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As part of an independent review, CRC LEME at Geoscience Australia (Canberra) was tasked by the Murray Darling Basin Commission (MDBC) to determine the suitability of the NanoTEM system for delineating salt accession into the River Murray. If validated, this technique has the potential to provide a relatively cost-effective method for establishing the locations of major salt fluxes into the river system. The results, coupled with ground validation and hydrological modelling, will be used to assist the various stake holders in implementing management and engineering options to attenuate salinity of both within the River Murray and its adjacent flood plains and creeks.

This report summarises the results of borehole and laboratory studies undertaken to validate the in-stream NanoTEM signatures with respect to the salinity and lithology in the river beds. Recommendations are made on the suitability of utilising in-stream NanoTEM to delineate salt accession into River Murray sediments.

The following major conclusions are drawn from this study:

1. The measured Cl^- and TDS of river sediment pore fluids correlate positively, which suggest that the former can be used as a surrogate for salinity.
2. Within the top 4 m of the river sediments, the measured nanoTEM data primarily reflects the pore fluid salinity as there are only small variations in the porosity of the sediment (Monoman Formation). In comparison, the electrical conductivity at greater depth (4 – 10 m) is a function of both salinity and porosity as the more porous muddy sand of the Bookpurnong Formation is present.
3. Conductivity values at less than 1 m sediment depth do not correlate with the pore fluid salinity, the former being less conductive than the high salinity of the pore fluids would suggest. This problem can be alleviated with better modelling.

In summary, the in-stream nanoTEM system results appear to provide a reliable measure of river sediment salinity, and can therefore be used to delineate the spatial distribution of salt accession along the River Murray. These data should be used within the context of an understanding of the hydrogeology of the area, and knowledge of the river bed sediment composition and texture is desirable to assist with data interpretation.

Some recommendations for further development/refinement and calibration of the in-river nanoTEM system are also made.