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investigation of surfers

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

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9 **Abstract**

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

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