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Recommendations following a multi-laboratory comparison of microbial source tracking methods

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ABSTRACT

Microbial source tracking (MST) methods were evaluated in the Source Identification Protocol Project (SIPP), in which 27 laboratories compared methods to identify host sources of fecal pollution from blinded water samples containing either one or two different fecal types collected from California. This paper details lessons learned from the SIPP study and makes recommendations to further advance the field of MST. Overall, results from the SIPP study demonstrated that methods are available that can correctly identify whether particular host sources including humans, cows and birds have contributed to contamination in a body of water. However, differences between laboratory protocols and data processing affected results and complicated interpretation of MST method performance in some cases. This was an issue particularly for samples that tested positive (non-zero Ct values) but below the limits of quantification or detection of a PCR assay. Although false positives were observed, such samples in the SIPP study often contained the fecal pollution source that was being targeted, i.e., the samples were true positives. Given these results, and the fact that MST often requires detection of targets present in low concentrations, we propose that such samples be reported and identified in a unique category to facilitate data analysis and method comparisons. Important data can be lost when such samples are simply reported as positive or negative. Actionable thresholds were not derived in the SIPP study due to limitations that included geographic scope, age of samples, and difficulties interpreting low concentrations of target in environmental samples. Nevertheless, the results of the study support the use of MST for water management, especially to prioritize impaired waters in need of remediation. Future integration of MST data into quantitative microbial risk assessments and other models could allow managers to more efficiently protect public health based on site conditions.