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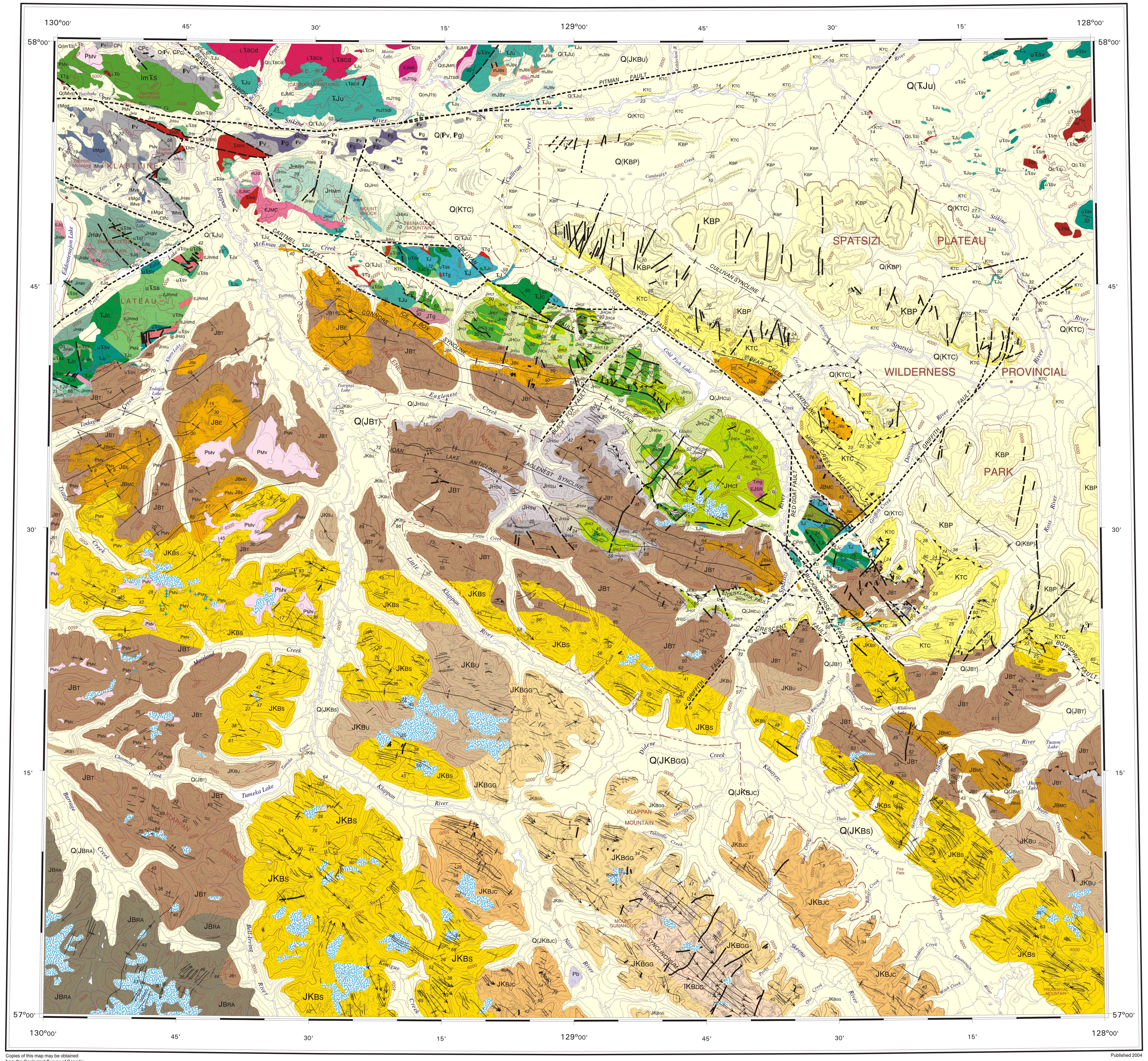
GEOLOGICAL SURVEY OF CANADA | COMMISSION GÉOLOGIQUE DU CANADA



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601 Booth Street, Ottawa, Ontario K1A 0E8
3303-33rd Street, N.W., Calgary, Alberta T2L 2A7
101-605 Robson Street, Vancouver, B.C. V6B 5J3

LOCATION MAP

Geology by C.A. Evenchick (1985–1990, 1992), D.J. Thorkelson (1986, 1987), P.S. Mustard (1988, 1992), C.F. Roots (1988), and G.M. Green (1989, 1990)

Geological compilation by C.A. Evenchick and D.J. Thorkelson (1999)

Digital cartography C.L. Wagner, R. Cocking, S. Churchill, and M. Sigouin, Earth Science Sector Information Division (ESS Info), D. Chan, D. Dunn, C. Evenchick, and T. Feeney, Geological Survey of Canada

MAP 2040A

GEOLOGY

SPATSIZI RIVER

BRITISH COLUMBIA

Scale 1:250 000/Échelle 1/250 000

kilometres 5 0 5 10 15 20 kilomètres

Universal Transverse Mercator Projection
North American Datum 1927

Projection transverse universelle de Mercator
Système de référence géodésique nord-américain, 1927

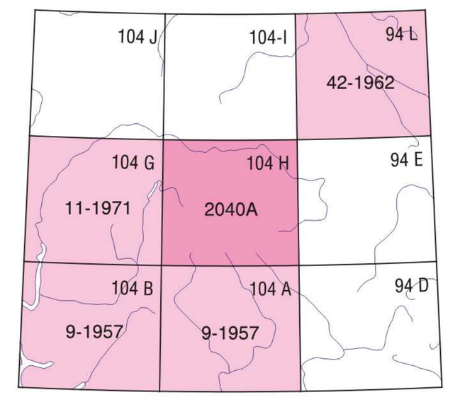
Digital base map from data compiled by Geomatics Canada, modified by ESS Info

Any revisions or additional geological information known to the user would be welcomed by the Geological Survey of Canada

Mean magnetic declination 2004, 23°44´E, decreasing 15.4´ annually. Readings vary from 23°23´E in the southeast corner to 24°01´E in the northwest corner of the map

Elevations in feet above mean sea level

Contour interval 500 feet



NATIONAL TOPOGRAPHIC SYSTEM REFERENCE AND INDEX TO ADJOINING GEOLOGICAL SURVEY OF CANADA MAPS

Canada

LEGEND

CENOZOIC

QUATERNARY
PLEISTOCENE AND RECENT

Q — *Glacial till, alluvium, and colluvium; unit designators in parentheses are the inferred underlying bedrock units.*

PLEISTOCENE

Pb — *Basaltic (basanite) intrusion east of Spatsizi River (1.3 Ma, K-Ar); pillow basalt in Nass River valley.*

TERTIARY
(?)PLIOCENE

Tmg — *Microgabbro dyke, possibly correlative with Maitland Volcanics.*

PLIOCENE

PMv — *MAITLAND VOLCANICS: olivine basalt and minor trachyte necks (shown as coloured +) and flows; columnar jointed, with rare pillows and breccia; 5.2 to 4.6 Ma (K-Ar; dated rocks are in 104 H/5, /12, /13).*

MESOZOIC

CRETACEOUS
UPPER LOWER AND UPPER CRETACEOUS
SUSTUT GROUP (units KBP and KTC)
CAMPANIAN AND MAASTRICHTIAN

KBP — *BROTHERS PEAK FORMATION: sandstone, siltstone, conglomerate, and tuff; sandstone and siltstone are cream- and grey-weathering; tuff is cream-weathering; conglomerate in laterally continuous sheets is most common near base.*

APTIAN OR ALBIAN TO CAMPANIAN

KTC — *TANGO CREEK FORMATION: micaceous sandstone, siltstone, mudstone, and minor quartz grit and pebble conglomerate; sandstone is grey- and green-weathering, occurring as laterally continuous sheets and as lenses; siltstone and mudstone are grey-, black-, and maroon-weathering.*

LOWER CRETACEOUS
BOWSER LAKE GROUP

lKBDC — *DEVILS CLAW FORMATION: conglomerate, sandstone, and siltstone; high proportion of pebble conglomerate (30–80%) in laterally continuous, grey-weathering sheets with large-scale crossbedding; conglomerate forms bases of fining-upward cycles with medium-grained sandstone, fine-grained sandstone, carbonaceous siltstone, and minor coal; sandstone is dark green- and grey-weathering with platy and trough crossbedding; fossil plants common; marine fossils absent.*

JURASSIC AND CRETACEOUS
UPPER JURASSIC AND LOWER CRETACEOUS
BOWSER LAKE GROUP (units JKBU–JKBJC)

JKBJC — *JENKINS CREEK ASSEMBLAGE (nonmarine assemblage): mudstone, siltstone, fine-grained sandstone, medium-grained sandstone, and rare conglomerate and coal, commonly arranged in fining-upward cycles; sandstone is grey-, green-, and brown-weathering, and occurs as laterally continuous sheets, discontinuous sheets, and lenses; lenses are planar and trough crossbedded; fossil plants abundant, including in situ roots, and plants with delicate structure; marine fossils absent.*

JKBGG — *GROUNDHOG-GUNANOOT ASSEMBLAGE (deltaic assemblage): sandstone, siltstone, and carbonaceous and calcareous mudstone, with minor conglomerate and coal, locally arranged in fining-upward cycles; sandstone is fine- to medium-grained with planar bedding and planar-tabular crossbedding; large proportion of sandstone is thin- and thick-bedded, medium-grained, recessive drab green- or brown-weathering wacke; resistant and light grey-weathering arenite is less common and forms discontinuous sheets and lenses; finer grained strata are thinly bedded and locally include densely packed plant fossils; conglomerate sheets and lenses, which constitute 10% of the unit, are light grey-weathering, with large-scale crossbedding; plant fossils common and include in situ trees; marine fossils rare.*

JKBS — *SKELHORNE ASSEMBLAGE (deltaic assemblage): thinly intermixed and varicoloured siltstone, sandstone, and conglomerate (with or without coal), commonly arranged in coarsening- and thickening-upward cycles; common features of sandstone are parallel bedding, crossbedding, ripples, burrows, bivalve coquina, and brown-, green-, and grey-weathering; conglomerate is rusty- and grey-weathering, but constitutes a lower proportion (15–30%) of the unit than in the Eaglenest assemblage; conglomerate units, up to 50 m thick, cap cycles up to 70 m thick, and tops locally have megaripples; plant and marine fossils are ubiquitous, and trace fossils including* Skolithus *and* Diplocraterion *are present, as are tree fragments several metres long.*

JKBU — *Undivided Bowser Lake Group.*

JURASSIC
UPPER MIDDLE TO UPPER JURASSIC
BOWSER LAKE GROUP (units JBRA–JBE)

JBE — *EAGLENEST ASSEMBLAGE (deltaic assemblage): conglomerate, sandstone, siltstone, mudstone, and rare coal, arranged in coarsening- and fining-upward cycles of mudstone to pebble or cobble conglomerate; prominently rusty-weathering and 30 to 80% conglomerate; sheets of conglomerate, up to 50 m thick, include planar beds, tabular-planar cross-stratification and trough cross-stratification, with sets locally up to tens of metres thick; sandstone is green-, brown-, and grey-weathering, and has planar cross-stratification and hummocky cross-stratification; sparse marine fossils, but abundant plant fossils, including silicified tree fragments.*

JBMC — *MUSKABOO CREEK ASSEMBLAGE (shelf assemblage): sandstone, siltstone, and conglomerate; primary lithofacies is sandstone, forming laterally continuous thin- to thick-bedded sheets; less common are siltstone interbedded with sandstone, and lenses of conglomerate; sandstone is green-, brown-, and grey-weathering, thin- to thick-bedded, and locally arranged in coarsening-upward cycles; includes burrows, bivalve coquina, and other marine fossils, common ripple marks and crossbedding, and local hummocky cross-stratification; conglomerate increases in proportion and thickness upsection.*

JBT — *TODAGIN ASSEMBLAGE (slope assemblage): siltstone, fine-grained sandstone, and conglomerate; mainly laminated siltstone and/or fine-grained sandstone, which is dark grey- to black-weathering and includes thin, orange-weathering claystone beds and syndepositional faults and folds; chert-pebble conglomerate occurs as lenses; marine fossils.*

JBRA — *RITCHIE-ALGER ASSEMBLAGE (submarine fan assemblage): sandstone, siltstone, and rare conglomerate; approximately equal proportions of sheet-like intervals, up to 50 m thick, dominated either by siltstone and very fine-grained sandstone, or by medium-grained sandstone; siltstone and/or fine-grained sandstone is dark grey- and black-weathering, sandstone is medium- and light-grey-weathering; abundant turbidite features (e.g. Bouma cycles, flame structures, flute-and-groove casts); conglomerate includes debris-flow units; marine fossils.*

MIDDLE JURASSIC

mJd — *Grey-green metadiabase.*

LOWER MIDDLE JURASSIC
BOWSER LAKE GROUP (units mJBs and mJBv)

mJBv — *Maroon plagioclase porphyry flows and breccia, green and grey-green aphyric and plagioclase porphyry flows, breccia and tuff.*

mJBs — *Maroon sandstone and siltstone, chert-pebble conglomerate, local grey and green sandstone.*

HOTAILUH BATHOLITH

mJTS — *THREE SISTERS PLUTON:* mJTSg*: hornblende-biotite granite.* mJTSdi*: hornblende diorite and gabbro; 170 ± 1 Ma (U-Pb; sample site from north of map area).*

EARLY JURASSIC
EDON, ROSE, AND RELATED INTRUSIONS

EJq — *Hornblende-quartz monzonite (Edon and Rose intrusions) and plagioclase-hornblende–porphyritic monzodiorite (intrusions to east).*

McEWAN CREEK PLUTON AND RELATED INTRUSIONS

EJMC — *Biotite-hornblende leucogranite, quartz monzonite; 183.5 ± 0.5 Ma (U-Pb).*

HOTAILUH BATHOLITH

EJMR — *McBRIDE RIVER PLUTON: massive to weakly foliated biotite-hornblende-quartz monzodiorite and granodiorite; 184 ± 8 Ma (U-Pb).*

LOWER AND LOWER MIDDLE JURASSIC
HAZELTON GROUP (units JHGf–JHv)

JHv — *Undivided volcanic and intercalated clastic rocks of the Hazelton Group; includes units* JHCu, JHMu, JHGm, JHGf.

JHMu — *Undivided Mount Brock volcanics (units* JHMm and JHMf*).*

JHSu — *Undivided Spatsizi Formation.*

JHCu — *Undivided Cold Fish Volcanics.*

LOWER TO MIDDLE TOARCIAN
MOUNT BROCK VOLCANICS (units JHMf and JHMm*)*

JHMm — *Mafic to intermediate lava flows, mainly subaerial, and minor felsic volcanic rocks, limestone, and sandstone.*

JHMf — *Felsic volcaniclastic rocks, including welded ignimbrite, with minor mafic volcanic rocks.*

PLIENSBACHIAN TO BAJOCIAN
SPATSIZI FORMATION (units JHSJ–JHSQ*)*

JHSQ — *QUOCK MEMBER: siliceous, well bedded, (?)tuffaceous siltstone, siltstone, and limy siltstone; black-, cream-, rusty-, and pink-weathering.*

JHSA JHSM JHSW JHSJ — *Lower members of Spatsizi Formation. ABOU MEMBER (*JHSA*): calcareous to siliceous organic shale, laminated, light-weathering. MELISSON MEMBER (*JHSM*): siliceous and calcareous siltstone and fine-grained sandstone. WOLF DEN MEMBER (*JHSW*): shale, dark grey- to black-weathering, with minor calcareous concretionary beds. JOAN MEMBER (*JHSJ*): siltstone, with minor mudstone, limestone, and local basal conglomerate.*

JURASSIC TO TERTIARY
CARTMEL STOCK

JTg — *Fine-grained hornblende granite, fine-grained hornblende±pyroxene quartz diorite, and medium-grained biotite-hornblende quartz monzonite.*

EARLY JURASSIC
SPATSIZI RIVER STOCK

EJSR — *Fine-grained alkali-feldspar granite; 190.7 +7.0/-7.8 Ma (U-Pb).*

LOWER JURASSIC
HAZELTON GROUP
LOWER PLIENSBACHIAN
COLD FISH VOLCANICS (units JHCe–JHCs*)*

JHCs — *Subaerial mafic lava flows interbedded with felsic air-fall tuff and nonwelded ignimbrite, minor felsic sills, welded ignimbrite, conglomerate, sandstone, shale, and subaqueous mafic lava.*

JHCm — *Marine mafic lava and minor sandstone, shale, limestone, tuff, and subaerial mafic lava. Thin units of limestone, minor siltsone, and shale are displayed on Map 2030A as* JHCl.

JHCf — *Felsic volcanic rocks, including sills, dykes, welded and nonwelded ignimbrite, air-fall tuff-breccia, and lava, with minor mafic lava and epiclastic rocks.*

JHCe — *Epiclastic and bioclastic rocks: lahar, breccia, conglomerate, sandstone, siltstone, shale, and limestone, with minor tuff and lava.*

PLIENSBACHIAN TO TOARCIAN

JHfv — *Felsic volcanic, volcaniclastic, and epiclastic rocks: includes breccia, conglomerate, feldspathic wacke, felsic volcanic sandstone, dark mudstone, and welded lapilli, ash and dust tuffs; volcanic rocks aphyric to locally quartz-feldspar-phyric, locally flow-banded (ca. 183 Ma).*

JHav — *Andesitic volcanic breccia and conglomerate: feldspar-hornblende–porphyritic, andesitic to dacitic debris flows and lahars, with minor flows; includes intercalated green and maroon epiclastic conglomerate and crystal lithic wacke; locally altered to epidote-chlorite-calcite or chlorite-calcite.*

JHmv — *Mafic to intermediate volcanic rocks: plagioclase microphyric amygdaloidal flows and pillow breccias; massive and columnar-jointed flows; local pillowed flows; includes intercalations of feldspathic wacke and siltstone.*

EARLY JURASSIC
RED STOCK AND RELATED INTRUSIONS (INCLUDES EALUE STOCK)

EJd — *Massive, equigranular pyroxene diorite.*

EJRmd — *Red Stock and related intrusions: hornblende monzonite, quartz monzonite porphyry; 203.8 ± 1.3 Ma (U-Pb); dykes (197.9 Ma, U-Pb) are hornblende-quartz diorite, monzodiorite, and monzonite.*

LOWER JURASSIC
HETTANGIAN
GRIFFITH CREEK VOLCANICS (units JHGf and JHGm*)*

JHGm — *Mafic lava flows, mainly with phenocrysts of plagioclase and augite or hornblende; minor welded ignimbrite and felsic sills, some hosting grains of feldspar, biotite, quartz, or hornblende.*

JHGf — *Felsic to intermediate sills, ignimbrite and air-fall tuff, some units rich in plagioclase, biotite, hornblende, or quartz; minor epiclastic rocks and mafic lava.*

LATE TRIASSIC TO TERTIARY

ƦTg — *Felsic to intermediate, fine- to coarse-grained intrusive rocks.*

UPPER TRIASSIC TO LOWER JURASSIC
(?)CARNIAN AND (?)NORIAN TO HETTANGIAN AND/OR LOWER SINEMURIAN

ƦJc, ƦJcl — *Conglomerate, sandstone, shale, mafic to intermediate volcanic breccia, and olistostrome; conglomerate clasts are mainly hornblende and plagioclase porphyry andesite, but include augite-phyric mafic lava and other volcanic rocks, felsic to intermediate granitoid rocks, and limestone (unit* ƦJcl*).*

ƦJu — *Undivided Hazelton Group, unit* JHCu*, Griffith Creek volcanics, unit* ƦJc*, and Stuhini Group.*

ƦJ ƦJl — *Undivided Stuhini Group, unit* ƦJc*, Griffith Creek volcanics, and rare beds of limestone (unit* ƦJl*).*

TRIASSIC
UPPER TRIASSIC
(?)CARNIAN TO NORIAN
STUHINI GROUP (units uƦSv, uƦSs, uƦSl, and lmƦS*)*

uƦSv — *Mafic lava flows, mainly aphyric to augite phyric, minor conglomerate, sandstone, mudstone, limestone, and olistostrome.*

uƦSs, uƦSl — *Mudstone, shale, sandstone and olistostrome, with minor conglomerate, mafic lava and limestone (unit* uƦSl*).*

LATE TRIASSIC
HOTAILUH BATHOLITH (units LƦCH, LƦBCs, and LƦBCd*)*

LƦBCs LƦBCd — *BEGGERLAY CREEK PLUTON:* LƦBCs*: massive biotite metasyenite.* LƦBCd*: massive hornblende-augite metadiorite and metagabbro; 218 ± 29 Ma (K-Ar).*

LƦCH — *CAKE HILL PLUTON: foliated hornblende-quartz monzodiorite, granodiorite, monzodiorite, and quartz monzonite; 221 ± 3 Ma (U-Pb; sample site is north of map area).*

STIKINE BATHOLITH

LƦS — *Undivided rocks of the Stikine Batholith.* LƦSm*: biotite-hornblende-quartz monzodiorite, monzodiorite, and diorite.* LƦSq*: biotite-hornblende-quartz monzonite and granite.*

LƦb — *Augite metagabbro.*

MIDDLE TO LATE TRIASSIC
RAILWAY PLUTON AND RELATED INTRUSIONS

ƦRm — *Biotite-augite metamonzodiorite; 227 ± 9 Ma (U-Pb).*

LOWER AND MIDDLE TRIASSIC
STUHINI GROUP

lmƦS — *Metabasalt, meta-andesite, breccia, tuff, flows, phyllite, and argillite.*

PALEOZOIC

CARBONIFEROUS TO PERMIAN

CPm — *White marble.*

CPc — *Massive, white and grey, bedded limestone.*

EARLY CARBONIFEROUS
MISSISSIPIAN

EMgd — *Granodiorite, quartz diorite, diorite, quartz monzonite, and tonalite; ca. 353–342 Ma (U-Pb).*

lMvs — *Metavolcanic and metasedimentary rock: includes green chlorite phyllite, brown phyllitic argillite, and grey-green to tan quartz-sericite schist (felsic metavolcanic rocks are ca. 342 Ma U-Pb).*

CARBONIFEROUS AND (?)OLDER

Pv — *Dark and light green phyllitic greenstone, light green and grey phyllite, minor chert, and rare limestone (may include unit* lMvs*).*

Pg — *Mylonitic to massive biotite-muscovite leucogranite, leucogranodiorite, biotite-hornblende quartz diorite, and tonalite with minor hornblende-augite gabbro.*

G — *Gossan.*

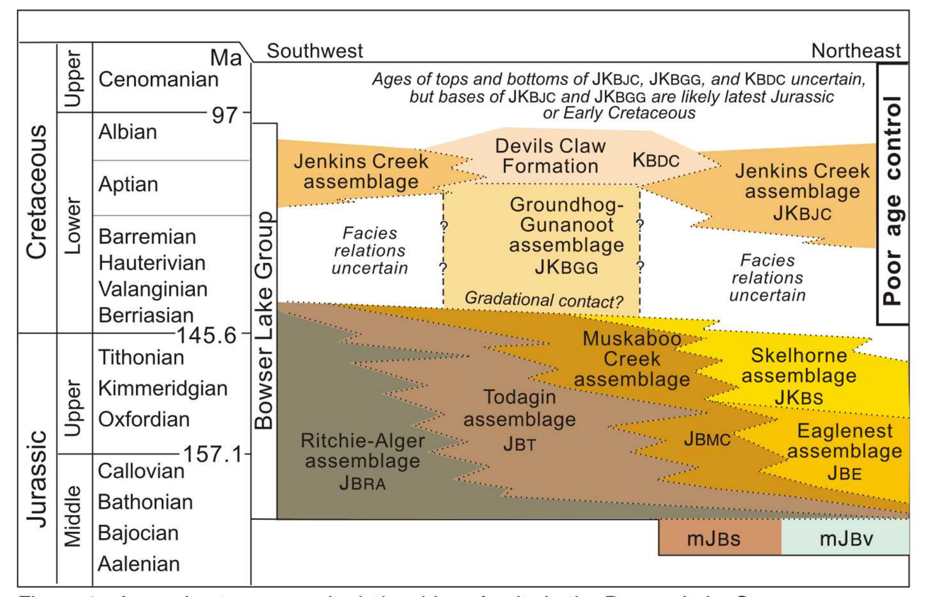


Figure 1. Approximate ages and relationships of units in the Bowser Lake Group

Geological boundary (defined, approximate, assumed or inferred beneath unit Q)

Trace of individual beds from ground observation and airphoto interpretation

Fault, unknown displacement (defined, approximate, assumed or inferred beneath unit Q)

Thrust fault (defined, approximate, assumed or inferred beneath unit Q); symbol on hanging-wall side

Normal fault (defined, approximate, assumed or inferred beneath unit Q); symbol on downthrown side

Steeply dipping fault, dip unknown (defined, approximate, assumed or inferred beneath unit Q); U *on upthrown side,* D *on downthrown side* — U / D

Anticline, trace of axial surface (defined, approximate, overturned); arrow on line indicates direction of plunge

Syncline, trace of axial surface (defined, approximate); arrow on line indicates direction of plunge

Syncline, overturned, trace of axial surface (defined, approximate); arrow on line indicates direction of plunge

Open, inclined anticline, trace of axial surface (defined, approximate); long arrow points in direction of dip of axial surface

Open, inclined syncline, trace of axial surface (defined, approximate); long arrow points in direction of dip of axial surface

Bedding (horizontal, inclined, vertical, overturned) — 30, 25

Cleavage (inclined) — 20

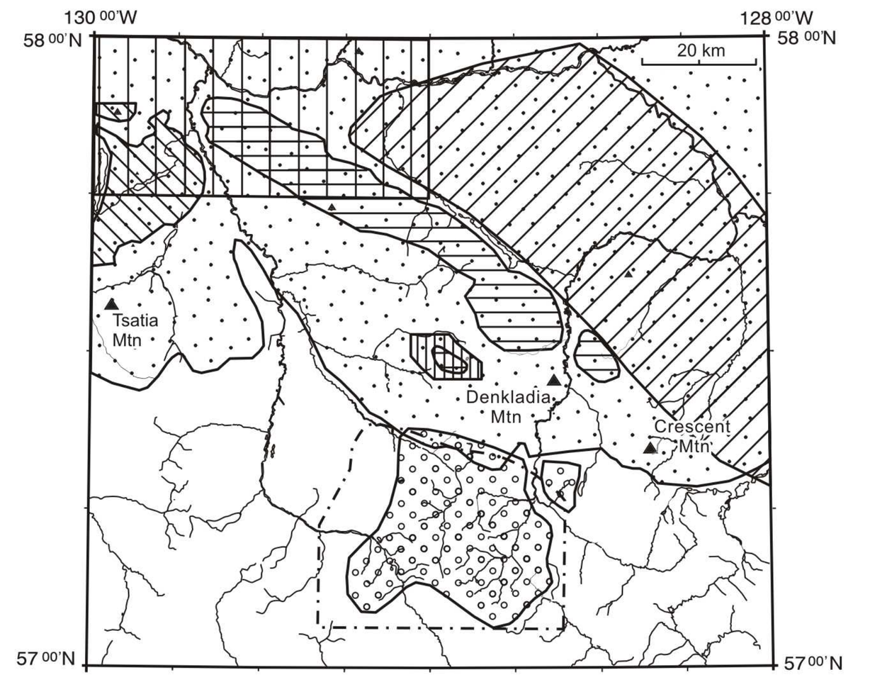
Maitland Volcanics necks (Pliocene)

Spatsizi Plateau Wilderness Provincial Park boundary

Road, track, trail

Conglomerate

Icefield



Previous map of entire area was by Geological Survey of Canada (1957).

- Eisbacher (1974)
- Gabrielse and Tipper (1984)
- Thomson et al. (1986)
- Koo (1986)
- Moffat (1985); includes many of the sections studied by MacLeod (1991), and Cookenboo (1989, 1993)
- Read and Psutka (1990), Read (1984)
- Thorkelson (1992)
- Ash et al. (1997)

Sources of information for this compilation are mapping by C.A. Evenchick, 1985–1990, 1992; D.J. Thorkelson, 1986, 1987; P.S. Mustard, 1988, 1992; C.F. Roots, 1988; G.M. Green, 1989, 1990, (1992); and maps of the areas shown above.

See Evenchick and Thorkelson (in press) for details of U-Pb and K-Ar ages.

Dates in parentheses are years of publications. Other dates are years of fieldwork from which fieldnotes are the source of information.

Figure 2. Sources of information

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