MARGINAL NOTES

INTRODUCTION

The Gladstone Creek map area covers the central Ruby Range. This part of the Ruby Range is characterized by rugged peaks up to 2200 m, and broad undulating plateaus above 1500 m, drained by deep U-shaped valleys running roughly east-west through the map area. The majority of the map area drains west into Kluane Lake via Gladstone Creek in the south, and Raft Creek in the north. Isaac Creek and Albert Creek drain the east margin of the map area (Fig. 1). Thick deposits of till, glaciolacustrine, and glaciofluvial sediments occur in valley bottoms. Steep slopes through these sediments are modern creeks, exposing thick stratigraphic sequences (Fig. 2). All but the gentlest slopes are covered by colluvium derived from weathered bedrock and till. The highest surfaces are composed of bedrock, or weathered bedrock where slopes are more stable (Fig. 3).

GLACIAL HISTORY

Stratigraphy in Gladstone Creek indicates at least three advances of the Cordilleran Ice Sheet's (CIS) St Elias Lobe entering the map area from the west. As ice advanced eastward up Gladstone and Raft creeks, the creeks were blocked, flooding the valleys and depositing thick glaciolacustrine sequences. As the glaciers receded glaciofluvial outwash plains were deposited where meltwater could flow freely (Figs. 4 & 5). Glacial features and limits have been identified from only two valleys, Raft Creek and Gladstone Creek, but these valleys are the only valleys in the map area that have been investigated for glacial deposits. Bond (in prep., 2007), as the most extensive limit has been mapped as MIS 4. However, this limit may be a composite of MIS 6 - Reid and MIS 4 glaciations, which could not be differentiated due to similar extents of glaciation, as observed immediately north of the map area (Bond and Lipovsky, 2009). A high degree of landform degradation from periglacial processes on the steep slopes and higher elevations surfaces common in the map area adds further difficulty to differentiation. Alternatively, the MIS 4 advance may have been more extensive than the MIS 6, removing evidence of prior glaciation.

Many of the higher peaks in the map area have well-developed cirques on their northern aspects which produced significant ice (Fig. 6). A late MIS 2 advance out of cirques in Raft Creek was dated to 13.8 ± 0.9 ka. The ice from these cirques appears to have coalesced with ice from the CIS in Gladstone valley during earlier advances (Bond, 2007). The ice from the CIS in Gladstone valley was at least 1000 m thick during the maximum extent of the last glaciation, and ice from the CIS flowed down into trunk valleys such as those at Gladstone and Alpine creeks. This may have contributed to the extent of CIS advance up Gladstone Creek. Many of these upland surfaces, which should have been glaciated based on mapped glacial limits, are devoid of till and erratics; this could be the result of cold-based ice or obscuring from periglacial processes (Figs. 7 & 8).

GEOMORPHIC PROCESSES

Rockfall is common on the steep slopes of the Ruby Range. McConnell-age cirques and over-deepened valley walls are common source areas, often accumulating large talus cones and aprons below. Rock slides occur in many of the talus aprons, as indicated by hummocks and debris flows occur throughout the study area in unconsolidated sediments where slopes are sufficiently steep. Debris flows commonly initiate as active layer detachments where permafrost is present. Solifluction is common on slopes above 1200 m.

PERMAFROST

Most of the study area is underlain by permafrost. Only steep, southerly aspects below 1000 m are likely to be permafrost free. Massive ice was observed in cut bank sediments in high alpine valleys and in active layer detachment scars on a colluvial apron on the left limit of Gladstone Creek (northern aspect) below the confluence with Cyr Creek. Isolated open-system pingos occur locally near valley bottoms. Permafrost is typically deeper in areas of coarse-grained materials such as glacial fluvial terraces (Fig. 4) or blocky colluvium. Fine-grained glaciolacustrine or basal till deposits are typically poorly drained, accumulate organics, and have a shallow active layer. Stopersaik is common on these slopes, particularly in the lower reaches of Gladstone and Raft creeks. Active and relict rock glaciers are commonly found in high elevation cirques with northerly or easterly aspects.

PLACER MINING AND GEOLOGY

Gladstone Creek has been mined since the 1910s (Cairnes, 1915). The lower reaches of Gladstone Creek and Cyr Creek are currently mined by TC Exploration Inc. Placer deposits are hosted in Holocene fluvial sediments (Fieldwork, 2009). Placer gold is derived from the Ruby Range bedrock. Pre-Reid glaciations may have introduced gold from distal sources. Placer gold is coarser immediately below the mouth of Cyr Creek suggesting a local gold source. Multiple gold-bearing gravel units are present throughout Gladstone valley. These units are typically coarse, imbricated to chaotically bedded boulder-cobble gravels with variable amounts of silty-sand matrix. Economic gold deposits are typically concentrated on bedrock and false bedrock surfaces (basal till, cemented paleosurfaces).

Figure 1 – McConnell age moraines (M) (arrows) in Albert Creek produced by advances from local cirques and ice caps. This series of nested moraines extends down valley for several kilometres. Colluvium (C) covers the slopes across the valley. Site GLD-233.

Figure 2 – Thick Quaternary deposits in lower Gladstone Creek valley. The sections are exposed by Holocene fluvial erosion and placer mining. Stratigraphy is shown in section GLD-02. Truck circled for scale.

Figure 3 – Blocky felsenmeer common to many upland surfaces in the Ruby Range. These surfaces take tens of thousands of years to develop in intense periglacial conditions. Felsenmeer is mapped as weathered bedrock (D). Site GLD-119.

Figure 4 – McConnell glacial fluvial (FG) terrace formed of sand and gravel at the northeastern end of the lowest Gladstone Lake. This outwash terrace was deposited as the ice margin receded west at the end of the McConnell glaciation. Sand dunes (eEfv), at the crest of the terrace, are forming due to modern aeolian processes. Site GLD-108.

Figure 5 - Kettled outwash plain (FGp-H) at the mouth of Gladstone Creek on the eastern margin of Kluane Lake. These outwash gravels formed as the St Elias Lobe receded south down the Shakwak trench. These gravels are underlain by McConnell till (M). Section GLD-06 is located on this exposure.

Figure 6 - Well-developed cirque complex in upper Rockslide Creek. Ice from these cirques may have coalesced with the CIS. The cirques are now filled with large colluvial cones built by persistent rockfall (eCc-R5). Site GLD-236.

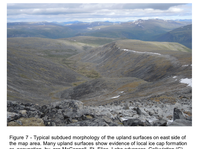

Figure 7 - Typical subdued morphology of the upland surfaces on east side of the map area. Many upland surfaces show evidence of local ice cap formation or, occupation by McConnell (M) or Reid (R) age advances. Colluvium (C) occurs on all but the gentlest slopes. Site GLD-106.

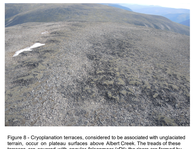

Figure 8 - Cryoplanation terraces, considered to be associated with unglaciated terrain, occur on plateau surfaces above Albert Creek. The treads of these terraces are mantled by colluvium (C), felsenmeer (eD), the risers are formed by bedrock (R) outcrops. Site BCW13.

SELECTED REFERENCES

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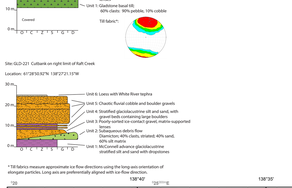
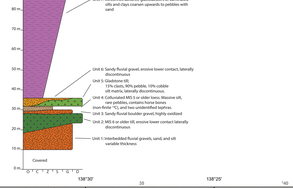
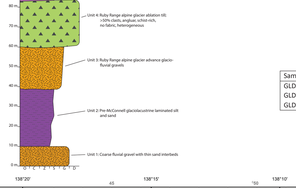
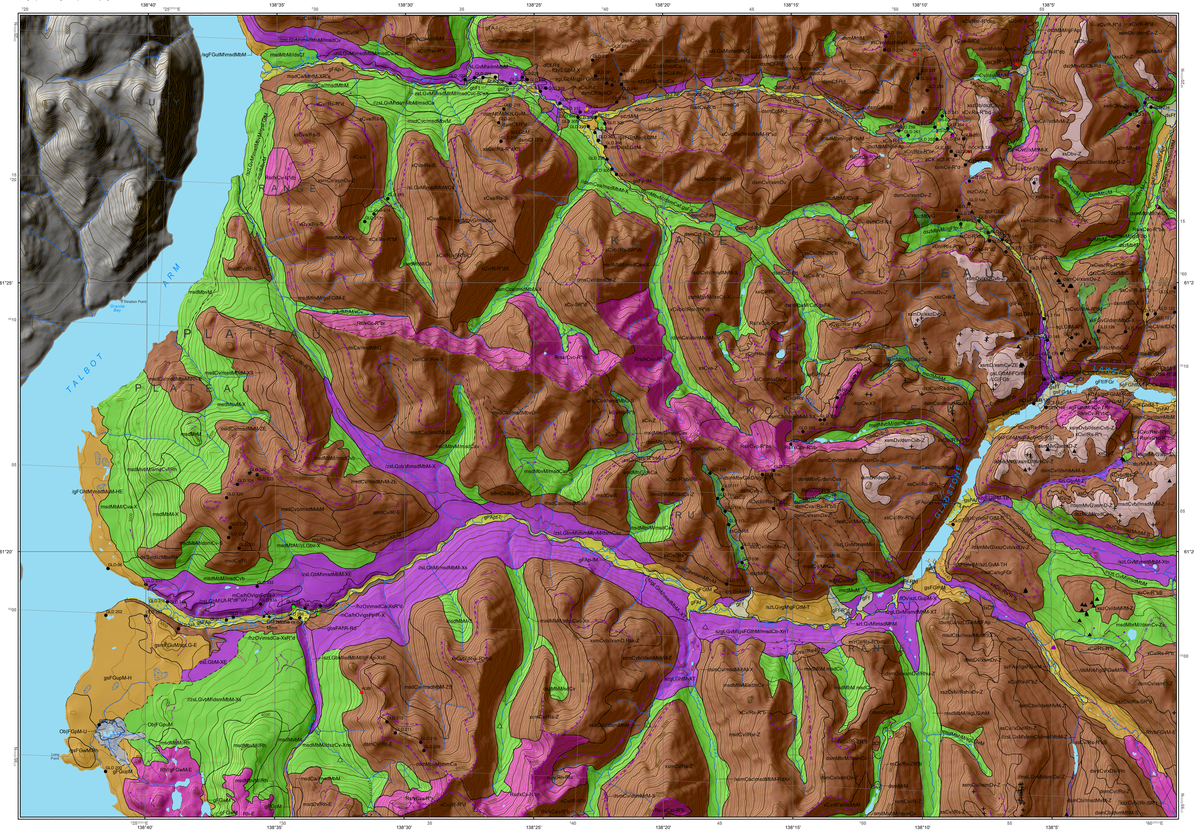
STRATIGRAPHIC SECTIONS









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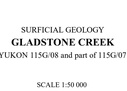
FIVE THOUSAND METRE GRID
Universal Transverse Mercator Projection
North American Datum 1983
Zone 7

CONTOUR INTERVAL 100 FEET
Elevations in feet above Mean Sea Level

SURFICIAL GEOLOGY
GLADSTONE CREEK
YUKON 115G/08 and part of 115G/07

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

115G/10 SERPENTHEAD LAKE	115G/09 TALBOT CREEK	115H/12 ALBERT CREEK
115G/07 BURNISH LANDING	115G/08 GLADSTONE CREEK map location	115H/05 SEKULMUN CREEK
115G/02 CONGDON CREEK	115G/01 CULTUS CREEK	115H/04 MCKINLEY CREEK

TERRAIN CLASSIFICATION SYSTEM

This surficial geology map was classified using the Terrain Classification System for British Columbia (Howes and Kenk, 1997), with minor modification to meet standards set by the Yukon Geological Survey. For example, we have added some permafrost process modifiers and modified the glacial process modifiers to better reflect terrain 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 form the core of the polygon map unit labels and are symbolized with a single upper case letter. Lower case textures 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 designator if a glacial genetic modified material. Age is indicated by a subscript letter to the right of the surface expression but precedes the process modifiers. Geomorphological processes (capital letters) and subclasses (lower case letters) always follow a dash symbol ("-").

sgFGpIM-Xs*
GEOMORPHOLOGICAL PROCESS(ES) (-X = permafrost)
SUBCLASS(ES) (s = sheetflow)
AGE (M = McConnell)
SURFACE EXPRESSION (pl = plain, terrace)
QUALIFIER (G = glacial; A = active; or I = inactive)
SURFICIAL MATERIAL (F = fluvial)
TEXTURE (