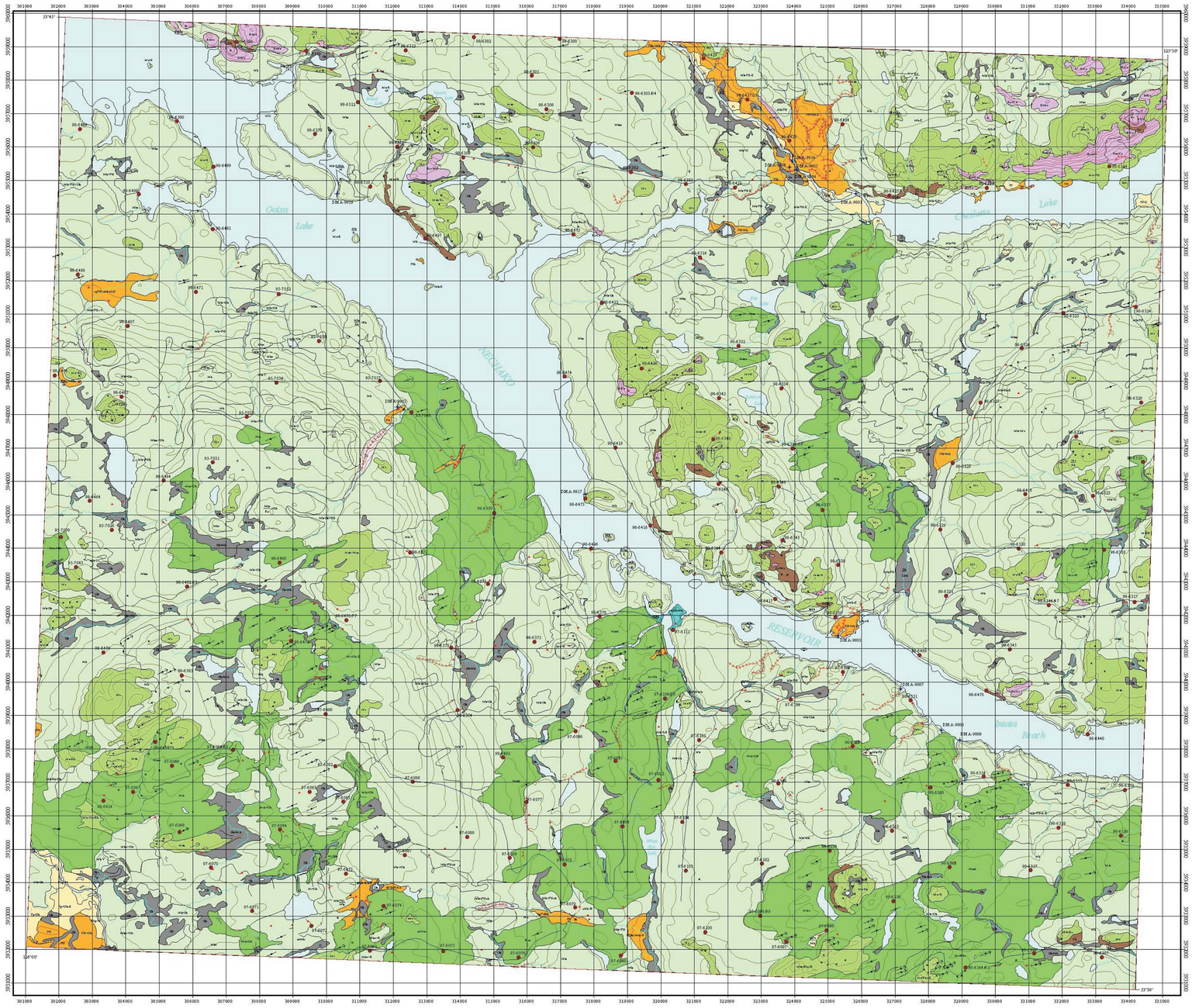


LEGEND

QUATERNARY

HOLOCENE

O — **ORGANIC:** Black, organic rich peat; commonly occurs as blankets; found in bogs occurring in low-lying, poorly drained areas; bogs support sedges, sphagnan moss, and small willow vegetation.

F — **FLUVIAL:** Sands and gravels; commonly occur as terraces and floodplains in Cheslatta and Chelaslie river valleys; occur in flood prone areas.

C — **COLLUVIAL:** Poorly sorted, sandy to gravelly diamicton with angular clasts; found along slopes and at the base of steep bedrock cliffs.

U — **UNDIFFERENTIATED:** Colluvial, morainal, glaciofluvial, fluvial, and/or bedrock occurring along steep, erosional slopes.

PLEISTOCENE

LG — **GLACIOLACUSTRINE:** Massive to laminated silts and clayey silts with thin, fine sand beds; rarely occur in areas large enough to be mapped at this scale; sometimes occur within other units.

FG — **GLACIOFLUVIAL:** Fine to coarse sand and pebble to cobble-sized gravels; gravel is subrounded to rounded, poorly sorted, and clast supported; deposits are typically found in terraces and outwash plains and in association with meltwater channels.

MORAINAL: Clayey to silty, poorly sorted, massive, dense, well jointed, and strongly fissile diamicton; contains striated clasts; interpreted as subglacial lodgement till, meltout till and/or glacigenic debris flows; grey-brown colour that in places is dark grey-red to purple reflecting varied local bedrock lithologies.

Mb — **Blanket:** Morainal deposits greater than 1 m thick.

Mv — **Veneer:** Morainal deposits less than 1 m thick.

Mm Mr — **Rolling (Mm) or Ridged (Mr):** Morainal deposits dominated by crag-and-tails, flutings, drumlinoid ridges, and steep sided till ridges.

PRE-PLEISTOCENE

R — **BEDROCK:** Volcanic, intrusive, and sedimentary rock that is Mesozoic to Cenozoic in age.

NOTE: Polygons in Nechako Reservoir delineate flooded areas.

BRITISH COLUMBIA
Ministry of Energy and Mines
Energy and Minerals Division

BRITISH COLUMBIA GEOLOGICAL SURVEY

Geological Survey Branch

OPEN FILE 2000-9

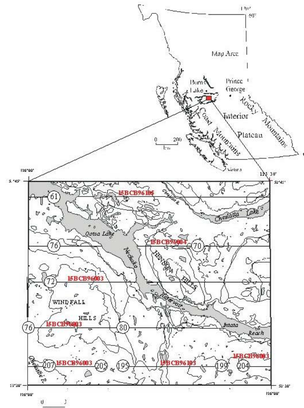
QUATERNARY GEOLOGY OF THE MARILLA MAP AREA (93F/12)

Geology by D.J. Mate and V.M. Levson (P.Geo)

Scale 1:50 000

2 0 2 4 km

NATMAP
CARTNAT



SYMBOLS

drumlin	Gravel Pit	Roads	
crag and tail	Quarry	Escarpment	
fluting	Outcrop	Esker	
striae	Mapping Station	Crevasse Filling	
	Stratigraphic Section Site (ie DMA-9801)	Meltwater channel	
	Till Sample Site (ie 98-6343)	Geological Boundary (approximate)	

TERRAIN SYMBOL

Surface Expression

Texture → **zsMb-E** ← Geomorphological Process

Surficial Material

TERRAIN CHARACTERISTICS

Texture

Name	Symbol
Cobbles	k
Pebbles	p
Sand	s
Silt	z
Clay	c
Gravel	g

Surface Expression

Name	Symbol
Moderate Slope	a
Blanket	b
Fan	f
Hummock	h
Moderately Steep Slope	k
Rolling	m
Ridge	r
Steep Slope	s
Terrace	t
Undulating	u
Veneer	v

Surficial Material

Name	Symbol
Colluvium	C
Fluvial	F
Glaciofluvial	FG
Glaciolacustrine	LG
Morainal (Till)	M
Organic	O
Bedrock	R
Undifferentiated	U

Geomorphological Process

Name	Symbol
Gully Erosion	V
Washing	W
Irregularly Sinuous Channel	I
Channeled by Meltwater	C
Kettled	H
Meandering Channel	M
Inundation	U

Delimiters: Indicate relative amounts of surficial material occurring in a polygon.

/ Material type in front of "/" is more extensive than the material type that comes after.

\ Material type in front of "\" is much more extensive than the component that follows.

• Materials on either side of the symbol are approximately equal

(Modified from Howes and Kenk 1997)

CREDITS

GIS support provided by Pat Desjardins

Field assistance provided by Andrew Stuart, Stephen Mate, and Crystal Huscroft.

Edited by Gib McArthur Brian Grant

Andrew Stumpf conducted reconnaissance surficial mapping and till sampling in the map sheet.

Mapping was conducted by the British Columbia Geological Survey and the University of Victoria as part of the Nechako NATMAP project.

Geology based on air photo interpretation by D. Mate

1:40 000 scale air photos were used in mapping

0.4 field checks per square kilometer

20 % of the polygons were field-checked on this map.

Magnetic declination in 1984 was 26°48'.
Annual change decreasing 8.8'

North American Datum 1983, UTM Zone 10.

Map base from digital 1:50 000 NTS data.

Map projection is UTM.

This map was produced over the internet and can be accessed from the Ministry of Energy and Mines web site at http://www.em.gov.bc.ca/Mining/Geolsurv/Surficial.

INTRODUCTION

The Quaternary geology of the Marilla map area was mapped in conjunction with 1:50 000 scale till geochemistry studies (Levson et al. 1999) and is part of the Nechako National Mapping (NATMAP) program conducted jointly by the British Columbia Geological Survey and the Geological Survey of Canada. Unlike other regions in the Nechako Plateau, the stratigraphy in this area is exceptionally well exposed. The completion of the Nechako Reservoir (1952) is largely responsible for the abundance of large Quaternary sections. Development of shoreline bluffs on the Nechako Reservoir and downcutting along the Cheslatta River Spillway have provided excellent cross-sections through Quaternary sequences and in some places the entire Holocene sequence, including sections through a number of drained Holocene lakes and deltas. A total of 12 Quaternary sections along the Cheslatta River and Nechako Reservoir were described from this map sheet. An overview of the stratigraphy in the Marilla map area is provided by Mate and Levson (1999; in prep).

DESCRIPTION OF STUDY AREA

The map area is approximately 70 km south of Burns Lake in central British Columbia and lies east of Tweedsmuir Provincial Park. Besides the reservoir, which was built to generate power for aluminum refineries in Kitimat, other types of land use are forestry and ranching. Access is reasonable in parts of the map area, consisting mostly of logging roads and some well maintained secondary roads. A private barge is needed to access forestry roads south of Ootsa Lake.

This area lies entirely within the Nechako Plateau physiographic region (Holland 1976), an area of low relief with large surfaces of flat or gently rolling topography and elevations up to 1500 m (see photo). Most of the ground surface is covered by thick glacial sediments and very little bedrock is exposed. The Quanchus Range (including Mt. Wells, Tweedsmuir Peak, and Mitchel Peak) lie immediately west of the map area in Tweedsmuir Provincial Park, while the Fawnie and Nechako ranges occur to the southeast. Highest elevations within the Marilla map sheet range from 1160 m - 1370 m a.s.l. and are found within the Windfall and Henson hills (see location figure).

QUATERNARY STRATIGRAPHY

Stratigraphic units identified within the map area are:

Pre-Late Wisconsinan Sediments:

Early Wisconsinan Till: Massive, slightly sandy, clayey silt diamicton is the oldest Pleistocene sediment in the map area. This unit underlies organic bearing nonglacial sediments and sediments deposited during the Late Wisconsinan (Fraser) Glaciation. It is exposed at the base of section DMA-9808 on Ootsa Lake.

Lacustrine Sediments: This unit consists of dark, blue-grey, very fine sand, with silt and clay laminations. Wavy and discontinuous lenses, laminae, and finely disseminated organics are present within this unit. It overlies Early Wisconsinan till at section DMA-9808 and lies beneath Late Wisconsinan sediments. Therefore this unit is believed to have been deposited during the Olympia Nonglacial Interval. These sediments are rare within the Nechako Plateau because they were eroded during the Fraser Glaciation and only occur as erosional remnants in specific areas. Recently, several new Olympia Nonglacial sites have been discovered in the general region (Plouffe and Jetté 1997, Levson et al. 1998; Mate and Levson 1999).

Late Wisconsinan Advance-Phase Sediments:

Till: This sediment is commonly found in Quaternary exposures and is the most widespread unit within the map area. It has two facies, the first of which is a clayey to silty, massive diamicton with a moderate to high density, high fissility, and moderate to well jointing. This facies is interpreted to have a lodgement origin. The second facies is a massive to crudely bedded, gravelly to sandy diamicton. It generally has a high density, strong fissility, and is well jointed. Thin, wavy and discontinuous sand and gravel lenses are common in this facies. This facies is interpreted as having a subglacial melt-out origin.

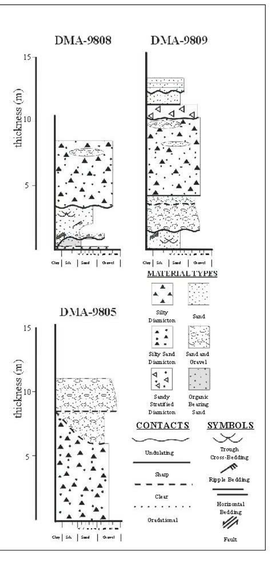
Glaciofluvial: This unit consists of fine to coarse sands and pebble to cobble-sized gravels. Sands are moderately to well sorted, show crude horizontal to subhorizontal bedding, and locally have small to medium scale trough cross-bedding and ripple bedding. Gravels are characterized by subrounded to rounded clasts, poor sorting, and crude medium to large-scale trough cross-bedding. Both sands and gravels occur above and below till and often have lense shapes.

Glaciolacustrine: This unit is dominated by silt and interbedded silts and clays. Occasionally silts are interbedded with sands. Bedded silts and clays above till are commonly deformed and occur in areas of hummocky topography. Glaciolacustrine silts and clays below till are also deformed and have sheared slickenside surfaces on bedding planes.

Ghetgeneic Debris Flows: This unit is characterized by stratified silty to silty sand diamicton with high density, moderate to strong fissility, and poor jointing. The unit is commonly interstratified with sands, gravels, and silts and occurs above and below till.

Holocene Sediments:

This unit includes organic, fluvial, and colluvial deposits. These sediments overly all other stratigraphic units in the map area. Organic sediments dominate and occur as fens and bogs, some of which resemble string bogs. Fluvial sands and gravels sometimes contain numerous buried organic horizons and are interpreted to be floodplain deposits.



QUATERNARY HISTORY

Late Wisconsinan glacial ice originated in the Coast Mountains west of the map area (Tipper 1971). Orientations of streamlined landforms and striae within the Marilla map area have a general northeasterly trend. Some striation directions from the shoreline of Ootsa Lake ice valley parallel indicating that during early or late phases of glaciation ice moved through the Ootsa Lake valley system.

Ice confined to major valleys (Ootsa Lake valley) was responsible for damming local tributaries like the Cheslatta River (see location figure). Rare, advance-phase glaciolacustrine sediments were formed in local proglacial lakes due to this damming. Aggradation in this valley by glaciofluvial outwash soon followed. Glacigenic debris flows overlying the outwash probably originated from the ice margin as it advanced into the area. Ice advancing from the Coast Mountains, coalesced and thickened in the Interior Plateau and the influence of topographic control on its movement diminished. This movement probably resulted in the dominant subglacial flow in the map area which is northeast. During this phase thick lodgement tills were deposited over extensive areas of the map sheet.

During deglaciation ice stagnation occurred in some areas. Evidence of stagnant ice is provided by till ridges, found in the southwest portion of the map area, that are interpreted to be crevasse fillings. Also, areas of poorly sorted pebble to cobble gravel commonly occur as thin veneers throughout the study region. These deposits probably reflect the winnowing of fine material from surficial sediments washed by glacial meltwater during ice stagnation. Rare, retreat-phase glaciolacustrine and occasional glaciofluvial sediments were formed in retreat-phase proglacial lakes dammed by stagnant ice blocks and small outwash plains.

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