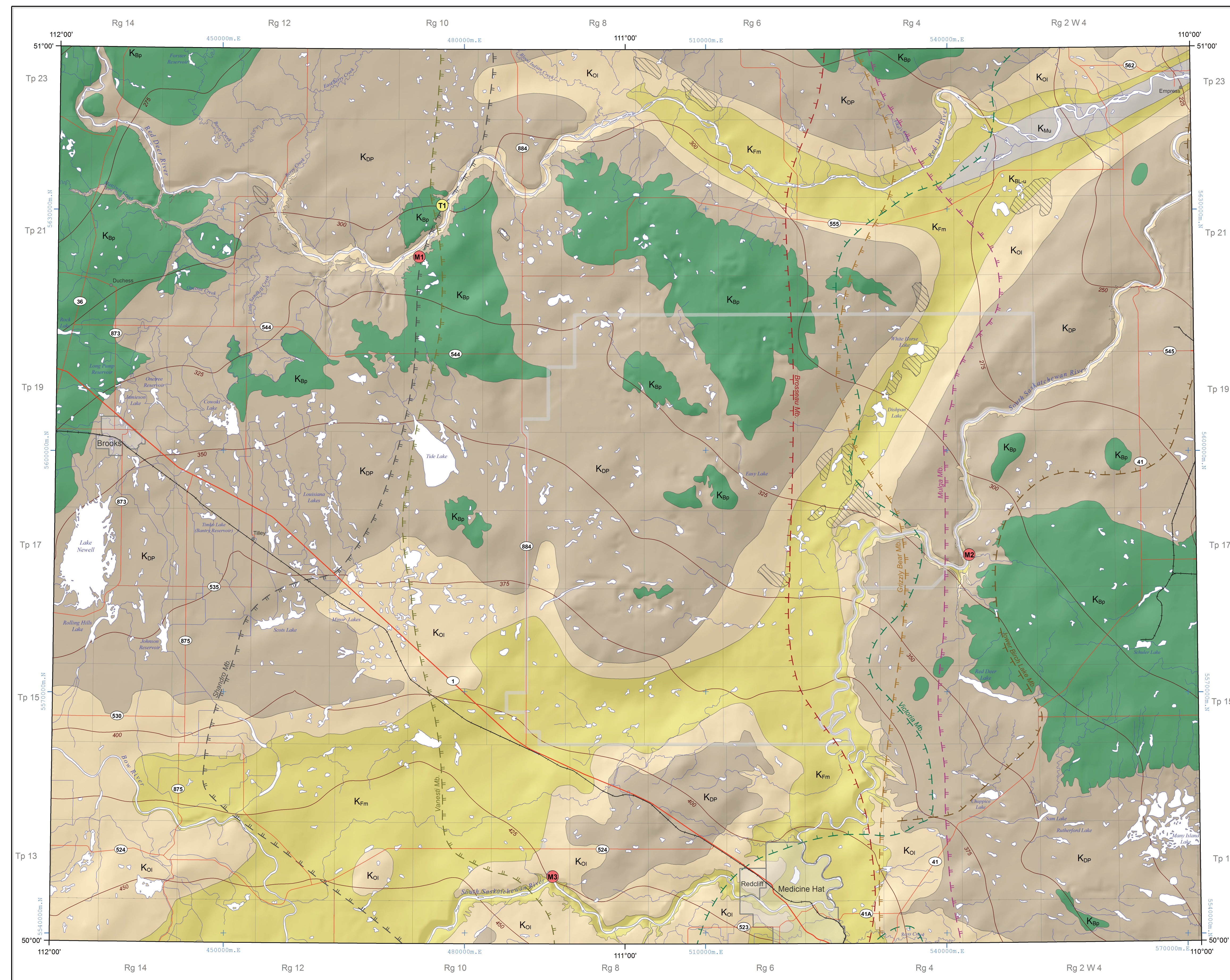


NTS 72L  
BEDROCK GEOLOGY



**SYMBOL LEGEND**

- Type section
- Measured 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 — Brossseau 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**  
**K<sub>sp</sub>** 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**

**K<sub>cp</sub>** 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).

**K<sub>ci</sub>** 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).

**K<sub>fm</sub>** 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).

**K<sub>bl-u</sub>** Upper Birch Lake Member (informal; Belly River Group; partly equivalent to upper Foremost Formation): 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 at uppermost coal seam (nonmarine to shallow marine).

**K<sub>mu</sub>** 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, upper contact gradational (marine).

**BASEMAP LEGEND**

- City or town
- Village
- Railway
- Road (major highway)
- Road (minor)
- Water body (lake or major river)
- Stream
- C.F.B. Suffield military base
- + 540000m.E UTM, Zone 12 grid

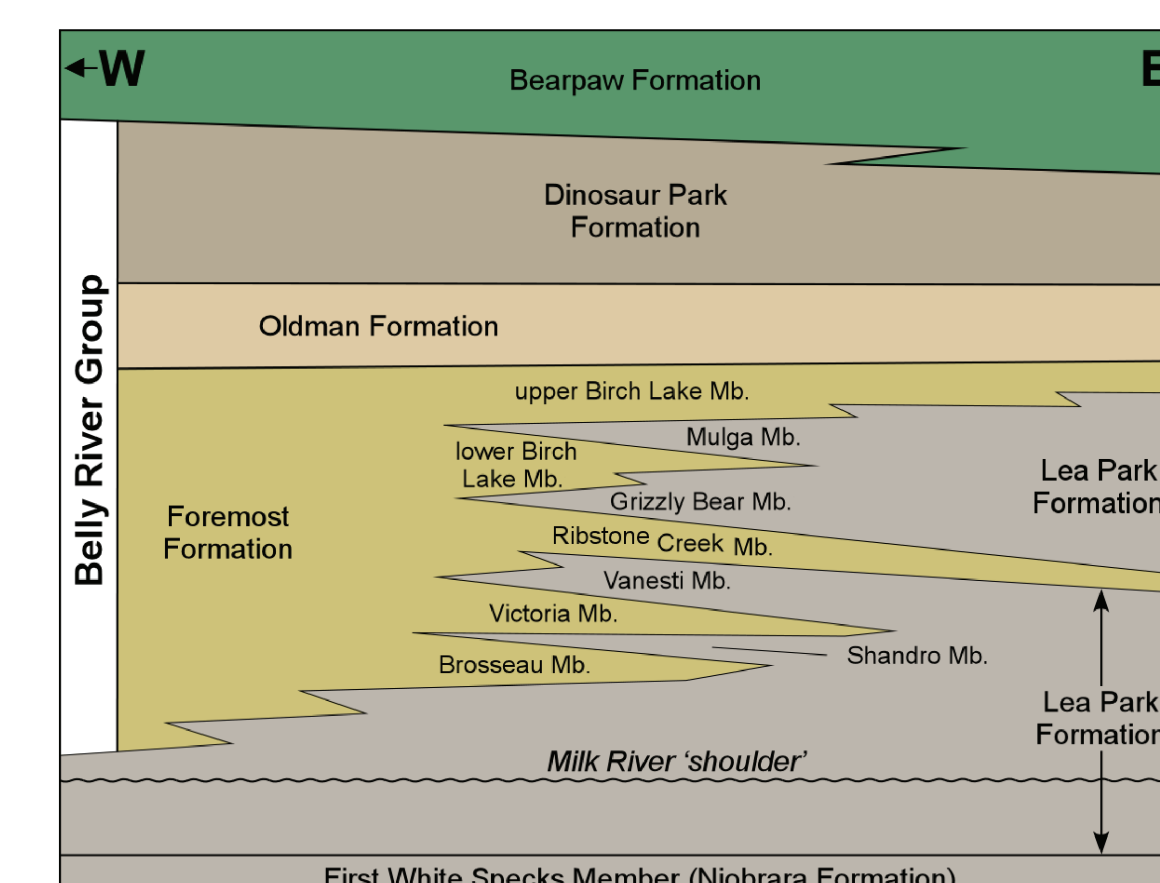


Figure 1. Schematic, east-west-trending stratigraphic cross-section showing the relationship between lithostratigraphic units in eastern Alberta (modified from Nauas, 1945; Shaw and Harding, 1949; Nichols and Wyman, 1969).

**Description of Type and Measured Sections Located within NTS 72L Medicine Hat Map Sheet**

- Units:** Oldman, Dinosaur Park, and Bearpaw formations  
**Top Easting:** 474 371 m **Top Northing:** 5 624 005 m  
**Base Easting:** 473 911 m **Base Northing:** 5 624 557 m  
**Reference:** Hathway and Prior, 2011  
**Section:** S01-T21-R10-W4
- Units:** Foremost and Oldman formations  
**Top Easting:** 490 245 m **Top Northing:** 5 546 944 m  
**Base Easting:** 489 850 m **Base Northing:** 5 546 922 m  
**Reference:** Hathway et al., 2011b  
**Section:** S01-T13-R09-W4
- Units:** Oldman, Dinosaur Park, and Bearpaw formations  
**Top Easting:** 542 765 m **Top Northing:** 5 586 987 m  
**Base Easting:** 542 368 m **Base Northing:** 5 586 920 m  
**Reference:** Hathway et al., 2011a  
**Section:** S01-T17-R03-W4
- Unit:** Dinosaur Park Formation  
**Type:** outcrop  
**Easting:** 477 344 m **Northing:** 5 630 819 m  
**Reference:** Eberth and Hamblin, 1993  
**Notes:** LSD09-S33-T21-R10-W4

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. The oldest bedrock exposed in the map area is the Foremost Formation of the Belly River Group. 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 (Brossseau, 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 the 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 measured outcrop sections (Hathway and Prior, 2011; Hathway et al., 2011a, b), previously published maps (Stewart, 1942a, b; Irish, 1968) 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 traces 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  
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**Recommended Reference Format**

Glombick, P.M. (2014) Bedrock geology of the Medicine Hat area, Alberta (NTS 72L), Alberta Energy Regulator, AER/AGS Map 567, scale 1:250 000.

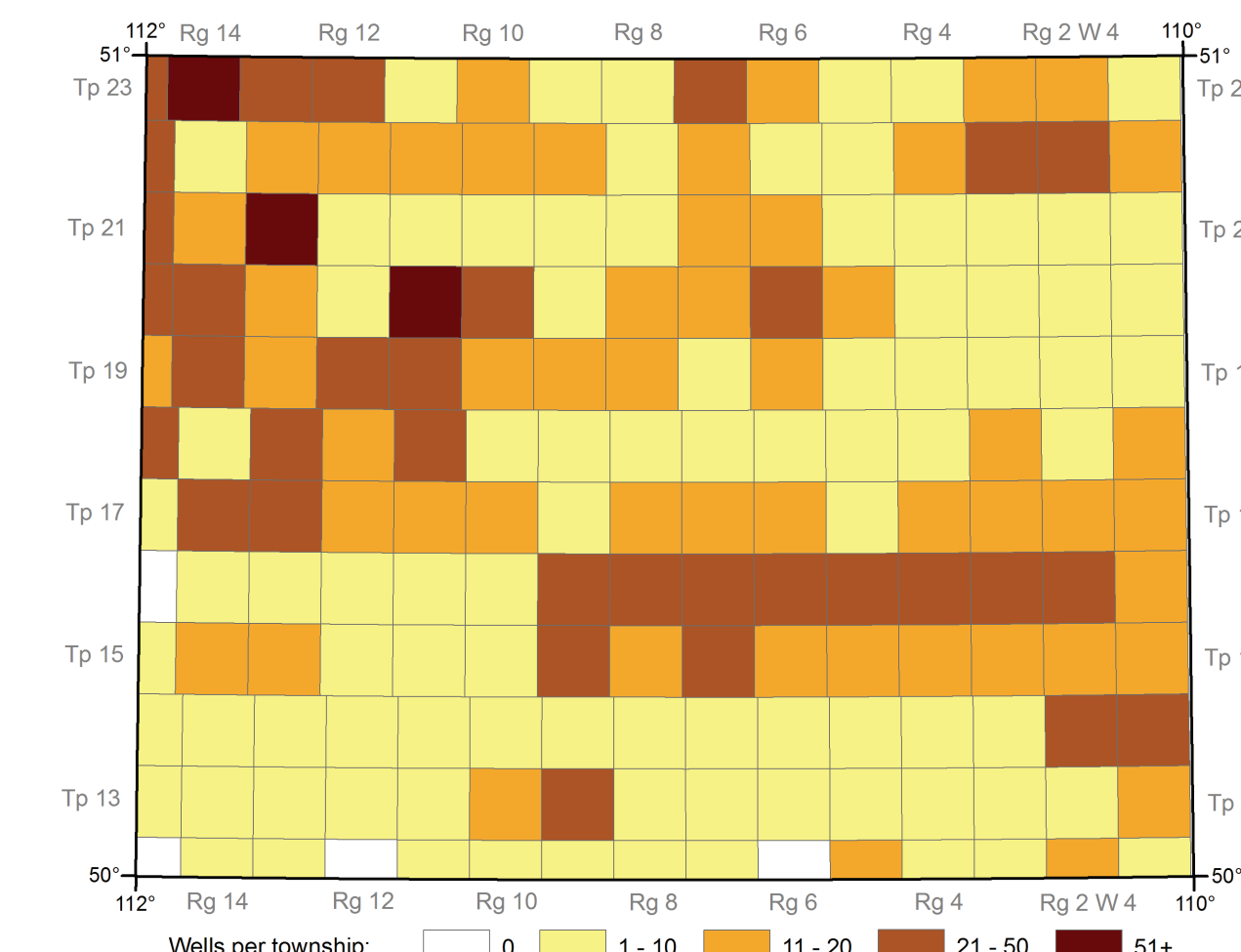


Figure 2. Map showing subsurface well data distribution used in this study.

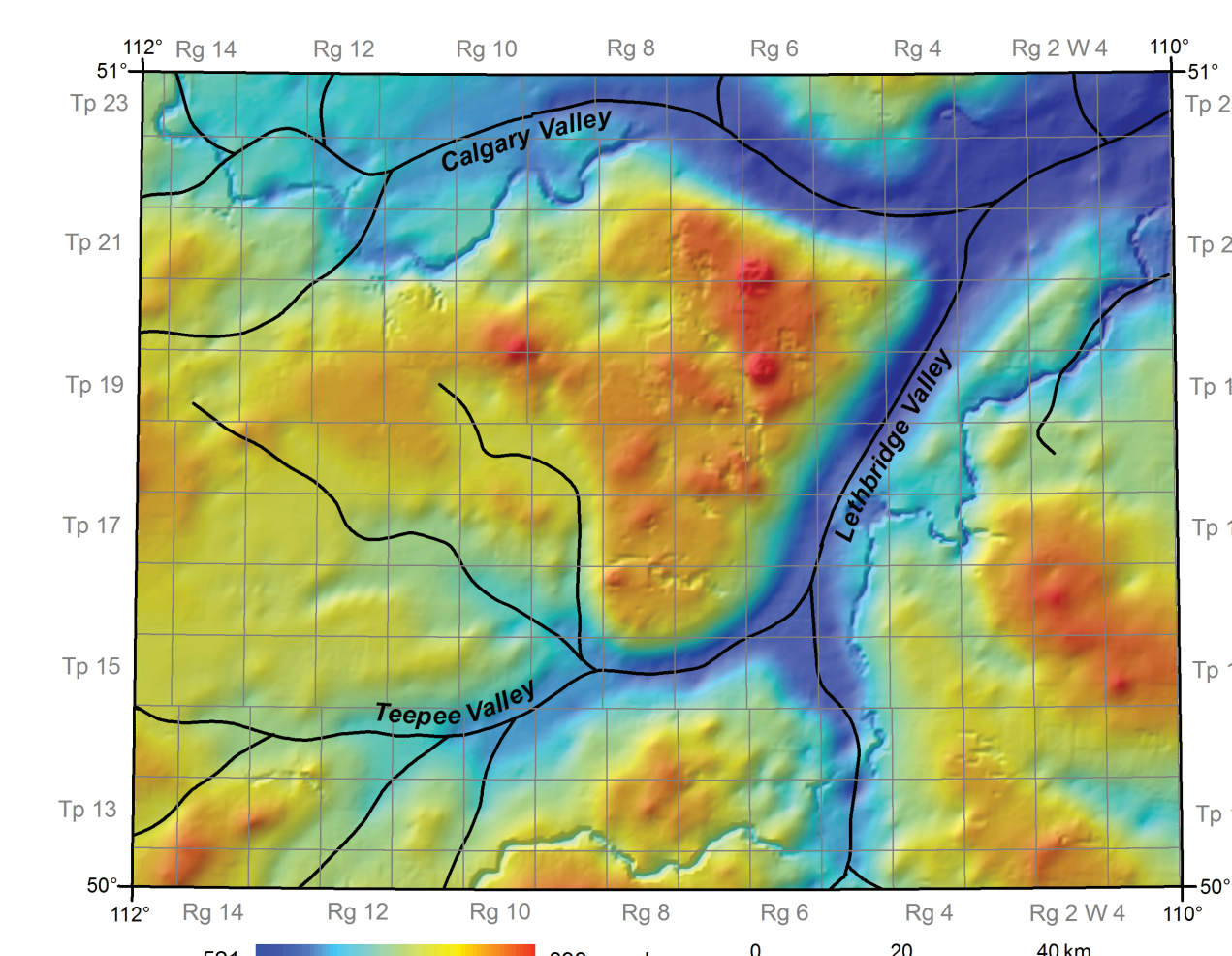


Figure 3. Shaded relief map of bedrock topography from Atkinson and Lyster (2010) showing the location of major preglacial valleys (from Carlson, 1967).

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**Map 567**  
**Bedrock Geology of the Medicine Hat Area (NTS 72L)**

Geology by: P.M. Glombick

