

# Optimization of Water-Level Monitoring Networks in the Eastern Snake River Plain Aquifer Using a Kriging-Based Genetic Algorithm Method



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**(Kaya Rippin)**

## OPTIMIZATION OF WATER-LEVEL MONITORING NETWORKS IN THE EASTERN SNAKE RIVER PLAIN AQUIFER USING A KRIGING-BASED GENETIC ALGORITHM METHOD

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CreateSpace Independent Publishing Platform. Paperback. Condition: New. This item is printed on demand. 82 pages. Dimensions: 11.0in. x 8.5in. x 0.2in. Long-term groundwater monitoring networks can provide essential information for the planning and management of water resources. Budget constraints in water resource management agencies often mean a reduction in the number of observation wells included in a monitoring network. A network design tool, distributed as an R package, was developed to determine which wells to exclude from a monitoring network because they add little or no beneficial information. A kriging-based genetic algorithm method was used to optimize the monitoring network. The algorithm was used to find the set of wells whose removal leads to the smallest increase in the weighted sum of the (1) mean standard error at all nodes in the kriging grid where the water table is estimated, (2) root-mean-squared-error between the measured and estimated water-level elevation at the removed sites, (3) mean standard deviation of measurements across time at the removed sites, and (4) mean measurement error of wells in the reduced network. The solution to the optimization problem (the best wells to retain in the monitoring network) depends on the total number of wells removed; this number is a management decision. The network design tool was applied to optimize two observation well networks monitoring the water table of the eastern Snake River Plain aquifer, Idaho; these networks include the 2008 Federal-State Cooperative water-level monitoring network (Co-op network) with 166 observation wells, and the 2008 U. S. Geological Survey-Idaho National Laboratory water-level monitoring network (USGS-INL network) with 171 wells. Each water-level monitoring network was optimized five times: by removing (1) 10, (2) 20, (3) 40, (4) 60, and (5) 80 observation wells from the original network. An examination of the trade-offs associated with changes in the number of...

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