

A MULTI-CONFIGURATION EVALUATION OF THE SOIL AND WATER ASSESSMENT  
TOOL (SWAT) IN A MIXED LAND USE WATERSHED IN THE CENTRAL U.S.A.

Daniel P. Scollan

Jason A. Hubbart, Thesis Advisor

**ABSTRACT**

Distributed watershed hydrologic/water quality (H/WQ) models are ubiquitous tools for watershed management. Despite advancements, there remain impediments for end-users. This study presents a practical framework for use of the Soil and Water Assessment Tool (SWAT). Results show variable accuracy across scales and evaluation methods using 20 model configurations based on two watershed subdivisions, two soil datasets, and five climate datasets. Nine goodness-of-fit indicators were tested, including four new indices (R-RMSE, R-MAE, R-NSE, and R-NSE<sub>1</sub>) designed to quantify model fit with flow distribution. Sixteen of 20 configurations achieved satisfactory monthly streamflow fit ( $NSE > 0.5$ ,  $PBIAS < 25\%$ ) without calibration. Watershed and soil resolution had negligible impact; climate input had considerable impact. Single climate station input is best used for applications requiring monthly predictions; distributed climate station input is needed for daily predictions. SWAT multi-objective auto-calibration better predicted monthly flow ( $PBIAS=1\%$ ,  $NSE=0.8$ ) than single-objective calibration ( $PBIAS=16\%$ ,  $NSE=0.5$ ). SWAT performs well in Central U.S. urbanizing watersheds. Accuracy can improve with auto-calibration as presented and continued model development.