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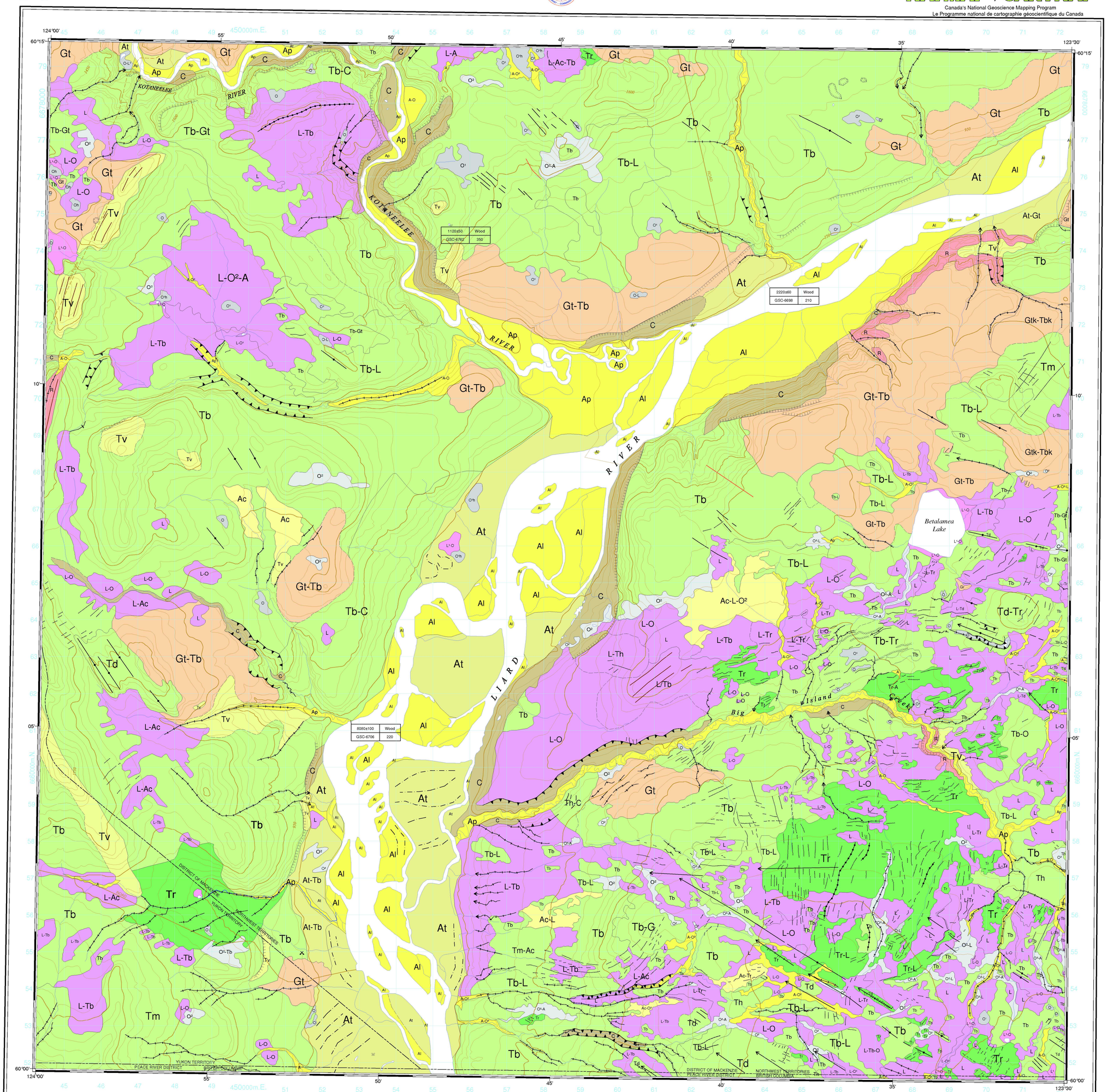
GEOLOGICAL SURVEY OF CANADA | COMMISSION GÉOLOGIQUE DU CANADA

NATMAP / CARTNAT

Canada's National Geoscience Mapping Program
Le Programme national de cartographie géoscientifique du Canada



LEGEND

Coloured legend blocks indicate map units that appear on this map

QUATERNARY

SURFICIAL DEPOSITS

POST LAST GLACIATION

NONGLACIAL ENVIRONMENTS

ORGANIC DEPOSITS: *peat; 1 to 2 m thick; formed by the accumulation of vegetation in poorly drained depressions (swamps and bogs); produces flat, wet terrain*

O^1 — ***Bog peat:*** *Sphagnum or forest peat formed in an ombrotrophic environment; may be treed or treeless with a cover of ericaceous shrubs; hummocky, wet terrain, in places underlain by ground ice,* **O^1h**; *undifferentiated bog and fen deposits,* **O**; *undifferentiated hummocky bog and fen deposits,* **Oh**

O^2 — ***Fen peat:*** *peat derived from sedges and partially decayed shrubs in a eutrophic environment; forms relatively open peatlands with a mineral rich water table that persists seasonally near the surface; often covered with low shrubs and sometimes a sparse tree cover*

C — ***COLLUVIAL DEPOSITS:*** *mass wasting debris <1-100 m thick; nonsorted to poorly sorted, massive to stratified debris deposited by direct, gravity-induced movement*

ALLUVIAL DEPOSITS: *sorted gravel, sand, and organic detritus deposited by flowing water*

A — ***Fluvial deposits:*** *sorted gravel and sand >1 m thick; forming active flood plains with meander channels and scroll marks,* **Ap**; *alluvial fan deposits, poorly sorted gravel and sand >1 m thick,* **At**; *large, low terraces with meander scars and active and inactive channels, primarily along the Liard River,* **Al**; *undifferentiated,* **A**

Ac — ***Fluvial deposits, channelled:*** *numerous subparallel alluvial channels covering gentle to moderate slopes*

At — ***Fluvial deposits, terraced:*** *low, inactive terraces immediately above active floodplains*

L^1 — ***LACUSTRINE DEPOSITS:*** *sand, silt and minor clay deposited in a former lake; generally overlain by organic deposits; exposed by recent fluctuations in lake levels*

POSTGLACIAL OR LATE WISCONSINAN

PROGLACIAL AND GLACIAL ENVIRONMENTS

L — ***GLACIOLACUSTRINE DEPOSITS:*** *fine sand, silt, and clay, deposited in glacier-dammed lakes in valleys or along margins of the retreating Laurentide Ice Sheet; > 1 m thick; level topography; usually overlain by organic deposits in lowlands*

G — ***GLACIOFLUVIAL DEPOSITS*** *: proglacial outwash, gravel and sand with minor diamictons deposited in front of the ice margin, usually 1-10 m thick; forming distal outwash terraces,* **Gt**; *kettled outwash terraces,* **Gtk**; *ice-contact ridges,* **Gr**; *undifferentiated,* **G**

TILL: *nonsorted debris deposited directly by glaciers; matrix is sandy to clayey and contains striated clasts of various lithologies, including many Canadian Shield erratics*

Tb — ***Till blanket:*** *> 1 m thick; forming undulating topography; extensively fluted and drumlinized till blanket,* **Td**; *hummocky moraine,* **Th**; *rolling topography,* **Tm**; *pitted topography,* **Tbk**

Tr — ***Ridged moraine:*** *moraines or crevasse fillings forming a ridged topography*

Tv — ***Till veneer:*** *< 1 m thick and discontinuous; underlying bedrock topography is discernible*

PRE-QUATERNARY

BEDROCK

R — *Sedimentary bedrock,* ***R****; Paleozoic to Mesozoic rocks exposed in uplands in the north west, steep cliffs along the Liard River and smaller outcrops along the Kotaneelee River*

NOTE: *In areas where the surficial cover forms a complex pattern, the area is coloured according to the dominant unit and labelled in descending order of cover; slash between two units indicates that the former unit overlies the latter*

Geological boundary (defined, gradational)

Small swamp or bog

River meander scar

Abandoned meltwater channel or channel occupied by an underfit stream (large, small and direction of flow inferred, small and direction of flow not inferred)

Esker (flow direction inferred)

Escarpment

Kettle

End moraine

Minor moraine or crevasse filling

Ice moulded form in till (direction of flow inferred, not inferred; broader forms have middle dots)

Furrows and troughs related to glacial flow, likely formed subglacially

Lineament in bedrock

Gravel pit

Radiocarbon date (uncorrected)

Date	Material
Lab. no.	Elev. (m)

NOTES ON GLACIAL HISTORY:

Betalamea Lake map area was glaciated during the Late Wisconsinan glaciation (ca. 25 000-10 000 years ago). Wood fragments between reworked till and glaciolacustrine sediment near Fisherman Lake, about 10 km north of the map area, radiocarbon dated 32.7 ka BP (I-3187, Millar 1968), providing a maximum age for the last glaciation in the area. The last major ice sheet to cover the area was the continental Laurentide Ice Sheet from the east, although the area may have been first glaciated by an earlier pulse of montane ice from the west. In the southern part of the map area, fluted till and subglacial furrows show that the Laurentide Ice Sheet flowed to the northwest, and then northward well into the Liard Range, north of the map area, to greater than 1200 metres above sea level. This ice-flow pattern was likely caused by the collision of the Laurentide and Cordilleran ice sheets, causing both ice sheets to be diverted northward.

Deglaciation was characterized by the southeastward retreat of the Laurentide ice margin, as indicated by small end moraines and crevasse fillings. Because the ice front retreated down the regional slope, numerous ice-dammed lakes formed along the ice margin. Initially, glacial lakes formed in the uplands to the north and west, within the tributary valleys of the Liard. These expanded and coalesced as the Liard River valley became ice free, forming glacial Lake Liard. Extensive glaciofluvial and glaciolacustrine sediments were deposited in the map area during stages of lake formation and ice retreat. By ca. 11 ka BP, the Laurentide Ice Sheet retreated far enough eastward for Liard River to drain into glacial Lake McConnell, which was occupying Mackenzie River valley at the time (Dyke and Prest, 1987).

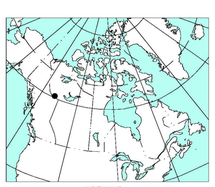
During postglacial time, as the watersheds became free of glaciers, fluvial processes began to dominate the Liard River valley. Nonetheless, lakes still existed within the Liard River valley, as shown by a ^{14}C date of 8090 BP (GSC-6706) obtained from a detrital log overlain by 2 metres of laminated clay. Pulses of fluvial terrace building followed initial valley incision by Liard River. Alluvial terraces, usually ca. 3-4 metres above the present river are common in the map area. Riverbank exposures typically show cobbly gravel overlain by rhythmically bedded silt and fine sand. Charred wood debris is exposed along cut banks for tens of kilometres along Liard River, suggesting that forest fires within the watershed may have contributed to periods of local fluvial aggradation. For example, just downstream of the confluence of the Liard and Kotaneelee rivers, a charred log was exposed in an 8 metre-high terrace, 4.3 metres above the river, which ^{14}C dated 2220 BP (GSC-6698). In contrast, a charred stump exposed in a low terrace near Mount Flett (map 95B/12) dated 850 BP (GSC-6692).

Landslides are common where Cretaceous shale is exposed along steep banks, particularly along the Kotaneelee River, where in places, extensive slumping of the shale has produced a step-like topography. At one site the slump blocks are over 1600 metres long with a total relief of over 180 metres. A wood fragment extracted from a slump scarp about 80 metres above the river ^{14}C dated 1120 BP (SC-6762). The wood, giving a maximum age of one of the slumps, was charred. Consequently, slumping may be related to the destabilizing effects of a forest fire, as well as, aggradation on the Liard River, as noted earlier.

REFERENCES

Dyke, A.S. and Prest, V.K.
1987: Late Wisconsinan and Holocene Retreat of the Laurentide Ice Sheet; Geological Survey of Canada, Map 1702-A, scale 1: 5 000 000

Millar, J.F.V.
1968: Archeology of Fisherman Lake, western District of Mackenzie, N.W.T.; unpublished Ph.D. dissertation, University of Calgary, 496 p.



CONTOUR INTERVAL 50 FEET
Elevations in Feet above Mean Sea Level

Digital Topographic Data provided by Geomatics Canada, Natural Resources Canada adjusted to conform to Landsat Geocover image (Landsat-5 image mosaic, August 1991), including an updated course of the Liard and Kotaneelee rivers, by the author

OPEN FILE 4502

SURFICIAL GEOLOGY

BETALAMEA LAKE

NORTHWEST TERRITORIES - YUKON TERRITORY - BRITISH COLUMBIA

Scale 1:50 000 Échelle

kilometres 1 0 1 2 3 4 5 kilomètres

Universal Tranverse Mercator Projection
North American Datum 1983

Projection transverse universelle de Mercator
Système de référence géodésique nord-américain, 1983

Geology by J. Bednarski, 2000, 2001, 2002
Geological compilation and digital cartography by J. Bednarski, 2002

This is a product of the Central Foreland NATMAP Project

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

95 O/8 Babiche Mountain GSC OF 1558	95 B/5 Fisherman Lake GSC OF 4360	95 B/6 Rabbit Creek GSC OF 4486
95 O/1 Mount Martin GSC OF 4260	95 B/4 Betalamea Lake GSC OF 4502	95 B/3 Fort Liard GSC OF 1760
94 N/16 Beaver River	94 O/13 Estsine Lake	94 O/14 Maxhamish Lake

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

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COMMISSION GÉOLOGIQUE DU CANADA
2003

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