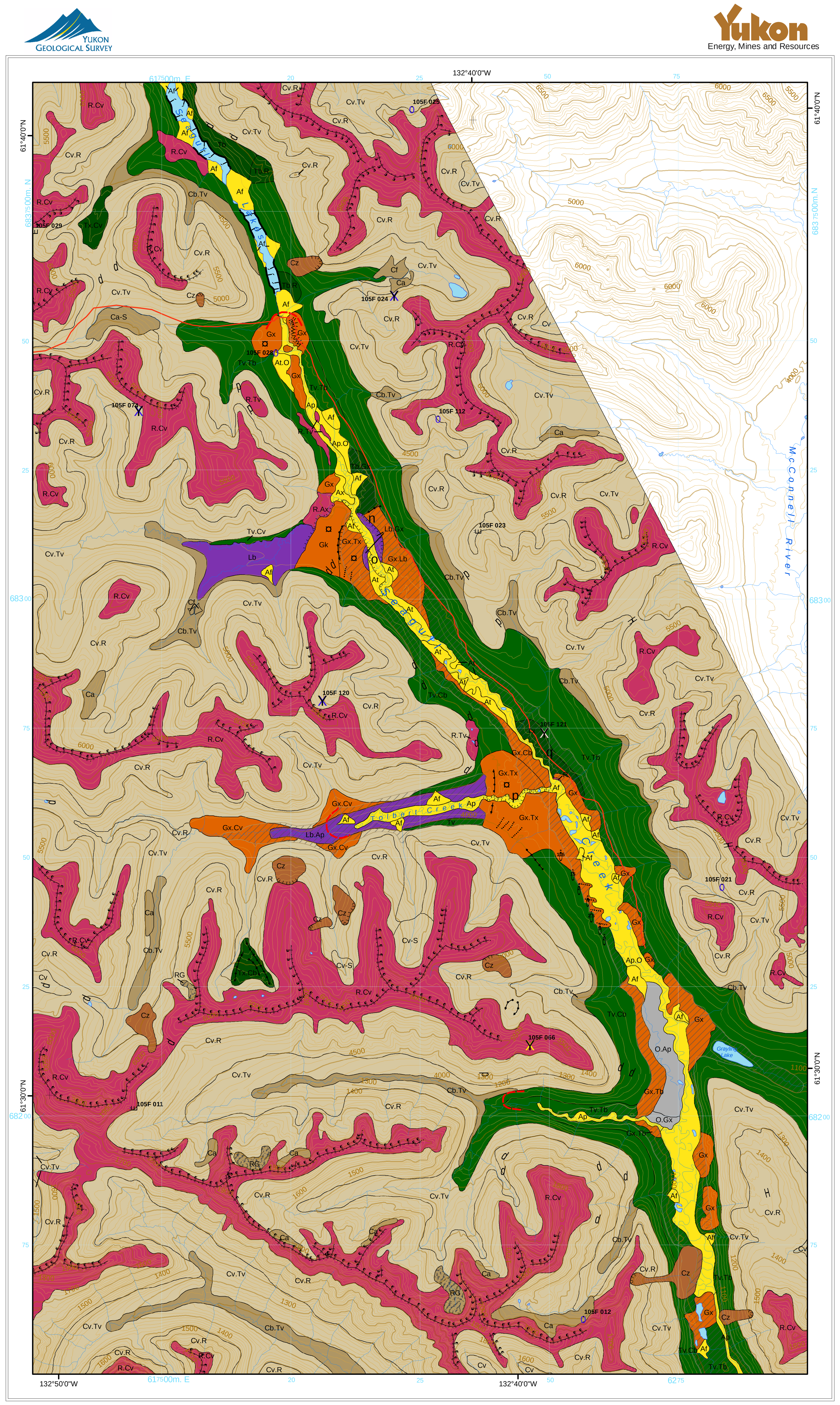
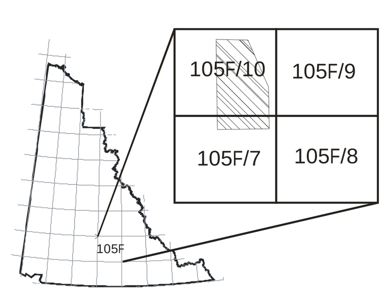


SEAGULL CREEK
(PARTS OF NTS 105F/10 and 7)

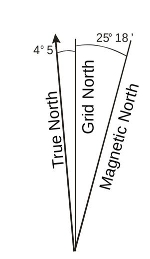
YUKON TERRITORY
SCALE 1:50 000



0 0.5 1 2 3 4 5 6 kilometres
0 0.2 0.4 0.8 1.2 1.6 2 2.4 miles

CONTOUR INTERVAL 20 FEET/10 METRE
Elevations in feet/metres above mean sea level
UTM Zone 8
North American Datum 1983
Transverse Mercator Projection

Topographic base produced by
SURVEYS AND MAPPING BRANCH
DEPARTMENT OF ENERGY, MINES
AND RESOURCES.



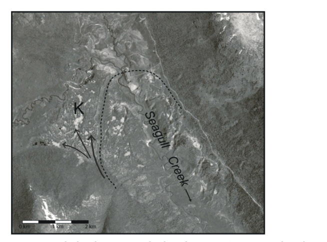
APPROXIMATE MEAN DECLINATION 2005
AVERAGE CENTRE OF MAP
Annual change of 19' (decreasing) per year

DESCRIPTIVE NOTES

Physiography: The Seagull Creek map area includes the upper two-thirds of the Seagull Creek drainage area. The creek rises at a high divide (1372 m) in the Pelly Mountains and flows south-southeast for approximately 30 km in a broad, U-shaped valley before joining the McConnell River (1067 m). The drainage area contains summits of up to 2162 metres elevation with numerous cirques on north and east-facing aspects. The evidence of glaciation in this landscape is ubiquitous. Most high peaks have been eroded into knife-edge arêtes or horn peaks and cirque basins are currently occupied by active or extinct rock glaciers, tarn lakes, or glacial debris. Valley sides have been over-steepened by glacial erosion and are susceptible to mass movements.

Glacial History: The Quaternary period in central Yukon is characterized by multiple glacial and interglacial events. Regions of initial ice accumulation and subsequent ice sheet supply were the Cassiar, Pelly, Selwyn, St.Elias, Wernecke, and Ogilvie mountains. Major valleys and plateaus were inundated by ice derived from the northern-most extent of the Cordilleran Ice Sheet. The pre-Reid (early Pleistocene), Reid (middle Pleistocene) and McConnell (late Pleistocene) glaciations all affected the Seagull Creek valley. Efficient and widespread erosion during each period of glaciation largely removed earlier glacial and interglacial deposits in the Seagull Creek valley. Present day geomorphology is therefore attributed to glacial processes of the late Pleistocene (most recent) McConnell Glaciation.

The McConnell Glaciation began sometime after 26 ka BP in the Pelly Mountains and was largely complete by 10 ka BP (Jackson and Harrington, 1991). Bond and Kennedy (2005) used four phases to describe the onset, maximum, and retreat of the McConnell glaciation in the Pelly Mountains. During the initial phase (the onset of glaciation) alpine cirques in the Pelly Mountains acted as ice accumulation and supplied ice to valley-bound glaciers that extended radially into neighbouring lowlands. The second phase of glaciation represents glacial maximum. During this period local ice in the Pelly Mountains remained sufficiently thin to allow Cordilleran ice to advance into the mountains from the south (Cassiar Lobe) and east (Selwyn Lobe). During glacial maximum ice flow trended primarily north-northeast over the Seagull Creek valley and overtopped all but the highest peaks. Deglaciation in Seagull Creek occurred in two distinct phases. Phase three represents the retreat of Cordilleran ice out of the Pelly Mountains, characterized by alternating periods of frontal retreat, recessional pauses, and re-advances of the ice front. Phase three was the most important sediment deposition controlling event in the Seagull Creek valley and is responsible for thick sediment packages on the valley bottom (see photos of kame terrace below). The final (fourth) phase of the McConnell glaciation in the Pelly Mountains describes a period of local ice accumulation that occurred after the mountains became free of Cordilleran ice. Evidence of this readvance is found in high alpine end moraines in north-facing cirques in the map area. This was a limited glacial advance that did not extend more than 5 km from cirques that lay above 1600 m in the Seagull Creek area.



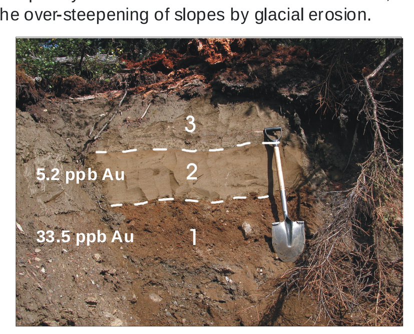
Aerial photos of the kame terrace in the Seagull Creek valley are an example of thick glaciofluvial deposits created by recessional lobes of the Cordilleran Ice Sheet.

Surficial Geology: Valley bottom sediments in the map area are dominated by alluvial and glaciofluvial materials. Alluvial sediment is limited to areas immediately surrounding Seagull Creek and its larger tributaries. Upper reaches of Seagull Creek (north of Tolbert Creek) are fast moving and characterized by migrating gravel point bars and interbedded organic and clastic overbank deposits. Lower Seagull Creek (south of Tolbert Creek) is characterized by a meandering stream channel and wide alluvial plain containing abundant channel lakes, oxbow lakes and fen bogs. Glaciofluvial deposits are located along the length of Seagull Creek and concentrated at the mouths of tributary valleys. Sediments in glaciofluvial deposits are derived from down-valley sources and have been transported up-valley to be deposited at the ice-front. Up-valley ice flow also caused damming of glacial meltwater at the ice-front and contributed to the glaciolacustrine deposits that drape much of the valley bottom (see Section 1 and 2). Glaciolacustrine deposits in tributary valleys are greater than 1 metre thick and are confined by well-defined recessional moraines. Glaciolacustrine veneer deposits in upper Seagull Creek valley are generally less than 1m thick and were likely deposited during rapid, down-valley retreat of the ice-front. In Seagull Creek valley, south of Tolbert Creek, glacial fill and glaciolacustrine materials increase in thickness.

Ice overrode many of the summits surrounding Seagull Creek and a veneer of till can be found at almost any elevation on the map sheet. In general, till thicknesses increase toward the valley bottom and become increasingly colluviated with, or covered by, other deposit types such as glaciofluvial or alluvial sediments (see Section 3). Colluvial processes are an important downslope process in the Seagull Creek valley and most till, glaciofluvial and glaciolacustrine deposits on slopes have undergone some degree of colluviation. Colluviation is the major sediment source for tributary streams in the Seagull Creek valley, making some alluvial deposits representative of up-stream geochemistry and/or geology. Cold-weather and alpine processes also affect the downslope movement of colluvial materials via solifluction, cryoturbation, and nivation. Permafrost is generally within 1-2 m of the ground's surface on north- and northeast-facing slopes in the Seagull Creek valley. Permafrost affected slopes can be identified by changes in vegetation (i.e., black spruce, willow, and fen are common to permafrost-affected ground), higher levels of ground moisture in summer, and the presence of early- or late-season snow. Permafrost is also present in organic-rich valley bottom sediments.

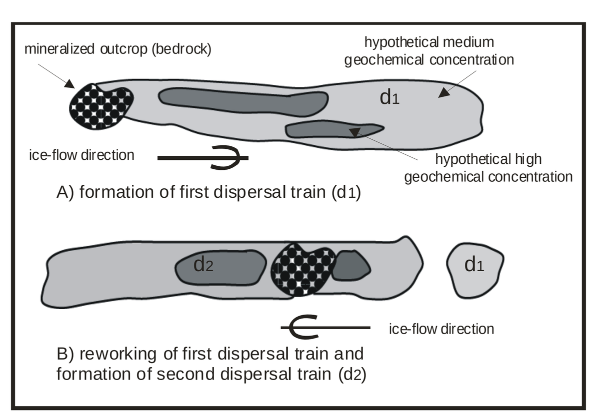
Elevations above 1400 m are predominantly bedrock, blockfields, or thin veneers of shattered rock. There are a number of mass movement features in the map area including landslides, rotational slumps, and rockfalls. Landslides occur more frequently in areas of human-caused disturbance, while rockfalls and slumps may be related to the over-steepening of slopes by glacial erosion.

Potential for Drift Prospecting: The distribution of Quaternary sediments in Seagull Creek valley is determined primarily by late-glacial recessional processes. Although the initial flow of ice was down-valley, the most recent glacial transport was up-valley and against the normal drainage gradient of the valley. Therefore, the spatial characteristics of a mineralized dispersal train in Seagull Creek valley may exhibit both down-valley and up-valley indicators (see diagram below). It is likely that up-valley flow was capable of eroding to bedrock and transported both previous glacial deposits and newly eroded material up-valley. Deposition of this material is largely confined below 1350 m elevations.



Section 4 shows a basal till (1) overlain by ~ 1 m of glaciolacustrine sand (2) and colluvial material (3). Geochemical assays indicate that the glaciolacustrine blanket obscures higher geochemical results found in the till below (see Section 4).

However, it is possible that, in areas protected from glacial erosion such as near the mouth of Tolbert Creek, ice overrode rather than eroded previously deposited glacial drift, thus preserving a down-valley mineral dispersal train at depth. In either case, transport distances are not large, and a group of geochemical anomalies probably represent a local source of mineralization. Basal till containing a high percentage of fine sediment is rare in the Seagull Creek valley due to extensive glaciofluvial and other water-dominated processes. Appropriate sediments for geochemical sampling are commonly located at depth beneath colluvial or glaciofluvial materials and can be identified by their more angular and poorly sorted clasts. For example, the glaciolacustrine unit in Section 4 (see photo above and Section 4), obscures the relatively high gold values found in the glacial till unit below. In this case, a first derivative glacial material (appropriate for geochemical studies) is located less than 1 m below the surface.



The first dispersal train (scenario A) is formed by local valley glaciers flowing down valley out of the Pelly Mountains (phase 1). The second dispersal train(scenario B) is formed when retreating ice of the Cordilleran Ice Sheet readvances up valley (phase 2)(Figure from Kennedy and Bond, 2004).

LEGEND

QUATERNARY
HOLOCENE

ALLUVIAL DEPOSITS: stream-deposited gravel, sand and silt, commonly overlain by, or grading laterally into, lacustrine and overbank silt and sand or organic deposits. Found along contemporary streams with meandering planforms. Gravel is typically rounded and contains interstitial sand. Alluvial deposits in Seagull Creek valley are moderately to well sorted and are commonly stratified with organic deposits.

Ap Ax At Af

Ap - *alluvial plain;* extensive on the nearly horizontal (relief of < 1 m) floodplain surface, alluvial plains consist predominantly of fine-grained sand and silt interbedded with gravel and/or organic materials. Floodplain sediments accrete vertically through organic and overbank deposition.

At - *alluvial terrace;* stepped or benched landforms occurring approximately 2 - 10 m above the edge of the Seagull Creek floodplain. Consist of gravel, sand, silt and locally cobbles. Terraces occurring at higher elevations are likely the result of paraglacial readjustments to stream base level immediately following the end of the last glaciation. These terraces generally contain coarser sediments (cobbles and boulders).

Af - *alluvial fan;* shallow-sloped (<15 degrees) conic sector, that descends from an apex to a semi-circular margin. These constructional landforms are built at the mouth of tributary valleys, ravines, or gullies and can be used to characterize the mineralogy of their drainage basins. Typically range from well sorted fine sand and silt to coarse sand, gravel and cobble diamicts; limited to the break in slope separating the valley side from the valley floor of Seagull Creek and some larger tributary valleys.

Ax - *alluvial complex;* ridges, pits, terraces, and channels with relief generally ranging between 0.5 m to > 2 m. Complexes are formed by undifferentiated plains, terraces, fans, and other non-alluvial materials.

ORGANIC DEPOSITS: accumulations of vegetal materials consisting primarily of peat, with minor amounts of mineral sediments such as sand, silt, and clay. These deposits are found in areas of poor drainage or high water table conditions such as lower Seagull Creek, and north-facing slopes impervious to drainage because of underlying permafrost.

O

O - *organic;* woody sedge peat, variable thicknesses.

ROCK GLACIERS: tongues or apron like accumulations of rock debris that display morphological features (such as steep-faced lobate snouts and morainal ridges) suggesting present or past, downslope movement. Active rock glaciers contain ice, either as a core or as a matrix between clasts.

RG

RG - *rock glacier;* small, mostly inactive rock glaciers occurring in north-facing cirques.

PLEISTOCENE AND HOLOCENE (UNDIVIDED)

COLLUVIAL DEPOSITS: diamicton, gravel, shattered bedrock, and lenses of silt and sand derived from bedrock and surficial materials by a variety of physical and chemical weathering processes and transported downslope by gravity. Transport processes range from fast moving rockfalls and debris flows to slow soil creep and solifluction. On the steep slopes of the Seagull Creek valley colluvium generally occurs as a veneer at high elevations and thickens toward the valley bottom. Solifluction processes are an important means of transportation on all slopes, but are particularly effective on north-facing slopes affected by permafrost processes.

Cv

Cv - *colluvial veneer;* thin (< 1 m) discontinuous veneer of angular rock fragments and coarse sand commonly overlying bedrock at higher elevations. Colluvium is predominantly locally derived from shattered or weathered bedrock. At lower elevations colluvium can become intercalated with till, alluvial fans, glaciofluvial or glaciolacustrine sediments.

Cb Ca Cf

Cf - *colluvial fan;* shallow-sloped (<15 degrees) conic sector, descending from an apex to a semi-circular margin. Colluvial fans are generally built at the mouths of tributary ravines, gullies, or chutes in high elevation areas of the map area and contain poorly sorted angular fragments of rock and other hillslope materials.

Ca - *colluvial apron;* angular, poorly sorted rock and rock fragments accumulating (>1 m thick) at the base of steep slopes, commonly as a series of coalesced fans. Generally found in alpine cirques and tributary valleys to Seagull Creek.

Cz

Cb - *colluvial blanket;* continuous or nearly continuous mantle of colluvium > 1 m thick. Colluvial blankets generally consist of a more diverse range of particle sizes than colluvial veneers. In the Seagull Creek valley, colluvial blankets occur on the lowest slopes and commonly contain permafrost on north-facing slopes.

Cz - *mass wasting;* includes rotational slumping, debris slides and rock avalanches (see symbols).

LATE PLEISTOCENE (WISCONSINAN) - McCONNELL GLACIATION

GLACIOFLUVIAL DEPOSITS: stratified to massive; poorly to well sorted; gravel with minor silt, sand and cobbles laid down by running water on top of, beneath, against, and beyond glaciers (glacial meltwater). Glaciofluvial deposits in the map area are concentrated in valley bottoms, and at the mouths of tributary streams of the Seagull and Tolbert Creek valleys. Deposits on the valley floor are commonly overlain with alluvial or glaciolacustrine sediments, and are present at the surface only on fluvial terraces and the lower slopes of the valley side.

Gx Gk

Gx - *glaciofluvial complex;* 0-30 m thick, hummocky topography associated with ice-contact glaciofluvial terraces, plains, crevasse fillings, eskers and related glaciolacustrine and morainal materials. Sand and gravel usually display moderate rounding, moderate to very poor sorting, and textures can change rapidly over small lateral or vertical distances.

Gk - *glaciofluvial kame;* ice marginal terrace, commonly with an irregular upper surface pitted with kettles and meltwater channels (see symbols). Stratification and sorting are generally poor, but can increase away from the former ice-margin. Similarly, boulders may be found near ice-contact surfaces or at depth within the landform, but clasts generally decrease in size away from the ice front (in the case of Seagull Creek, this is up-valley toward Seagull Lakes).

GLACIOLACUSTRINE DEPOSITS: well-stratified sand, silt and minor clay deposited in lakes impounded by glacial ice or sediment; may have a smooth or kettled surface pattern due to melting of buried ice. Poorly drained areas are commonly overlain by organic material and can be subject to thermokarst processes. Much of the alluvial plain in lower Seagull Valley may be underlain by glaciolacustrine deposits of significant thickness.

Lb

Lb - *glaciolacustrine blanket;* 1 - > 3 m thick, blankets generally subdue underlying topography and have horizontal, planar surfaces.

Lv

Lv - *glaciolacustrine veneer;* < 1 m thick, veneers conform to underlying topography and are usually evident in the Seagull Creek valley by a thin drape of laminated fine silt, sand, and clay on valley sides and bottom.

GLACIAL DEPOSITS (TILL): unsorted clay, silt, sand pebbles and cobbles with minor boulders; deposited by or from glacial ice and occuring as subdued veneer and blanket deposits. Occurs on the surface of valley sides in the Seagull Creek valley but is largely buried by glaciofluvial and glaciolacustrine sediments in the valley bottom.

Tv

Tb Tx

Tv - *till veneer;* < 1 m thick, conforms to underlying topography.

Tb - *till blanket;* > 1 m thick, gently to moderately sloping plain controlled by bedrock or underlying surficial deposits.

Tx - *till complex;* till blanket or veneer composed of meltout till and minor ice contact glaciofluvial deposits.

PRE-QUATERNARY (UNDIVIDED)

BEDROCK: The Seagull Creek map area is located within the Pelly-Cassiar Platform, a region of northwest trending platform carbonates deposited at the western margin of North America between the late Precambrian and Triassic (Gordey and Makepeace, 1999). Mid-Cretaceous granitic rocks extensively intrude the assemblage, and Tertiary right-lateral movement of 450 km along the Tintina Fault (located approximately 35 km to the northeast) has displaced these rocks relative to ancestral North America (Murphy and Mortensen, 2003). Epigenetic occurrences of gold and silver occur within the map sheet (see MINFILE occurrences). The mineralization has been related to a domal uplift, termed the Ketza-Seagull Arch (Abbott, 1986). Vein deposits are found in pods and lenses along well-defined faults with small apparent displacements. On the Tay-LP gold-copper property at Seagull Creek, garnet-diopside skarn rocks are found in close association with limestone and intrusions of quartz monzonite (Tolbert, 2000).

R

R - *bedrock;* primarily prominent ridges, escarpments, and mountain summits.

COMBINED MAP UNITS

Surficial geology unit(s) are shown first followed by terrain modifiers. Combined surficial geology units are used where, for reasons of scale, two or more deposits cannot be delineated individually. The dominant unit (> 50% of polygon coverage) is shown first and the subordinate unit(s) (< 50% of polygon coverage) are shown subsequently. A dot separates the surficial units and a dash separates the terrain modifier from the surficial geology.

TERRAIN MODIFIERS

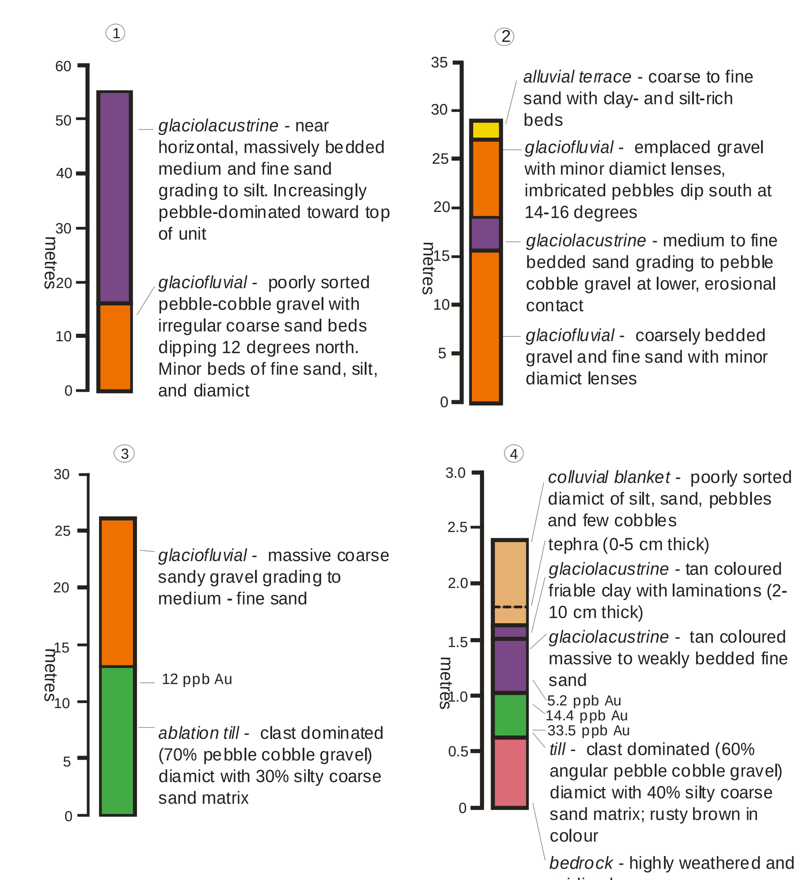
S - solifluction

SYMBOLS

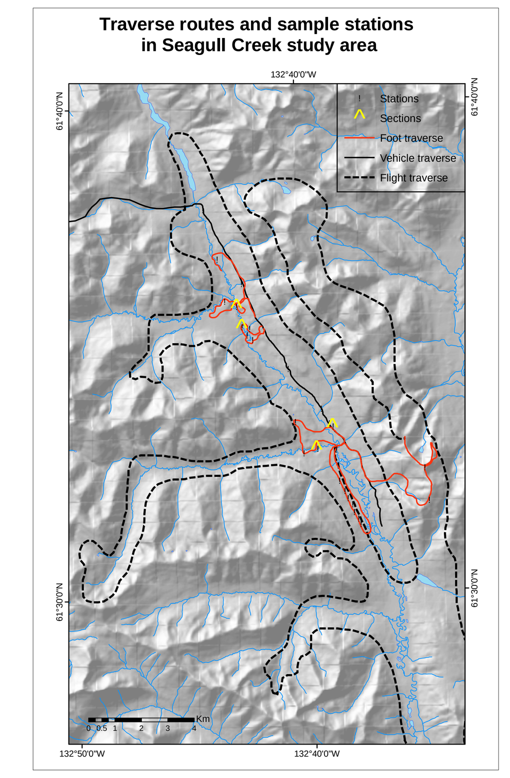
geological boundary
road
arête / cirque
glacial meltwater channel
large(proglacial or subglacial)
small(lateral/sidehill)
moraine ridge
esker (flow direction known or assumed)
crevasse filling
streamlined glacial landform (ice flow direction unknown)
scarp (landslide, fluvial terrace)
kettled surface
location of stratigraphic section
location of till geochemistry sample — Au (ppb)
glacial limit (late McConnell recessional moraine)
landslide flow direction (failure rate):
fast
slow

Yukon MINFILE occurrences (with MINFILE number):
stibnite veins
barite veins
barite-fluorite veins
Pb-Zn skarn
W skarn
volcanogenic massive sulphide

STRATIGRAPHIC SECTIONS



Traverse routes and sample stations in Seagull Creek study area



Mineral Occurrences Yukon MINFILE (Deklerk and Traynor, 2004)		
105F 011	STORMY	DEPOSIT
105F 012	MM, ARNOLD	DRILLED PROSPECT
105F 021	BOX, MAT	DRILLED PROSPECT
105F 023	COXALL	DRILLED PROSPECT
105F 024	TYRO	PROSPECT
105F 025	MUM	SHOWING
105F 028	GULL MINERAL, HAYDN, ANISE	DRILLED PROSPECT
105F 029	GROUNDHOG	DEPOSIT
105F 066	CONNELL	SHOWING
105F 074	PINNACLE, H, PEAK	DRILLED PROSPECT
105F 112	GRAHAM, BID	PROSPECT
105F 120	BOBBY	DRILLED PROSPECT
105F 121	SEAGULL CREEK, TAY-LP	DRILLED PROSPECT

REFERENCES

Abbott, J. G., 1986. Epigenetic mineral deposits of the Ketza-Seagull District, Yukon. In Yukon Geology, Vol 1, Exploration and Geological Services Division, Yukon Region, Indian and Northern Affairs Canada, p. 56-66.

Bond, J.D., and Kennedy, K.E., 2005. Late Wisconsinan McConnell ice-flow and sediment distribution patterns in the Pelly Mountains. *In:* Yukon Exploration and Geology 2004, D.S. Emond, L.L. Lewis, and G.D. Bradshaw (eds.), Yukon Geological Survey, p. 67-82.

Deklerk, R. And Traynor, S., 2004. Yukon MINFILE - a database of mineral occurrences. Yukon Geological Survey, CD-ROM.

Gordey, S.P. and Makepeace, A.J. (comps.), 2003. Yukon Digital Geology, Version 2. Geological Survey of Canada, Open File 1749, and Yukon Geological Survey, Open File 2003-9(D), 2 CD-ROMs.

Jackson, L.E., Jr., 1993. Surficial geology, Bruce Lake, Yukon Territory. Geological Survey of Canada, Map 1791A, scale 1:100 000.

Jackson, L.E., Jr., 1993. Surficial geology, McConnell River, Yukon Territory. Geological Survey of Canada, Map 1793A, scale 1:100 000.

Jackson, L.E., Jr., 1994. Terrain inventory and Quaternary history of the Pelly River area, Yukon Territory. Geological Survey of Canada, Memoir 437, 41 p.

Jackson, L.E., Jr. and Harington, C.R., 1991. Pleistocene mammals, stratigraphy, and sedimentology at the Ketza River site, Yukon Territory. Géographie physique et Quaternaire, vol. 45, p. 69-77.

Kennedy, K.E. and Bond, J.D., 2004. Evidence for a late-McConnell readvance of the Cassiar Lobe in Seagull Creek, Pelly Mountains, central Yukon. In Yukon Exploration and Geology 2003, D.S. Emond, and L.L. Lewis, (eds.), Yukon Geological Survey, p. 121-128.

Murphy, D.C. and Mortensen, J.K., 2003. Late Paeozoic and Mesozoic features constrain displacement on Tintina Fault and limit large-scale orogen-parallel displacement in the Northern Cordillera. In: GAC-MAC-SEG Joint Annual Meeting, Vancouver, British Columbia, Abstracts vol. 28, p. 151, CD-ROM.

Tolbert, R.S., 2000. Assessment report on selective leach soil geochemistry and prospecting. Ross River Minerals Ltd., Assessment Report #94143, Energy, Mines and Resources, Yukon government, 17 p.

RECOMMENDED CITATION

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Energy, Mines and Resources
Yukon Government

Open File 2005-1

Surficial Geology of Seagull Creek (Parts of NTS 105F/10 and 7), Yukon (1:50 000 scale)

by

K.E. Kennedy