Geophysical Research Abstracts
Vol. 19, EGU2017-5094, 2017
EGU General Assembly 2017

Biotic Drivers of Spatial Heterogeneity and Implications for River Ecosystems

Ellen Wohl
Colorado State University, United States (ellen.wohl@colostate.edu)

Rivers throughout the northern hemisphere have been simplified and homogenized by the removal of beavers and instream wood, along with numerous forms of channel engineering and flow regulation. Loss of spatial heterogeneity in river corridors – channels and floodplains – affects downstream fluxes of water, sediment, organic matter, and nutrients, as well as stream metabolism, biomass, and biodiversity. Recent work in streams of the Colorado Rocky Mountains illustrates how the presence of beavers and instream wood can facilitate spatial heterogeneity by creating stable, persistent, multithread channel planform and high channel-floodplain and channel-hyporheic zone connectivity. This spatial heterogeneity facilitates retention of water in pools, floodplain wetlands, and hyporheic storage. Suspended sediment, particulate organic matter (POM), and solutes are also more likely to be retained in these stream segments than in more uniform stream segments with greater downstream conveyance. Retention of POM and solutes equates to greater volumes of organic carbon storage per unit valley length and greater rates of nitrogen uptake. Spatially heterogeneous stream segments also exhibit greater biomass and biodiversity of aquatic macroinvertebrates, salmonid fish, and riparian spiders than do more uniform stream segments. These significant differences in stream form and function are unlikely to be unique to this field area and can provide a conceptual model for understanding and restoring ecosystem functions in other rivers.