

Descriptive Notes

This map area is relatively inaccessible due to limited outcrop and extensive tree cover. In the northwest and southeast parts of the map area, 1970s vintage seismic reflection data were used to inform the compilation. In the northwest, the surface projection of a pre-Mesozoic syncline is shown there. This structure is the most southerly large fold involving Late Devonian to Early Carboniferous strata that was detached from Paleozoic strata during the latest Devonian and earliest Carboniferous Ellesmerian Orogeny. Based on seismic reflection data nearby to the west, the Ellesmerian deformation front is inferred to lie approximately 10 km to the south of the syncline (Lane, 2007, Fig. 9). Devonian strata occur at the surface in this area, however exposure is too poor to document reliably the presence of the low-amplitude frontal syncline. Outcrop traces of several sandstone ribs, observed on airphotos, are shown on the map where they exhibit a gentle southward component of dip that would be consistent with the occurrence of a frontal synclinal hinge nearby to the south. However, their orientation also is consistent with their position on the limb of the adjacent North Tuttle Syncline.

In the northeastern corner of the map, Jurassic-Early Cretaceous strata are locally preserved in broad, faulted synclines. Just beyond the map edge to the east and north, additional exposures define a large M-shaped anticline, with a broad wavy hinge area. The entire structure is cut by multiple small faults, mostly of uncertain orientation due to poor exposure. Notably, although the structure outlined by Mesozoic strata indicate little or no plunge, the underlying Devonian bedding traces, exposed in the hinge area of the structure, indicate a distinct southward plunge. This discordance may be evidence of Ellesmerian structure exposed at the surface, possibly an expression of the subsurface syncline identified farther west.

Shale, sandstone and conglomerate of the Late Devonian and Early Carboniferous Tuttle Formation are exposed in the North Tuttle Syncline in the south of the map area. Dramatic thickness and grain size variations occur over short distances in sandstone and conglomerate units. These variations are well displayed on adjacent maps to the south (Lane, 2013a, 2013b). Accordingly, the four lithological subdivisions shown do not imply any stratigraphic order. The Tuttle Formation is interpreted here as consisting of gravely flow deposits within channels cut into the underlying Imperial Formation, deposited in a deeper water marine slope setting.

The Deception Fault in this area juxtaposes the sandstone-rich middle member of the Imperial Formation in the east, against the shale-dominated upper member of the Imperial Formation, together with unconformably overlying mid-Cretaceous strata in the west. Earlier reconnaissance mapping (Norris, 1981) indicated that the fault predates Cretaceous units. However, east-trending outcrop traces of Cretaceous sandstone beds are visible on airphotos to be truncated by north-trending beds of the Imperial Formation, demonstrating that the Deception Fault post-dates deposition of the Cretaceous strata.

Nearly flat-lying Cretaceous strata in the northwest part of the map area were mapped by Norris (1981) as Whitestone River Formation, of 'Early and Late Cretaceous' age; and several 'Hautevrian - Alban' macrofossil localities are recorded along Eagle River immediately west of the map area. However, the Whitestone River Formation as used by Norris (1981) includes the Parkin Formation, subsequently defined by Dixon (1992). Unlike the Whitestone River Formation, the Parkin Formation is known to contain prominent sandstone units (e.g. Jackson et al., 2011). Further, the Parkin Formation is now inferred to be Alban in age (Haggart et al., 2013). Although the definition and age of preserved Jurassic and Cretaceous units is uncertain in this area, the Cretaceous shale and sandstone succession in the northwest part of the map is provisionally identified here as Parkin Formation rather than Whitestone River.

Acknowledgments

This map is a product of the Geo-mapping for Energy and Minerals (GEM) Program, 2009-2013. Helicopter observations by D.A. Huntley and K.M. Bell in 2012 in and adjacent to the map area were used to inform the compilation, as were archival notes and airphoto observations by the late D.K. Norris. The project benefited from the support and participation of the Yuntut Gwich'in First Nation (YGFN). Field assistants in 2010 were Y. Mercredi and M. Charlie (YGFN), and A. Hayman and K.M. Bell (University of Calgary). Trans North Helicopters (Dawson, Yukon) provided helicopter support in 2010 and 2012. K.M. Fallas is thanked for a thorough critical review.

Catalogue Number	Locality	Unit	Age	Easting	Northing	Reference
C-027159	1050NC	Imperial	Devonian	432409	7424228	Brideaux, 1974
C-027160	1051NC	Imperial	?Devonian	428109	7424944	Brideaux, 1974
C-491794	10LHA012	Imperial	Late Devonian, Frasnian?	425968	7408384	Dolby, 2011
C-491907	10LHA158	Imperial	Devonian, mid-Givetian to Frasnian	430954	7414564	Dolby, 2011

Table 1. Fossil localities.

Abstract

The Polley Hill map area lies at the transition from Eagle Plain in the west to the Richardson Mountains in the east. The map area is largely underlain by Late Devonian and Early Carboniferous strata, with Cretaceous and locally Jurassic strata lying unconformably on the older successions. New field mapping has improved the definition and refined the extent of the map units and structures present, in spite of poor exposure and extensive tree cover that limit helicopter access. The regionally important Deception Fault is a west-directed thrust fault that carries the Imperial Formation westward over Upper Devonian, Carboniferous and Cretaceous strata. In and adjacent to the northwest part of the map area, 1970s vintage seismic reflection profiles were used to inform the surface structural geometry. A subsurface east-trending syncline that pre-dates the Cretaceous succession is observed in the seismic data and projected to the surface. This is one of the most southerly structures of the Late Devonian - Early Carboniferous Ellesmerian Orogeny that affected much of Arctic Canada.

Résumé

La région cartographique de Polley Hill se situe à la transition de la plaine Eagle, à l'ouest, aux monts Richardson, à l'est. La région cartographique est principalement occupée par des strates du Dévonien tardif et du Carbonifère précoce, que surmontent en discordance des strates du Crétacé et, par endroits, du Jurassique. De nouveaux travaux de cartographie géologique sur le terrain nous ont permis de mieux définir et circonscrire les unités cartographiques et les structures présentes, malgré le peu d'affleurements et l'existence d'un couvert forestier étendu qui limite l'accès par hélicoptère. La faille de Deception, une importante structure régionale, est un chevauchement à vergence ouest le long duquel la Formation d'Imperial a été charriée vers l'ouest pour être déposée sur des strates du Dévonien supérieur, du Carbonifère et du Crétacé. Dans la partie nord-ouest de la carte et le secteur adjacent, d'anciens profils sismiques des années 1970 ont servi à nous renseigner sur la géométrie structurale en surface. Un synclinal d'orientation est-ouest, révélé par les données sismiques du sous-sol et tracé à la surface par projection, est antérieur à la succession du Crétacé. Cette entité structurale est l'une des manifestations les plus méridionales de l'orogénèse ellesmérienne du Dévonien tardif-Carbonifère précoce qui a touché la majeure partie de l'Arctique canadien.

116-P03	116-P02	116-P01
116-014	CGM 129	116-016
116-011	CGM 73	116-009

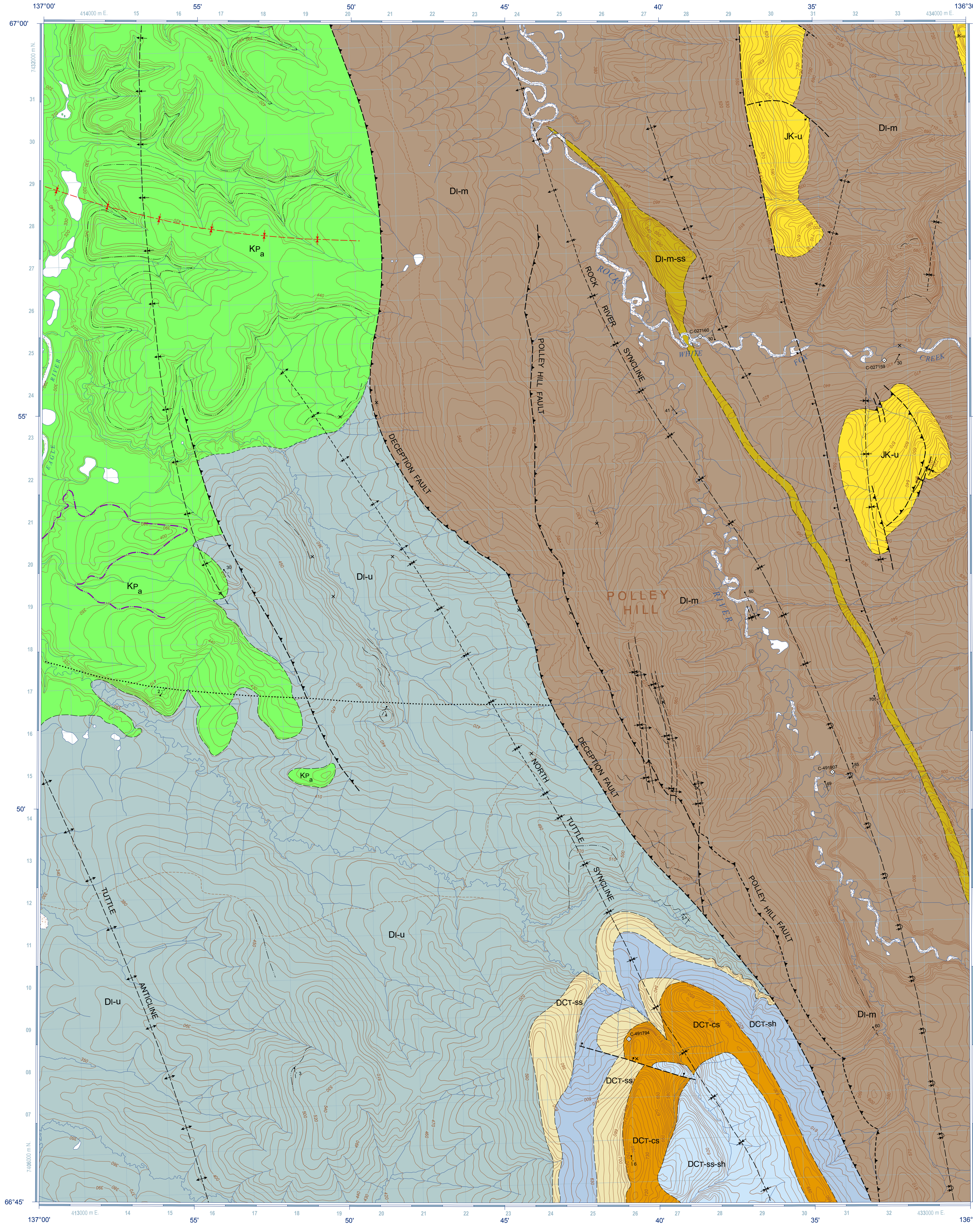
National Topographic System reference and index to adjoining published Geological Survey of Canada maps

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CANADIAN GEOSCIENCE MAP 129
BEDROCK GEOLOGY
POLLEY HILL
Yukon
1:50 000



CRETACEOUS

JK-u? Parkin Formation? shale, siltstone; sandstone; conglomerate; marine (Alban).

JURASSIC AND CRETACEOUS

JK-u Undifferentiated: may include strata of the North Branch and Husky formations and Parson Group (sandstone, shale).

DEVONIAN AND CARBONIFEROUS

Tuttle Formation (No stratigraphic order implied)

DCT-sh Shale unit: shale-dominated lithofacies.

DCT-ss-sh Sandstone and shale unit: interbedded sandstone and shale lithofacies.

DCT-ss Sandstone unit: sandstone-dominated lithofacies.

DCT-cs Sandstone and conglomerate unit: sandstone and conglomerate-dominated lithofacies.

DEVONIAN

Imperial Formation

DI-u upper member: shale, dark grey laminated, weathers medium grey, siltstone, dark grey; minor sandstone, pyritic.

DI-m middle member: shale, dark grey, siliceous; siltstone, dark grey, laminated and ripple crosslaminated, weathers rusty; sandstone, dark grey, fine grained, turbiditic.

DI-m-ss Sandstone unit: locally mappable sandstone unit within Imperial Formation middle member.

Geological contact
Approximate
Inferred
Normal fault, symbol on hanging wall side
Approximate
Inferred
Thrust fault, symbol on hanging wall side
Approximate
Inferred
Anticline, upright
Approximate
Approximate
Inferred
Monocline, anticlinal bend, upright, short arrow on steeper limb
Approximate
Inferred
Syncline, upright
Defined
Approximate
Inferred
Approximate (only present at subsurface)
Syncline, overturned
Approximate
Traces
Sandstone rib
Bedding form line
Inferred front of Ellesmerian Deformation
Station
Bedding
Overturned, estimated remotely
Upright, measured at station
Upright, estimated remotely
Upright, calculated from imagery
Fossil Locality

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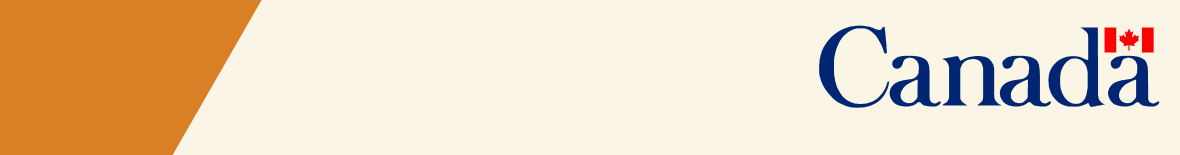
This publication has been scientifically reviewed, but it has not undergone a formal edit.

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Geological Survey of Canada
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Geology by L.S. Lane, 2009-2010; D.A. Huntley, 2012; and D.K. Norris, 1982.
Geological compilation by L.S. Lane, 2012-2014
Geology conforms to Bedrock Data Model v. 3.1
Geomatics and cartography by M. Le

Initiative of the Geological Survey of Canada, conducted under the auspices of the Yukon Sedimentary Basins project as part of Natural Resources Canada's Geo-mapping for Energy and Minerals (GEM) program
Map projection Universal Transverse Mercator, zone 8, North American Datum 1983



BEDROCK GEOLOGY
POLLEY HILL
Yukon
1:50 000



Base map at the scale of 1:50 000 from Natural Resources Canada, with modifications.
Elevations in metres above mean sea level
Magnetic declination 2017, 21°00'E, decreasing 29.8'W annually
This map is not to be used for navigational purposes.

Title photograph: Aerial view of open anticline at Station 10LHA168HE, exposed in the south-facing cut-bank on Rock River. Although light coloured sandstone beds near river level appear symmetric, bedding plane slip in the shale has resulted in progressive tightening and westward displacement of the fold hinge in the upper part of the fold. The bluff is approximately 20 m high. Photograph by Larry Lane, 2015-108

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