

Effects of Post-Wildfire Erosion on Channel Environments, Boise River, Idaho

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Abstract

What is the geological or ecological context that earth scientists, biologists, and resource managers use to understand large-scale watershed disturbances, such as fires, mass wasting, and floods? We address this question using a field study of post-fire channel changes in the Boise River basin in central Idaho based on surveys of over 27 km of channels. Intense rill and gully erosion from the Rabbit Creek fire (1995) greatly increased sediment supply to numerous third- through sixth-order valley floors. We concentrated our field study where recently aggraded and enlarged alluvial fans impinged on channels in drainage areas of 100 - 350 km². Alluvial fans that had enlarged because of post-fire sedimentation triggered a number of morphological changes in channels and valley floors. Alluvial fans created nick points in receiving channels that caused an increase in channel gradient immediately downstream of fans and a decrease in channel gradients upstream of fans for distances up to 4 km. Wide floodplains, side channels, and the beginning of terrace construction were associated with increased sediment storage in proximity to aggraded fans. Fan-related changes in channel gradients also affected the spatial distribution of channel substrates. Studies across western North America indicate that periodic, large influxes of sediment to channels are a fundamental part of stream ecosystems. In addition, new perspectives in riverine ecology focus on the patchy distribution of aquatic habitats. Our study integrates those two perspectives by illustrating how fire-related sediment production, coupled with irregularly-spaced tributary junctions, contributed to the formation of certain types of riverine habitats.

Keywords: aquatic habitat, fire, landslide, erosion