



## **Patterns of surface sub-surface water exchange in an upland catchment, and the importance of pool: riffle couplets.**

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This paper examines variations in water movement through an upland floodplain in mid-Wales, UK, and considers the importance of the river-bed permeability in determining the magnitude of water flows through an underlying alluvial aquifer and floodplain. Observations of changing river stage across pool - riffle couplets, combined with data from tensiometer nests in the adjacent floodplain highlight the sensitivity of the floodplain / riparian hydrology to changes in bed sedimentology and river stage. Vertical and horizontal hydraulic gradients between individual tensiometers are derived and interpreted in the context of the local floodplain sedimentology. The results demonstrate the episodic nature of water movement which is characterised by relatively rapid horizontal water fluxes during and after individual rain events, followed by residual seepage to the river and vertical water movement under a local soil moisture gradient. The significance of these results are discussed in elucidating the role of upland floodplains in buffering sub-surface drainage, and attenuating patterns of river flow under base-flow conditions. Selected data are used to generate scenarios of the varying direction and magnitude of river seepage, and a simple sensitivity analysis is completed to demonstrate how changes in river bed permeability might impact riparian ecosystems at various distances from the river.