SAFL Seminar Series
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St. Anthony Falls Laboratory ~ Auditorium

Quantifying and utilizing uncertainty in stream restoration design

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ABSTRACT

Public agencies spend significant funds on stream restoration projects to improve the quality of impaired stream reaches. Many sources of uncertainty can potentially influence the final design, such as the natural stochasticity of input variables, measurement errors from the field, and the uncertainties inherent to the parameters and conceptualizations of the equations used for the design model. For this study, a two-phase uncertainty analysis was performed on a two-stage channel stream restoration design for Stroubles Creek in Blacksburg, VA, USA. Monte Carlo Simulation was used to calculate a range of channel dimensions including channel width, channel depth, bench width and bench flow depth from stochastic variables, such as bankfull discharge and grain size distribution, and calculated parameters, such as Manning’s n and critical Shield’s number. Results of this research indicate the final stream restoration design outcomes can vary over one to four orders of magnitude with respect to the deterministic solution, reinforcing the high uncertainty and risk associated with stream restoration.