SUMMARY

"SECONDARY INFLUENCES IN CURVE NUMBER RAINFALL-RUNOFF"

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The secondary influences on direct runoff depth are studied for a number of small agricultural watersheds in the United States. A variation of Curve Number function is used as a basis for primary rainfall depth response. Using 1830 events from 25 small watersheds with effective rainfall greater than 1.00 inch, the effects of prior rainfall (including initial abstraction), intensity, and storm distribution (pattern index) on departures from the fitted rainfall effects are evaluated.

The analyses show that rainfall depth alone accounts for the majority of the explained variance in direct runoff depth. Using stepwise regression to explain deviations from the primary rainfall fitting increased the average r^2 from 55.5% to 62.9%. In general, secondary effects are scattered and inconsistent, and not always in accord with hydrologic reasoning. There were 4 cases where NO secondary effects were detected. The most pronounced secondary effects were with 5-day prior rainfall, which was significant and positive in 11 of the 25 cases. Storm distribution and storm intensity effects were scattered, and of both positive and negative sign. Some residual effects of seasonality were seen, however.

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Beta Coefficients in Stepwise Regression for Secondary Effects

NAME	IA	P1	P5	i15	i60	PI
Edwardsville, IL						
17001	-0.48					
Coshocton, OH						
26017						
26019	-0.24					
26026	0.26		0.12		-0.46	
Cherokee, OK						
34001			0.33	0.25		
34006			0.19			
34007	0.25		0.39	0.20		0.25
34008			0.29			
Coshocton, OH						
42003			0.23		-0.17	-0.15
42006			0.42		0.11	-0.24
42016			0.31			
42023						
42024					-0.30	
42028				-0.41		
42037						
Hastings, NE						
44007			0.07		0.11	
44008		0.23		0.43		
44009	-0.30					
44011		0.43				
44025	-0.42					
44026						
Monticello, IL						
61002					-0.53	
Treynor, IA						
71001			0.42	0.24		
71002			0.46		0.40	
71004	0.15				-0.31	

Note: Beta coefficients of the form $(dev-\mu_{dev})/\sigma_{dev} = \beta_1(Ia-\mu_{Ia})/\sigma_{Ia} + \beta_2(P1-\mu_{P1})/\sigma_{P1} + \beta_3(P5-\mu_{P5})/\sigma_{P5}$... etc, where $dev = Q_{obs} - Q_{calc}(P;A)$