

QUANTIFYING UNCERTAINTY IN THE USDA'S NATIONAL CONSERVATION EFFECTS

ASSESSMENT FOR THE SOUTHEASTERN COASTAL PLAIN. Comparisons of output from the Soil Water Assessment Tool (SWAT) Model to observed data on the Little River Experimental Watershed in Georgia indicate that the accuracy of National assessments of conservation practice impacts to stream flow may be in the range of +/- 22%. Scientists at the Southeast Watershed Research Laboratory in Tifton, GA have evaluated the effect that the selection of a single watershed for model calibration may have when extrapolating results to other watersheds in the same physiographic region. Results indicate that while accuracy may be high in watersheds of similar size and land use (+/- 5.55% of flow), poorer simulation results (as high as +/- 22.69% of flow) occurred on watersheds of substantially different sizes and/or land uses. Inconsistencies between observed and simulated total flow volume for 1995-2004 simulation period increased as size of containing watersheds increased with performance bias values (uncertainty in the accuracy of the predicted value) of -8.71%, 8.35%, and 15.61% for LRI, LRF, and LRB, respectively. While the modeled values were not perfect, such values are comparable to the natural variability in ecosystems and to the magnitude of measurement error commonly encountered in environmental monitoring efforts. Such information suggests that SWAT performs well in simulating temporal trends of stream flow of all watersheds within the same drainage system (daily and monthly efficiency values greater than 60% in all cases) and is likely to provide an accurate assessment of the effects of conservation programs in the Coastal Plain.

Characteristics of sub-watersheds in the Little River Experimental Watershed, GA.

Land cover	LRK	LRJ	LRO	LRI	LRF	LRB
Pasture	0.5	1.4	11.0	0.4		0.8
Crop	43.4	48.8	66.9	49.8	60.8	70.4
Urban	1.1	1.1	2.6	0.8	2.3	1.0
Forest	55.1	48.8	18.1	48.9	36.9	27.8
Water			1.5			
Watershed delineation	LRK	LRJ	LRO	LRI	LRF	LRB
Area (km ²)	16.7	22.1	15.9	49.9	114.9	334.3
Number of subbasins	26	23	31	83	179	503
Number of HRUs	174	185	205	557	1186	3326

Performance measures of SWAT for calibration watershed (LRK) from 1995 to 2004.

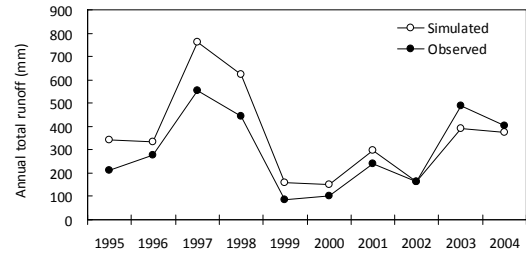
Evaluation measures	
Observed total runoff (mm)	3166
Simulated total runoff (mm)	3204
Percent Bias (%)	1.21 (very good)
Monthly RSR	0.24 (very good)
Monthly NSE	0.94 (very good)
Daily RSR	0.49 (very good)
Daily NSE	0.76 (very good)

Performance measures of SWAT for validation watersheds from 1995 to 2004.

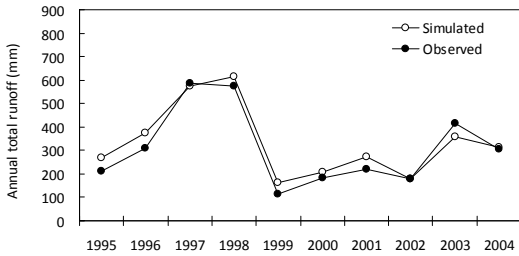
Evaluation Measures	LRJ	LRO	LRI	LRF	LRB
Obs. total runoff (mm)	3341	2967	3425	3101	2786
Sim. total runoff (mm)	3156	3641	3127	3360	3221
Percent Bias (%)	-5.55 (very good)	22.69 (satisfactory)	-8.71 (very good)	8.35 (very good)	15.61 (satisfactory)
Monthly RSR	0.34 (very good)	0.41 (very good)	0.29 (very good)	0.24 (very good)	0.29 (very good)
Monthly NSE	0.89 (very good)	0.83 (very good)	0.92 (very good)	0.94 (very good)	0.92 (very good)
Daily RSR	0.54 (good)	0.62 (satisfactory)	0.51 (good)	0.44 (very good)	0.46 (very good)
Daily NSE	0.71 (good)	0.61 (satisfactory)	0.74 (good)	0.80 (very good)	0.79 (very good)



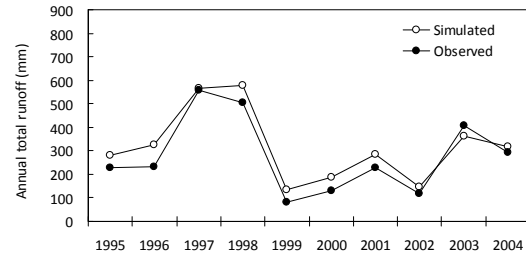
(a) LRJ



(b) LRO



(c) LRF



(d) LRB

Observed and simulated annual flow volume for (a) LRJ, (b) LRO, (c) LRF, and (d) LRB watersheds, 1995-2000 .