

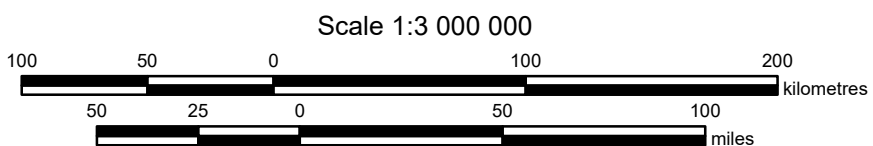
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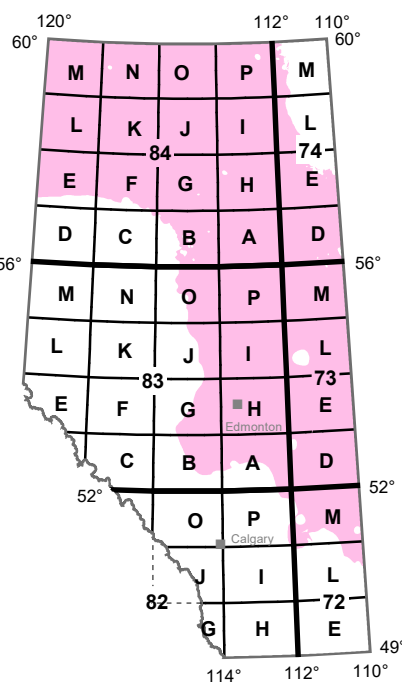
Map 623

Distribution of Total Dissolved Solids in the  
Keg River / Winnipegosis Hydrostratigraphic Unit

Hydrogeology by: N. Nakevska

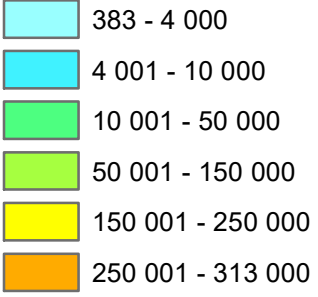


Projection: 10 Degree Transverse Mercator  
Datum: North American Datum, 1983

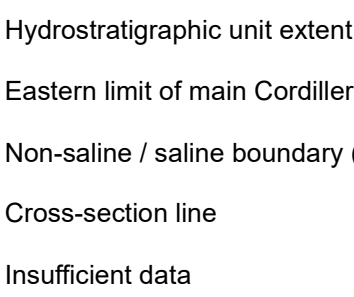


SYMBOL LEGEND

Total dissolved solids (mg/L)



Well data point



This map depicts the distribution of total dissolved solids (TDS) in the Keg River / Winnipegosis hydrostratigraphic unit (HSU). The horizontal and vertical extent of the unit was adopted from the Geological Framework of Alberta, Version 3 (Alberta Geological Survey, 2021). The relationship of the Keg River / Winnipegosis Hsu with the units above and below as well as its geometry can be seen in Figures 1 and 2.

Methodology

The TDS distribution map is a result of an ordinary kriging technique using publicly available formation water analysis from 525 drillstem tests from oil and gas wells, and 42 industry monitoring wells. A screening process modified from Jensen et al. (2013) was used to ensure that only representative formation water chemistries were used. Measured TDS values range from 420 mg/L to approximately 336 000 mg/L. The final gridded map surface was clipped based on the spatial distribution of representative data. Residual values are plotted at each location (Figure 3) to indicate where underprediction or overprediction occurs compared to the measured TDS values.

Additional formation-scale hydrogeological maps for the Keg River / Winnipegosis Hsu are presented in Figures 4 and 5. Figure 4 shows the distribution of hydraulic head in the Keg River / Winnipegosis Hsu. Figure 5 shows the water driving force (WDF) vector map for the Keg River / Winnipegosis Hsu. The WDF vector map allows identification of areas where the buoyancy effect of formation water density has the potential to change the inferred magnitude and direction of groundwater flow (Singh et al., 2017). With the exception of some localized areas in the northern and southeastern parts of the map where larger angles between the WDF vector and the hydraulic gradient vector are observed (dark orange areas), buoyancy does not appear to have a significant effect on groundwater flow.

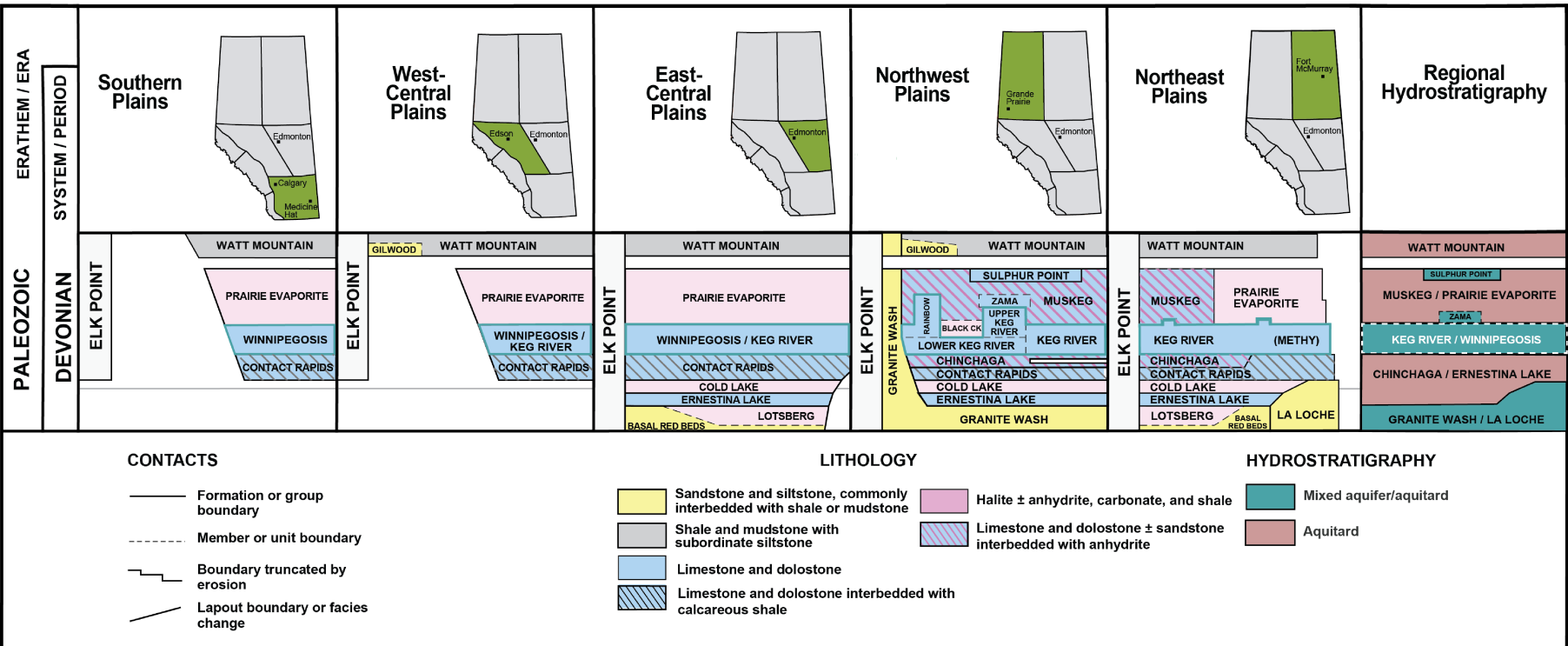


Figure 1. Regional lithostratigraphy and hydrostratigraphy (based on Alberta Geological Survey, 2019). Solid teal lines highlight the top and base of the stratigraphic units combined for mapping the Keg River / Winnipegosis Hsu. Dashed white lines depict the Keg River / Winnipegosis Hsu within the regional hydrostratigraphy. Strata above the Watt Mountain Formation and below the Elk Point Group are not shown.

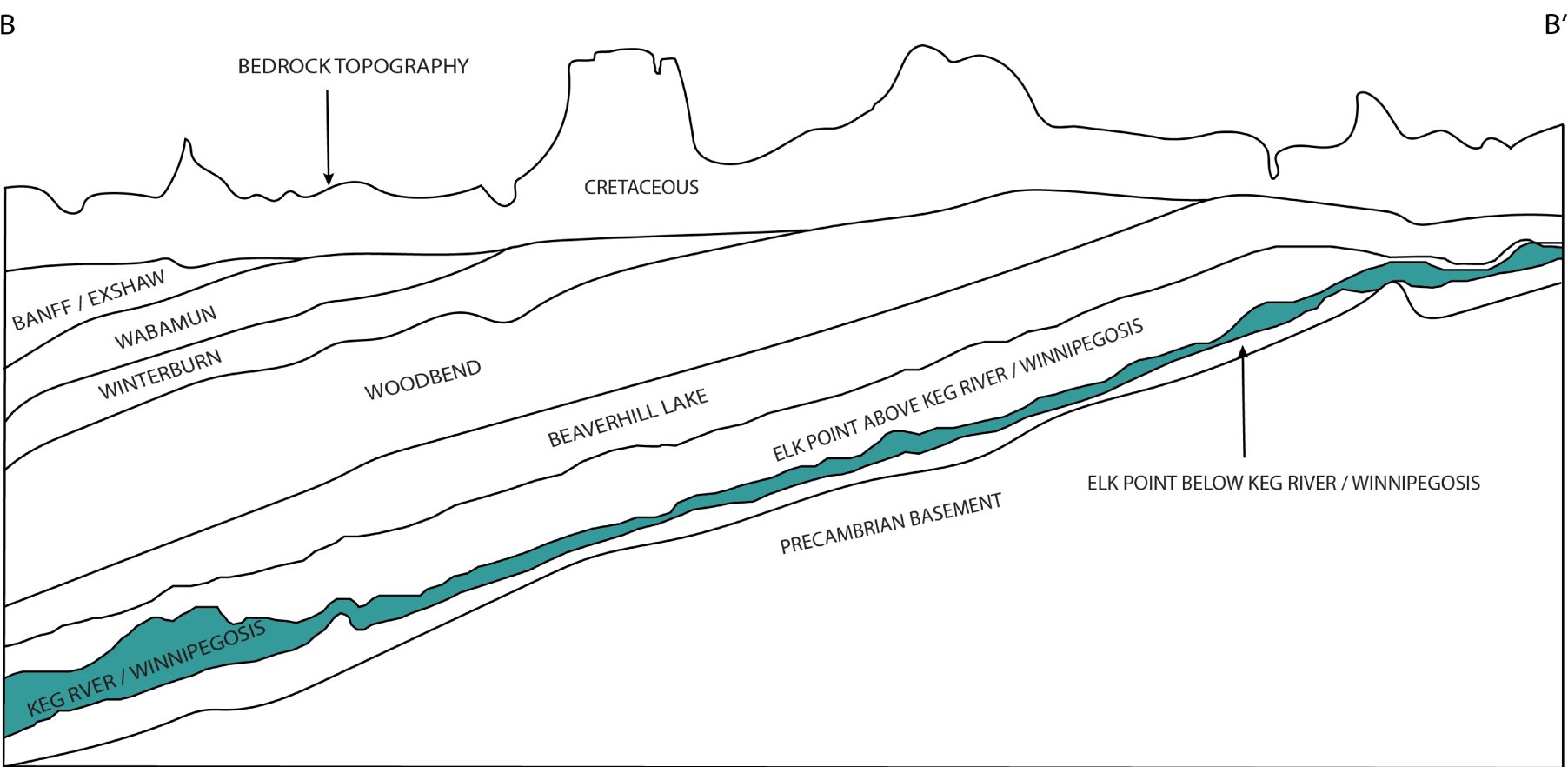
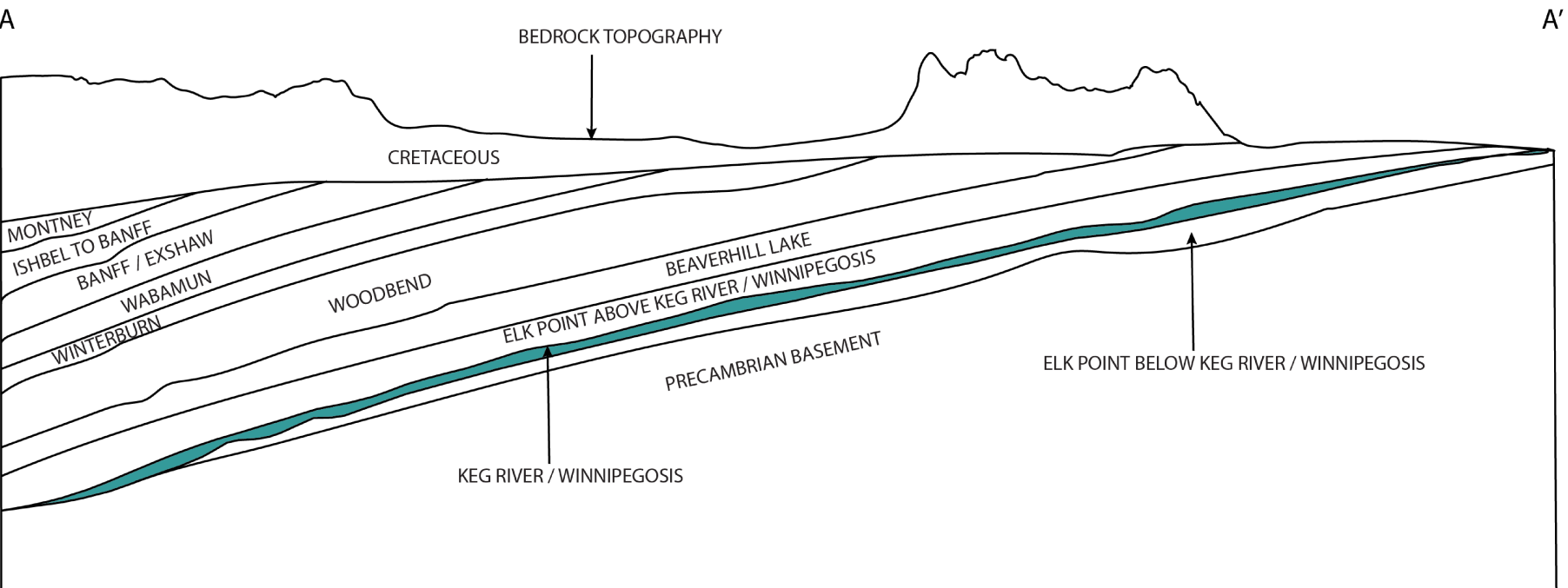


Figure 2. Schematic cross-sections identifying the geometry and variable thickness of the Keg River / Winnipegosis Hsu (not to scale).

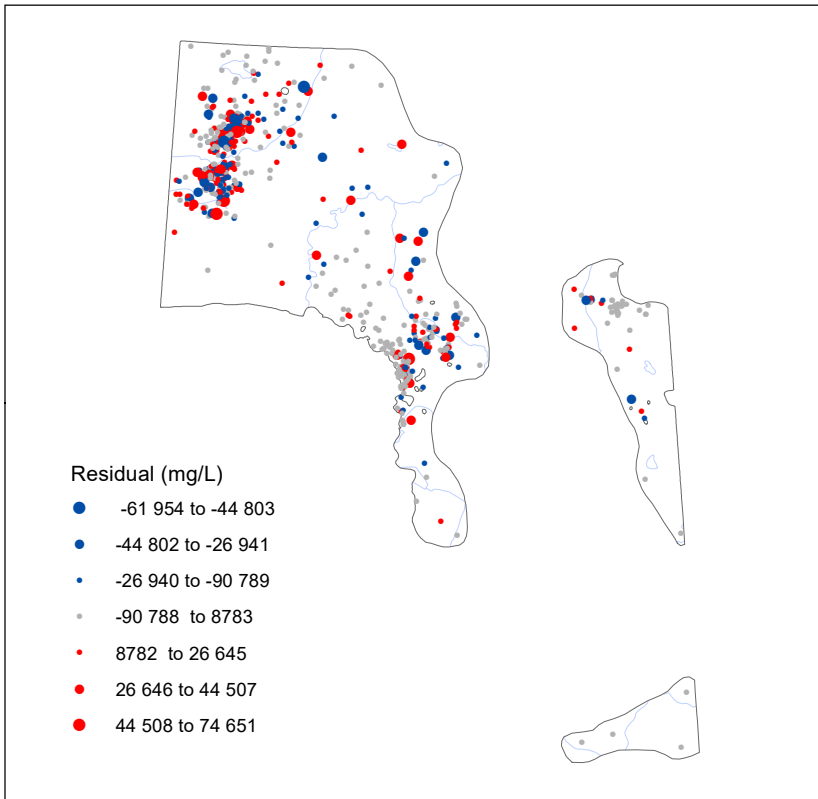


Figure 3. Calculated residuals between the modelled TDS distribution and measured values. Symbol classes are based on the standard deviation of the calculated residuals.

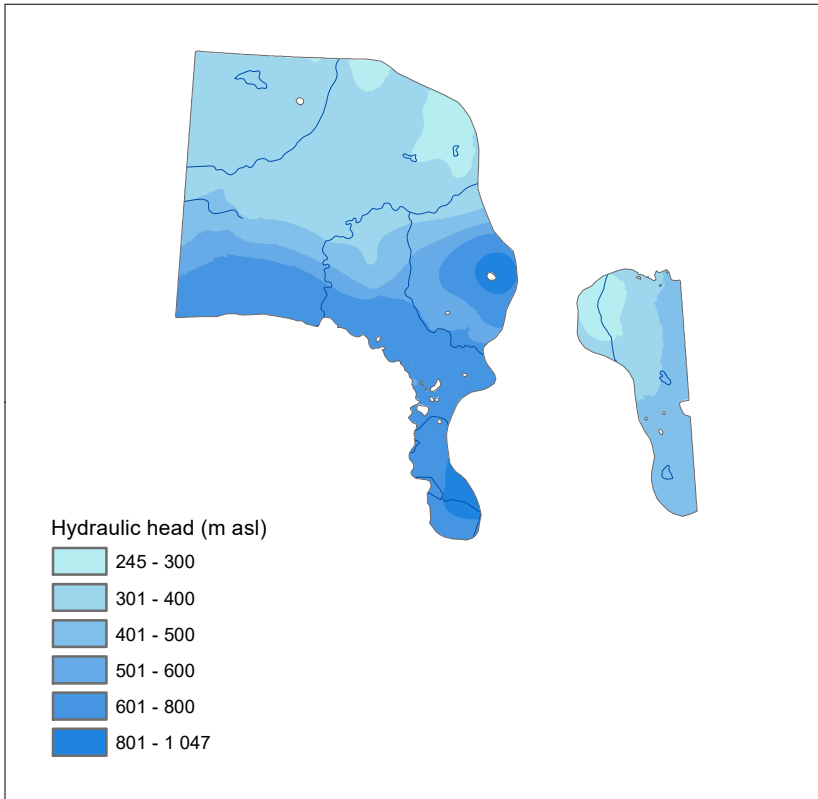


Figure 4. Distribution of hydraulic head in the Keg River / Winnipegosis Hsu. The map extent is based on the spatial distribution of hydraulic head data and differs from the extent of the main map.

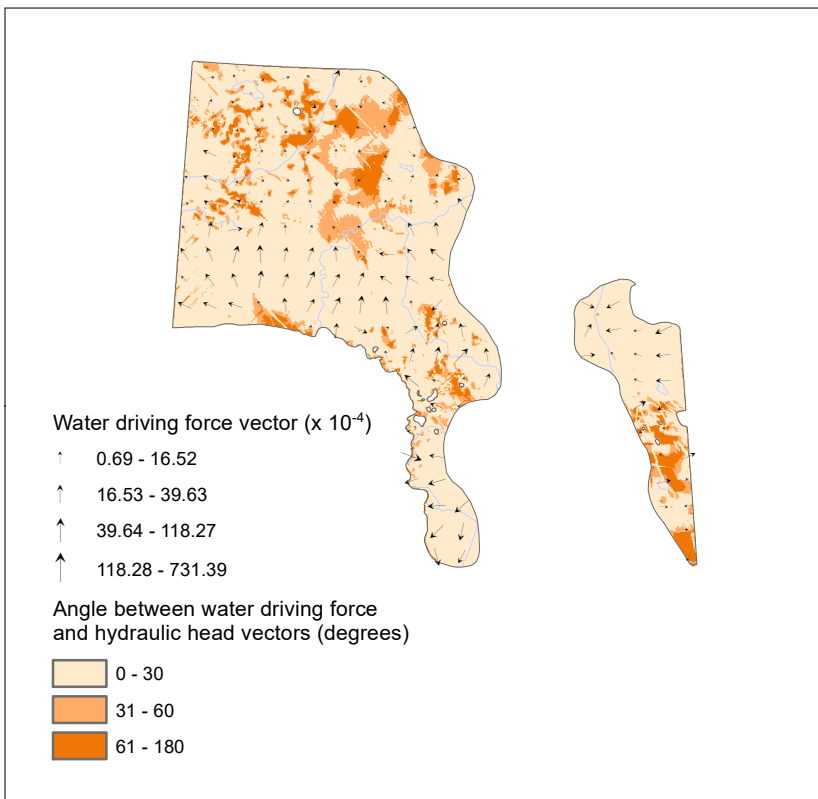


Figure 5. Water driving force vector map of the Keg River / Winnipegosis Hsu. The map covers only the area where hydraulic head and TDS gridded surfaces overlap.

Acknowledgements

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References

Alberta Geological Survey (2021): Geological Framework of Alberta, version 3 (interactive app and map, methodology, model, dataset, story maps, web maps); Alberta Energy Regulator / Alberta Geological Survey, AER/AGS Interactive Application, URL <<https://gfa-v3-ags-aer.hub.arcgis.com>> [December 2021].

Alberta Geological Survey (2019): Alberta Table of Formations; Alberta Energy Regulator, URL <[https://ags.aer.ca/publications/table\\_of\\_formations](https://ags.aer.ca/publications/table_of_formations)> [October 2019].

Nakevska, N. (2023): Distribution of hydraulic head in the Keg River / Winnipegosis hydrostratigraphic unit; Alberta Energy Regulator / Alberta Geological Survey, AER/AGS Map 624, scale 1:3 000 000.

Jensen, G.K.S., Rostron, B., Palombi, D. and Melnik, A. (2013): Saskatchewan Phanerozoic Fluids and Petroleum Systems project: hydrogeological mapping framework; in Summary of investigations 2013, v.1, Saskatchewan Geological Survey, Saskatchewan Ministry of the Economy, Miscellaneous Report 2013-4.1, Paper A-5,10 p.

Natural Resources Canada (2012): CanVec digital topographic data; Natural Resources Canada, Earth Sciences Sector. URL <<https://open.canada.ca/data/en/dataset/8ba2aa2a-7bb9-4448-b4d7-f164409fe056>> [December 2012].

Singh, A., Palombi, D., Nakevska, N., Jensen, G. and Rostron, B. (2017): An efficient approach for characterizing basin-scale hydrodynamics; Marine and Petroleum Geology, p. 332-340, URL <<https://dx.doi.org/10.1016/j.marpetgeo.2017.02.015>>.

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