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Understanding Sediment Toxicity off Southern California

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ABSTRACT

Benthic species composition and abundances change along sewage outfall gradients off southern California (Word and Mearns, 1979; Swartz et al., 1986). The most contaminated areas are inhabited by low diversity assemblages dominated by the polychaete Capitella capitata. Normal, or reference areas are dominated by the ophiuroid Amphiodia urtica and the urchin Lytechinus pictus, neither of which exist in the contaminated areas. Why these species do not inhabit contaminated sediments is not known.

In trying to understand cause-and-effect of these patterns, we have utilized empirical field studies and experimental laboratory studies focusing on key, indigenous benthic species. Laboratory toxicity tests have shown that whole sediment from contaminated areas caused mortality and reduced growth to both Lytechinus and Amphiodia, but we do not know which components of the sediments caused the mortalities (Thompson et al., 1989; SCCWRP unpubl.). Similarly, field studies of benthic macrofaunal assemblages were inconclusive (Anderson et al., 1988). The problem with both of these approaches was that the numerous contaminants present in sediments generally covaried; where one contaminant (including organic material) was high all were high. Even multivariate ordination methods could not correlate individual contaminants with the observed biological effects. We concluded that it is not possible, using whole sediment mixtures, to determine which contaminants, let alone what concentrations, cause biological responses.