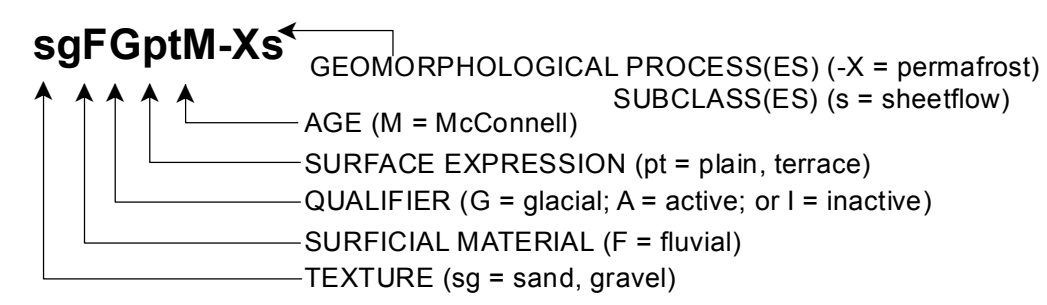


### TERRAIN CLASSIFICATION SYSTEM

This surficial geology map was classified using the Terrain Classification System for British Columbia (Howes and Kerik, 1997), with minor modification to meet standards set by the Yukon Geological Survey. For example, we have added some permafrost process subclasses to accommodate the wider variety of permafrost features found in Yukon. We have also added an age classification to distinguish materials deposited during different Pleistocene glaciations.

A sample map unit label is shown below to illustrate the terrain classification system. Surficial materials from the core of the polygon map unit labels are symbolized with a single upper case letter. Lower case features are written to the left of the surficial material and lower case surface expressions are written to the right. An upper case activity qualifier (A = active, I = inactive) may be shown immediately following the surficial material designator. The glacial qualifier "G" may alternatively be written immediately following the surficial material to indicate glacially modified materials. Age is indicated by a capital letter that follows the surface expression but precedes the process modifiers. Geomorphological processes (capital letters) and subclasses (lower case letters) always follow a dash symbol (-).



### COMPOSITE SYMBOL DELIMITERS:

Due to scale limitations, up to 4 terrain units may be included in a single map unit label (e.g. sgFGpM-dsmMMXsCvZcZGpM-XV). Each component is separated by a delimiter that indicates relative proportions between the components (" ", "-", "/", or a stratigraphic relationship "-").

\*\* - terrain units on either side of the symbol are of approximately equal proportion  
? - terrain units before the symbol is more extensive than the one(s) following  
\* - terrain units before the symbol is considerably more extensive than the one(s) following  
+ - terrain units before the "T" symbol stratigraphically overlies the one(s) following

### SURFICIAL MATERIALS

Surficial materials are non-lithified, unconsolidated sediments. They are produced by weathering, sediment deposition, biological accumulation, human and volcanic activity. In general, surficial materials are of relatively young geological age and they constitute the parent material to most (pedologic) soils. Note that a single polygon will be colored only by the dominant surficial material, but other materials may exist in that unit.

- D** HOLOCENE: Organic deposits are accumulations of vegetative matter thicker than 1 m. They are commonly found in floodplains, areas of near-surface permafrost such as north-facing slopes, and locations where there is poor drainage. Thin veneers of organic material are widespread and generally unsorted. Organic material in the map area commonly consists of peat with fibric to mesic decomposition.
- E** Eolian: Sediment transported and deposited by wind. The dominant eolian sediment in the map area is loess, which is predominantly silt in texture with a smaller fraction of fine sand. Loess veneers and blankets were deposited over the landscape during the last (McConnell) glaciation. On stable sites, the loess is intact, whereas in cryotablated or colluvial areas, the loess is reworked into the soil profile and its presence is indicated by the "T" textural symbol. Resedimentation loess is a major component of colluvial aprons in the area. Ice-rich permafrost is common within low-lying eolian sediments.
- C** Colluvium: Material transported and deposited by down-slope, gravity-driven processes such as creep, soilfall, landslides and snow avalanches. Colluvium is the most dominant surficial material in the northern Dawson Range as most of the area escaped Pleistocene glaciation. It commonly has a stratified structure with a highly variable texture and composition controlled by the parent material, transport mechanism and travel distance. Colluvium on uplands and slopes in the northern Dawson Range is generally derived from weathered bedrock and loess, resulting in a silt-rich diatom containing angular, local bedrock clasts. On steeper slopes colluvium is generally coarser grained, as it has been deposited by rapid mass wasting processes such as rock fall, debris flows and avalanches. Slower processes such as sheetwash and creep occur on gentler slopes and produce finer grained colluvium. Colluvial aprons extend down lower slopes on commonly ice-rich and are primarily composed of reworked loess and peat.
- F** Fluvial: Sediments transported and deposited by modern streams and rivers, found in floodplains, fans and terraces. Fluvial deposits typically consist of well-sorted stratified sand and gravel comprising sub-angular to rounded clasts. In the unglaciated regions of the northern Dawson Range, low order streams are confined to very narrow V-shaped valleys and their fluvial deposits are generally not mapped due to scale limitations; their sediments, however, are more coarse grained and more locally derived than in higher order streams. Active fluvial (FA) materials are subject to regular flooding.

### TEXTURE

Texture refers to the size, shape and sorting of particles in clastic sediments, and the proportion and degree of decomposition of plant fibre in organic sediments. Texture is indicated by up to three lower case letters, placed immediately before the surficial material designator, listed in order of decreasing abundance.

### Specific classic textures

- a - blocks: angular particles >250 mm in size
  - b - boulders: rounded particles >25 mm in size
  - k - cobbles: rounded particles >4 - 25 mm in size
  - p - pebbles: rounded particles >2 - 4 mm in size
  - s - sand: particles between >0.0625 - 2 mm in size
  - z - silt: particles >2 µm - 0.0025 mm in size
  - c - clay: particles <2 µm in size
- Common classic textural groupings
- d - mixed fragments: a mixture of rounded and angular particles >2 mm in size
  - x - angular fragments: a mixture of angular fragments >2 mm in size (i.e., a mixture of blocks and rubble)
  - g - gravel: a mixture of two or more size ranges of rounded particles >2 mm in size (e.g., a mixture of boulders, cobbles and pebbles); may include interstitial sand
  - r - rubble: angular particles between 2 and 256 mm, may include interstitial sand
  - m - mud: a mixture of silt and clay; may also contain a minor fraction of fine sand
  - y - shells: a sediment containing dominantly of shells and/or shell fragments
- Organic terms
- o - organic: general organic materials
  - e - fibric: the least decomposed of all organic materials. It contains amounts of well-preserved fibre (40% or more) that can be identified as to botanical origin upon rubbing
  - u - mesic: organic material at a stage of decomposition intermediate between fibric and humic
  - h - humic: organic material at an advanced stage of decomposition. It has the lowest amount of fibre, the highest bulk density, and the lowest saturated water-holding capacity of the organic materials; fibres that remain after rubbing constitute less than 10% of the volume of the material

### SURFACE EXPRESSION

Surface expression refers to the form (assemblage of slopes) and pattern of forms expressed by a surficial material at the land surface. This three-dimensional shape of the material is equivalent to landform used in a non-geologic setting (e.g., ridges, plains). Surface expression symbols also describe the number of times unconsolidated surficial materials relate to the underlying substrate (e.g., veneer). Surface expression is indicated by up to three lower case letters, placed immediately before the surficial material designator, listed in order of decreasing abundance.

- a - apron: a wedge-like slope-be surface of laterally coalescent colluvial fans and blankets; longitudinal slopes are generally less than 15° (26%) from apex to toe with flat or gently concave profiles
- b - blanket: a layer of unconsolidated material thick enough (>1 m) to mask minor irregularities of the surface of the underlying material, but still conforms to the general underlying topography; outcrops of the underlying unit are rare
- c - cone: a cone or sector of a cone, mostly steeper than 15° (26%); longitudinal profile is smooth and straight, or slightly concave; cones typically consist of colluvial cones
- f - fan: sector of a cone with a slope gradient less than 15° (26%) from apex to toe; longitudinal profile is smooth and straight, or slightly concave/conex
- h - hummock: steep sided hillocks (s) and hollows (s) with multidirectional slopes dominantly between 15-35° (26-70%) if composed of unconsolidated materials, whereas bedrock slopes may be steeper; local relief >1 m; in plan, an assemblage of non-linear, generally chaotic forms that are rounded or irregular in cross-profile; commonly applied to knob-and-kettle glacial features
- i - delta: landform created at the mouth of a river or stream where it flows into a body of water; gently sloping surface irregularities generally <1 m, applied to (glacial) floodplains, organic deposits, lacustrine deposits and striped bedrock topography
- n - ridge: elongate hillocks (s) with slopes dominantly 15-35° (26-70%) if composed of unconsolidated materials, bedrock slopes may be steeper; local relief >1 m; in plan, an assemblage of parallel or sub-parallel linear forms; commonly applied to hummocked till plains, eskers, moraine ridges, cuestas, ridges and striped bedrock
- r - terrace: a single or assemblage of step-like forms where each step-like form consists of a scarp face and a horizontal or gently inclined surface above it, applied to fluvial and lacustrine terraces and striped bedrock topography
- v - veneer: a layer of unconsolidated materials too thin to mask the minor irregularities of the surface of the underlying material; 10 cm - 1m thick; commonly applied to eolian-loess veneers and colluvial veneers

### GEOMORPHOLOGICAL PROCESSES

Geomorphological processes are natural mechanisms of weathering, erosion and deposition that result in the modification of the surficial materials and landforms at the earth's surface. Unlike a qualifier (A active or I inactive) is used, all processes are assumed to be active, except for denudial processes. Up to three lower case letters may be used to indicate processes. These are listed in order of decreasing importance and placed after the surface expression symbol, following a dash (-) symbol.

Subclasses are used to provide more specific information about a general geomorphological process, and are represented by lower case letters) placed after the related process designator. Up to two subclasses can be associated with each process. Process subclasses used on this map are defined with the related process below.

### EROSIONAL PROCESSES

V - gully erosion: running water, mass movement and/or snow avalanching, resulting in the formation of parallel and sub-parallel, long, narrow ravines

### FLUVIAL PROCESSES

- B - braiding channel: active floodplain consists of many diverging and converging channels characterized by unvegetated bars
- I - irregularly sinuous channel: a clearly defined main channel displaying irregular turns and bends without repetition of similar features; backchannels may be common, and minor side channels and a few bars and islands may be present, but regular and regular meanders are absent
- J - anastomosing channel: a channel zone where channels diverge and converge around many islands. The islands are vegetated and have surfaces that are far above mean maximum discharge levels
- M - meandering channel: a clearly defined channel characterized by a regular and repeated pattern of bends with relatively uniform amplitude and wave length

### MASS MOVEMENT PROCESSES

- F - slow mass movements: slow downward movement of masses of cohesive or non-cohesive surficial material and/or bedrock by creeping, flowing or sliding
- L - mass movement with an unspecified rate
- R - rapid mass movements: rapid downward movement by falling, rolling, sliding or flowing of dry, moist or saturated debris derived from surficial material and/or bedrock

Subclasses: (b) rockfall; (c) debris flow; (g) rock creep; (s) debris slide; (u) slump on surficial material

### PERIGLACIAL PROCESSES

- C - cryoturbation: movement of surficial materials by heaving and/or churning due to frost action (repeated freezing and thawing)
  - S - soilfuction: slow gravitational downslope movement of saturated non-frozen overburden across a frozen or otherwise impermeable substrate
  - X - permafrost processes: processes controlled by the presence of permafrost, and permafrost aggradation or degradation
  - Z - general periglacial processes: soilfuction, cryoturbation and rivination, possibly occurring in a single polygon
- Subclasses: (e) thermokarst erosion; (f) thaw slides; (i) segregated ice; (j) pingo; (t) thermokarst subsidence; (l) patterned ground; (s) sheetwash; (w) ice-wedge polygons

### DEGLACIAL PROCESSES

- E - channelled by meltwater: erosion and channel formation by meltwater along, beneath, or in front of a glacier
- H - kettle: depression in surficial materials resulting from the melting of buried glacial ice
- T - ice contact: landforms that developed in contact with glacial ice such as kames

### SURFICIAL MATERIAL AGE

GLACIATION	TIME PERIOD	APPROXIMATE GLACIAL MAXIMUM	MARINE ISOTOPE STAGE
M - McConnell	late Wisconsin	15 000 years ago	2
G - Gladstone	early Wisconsin	35 000 years ago	4
R - Reid	Illinoian	130 000 years ago	6
R-R - Pre-Reid	early to middle Pleistocene	2.6 million to 200 000 years ago	8-102

### ACKNOWLEDGEMENTS

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### Yukon Geological Survey Energy, Mines and Resources Government of Yukon

### Open File 2012-1

### Surficial Geology of Selwyn River (NTS 115J/09)

### Yukon (1:50 000 scale)

### by

Jeffrey D. Bond and Panya S. Lipovsky

### MARGINAL NOTES

### INTRODUCTION

The map area spans a portion of the northern Dawson Range and is divided by the Selwyn River which flows through a narrow rock-walled canyon up to 300 m deep. The topography of the largely unglaciated region is characterized by broad ridges, convex slopes and v-shaped valleys. Ridges and summits range in elevation from 1070 to 1630 m above sea level. Upland surfaces consist primarily of loess-enriched weathered bedrock and colluvium modified by periglacial processes such as cryoturbation and soilfuction (Fig. 1). Bedrock outcrops and tons are commonly found along alpine ridges. Bedrock is also exposed along valley bottoms where spurs intersect high order valleys. Slopes are generally covered in mantles of colluvium (Fig. 2) that grade into thick loess-enriched aprons along lower slopes and valley bottoms. Steep slopes flanking the Mount Cockfield massif and within the Selwyn River canyon are subject to rock fall, landslides and debris flows.

### GLACIAL HISTORY

Isolated alpine glaciers existed on Mount Cockfield during the Pleistocene glaciations, extending both west into the headwaters of Victor and Colorado creeks and east into tributary valleys of the Selwyn River. Evidence of these glacial advances exists in the form of end moraines and alpine cirque development (Fig. 3). Pleistocene alpine glaciers also extended northeastward into the headwaters of the Selwyn River and Apex Creek from Apex Mountain, located immediately southeast of the map area. Pre-Reid glacial terraces and recessional moraines are found along Hayes Creek near Sonora Gulch (Fig. 4).

### PERMAFROST

Permafrost is widespread but discontinuous in the map area (Bond & Lipovsky, 2011). Several landforms that indicate the presence of permafrost were found in the map area, including soilfuction lobes, active-layer detachment slides, open system pingos and thermokarst ponds. Permafrost distribution and character (depth, thickness and ice content) vary widely with local scale variations in both micro- and macro-topography, surface cover and soil texture. It is commonly absent on steep south-facing slopes with bedrock outcrop and thin, coarse-grained colluvium. It is most prevalent on north-facing slopes and in valley bottoms where thick fine-grained colluvial aprons (interbedded loess, colluvium and peat) and organic veneers are located. Permafrost is most commonly found in valley bottoms and zones of groundwater convergence. Clearing or disturbance of organic cover in these areas may lead to rapid thaw and terrain destabilization.

### HEAVY MINERAL SAMPLING

Preliminary heavy mineral sampling was undertaken in Selwyn River, Sonora Gulch (Fig. 5) and east of Mount Cockfield.

Site Number	Location (UTM Zone 7, NAD 83)	Type	Results
10JB005	635457 E, 6942623 N	pan (x6)	no gold
10JB025	640538 E, 6943996 N	pan (x3)	4 very fine colours, abundant black sand
10JB026	640417 E, 6940323 N	pan (x2)	no gold
10JB027	640388 E, 6949797 N	pan (x4)	5 very fine colours + 1 small colour
10JB029	639345 E, 6938029 N	pan (x2)	no gold, minor black sand
10JB030	639611 E, 6937836 N	pan (x2)	no gold, moderate black sand
10PL073	652211 E, 6959696 N	pan (x4)	2 large colours + 6 small colours

### DATA SOURCES

This surficial geology map was interpreted from high resolution digital stereo imagery (1:40 000 scale aerial photographs flown in 1987). Selective field checking was performed in July 2010.

\*National Photo Library photographs AZ7481: 1-7, 8-89, 88-101 & 175-179; AZ7517: 63-72 & 151-153; AZ7518: 168-172 & 149-154.



Figure 1. Alpine topography on the north side of Mount Cockfield. Colluvium derived from weathered bedrock is the predominant surficial material and periglacial processes such as soilfuction are common.

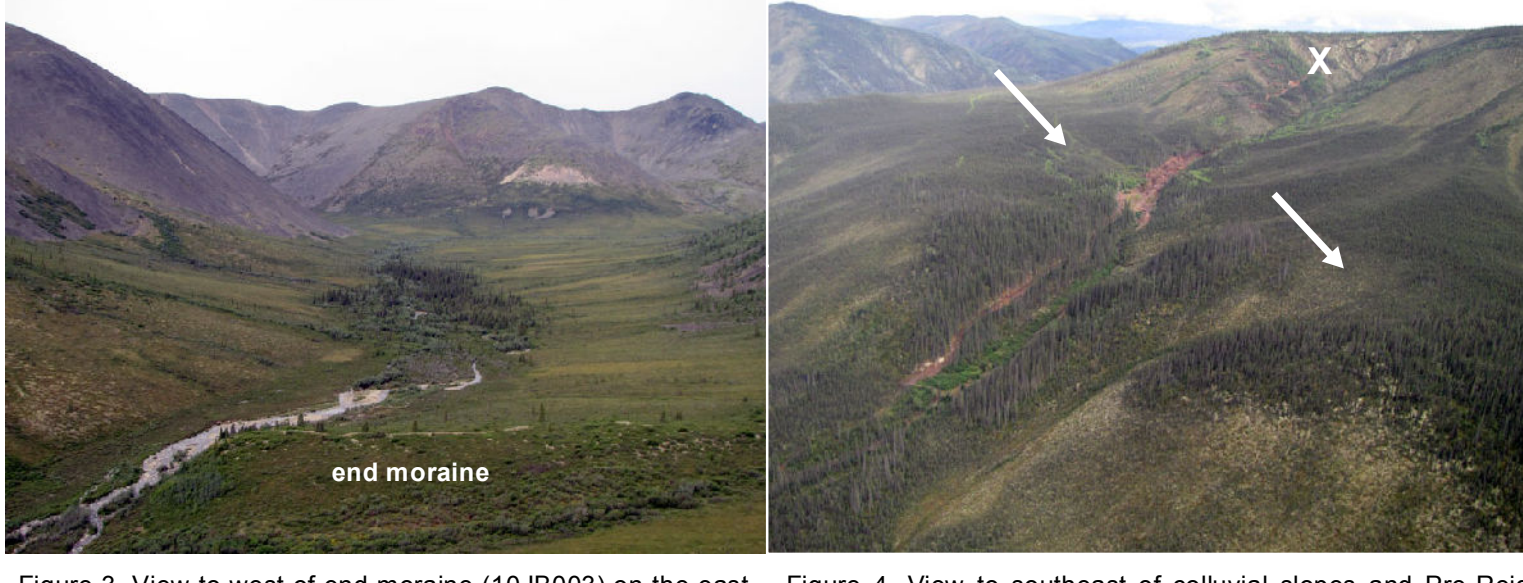


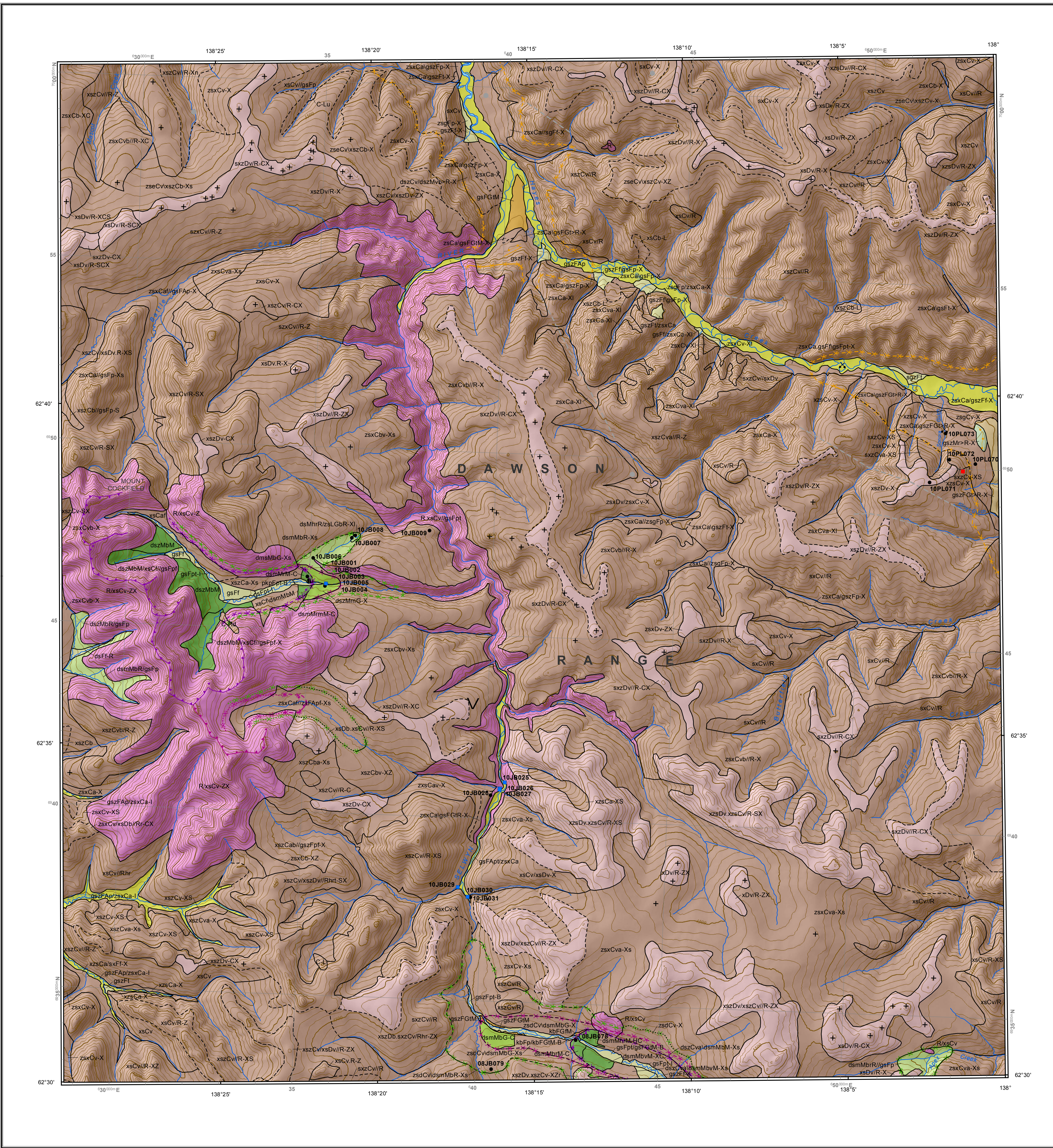
Figure 3. View to west of end moraine (10JB003) on the east side of Mount Cockfield. The moraine is estimated to be late Wisconsin-McConnell in age based on its distinct morphology.



Figure 5. Gold-bearing gravel at Sonora Gulch placer mine (10PL073).

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FIVE THOUSAND METRE GRID  
Universal Transverse Mercator Projection  
North American Datum 1983  
Zone 7

CONTOUR INTERVAL: 100 FEET  
Elevations in feet above Mean Sea Level

SURFICIAL GEOLOGY  
SELWYN RIVER  
YUKON 115J/09

SCALE 1:50 000

0 1 2 3 4 5  
kilometres

Use diagram only to obtain numerical values  
APPROXIMATE MEAN DECLINATION NOVEMBER 2011  
FOR CENTRE OF MAP

115J/15	115J/16	115J/13
BRITANNIA GREEN DEC 09M 1E 43450	CRIPPLE CREEK DEC 09M 1E 4046	BLACK BEEK DEC 09M 1E 3774
115J/10 OJ-GRAVE GREEN 09M 1E 2012-2	115J/09 SELWYN RIVER 09M 1E 2012-1 WAP 09M 1E 2012-1	115J/12 WICKLIFFENE GREEN DEC 09M 1E 3774
115J/07 MOUNT PATTON	115J/08 APEX MOUNTAIN	115J/05 PROSPECTOR MOUNTAIN DEC 09M 1E 3774