The Value of Quantitation When Applying Host-Associated Microbial Source Tracking Markers to Environmental Samples

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Biosketch: Dr. Donald Stoeckel has been with the United States Geological Survey's (USGS) Ohio Water Science Center from 1999, ending July 2009. He began working at the USGS after receiving his Bachelors of Science degree in Microbiology at the Ohio State University, Masters of Science in Environmental Science at the University of Cincinnati, and Ph.D. in Soil Microbiology at Auburn University. His research program at USGS focused on evaluation and application of methods for microbial source tracking of fecal contamination in waters. During his time with the USGS, he co-authored several papers on validation and application of microbial source tracking, applications of molecular microbiology for environmental monitoring, and was able to participate in USGS data collection and training missions, respectively, to post-hurricane New Orleans and wartime Afghanistan.

Abstract: Library-independent microbial source tracking (MST) markers have demonstrated utility for presence-absence detection of fecal contamination sources in water. However, use of these tests to inform environmental management is partially dependent on laboratory detection limits. Various host-associated markers are detectable in samples where contamination by the associated host is small relative to other sources. Furthermore, host-associated markers contributed by nontarget hosts (for example, dogs carrying a ruminant marker) can result in false-positive results in contaminated environmental samples. An approach will be described wherein the upper limit of *E. coli* contribution from a particular host is estimated based upon: 1) observations of *E. coli* and MST marker concentration in reference fecal material, 2) microcosm evaluation of relative decay rates for cultivable *E. coli* and amplifiable MST marker over time, and 3) observed *E. coli* density and MST marker concentration in environmental samples. By use of this approach, a determination was made as to whether particular sources (in particular, human and ruminant) were likely major contributors of fecal contamination to quality-control samples and to environmental samples. This approach may be particularly useful to prioritize human and dairy waste centered remediation efforts in contaminated watersheds.