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Using Microbial Source Tracking to Enhance Environmental Stewardship of Agriculture

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Large scale agriculture relies on the application of chemical fertilizers and animal manure. It is well known that nutrients in excess of a plant's uptake and soil retention capacity can travel to nearby waterways via surface run-off and groundwater pathways, indirectly fertilizing these aquatic ecosystems. It has not yet been possible to distinguish water quality impacts of fertilizer from those derived from human and animal waste sources. However, new microbial source tracking (MST) tools allow specific identification of fecal pollution. Our objective was to examine pollution risks at the regional scale using MST, mapping and classification and regression tree analysis. We present results Bovine M2 genetic marker data from three flow regimes (baseflow, snow melt, and post-planting rain). Key landscape characteristics were related to the presence of the bovine markers and appear to be related to fate and transport. Impacts at this regional watershed scale will be discussed. Our research aims to identify the impacts of agricultural management practices on water quality by linking nutrient concentrations with fecal pollution sources. We hope that our research will provide guidance that will help improve water quality through agricultural best management practices to reduce pathogen contamination.