

Effects of Snow-making, grading, and timber harvest on stream channel morphology in the White River National Forest, Colorado

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Abstract. The White River National Forest Service is responsible for managing and protecting the ecological integrity of many streams in some of the major ski resorts in Colorado. The combined effects of timber harvesting, snow-making, grading and road construction can increase streamflows but the effects of these four activities on stream channel stability are not well documented. Increased flow can result in bank failure, increased amounts of wood, pool scour and bed coarsening. Specific stream channel response to increased flows associated with ski resort activities partly depend on the type of vegetation growing along stream banks and the amount of human development in the basin.

We hypothesize that a threshold of development must be attained before the stream channel is significantly impacted. To test this hypothesis, we surveyed channel condition, channel dimensions, and vegetation along 49 stream reaches (200 - 300 m in length). Twenty-four of these streams are within ski areas (project streams), either adjacent to or downstream from ski slopes. Twenty-five “reference” streams have very little to no development in their basins. These streams are used to define reference conditions bank stability, bank undercutting, bank height, bank angle, percent of wood, pool depth, sediment size, and vegetation structure. A Principle Component Analysis will be utilized to ordinate and allow comparison of project and reference streams. The effects of vegetation on bank height, angle and stability will also be determined. These data will help in the revision of a forest management plan to provide guidelines for planning and development of ski areas on public lands.

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