Comparison of bacterial indicator analysis methods in stormwateraffected coastal waters

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ABSTRACT

Membrane filtration (MF) and multiple tube fermentation (MTF) have been used for decades to measure indicator bacteria levels in beach water samples, but new methods based on chromogenic substrate (CS) technology are becoming increasingly popular. Only a few studies have compared results among these methods, and they have generally been based on samples collected from a limited number of sites during dry weather. In this study, samples were collected from 108 sites the day after a major rainstorm and three indicator bacteria (total coliforms, fecal coliforms or *E. coli*, and enterococci) were each measured using MF, MTF, and CS. Sampling sites were selected using a stratified random design, stratified by open sandy beach, rocky shoreline, and beach areas near urban runoff outlets. The CS was found to be highly correlated with both MF and MTF for all three indicators regardless of whether the samples were taken along open shoreline or near a runoff outlet. While correlated, total coliform values were slightly higher using CS, consistent with other studies that have demonstrated false positives with this method. Fecal coliform values were 12% lower with CS, reflecting specificity of the CS method for *E. coli* rather than the entire fecal coliform group. No significant differences were observed for enterococci, although some differences were observed within specific laboratories. Differences for all of these indicators were small enough that, when assessed categorically, there was more than 90% agreement between CS and either MF or MTF methods as to whether State of California Beach Water Quality Standards were met.

Full Text