Brook Trout Response to Canopy and Large Woody Debris Manipulations in Appalachian Streams

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Abstract: Brook trout (*Salvelinus fontinalis*) are the only salmonid native to the Appalachians and are thought to have experienced substantial declines over the past century. They continue to be an important recreational resource and are an excellent biotic synthesizer of aquatic integrity for forested watersheds. Management of forested watersheds to maintain and even enhance water quality and this specific species are critical to sustainable forest management in this region. We are conducting a set of manipulative experiments in streamside management zones within forested watersheds in order to determine: 1) the effects of increased solar radiation on stream productivity, especially brook trout, and 2) water quality, and the 3) effects of increased large woody debris (LWD) inputs on those same factors and on 4) habitat structure (e.g., pools). Subwatersheds of the Middle Fork River, West Virginia, were selected for the treatment sites. Ongoing studies of brook trout in these watersheds have developed excellent baselines for trout, invertebrates, habitat, and water quality since 2000. We selected eight streams to be used in this study from among those watersheds. The study was implemented in a complete randomized block design that incorporated four replicates of three treatments: control, 50% canopy removal, and >90% canopy removal. Canopy removals were affected by commercial timber harvest within 100ft Streamside Management Zones (SMZ) associated with operational timber harvest on properties of MeadWestvaco located in Randolph County, West Virginia. The downstream half of each treatment area was further treated by felling trees and leaving tops in the stream channel as a means of increasing LWD loading in a cost-effective and operationally practical manner. Our study provides the first quantification of the effect of intensive SMZ manipulation upon brook trout and their habitat in the Appalachians of the eastern United States This study provides quantitative evidence of the effect of extensive manipulations of SMZ canopy and LWD additions upon brook trout populations and ultimately suggests what role habitat enhancement and increased solar radiation play in enhancing and protecting native brook trout.

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