

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

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ABSTRACT

Aims: The absence of standardized methods for quantifying faecal indicator bacteria (FIB) in sand hinders comparison of results across studies. The purpose of the study was to compare methods for extraction of faecal bacteria from sands and recommend a standardized extraction technique.

Methods and Results: Twenty-two methods of 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.

Conclusions: The simplest extraction method that produced the highest FIB recoveries consisted of 2 min of hand shaking in phosphate-buffered saline or deionized water, a 30-s settling time, one-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.

Significance and Impact of the Study: Method standardization will improve the understanding of how sands affect surface water quality..

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