung porphyry which hosts 160 million tonnes of 0.12% tungsten oxide and 0.052% molybdenum oxide. Also of note are asbestos and topaz occurrences.

SURFICIAL GEOLOGY

The main sources of information for the Wolf Lake area are a surficial geology map by Klassen (1982), and a report by Jackson (1994) which discusses the terrain hazards and surficial geology of adjoining map sheets.

The surface deposits of the Wolf Lake map sheet are associated with the most recent Cordilleran ice sheet (McConnell) which is believed to have covered south and central Yukon between 26,500 and 10,000 years ago. The western half of the map sheet was covered by the Cassiar lobe, which flowed east and northwest of the Cassiar Mountains. Ground moraine consists mainly of rolling to hummocky morainal deposits (drumlins) in the Twin Lake valley. The Cassiar Mountains occupy the central portion of the map and were covered by ice caps and cirque glaciers. The surface of these deposits is quite variable. Most of the morainal deposits, locally covered by thin colluvial and organic deposits.

The northwest corner of the map area is dominantly covered by morainal deposits. Till, or more correctly diamicton of glacial origin, is an unsorted mixture of coarse material ranging in size from pebble to boulder, with a matrix of clay, silt and sand. The general composition of the till matrix in adjoining map areas (Jackson, 1994) indicates a wide range of content: sand (20 to 70%), silt (20 to 60%) and commonly lower clay (5 to 30%). The low clay content is reflected by the low plasticity of the matrix. Morainal deposits can provide a stable base if there is no permafrost present. Lenses of permafrost may occur locally on north-facing slopes and at high elevations, where thick organic deposits overlay the Quaternary sediments.

The Liard River and Rancheria River valleys, as well as the major creeks such as Gravel, Ram, Cabin and Irving creeks, are commonly benched and covered by glaciofluvial sand and gravel. These sediments, of variable thickness and composition, usually provide stable surfaces. However, they could contain undesirable lithologies (weak) for their potential use as aggregate. These well-drained and coarse deposits are commonly capped by silt and fine sand blankets (0.3 to 1.5 m thick).

Glaciolacustrine sediments occur around Wolf Lake. They commonly contain massive ice bodies and are susceptible to retrogressive thaw slide and thermokarst degradation when disturbed by river erosion, forest fires, or other changes in surface conditions.

The White River Ash (1,200 years B.P.) is found at the surface of most landforms except on actively colluviated slopes, landslides, and very recent alluvial landforms. This tephra can be used in some cases as an indication of active slope wash, creep or aeolian activity.

TERRAIN HAZARDS

Slope failures in steep bedrock represent the highest risk hazard in the area. Although not documented in any available publication and not present on the terrain hazard map, potential areas for slides or avalanches should be noted when an area is investigated.

Seismicity

There have been seven recorded seismic events in the northeast part of the map area. All of the recorded events have been 4.0 to 4.999 or less in magnitude.

Mass Movement Processes

A few small earth flows or landslides were mapped in the Cassiar Mountains, but no large slumps or slides were identified. Snow avalanches could occur on steep bedrock slopes and can entrain a large volume of boulders and debris. Development close to steep escarpments, ridges, cirques and arêtes prone to these hazards should be discouraged. Map units labelled cs are considered unstable.

Permafrost

This area lies within the Discontinuous Permafrost Zone (Brown, 1967). Distribution of permafrost is expected to be sporadic (Heginbottom and Radburn, 1992). Permafrost is commonly present at high elevations in colluvial and morainal blankets covered by thick organic mats. Its presence is often indicated by solifluction lobes, stripes and sorted stone polygons. Ice content in morainal and colluvial deposits is estimated to be low to moderate, in the form of small lenses, veins and crystals. Ice content should be lowest in coarse-grained, permeable sediments such as glaciofluvial sand and gravel (eskers, kames, terraces), and gravelly to sandy fluvial deposits. Ice content should be highest in fine-grained sediments such as silty fluvial terrace deposits, the lowermost part of colluvial and alluvial fans, and glaciolacustrine deposits. These landforms are commonly covered with thick moss and organic soils which increase the possibility of permafrost. Thermokarst collapse and thaw slides are documented in fine-grained glaciolacustrine and fluvial sediments around Wolf Lake.

Flooding and Other Risks

Floods related to ice-jams, snow melt and summer rainstorms are possible hazards in lower reaches of most streams in the area. The steep portions of alluvial fans, in addition to the flooding risk, are also exposed to the additional possibility of mud flows and debris flows associated with rapid discharge increase.

NOTE: A new digital compilation of Yukon Geology is now available by Steve Gordey and Andrew Makepeace (GSC Open File D3826 and/or DIAND Open File 1999-1(D)), and more recent MINFILE updates should also be verified (Yukon MINFILE, 2001).

References: Wolf Lake Map Area - NTS 105 B

To be thorough, check the references for adjacent NTS map sheets and the General Reference List (See User Guide).

Most of the following references should be available for viewing in the DIAND library on the third floor of the Elijah Smith building in Whitehorse. The library and call number of some internal government reports are listed.

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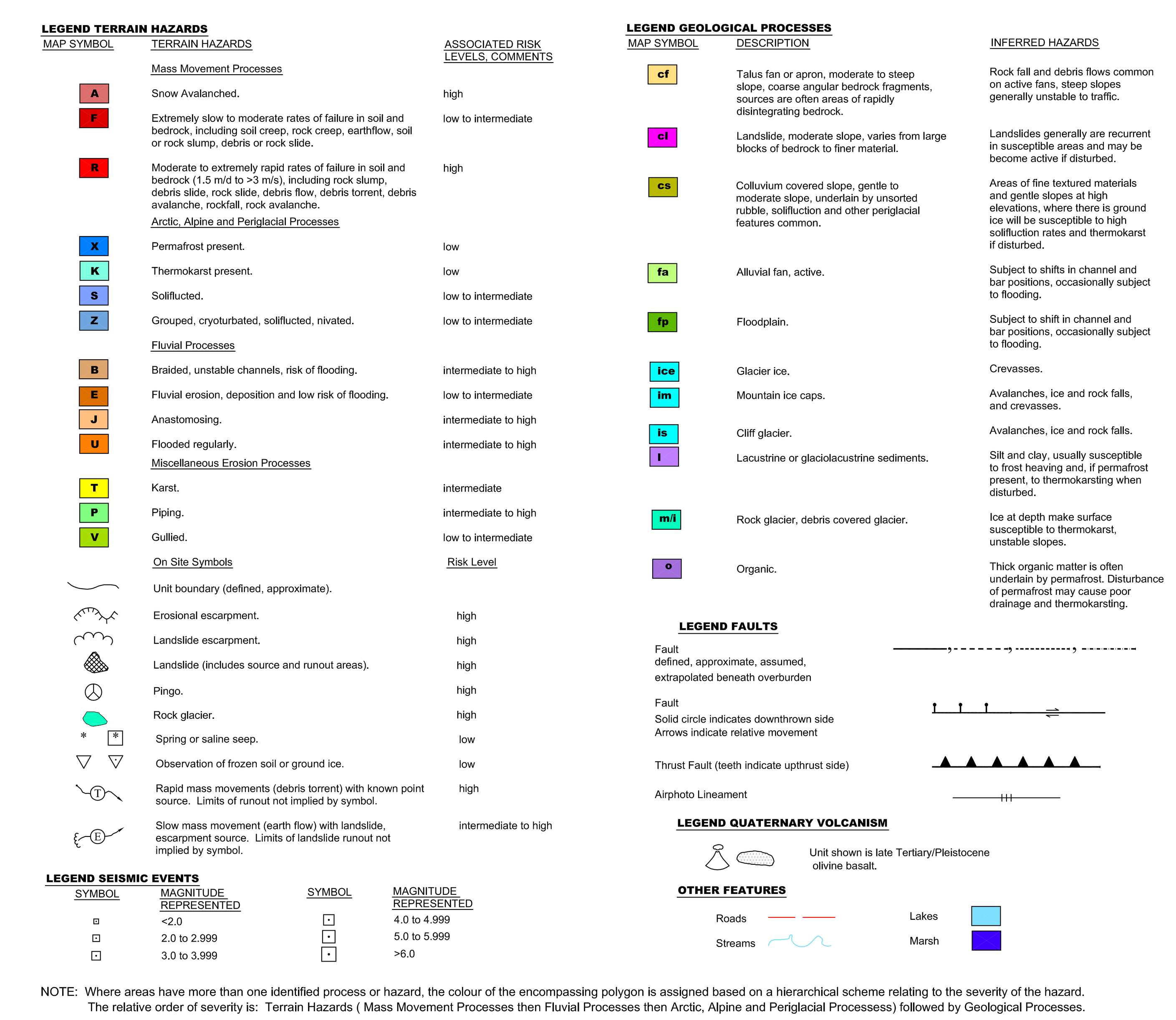
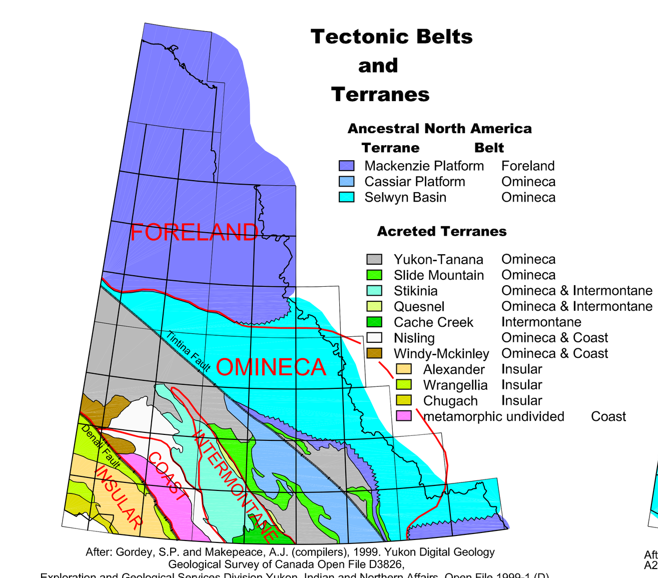
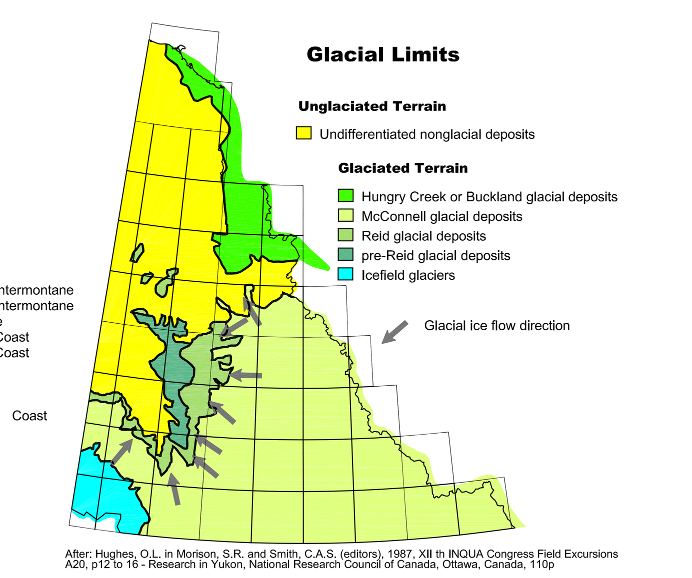
LEGEND



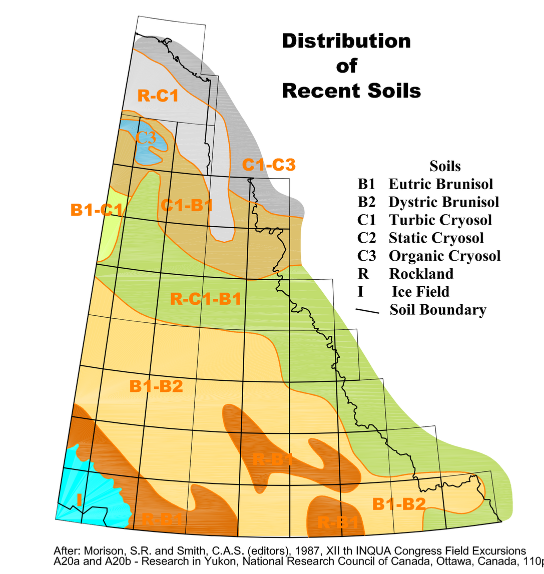
Tectonic Belts and Terranes



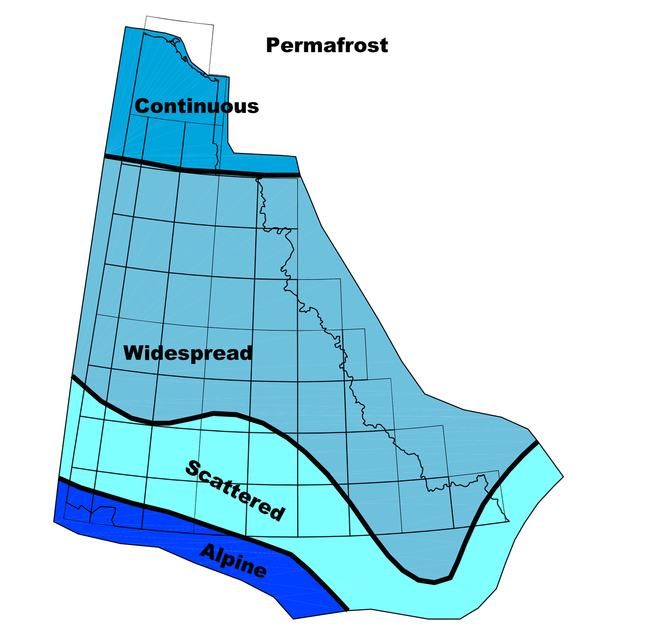
Glacial Limits



Distribution of Recent Soils



Permafrost



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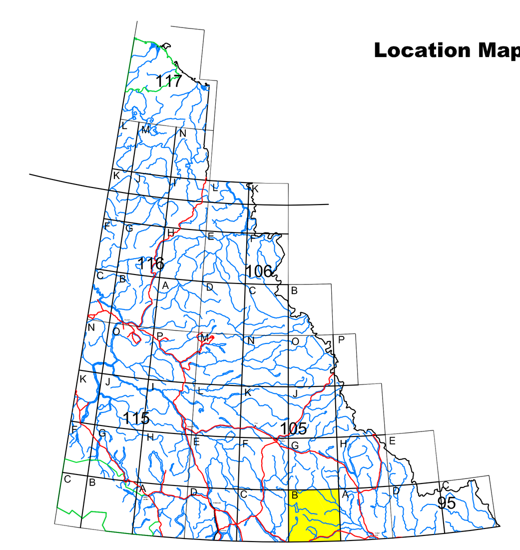
Location Map



Exploration and Geological Services Division
Yukon Region
Indian and Northern Affairs Canada

Yukon GEOPROCESS File

Geological Processes and Terrain Hazards of Wolf Lake 105 B

by

Mougeot, C.M. and Walton, L.A.

Copies of this map
may be obtained from Geoscience and Information Sales
c/o Whitehorse Mining Recorder, Indian and Northern Affairs Canada,
Room 102, 300 Main Street, Whitehorse, Yukon Y1A 2B5
(867) 667-3266; FAX; (867) 667-3267

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Exploration and Geological Services Division, Yukon Region, Indian and Northern Affairs Canada, 1:250 000 scale.