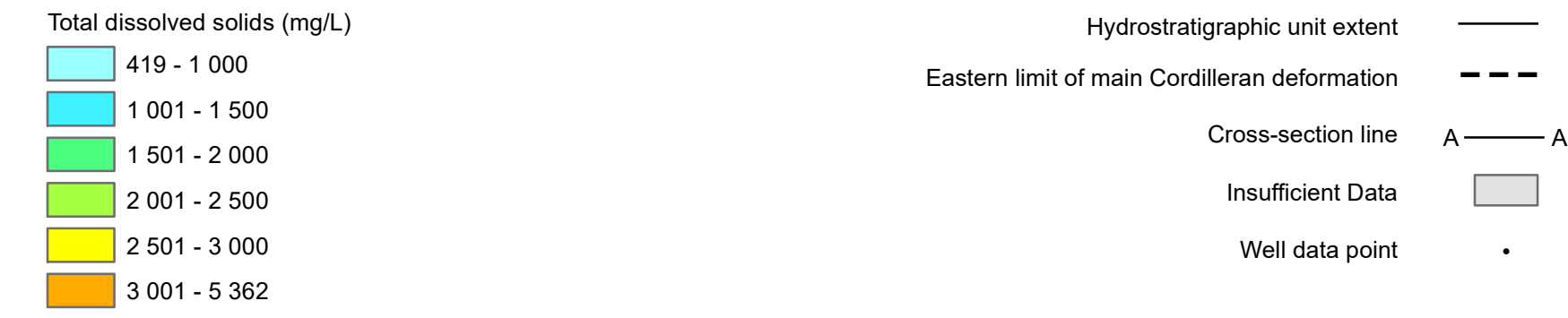


SYMBOL LEGEND



This map depicts the distribution of total dissolved solids (TDS) in the Horseshoe Canyon / St. Mary River hydrostratigraphic unit (HSU). The horizontal and vertical extent of the unit was adopted from the 3D Provincial Geological Framework Model, Version 3 (Alberta Geological Survey, 2021), and includes the St. Mary River and Blood Reserve formation equivalents in the southern plains. The relationship of the Horseshoe Canyon / St. Mary River HSU with the units above and below as well as its geometry can be seen in Figures 1 and 2.

Methodology

The TDS map is a result of an inverse distance weighting technique using publicly available data from 12 686 water chemistry analyses from water wells. The Horseshoe Canyon / St. Mary River HSU reaches maximum depth of approximately 2 100 m (south of Calgary), and it is exposed at surface towards the eastern extent of the HSU. The isochore increases from east to west, where it reaches a maximum of over 800 m (Figure 3). The average well depth used to map the distribution of TDS is 45 m, with maximum and minimum values of 685 m and 5 m respectively. Measured TDS values range from 300 mg/L to 6 019 mg/L. The final gridded map surface was clipped based on the spatial distribution of representative data. Where data density was insufficient to support the prediction, only data points with TDS values were plotted (i.e., east of Calgary and northwest of Lethbridge). Residual values are plotted at each location (Figure 4) to indicate where underprediction or overprediction occurs compared to the measured TDS values. An additional formation-scale hydrogeological map for the Horseshoe Canyon / St. Mary River HSU is presented in Figure 5, which shows the distribution of hydraulic head in the Horseshoe Canyon / St. Mary River HSU.

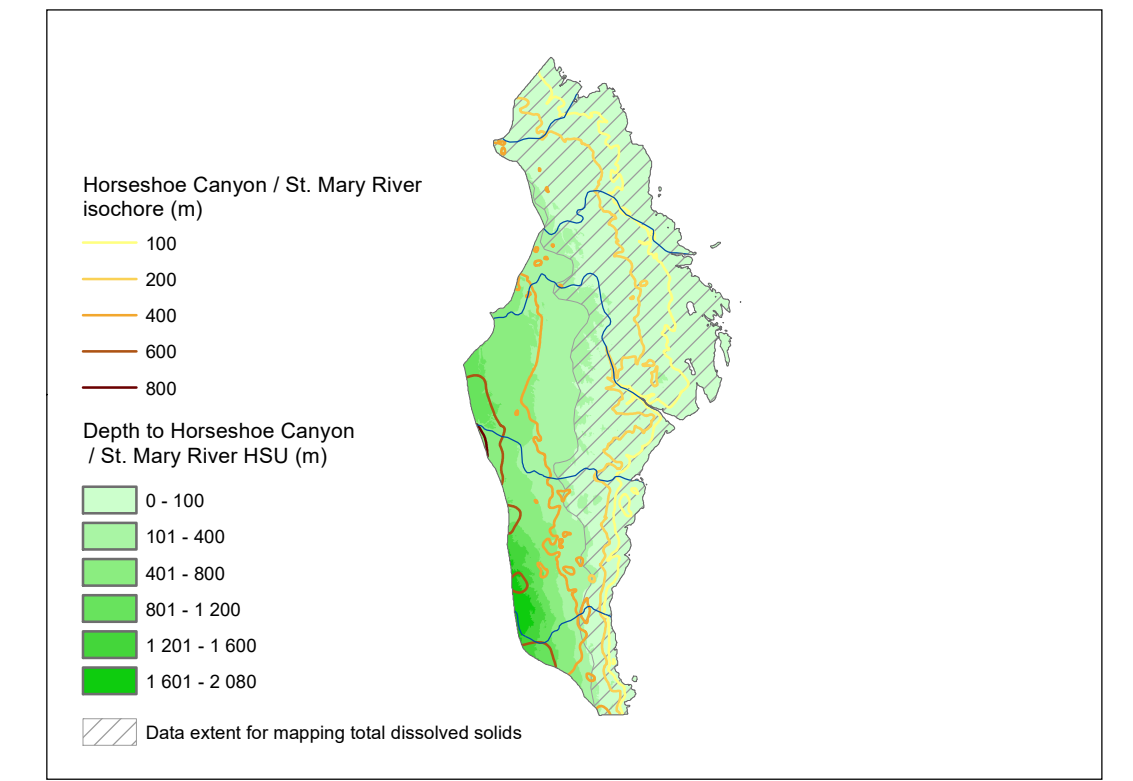


Figure 3. Depth to and isochore of Horseshoe Canyon / St. Mary River HSU. The extent of the total dissolved solids mapping is shown in cross-hatch.

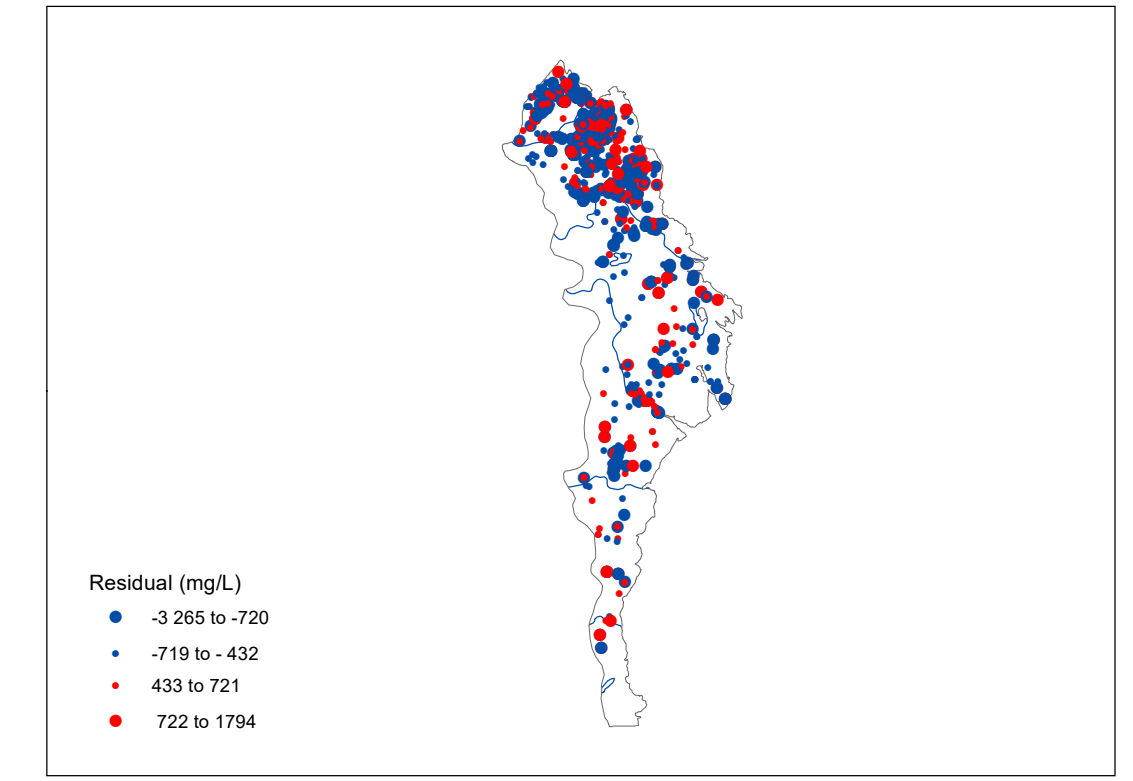


Figure 4. Calculated residuals between the modelled distribution of TDS and measured values. Symbol classes are based on the standard deviation of the calculated residuals. Residuals within 1.5 standard deviations are excluded from this figure due to high data density.

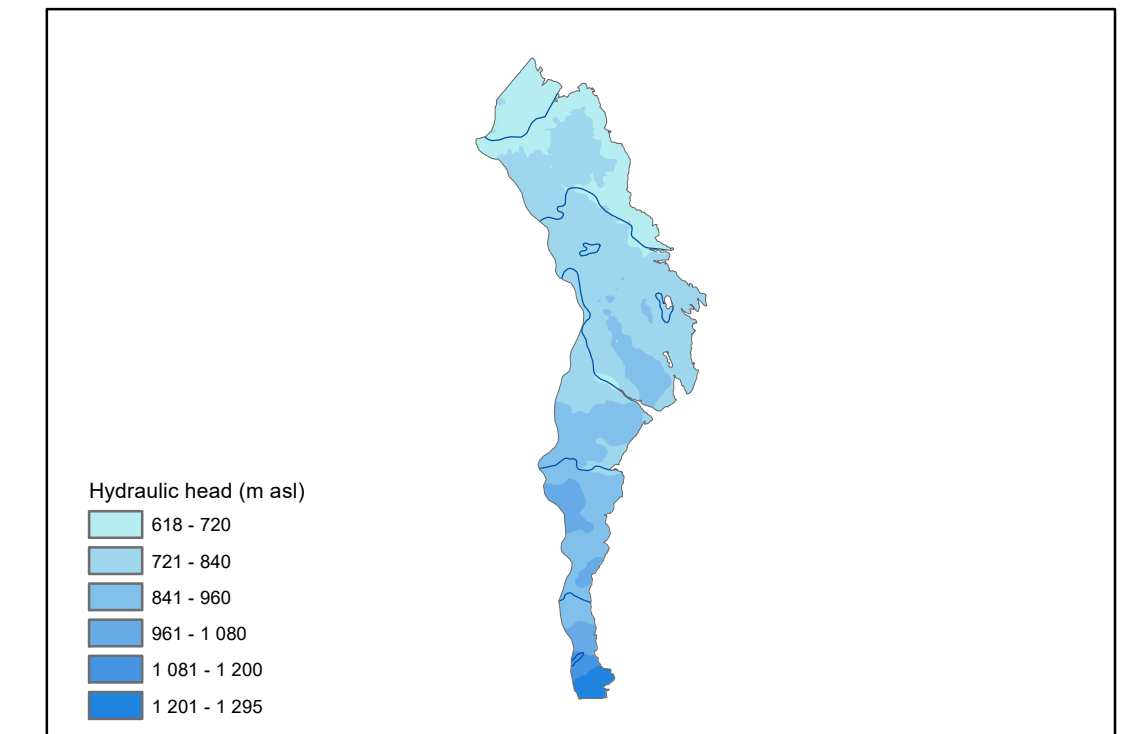


Figure 5. Distribution of hydraulic head in the Horseshoe Canyon / St. Mary River HSU. The map extent is based on the spatial distribution of data and differs from the extent of the main map.

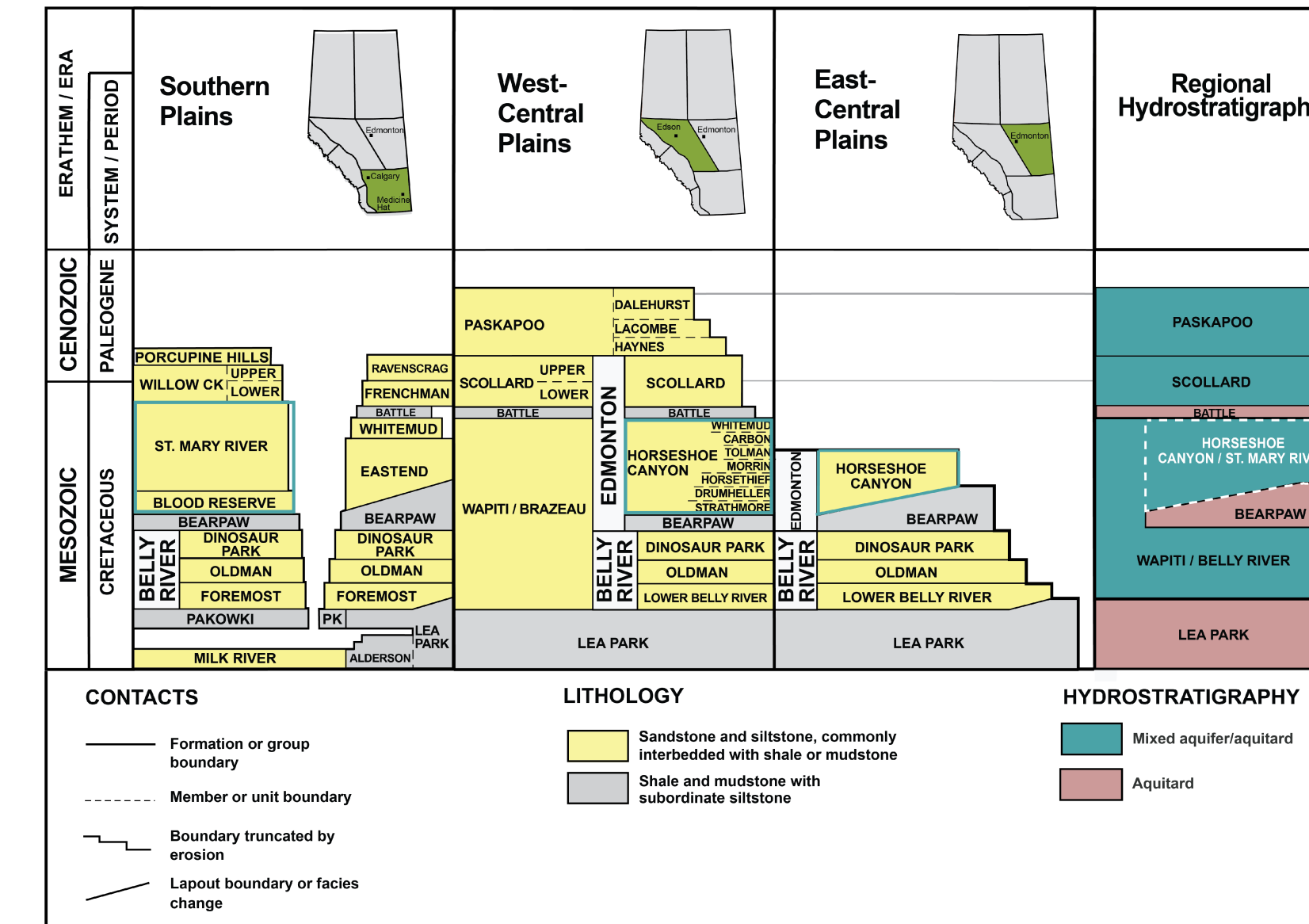


Figure 1. Regional lithostratigraphy and hydrostratigraphy (based on Alberta Geological Survey, 2019). Solid teal lines depict the top and base of the Horseshoe Canyon / St. Mary River stratigraphic unit. Dashed white lines depict the Horseshoe Canyon / St. Mary River HSU within the regional hydrostratigraphy.

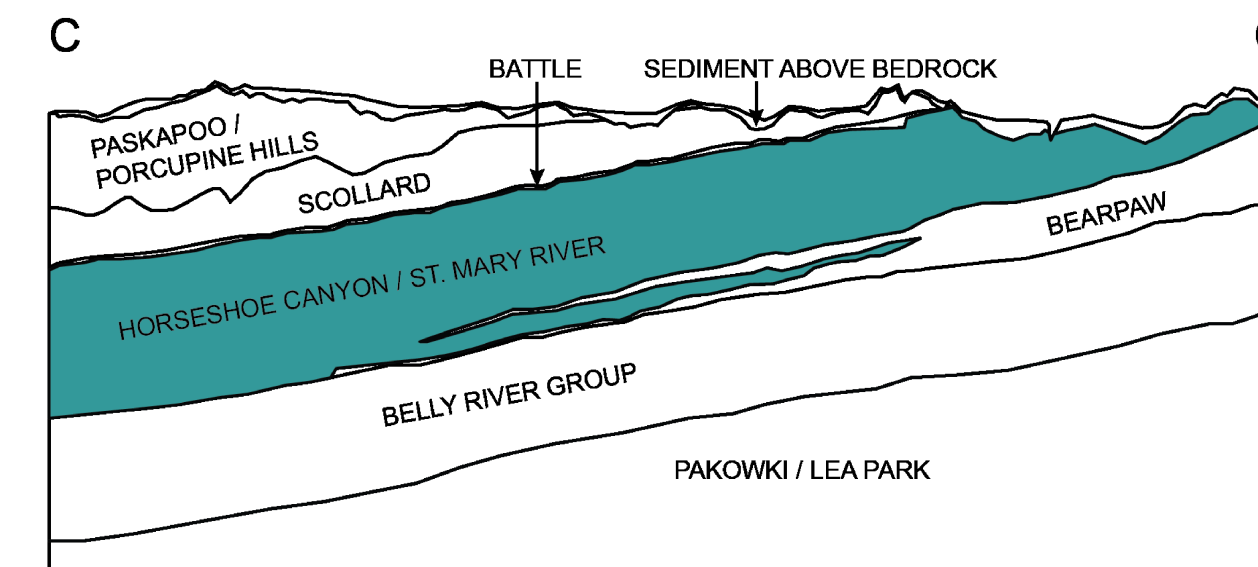
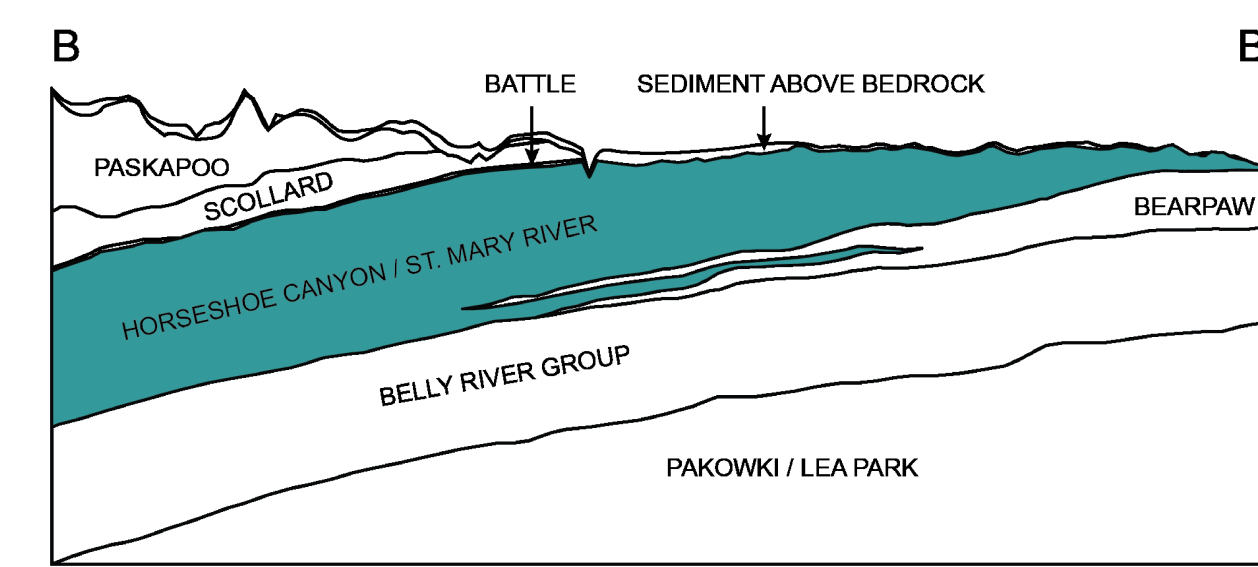
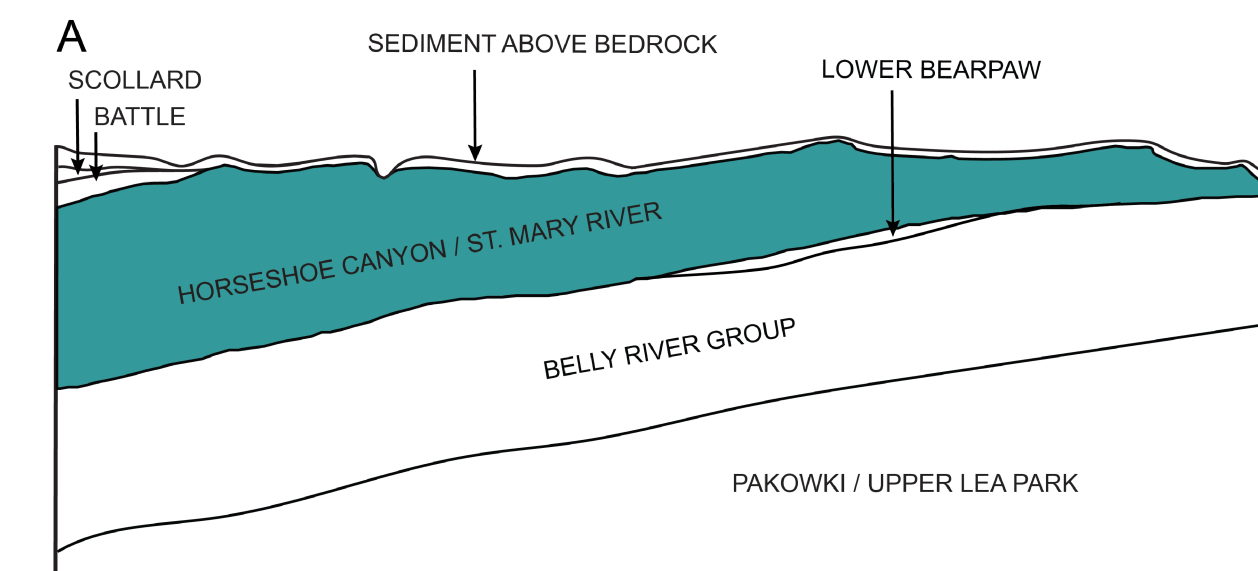


Figure 2. Schematic cross-sections identifying the geometry and variable thickness of the Horseshoe Canyon / St. Mary River HSU (not to scale).

Acknowledgements

Base data from the Atlas of Canada (Natural Resources Canada, 2012) and Spatial Data Warehouse, Ltd.

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