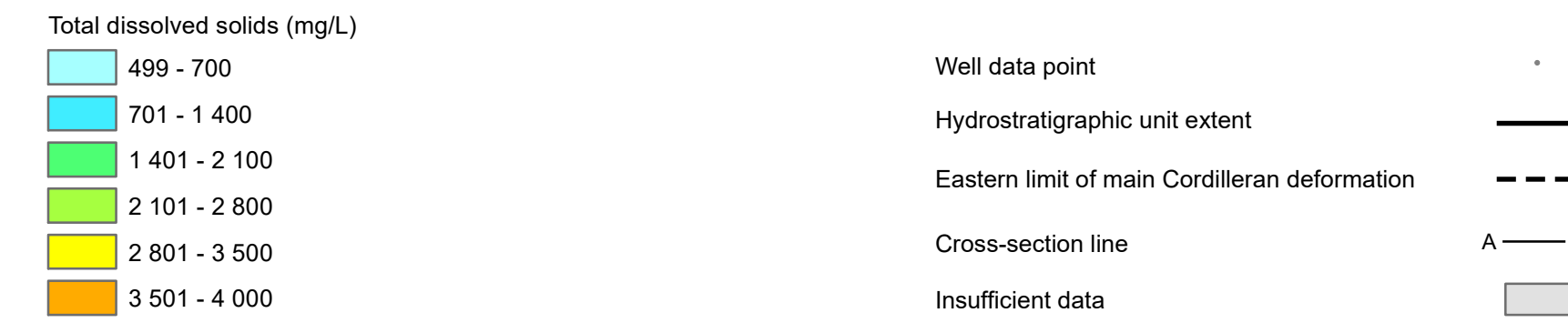


SYMBOL LEGEND



This map depicts the distribution of total dissolved solids (TDS) in the Scollard / Willow Creek 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 Scollard / Willow Creek 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 empirical Bayesian kriging technique using publicly available data from 5 883 water chemistry analyses from water wells. The Scollard / Willow Creek HSU is exposed at the ground surface in some areas, has a vertical thickness of up to 1 573 m, and its top reaches a maximum depth of 1 118 m in the western part of its extent (Figure 3). Most of the water wells are located near the subcrop margin of the Scollard / Willow Creek HSU. The average well depth for data used in mapping the Scollard / Willow Creek TDS is 49 m and the minimum and maximum well depths are 3 m and 368 m, respectively. Outliers were identified and removed using a cross-validation statistical approach. Measured TDS values range from 254 mg/L to 6 640 mg/L, while predicted TDS values range from 499 mg/L to 4 000 mg/L.

The final gridded map surface was clipped based on the spatial distribution of representative data. Residual values are plotted at each location (greater than 1.5 and less than -1.5 standard deviations) to indicate where underprediction or overprediction occurs compared to the measured TDS values (Figure 4). An additional formation-scale hydrogeological map showing the distribution of hydraulic head for the Scollard / Willow Creek HSU is presented in Figure 5.

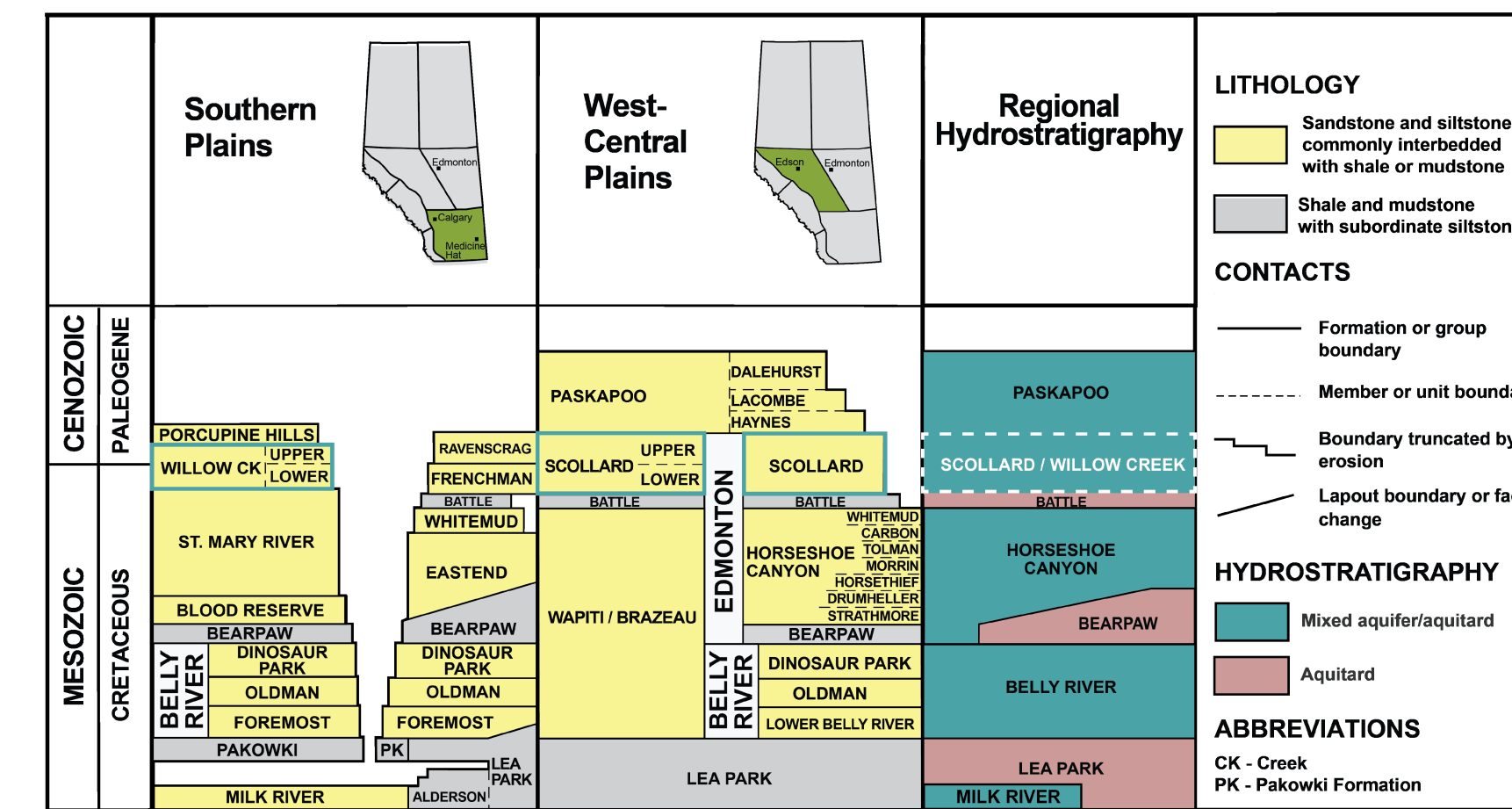


Figure 1. Regional lithostratigraphy and hydrostratigraphy (based on Alberta Geological Survey, 2019). Solid teal lines highlight the Scollard / Willow Creek stratigraphic unit. Dashed white lines depict the Scollard / Willow Creek HSU within the regional hydrostratigraphy. Strata below the Lea Park and equivalent formations are not shown. In the southern portion of the province, the Battle Formation is not present and the Scollard / Willow Creek HSU overlies the St. Mary River Formation.

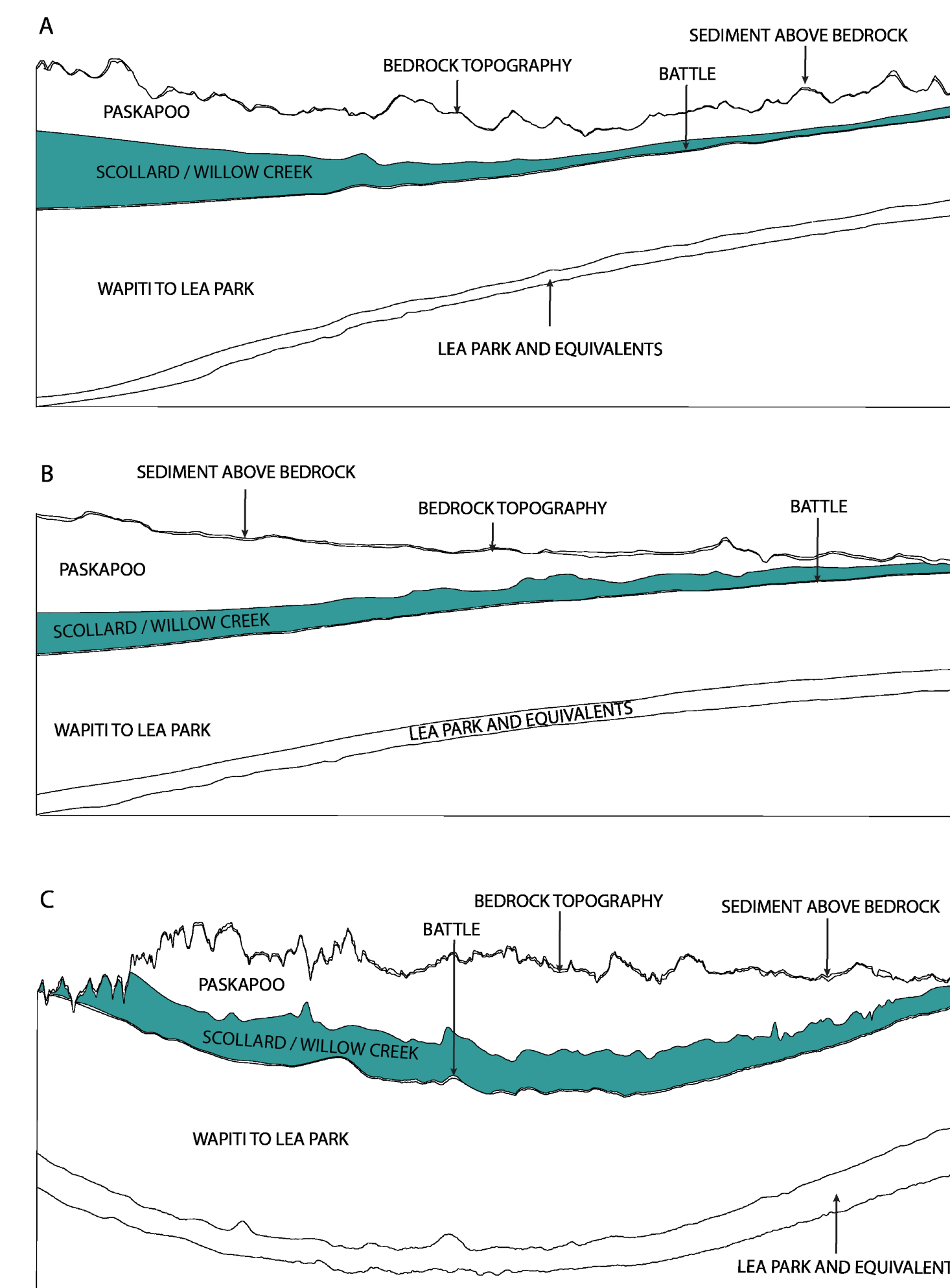


Figure 2. Schematic cross-sections identifying the geometry and variable thickness of the Scollard / Willow Creek HSU. Strata below the Lea Park and equivalent formations are not shown.

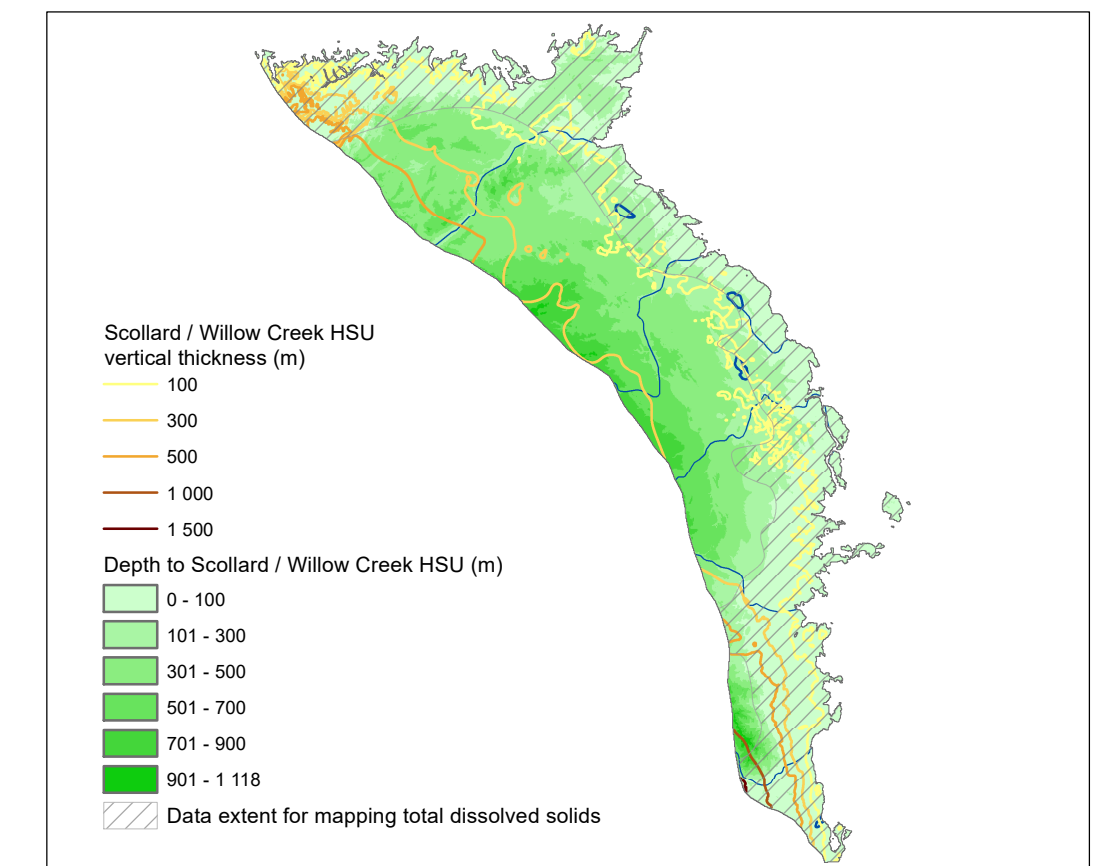


Figure 3. Depth to, and vertical thickness of the Scollard / Willow Creek HSU. Hatched pattern shows the extent of data used for total dissolved solids mapping.

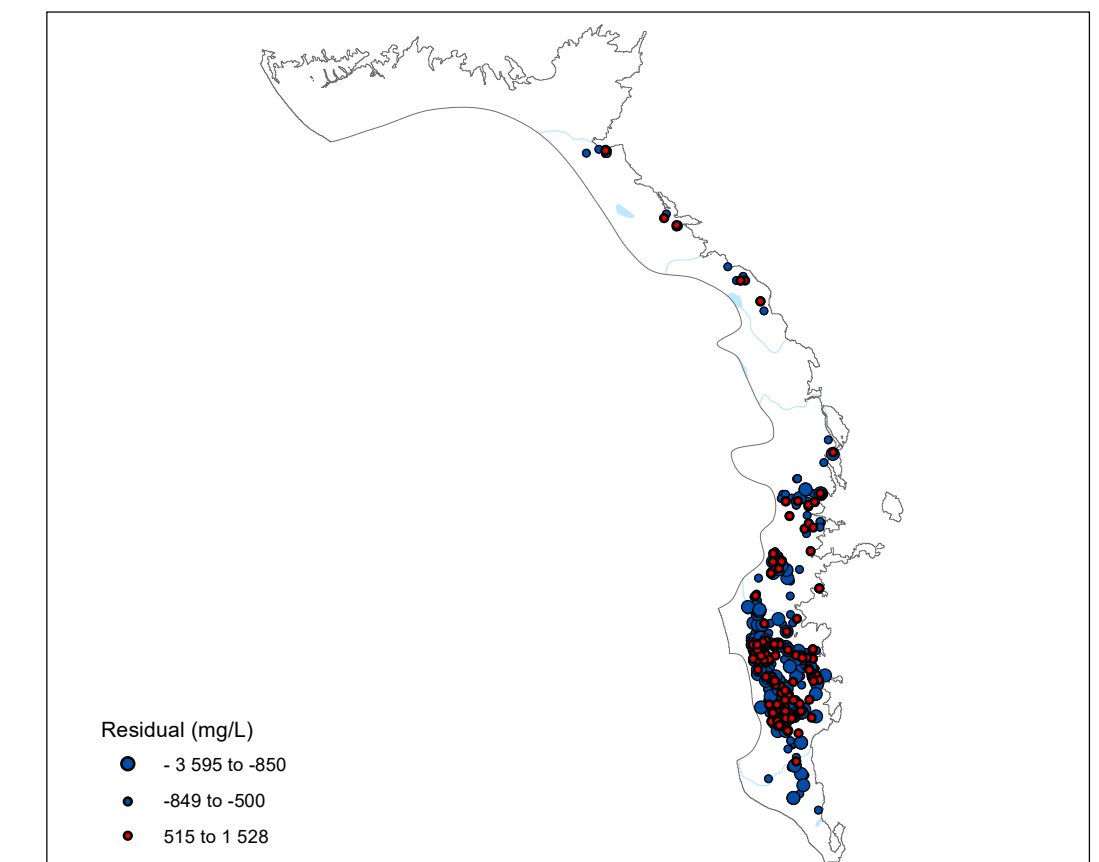


Figure 4. Calculated residuals between the modelled distribution of TDS and measured values. Symbol classes are based on the standard deviation of the calculated residual. Residuals within 1.5 standard deviations are excluded from this figure due to high data density.

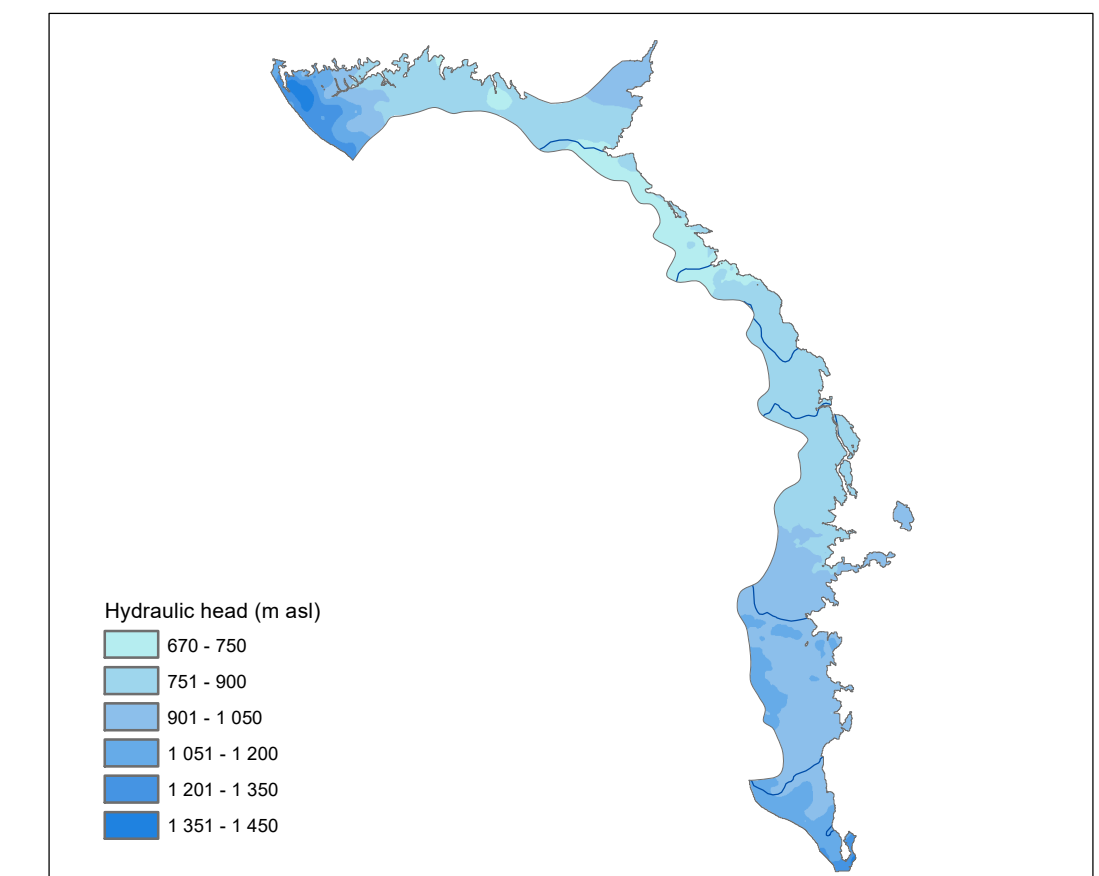


Figure 5. Distribution of hydraulic head in the Scollard / Willow Creek HSU (Brinsky and Singh, 2022). The map extent is based on the spatial distribution of hydraulic head data and differs from the extent of the main map.

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].
- 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 <https://gfa-v3-ags-aer.hub.arcgis.com> [December 2021].
- Brinsky, J. and Singh, A. (2022): Distribution of hydraulic head in the Scollard / Willow Creek hydrostratigraphic unit; Alberta Energy Regulator / Alberta Geological Survey, AER/AGS Map 629, scale 1:1 750 000.
- 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].

Acknowledgements

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

Recommended Reference Format

Brinsky, J. and Lemay, T.G. (2022): Distribution of total dissolved solids in the Scollard / Willow Creek hydrostratigraphic unit; Alberta Energy Regulator / Alberta Geological Survey, AER/AGS Map 628, scale 1:1 750 000.

Disclaimer

The Alberta Geological Survey and its employees and contractors make no warranty, guarantee or representation, express or implied, or assume any legal liability regarding the correctness, accuracy, completeness, or reliability of the publication. When using information from this publication in other publications or presentations, due acknowledgement should be given to the Alberta Energy Regulator / Alberta Geological Survey.