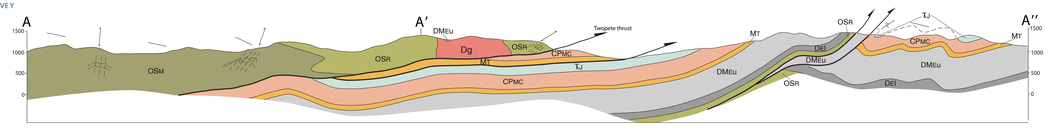
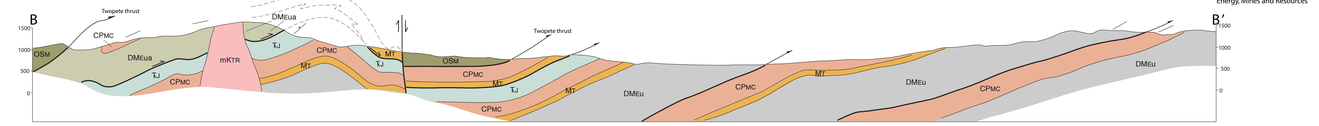
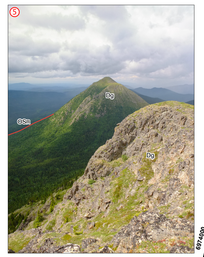
Yukon Geological Survey

Yukon
Energy, Mines and Resources







View looking southwest from central part of Devonian gabbro pluton. The gabbro commonly forms very steep sided mountains that are anomalous in a landscape of rolling, tree-covered mountains.

View looking south from east end of Crystal Peak. Devonian gabbro shown in photos 5 is the prominent peak in the background. Twopete thrust is the fault that places Road River Group (OSR) over Mount Christie Formation (CPMc) and is shown as a white line. Un-named fault that places Tay Formation (MT) over Jones Lake Formation (TJ) is also shown in white. Chert pebble conglomerate of the Earn Group comprises the foreground of the photo.



1:50 000-scale topographic base data produced by CENTRE FOR TOPOGRAPHIC INFORMATION, NATURAL RESOURCES CANADA

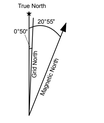
Copyright Her Majesty the Queen

CONTOUR INTERVAL 100 FEET
Elevations in feet above Mean Sea Level
North American Datum 1983
Universal Transverse Mercator Projection

BEDROCK GEOLOGY
EARN LAKE AREA
CENTRAL YUKON

SCALE 1:50 000

0 1 2 3 4 5 kilometres



Use diagram to obtain numerical values
APPROXIMATE MEAN DECLINATION 2016
FOR CENTRE OF MAP
Annual change decreasing 23.7 '

105M/02 Clarke Hills	105M/01 Moose Lake	105N/04 Plateau Mtn
105L/15 Dromedary Mtn	105L/16 **THIS MAP**	105K/13 Stokes Lake
105L/10 Detour Lakes	105L/09 Menzie Creek	105K/12 Twopete Mountain

QUATERNARY

Q — unconsolidated glacial, glaciofluvial and glaciolacustrine deposits; fluviatile silt, sand, and gravel, and local volcanic ash, in part with cover of soil and organic deposits

INTRUSIVE ROCKS

MID CRETACEOUS

TAY RIVER PLUTONIC SUITE (99-95 Ma)

mKTr — medium-grained, biotite ± hornblende granodiorite with minor feldspar phenocrysts

LATE DEVONIAN

Dg — (370-360 Ma) grey-green weathering, green fresh, porphyritic, pyroxene ± hornblende-bearing gabbro

LAYERED ROCKS

MIDDLE TO UPPER TRIASSIC

JONES LAKE FORMATION

TJ — brown-grey weathering, grey fresh, medium-grained, cross-bedded grainstone commonly interbedded with siltstone; medium-bedded, variably calcareous, muddy siltstone with convoluted laminations, commonly bioturbated; rare beds of packstone and orange-weathering iron carbonate layers

CARBONIFEROUS TO PERMIAN

MOUNT CHRISTIE FORMATION

CPMc — orange-brown weathering, green, green-grey, light grey and black, medium and thin-bedded chert; brown-grey-weathering, brown and dark grey, medium-bedded siltstone; minor, maroon, silty chert

MISSISSIPPIAN

TAY FORMATION

MT — grey-brown weathering, grey fresh, thick-bedded to massive, fossiliferous limestone with minor elongate nodules of black chert up to 10 cm long

DEVONIAN TO MISSISSIPPIAN

EARN GROUP

DMEua — grey, massive to laminated quarztose siltstone; light grey, massive to medium-bedded, fine to medium-grained quartz arenite; massive to medium-bedded, black and grey chert; rare calcareous quartz arenite and orange-grey weathering limestone
South of Earn Hills: grey-brown weathering, grey fresh, laminated siltstone with fine-grained sandstone; localized bed of orange-weathering, coarse-grained, calcareous quartz arenite and rare thick bed of medium-grained, mature, quartz arenite

DMEu — grey, very thick bedded, chert pebble conglomerate that typically fines upwards to a coarse-grained, laminated sandstone at the top of the bed; rare section of cobble and boulder conglomerate with dominantly clasts of chert but also includes calcareous sandstone and quartzite clasts.
Earn Mountain: brown-orange weathering, grey fresh, calcareous, quartz-rich sandstone interbedded with grey, fossiliferous limestone and fossiliferous, cross-bedded, quartz-rich sandstone

DEl — orange-brown weathering, fine to medium-grained sandstone thinly interbedded with dark grey weathering, black siltstone

ORDOVICIAN AND SILURIAN

ROAD RIVER GROUP

OSR — *North of Dromedary Creek*: orange-weathering, light grey fresh, bioturbated, dolomitic, argillaceous siltstone
South of Dromedary Creek: grey and orange weathering, laminated, variably calcareous, siltstone and fine-grained sandstone with minor micrite layers. This unit becomes a phyllite near thrust faults; orangey-grey weathering, grey and brown fresh, fine-grained sandstone and siltstone with distinct detrital mica and rare micrite horizons

MENZIE CREEK FORMATION

OSM — orange-weathering, medium-grained, pyroxene-bearing basalt thickly interbedded with laminated to thin-bedded, grey siltstone, fine-grained sandstone and micrite; minor, light green, laminated tuffaceous siltstone

SYMBOLS

bedding (tops unknown, upright bedding, overturned)
foliation
joint, fault
fold axis unknown phase, z-fold)
Yukon MINFILE location
field station
fossil location
U-Pb geochronology sample
apparent dip of bedding in cross section (overturned, upright)
apparent dip of foliation in cross section
point of view of photograph
geologic contacts (defined, approximate, inferred, covered)
fault; movement not known (known, approximate, covered)
thrust fault (known, approximate, inferred, covered)
normal fault (known, covered)
fold axial trace (antiform; synform; overturned antiform; overturned synform)
limit of outcrop

GEOCHRONOLOGY

Locality	Sample/Curation #	Age	Mineral/Fossil	Reference
U/Pb				
1	GGA-87-26G3	360+/-25 Ma	zircon	unpublished data
FOSSILS				
2	C-081699	Early Carboniferous	Conodonts	GSC OF-1992-5
3	C-102599	early-middle Tournasian	Conodonts	GSC OF-1992-11
4	C-150026	Visean or Serpukhovian		Bamber, E.W., 1987
5	C-103834	Mississippian	Conodonts	GSC OF-1992-11
6	C-103835	Carnian	Conodonts	GSC OF-1992-11
7	16RC052-3-1	Famennian	Macrofossils	preliminary data
8	16RC053-1	Frasnian-Early Famennian	Macrofossils	preliminary data
9	16RC087-1	Frasnian	Macrofossils	preliminary data

Digital cartography and drafting by Rosie Cobbett, Yukon Geological Survey.

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

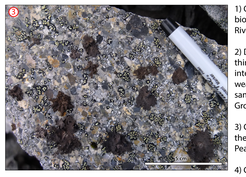
Paper copies of this map may be obtained from the Yukon Geological Survey, Energy, Mines and Resources, Government of Yukon, Room 102, 300 Main Street, Whitehorse, Yukon, Y1A 2B5. Phone: 867-667-3201, Email: geology@gov.yk.ca

A digital PDF (Portable Document File) file of this map may be downloaded free of charge from the Yukon Geological Survey website: http://www.geology.gov.yk.ca.

RECOMMENDED CITATION

Cobbett, R., 2016. Bedrock geology of Earn Lake area, central Yukon. Yukon Geological Survey, Open File 2016-40, scale 1:50 000.





1) Orange weathering, dolomitic, bioturbated siltstone of the Road River Group (Steel Formation).

2) Dark grey weathering, thin-bedded siltstone interbedded with orange weathering, fine-grained sandstone of the lower Earn Group.

3) Chert pebble conglomerate of the upper Earn Group near Crystal Peak.

4) Chert pebble conglomerate from the upper Earn Group near Earn Mountain. Distinct green-blue clasts are common in the conglomerate near Earn Mountain but are not seen elsewhere within the Earn Group.





Marginal Notes

The Earn Lake area was last systematically mapped in the late 1940s and early 1950s by Richard Campbell of the Geological Survey of Canada (Campbell, 1967). The regional geology has been updated and re-interpreted by Steve Gordey and Grant Abbott but neither party spent enough time in the area to fully sort out the geologic history. This open file represents preliminary results of one summer of geologic mapping at a 1:50000 scale. Bedrock is moderately exposed in this area, however large areas that are completely covered have made it difficult to interpret the geology over much of the map sheet.

Stratigraphy

The northern half of the map area is underlain by Devonian to Triassic dominantly marine sedimentary rocks. Near Crystal Peak a complete section of this stratigraphy is exposed from north to south including a small sliver of what is interpreted to be the part of the Road River Group (Silurian Steel Formation) that crops out on the north slope of Crystal Peak. The Earn Group arenite unit (DMEua) is interpreted to be laterally equivalent to the Tay Formation (MT; cross section B-B'). Both units contain Tournaisian fossils. The Tay Formation does not always occur between the Earn Group and the Mount Christie Formation. Here it is interpreted to laterally pinch out in the northeast corner of the map. The southern half of the map area includes Ordovician to Silurian volcanic rocks (OSM) and tuffaceous sedimentary rocks with rare micrite (OSR). These rocks have been assigned to the Menzie Creek formation and the overlying Road River Group, both of which are considered to be part of Selwyn Basin (Gordey and Anderson, 1993; Gordey, 2013).

Igneous Rocks

One small granitic plug crops out in the center of the plateau that makes up Earn Hills and has been assigned to the mid-Cretaceous Tay River Suite. Several bodies of pyroxene ± hornblende-bearing porphyritic gabbro have been mapped intruding the Road River Group in the southwest part of the map and the lower Earn Group in the southeast part of the map. The age of this gabbro is probably Late Devonian based on a U-Pb zircon age from one of the exposures. This unit may represent plutonic roots of the upper Devonian tuffs that have been well documented to the southeast (Cobbett, 2014; 2016).

Structure

The upper Paleozoic strata are deformed by northeast-verging folding and thrusting that typically place rocks of Devonian to Mississippian age over Permian to Triassic strata (cross sections A-A' and B-B'). Ordovician and Silurian strata of Selwyn basin are thrust northward over the upper Paleozoic strata along a flat lying thrust fault. This thrust fault is probably the northwestern continuation of the Twopete thrust fault that has been recognized farther southeast by Cobbett, (2014; 2016). It is unclear whether the Twopete thrust fault is out-of-sequence with the thrust faults to the north but this is how it has been interpreted in the cross sections included here. There are two late structures that are inferred to exist based on abrupt changes in lithology and structure. One of these faults has been drawn under Earn Lake and most likely represents a dip-slip fault that may have a complicated movement history. The other fault is interpreted to the east of the small granitic plug that crops out in the south-central part of the map. Both structure and lithology change abruptly across this feature, however, due to poor exposure in this area complete understanding of these changes is not possible.

References

Campbell, R. B., 1967. Geology of Glenlyon map-area, Yukon Territory. Geological Survey of Canada, Memoir 352, 92 pages.

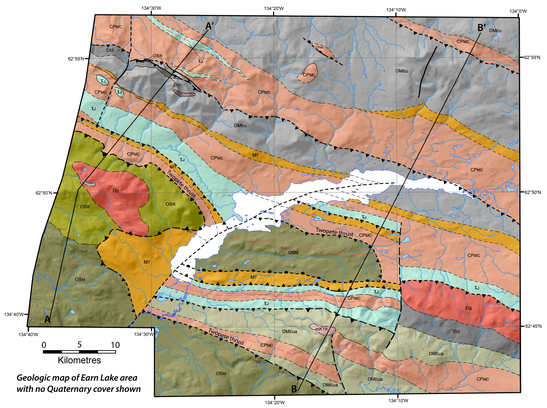
Cobbett, R.N., 2014. Preliminary observations on the geology of the Anvil Lake area (parts of NTS 105K/11 and 12), central Yukon. In: Yukon Exploration and Geology 2013, K.E. MacFarlane, M.G. Nordling, and P.J. Sack (eds.), Yukon Geological Survey, p. 33-51.

Cobbett, R., 2016. Preliminary observations on the geology of Tay Mountain Area (parts of NTS 105K/12 and 13, 105L/09 and 16), central Yukon. In: Yukon Exploration and Geology 2015, K.E. MacFarlane and M.G. Nordling (eds.), Yukon Geological Survey, p. 79-98.

Gordey, 2013. Evolution of the Selwyn Basin region, Sheldon Lake (105J) and Tay River (105K) map areas, central Yukon Territory. Geological Survey of Canada, Bulletin 599, 176 p., doi:10.4095/293034.

Gordey, S.P. and Anderson, R.G., 1993. Evolution of the northern Cordilleran miogeocline, Nahanni Map area (105I), Yukon and Northwest Territories. Geological Survey of Canada, Memoir 428, 214 p.

Yukon MINFILE, 2015. Yukon MINFILE – A database of mineral occurrences. Yukon Geological Survey, http://data.geology.gov.yk.ca [accessed November, 2015].



Geologic map of Earn Lake area with no Quaternary cover shown

Yukon Geological Survey
Energy, Mines and Resources
Government of Yukon

Open File 2016-40

Geological map of the Earn Lake area, central Yukon, parts of NTS 105L/9, 105L/15, and 105L/16

by
Rosie Cobbett