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# Seismic Stratigraphy of Liard Basin NEBC

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## Summary

The Liard Basin is a sub-basin of the Western Canada Sedimentary Basin, located in Northeast British Columbia, Yukon and Northwest Territories, which contains significant unconventional gas resources in Upper Devonian – Lower Mississippian (Tournasian) shales (Ferri et al., 2015; NEB, 2016). The basin contains up to 5 km of Phanerozoic strata overlying Proterozoic strata and the Laurentian craton, and is characterized by anomalously thick upper Paleozoic and mid-Cretaceous strata (Leckie et al., 1991; Wright et al., 1994). Located between the Bovie Structure to the east, the Mackenzie Mountains to the NW and the Rocky Mountains to the SW, it is a geologically unique basin (Leckie et al., 1991) with the structural orientations interpreted to reflect older originally extensional components (McMechan et al., 2012). The surface structure and stratigraphy of the Liard Basin area is well established (Taylor and Stott, 1968; McMechan, 2013, 2014).

The primary focus of this study was to use available-for-purchase 2D seismic data to regionally map the extent of the Liard Basin in Northeast British Columbia, south of the Yukon / Northwest Territories border (60$^{o}$ N latitude), in the area indicated by the red polygon in Figure 1. As there is very little seismically constrained information on the subsurface geology of this basin in the public domain, this study provides the first seismically controlled, high-level overview of the basin structure and stratigraphy. In particular, the seismic data indicate that the Upper Devonian Lower Besa River interval is comprised of a series of clinoforms, rather than a uniform, layer-cake model as originally interpreted by Morrow and Shinduke (2003). The work presented herein provides an updated understanding of this important shale-gas bearing interval. The result of the current seismic interpretation is an advanced stratigraphic cross-section for the area (Figure 2; Leslie-Panek et al., in press).

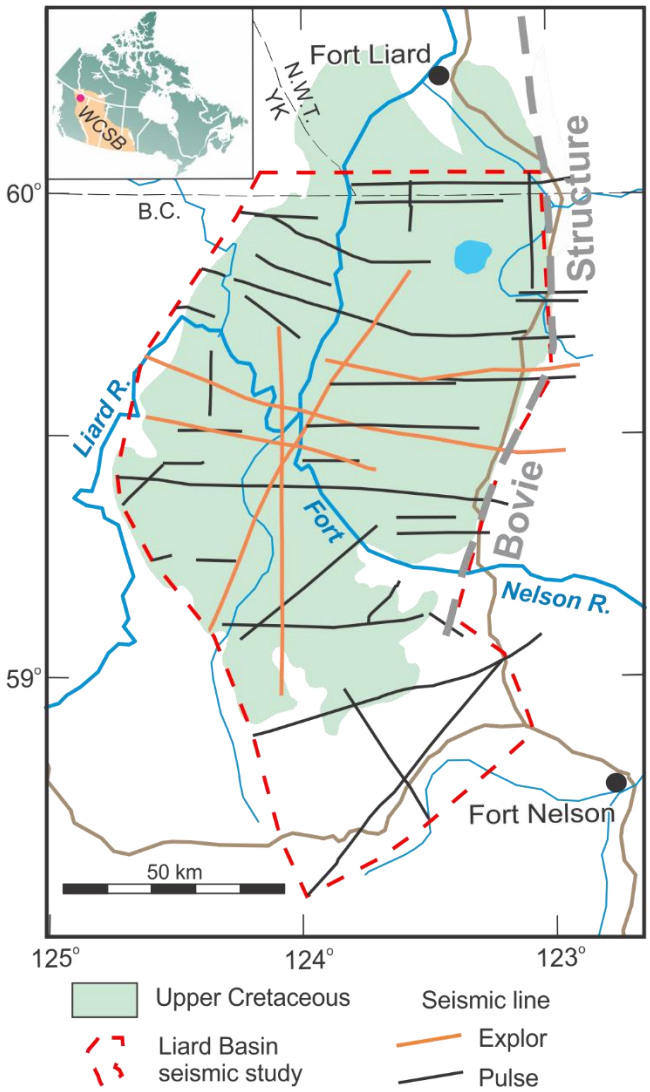


Figure 1. Location map for the Liard Basin seismic study (red outline) located in Northeast British Columbia Canada, at the northwestern end of the Western Canada Sedimentary Basin (WCSB). The green colour indicates the Upper Cretaceous sediments and the general extent of the Liard Basin. The seismic lines are coloured by owner; orange for Explor and black for Pulse Seismic.

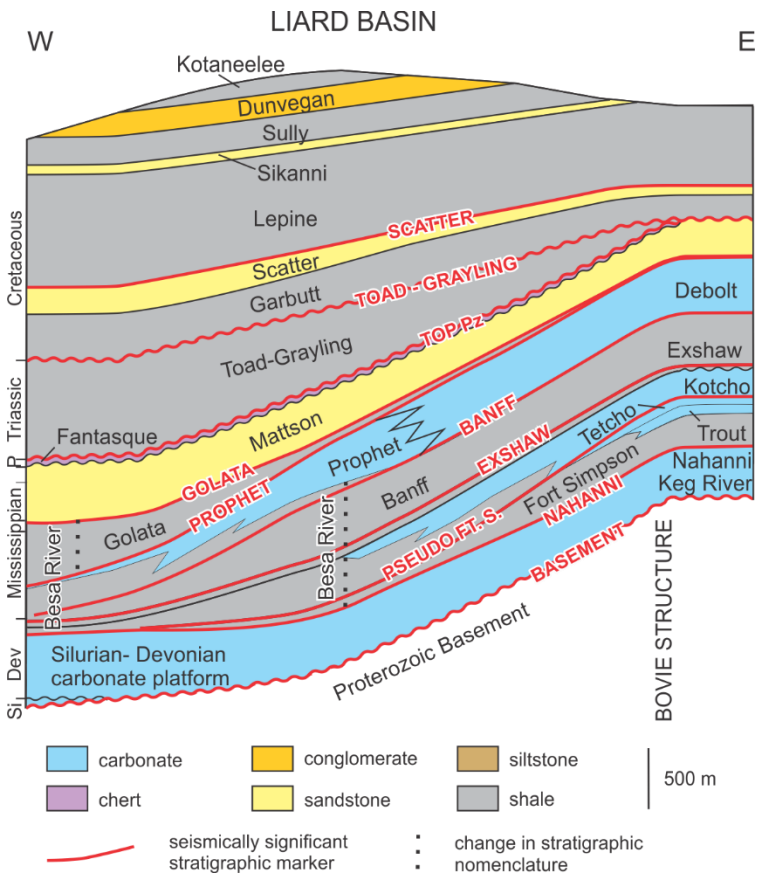


Figure 2. Updated west-east stratigraphic cross-section across the Liard Basin, based on the seismic interpretation presented in this study (Leslie-Panek et al., in press). The red lines and text indicate the ten seismically significant stratigraphic markers that were mapped in the seismic interpretation. This new information improves the stratigraphic interpretation of the Lower Besa River group interval from the original interpretation of Morrow and Shinduke (2003).

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