Effects of Physicochemical parameters on macroinvetebrate community structure under two logging regimes

M.W. Griswold1,2, R.T. Winn3,4, and T.L. Crisman2,5
1Graduate Student, 3Partnerships Coordinator, 5Professor and Director
2Department of Environmental Engineering Sciences, University of Florida and Howard T. Odum Center for Wetlands, Gainesville, FL, USA
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Human disturbances of aquatic ecosystems result in far reaching impacts on both aquatic and terrestrial biota. This is especially true for headwater streams that depend on interactions with the terrestrial environment. In order to minimize impacts, Streamside Magagement Zones (SMZs) are established along stream courses to protect riparian habitat and associated stream ecosystems. Changes in water chemistry, flow, and organic matter inputs ultimately alter biotic structure and function. Benthic macroinvertebrates are valuable bioindicators of water quality in streams that respond to changes in habitat and water quality. Macroinvertebrate community structure should respond predictably to gradients of deforestation along streams. In four streams within the Dry Creek watershed in southwest Georgia, the impacts of two logging regimes on macroinvertebrate communities and their resource base were examined. In one reach for each treatment stream, the SMZ was left intact, while in a second, 50% of the basal area was removed from the SMZ (selective harvest). Benthic macroinvertebrates, water chemistry, flow, and organic matter input were sampled pre and post harvest (four years total) from the streams. Regression and multivariate analyses were used to examine relationships between water quality and macroinvertebrate community structure before and after harvest. Flow, temperature, and turbidity increased significantly due to harvest, while organic matter input decreased most significantly. As a result, most taxa increased with increasing flow, while none responded to changes in leaf litter input. The increase in scrapers with turbidity was potentially confounded by positive effects from increased flow. Clams and snails increased at the higher temperatures due to harvest, likely resulting from increased resource availability at higher temperatures and lower canopy cover. Overall harvest had both positive and negative effects on macroinvertebrate taxa; however, the intact SMZ created less disturbance than the selective harvest. Limited response to leaf litter inputs may stem from the dynamic nature of sandy bottomed streams.