A comparison of the taxonomic and trait structure of macroinvertebrate communities between the riffles and pools of montane headwater streams

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Abstract

Macroinvertebrate community taxonomic and trait structure showed consistent differences between riffles and pools across 12 headwater streams in the Sierra Nevada (California) even as flows varied from wet to dry years and between seasons. Densities of Ephemeroptera, Plecoptera, Trichoptera, Elmidae, Orthocladiinae and Diamesinae midges, and mites were greater in riffles, whereas Tanypodinae, Chironominae, *Sialis*, and *Pisidium* were more abundant in pools. Pools had higher densities but estimated biomass was greater in riffles. Collector-gatherer and micropredator abundances were greater in pools whereas grazers, collector-filterers, and macropredators were more abundant in riffles. Stonefly shredders were most abundant in riffles but some caddis shredders were more abundant in pools. Trait state patterns were related to food resource and physical habitat differences between riffles and pools. Of the distinct pool–riffle differences we found among taxa, only about half conformed to expectations from the literature. Pool and riffle assemblages were most dissimilar at intermediate discharge and converged at low and high flows when one or the other habitat dominated. Bioassessment sampling will need to account for these flow-related differences. Benthic invertebrate communities in these mountain streams clearly differ between pools and riffles, but the relative extent of habitats and biological similarity shift with flow regime.

Keywords

Stream invertebrates Pools Riffles Sierra Nevada Bioassessment