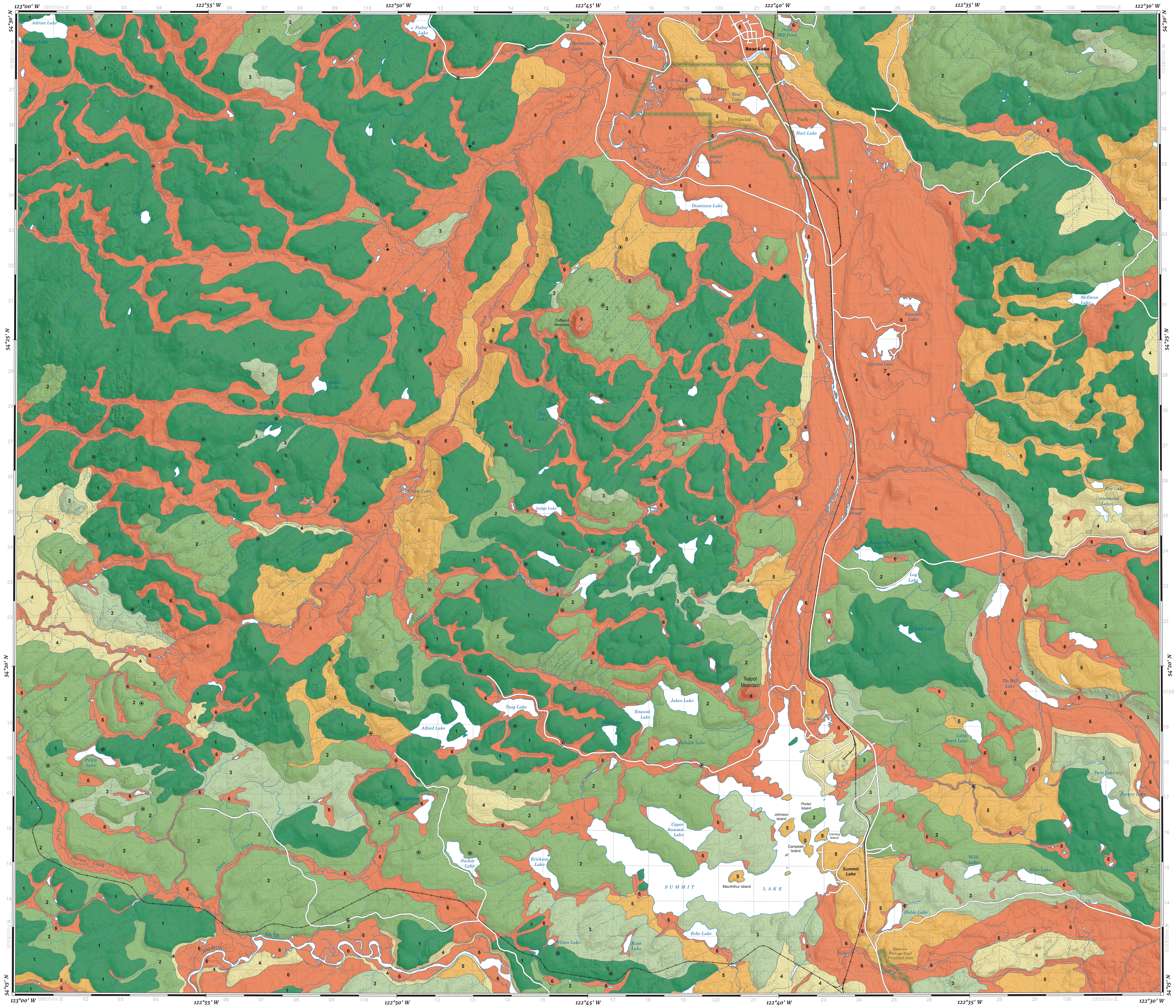


North American Datum 1983
Shaded relief and contour lines derived from the digital elevation model supplied by Natural Resources Canada. Illumination: azimuth 315°, altitude 45°, vertical exaggeration 1x.
Base map at the scale of 1:50 000 from Natural Resources Canada, with modifications.
Contour interval 10 metres. Elevations in metres above mean sea level.

ONE THOUSAND METRE GRID
UNIVERSAL TRANSVERSE MERCATOR GRID
ZONE 10 NORTH

GRID NORTH 0°12' EAST OF TRUE NORTH.
APPROXIMATE MEAN MAGNETIC DECLINATION 2021 FOR CENTRE OF MAP IS 16°59' EAST, DECREASING ANNUALLY 12.9'

Disclaimer: whilst every effort has been taken to ensure the accuracy of the information on this map, the data are provided 'as-is', without any warranty, guarantee, or representation of any kind, whether expressed or implied. It is the responsibility of the user to check the facts before enetering any financial or other commitment based upon this information. This map is not intended for navigation purposes.

Geoscience BC Map 2021-03-05b

Till sampling suitability of the Summit Lake area NTS 093J/07, British Columbia

Geology by D. Sacco and D. Cronmiller

1 0 1 2 3 4 5
KILOMETRE SCALE

Scale 1:50,000

Cartography by B. Elder

Geoscience BC

Palmer™

Legend

TILL SAMPLING SUITABILITY (TSS) CLASSIFICATION

TSS class	Description	Surficial geology map unit example*	Implications for exploration
High (1)	All subglacial till.	**Tb; Tv**	Surface sediment is composed entirely of subglacial till suitable for sampling or veneers of subglacial till punctuated by outcrop. Optimal conditions for till sampling. Historical samples are likely subglacial till.
Moderately high (2)	Dominantly subglacial till; all subglacial till with localized reworking.	**Tb.O; Ts-RW_min**	Majority of polygon area is composed of subglacial till suitable for sampling. Till polygons with the minor reworking (RW_min) overlay are interpreted to include localized areas of reworking, predominantly by meltwater processes. Till sampling can be planned throughout the majority of polygon; target topographic highs to avoid localized reworking. Historical samples are likely subglacial till.
Moderate (3)	Dominantly subglacial till with localized reworking; dominantly another surficial material with lesser amounts of subglacial till; subglacial till overlain by a veneer of another material.	**Tb.GFv-RW_min; Ap.Tv; Cv/Tb**	Unmodified subglacial till suitable for sampling ranges from the minor component up to roughly half of the polygon area. Suitable subglacial till may be overlain by a veneer of colluvium, organics, or glaciolacustrine sediments. Unmodified till may be found on topographic highs and away from meltwater channels.
Moderately low (4)	All subglacial till with major reworking; dominantly another surficial material with lesser amounts of subglacial till that has been locally reworked; undulating ablation till.	**Tb-RW_maj; GFv.Ts-RW_min; Tu**	Subglacial till is commonly affected by meltwater or overlain by ablation till in these units; suitable till for sampling will be difficult to locate. Meltwater has potential to concentrate heavy minerals or remove the fine fraction completely. Suitable till may be located by targeting topographic highs and in deposits down-ice from topographic highs that may have been partially protected. Drill-supported sampling may yield unmodified till samples where surface materials are sufficiently thick (*e.g.*, Tb). Ablation till (*e.g.*, Tu) is typically sourced from greater distances than subglacial till, assumed to have an inherent degree of reworking by meltwater and should be avoided. Tu may be sufficiently thin in some areas that underlying subglacial till can be accessed in deeper road or stream cuts.
Low (5)	Any amount of subglacial till with major reworking; Dominantly undulating ablation till or all hummocky ablation till.	**Tb.GFh-RW_maj; GLv.Ts-RW_maj; Tu.O; Th**	*In situ* subglacial till comprises a small proportion of these polygons; reworking by glacial or modern processes is common. Unmodified subglacial till may occur at depth in thicker till deposits that have been affected by meltwater or where it is stratigraphically overlain by other materials. Unmodified till is most likely to occur on topographic highs.
Very low (6)	No mapped till.	**Ap.O; GFh.R**	Unlikely to locate till for sampling; these units should be avoided in till sampling programs and historical analytical data from samples may not be suitable tot evaluate local mineral potential. Drill-supported till sampling may be useful in areas where subglacial till is likely to occur at depth (*e.g.*, beneath thick glaciolacustrine or ablation till deposits).

**For full explanation of surficial geology classification see companion map publication "Surficial geology of the Summit Lake map area (NTS 093J/07), British Columbia, Geoscience BC map 2021-03-05a"*

ONSITE SYMBOLS

Till sample site
Mineral occurrence (see Table 1; numbers indicate Map ID)
- Past Producer
- Prospect
- Developed Prospect
- Showing

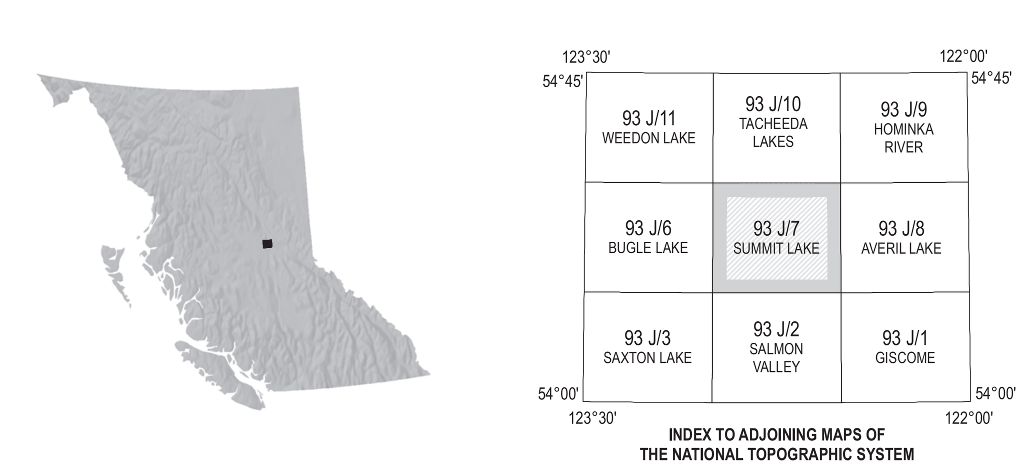
Park or protected area
Road[1]
Rail line
Stream[2]
- Definite
- Intermittent or indefinite

1 - Roads displayed on map are from the CanVec 1:50k database (Natural Resources Canada) and do not include the extensive gravel forest service road network present in the area.

2 - Classification provided by BC Freshwater Atlas.

Table 1. Mineral occurrences from MINFILE database (MINFILE, 2020). Letter and number designation under deposit type correspond to definitions provided by Lefebure and Ray (1995) and Lefebure and Höy (1996).

Map ID	MINFILE No.	Name	Status	Commodity	Deposit Type
1	103I004	LAKELSE□	Showing	Hot spring, Li	T02: Geothermal spring
2	103I010	AUTUMN	Showing	Cu, Ag, Au, Fe, Limestone	L01: Subvolcanic Cu-Ag-Au (As-Sb)
3	103I013	LADY LUCK	Prospect	Zn, Cu, Mo, Pb, Ag, Fe	K02: Pb-Zn skarn K01: Cu skarn
4	103I123	LADY LUCK 7	Showing	Cu, Mo	K01: Cu skarn K07: Mo skarn
5	103I124	LUCKY FORTUNE	Showing	Cu, Mo, Fe	K01: Cu skarn K07: Mo skarn
6	103I126	IRON CAP	Showing	Fe, Cu	K03: Fe skarn K01: Cu skarn
7	103I192	HAL	Showing	Cu, Mo, Zn, Fe	K01: Cu skarn K07: Mo skarn



INDEX TO ADJOINING MAPS OF THE NATIONAL TOPOGRAPHIC SYSTEM

Descriptive Notes

The mapping presented here is part of a series of surficial geology, till sampling suitability, and drift thickness maps completed for Geoscience BC's **C**entral **I**nterior **C**opper-**G**old **R**esearch **(CICGR)**: Surficial Exploration Project (See index map). The purpose of this map series is to inventory and characterize surficial materials and landforms to inform resource exploration (*e.g.*, mineral, water and aggregate) and infrastructure development in British Columbia. The surficial geology interpretations follow standardized mapping protocols defined by the Geological Survey of Canada (Deblonde *et al.*, 2018) and used by the British Columbia Geological Survey, ensuring accordance with existing and ongoing surficial geology mapping produced by the government. Polygons are delineated based on surficial material and morphology, and overlays are used to indicate geomorphological processes. Features such as bedrock outcrop or glaciofluvial landforms that are too small to delineate as polygons are identified using point and line symbols. The surficial geology was interpreted from 1.5 m resolution colour and near-infrared SPOT satellite imagery. Pseudo-stereo models were produced from the imagery using the Canadian Digital Elevation Model (Natural Resources Canada, 2015). The till sampling suitability mapping builds on earlier drift exploration potential maps developed by Proudfoot *et al.* (1995) and basal till potential mapping (*e.g.*, Sacco *et al.*, 2014; Ferbey, 2014).

This map series was initiated to streamline the CICGR regional till geochemical and mineralogical sampling program. Subglacial till is ideal for assessing bedrock hosted mineral potential in areas covered by Quaternary sediments because it is commonly the first derivative of bedrock (Shilts, 1993), it has a relatively simple and predictable transport history related to ice-flow directions, and geochemical and mineralogical anomalies in till are more extensive than its bedrock source (Levson, 2001). This mapping focuses on identifying discrete occurrences of subglacial till to guide exploration programs. In central British Columbia, it is specifically important to distinguish subglacial till facies from ablation till facies, as ablation till has a more complex transport and depositional history and, therefore, is less suitable for mineral exploration.

Till sampling suitability is derived from the surficial geology interpretations. Each mapped polygon is attributed a suitability using a multi-class index that considers the proportions of surficial materials and geomorphological processes that have affected them. Suitability ratings are ultimately a function of the proportion of a polygon that contains *in situ* subglacial till that is suitable for sampling. This helps to inform the planning and execution of till sampling surveys by identifying areas where subglacial till can be readily sampled and areas where extra efforts or alternative sampling methods or materials may be required.

Drift thickness mapping provides an indication of the relative thickness of Quaternary sediment cover based on the results of the surficial geology interpretations. Drift thickness estimations consider the interpreted surface expression of map units (polygons) and the potential for preserved stratigraphic sequences. Stratigraphic sequences are assumed where depositional environments were non-erosional and pre-existing materials are likely preserved (*e.g.*, beneath glaciolacustrine sediments and ablation till). The interpretations have not been calibrated with known depths to bedrock. Drift thickness maps can be used to inform bedrock mapping and prospecting programs because they identify areas where bedrock outcrops are likely present or where bedrock is overlain by shallow cover and may be accessed with hand tools. This mapping can also be used in combination with till sampling suitability to identify areas where drilling or trenching may be required to sample till, or provide information such as ice flow direction for drift-based exploration programs.

The glacial landforms of the Summit Lake map area (NTS map sheet 093J/07) were previously mapped at a reconnaissance scale by Tipper (1971). The map area lies primarily within the Fraser Basin, with small areas in the southeast and southwest that are within the Nechako Plain, which are physiographic subdivisions of the Interior Plateau (Holland, 1976). The region is characterized by flat to gently rolling topography with surface elevation between approximately 700 m and 1130 m. Thick glacial sediments cover much of the region and exposed bedrock is extremely rare. Streamlined till (**Ts**) is prevalent throughout the map area and is commonly dissected by northwest-southeast-oriented ice-marginal meltwater channels that demarcate the pattern of ice front retreat. Glacial lakes previously inundated low-lying regions in the southern part of the map area depositing various thicknesses of glaciolacustrine material. A large glaciofluvial system extends north across the map area from Summit Lake. The initial formation of this system may have been associated with northern ice-marginal drainage, and then reactivated when the glacial lakes formed and spilled north over the local drainage divide. Ablation till (**Tu, Th**) is rare in the area, but was interpreted in association with the glaciolacustrine sediments, suggesting that stagnant ice may have impounded the glacial lakes. The abundance of streamlined landforms and northwest-southeast-trending ice-marginal meltwater channels suggest the dominant northeast ice-flow direction was maintained throughout deglaciation.

The Summit Lake map area is well suited to till sampling. Subglacial till occurs throughout most of the map area with only minor obstruction by narrow glaciofluvial deposits and meltwater reworking. Till sampling suitability is poor within the more extensive north-trending glaciofluvial system where continuous glaciofluvial sediments occur and preservation potential for underlying till is low. Subglacial till is likely preserved beneath glaciolacustrine sediments due to the non-erosive nature of their deposition. Machine-assisted till sampling may be effective in accessing buried subglacial till in these areas.

Acknowledgements
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Recommended citation
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