British Columbia Geological Survey Geoscience Map 2025-02

Surficial geology of the Nanitsch Lake area, British Columbia (NTS 94D/1)

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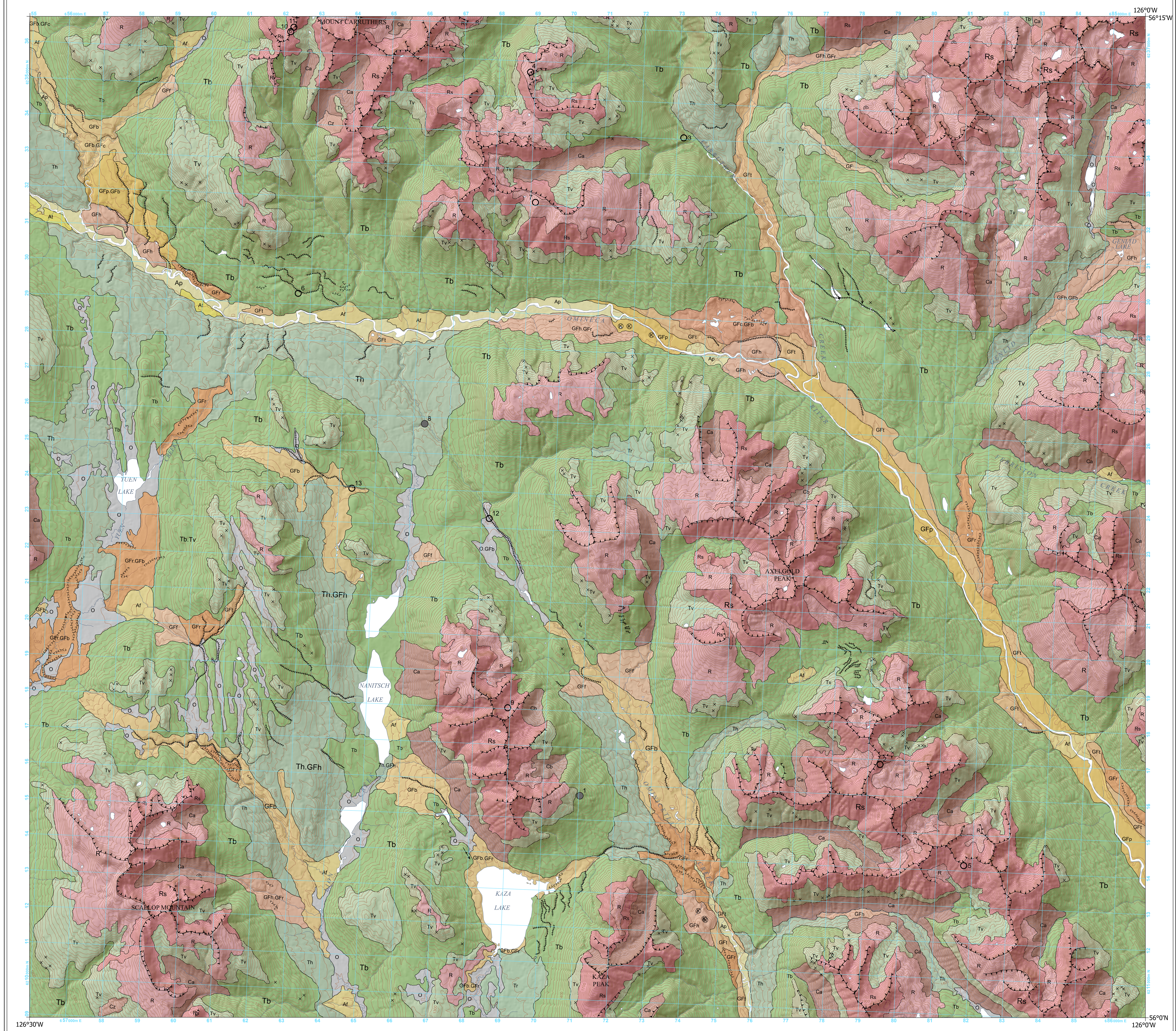


Kilometres 0 1 2 3 4 5

Scale 1:50,000

Cartography by K. Szponarski.

Note: Where surficial geology map units consist of multiple materials, a compound map unit designator is used. These compound designators note areally more extensive and less extensive surficial materials joined with a '.' (e.g., Cv.R where Cv is more extensive than R). We used the surficial geology data model of Deblonde et al. (2024) and definitions for surficial materials and surface expressions in Howes and Kenk (1997).

QUATERNARY SURFICIAL DEPOSITS
NONGLACIAL ENVIRONMENT

O — ***Organic deposits:*** peat and other plant material in various stages of decomposition; generally in flat and wet terrain over poorly drained substrates; may include minor fluvial and lacustrine sediments; most common in valley bottoms in transition zones between tree stands and water bodies; rare at high elevations.

Colluvial and mass wasting deposits
Rubble and diamicton, poorly sorted, massive to stratified. Composition is dependent on source material. Deposited directly by gravity-induced movement.

Ca — ***Colluvial apron and talus slope:*** diamicton and rubble sourced from steep upslope bedrock exposures; 1 to 10 m thick but locally >10 m near the base of tall slopes; typically a series of colluvial cones (slope gradient >15°) that have merged into a relatively homogeneous slope.

Cz — ***Landslide deposit:*** diamicton, rubble, and blocks; hummocky and ridged topography; can be >10 m thick; typically forms hummocky topography; includes inactive and active landslides.

Cb — ***Colluvial blanket:*** sand, rubble, and diamicton; >2 m thick; topography is predominantly controlled by the underlying material and masks minor irregularities; typically overlies till or bedrock; occurs on moderate to steep slopes.

Alluvial deposits: Gravel, sand, minor silt, and organic material, commonly stratified. Deposited by modern streams.

Ap — ***Alluvial floodplain:*** sorted sand and gravel with minor silt; >2 m thick; local and discontinuous organic veneers; forms low-relief planar surfaces near modern rivers; prone to flooding.

Af — ***Alluvial fan:*** poorly sorted gravel, sand, and diamicton; >2 m thick; stratified; slope gradient <15°; occur where a stream issues from a narrow valley onto a plain or valley floor; a potential aggregate source.

At — ***Alluvial terrace:*** sorted gravel, sand, and minor silt; >2 m thick; inactive terraces perched above modern floodplain; a potential aggregate source.

PROGLACIAL AND GLACIAL ENVIRONMENTS

Glaciofluvial Deposits: Sand and gravel with minor diamicton, well to poorly stratified. Deposited by glacial meltwater. All deposit types are potential aggregate sources.

GFp — ***Glaciofluvial outwash plain:*** sand and gravel; 1 to >10 m thick; massive to bedded; generally forms flat surfaces sloping away from direction of glacier retreat.

GFt — ***Glaciofluvial terrace:*** sand and gravel; 1 to 10 m thick; forming gently sloping flat surfaces perched above meltwater channels or modern streams and alluvial deposits.

GFf — ***Glaciofluvial fan:*** sand and gravel; bedded; 1 to >10 m thick with a slope gradient <15°; deposited at the mouth of meltwater channels immediately following deglaciation.

GFh — ***Hummocky glaciofluvial:*** poorly sorted sand and gravel with minor diamicton; bedded to massive; 1 to >20 m thick; deposited in contact with a retreating glacier; forms hummocky topography related to melting of buried ice.

GFc — ***Glaciofluvial ice-contact:*** poorly sorted sand and gravel; >2 m thick; hummocky ridged and kettled surface expressions; locally with discontinuous glaciolacustrine sediments in areas that were ponded; a product of ice stagnation, typically in low-relief valley bottoms.

GFr — ***Esker:*** sand and gravel; massive to bedded; 3 to >5 m thick; deposited by meltwater flowing in tunnels in interior of glacier or in channels at base; forms sinuous ridges.

GFb — ***Glaciofluvial blanket:*** sand and gravel; >2 m thick; occurs near the margins and at the mouth of meltwater channels; forms gently undulating to flat surfaces.

GF — ***Glaciofluvial undifferentiated:*** sand and gravel units too small to be represented at the scale of mapping.

Till Deposits: Diamicton consisting of clasts of all sizes and diverse rock types in a sandy to silty sand matrix. Deposited directly by glaciers and may be modified by modern periglacial processes. On steep slopes, primary features may be modified by slope creep. Mostly deposited by the Cordilleran Ice Sheet during the Late Wisconsinan Fraser Glaciation. Holocene tills deposited by cirque glaciers are included in this unit.

Th — ***Hummocky till:*** sand- and gravel-rich diamicton; >2 m thick; hummocky to rolling surface with moderate to steep slopes and local relief of 1 to 10 m; locally may contain glaciolacustrine and glaciofluvial sediments between hummocks; a product of ice stagnation.

Tr — ***Ridged till:*** diamicton; >2 m thick; includes discontinuous elongate ridges interpreted as moraines, roughly oriented perpendicular to ice-flow direction; local relief of 1 to 2 m.

Tv — ***Till veneer:*** diamicton; <2 m thick; surface expression mimics underlying topography; on moderately steep slopes and at high elevations; may be modified by creep processes; can be discontinuous and include abundant bedrock outcrops.

Tb — ***Till blanket:*** diamicton; >2 m thick; continuous till cover forming undulating topography that locally obscures underlying units; rare bedrock outcrops.

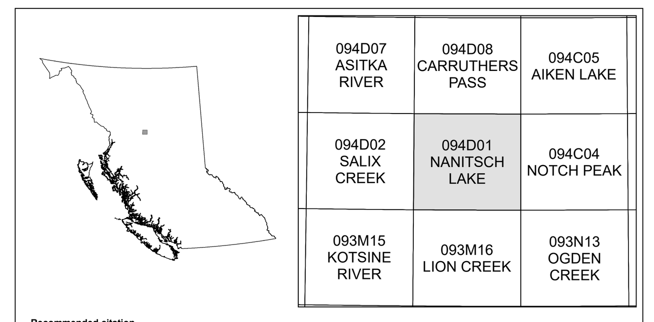
PRE-QUATERNARY

Bedrock: Mainly igneous intrusive rocks of northern Hogem batholith (Jurassic to Cretaceous). Also metamorphosed volcanic and sedimentary rocks and less common intrusive rocks of Quesnel and Stikine terranes and metamorphic and ultramafic rocks of Cache Creek terrane (Ootes et al., 2020a).

R — ***Bedrock:*** bedrock outcrop; locally includes areas of colluvium and till generally <2 m thick; extensively frost shattered at higher elevations; commonly exposed on steep slopes and in alpine environments.

Rs — ***Steep bedrock slopes:*** bedrock outcrop with loose blocks of local bedrock on steeply sloping terrain (>30°); patchy cover of till and colluvium (<2 m thick) increases downslope.

Rock glacier
Kettle
Meltwater Channel:
Minor (flow direction unknown)
Minor (flow direction known)
Esker ridge
Crag-and-tail ridge; paleo ice-flow direction indicated
Cirque headwall
Arête
Small bedrock outcrop
Station (ground observation)
Geological contact (defined)
Mineral occurrence (see Table 1; numbers indicate Map ID)
Prospect
Showing



Recommended citation
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North American Datum 1983 (CSRS)
Universal Transverse Mercator Zone 9 North
Shaded relief image derived from the digital elevation model supplied by Natural Resources Canada.
Illumination: azimuth 315°, altitude 45°, vertical factor 1x.
Base map at the scale of 1:50 000 from GeoBC, with modifications.
Contour interval 20 metres. Elevations in metres above mean sea level.

Table 1. Mineral occurrences from MINFILE database (MINFILE, 2025. Abbreviated deposit type designations (e.g., L03) follow deposit descriptions detailed in Lefebure and Jones (2020).

Map ID	MINFILE No.	Name	Status	Commodity	Deposit Type
1	094D 032	NORTHSTAR	Prospect	Cu, Ag, Au	D03: Volcanic redbed Cu
2	094D 035	NERO 5	Showing	Ti, Cu	M04: Magmatic Fe-TiV oxide deposits
3	094D 060	CARRUTHERS CREEK	Showing	Cr	M03: Podiform chromite
4	094D 066	ARP	Showing	Cu	D03: Volcanic redbed Cu
5	094D 110	PGM	Showing	Ti, Cu	M02: Tholeiitic intrusion-hosted Ni-Cu
6	094D 112	NORMAN	Showing	Cu	uknown
7	094D 122	LEISHMAN	Showing	Cu	D03: Volcanic redbed Cu
8	094D 123	FORKS	Prospect	Au, Cu, Ag, Zn, Pb	D03: Volcanic redbed Cu
9	094D 191	KAZA 2	Showing	Cu, Ag, Au	D03: Volcanic redbed Cu
10	094D 208	LOO19-4-4	Showing	Cu, Au, Ag	I06: Cu-Ag quartz veins
11	094D 209	LOO19-4-2	Showing	Cu	I06: Cu-Ag quartz veins
12	094D 233	EAST CREEK	Showing	Cu	L04: Porphyry Cu-Mo -Au
13	094D 234	THIRD SHOWING	Showing	Cu, Ag	I06: Cu-Ag quartz veins

Descriptive notes

In 2018, the British Columbia Geological Survey initiated a multi-year program integrating 1:50,000-scale bedrock and surficial geological mapping for northern Hogem batholith. New bedrock mapping refined the origin and timing of batholith emplacement and base- and precious-metal mineralization (Ootes et al., 2019a, b, 2020a; Jones et al., 2021), and new surficial geology mapping detailed the ice-flow history (Ferbey and Elia , 2021). The present series of 1:50,000-scale surficial geology maps is for the Notch Peak (NTS 94C/4), Aiken Lake (NTS 94C/5), Nanitsch Lake (NTS 94D/1), and Carruthers Pass (NTS 94D/8) map areas.

The Cordilleran Ice Sheet covered the Hogem batholith area during the Late Wisconsinan glacial maximum when ice flowed east and southeast across the region from an ice divide above the Skeena Mountains. During this stage, ice flow was independent of valley floor topography and glaciers were able to move over low-elevation topographic divides, transporting glacial debris into adjacent drainages (Ryder and Maynard, 1991; Clague and Ward, 2011). Glacially streamlined or eroded landform- and outcrop-scale indicators are commonly aligned parallel with valleys, indicating that ice flow direction was still controlled by steep, high-elevation valley walls for most of the Late Wisconsinan.

Overconsolidated subglacial tills were deposited in the area during full-glacial conditions as till blankets, streamlined tills, and till veneers. During deglaciation, less consolidated melt-out tills were deposited as hummocky tills. Significant volumes of glacial meltwater flowed through the area during deglaciation, transporting coarse-grained sands and gravels. Much of this transport and deposition was subaerial (forming extensive outwash plains and terraces) but a component was subglacial (forming eskers) or in contact with stagnant ice blocks (producing hummocky sands and gravels). Colluvial deposits are common along the base of steep slopes and are now vegetated and stable, but talus aprons and cones are still actively being constructed. Solifluction lobes and rock glaciers are currently active, predominantly on north-facing slopes. Organic deposits occur throughout the study area, mostly as narrow transition zones between tree stands and water bodies. These deposits can be extensive along the floors of retreat-phase glaciofluvial meltwater channels.

Subglacial till, the ideal sample medium for till geochemistry and mineralogy surveys in mineral exploration (Levson, 2001), is common in valley bottoms and covering lower hillslopes. Although bedrock is well-exposed at high elevation, small, isolated outcrops, which may be overlooked, are common along valley bottoms and on forested hill flanks.

References cited

Clague, J.J., and Ward, B.C., 2011. Pleistocene Glaciation of British Columbia. In: Ehlers, J., Gibbard, P.L., and Hughes, P.D., (Eds.), Developments in Quaternary Science, 15, Amsterdam, pp. 563-573.

Deblonde, C., Campbell, J.E., Chow, W., Cocking, R.B., Huntley, D.H., Parent, M., Rice, J.M., Robertson, L., Smith, I.R., Weatherston, A., and Zawadzka, K., 2024. Surficial data model: the science language of the integrated Geological Survey of Canada data model for surficial geology maps. Geological Survey of Canada, Open File 8236, ver. 2.5.1., 9 p.

Ferbey, T., and Elia, E.A., 2021. Preliminary surficial geology of the northern Hogem batholith area, north-central British Columbia. In: Geological Fieldwork 2020, British Columbia Ministry of Energy, Mines and Low Carbon Innovation, British Columbia Geological Survey Paper 2021-01, pp. 57-64.

Howes, D., and Kenk, E., (Eds.), 1997. Terrain classification system for British Columbia (Version 2). Ministry of Environment, Lands and Parks, Province of British Columbia. Ministry of Environment Manual 10, 101 p.

Jones, G., Ootes, L., Milidragovic, D., Friedman, R., Camacho, A., Luo, Y., Vezinet, A., Pearson, D.G., and Schiarizza, P., 2021. Geochronology of northern Hogem batholith, Quesnel terrane, north- central British Columbia. In: Geological Fieldwork 2020, British Columbia Ministry of Energy, Mines and Low Carbon Innovation, British Columbia Geological Survey Paper 2021-01, pp. 37-56.

Lefebure, D.V., and Jones, L.D., (Compilers), 2020. British Columbia Geological Survey mineral deposit profiles, 1995 to 2012; updated with new profiles for VMS, porphyry, and mafic-ultramafic deposits. British Columbia Ministry of Energy, Mines and Low Carbon Innovation, British Columbia Geological Survey GeoFile 2020-11, 652 p.

Levson, V.M., 2001. Regional till geochemical surveys in the Canadian Cordillera: sample media, methods, and anomaly evaluation. In: McClenaghan, M.B., Bobrowsky, P.T., Hall, G.E.M. and Cook, S.J., (Eds.), Drift Exploration in Glaciated Terrain; Geological Society, Special Publication, No. 185, pp. 45-68.

MINFILE, 2025. MINFILE mineral inventory. British Columbia Ministry of Energy, Mines and Low Carbon Innovation, British Columbia Geological Survey, MINFILE digital data, December 2025 update.

Ootes, L., Bergen, A., Milidragovic, D., Graham, B., and Simmonds, R., 2019a. Preliminary geology of northern Hogem batholith, Quesnel terrane, north-central British Columbia. In: Geological Fieldwork 2018, British Columbia Ministry of Energy, Mines and Petroleum Resources, British Columbia Geological Survey Paper 2019-01, pp. 31-53.

Ootes, L., Bergen, A.L., Milidragovic, D., and Graham, B., 2019b. Bedrock geology of Notch Peak and Ogden Creek (parts of NTS 094C/04 and 093N/13), northern Hogem batholith, Quesnel terrane, north-central British Columbia. British Columbia Ministry of Energy, Mines and Petroleum Resources, British Columbia Geological Survey Open File 2019-02, scale 1:50,000.

Ootes, L., Bergen, A.L., Milidragovic, D., Jones, G.O., Camacho, A., and Friedman, R., 2020a. An update on the geology of northern Hogem batholith and its surroundings, north-central British Columbia. In: Geological Fieldwork 2019, British Columbia Ministry of Energy, Mines and Petroleum Resources, British Columbia Geological Survey Paper 2020-01, pp. 25-47.

Ootes, L., Bergen, A.L., Milidragovic, D., and Jones, G.O., 2020b. Bedrock geology of northern Hogem batholith and its surroundings, north-central British Columbia. British Columbia Ministry of Energy, Mines and Petroleum Resources, British Columbia Geological Survey Open File 2020-02, scale 1:50,000.

Ryder, J.M., and Maynard, D., 1991. The Cordilleran Ice Sheet in northern British Colombia. Géographie physique et Quaternaire, 45, 355-363.