Numerical Modeling of Artificial Aquifer Recharge in the Eastern Snake River Plain

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FY 1998 - FY 1999

The research effort addresses the hydrologic feasibility of large-scale artificial recharge of the Eastern Snake River Plain aquifer (ESPA) in Southern Idaho. Recent declines in groundwater levels and discharges to the Snake River at Thousand Springs have caused concern for stability of the ESPA system, and prompted interest in artificial aquifer recharge as one part of a conjunctive management plan for restoring and sustaining the ESPA system.

Use hydrologic models to develop and evaluate various alternative strategies for large-scale artificial aquifer recharge of the ESPA. Estimate recharge water availability subject to present day institutional and environmental constraints on river diversions. Prioritize recharge locations in the basin based on their potential to meet key hydrologic objectives for artificial recharge. Assess the net impact of large-scale managed recharge on flows in the Snake River.

Four possible scenarios for large-scale artificial aquifer recharge were represented using a numerical model developed by the Idaho Water Resources Research Institute. For each scenario, modeling results describe the expected availability of recharge water, the basin-wide impact of recharge on groundwater levels and on discharge from springs, and the seasonal impacts of recharge on flows in the Snake River.

Modeling results show that large-scale recharge, about 400,000 to 500,000 acre feet per year for 20 years or more, would be required to meet basin-wide hydrologic objectives for restoring the ESPA system. Modeling also reveals that three "aquifer compartments" exist as a result of hydrogeologic features (fault zones and buried lake sediments) which influence the distribution of aquifer transmissivity and river/aquifer interactions within the ESPA. To be effective, artificial recharge must be conducted in the same "aquifer compartment" in which declines in groundwater levels and spring discharges have occurred in the past.
Idaho Department of Water Resources, Idaho Department of Fish and Game, Idaho Power Company, Idaho Water Resources Research Institute

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