

Both pollutants and altered hydrology negatively affect stream life in the Upper Oconee Watershed

Amy Rosemond¹, Jessica Sterling^{1,2}, Phillip Bumpers^{1,3}, Seth Wenger^{1,3}

¹Odum School of Ecology, University of Georgia, Athens, GA

²Chattahoochee Riverkeeper, Atlanta, GA

³River Basin Center, University of Georgia, Athens, GA

Email addresses: rosemond@uga.edu, jessica.sterling@gmail.com, bumpersp@uga.edu, sethwenger@fastmail.fm

Watershed land use, including reduction in forest cover and increased urbanization, affects many physical and chemical stressors in streams that in turn affect stream health and the capacity of streams to provide ecosystem services. Such services include maintenance of species richness and providing ecosystem-level nutrient uptake capacity. A key challenge in improving stream health is to identify and disentangle the many co-occurring stressors in impaired streams so that appropriate solutions can be sought. Two key types of stressors associated with land use change are pollutants and altered hydrology. Our work has been aimed at identifying the relative strength of each of these stressor groups in contributing to poor health in Athens-Clarke County (ACC), GA streams. Our most convincing evidence that both stressor groups are important came from a two year study of 12 sites in ACC streams, which was conducted in collaboration with the Athens Stormwater Management Program and funded by GA EPD. In this study, we quantified the biomass of stream macroinvertebrates, identified macroinvertebrates (typically to genus) and based on what is known about their sensitivity to pollution, categorized them as 'sensitive' or 'tolerant' to pollution. We found dramatic declines in biomass of all macroinvertebrates with increased watershed impervious surface cover, including tolerant taxa, giving us strong evidence of an effect of altered hydrology. However, watershed urbanization had even stronger effects on 1) the biomass of sensitive taxa and 2) overall species richness, indicating that pollutants were also an important negative influence on the amount and composition of stream life. We have found additional evidence for negative pollutant effects (specifically increased nitrogen and other ions associated with chemical run-off) in this and other studies. Fortunately, improved management of stormwater and control of watershed inputs can reduce both types of stressors in ACC streams, which would lead to improved water quality and stream health.