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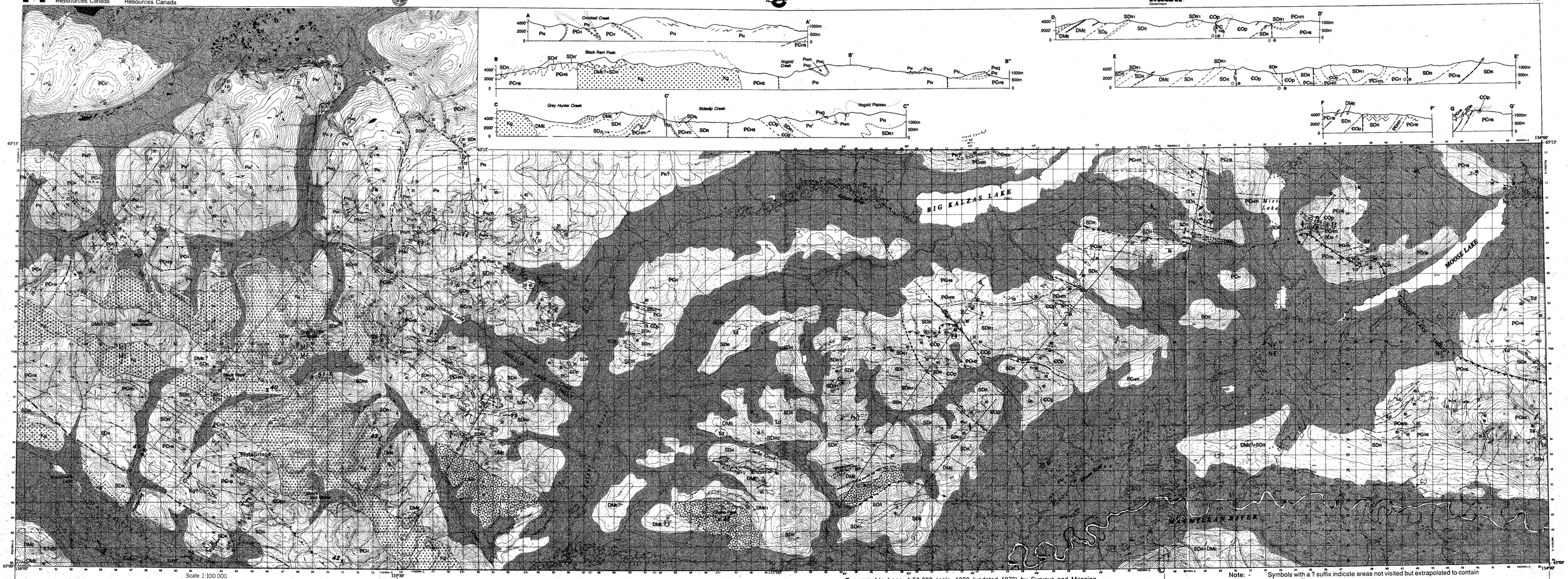

LEGEND

QUATERNARY

Unconsolidated alluvial, colluvial, glaciofluvial and moraine gravel, sand, clay and organic deposits (distribution modified from Hughes, 1982)

CRETACEOUS

Kg — **McArthur pluton**: White medium-grained, biotite-, hornblende-phyric granite. Buff to grey dykes, sills and small plugs of aplite and granite[1]

K?qfp — Pink fine-grained, hornblende-, quartz- orthoclase(?)-phyric rhyolite (southwest of Tintina Trench only)

TRIASSIC or older

Td — Hornblende-clinopyroxene meta-diorite to meta-gabbro[2]

DEVONO-MISSISSIPPIAN

EARN GROUP

DMe — Undifferentiated black siltstone[3], mudstone and graphitic phyllite with lenses of chert pebble conglomerate (**circle pattern**), chert breccia with baritic matrix and dark grey, fetid limestone (**hatch pattern**); DMe1: Black chert and arenite north of Clarke Peak; DMe2: Brown sandstone with chert pebbles and grit

PALEOZOIC (age range uncertain)

"NOGOLD ASSEMBLAGE"

PN — Beige weathering, medium bedded, quartz grit-sandstone with interbedded khaki and dark grey mudstone-phyllite; Pnm, Maroon and apple green slate, mudstone; contains single thin beds (**hatch pattern**) of dark grey limestone[3]; Pnc, Chloritic gritty schist and foliated breccia; Pnq, Light grey weathering, thick bedded quartzite

SILURIAN to LOWER DEVONIAN

ROAD RIVER GROUP

SDR — Undifferentiated black siltstone, mudstone and chert; SDR1, Thick bedded black chert; SDR2, Interbedded black mudstone, dark brown and black quartz siltstone, dark grey shale, with minor lenses of dark grey limestone[3] (**hatch pattern**); SDR3, Black quartz-feldspar arenite (of igneous provenance)

LATE CAMBRIAN to EARLY ORDOVICIAN(?)

€Op — Olive and brown weathering siltstone with black laminae, brown sandstone with thin interbeds of black, bioturbated chert; single occurrence of olive grey, clastic limestone[4]; €Op$_c$, purple and green-white nodular limy siltstone-schist

PRECAMBRIAN-LOWER CAMBRIAN

HYLAND GROUP; may include unexposed €O at top.

PCH — Undivided, except where lithologic separation as noted; PCHm, maroon and green mudstone and siltstone, locally with white quartz sandstone interbeds; PCHs, Brown weathering medium-to coarse-grained quartz mica schist and metasandstone (psammite) with thin, discontinuous white limestone (**hatch pattern**);

Age Constraints (superscribed in legend)

1 U-Pb age determination of **94.1 +/- 0.3** Ma (M.L. Bevier and J.K. Mortensen, pers. comm. 1992), from monazite collected 5.5 km NNW of Grey Hunter Peak (McArthur Group).

2 Age unknown. Triassic minimum age based upon U-Pb zircon and baddeleyite date from diorite sill in Dawson map area: **232 +1.5/-1.2** Ma (Mortensen and Thompson, 1990).

3 Spiriferid brachiopod suggestive of *Eleutherokomma reidforti* Crickmay 1950 (**mid Frasnian**, early Late Devonian age; GSC #203017; A.W. Norris, pers. comm., 1993) collected 3 km WSW of Clarke Peak (**F1**).

4 Cricoconarids of Late Silurian/Early Devonian age (GSC #203011,-13; S. Irwin, pers. comm., 1993). Echinoderm ossicle and *Nowakia?* sp. of **late Lochkovian** to **mid-Famennian** (Devonian; GSC #203006; A.W. Norris, pers. comm., 1993) age, recovered 11.5 km NE of Grey Hunter Peak (**F2**).

5 Conodonts of **Llandoverian/Wenlockian** (Early-Middle Silurian; GSC #202240; M.J. Orchard, pers. comm., 1992) age recovered from limestone 15 km WNW of Clarke Peak (**F3**).

6 Primitive conodont of Late Cambrian/Early Ordovician (GSC #202221; M. Orchard, pers. comm., 1992) age recovered from limestone 7 km S of the outlet of Big Kalsas Lake (**F4**).

SYMBOLS

- Geological contact (defined, approximate, assumed)
- Fault (defined, approximate, assumed)
- Fault (in cross-section: fault block moving toward, away from observer)
- Thrust fault (defined, approximate, assumed)
- Axial surface trace of folds
- Folds (syncline, anticline, overturned anticline, overturned syncline; arrow on trace indicates direction of plunge)
- Bedding (tops known, tops unknown, overturned)
- Prominent foliation (strike and dip) and lineation (trend and plunge)
- Limestone beds (age corresponds to enclosing unit)
- Fossil and micro-fossil locality (see legend - Age Constraints)
- X41 — Mineral occurrence (Yukon MINFILE reference number)
- B — B' — Line of cross-section
- Form-line to outline surface of resistant layer, indicating structural trend
- Thermal alteration halo around McArthur pluton

NOTES

The area shown on this map includes Late Proterozoic through Mississippian strata which potentially host sedimentary-exhalative zinc-lead mineralization like that of the Anvil and Macmillan Pass districts. The Paleozoic units described here have not been distinguished on previous maps. Furthermore, a middle Paleozoic maroon argillite (the Nogold Assemblage), similar in appearance to the maroon argillite of the Hyland Group (Late Proterozoic to Middle Cambrian) has recently been discovered. Although the extent of this new unit is unknown its existence may eventually result in a reinterpretation of the paleogeography and structure of this tectonic belt.

Mayo map area (105M) lies within the Selwyn Basin at the northern edge of the Selwyn Fold Belt, which was deformed in Middle Jurassic and Early Cretaceous time (Roots, 1991). All rocks have been tectonically displaced from their place of origin. The Robert Service Thrust which underlies most of this area at shallow depth (less than 5 km) comes to surface 30 km north (Roots and Murphy, 1992b). The thrust sheet of northward-displaced strata is truncated by Tintina Fault. Rocks in the extreme southwest area of this map are part of the Nisutlin allochthonous assemblage of Paleozoic or Mesozoic age (Tempelman-Kluit, 1979, 1984).

In the map area in-place rock exposure is sparse and steep bush with talus hinders foot travel below 1200 m (4000') elevation. The distribution of pro- and postglacial deposits is modified from Hughes (1982).

STRATIGRAPHIC UNITS

Hyland Group (PCH; Gordey and Anderson, 1993) underlies the region and is predominantly exposed north of the map area. Stratigraphy varies and its total thickness is unknown.

Unit €Op contains two types of strata that both appear to conformably overlie argillite of the Hyland Group. The first, widespread type is olive- to buff-coloured mudstone characterized by brown and black, whispy laminae and include a single limestone occurrence containing conodonts (F[4]). This unit is probably the **Gull Lake Formation**, described in Nahanni map area by Gordey and Anderson (1992). The second type, exposed in talus west of Mount Van Sibber, comprises grey nodular limestone with darker siltstone matrix. This is a distinctive lithology of **Rabbitkettle Formation** where it is exposed on Dromedary Mountain, on structural trend 56 km to the southeast.

The **Road River Group** (SDR) conformably overlies Unit CO and its base is defined as the lowest black chert. **Earn Group** (DME) strata are distinguished from Road River by chert-pebble conglomerate, in lenticles of decimetre to kilometre extent. The five formations described by Campbell (1967) immediately to the south cannot be individually distinguished in Mayo map area. Bostock (1947), described a section northeast of Clarke Peak which is here interpreted as Road River (lower and middle parts) and Earn Group (upper part), although fossil control is lacking. Neither bedded chert nor chert-pebble conglomerate are present southwest of the McArthur pluton and the black siltstone-argillite succession is labelled **SDR-DME** because these units cannot be differentiated without fossils.

"Nogold Assemblage" (PN; provisional) is a dominantly siliciclastic succession of probable mid-Paleozoic age. In the headwaters of Nogold Creek a composite section includes: at the base more than 400 m of beige-weathering fine-grained meta-sandstone including chlorite schist (up to 40 m) at the top, overlain by purple argillite (100 m, locally thickened) with isolated, centimetre-thick beds of black limestone containing rare late Silurian to Devonian organic remains (F[2]), capped by clean, uniformly fine-grained quartz sandstone. Bedding is rarely observed and top-indicators are unknown.

The contact of the Nogold Assemblage with older and younger rocks has not been identified. The brown meta-sandstone appears to conformably overlie black chert of Road River Group northeast of Sideslip Lake (63°10.5'N 135°25'W). Meta-sandstone of the Nogold Assemblage resembles that of the Hyland Group and the contact is obscure in a succession near the headwaters of Crooked Creek (63°12'N 135°50'W). The Nogold Assemblage is presently thought to be a facies-equivalent of Earn Group, although the two units are nowhere in contact. However the Nogold Assemblage may underlie a larger area than shown because its contact with PC$_H$, has not been determined. On this map the Nogold Assemblage is restricted to laterally continuous lithology in the area of (F[2]), and adjacent areas considered to have been offset by younger faults.

McArthur pluton belongs to the Tombstone suite (**Woodsworth et al., 1991**) on the basis of age and metallogeny. Unlike other intrusions of the suite it has an irregular shape and is oriented parallel to the Tintina Trench. It contains roof pendants of hornfelsed **SDR-DME** strata. The thermal metamorphic aureole, 500 to 1500 m wide, contains andalusite, staurolite and chloritoid 'spotted slates'. The granite near Woodburn Lake truncated by Tintina Fault is poorly exposed and reported by Bostock (1947) to be coarse-grained, non-porphyritic and more altered than other intrusions of Mayo map-area.

STRUCTURE

A gradual transition north of Nogold Creek headwaters and across the Clarke Hills separates open, upright folds in the south from penetratively foliated, isoclinal and recumbent folds in the north. This transition may reflect exposure of a deeper structural level in the north.

The micaceous and friable Hyland Group meta-sandstone commonly displays a mineral stretching lineation (typically plunging northwest) and locally a fine crenulation. Overlying shale units are pervasively cleaved, and steeply dipping cleavage is axial planar to tight, nearly isoclinal folds that verge both north- and southward on northwest- and southeast-plunging axes. These folds reflect the northeast-ward (and possibly coincidental) motion of the Robert Service Thrust in Late Jurassic or Early Cretaceous time (Roots and Murphy, 1992b).

Siliciclastic rocks of the Nogold Assemblage are characterized by a fissel fabric in which are locally preserved isoclinal, rootless folds. Although thick layering resembles bedding in north-facing cliffs, the strata has been internally thickened by layer-parallel thrusts and folds. 'Four Rams Bluff' (63°12'N 135°35'W) is a south-facing exposure of the vertical complexity (ramped west-verging chevron folds at all scales) that belies this poorly exposed and enigmatic unit.

Truncation of structural trends (such as north of Sideslip Lake and south of North Crooked Creek) indicate faults buried beneath unconsolidated valley sediments. The northwest trend of many straight faults suggests that they may have released strain associated with Late Cretaceous and Tertiary movement of Tintina Fault.

MINERAL OCCURRENCES

39. **Sideslip** — Cu-skarn
40. **Great Horn** — W, Cu Zn - skarn
41. **Ram** — unknown
42. **Hot Spring** — Ag,Pb - vein
43. **Lost Wernecke Copper** — Cu-unknown
45. **Able (Dope)** — unknown
51. **Friesen** — Cu,W,Mo - skarn

Numbered with Yukon MINFILE (105M) reference numbers (updated 1992).

Occurrences #39, 40, 42 and 51 occur within the contact metamorphic aureole of the McArthur pluton. Chalcopyrite and other sulphides are relatively common in the aureole, particularly near discontinuous limestone pods.

Lost Wernecke Copper (#43) may be a legend or erroneously located from stories of a large, low grade deposit in the Dawson Range.

The Road River-Earn Group strata at the northern edge of Selwyn Basin hosts numerous stratabound zinc-lead occurrences. The nearest that have been extensively explored are at Dromedary Mountain (105L #51,52, 54), 25 km southeast of Clarke Peak.

Ram (#42) was not visited but there are probably numerous showings of this type among the low hills and steep ravines on the flanks of the Tintina Trench.

Topographic base: 1:50 000 scale, 1969 (updated 1973) by Surveys and Mapping Branch, Department of Energy, Mines and Resources, Canada. Includes 6 sheets: 105M/1 (Moose Lake), 105M/2 (Clarke Hills), 105M/3 (Sideslip Lake), 105M/4 (Woodburn Lake), and parts of 105M/5 (Ethel Lake) and 105M/6 (Francis Lake).

Note:
- Symbols with a ? suffix indicate areas not visited but extrapolated to contain this rock unit.
- Symbols with a subscript 'prime' (e.g., PC H') lack paleontologic control and have no diagnostic lithologic features. Unit assignment is based upon local structural coherence only.

McArthur hot springs (in 1993 protected as wildlife refuge and under selection by the Selkirk Band) is of great natural beauty. An area at least 100 m x 50 m contains numerous cold water springs and at least three springs of >40° C (estimated 3-10 l/min., 1992). The hot springs appear to be re-circulated groundwater driven by residual heat of the adjacent McArthur pluton, because no faults are apparent and the Tintina Fault is 10 km southwest. Although iron oxide coatings are present limonite deposits appear minimal in the 40 m x 60 m clearing around the hot springs. At other margins of the McArthur pluton, such as southwest of Grey Hunter Creek ferricrete talus may indicate abandoned springs. Limonite-cemented breccia that pre-dates Holocene glaciation on the south side of Clarke Peak (Able/Dope, #45) was described by Bostock (1947).

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Geology from 1990-1992 and 1996 mapping by Roots and co-workers, and compiled from Bostock (1947) in the Kalzas River area. Field assistants P. Daubeny, D. Lucas, J. Hunt, L. Thorogood and K. Netherton were exemplary companions during arduous mapping. Rapid, uneventful helicopter access was provided by W. Thompson, D. Holden and A. Patch, all with Trans North Turbo Air, Ltd. Prospecting tips and local occurrences were discussed with S. Mason-Wood, as well as S. Enns and A. Hitchens, who prospected this area with AMAX Exploration in 1982. The hospitality of Pat and Randy Randolph, homesteading in the area, was a special treat during mapping.

D. Templeman-Kluit discussed field relationships and located key locality F[2] during a short visit in 1992. S. Gordey extended my knowledge of Paleozoic stratigraphy and led a tour of the nearby Dromedary Mountain geology in 1991. Alert and expert examination for organic remains by S.E.B. Irwin and prompt identification by A.W. Norris, as well as uranium-lead isotopic determinations and discussion with R. Parrish, M-L. Bevier, V. McNicholl and J.K. Mortensen, have provided ages essential to making the map. D. Templeman-Kluit and L.C. Struik were patient in review and steadfast in their encouragement. P. McFeely provided editorial and cartographic skills, significantly improving the map. Final style check and formatting was done by B. Vanlier.

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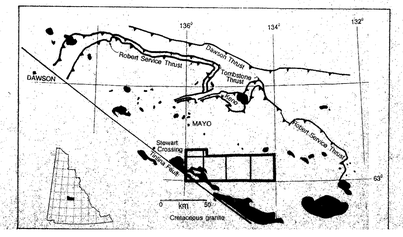
INDEX TO MAP AREAS

LARSEN CREEK (116A) Green, 1972	NASH CREEK (106D) Green, 1972	NADALEEN RIVER (106C) Blusson, 1974
McQUESTEN (115P) Bostock, 1964	MAYO (105M) Roots and Murphy, 1992a	LANSING (105N) Blusson, 1974
CARMACKS (115I) Tempelman-Kluit, 1984	GLENLYON (105L) Campbell, 1967	TAY RIVER (105K) Gordey and Irwin, 1987



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Indian and Northern Affairs Canada
Exploration and Geological Services Division
Yukon Region

Open File 1993-11 (G)

Natural Resources Canada
Geological Survey of Canada
Cordilleran Division

Open File 3022

GEOLOGICAL MAP OF SOUTHERN MAYO MAP AREA (105M/1,2,3,4 and parts of 105M/5 and M/6) YUKON

by

Charles F. Roots

Canada/Yukon Mineral Development Agreement
Geoscience Office
and
Geological Survey of Canada

(Contribution #33494)