

Descriptive Notes

Physiography and drainage
The main physiographic features in this map area is the junction of the Tahltan and Yukon river valleys. North of the Tahltan River is the Yukon Plateau and more specifically, the southern extent of the Miners Range. South of the Tahltan River is the Boundary Ranges of the Coast Mountains.

The Yukon River captures the Tahltan River and flows northward into Lake Laberge. A prominent delta of the Yukon River is built into Lake Laberge. Another important drainage in the map area is Flat Creek which flows southward into the Tahltan River.

The McConnell Glaciation in the Whitehorse area
During the Late Wisconsinan (McConnell) Glaciation (~20 000 years ago), the Whitehorse map area (NTS 105D) was glaciated by ice lobes originating in the Coast Mountains and the Cassiar Mountains of southern Yukon. Initial ice accumulations in the map area probably began in the higher regions of the Coast Mountains. It was not until localized ice caps had formed that the more distal Cassiar Lobe advanced into the map area from the southwest through Marsh Lake valley. The convergence of the two lobes at glacial maximum occurred over the Coast Mountains west of the city of Whitehorse. At the height of the last glaciation, movement of ice over this area was to the northwest and was unobstructed by topography. Adjacent to the Alaska Highway near the hamlet of Bee Valley, evidence of ice-flow directions from this period of the glaciation are recorded on polished bedrock surfaces as glacial striae.

The pattern of deglaciation is highlighted by periods of differential retreat and fluctuating ice fronts. A re-advance of the Cassiar Lobe occurred into this area and had a significant influence on sediment deposition on the landscape. In particular, systems of pro-glacial lakes developed marginally to the Cassiar Lobe in the Tahltan River and Lake Laberge valleys as it retreated. The glacial lake in the Tahltan River valley, also known as Glacial Lake Champagne, during its latest stage drained northward via the headwaters of the Nondenskiid River. This outlet maintained a maximum water level of 746 m a.s.l. or about 100 m (328 ft) depth. Glacial Lake Laberge developed behind a sediment dam that lay north of the present site. This natural dam still controls the water level in the lake). The outlet through the sediment dam has since dropped due to erosion but at its maximum level the depth of Glacial Lake Laberge was 73 m (239 ft) above the current shoreline. The water depth over the city of Whitehorse was likely <5 m deep.

Landforms
Tahltan River valley
As the glacier front retreated to the east of the Tahltan River valley, it periodically paused and deposited large end moraines (Figure 1; see the moraine symbol on the map). The curvature of these landforms reflects the shape of the ice margin at the time of deposition. These moraines are a good approximate resource in a valley bottom that is otherwise devoid of colline sediment (see section JB-03-002 on map).

The dominant landforms in the Tahltan River valley are the plains that formed from the bottom of Glacial Lake Champagne. The Tahltan River has since cut down into these silty deposits (Figure 2; see 'L' on the map) and exposed the depositional layering from within the former lake. Side tributaries entering the Tahltan River from the south also cut impressive canyons into the glacial lake bed sediments.

Scout Lake valley
The glacier that filled the Tahltan River valley spilled into the Scout Lake valley. As this glacier retreated large meltwater channels were carved into the valley sides (Figure 3; see meltwater channel symbols). Many of these channels are very large and attest to the quantity and force of water draining of the melting glaciers.

Lake Laberge and Yukon River valley
Like the Tahltan River valley, the dominant landforms in the Yukon River valley are glacial lake plains. On the west side of the Yukon River these plains are visible from the North Klondike Highway. The reduction in lake levels in this valley has been ongoing since their initial high stand following glacial retreat to the present day level of Lake Laberge. This is due to the continual erosion of the sediment dam at the north end of Lake Laberge. Evidence of this progressive lake level reduction is visible along the North Klondike Highway between Tahltan Hot Springs Road and Shallow Bay Road. The highway traverses over terrace edges which represent former shorelines of Lake Laberge (see stransline symbols). As you drive north, the shorelines become lower in elevation until you reach the modern shoreline at Shallow Bay. Shorelines are also visible immediately north of the Horse Creek road near its junction with the North Klondike Highway. Other evidence of former shorelines is presented as beach ridge deposits on the east side of the Yukon River near Swan Lake and the Livingstone Trail. These beaches formed on a south-facing shoreline that was part of a former bay of Lake Laberge, similar to Swan Lake today. This shoreline has an age of 10000 ± 1000 years old. A sand spit that developed from river currents entering this former bay is well preserved in Swan Lake and forms a point out into the lake (Figure 4).

Following glacial retreat, the reduction in lake levels in the Yukon River valley exposed the former lake bottom surface. During this time the winds coming off the retreating glaciers to the south were strong and began reworking the lake bottom sediments into parabolic dunes (see Eolian materials on the map). The last period of eolian activity (active dunes) in the Whitehorse dune field was approximately 9100 ± 1000 years ago. At this time the wind strength probably waned and vegetation stabilized the land surface. While the largest dunes are located east of the Yukon River near the Livingstone Trail there are also smaller dunes visible in North Klondike Highway road cuts, immediately north of the Tahltan Road junction.

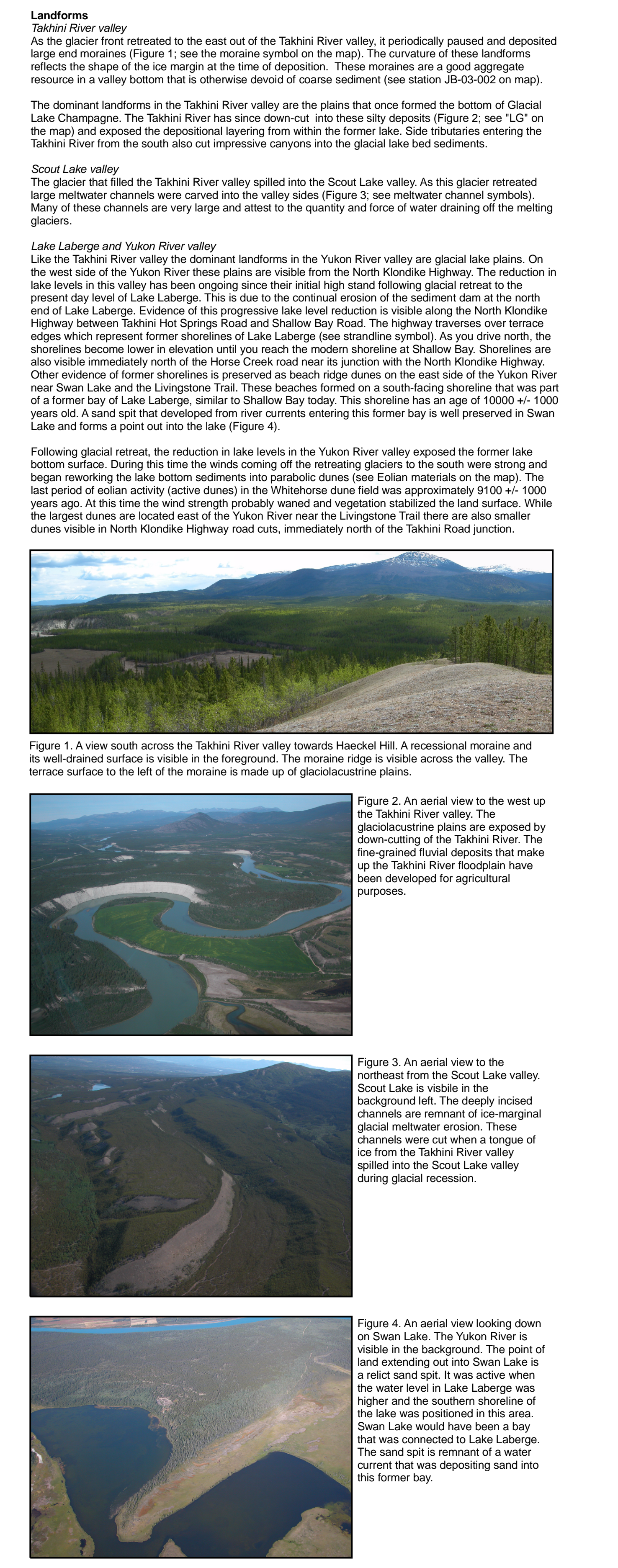


Figure 1. A view south across the Tahltan River valley towards Healdy Hill. A recession moraine and its well-drained surface is visible in the foreground. The moraine ridge is visible across the valley. The terrace surface to the left of the moraine is made up of glaciolacustrine plains.

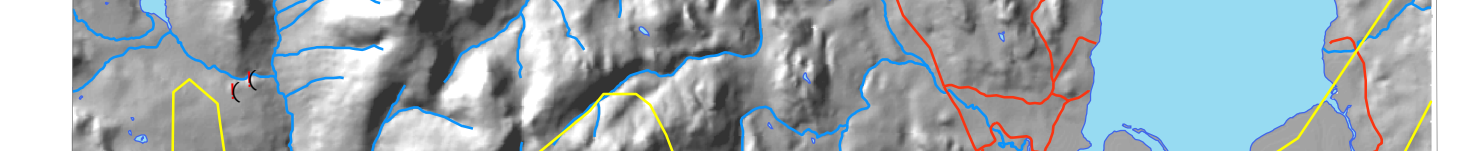


Figure 2. An aerial view to the west up the Tahltan River valley. The glaciolacustrine plains are exposed by down cutting of the Tahltan River. The fine-grained fluvial deposits that make up the Tahltan River floodplains have been developed for agricultural purposes.

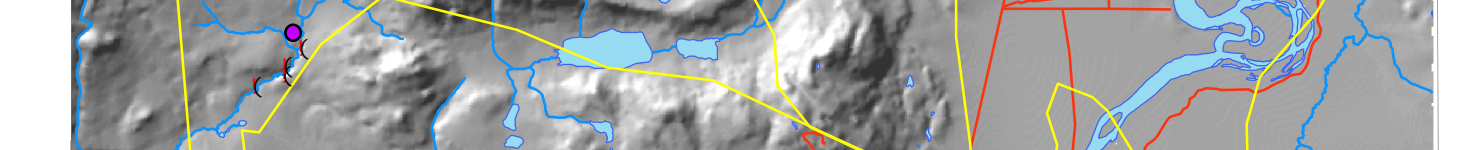


Figure 3. An aerial view to the north from the Scout Lake valley. Scout Lake is visible in the background. The point of land standing out into Swan Lake is a relict sand spit. It was active when the water level in Lake Laberge was higher and the southern shoreline of the lake was positioned in this area. Swan Lake would have been a bay that was connected to Lake Laberge. The sand spit is remnant of a water current that was depositing sand into the former bay.

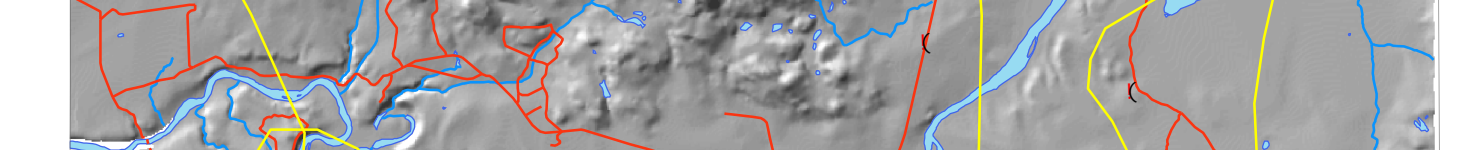
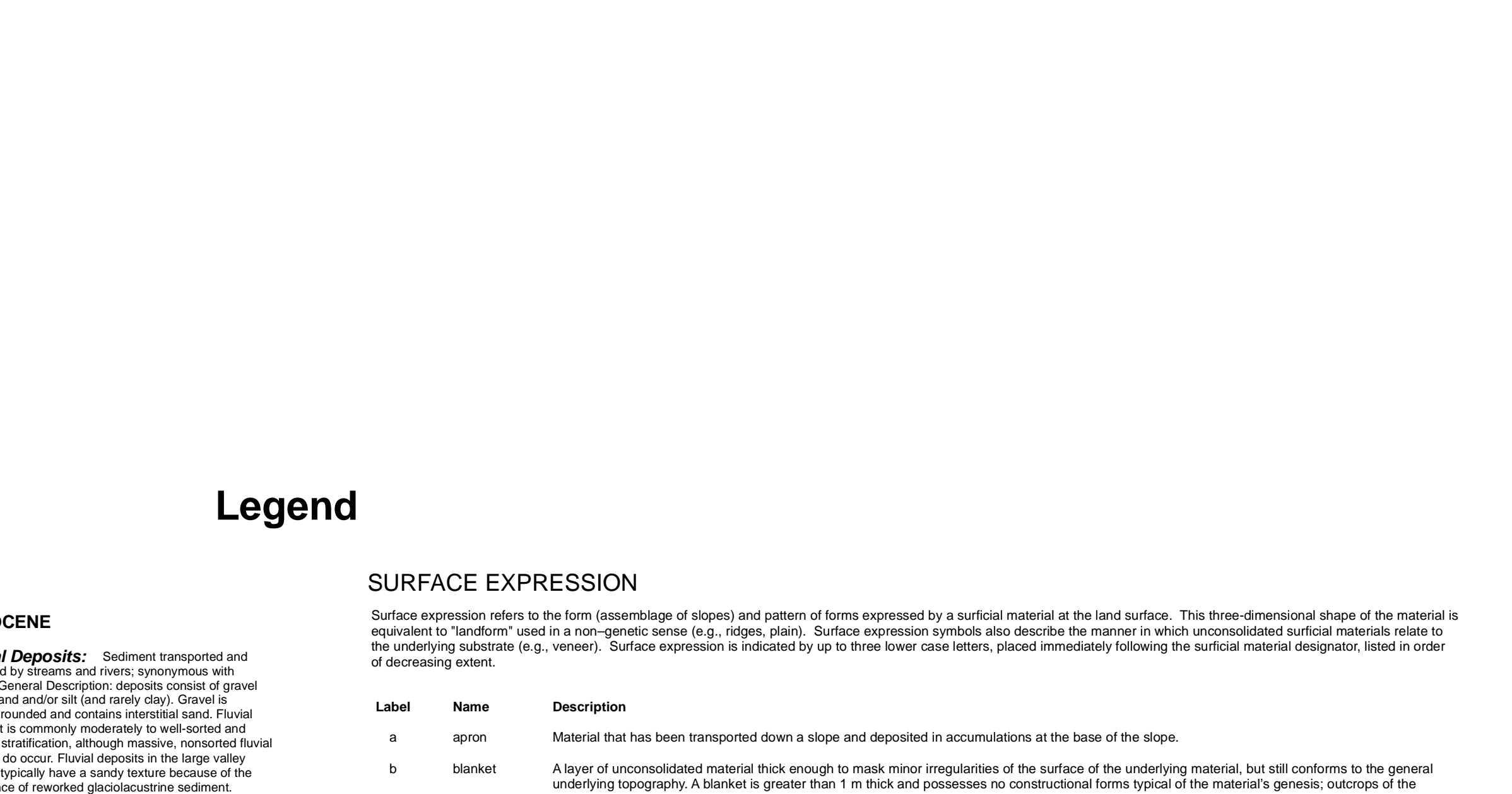
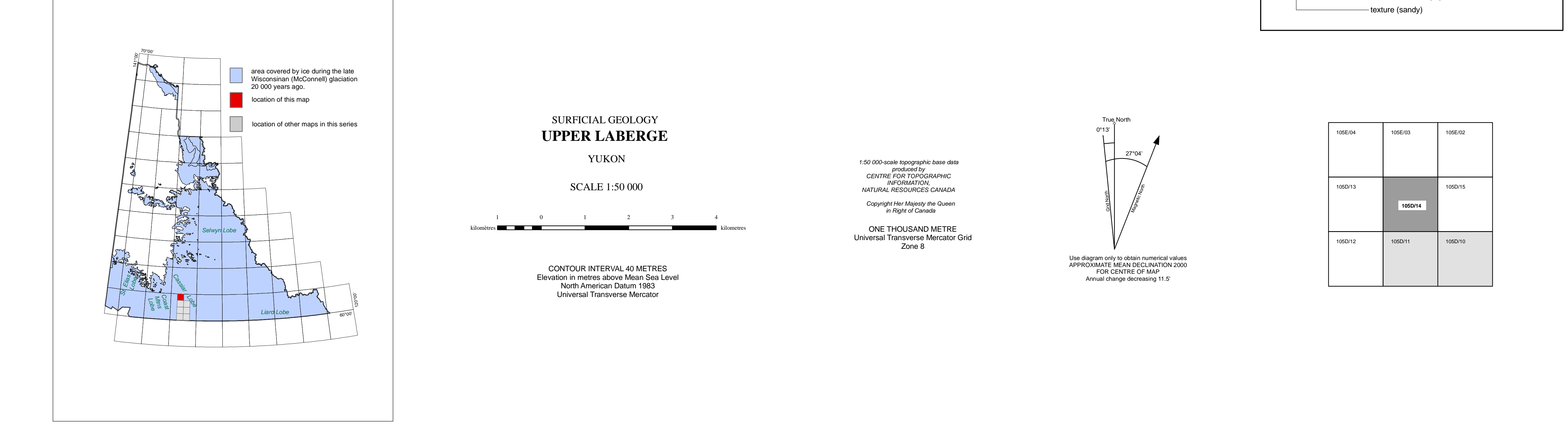
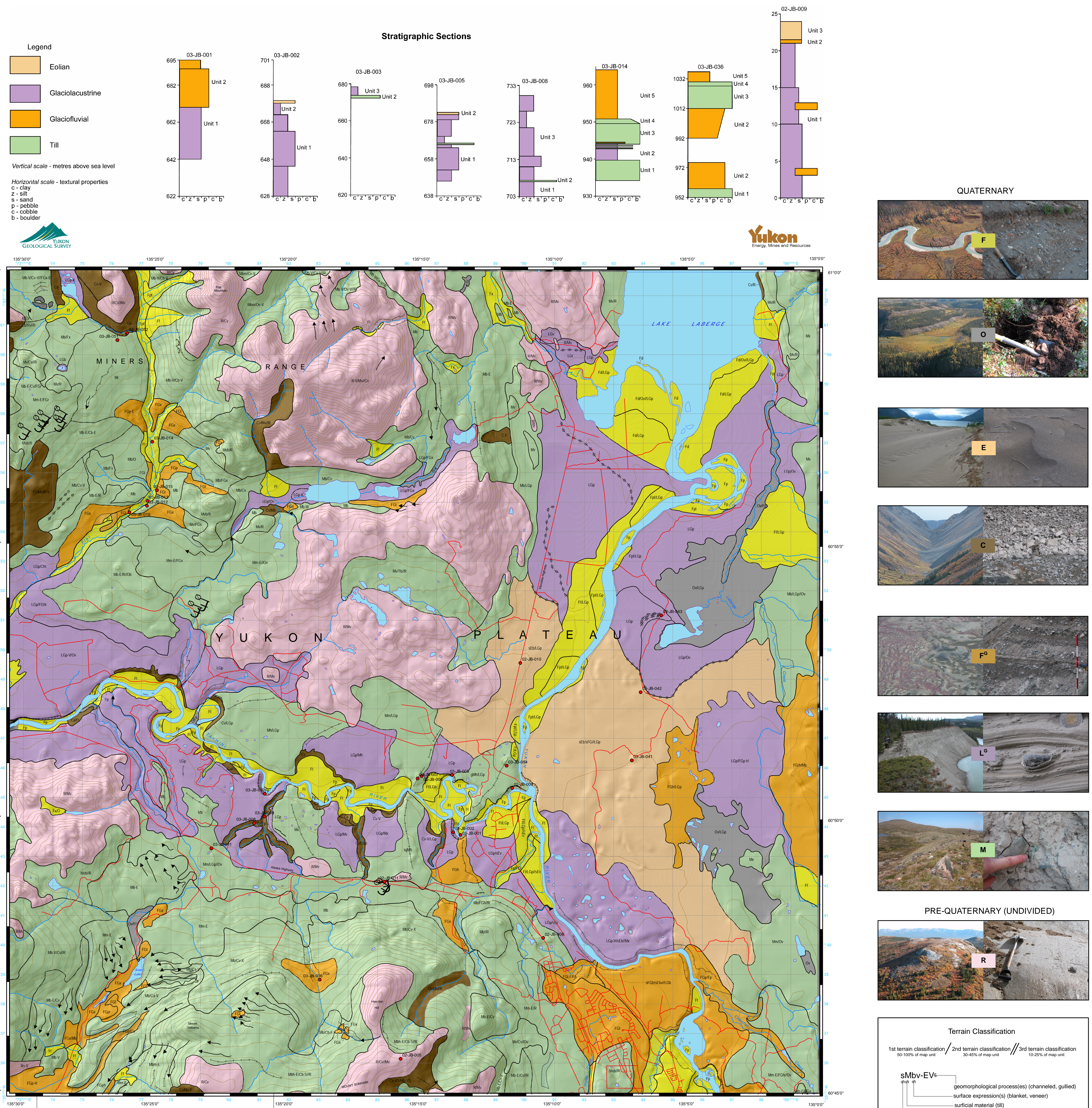
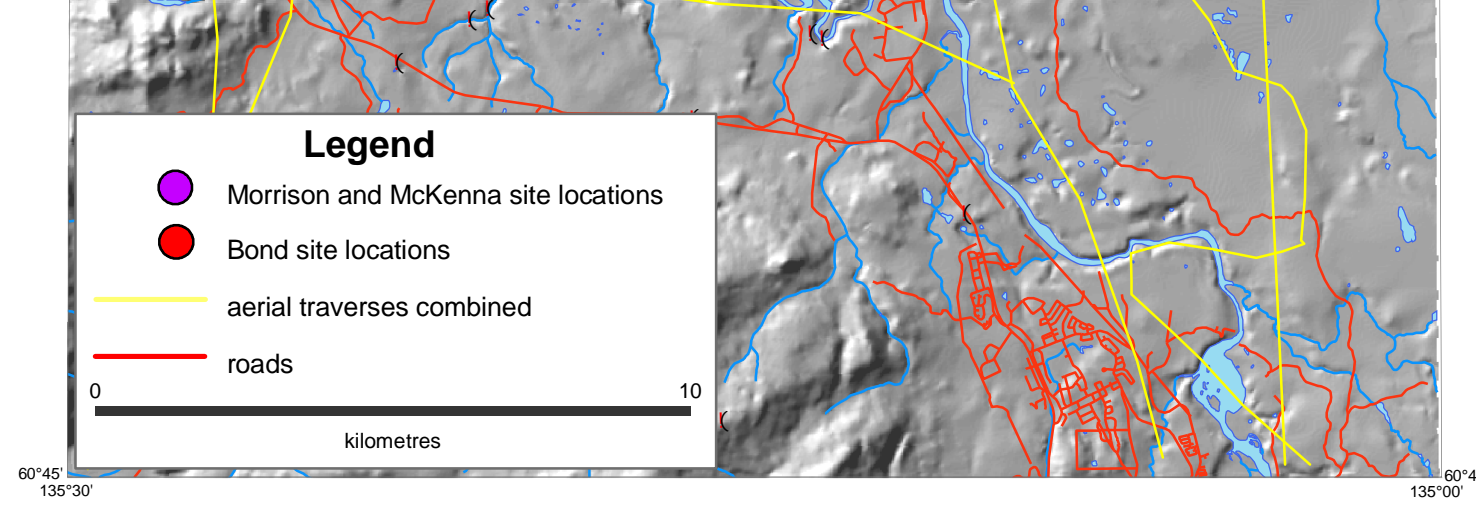


Figure 4. An aerial view looking down on Swan Lake. The Yukon River is visible in the background. The point of land standing out into Swan Lake is a relict sand spit. It was active when the water level in Lake Laberge was higher and the southern shoreline of the lake was positioned in this area. Swan Lake would have been a bay that was connected to Lake Laberge. The sand spit is remnant of a water current that was depositing sand into the former bay.



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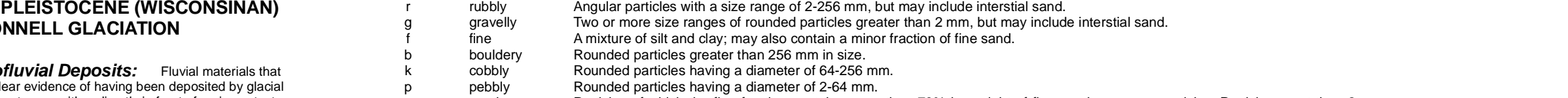
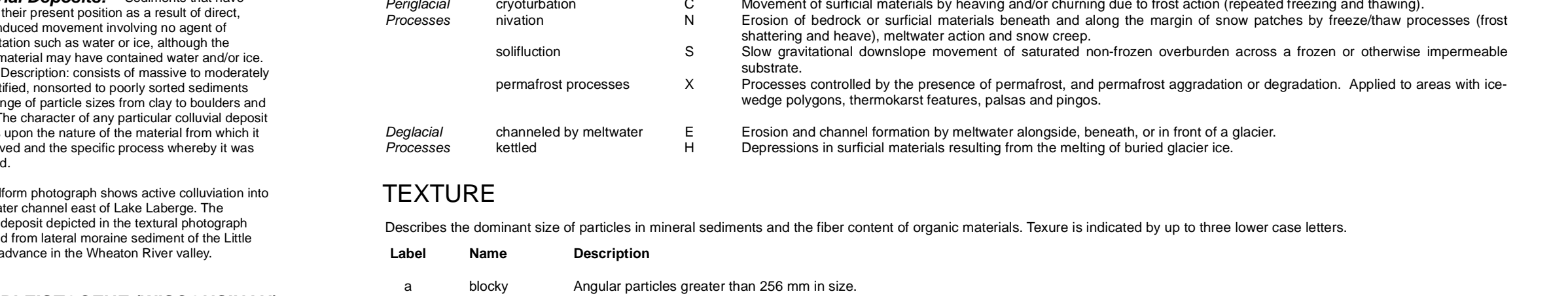
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Stratigraphic Sections

03-JB-001: Unit 2 (Eolian), Unit 1 (Glaciolacustrine)

03-JB-002: Unit 2 (Eolian), Unit 1 (Glaciolacustrine)

03-JB-003: Unit 3 (Glaciolacustrine), Unit 2 (Glaciolacustrine), Unit 1 (Glaciolacustrine)

03-JB-005: Unit 2 (Glaciolacustrine), Unit 1 (Glaciolacustrine)

03-JB-008: Unit 3 (Glaciolacustrine), Unit 2 (Glaciolacustrine), Unit 1 (Glaciolacustrine)

03-JB-014: Unit 5 (Eolian), Unit 4 (Glaciolacustrine), Unit 3 (Glaciolacustrine), Unit 2 (Glaciolacustrine), Unit 1 (Glaciolacustrine)

03-JB-036: Unit 5 (Eolian), Unit 3 (Glaciolacustrine), Unit 2 (Glaciolacustrine), Unit 1 (Glaciolacustrine)

03-JB-009: Unit 3 (Eolian), Unit 2 (Glaciolacustrine), Unit 1 (Glaciolacustrine)

Legend

Vertical scale - metres above sea level

Horizontal scale - textural properties

z - clay
s - sand
p - pebble
c - cobble
b - boulder

QUATERNARY

HOLOCENE

FLUVIAL DEPOSITS: Sediment transported and deposited by streams and rivers, synchronous with about General Description: deposits consist of gravel and sand, locally rounded and contains interstitial sand. Fluvial sediments are commonly massive to well-sorted and display indistinct, although massive, remoulded fluvial channel deposits. Fluvial sediments may be massive, well-sorted, and contain rounded pebbles and cobbles. Fluvial sediments may be massive, well-sorted, and contain rounded pebbles and cobbles. Fluvial sediments may be massive, well-sorted, and contain rounded pebbles and cobbles.

ORGANIC DEPOSITS: Materials resulting from vegetation growth, decay and accumulation in soil and ground cover. Organic deposits may be massive, well-sorted, and contain rounded pebbles and cobbles. Organic deposits may be massive, well-sorted, and contain rounded pebbles and cobbles. Organic deposits may be massive, well-sorted, and contain rounded pebbles and cobbles.

PLEISTOCENE AND HOLOCENE (UNDIVIDED)

Eolian Deposits: Sediment transported and deposited by wind action. General Description: consists of medium to fine sand and coarse silt that is well-sorted, and contains rounded pebbles and cobbles. Eolian deposits may be massive, well-sorted, and contain rounded pebbles and cobbles. Eolian deposits may be massive, well-sorted, and contain rounded pebbles and cobbles.

Colluvial Deposits: Sediments that have accumulated in the present position as a result of direct or indirect erosion of parent rock. Colluvial deposits may be massive, well-sorted, and contain rounded pebbles and cobbles. Colluvial deposits may be massive, well-sorted, and contain rounded pebbles and cobbles. Colluvial deposits may be massive, well-sorted, and contain rounded pebbles and cobbles.

LATE PLEISTOCENE (MISCONINAN) McCONNELL GLACIATION

Glaciolacustrine Deposits: Fluvial materials that are deposited in a lake basin. Glaciolacustrine deposits may be massive, well-sorted, and contain rounded pebbles and cobbles. Glaciolacustrine deposits may be massive, well-sorted, and contain rounded pebbles and cobbles. Glaciolacustrine deposits may be massive, well-sorted, and contain rounded pebbles and cobbles.

Glacial Deposits (Till): Sediment deposited directly or indirectly by a glacier. Glacial deposits may be massive, well-sorted, and contain rounded pebbles and cobbles. Glacial deposits may be massive, well-sorted, and contain rounded pebbles and cobbles. Glacial deposits may be massive, well-sorted, and contain rounded pebbles and cobbles.

PRE-QUATERNARY (UNDIVIDED)

Bedrock: Bedrock outcrops and outcrops covered by a thin layer of unconsolidated or organic material. Bedrock in the Whitehorse area are part of the Mackenzie Group (Proterozoic: 980, Lower, 2005). These rocks belong to the Lower River Group (Upper Triassic). Unconformable, clastic and coarse of the Lower River Group (Upper Triassic). Unconformable, clastic and coarse of the Lower River Group (Upper Triassic). Unconformable, clastic and coarse of the Lower River Group (Upper Triassic).

Terrain Classification

1st terrain classification // 2nd terrain classification // 3rd terrain classification

sMbV-EVz

geomorphological process(es) (channeled, gullied)
surface expression(s) (blanket, veneer)
surfacial material (till)
texture (sandy)

SYMBOLS

glacially aligned landform; includes: drumlins, crag and rock; rock outcrops; ridges, grooves and striae. These landforms indicate past ice flow direction.

esker; known direction

esker; unknown direction

moraine ridge

glacial meltwater channel - minor

glacial meltwater channel - major

glacial lake strand lines

cirque

escarpment

escarpment - falling

landslide

recessionary glacial limit

Bond site locations

roads

GEOLOGICAL BOUNDARIES

defined

approximate

assumed

REFERENCES

Dak-Rodkin, A., 1999. Glacial limits map of Yukon. Exploration and Geological Services Division, Yukon Region, Indian and Northern Affairs Canada. Geoscience Map 1999-2; also known as Geological Survey of Canada, Open File 3694, 1:1 000 000 scale.

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RECOMMENDED CITATION

Bond, J.D., Morison, S. and McKenna, K. Surficial Geology of Upper Laberge (1:50 000 scale). Yukon Geological Survey, Geoscience Map 2005-8.

Digital cartography and drafting by Gary Carriere and Olwyn Bruce, Yukon Geological Survey.

Original mapping and drafting completed by S. Morison, K. McKenna and S. Davies (1982). Subsequent mapping and compilation completed by J.D. Bond (2005-2004).

Any revisions or additional geological information known to the user would be welcomed by the Yukon Geological Survey.

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Yukon Geological Survey
Energy, Mines and Resources
Government of Yukon

Geoscience Map 2005-8
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by
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