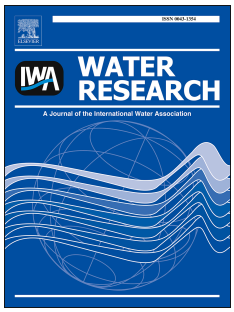
Accepted Manuscript



Incidence of gastrointestinal illness following wet weather recreational exposures: Harmonization of quantitative microbial risk assessment with an epidemiologic investigation of surfers

Jeffrey A. Soller, Mary Schoen, Joshua A. Steele, John F. Griffith, Kenneth C. Schiff

PII: S0043-1354(17)30376-7

DOI: 10.1016/j.watres.2017.05.017

Reference: WR 12896

To appear in: *Water Research*

Received Date: 16 December 2016

Revised Date: 2 May 2017

Accepted Date: 8 May 2017

Please cite this article as: Soller, J.A., Schoen, M., Steele, J.A., Griffith, J.F., Schiff, K.C., Incidence of gastrointestinal illness following wet weather recreational exposures: Harmonization of quantitative microbial risk assessment with an epidemiologic investigation of surfers, *Water Research* (2017), doi: 10.1016/j.watres.2017.05.017.

Incidence of gastrointestinal illness following wet weather recreational exposures: harmonization of quantitative microbial risk assessment with an epidemiologic investigation of surfers

Jeffrey A. Soller[1*], Mary Schoen[1], Joshua A. Steele[2], John F. Griffith[2], and Kenneth C. Schiff[2]

[1] Soller Environmental, LLC, 3022 King St., Berkeley, CA 94703, USA

[2] Southern California Coastal Water Research Project, 3535 Harbor Blvd #110, Costa Mesa, CA 92626, USA

[*] Corresponding author

Abstract

We modeled the risk of gastrointestinal (GI) illness associated with recreational exposures to marine water following storm events in San Diego County, California. We estimated GI illness risks via quantitative microbial risk assessment (QMRA) techniques by consolidating site specific pathogen monitoring data of stormwater, site specific dilution estimates, literature-based water ingestion data, and literature based pathogen dose-response and morbidity information. Our water quality results indicated that human sources of contamination contribute viral and bacterial pathogens to streams draining an urban watershed during wet weather that then enter the ocean and affect nearshore water quality. We evaluated a series of approaches to account for uncertainty in the norovirus dose-response model selection and compared our model results to those from a concurrently conducted epidemiological study that provided empirical estimates for illness risk following ocean exposure. The preferred norovirus dose-response approach yielded median risk estimates for water recreation-associated illness (15 GI illnesses per 1000 recreation events) that closely matched the reported epidemiological results (12 excess GI illnesses per 1000 wet weather recreation events). The results are consistent with norovirus, or other pathogens associated with norovirus, as an important cause of