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Streamside Management Zone Effectiveness for Water Temperature Control in Montana

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Abstract

An important function of Streamside Management Zones (SMZs) retained during harvest operations is shading for temperature control. SMZ width and allowable timber removal within them varies from state-to-state. In Montana, an SMZs law requires that timber be retained within 15 m of streams, with a steep-slope ground-based equipment exclusion area that can extend up to 30 m. The amount of timber removal in the SMZ is a function of the pre-harvest tree size and stocking, with removals of 0-30% typical. The effectiveness of SMZs for stream temperature control in Montana has not been previously evaluated. Between 1999 and 2004, half-hourly stream temperature data were collected at 30 operational harvest sites bordering perennial fish-bearing streams in western Montana. Temperature data were collected at the upper and lower boundary of the harvest, for a minimum of one summer before and after harvest. A variety of covariate data were collected to describe the harvest, and fish data were also collected. The response measures were analyzed using a linear mixed effects model. The mean model structure was based on the experimental design and included terms for year, position, harvest-state, and a position x harvest-state interaction, with the latter term used to estimate the impact of harvest on stream temperature. Results found no significant harvest effect for the six temperature metrics evaluated, with estimates between -0.1 and 0.04 degrees C. Fish population and biomass also had no significant harvest effect. This suggests that operational SMZs being retained in Montana are protective of water temperature.