Natural Resources Canada / Ressources naturelles Canada

OPEN FILE 4641
GEOLOGY

STEWART RIVER AREA
(PARTS OF 115 N/1,2,7,8 AND 115-O/2-12)

YUKON TERRITORY

Scale 1:100 000/Échelle 1/100 000

kilometres 2 0 2 4 6 8 kilomètres

Transverse Mercator Projection
Central meridian 139°30'W, Scale Factor 0.9996
North American Datum 1983

Projection transverse de Mercator
Méridien central 139° 30' W, facteur d'échelle 0.9996
Système de référence géodésique nord-américain, 1983

NATIONAL TOPOGRAPHIC SYSTEM REFERENCE: DAWSON 116 B & C; LARSEN CREEK 116 A; NASH CREEK 106 D; STEWART RIVER 115 N & O; McQUESTEN 115 P; MAYO 105 M; STEVENSON RIDGE 115 J & K; CARMACKS 115-I; GLENLYON 105 L; UNITED STATES OF AMERICA

Ancient Pacific Margin NATMAP CARTNAT Ancienne marge du Pacifique

LOCATION MAP

Geology by J.J. Ryan and S.P. Gordey (2000 - 2003),
P. Glombick and S. Piercey (2002),
M. Colpron, C. Roots, S. Piercey and T. Ruks (2003)

Digital cartography by R. Cocking and C. Wagner, Earth Sciences Sector Information Division (ESS Info). Hillshade model by K. Shimamura, Terrain Sciences Division

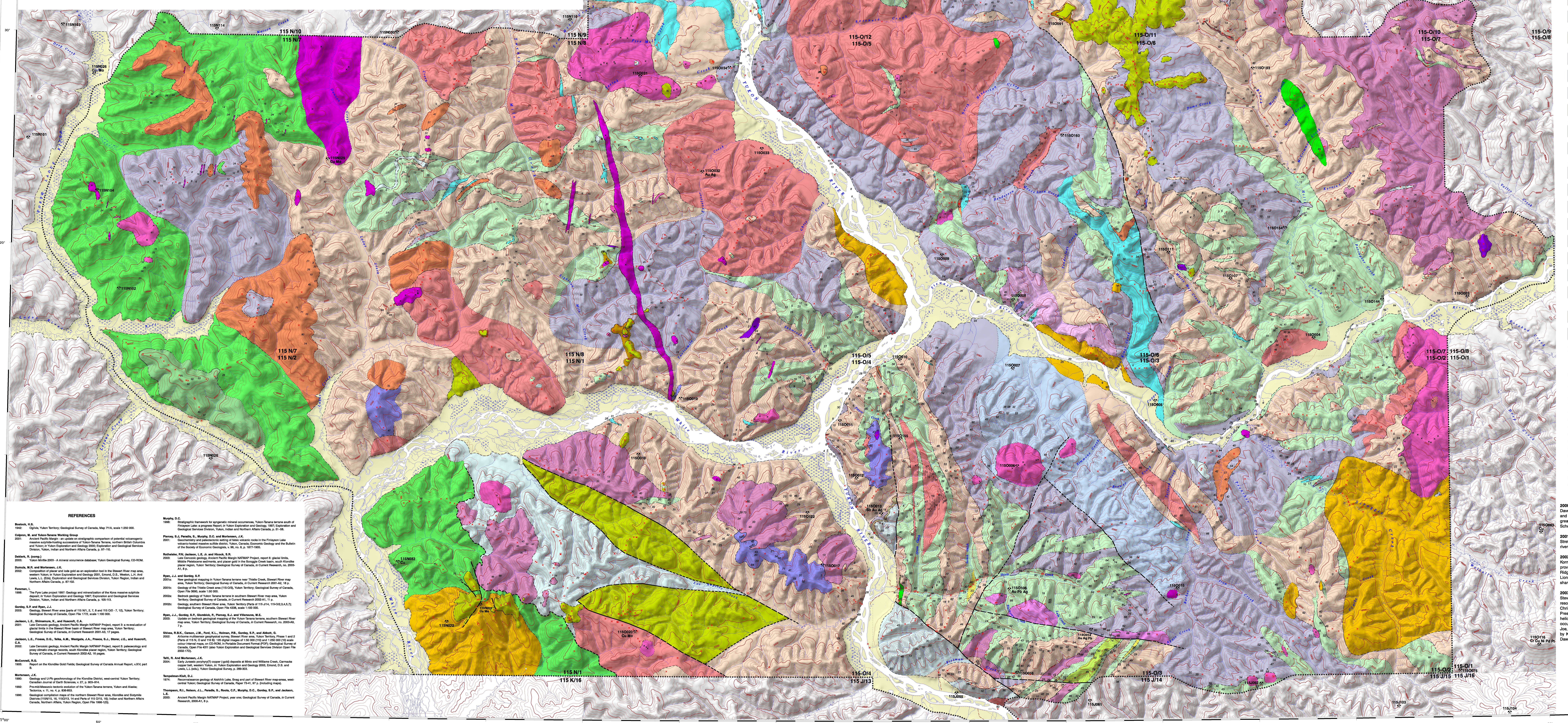
Any revisions or additional geological information known to the user would be welcomed by the Geological Survey of Canada

Digital base map at a scale of 1:50 000 from data compiled by Geomatics Canada, modified for 1:100 000 by ESS Info

Mean magnetic declination 2004, 25°45'E, decreasing 18.7' annually. Readings vary from 25°10'E in the southwest to 26°18'E in the northeast

Elevations in feet above mean sea level (metres where noted)

Contour interval 200 feet (40 metres where noted)



DESCRIPTIVE NOTES

INTRODUCTION

Geological mapping in the Stewart River area (NTS 115 N, O) began as part of the Ancient Pacific Margin NATMAP Project. Initiated by the Geological Survey of Canada, Yukon Geological Survey, and British Columbia Geological Survey Branch, the NATMAP Project seeks to understand the composition, relationships, and metallogeny of poorly understood pericratonic terranes lying between the ancestral North American margin and those known with more certainty to be tectonically accreted (Thompson et al., 2000; Colpron et al., 2001). The Stewart River component (Fig. 1) focuses on the Yukon-Tanana terrane (Mortensen, 1990, 1992), comprising complexly deformed, mostly (?)Paleozoic meta-igneous and metasedimentary rocks. The final two years of the Stewart River Project are funded under the Geological Survey of Canada's Northern Resources Development Program.

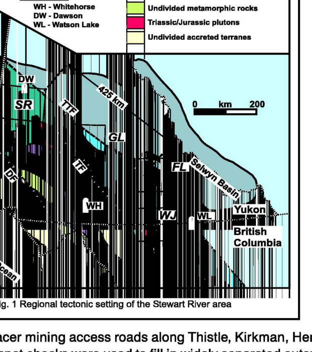


Fig. 1 Regional tectonic setting of the Stewart River area

The objective of the Stewart River Project is to investigate the stratigraphic, structural, and tectonic history and the economic framework of this large tract of Yukon- Tanana terrane by mapping about 2/3 of the area over a four year period. Geology is being interpreted in light of new geophysical data collected in this area under the Targeted Geoscience Initiative (Fig. 2; Shives et al., 2002). Concurrent surficial geological studies were aimed at understanding the Quaternary history and setting of the numerous placer gold deposits in the region (e.g. Jackson et al., 2001, 2002; Rotheisler et al., 2003).

In summer 2003, gaps in the previous mapping were bridged and the mapping extended to cover about eleven 1:50 000 scale map areas (see Fig. 2). These new data and previous work in surrounding areas (e.g. Bostock, 1942; Tempelman-Kluit, 1974; Mortensen, 1996) will be synthesized into a new geological map of the Stewart River map area (1:250 000 scale; 115N-O).

Access into the heart of the Stewart River area is afforded by boat along the Yukon and Stewart rivers and by truck on placer mining roads, many of which extend south from Dawson. Fieldwork in 2000-2003 included foot traverses from small camps mobilized along these routes and from helicopter or fixed-wing supported camps in more remote areas. All-terrain vehicles were used on placer mining access roads along Thistle, Kirkman, Henderson, Black Hills and Maisy Mae creeks and the Sixty Mile River. Helicopter spot checks were used to fill in widely separated outcrops in the southwest part of the map area where foot traverses or fly camps were impractical. Bedrock mapping is hampered by a deep (~1 m) soil veneer, thick gravel, and loess deposits in valley bottoms, and by dense cover of forest, moss, and lichen. The detailed aeromagnetic and gamma-ray surveys (Shives et al., 2002) are an effective aid to bedrock mapping in this poorly exposed, unglaciated terrain.

GEOLOGICAL FRAMEWORK

The Stewart River area is underlain by twice-transposed, amphibolite-facies gneiss and schist of mostly(?) Paleozoic age. These are intruded by younger plutonic rocks (Jurassic, Cretaceous and Eocene; EJgd, JKg, Er) and overlain by Upper Cretaceous volcanic rocks (uKCv) and local occurrences of Lower Cretaceous conglomerate (lKTcg). The reader is directed to Ryan and Gordey (2001a, b; 2002a, b) and Ryan et al. (2003) for a more comprehensive description of the geology.

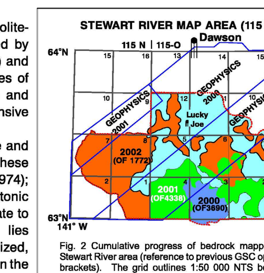


Fig. 2 Cumulative progress of bedrock mapping in the Stewart River area (reference to previous GSC open files in brackets). The grid outlines 1:50 000 NTS boundaries. Helicopter-borne detailed aeromagnetic and gamma-ray surveys (dark blue outline) were flown in 2000 and 2001. Mapping in 2003 completed areas in light blue.

Metasiliciclastic rocks are widespread, and dominated by psammite and quartzite, with lesser pelites and rare conglomerate (DMq, DMcg, DMps). These were thought to be as old as late Proterozoic (e.g. Tempelman-Kluit, 1974); however, preliminary detrital zircon geochronology and geochronology for plutonic rocks suggest a middle Paleozoic age (M. Villeneuve, in prep.). Intermediate to mafic composition amphibolite (DMa, DMm) interdigitates with, and lies stratigraphically above, the siliciclastic rocks. Although intensely tectonized, heterogeneous compositional layering and local vestiges of primary textures in the amphibolite, such as breccia clasts and pillow selvages, indicate derivation from volcanic and volcaniclastic rocks. Marble horizons (DMc) occur within the amphibolite, as well as the siliciclastic rocks. In turn, dark carbonaceous quartzite, metapelite and minor marble of the Nasina assemblage (DMNq, DMNl), markedly sparse in volcanic-derived material, lies structurally above and/or may be partly equivalent to the aforementioned metaclastic rocks. Abundant orthogneiss bodies with diorite, tonalite, granodiorite, monzogranite and granite protoliths, intrude the above assemblages. Some are Devono-Mississippian in age (DMag, DMg, DMt), whereas others (Pag) are known to be Permian. For many others, the age is probably one of these, yet remains unclear (DPag, DPg). The tectonic significance of ultramafic and gabbroic rocks (mPum, mPums) that lie near the boundary between the siliciclastic and metavolcanic-metavolcaniclastic successions is also unclear.

An extensive area of likely Permian, low to medium grade muscovite-quartz and chlorite-quartz schist (PKs) in the western part of the map area, correlated by Tempelman-Kluit (1974) with the Klondike Schist (McConnell, 1905) is derived from a combination of volcanic, volcaniclastic and plutonic rocks. Southeast of the White River this succession may lie beneath a low-angle fault. To the northwest, contact relationships are uncertain. East of Ladue River these rocks are overlain by relatively unstrained, chlorite-altered intermediate to mafic volcanics (Pv), of unknown but possibly Permian(?) age.

In summary, the extensive metaplutonic and metavolcanic rocks represent two periods of arc activity. The older arc, built upon a siliciclastic foundation, largely comprises Devono-Mississippian amphibolite (DMa) associated with coeval widespread tonalitic orthogneiss (DMt) that formed its subvolcanic intrusive complex. A Permian arc, built upon the previous, is represented by granitic orthogneiss (Pag) and coeval metavolcanics (PKs and possibly Pv).

STRUCTURE

The Paleozoic rocks in the field area exhibit a regional foliation (ST), characterized by high-strain transposition of layering in the gneiss and schist, with abundant intrafolial isoclinal folds that are commonly rootless. The intensity of strain within the regional foliation locally grades to mylonite. Primary compositional layering (S0) in metasedimentary rocks, unit contacts, and a pre-existing foliation (S1) can be traced around closures of the transposition folds, indicating that they are at least F2 structures. F2 deformation appears to accompany the regional metamorphism, and preliminary geochronological results indicate that this happened during the mid-Permian (M. Villeneuve, in prep). The F2 folds are generally recumbent to shallowly inclined, close to isoclinal, long-wavelength structures. They commonly lack an axial planar foliation, and their axes parallel a regional extension lineation (L2). This relationship helps distinguish F2 and F3 folds, which can have very similar style. The latter are open, moderately inclined (but varying from shallow to steep), shallowly plunging structures, that have weak axial-planar fabric where developed in schistose layers, and have no associated extension lineation. The map area is also affected by faults of varying significance. Most of these could not be observed directly, but are interpreted from changes in rock type and/or structural grain; some are also well delineated by prominent physiographic and aeromagnetic lineaments. Locally, fault breccia and slickensides provide direct evidence of fault contacts.

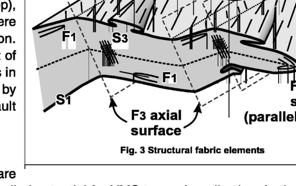


Fig. 3 Structural fabric elements

ECONOMIC GEOLOGY

One of the more significant findings is that parts of the area are dominated by a mid-Paleozoic volcano-plutonic arc(?) complex with implied potential for VMS type mineralization. In the Finlayson Lake area (Fig. 1), originally contiguous with the Stewart River area (allowing for 425 km of late Mesozoic-Tertiary dextral offset), correlative mid-Paleozoic strata host massive sulphide mineralization in both felsic (e.g., Kudz Ze Kayah and Wolverine Lake deposits; Murphy (1998, and references therein), Piercey et al, 2001) and mafic (Fyre Lake deposit; Foreman (1998)) metavolcanic sequences. It should be noted that primary geochemical (e.g., alteration), structural and lithological signatures may be strongly modified by the amphibolite facies metamorphism and high state of strain in the Stewart River area.

The Lucky Joe occurrence was explored in 2003 by Kennecott Exploration. Two large strong parallel geochemical trends defined by high soil values of Cu and Au, with associated Mo and Ag, have been identified (press release: www.copper-ridge.com). The origin of the occurrence is obscured by complex structure and metamorphism. Cu-Au porphyry, Fe-oxide Cu-Au, or sediment-hosted Cu deposit models have all been suggested. A metallogenic study now underway (Jan Peter (GSC)) is aimed at identifying the deposit type and it's origin. The Lucky Joe represents a new type of potentially large occurrence within Yukon-Tanana terrane.

In Yukon and Alaska, mid-Cretaceous (105-90 Ma) and Late Cretaceous (70-65 Ma) plutons and their country rock are prospective targets for intrusion-related gold deposits (e.g., Hart et al., 2000). Undeformed granite-syenite stocks, such as near Mt. Stewart (JKg), possibly of Cretaceous or Tertiary age, could be prospective. Although perhaps of less significance, Early Jurassic plutons (EJgd) are known to host Au $\pm$ Cu rich shear zones, stockworks and skarns in Alaska (Newberry, 2000) as well as central Yukon (e.g. Minto deposit, Tafti and Mortensen, 2004). Other plutonic bodies show evidence of significant strain, are all pre-Early Jurassic (Paleozoic) in age, and regionally unproductive. The source of gold leading to significant placer deposits in many drainages (e.g. Thistle, Kirkman, Barker, Scroggie, Black Hills, Maisy Mae and Henderson creeks) remains enigmatic. For example, Dumula and Mortensen (2002) suggest undiscovered intrusion-related gold as a placer source within the Thistle basin on the basis of placer gold composition. However, Mesozoic plutonic rocks are rare within this drainage. They also indicate that as yet undiscovered sources for placer gold in the Eurkea Dome or Henderson Dome area are of epithermal origin. Rotheisler et al suggest two separate, as yet unidentified lode gold occurrences sourced placer deposits in the Scroggie Creek basin.

LEGEND

Unit	Description
QUATERNARY	
Qs	Fluvial silt, sand and gravel deposits
EOCENE	
Er	PORPHYRY: Smokey quartz and K-feldspar phyric rhyolite to rhyodacite stocks and dykes, and possible rare flows
UPPER CRETACEOUS	
uKCv	CARMACKS GROUP: rhyodacite and dacite, commonly biotite and hornblende phyric, dominated by lesser andesite and basalt; minor rhyolite
LOWER CRETACEOUS	
lKTcg	TANTALUS(?) FORMATION: clast-supported pebble to cobble conglomerate with clasts of vein quartz and foliated quartzite
JURASSIC? OR CRETACEOUS	
JKg	GRANITE: pink to grey, locally porphyritic, syenogranite to monzogranite plutons and dykes
EARLY JURASSIC	
EJgd	GRANODIORITE: chlorite-altered hornblende and biotite-bearing granodiorite, monzogranite, quartz monzonite and quartz monzodiorite
PALEOZOIC AND/OR MESOZOIC	
PMg	FOLIATED GRANITE: deformed (foliated to gneissic), felsic to intermediate monzogranite, granodiorite and quartz monzonite
PMd	GABBRO: foliated to unfoliated metagabbro (locally garnet-bearing); diabase, metabasite
MID(?)- TO LATE PALEOZOIC	
mPum, mPums	ULTRAMAFIC-GABBRO: foliated to unfoliated amphibolite facies metagabbro, metapyroxenite, serpentinite and talc-siderite schist; mPums, dominantly serpentinite
PERMIAN	
Pv	FOLIATED VOLCANIC: chlorite-altered weakly foliated intermediate to mafic aphanitic volcanic flows and tuffs, locally with clastic textures preserved
PKs	KLONDIKE SCHIST: muscovite-chlorite-quartz-feldspar schist, chlorite schist, chlorite phyllonite; local cleaved lapilli tuff with preserved primary texture, probably derived from Pv
Pag	AUGEN GNEISS (YOUNGER): K-feldspar augen granite; exhibits various states of strain including porphyroclastic straight gneiss
Pfs	FELSIC SCHIST: quartz-sericite schist or metafelsite, possibly derived from felsic volcanic or hypabyssal intrusive rocks, e.g. rhyolite or quartz-feldspar porphyry
DEVONIAN AND/OR PERMIAN	
DPag	AUGEN GNEISS (UNDIVIDED): K-feldspar augen granite orthogneiss undivided; may include bodies of Devono-Mississippian and Permian age (i.e. DMag or Pag)
DPg	FELSIC GNEISS (UNDIVIDED): pink to orange K-feldspar rich felsic orthogneiss; banded to layered; veined and/or segregated; commonly includes, or associated with, K-feldspar augen orthogneiss; may include bodies of Devono-Carboniferous and Permian age
DEVONIAN TO MISSISSIPPIAN	
DMNq, DMNl	NASINA ASSEMBLAGE: DMNq, fine-grained, dark-grey to black carbonaceous quartzite and metapelite; DMNl, marble
DMag, DMg	AUGEN GNEISS (OLDER): mainly K-feldspar augen orthogneiss; DMg includes granite to granodiorite orthogneiss, opposite mouth of Reindeer Creek.
DMta	Undivided GREY GNEISS / AMPHIBOLITE (DMt / DMa)
DMt	GREY GNEISS: intermediate to mafic orthogneiss; generally grey; banded to layered; commonly veined; derived from intermediate granitoid (tonalite to diorite) sheets; usually interlayered with amphibolite schist and gneiss
DMa	AMPHIBOLITE: amphibolite schist and gneiss; metabasite; probably derived from mafic to intermediate volcanic or volcaniclastic rocks; locally associated with psammite or interlayered with orthogneiss
DMm	MAFIC SCHIST: biotite-hornblende+/-plagioclase+/-quartz metabasite?; generally associated with amphibolite; main locality on Thistle Mountain
DMc	MARBLE: marble (metacarbonate) derived from pure to impure limestone; associated calc-silicate schist derived from calcareous metapelite
DMps	QUARTZ-MICA SCHIST: undivided metasedimentary rocks dominated by metapsammite, semipelite and metapelite; commonly quartz-garnet-biotite-muscovite schist possibly derived from siliceous siltstone; commonly finely interlayered with garnet metapelite; commonly contains members of micaceous quartzite; rare conglomerate; grades locally to paragneiss
DMcg	METACONGLOMERATE: pebble- to cobble-sized rounded clasts; mainly massive white vein quartz, but including some granitoid clasts (tonalite?); has an arkosic matrix; grades into quartzite; matrix supported
DMq	QUARTZITE: banded to massive, grey to white quartzite; apparently clastic in origin, or in part, possibly derived from metachert

NOTE: Relative ages of many units are unknown; superimposed hillshade may darken colours on map from those shown on legend above

SYMBOLS

Geological contact (defined, approximate, assumed)
Fault, sense of movement uncertain (defined, approximate, assumed)
Limit of mapping
Transposition foliation (ST) 10
Bedding 40
Fracture cleavage, slaty cleavage 23
Foliation (S2,S3) 12 12
Mineral (elongation) lineation (L2) 23
Minor fold axis (F1, u-fold) 19
Minor fold axis (F2, u-fold, z-fold, s-fold) 28 28 28
Minor fold axis (F3, u-fold, z-fold, s-fold) 18 18 18
Minor fold axial plane (F2, F3) 44 44
Intersection lineation (IL3) 10
Station (observation point without structural data) × or ×
Mineral Prospect (Yukon Minfile number (de Klerk, 2003); commodities, if known) 115O999 Ag, Cu

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2001: Dave Lister, Adrian Manlagnit and Olwyn Bruce assisted in the field. We also thank Eric Stretch for providing a camp site at Frisco Creek, and freighting services on Yukon and Stewart rivers. Karl Scholz and Adam Morrison provided helicopter transport.

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2004: Geology, Stewart River Area (Parts of 115 N/1,2,7,8 and 115-O/2-12), Yukon Territory; Geological Survey of Canada, Open File 4641, scale 1:100 000.

REFERENCES

Bostock, H.S.
1942: Ogilvie, Yukon Territory; Geological Survey of Canada, Map 711A, scale 1:250 000.

Colpron, M. and Yukon-Tanana Working Group
2001: Ancient Pacific Margin - an update on stratigraphic comparison of potential volcanogenic massive sulphide-hosting successions of Yukon-Tanana Terrane, northern British Columbia and Yukon; *in* Yukon Exploration and Geology 2000; Exploration and Geological Services Division, Yukon, Indian and Northern Affairs Canada, p. 97–110.

Deklerk, R. (comp.)
2003: Yukon Minfile 2003 - A mineral occurrence database; Yukon Geological Survey, CD-ROM.

Dumula, M.R. and Mortensen, J.K.
2002: Composition of placer and lode gold as an exploration tool in the Stewart River map area, western Yukon; in Yukon Exploration and Geology 2001, Emond, D.S., Weston, L.H. And Lewis, L.L. (Eds), Exploration and Geological Services Division, Yukon Region, Indian and Northern Affairs Canada, p. 87-102.

Foreman, I.
1998: The Fyre Lake project 1997: Geology and mineralization of the Kona massive sulphide deposit; *In* Yukon Exploration and Geology 1997; Exploration and Geological Services Division, Yukon, Indian and Northern Affairs Canada, p. 105-113.

Gordey, S.P. and Ryan, J.J.
2003: Geology, Stewart River area (parts of 115 N/1, 2, 7, 8 and 115 O/2 - 7, 12), Yukon Territory; Geological Survey of Canada, Open File 1772, scale 1:100 000.

Jackson, L.E., Shimamura, K., and Huscroft, C.A.
2001: Late Cenozoic geology, Ancient Pacific Margin NATMAP Project, report 3: a re-evaluation of glacial limits in the Stewart River basin of Stewart River map area, Yukon Territory; Geological Survey of Canada, *in* Current Research 2001-A3, 17 pages.

Jackson, L.E., Froese, D.G., Telka, A.M., Westgate, J.A., Preece, S.J., Storer, J.E., and Huscroft, C.A.
2002: Late Cenozoic geology, Ancient Pacific Margin NATMAP Project, report 5: paleoecology and proxy climatic change records, south Klondike placer region, Yukon Territory; Geological Survey of Canada, *in* Current Research 2002-A2, 16 pages.

McConnell, R.G.
1905: Report on the Klondike Gold Fields; Geological Survey of Canada Annual Report, v.XIV, part B.

Mortensen, J.K.
1990: Geology and U-Pb geochronology of the Klondike District, west-central Yukon Territory; Canadian Journal of Earth Sciences, v. 27, p. 903–914.
1992: Pre-mid-Mesozoic tectonic evolution of the Yukon-Tanana terrane, Yukon and Alaska; Tectonics, v. 11, no. 4, p. 836-853.
1996: Geological compilation maps of the northern Stewart River area, Klondike and Sixtymile Districts (115N/15, 16, 115O/13, 14 and Parts of 115 O/15, 16); Indian and Northern Affairs Canada, Northern Affairs, Yukon Region, Open File 1996-1(G).

Murphy, D.C.
1998: Stratigraphic framework for syngenetic mineral occurrences, Yukon-Tanana terrane south of Finlayson Lake: a progress Report; *in* Yukon Exploration and Geology, 1997; Exploration and Geological Services Division, Yukon, Indian and Northern Affairs Canada, p. 51–58.

Piercey, S.J, Paradis, S., Murphy, D.C. and Mortensen, J.K.
2001: Geochemistry and paleotectonic setting of felsic volcanic rocks in the Finlayson Lake volcanic-hosted massive sulfide district, Yukon, Canada; Economic Geology and the Bulletin of the Society of Economic Geologists, v. 96, no. 8, p. 1877-1905.

Rotheisler, P.N; Jackson, L.E, Jr. and Hicock, S.R.
2003: Late Cenozoic geology, Ancient Pacific Margin NATMAP Project, report 6: glacial limits, Middle Pleistocene sediments, and placer gold in the Scroggie Creek basin, south Klondike placer region, Yukon Territory; Geological Survey of Canada, *in* Current Research, no. 2003-A1, 8 p.

Ryan, J.J. and Gordey, S.P.
2001a: New geological mapping in Yukon-Tanana terrane near Thistle Creek, Stewart River map area, Yukon Territory; Geological Survey of Canada, *in* Current Research 2001-A2, 18 p.
2001b: Geology of the Thistle Creek area (115-O/3), Yukon Territory; Geological Survey of Canada, Open File 3690, scale 1:50 000.
2002a: Bedrock geology of Yukon Tanana terrane in southern Stewart River map area, Yukon Territory; Geological Survey of Canada, *in* Current Research 2002-A1, 11 p.
2002b: Geology, southern Stewart River area, Yukon Territory (Parts of 115 J/14, 115-O/2,3,4,5,7); Geological Survey of Canada, Open File 4338, scale 1:100 000.

Ryan, J.J., Gordey, S.P., Glombick, P., Piercey, S.J. and Villeneuve, M.E.
2003: Update on bedrock geological mapping of the Yukon-Tanana terrane, southern Stewart River map area, Yukon Territory; Geological Survey of Canada, *in* Current Research, no. 2003-A9, 7 p.

Shives, R.B.K., Carson, J.M., Ford, K.L., Holman, P.B., Gordey, S.P., and Abbott, G.
2002: Airborne multisensor geophysical survey, Stewart River area, Yukon Territory, Phase 1 and 2 (Parts of 115 N, O and 116 B): 120 digital images of 1:50 000 (110) and 1:250 000 (10) scale colour interval maps, on CD-ROM, in Portable Document Format (PDF); Geological Survey of Canada, Open File 4311 (also Yukon Exploration and Geological Services Division Open File 2002-17D).

Tafti, R. And Mortensen, J.K.
2004: Early Jurassic porphyry(?) copper (-gold) deposits at Minto and Williams Creek, Carmacks copper belt, western Yukon, *in*: Yukon Exploration and Geology 2003, Emond, D.S. and Lewis, L.L (eds.), Yukon Geological Survey, p. 289-303.

Tempelman-Kluit, D.J.
1974: Reconnaissance geology of Aishihik Lake, Snag and part of Stewart River map-areas, west-central Yukon; Geological Survey of Canada, Paper 73-41, 97 p. (including maps).

Thompson, R.I., Nelson, J.L., Paradis, S., Roots, C.F., Murphy, D.C., Gordey, S.P., and Jackson, L.E.
2000: Ancient Pacific Margin NATMAP Project, year one; Geological Survey of Canada, *in* Current Research, 2000-A1, 8 p.

Canada