Appendix B
Model Sensitivity Analyses

B1—SENSITIVITY ANALYSIS FOR MODEL SIMULATING THE UPPER ASH CREEK DRAINAGE BASIN AQUIFERS

The baseline model for the upper Ash Creek drainage basin was tested to determine how sensitive simulation results were when selected properties and fluxes were varied within what was deemed a reasonable range. The properties varied were (1) hydraulic-conductivity values for each of the simulated aquifers (the basin fill, the alluvial fan, and the Pine Valley monzonite); (2) the conductance values between each of the aquifers (basin fill to alluvial fan and alluvial fan to monzonite); (3) the vertical conductance of the river cells used to represent Ash, Sawyer, and Kanarra Creeks; (4) the depth at which evapotranspiration by riparian vegetation ceases; and (5) the maximum evapotranspiration rate for cottonwoods and pasture grasses. Fluxes that were varied were (1) areal recharge from precipitation; (2) recharge from unconsumed irrigation water; and (3) recharge from infiltration along ephemeral streams.

The graphs shown indicate the magnitude of variation from the baseline simulation. Figures B1-1, 2, and 3 show how baseline heads in each layer reacted to variations in hydraulic conductivity of the three layers. Variations in hydraulic conductivity of the basin-fill and Pine valley monzonite aquifers affected calculated water levels more substantially (greater than100 ft) than variations in hydraulic conductivity of the alluvial-fan aquifer (less than 100 ft). The same variations in hydraulic conductivity in each layer affected only spring discharge substantially. Other discharge fluxes were affected minimally (figs. B1-4, 5, and 6).

Calculated water levels in the baseline model were moderately sensitive to variations in the vertical leakance between the basin-fill and alluvial-fan aquifers, especially in layers 2 and 3, and insensitive to variations in the vertical leakance between the alluvial-fan and Pine Valley monzonite aquifers (figs. B1-7 and 8). Simulated discharge amounts were largely insensitive to the variations in vertical leakance, except for spring discharge, which is linked to head change occurring in layer 3 (Pine Valley monzonite aquifer) (figs. B1-9 and 10).

Simulated water levels in all layers respond slightly to variations in riverbed conductance, but simulated river gains and evapotranspiration are more sensitive to these variations because much of this discharge occurs near the perennial reaches that are simulated in the stream package. Discharge components that occur away from the river corridor were not substantially affected by the variations (figs. B1-11 and 12).

Simulated water levels were largely insensitive to reasonable variations in the depth at which evapotranspiration ceases and in the maximum evapotranspiration rate (5 ft or less in all layers) (figs. B1-13, 14, 15, and 16). Discharge boundaries were not appreciably affected by variations in the depth at which evapotranspiration ceases or in the maximum evapotranspiration rate. Discharge to Ash Creek increased by only about 18 percent when extinction depths were decreased to 60 percent of baseline values. All other discharge amounts were minimally affected.

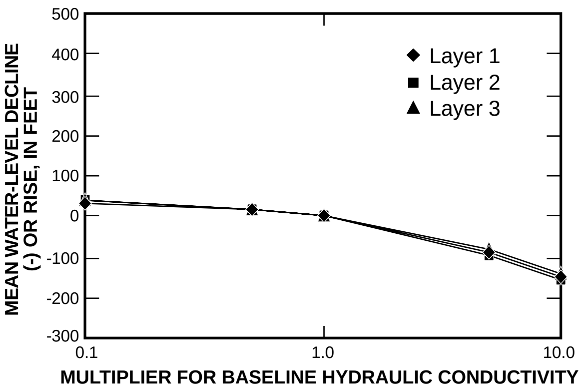

Figure B1-1 Sensitivity of water level to variations in horizontal hydraulic conductivity of the basin-fill aquifer in the ground-water flow model of the upper Ash Creek drainage basin, Utah.

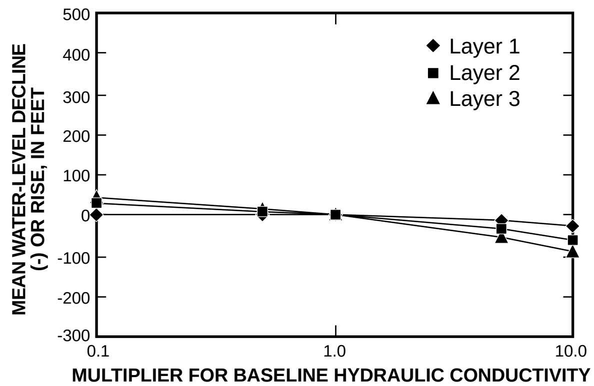

Figure B1-2. Sensitivity of water level to variations in horizontal hydraulic conductivity of the alluvial-fan aquifer in the ground-water flow model of the upper Ash Creek drainage basin, Utah.

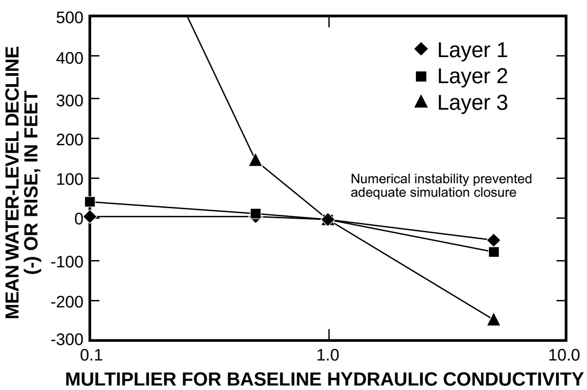

Figure B1-3. Sensitivity of water level to variations in horizontal hydraulic conductivity of the Pine Valley monzonite aquifer in the ground-water flow model of the upper Ash Creek drainage basin, Utah.

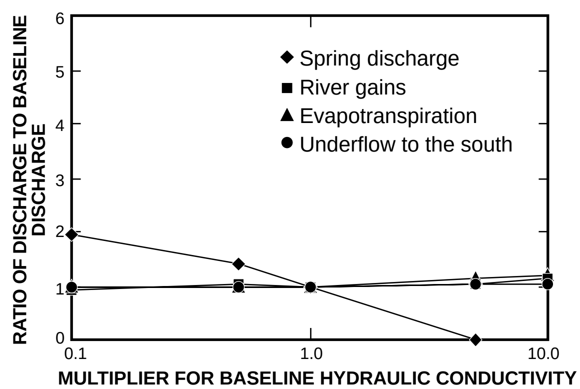

Figure B1-4. Sensitivity of discharge boundaries to variations in horizontal hydraulic conductivity of the basin-fill aquifer in the ground-water flow model of the upper Ash Creek drainage basin, Utah.

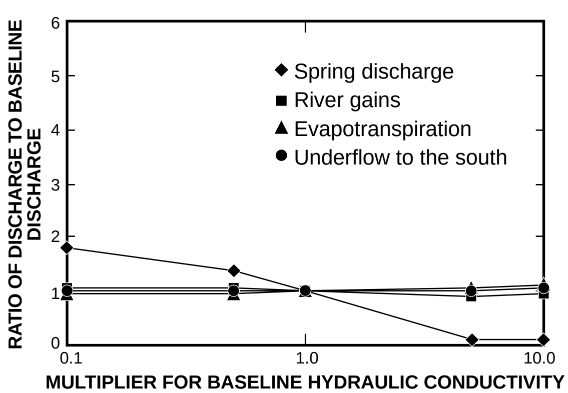

Figure B1-5. Sensitivity of discharge boundaries to variations in horizontal hydraulic conductivity of the alluvial-fan aquifer in the ground-water flow model of the upper Ash Creek drainage basin, Utah.

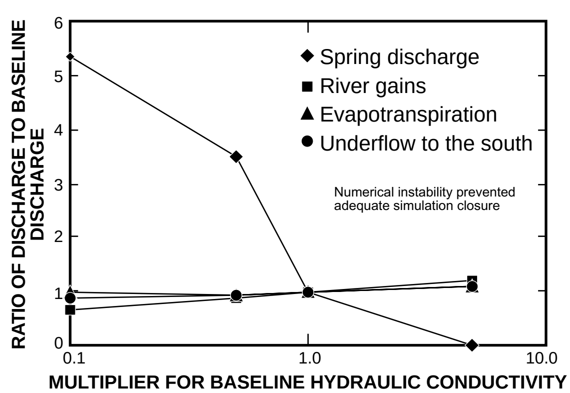

Figure B1-6. Sensitivity of discharge boundaries to variations in horizontal hydraulic conductivity of the Pine Valley monzonite aquifer in the ground-water flow model of the upper Ash Creek drainage basin, Utah.

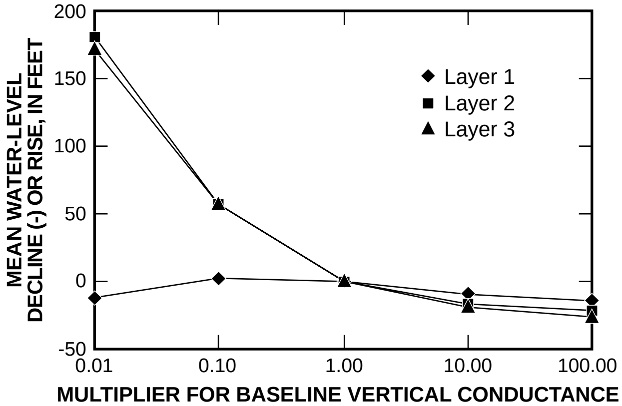

Figure B1-7. Sensitivity of water level to variations in vertical conductance between the basin-fill and alluvial-fan aquifers in the ground-water flow model of the upper Ash Creek drainage basin, Utah.

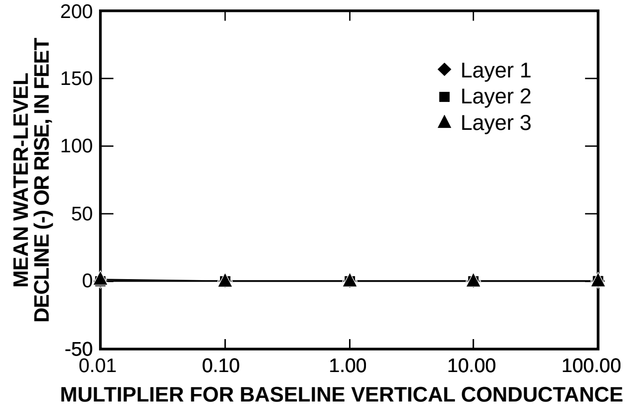

Figure B1-8. Sensitivity of water level to variations in vertical conductance between the alluvial-fan and Pine Valley monzonite aquifers in the ground-water flow model of the upper Ash Creek drainage basin, Utah.

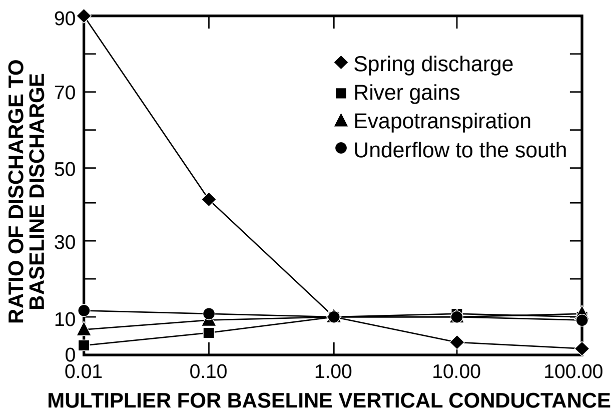

Figure B1-9. Sensitivity of discharge boundaries to variations in vertical conductance between the basin-fill and alluvial-fan aquifers in the ground-water flow model of the upper Ash Creek drainage basin, Utah.

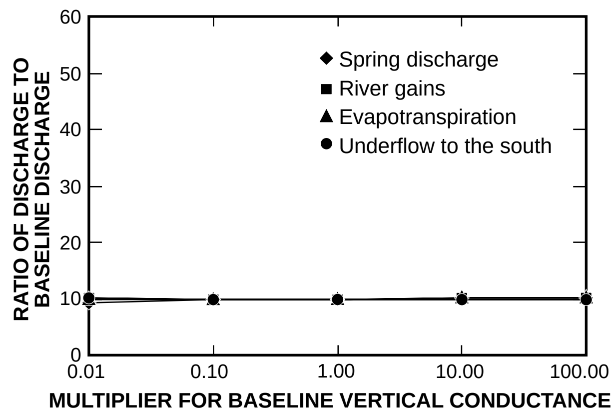

Figure B1-10. Sensitivity of discharge boundaries to variations in vertical conductance between the alluvial-fan and Pine Valley monzonite aquifers in the ground-water flow model of the upper Ash Creek drainage basin, Utah.

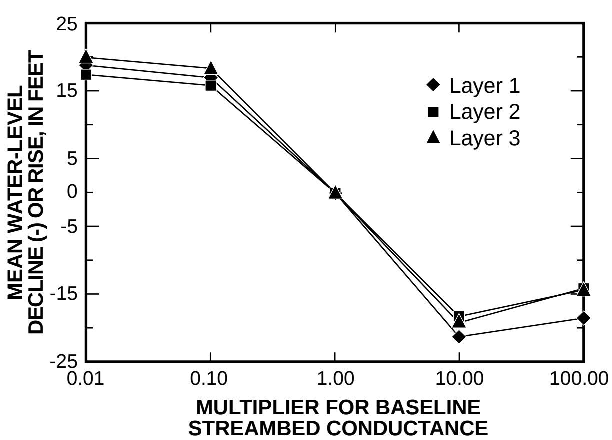

Figure B1-11. Sensitivity of water level to variations in streambed conductance in the ground-water flow model of the upper Ash Creek drainage basin, Utah.

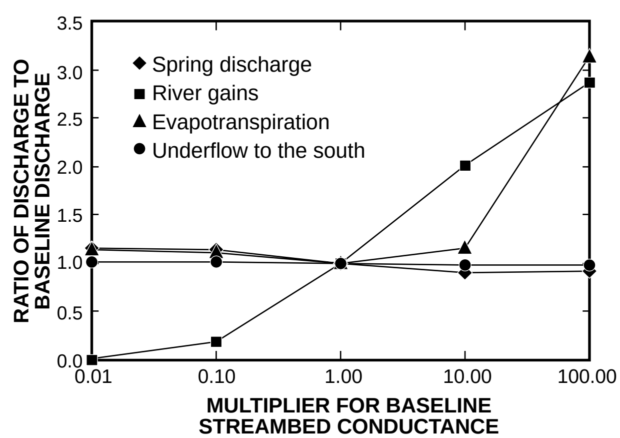

Figure B1-12. Sensitivity of discharge boundaries to variations in streambed conductance in the ground-water flow model of the upper Ash Creek drainage basin, Utah.

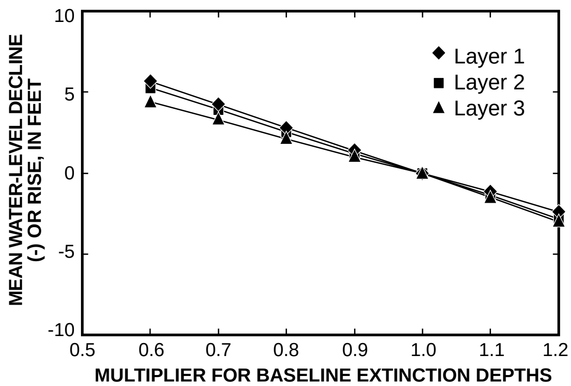

Figure B1-13. Sensitivity of water level to variations in the depth at which evapotranspiration ceases in the ground-water flow model of the upper Ash Creek drainage basin, Utah.

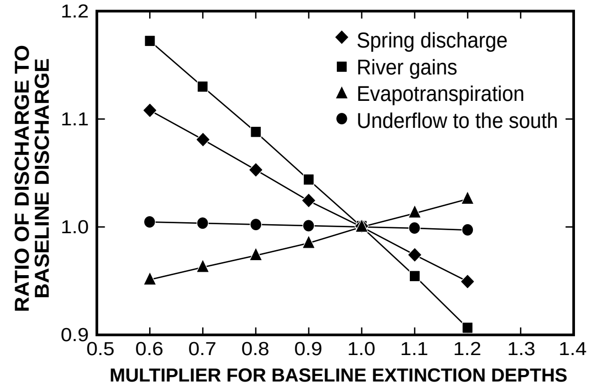

Figure B1-14. Sensitivity of discharge boundaries to variations in the depth at which evapotranspiration ceases in the ground-water flow model of the upper Ash Creek drainage basin, Utah.

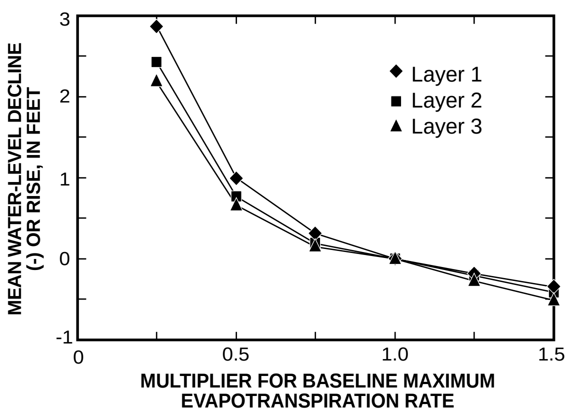

Figure B1-16. Sensitivity of discharge boundaries to variations in the maximum evapotranspiration rate in the ground-water flow model of the upper Ash Creek drainage basin, Utah.

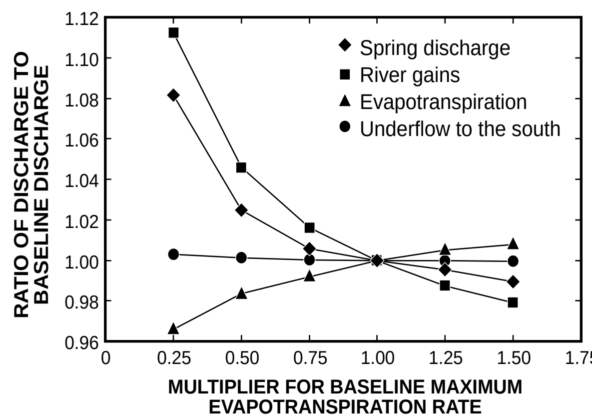

Figure B1-15. Sensitivity of water level to variations in maximum evapotranspiration rate in the ground-water flow model of the upper Ash Creek drainage basin, Utah.