POTENTIAL TROUT POPULATION RESPONSE TO REDUCED RIPARIAN BUFFER WIDTHS IN NORTH GEORGIA

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REFERENCE: *Proceedings of the 2005 Georgia Water Resources Conference*, held April 25-27, 2005, at the University of Georgia. Kathryn J. Hatcher, editor, Institute of Ecology, The University of Georgia, Athens Georgia.

Abstract. The Georgia State Legislature reduced the width of mandatory-forested riparian buffers along the State's trout streams from 100 ft to 50 ft in 2000. This research evaluated the potential response of trout populations to this reduction in buffer width by: 1) quantifying the relationships between riparian forest conditions, instream habitat, and young-of-the-year rainbow and brown trout (O*ncorhyncus mykiss* and *Salmo trutta*); 2) applying these quantified relationships at the stream segment and stream network scales to determine the efficacy of 50-ft buffers for protecting instream habitat; 3) examining existing forest conditions along the stream network; and 4) assessing the existing thermal alteration of trout streams. Stream temperatures were consistently and negatively related to percent riparian forest cover and elevation; in this study landscape, riparian forest cover overwhelms the influence of basin forest cover in determining stream temperature. Fine sediment in riffles was negatively related to percent riparian forest cover and maximum reach velocity. Biomass of young-of-the-year trout (< 150 mm in total length) was negatively related to stream temperature, riffle embeddedness, and maximum reach depth. When these relationships were applied at the stream segment scale, we found that reducing forested buffers from 100 ft to 50 ft would increase stream temperatures by 1.6 to 2.3°C, depending on summer weather conditions, and increase riffle embeddedness scores by 4.2 points across a range of maximum stream velocity. As a consequence of these seemingly small increases in stream temperature and riffle embeddedness, the biomass of young-of-the-year trout would be reduced by 81% to 88%, depending on elevation and summer weather conditions. Within the trout stream network, 63% of stream segments are likely to support reproducing trout populations with the presence of a 100-ft buffer; this percentage drops to 9% with a 50-ft buffer. These quantitative analyses at both the stream segment and trout stream network scales imply that a 50-ft buffer is not effective at maintaining the instream conditions necessary for self-sustaining trout populations. Due to existing disturbance of riparian forests, substantial alteration of the thermal conditions of trout streams has occurred along the trout stream network in North Georgia. Further deforestation of riparian areas will increase the warming of trout streams. The ability of Georgia's mountain streams to maintain self-sustaining trout populations is reduced because of the warmer stream temperatures and increased fine sediment delivery associated with a reduction in riparian buffer width to 50 ft.