

# **Estimates of Consumptive Use and Ground-Water Return Flow Using Water Budgets in Palo Verde Valley, California**

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## **Abstract**

**Palo Verde Valley, California, is an agricultural area on the flood plain of the Colorado River where irrigation water is diverted from the river and ground water is discharged to a network of drainage ditches and (or) the river. Consumptive use by vegetation and ground-water return flow were calculated using water budgets. Consumptive use by vegetation was 484,000 acre-feet in 1981, 453,600 acre-feet in 1982, 364,400 acre-feet in 1983, and 374,300 acre-feet in 1984. The consumptive use estimates are most sensitive to two measured components of the water budget—the diversion at Palo Verde Dam and the discharge from drainages ditches to the river. Ground-water return flow was 31,700 acre-feet in 1981, 24,000 acre-feet in 1982, 2,500 acre-feet in 1983, and 7,900 acre-feet in 1984. The return-flow estimates are most sensitive to discharge from drainage ditches; various irrigation requirements and crop areas, particularly alfalfa; the diversion at Palo Verde Dam; and the estimate of consumptive use. During increasing flows in the river, the estimate of ground-water return flow is sensitive also to change in ground-water storage.**

**Change in ground-water storage was estimated to be -5,700 acre-feet in 1981, -12,600 acre-feet in 1982, 5,200 acre-feet in 1983, and 11,600 acre-feet in 1984. Change in storage can be a significant component in the water budget used to estimate ground-water return flow but is negligible in the water budget used to estimate consumptive use. Change in storage was 1 to 3 percent of annual consumptive use. Change in storage for the area drained by the river ranged from 7 to 96 percent of annual ground-water return flow during the 4 years studied.**

**Consumptive use calculated as diversions minus return flows was consistently lower than consumptive use calculated in a water budget. Water-budget estimates of consumptive use account for variations in precipitation, tributary inflow, river stage, and ground-water storage. The calculations for diversions minus return flows do not account for these components, which can be large enough to affect the estimates of consumptive use.**

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