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Detection limits and cost comparisons of human-and gull-associated conventional and quantitative PCR assays in artificial and environmental waters

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ABSTRACT

Some molecular methods for tracking fecal pollution in environmental waters have both PCR and quantitative PCR (qPCR) assays available for use. To assist managers in deciding whether to implement newer qPCR techniques in routine monitoring programs, we compared detection limits (LODs) and costs of PCR and qPCR assays with identical targets that are relevant to beach water quality assessment. For human-associated assays targeting Bacteroidales HF183 genetic marker, qPCR LODs were 70 times lower and there was no effect of target matrix (artificial freshwater, environmental creek water, and environmental marine water) on PCR or qPCR LODs. The PCR startup and annual costs were the lowest, while the per reaction cost was 62% lower than the Taqman based qPCR and 180% higher than the SYBR based qPCR. For gull-associated assays, there was no significant difference between PCR and qPCR LODs, target matrix did not effect PCR or qPCR LODs, and PCR startup, annual, and per reaction costs were lower. Upgrading to qPCR involves greater startup and annual costs, but this increase may be justified in the case of the human-associated assays with lower detection limits and reduced cost per sample.