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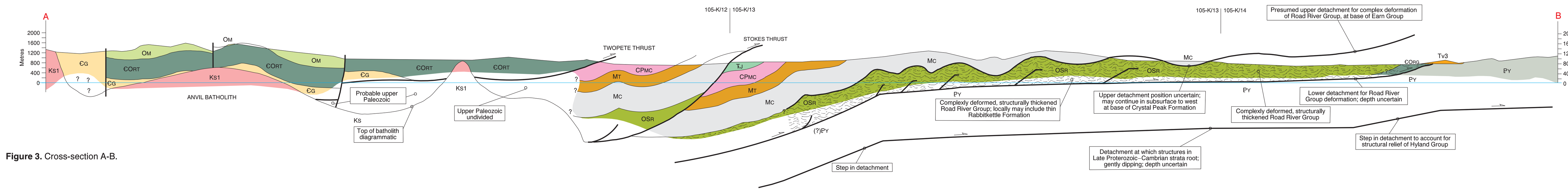

Figure 3. Cross-section A-B.

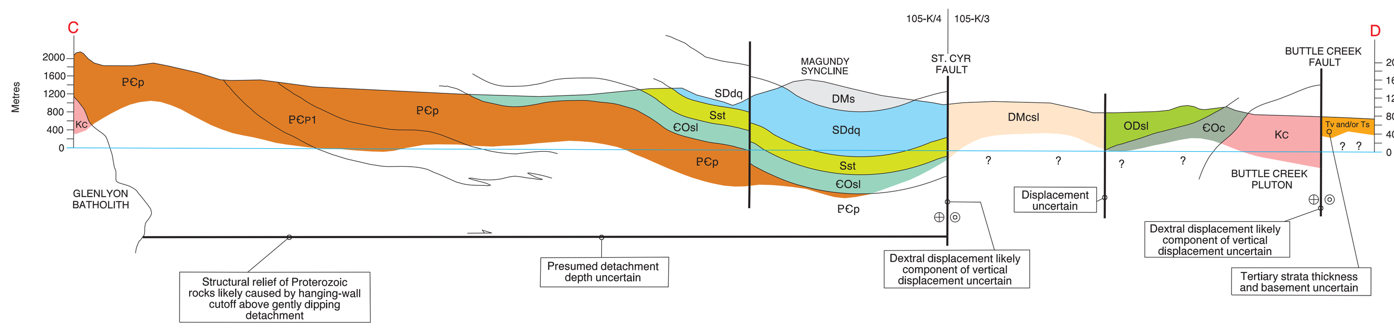

Figure 4. Cross-section C-D.

Figure 5. Cross-section D-E-F.

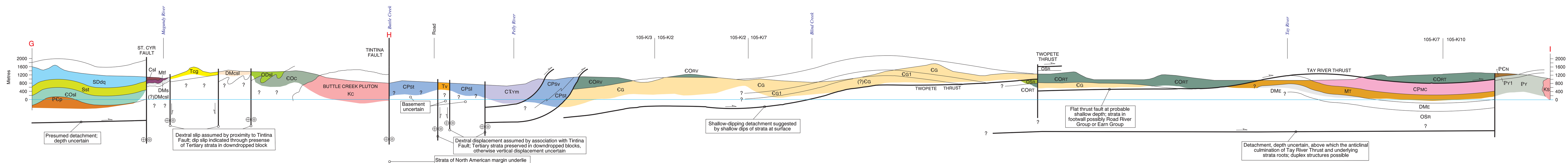

Figure 6. Cross-section G-H-I.

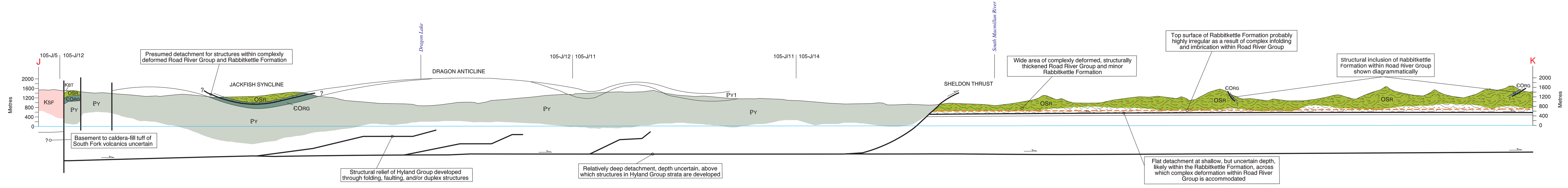

Figure 7. Cross-section J-K.

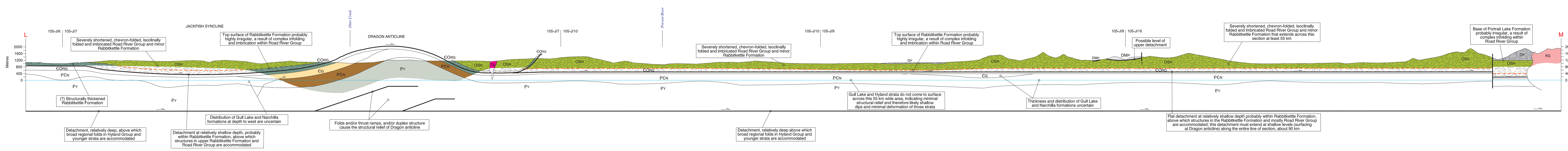

Figure 8. Cross-section L-M.

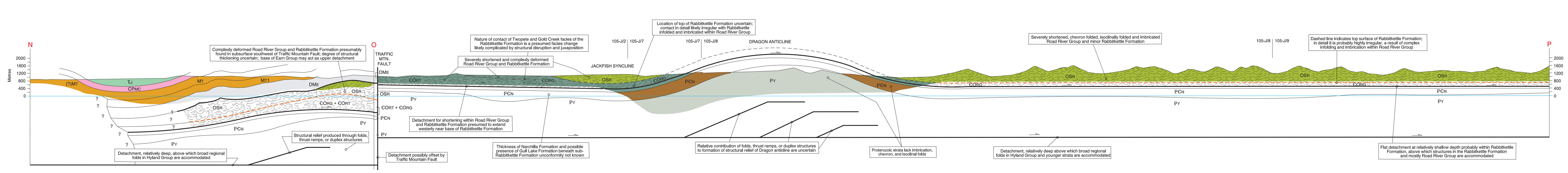

Figure 9. Cross-section N-O-P.

STRUCTURAL NOTES

Strata within the Sheldon Lake (NTS 105-J) and Tay River (NTS 105-K) map areas were shortened in response to Mesozoic docking of allochthonous terranes with the western North American margin. In this part of the resulting Cordilleran Foreland Fold and Thrust Belt, contraction is bracketed as Early Cretaceous by deformation of the youngest affected strata (Early Cretaceous) and intrusion of post-tectonic plutons (mid-Cretaceous). The region was subsequently transected by large-scale Cenozoic ((?)Eocene) dextral offset along Tintina Fault and related strands (420 km) (Gabrielse et al., 2006).

The cross-sections portray structural geometry at depth in terms of a thin-skinned detachment model, a model widely applied to other regions of the Foreland Fold and Thrust Belt. The annotations illustrate some of the rationale and uncertainty in the interpretation. Beyond the lower limit of colour, confidence in the projection of surface structures decreases rapidly with depth. The lack of geophysical data precludes accurate indication of depth to detachments and other features that are suggested by structural geometries at surface.

Northeast of Tintina Fault the region is characterized by gently dipping thrust faults and low-angle detachments. The Stokes, Twopete, and Tay River thrusts (sections A-B, D-E-F, and H-I) carry successions that are generally competent. Slaty cleavage and minor folds are rare except in Cambrian and Ordovician strata southwest of Anvil batholith. For the Twopete (section D-E) and Tay River (section H-I) thrusts a minimum 8 km and 11 km of overlap, respectively, are demonstrated by map relationships. Appreciable overlap is also supported for Twopete Thrust by absence of Ordovician volcanic rocks in the footwall that are voluminous in the hanging wall.

Northeast of the Stokes, Twopete, and Tay River thrusts, complexly deformed Cambro-Ordovician to lower Devonian chert, shale, and carbonate rocks (units OSR and ЄORG; patterned) form most of the exposure of stratified rocks over a broad region. Isoclinal fold closures are seen in places, whereas in others duplication is accomplished by a combination of thrust imbrication and folding. Steep dips are common. In contrast, late Proterozoic strata brought to surface along Dragon anticline (sections J-K, L-M, and O-P) are broadly warped. A regional detachment within Cambro-Ordovician silty limestone (unit ЄORG) is inferred to separate the markedly differently deformed successions (sections J-K, L-M, and N-O-P) and to be the surface above which the complex deformation was accommodated. The broad region of exposure of complexly deformed strata of generally similar stratigraphic level implies that the underlying detachment is relatively flat. In some places overlying competent Devono-Mississippian strata (e.g. section A-B, unit MC) seem much less deformed than the underlying rocks so that the base of that unit may have acted as an upper detachment. In addition, the structural relief of Dragon anticline must have developed above another décollement deeper than that accommodating the more complex deformation of the Cambro-Ordovician to Devonian section.

As with the stratified rocks, the boundaries of Cretaceous intrusive and extrusive bodies (sections A-B, C-D, D-E-F, G-H-I, J-K, and L-M) are unconstrained at depth by geophysical data. The extrusive rocks form large calderas bounded by inward-dipping normal faults that may be projected downward with more confidence than intrusive boundaries, but the depth to the floors of these calderas is unclear. Both intrusive contacts and calera-fill bounding faults postdate deformation and must pierce the detachments that accommodated shortening.

By analogy with the southern Canadian Cordillera, it is likely that all shortening within the Sheldon Lake–Tay River area roots along a basal detachment that extends underneath the entire deformed belt to the front of Mackenzie Mountains 300 km to the northeast of the present area. A consequence is that any younger contractional deformation in the foreland to the east passively transported the already intruded plutons and enclosing rocks of the present area northeasterly along this basal décollement a distance equivalent to that contraction. Given the offset along Tintina Fault, the basal detachment for structures in southwesternmost Tay River area (section C-D and G-H) would align with that beneath the northern Rocky Mountains 420 km to the southeast.

REFERENCE

Gabrielse, H., Murphy, D.C., and Mortensen, J.K., 2006. Cretaceous and Cenozoic dextral orogen-parallel displacements, magmatism, and paleogeography, north-central Canadian Cordillera; *in* Paleogeography of the North American Cordillera: evidence for and against large-scale displacements; Geological Association of Canada, (ed.) J.W. Haggart, R.J. Enkin, and J.W.H. Monger; Special Paper 46, p. 255–276.

Gordey, S.P., 2013. Geology, central Tay River, Yukon; Geological Survey of Canada, Map 2150A, scale 1:100 000. doi:10.4095/288983

Gordey, S.P., 2013. Geology, Selwyn Basin, Yukon; Geological Survey of Canada, Bulletin 599.

ACKNOWLEDGMENTS

C.F. Roots and K. Fallas are thanked for constructive reviews.

CO-ORDINATES FOR CROSS-SECTION LINES

Sheldon Lake (105-J): UTM Zone 9, NAD83
Easting; Northing

SECTION J-K
J: 361202; 6931787
K: 390920; 6987303

SECTION L-M
L: 394700; 6905006
M: 449096; 6979399

SECTION N-O-P
N: 404476; 6875528
O: 411773; 6892172
P: 448582; 6942155

Tay River (105-K): UTM Zone 8, NAD83
Easting; Northing

SECTION A-B

A: 551442; 6934978
B: 583171; 6986564

SECTION C-D

C: 566132; 6874825
D: 583818; 6897637

SECTION D-E-F

D: 583818; 6897637
E: 629592; 6967981
F: 651717; 6989082

SECTION G-H-I

G: 586059; 6875275
H: 596887; 6888920
I: 627439; 6936569

NOTE:

Pattern overprint indicates zone of complex deformation and structural thickening.

Top surface of Rabbitkettle Formation coloured for clarity.

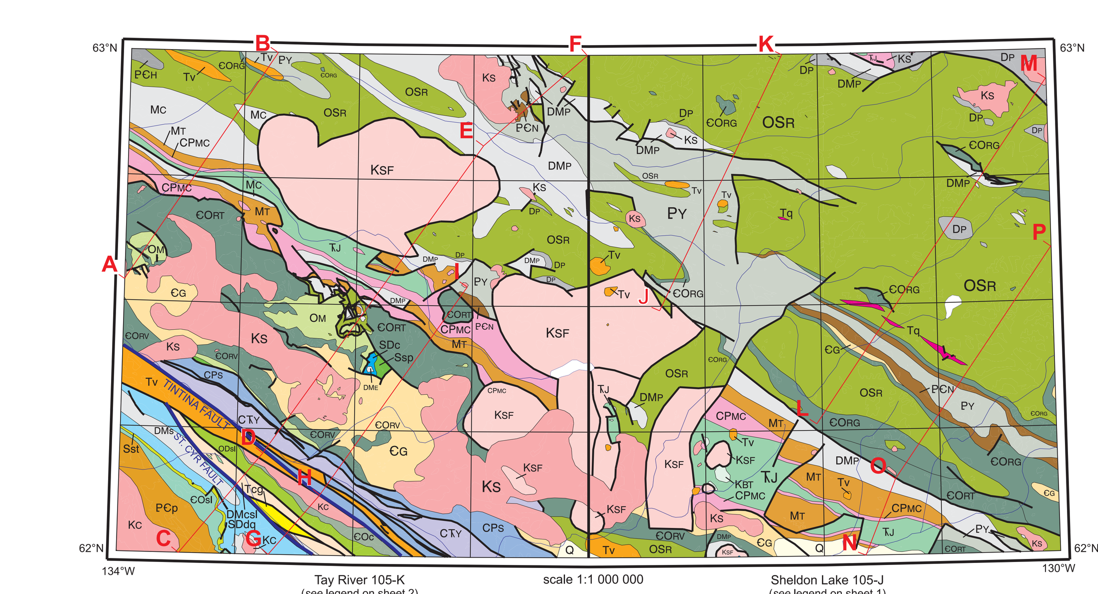

Figure 2. Index map of geology, Tay River–Sheldon Lake area.

This publication is available for free download through GEOSCAN (http://geoscan.ess.nrcan.gc.ca/). doi:10.4095/288980

LOCATION MAP

Author: S.P. Gordey

Based on surface geology by S.P. Gordey, Geological Survey of Canada 1980, 1982–1983, 1985–1987, with contributions from previous work by J.A. Roddick and L.H. Green

Cartography by R. Cocking, R. Chan, and S.P. Williams, Geological Survey of Canada and E. Everett, Data Dissemination Division

MAP 2149A

GEOLOGY

SELWYN BASIN (SHELDON LAKE AND TAY RIVER)

YUKON

Scale 1:100 000/Échelle 1/100 000

kilometres 2 0 2 4 6 8 kilomètres

(For comprehensive legend, see sheets 1 and 2)

No vertical exaggeration

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

Topographic profiles derived from data compiled by Natural Resources Canada

Elevations in metres above mean sea level

Canada

Sheet 3 of 3: Cross-sections, Sheldon Lake and Tay River

Recommended citation
Gordey, S.P., 2013. Geology, Selwyn Basin (Sheldon Lake and Tay River), Yukon; Geological Survey of Canada, Map 2149A, 2 map sheets, scale 1:250 000 and 1 sheet of cross-sections, scale 1:100 000. doi:10.4095/288980