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Simulation of E. coli release from streambed to water column during base flow periods

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Microbial water quality in streams is of importance for recreation, irrigation, and other uses. The streambed sediment has been shown to harbor large fecal indicator bacteria (FIB) population that can be released to water column during high-flow events when sediments are resuspended. There have been numerous studies investigating effect of sediment FIB on in-stream concentration during high-flow events, whereas there has been no research so far that would simulate FIB release from the bottom sediment to water column during baseflow periods. The objective of this work was to evaluate the need in including modeling of the E. coli release from the bottom sediment to water column during baseflow periods. The simulation results obtained from soil and water assessment tool (SWAT) model for the Cove Mountain Creek watershed, Franklin Co. PA, showed that the baseflow E. coli concentrations were underestimated in this work if E coli release was simulated only for high-flow events. Two release assumptions (passive and active release) that correct the underestimation during baseflow periods substantially improved the model performance. The assumption of active release provided more accurate simulations. These simulation results indicate that the release of E. coli to water column during baseflow periods can be considered as a factor substantially affecting concentrations of this organism in streams. These results may be critical to using E. coli concentrations in regulations related to microbial water quality. Modeling the release for baseflow periods in watershed-scale microbial water quality models will decrease the uncertainty in modeling results, and thus can be useful in supporting decision-making regulations to effectively manage fecal contamination in watersheds.