

An Interregional Comparison of Channel Structure and Transient Storage in Streams Draining Early and Late Successional Watersheds

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Abstract

We compared measures of channel structure and riparian canopy with estimates of transient storage in 32 streams draining old-growth and harvested watersheds in the Southern Appalachian Mountains of North Carolina ($n = 4$), the Ouachita Mountains of Arkansas ($n = 5$), the Cascade Mountains of Oregon ($n = 8$) and the redwood forests of northwestern California ($n = 15$). Channel cross-sections and riparian canopy were measured at 10 equally spaced intervals along each 50-m to 100-m study reach. Stream depth was measured at 1-m intervals along the study reaches, and stream substrate composition was visually estimated at 50 points within each reach. While there were distinct stream differences between the geographic regions, there were consistent trends among these regions when comparing measurements of channel structure and riparian canopy in streams draining old growth and harvested watersheds. No significant differences were found in stream width, depth, or streambed area, but streams draining harvested watersheds had more open riparian canopies and smaller median substrate sizes. Transient storage (A_s) was calculated as differences in area under the curves for predicted and actual Cl⁻ transport through the study reaches. Total reach volume was estimated as the sum of transient storage and surface water volume estimated from channel cross-sections. The percentage of reach volume attributable to transient storage was significantly smaller in streams draining harvested watersheds, and was negatively correlated with median particle size, and positively correlated with riparian canopy cover and stream depth.

Keywords: transient storage, physical habitat

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