

## The coastal plain to Clearwater stratigraphy of central Alberta: differentiating the Mannville Group.

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### Summary

The Mannville Group stratigraphy above the Glauconitic/Bluesky formation across most of Alberta has remained undifferentiated for decades. This has endured because of the general belief the section was non-marine, lacked correlative beds, and had no economic potential. This author correlated the logs for every Mannville penetration across >800 contiguous Twps. using the Lloydminster stratigraphic nomenclature while working in industry and for a planned MSc thesis. This talk presents maps and observations from the graduate studies data subset.

### Sequence stratigraphy of the Mannville Group

The large hole that presently exists in our understanding of the vertical and lateral variations of individual Mannville Group formations is addressed in this study. This research is the result of efforts by the author to understand indications of oil pay on logs across the region. The first stage of these efforts involved correlating the Mannville formations to determine the continuity of flooding surfaces and the presence, trends, and variability of reservoir beds. This was/is primarily done with well log correlations. Cross-sections were auto created for individual or groups of Twps using subset well lists of up to 250 wells, the present limit of geoSCOUT. Each cross-section was evaluated several times as the certainty in picks evolved. The presence of channels was noted and some of the reservoir sandstones were mapped to varying degrees of detail.

### Isopach maps and reservoir trends – influence of multiple basins

The study region includes parts of the Pembina Highlands (PH), Edmonton Channel (EC), Wainwright Ridge (WR), and McMurray Basin (MB). Depositional variations of marginal marine and channel sandstones and overall stacking patterns indicate the foreland, McMurray, and Liard basins all exerted some influence. The Ostracod limestone marker is only distinguishable within the EC and some of the PH. It is reflective of inundation into the foreland basin (Cant and Abrahamson, 1997). Basin influences are mixed from the lower Glauconitic until the end of Rex deposition. A pronounced shift eastward in marginal marine facies is evident in the General Petroleum (GP) to Waseca formations (this study). Much of the study area is coastal plain during this time based on the thickness and extent of the numerous coal beds (Layer and Staff, 1949). The GP and Sparky formations grade from quartz rich to lithofeldspathic sandstone belts westward before disappearing into coal seam splits (Banerjee et al., 1996; Chalmers et al., 2013) east of Edmonton. Little work was done on the Waseca and equivalents other than noting channels. The region west of the WR was influenced by the foreland and Liard basins with shorefaces trending SSW-NNE or roughly W-E. The region east of the WR was primarily influenced by the McMurray basin.

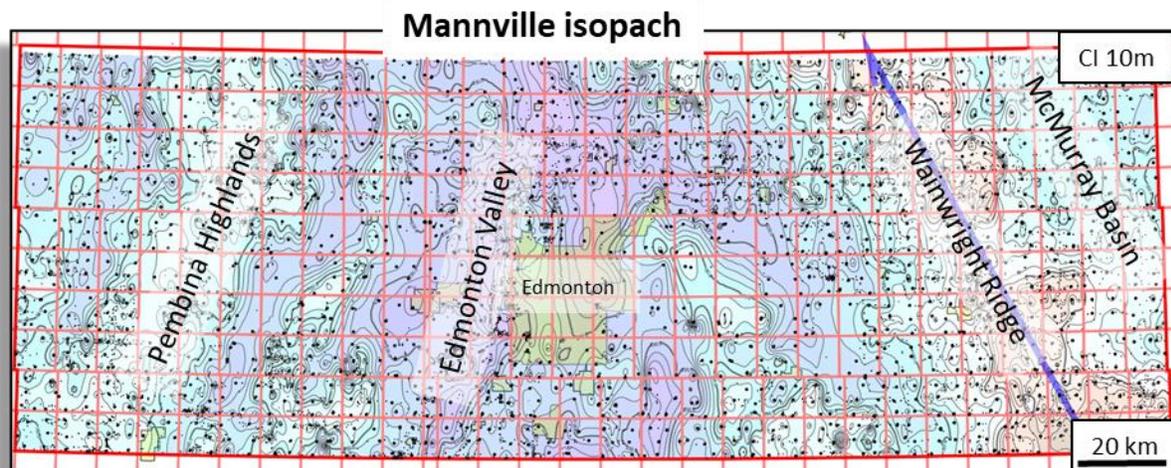
The Lloydminster stratigraphic boundary flooding surfaces can be carried over 300 km west and north. This should not be surprising and is consistent with existing interpretations that the Mannville Group was deposited in low slope, coastal plain to marginal marine settings (Jackson, 1984; Cant and Abrahamson, 1997). Unsurprisingly, the vertical and lateral variability in facies seen in the developed Lloydminster region remain consistent across the study area.

### Other research

Shaly sandstones are the dominant reservoir type across the study area. They present significant challenges to resource evaluation analysis. Solutions for this are discussed in other research by this author related to Capillary Forces Theory.

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