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Application of TIEs in studies of urban stormwater impacts on marine organisms

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ABSTRACT

Urban stormwater runoff is a significant, yet poorly understood, source of contaminants to the marine environment. One of the largest sources of stormwater inputs to Santa Monica Bay (California) is the Ballona Creek watershed. Receiving water and runoff water samples were collected during several storms in both the 1995-96 and 1996-97 wet seasons. Sea urchin fertilization tests indicated toxicity in most Ballona Creek stormwater samples; EC₅₀ values were about 12-20%. Receiving water samples were also toxic, with the magnitude of effects generally corresponding to the concentration of runoff present. Select phase I TIE (toxicity identification evaluation) manipulations were applied to sample showing toxicity. Ballona Creek samples had a consistent response pattern; EDTA addition removed virtually all toxicity, implicating divalent trace metals as the probable toxic constituents. Santa Monica Bay surface water samples showed a similar response pattern but other manipulations also removed some toxicity. Toxicity of receiving water samples tended to degrade with storage, while runoff sample toxicity was more stable. Chemical analysis of runoff and comparison to spiking studies showed that concentrations of zinc and occasionally copper were sufficient to produce toxicity. Evaluation of the relative effectiveness of EDTA versus sodium thiosulfate in toxicity removal also suggested zinc as a likely cause of toxicity.

Keywords: stormwater, marine, TIE (toxicity identification evaluation), sea urchin, metals, Santa Monica Bay

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