

U.S. Department of the Interior
U.S. Geological Survey

Ground-Water Discharge Determined from Measurements of Evapotranspiration, Other Available Hydrologic Components, and Shallow Water-Level Changes, Oasis Valley, Nye County, Nevada

Water-Resources Investigations Report 01-4239

Prepared in cooperation with the
OFFICE OF ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
U.S. DEPARTMENT OF ENERGY
National Nuclear Security Administration
Nevada Operations Office, under
Interagency Agreement DE-AI08-96NV11967



Table 4. Evapotranspiration rates used to compute annual evapotranspiration from Oasis Valley discharge area, Nevada
[Abbreviations: AM, Ash Meadows; OV, Oasis Valley; ft/yr, feet per year]

Site name	Location	Site identifier	ET-unit identifier ¹	Measured ET rate (ft/yr) ²	Average ET rate (ft/yr) ³
Peterson Reservoir	AM	PRESVR	OWB/SAV	8.60	8.6
Fairbanks Swamp	AM	FSWAMP	DWV	3.91	3.9
Carson Meadow	AM	CMEADW	DMV	3.44	
Springdale	OV	SDALE	DMV	3.14	3.3
Fairbanks Meadow	AM	FMEADW	DGV	3.07	
Rogers Spring 2	AM	RGSPR2	DGV	3.23	3.2
Middle Oasis Valley	OV	MOVAL	SGV	2.49	
Bole Spring South	AM	BSSOUT	SGV	1.88	
Rogers Spring 1	AM	RGSPR1	SGV	1.92	2.0
Upper Oasis Valley Middle	OV	UOVMD	SGV	1.63	
Lower Crystal Flat	AM	LCFLAT	MBS	2.58	
Bole Spring North	AM	BSNORT	MBS	2.60	2.6
Upper Oasis Valley Lower	OV	UOVLO	SSV	1.38	
Upper Oasis Valley Upper	OV	UOVUP	SSV	.62	1.2

¹ ET unit descriptions are given in table 1 of this report and in table 7 of Laczniaik and others (1999).

² Rates for sites in Ash Meadows taken from Laczniaik and others (1999, table 7) and in Oasis Valley from table 3 in this report.

³ Average rate is computed as arithmetic mean of measured rates for each ET unit except for SSV. Average rate for SSV is area-weighted average.

ground-water discharge. The precipitation component was removed by decreasing the ET rate by an amount equivalent to the average annual precipitation. The remaining ET is assumed to be that derived from ground water. Removing all the average annual precipitation reasonably assumes that no precipitation leaves the Oasis Valley discharge area as runoff during average conditions.

Mean annual precipitation was estimated from bulk precipitation measurements collected during the study and long-term measurements taken at National Weather Service station Beatty 8N. The average annual precipitation determined from long-term measurements (1972–99) was 6.3 in. (electronic data accessed at <<http://www.wrcc.dri.edu/summary/climsmnv.html>> on June 17, 2001). Based on this average and bulk precipitation measurements, a reasonable estimate of mean annual precipitation for the Oasis Valley area is 6 in. (fig. 14B). Mean annual ground-water ET rates were estimated by subtracting the mean annual precipitation (0.5 ft) from the mean annual ET rate (table 5). As applied, this adjustment assumes that the only source of water other than ground water is the rain falling directly on an ET unit's surface. This assumption discounts as potential sources any water originating from the infiltration of local surface runoff or precipitation falling on the surface of areas of no

substantial ground-water ET. Although a limitation, these assumptions are considered reasonable because local surface runoff is minimized by (1) the fractured nature of the volcanic ridges within the area, and (2) low and infrequent rainfall. In addition, limited available data indicate that much of the local surface runoff occurring throughout the region evaporates before entering the discharge area.

Mean annual ground-water ET from Oasis Valley was estimated by summing the mean annual ground-water ET from each ET unit. Mean annual ground-water ET from each ET unit was computed as the product of the unit's acreage and mean average ground-water ET rate. Estimates of mean annual ground-water ET from individual ET units range from 8.1 acre-ft at OWB and SAV to 2,300 acre-ft at DMV (table 5). The estimate of the mean annual ground-water ET from Oasis Valley is 6,000 acre-ft (table 5).

The estimate of mean annual ground-water ET differs by a factor of 3 from that of Malmberg and Eakin (1962, p. 25). Their estimate of 2,000 acre-ft assumes that there are 3,800 acres of phreatophytes in Oasis Valley and an average ET rate of 0.5 ft/yr, whereas the 6,000 acre-ft estimated in this study assumes that there are 3,426 acres of phreatophytes and moist bare soil and an average ET rate of 1.7 ft/yr (table 5). There is a difference of about 10 percent in the estimated