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**Development of Regression-Based Models to Predict Fecal Indicator Bacteria
at the Illinois River Basin, Arkansas and Oklahoma**

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Abstract:

Fecal bacteria enter the aquatic environment through direct deposition, runoff from fields receiving manure application and municipal wastewater treatment plant effluent discharges. The presence of fecal bacteria, particularly *E. Coli*, in aquatic systems is an indicator of pathogens, as well as a potential or possible health risk for humans exposed to the water. Fecal bacteria presence and transport in the fluvial channel can be difficult and expensive to intensively monitor; however, some studies have shown that real-time monitoring of surrogates can be used to predict fecal bacteria numbers in streams. The objective of this study was to develop regression models that accurately predict fecal bacteria concentrations in the Illinois River Watershed using parameters measured in real-time during base flow and storm even conditions. A synthetic model was developed to identify the relationships between fecal bacteria and other measured physico-chemical parameters using all data available in the USGS NWIS database for select sites within the Illinois River Basin, and that separated by flow conditions (i.e. base flow conditions). Fecal bacteria and *E. coli* concentrations were highly correlated during baseflow and storm events, except at low numbers. Fecal bacteria numbers were generally low during base flow conditions across the Illinois River and its tributaries, although fecal bacteria numbers increased during surface runoff conditions, where fecal bacteria increased with increasing discharge across these sites. The regression models were somewhat different across the sites and the databases used (all data, base flow data, and surface runoff data) at the Illinois River and its tributaries, and the predictive abilities of these regression models was limited during base flow conditions, as several sites showed that no regression model could be developed using these parameters.

Impact Statement:

The ability of the regression models to predict changes in fecal bacteria numbers differed across sites, where the regression models explained between 8 and 86% of the variation in bacterial numbers. Several other studies across the south-central USA have developed regression models to predict fecal bacteria numbers, and these models collectively suggest that turbidity should be included.

Category: Watershed Assessment and Restoration
Type of Presentation: Poster Presentation