

Figure 1. Southwest Mahony Lake map area (NTS 96-F/SW) showing seismic lines on record with the National Energy Board (NEB) that were used to augment the bedrock geology interpretation. Line names are provided in the digital data files.

Abstract

The southwest quadrant of the Mahony Lake map area (NTS 96-F) lies within the Franklin Mountains, Northwest Territories and features relatively flat, low-lying plains around Brackett and Mahony lakes, as well as prominent ridges such as the Norman Range. The area is well vegetated, with bedrock exposure more common on the high ridges or along stream banks. Cordilleran deformation from the southwest has uplifted Paleozoic strata, dominated by carbonate, along reverse or thrust faults, and anticlinal folds. Cambrian evaporite strata of the Saline River Formation in the hanging walls of some faults, and the cores of anticlines, indicates this unit is likely a local detachment layer for faulting and folding. Cretaceous to Paleocene siliciclastic strata are preserved in the intervening synclinal features, particularly south of Brackett Lake. A paleotopographically high feature known as the Keele Arch can be identified through the central part of the map area where Ordovician to Devonian strata are generally absent beneath the sub-Cretaceous unconformity. Public-domain seismic-reflection profiles, archived with the National Energy Board, reveal the presence of numerous folds with associated faults hidden beneath unconsolidated Quaternary deposits south of Brackett Lake. Exploration by petroleum companies in the area targets potential reservoirs in buried Cambrian or Devonian strata.

Résumé

Le quadrant sud-ouest de la région cartographique de Mahony Lake (SNRC 96-F) se situe dans les monts Franklin (Territoires du Nord-Ouest) et est caractérisé par de basses plaines planes autour des lacs Brackett et Mahony, ainsi que par des crêtes prononcées telles que le chaînon Norman. La région présente un bon couvert végétal et des affleurements du socle rocheux y sont plus communs sur les hautes crêtes et le long des rives des ruisseaux. La déformation cordillérienne en provenance du sud-ouest a soulevé les strates du Paléozoïque, à dominante carbonatée, le long de failles inverses ou de failles de chevauchement ainsi que par le jeu de plis anticlinaux. Les strates évaporitiques du Cambrien de la Formation de Saline River dans le toit de certaines failles, ainsi que dans le cœur d'anticlinaux, indiquent que cette unité a probablement servi de surface de décollement locale pour les failles et les plis. Les strates silicoclastiques du Crétacé au Paléocène sont conservées dans les structures synclinales intermédiaires, particulièrement au sud du lac Brackett. Une hauteur paléotopographique appelée arche de Keele peut être identifiée dans toute la partie centrale de la région cartographique où les strates de l'Ordovicien au Dévonien sont généralement absentes sous la discordance à la base du Crétacé. Des profils de sismique-réflexion du domaine publique, archivés par l'Office national de l'énergie, révèlent l'existence de nombreux plis associés à des failles masquées par la couverture de dépôts meubles du Quaternaire au sud du lac Brackett. Les travaux d'exploration menés par des compagnies pétrolières dans la région ont ciblé de possibles réservoirs dans les strates enfouies du Cambrien ou du Dévonien.

96-FNE	96-FNW	96-FNE
CGM 99	CGM 88	CGM 89
96-FSE	96-FSW	96-FSE
CGM 100	CGM 91	CGM 90
96-FNE	96-FNW	96-FNE
CGM 95	CGM 92	

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

Cover illustration
View looking southeast at Devonian carbonate strata exposed in the hanging wall of the Norman Range Thrust, along the Norman Range of the Franklin Mountains, Northwest Territories. Photograph by K.M. Fallas, 2012-131

Catalogue No. M183-1/91-2012E-PDF
ISBN 978-1-100-20898-5
doi:10.4095/292283

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Canada Natural Resources Canada
Canada Ressources naturelles du Canada

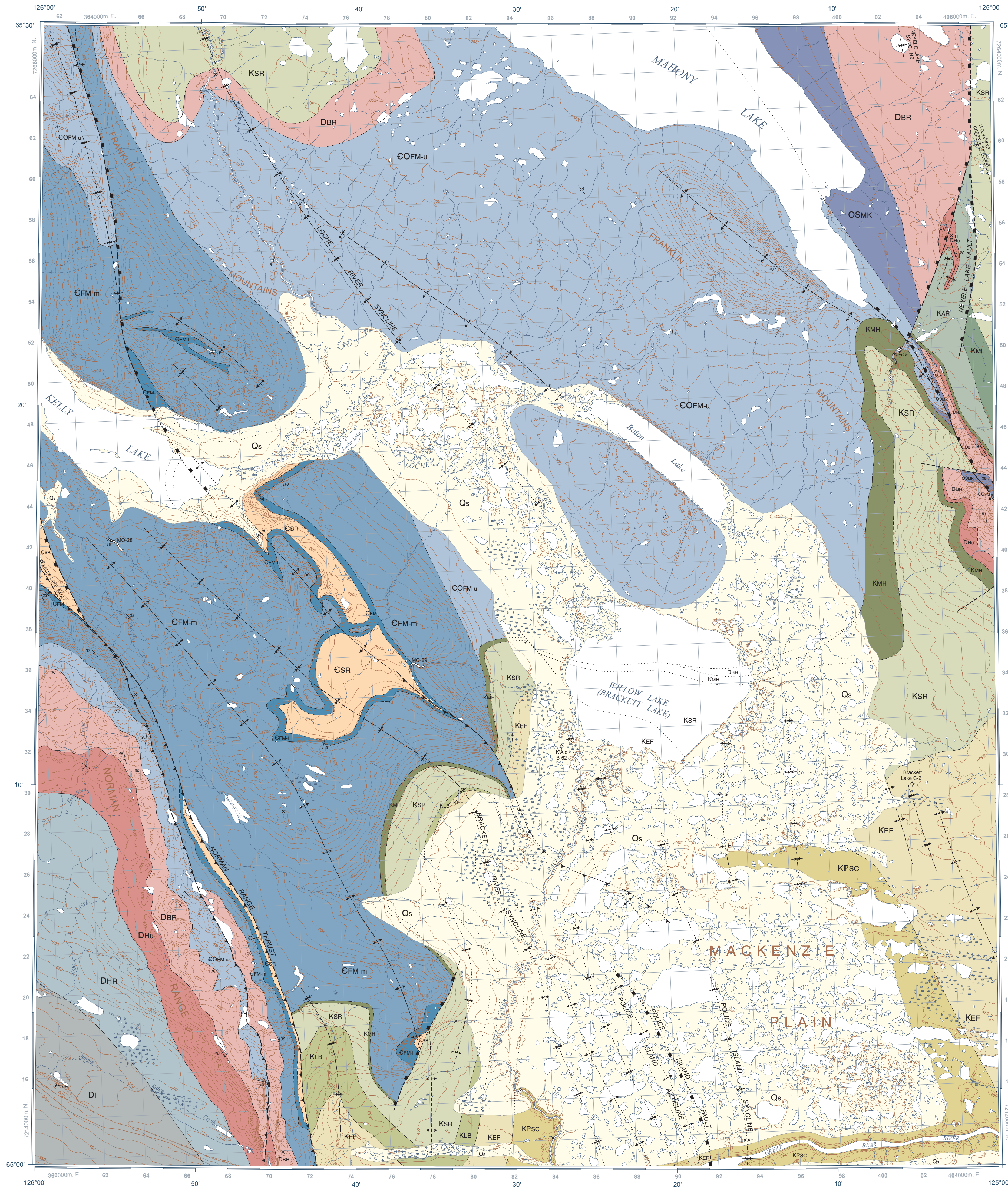
CANADIAN GEOSCIENCE MAP 91

GEOLOGY

MAHONY LAKE (SOUTHWEST)

Northwest Territories

1:100 000



QUATERNARY

Qs Quaternary sediment: mud, sand, and gravel: unconsolidated.

LATE CRETACEOUS TO PALEOGENE

KPSC Summit Creek Formation: sandstone: lithic arenite, very friable, interbedded with conglomerate; polymict, granules to cobbles, poorly cemented; minor shale; carbonaceous; coal, and ash tuff. Unit locally contains plant remains, and dinosaur fossils in the lower part of the unit.

LATE CRETACEOUS

KEF East Fork Formation: mudstone and shale: locally silty or carbonaceous, dark brown to dark grey or black, soft and crumbly, contains sideritic concretions; interbedded with minor sandstone: lithic wacke, grey to brown, very thin- to thin-bedded, friable, laminated, ripple marks, rip-up clasts, and minor trace fossils; and pebble conglomerate: locally occurs at base of unit.

KLB Little Bear Formation: sandstone: lithic wacke to quartz arenite and chert arenite, mottled grey, greenish-grey, brown, or rusty, thin- to thick-bedded, typically friable and porous, crossbedded, laminated, ripple marks, graded bedding, locally bioturbated; interbedded with mudstone and shale: somewhat silty, dark grey to brown or black, crumbly and soft, minor sideritic concretions; and minor coal.

KSR Slater River Formation: shale and mudstone: dark brown to dark grey, black, or rusty-brown, soft, crumbly, and fissile, sideritic concretions common, rare fish scales; minor bentonite and ash tuff: white to yellow, pale green, or orange-brown; and minor sandstone: lithic wacke, brown, grey, or rusty, very thin- to thin-bedded, crosslaminated, and bioturbated.

EARLY CRETACEOUS

KML Mahony Lake Formation: sandstone: lithic to quartz arenite, very fine- to fine-grained, brown to grey, weathers brown, grey, and orange, thin- to medium-bedded, commonly bioturbated, locally laminated or crossbedded; interbedded with minor shale: grey, fissile.

KAR Arctic Red Formation: shale and mudstone: locally gypsiferous, dark grey, weathers grey and rusty, variably fissile and soft, sideritic concretions fairly common.

KMH Martin House Formation: sandstone: quartz arenite, variably glauconitic, locally conglomeratic, beige to light grey, thin- to thick-bedded, crossbedded, friable, trace fossils common; interbedded with shale or mudstone: medium to dark grey, weathers grey or rusty-brown, proportion of shale and mudstone increases upsection.

DEVONIAN

DI Imperial Formation: shale: locally silty, dark grey to greenish-grey, fissile; interbedded with siltstone: locally micaceous or calcareous, greenish-grey to purplish-brown, laminated, bioturbated; and sandstone: lithic wacke to quartz arenite, micaceous, locally calcareous or glauconitic, grey to greenish-grey or brown, very thin- to medium-bedded, laminated and crosslaminated, abundant and diverse trace fossils; and minor limestone: bioclastic, grey to brown or orange, diverse fossil assemblage. Includes Jungle Ridge Member, comprising limestone: lime mudstone, silty, grey, weathers light yellow, very thin- to thin-bedded, laminated, shale partings, and rare fossils.

DHR Horn River Group: shale: carbonaceous or petrolierous, calcareous to siliceous, locally silty, dark grey or black, weathers grey, black, brown, or rusty, locally fossiliferous; minor limestone: dark grey with tentaculitids, interbedded with shale at base of unit.

DHu Hume Formation: limestone: wackestone to grainstone, floatstone, medium to thick-bedded, parallel to irregular or nodular bedded, fossiliferous with abundant and diverse assemblage. Unit is thicker bedded and chert-forming in upper part.

DBR Bear Rock Formation: limestone breccia: variably dolomitic and petrolierous, angular clasts range from granule- to boulder-sized, greyish-brown to grey, weathers light grey, vuggy, massive and rubby with rare bedded intervals of laminated carbonate, tends to form hoodoo.

ORDOVICIAN TO SILURIAN

OSMK Mount Kindle Formation: dolostone: dolowackestone to dolopackstone and dolofloatstone, siliceous and cherty, light to dark grey or brownish-grey fresh and weathered surfaces, thin- to very thick-bedded, vuggy, reysal-laminated, bioturbated, and fossiliferous (mainly silicified corals, crinoids, orthocone cephalopods, and stromatopores).

CAMBRIAN TO ORDOVICIAN

COFM-u Franklin Mountain Formation, upper member: dolostone: crystalline dolostone, commonly cherty and siliceous, cream to beige or grey, weathers white to light grey, very thin- to thick-bedded, vuggy and nodular, locally stromatolitic, bioturbated, intracast-bearing, or oolitic.

CAMBRIAN

CFM-m Franklin Mountain Formation, middle member: dolostone: dolomudstone to dolopackstone, rarely calcareous or cherty, light grey to cream or beige, weathers light yellowish-grey to orange-brown, thin- to thick-bedded, typically recrystallized oblitterating primary textures, locally vuggy, stromatolitic or thrombolitic, bioturbated, oolitic, crossbedded, or intracast-bearing; rare shale partings. Alternation, at 1-2 m intervals, of oolitic dolopackstone with dolomudstone produces a locally prominent striped appearance.

CFM-l Franklin Mountain Formation, lower member: dolostone: dolomudstone, locally calcareous or silty, rare detrital chert grains, grey to greenish-grey or brown, weathers pale yellow to grey or orange-brown, very thin- to medium-bedded, parallel-laminated, locally includes intracast mudstone, locally stromatolitic or bioturbated; interbedded with shale: dolomitic and silty, varicoloured, laminated, and fissile.

CSR Saline River Formation: shale: silty, grey, red, or green, fissile, minor salt casts, desiccation cracks, and horizontal burrows, evaporite, gypsum, anhydrite, or halite, white and grey to pink or red, very thin- to thin-bedded, bedding typically disturbed and chaotic, dominates middle part of unit; minor dolostone: dolomudstone to dolopackstone, grey to yellow, green, or orange, locally intracast-bearing, oolitic, stromatolitic, and sandstone: lithic wacke to quartz arenite, calcareous dolomitic, can be conglomeratic, varicoloured, parallel- and crosslaminated, ripple marks, rip-up clasts, and possible trace fossils.

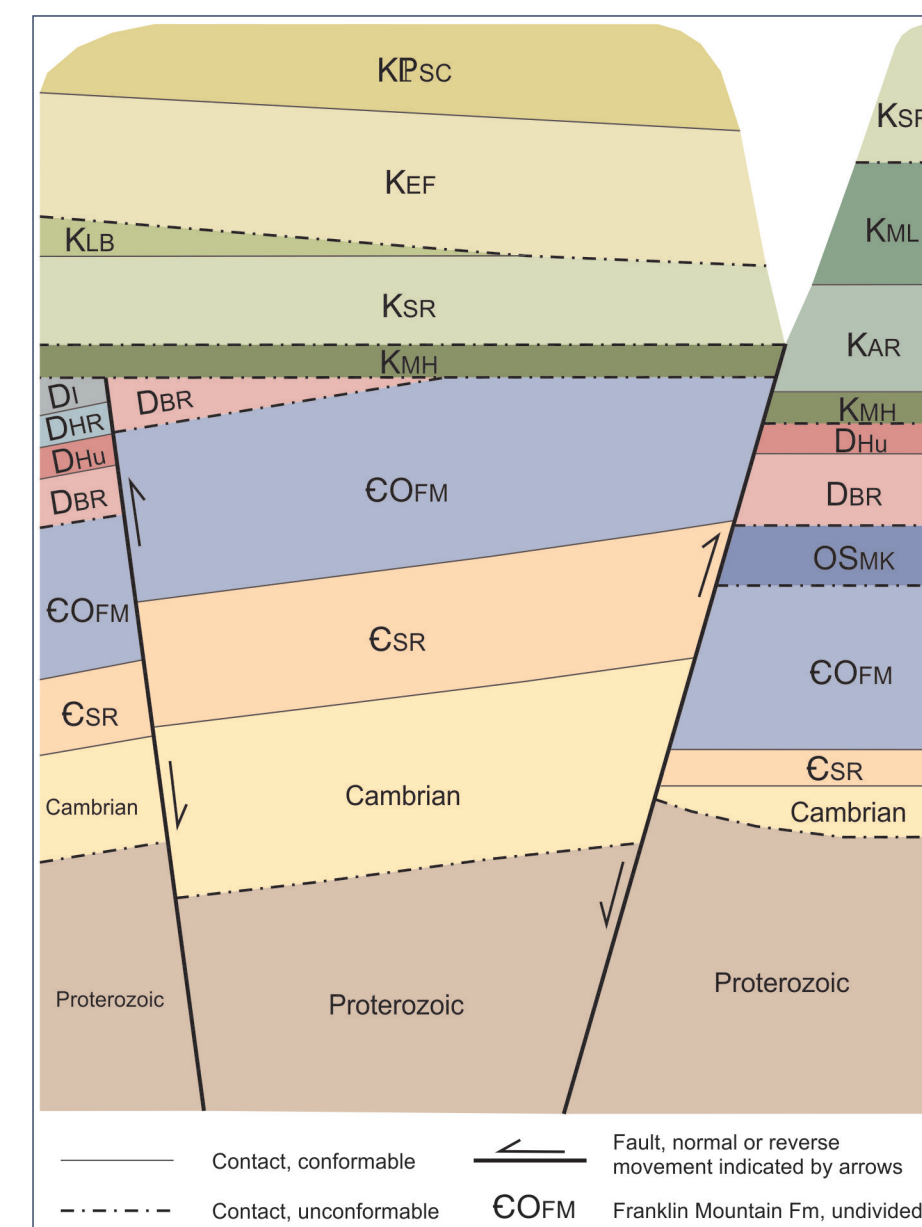
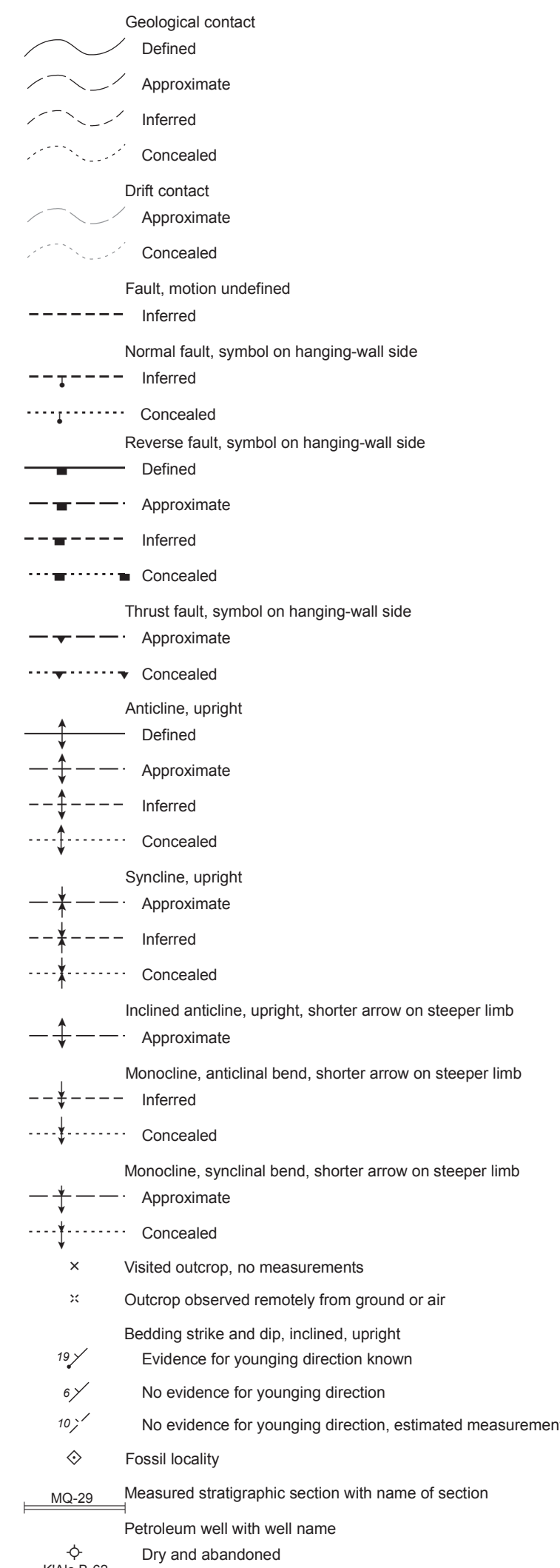


Figure 2. Schematic stratigraphic relationship diagram for southwest Mahony Lake map area (NTS 96-F/SW). Subsurface units are constrained by well and seismic data. Changes in thickness and preservation of map units across reactivated fault systems is an expression of movement and erosion on the Keele Arch, a feature underlying the central portion of the map area.



NOTES

The authors have updated and revised map unit terminology from the Operation Norman map (Aitken and Cook, 1976). In general, terminology for Cambrian units is that of Dixon and Stasiuk (1998), Silurian and Devonian usage follows that of Morrow (1991), and Cretaceous to Paleocene formation names are those of Dixon (1999). Cambrian to Ordovician units have recently undergone revision to their terminology, as outlined below.

Previous work by the Geological Survey of Canada in the Mahony Lake map area (Aitken and Cook, 1976) subdivided the Cambro-Ordovician Franklin Mountain Formation into three informal units. In ascending order they are: Cyclic member, Rhythmic member, and Cherty member (Norford and Macqueen, 1975). On the present maps, these older unit names correspond, in ascending order, to informal lower, middle, and upper members of the Franklin Mountain Formation. These lower, middle, and upper members correspond to the units 1, 2, and 3 of the Franklin Mountain Formation described by Turner (2011).

For detailed information on surficial deposits, here shown as "Quaternary sediment", see Chabrin et al. (1975).

The names Norman Range Thrust, Neye Lake Fault, Police Island Fault, Kelly Lake Fault, Loch River syncline, Brackett River syncline, Police Island anticline, Police Island syncline, Wolverine Creek syncline, and Neye Lake syncline have been introduced to facilitate discussion of these structural features. Cordilleran deformation in this map area has generated two types of faults: thrust faults, which are interpreted to be detached within the Cambrian Saline River Formation, and reverse faults, which are interpreted to be inverted normal faults with steep dips at depth. In Proterozoic strata, Seismic-reflection data are the basis for interpreting the Norman Range Thrust as a thrust fault, and the others as reverse faults. The inverted normal faults are shown schematically in Figure 2.

ACKNOWLEDGMENTS

Field transportation for 2009-2011 was provided from Norman Wells by Sahtu Helicopters (Great Slave Helicopters) and Canadian Helicopters. The authors wish to thank K. Breker, K. Montgomery, and M. Sommers for capable field assistance and T. Andrew, J. Ayah, and D. Widow for providing wildlife monitoring. The authors wish to thank G. Stockmal and P. Kabanov for critical review of the map.

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Recommended citation

Fallas, K.M., MacLean, B.C., and Hadlari, T., 2013. Geology, Mahony Lake (southwest), Northwest Territories. Geological Survey of Canada, Canadian Geoscience Map 91, scale 1:100 000. doi:10.4095/292283

CANADIAN GEOSCIENCE MAP 91

MAHONY LAKE (SOUTHWEST)

Northwest Territories

1:100 000

2 0 2 4 6 8 km

Authors: K.M. Fallas, B.C. MacLean, and T. Hadlari
Geological compilation by K.M. Fallas, B.C. MacLean, and T. Hadlari, 2011-2012

Geological field observations by K.M. Fallas, R. Lemski, 2009-2011, D.G. Cook, J.D. Aitken, H.R. Balkwill, 1968-1973, and J. Dawson, 2008

Seismic data interpretation by B.C. MacLean, 2010-2012

Stratigraphic sections measured by R.W. Macqueen, 1969

Geomatics by K.M. Fallas, S.D. Orzeck, and N. Raska

Cartography by S.D. Orzeck

Scientific editing by E. Inglis

GEOLOGY

MAHONY LAKE (SOUTHWEST)

Northwest Territories

1:100 000

Joint initiative of the Geological Survey of Canada and the Northwest Territories Geoscience Office, conducted under the auspices of the Maclean Delta and Corridor Project as part of Natural Resources Canada's Geo-mapping for Energy and Minerals (GEM) Program.

Logistical support provided by the Polar Continental Shelf Program as part of its mandate to promote scientific research in the Canadian North. PCSP 02569, 01310, and 00411

Map projection Universal Transverse Mercator, zone 10, North America Datum 1983

Base map at the scale of 1:50 000 from Natural Resources Canada, with modifications.

Elevations above mean sea level are expressed in metres north of 65°15' and feet south of 65°15'

Some geographic names on this map are not official and reflect local use as reported by the Sahtu Heritage Places and Sites Joint Working Group.

Mean magnetic declination 2013, 23°13'E, decreasing 31' annually. Readings vary from 23°24'E in the NW corner to 23°02'E in the SE corner of the map.

The Geological Survey of Canada welcomes corrections or additional information from users.

Data may include additional features not portrayed on this map.

See documentation accompanying the data. Additional references are included in the map information document.

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CANADIAN GEOSCIENCE MAP 91

GEOLOGY

MAHONY LAKE (SOUTHWEST)

Northwest Territories



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