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Enterovirus detection in storm drain-impacted waters along the shoreline of the Southern California Bight

Rachel T. Noble

ABSTRACT

Assays for the detection of enteroviruses by reverse transcriptase-polymerase chain reaction (RT-PCR) were performed on coastal seawater samples taken at 15 randomly selected freshwater outlet sites along the shoreline of the Southern California Bight (SCB). All of the sites from which these samples were taken are influenced year-round by urban runoff and many are proximal to high-use sandy beaches that are recreational "hot spots" in southern California. Reverse transcriptase-PCR (RT-PCR) is a primer-based molecular biology technique that can be used to detect specific groups or types of viruses based upon the complementarity of primer sequences with conserved sequences in viral genomes. Pan-enterovirus primers were used for the detection of enteroviruses, the family of which includes poliovirus, Coxsackievirus, and echovirus. The results of our analyses showed that the concentration methods and RT-PCR protocol can be used consistently to detect enterovirus genomes from 201 samples of coastal seawater. Results were presence-absence for enterovirus detection. In addition, a most probable number (MPN) approach was used to estimate the number of viral genomes present in each sample. Of the 15 samples taken, 7 were positive for enteroviruses. Results of the virus estimates did not demonstrate a strong significant logistical or rank correlation to total and fecal coliforms, or enterococci ($p > 0.05$). However, a weak logistical correlation was observed between fecal coliforms and the detection of enteroviruses. Our results demonstrate that enteroviruses, which are indicative of local human fecal contamination, are found in nearly half of the freshwater outlets in southern California. Since enteroviruses are known to be causative agents of disease in humans from recreational water contact, the analysis of their presence will assist managers in protecting the public health at high-risk locations (e.g., high-use sandy beaches) or during certain seasons of the year.

Full Text

http://ftp.sccwrp.org/pub/download/DOCUMENTS/AnnualReports/1999AnnualReport/21_ar21.pdf