

## **Salt water intrusion within a Carboniferous sandstone aquifer at Richibucto, New Brunswick, as revealed by hydrogeophysical and petrophysical investigations**

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Hydrogeophysical surveys have been carried out in the vicinity of Richibucto, New Brunswick, as part of a project to assess the risk that salt water intrusion along the Northumberland Strait could increase over time as a consequence of climate change and rising sea level. The surveys involved electrical resistivity imaging (ERI) measurements along several lines extending inland from the coast in conjunction with geophysical logging of two new and several pre-existing boreholes. The investigation indicates that the elevated salinities that have intermittently affected Richibucto's municipal wellfield are likely a consequence of salt water upconing beneath pumping wells. Evidence of a salt water wedge extending approximately 200 m inland was also observed beneath one ERI line acquired in a particularly low lying area adjacent to Richibucto Harbour. The results illustrate that ERI surveying can be an effective tool in identifying the extent and modes of salt water intrusion in Carboniferous sandstone aquifers that supply water to many coastal communities along the Northumberland Strait coast. Data interpretation is, however, complicated by the presence of relatively thin, discontinuous layers of electrically conductive shale.

With core recovered from boreholes, a relationship was established in the laboratory between the bulk conductivity of rock samples and their pore fluid conductivity. With this relationship, along with a relationship of chloride concentration to water conductivity acquired from water sampling, it was possible to estimate in-situ pore water salinity from borehole resistivity measurements.