

Where Do Inflows Occur Along Western Rivers? Using Water Quality Profiles and Geophysics to Identify Inputs to Rivers

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Project Abstract:

Groundwater inflows to rivers are controlled by both the hydraulic head gradients between the channel and surrounding aquifer and the spatial distribution of hydraulic conductivity in the subsurface. In this project we seek to determine how the spatial distribution of geologic units influences the locations of groundwater inflows to western rivers, namely the Columbia River in Eastern Washington, the Colorado River in Colorado, the Green River in Utah, and the Gunnison River in Colorado. To date we have collected high-frequency water quality data in the water column and along the beds of these rivers to identify locations of anomalies indicating the inflows of water that is different in character than channel water. In the case of the Columbia River, we have also collected transient electromagnetic (TEM) geophysical data along the river to map changes in subsurface resistivity (using the boat-pulled FloaTEM system), indicative of changes in geologic units. Preliminary assessment of summer 2021 data collection from the Columbia River shows promise that a set of inflows identified by the water quality survey align with shifts in resistivity identified by the FloaTEM data. Others that do not align are likely associated with surface controls (e.g., irrigation return flows). In the case of the Colorado, Green, and Gunnison Rivers, very few anomalies were identified, perhaps because of the low flow conditions in 2021. Samples collected for water stable isotope analysis from these rivers demonstrate a strong evaporation signal. Dissolved radon analyses suggest little ‘old water’ contributions to these rivers.

