POSTER #15

Assessing Reservoir Operations and the Associated Changes in Water Quality on the Persistence of Stream Fishes

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The persistence of riverine fish populations likely to be affected by human-induced changes relates directly to environmental conditions that are controlled by the interaction between ground and surface waters. We have a limited understanding of the temperature tolerances of stream fishes and how groundwater-surface water interactions via hyporheic flow mediate stream temperatures at multiple spatial scales. This is particularly significant to populations that reside below dams and are subject to both flow and temperature modifications, coupled with a significant loss of stream habitat. The long-term objectives of this research are: 1) Determine how reservoir releases influence the downstream temperature and dissolved oxygen regime, with an emphasis on the summer, baseflow period, 2) Assess interactions between changes in baseflow levels in the Kiamichi River and hyporheic exchange, which correspondingly influences temperature at the reach scale, 3) Determine changes in fish assemblage use of thermal patches at the reach scale, and 4) Examine acute thermal tolerances and delayed mortality associated with duration of exposure to elevated water temperatures by stream fishes. Preliminary temperature model calibrations were performed using both the regression model proposed by Spooner et al. (2005) and the Water Quality Analysis Simulation Program (WASP). Results were in good agreement with observation data, with deviations supporting incorporation of groundwater in the model to more accurately model stream temperatures. Dissolved oxygen data are currently being collected to support model calibration for DO predictions. Initial comparisons of critical thermal maximums of fishes occupying adjacent basins at similar latitudes suggest these values can be used as a basis for comparisons with delayed mortality studies that will begin this year.

KEY WORDS Hyporheic, Temperature Regime, Critical Thermal Maximum, Dissolved Oxygen, Reservoir Releases, Delayed Mortality.