GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF ENERGY, MINES AND RESOURCES

SURFICIAL GEOLOGY AND GEOMORPHOLOGY

KOIDERN MOUNTAIN

(115K-SE)

141°00' 62°30' 140°00' 62°00'

EXPLANATION OF LANDFORM UNIT NOTATIONS

Compositional-Genetic Category + Age Modifier + Textural Modifier + Morphologic Modifier(s)

$\frac{C_{b1}}{D}$ Stratigraphic relationship given where thickness of upper unit is irregular and where underlying unit is a known compositional-genetic unit other than bedrock.

Compositional -Genetic Category[1]

- A- Alluvial Deposits: sand and gravel with veneer of fine sediment; Postglacial, rarely older; floodplain (A_p); modern.
- C- Colluvium: various materials, mainly rubble, includes landslides (C_b); undifferentiated Pleistocene in age; talus aprons(TC_a), Neoglacial, mainly modern.
- D- Drift: undifferentiated till, sand, gravel, and lacustrine sediment; Late Wisconsinan (Macauley).
- E- Eolian Deposits: sand, silt, or tephra; Postglacial.
- G- Glaciofluvial Deposits: sand and gravel with veneer of fine sediment; Late Wisconsinan (Macauley).
- I- Ice; snow and firn veneer; Neoglacial.
- L- Lacustrine Deposits: mainly silt and clay with little fine sand; Late Wisconsinan (Macauley).
- M- Morainal Deposits: till, silty/sandy, Late Wisconsinan (Macauley); ice-cored moraines and debris-covered glaciers (M/I) and rock glaciers (MR), rubble, Neoglacial.
- R- Bedrock: various types; pre-Pleistocene.

Textural Modifiers

- a- sand or gravel; M- till containing a high proportion of sand, gravel, rubble, or boulders
- b- boulders, blocks, bouldery
- c- clay, clayey
- f- silt, clay, and fine sand; commonly with high organic content
- g- gravel, gravelly
- r- rubble; predominantly sand to boulder-sized fragments
- s- sand, sandy
- v- volcanic tephra, sand or fine gravel
- x- interbedded volcanic tephra (v) and sand (s) or fines (f); overlies gravel in alluvial fans ($_sA_f$)

Age Modifier

- A- Modern
- L- Late Wisconsinan (Macauley)
- N- Neoglacial
- P- Postglacial
- 2- Early Wisconsinan or Illinoian (Mirror Creek)

CHRONOLOGY

MODERN NEOGLACIAL		
2800 years B.P.	POSTGLACIAL	
HYPSITHERMAL		
8700 years B.P.		
EARLY POSTGLACIAL		
12 500 years B.P.		
MACAULEY GLACIATION	LATE WISCONSINAN	
29 300 years B.P.		
NONGLACIAL INTERVAL(S)	EARLY WISCONSINAN or ILLINOIAN	
MIRROR CREEK GLACIATION		

Morphologic Modifiers

- a- apron
- b- blanket[2]
- c- castled outcrop
- d- delta
- f- fan
- h- hummocky
- m- undulating, rolling
- p- plain, floodplain
- r- ridge, ridged
- s- steep slope (greater than 35°) cliff
- t- terrace, terraced
- v- veneer[3]
- 1- gentle to moderate slope (5-15°)
- 2- moderate to steep slope (15-35°)

[1] General descriptions of texture and age are given for each category; only where texture and age differ from the general description are texture and age modifiers used.

[2] Blanket indicates category forms nearly continuous cover greater than 1 m thick, generally 0.5 to 3 m thick, over underlying unit.

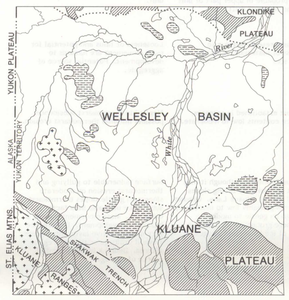
[3] Veneer indicates category forms broken thin cover, usually less than 1 m thick, but averaging 0.5 m thick, over underlying unit.

Geological boundary (defined, approximate, assumed)
Drumlin, fluted till
Rock drumlin, crag and tail, fluted bedrock
Glacially scoured bedrock hillock
Esker
Kame
Kame terrace
Pits (kettle holes)
Morainic ridges; Early Wisconsinan(?), Late Wisconsinan, Neoglacial
Lake strandline; Early Wisconsinan(?), Late Wisconsinan, Neoglacial
Meltwater channel; Early Wisconsinan(?), Late Wisconsinan, Neoglacial
Stratigraphic section (A1)

Note: Symbols in red may form geological boundaries.

Rock glacier (MR)
Altiplanation terrace
Pingo
Thermokarst depression
Castled bedrock outcrop
Bedrock outcrop
Organic deposit
Landslide
Landslide scar
Stream-trimmed scarp (unconsolidated material, bedrock in part) Postglacial, Late Wisconsinan
Stream-trimmed scarp Modern (unconsolidated material, bedrock in part)
Stream-cut ravines and canyons (unconsolidated material, bedrock in part) Postglacial, Late Wisconsinan
Stream-cut ravines and canyons, modern (unconsolidated material, bedrock in part)

PHYSIOGRAPHY



VALLEY or BASIN (DEPRESSION) – Low-lying land bordered by higher ground; flat, smooth, or gently undulating terrain with few surface irregularities.

PLATEAU- Land standing well above valleys but below elevation of nearby mountains; flat, smooth, gently sloping to moderately hilly terrain; in places dissected by valleys, but major part of surface is near summit level.

HILLS - Prominences that rise above surrounding terrain; relief less than 350 m; rounded summits.

MOUNTAINS - Prominences that rise above surrounding terrain; relief more than 350 m; have restrictive summit area and steep slopes.

BOUNDARIES
- Between physiographic systems.
- Between major physiographic subdivisions.
- Delineating minor physiographic subdivisions.
- Between physiographic elements.

INDEX MAP

DESCRIPTIVE NOTES

Wellesley Basin is a broad, flat to gently sloping depression with some hills, ridges, and mountains scattered on its surface. Streams generally are incised to between 15 and 30 m. The basin floor is poorly to moderately well drained with an irregular drainage pattern. White River is a broad stream that crosses Wellesley Basin carrying mainly glacial meltwater and sediment from the Icefield Ranges north to Yukon River. Klondike Plateau, whose long, interconnected, smooth-topped ridge crests rise 300 m above Wellesley Basin, marks the northern edge of Wellesley Basin[1,2]; valleys within Klondike Plateau merge imperceptibly with Wellesley Basin. Southeast of Wellesley Basin, Kluane Plateau slopes gradually up to elevations of 1730 m. Kluane Plateau consists of an upper surface of rounded peaks connected by broad, undulating ridges that are dissected by broad, interconnected valleys. Relief in the northwestern part of Kluane Plateau ranges between 450 and 920 m with well drained uplands and imperfectly drained valleys. The physiographic units described above are underlain by metamorphic rocks of Precambrian or Paleozoic age that have been intruded by granitic rocks of Mesozoic age[2]. Some Tertiary volcanic rocks are present southeast of Fish Hole Lake.

"The Shakwak Valley is a large trench-like valley that separates the St. Elias Mountains from the Yukon Plateau"[1,2]. Except for gaps formed by major stream valleys and a common boundary with Wellesley Basin, Shakwak Trench is bounded by steep escarpments up to 800 m high on its southwestern edge and 600 m high on its northeastern edge west of White River. Drainage is poorly developed in broader parts of Shakwak Trench. Shakwak Trench is a physiographic expression of the Denali Fault system along which late Tertiary, and probably Pleistocene, faulting has occurred"[1,5].

The Kluane Ranges (Nutzotin Mountains) are characterized by steep slopes and serrated, narrow ridges and peaks, which rise 730 to 900 m above intervening valleys. Basically, the Kluane Ranges consist of two parallel ridges. Part of the northern ridge, which is known as Miles Range, is a gently rolling plateau surface[1]. Beaver Creek valley crosses the general northwest-southeast structural and geomorphic grain of the Kluane Ranges. The Kluane Ranges consist mainly of Paleozoic metamorphosed volcanic and sedimentary rocks; one ultramafic intrusive is present[2].

The area lies within the zone of widespread permafrost[6,7]; permafrost is probably more than 30 m thick throughout most of the area[3]. Open taliks probably are present under large lakes and stream channels, e.g. White River, Beaver Creek. In fine grained sediments and peat, ground ice is present in the form of ice lenses, veinlets, and ice wedges; the latter commonly is indicated by the presence of polygonal ground. Ice wedges also may be present in colluvium and morainal deposits, even though they are not marked by obvious surface expression[3]. Some lakes, especially shallow flat-bottomed lakes, in peat and fine grained sediments have thermokarst origins.

The plateau forming Miles Ridge and Gates Ridge appears to be part of an erosion surface or sediment that formed between Paleocene or Eocene time and Pliocene or early Pleistocene time[2]. Late Cenozoic tectonism and stream dissection have resulted in this surface being elevated above present stream levels.

During the Pleistocene periglacial processes continually have affected the terrain, especially at higher elevations. Altiplanation terraces and tors on ridges at high elevations are confined mainly to the unglaciated parts of Kluane Plateau[2,3]. Solifluction lobes and sorted stripes, steps, and polygons commonly are present at higher elevations and indicate frost creep and sporadic active solifluction. On silt-mantled slopes, water flowing over permafrost occasionally transports silt downslope[3]. The presence of permafrost has allowed peat to accumulate on most flat, poorly drained surfaces, even some underlain by sand or gravel.

Wellesley Basin and surrounding area have been glaciated twice during the late Pleistocene: the most extension glaciation, the Mirror Creek glaciation, likely is early Wisconsinan in age, whereas the least extensive glaciation, the Macauley glaciation, is late Wisconsinan[2,3,8]. The Mirror Creek glacial limit usually stands about 150 m above the Macauley limit on most hillsides; the Macauley limit drops from 1130 m elevation near Koidern Mountain to 760 m just north of Snag. During both glaciations the glaciers flowed northwest along Shakwak Trench and then spread out over Wellesley Basin in a spatulate manner; Sanpete Hill, Eikland Mountain, Macauley Ridge, and much of the high terrain near Koidern Mountain stood as nunataks above the ice. During the glacial maximum, drainage was diverted along the southeastern edge of the ice around the Koidern Mountain complex east towards Donjek River,and along the southwestern edge through Shakwak Trench west towards Beaver Creek.

Southwest of Shakwak Trench, only the limit of the Mirror Creek glaciation can be traced along Beaver Creek valley; during the Macauley glaciation, only local valley glaciers were present in this part of the Kluane Ranges. A few patches of drift and erratics are present above the Mirror Creek limit and are thought to be related to an early Pleistocene or late Tertiary glaciation[2].

During the Mirror Creek and Macauley glaciations, large amounts of sediment were carried by Beaver Creek into Wellesley Basin to form the broad outwash plain of Beaver Creek. During the waning stage of the Macauley glaciation many broad pitted outwash plains and disintegration moraines were constructed in Wellesley Basin. During one stage of deglaciation, drainage was diverted north from White River and Sanpete Creek along Dry Creek, and a canyon was cut from Shakwak Trench north to Deadman Hill along the course of Dry Creek. A temporary lake also formed in the headwaters of Dry Creek.

Immediately following the Macauley deglaciation streams began to incise, and colluvium and drift clogging tributary valleys were redeposited in the alluvial fans that are present at the mouths of most high-gradient valleys. Peat has continued to accumulate on most flat, poorly drained areas during Postglacial time.

During both glaciations large amounts of silt were blown off the wide expanses of outwash. Loess deposited during the Mirror Creek glaciation on unglaciated terrain and on Mirror Creek drift generally has been redeposited in depressions and at the base of slopes[2,11,9,11]. Macauley loess is generally thickest near large outwash plains, e.g. on the northern end of Macauley Ridge.

During the Neoglacial, a number of rock glaciers developed at the base of steep, north-facing walls and cirques near Mount Doyle.

At numerous localities throughout the lowlands, older till and outwash and nonglacial deposits such as landslide debris, alluvium, and lacustrine sediments underlie Macauley till and outwash. These lower sediments were deposited during the Mirror Creek or earlier glaciations and during pre-Macauley nonglacial intervals[2,9,11].

Obvious hazards to development are the constantly shifting braided channels on the White River floodplains; flooding on floodplains and low terraces adjacent to all streams; bank erosion along incised streams; aufeis on floodplains and icings on slopes; thermokarst subsidence in flat, low-lying areas underlain by icy organic or icy fine grained sediments; shallow slope failures and flows on moderately steep slopes blanketed by medium to fine textured sediments; and rock falls under steep rocky cliffs. Penetration through the permafrost layer in low areas may intercept water under artesian pressure at the base of the permafrost.

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SECTION DESCRIPTIONS

- A1: Peat (2 m) / Gravel and sand (2-9 m) / Till (0-12 m) / Gravel (2-3 m) / Peat (0-1 m) / Till and landslide debris (5 m) (Composite section)
- A2: Cover (1 m) / Diamicton (till?) (2.5 m) / Gravel (12 m) / Till (5 m) / Covered to river
- A3: Peat, silty (0.7 m) / Till (2 m) / Covered (till?) to river
- A4: Gravel, clayey (till?), few organics (1.5 m) / Gravel, silty, sandy? (4.6+m)
- A5: Peat (4 m) / Gravel, sandy (2+m)
- A6: Sand, silty (1 m) / Gravel, sandy
- A7: Moss (0.1 m) / Sand, silty (0.2 m) / Gravel
- A8: Peat (0.2 m) / Silt, sandy (0.2 m) / Till
- A9: Peat (0.1 m) / Silt (0.2m) / Gravel
- A10: Gravel, silty, sandy (till?) (3 m) / Gravel, sandy (3.7+m)
- A11: Peat (0.1 m) / Silt (0.3 m) / Gravel
- A12: Gravel, pebbly, silty (till?) (2.1 m) / Gravel, sandy (3+m)
- B1: Covered / Till (6 m) / Gravel (0-2 m) / Sand, fine, silt, clay (2.7 m) / Covered (19 m)
- B2: Till (6 m) / Gravel (30+m) / Covered (30 m)
- B3: Till (9.6 m) / Gravel
- B4: Covered (till?) / Gravel (3 m) / Sand and silt (21.4 m) / Gravel (1.8 m)
- C1: Covered / Gravel (9+m) / Till / Covered
- C2: Silt (0.2 m) / Gravel, silty (0.1 m) / Gravel; calcic horizon at top (0.3+m)
- D1: Peat, woody (2.1+m)
- D2: Organic (14.2 m) / Silt (0.1+m)
- D3: Peat (5 m) / Silt (0.2 m) / Gravel, oxidized (0.4 m) / Gravel (1.0+m) / Covered
- D4: Peat (1.3+m)
- D5: Turf and peat, silty (0.1 m) / Silt (0.5 m) / Silt, peaty layers (2.1+m)
- D6: Humus (6 m) / Silt (0.2 m) / Till (2+m)
- D7: Peat with active layer of 0.4 m
- D8: Silt (1.2 m) / Gravel
- D9: Covered (0.6 m) / Till (1.8 m) / Gravel (10.7+m) / Covered (24 m)
- D10: Peat (0.1 m) / Sand (0.5+m) Active layer (0.6 m)
- D11: Silt, organic (0.3 m) / Gravel
- D12: Peat and silt (0.2 m) / Silt (0.4+m) Active layer (0.6 m)
- D13: Peat (7 cm) / Silt (15 cm) / Gravel, silty(15 cm) / Gravel
- D14: Silt (0.6-1.2 m) / Gravel
- D15: Peat (0.8 m) / silt (0.3-0.9 m) / Gravel and sand
- D16: Peat (0.2 m) / silt, pebbly (0.3 m) / Gravel (0.1+m)
- D17: Silt and sand, organic lenses (2.1+m)
- D18: Clay, sandy, silty, moderately icy (1.8 m) / Sand, silty, moderately icy (4 m) / Gravel, sandy (2.4+m)

Geology by V.N. Rampton 1977.

Base maps at the 1:50 000 scale published by the Surveys and Mapping Branch.

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Approximate magnetic declination 1979 30°15.5' East, decreasing 1.3' annually.

Elevations in feet above mean sea-level.

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MAP 5-1978

SURFICIAL GEOLOGY AND GEOMORPHOLOGY

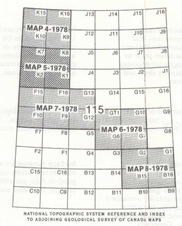
KOIDERN MOUNTAIN

YUKON TERRITORY

Scale 1:100 000

Kilometres 2 0 2 4 6 8 Kilometres
Miles 2 0 2 4 Miles

Universal Transverse Mercator Projection



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MAP 5-1978
KOIDERN MOUNTAIN
YUKON TERRITORY