SURFACE-WATER RESOURCES AND BASIN WATER BUDGET FOR SPRING VALLEY, WHITE PINE AND LINCOLN COUNTIES, NEVADA

For
THE LAS VEGAS VALLEY WATER DISTRICT, LAS VEGAS, NEVADA

2003

By

Terry Katzer, Hydrogeologist
Cordilleran Hydrology, Inc., Reno, Nevada
and
David J. Donovan, Hydrogeologist
Department of Resources
Southern Nevada Water Authority, Las Vegas, Nevada

Table 35.-- Las Vegas Valley Water District water-resource budget for Spring Valley.

Water Resources Budget Component	Brothers and others[1]	This Study
INFLOW	Values in acre-feet/year, rounded	
Precipitation	(966,000)	(1,110,000)
Ground-water recharge	75,000	71,000 [a]
Surface-water runoff	35,000	53,000[b]
Subsurface Inflow from Tippet Valley	2,000 [c]	2,000 [c]
Total (rounded)	**112,000**	**126,000**
OUTFLOW		
Evapotranspiration		
Phreatophytes	70,000	90,000[d]
Crops	21,000	e
Mining, domestic, and stock	2,000	2,000[f]
Surface-water evaporation	15,000	19,000[g]
Ground-water to: Hamlin Valley	4,000	4,000[h]
Steptoe Valley	Not determined	2,000[h]
Snake Valley	Not determined	6,000[i]
Total (rounded)	**112,000**	**123,000**
Imbalance	**0**	**3,000**

1. (1994, Table 7, p. 39)
a. Table 31.
b. Table 13.
c. Rush and others, (1971) and Harrill and others, (1988)
d. Nichols (2000C), includes bare soil evaporation from playas and transpiration from crops, however he lists only (Table C17, p. C44) ~ 18,200 acres. This study using recent LANDSAT coverage determined there were ~ 106,000 acres (Table 29) of playa area.
e. Brothers and others (1994, p. 45) list 6,900 acres under irrigation and according to Nichols (oral commun., 2000) agricultural lands are included in his estimation of ET for phreatophytes.
f. Brothers and others, (1994, Table 7, p. 29).
g. Nichols (2000C, p. C15) considers the area of permanent water to be insignificant for ground-water discharge, however he lists,~7,600 acres of open water from surface-water runoff and the evaporation rate used in this study is estimated at 2.5 af/a/y (Shevenell, 1996).
h. Darcy flow equation determination. Nichols (2000, Table C14, p. C28) estimates 10,000 afy of outflow.
i. Head data presented in Brothers and others (1994, Figure 7, p. 27) does not support ground-water discharge to Snake Valley. However, Nichols (2002C, C14, p. C 28) estimates 4,000 afy of ground water outflows to Snake Valley. For this study we assumed the discharge from hot springs in Snake Valley along an east-west geologic structure between the Snake Range and the Kern Mountains represents interbasin flow from Spring Valley.

The imbalance between inflow and outflow is minor, and equals about 2 percent of the inflow. This small percentage of closure certainly does not infer the estimating techniques are within this degree of accuracy. In just the ET estimates alone, the range of values for phreatophytes is 77,500 to 102,000 afy (Nichols, 2000C, Table C5, p. C15).

There is one other estimate of recharge for Spring Valley made by the USGS and that is the work of Dettinger (1989) who applied a chloride-balance technique. This method assumes a relationship exists between the concentration of chloride deposited in recharge areas and the resulting concentration in the basin's ground-water system. There is some commonality with the Maxey-Eakin method in that both methods use total precipitation on any given basin and for Spring Valley only the Hardman (1936, 1965) precipitation map was available. The total amount of natural ground-water recharge estimated for Spring Valley by Dettinger (1989, Table 2, p. 69)