

Light, Nutrients and Macroinvertebrates

How the legacies of early forest management in stream riparian zones affect light availability and food webs in headwater ecosystems today

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Light is a fundamental constraint on ecosystem processes in forested headwater streams. Historic forest management practices cleared riparian zones across much of the Pacific Northwest, and today, many regenerating riparian forests are dense second growth stands with uniform shade that cover the stream. In the western Cascades of Oregon, we found that streams with regenerating riparian forests had on-average less light exposure than comparable stream sections that run through late succession forests. Streams bordered by these younger dense regenerating forests also had lower algal biomass, and comparable or lower fish biomass to reference sites bordered by late-successional forests in most (but not all) cases. In light manipulation experiments (both increasing and decreasing light availability) along several forested headwater streams, we found that moderate changes in light availability were generally accompanied by changes in standing stocks of primary producers and fish. Our research suggests that the legacies of early forest management set the stage for current dense canopy second-growth forests along many headwater streams, and that the low light levels that keep these systems cool also have implications for primary productions, nutrient dynamics and biota in these ecosystems.