Public Abstract

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For stream management to be most effective, ecological studies and perspectives should be integrated across a broad range of spatial scales that include influences of the terrestrial environment.  Few landscape studies have addressed the effects of anthropogenic land-use attributes within the framework of natural-occurring environmental features.  This study investigated the effects natural-occurring and anthropogenic landscape and inchannel factors have on the distribution and abundance of riverine smallmouth bass at multiple spatial scales.  The range of smallmouth bass was identified using a few natural-occurring landscape variables: coarse-textured soils within the watershed, watershed relief, and soil permeability.  Relative abundance could be predicted for every stream segment within this range using natural-occurring landscape and stream segment variables: soil permeability, channel gradient, stream size, spring-flow volume, and local slope.  Densities of smallmouth bass in stream segments depended on interactions between land use (forest, pasture, and urban) and particularly important natural-occurring features (coarse-textured soils and soil permeability).  Higher relative abundances based on natural features related to higher densities in pasture watersheds whereas urban watersheds generally had the lowest densities of fish regardless of natural conditions.  Young-of-year fish densities were higher in stream segments with high spring flows compared to low spring flows but not for other age classes.  All age classes used pools more than other inchannel habitats.  Microhabitat temperature selection differed among age classes with young of year selecting warmer microhabitats than adults.  Velocity was the most significant variable identifying microhabitats used by young of year whereas depth was important in small streams and stream segments classified by pasture land use.  This research shows how natural watershed conditions influence the magnitude of the effects of land use and relate to use of fine scale habitat elements. These results may be used to prioritize conservation and management efforts across the landscape.  Specifically, results may be used to identify areas that will likely benefit most from watershed restoration in altered landscapes.