Pile Burning Effects on Soil Water Repellency, Infiltration, and Downslope Surface and Sub-Surface Water Chemistry

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Due to increased demands to reduce fuel loads, thinning followed by pile burning has become a popular treatment in the Tahoe Basin. However, concern has been voiced on burning within/or near stream environment zones (SEZ's). Our objective was to look at the effects of pile burning on soil water repellency, infiltration, and downslope surface and sub- surface water chemistry. Seven sites with a total of 27 burn piles of varying sizes were selected. Sites occurred on both granitic and volcanic parent materials, as well as glacial outwash. We suspected changes in soil physical and chemical properties as soil temperatures >450°C were maintained for ~12 hrs at the 5 cm depth for large bole material piles. Burning resulted in only small increases in soil bulk density for all pile sizes. Within the pile perimeter, soil water repellency properties tended to disappear at soil moisture contents of 8-9%. Persistence of 'moderate to high' soil water repellency was greatest under piles containing large bole material, and increased at all depths as soil moisture content decreased through the summer dry season. Accordingly, infiltration rates were significantly decreased on the large bole piles. For all pile sizes, surface overland flow of nitrate, phosphate, and sulfate decreased significantly from the pile edge to 7 m downslope. There was also little change in subsurface flow of these nutrients away from the pile. Our results suggest that plant and litter cover act as a filtering agent in reducing the downslope concentration of burn-pile nutrients.