Stream Temperature in a Watershed Context: Implications for Cold and Warmwater Fisheries Management

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Abstract: We examined relationships between landscape physiographic variables and summer stream temperatures in the Cheat River watershed, West Virginia, to develop statistical models for characterizing thermal patterns at the stream segment and watershed scales and to examine the relationship between modeled thermal patterns and the distribution of smallmouth bass (*Micropterus dolomieui*) and brook trout (*Salvelinus fontinalis*) at these scales. Our study produced three important results. First, we developed a model to accurately predict weekly mean July temperature (WMJT) in this system using easily obtainable landscape variable ($R^2 = 0.81$) and then validated this model ($R^2 = 0.77$) in a neighboring watershed. Second, after using this model to predict WMJT in unsampled stream segments, we characterized the geography of coldwater, coolwater, and warmwater segments among as highly variable at both the segment and watershed scales. Third, we found that both brook trout and smallmouth bass distributions in the Cheat River watershed were strongly related to modeled WMJT and that the high degree of sympatry among these two species in the watershed may be related to the thermal geography of the basin. In summary, we believe these results provide further evidence that stream fish communities are influenced simultaneously by local and regional processes and that managing thermal regimes at the watershed scale will afford the greatest protection to these potentially vital processes.

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