



GEOPROCESS FILE - SUMMARY REPORT SHELDON LAKE MAP AREA - NTS 105J

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

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

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 of the bedrock summaries.

GEOPROCESS File maps.

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

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.

TEN THOUSAND METRE UNIVERSAL TRANSVERSE MERCATOR GRID NAD 83 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 ILL ACCEPT NO RESPONSIBILITY FOR ANY ERRORS, INACCURACIE OR OMISSIONS WHATSOEVER. EDITION: 2 PRINT DATE: JULY 21, 1999

The Sheldon Lake map area is entirely within the Omineca Belt. The South MacMillan River drainage dominates the north part of the map area. Ross River flows from northeast to southwest.

Most of the map area is underlain by 530-390 million year old Road River Group black slate, shale, argillite and phyllite. The southwest part has been intruded by mid-Cretaceous South Fork volcanics consisting of biotite-quartz-hornblende-feldspar crystal tuff. Intrusions of the Selwyn Plutonic Suite occur throughout the map area. Black shales and chert-pebble conglomerate of the Devonian-Mississippian Earn Group occur mainly in the northern part of the map area.

Tertiary quartz-sanidine porphyries, ash-flow tuffs and flows, and basalt occur in the southeast part of the map area.

Mineral Deposits and Occurrences

Yukon MINFILE lists 42 mineral prospects, of which 31 host known mineralization. The majority of mineralized showings are skarn or vein deposits, most of which are lead-zinc-silver +/- copper, or, less commonly, tungsten +/molybdenum and copper. There are three known copper-silver-molybdenum porphyry deposits. There are four sedimentary exhalative deposits, and one coal

SURFICIAL GEOLOGY

The main sources of information for the Sheldon Lake area are a terrain inventory (Jackson, 1987), surficial geology maps (Jackson, 1993) and a report by Jackson (1994) which discusses the terrain hazards and surficial geology of NTS map sheets 105K, J, F and G.

The surface deposits of the Quiet Lake map sheet are associated with the most recent Cordilleran ice sheet (McConnell), believed to have covered south and central Yukon between 26,500 and 10,000 years ago.

The Pelly Mountains occupy most of the central part of the map sheet. During the last Cordilleran ice advance, they were covered by ice caps, which shed ice both south to the Selwyn Lobe of the Cordilleran Ice Sheet and north to the Cassiar Lobe (Hughes et al.,1969). Because of the rugged topography of the Pelly Mountains and great elevations involved, the ice bodies separated in a complex series of tongues or lobe extensions through the narrow valleys. Jackson (1994) warns that this complex ice geometry in conjunction with the variable bedrock geology of the Pelly Mountains renders drift prospecting extremely difficult in this area. The highest peaks of the Pelly Mountains were exposed above the ice caps (nunataks). Now, bedrock is exposed for most of the surface of the Pelly Mountains. Sorted polygons, solifluction lobes, block fields and rock glaciers are common in that part of the map. Lateral moraine deposits from the Cassiar Lobe form benches along major valleys such as the Gray, Caribou, Pony and Scurvy creeks and Salmon River. At lower elevations, these same valley floors are covered with glaciofluvial sand and gravel. Rock glaciers are common at elevations greater than 5000 m, mostly on north- and

northeast-facing slopes. A few small glaciers are still active in the Pelly

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).

SHELDON LAKE YUKON TERRITORY SCALE 1:250 000

Northeast of Pelly Mountains, moraine and glaciofluvial deposits from the Selwyn in non-carbonate rocks involved volumes of material greater than 1 to 5 x 106 m3 and are reported to have traveled great distances (Jackson and Isobe, 1990). All Lobe cover most of the Pelly River valley. The surface of the Selwyn lobe ice was estimated at 1645 m (Duk-Rodkin, et al.,1986). Numerous drumlins or streamlined these failures took place in very steep arrêtes or cirque walls and the addition of landforms are indicative of northwestward-flowing ice. The creek and valley floors moisture via snow and rain plays a key role in triggering of such large and rapid rock are commonly occupied by glaciofluvial sand and gravel. Till, or more correctly slides. Development of any kind in close proximity to steep escarpments, ridges, diamicton of glacial origin, is an unsorted mixture of coarse material ranging in size cirques and arrêtes prone to these hazards should be discouraged. from pebble to boulder, with a matrix of clay, silt and sand. The general composition of the till matrix in this area indicates a wide range of sand (20 to 70%) and silt Failures in unconsolidated deposits are also a concern due to the presence of permafrost and associated processes such as thermokarst and solifluction. These content (20 to 80%), and an usually low clay content (5 to 30%). This low clay content is reflected by the low plasticity of the matrix. Morainal deposits usually can failures can be rapid and involve large volumes of material or they can occur slowly, on small surfaces. Erosion of friable sediments such as glaciolacustrine sediments

provide a stable base if there is no permafrost present. In the southern part of the map sheet, around Quiet Lake, the areas located at lower elevations are covered by moraines and glaciofluvial sand and gravel deposited during the retreat of the Cassiar Lobe of the Cordilleran Ice. Till in the Pelly Mountains generally shows a high carbonate content due to the abundance of carbonate bedrock. Glaciolacustrine deposits in this area are restricted to few small basins, the largest is located in the Rose River valley.

In general, deglaciation in this area was marked by widespread ice stagnation alternating with periods of ice thickening (Jackson, 1987). The higher elevations, such as mountains peaks were the first to emerge from the ice and as deglaciation proceeded, the ice bodies were controlled by valley configurations. Sequences of glaciofluvial benches of sand and gravel, and glaciolacustrine deposits are evidence of this gradual and fluctuating ice retreat. The last area to be free of ice was the Tintina Trench. According to Jackson (1987), the lowest major lake was ponded along the Tintina Trench in the Pelly River by isostatic downwarping.

The Pelly River valley is also benched and covered by glaciofluvial sand and gravel. The glaciofluvial sand and gravel has variable thickness and composition, usually stable surfaces and may contain undesirable lithologies (weak) for their potential use as aggregate. The lowermost terraces of the Pelly River are composed of mixed alluvial deposits and can be prone to flooding. The White River tephra, deposited approximately 1200 years ago, is visible in the soil profiles of alluvial (modern) deposits of the Pelly River.

TERRAIN HAZARDS Snow avalanches and slope failures resulting in rock avalanches on steep bedrock slopes represent the highest risk hazard in the area.

Three seismic events were recorded in this area with a magnitude of 4.999 or less. Mass Movement Processes Landslides have occurred in a variety of lithologies in the area (Jackson, 1994).

of the map. Snow avalanches are common and can entrain large volumes of

boulders and debris. Numerous landslides have been mapped in the Pelly

Large rock avalanches and rock falls are still taking place, as indicated by the large

Mountains (Jackson, 1994; Jackson and Isobe, 1990). Five large rock avalanches in

number and volume of talus cones and aprons throughout the mountainous portions

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.

years have been recorded in Nahanni National Park, west of this map sheet

hazards in fine-grained glaciolacustrine and fluvial sediments.

debris flows associated with rapid discharge increase.

Permafrost is widespread in the area and is often present in colluvial and morainal

blankets at high elevation. Its presence is commonly indicated by solifluction lobes,

Floods related to ice-jams, snow melt and summer rainstorms are possible hazards

in lower reaches of most streams in the area. The steep portion of alluvial fans, in

Sheldon Lake Map Area - NTS 105J

addition to the flooding risk, are also exposed to the additional possibility of mud and

by streams may cause bank erosion.

(Jackson and McDonald, 1980).

Flooding and Other Risks

NIDDERY

LAKE

SHELDON

FINLAYSON

MOUNTAIN

FRANCES

Brown, R.J.E., 1967. Permafrost in Canada, Geological Survey of Canada, Map 1246A (scale 1:7 603 200). *Canadian Earthquake Epicentre File; Maintained by the Geological Survey of Canada, Geophysics Division. Duk-Rodkin, A., Jackson, L.E., Jr. and Rodkin, O., 1986. A composite profile of the

Cordilleran Ice Sheet during McConnell Glaciation, Glenlyon and Tay River map

areas, Yukon Territory. Geological Survey of Canada, Paper 86-1B, p. 257-262.

Gabrielse, H., Tempelman-Kluit, D.J., Blusson, S.L. and Campbell, R.B. (comps.), 1980. MacMillan River, Yukon - District of MacKenzie-Alaska (Sheet 105-115). Geological Survey of Canada, Map 1398A (1:1 000 000 map). Gabrielse, H. and Yorath, C.J. (eds.), 1991. Geology of the Cordilleran Orogen in Canada. Geological Survey of Canada, No. 4, 844 p. Geological Survey of Canada, 1991. Regional stream sediment and water geochemical reconnaissance data (105J). Geological Survey of Canada, Open File

Gordey, S.P. and Irwin, S.E.B., 1987. Geology, Sheldon Lake and Tay River map area, Yukon Territory. Geological Survey of Canada, Map 19-1987 (3 sheets), scale Heginbottom, J.A. and Radburn, L.K. (comps.), 1991. Permafrost and ground ice conditions of northwestern Canada. Geological Survey of Canada, Map 1691A, scale Hughes, O.L., Campbell, R.B., Muller, J.E. and Wheeler, J.O., 1969, Glacial limits and flow patterns, Yukon Territory, south of 65 degrees north latitude. Geological Survey of Canada, Paper 68-34, 9 p. (1:1 000 000-scale map). Jackson, L.E., Jr., 1993. Surficial geology, Big Timber Creek, Yukon Territory, Geological Survey of Canada, Map 1834A, scale 1:100 000. Jackson, L.E., Jr., 1994. Terrain Inventory and Quaternary History of the Pelly River Rock glaciers are common throughout the Pelly Mountains. They can be as thick as area, Yukon Territory. Geological Survey of Canada, Memoir 437, 41 p. (NTS 105F, 10 m, and show surface movements of up to 51 m. Snout advances of 2.5 m over 17 105G, 105J, 105K)

Jackson, L.E., Jr. and Isobe, J.S., 1990. Rock avalanches in the Pelly Mountains, Yukon Territory. Geological Survey of Canada, Paper 90-1E, p. 263-269. Jackson, L.E., Jr. and McDonald, G.M., 1980. Movement of an ice-core rock glacier, Tungsten, N.W.T., Canada, 1963-1980, Arctic, v. 33, p. 842-847. stripes and sorted stone polygons. Thermokarst collapse and thaw slides are possible * Jackson, L.E., Jr. and Morison, S.E., 1984. Terrain inventory, Sheldon Lake, Yukon Territory, map and notes. Geological Survey of Canada, Open File 1033. Morison, S.R. and McKenna. Soils and surficial geology, Macmillan Pass Project, Yukon Territorial Government (1:100 000 scale). Roddick and Green, 1961. Geology of Sheldon Lake map area. Geological Survey of Canada, Map 12-1961. * Wheeler, J.O., Brookfield, A.J., Gabrielse, H., Monger, J.W.H., Tipper, H.W. and Woodsworth, G.J., 1991. Terrane map of the Canadian Cordillera. Geological Survey of Canada, Map 1713. * Wheeler, J.O. and McFeely, P., 1991. Tectonic assemblage map of the Canadian Cordillera and adjacent parts of the United States of America. Geological Survey of Canada, Map 1712A. Yukon MINFILE, 1994. 105J - Sheldon Lake. Exploration and Geological Services

Division, Yukon Region, Indian and Northern Affairs, Canada.

* References used in compiling this map

