Investigation of the Fate and Transport of Fecal Contamination using Microbial Source Tracking

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Introduction: Rutgers University Department of Environmental Sciences, Rutgers University Biotech Center, and Rutgers Cooperative Extension (RCE) Water Resources Program have conducted Microbial Source Tracking (MST) assays of *Bacteroides* to identify and quantify fecal sources in an agricultural watershed of southern New Jersey. These assays have been used to determine the relative contributions of small scale dairy operations to fecal contamination in the Upper Salem River watershed. The project has included a field sampling campaign to collect water quality, as well as MST samples bi-weekly continuously since June 2007 and the development of a Soil & Water Assessment Tool (SWAT) model to investigate the fate and transport of species specific fecal contamination.

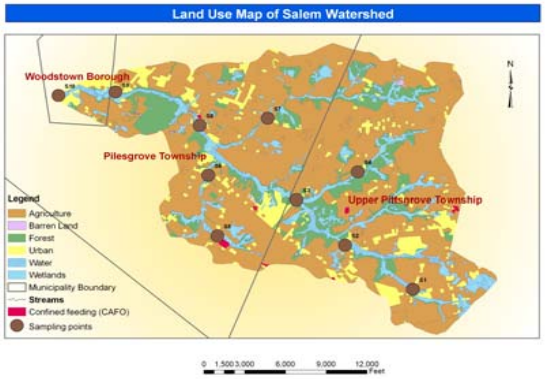

Figure 1. Site map including locations of sampling sites, CAFO sites, and landuse

Study area: The study is located in Salem County, in southern New Jersey. Over 90% of the land uses are agriculture (including several dairy farms), forest and urban which are the main sources of bacterial pollution. The source of which are presumed to be livestock, wildlife and human, respectively.

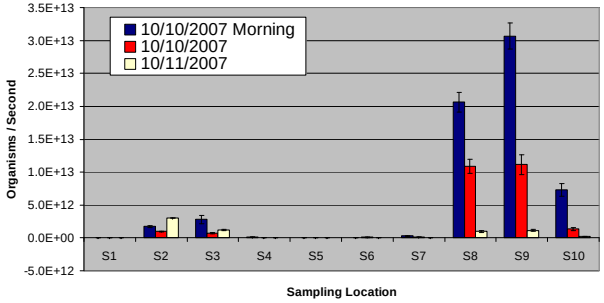

Figure 2. AllBac load during storm event on October 10-11, 2007

Field Results: Water quality and MST samples have been collected for 18 months. Preliminary species specific sources of fecal contamination have been identified

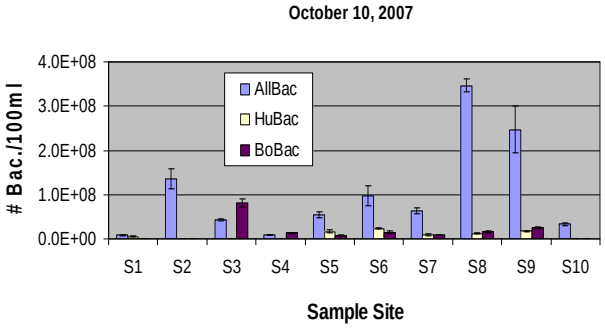

Figure 3. Species specific load of *Bacteroides* to the Salem River at each sampling location

Modeling efforts: A SWAT model has been built of the Upper Salem River Watershed. It has been calibrated for river flow over a one year and a half year period at the discharge and nine upstream sampling sites. Calibration for fecal coliform, E. coli and *Bacteroides* are currently underway.

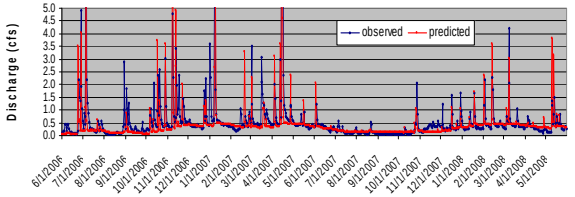

Figure 4. Observed and predicted river flow at discharge of watershed (NSE =0.49)

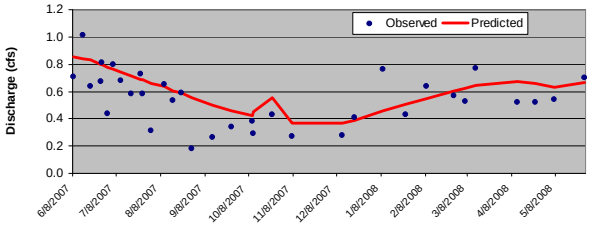

Figure 5. Observed and predicted river flow at Sampling Location S5

Remaining Work: The field sampling program will continue through June 2009, and the SWAT model will be calibrated for bacterial parameters to investigate the fate and transport characteristics of species specific fecal contamination.

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