



Runoff and sediment delivery from small, burned headwater catchments

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High intensity rainfall on burned areas can increase hillslope runoff and erosion and generate peak flows and sediment yields that greatly exceed rates from unburned forests. The lack of information on these effects challenges post-fire planning efforts. We measured runoff and sediment delivery rates from four small catchments (0.1–0.6 ha) after the 2013 Rim Fire in the central Sierra Nevada in California and from six small catchments (0.2–0.7 ha) after the 2015 Valley Fire in the northern Coast Range in California. We also measured site characteristics including surface cover and precipitation. At both sites, peak flows and sediment yields were consistently generated by high intensity rain storms with low recurrence intervals. The rainfall intensities that generated overland flow were comparable between the two mountain ranges, suggesting the different soils and geology between the sites had little impact on post-fire responses. Peak flow rates increased with increasing burn severity for similar rainfall conditions, but during particularly wet seasons, runoff was sometimes generated by exfiltration within the small catchments and was therefore less dependent on burn severity. Surface cover of organic litter, wood, and vegetation decreased with increasing burn severity and secondarily controlled sediment delivery, and this led to the greater sediment yields in the more severely burned catchments. Time since burning was a third control on sediment delivery, as we observed decreasing sediment yields in the high burn severity sites at both study locations over time. These results will be useful for the protection of post-fire water resources and infrastructure as well as for verification of hydrogeomorphic models.