

# **PREDICTING E. COLI AND ENTEROCOCCI CONCENTRATIONS IN THE SOUTH FORK BROAD RIVER WATERSHED USING VIRTUAL BEACH**

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Virtual Beach (VB) is a decision support tool that constructs site-specific statistical models to predict fecal indicator bacteria (FIB) at locations of exposure. Although primarily designed for making decisions regarding beach closures or issuance of swimming advisories based on exceedance to the FIB criteria, VB can also be used for studying relationships between any water quality indicator and ambient environmental conditions. Our objective was to evaluate the effectiveness of statistical models developed using VB for predicting the impairment of inland rivers and streams. From 2012-2015, water samples were collected during rainfall events and base flow conditions from two sites on the South Fork Broad River watershed located in Madison and Oglethorpe Counties in Northeast Georgia. Samples were analyzed for E. coli and Enterococci along with other water quality parameters. Data collected during the study were divided into two groups: one for model development and another for model prediction at each site. Approximately 75% of the data points were randomly selected to develop a multiple linear regression (MLR) model describing the relationship between E. coli and Enterococci and a set of independent variables (IVs): turbidity, total suspended solids (TSS), rainfall and water temperature. R-squared values for the MLR models developed by VB were 0.73 for E. coli and 0.69 for Enterococci at the Clouds Creek site (N=270). For the Carlton site, R-squared values were 0.81 for E. coli and 0.80 for Enterococci (N=188). Model accuracy (i.e., model prediction agrees with the observed FIB concentration being above or below the regulatory level) ranged from 96-98% for E. coli and 99% for Enterococci. Accuracy using data not included in model development (approximately 25%) was 99% for E. coli and Enterococci. Our results show statistical models developed with VB can be effective for predicting the impairment of inland rivers and streams.

*Program reference: 1.4.11*