Linkages between Land Cover and the Environmental Conditions in Tidal Creeks (54)

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Meandering shallow tidal creeks are a dominant feature of Southeastern estuaries and provide nursery grounds for many fish and crustaceans. The shores of these creeks are also preferred sites for human development. The Tidal Creek Project was initiated in 1994 to define the linkages between surrounding watershed land use and the ecological condition of headwater tidal creeks in South Carolina. One of the primary goals of this research was to answer questions relevant to the public as well as regulatory agencies. Between 1994 and 2004, over forty creeks have been comprehensively sampled in South Carolina for demographics of the watershed as well as the physical, chemical, and biological quality of the creek. The amount of impervious cover in the watershed was associated with physical-chemical and biological conditions in the creek. When the watershed exceeded approximately 10-20% impervious cover, physical-chemical conditions in creeks were adversely altered. When the amount of impervious cover exceeded approximately 20-30%, biological resources were degraded. This research has shown that these headwater creeks have the potential to serve as sentinel habitats for assessing the impact of watershed development on ecosystem and public health. In 2005 and 2006 as part of the Oceans and Human Health Initiative at the Hollings Marine Laboratory, tidal creeks in the southeast (SC, GA, NC) were sampled with two objectives in mind: 1) evaluating a potential tidal creek classification system (i.e., the entire length of a tidal creek is not equal) and 2) examining the effect of land use changes on creek ecological condition throughout the southeast. Creeks from urban, suburban, and forested watersheds were sampled from the upper intertidal zone down to the subtidal zone (i.e., longitudinal position) for a similar suite of indicators mentioned above plus new pathogen indicators. In most cases, concentrations increased with increasing urbanization and decreased along the gradient from the headwaters to the mouth of the creek. These results provide support for a tidal creek classification system. Furthermore, these results support the headwater conceptual model of linkages among watershed-scale stressors, physical and chemical exposures, and biological and public health responses of tidal creeks to human development throughout the southeast.