FROM HEADWATERS TO THE CITY: CHANGES IN SOIL NITROGEN CYCLING AND STREAM-SOIL CONNECTIONS ALONG A RIPARIAN GRADIENT, RED BUTTE CREEK, UT.

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Urbanization increases reactive nitrogen (N) deposition to ecosystems, yet the effects of these inputs along wildland to urban riparian gradients are poorly understood. Relationships between soil nutrients and stream hydrodynamic transport in semiarid systems may play a role in the distribution of urban N deposition. The focus of this study was to examine concentrations and isotope signatures of soil N along a montane-to-urban stream gradient, and to identify links between riparian soil nutrients and stream hydrodynamics. We hypothesized that N concentrations and $\delta^{15}N$ values would gradually increase from the montane to urban zone due to anthropogenic inputs, and that stream hydrodynamics (gaining vs. loosing reaches) would exert second-order control on riparian soil N dynamics. Nine sites, varying in land cover (urban or montane) and hydrology (gaining or losing water), were sampled along Red Butte Creek, sourced in a protected area of the Wasatch Mountains and flowing into Salt Lake City, UT. Contrary to our hypothesis, montane sites showed a decreasing trend of soil inorganic nitrogen with proximity to the urban zone. However, urban sites did have higher inorganic N that increased as the creek flowed into the city. Additionally, the $\delta^{15}N$ of soil nitrate increased with proximity to the urban zone, suggesting the importance of new, heavier N sources as the stream enters the urban zone. Sites in gaining stream sections had higher % soil C and N, indicating more organic production and/or retention, as well as higher soil moisture. However, local hydrology did not affect inorganic N concentrations or N isotope signatures. Together, these data suggest that anthropogenic N sources increase in importance in riparian systems near the urban zone, but other factors (such as climate) may still regulate the more distant wildland areas. Moreover, local hydrodynamics appear to have a strong effect on organic versus inorganic components of the riparian soil nutrient system.