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Use of an exogenous plasmid standard and quantitative PCR to monitor spatial and temporal distribution of *Enterococcus* spp. in beach sands

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ABSTRACT

Studies using culture dependent methods have indicated that enterococci, the fecal indicator used to monitor marine waters for the potential of enteric disease risk to swimmers, can be abundant in beach sands and may contribute to water column indicator exceedances. A quantitative Polymerase Chain Reaction (qPCR) method for the Entercoccus genus was tested and applied to more rapidly determine the amount of enterococci in beach sands and study their distribution over space and time. The qPCR method amplified a 23S rDNA sequence specific to Enterococcus (Ludwig and Schliefer 2000), and was used to examine subsamples and composite samples of wet and dry beach sand from Avalon Bay, CA. The differences in efficiency of DNA recovery and inhibition in qPCR reactions were accounted for by spiking pairs of duplicate subsamples with a known amount of pGEM® plasmid before or after extraction, respectively (Coyne *et al*. 2005). This study revealed levels of environmental inhibition that were similar in wet and dry sands, and efficiency of DNA recovery that was observably lower for wet beach sands and varied between years. Using the correction factors generated by this method to estimate the abundance of Enterococcus, we show that wet and dry beach sands both have *Enterococcus* spp. populations that can vary dramatically from day to day, and often are potentially higher than the equivalent health standards mandated for recreational waters.

Full Text

ftp://ftp.sccwrp.org/pub/download/DOCUMENTS/AnnualReports/2010AnnualReport/ar10_103_112.pdf