

## Organic matter content and redox chemistry in upwelling and down-welling hyporheic zones of a groundwater fed stream

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This research project was initiated to improve understanding of organic matter content and redox chemistry in upwelling and down-welling hyporheic zones of a groundwater fed stream in northern New South Wales. This is part of a larger project investigating hydrogeochemical and ecological responses in the hyporheic zone of streams which aims to develop ecohydrological models that improve understanding of the water-related ecological impacts of groundwater drawdown from human activities such as agriculture and mining. Surface water samples were collected from a 1.5 km section of permanent pools and flowing reaches of Horsearm Creek in the Naomi Catchment (NSW). Samples were analysed for total organic carbon (TOC) and fluorescence, dissolved oxygen (DO), electrical conductivity (EC), pH, major cations, anions, and nutrients. In addition, selected upwelling and downwelling zones were further characterised through the sampling from the saturated sediment layer. Compared with upwelling hyporheic zones, samples collected from down-welling zones were characterised by higher TOC, ammonia and pH, but lower DO. Down-welling zones also had higher As, Fe, P and Mn and low nitrate indicating more reduced conditions compared to the upwelling zones. In the down-welling zones the organic matter was more terrestrially-derived and refractory. In upwelling zones DO was higher at depths 0.6 to 0.8 m compared with 0.3 to 0.4m below the streambed. Perennial hyporheic flow in Horsearm Creek is supported by localised inputs of regional groundwater which is oxygenated and low in TOC. Inputs of oxygenated groundwater influence the redox chemistry and organic matter processing in upwelling hyporheic zones, which in turn influences stream ecology including the habitat for hyporheic fauna. Thus activities causing drawdown in groundwater fed streams may impact redox chemistry, organic matter processing and stream ecology.