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**ESTIMATING SIMULATED-DRAWDOWN UNCERTAINTY  
IN THE SEVEN RIVERS AUGMENTATION WELL FIELD**

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**ABSTRACT:** The Roswell Artesian Basin Groundwater Model was first developed in 1995 and has undergone several refinements to improve water-level predictions, particularly in the area of the Seven Rivers Augmentation Well Field. Recently, the Seven Rivers Augmentation Well Field portion of the regional model was recalibrated using results from a 10-well, 73-day pump test that ran from December of 2009 into February 2010. Extensive water level monitoring and detailed records of the applied stresses allowed application of both overdetermined and regularized (truncated singular value decomposition) parameter estimation methods. Simulated drawdown levels from the recalibrated model provide a very good match to measured values. To estimate uncertainty of the simulated water levels, PEST was used to implement a Pareto front evaluation, providing estimates of predictive confidence intervals for water levels at select locations. The results indicate about 5 to 10 feet of uncertainty on drawdowns ranging from 70 to 85 feet. The drawdown uncertainty can be used to estimate an equivalent uncertainty in pumping rates of select wells. The simulated predictions, along with their predictive confidence intervals, support the hypothesis that observations from adjacent existing wells reflect water levels from a different formation, or combination of formations. Pareto-front shapes and differences between Pareto fronts illustrate nonlinearity in the tradeoff between predictive and measurement objective function contributions and the spatial variability of prediction uncertainty, respectively. Factors contributing to the tradeoffs and spatial variability are discussed.