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Microbiological water quality at nonhuman impacted reference beaches in southern California during wet weather

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ABSTRACT

Although wet weather discharges from urban watersheds may have elevated concentrations of fecal indicator bacteria that impact water quality at swimming beaches, not all of these bacteria may arise from human sources. In this study, the contribution of fecal indicator bacteria was quantified at coastal reference beaches in southern California having minimal human impact. Operationally, reference beaches were defined as open beaches with breaking waves that receive runoff from undeveloped (>93% open space) watersheds and were selected to represent geographical conditions and watershed sizes. Six reference beaches were sampled during nine storm events during the 2004 - 2005 and 2005 - 2006 wet seasons. Samples were analyzed for total coliform, *Escherichia coli* (*E. coli*), and enterococci in the discharge from the undeveloped watershed and in the wave wash where the discharge and surf zone initially mix. Samples collected during wet weather exceeded water quality thresholds established by the State of California greater than 10 times more frequently during wet weather than during recent dry weather in summer or winter, although the frequency differed by beach. These exceedences were greatest <24 hours following recorded rainfall, then steadily declined for the following three days. Early season storms exceeded water quality thresholds more than twice as frequently as late season storms. In addition, over half of these early season storms exceeded thresholds for multiple bacterial indicators, while the vast majority of late season storms only exceeded thresholds for a single bacterial indicator. Large storms exceeded water quality thresholds three times more frequently than smaller-sized storms. This was partly due to the breaching of sand berms during large storm events; small storms could not breach these berms and this restricted watershed discharges from entering the surf zone. When watershed discharges did enter the surf zone, bacterial concentrations in the wave wash were correlated with watershed bacterial flux.

Full Text

ftp://ftp.sccwrp.org/pub/download/DOCUMENTS/AnnualReports/2005_06AnnualReport/AR0506_195-206.pdf