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Use of chemical markers to identify sources of fecal indicator bacteria in the lower Santa Ana River

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ABSTRACT

The Santa Ana River and adjacent wetlands have been identified as potential sources of fecal indicator bacteria (FIB) to the surf zone at Huntington Beach, California, but it remained unclear whether sewage or non-sewage related contamination was the main concern. To address this issue, we collected and analyzed 54 water samples from three locations in the intertidal zone near the mouth of the Santa Ana River, California, for a suite of 10fecal steroids and caffeine. The data were used to identify possible sources of FIB within the lower Santa Ana River watershed. The sampling times were chosen to assess the influence of daily and fortnightly tidal cycles. Steroid ratios were different from those found in raw sewage or the effluent plume from a local wastewater treatment plant, and were more influenced by the spring/neap tidal cycle than by the daily tides, or by station location. Multivariate statistical analysis showed that the concentrations of FIB were better correlated with cholesterol (CHOE) than with the typical sewage sterols. Conversely, coprostanol (COP) was found to correlate most strongly with turbidity, suggesting that it stemmed from tidal resuspension of bottom sediments. Moreover, the relative abundances of certain steroids suggested a diagenetic rather than a bio-genic source for the COP content of the samples. The results implied that sewage was not a significant source of fecal steroids, and therefore perhaps FIB to the study area. Instead, birds may be one possible source of the intermittently high levels of FIB observed in the Santa Ana River and the nearby surfzone.

Full Text

ftp://ftp.sccwrp.org/pub/download/DOCUMENTS/AnnualReports/2003_04AnnualReport/ar25-zeng_304-315.pdf