MACROINVERTEBRATES IN URBAN STREAMS: NEGATIVE RELATIONSHIPS BETWEEN IMPERVIOUS SURFACE COVER AND MACROINVERTEBRATE BIOMASS INDICATE REDUCED BIOTIC FUNCTION

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Abstract. Landscape urbanization is associated with increased impervious surface cover (ISC) and other sources of stressors, which contribute to reduced biological integrity and altered ecosystem functions in streams. The effects of urbanization on stream physical, biological, and chemical characteristics are collectively known as the "Urban Stream Syndrome". However, little is currently known about how the biomass of macroinvertebrates, which link food resources to predators, is affected by urbanization. Macroinvertebrates are a common assessment of the biological integrity of a stream, process allochthonous and autochthonous materials and link basal resources to higher trophic levels. The biomass of invertebrates affects several ecosystem functions of streams, including nutrient cycling, decomposition rates, algal productivity and fish production. To assess how urbanization affects streams we compared impervious surface cover and macroinvertebrate biomass from several low order streams in the upper Oconee River basin, in or near Athens, Georgia, USA. Macroinvertebrate data were collected from 12 streams in 2008 and the watersheds were classified as urban, suburban, mixed-use or forested. To determine biomass, macroinvertebrates were identified to genus, measured and fit to population-specific length-body mass regressions. Total biomass of macroinvertebrates was then calculated for each stream. Watershed % ISC and land-use were estimated using aerial photography and land use maps. Model results indicate that for every 1% increase in % ISC, macroinvertebrate biomass decline by 7%. Macroinvertebrates were collected from additional urban streams in Athens-Clarke County and will be used to test whether data collected from additional streams in 2011 and 2012 fit predictions based on the 2008 model. These additional streams are estimated to range in impervious surface cover from < 20% to > 40% ISC. These data will provide a test of the predictive power of our model, which, by using data on biomass, links aspects of biological integrity and ecosystem function in urban streams.