GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF MINES AND TECHNICAL SURVEYS

PRELIMINARY SERIES

QUESNEL LAKE
(EAST HALF)
BRITISH COLUMBIA

SHEET 93A (East Half)

MAP 1-1963
GEOLOGY
QUESNEL LAKE
(EAST HALF)
BRITISH COLUMBIA

Scale: One Inch to Four Miles = 1/253,440

4 2 0 4 8 12 Miles

Base-map by the Surveys and Mapping Branch, 1959. Revisions to roads by the Geological Survey of Canada, 1962-1963

Geology by R. B. Campbell, 1961 and 1962

Cartography by the Geological Survey of Canada, 1963

Adjoins Map 3-1961 "Quesnel Lake (West Half)"

PUBLISHED, 1963
COPIES OF THIS MAP MAY BE OBTAINED FROM THE DIRECTOR, GEOLOGICAL SURVEY OF CANADA, OTTAWA

PRINTED BY THE SURVEYS AND MAPPING BRANCH

LEGEND

CENOZOIC

QUATERNARY
PLEISTOCENE AND RECENT

14 Glacial deposits and recent alluvium; till, gravel, sand, silt, clay; few if any bedrock exposures

13 Olivine basalt; cinder cones, flows, breccia, tuff; gravel; may be pre-Pleistocene in part

TERTIARY
MIOCENE OR PLIOCENE (?)

12 Flat-lying olivine basalt flows; minor tuff, breccia and conglomerate

MESOZOIC

JURASSIC AND/OR CRETACEOUS AND (?) EARLIER

11 11a, hornblende-biotite and biotite granodiorite; minor hornblende-biotite syenite and monzonite, hornblende diorite; 11b, hornblende diorite; 11c, muscovite granite and quartz monzonite including pegmatite and aplite; 11d, gneissic biotite granodiorite with pegmatite and inclusions of unit 7

TRIASSIC AND/OR JURASSIC

10 10a, green andesitic tuff, agglomerate, breccia, and flows; slaty argillite, greywacke, chert; minor conglomerate and limestone; 10b, green andesitic flows, pillow lavas, agglomerate, tuff; generally more altered than 10a and may be older; 10c, slaty argillite, limy argillite, and limestone; age uncertain

PRE-TRIASSIC (?)

9 9a, serpentinite; 9b, amphibolite gneiss

PALAEOZOIC

CAMBRIAN OR LATER
LOWER CAMBRIAN OR LATER

7 8 CARIBOO GROUP (3 to 8)
SNOWSHOE FORMATION: may include older units, particularly in 7c; 7a, brown and grey quartz-mica schist, commonly garnetiferous, quartzite; local quartz-mica-staurolite and kyanite schist; quartz-feldspar-mica gneiss, thin-bedded marble, amphibolite; includes many small pegmatite bodies; 7b, sericitic quartzite, sercitic and chloritic phyllite, limy phyllite, limestone; 7c, quartz-feldspar-biotite gneiss, amphibolite gneiss, quartz-mica schist, lime-silicate gneiss, marble; contains much pegmatite and aplite
8. Massive, grey-weathering, creamy white marble; shown, in places, as heavy black line

6 MIDAS FORMATION: 6a, black argillite, siltstone, and quartzite; 6b, black argillite, phyllite, and fine-grained, black, mica schist, locally contains chloritoid and small garnets; age of 6b uncertain, may be early Mesozoic

5 YANKS PEAK QUARTZITE: grey, white, and tan quartzite

4 YANKEE BELLE FORMATION: 4a, thin-bedded, green, slaty shale and siltstone; minor brown and purple shale, brown quartzite, limestone; 4b, green and brown phyllite

CAMBRIAN
LOWER CAMBRIAN

3 CUNNINGHAM LIMESTONE: thin-bedded, brown-weathering, dark grey limestone and grey-weathering massive grey limestone, cream-coloured marble; minor shale and argillite

LOWER CAMBRIAN OR EARLIER

2 Dark to medium grey, thin-bedded, slaty shale interbedded with limy shale and limestone near top of section and brown and grey quartz-granule and pebble conglomerate near bottom

PROTEROZOIC

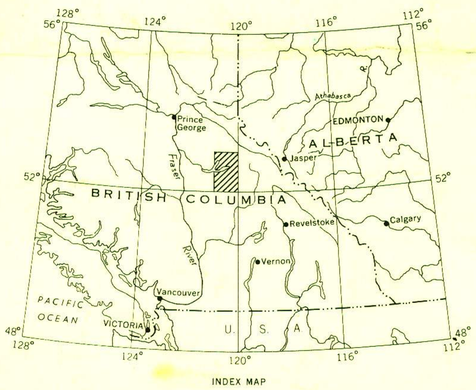
KAZA GROUP

1 Thick-bedded grey and brown-weathering, green, micaceous, feldspathic quartzite and granule conglomerate; silvery green mica-chlorite schist and phyllite; local quartz-mica-garnet schist

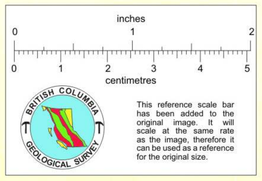
Small rock outcrop ×
Geological boundary (defined, approximate and assumed)
Bedding, tops known (horizontal, inclined, vertical)
Bedding, tops unknown (inclined, vertical)
Schistosity (inclined, vertical)
Foliation (inclined, vertical)
Fault (approximate, assumed)
Anticline, approximate (upright, overturned)
Syncline, approximate (upright, overturned)
Anticline-like structure in metamorphic rocks (approximate)
Mineral prospect (molybdenum, Mo) Mo×

Roads, loose surface, all weather
Roads, loose surface, dry weather
Trail
District boundary
Building or cabin
Horizontal control point △
Intermittent stream
Rapids R
Glacier Gl.
Contours (interval 500 feet) 4000
Height in feet above mean sea-level 7010

Mean magnetic declination, 24° 55' East, decreasing 3.5' annually. Readings vary from 24° 35'E in the SE corner to 25° 31'E in the NW corner of the map-area



INDEX MAP



DESCRIPTIVE NOTES

Roads provide access to the southwestern and southern parts of the area; the remainder is accessible only from the large lakes of the Quesnel and Clearwater systems. Below an elevation of about 6,200 feet the valleys are covered with heavy timber and thick underbrush; foot travel there is slow and arduous.

The sequence of sedimentary rocks beginning with the Kaza Group (1) and extending up to the Yanks Peak Quartzite (5) is an apparently conformable succession more than 12,000 feet thick and may exceed 20,000 feet.

Nearly 4,500 feet of almost flat-lying strata of the Kaza Group (1) are exposed along the north side of Mitchell Lake valley and the total thickness of the group may exceed 12,000 feet [1].

The contacts of unit 2 are gradational downward into the Kaza Group and upward into the Cunningham Limestone (3); their position is arbitrary and may be changed as a result of further work. The unit is characterized by the presence of dark grey and brown slaty shale and is believed to be about 2,000 feet thick.

The Cunningham Limestone (3) is prominently bedded and weathers in shades of brown where it is relatively undeformed. Where highly deformed, as near the North Arm of Quesnel Lake and near the head of Hobson Lake, the limestone is more massive, is commonly recrystallized, and is grey weathering. On the southeast slopes of the mountain 5 miles east of Mitchell Lake 2,800 feet of limy beds are exposed below the Yankee Belle Formation (4) and all are believed to be a part of the Cunningham Limestone, though part of unit 2 may be present.

The argillaceous rocks of the Yankee Belle Formation (4) become phyllitic in zones of intense deformation. About 10 miles southeast of the head of Mitchell Lake the thickness of this unit is approximately 2,000 feet.

Quartzite beds in the Yankee Belle Formation are more prevalent high in the section and merge with the Yanks Peak Quartzite (5). Beds in the quartzite (5) are from 1 foot to 2 feet thick and are locally crossbedded. In exposures 10 miles southeast of the head of Mitchell Lake the unit is approximately 650 feet thick.

In the northeastern part of the map-area only thin remnants of the Midas Formation (6a) have been found and the total thickness there is not known. South of Quesnel Lake map-unit 6b, comprising highly deformed argillaceous rocks that are lithologically similar to the Midas Formation (6a), appears to be conformable with the Snowshoe Formation (7a). If these argillaceous rocks are part of the Midas Formation then they must underlie more highly metamorphosed strata (7a). On the other hand, if they are younger than the metamorphic rocks, then, as their distribution suggests, they may be the basal member of the Mesozoic succession. With present information this uncertainty cannot be resolved.

Unit 7 may include, with the Snowshoe Formation, older units that cannot be recognized due to metamorphism. If such is the case it is most probable that Kaza Group rocks (1) may be involved; this is particularly true of the gneissic rocks of unit 7c. There is no clear evidence, however, that any rocks older than those of the Snowshoe Formation are included in this unit [2]. Schistosity or foliation in these rocks generally seems to be parallel with bedding. The exact nature of the structure in the unit is difficult to determine because of the lack of good marker beds, though locally, discontinuous marble layers (8) outcrop prominently. The largest of these extends southeast and northwest from the carbonate mass atop Mount Watt. This mass seems to result from spectacular structural and sedimentary thickening of the thin marble layer that extends to the southeast but there is some possibility that it is a contorted and metamorphosed part of the Cunningham Limestone (3).

Serpentinite (9a) is found only in association with metamorphic rocks of unit 7 and may be pre-Mesozoic in age. In the more southerly occurrence the serpentinite is distinctly layered and grades upward into amphibolite gneiss (9b) rich in actinolite and epidote.

The dominantly volcanic sequence of unit 10a is characterized by the presence of tuffaceous rocks that commonly contain fragments or whole crystals of black pyroxene though such rocks may not be dominant in any one set of exposures. Similar but more altered volcanic rocks (10b) may be older than those of unit 10a or they may be equivalent. Argillite and limy rocks (10c) associated with unit 10b do not seem to be similar to the rocks of unit 6b.

The granitic mass east of the head of Hobson Lake has sharp contacts against the intruded limestone which is recrystallized, but there is little silication along the contact; this is true even of many huge inclusions of limestone within the granitic mass. The batholith in the southwestern part of the map-area grades into rather basic dioritic rocks along its northeastern margin and seems to intrude the volcanic rocks of unit 10a, though clear evidence of this is lacking. Felsic granitic rocks (11c), including pegmatite, are common associates of all the metamorphic rocks of unit 7 and become dominant in parts of the gneissic rocks of unit 7c.

Flat-lying olivine basalt flows (12) that lie along the Clearwater Valley are similar to the Miocene or Pliocene flows of the Interior Plateau, but may be younger. The map shows an estimate of the total area underlain by the flows rather than individual outcrops.

At least four cinder cones and related flows (13) near Clearwater Lake are clearly post-glacial [3]; others, together with deposits in the western part of the area, are glaciated, and are Pleistocene or older.

The rocks of the area may be divided into three major structural zones. Northeast of the metamorphic rocks (7) low-grade and unmetamorphosed rocks of the Kaza and Cariboo Groups are involved in overturned folds and reverse faults which generally indicate tectonic transport toward the southwest. Within this zone is a plate of almost flat-lying strata centred around the head of Mitchell Lake; in these flat-lying beds are isolated small folds overturned toward the southwest. A fault is believed to form the southwest margin of this zone and in the Kaza Group strata near the west end of Mitchell Lake there are folds with steeply southwest dipping axial planes; these may have formed in response to movement along the fault.

In the metamorphic rocks (7) folding seems to be simple. Bedding and schistosity or foliation have relatively uniform attitudes over large areas and in a few places are folded into broad, apparently simple anticlines. In detail there is intense small-scale isoclinal and recumbent folding, particularly in the area north of the east arm of Quesnel Lake. It is probable that all these rocks have been highly deformed, possibly with development of large recumbent structures, upon which a second folding has been superimposed.

Little is known of folding in the Mesozoic sequence because of poor exposures and the massive character of much of the rock.

An important molybdenum deposit on the east slope of Takomkane Mountain is currently under development. The sulphide minerals – almost exclusively molybdenite – occur in brecciated granitic rocks. To date no other significant mineral deposit is known in the area, but there are reports of lead mineralization in the Cunningham Limestone near the head of Hobson Lake.

[1] Campbell, R. B.: Quesnel Lake, East Half, British Columbia; Geol. Surv., Canada, Map 42-1961.
[2] Campbell, R. B.: Quesnel Lake, West Half, British Columbia; Geol. Surv., Canada, Map 3-1961.
[3] Davis, N. F. G.: Clearwater Lake Area, British Columbia; Geol. Surv., Canada, Summ. Report. 1929, Pt. A.

MAP 1-1963
QUESNEL LAKE
BRITISH COLUMBIA
SHEET 93 A (East Half)

681319