

Assessing off-site impacts of wildfires on aquatic organisms using in-situ assays

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Wildfires have been recognized as an important source of diffuse pollution to aquatic systems, particularly through the production and transport of pyrolytic substances such as polycyclic aromatic hydrocarbons (PAHs) and metals associated to ash/soil loads. However, the effects of these compounds from recently burnt areas on the aquatic biota have been largely ignored. Hence, the main goal of this study was to assess the ecotoxicological effects of wildfires in aquatic systems through the use of in situ experiments. In this sense, five sites were selected in a catchment partially burnt: two in the main water course - Ceira river (Miranda do Corvo, Portugal), being one located upstream (RUS) and the other downstream (RDS) the burnt area; two in tributary streams within the burnt area (SUS and SDS); and finally one in a stream located in the unburnt part of the catchment (CS). During the first post-fire rainfall events, distinct organisms, including the water flea *Daphnia magna*, the freshwater shrimp *Atyaephyra desmaresti*, the freshwater clam *Corbicula fluminea* and the mosquitofish *Gambusia holbrooki* were exposed in situ, in all five sites, using dedicated test chambers. After four days of field exposition, the mortality and post-exposure feeding inhibition were evaluated. Feeding depression after exposure time was selected as a sub-lethal endpoint because it is a quick, sensitive and ecologically relevant indicator of toxic stress. The results showed negligible mortality for all the species and sites, thus lethality was not sensitive to discern impacts among the assessed sites. Conversely, the sub-lethal post-exposure feeding inhibition endpoint, revealed a decrease of feeding rate, in streams within the burnt area (SUS and SDS), that seemed to be the most affected places in the study area. Conversely, the sites outside the burnt area, both on river (RUS) and on the stream (CS), showed no adverse effects in this endpoint. Hence, the current results pointed-out that in situ bioassays were a suitable tool to assess the risks of wildfire to aquatic species and that the post-fire runoff rich in concerning substances as PAHs and metals can sub-lethally impair the aquatic organisms in water bodies located within or downstream the burnt area.