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A combined hydrodynamic and mixing model approach to quantify small saline groundwater input into rivers

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Abstract The flow of groundwater into a stream is difficult to quantify. Several techniques exist, however they all have limitations with both practicality and accuracy being difficult to achieve. This study develops a method that is accurate, within the limits of input data, and practical for use in areas where groundwater inputs into rivers have a detectable level of some tracer (in this case salt). The study is undertaken on the Darling River in northwestern New South Wales, Australia. This study used a one-dimensional hydrodynamic model (MIKE 11) of the river with the coupled advection-dispersion module to model the transport of salinity concentrations. Using a simple mixing model, a time series of saline groundwater discharge was generated and input into the hydrodynamic model. The resulting saline–groundwater discharge hydrograph agrees with conceptual understanding of groundwater–surface water processes and reasonably approximates the actual measured EC values in the river.

Key words Darling River; dry-land; semi-arid; electro-conductivity; tracer; MIKE 11