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Characterization of stormwater toxicants from an urban watershed to freshwater and marine organisms

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ABSTRACT

Numerous studies have shown that urban stormwater discharges in southern California are a large source of pollutants to coastal waterbodies, but their biological effects have been studied rarely. This study addressed two primary questions: (1) How do the toxic responses to urban stormwater runoff differ between freshwater and marine organisms? and (2) Which constituents are responsible for stormwater toxicity in freshwater and marine organisms?

Samples were collected from Chollas Creek, a highly urbanized watershed in San Diego, California, that discharges directly to San Diego Bay. Stormwater samples were tested using one freshwater species (*Ceriodaphnia dubio*, water flea) and two marine species (*Strongylocentrotus purpuratus*, purple sea urchin; and *Mysidopsis bahia*, mysid shrimp). Toxicity identification evaluations (TIEs) were conducted on each species to determine the toxic constituent(s).

No two species responded similarly after exposure to stormwater from Chollas Creek. The sea urchin was extremely sensitive to stormwater, exhibiting responses during every storm at concentrations as low as 12% stormwater. The other marine species, *Mysidopsis*, exhibited no response to stormwater for any of the storms sampled. *Ceriodaphnia* exhibited intermediate toxic responses; two of three samples were toxic at relatively high concentrations (100%) of stormwater. The pattern of toxicity was also inconsistent; no single storm was the most toxic to both the marine and freshwater species.

Organophosphate pesticides in stormwater runoff from Chollas Creek were responsible for the toxicity observed in the freshwater species *Ceriodaphnia*. Concentrations of diazinon and chlorpyrifos, both organophosphate pesticides, were found in the stormwater samples in sufficient amounts to induce toxicity. Trace metals in stormwater runoff from Chollas Creek were responsible for the toxicity observed to the sea urchin. Concentrations of zinc, and to a lesser extent copper, were of sufficient quantity in the stormwater samples to induce toxicity.

Full Text

ftp://ftp.sccwrp.org/pub/download/DOCUMENTS/AnnualReports/1999AnnualReport/06_ar05.pdf