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Stormwater contaminant loading following southern California wildfires

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ABSTRACT

Contaminant loading associated with stormwater runoff from recently burned areas is poorly understood, despite the fact that it has the potential to affect downstream water quality. The goal of the present study is to assess regional patterns of runoff and contaminant loading from wildfires in urban fringe areas of southern California. Postfire stormwater runoff was sampled from five wildfires that each burned between 115 and 658 km^2 of natural open space between 2003 and 2009. Between two and five storm events were sampled per site over the first one to two years following the fires for basic constituents, metals, nutrients, total suspended solids, and polycyclic aromatic hydrocarbons (PAHs). Results were compared to data from 16 unburned natural areas and six developed sites. Mean copper, lead, and zinc flux (kg/km^2) were between 112- and 736-fold higher from burned catchments and total phosphorus was up to 921-fold higher compared to unburned natural areas. Polycyclic aromatic hydrocarbon flux was four times greater from burned areas than from adjacent urban areas. Ash fallout on nearby unburned watersheds also resulted in a threefold increase in metals and PAHs. Attenuation of elevated concentration and flux values appears to be driven mainly by rainfall magnitude. Contaminant loading from burned landscapes has the potential to be a substantial contribution to the total annual load to downstream areas in the first several years following fires.