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Origins and mechanisms of watershed and land use based sources of fecal indicator bacteria in urban stormwater

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ABSTRACT

Stormwater runoff is a well documented source of fecal indicator bacteria (FIB). Routine stormwater monitoring programs focus on quantification of average FIB concentration, or fluxes at the terminal watershed discharge point. While important for overall status and trends assessment, such monitoring provides little insight in assessing land use impacts on aquatic ecosystems, or into the mechanisms and processes that influence FIB concentrations in stormwater. The goal of this study was to quantify the sources, patterns of concentrations and fluxes of three FIB (i.e., *Escherichia coli*, enterococci., and total coliforms) from representative land use (LU) types in both urban and non-urban watersheds within the greater Los Angeles, California region. Bacteria concentrations were measured over the entire storm duration from 8 different LU types over 13 storm events in 5 southern California watersheds during the 2000-2001 through 2004-2005 storm seasons. In addition, runoff samples were collected from 8 bottom of the watershed mass emission (ME) sites during 13 storm events. Intra-storm and intra-season patterns were investigated in order to identify mechanisms that influence patterns of FIB concentrations. Finally, this study compared the estimates of stormwater FIB concentrations to existing water quality standards to provide context for the contribution of stormwater to overall FIB concentrations in the region. Mean event mean concentrations (EMCs) at LU sites ranged from 103 to 105 MPN/100 ml for *E. coli*, and enterococci, and 104 to 106 MPN/100 ml for total coliforms. Recreational LU sites contributed significantly higher storm EMCs than other LU types. Early season storms (October-December) repeatedly produced higher EMCs than comparably sized late season (April-May) storms. For most storms sampled, the highest bacterial concentrations occurred during the early phases of stormwater runoff with peak concentrations usually preceding peak flow.

Full Text

ftp://ftp.sccwrp.org/pub/download/DOCUMENTS/AnnualReports/2008AnnualReport/AR08_153_161.pdf