



***E. coli* transport to stream water column from bottom sediments to the stream water column in base flow conditions**

Yakov Pachepsky, Daniel Shelton, and Matthew Stocker

USDA-ARS Beltsville Agricultural Research Center, Environmental Microbial and Food Safety Laboratory, Beltsville, United States (yakov.pachepsky@ars.usda.gov)

E. coli as an indicator bacterium is commonly used to characterize microbiological water quality, to evaluate surface water sources for microbiological impairment, and to assess management practices that lead to the decrease of pathogens and indicator influx in surface water sources for recreation and irrigation. Bottom sediments present a large reservoir of fecal indicator bacteria that are known to be released to water column during high flow events caused by rainstorms and snowmelt. The objective of this work was to see if the influx of *E. coli* from sediments to water occurs also during base flow periods when groundwater rather than runoff provides the major water input to the stream. The experiment was carried out at the first-order creek in Maryland flowing in the riparian zone in base flow conditions. An inert tracer was released to creek water from the manifold for 5 hours. Streamflow and concentrations of *E. coli* and tracer were monitored in water 10 m below tracer release location, and at the downstream location at 450 m from the release location. The tracer mass recovered at the downstream location was close to the released tracer mass. We then could directly compare the total numbers of *E. coli* in volumes of water containing tracer at the upstream (release) location and the downstream location. There was a substantial (3 to 6 times) increase in flow between the upstream and downstream locations as well as the substantial increase in the *E. coli* total numbers in water (14 to 26 times). The average *E. coli* influx from the bottom sediment was about $400 \text{ cells m}^{-2}\text{s}^{-1}$. Although this value is about 2 to 5 times less than published *E. coli* release rates during high flow events, it still can substantially change the microbial water quality assessment without any input from animal agriculture or manure application. Interesting research objectives include finding out whether the transport of *E. coli* from bottom sediment to water column during the base flow periods is an active or passive transport, and how it is affected by the *E. coli* concentrations in sediment, sediment properties, and flow conditions.