

## **Hyporheic Exchange Flows and Biogeochemical Patterns near a Meandering Stream: East Fork of the Jemez River, Valles Caldera National Preserve, New Mexico**

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A study by the 2012 Hydrogeology Field Methods class of the University of Texas at Austin implemented multiple approaches to evaluate and characterize local hyporheic zone flow and biogeochemistry in a highly meandering reach of the of the East Fork of the Jemez River, a fourth order stream in northwestern New Mexico. Not only is this section of the Jemez River strongly meandering, but also has distinct riffle-pool morphology. The high stream sinuosity creates inter-meander hyporheic flow, but this is also largely influenced by regional groundwater gradients. In this study, dozens of piezometers were used to map the water table (and therefore flow) and for collection of water samples for a suite of chemical analyses. Additionally, we conducted a series of electrical resistivity surveys forming a network across the site, thermal monitoring of the streambed, and stream gauging.

Stream gauging at multiple locations indicate alternating gaining and losing sections of the stream suggesting hyporheic flow paths, which in turn are partly corroborated by water table maps and calculated fluxes across the sediment-water interface. Furthermore, we find variability in the distribution of biogeochemical constituents (oxidation-reduction potential, nitrate, ammonium, and phosphate) along interpreted flow paths, which is partly consistent with hyporheic exchange. The variability and patchiness of reducing and oxidizing conditions is interpreted as a result of groundwater-surface water interaction. Further analysis of other measured unstable chemical parameters result in observable trends strongly delineated along preferential flow paths consistent with the direction of groundwater flow and the assumed direction of inter-meander hyporheic flow.

**Keywords:** Hyporheic flow, surface water-groundwater interaction, biogeochemistry