SCCWRP Annual Report 2012

The association of fecal indicator bacteria with human viruses and microbial source tracking markers at coastal beaches impacted by nonpoint source pollution

Shannon McQuaig[1], John Griffith and Valerie J. Harwood[1]

[1]University of South Florida, Department of Biology, Tampa, FL

ABSTRACT

Water quality was assessed at two marine beaches in California (USA) by measuring culturable fecal indicator bacteria (FIB) concentrations, library-independent microbial source tracking (MST) methods targeting human-associated microbes (human polyomaviruses PCR and qPCR, *Methanobrevibacter smithii* PCR, *Bacteroides* HF183 PCR) and a human pathogen (adenovirus by nested PCR). FIB levels periodically exceeded regulatory thresholds at Doheny and Avalon Beaches for enterococci (28.5 and 31.7% of samples, respectively) and fecal coliforms (20 and 5.8%). Adenoviruses were detected at four of five sites at Doheny Beach, and were correlated with detection of human polyomaviruses and human *Bacteroides* HF183; however, adenoviruses were not detected at Avalon. The most frequently detected human source marker at both beaches was *Bacteroides* HF183, in 27% of samples. Correlations between FIBs and human markers were much more frequent at Doheny Beach than at Avalon Beach, e.g. adenovirus was correlated with human polyomaviruses (HPyVs) and HF183. Human sewage markers and adenoviruses were routinely detected in samples meeting FIB regulatory standards. The "toolbox approach" of FIB measurement coupled with analysis of several MST markers and human pathogens used here demonstrated that human sewage is at least partly responsible for the degradation of water quality, particularly at Doheny Beach, and resulted in a more definitive assessment of recreational water quality and human health risk than reliance on FIB concentrations alone could have provided.

Full Text

ftp://ftp.sccwrp.org/pub/download/DOCUMENTS/AnnualReports/2012AnnualReport/ar12_323_340.pdf