



S	Y	M	В	0	L

Unit Boundary (defined, approximate, assumed)
Avalanche track
Debris flow track
Earthflow (displacement direction known)
Terrace scarp
Cirque
Meltwater scoured bedrock (flow direction known)
Meltwater channel (small, large)
Fluting
Drumlin (long drumlins shown by two or more symbols)
Moraine
Linear bedrock ridge
Roche moutonnée
Striation (ice flow direction known; unknown; older = 1, younger = 2, no numbers = age relationship unknown)
Major gravel pit
Stratigraphic section
Drill hole
Glaciers

**DESCRIPTIVE NOTES** 

## GLACIAL HISTORY OF THE NASS RIVER REGION

(Maps 103P/NW and 103P/SW) Surficial geology mapping, shallow seismic reflection, ground penetrating radar and drilling were used to determine the stratigraphy of the Nass Valley and the glacial history of the Nass River region. At the height of the last glaciation, ice flowed southwest over the entire region. It deposited a compact till called 'Kwinatahl Till'. This till is dominated by Bowser Lake Group metasedimentary rocks which outcrop in the eastern part of the map area. Kwinatahl Till deposits can be more than 50 m thick. As ice thinned during deglaciation, it became confined to valleys and fiords. 'Kinskuch Till', a till containing rounded clasts and volcanic material, formed in the northeastern part of the study area at this time (map 103P/NW). Kinskuch Till overlies Kwinatahl Till and occurs in an area of drumlinized terrain.

Sea level rise at the start of deglaciation caused calving and rapid retreat of glaciers in fiord areas. The maximum marine limit was 230 m above present sea level. This sea level is thought to have been achieved around 10 200 years BP, and was followed by rapid deglaciation and rapid sea level fall. Interbedded gravel, sand and silt were deposited subaqueously at this time in ice-proximal glaciomarine environments. These deposits grade distally to massive silty clay. Apparently, there were no stillstands; proximal to distal depositional environments migrated as the ice margins retreated. Distal silty clay deposits in the Nass Valley can be up to 25 m thick.

Eventually, ice became grounded as valley glaciers retreated and sea level dropped. Extensive meltwater braidplains formed in front of the glaciers, terminating in marine water and forming large deltas. These deltas and braidplains record sea levels of 185, 150 and 135 m, of which the 150 m highstand was the longest lived. In the upper Nass Valley, one such braidplain formed during the 185 m highstand. This was succeeded by an extensive braidplain that formed northeast of the town of New Aiyansh when sea level had dropped to 150 m. The meltwater river then moved back to its original location (further west) when sea level was at 135 m, forming a small braidplain southwest of the 185 m braidplain. Sea level then fell to is current level. The meltwater river evolved into the modern Nass River and assumed its current course, which incises the 185 m

and 135 m braidplains. The most complete Quaternary stratigraphic sequence is found in the Nass Valley. Less complete sequences occur elsewhere in the study area. From oldest to youngest, the region's stratigraphy comprises bedrock, till, glaciomarine proximal deposits, glaciomarine distal deposits and glaciofluvial braidplain/braid delta deposits. Holocene peat bogs, colluvium and alluvium overlie all of these units.

> BRITISH COLUMBIA OF3901 Sheet 2

**OPEN FILE 3901** 

SURFICIAL GEOLOGY NASS VALLEY **BRITISH COLUMBIA** 

Scale 1:100 000/ Échelle 1/100 000 Projection transverse universelle de Mercator Universal Transverse Mercator Projection Système de référence géodésique nord-américain, 1983 North American Datum 1983 © Her Majesty the Queen in Right of Canada, 2003 © Sa Majesté la Reine du chef du Canada, 2003

Digital base map from data compiled by Geomatics Canada, modified by the Terrain Sciences Division Mean magnetic declination (2003), 22 ° 43′ E, decreasing 13.3′ annually. Readings vary from 22 ° 37′ E in the SW corner to 22° 48′ E in the NE corner of the map

> Elevations in feet above mean sea level Contour interval 500 feet

LEGEND

POST-FRASER GLACIATION Artificial Deposits:

Made Land: artificial fill and mine waste

Organic Deposits:

Organic deposits: peat and organic-rich silt; water saturated; formed predominantly by the accumulation of plant material in bogs, fens, and swamps; thickness > 2 m Colluvial Deposits: bouldery gravel with clay to sand size matrix; loose, very poorly

flow, rockfall, earthflow and snow avalanche Colluvial Blanket: diamicton; generally found on valley floors; thickness > 2 m

Colluvial Apron: bouldery diamicton; forms a talus apron or sheet at foot of steep slope; little or no vegetation where active; thickness > 2 m, thickening toward base of

sorted, massive; dominated by subangular to angular clasts of local bedrock; texture dependent on source sediments; forms by gravitational processes such as debris

Colluvial Fan: bouldery diamicton with a sandy matrix; forms steep fan or cone shaped

bodies at foot of steep bedrock slopes; deposited by debris flow and rock avalanche; thickness up to 10 m near fan midpoint Landslide Sediments: bouldery diamicton; mainly silty clay if accompanied by

earthflow symbol; forms hummocky terrain; little or no vegetation if recent; thickness

Colluvial Veneer: diamicton; takes form of underlying surface; discontinuous cover with numerous areas of exposed bedrock; thickness 1 to 2 m

Undivided Colluvial Sediments: mixture of colluvial blanket, apron, fan, landslide and veneer, which cannot be subdivided at this map scale; thickness > 2 m Marine Deposits:

Marine Tidal Flat: silt and clay, forming tidal flat in brackish water at mouths of major ivers; thickness 2 to 10 m

Alluvial Deposits: gravel and sand, with minor silt; moderately to well sorted; clasts generally subrounded to well rounded; deposited by rivers either within channels or as overbank deposits

Alluvial Plain: gravel and sand; massive to stratified; moderately to well sorted; locally Ap overlain by peat and organic-rich silt deposited in abandoned channels and on floodplain surface; forms flat plains occupied by single or multiple channel rivers; includes deltas at mouths of major rivers; thickness 2 to 10 m, > 10 m in deltaic

Alluvial Fan: diamicton, gravel and sand; matrix supported, massive to weakly Af stratified, poorly sorted; interbedded with moderately to well sorted, clast supported, bedded fluvial gravel and sand; forms fan shaped bodies where rivers enter larger valleys; deposited by debris flows and streams; thickness up to 10 m at fan midpoint

Fan Delta: diamicton, gravel and sand; massive to stratified; subaerial facies same as Afd alluvial fans, subaqueous facies consisting of interbedded silt, clay, sand and gravel; beach facies predominantly pebble-cobble gravel, with boulder concentration at high tide line; forms where alluvial fans meet marine water; thickness 3 to 15 m

Neoglacial Deposits: diamicton (till); grey, massive, matrix supported; subangular to angular, striated granule to boulder sized clasts set in silty sand or sand matrix; loose to slightly compact, commonly unweathered; formed by melt-out from ice and found surrounding modern alpine glaciers and ice fields; deposited during Holocene

Neoglacial Till Blanket: till; locally forming flights of recessional moraines; thickness 2 to

Neoglacial Till Veneer: till; discontinuous cover with numerous areas of exposed

bedrock; takes form of underlying surface; thickness 1 to 2 m

FRASER GLACIATION (Wisconsinan)

PROGLACIAL DEPOSITS

Glaciolacustrine Deposits: laminated silt, clay and minor sand deposited in lakes ponded by glacial ice; well sorted; dropstones common, macrofossils absent

Glaciolacustrine Blanket: silt, clay, minor sand; irregular or conforms to underlying surface; thickness > 2 m

Glaciomarine Deposits: massive blue-grey or grey silty clay with minor silt, sand and granule gravel; rarely weakly laminated; locally containing dropstones; found in coastal areas below marine limit; coarser proximal deposits are horizontally bedded and well sorted; distal deposits are dominated by massive silty clay that is weathered to pale brown at the surface and may contain salt crusts; marine macrofossils are

Glaciomarine Blanket: massive silty clay with minor sand, silt and granule gravel; regular surface; thickness > 2 m

Glaciomarine Veneer: massive silty clay with minor sand, silt and granule gravel; Mv discontinuous cover with numerous areas of exposed bedrock; takes form of underlying surface; thickness 1 to 2 m

Glaciofluvial Deposits: gravel, sand, minor silt and clay; poorly to well sorted; deposited by meltwater flowing away from or in contact with glacial ice; including deltas graded to former sea levels; rarely faulted; clasts commonly rounded and of more local provenance than underlying till

Glaciofluvial Plain: gravel and sand; massive to weakly horizontally bedded; forms flat surfaces; consists of former outwash plains; bogs common on plain surface; thickness

Glaciofluvial Delta: gravel, sand and silt; poorly to moderately sorted, angular to well rounded clasts; forming flat surfaces; deposited as proglacial marine deltas, often forming terminal regions of glaciofluvial braidplains; thickness up to 230 m

Glaciofluvial Blanket: gravel and sand; massive to weakly horizontally bedded; forms irregular surface; thickness 2 to 20 m

Glaciofluvial Veneer: gravel and sand, massive to vaguely horizontally bedded; discontinuous cover with large areas of exposed bedrock and locally, colluvial veneer; takes form of underlying surface; thickness 1 to 2 m Undivided Glaciofluvial Sediments: glaciofluvial gravel and sand, with till and

glaciolacustrine clay, undifferentiated at this scale of mapping; forms irregular or rolling terrain; thickness 2 to 20 m GLACIAL DEPOSITS Glacial Deposits: diamicton (till), granule to boulder size clasts in a silt to silty clay

matrix; massive, very compact, very poorly sorted, with angular to subrounded striated clasts; commonly blue-grey or grey; dominant clast lithologies are Bowser Lake Group sandstone, siltstone and mudstone; deposited directly by glacial ice or by gravity flow from glacial ice

Till Blanket: till; conforms to and locally obscures underlying topography; thickness 2

Till Veneer: till; discontinuous cover with numerous areas of exposed bedrock and locally, colluvial veneer; takes form of underlying surface; thickness 1 to 2 m

R1 Basaltic flows, forming ridged and blocky valley fill; little vegetation due to recent activity; thickness 3-15 m

Pre-Quaternary Triassic-Jurassic volcanic and sedimentary bedrock of island arc origin, slightly R metamorphosed, and Cretaceous igneous intrusions; includes minor colluvial and till veneer, but > 75% of unit is bedrock

> OPEN FILE Open files are products DOSSIER PUBLIC that have not gone through the GSC formal GEOLOGICAL SURVEY OF CANADA COMMISSION GÉOLOGIQUE DU CANADA pas étésoumis au processus officiel de 2003 SHEET 2 OF 3 FEUILLET 2 DE 3

Sheet 2 of 3, Surficial geology Recommended citation: McCuaig, S. 2003: Surficial geology, Nass Valley, British Columbia; Geological Survey of Canada, Open File 3901, scale 1:100 000.



130°15'

130°00'

Geology by S. McCuaig, Geological Survey of Canada and Simon Fraser University, 1999

Digital cartography by S. McCuaig and K. Shimamura, Geological Survey of Canada

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

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