



## Effects of labile carbon addition on a headwater stream food web

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**ABSTRACT:** We added dextrose for two 8-week periods (summer and autumn) to a highly heterotrophic headwater stream in North Carolina, U.S.A., to examine the responses of its benthic food web to increased labile carbon. We hypothesized that addition of labile carbon would elevate microbial abundance and activity, resulting in greater resource availability and higher macroinvertebrate production and that the effect of dextrose addition would be less marked during the autumn due to lower ambient stream temperatures and large seasonal inputs of leaf litter. Bacterial densities were significantly higher in the treatment reach during both additions. Thick microbial mats of sheathed bacteria and the aquatic hyphomycete *Lemmoniera pseudofloscula* developed on bedrock outcrops. Increased microbial growth led to higher respiration rates on leaf disks and a threefold increase in instantaneous growth rates of chironomid larvae. The abundance and biomass of invertebrate collector-gatherers and predators increased significantly on bedrock during the summer addition but not in the autumn; however, shredder biomass increased significantly in the autumn. On mixed substrates, shredder abundance and scraper biomass increased significantly during the autumn addition. During both additions, all functional feeding groups, including predators, assimilated isotopically distinct dextrose, despite high standing stocks of coarse particulate matter during the autumn addition. Consumers of epilithon and fine particles showed the greatest response. Assimilation of dextrose and increases in invertebrate abundance and biomass suggest that the added carbon stimulated biological activity even in a stream with abundant organic carbon.

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