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WILDFIRE ASH ALTERS FRESHWATER CRUSTACEAN BEHAVIOR: DISENTANGLING THE CONTRIBUTIONS OF SUSPENDED MACROPARTICLES AND ASH-INDUCED PH SHIFTS

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Climate change and anthropogenic ignitions are intensifying wildfire frequency worldwide, elevating the risk of freshwater contamination by ash. In water, dissolved ash releases ions and other toxic constituents that alter physicochemical conditions, while suspended ash particles may impose mechanical stress, disrupt behavior, and increase exposure through ingestion. However, the relative contributions of these distinct ash exposure pathways to ecological toxicity remain poorly understood. Here, we investigated whether wildfire ash alters crustacean behavior and whether suspended macroparticles and ash-induced pH shifts differentially shape these responses. The freshwater crab *Aegla jarai* and the cladoceran *Daphnia magna* were exposed to aqueous ash extracts without suspended macroparticles (dissolved fraction) or containing suspended macroparticles (dissolved plus particulate fractions), alongside a control. For *D. magna*, treatments with and without pH correction disentangled intrinsic ash toxicity from alkalization effects. In *A. jarai*, ash did not affect agonistic responsiveness, refuge use, or food consumption. However, locomotor activity increased during the food detection test, and the probability of responding to an agonistic stimulus was higher in treatments containing macroparticles. In contrast, *D. magna* exhibited concentration-dependent immobilization (a proxy for mortality), intensified by elevated pH and the presence of macroparticles. Effects on distance traveled were weaker and mainly associated with pH shifts. Together, these findings show that wildfire ash affects freshwater crustaceans through interacting chemical and physical pathways. Ash-induced pH shifts primarily drive ash toxicity, while suspended macroparticles amplify this effect, underscoring the need to consider both dissolved and particulate fractions in post-wildfire risk assessments.

Keywords: *Fire ecology; Ecotoxicology; Water Pollution; Aegla jarai; Daphnia magna.*