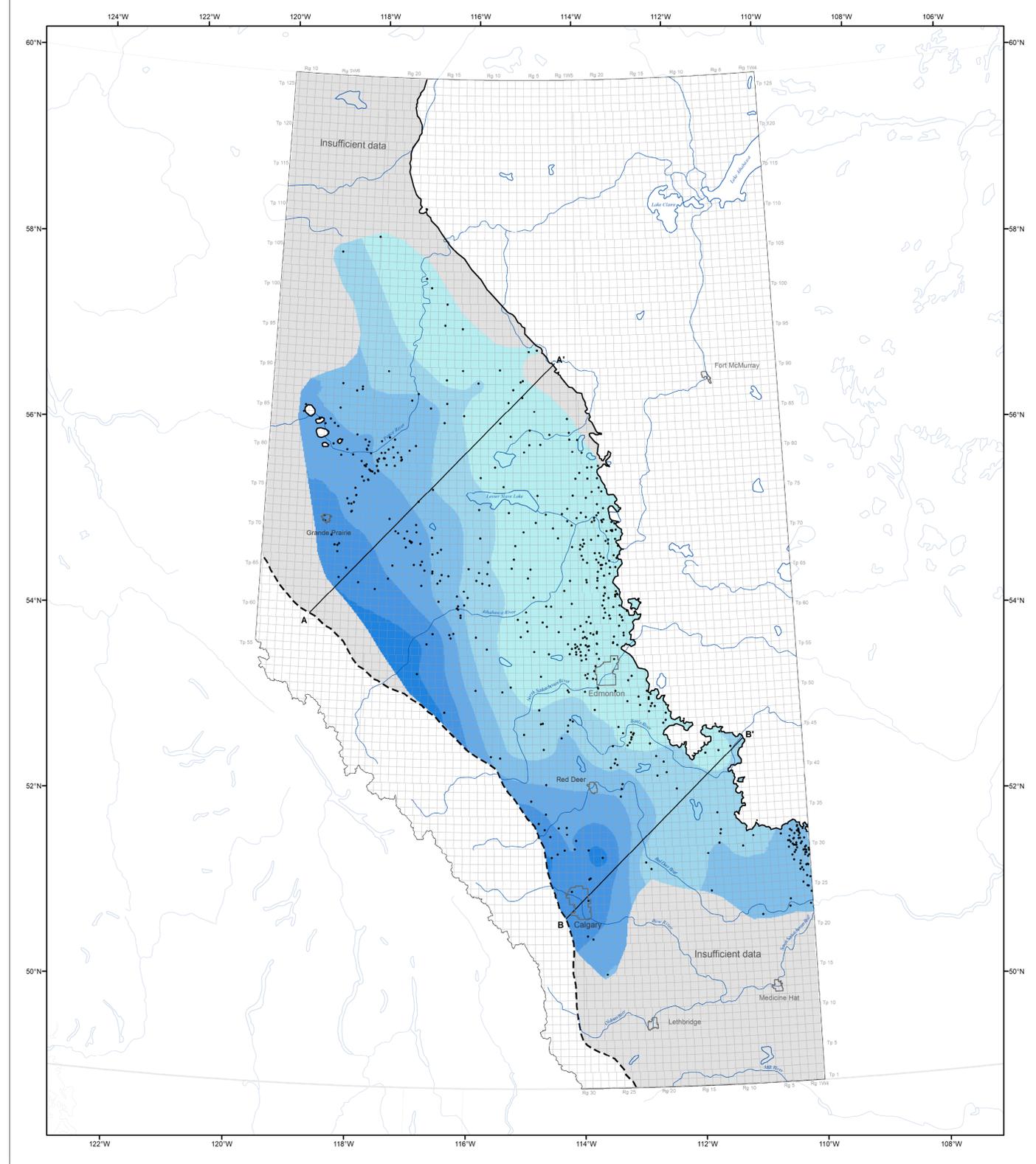


HYDRAULIC HEAD

WABAMUN HSU



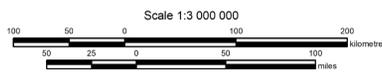
Alberta Geological Survey  
www.ags.aer.ca

Published 2020  
ISBN 978-1-4601-4507-4

Map 547

Distribution of Hydraulic Head in the Wabamun Hydrostratigraphic Unit

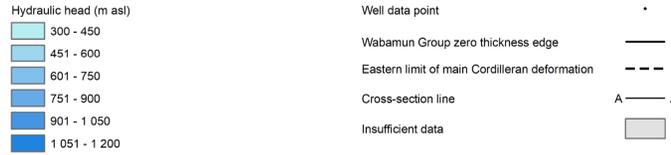
Hydrogeology by: J. Brinsky



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



SYMBOL LEGEND



This map depicts the distribution of hydraulic head in the Wabamun hydrostratigraphic unit (HSU). The horizontal and vertical extent of the unit was adopted from the 3D Provincial Geological Framework Model of Alberta, Version 1 (Branscombe et al., 2018). The relationship of the Wabamun HSU with the units above and below as well as its geometry can be seen in Figure 1 and Figure 2.

Methodology

The hydraulic head distribution map is a result of an empirical Bayesian kriging technique using publicly available pressure data from 533 drillstem tests from oil and gas wells. A screening process modified from Jensen et al. (2013) was used to ensure that only representative pressures were used to calculate equivalent freshwater hydraulic heads. 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 and overprediction occurs compared to the measured hydraulic head values.

Using the methodology of Singh et al. (2017) the Cumulative Interference Index (CII) was determined and used to identify and remove data that have been influenced by production or injection (Figure 4). An additional formation-scale map shows the distribution of total dissolved solids in the Wabamun HSU (Figure 5).

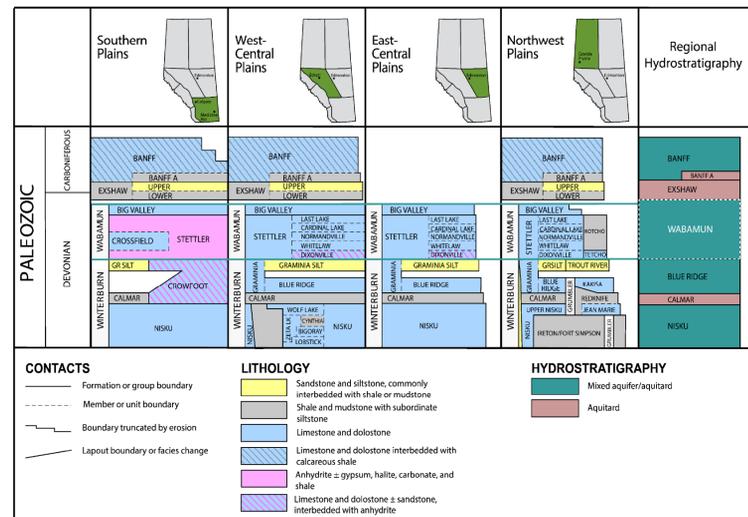


Figure 1. Regional lithostratigraphy and hydrostratigraphy (based on Alberta Geological Survey, 2019). Solid teal lines depict the top and base of stratigraphic units combined for mapping the Wabamun HSU. Dashed white lines depict the Wabamun HSU within the regional hydrostratigraphy. Strata above the Banff HSU and below the Nisku HSU are not shown.

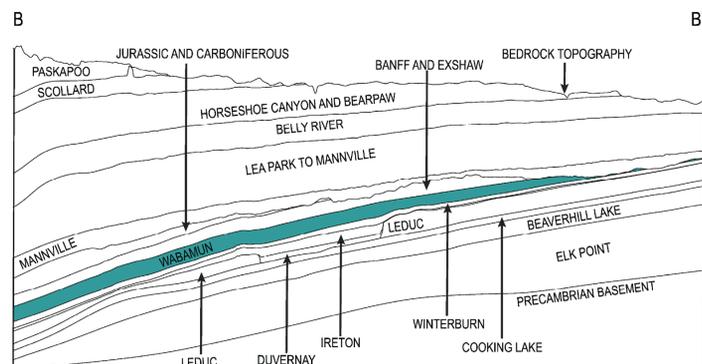
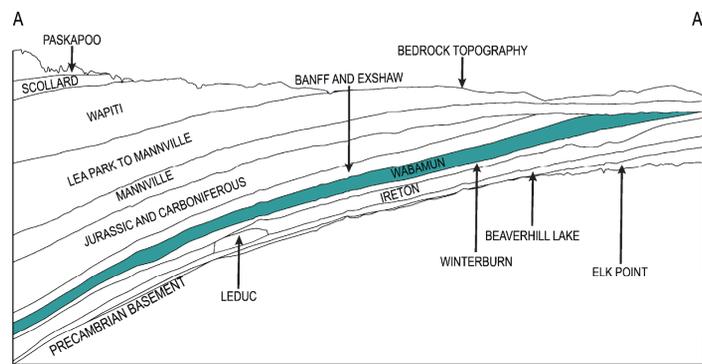


Figure 2. Schematic cross-sections identifying the geometry and variable thickness of the Wabamun HSU (not to scale). Jurassic and Carboniferous strata have not been subdivided at the scale of this cross-section.

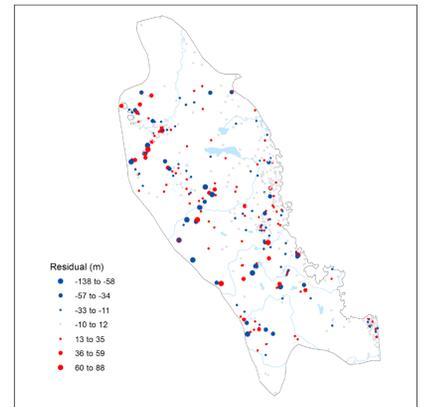


Figure 3. Calculated residuals between the modelled distribution of hydraulic head and measured values. Symbol classes are based on the standard deviation of the calculated residuals.

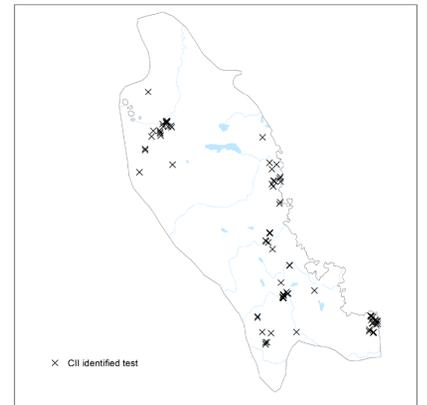


Figure 4. Location of tests that may have been influenced by production or injection and were removed during the Cumulative Interference Index (CII) process.

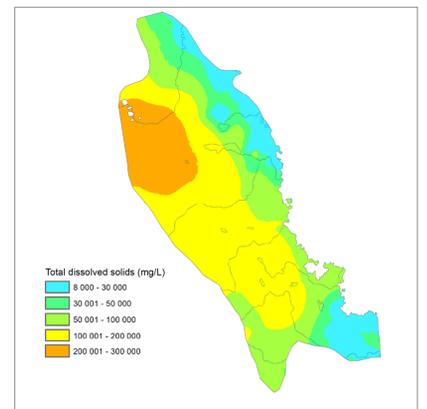


Figure 5. Distribution of total dissolved solids in the Wabamun HSU (Brinsky, 2020).

Acknowledgements

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References

- Alberta Geological Survey (2019): Alberta Table of Formations; Alberta Energy Regulator, URL <https://ags.aer.ca/publications/table\_of\_formations\_2019.html> [October 2019].
- Branscombe, P., MacCormack, K.E., Corlett, H., Hathway, B., Hauk, T.E. and Peterson, J.T. (2018): 3D provincial geological framework model of Alberta, version 1 (dataset, multiple files); Alberta Energy Regulator, AER/AGS Model 2017-03.
- Brinsky, J. (2020): Distribution of total dissolved solids in the Wabamun hydrostratigraphic unit. Alberta Energy Regulator / Alberta Geological Survey, AER/AGS Map 546, scale 1:3 000 000.
- Jensen, G.K.S., Rostrom, 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 <http://ftp2.cits.nrcan.gc.ca/pub/canvec/province\_fgdb/ab/canvec10\_gdb\_AB\_HD.zip> [December 2012].
- Singh, A., Palombi, D., Nakevska, N., Jensen, G. and Rostrom, B. (2017): An efficient approach for characterizing basin-scale hydrodynamics; Marine and Petroleum Geology, p. 332-340, <http://dx.doi.org/10.1016/j.marpetgeo.2017.02.015>.

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