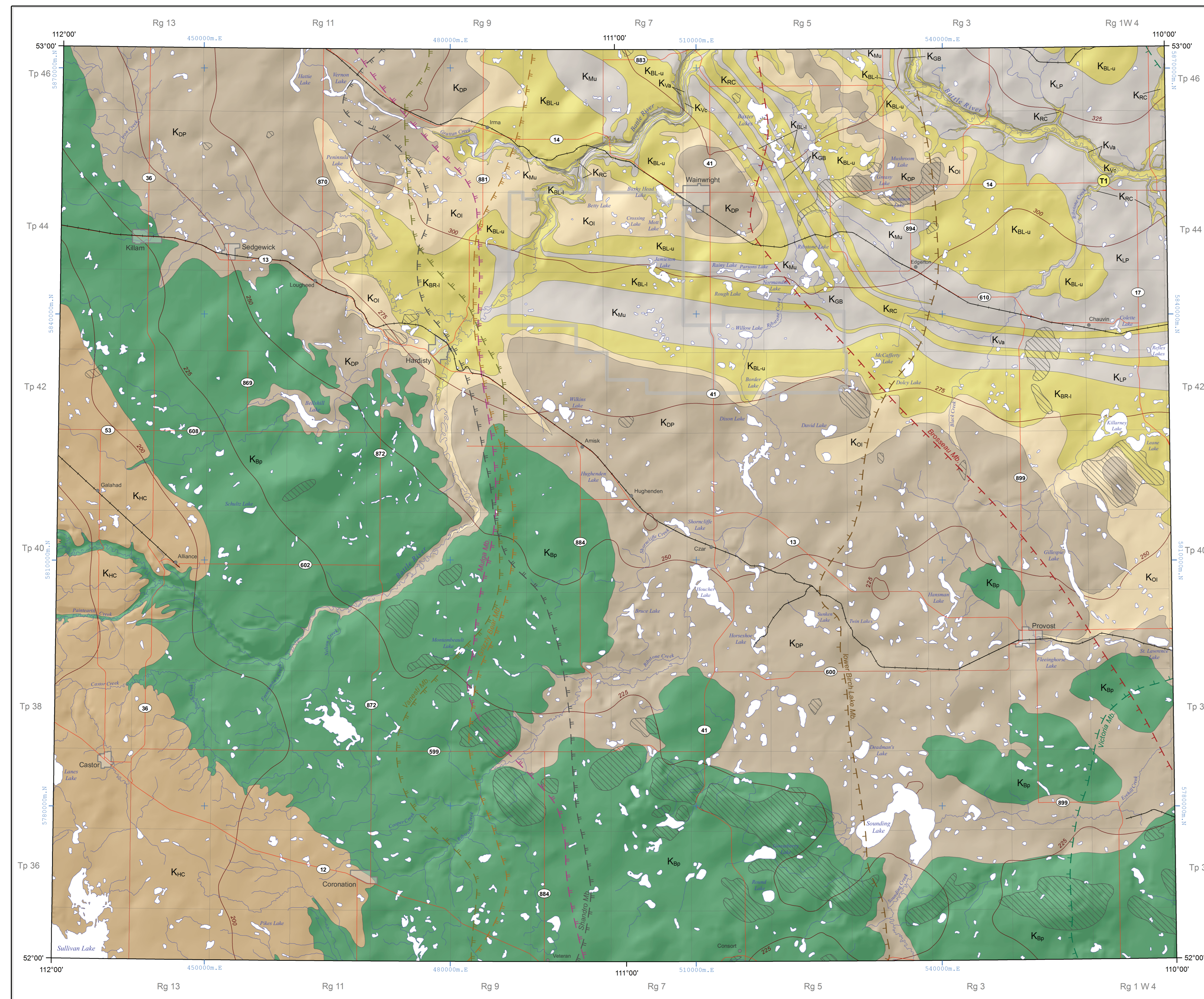


NTS 73D
BEDROCK GEOLOGY



SYMBOL LEGEND

- (T1)** Type section
 - Area of glacial thrusting that may involve bedrock (from Shetsen, 1990; 2007)
 - Top of First White Specks Member (Niobrara Formation) structure contour in metres above sea level
- Subsurface extents of stratigraphic units in plan view (listed in ascending stratigraphic order from left; ticks show direction of thickening)
- Sandstone units → Broseuse Mb. Victoria Mb. lower Birch Lake Mb.
- Shale units → Shandro Mb. Vanesti Mb. Grizzly Bear Mb. Mulga Mb.
- UPPER CRETACEOUS
- UPPER CAMPANIAN TO LOWER MAASTRICHTIAN
- Ksp** Bearpaw Formation: dark grey, blocky-weathering shale and silty shale; greenish (glauconitic) and grey, muddy sandstone; thin concretionary siltstone and bentonite layers; concretions locally yield ammonites (marine to marginal marine).
- CAMPANIAN
- BELLY RIVER GROUP**
- Kdp** Dinosaur Park Formation: pale grey, very fine to medium-grained, bentonitic to carbonaceous sandstone interbedded with grey to brownish-grey siltstone, carbonaceous siltstone to mudstone, and coal; disconformity at base; coal restricted to upper part (fluvial and estuarine, uppermost part marginal marine).
 - Koi** Oldman Formation: fine to coarse-grained, light grey to yellow-weathering sandstone; beds are commonly trough cross-bedded, fining upwards and lenticular; grey, muddy siltstone; grey to greenish grey-weathering mudstone, commonly with carbonaceous fragments; dark grey to brown carbonaceous mudstone; concretionary siltstone layers; locally divisible into lower sandstone-dominated unit and upper siltstone unit (nonmarine).
 - Kbrl** Undivided lower Belly River Group (equivalent in part to Foremost Formation): pale grey and pale brown sandstone; grey to greenish-grey siltstone; dark grey carbonaceous mudstone; coal; concretionary siltstone layers; coal seams present near the top of the formation (marginal marine to nonmarine).
 - Kblu** Upper Birch Lake Member (informal; Belly River Group): very fine to fine-grained, buff-coloured, massive to cross-bedded sandstone; lesser siltstone and mudstone; calcareous concretions up to 2 m in diameter; thin and becomes fine-grained from west to east; lower contact gradational, upper contact gradational.
 - Kmu** Mulga Member (Lea Park Formation): massive, dark-grey mudstone; thin siltstone interbeds, increasing in number and thickness upwards; carbonaceous fragments common; minor pyrite; lower contact sharp, gradational upper contact (marine).
 - Kbl** Lower Birch Lake Member (informal; Belly River Group): very fine to fine-grained, buff-coloured, massive to cross-bedded sandstone; lesser siltstone and mudstone; thin and becomes fine-grained from west to east; lower contact gradational, upper contact sharp (nonmarine to shallow marine).
 - Kgb** Grizzly Bear Member (Lea Park Formation): dark grey mudstone containing ironstone concretions; thin siltstone and sandstone beds, increasing in thickness and abundance upwards; sharp lower contact, gradational upper contact (marine).
 - Krc** Ribstone Creek Member (Belly River Group): massive to cross-bedded, very fine to medium-grained buff to light yellow-weathering sandstone; local thin coal interbeds, carbonaceous fragments common; calcite-cemented; lower contact gradational, upper contact sharp (shallow to nonmarine).
 - Kvn** Vanesti Member (Lea Park Formation): interbedded medium to dark-grey mudstone and siltstone; variably bioturbated; siltiness increasing upwards; sharp lower contact; upper contact gradational (marine).
 - Kvc** Victoria Member (Belly River Group): massive, yellow to brownish-grey weathering, fine to medium-grained sandstone; carbonaceous siltstone, local thin coal seams (shallow marine to nonmarine).
 - Klp** Lea Park Formation: medium to dark grey mudstone; thin stringers of fine-grained, tan siltstone to fine-grained sandstone; thin-bedded, light grey bentonite; siltstone concretions; calcite veining common; intertongues with shallow to marginal-marine sandstone of the lower Belly River Group in east-central Alberta (marine).

BASEMAP LEGEND

- City or town
- Village
- Railway
- Road (major highway)
- Road (minor)
- Water body (lake or major river)
- Stream
- C.F.B. Wainwright military base
- UTM, Zone 12 grid

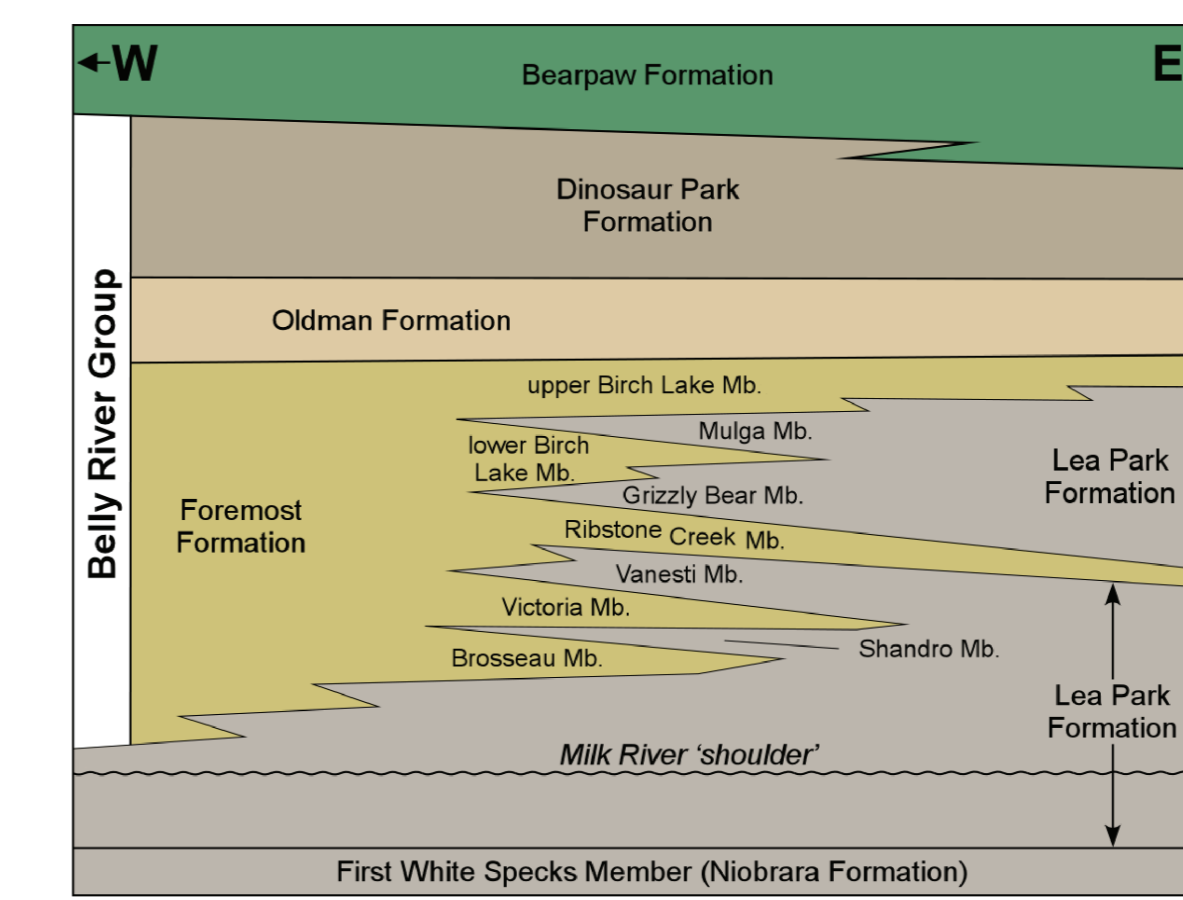


Figure 1. Schematic, east-west-trending stratigraphic cross-section showing the relationship between lithostratigraphic units in eastern Alberta (modified from Naus, 1945; Shaw and Harding, 1949; Nichols and Wyman, 1969).

Description of Type Section Located within NTS 73D Wainwright Map Sheet

Unit: Ribstone Creek Member
Type: outcrop
Easting: 559 757 m Northing: 5 856 228 m
Reference: Slipper, 1918
Notes: exact location uncertain

Coordinates in UTM Zone 12, NAD83.

Background

Exposed bedrock in the area is composed dominantly of Upper Cretaceous clastic sedimentary rocks of the Bearpaw Formation, Belly River Group, and the Lea Park Formation. From west to east, there is a complex transition between nonmarine to marginal marine clastic rocks of the Foremost Formation and marine mudstone and siltstone of the Lea Park Formation. In the transitional zone, sandstone-dominated regressive members of the Belly River Group (Broseuse, Victoria, Ribstone Creek, upper and lower Birch Lake members) interfinger with mudstone-dominated units of the Lea Park Formation (Shandro, Vanesti, Grizzly Bear, and Mulga members; Figure 1). The maximum westward extent, shown in plan view, of each of the members of Lea Park Formation is shown on the map, as is the easternmost extent of the sandstone-dominated members of the Belly River Group.

Structure in the map area is dominated by the extension of the Kevin-Sunburst dome into south-eastern Alberta from northern Montana. Structure contours are shown for the top of the First White Specks Member of the Niobrara Formation. A broad structural arch, known as the Bow Island Arch, extends north-northeastward from the northern flank of the dome into east-central Alberta. This arch separates the Alberta Basin in the west from the Williston Basin in the east. The Bow Island Arch terminates northwards against an unnamed domal structural high in east-central Alberta, located in the northern half of NTS map sheet 073E.

Approach

Bedrock units were mapped in the subsurface using downhole geophysical well logs (Figure 2; Glombick, 2010a, b, 2011a, b, 2013a, b, c, d). Additional data points were obtained from outcrop sections, previously published maps (Hume and Warren, 1939a, b) and air photo interpretation. Elevation data for outcrop locations were obtained using topographic contour data. All data were modelled using ArcGIS Geostatistical Analyst® to create structure surfaces for the top of each stratigraphic unit. The intersection of each surface with a model of bedrock topography (Figure 3; Atkinson and Lyster, 2010) provided the preliminary map trace for each unit. Structure surfaces were also intersected with a digital elevation model (DEM; United States Geological Survey, 2004) for comparison. Map traces were modified to honour the control data as best as possible. As the regional structure of the area is gentle, map patterns are controlled to a large degree by topography on the bedrock surface.

Acknowledgement

GIS and cartography by R. Elgr.
Digital base provided by Spatial Data Warehouse and Natural Resources Canada.

Recommended Reference Format

Glombick, P.M. (2014). Bedrock geology of the Wainwright area, Alberta (NTS 73D); Alberta Energy Regulator, AER/AGS Map 569, scale 1:250 000.

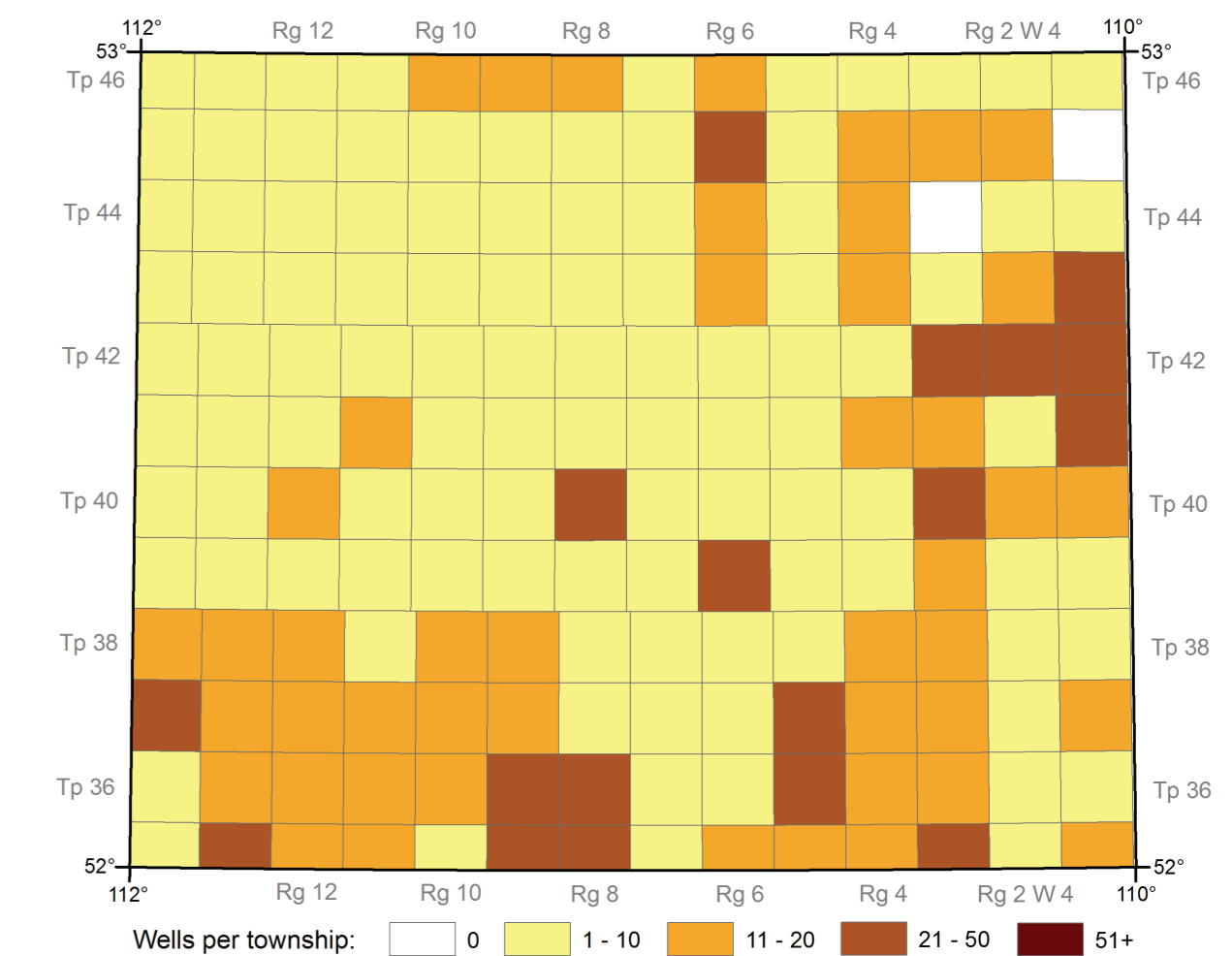


Figure 2. Map showing subsurface well data distribution used in this study.

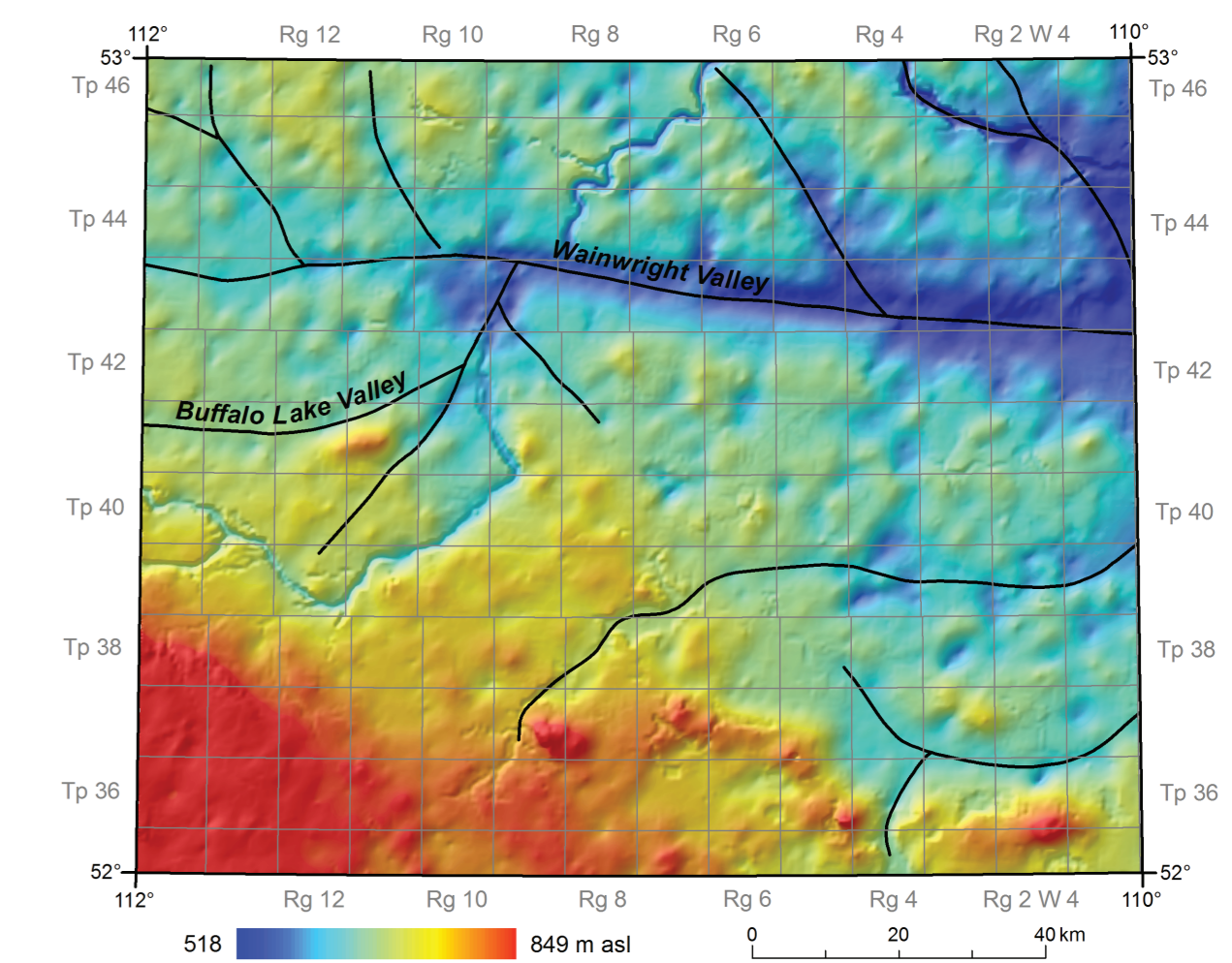


Figure 3. Shaded relief map of bedrock topography from Atkinson and Lyster (2010) showing the location of major preglacial valleys (from Carlson and Topp, 1969).

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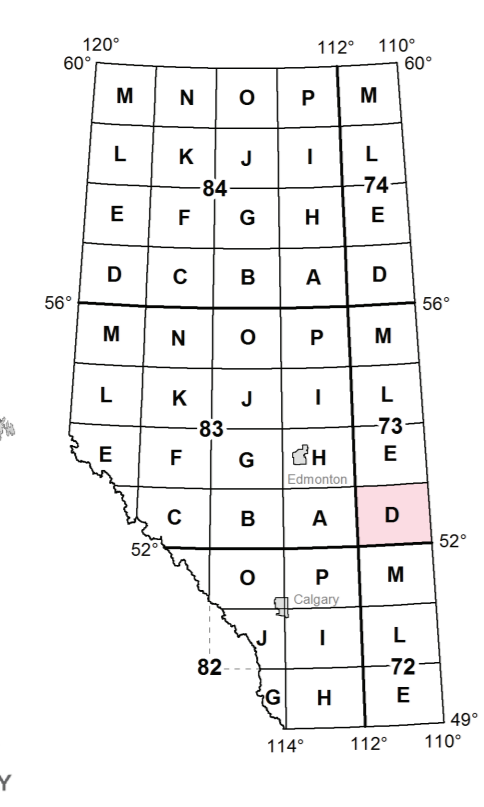
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Map 569
Bedrock Geology of the Wainwright Area (NTS 73D)

Geology by: P.M. Glombick

