

Effects of Landscape Scale Prescribed Fire on Hydrology and Stream Chemistry

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Abstract

Abstract. The East Fork of the Kaweah River in Sequoia National Park, California was the site of a landscape scale prescribed fire project, in which sections of a 20,000 ha watershed were burned from 1995-2002. To investigate the potential effects of prescribed fire in sequoia forests at different scales, water quality parameters were measured in the large (20,000 ha) watershed and in two small (100 ha) watersheds nested in the larger watershed. One 100 ha watershed (Deadwood Creek) was treated with a single prescribed fire that burned 60% of the watershed area; the other 100 ha watershed area (Trauger's Creek) was only slightly burned.

In Deadwood Creek, increases in stream solute concentrations were detected. Pre- and post-fire means were significantly different for nine parameters (specific conductance, pH, ANC, chloride, sulfate, calcium, potassium, nitrate, and phosphate). Specific conductance and ANC values increased after the burn. Chloride and sulfate also increased in the first months following the fire. Base cation concentrations were greatest in the first month after the burn. Nitrate concentrations increased, while ammonium concentrations remained below the detection level. Phosphate concentrations peaked one year after the burn. Although differences were detected, due to high phosphate concentration variability and similar patterns in Trauger's and Deadwood it is uncertain how much of the increase was attributed to the fire.

The 20,000 ha watershed was treated with eight prescribed fires staggered over 7 years that burned 11% of the watershed area. Changes in hydrology and stream chemistry were not detected at the landscape scale. This suggests that treatments must affect more than 11% of the watershed area, or occur more frequently than over 7 years, before changes in water yield and/or stream chemistry are detectable. Although there were inter-annual differences in solute concentrations, annual means remained relatively unchanged throughout the study period.