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Title:

Measuring the response of Santa Cruz Mountains streams to the Summit Fire of 2008

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Abstract-We have been measuring bed conditions and sediment transport following the Summit fire, which burned 4270 acres in the Santa Cruz Mountains during May 22, 2009 and the days following. The fire affected the headwaters of Corralitos Creek (1992 acres), and Browns Creek (847 ac)—channel systems particularly important to the Pajaro River steelhead run. The fire also burned 1130 acres in the upstream-most 50-square-mile Soquel watershed, considered a critical element in southern steelhead recovery and one of the two southernmost coho streams in coastal California. Seasonal rainfall through March 1, 2009 has been 14.62 inches at CIMIS Station #209, Watsonville West II, the benchmark station. Runoff has been 3306 acre feet, about 29% of the long-term mean, corresponding to roughly 72% exceedance for flows on Corralitos Creek, which has been gaged since 1958. The resultant peak flows during WY2009 have been limited to 800 cfs, a 1.71-year event. Thus far, we have observed only limited delivery of sediment from the hillsides.

Post-fire sedimentation is only one of several major episodic events recurrently affecting steelhead in these watersheds. We discuss evidence for the types of episodes inducing sedimentation in the various parts of this watershed. During the major January 5, 1982 storm, Corralitos Creek responded with a 10-fold increase in suspended-sediment transport, with sedimentation of pools in the upper watershed followed by a sequential decrease over the next season and a half in bed elevation, embeddedness, and percent bed area covered by sand as well as a concurrent increase in grain sizes on the bed surface. A similar response following the fire might lead to loss of rearing habitat throughout the watershed, passage obstruaction, as well as aggradation downstream reducing flood-conveyance capacity and threatening public safety in Watsonville. In addition to low rainfall and runoff during 2009, differences in channel response is thought to be due to the relatively small percentage of the basin burned, storage in the buffer zone between the downslope burn periphery and channels, the thin soils of the burn area which limit the volume of available sediment, and the extent of vegetative regrowth that has occurred during a mild summer and relatively cool autumn following the fire. Monitoring will continue during WY2010.

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