

A METHOD FOR ESTIMATING GROUND-WATER RETURN FLOW TO THE COLORADO RIVER IN THE PALO VERDE-CIBOLA AREA, CALIFORNIA AND ARIZONA

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ABSTRACT

Ground-water return flow to the Colorado River was estimated as the residual in water budgets for the areas that drain in the subsurface to the river in Palo Verde and Cibola Valleys, California and Arizona. Two ground-water drainage areas in each valley were delineated using average annual water-table altitudes in the shallow alluvial aquifer that underlies Palo Verde and Cibola Valleys. Surface-water diversions from and returns to the Colorado River were measured. Consumptive use was estimated using a water budget for the area drained by drainage ditches in Palo Verde Valley and was adjusted for the unequal distribution of vegetation types on either side of the ground-water divide. Cibola Valley had no drainage ditches in 1981, and consumptive use was estimated using vegetation types, empirically determined consumptive use, and acreages. Vegetation data were obtained from crop records, crops mapping, and Landsat satellite imagery. A 1-year period was used because river-surface altitudes, ground-water heads, and irrigation-water deliveries follow a 1-year cycle and changes in ground-water storage are probably negligible at the end of the 1-year period. Estimates of ground-water return flow using data from 1981 were 23,900 acre-feet from Palo Verde Valley and 5,200 acre-feet from Cibola Valley.

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