# Preliminary report on the bedrock geology of the Long Lake and Moraine Lake areas, southwestern Yukon (NTS 115A/15 and 115H/2 and 7)

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## ABSTRACT

Recent bedrock mapping by the Yukon Geological Survey in Long Lake and Moraine Lake areas in southwestern Yukon fills the gap in similar mapping projects that were completed in the Aishihik Lake area and the region south of the Alaska Highway to the British Columbia border. This project focuses on the geological relationships and the regional mineral potential of the Yukon-Tanana terrane, the Kluane schist, and the intrusive suites found in the area.

The Yukon-Tanana terrane is characterized by strongly deformed and metamorphosed siliciclastic and volcanic rocks of probable Late Proterozoic to Devonian age. These are intruded by several generations of plutonic rocks that exhibit a variable state of deformation and metamorphism. Gneissic rocks that are structurally interleaved with the Yukon-Tanana terrane are likely Mississippian and Permian in age. Relatively undeformed Early Jurassic Long Lake and Paleocene Ruby Range suites intrude the structural top and base, respectively, of the Yukon-Tanana terrane. Both these suites overprint ductile deformation within the Yukon-Tanana terrane but are deformed by brittle faults.

Several mineral occurrences are documented within the project area, and all are related to Late Cretaceous intrusions of the Casino suite. In the project area, this suite is characterized by highly magnetic, granodiorite and quartz-diorite plutons and porphyritic dikes. Skarn and porphyry mineralization that is associated with these intrusions are part of a much larger and significant regional metallogenic belt that encompasses an area from north of the Dawson Range, south to the Alaska Highway.

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## INTRODUCTION

This paper presents data collected in the summers of 2015 and 2016 under the 'Coast Belt' project of the Yukon Geological Survey. The project area is located in southwestern Yukon northeast of the town of Haines Junction (Fig. 1). The goals of this project were to investigate the relationships between several geologic entities in southwest Yukon and to determine the regional mineral potential through 1:50 000-scale bedrock mapping.

The 2015 and 2016 projects were focussed on mapping rocks of the Yukon-Tanana terrane, the Long Lake and Ruby Range suites, and the Kluane schist found within parts of NTS 115A/15 and NTS 115H/2 and 7 (Fig. 1). Prior to this project, only regional, reconnaissance-scale mapping by the Geological Survey of Canada had been completed; minor areas were covered by more detailed 1:50 000-scale mapping (Kindle, 1952; Tempelman-Kluit, 1974; Johnston and Timmerman, 1994).

The bedrock exposure in the study area is variable, having abundant outcrop within the mountainous regions, but very little exposure observed in the intervening valleys. The western part of the map area is accessed by the Aishihik Lake Road, a well-maintained gravel road (Fig. 1). The rest of the study area is accessed by helicopter or by long hikes along existing ATV and hiking trails.

## REGIONAL GEOLOGY

Based upon regional foliation and folds, a northeast-dipping tectonic stacking of terranes and assemblages is interpreted to characterize the geology of southwestern Yukon (Johnston and Canil, 2006; Israel *et al.*, 2011). From northeast to southwest, the stacking of terranes occurs as follows: the Stikine terrane, the Yukon-Tanana terrane and the Kluane schist (Fig. 1). The age of this tectonic stacking in not well constrained but is likely the result of at least two phases of large-scale compression, initially developing in the Latest Triassic to Earliest Jurassic and again in the Late Cretaceous. These tectonic elements were separated from the Insular terranes to the southwest (Wrangellia and Alexander terranes) by dextral strike-slip motion along the Denali fault (Fig. 1). As much as 400 km of displacement is thought to have occurred along this fault in the Tertiary (Lowey, 1998).

The metamorphic rocks of the Yukon-Tanana terrane extend to the west and northwest of the project area and continue to the south into British Columbia (Fig. 1). West and northwest of the mapped area, the Yukon-Tanana terrane includes Proterozoic to Devonian schist and marble of the Snowcap assemblage interlayered with Devonian to Mississippian carbonaceous schist, marble and metavolcanic rock of the Finlayson assemblage (Murphy *et al.*, 2009; Israel and Westberg, 2011). Mississippian and Permian metaplutonic rocks are structurally interleaved with the Yukon-Tanana terrane country rocks and have been correlated with the Simpson Range and Sulphur Creek suites respectively. South of the project area, Yukon-Tanana rocks continue to outcrop, mainly as large roof pendants in the Ruby Range suite (Bordet *et al.*, 2015). The Kluane schist occupies a position north of the Denali fault, and south and west of the Yukon-Tanana terrane (Fig. 1). The schist has been interpreted as a basinal marine succession that was deposited during exhumation and erosion of the Yukon-Tanana terrane, and Jurassic and mid-Cretaceous intrusions contained within (Israel *et al.*, 2011). The age of this deposition is constrained by mid-Cretaceous (~94 Ma) detrital zircons found within the schist. Significant deformation and metamorphism occurred shortly after deposition (*ca.* 82 Ma), likely a consequence of deep burial underneath the Yukon-Tanana terrane during southwest-directed thrusting (Israel *et al.*, 2011).

The Long Lake suite forms extensive outcrops in southwestern Yukon where it comprises the Aishihik batholith and smaller plutons that range in age from 192-178 Ma (Joyce *et al.*, 2016). Rocks of the Long Lake suite intrude along and across the boundary between the Stikine and Yukon-Tanana terranes. They are interpreted to have intruded at moderate depths (10-12 km) and have an overall sheet-like geometry, dipping east-northeast (Joyce *et al.*, 2016; Topham *et al.*, 2016). Johnston and Erdmer (1995) argued for syn-deformational intrusion of the Long Lake suite based on the foliated to gneissic character of the margins. However, new observations and geochronological analyses suggest that the deformed part of the suite is older (~350 Ma) and that the main phase of the Long Lake suite crosscuts the fabrics at the margin (Joyce *et al.*, 2016). Some foliation is developed within the Long Lake suite, but is more likely a flow foliation rather than a solid-state fabric.

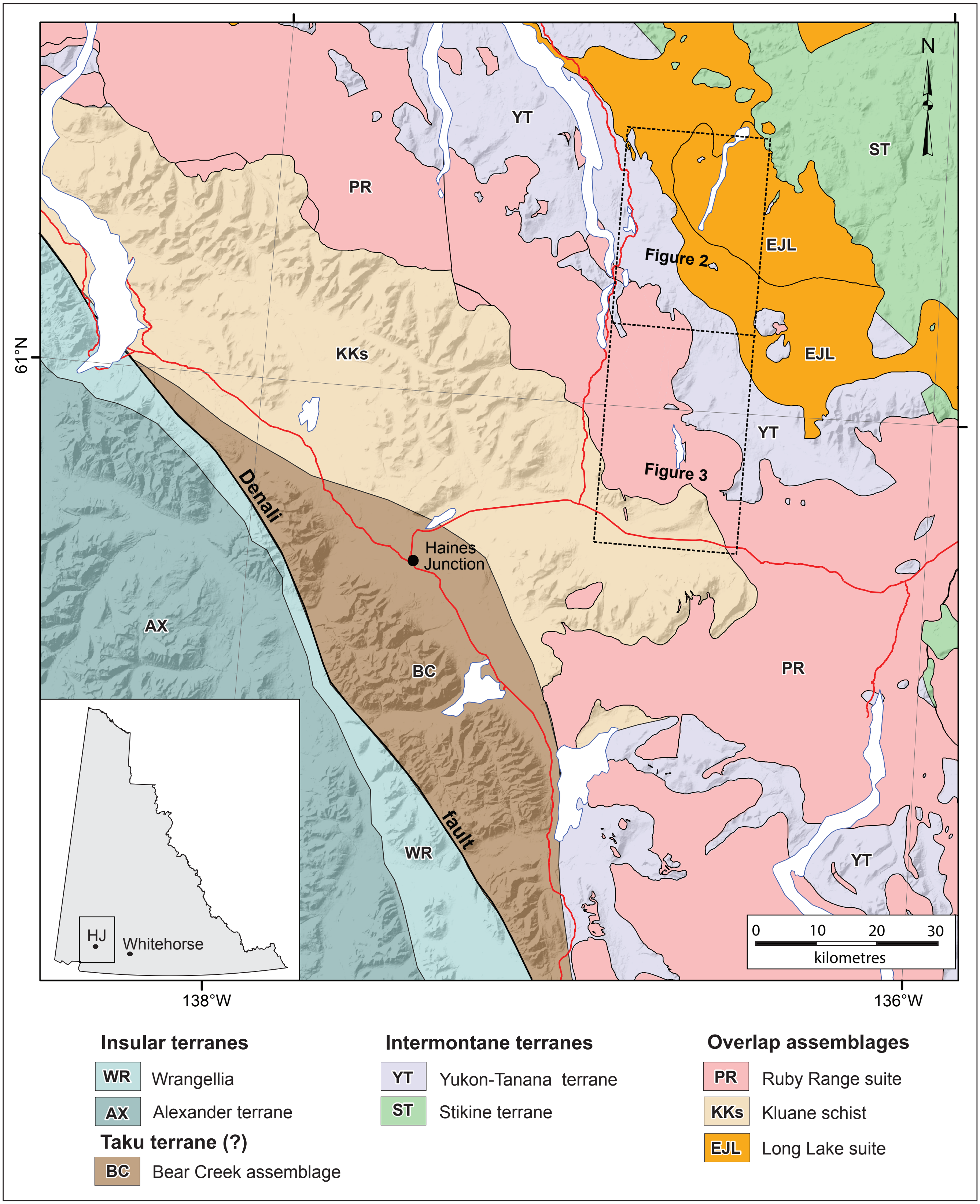


***Figure 1.*** *Tectonic assemblage map of southwestern Yukon with Early Jurassic and Paleocene plutonic rocks shown. Location of study area and Figures 1 and 2 indicated by dashed boxes. Inset map shows location of study area in Yukon. HJ=Haines Junction.*

The Ruby Range suite is also widely observed in southwestern Yukon. The suite comprises a northwest-trending batholith that extends from northern British Columbia to the northwest where it is cut off by the Denali fault near the Yukon/Alaska border. Unlike the Long Lake suite which intrudes the upper structural boundary of the Yukon-Tanana terrane, the Ruby Range batholith intrudes the base of the Yukon-Tanana (Fig. 1). Strongly foliated to gneissic rocks define much of the structural base of the Ruby Range suite and also correspond to its oldest ages (*ca.* 64 Ma). These rocks are crosscut by more massive phases (~62-57 Ma) that comprise the bulk (90%) of the suite.

# LITHOLOGY

The project area encompasses parts of three 1:50 000-scale map sheets and covers rocks of the Kluane schist in the south, and extends north through the Ruby Range suite, the Yukon-Tanana terrane and the Long Lake suite (Figs. 2, 3 and 4). Below we describe the lithologic character of each of these and other units observed during mapping.

## YUKON-TANANA TERRANE

### *Snowcap Assemblage*

Rocks of the Yukon-Tanana terrane in the project area are assigned to the Proterozoic to Devonian Snowcap assemblage as defined by Colpron *et al.* (2006a). Rocks of the Yukon-Tanana terrane are intruded by the Long Lake suite in the north and northwest, and by the Ruby Range suite in the south and southwest (Figs., 2, 3 and 4). The Snowcap assemblage has undergone upper greenschist to amphibolite facies metamorphism and displays evidence for several generations of ductile and brittle deformation. It is dominated by siliciclastic rocks, including psammitic schist, quartzite and minor carbonaceous schist. Psammitic schist (PDSs) is composed of quartz, biotite and feldspar, and the amount of biotite varies from <10% to 60% (Fig. 5a). The schist commonly weathers beige to grey depending on the amount of biotite present. Quartzite is common in the psammitic schist and is found in thin layers (~10 cm) and bands up to several metres thick. The quartzite can contain minor amounts of either biotite or muscovite and generally weathers light grey to white. Locally, very dark grey quartzite bands are found interlayered with a slight to moderately carbonaceous phyllite to schist (PDScs; Fig. 5b). The carbonaceous horizons are generally less than one metre thick and more often just a few centimetres thick, but together with the dark grey quartzite can form outcrops up to 100 m thick in places. Overall, these rocks are not a significant part of the Snowcap assemblage in the project area, but are notable as they can be traced for several hundred metres along strike.

Marble and calc-silicate schist are common and in the case of the marble, can be mapped over an extensive region. White to cream-coloured marble (PDSc) outcrops throughout the entire project area and can be found as thin, centimetre to metre-scale interlayers within the siliciclastic rocks, and as thick bands several tens of metres thick that can be traced over several kilometres (Fig. 5c). Skarn is commonly developed within the marble when in close proximity to intrusive bodies. The skarn is characterized by diopside, garnet and epidote, and in several areas include pyrite, chalcopyrite, molybdenite and malachite. Calc-silicate schist (PDSsc) is observed as thin layers (10-20 cm) within psammitic schist and thicker layers (1-5 m) near marble horizons. It outcrops extensively in the northern part of the project area, around the Hopper pluton, and makes up a minor component of the mapped marble horizons in the southern part of the map area (Figs. 2 and 3). The calc-silicate is often light grey to creamy brown in colour and composed of quartz, diopside, epidote and calcite (Fig. 5d).

Commonly interlayered with marble are horizons of amphibolite, greenstone and locally chlorite schist (PDSa). The layers of amphibolite range from <50 cm up to several metres in thickness, are dark green to black in colour and are commonly garnet bearing (Fig. 5e). Layers of amphibolite are also found within the psammitic schist, especially in the central and southern parts of the mapped area (Figs. 2 and 3). In these areas, the rock has a more gneissic texture, showing a compositional layering with plagioclase and minor quartz making up leucocratic layers within a dominantly amphibole composition (Fig. 5f). Where the gneissic amphibolite is thickest, it is frequently associated with granodioritic orthogneiss (MPgn; Fig. 6a). The orthogneiss can be up to several hundred metres thick and commonly has augens of potassium feldspar between 1 and 3 cm in length. The age of the orthogneiss is not known, but similar gneiss found elsewhere in the Snowcap assemblage are Mississippian in age and are assigned to the Simpson Range suite (Colpron *et al.*, 2006b). Likewise, the age of the amphibolite is not well constrained. The gneissic-textured amphibolite is intimately related to the orthogneiss and therefore is likely the same age. The age of the garnet-bearing amphibolite and more schistose amphibolite is likely Proterozoic to Devonian.

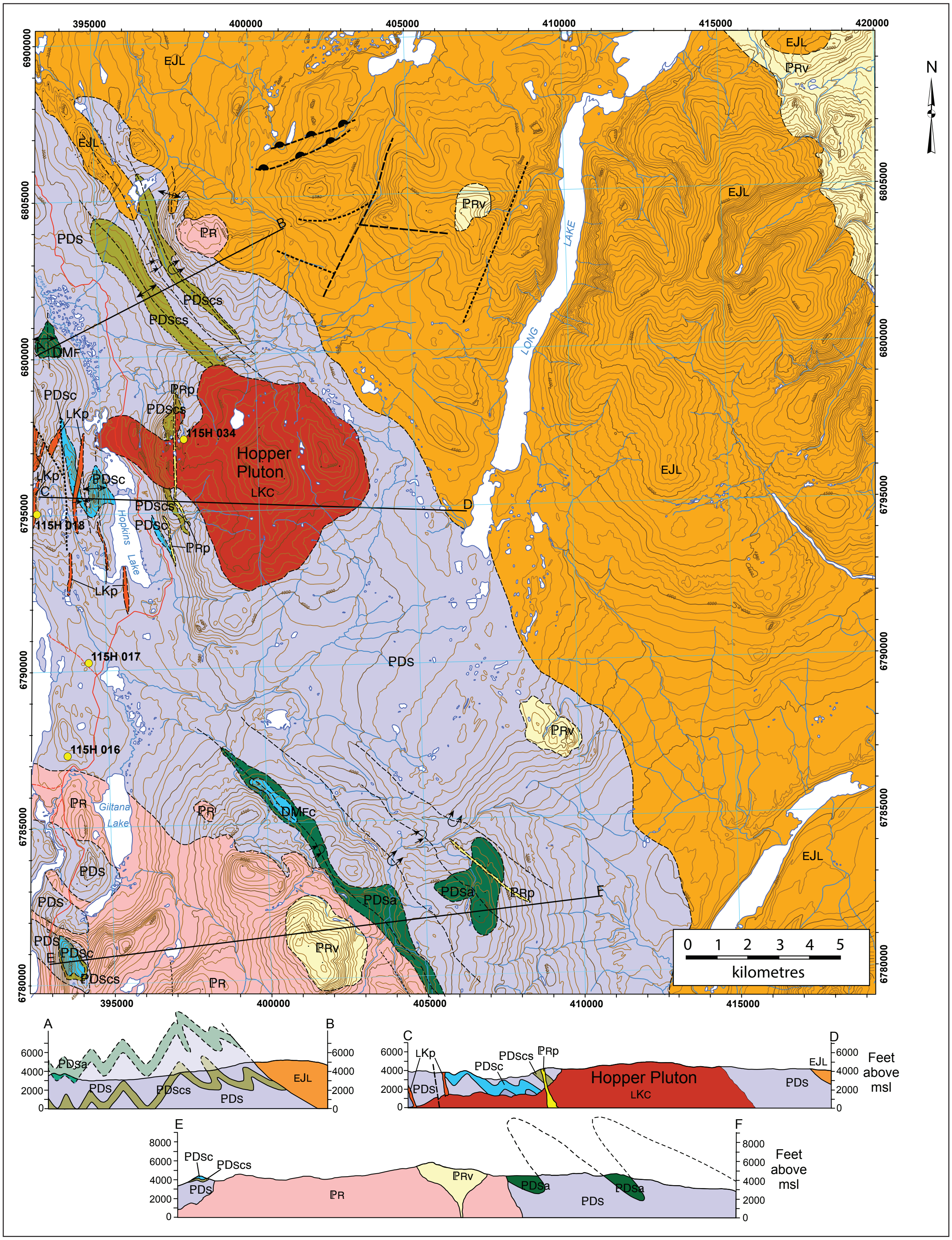


*Figure 2.* *Bedrock geology map and schematic cross sections from 2015 mapped area (modified from Israel and Borch, 2015). See legend, Figure 4. msl=mean sea level.*

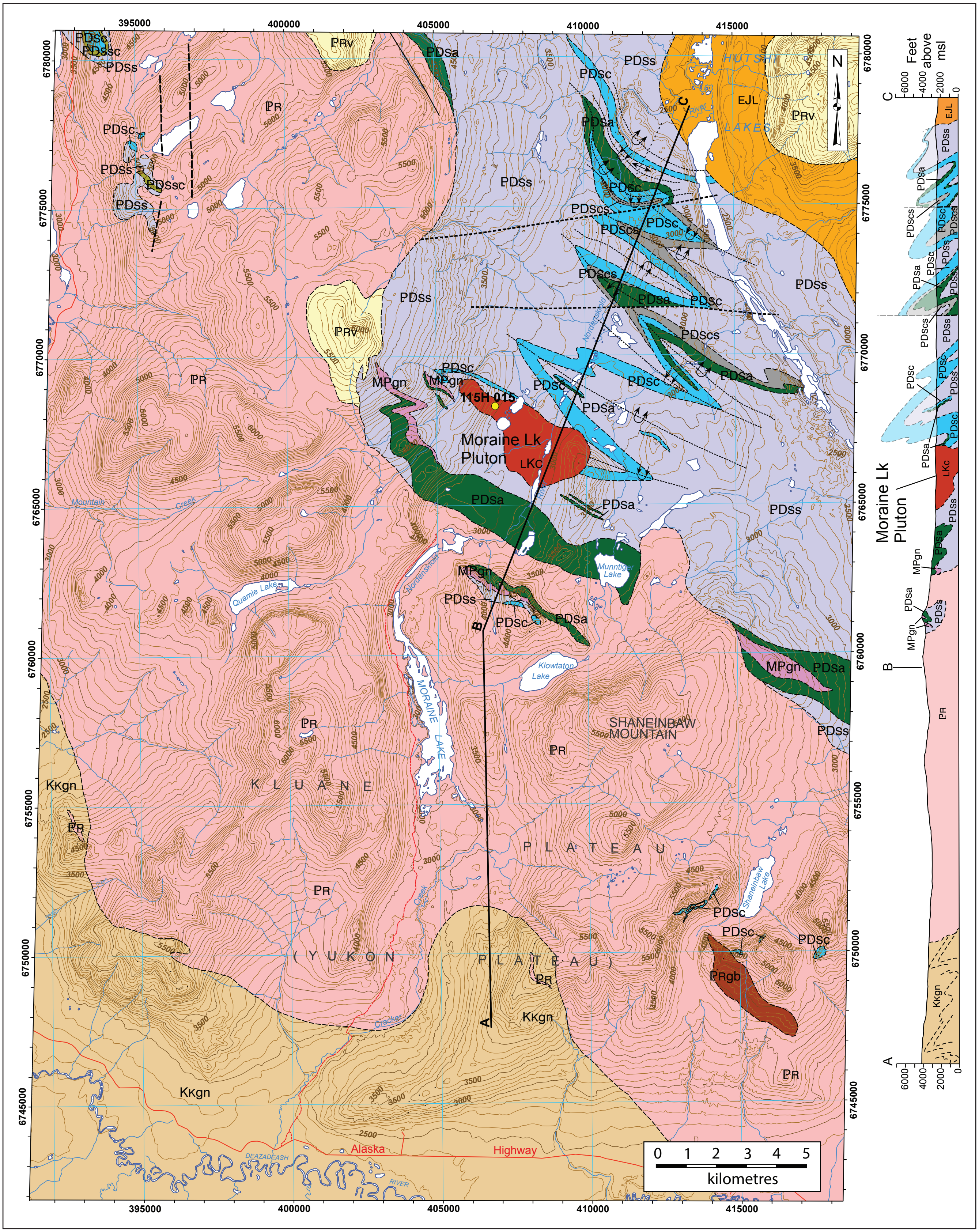


*Figure 3.* *Bedrock geology map and schematic cross section from 2016 mapped area (modified from Israel and Friend, 2016). See legend, Figure 4. msl=mean sea level.*

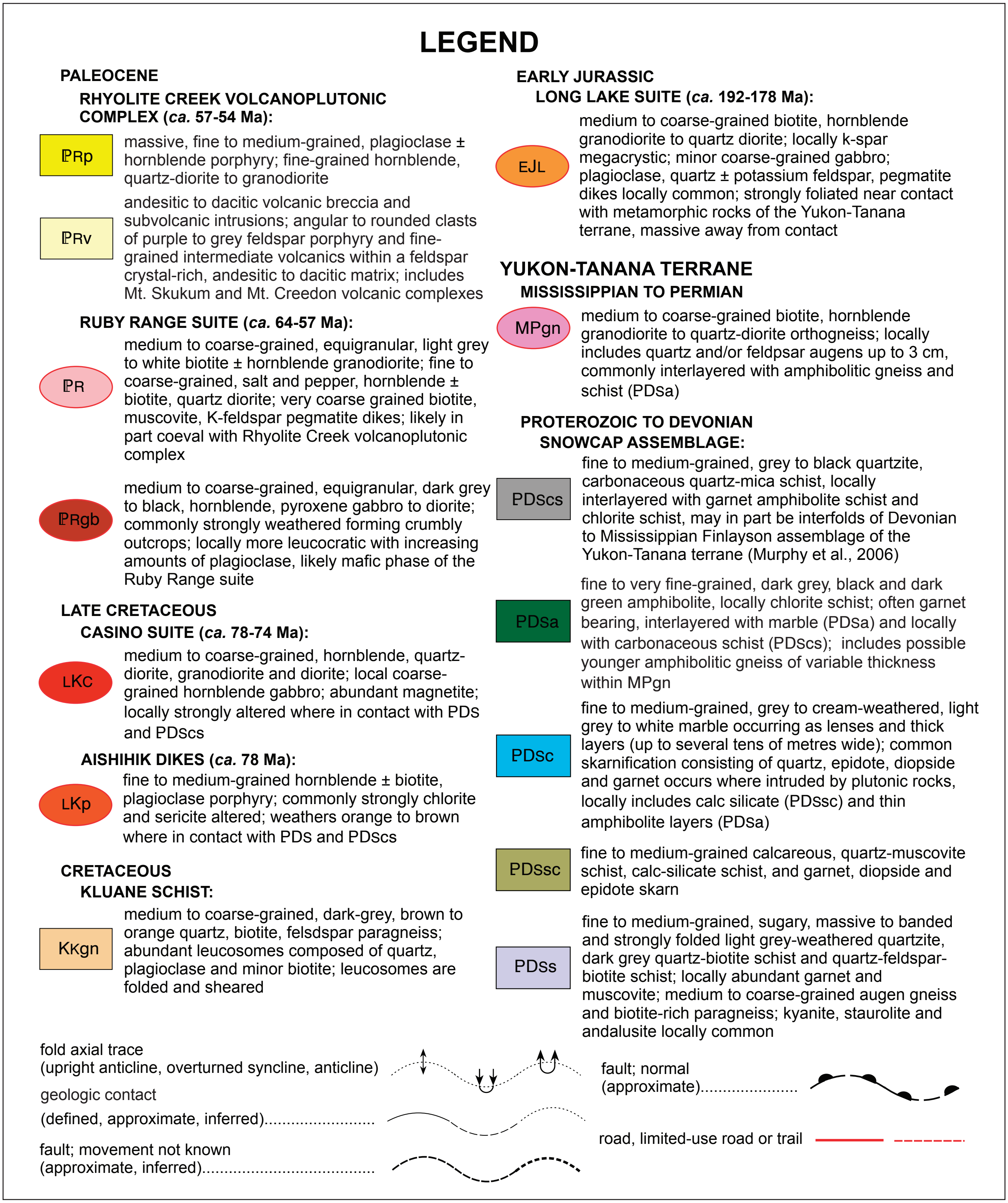


***Figure 4.*** *Bedrock geology legend for Figures 2 and 3.*


***Figure 5.*** *Lithology of the Snowcap assemblage:* ***(a)*** *quartz, feldspar, biotite schist of the Snowcap assemblage (*PDSs*);* ***(b)*** *dark grey, variably carbonaceous quartzite and schist (*PDScs*);* ***(c)*** *large marble outcrop (*PDSc*);* ***(d)*** *calc-silicate schist near the Hopper pluton (*PDSsc*);* ***(e)*** *garnet amphibolite from north of Moraine Lake, part of unit* PDSa*; and* ***(f)*** *gneissic-texture of more leucocratic amphibolite included in unit PDSa.*

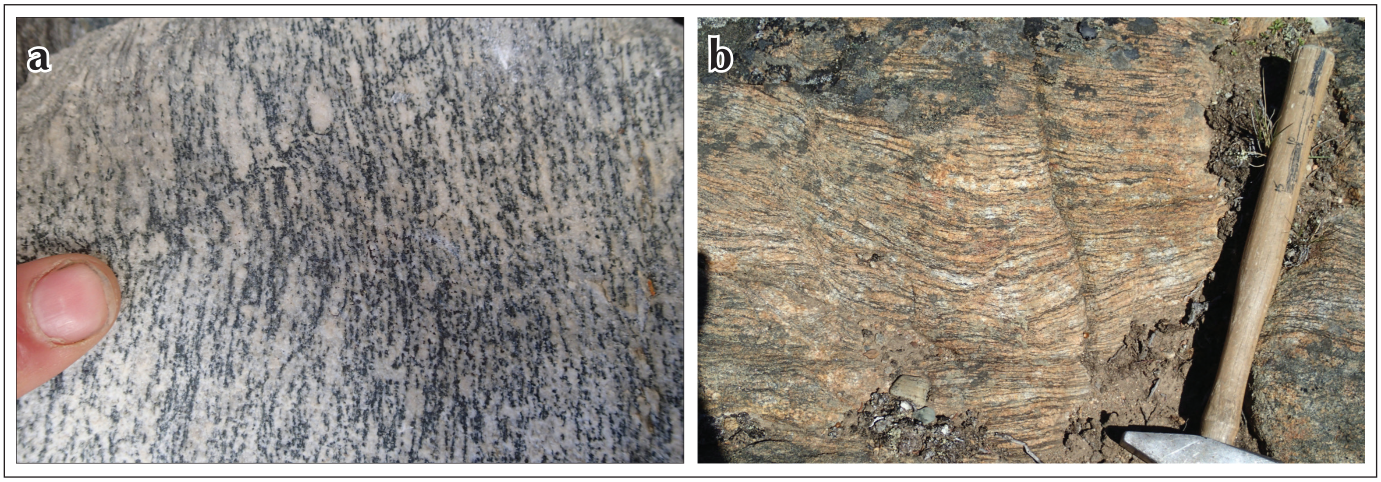


***Figure 6. (a)** Felsic to intermediate orthogneiss structurally interleaved with the Yukon-Tanana terrane, likely Mississippian or Permian in age. **(b)** Typical outcrop of Kluane schist paragneiss.*

## KLUANE SCHIST

The name 'Kluane schist' is a generic, informal name referring to a package of rocks located south of the Ruby Range suite and north of the Denali fault (Fig. 1). The term schist is used since the majority of the package is composed of quartz-biotite schist, including locally common quartz-muscovite and minor biotite schist. The schist is as young as Late Cretaceous (Israel *et al.*, 2011).

Within the project area, the Kluane schist outcrops east and south of the Ruby Range suite (Fig. 3). Here it is characterized by an orange-brown to dark grey-weathering paragneiss, a regionally continuous unit that is quite distinct from other more common schists within the Kluane schist. This paragneiss is only found next to the Ruby Range suite near the contact with the Yukon-Tanana terrane. The gneiss exhibits at least two phases of folding (Mezger *et al.*, 2001; Stanley, 2012).

The gneissic texture is defined by dark grey to black layers of biotite and lesser feldspar and quartz separated from more leucocratic layers of quartz and feldspar (Fig. 6b). The leucocratic layers have a vein-like appearance and are likely partial melts and/or injected melts. The age of the Kluane schist in the project area is not well constrained. The fabric within the gneiss is crosscut by the main body of the Ruby Range suite and by dikes that are likely related to the Ruby Range suite. Elsewhere, detrital zircon analyses from the more common parts of the unit (quartz-biotite schist) suggest a mid-Cretaceous and older age for the schist (Israel *et al.*, 2011).

## INTRUSIVE ROCKS

Several ages of intrusive rock are found within the project area and are characterized by large batholiths and small dikes and stocks. They outcrop throughout the map area and are often the best exposed rock types.

### *Long Lake Suite*

Rocks of the Long Lake suite (EJL) make up the Aishihik batholith and are found underlying a plateau east of Aishihik Lake (Figs. 2 and 3). The suite intrudes across the boundary between the Stikine and Yukon-Tanana terranes. It appears to be multi-phase having varying compositions and textures ranging from diorite to granite, whereby granodiorite is dominant. Rocks are generally massive with local, weakly developed foliation attributed to both magmatic and tectonic processes. The most common rock within this suite in the project area is a pinkish to light grey-weathered, potassium feldspar-porphyritic granodiorite (Fig. 7a). Hornblende and biotite are commonly found in the granodiorite. Tonalite, quartz-diorite and diorite are less common, and mafic minerals are predominantly hornblende. True granites are also rare, but can be locally abundant. The age of the Long Lake suite ranges from 192-178 Ma (Joyce *et al.*, 2016).

### *Casino suite*

The Casino suite (LKC) consists of Late Cretaceous intrusive rocks that form a loosely defined belt in Yukon from the Dawson Range (south of Dawson City) to the southern extent of this project area. It represents a suite of rocks of metallogenic significance, hosting the Casino porphyry deposit, several porphyry and epithermal-style mineral deposits and occurrences in the Freegold Mountain area and the Klaza/Mount Nansen areas, as well as several porphyry-type occurrences just north of the project area. The age of the suite is defined at ~78-74 Ma.

Within the study area, rocks assigned to the Casino suite include large plutons and much smaller discrete dikes. The largest of the bodies is the Hopper pluton, located in the northern part of the mapped area, near Hopkins Lake (Fig. 2). This pluton has a variable composition ranging from granodiorite to quartz-diorite and rare diorite (Fig. 7b). The main mafic phenocryst is hornblende; varying amounts of biotite are also observed and is usually most abundant in the more granodioritic phase. The Hopper pluton is highly magnetic throughout having values of 16-83 SI. The pluton is mainly undeformed and crosscuts all ductile fabrics in the Yukon-Tanana terrane rocks. It is, however, deformed by younger brittle faults. U-Pb analyses of zircon from the Hopper pluton returned an age of 78 Ma (Israel, unpublished data).

North to northeast-striking dikes informally known as the Aishihik dikes, are also interpreted as being part of the Casino suite. It is not known how extensive the dikes are, but several are found west of the Hopper pluton (Fig. 2). Dike thicknesses vary considerably from ~1 m up to 50 m. They typically weather a light grey to beige but can locally weather orange to brown weathering where significantly altered. The dikes are porphyritic with plagioclase and hornblende crystals up to several millimetres in length within a fine-grained grey groundmass (Fig. 7c). Alteration and skarning commonly occurs where the dikes intrude marble of the Yukon-Tanana terrane. The dikes crosscut the main foliation in the country rock but are affected by younger brittle faulting. The age of the dikes are *ca.* 78 Ma making them coeval with the Hopper pluton (Israel, unpublished data).

Another large pluton in the southwestern part of the map area is tentatively interpreted as being part of the Casino suite. This pluton is herein informally named the Moraine pluton and is found to intrude rocks of the Yukon-Tanana terrane just north of the northern boundary of the Ruby Range suite (Fig. 3). The Moraine pluton exhibits several characteristics that are similar to the Hopper pluton such as a variable composition, a highly magnetic signature, and skarning of marble and calc-silicate rocks at its margins. An age of the Moraine pluton is pending.

### *Ruby Range suite*

Rocks of the Ruby Range suite occupy a large part of the map area intruding along the Yukon-Tanana terrane/Kluane schist boundary (Figs. 2 and 3). The suite is characterized by massive, equigranular to locally feldspar-porphyritic, biotite, hornblende granodiorite, tonalite, quartz-diorite and rare gabbro. The most common phase of the Ruby Range suite is a medium-grained biotite, and locally hornblende, granodiorite with distinctive smoky quartz (Fig. 7d). This phase often has miarolitic cavities up to several centimetres long. The granodiorite is quite susceptible to weathering and can exhibit a crumbly texture in outcrop. The granodiorite is locally potassium feldspar porphyritic resembling the older Long Lake suite; however, the smoky quartz is still a distinguishing feature. Locally the suite becomes quartz-diorite and tonalite dominant; here hornblende is more common than biotite and miarolitic cavities are less common. Rare outcrops of gabbro are found in the southwestern part of the map area. These are highly weathered and are dark grey to green/black, and composed mainly of plagioclase, hornblende and pyroxene.

The age of the Ruby Range suite is fairly well constrained to *ca.* 64 to 57 Ma (Israel *et al.*, 2011; Israel and Kim, 2014).

### *Rhyolite Creek volcanoplutonic complex*

The Rhyolite Creek volcanoplutonic complex is named for volcanic and subvolcanic rocks described in Rhyolite Creek by D. Murphy (unpublished data) and in the northern Aishihik Lake area by Israel and Westberg (Israel and Westberg, 2011). The complex includes the Mount Creedon volcanic centres described by Johnston and Timmerman (1994) and is likely equivalent to the Sifton Range volcanic rocks found to the east of the study area.

Rocks assigned to the Rhyolite Creek complex outcrop mainly in the central and northeastern parts of the project area (Figs. 2 and 3). They consist of volcanic to sub-volcanic breccia found within discrete centres a few square kilometres in size. The centres are mostly found within the Ruby Range suite but also occur in metamorphic rocks and the Long Lake suite. The breccia is composed of intermediate to felsic, aphyric to feldspar-phyric clasts in a feldspar crystal-rich, fine-grained matrix. Clasts are andesitic, dacitic and rhyolitic in composition, and colour varies from deep purple to light grey and green. Many clasts are angular to subrounded and locally


***Figure 7.*** *Intrusive rocks: **(a)** Massive, slightly potassium feldspar mega-crystic granodiorite of the Long Lake suite. **(b)** Slightly altered, biotite, hornblende granodiorite of the Hopper pluton, Casino suite. **(c)** Hornblende, plagioclase porphyry typical of the Late Cretaceous Aishihik dikes (part of the Casino suite). **(d)** Typical biotite, smoky grey quartz granodiorite to tonalite of the Ruby Range suite. **(e)** Volcanic breccia of the Paleocene Rhyolite Creek volcanoplutonic complex. Note the wispy, cuspate-like texture of some clasts, indicating a hot emplacement. **(f)** Large clast of probable Ruby Range suite granodiorite in volcanic breccia of the Rhyolite Creek complex.*

clasts show a curved or cuspate texture (Fig. 7e). Clast size ranges from <1 cm to 50 cm, however most clasts are around 5-8 cm. The largest clasts consist of granodiorite and quartz-diorite similar to rocks that make up the Ruby Range suite (Fig. 7f). The extent of each of the centres is difficult to map because of poor exposure, and it is therefore hard to determine whether they represent true pyroclastic flows or some kind of subvolcanic breccia. Similar types of deposits are found north of Aishihik Lake, but in this region they are clearly eruptive in nature as they are found interlayered with tuff and volcanic flows (Israel and Westberg, 2011). The age of the Rhyolite Creek complex is relatively well constrained to *ca.* 57 to 54 Ma.

## STRUCTURE

The main map patterns observed in the Yukon-Tanana terrane and the Kluane schist are controlled by at least two separate ductile deformation events that were accompanied by regional-scale metamorphism. These events were followed by brittle faulting that likely occurred before and after Rhyolite Creek complex deposition.

The main foliation within the Yukon-Tanana terrane generally strikes northwest and dips moderately to the northeast. Folds associated with the main foliation trend northwest, are tight to isoclinal, and are overturned towards the southwest (Fig. 8a). The main folds are re-folded along a parallel fold axis resulting in Type III fold interference patterns (Fig. 8b). Locally, the main foliation is deformed by a crenulation foliation that has a strike generally parallel to the main foliation but has a steeper dip to the northeast (Fig. 8c).

A later folding event affects all older structures. Folds associated with this event are open and plunge shallowly to moderately to the north and northeast (Fig. 8d). These folds are found throughout the mapped area, but are not always evident at the outcrop scale; more often they are observed in the change in orientation of earlier structures.


***Figure 8. (a)*** *Tight to isoclinal, overturned folds in quartzite of the Snowcap assemblage, Yukon-Tanana terrane.* ***(b)*** *Re-folded fold observed in schist of the Snowcap assemblage; axial trace of earlier folds denoted by dashed line.* ***(c)*** *Localized crenulations developed within schist of the Snowcap assemblage.* ***(d)*** *Late generation of open folding developed within the Snowcap assemblage; fold outlined by dashed line; backpack for scale and highlighted by arrow.*

Large north to northeast-striking brittle faults are observed in all parts of the project area. They are characterized by zones up to several tens of metres wide consisting of broken and shattered rock that often form deep depressions. They form linear topographic features that are easily observed in air photos and satellite images, especially where they cut through the Long Lake and Ruby Range suites (Fig. 9). No reliable kinematic indicators were observed on any of these features, except on two west-striking brittle faults that have slickenside lineations that suggest normal, tops-to-the-north, motion. These west-striking faults are not common and are only found in the northernmost part of the project area within the Long Lake suite (Fig. 2). The timing of the brittle faults is not well constrained. The faults are developed within Ruby Range suite rocks indicating at least some post Paleocene deformation. However, several of the Late Cretaceous Aishihik dikes strike north, perhaps suggesting a structural control.

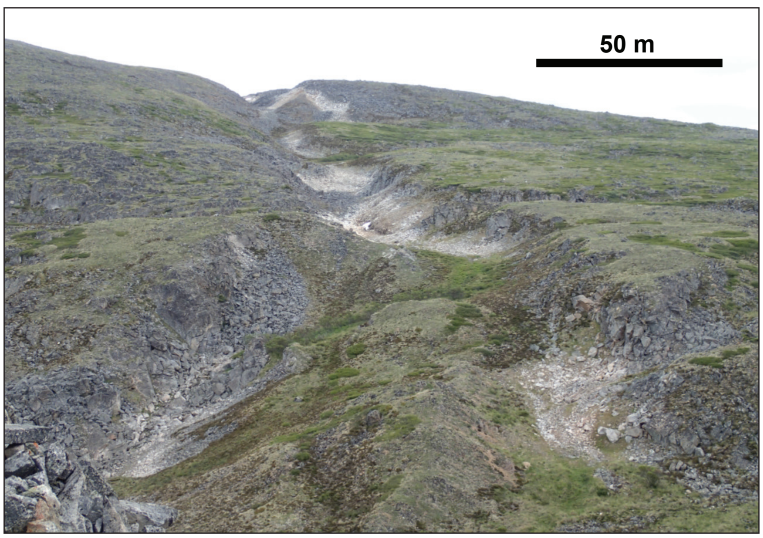


***Figure 9.*** *Late brittle fault developed within the Long Lake suite, defined by linear depression and rubbly bedrock.*

***Table 1.*** *Yukon MINFILE occurrences documented within the project area.*

| MINFILE Occurrences | | | |
|---|---|---|---|
| Number | Name | Deposit Type | Commodity |
| 115H016 | Giltana | Cu-skarn | Cu, Mo |
| 115H017 | Aishihik | Cu-skarn | Cu |
| 115H018 | Janisaw | Cu-skarn | Cu |
| 115H034 | Hopper North | Cu-skarn/porphyry | Cu, Au |
| 115H015 | Moraine | Cu-skarn | Cu, Au, Ag |

## MINERAL POTENTIAL

Mineral potential in the area is mainly attributed to intrusion-related systems such as porphyry, skarn and epithermal styles of mineralization. Several Yukon MINFILE occurrences are located around Hopkins Lake and north of Moraine Lake (Figs. 2 and 3; Table 1). All of these are either porphyry or skarn types of mineralization. In the Hopkins Lake area, the mineralization is associated with intrusions of the Late Cretaceous Casino suite. Yukon MINFILE occurrences 115H016, 017 and 018 are all skarn mineralization associated with the Aishihik dikes (Fig. 2).

The largest known occurrence in the area is the Hopper (Yukon MINFILE 115H034). The Hopper is characterized by skarn and porphyry mineralization associated with the Hopper pluton (Fig. 2). Recent exploration at the Hopper has focussed on layered skarn horizons flanking the intrusion that host significant copper, gold, silver and molybdenum mineralization. The skarn occurs in limestone and calc-silicate schist of the Snowcap assemblage (Fig. 10). Porphyry alteration is also associated with the Hopper pluton but has not yet been the focus of exploration so the potential is not well understood.

The Moraine (Yukon MINFILE 115H015), is similar to the Hopper in that both are characterized by well-developed skarn mineralization surrounding an intrusive body that has a high aeromagnetic response (Fig. 10). The bedrock exposure around the Moraine is poor and therefore the mineralization is not well characterized. To date, two skarn zones (north and south) have been identified, hosting gold, silver, copper, molybdenum and tungsten mineralization. Both geophysical and geochemical anomalies exist on the property, but have yet to be thoroughly investigated.

The evidence for Late Cretaceous (Casino suite-aged) mineralization in the project area is significant, as rocks in southwestern Yukon associated with this period in time host numerous mineral deposits and occurrences (Fig. 10). It is likely that the presence of Casino-suite rocks in the project area indicates the continuation of a south to southeast-trending belt of Late Cretaceous (~78-74 Ma), intrusion-related mineralization that

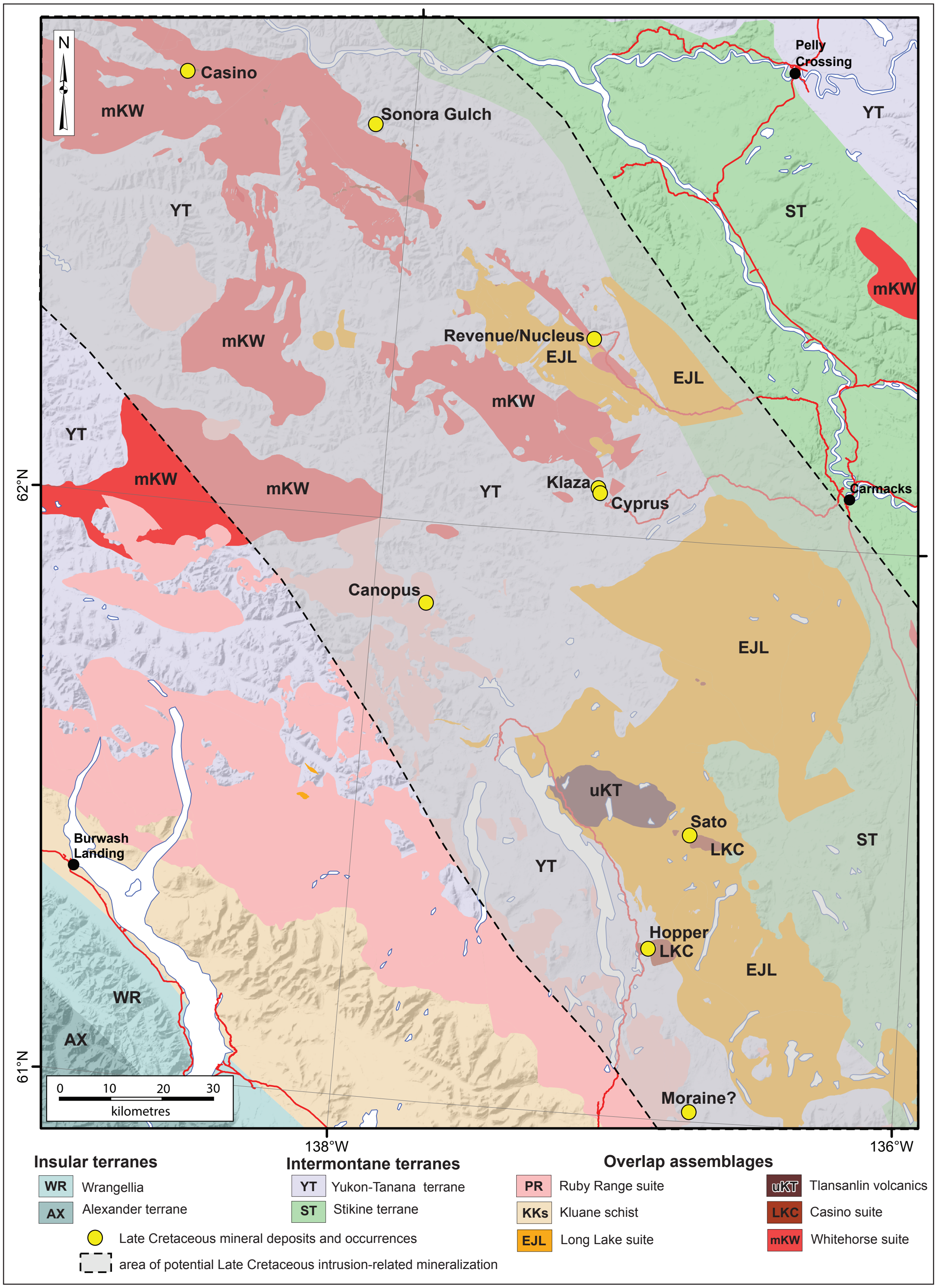


***Figure 10.*** *Tectonic assemblage map of parts of southwestern Yukon with Jurassic, mid-Cretaceous, Late Cretaceous and Paleocene plutonic suites depicted. Late Cretaceous intrusion-related mineral deposits and occurrences are plotted for reference.*

includes both porphyry and epithermal mineralization (Fig. 10). The significant amount of surficial cover and hence lack of outcrop exposure may be a factor for the low number of Yukon MINFILE occurrences in the project area. This coupled with the fact that only broad, regional-scale geophysics exists for much of the area may indicate that there is good potential for more intrusion-related mineralization in the area.

## CONCLUSIONS

Mapping in 2015 and 2016 focussed on the Yukon-Tanana terrane and Kluane schist and the Long Lake, Casino and Ruby Range suites located in southwestern Yukon. Several phases of deformation and metamorphism were identified within the Yukon-Tanana terrane and Kluane schist. The identification of Casino suite-aged plutons in the area indicates a high potential for intrusion-related mineralization for this area.

## ACKNOWLEDGEMENTS

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