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Fecal indicator bacteria (FIB) enumeration in beach sand: A comparison study of FIB extraction methods in medium to coarse sands

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ABSTRACT

The absence of standardized methods for quantifying fecal indicator bacteria (FIB) in sand hinders comparison of results across studies. This study aimed to compare methods for extraction of fecal bacteria from sands and recommend a standardized extraction technique. Twenty-two methods for extracting enterococci and *Escherichia coli* from sand were evaluated, including multiple permutations of hand shaking, mechanical shaking, blending, sonication, number of rinses, settling time, eluant to sand ratio, eluant composition, prefiltration, and type of decantation. Tests were performed on sands from California, Florida, and Lake Michigan. Most extraction parameters did not significantly affect bacterial enumeration. ANOVA revealed significant effects of eluant composition and blending, with both sodium metaphosphate buffer and blending producing reduced counts. The simplest extraction method that produced the highest FIB recoveries consisted of 2 minutes of hand shaking, a 30-second settling time, 1 rinse step, and a 10:1 eluant volume to sand weight ratio. This result was consistent across the sand compositions tested in this study, but could vary for other sand types. Method standardization will improve the understanding of how sands affect surface water quality.

Full Text

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