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RELATIONSHIPS BETWEEN LAND COVER AND WATER QUALITY PARAMETERS IN STREAMS OF NORTHWESTERN SOUTH CAROLINA

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In the southeastern United States, forested and agricultural lands are being converted rapidly to urban land with greater impervious surface cover (ISC). Previous studies have suggested that concentrations of solutes and fecal-indicator bacteria in streams may increase with urbanization. We conducted two studies during June-August 2006 to examine the relationships between land cover and water quality parameters in the upper piedmont and mountains of South Carolina. In the first study, we compared physical, chemical, and bacteriological parameters in 19 stream reaches of the Enoree and Saluda River basins. Under baseflow conditions we sampled streams in four land cover categories: mostly forested (4 streams), rural (mixed forest and pasture; 5 streams), residential urban (6 streams), and commercial/industrial urban (4 streams). Solute concentrations differed significantly among land covers, with concentrations generally highest in urban land cover (ULC) and lowest in forested land cover. However, contrary to our initial hypothesis, mean concentrations of bacteria did not differ significantly among the four land covers, although for total coliforms the lowest concentrations did tend to occur in forest and rural streams. In the second study, we correlated solute concentrations with percent ULC (commercial plus residential cover) and percent ISC for 11 sub-watersheds nested in 5 watersheds within the Enoree River basin. Under baseflow conditions, concentrations of nitrate, sulfate, and chloride were significantly and positively correlated with percent ULC (range 0-83 %) and percent ISC (range 3-45 %). Correlations with percent ISC were stronger than correlations with percent ULC. However, solute concentrations during stormflow did not correlate significantly with either percent ULC or percent ISC (data from 6 sites only). Apparently, during stormflow, the rain chemistry signature temporarily overwhelms the land cover signature in stream chemistry. Overall, our results were consistent with expected relationships between land cover and measures of water quality. However, the relationships between land cover and water chemistry were much stronger than between land cover and bacterial abundance. Also, percent ISC was a better predictor of solute concentrations than was percent ULC.