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Mesozoic geology of the Takysie Lake and Marilla map areas, central British Columbia[1]

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Abstract: Takysie Lake (NTS 93 F/13) and Marilla (NTS 93 F/12) map areas are underlain by Mesozoic to Tertiary stratified and intrusive rocks segmented by Jura-Cretaceous and Tertiary faults. Lower to Middle Jurassic Hazelton Group includes heterolithic coarse-grained volcaniclastic rock; lesser, finer grained greywacke and mudstone; and clinopyroxene-phyric, coarse-grained laharic volcanic conglomerate characteristic of the Naglico formation. Jura-Cretaceous siliciclastic rocks, rich in chert and felsic volcanic fragments, are correlated with Bowser Lake or Skeena groups. Hornblende-phyric volcaniclastic rocks of the Cretaceous Kasalka Group are rare.(?)Jurassic and (?)Late Cretaceous, porphyritic and phaneritic, mafic, intermediate and felsic intrusions locally crosscut a pre-Eocene reverse fault, and are cut by northwest- and northeast-trending Eocene block faults.

Résumé : Les régions cartographiques de Takysie Lake (SNRC 93 F/13) et de Marilla (SNRC 93 F/12) se composent de roches stratifiées et intrusives de l'intervalle du Mésozoïque-Tertiaire qui sont découpées par des failles du Jurassique-Crétacé et du Tertiaire. Le Groupe de Hazelton du Jurassique inférieur et moyen se compose de volcanoclastites hétérolithiques à grain grossier, de quantités moindres de grauwackes à grain plus fin et de mudstones, ainsi que de conglomérats volcaniques grossiers à phénocristaux de clinopyroxène de type lahar qui sont caractéristiques de la formation de Naglico. Les roches silicoclastiques du Jurassique-Crétacé riches en fragments de chert et en fragments de roches volcaniques felsiques sont mises en corrélation avec les groupes de Bowser Lake ou de Skeena. Les volcanoclastites à phénocristaux de hornblende attribuées au Groupe de Kasalka du Crétacé sont rares. Des intrusions porphyriques et phanéritiques de compositions mafique, intermédiaire et felsique du Jurassique(?) ou du Crétacé tardif(?) recoupent par endroits une faille inverse pré-éocène et sont à leur tour morcelées par des failles de directions nord-ouest et nord-est de l'Éocène.

[1] Contribution to the Nechako NATMAP Project

INTRODUCTION

Mapping in the Takysie Lake (NTS 93 F/13) and Marilla (NTS 93 F/12) map areas (Fig. 1) finalizes the Nechako NATMAP Project contribution to the revision of the Nechako River 1:250 000 scale geological map (Tipper, 1963; Struik and MacIntyre, 1999a, b, 2000).

This report summarizes descriptions of Mesozoic sedimentary and igneous rocks and emphasizes the newly discovered stratigraphic members within Lower to Middle Jurassic Hazelton Group, siliciclastic rocks of the Bowser Lake or Skeena groups, and Jura-Cretaceous reverse fault structures in the area (Fig. 2). The geology of the Tertiary rocks is described elsewhere (Anderson et al., 2000). The work reported here builds on the excellent mapping and dating contributions by mineral exploration and provincial geological survey geologists in the area over the past 30 years (e.g. Kimura et al., 1980; Bellefontaine et al., 1995; Lane, 1995; Lane and Schroeter, 1997; T.A. Richards, unpub. data, 1998).

The map area encompasses the Interior Plateau, where physiography is characteristically low relief and entirely below treeline, although extensive logging is continually improving access to outcrop. New data reported here were based upon 6 weeks' work (111 traverses) in July–August 1998. The paper includes data collected for topical, baccalaureate studies summarized earlier (e.g. Barnes, 1998; Barnes and Anderson, 1999; Grainger, 1999; Grainger and Anderson, 1999; Resnick, 1999; Resnick et al., 1999; J. Resnick, unpub. data, 1999; Pint et al., 2000). Standard geological mapping techniques described in Anderson et al. (1999) were employed in the mapping.

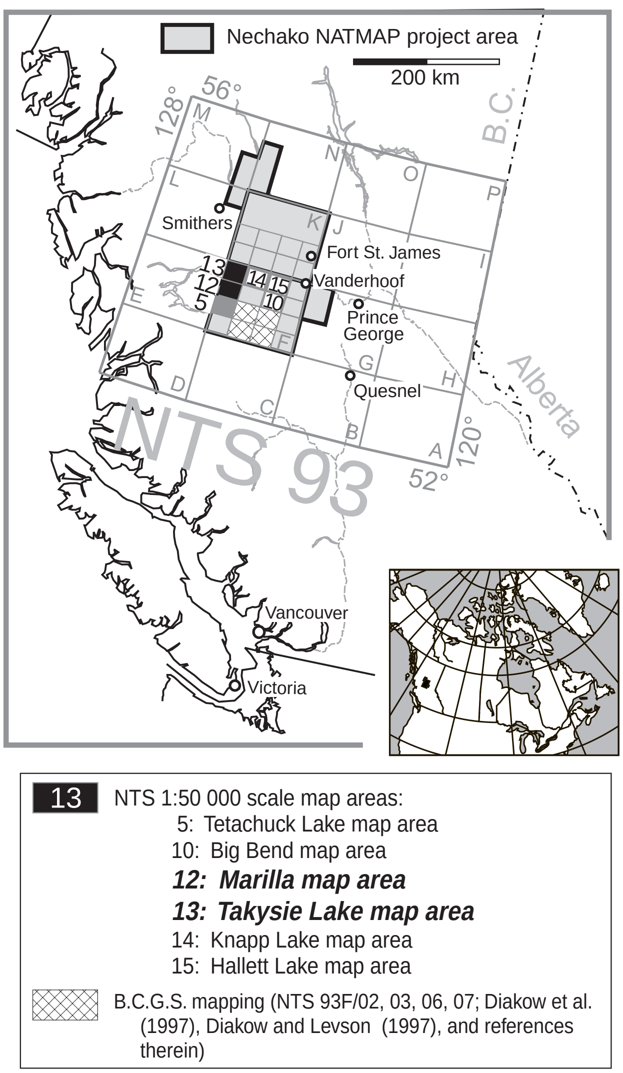

Figure 1. *Location of the Marilla (NTS 93 F/12), map area within the Nechako NATMAP project area and distribution of 1998 bedrock mapping.*

GEOLOGY

The Takysie Lake and Marilla map areas are underlain by widespread Eocene and Neogene volcanic rocks and minor Tertiary plutonic rocks (Anderson et al., 2000), lesser Mesozoic sedimentary and volcanic rocks, and scattered Jura-Cretaceous plutonic rocks (Fig. 2).

Stratified rocks

Lower and Middle Jurassic Hazelton Group (unit lmJ_H) and Naglico formation (unit mJ_{HN})

Maroon and green, basaltic, andesitic and rhyolitic volcanogenic epiclastic rocks, as well as breccia, tuff, and flows of feldspar-phyric andesite of the Hazelton Group are the oldest units recognized in the Takysie Lake and Marilla map areas. South and east of the area, the Hazelton Group is further divisible into the Middle Jurassic Entiako and Naglico formations (Diakow et al., 1997; Struik et al., 1999; Quat and Struik, 1999; Billesberger et al., 1999). In the Takysie Lake–Marilla area, Hazelton Group rocks are mainly exposed on Uncha Mountain (Barnes and Anderson, 1999), and north and south of Ootsa Lake (Pint et al., 2000) (Fig. 2). The unit strongly resembles well dated Lower Jurassic rocks at the base of Cutoff Butte (Anderson et al., 1998a) and locally has similarities with Lower Jurassic Entiako or Middle Jurassic Naglico formations rocks to the south described in detail by Quat and Struik (1999).

Lower and Middle Jurassic Hazelton Group (undivided)

Uncha Mountain area. At Uncha Mountain (Barnes and Anderson, 1999), the Hazelton Group rocks occur east of the north-northeast-trending Uncha fault and are generally maroon to grey, poorly sorted, poorly to moderately bedded, epiclastic volcanic conglomerate, greywacke, and pebbly mudstone. The unit gets younger from east to west and changes in colour from the typical maroon and grey to greyish black, and decreases gradationally in clast variation.

The fine- to coarse-grained, maroon grey to greenish-grey, heterolithic volcanic breccia, conglomerate, and tuffaceous sedimentary rocks are best exposed near the Uncha Mountain summit and along Francois Lake. The conglomerate is matrix supported to clast supported and contains 2–90% angular to rounded, granule- to cobble-sized clasts, which increase to boulder size in the southeast (Fig. 3a, b). From most to least common, clast types are, pale to dark grey aphanitic volcanic rocks, (<60%); locally subequal variegated aphyric rhyolite, aphanitic to plagioclase-phyric andesite, and amygdaloidal basaltic andesite; hornblende porphyry (up to 20-30%); chert and jasper (<25%); dark maroon fine-grained volcanic rocks (<15%); pale green fine-grained volcanic rocks (<10%); plagioclase porphyry (<5%); and rare black and buff pumice, bright orange lithic fragments, and granite. The green, tuffaceous, greywacke and mudstone matrix is well to poorly sorted, consists of grain sizes less than 2 mm, and is locally rich in sub-centimetre-sized plagioclase, chloritized hornblende (#15% of rock), and minor broken quartz crystals. Most beds are chaotic and discontinuous, 10 cm to1 m thick, and, in the northeast, exhibit rapid alternation of conglomerate, greywacke, and/or pebbly mudstone.

Greyish-black epiclastic rocks overlie the volcanic conglomerate to the southwest of Uncha Mountain and resemble the underlying unit in clast abundance, rounding, and size, but the fragments are dominated by pale to dark grey aphanitic volcanic rock (commonly showing quartz-filled microfractures and chloritic alteration) and chert, with minor plagioclase porphyry (<5%) and quartz (2–3 mm, <1–5%). The dense, black matrix consists generally of ash-sized grains. Many of the epiclastic units are likely laharic deposits.

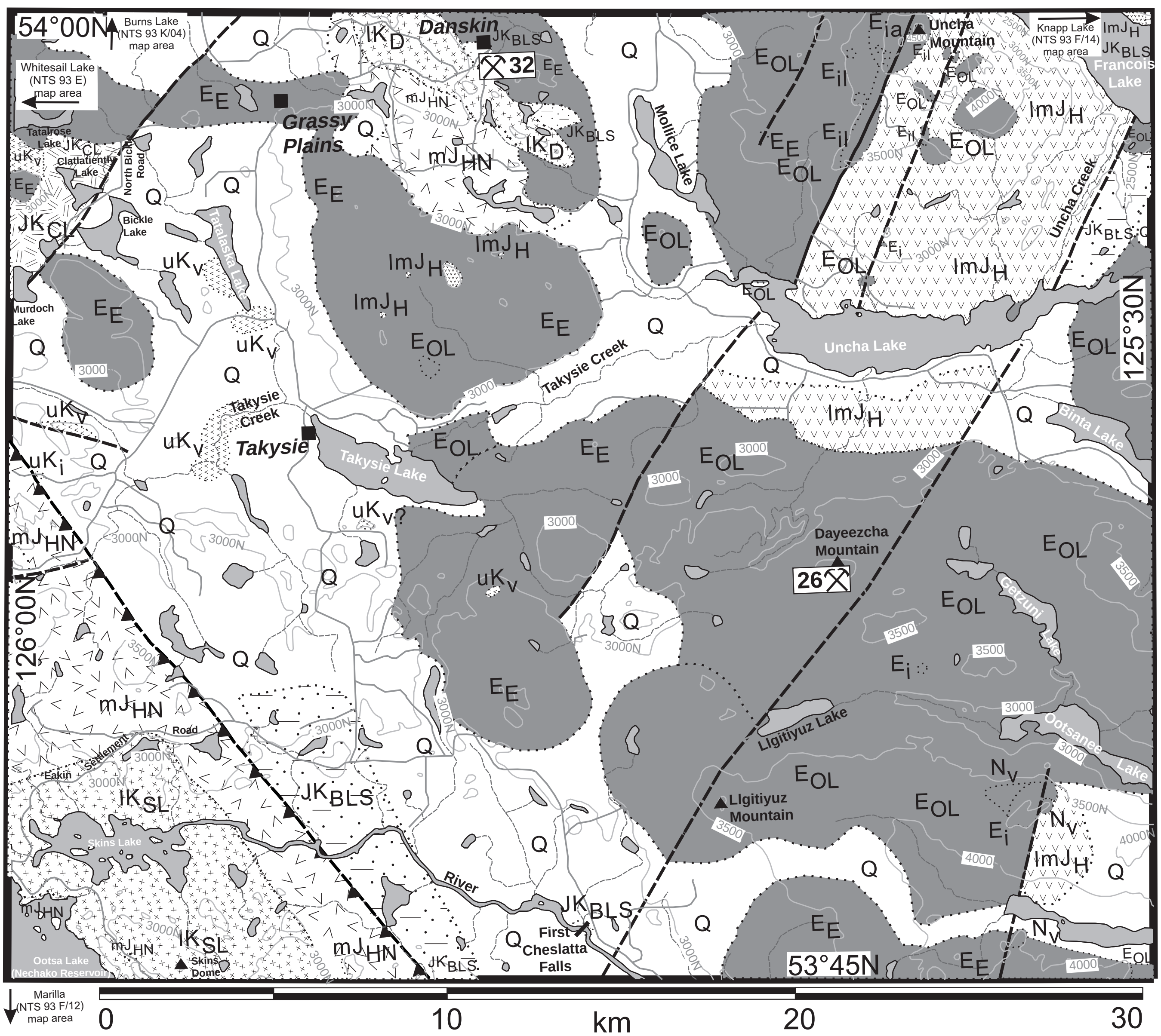

Figure 2a. Generalized geology of the Takysie Lake area (after *Tipper, 1963; Williams, 1997; this study).*

The amygdaloidal andesitic fragments (Fig. 3b) are particularly characteristic of Hazelton Group volcanic conglomerate seen regionally as well as a distinctive flow rock in the Middle Jurassic Naglico formation in southeastern Nechako River map area (Diakow et al., 1997; Struik et al., 1999). The chert-poor, volcanic-rich nature of fragments in the volcanic conglomerate is dissimilar to well dated and described Callovian Bowser Lake Group conglomerate in the Nechako Range to the southeast (e.g. Diakow et al., 1997; Anderson et al., 1998a); similarly, the paucity of hornblende phenocrysts is dissimilar to Upper Cretaceous Kasalka Formation (Diakow et al. (1997) and Diakow and Levson (1997) and references therein).

Rare, fine-grained andesite included with the Hazelton Group near Uncha Mountain is dark grey to maroon and pale green and contains common (10–50% of the rock) vesicles and amygdules sequentially in-filled with quartz or chlorite, epidote, and calcite.

Ootsa Lake area. Hazelton Group rocks near Ootsa Lake (Pint et al., 2000) include maroon to reddish-brown- weathering, thin-bedded mudstone, greywacke, and conglomerate (Fig. 4a), with subordinate dacitic, plagioclase-phyric, crystal-lithic tuffaceous greywacke, and reworked tuff (Fig. 4b). Mudstone contains 5–10% subangular to subrounded clasts which resemble those in the conglomeratic subunits in rock type and relative proportions and are set in a mud or less common sand matrix. The mudstone subunit best exhibits a regional, millimetre-spaced, S_1 fissile cleavage.

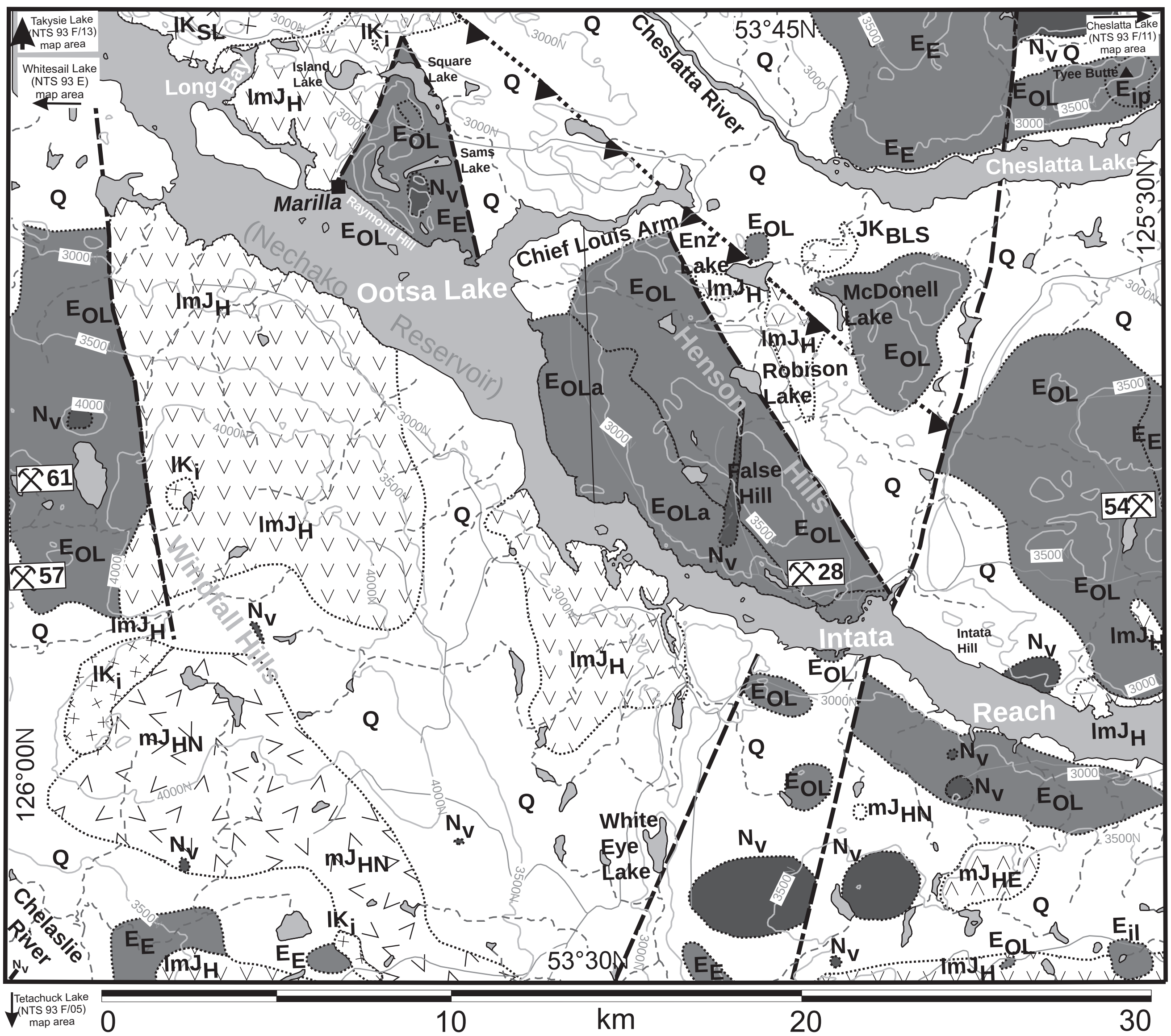

*Figure 2b. Generalized geology of the Marilla map area (*after *Tipper, 1963; Williams, 1997; this study).*

Rust-red, matrix-supported, volcanic pebble conglomerate occurs in lenticular beds (5 cm to 1.5 m thick) and represents channel-fill deposits. The conglomerate is commonly moderately organized, and locally displays fining-upward sequences. Sand to cobble size, subangular to subrounded clasts are predominately felsic porphyritic volcanic flow rocks (20–60%), chert (30–70%), and minor mafic volcanic flow rocks.

Maroon, medium sand to pebble, feldspathic lithic greywacke and reworked lithic-crystal tuff occur as matrix to the conglomerate and as poorly sorted and medium-grained, 10–30 cm thick beds. Subhedral plagioclase (1–35%, 1–3 mm) and minor amounts of anhedral quartz (1–2%, 0.25–0.5 mm) and subhedral hornblende (1–10%, 0.25–0.5 mm) are important constituents.

Ootsanee Lake. The correlation of a sequence of intermediate to mafic rocks in the southeastern corner of NTS map area 93 F/13 with the Hazelton Group is less certain. It is dominated by variegated maroon and green flows and flow breccia, with the flows ranging from massive and aphanitic to locally porphyritic (uncommon plagioclase and chloritized (?)pyroxene glomerocrysts). Elsewhere, cleaved, altered, and amygdaloidal, plagioclase-phyric andesite is common; the occurrence of amphibole phenocrysts is rare and scattered. Amygdules commonly contain chlorite, silica, and earthy iron oxide minerals. Although the rocks resemble those in the

Legend for Figure 2a and b

Stratified rocks

Quaternary

Q — Pleistocene glaciofluvial and glaciolacustrine sediments.

Neogene

N_V — Dark grey, vesicular, olivine basalt flows and volcanic centres; contains clinopyroxene, olivine and plagioclase megacrysts, and ultramafic nodules

Eocene

E_E — **Endako Group:** vesicular and amygdaloidal, plagioclase-phyric basalt to andesite volcaniclastic and flow rocks; associated minor intrusions

E_{OL} — **Ootsa Lake Group:** rhyolitic and dacitic tuff, and pyroclastic, volcaniclastic and flow rocks; Eola: vesicular andesite, hornblende-plagioclase porphyry andesite flows and breccia (upper Ootsa Lake Group in Henson Hills)

(?)Upper Cretaceous

uK_V — Reddish-grey or brown hornblende-plagioclase-phyric andesitic volcanic breccia

Jurassic or Cretaceous

JK_{BLS} — **Bowser Lake (or (?) Skeena Group):** tan heterolithic pebble conglomerate, greywacke, and minor grit and siltstone

Lower to Middle Jurassic

Hazelton Group

mJ_{HN} / mJ_{HE} — **Naglico formation:** maroon and green, clinopyroxene-plagioclase-phyric, laharic volcanic breccia and conglomerate

Entiako formation: rhyolitic crystal-lithic tuff, sandstone, minor ash; vesicular andesite and purple basaltic pillowed lavas

lmJ_H — **Hazelton Group (undivided):** maroon and green, heterolithic fine- to coarse-grained, basaltic, andesitic and rhyolitic volcaniclastic and epiclastic volcanic rocks

Intrusive rocks

(?)Eocene

E_i — Felsic intrusions undivided; Eia: aphanitic; Eip: porphyry; and Eil: miarolitic leucogranite

Late Cretaceous

lK_i / lK_D / lK_{SL} — Undivided: fine- to medium-grained diorite and granite

lK_D: Danskin andesitic and dacitic plagioclase porphyry

lK_{SL}: Skins Lake andesitic and dacitic hornblende-plagioclase porphyry; minor alkali feldspar megacrystic biotite quartz monzonite and biotite hornblende diorite

Jurassic–Cretaceous

JK_{CL} — **Clatlatiently Lake pluton:** alkali-feldspar megacrystic biotite-hornblende quartz monzonite

SYMBOLS

Geological contact (inferred)

Block fault (approximate, inferred)

Reverse fault (teeth on hanging wall; approximate, inferred)

Lakes

Rivers and creeks

Contours (contour interval: 500 feet)

28 — MINFILE locality and number

Marilla map area (NTS 93 F/12)	*Takysie Lake map area (NTS 93 F/12)*
28: HENSON HILLS (perlite)	61: LOON (Au-Ag)
54: RHUB (Cu-Au-Ag)	26: UNCHA LAKE (perlite)
57: UDUK LAKE (Au)	32: BOSS (WEE McGREGOR)

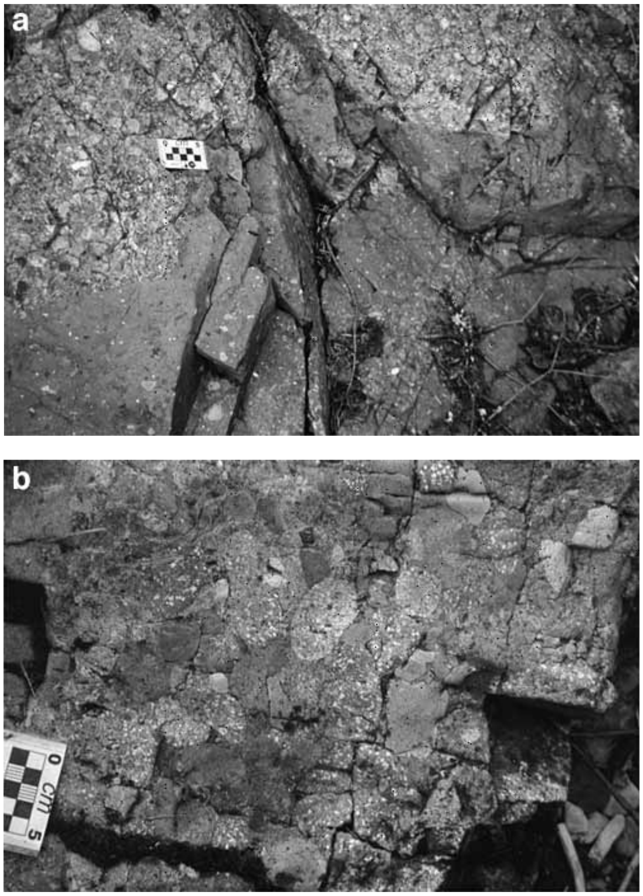

***Figure 3. a), b)** Heterolithic volcanic conglomerate of Lower and Middle Jurassic Hazelton Group north of Uncha Mountain. In Figure 3b, note abundance of amygdaloidal andesite fragments in conglomerate units.*

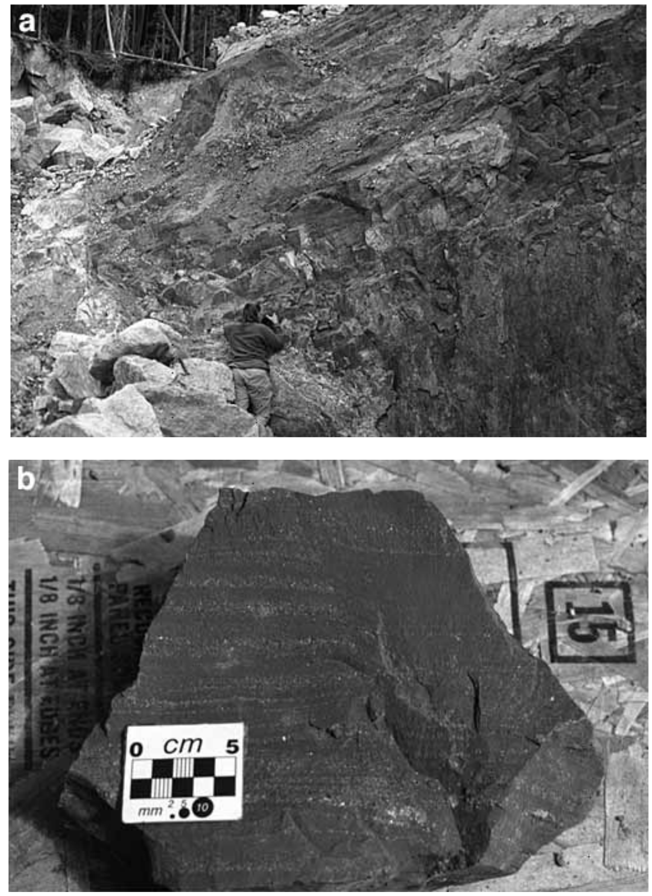

***Figure 4.** Hazelton Group rocks south of Ootsa Lake: **a)** thin-bedded crystal-rich greywacke overlying breccia; **b)** alternation of crystal-rich and crystal-free layers in reworked lithic-crystal tuff.*

Endako Group, the range of textures is more heterogeneous and the weathering colour is dissimilar. The unit is intruded by tabular, north-trending, biotite alkali-feldspar plagioclase porphyry intrusions and, south of Ootsanee Lake, the unit is apparently overlain by felsic volcanic rocks and overlain (or possibly intruded by) nodule-bearing columnar-jointed olivine basalt south of Ootsanee Lake (*see* below). It is likely that the sequence is pre-Eocene and is tentatively correlated with the Hazelton Group although a Cretaceous age is possible.

Naglico formation

Green- and maroon-weathering, dark grey, resistant, aphanitic to clinopyroxene-plagioclase phyric, laharic volcanic breccia and conglomerate in southern part of the map areas are correlated with the Middle Jurassic Naglico formation of the Hazelton Group (Diakow et al., 1997). Volcanic conglomerate units underlying Uncha Mountain (*see* above) may also be part of the Middle Jurassic unit. Heterolithic fragments (#5 cm) of mainly intermediate pyroxene-plagioclase phyric volcanic rocks are set in a sandy matrix comprising 40–60% euhedral or broken plagioclase (2–4 mm), 2–15% pyroxene (2 mm), and variable amounts of oxidized lithic fragments. Calcite and epidote alteration is pervasive in this unit. Lesser amounts of andesitic flow rocks are distinctively porphyritic, containing phenocrysts of plagioclase (2–15%; 6–10 mm; locally grading into a crowded porphyry), pyroxene (1–2%; 4–10 mm), and rare amphibole.

In southern Takysie Lake, the volcaniclastic units overlie thin-bedded siltstone and locally, a well deformed, felsic volcanic clast-bearing conglomerate and maroon mudstone. The units make up the upper panel of a northwest-trending, southwest-dipping, reverse fault which juxtaposed the rocks against the siliciclastic rocks of the Bowser Lake or Skeena groups; the hanging wall rocks are pervasively veined by quartz near the fault and contain a penetrative, millimetre-scale, southwesterly dipping cleavage in a basal maroon mudstone.

Rocks most closely resembling Middle Jurassic Entiako and Naglico formations (Diakow et al., 1997; Quat and Struik, 1999) also occur south of Ootsa Lake. Well preserved, reworked lithic-crystal rhyolitic tuff interbedded with pebbly and silty sandstone and minor few ash layers make up the unit (Fig. 5a, b). Rhyolite and minor andesite clasts are the principal fragment types. Vesicular andesitic flows and purple

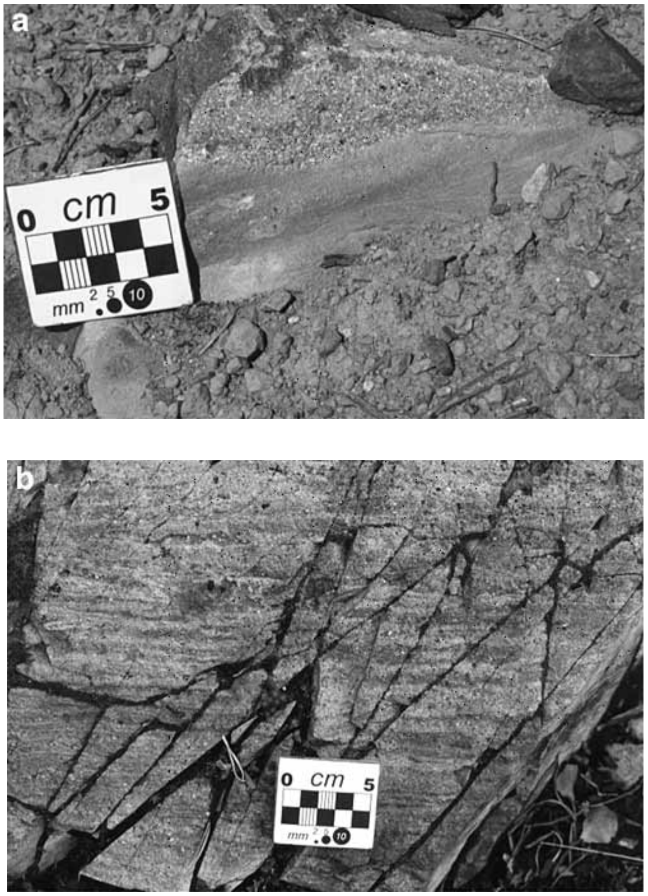

Figure 5. *Hazelton Group rocks possibly correlative to Entiako formation south of Ootsa Lake:* ***a)*** *thin-bedded, reworked felsic ash and grit layers;* ***b)*** *thin-bedded, crystal-rich, rhyolitic reworked tuff.*

basaltic pillowed lavas locally overlie the tuff. Blue-grey plagioclase and hornblende-plagioclase porphyry andesite are also included in the unit. Epidote alteration of plagioclase, hematite-coated fracture surfaces, and local pyrite dissemination are typical.

Jurassic–Cretaceous sedimentary rocks (Bowser Lake or Cretaceous Skeena groups, unit JK_{BLS})

Unfossiliferous, coarse- to medium-grained siliciclastic rocks correlative to the Middle and Upper Jurassic Bowser Lake Group or to the Lower Cretaceous Skeena Group occur sparsely throughout the Takysie Lake–Marilla map area. An exception is the area bounded by Moss Lake to the north, Cheslatta River to the east, Skins Lake to the west, and Island and Square lakes on the south, characterized by poor exposure, which was shown by Tipper (1963) and in subsequent compilations (Bellefontaine et al., 1995; Williams, 1997) as being underlain by reddish-brown shale, conglomerate, and greywacke of the Middle and Upper Jurassic Bowser Lake Group. The rocks are best exposed near Danskin, north of Eakin Settlement road, and in the Cheslatta River near the picnic area at first Cheslatta falls.

South of Danskin, rusty tan, highly fractured outcrops of heterolithic, matrix-supported pebble conglomerate beds (30–50 cm thick) contain poorly sorted fragments (2–6 cm long by 4 cm wide) of variegated chert (30% of rock), pale green, aphanitic to flow-laminated rhyolite (5–10%), and mafic aphanitic volcanic rock (1%). The conglomerate is intercalated with poorly sorted cherty grit, the same material which makes up the conglomerate matrix.

North of the Eakin Settlement road, subvertical 5–60 cm thick beds of heterolithic pebble conglomerate and dominant greywacke and grit make up the Jura-Cretaceous Bowser Lake or Skeena groups. The matrix-supported conglomerate contains round chert fragments 2–4 cm in size and up to 25% of the rock. The rocks are immediately northeast of an inferred reverse fault contact with moderately dipping hanging wall augite-phyric volcaniclastic rocks and basal maroon mudstone of the Middle Jurassic Naglico formation of the Hazelton Group, and the younger rocks have a well developed, moderately south-dipping cleavage.

Scattered exposures of Jura-Cretaceous conglomerate north of the Macdonald rock pit in northeastern Whitesail Lake (NTS 93 E) map area are remarkable for their content of granitic clasts (up to 5 cm in size) in addition to the more typical chert rock types.

(?) Upper Cretaceous volcanic rocks (unit uK_v)

Undated (?) Upper Cretaceous hornblende-phyric, andesitic volcanic rocks, correlated with the Kasalka Group rocks by Bellefontaine et al. (1995) and Williams (1997) are poorly exposed but believed to be less widespread than shown in the earlier compilations. The unit comprises reddish-grey-weathering, hornblende- and plagioclase-phyric lapilli-sized andesitic volcanic breccia which is commonly altered to epidote, and locally contains common quartz veins. The breccia is massive and heterolithic at all scales comprising 20–40% subrounded to subangular aphanitic to plagioclase- and/or hornblende-phyric andesite fragments (1–3 cm size). The hornblende-phyric and fragmental nature of the unit are the main features in common with other interpreted Cretaceous volcanic units to the east (e.g. Anderson et al., 1999) and with the better defined Kasalka Group to the south, west, and north (e.g. Diakow et al., 1997; MacIntyre and Diakow, 1998).

Included with the unit are rocks on Westman Lake Road, just to the south of Takysie Lake, comprising greenish-grey, aphanitic andesite which is structurally low compared to Eocene felsic and mafic volcanic rocks believed to overlie it.

Plutonic rocks

Compared with the Hallett Lake map area to the east (e.g. Anderson et al., 1997, 1998b; Anderson and Snyder, 1998), plutonic rocks are subordinate to stratified rocks in the Takysie Lake and Marilla map areas; however, representatives of the (?) Jurassic–Cretaceous, Late Cretaceous, and Eocene suites, earlier recognized to the north and east (e.g. Anderson and Snyder, 1998; Barnes and Anderson, 1999; Sellwood et al., 1999) and south (e.g. Billesberger et al., 1999), also occur in the Takysie Lake and Marilla map areas.

(?) Jurassic–Cretaceous plutonic rocks (unit JK_{CL})

Clatlatiently Lake pluton

The Clatlatiently Lake pluton has subdued physiographic expression but the distribution of scattered outcrops suggests it underlies a significant part of northwestern Takysie Lake map area. The rock is characteristically massive, medium- to coarse-grained, leucocratic, alkali-feldspar megacrystic, biotite-hornblende quartz monzonite (Fig. 6a). The alkali feldspar megacrysts, which reach 2–3 cm long, are distinctive. The coarser grain size and compositional and mineralogical similarities to Mesozoic alkali-feldspar megacrystic phases of the Endako Batholith suggest correlation with those Jura-Cretaceous phases rather than well studied Late Cretaceous or Eocene plutons.

The pluton is unconformably overlain by the highly plagioclase-phyric basalt of the basal Endako Group (Goosly Lake formation-equivalent) described above. A 3 m thick, light buff-brown saprolite horizon (Fig. 6b) separates the less altered plutonic rocks from the overlying mafic flow rocks (Resnick et al., 1999; Anderson et al., 2000).

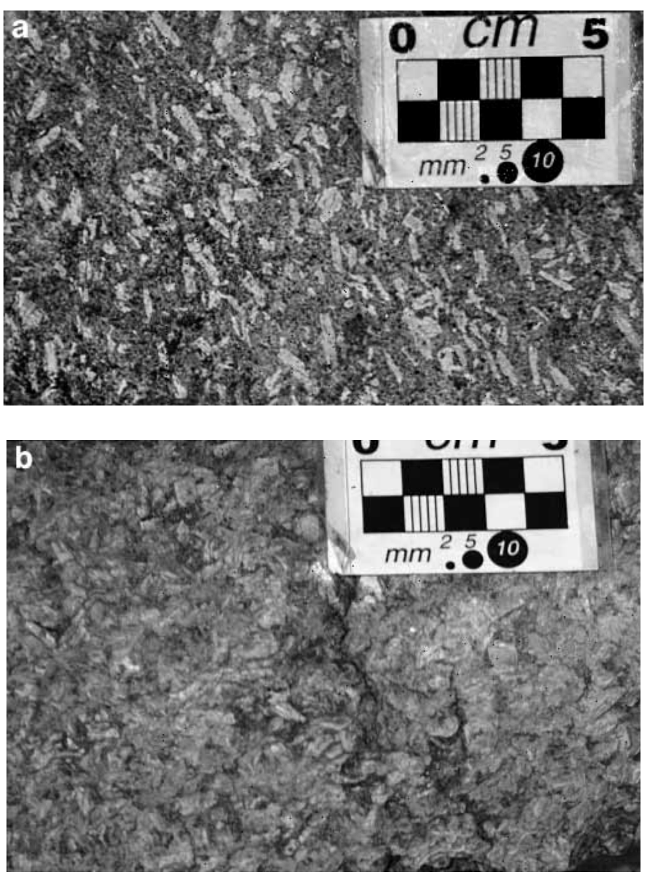

Figure 6. *Clatlatiently Lake pluton:* ***a)*** *fresh sample of alkali-feldspar megacrystic, biotite-hornblende quartz monzonite;* ***b)*** *altered equivalent (saprolite).*

(?)Late Cretaceous plutonic rocks (units lK_i, lK_D, lK_{SL})

There are a variety of porphyritic and phaneritic stocks scattered throughout the map area including the Danskin porphyry, which locally is associated with base-metal showings, and the postkinematic Skins Lake pluton, centred on Skins Lake.

Undivided plutons in the southern Marilla area include stocks consisting of a variety of fine- to medium-grained diorite and associated coarser grained biotite granite (Fig. 7) phases, such as exposed on Uduk road. Disseminated pyrite occurs in the western portions of the Uduk road body. The compositions and association with sulphide mineralization is closely similar to well studied Late Cretaceous plutons in the Tetachuck map area (NTS 93 F/05) to the south (Billesberger et al., 1999; Friedman et al., 2000).

The Danskin porphyry comprises greenish-grey, andesitic and dacitic plagioclase porphyry which is fine to medium grained, porphyritic and phaneritic, and contains distinctive phenocrysts of euhedral plagioclase (6–40% of rock, 1–8 mm long), subhedral hornblende (5%, 1–3 mm long), and scattered pyrite (1–3%, 2 mm). Chlorite and epidote alteration products and penetrative fractures in the rock are characteristic. The porphyry intruded the chert-pebble conglomerate of the Jura-Cretaceous Bowser Lake or Skeena groups and the country rocks are intensely veined with quartz. Veins and disseminations of pyrite (and rare (?)chalcopyrite) occur in the associated dacitic porphyry host rocks over a 2–3 km interval (at or near NTS 93 F MINFILE occurrence 32, BOSS (or WEE McGREGOR) Cu-Ag-Au-Pb-Zn showing; Bailey et al., 1995) and at least two exploration trenches record comparatively recent exploration.

Figure 7. *Biotite granite of undivided (?)Late Cretaceous intrusions south of Ootsa Lake.*

A large, subcircular, composite intrusion, the Skins Lake pluton, and scattered homogeneous stocks make up the most extensive plutonic rocks in southwestern Takysie Lake and northwestern Marilla map areas. Skins Lake porphyry pluton has been variously included in the Hazelton and Endako groups (Tipper, 1963) or Upper Cretaceous Kasalka Group (Bellefontaine et al., 1995; Williams, 1997). It comprises dominant porphyritic and minor phaneritic mafic to felsic phases. Greyish-green to brown, unfoliated, fine- to medium-grained, andesitic hornblende-plagioclase porphyry is the most extensive phase; white-weathering, pyrite-bearing, dacitic plagioclase porphyry is common along the western and northwestern shores of Skins Lake. Plagioclase phenocrysts dominate over hornblende and rare quartz; phenocrysts are uncommon (1–5% on average and up to 25%) and fine- to medium-grained (1–4 mm on average and up to 10 mm). Chlorite and epidote alteration products of hornblende and plagioclase are weakly developed. Amygdules are locally abundant and suggest a high-level emplacement of the pluton. They are round to elongate, make up 2–7% of the rock, are 0.5–10 cm, and are sequentially filled by chlorite and quartz. Locally, intraplutonic, subvertical intrusive contacts are rare (Fig. 8) and aphanitic, pyritiferous rhyolite locally intruded the andesitic porphyry. Satellitic porphyry bodies intruded the poorly sorted cherty sandstone of the Jura-Cretaceous Bowser Lake or Skeena groups. Adjacent to its southern contact, on the Ootsa Lake road south of Skins Dome, retrograded, white (?)andalusite porphyroblasts are developed in a screen of black and grey, well bedded, fossiliferous shale and siltstone (Hazelton Group, (?) Naglico formation). Volcaniclastic rocks ((?) Hazelton Group) directly west of the Ootsa Lake dam and spillway also appear to be rusty altered and bleached adjacent the unexposed contact with the pluton. Rare intrusive breccia crosscuts the dacite phase. Scattered pyrite-rich fractures occur in andesitic porphyry phases.

Phaneritic phases in Skins Lake pluton include seriate, unfoliated medium-grained alkali-feldspar megacrystic biotite quartz monzonite along its southern margin near the Ootsa Lake dam site spillway and seriate to equigranular biotite-hornblende diorite along the northeastern shore of Skins Lake. The felsic phase is intruded by andesitic porphyry; these coarser grained phases may be older and unrelated to the development of the main porphyry body.

Figure 8. *Subvertical contact between plagioclase-phyric and plagioclase-poor phases of Skins Lake pluton.*

A north-northwest-trending, tabular, porphyritic to seriate hornblende monzodiorite intrusion, satellitic to the Skins Lake porphyry pluton in the Square Lake locality, crosscuts Hazelton Group rocks and their deformation structures (Pint et al., 2000). Neither the pluton nor the satellitic intrusion are yet dated but may belong to the ca. 80–75 Ma suite described in the Tetachuck Lake area to the south of the study area (Billesberger et al., 1999; Friedman et al., 2000).

STRUCTURE

The structural style in the Takysie Lake and Marilla map areas is dominated by northeast and subordinate northwest-trending Eocene fault blocks which generally contain undeformed or weakly cleaved or jointed strata (e.g. Barnes and Anderson, 1999; Grainger and Anderson, 1999); however, there is evidence for a Jura-Cretaceous northwest-trending reverse fault of regional scale in southern Takysie Lake and Marilla map areas which emplaced multiply deformed Lower to Middle Jurassic Hazelton Group volcanic rocks onto well cleaved Jura-Cretaceous siliciclastic rocks of the Bowser Lake or Skeena groups (*see* Pint et al. (2000) for details) (Fig. 2).

A pre-Eocene structure involves the Lower to Middle Jurassic Hazelton Group rocks juxtaposed across a northwest-trending reverse fault against subvertical siliciclastic rocks of the Jura-Cretaceous Bowser Lake or Skeena groups (Pint et al., 2000). The Hazelton Group rocks have undergone two periods of deformation, resulting in the rocks being folded about a shallowly northwest-plunging fold axis and developing two later, nearly perpendicular sets of planar structures. Intrusion of the volcanic rocks and the deformation structures by a satellitic monzodiorite apophysis of the nearby (?)Late Cretaceous Skins Lake pluton helps constrain the deformation to Middle Jurassic to (?)Late Cretaceous.

The inferred, two-event structural history is characteristic of the Hazelton Group rocks found in the hanging wall of the reverse fault that extends northwest at least from northern Marilla to southwestern Takysie map areas. The fault is poorly exposed, particularly along its southeastern extent, but its location is closely bracketed in localities along the Eakin Settlement road to the northwest, where augite-phyric volcaniclastic rocks of the Middle Jurassic Naglico formation of the Hazelton Group are underlain by a basal maroon mudstone which contains penetrative, millimetre-scale, southwesterly dipping cleavage and is the hanging wall unit immediately southwest of the inferred reverse fault contact with subvertical, footwall greywacke and conglomerate beds of the Middle to Upper Jurassic Bowser Lake Group or Lower Cretaceous Skeena Group. The younger rocks have a well developed, moderately south-dipping cleavage. Elsewhere, in southwestern Takysie Lake map area, intense veining in the Naglico formation rocks marks the leading edge of the hanging wall rocks.

Along the southwestern margin of the Takysie Lake map area, an L-S tectonite is developed in chloritic metavolcanic schist. The deformation marks the western extent of a east-northeasterly trending fault recognized by Tipper (1963) and included in later compilations (Bellefontaine et al., 1995; Williams, 1997) which juxtaposes (?) Upper Cretaceous ((?) Kasalka Group) hornblende-phyric andesitic volcaniclastic rocks to the north from medium- to coarse-grained siliciclastic rocks of the Bowser Lake or Skeena groups to the south. Planar structures dip moderately southeast and common lineations, defined by stretched pebbles in the conglomerate (aspect ratios of 2:1 to 3:1) plunge gently west-southwest. The S_1 structures are crosscut by northerly trending, centimetre-spaced, subvertical minor fault planes with subhorizontal slickensides. The orientations and relative timing of structures is similar to that seen in the Hazelton Group hanging wall rocks in the Square Lake and south Ootsa Lake localities (Pint et al., 2000) and to a locality along the Red Road in southwestern Big Bend Creek map area (Anderson et al., 1998a).

Elsewhere to the east and north, the Hazelton and Bowser Lake groups rocks are weakly deformed or massive (Lane, 1995; Anderson and Snyder, 1998; Barnes and Anderson, 1999; Anderson et al., 1999); an exception is east of Henson Hills where two planar structures are also recognized in Hazelton Group rocks.

MINERAL OCCURRENCES

At least six MINFILE mineral occurrences are known from the Takysie Lake–Marilla map area (Bailey et al., 1995); but only one was revisited. Most involve perlite as the commodity, plot in the Ootsa Lake Group and/or are epithermal base- and precious-metal occurrences (Lefebure and Höy, 1996). They are discussed in more detail in Anderson et al. (2000). The mineralization style of the BOSS (WEE McGREGOR; Cu-Ag-Au-Pb-Zn, NTS 93 F/13, MINFILE number 32) associated with the Danskin pluton is described above.

CONCLUSIONS

A variety of Mesozoic and Tertiary stratified and Jura-Cretaceous, (?)Late Cretaceous, and Tertiary plutonic rocks were identified during mapping of the sparse bedrock outcrops in the Takysie Lake and Marilla map areas (*see also* Anderson et al., 2000). Lower and Middle Jurassic Hazelton Group epiclastic and lesser flow rocks are widespread including rocks possibly correlative to the Naglico and Entiako formations identified elsewhere. Coarse siliciclastic rocks are likely part of the Bowser Lake Group but correlation with the Cretaceous Skeena Group cannot be ruled out. Cretaceous volcanic rocks, possibly correlative to the Kasalka Group, are apparently less widespread than earlier thought.

The structural style in the area is dominated by northeast- and subordinate northwest-trending Eocene block faults; however, there is evidence for a Jura-Cretaceous northwest-trending reverse fault involving Middle Jurassic to Lower Cretaceous strata.

(?) Jurassic–Cretaceous and (?)Late Cretaceous, porphyritic and phaneritic, mafic, intermediate and felsic intrusions locally crosscut the Jura-Cretaceous reverse fault.

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