Ground-Water Pumpage and Artificial Recharge Estimates for Calendar Year 2000 and Average Annual Natural Recharge and Interbasin Flow by Hydrographic Area, Nevada

Scientific Investigations Report 2004–5239

Prepared in cooperation with the
NEVADA DIVISION OF ENVIRONMENTAL PROTECTION

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(Back of Cover)

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by Thomas J. Lopes and David M. Evetts

U.S. GEOLOGICAL SURVEY

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Carson City, Nevada
2004

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CONVERSION FACTORS AND VERTICAL DATUM

Multiply	By	To obtain
acre-foot (acre-ft)	1,233	cubic meter (m^3)
acre-foot per year (acre-ft/yr)	1,233	cubic meter per year (m^3/yr)
foot (ft)	0.3048	meter (m)
gallon (gal)	0.00378	cubic meter (m^3)
million gallons (Mgal)	3,785	cubic meter (m^3)
inch (in.)	2.54	centimeter (cm)
inch per year (in/yr)	25.40	millimeter per year (mm/yr)
mile (mi)	1.609	kilometer (km)
pound (lb)	0.4536	kilogram (kg)

Temperature: Degrees Celsius (^oC) can be converted to degrees Fahrenheit (^oF) by using the formula $^oF = 1.8(^oC)+ 32$. Degrees Fahrenheit can be converted to degrees Celsius by using the formula $^oC = 0.556(^oF-32)$.

Sea level: In this report, “sea level” refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929, formerly called Sea-Level Datum of 1929), which is derived from a general adjustment of the first-order leveling networks of the United States and Canada.

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ABSTRACT

Nevada's reliance on ground-water resources has increased because of increased development and surface-water resources being fully appropriated. The need to accurately quantify Nevada's water resources and water use is more critical than ever to meet future demands. Estimated ground-water pumpage, artificial and natural recharge, and interbasin flow can be used to help evaluate stresses on aquifer systems. In this report, estimates of ground-water pumpage and artificial recharge during calendar year 2000 were made using data from a variety of sources, such as reported estimates and estimates made using Landsat satellite imagery. Average annual natural recharge and interbasin flow were compiled from published reports.

An estimated 1,427,100 acre-feet of ground water was pumped in Nevada during calendar year 2000. This total was calculated by summing six categories of ground-water pumpage, based on water use. Total artificial recharge during 2000 was about 145,970 acre-feet. At least one estimate of natural recharge was available for 209 of the 232 hydrographic areas (HAs). Natural recharge for the 209 HAs ranges from 1,793,420 to 2,583,150 acre-feet. Estimates of interbasin flow were available for 151 HAs.

The categories and their percentage of the total ground-water pumpage are irrigation and stock watering (47 percent), mining (26 percent), water systems (14 percent), geothermal production (8 percent), self-supplied domestic (4 percent), and miscellaneous (less than 1 percent). Pumpage in the top 10 HAs accounted for about 49 percent of the total ground-water pumpage. The most ground-water pumpage in an HA was due to mining in Pumpernickel Valley (HA 65), Boulder Flat (HA 61), and Lower Reese River Valley (HA 59). Pumpage by water systems in Las Vegas Valley (HA 212) and Truckee Meadows (HA 87) were the fourth and fifth highest pumpage in 2000, respectively. Irrigation and stock watering pumpage accounted for most ground-water withdrawals in the HAs with the sixth through ninth highest pumpage. Geothermal production accounted for most pumpage in the Carson Desert (HA 101).

Reinjection of ground water pumped for geothermal energy production accounted for about 64 percent (93,310 acre-feet) of the total artificial recharge. The only artificial recharge by water systems was in Las Vegas Valley, where 29,790 acre-feet of water from the Colorado River was injected into the aquifer system. Artificial recharge by mining totaled 22,870 acre-feet.

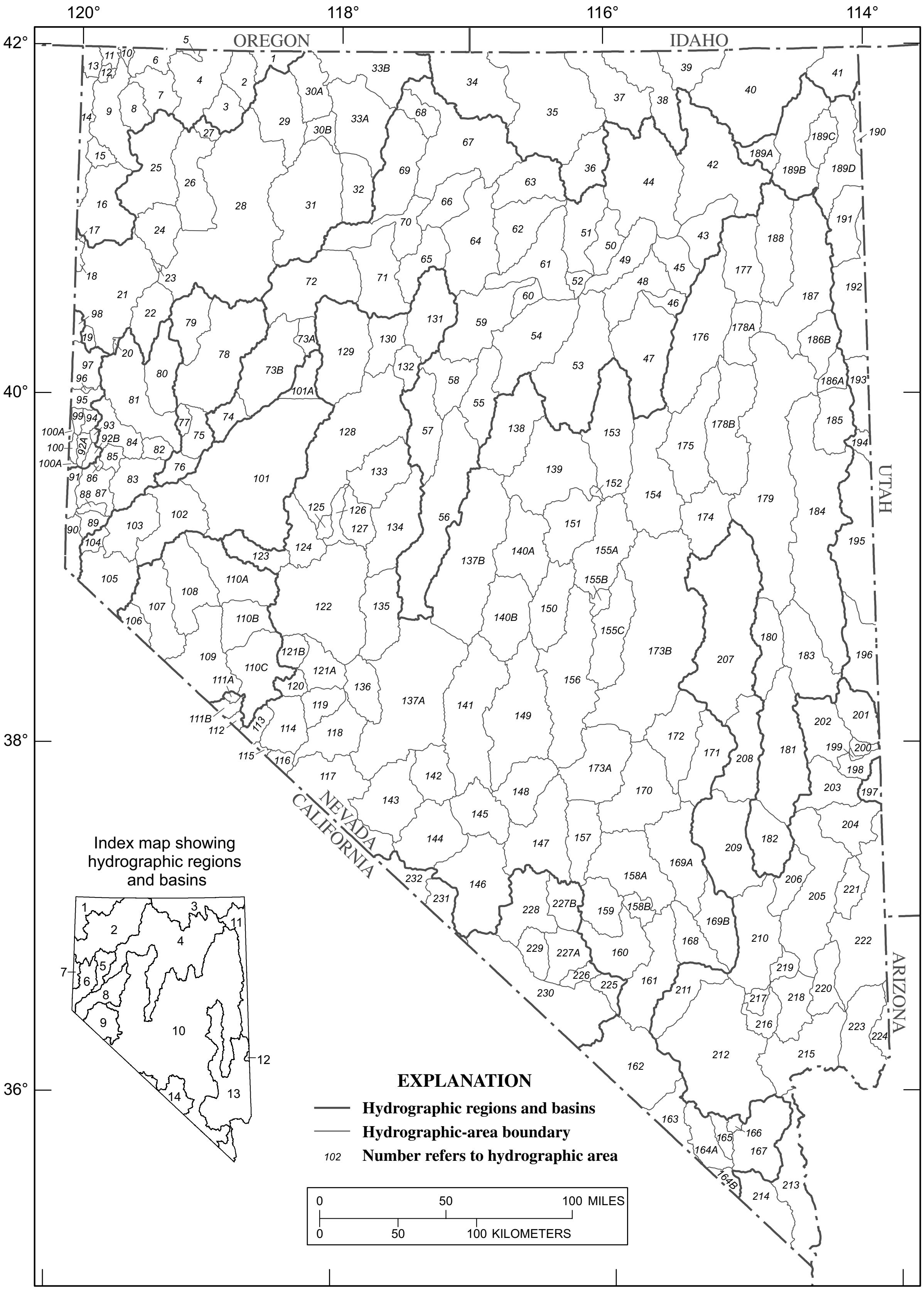
Net ground-water flow was estimated only for the 143 HAs with available estimates of both natural recharge and interbasin flow. Of the 143 estimates, 58 have negative net ground-water flow, indicating that ground-water storage could be depleted if pumpage continues at the same rate. The State has designated HAs where permitted ground-water rights approach or exceed the estimated average annual recharge. Ten HAs were identified that are not designated and have a net ground-water flow between -1,000 to -35,000 acre-feet. Due to uncertainties in recharge, the water budgets for these HAs may need refining to determine if ground-water storage is being depleted.

INTRODUCTION

Nevada is the driest state in the Nation with an average annual precipitation of 9 in. and as little as 3 to 4 in. in the southern parts of the State (Houghton and others, 1975). Nevada also is one of the fastest growing states. The population increased from about 1.2 million in 1990 to 2.2 million in 2002 and is projected to reach 3 million by 2022 (Nevada State Demographer, 2004a, b). Nevada's reliance on ground water has increased because of increased development and surface-water resources being fully appropriated (Nevada Department of Conservation and Natural Resources, 1999). The need to accurately quantify Nevada's water resources and water use is more critical than ever to meet future demands.

Most ground water in Nevada is pumped from basin-fill aquifer systems. Basin-fill aquifer systems underlie the valleys and consist mostly of unconsolidated lacustrine, colluvial, and alluvial sediments (Maurer and others, 2004). Bedrock aquifer systems are pumped to a lesser extent. However, water suppliers have become interested in bedrock aquifer systems to meet future water demands. Bedrock aquifer systems, consisting primarily of carbonate-rock and volcanic-rock aquifers, form many of the mountain ranges surrounding the valleys and underlie many basin-fill aquifer systems. Basin-fill and bedrock aquifer systems vary in productivity due to differences in hydraulic properties such as storage and transmissivity, and recharge rates.

Recharge to aquifer systems in Nevada occurs primarily by infiltration of precipitation in the ranges that form the boundaries of the hydrographic areas (HAs; fig. 1). Generally, it is believed that annual precipitation on the ranges in excess of 8 in. contributes to ground-water recharge, whereas most



Modified from Rush (1968)

Figure 1. Hydrographic areas of Nevada.

STATE OF NEVADA--HYDROGRAPHIC AREAS

1-NORTHWEST REGION

1. Pueblo V.
2. Continental Lake V.
3. Gridley Lake V.
4. Virgin V.
5. Sage Hen V.
6. Guano V.
7. Swan Lake V.
8. Massacre Lake V.
9. Long V.
10. Macy Flat
11. Coleman V.
12. Mosquito V.
13. Warner V.
14. Surprise V.
15. Boulder V.
16. Duck Lake V.

2-BLACK ROCK DESERT REGION

17. Pilgrim Flat
18. Painter Flat
19. Dry V.
20. Sano V.
21. Smoke Creek Desert
22. San Emidio Desert
23. Granite Basin
24. Hualapai Flat
25. High Rock Lake V.
26. Mud Meadow
27. Summit Lake V.
28. Black Rock Desert
29. Pine Forest V.
30. Kings River V.
    (A) Rio King Subarea
    (B) Sod House Subarea
31. Desert V.
32. Silver State V.
33. Quinn River V.
    (A) Orovada Subarea
    (B) McDermitt Subarea

3-SNAKE RIVER BASIN

34. Little Owyhee River Area
35. South Fork Owyhee River Area
36. Independence V.
37. Owyhee River Area
38. Bruneau River Area
39. Jarbidge River Area
40. Salmon Falls Creek Area
41. Goose Creek Area

4-HUMBOLDT RIVER BASIN

42. Marys River Area
43. Starr V. Area
44. North Fork Area
45. Lamoille V.
46. South Fork Area
47. Huntington V.
48. Dixie Creek --
    Tenmile Creek Area
49. Elko Segment
50. Susie Creek Area
51. Maggie Creek Area
52. Marys Creek Area
53. Pine V.
54. Crescent V.
55. Carico Lake V.
56. Upper Reese River V.
57. Antelope V.
58. Middle Reese River V.
59. Lower Reese River V.
60. Whirlwind V.
61. Boulder Flat
62. Rock Creek V.
63. Willow Creek V.
64. Clovers Area
65. Pumpernickel V.
66. Kelly Creek Area
67. Little Humboldt V.
68. Hardscrabble Area
69. Paradise V.
70. Winnemucca Segment
71. Grass V.
72. Imlay Area
73. Lovelock V.
    (A) Oreana Subarea
74. White Plains

5-WEST CENTRAL REGION

75. Bradys Hot Springs Area
76. Fernley Area
77. Fireball V.
78. Granite Springs V.
79. Kumiva V.

6-TRUCKEE RIVER BASIN

80. Winnemucca Lake V.
81. Pyramid Lake V.
82. Dodge Flat
83. Tracy Segment
84. Warm Springs V.
85. Spanish Springs V.
86. Sun V.
87. Truckee Meadows
88. Pleasant V.
89. Washoe V.
90. Lake Tahoe Basin
91. Truckee Canyon Segment

7-WESTERN REGION

92. Lemmon V.
    (A) Western Part
    (B) Eastern Part
93. Antelope V.
94. Bedell Flat
95. Dry V.
96. Newcomb Lake V.
97. Honey Lake V.
98. Skedaddle Creek V.
99. Red Rock V.
100. Cold Spring V.
    (A) Long V.

8-CARSON RIVER BASIN

101. Carson Desert
    (A) Packard V.
102. Churchill V.
103. Dayton V.
104. Eagle V.
105. Carson Valley

9-WALKER RIVER BASIN

106. Antelope V.
107. Smith V.
108. Mason V.
109. East Walker Area
110. Walker Lake V.
    (A) Schurz Subarea
    (B) Lake Subarea
    (C) Whisky Flat --
        Hawthorne Subarea

10-CENTRAL REGION

111. Alkali V. (Mineral).
    (A) Northern Part
    (B) Southern Part
112. Mono V.
113. Huntoon V.
114. Teels Marsh V.
115. Adobe V.
116. Queen V.
117. Fish Lake V.
118. Columbus Salt Marsh V.
119. Rhodes Salt Marsh V.
120. Garfield Flat
121. Soda Spring V.
    (A) Eastern Part
    (B) Western Part
122. Gabbs V.
123. Rawhide Flats
124. Fairview V.
125. Stingaree V.
126. Cowkick V.
127. Eastgate V. Area
128. Dixie V.
129. Buena Vista V.
130. Pleasant V.
131. Buffalo V.
132. Jersey V.
133. Edwards Creek V.
134. Smith Creek V.
135. Ione V.
136. Monte Cristo V.
137. Big Smoky V.
    (A) Tonopah Flat
    (B) Northern Part
138. Grass V.
139. Kobeh V.
140. Monitor V.
    (A) Northern Part
    (B) Southern Part
141. Ralston V.
142. Alkali Spring V. (Esmeralda)
143. Clayton V.
144. Lida V.
145. Stonewall Flat
146. Sarcobatus Flat
147. Gold Flat
148. Cactus Flat
149. Stone Cabin V.
150. Little Fish Lake V.
151. Antelope V. (Eureka & Nye)
152. Stevens Basin
153. Diamond V.
154. Newark V.
155. Little Smoky V.
    (A) Northern Part
    (B) Central Part
    (C) Southern Part
156. Hot Creek V.
157. Kawich V.
158. Emigrant V.
    (A) Groom Lake V.
    (B) Papoose Lake V.
159. Yucca Flat
160. Frenchman Flat
161. Indian Springs V.
162. Pahrump V.
163. Mesquite V. (Sandy V.)
164. Ivanpah V.
    (A) Northern Part
    (B) Southern Part
165. Jean Lake V.
166. Hidden V. (South)
167. Eldorado V.
168. Three Lakes V. (Northern Part)
169. Tikapoo V. (Tickaboo V.)
    (A) Northern Part
    (B) Southern Part
170. Penoyer V. (Sand Spring V.)
171. Coal V.
172. Garden V.
173. Railroad V.
    (A) Southern Part
    (B) Northern Part
174. Jakes V.
175. Long V.
176. Ruby V.
177. Clover V.
178. Butte V.
    (A) Northern Part (Round V.)
    (B) Southern Part
179. Steptoe V.
180. Cave V.
181. Dry Lake V.
182. Delamar V.
183. Lake V.
184. Spring V.
185. Tippett V.
186. Antelope V. (White Pine & Elko)
    (A) Southern Part
    (B) Northern Part
187. Goshute V.
188. Independence V. (Pequop V.)

11-GREAT SALT LAKE BASIN

189. Thousand Springs V.
    (A) Herrill Siding--Brush Creek Area
    (B) Toano--Rock Spring Area
    (C) Rocky Butte Area
    (D) Montello--Crittenden Creek Area
        (Montello V.)
190. Grouse Creek V.
191. Pilot Creek V.
192. Great Salt Lake Desert
193. Deep Creek V.
194. Pleasant V.
195. Snake V.
196. Hamlin V.

12-ESCALANTE DESERT

197. Escalante Desert

13-COLORADO RIVER BASIN

198. Dry V.
199. Rose V.
200. Eagle V.
201. Spring V.
202. Patterson V.
203. Panaca V.
204. Clover V.
205. Lower Meadow Valley Wash
206. Kane Springs V.
207. White River V.
208. Pahroc V.
209. Pahranagat V.
210. Coyote Spring V.
211. Three Lakes V. (Southern Part)*
212. Las Vegas V.
213. Colorado V.
214. Piute V.
215. Black Mountains Area
216. Garnet V. (Dry Lake V.)*
217. Hidden V. (North)*
218. California Wash
219. Muddy River Springs Area (Upper Moapa V.)
220. Lower Moapa V.
221. Tule Desert
222. Virgin River V.
223. Gold Butte Area
224. Greasewood Basin

*Noncontributing part of the Colorado River Basin

14-DEATH VALLEY BASIN

225. Mercury V.
226. Rock V.
227. Fortymile Canyon
    (A) Jackass Flats
    (B) Buckboard Mesa
228. Oasis V.
229. Crater Flat
230. Amargosa Desert
231. Grapevine Canyon
232. Oriental Wash

precipitation on the valley floors does not contribute to recharge (Maxey and Eakin, 1949; Nichols, 2000). Artificial recharge occurs through ground-water injection and rapid-infiltration techniques used by water utilities, mining, and geothermal companies.

Agriculture, mining, public water systems, and the rural domestic population in Nevada rely heavily on ground-water withdrawals. Rapid population growth has increased demands for ground-water resources in much of the State. To quantify the stress applied to the aquifer systems, ground-water pumpage and artificial recharge for calendar year 2000 were estimated and compared to published estimates of average annual recharge and interbasin flow.

Purpose and Scope

This report documents estimates of ground-water pumpage and artificial recharge during calendar year 2000 for the 232 HAs in Nevada, published estimates of average annual recharge and interbasin flow, and estimates of net ground-water flow. Ground-water pumpage was estimated for six categories based on the primary use of ground water. The categories are irrigation and stock watering, mining, water systems, geothermal production, self-supplied domestic, and miscellaneous. The total ground-water pumpage for each HA is the summation of ground-water pumpage for each of these six categories. Total inflow to an HA is the summation of artificial recharge, natural recharge, and interbasin inflow. Total outflow is the summation of total ground-water pumpage and interbasin outflow. Net ground-water flow is the difference between total inflow and total outflow excluding evapotranspiration.

Previous Investigations

Many reports have been published that estimate ground-water pumpage and use in Nevada. The U.S. Geological Survey (USGS) publishes water use by state and geologic regions for the United States every 5 years, in which water use is estimated for eight categories (MacKichan, 1951, 1957; MacKichan and Kammerer, 1961; Murray, 1971; Murray and Reeves, 1972, 1977; Solley and others, 1983, 1993, 1998; and Hutson and others, 2004). Every 5 years, the USGS also publishes estimated water use for 10 categories for counties, hydrographic regions, and hydrologic cataloging units for Nevada (Crompton and Frick, 1996). The State of Nevada also has reported water use and pumpage, in which water usage is estimated by county and hydrographic area (Smales and Harrill, 1971; Harrill and Worts, 1968; Nevada Department of Conservation and Natural Resources, 1999).

Natural recharge has been estimated for most of the 232 HAs in Nevada. The primary sources of natural-recharge estimates are the Water-Resources Reconnaissance Series Reports and the Water-Resources Bulletins published by the Nevada Department of Conservation and Natural Resources. Most of these reports also have estimates of interbasin flow. No previous report has compiled these recharge and interbasin-flow estimates.

METHODS

A variety of data sources were used to estimate ground-water pumpage, artificial recharge, natural recharge, and interbasin flow for the HAs in Nevada. Available ground-water pumpage and crop inventory reports were the primary sources of pumpage and artificial-recharge data (from the files of the State Engineer's Office, Nevada Division of Water Resources, written commun., 2002). In the absence of inventory reports, quarterly and monthly pumpage reports submitted by individual water users and geothermal operations during 2000 were used. Lastly, if no pumpage was reported, pumpage for the HA was estimated using Landsat imagery, statistical analysis, and mass-balance calculations. Estimates of natural recharge and interbasin flow were compiled from existing publications.

Reported Estimates of Ground-Water Pumpage, Recharge, and Interbasin Flow

Ground-water pumpage estimates for 7 percent of Nevada's HAs and 50 percent of the total estimated pumpage were obtained from ground-water pumpage inventories. Pumpage inventories are conducted annually by the Nevada Division of Water Resources (NDWR) for HAs with large ground-water withdrawals. These inventories include estimates in several categories such as agriculture, water systems, domestic supply (hereafter referred to as self-supplied domestic), mining, and miscellaneous. There was no pumpage for some categories of use in some HAs.

Crop inventories are done by NDWR and were available for 37 percent of Nevada's HAs. Annual crop inventories tally agricultural acreage by crop type. Nevada's primary crops are alfalfa, hay, wheat, potatoes, garlic, and onions (Nevada Department of Conservation and Natural Resources, 1999). Irrigation pumpage is estimated based on water-application rates for each crop type; application rates can vary between HAs depending on a variety of factors such as elevation, latitude and longitude, and precipitation. When acreage is reported but not pumpage, an estimate was made based on acreage of each crop type in the HA and the water-application rate reported in crop inventories of nearby HAs.

Quarterly pumpage reports are submitted by the larger water systems to NDWR as part of the permit agreement. These water systems include public, industrial, commercial, and mining. Quarterly pumpage reports include the pumpage for each metered well and the HA in which the well is located. Ground-water pumpage and artificial recharge amounts for geothermal operations were provided in monthly pumpage-injection reports (from the files of the State Administrator's Office, Nevada Commission on Mineral Resources, written commun., 2002).

Where applicable, artificial recharge during 2000 is documented in quarterly pumpage reports and ground-water pumpage inventories. Artificial recharge from mining operations using injection and rapid infiltration techniques are supplied through quarterly pumpage reports submitted to NDWR. Injection in Las Vegas Valley is reported in the 2000 pumpage inventory for that area (Coache, 2001). Injection of water from geothermal plant operations is provided by monthly pumpage-injection reports (from the files of the State Administrator's Office, Nevada Commission on Mineral Resources, written commun., 2002).

Most estimates of natural recharge and interbasin flow were published in the Nevada Department of Conservation and Natural Resources Water-Resources Reconnaissance Series Reports and Water-Resources Bulletins during the 1960's and 1970's (apps. 1–3 at back of report). More recent estimates were compiled from USGS reports. Estimates also have been made by universities, water-resources agencies, and consultants. However, it was beyond the scope of this report to compile all estimates of recharge and interbasin flow that have been made in the State.

Estimated Ground-Water Pumpage

If a pumpage inventory or crop inventory was not available for an HA, then pumpage was estimated using various methods. Irrigation and stock watering pumpage was estimated by mapping irrigated land using Landsat 7 and 5 Thematic Mapper, false color composite imagery taken during April and May 2000. On these images, agricultural land irrigated by ground water appears as large green circles. Agricultural areas that were possibly supplied by springs or surface water, indicated by irregular coloring of the fields and nongeometric shapes, were not included. Gap Analysis Program (GAP) data and a vegetation map for Nevada were used to compare and locate the agricultural areas within the HAs. The acreage of irrigated fields were calculated and tallied for each HA. The crop type was assumed to be alfalfa, the most common crop in Nevada, with a water-application rate of 3.5 acre-ft/yr, which is an average of rates used in crop inventories.

The majority of the public water-system pumpage in this report was estimated using information from the Safe Drinking Water Information System (SDWIS; U.S. Environmental Protection Agency, 2004) database. The SDWIS database contains information on the public water systems throughout the State based on three categories: community water systems, such as city water systems and mobile home parks; noncommunity nontransient systems, such as schools and community services; and noncommunity transient water systems, such as hotels and campgrounds. SDWIS includes the county in which the water system is located, estimated population served by the water system, primary water source (ground water, surface water, or both), system status (active, nonactive), and water-system identification number. However, SDWIS does not include the amount of ground-water pumpage. Thus, pumpage was estimated for active water systems with ground water as their primary source of water.

In order to estimate pumpage for public water systems, the per-capita pumpage needed to be estimated. NDWR estimated 315 gal/d/capita (0.35 acre-ft/yr/capita; Nevada Department of Conservation and Natural Resources, 1999). This estimate was calculated by dividing the total amount of water supplied by public water systems in 1995 by the estimated population served (Nevada Department of Conservation and Natural Resources, 1999). This rate includes public supplied water for domestic, industrial, and commercial uses from ground- and surface-water sources. The per-capita rate for domestic public supplied water was 206 gal/d (0.23 acre-ft/yr), which is 65 percent of the total per-capita pumpage rate. NDWR assumed that self-supplied domestic pumpage was 90 percent of the domestic public-supplied rate (0.21 acre-ft/yr), which is 58 percent of the total per-capita pumpage rate. These per-capita rates were not used in this analysis because they are based on water systems that use surface and ground water.

For this report, per-capita pumpage was calculated from public water systems that use only ground water. Pumpage from quarterly pumpage reports and population served from SDWIS were compared for 41 water systems throughout Nevada. A strong correlation ($r^2 = 0.88$) exists between ground-water pumpage and the population served (fig. 2). The correlations between per-capita pumpage and location of the water system, and between per-capita pumpage and income from the 2000 census also were considered because climate and income could influence the per-capita pumpage rate. Correlations between per-capita pumpage and latitude, longitude, and income did not exist ($r^2 < 0.02$), indicating location and income did not affect per-capita pumpage.

A simple first-order linear regression model (Draper and Smith, 1966) was applied to the amount of ground-water pumpage and the population served by the water system with the regression line forced through the origin. The slope of the regression line (0.40 acre-ft/yr/capita) represents the per-capita pumpage rate and compares well with per-capita water use estimated by NDWR. The population served by public water systems with no pumpage data in the SDWIS database was multiplied by the per-capita pumpage rate to estimate the total ground-water pumpage by public water systems for the HA. Self-supplied domestic pumpage was assumed to be 58 percent (0.23 acre-ft/yr/capita) of the per-capita rate for public water systems (Nevada Department of Conservation and Natural Resources, 1999).

Reported population served in the SDWIS database was estimated by multiplying the number of ¾-in. domestic connections by the average number of people per household. Because this population estimate is not based directly on population, the 2000 census population estimates were compared with the SDWIS population estimates. A demographic data set from GeoLytics, Inc. (2001), provided 2000 census population data

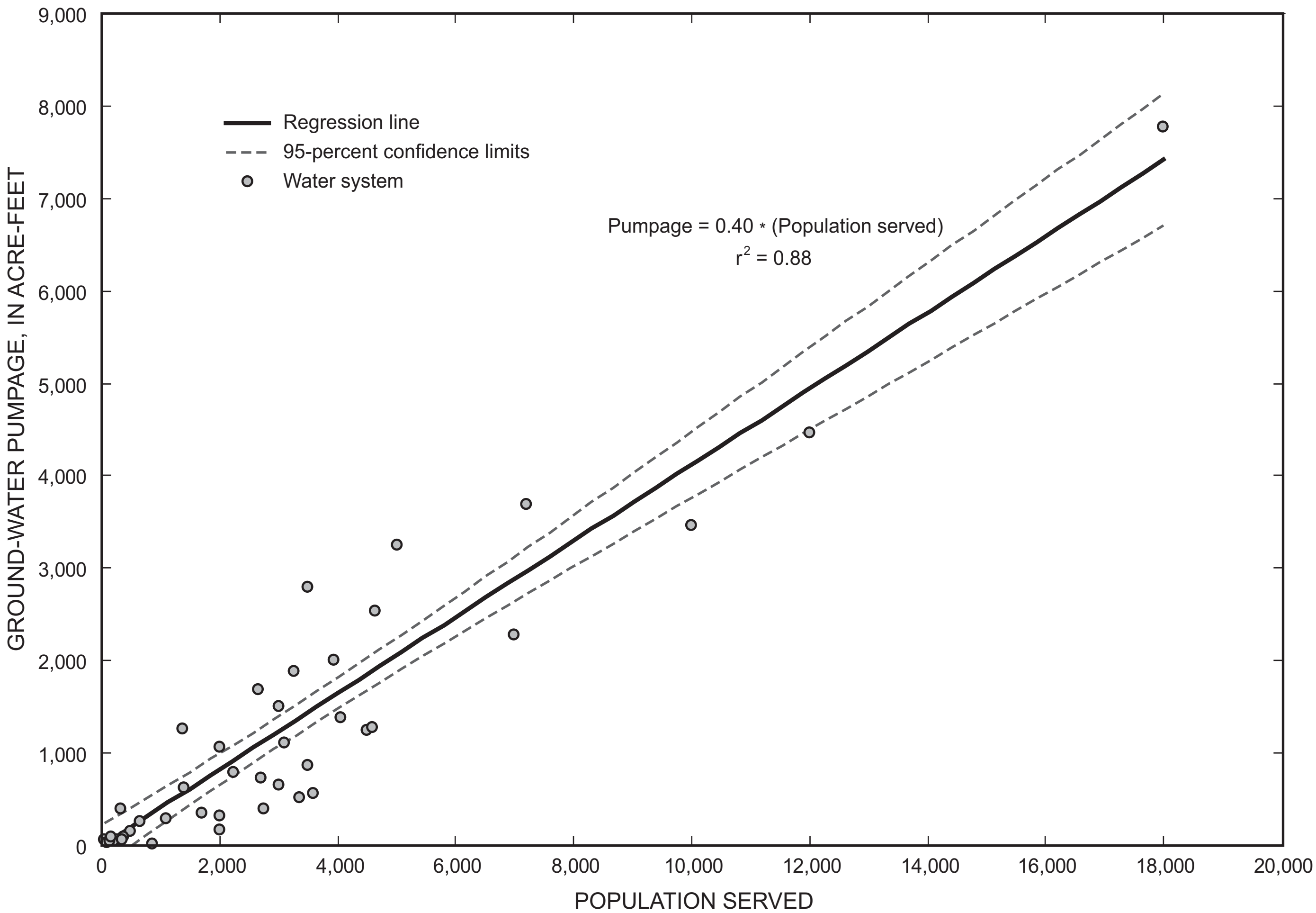


Figure 2. Ground-water pumpage as a function of the population served by public water systems.

in the form of population density blocks 100 meters (328 ft) on a side. The population value for each block represents the number of people per square kilometer. The geographic location was then cross-referenced with a geographic-information-system (GIS) dataset containing HA boundaries. The block population values then were totaled to estimate the total population in each HA.

Some inconsistencies were found when population data from the 2000 census and the SDWIS database were compared. In instances where SDWIS population data were available but census data were not, the location of the water system in question was verified. If the location was accurate, the population for the HA was assumed to be completely on public water systems with no self-supplied domestic pumpage. If the location of the water system was inaccurate, the population in the SDWIS database was moved to the correct HA under the water-system category. In instances where the census data were less than the population served in SDWIS, the 2000 census data were used because the SDWIS data are estimated from the number of domestic connections and not directly from population. In this case, it was assumed that the entire population defined by the 2000 census was served by the water system(s) in that HA and no pumpage was from private-domestic wells. In instances where the census data were more than the population served in SDWIS database, the remainder of the population was assumed to use self-supplied domestic water.

Public water systems in the SDWIS database are listed by county rather than HA. Three methods were used to correctly place the water system within an HA. A GIS dataset of political and topographic points was used to locate water systems for parks, schools, and communities. These points were then cross-referenced with the GIS dataset of HA boundaries to identify the HA containing the specified point. For water systems not found in the political and topographic points dataset, a search was done on the World Wide Web (WWW) for the physical address of the water system. If this search was unsuccessful, the location of the water system was assumed to be the contact address, provided by the SDWIS database, and assigned to the corresponding HA.

No pumpage reports or inventories were available for a lithium mine in Clayton Valley (HA143; fig. 1), which pumps large amounts of saline ground water. The lithium mine produced 17 million pounds of lithium carbonate and lithium hydroxide in 1998 (Castor, 1999). Lithium constitutes about 22 percent of this weight, assuming equal weights of lithium compounds. The concentration of lithium in the brine solution is about 300 parts per million. The concentration of total dissolved solids is about 30 percent with more than 94 percent of the dissolved solids consisting of sodium chloride (Papke, 1976). Because the total dissolved solids of the brine primarily is sodium chloride, the specific gravity of the brine is assumed to be 1.2 (Weast, 1970). The 1998 pumpage for the lithium mine was assumed to be the same in 2000, which was estimated using the following mass-balance equation and converted to acre-feet.

$$(Q) = \frac{(Pr) \times (Lwt) \times \left[\frac{1 \times 10^{6} lbs(brine)}{300 lbs(Li)}\right]}{SG(brine) \times \left(\frac{8.33 lbs}{1 gal(water)}\right)} \times 10^{-6} (Mgal)/(gal)$$

where Q is ground-water pumpage, in million gallons,
Pr is lithium compound production, in pounds,
Lwt is the fraction of lithium in lithium compounds, and
SG is specific gravity of the brine.

Assumptions and Accuracy of Ground-Water Pumpage Estimates

Assumptions were made in estimating the ground-water pumpage by HA for Nevada. For the irrigation and stock watering category, when an estimate was not provided by pumpage or crop inventory reports, assumed crop-water application rates were estimated based on ground-water pumpage data from surrounding HAs. An estimated 3.5 acre-ft/yr of ground water was assumed to be used on circular fields found using Landsat imagery; this amount is the average water application rate for alfalfa, the most common crop grown in Nevada.

SDWIS database uses the assumption that 2.8 people are supplied by domestic line connections to calculate the population served by a given water system; this is based on the 1995 census average of 2.8 people per household (U.S. Environmental Protection Agency, 2004). To estimate self-supplied domestic pumpage, the per-capita rate was assumed to be 90 percent of the domestic per-capita rate of public water systems (Nevada Department of Conservation and Natural Resources, 1999).

Estimates of ground-water pumpage and artificial recharge were rounded to the nearest 10 acre-ft because higher rounding would result in some estimates being eliminated. Eliminating these estimates would have negligible effect on the total amounts, but the small values could be of interest in certain HAs. Estimates of natural recharge and interbasin flow were used as reported. The accuracy of estimates presented in this report could not be determined, but it is less than indicated by the significant figures listed in table 1 (at back of report).

GROUND-WATER PUMPAGE AND ARTIFICIAL RECHARGE

An estimated 1,427,100 acre-ft of ground water was pumped in Nevada during 2000 (table 1). Irrigation and stock watering accounted for about 47.2 percent of the total pumpage, followed by mining (26.1 percent), water systems (13.7 percent), geothermal production (7.7 percent), self-supplied domestic (4.5 percent), and miscellaneous (0.8 percent; fig. 3). The 10 HAs with the greatest amount of pumpage accounted for about 49 percent of the total ground-water pumpage (fig. 4). The most ground-water pumpage in a HA was due to mining in Pumpernickel Valley (HA 65), Boulder Flat (HA 61), and Lower Reese River Valley (HA 59), which accounted for almost 19 percent of the total ground-water pumpage. Pumpage by water systems in Las Vegas Valley (HA 212) and the Truckee Meadows (HA 87) had the fourth and fifth highest pumpage in 2000, respectively. Irrigation and stock watering pumpage accounted for most ground-water withdrawals in the HAs with the sixth through ninth highest pumpage. Geothermal production accounted for most pumpage in the Carson Desert (HA 101).

Total artificial recharge during 2000 was about 145,970 acre-ft (table 1). About 64 percent (93,310 acre-ft) of artificial recharge was reinjection of ground water pumped for geothermal energy production (from the files of Nevada Commission on Mineral Resources, written commun., 2002). The only artificial recharge by water systems was in Las Vegas Valley, where 29,790 acre-ft of water from the Colorado River was injected into the aquifer system (Coache, 2001). Artificial recharge by mining totaled 22,870 acre-ft.

Irrigation and stock watering used 674,000 acre-ft of ground water in 78 of the 232 HAs in 2000. About 35 percent of the irrigation pumpage took place in four HAs (fig. 5): Diamond Valley (70,600 acre-ft), Mason Valley (63,170 acre-ft), Quinn River Valley (51,980 acre-ft), and Paradise Valley (51,120 acre-ft). A total of 371,930 acre-ft of ground water was pumped by 64 mining operations in 34 HAs. Over 67 percent of the pumpage for mining occurred in three HAs: Pumpernickel Valley (92,550 acre-ft), Boulder Flat (89,890 acre-ft), and Lower Reese River Valley (68,200 acre-ft).

Total water-system pumpage was 195,590 acre-ft. Although Las Vegas relies primarily on surface water from the Colorado River, 35 percent (68,500 acre-ft) of the ground-water pumpage by water systems occurred in Las Vegas Valley (HA 212; fig. 1; Coache, 2001). Truckee Meadows (HA 87) and Eagle Valley (HA 104) also primarily rely on surface water, but account for about 11 percent (21,220 acre-ft) and 9 percent (18,200 acre-ft),

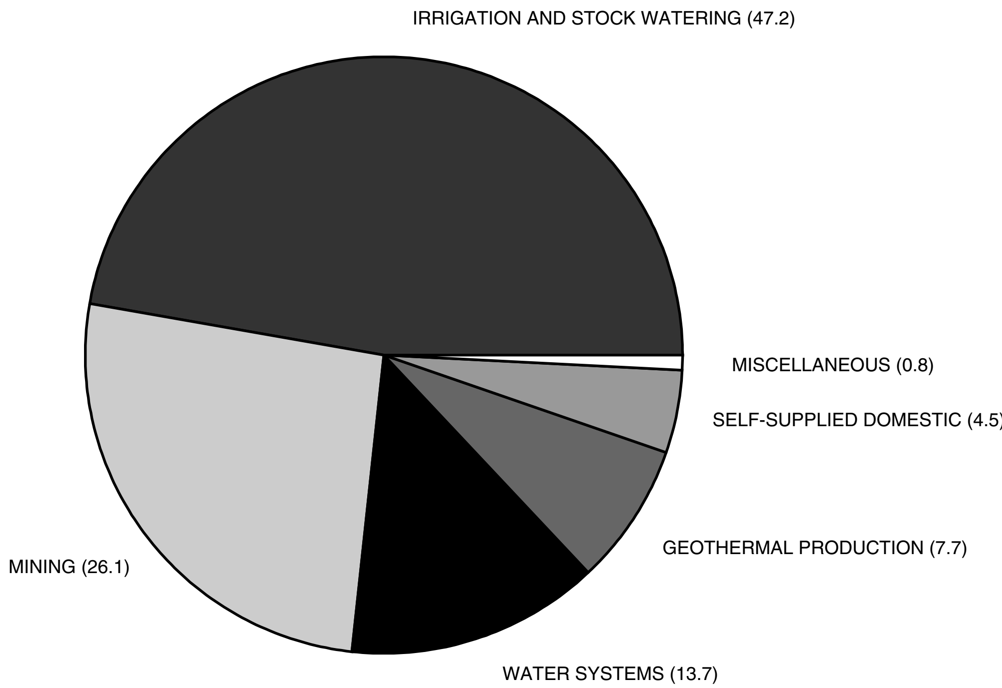


Figure 3. Percentages of ground-water pumpage by category.

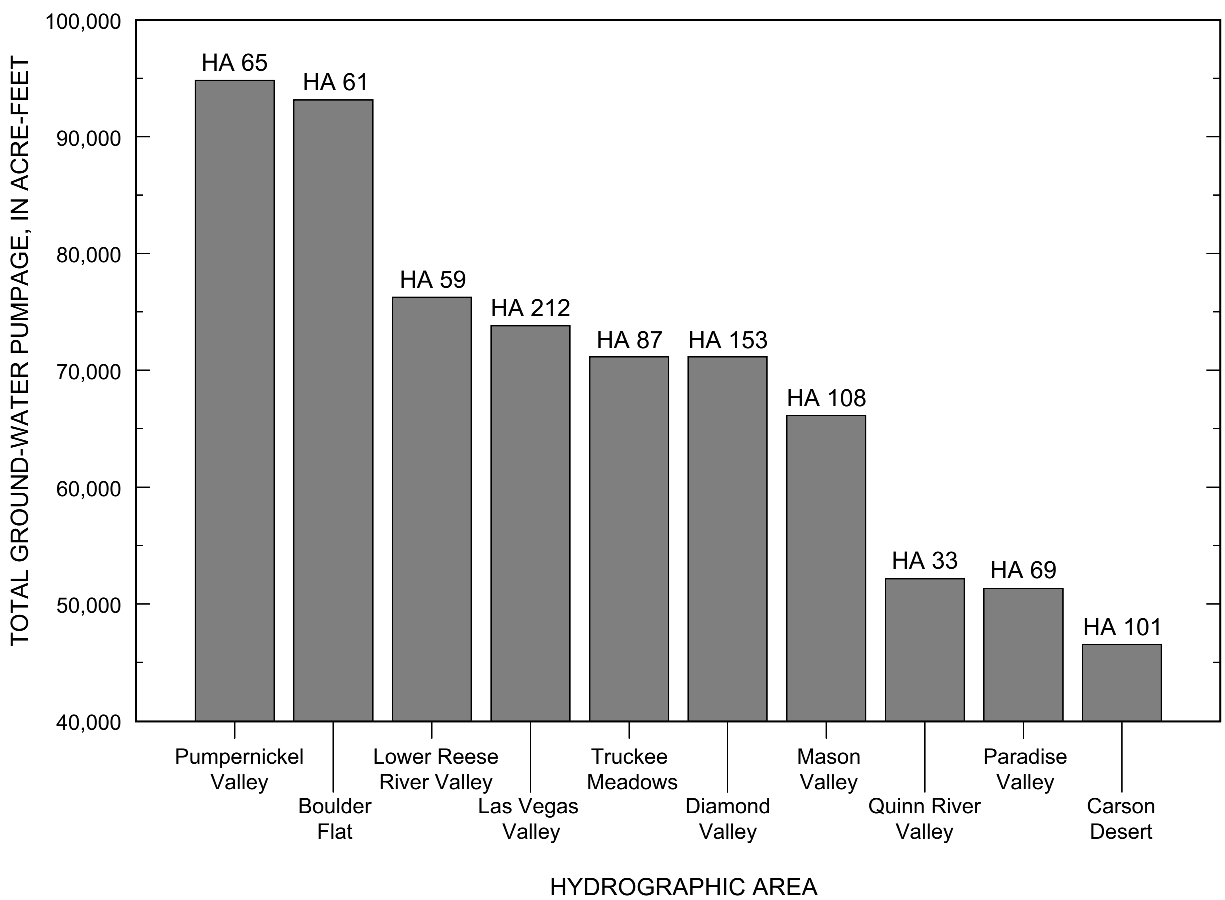


Figure 4. Hydrographic areas with the greatest amount of total ground-water pumpage.

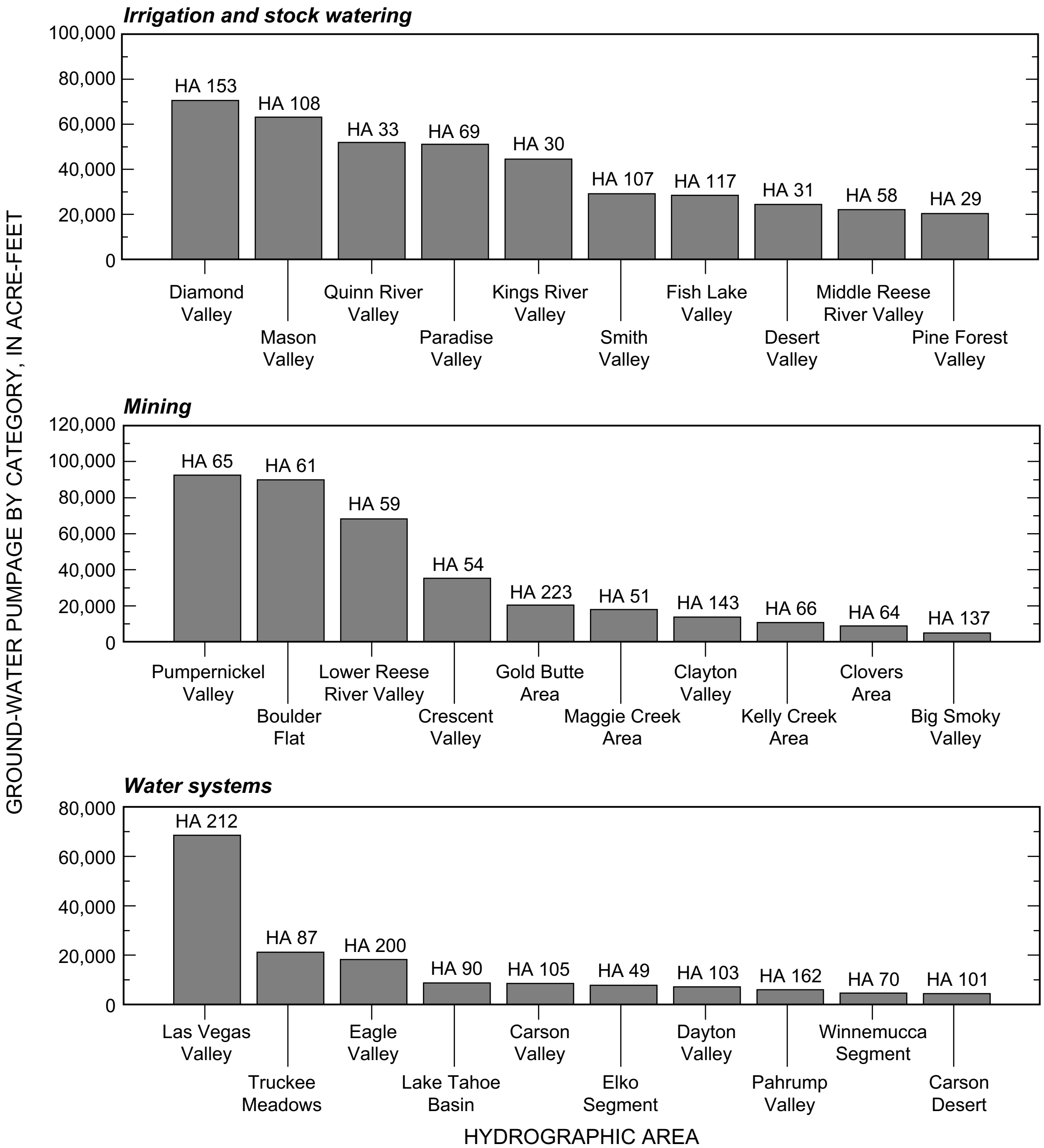


Figure 5. Ground-water pumpage by category in the top 10 hydrographic areas.

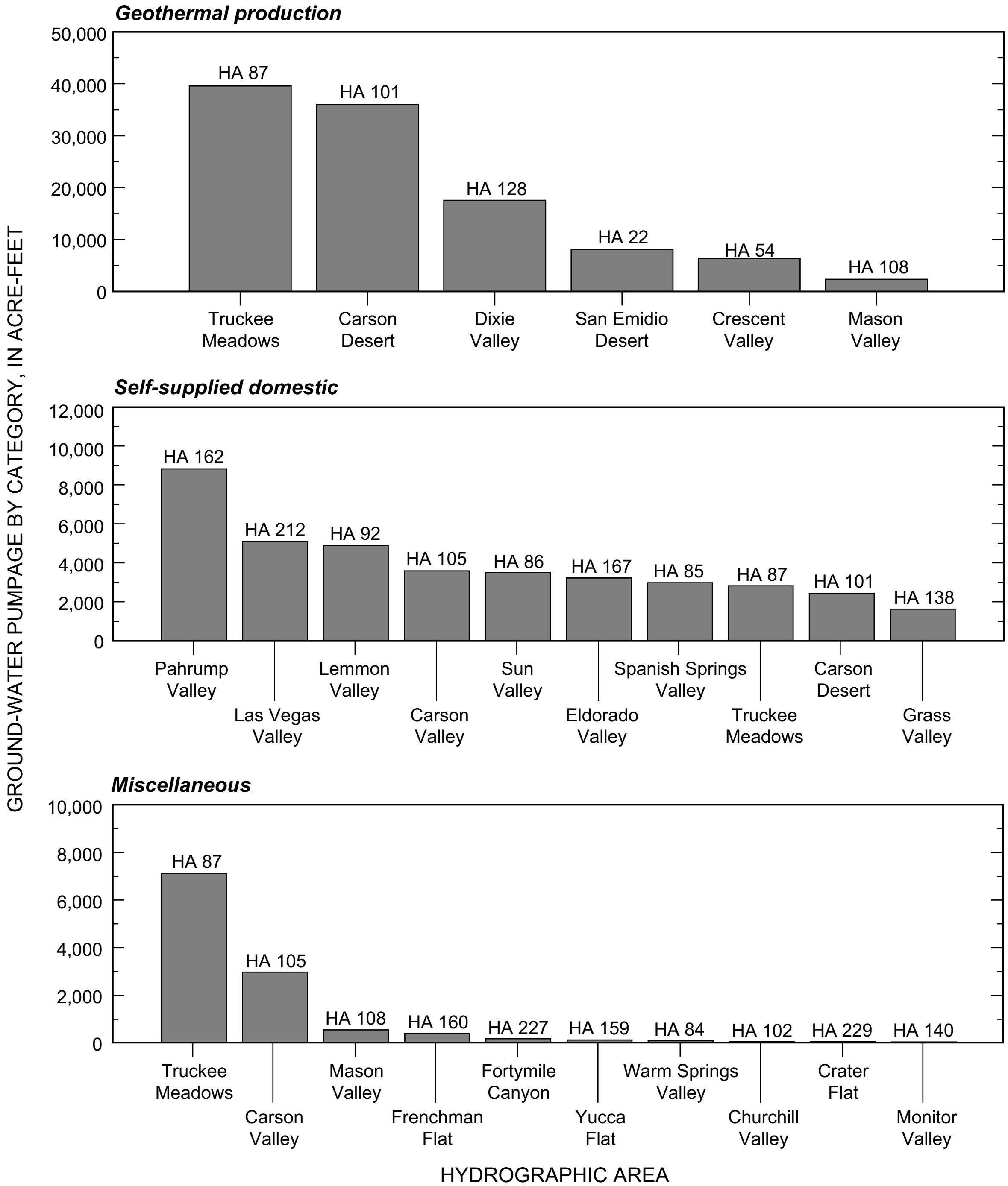


Figure 5. Ground-water pumpage by category in the top 10 hydrographic areas—Continued.

respectively, of the total water-system pumpage (Gallagher, 2002). Self-supplied domestic pumpage totaled 64,010 acre-ft. Pahrump Valley (HA 162) had the highest with about 14 percent (8,820 acre-ft) of the total self-supplied domestic pumpage, followed by Las Vegas Valley (HA 212; 5,100 acre-ft) and Lemmon Valley (HA 92; 4,900 acre-ft) both with 8 percent, Carson Valley (HA 105; 3,590 acre-ft) with 6 percent, and Sun Valley (HA 86; 3,510 acre-ft) with 5 percent.

In some HAs with geothermal resources, large amounts of super-heated water are removed for geothermal power generation. The geothermal water supply usually is in bedrock aquifer systems underlying or on the margins of the valleys. The wells used to extract the super-heated water tend to be artesian in nature. Except for one plant in Mason Valley (HA 108), which discharges the ground water into wetlands. This water is reinjected after use to approximately the same depth from which it was withdrawn. Little or no loss occurs between extraction and reinjection. Twelve geothermal plants pumped 110,060 acre-ft of ground water in 6 HAs during 2000. About 69 percent of the geothermal ground-water pumpage occurred in the Truckee Meadows (HA 87) and Carson Desert (HA 101).

The miscellaneous category includes ground-water pumpage reported as miscellaneous in pumpage inventories and uses in quarterly pumpage reports that do not fall within the other categories.

NATURAL RECHARGE AND INTERBASIN FLOW

At least one estimate of natural recharge was available for 209 of the 232 HAs (app. 1). Total natural recharge for these HAs ranges from 1,793,420 to 2,583,150 acre-ft. The range in recharge mostly is due to the source of precipitation data used in the estimate. Early studies used an isohyetal map first developed by Hardman (1936), which was updated using improved topographic data (Hardman and Mason, 1949; George Hardman, unpublished map, 1965). Recent studies have used a distribution of precipitation that was estimated by regression analysis (Daly and others, 1994). The modeled precipitation estimates generally are larger than estimates used by early studies, resulting in larger estimates of natural recharge (Nichols, 2000).

Estimates of interbasin flow were available for 151 HAs (app. 2). Most estimates were calculated from Darcy’s Law or as a residual of the water budget. Estimates using Darcy’s Law generally were based on little data on aquifer-system geometry, a rough estimate of the ground-water gradient, and an assumed transmissivity.

NET GROUND-WATER FLOW

Net ground-water flow was estimated only for the 143 HAs with available estimates of both natural recharge and interbasin flow (table 2 at back of report). Where available, calculations were made using low and high estimates of natural recharge and assume that pumpage does not affect interbasin flow. A negative value for net ground-water flow indicates that ground-water storage could be depleted if pumpage continues at the same rate. NDWR has designated certain HAs, as “basins where permitted ground water rights approach or exceed the estimated average annual recharge and the water resources are being depleted or require additional administration” (Nevada Department of Conservation and Natural Resources, 2004). Net ground-water flow may not be negative for designated HAs because current pumpage does not exceed estimated average annual recharge.

For net ground-water flow, 58 of the 143 estimates have negative values when using either low or high estimates of natural recharge. More HAs would have negative values if evapotranspiration was included in the estimates. HAs that are not designated and have a net ground-water flow between -1,000 to -35,000 acre-ft include Pueblo Valley (HA 1; fig. 1), Hualapai Flat (HA 24), Lower Reese River Valley (HA 59), Little Smoky Valley (HA 155), Jakes Valley (HA 174), Long Valley (HA 175), Tippett Valley (HA 185), Antelope Valley (HA 186), Butte Valley (HA 178), and Gold Butte Area (HA 223). Due to uncertainties in recharge, the water budgets for these HAs may need refining to determine whether ground-water storage is being depleted.

SUMMARY

Nevada is the driest state in the nation and also one of the fastest growing states. With increasing development and Nevada's surface water resources being fully appropriated, Nevada's reliance on ground-water resources has increased. Recharge to aquifer systems in Nevada occurs primarily from precipitation in the ranges that form the boundaries of the hydrographic areas. Artificial recharge occurs through ground-water injection and rapid-infiltration techniques used by water utilities, mining, and geothermal companies. Agriculture, mining, public water systems, and the rural domestic population in Nevada rely heavily on ground-water withdrawals. To quantify the stress being applied to the aquifer systems, ground-water pumpage and artificial recharge for calendar year 2000 were estimated and compared to average annual recharge and interbasin flow estimated for most HAs in the State.

Estimates of ground-water pumpage and artificial recharge during calendar year 2000 were made using data from a variety of sources. When available, water-use and crop inventory reports were the primary sources of pumpage and artificial recharge data for each HA. In the absence of inventory reports, quarterly and monthly pumpage reports submitted by individual water users and geothermal operations during 2000 were used. If no pumpage was reported, pumpage for the HA was estimated using Landsat imagery, statistical analysis, and mass-balance calculations. Estimates of average annual natural recharge and interbasin flow were compiled from published reports. At least one estimate of natural recharge was available for 209 of the 232 HAs. Estimates of interbasin flow were available for 151 HAs.

An estimated 1,427,100 acre-ft of ground water was pumped in Nevada during calendar year 2000. This total was calculated by summing six categories of ground-water pumpage, based on water use. The categories and their percentage of the total ground-water pumpage are irrigation and stock watering (47 percent), mining (26 percent), water systems (14 percent), geothermal production (8 percent), self-supplied domestic (4 percent), and miscellaneous (less than 1 percent). Pumpage in the top 10 HAs accounted for about 49 percent of the total ground-water pumpage. The most ground-water pumpage in a HA was due to mining in Pumpernickel Valley (HA 65), Boulder Flat (HA 61), and Lower Reese River Valley (HA 59). Pumpage by water systems in Las Vegas Valley (HA 212) and the Truckee Meadows (HA 87) had the fourth and fifth highest pumpage in 2000. Irrigation and stock watering pumpage accounted for most ground-water withdrawals in the HAs with the sixth through ninth highest pumpage. Geothermal production accounted for most pumpage in the Carson Desert (HA 101).

Total artificial recharge during 2000 was about 145,970 acre-ft. About 64 percent (93,310 acre-ft) of artificial recharge was reinjection of ground water pumped for geothermal energy production. The only artificial recharge by water systems was in Las Vegas Valley, where 29,790 acre-ft of water from the Colorado River was injected into the aquifer system. Artificial recharge by mining totaled 22,870 acre-ft. Natural recharge for the 209 HAs ranges from 1,793,420 to 2,583,150 acre-ft. The range in recharge is mostly due to the source of precipitation data used in the estimate.

Net ground-water flow was estimated only for the 143 HAs with available estimates of both natural recharge and interbasin flow. Of the 143 estimates, 58 have negative values for net ground-water flow, indicating that ground-water storage could be depleted if pumpage continues at the same rate. The State has designated HAs where permitted ground-water rights approach or exceed the estimated average annual recharge. Ten HAs were identified that are not designated and have a net ground-water flow between -1,000 to -35,000 acre-ft. Due to uncertainties in recharge, the water budgets for these HAs may need refining to determine if ground-water storage is being depleted.

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Tables 1–2

Table 1. Ground-water pumpage and artificial recharge estimates for Nevada, 2000

[Values are in acre-feet per year; pumpage are negative values, artificial recharge are positive values]

Hydro-graphic area no. (see fig. 1)	Hydrographic area name	Categories of ground-water pumpage						Total pumpage	Categories of artificial recharge			Total artificial recharge
		Irrigation and stock watering	Mining	Water systems	Geo-thermal production	Self-supplied domestic	Miscel-laneous		Mining	Geo-thermal production	Municipal	
1	Pueblo Valley	-2,320	0	0	0	-10	0	-2,330	0	0	0	0
2	Continental Lake Valley	0	0	0	0	-10	0	-10	0	0	0	0
3	Gridley Lake Valley	0	0	0	0	-10	0	-10	0	0	0	0
4	Virgin Valley	0	0	0	0	-30	0	-30	0	0	0	0
5	Sage Hen Valley	0	0	0	0	0	0	0	0	0	0	0
6	Guano Valley	0	0	0	0	0	0	0	0	0	0	0
7	Swan Lake Valley	0	0	0	0	0	0	0	0	0	0	0
8	Massacre Lake Valley	0	0	0	0	0	0	0	0	0	0	0
9	Long Valley	-1,090	0	0	0	0	0	-1,090	0	0	0	0
10	Macy Flat	0	0	0	0	0	0	0	0	0	0	0
11	Coleman Valley	0	0	0	0	0	0	0	0	0	0	0
12	Mosquito Valley	0	0	0	0	0	0	0	0	0	0	0
13	Warner Valley	0	0	0	0	0	0	0	0	0	0	0
14	Surprise Valley	-290	0	0	0	0	0	-290	0	0	0	0
15	Boulder Valley	0	0	0	0	0	0	0	0	0	0	0
16	Duck Lake Valley	0	0	0	0	0	0	0	0	0	0	0
17	Pilgrim Flat	0	0	0	0	0	0	0	0	0	0	0
18	Painter Flat	0	0	0	0	0	0	0	0	0	0	0
19	Dry Valley	0	0	0	0	0	0	0	0	0	0	0
20	Sano Valley	0	0	0	0	-10	0	-10	0	0	0	0
21	Smoke Creek Desert	-870	0	0	0	-50	0	-920	0	0	0	0
22	San Emidio Desert	-2,820	-380	0	-8,110	-120	0	-11,430	0	5,630	0	5,630
23	Granite Basin	0	0	0	0	0	0	0	0	0	0	0
24	Hualapai Flat	-8,840	0	0	0	-10	0	-8,850	0	0	0	0
25	High Rock Lake Valley	0	0	0	0	-10	0	-10	0	0	0	0

Table 1. Ground-water pumpage and artificial recharge estimates for Nevada, 2000—Continued

[Values are in acre-feet per year; pumpage are negative values, artificial recharge are positive values]

Hydro-graphic area no. (see fig. 1)	Hydrographic area name	Categories of ground-water pumpage						Total pumpage	Categories of artificial recharge			Total artificial recharge
		Irrigation and stock watering	Mining	Water systems	Geo-thermal production	Self-supplied domestic	Miscel-laneous		Mining	Geo-thermal production	Municipal	
26	Mud Meadow	0	0	0	0	-30	0	-30	0	0	0	0
27	Summit Lake Valley	0	0	0	0	0	0	0	0	0	0	0
28	Black Rock Desert	0	-270	0	0	-140	0	-410	0	0	0	0
29	Pine Forest Valley	-20,310	0	0	0	-30	0	-20,340	0	0	0	0
30	Kings River Valley	-44,550	0	0	0	-20	0	-44,570	0	0	0	0
31	Desert Valley	-24,350	-200	0	0	-240	0	-24,790	0	0	0	0
32	Silver State Valley	-14,150	0	0	0	-20	0	-14,170	0	0	0	0
33	Quinn River Valley	-51,980	0	-30	0	-130	0	-52,140	0	0	0	0
34	Little Owyhee River Area	0	0	0	0	-40	0	-40	0	0	0	0
35	South Fork Owyhee River Area	0	0	0	0	-100	0	-100	0	0	0	0
36	Independence Valley	0	-820	-30	0	-30	0	-880	0	0	0	0
37	Owyhee River Area	0	0	-10	0	-130	0	-140	0	0	0	0
38	Bruneau River Area	0	-1,710	0	0	0	0	-1,710	0	0	0	0
39	Jarbidge River Area	0	0	-40	0	0	0	-40	0	0	0	0
40	Salmon Falls Creek Area	0	0	-180	0	0	0	-180	0	0	0	0
41	Goose Creek Area	0	0	0	0	-80	0	-80	0	0	0	0
42	Marys River Area	-1,590	0	-470	0	0	0	-2,060	0	0	0	0
43	Starr Valley Area	-540	0	0	0	-460	0	-1,000	0	0	0	0
44	North Fork Area	0	0	0	0	-500	0	-500	0	0	0	0
45	Lamoille Valley	0	0	-70	0	-1,160	0	-1,230	0	0	0	0
46	South Fork Area	0	0	0	0	-80	0	-80	0	0	0	0
47	Huntington Valley	0	0	0	0	-470	0	-470	0	0	0	0
48	Dixie Creek-Tenmile Creek Area	0	-40	-3,400	0	0	0	-3,440	0	0	0	0

Table 1. Ground-water pumpage and artificial recharge estimates for Nevada, 2000—Continued

[Values are in acre-feet per year; pumpage are negative values, artificial recharge are positive values]

Hydro-graphic area no. (see fig. 1)	Hydrographic area name	Categories of ground-water pumpage						Total pumpage	Categories of artificial recharge			Total artificial recharge
		Irrigation and stock watering	Mining	Water systems	Geo-thermal production	Self-supplied domestic	Miscel-laneous		Mining	Geo-thermal production	Municipal	
49	Elko Segment	-500	0	-7,770	0	0	0	-8,270	0	0	0	0
50	Susie Creek Area	0	0	-200	0	-90	0	-290	0	0	0	0
51	Maggie Creek Area	0	-17,930	0	0	-140	0	-18,070	0	0	0	0
52	Marys Creek Area	0	0	-740	0	0	0	-740	0	0	0	0
53	Pine Valley	0	0	0	0	-150	0	-150	0	0	0	0
54	Crescent Valley	-3,100	-35,320	-150	-6,410	0	0	-44,980	0	5,570	0	5,570
55	Carico Lake Valley	-450	0	0	0	-10	0	-460	0	0	0	0
56	Upper Reese River Valley	-5,710	0	-40	0	0	0	-5,750	0	0	0	0
57	Antelope Valley	-18,460	0	0	0	0	0	-18,460	0	0	0	0
58	Middle Reese River Valley	-22,060	0	0	0	-10	0	-22,070	0	0	0	0
59	Lower Reese River Valley	-7,890	-68,200	0	0	-150	0	-76,240	19,570	0	0	19,570
60	Whirlwind Valley	0	-90	0	0	-20	0	-110	0	0	0	0
61	Boulder Flat	-3,200	-89,890	0	0	-60	0	-93,150	30	0	0	30
62	Rock Creek Valley	0	0	0	0	-60	0	-60	0	0	0	0
63	Willow Creek Valley	0	-150	-10	0	0	0	-160	0	0	0	0
64	Clovers Area	-6,240	-8,880	-3,050	0	0	0	-18,170	0	0	0	0
65	Pumpernickel Valley	-2,200	-92,550	0	0	-70	0	-94,820	1,490	0	0	1,490
66	Kelly Creek Area	-3,840	-10,660	0	0	-60	0	-14,560	350	0	0	350
67	Little Humboldt Valley	-7,560	0	0	0	-100	0	-7,660	0	0	0	0
68	Hardscrabble Area	0	0	0	0	-20	0	-20	0	0	0	0
69	Paradise Valley	-51,120	0	-20	0	-170	0	-51,310	0	0	0	0
70	Winnemucca Segment	-3,630	-1,160	-4,650	0	0	0	-9,440	0	0	0	0
71	Grass Valley	-14,730	0	0	0	-1,630	0	-16,360	0	0	0	0
72	Imlay Area	-1,420	-1,000	-220	0	-20	0	-2,660	0	0	0	0

Table 1. Ground-water pumpage and artificial recharge estimates for Nevada, 2000—Continued

[Values are in acre-feet per year; pumpage are negative values, artificial recharge are positive values]

Hydro-graphic area no. (see fig. 1)	Hydrographic area name	Categories of ground-water pumpage						Total pumpage	Categories of artificial recharge			Total artificial recharge
		Irrigation and stock watering	Mining	Water systems	Geo-thermal production	Self-supplied domestic	Miscel-laneous		Mining	Geo-thermal production	Municipal	
73	Lovelock Valley	-240	0	-1,090	0	0	0	-1,330	0	0	0	0
74	White Plains	0	0	0	0	-90	0	-90	0	0	0	0
75	Bradys Hot Springs Area	0	0	0	0	-190	0	-190	0	0	0	0
76	Fernley Area	0	0	-2,790	0	-1,060	0	-3,850	0	0	0	0
77	Fireball Valley	0	0	0	0	-30	0	-30	0	0	0	0
78	Granite Springs Valley	0	0	0	0	-230	0	-230	0	0	0	0
79	Kumiva Valley	0	0	0	0	-30	0	-30	0	0	0	0
80	Winnemucca Lake Valley	0	0	0	0	-100	0	-100	0	0	0	0
81	Pyramid Lake Valley	0	0	0	0	-380	0	-380	0	0	0	0
82	Dodge Flat	0	0	0	0	-50	0	-50	0	0	0	0
83	Tracy Segment	0	0	-920	0	-350	0	-1,270	0	0	0	0
84	Warm Springs Valley	-4,280	0	-190	0	-430	-100	-5,000	0	0	0	0
85	Spanish Springs Valley	-70	0	-2,310	0	-2,980	0	-5,360	0	0	0	0
86	Sun Valley	0	0	-600	0	-3,510	0	-4,110	0	0	0	0
87	Truckee Meadows	-380	0	-21,220	-39,610	-2,820	-7,130	-71,160	0	37,650	0	37,650
88	Pleasant Valley	0	0	-1,340	0	-980	0	-2,320	0	0	0	0
89	Washoe Valley	0	0	-330	0	-1,300	0	-1,630	0	0	0	0
90	Lake Tahoe Basin	-660	0	-8,740	0	-100	0	-9,500	0	0	0	0
91	Truckee Canyon Segment	0	0	-290	0	-1,590	0	-1,880	0	0	0	0
92	Lemmon Valley	0	0	-1,270	0	-4,900	0	-6,170	0	0	0	0
93	Antelope Valley	0	0	0	0	-50	0	-50	0	0	0	0
94	Bedell Flat	0	0	0	0	-90	0	-90	0	0	0	0
95	Dry Valley	0	0	0	0	0	0	0	0	0	0	0
96	Newcomb Lake Valley	0	0	0	0	0	0	0	0	0	0	0

Table 1. Ground-water pumpage and artificial recharge estimates for Nevada, 2000—Continued

[Values are in acre-feet per year; pumpage are negative values, artificial recharge are positive values]

Hydro-graphic area no. (see fig. 1)	Hydrographic area name	Categories of ground-water pumpage: Irrigation and stock watering	Mining	Water systems	Geo-thermal production	Self-supplied domestic	Miscel-laneous	Total pumpage	Categories of artificial recharge: Mining	Geo-thermal production	Municipal	Total artificial recharge
97	Honey Lake Valley	-1,450	0	0	0	0	0	-1,450	0	0	0	0
98	Skedaddle Creek Valley	0	0	0	0	0	0	0	0	0	0	0
99	Red Rock Valley	0	0	0	0	-70	0	-70	0	0	0	0
100	Cold Spring Valley	0	0	0	0	-960	0	-960	0	0	0	0
101	Carson Desert	-1,560	-2,140	-4,400	-36,020	-2,410	0	-46,530	0	30,460	0	30,460
102	Churchill Valley	-130	0	-1,420	0	-940	-20	-2,510	0	0	0	0
103	Dayton Valley	-610	0	-7,130	0	-1,080	0	-8,820	0	0	0	0
104	Eagle Valley	0	0	-18,200	0	0	0	-18,200	0	0	0	0
105	Carson Valley	-8,800	-70	-8,510	0	-3,590	-2,970	-23,940	0	0	0	0
106	Antelope Valley	0	0	-490	0	0	0	-490	0	0	0	0
107	Smith Valley	-29,180	0	0	0	0	0	-29,180	0	0	0	0
108	Mason Valley	-63,170	0	-40	-2,360	0	-550	-66,120	0	0	0	0
109	East Walker Area	0	0	0	0	-70	0	-70	0	0	0	0
110	Walker Lake Valley	-2,850	0	-1,460	0	0	0	-4,310	0	0	0	0
111	Alkali Valley	0	0	0	0	0	0	0	0	0	0	0
112	Mono Valley	0	0	0	0	0	0	0	0	0	0	0
113	Huntoon Valley	0	0	0	0	-10	0	-10	0	0	0	0
114	Teels Marsh Valley	0	0	0	0	-20	0	-20	0	0	0	0
115	Adobe Valley	0	0	0	0	0	0	0	0	0	0	0
116	Queen Valley	0	0	0	0	0	0	0	0	0	0	0
117	Fish Lake Valley	-28,500	0	-400	0	-140	0	-29,040	0	0	0	0
118	Columbus Salt Marsh Valley	0	0	0	0	-20	0	-20	0	0	0	0
119	Rhodes Salt Marsh Valley	0	0	0	0	-10	0	-10	0	0	0	0
120	Garfield Flat	0	0	0	0	-10	0	-10	0	0	0	0
121	Soda Spring Valley	0	0	-50	0	0	0	-50	0	0	0	0

Table 1. Ground-water pumpage and artificial recharge estimates for Nevada, 2000—Continued

[Values are in acre-feet per year; pumpage are negative values, artificial recharge are positive values]

Hydro-graphic area no. (see fig. 1)	Hydrographic area name	Categories of ground-water pumpage						Total pumpage	Categories of artificial recharge			Total artificial recharge
		Irrigation and stock watering	Mining	Water systems	Geo-thermal production	Self-supplied domestic	Miscel-laneous		Mining	Geo-thermal production	Municipal	
122	Gabbs Valley	-4,880	0	-90	0	-20	0	-4,990	0	0	0	0
123	Rawhide Flats	0	0	0	0	-130	0	-130	0	0	0	0
124	Fairview Valley	0	0	0	0	-20	0	-20	0	0	0	0
125	Stingaree Valley	0	0	0	0	0	0	0	0	0	0	0
126	Cowkick Valley	-170	0	0	0	-10	0	-180	0	0	0	0
127	Eastgate Valley Area	0	0	0	0	-10	0	-10	0	0	0	0
128	Dixie Valley	-2,800	0	-10	-17,550	-100	0	-20,460	0	14,010	0	14,010
129	Buena Vista Valley	-5,930	-430	0	0	-170	0	-6,530	0	0	0	0
130	Pleasant Valley	0	0	0	0	-50	0	-50	0	0	0	0
131	Buffalo Valley	0	0	0	0	-80	0	-80	0	0	0	0
132	Jersey Valley	0	0	0	0	-20	0	-20	0	0	0	0
133	Edwards Creek Valley	-2,010	0	0	0	-20	0	-2,030	0	0	0	0
134	Smith Creek Valley	-1,080	0	0	0	0	0	-1,080	0	0	0	0
135	Ione Valley	0	0	0	0	-30	0	-30	0	0	0	0
136	Monte Cristo Valley	0	0	0	0	-20	0	-20	0	0	0	0
137	Big Smoky Valley	-8,120	-4,970	-100	0	0	0	-13,190	0	0	0	0
138	Grass Valley	0	0	0	0	-10	0	-10	0	0	0	0
139	Kobeh Valley	-2,660	0	0	0	-60	0	-2,720	0	0	0	0
140	Monitor Valley	0	0	0	0	-60	-10	-70	0	0	0	0
141	Ralston Valley	0	0	-370	0	0	0	-370	0	0	0	0
142	Alkali Spring Valley	0	0	-30	0	0	0	-30	0	0	0	0
143	Clayton Valley	0	-13,680	-60	0	0	0	-13,740	1,420	0	0	1,420
144	Lida Valley	0	0	0	0	-40	0	-40	0	0	0	0
145	Stonewall Flat	0	0	0	0	-10	0	-10	0	0	0	0
146	Sarcobatus Flat	0	0	-10	0	-100	0	-110	0	0	0	0

Table 1. Ground-water pumpage and artificial recharge estimates for Nevada, 2000—Continued

[Values are in acre-feet per year; pumpage are negative values, artificial recharge are positive values]

Hydro-graphic area no. (see fig. 1)	Hydrographic area name	Categories of ground-water pumpage						Total pumpage	Categories of artificial recharge			Total artificial recharge
		Irrigation and stock watering	Mining	Water systems	Geo-thermal production	Self-supplied domestic	Miscel-laneous		Mining	Geo-thermal production	Municipal	
147	Gold Flat	0	0	0	0	0	0	0	0	0	0	0
148	Cactus Flat	0	0	0	0	0	0	0	0	0	0	0
149	Stone Cabin Valley	-1,530	0	0	0	-60	0	-1,590	0	0	0	0
150	Little Fish Lake Valley	0	0	0	0	-30	0	-30	0	0	0	0
151	Antelope Valley	0	0	0	0	-50	0	-50	0	0	0	0
152	Stevens Basin	0	0	0	0	0	0	0	0	0	0	0
153	Diamond Valley	-70,600	-200	-340	0	0	0	-71,140	0	0	0	0
154	Newark Valley	-4,230	0	-10	0	-40	0	-4,280	0	0	0	0
155	Little Smoky Valley	-2,300	0	0	0	-80	0	-2,380	0	0	0	0
156	Hot Creek Valley	-1,420	0	-40	0	-40	0	-1,500	0	0	0	0
157	Kawich Valley	0	0	0	0	0	0	0	0	0	0	0
158	Emigrant Valley	0	0	0	0	-30	0	-30	0	0	0	0
159	Yucca Flat	0	0	0	0	0	-130	-130	0	0	0	0
160	Frenchman Flat	0	0	0	0	-10	-400	-410	0	0	0	0
161	Indian Springs Valley	-100	0	-530	0	-80	0	-710	0	0	0	0
162	Pahrump Valley	-7,930	0	-6,050	0	-8,820	0	-22,800	0	0	0	0
163	Mesquite Valley	-40	0	-220	0	-350	0	-610	0	0	0	0
164	Ivanpah Valley	0	0	-20	0	-280	0	-300	0	0	0	0
165	Jean Lake Valley	0	0	0	0	-130	0	-130	0	0	0	0
166	Hidden Valley	0	0	0	0	-80	0	-80	0	0	0	0
167	Eldorado Valley	0	0	0	0	-3,220	0	-3,220	0	0	0	0
168	Three Lakes Valley	0	0	0	0	-20	0	-20	0	0	0	0
169	Tikapoo Valley	0	0	0	0	-70	0	-70	0	0	0	0
170	Penoyer Valley	-12,490	0	-40	0	-30	0	-12,560	0	0	0	0
171	Coal Valley	0	0	0	0	-30	0	-30	0	0	0	0
172	Garden Valley	0	0	0	0	-30	0	-30	0	0	0	0

Table 1. Ground-water pumpage and artificial recharge estimates for Nevada, 2000—Continued

[Values are in acre-feet per year; pumpage are negative values, artificial recharge are positive values]

Hydro-graphic area no. (see fig. 1)	Hydrographic area name	Categories of ground-water pumpage						Total pumpage	Categories of artificial recharge			Total artificial recharge
		Irrigation and stock watering	Mining	Water systems	Geo-thermal production	Self-supplied domestic	Miscel-laneous		Mining	Geo-thermal production	Municipal	
173	Railroad Valley	-2,090	0	0	0	-160	0	-2,250	0	0	0	0
174	Jakes Valley	0	0	0	0	-30	0	-30	0	0	0	0
175	Long Valley	0	0	0	0	-40	0	-40	0	0	0	0
176	Ruby Valley	-4,760	0	-30	0	-100	0	-4,890	0	0	0	0
177	Clover Valley	-9,230	0	0	0	-50	0	-9,280	0	0	0	0
178	Butte Valley	-3,560	0	0	0	-80	0	-3,640	0	0	0	0
179	Steptoe Valley	-3,560	0	-2,800	0	0	0	-6,360	0	0	0	0
180	Cave Valley	0	0	0	0	-40	0	-40	0	0	0	0
181	Dry Lake Valley	0	0	0	0	-60	0	-60	0	0	0	0
182	Delamar Valley	0	0	0	0	-30	0	-30	0	0	0	0
183	Lake Valley	-12,990	0	0	0	-30	0	-13,020	0	0	0	0
184	Spring Valley	-4,170	0	-20	0	-90	0	-4,280	0	0	0	0
185	Tippett Valley	0	0	0	0	-20	0	-20	0	0	0	0
186	Antelope Valley	0	0	0	0	-120	0	-120	0	0	0	0
187	Goshute Valley	-580	-120	-1,400	0	-310	0	-2,410	0	0	0	0
188	Independence Valley	0	0	0	0	-90	0	-90	0	0	0	0
189	Thousand Springs Valley	-2,770	0	-60	0	-410	0	-3,240	0	0	0	0
190	Grouse Creek Valley	0	0	0	0	-20	0	-20	0	0	0	0
191	Pilot Creek Valley	-180	0	0	0	-120	0	-300	0	0	0	0
192	Great Salt Lake Desert	0	0	-320	0	0	0	-320	0	0	0	0
193	Deep Creek Valley	0	0	0	0	-30	0	-30	0	0	0	0
194	Pleasant Valley	0	0	0	0	0	0	0	0	0	0	0
195	Snake Valley	-470	0	-30	0	-30	0	-530	0	0	0	0
196	Hamlin Valley	0	0	0	0	-20	0	-20	0	0	0	0
197	Escalante Desert	0	0	0	0	-40	0	-40	0	0	0	0

Table 1. Ground-water pumpage and artificial recharge estimates for Nevada, 2000—Continued

[Values are in acre-feet per year; pumpage are negative values, artificial recharge are positive values]

Hydro-graphic area no. (see fig. 1)	Hydrographic area name	Categories of ground-water pumpage						Total pumpage	Categories of artificial recharge			Total artificial recharge
		Irrigation and stock watering	Mining	Water systems	Geo-thermal production	Self-supplied domestic	Miscel-laneous		Mining	Geo-thermal production	Municipal	
198	Dry Valley	-5,170	0	0	0	-10	0	-5,180	0	0	0	0
199	Rose Valley	-1,370	0	0	0	0	0	-1,370	0	0	0	0
200	Eagle Valley	0	0	0	0	0	0	0	0	0	0	0
201	Spring Valley	0	0	0	0	-20	0	-20	0	0	0	0
202	Patterson Valley	-2,170	0	-40	0	0	0	-2,210	0	0	0	0
203	Panaca Valley	-9,250	0	-470	0	-70	0	-9,790	0	0	0	0
204	Clover Valley	0	0	-120	0	0	0	-120	0	0	0	0
205	Lower Meadow Valley Wash	-330	0	0	0	-120	0	-450	0	0	0	0
206	Kane Springs Valley	0	0	0	0	-30	0	-30	0	0	0	0
207	White River Valley	-3,340	0	-50	0	-140	0	-3,530	0	0	0	0
208	Pahroc Valley	0	0	0	0	-30	0	-30	0	0	0	0
209	Pahranagat Valley	-2,320	0	-390	0	-80	0	-2,790	0	0	0	0
210	Coyote Spring Valley	0	-50	-150	0	0	0	-200	0	0	0	0
211	Three Lakes Valley	0	0	-520	0	0	0	-520	0	0	0	0
212	Las Vegas Valley	0	-220	-68,500	0	-5,100	0	-73,820	0	0	29,790	29,790
213	Colorado Valley	0	0	-1,770	0	-1,150	0	-2,920	0	0	0	0
214	Piute Valley	0	-20	-520	0	-100	0	-640	0	0	0	0
215	Black Mountains Area	0	0	-1,700	0	-1,090	0	-2,790	0	0	0	0
216	Garnet Valley	0	0	0	0	-40	0	-40	0	0	0	0
217	Hidden Valley	0	0	0	0	-10	0	-10	0	0	0	0
218	California Wash	0	0	0	0	-160	0	-160	0	0	0	0
219	Muddy River Springs Area	0	0	-130	0	0	0	-130	0	0	0	0
220	Lower Moapa Valley	0	0	0	0	-960	0	-960	0	0	0	0
221	Tule Desert	0	0	0	0	-20	0	-20	0	0	0	0

Table 1. Ground-water pumpage and artificial recharge estimates for Nevada, 2000—Continued

[Values are in acre-feet per year; pumpage are negative values, artificial recharge are positive values]

Hydro-graphic area no. (see fig. 1)	Hydrographic area name	Categories of ground-water pumpage						Total pumpage	Categories of artificial recharge			Total artificial recharge
		Irrigation and stock watering	Mining	Water systems	Geo-thermal production	Self-supplied domestic	Miscel-laneous		Mining	Geo-thermal production	Municipal	
222	Virgin River Valley	0	0	-4,370	0	0	0	-4,370	0	0	0	0
223	Gold Butte Area	0	-20,350	0	0	-200	0	-20,550	0	0	0	0
224	Greasewood Basin	0	0	0	0	-40	0	-40	0	0	0	0
225	Mercury Valley	0	0	0	0	-50	0	-50	0	0	0	0
226	Rock Valley	0	0	0	0	-10	0	-10	0	0	0	0
227	Fortymile Canyon	0	0	-10	0	-10	-180	-200	0	0	0	0
228	Oasis Valley	0	-80	0	0	-50	0	-130	0	0	0	0
229	Crater Flat	0	0	0	0	-70	-20	-90	0	0	0	0
230	Amargosa Desert	-9,710	-350	0	0	-790	0	-10,850	0	0	0	0
231	Grapevine Canyon	0	0	0	0	-20	0	-20	0	0	0	0
232	Oriental Wash	0	0	0	0	-10	0	-10	0	0	0	0
	Total	-674,000	-371,930	-195,590	-110,060	-64,010	-11,510	-1,427,100	22,850	93,310	29,790	145,950
	Percentage of total	47.2	26.1	13.7	7.7	4.5	0.8	100	16	64	20	100

Table 2. Net ground-water flow and designated hydrographic areas of Nevada

[Values are in acre-feet per year; inflow are positive and outflow are negative values. Abbreviations: --, placeholder; HA, hydrographic area]

Hydrographic area no. (see fig. 1)	Hydrographic area name	Natural recharge (high)	Natural recharge (low)	Total artificial recharge	Net interbasin flow[a]	Total pumpage	Net ground-water flow[b] (high natural recharge)	Net ground-water flow[c] (low natural recharge)	Designated HA?
1	Pueblo Valley	2,000	--	0	-1,000	-2,330	-1,330	--	No
2	Continental Lake Valley	11,000	--	0	--	-10	--	--	No
3	Gridley Lake Valley	4,500	--	0	--	-10	--	--	No
4	Virgin Valley	7,000	--	0	--	-30	--	--	No
5	Sage Hen Valley	--	--	0	--	0	--	--	No
6	Guano Valley	7,500	--	0	--	0	--	--	No
7	Swan Lake Valley	--	--	0	--	0	--	--	No
8	Massacre Lake Valley	3,500	--	0	--	0	--	--	No
9	Long Valley	6,000	--	0	--	-1,090	--	--	No
10	Macy Flat	--	--	0	--	0	--	--	No
11	Coleman Valley	1,000	--	0	--	0	--	--	No
12	Mosquito Valley	700	--	0	--	0	--	--	No
13	Warner Valley	--	--	0	--	0	--	--	No
14	Surprise Valley	1,500	--	0	--	-290	--	--	No
15	Boulder Valley	2,000	--	0	--	0	--	--	No
16	Duck Lake Valley	9,000	8,900	0	--	0	--	--	No
17	Pilgrim Flat	500	--	0	-500	0	0	--	No
18	Painter Flat	1,300	--	0	--	0	--	--	No
19	Dry Valley	200	--	0	-180	0	20	--	No
20	Sano Valley	4	--	0	--	-10	--	--	No
21	Smoke Creek Desert	13,000	--	0	5,680	-920	17,760	--	No
22	San Emidio Desert	2,100	--	5,630	-300	-11,430	-4,000	--	Yes
23	Granite Basin	2,000	--	0	--	0	--	--	No
24	Hualapai Flat	7,000	4,000	0	-400	-8,850	-2,250	-5,250	No
25	High Rock Lake Valley	13,000	--	0	--	-10	--	--	No
26	Mud Meadow	8,000	--	0	--	-30	--	--	No
27	Summit Lake Valley	4,200	--	0	--	0	--	--	No
28	Black Rock Desert	13,900	--	0	3,860	-410	17,350	--	No
29	Pine Forest Valley	10,000	--	0	-2,000	-20,340	-12,340	--	Yes
30	Kings River Valley	15,000	--	0	-250	-44,570	-29,820	--	Yes
31	Desert Valley	7,000	3,300	0	-510	-24,790	-18,300	-22,000	Yes
32	Silver State Valley	1,400	--	0	-100	-14,170	-12,870	--	Yes
33	Quinn River Valley	62,000	--	0	-300	-52,140	9,560	--	Yes
34	Little Owyhee River Area	2,700	--	0	--	-40	--	--	No
35	South Fork Owyhee River Area	28,000	--	0	--	-100	--	--	No
36	Independence Valley	10,000	9,700	0	--	-880	--	--	No

Table 2. Net ground-water flow and designated hydrographic areas of Nevada—Continued

[Values are in acre-feet per year; inflow are positive and outflow are negative values. Abbreviations: --, placeholder; HA, hydrographic area]

Hydro-graphic area no. (see fig. 1)	Hydrographic area name	Natural recharge (high)	Natural recharge (low)	Total artificial recharge	Net interbasin flow[a]	Total pumpage	Net ground-water flow[b] (high natural recharge)	Net ground-water flow[c] (low natural recharge)	Desig-nated HA?
37	Owyhee River Area	17,000	--	0	--	-140	--	--	No
38	Bruneau River Area	26,000	--	0	--	-1,710	--	--	No
39	Jarbidge River Area	32,000	--	0	--	-40	--	--	No
40	Salmon Falls Creek Area	44,000	--	0	--	-180	--	--	Yes
41	Goose Creek Area	6,700	--	0	--	-80	--	--	No
42	Marys River Area	--	--	0	--	-2,060	--	--	Yes
43	Starr Valley Area	--	--	0	--	-1,000	--	--	Yes
44	North Fork Area	--	--	0	--	-500	--	--	Yes
45	Lamoille Valley	--	--	0	--	-1,230	--	--	Yes
46	South Fork Area	3,000	--	0	-9,000	-80	-6,080	--	Yes
47	Huntington Valley	14,000	--	0	-19,000	-470	-5,470	--	Yes
48	Dixie Creek-Tenmile Creek Area	13,000	--	0	--	-3,440	--	--	Yes
49	Elko Segment	--	--	0	300	-8,270	--	--	Yes
50	Susie Creek Area	9,700	--	0	--	-290	--	--	Yes
51	Maggie Creek Area	23,000	--	0	--	-18,070	--	--	Yes
52	Marys Creek Area	2,100	--	0	--	-740	--	--	Yes
	Sum of HAs 50, 51, 52	34,800	--	0	-8,600	-19,100	7,100	--	--
53	Pine Valley	79,300	46,000	0	-14,300	-150	64,850	31,550	Yes
54	Crescent Valley	26,200	14,000	5,570	700	-44,980	-12,510	-24,710	Yes
55	Carico Lake Valley	20,400	4,300	0	2,700	-460	22,640	6,540	No
56	Upper Reese River Valley	110,000	30,000	0	-3,500	-5,750	100,750	20,750	Yes
57	Antelope Valley	25,200	11,000	0	-6,000	-18,460	740	-13,460	Yes
58	Middle Reese River Valley	13,200	7,000	0	-2,500	-22,070	-11,370	-17,570	Yes
59	Lower Reese River Valley	19,000	13,000	19,570	14,000	-76,240	-23,670	-29,670	No
60	Whirlwind Valley	3,800	2,000	0	-1,200	-110	2,490	690	Yes
61	Boulder Flat	19,300	11,000	30	-12,000	-93,150	-85,820	-94,120	Yes
62	Rock Creek Valley	17,100	9,000	0	-2,800	-60	14,240	6,140	No
63	Willow Creek Valley	28,000	20,000	0	-4,300	-160	23,540	15,540	No
64	Clovers Area	18,400	13,000	0	19,100	-18,170	19,330	13,930	Yes
65	Pumpernickel Valley	9,000	7,500	1,490	--	-94,820	--	--	No
66	Kelly Creek Area	13,200	11,000	350	--	-14,560	--	--	Yes
67	Little Humboldt Valley	24,000	--	0	-300	-7,660	16,040	--	No
68	Hardscrabble Area	9,000	--	0	--	-20	--	--	No
69	Paradise Valley	10,000	--	0	-3,200	-51,310	-44,510	--	Yes
70	Winnemucca Segment	--	--	0	-3,000	-9,440	--	--	Yes

Table 2. Net ground-water flow and designated hydrographic areas of Nevada—Continued

[Values are in acre-feet per year; inflow are positive and outflow are negative values. Abbreviations: --, placeholder; HA, hydrographic area]

Hydro-graphic area no. (see fig. 1)	Hydrographic area name	Natural recharge (high)	Natural recharge (low)	Total artificial recharge	Net interbasin flow[a]	Total pumpage	Net ground-water flow[b] (high natural recharge)	Net ground-water flow[c] (low natural recharge)	Desig-nated HA?
71	Grass Valley	12,000	--	0	-6,000	-16,360	-10,360	--	Yes
72	Imlay Area	4,000	--	0	2,000	-2,660	3,340	--	Yes
73	Lovelock Valley	3,200	--	0	-1,060	-1,330	810	--	Yes[d]
74	White Plains	3	--	0	40	-90	-47	--	Yes
75	Bradys Hot Springs Area	160	--	0	1,200	-190	1,170	--	Yes
76	Fernley Area	600	--	0	-6,000	-3,850	-9,250	--	Yes
77	Fireball Valley	200	--	0	-200	-30	-30	--	No
78	Granite Springs Valley	3,500	--	0	1,000	-230	4,270	--	No
79	Kumiva Valley	1,000	--	0	-1,000	-30	-30	--	No
80	Winnemucca Lake Valley	2,900	--	0	400	-100	3,200	--	No
81	Pyramid Lake Valley	6,600	--	0	1,600	-380	7,820	--	No
82	Dodge Flat	1,400	--	0	2,500	-50	3,850	--	No
83	Tracy Segment	6,000	--	0	1,400	-1,270	6,130	--	Yes
84	Warm Springs Valley	6,000	--	0	80	-5,000	1,080	--	Yes
85	Spanish Springs Valley	830	600	0	-380	-5,360	-4,910	-5,140	Yes
86	Sun Valley	50	--	0	-25	-4,110	-4,085	--	Yes
87	Truckee Meadows	27,000	--	37,650	1,125	-71,160	-5,385	--	Yes
88	Pleasant Valley	10,000	--	0	-250	-2,320	7,430	--	Yes
89	Washoe Valley	15,000	--	0	-50	-1,630	13,320	--	Yes
90	Lake Tahoe Basin	--	--	0	--	-9,500	--	--	Yes
91	Truckee Canyon Segment	27,000	--	0	-300	-1,880	24,820	--	Yes
92	Lemmon Valley	1,800	1,500	0	--	-6,170	--	--	Yes
93	Antelope Valley	300	--	0	--	-50	--	--	Yes
94	Bedell Flat	1,100	--	0	-200	-90	810	--	Yes
95	Dry Valley	2,400	--	0	-2,200	0	200	--	No
96	Newcomb Lake Valley	300	--	0	--	0	--	--	No
97	Honey Lake Valley	1,500	--	0	-6,200	-1,450	-6,150	--	Yes
98	Skedaddle Creek Valley	600	--	0	--	0	--	--	No
99	Red Rock Valley	900	--	0	200	-70	1,030	--	Yes
100	Cold Spring Valley	900	--	0	--	-960	--	--	Yes
101	Carson Desert	2,010	--	30,460	2,820	-46,530	-11,240	--	Yes
102	Churchill Valley	1,300	--	0	320	-2,510	-890	--	Yes
103	Dayton Valley	26,000	7,900	0	1,975	-8,820	19,155	1,055	Yes
104	Eagle Valley	10,000	5,600	0	-5,100	-18,200	-13,300	-17,700	Yes
105	Carson Valley	49,000	25,000	0	10,035	-23,940	35,095	11,095	Yes
106	Antelope Valley	5,000	--	0	800	-490	5,310	--	Yes
107	Smith Valley	17,000	--	0	-50	-29,180	-12,230	--	Yes

Table 2. Net ground-water flow and designated hydrographic areas of Nevada—Continued

[Values are in acre-feet per year; inflow are positive and outflow are negative values. Abbreviations: --, placeholder; HA, hydrographic area]

Hydrographic area no. (see fig. 1)	Hydrographic area name	Natural recharge (high)	Natural recharge (low)	Total artificial recharge	Net interbasin flow[a]	Total pumpage	Net ground-water flow[b] (high natural recharge)	Net ground-water flow[c] (low natural recharge)	Designated HA?
108	Mason Valley	2,000	--	0	-450	-66,120	-64,570	--	Yes
109	East Walker Area	22,000	--	0	50	-70	21,980	--	No
110	Walker Lake Valley	6,500	--	0	2,050	-4,310	4,240	--	Yes[e]
111	Alkali Valley	1,800	--	0	-1,400	0	400	--	No
112	Mono Valley	700	--	0	-700	0	0	--	No
113	Huntoon Valley	800	--	0	-350	-10	440	--	No
114	Teels Marsh Valley	1,300	--	0	350	-20	1,630	--	No
115	Adobe Valley	300	--	0	-300	0	0	--	No
116	Queen Valley	2,000	--	0	-2,000	0	0	--	No
117	Fish Lake Valley	33,000	26,800	0	-3,200	-29,040	760	-5,440	Yes
118	Columbus Salt Marsh Valley	700	--	0	3,200	-20	3,880	--	No
119	Rhodes Salt Marsh Valley	500	--	0	400	-10	890	--	No
120	Garfield Flat	300	--	0	-300	-10	-10	--	No
121	Soda Spring Valley	700	--	0	-400	-50	250	--	Yes
122	Gabbs Valley	5,000	4,900	0	--	-4,990	--	--	Yes
123	Rawhide Flats	150	--	0	--	-130	--	--	No
124	Fairview Valley	2,300	500	0	-2,300	-20	-20	-1,820	Yes
125	Stingaree Valley	--	--	0	--	0	--	--	Yes
126	Cowkick Valley	--	--	0	--	-180	--	--	Yes
127	Eastgate Valley Area	--	--	0	--	-10	--	--	Yes
	Sum of HAs 125, 126, 127	6,700	6,000	0	-6,300	-190	210	-490	--
128	Dixie Valley	8,900	6,000	14,010	10,800	-20,460	13,250	10,350	Yes
129	Buena Vista Valley	10,000	--	0	--	-6,530	--	--	Yes
130	Pleasant Valley	3,300	3,000	0	-1,100	-50	2,150	1,850	Yes
131	Buffalo Valley	--	--	0	-8,000	-80	--	--	No
132	Jersey Valley	1,400	800	0	-1,100	-20	280	-320	Yes
133	Edwards Creek Valley	8,000	--	0	--	-2,030	--	--	No
134	Smith Creek Valley	12,000	8,300	0	0	-1,080	10,920	7,220	No
135	Ione Valley	8,000	--	0	-2,500	-30	5,470	--	No
136	Monte Cristo Valley	500	--	0	--	-20	--	--	No
137	Big Smoky Valley	77,000	74,000	0	-200	-13,190	63,610	60,610	Yes
138	Grass Valley	13,000	--	0	--	-10	--	--	No
139	Kobeh Valley	11,000	--	0	5,850	-2,720	14,130	--	Yes
140	Monitor Valley	23,300	--	0	-6,000	-70	17,230	--	No
141	Ralston Valley	16,000	5,000	0	-3,500	-370	12,130	1,130	Yes
142	Alkali Spring Valley	100	--	0	500	-30	570	--	No

Table 2. Net ground-water flow and designated hydrographic areas of Nevada—Continued

[Values are in acre-feet per year; inflow are positive and outflow are negative values. Abbreviations: --, placeholder; HA, hydrographic area]

Hydro-graphic area no. (see fig. 1)	Hydrographic area name	Natural recharge (high)	Natural recharge (low)	Total artificial recharge	Net interbasin flow[a]	Total pumpage	Net ground-water flow[b] (high natural recharge)	Net ground-water flow[c] (low natural recharge)	Desig-nated HA?
143	Clayton Valley	1,500	--	1,420	18,000	-13,740	7,180	--	No
144	Lida Valley	1,900	500	0	-500	-40	1,360	-40	No
145	Stonewall Flat	800	100	0	-300	-10	490	-210	No
146	Sarcobatus Flat	1,500	1,200	0	900	-110	2,290	1,990	Yes
147	Gold Flat	6,600	3,800	0	--	0	--	--	No
148	Cactus Flat	3,100	600	0	-600	0	2,500	0	No
149	Stone Cabin Valley	16,000	5,000	0	-2,800	-1,590	11,610	610	Yes
150	Little Fish Lake Valley	11,000	9,700	0	-200	-30	10,770	9,470	No
151	Antelope Valley	4,100	--	0	200	-50	4,250	--	No
152	Stevens Basin	200	--	0	-200	0	0	--	No
153	Diamond Valley	21,000	10,500	0	9,350	-71,140	-40,790	-51,290	Yes
154	Newark Valley	49,000	17,500	0	11,500	-4,280	56,220	24,720	No
155	Little Smoky Valley	13,000	5,400	0	-7,000	-2,380	3,620	-3,980	No
156	Hot Creek Valley	10,600	5,800	0	-800	-1,500	8,300	3,500	No
157	Kawich Valley	7,500	3,500	0	1,000	0	8,500	4,500	No
158	Emigrant Valley	13,000	3,204	0	--	-30	--	--	No
159	Yucca Flat	1,900	700	0	--	-130	--	--	No
160	Frenchman Flat	1,000	100	0	--	-410	--	--	No
161	Indian Springs Valley	10,000	4,700	0	--	-710	--	--	Yes
162	Pahrump Valley	23,000	20,200	0	-700	-22,800	-500	-3,300	Yes
163	Mesquite Valley	2,200	1,400	0	700	-610	2,290	1,490	Yes
164	Ivanpah Valley	700	--	0	-700	-300	-300	--	Yes
165	Jean Lake Valley	100	--	0	-100	-130	-130	--	Yes
166	Hidden Valley	--	--	0	--	-80	--	--	Yes
167	Eldorado Valley	1,100	--	0	-1,100	-3,220	-3,220	--	Yes
168	Three Lakes Valley	2,000	1,200	0	--	-20	--	--	No
169	Tikapoo Valley	9,800	6,000	0	--	-70	--	--	No
170	Penoyer Valley	13,500	3,200	0	--	-12,560	--	--	Yes
171	Coal Valley	2,000	--	0	-1,700	-30	270	--	No
172	Garden Valley	10,000	--	0	-8,300	-30	1,670	--	No
173	Railroad Valley	[f]61,000	33,300	0	19,000	-2,250	77,750	50,050	No
174	Jakes Valley	38,500	13,000	0	-37,900	-30	570	-24,930	No
175	Long Valley	48,000	10,000	0	-44,800	-40	3,160	-34,840	No
176	Ruby Valley	146,000	68,000	0	21,000	-4,890	162,110	84,110	Yes
177	Clover Valley	59,000	20,700	0	25,500	-9,280	75,220	36,920	Yes
178	Butte Valley	69,000	14,600	0	-25,300	-3,640	40,060	-14,340	No
179	Steptoe Valley	132,000	85,000	0	-4,000	-6,360	121,640	74,640	Yes
180	Cave Valley	14,000	--	0	-13,700	-40	260	--	No

Table 2. Net ground-water flow and designated hydrographic areas of Nevada—Continued

[Values are in acre-feet per year; inflow are positive and outflow are negative values. Abbreviations: --, placeholder; HA, hydrographic area]

Hydro-graphic area no. (see fig. 1)	Hydrographic area name	Natural recharge (high)	Natural recharge (low)	Total artificial recharge	Net interbasin flow[a]	Total pumpage	Net ground-water flow[b] (high natural recharge)	Net ground-water flow[c] (low natural recharge)	Desig-nated HA?
181	Dry Lake Valley	5,000	--	0	-4,800	-60	140	--	No
182	Delamar Valley	1,000	--	0	-900	-30	70	--	No
183	Lake Valley	13,000	--	0	-3,000	-13,020	-3,020	--	Yes
184	Spring Valley	104,000	61,600	0	-12,000	-4,280	87,720	45,320	No
185	Tippett Valley	12,500	6,900	0	-11,600	-20	880	-4,720	No
186	Antelope Valley	17,000	4,700	0	-13,000	-120	3,880	-8,420	No
187	Goshute Valley	41,000	--	0	500	-2,410	39,090	--	Yes
188	Independence Valley	50,000	9,300	0	-3,000	-90	46,910	6,210	Yes
189	Thousand Springs Valley	12,000	--	0	-1,800	-3,240	6,960	--	Yes
190	Grouse Creek Valley	700	--	0	--	-20	--	--	No
191	Pilot Creek Valley	2,400	--	0	700	-300	2,800	--	Yes
192	Great Salt Lake Desert	4,800	--	0	21,800	-320	26,280	--	No
193	Deep Creek Valley	2,200	--	0	--	-30	--	--	No
194	Pleasant Valley	--	--	0	--	0	--	--	No
195	Snake Valley	--	--	0	7,600	-530	--	--	No
196	Hamlin Valley	--	--	0	10,000	-20	--	--	No
197	Escalante Desert	2,300	--	0	-2,300	-40	-40	--	No
198	Dry Valley	--	--	0	--	-5,180	--	--	No
199	Rose Valley	--	--	0	--	-1,370	--	--	No
200	Eagle Valley	--	--	0	--	0	--	--	No
201	Spring Valley	10,000	--	0	--	-20	--	--	No
202	Patterson Valley	6,000	--	0	3,000	-2,210	6,790	--	No
203	Panaca Valley	--	--	0	--	-9,790	--	--	Yes
204	Clover Valley	--	--	0	--	-120	--	--	No
205	Lower Meadow Valley Wash	--	--	0	-7,000	-450	--	--	Yes
206	Kane Springs Valley	500	--	0	--	-30	--	--	No
207	White River Valley	40,000	--	0	33,700	-3,530	70,170	--	No
208	Pahroc Valley	2,200	--	0	17,500	-30	19,670	--	No
209	Pahranagat Valley	1,800	--	0	--	-2,790	--	--	No
210	Coyote Spring Valley	2,100	--	0	--	-200	--	--	Yes
211	Three Lakes Valley	7,300	6,000	0	--	-520	--	--	Yes
212	Las Vegas Valley	35,000	25,000	29,790	-400	-73,820	-9,430	-19,430	Yes
213	Colorado Valley	200	--	0	--	-2,920	--	--	Yes
214	Piute Valley	1,700	--	0	-1,700	-640	-640	--	Yes
215	Black Mountains Area	70	--	0	1,900	-2,790	-820	--	Yes
216	Garnet Valley	400	--	0	-400	-40	-40	--	No
217	Hidden Valley	400	--	0	-400	-10	-10	--	No

Table 2. Net ground-water flow and designated hydrographic areas of Nevada—Continued

[Values are in acre-feet per year; inflow are positive and outflow are negative values. Abbreviations: --, placeholder; HA, hydrographic area]

Hydro-graphic area no. (see fig. 1)	Hydrographic area name	Natural recharge (high)	Natural recharge (low)	Total artificial recharge	Net interbasin flow[a]	Total pumpage	Net ground-water flow[b] (high natural recharge)	Net ground-water flow[c] (low natural recharge)	Desig-nated HA?
218	California Wash	60	--	0	7,800	-160	7,700	--	No
219	Muddy River Springs Area	--	--	0	--	-130	--	--	Yes
220	Lower Moapa Valley	40	--	0	-1,100	-960	-2,020	--	Yes
221	Tule Desert	2,100	--	0	-2,100	-20	-20	--	No
222	Virgin River Valley	3,600	--	0	13,100	-4,370	12,330	--	Yes
223	Gold Butte Area	1,000	--	0	-1,000	-20,550	-20,550	--	No
224	Greasewood Basin	600	--	0	-600	-40	-40	--	No
225	Mercury Valley	250	--	0	--	-50	--	--	No
226	Rock Valley	30	--	0	--	-10	--	--	No
	Sum of 225, 226	400	--	0	--	-60	--	--	
227	Fortymile Canyon	2,300	700	0	--	-200	--	--	No
228	Oasis Valley	3,000	1,000	0	--	-130	--	--	Yes
229	Crater Flat	220	100	0	--	-90	--	--	No
230	Amargosa Desert	1,500	400	0	--	-10,850	--	--	Yes
231	Grapevine Canyon	50	--	0	100	-20	130	--	No
232	Oriental Wash	300	--	0	-300	-10	-10	--	No

[a]Sum of interbasin flow estimates in appendix 2. The most recent estimate was used for multiple estimates of flow between the same basins. The average value was used when a range in values was reported.

[b]Sum of natural recharge (high), total artificial recharge, net interbasin flow, and total pumpage.

[c]Sum of natural recharge (low), total artificial recharge, net interbasin flow, and total pumpage.

[d]Hydrographic Subarea 73A (Oreana Subarea) not included.

[e]Only Hydrographic Subarea 110C (Whisky Flat–Hawthorne Subarea).

[f]Estimate is for the Hydrographic Subarea 173B (Railroad Valley, Northern Part).

Appendixes 1–3

Appendix 1. Estimates of natural recharge for hydrographic areas of Nevada

[Abbreviations: HA, hydrographic area; --, placeholder; ET, evapotranspiration; PRISM, Parameter-elevation Regressions on Independent Slopes Model; acre-ft/yr, acre-feet per year; ft, feet; in., inches; <, less than; >; greater than; ≥, greater than or equal to. Precipitation volume where precipitation is ≥8 in/yr unless noted otherwise]

HA no. (see fig. 1)	Hydrographic area name	Precipitation, acre-ft/yr	Recharge, acre-ft/yr	Source of precipitation data	Comments	Reference
1	Pueblo Valley	48,300	2,000	Hardman and Mason, 1949	Maxey-Eakin method	Sinclair, 1963a
2	Continental Lake Valley	254,200	11,000	Hardman and Mason, 1949	Maxey-Eakin method	Sinclair, 1963a
3	Gridley Lake Valley	97,900	4,500	Hardman and Mason, 1949	Maxey-Eakin method	Sinclair, 1963a
4	Virgin Valley	230,000	7,000	Hardman and Mason, 1949	Maxey-Eakin method	Sinclair, 1963a
5	Sage Hen Valley	--	--	--	No estimate available	--
6	Guano Valley	206,000	7,500	Hardman and Mason, 1949	Maxey-Eakin method	Sinclair, 1963b
7	Swan Lake Valley	--	--	--	No estimate available	--
8	Massacre Lake Valley	88,200	3,500	Hardman and Mason, 1949	Maxey-Eakin method	Sinclair, 1963b
9	Long Valley	168,000	6,000	Hardman and Mason, 1949	Maxey-Eakin method	Sinclair, 1963b
10	Macy Flat	--	--	--	No estimate available	--
11	Coleman Valley	28,000	1,000	Hardman and Mason, 1949	Maxey-Eakin method	Sinclair, 1963b
12	Mosquito Valley	14,300	700	Hardman and Mason, 1949	Maxey-Eakin method	Sinclair, 1963b
13	Warner Valley	--	--	--	No estimate available	--
14	Surprise Valley	37,500	1,500	Hardman and Mason, 1949	Maxey-Eakin method	Sinclair, 1963b
15	Boulder Valley	50,400	2,000	Hardman and Mason, 1949	Maxey-Eakin method	Sinclair, 1963b
16	Duck Lake Valley	247,000	9,000	Hardman and Mason, 1949	Maxey-Eakin method	Sinclair, 1963c
		243,000	8,900	Altitude-precipitation relation	Chloride-balance method	Dettinger, 1989
17	Pilgrim Flat	7,000	500	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >12 in. assumed equal to 1.1 ft	Glancy and Rush, 1968
18	Painter Flat	31,000	1,300	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >12 in. assumed equal to 1.1 ft	Glancy and Rush, 1968
19	Dry Valley	5,900	200	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >12 in. assumed equal to 1.1 ft	Glancy and Rush, 1968
20	Sano Valley	130	4	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >8 in. assumed equal to 0.8 ft	Glancy and Rush, 1968
21	Smoke Creek Desert	275,100	13,000	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.8 ft	Glancy and Rush, 1968

Appendix 1. Estimates of natural recharge for hydrographic areas of Nevada—Continued

[Abbreviations: HA, hydrographic area; --, placeholder; ET, evapotranspiration; PRISM, Parameter-elevation Regressions on Independent Slopes Model; acre-ft/yr, acre-feet per year; ft, feet; in., inches; <, less than; >; greater than; ≥, greater than or equal to. Precipitation volume where precipitation is ≥8 in/yr unless noted otherwise]

HA no. (see fig. 1)	Hydrographic area name	Precipitation, acre-ft/yr	Recharge, acre-ft/yr	Source of precipitation data	Comments	Reference
22	San Emidio Desert	47,900	2,100	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >15 in. assumed equal to 1.5 ft	Glancy and Rush, 1968
23	Granite Basin	45,400	2,000	Hardman, 1936; Hardman and Mason, 1949	Maxey-Eakin method	Sinclair, 1963d
24	Hualapai Flat	62,700	4,000	Hardman, 1936	Maxey-Eakin method	Sinclair, 1962a
		106,200	7,000	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.8 ft	Harrill, 1969
25	High Rock Lake Valley	435,000	13,000	Hardman, 1936; Hardman and Mason, 1949	Maxey-Eakin method	Sinclair, 1963d
26	Mud Meadow	130,600	8,000	Hardman, 1936; Hardman and Mason, 1949	Maxey-Eakin method	Sinclair, 1963d
27	Summit Lake Valley	42,700	4,200	Hardman, 1936; Hardman and Mason, 1949	Maxey-Eakin method	Sinclair, 1963d
28	Black Rock Desert	260,900	13,900	Hardman, 1936; Hardman and Mason, 1949	Maxey-Eakin method	Sinclair, 1963d
29	Pine Forest Valley	197,000	10,000	Hardman, 1936; modified by subsequent unpublished data	Maxey-Eakin method	Sinclair, 1962b
30	Kings River Valley	260,000	15,000	Altitude-precipitation relation	Maxey-Eakin method, precipitation >18 in. assumed equal to 1.75 ft	Malmberg and Worts, 1966
31	Desert Valley	100,000	5,000	Hardman, 1936	Maxey-Eakin method	Sinclair, 1962c
		110,000	7,000	Altitude-precipitation relation	Maxey-Eakin method	Berger, 1995
		110,000	3,300	Altitude-precipitation relation	Chloride-balance method	Berger, 1995
32	Silver State Valley	35,000	1,400	Altitude-precipitation relation	Maxey-Eakin method, precipitation >15 in. assumed equal to 1.4 ft; precipitation <10 in. not used in recharge estimate	Huxel and others, 1966
33	Quinn River Valley	880,000	62,000	Altitude-precipitation relation	Maxey-Eakin method, precipitation >12, 19, 24 in. assumed equal to 1.1, 1.8, 2.2 ft, respectively; precipitation <12 in. assumed equal to 0.9 ft	Huxel and others, 1966
34	Little Owyhee River Area	357,000	2,700	Altitude-precipitation relation	Maxey-Eakin method	Moore and Eakin, 1968

Appendix 1. Estimates of natural recharge for hydrographic areas of Nevada—Continued

[Abbreviations: HA, hydrographic area; --, placeholder; ET, evapotranspiration; PRISM, Parameter-elevation Regressions on Independent Slopes Model; acre-ft/yr, acre-feet per year; ft, feet; in., inches; <, less than; >; greater than; ≥, greater than or equal to. Precipitation volume where precipitation is ≥8 in/yr unless noted otherwise]

HA no. (see fig. 1)	Hydrographic area name	Precipitation, acre-ft/yr	Recharge, acre-ft/yr	Source of precipitation data	Comments	Reference
35	South Fork Owyhee River Area	1,004,000	28,000	Altitude-precipitation relation	Maxey-Eakin method	Moore and Eakin, 1968
36	Independence Valley	--	10,000	--	Water-balance method	Eakin, 1962a
		251,000	9,700	Altitude-precipitation relation	Chloride-balance method	Dettinger, 1989
37	Owyhee River Area	458,000	17,000	Altitude-precipitation relation	Maxey-Eakin method	Moore and Eakin, 1968
38	Bruneau River Area	497,000	26,000	Altitude-precipitation relation	Maxey-Eakin method	Moore and Eakin, 1968
39	Jarbidge River Area	334,000	32,000	Altitude-precipitation relation	Maxey-Eakin method	Moore and Eakin, 1968
40	Salmon Falls Creek Area	1,021,000	44,000	Altitude-precipitation relation	Maxey-Eakin method	Moore and Eakin, 1968
41	Goose Creek Area	198,000	6,700	Altitude-precipitation relation	Maxey-Eakin method, includes drainage area in Idaho	Moore and Eakin, 1968
42	Marys River Area	--	--	--	No estimate available	--
43	Starr Valley Area	--	--	--	No estimate available	--
44	North Fork Area	--	--	--	No estimate available	--
45	Lamoille Valley	--	--	--	No estimate available	--
46	South Fork Area	98,000	3,000	Altitude-precipitation relation	Water-budget method, recharge equals ET, precipitation >20 in. assumed equal to 2.0 ft	Rush and Everett, 1966a
47	Huntington Valley	554,000	14,000	Altitude-precipitation relation	Water-budget method, recharge equals ET, precipitation >20 in. assumed equal to 2.0 ft	Rush and Everett, 1966a
48	Dixie Creek-Tenmile Creek Area	235,000	13,000	Altitude-precipitation relation	Water-budget method, recharge equals ET, precipitation >20 in. assumed equal to 2.0 ft	Rush and Everett, 1966a
49	Elko Segment	--	--	--	No estimate available	--
50	Susie Creek Area	147,000	9,700	Altitude-precipitation relation	Maxey-Eakin method, used precipitation >8 in., precipitation >20 in. assumed equal to 1.7 ft	Maurer and others, 1996
51	Maggie Creek Area	280,000	23,000	Altitude-precipitation relation	Maxey-Eakin method, used precipitation >8 in., precipitation >20 in. assumed equal to 1.7 ft	Maurer and others, 1996
52	Marys Creek Area	37,000	2,100	Altitude-precipitation relation	Maxey-Eakin method, used precipitation >8 in., precipitation >20 in. assumed equal to 1.7 ft	Maurer and others, 1996

Appendix 1. Estimates of natural recharge for hydrographic areas of Nevada—Continued

[Abbreviations: HA, hydrographic area; --, placeholder; ET, evapotranspiration; PRISM, Parameter-elevation Regressions on Independent Slopes Model; acre-ft/yr, acre-feet per year; ft, feet; in., inches; <, less than; >; greater than; ≥, greater than or equal to. Precipitation volume where precipitation is ≥8 in/yr unless noted otherwise]

HA no. (see fig. 1)	Hydrographic area name	Precipitation, acre-ft/yr	Recharge, acre-ft/yr	Source of precipitation data	Comments	Reference
53	Pine Valley	654,000	46,000	Hardman, written commun., 1960	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.75 ft	Eakin, 1961a
		688,000	52,500	PRISM 1997	Water-budget method, minimum estimate	Berger, 2000
		688,000	79,300	PRISM 1997	Water-budget method, maximum estimate	Berger, 2000
		688,000	66,000	PRISM 1997	Revised Maxey-Eakin method (Nichols, 2000)	Berger, 2000
54	Crescent Valley	200,000	14,000	Hardman, 1936	Assumed 40 percent of runoff is recharge	Zones, 1961
		446,000	25,200	PRISM 1997	Water-budget method, minimum estimate	Berger, 2000
		446,000	26,200	PRISM 1997	Water-budget method, maximum estimate	Berger, 2000
		446,000	21,000	PRISM 1997	Revised Maxey-Eakin method (Nichols, 2000)	Berger, 2000
55	Carico Lake Valley	86,600	4,300	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.75 ft	Everett and Rush, 1966
		239,000	18,700	PRISM 1997	Water-budget method, minimum estimate	Berger, 2000
		239,000	20,400	PRISM 1997	Water-budget method, maximum estimate	Berger, 2000
		239,000	18,000	PRISM 1997	Revised Maxey-Eakin method (Nichols, 2000)	Berger, 2000
56	Upper Reese River Valley	591,500	37,000	Hardman and Mason, 1949	Maxey-Eakin method adjusted to equal discharge, precipitation >20 in. assumed equal to 1.75 ft	Eakin and others, 1965
		592,000	30,000	Altitude-precipitation relation	Chloride-balance method	Dettinger, 1989
		803,000	71,400	PRISM 1997	Water-budget method, minimum estimate	Berger, 2000
		803,000	110,000	PRISM 1997	Water-budget method, maximum estimate	Berger, 2000
		803,000	93,000	PRISM 1997	Revised Maxey-Eakin method (Nichols, 2000)	Berger, 2000
57	Antelope Valley	240,000	11,000	Hardman and Mason, 1949	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.75 ft	Crosthwaite, 1963
		279,000	17,200	PRISM 1997	Water-budget method, minimum estimate	Berger, 2000
		279,000	25,200	PRISM 1997	Water-budget method, maximum estimate	Berger, 2000
		279,000	19,000	PRISM 1997	Revised Maxey-Eakin method (Nichols, 2000)	Berger, 2000

Appendix 1. Estimates of natural recharge for hydrographic areas of Nevada—Continued

[Abbreviations: HA, hydrographic area; --, placeholder; ET, evapotranspiration; PRISM, Parameter-elevation Regressions on Independent Slopes Model; acre-ft/yr, acre-feet per year; ft, feet; in., inches; <, less than; >; greater than; ≥, greater than or equal to. Precipitation volume where precipitation is ≥8 in/yr unless noted otherwise]

HA no. (see fig. 1)	Hydrographic area name	Precipitation, acre-ft/yr	Recharge, acre-ft/yr	Source of precipitation data	Comments	Reference
58	Middle Reese River Valley	142,000	7,000	Hardman and Mason, 1949	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.75 ft	Crosthwaite, 1963
		186,000	12,800	PRISM 1997	Water-budget method, minimum estimate	Berger, 2000
		186,000	13,200	PRISM 1997	Water-budget method, maximum estimate	Berger, 2000
		186,000	10,000	PRISM 1997	Revised Maxey-Eakin method (Nichols, 2000)	Berger, 2000
59	Lower Reese River Valley	341,000	18,500	PRISM 1997	Water-budget method, minimum estimate	Berger, 2000
		341,000	19,000	PRISM 1997	Water-budget method, maximum estimate	Berger, 2000
		341,000	13,000	PRISM 1997	Revised Maxey-Eakin method (Nichols, 2000)	Berger, 2000
60	Whirlwind Valley	55,000	3,700	PRISM 1997	Water-budget method, minimum estimate	Berger, 2000
		55,000	3,800	PRISM 1997	Water-budget method, maximum estimate	Berger, 2000
		55,000	2,000	PRISM 1997	Revised Maxey-Eakin method (Nichols, 2000)	Berger, 2000
61	Boulder Flat	291,000	14,000	Altitude-precipitation relation	Maxey-Eakin method, used precipitation >8 in., precipitation >20 in. assumed equal to 1.7 ft	Maurer and others, 1996
		308,000	19,100	PRISM 1997	Water-budget method, minimum estimate	Berger, 2000
		308,000	19,300	PRISM 1997	Water-budget method, maximum estimate	Berger, 2000
		308,000	11,000	PRISM 1997	Revised Maxey-Eakin method (Nichols, 2000)	Berger, 2000
62	Rock Creek Valley	256,000	17,100	PRISM 1997	Water-budget method	Berger, 2000
		256,000	9,000	PRISM 1997	Revised Maxey-Eakin method (Nichols, 2000)	Berger, 2000
		270,000	13,000	Altitude-precipitation relation	Maxey-Eakin method, used precipitation >8 in., precipitation >20 in. assumed equal to 1.7 ft	Maurer and others, 1996
63	Willow Creek Valley	279,000	20,000	Altitude-precipitation relation	Maxey-Eakin method, used precipitation >8 in., precipitation >20 in. assumed equal to 1.7 ft	Maurer and others, 1996
		280,000	27,500	PRISM 1997	Water-budget method	Berger, 2000
		280,000	28,000	PRISM 1997	Revised Maxey-Eakin method (Nichols, 2000)	Berger, 2000
64	Clovers Area	401,000	17,900	PRISM 1997	Water-budget method, minimum estimate	Berger, 2000
		401,000	18,400	PRISM 1997	Water-budget method, maximum estimate	Berger, 2000
		401,000	13,000	PRISM 1997	Revised Maxey-Eakin method (Nichols, 2000)	Berger, 2000

Appendix 1. Estimates of natural recharge for hydrographic areas of Nevada—Continued

[Abbreviations: HA, hydrographic area; --, placeholder; ET, evapotranspiration; PRISM, Parameter-elevation Regressions on Independent Slopes Model; acre-ft/yr, acre-feet per year; ft, feet; in., inches; <, less than; >; greater than; ≥, greater than or equal to. Precipitation volume where precipitation is ≥8 in/yr unless noted otherwise]

HA no. (see fig. 1)	Hydrographic area name	Precipitation, acre-ft/yr	Recharge, acre-ft/yr	Source of precipitation data	Comments	Reference
65	Pumpernickel Valley	169,000	8,800	PRISM 1997	Water-budget method, minimum estimate	Berger, 2000
		169,000	9,000	PRISM 1997	Water-budget method, maximum estimate	Berger, 2000
		169,000	7,500	PRISM 1997	Revised Maxey-Eakin method (Nichols, 2000)	Berger, 2000
66	Kelly Creek Area	181,000	12,700	PRISM 1997	Water-budget method, minimum estimate	Berger, 2000
		181,000	13,200	PRISM 1997	Water-budget method, maximum estimate	Berger, 2000
		181,000	11,000	PRISM 1997	Revised Maxey-Eakin method (Nichols, 2000)	Berger, 2000
67	Little Humboldt Valley	443,000	24,000	Hardman, 1936	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.8 ft	Harrill and Moore, 1970
68	Hardscrabble Area	115,000	9,000	Hardman, 1936	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.8 ft	Harrill and Moore, 1970
69	Paradise Valley	121,000	10,000	Hardman, 1936	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.8 ft	Harrill and Moore, 1970
70	Winnemucca Segment	--	--	--	No estimate available	--
71	Grass Valley	180,000	12,000	Hardman, 1936	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.75 ft	Cohen, 1964
72	Imlay Area	82,000	4,000	Hardman and Mason, 1949	Maxey-Eakin method, precipitation >15 in. assumed equal to 1.46 ft	Eakin, 1962b
73	Lovelock Valley	60,000	3,200	George Hardman, unpublished map, 1964	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.75 ft	Everett and Rush, 1965
74	White Plains	100	3	Altitude-precipitation relation	Maxey-Eakin method, used precipitation >8 in. assumed equal to 0.8 ft	Glancy and Katzer, 1976
75	Bradys Hot Springs Area	4,800	160	George Hardman, unpublished map, 1965	Maxey-Eakin method	Harrill, 1970
76	Fernley Area	13,000	600	Hardman and Mason, 1949	Maxey-Eakin method	Van Denburgh and others, 1973
77	Fireball Valley	6,000	200	George Hardman, unpublished map, 1965	Maxey-Eakin method	Harrill, 1970
78	Granite Springs Valley	97,600	3,500	George Hardman, unpublished map, 1965	Maxey-Eakin method	Harrill, 1970
79	Kumiva Valley	28,000	1,000	George Hardman, unpublished map, 1965	Maxey-Eakin method	Harrill, 1970
80	Winnemucca Lake Valley	61,000	2,900	Hardman and Mason, 1949	Maxey-Eakin method	Van Denburgh and others, 1973

Appendix 1. Estimates of natural recharge for hydrographic areas of Nevada—Continued

[Abbreviations: HA, hydrographic area; --, placeholder; ET, evapotranspiration; PRISM, Parameter-elevation Regressions on Independent Slopes Model; acre-ft/yr, acre-feet per year; ft, feet; in., inches; <, less than; >; greater than; ≥, greater than or equal to. Precipitation volume where precipitation is ≥8 in/yr unless noted otherwise]

HA no. (see fig. 1)	Hydrographic area name	Precipitation, acre-ft/yr	Recharge, acre-ft/yr	Source of precipitation data	Comments	Reference
81	Pyramid Lake Valley	100,000	6,600	Hardman and Mason, 1949	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.8 ft	Van Denburgh and others, 1973
82	Dodge Flat	21,000	1,400	Hardman and Mason, 1949	Maxey-Eakin method	Van Denburgh and others, 1973
83	Tracy Segment	121,000	6,000	Hardman and Mason, 1949	Maxey-Eakin method	Van Denburgh and others, 1973
84	Warm Springs Valley	96,000	6,000	George Hardman, unpublished map, 1965	Maxey-Eakin method	Rush and Glancy, 1967
85	Spanish Springs Valley	16,000	600	George Hardman, unpublished map, 1965	Maxey-Eakin method, does not include Dry Lakes Area of HA	Rush and Glancy, 1967
		26,000	830	Altitude-precipitation relation	Maxey-Eakin method, precipitation >12 in. assumed equal to 1.1 ft or 1.08 ft	Berger and others, 1997
		26,000	770	Altitude-precipitation relation	Chloride balance, precipitation >12 in. assumed equal to 1.1 ft or 1.08 ft	Berger and others, 1997
86	Sun Valley	1,800	50	George Hardman, unpublished map, 1965	Maxey-Eakin method	Rush and Glancy, 1967
87	Truckee Meadows	161,000	27,000	Hardman and Mason, 1949	Maxey-Eakin method, precipitation >39 in. assumed equal to 3.3 ft	Van Denburgh and others, 1973
88	Pleasant Valley	46,000	10,000	Hardman and Mason, 1949	Maxey-Eakin method, precipitation >39 in. assumed equal to 3.3 ft	Van Denburgh and others, 1973
89	Washoe Valley	87,000	15,000	Altitude-precipitation relation	Maxey-Eakin method, precipitation >32 in. assumed equal to 2.8 ft	Rush, 1967
90	Lake Tahoe Basin	--	--	--	No estimate available	--
91	Truckee Canyon Segment	110,000	27,000	Hardman and Mason, 1949	Maxey-Eakin method, precipitation >39 in. assumed equal to 3.3 ft	Van Denburgh and others, 1973
92	Lemmon Valley	43,400	1,800	George Hardman, unpublished map, 1965	Maxey-Eakin method	Rush and Glancy, 1967
		44,000	1,500	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.7 ft	Harrill, 1973
		30,800	1,600	Altitude-precipitation relation	Chloride-balance method	Dettinger, 1989
93	Antelope Valley	9,000	300	George Hardman, unpublished map, 1965	Maxey-Eakin method	Rush and Glancy, 1967
94	Bedell Flat	27,000	1,100	George Hardman, unpublished map, 1965	Maxey-Eakin method	Rush and Glancy, 1967

Appendix 1. Estimates of natural recharge for hydrographic areas of Nevada—Continued

[Abbreviations: HA, hydrographic area; --, placeholder; ET, evapotranspiration; PRISM, Parameter-elevation Regressions on Independent Slopes Model; acre-ft/yr, acre-feet per year; ft, feet; in., inches; <, less than; >; greater than; ≥, greater than or equal to. Precipitation volume where precipitation is ≥8 in/yr unless noted otherwise]

HA no. (see fig. 1)	Hydrographic area name	Precipitation, acre-ft/yr	Recharge, acre-ft/yr	Source of precipitation data	Comments	Reference
95	Dry Valley	37,000	2,400	George Hardman, unpublished map, 1965	Maxey-Eakin method	Rush and Glancy, 1967
96	Newcomb Lake Valley	4,500	300	George Hardman, unpublished map, 1965	Maxey-Eakin method	Rush and Glancy, 1967
97	Honey Lake Valley	24,000	1,500	George Hardman, unpublished map, 1965	Maxey-Eakin method	Rush and Glancy, 1967
98	Skedaddle Creek Valley	17,680	600	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >12 in. assumed equal to 1.1 ft	Glancy and Rush, 1968
99	Red Rock Valley	7,700	900	George Hardman, unpublished map, 1965	Maxey-Eakin method	Rush and Glancy, 1967
100	Cold Spring Valley	18,000	900	George Hardman, unpublished map, 1965	Maxey-Eakin method	Rush and Glancy, 1967
101	Carson Desert	43,000	2,010	Altitude-precipitation relation	Maxey-Eakin method, precipitation >15 in. assumed equal to 1.5 ft	Glancy and Katzer, 1976
102	Churchill Valley	32,000	1,300	Altitude-precipitation relation	Maxey-Eakin method, precipitation >15 in. assumed equal to 1.5 ft	Glancy and Katzer, 1976
103	Dayton Valley	125,300	7,900	Altitude-precipitation relation	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.8 ft	Glancy and Katzer, 1976
		127,000	7,900	Altitude-precipitation relation	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.8 ft	Maurer, 1997
		163,000	11,000	Distance-altitude relation	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.8 ft	Maurer, 1997
		229,000	26,000	PRISM 1996	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.8 ft	Maurer, 1997
	Stagecoach subbasin[a]	9,700	320	Altitude-precipitation relation	Chloride-balance method	Dettinger, 1989
		12,200	440	Hardman and Mason, 1949	Chloride-balance method	Harrill and Preissler, 1994
		12,200	580	Hardman and Mason, 1949	Maxey-Eakin method	Harrill and Preissler, 1994
		12,000	560	Glancy and Katzer, 1976	Maxey-Eakin method	Maurer, 1997
		18,000	800	Distance-altitude relation	Maxey-Eakin method	Maurer, 1997
		22,000	1,500	PRISM 1996	Maxey-Eakin method	Maurer, 1997
104	Eagle Valley	58,000	8,700	Altitude-precipitation relation	Maxey-Eakin method, precipitation >30 in. assumed equal to 2.6 ft	Worts and Malmberg, 1966
		--	5,600	Altitude-precipitation relation	Water-budget method, includes recharge after agricultural and municipal water use	Arteaga and Durbin, 1978
		67,000	8,000	Altitude-precipitation relation	Water-budget method, minimum estimate	Maurer and Thodal, 2000

Appendix 1. Estimates of natural recharge for hydrographic areas of Nevada—Continued

[Abbreviations: HA, hydrographic area; --, placeholder; ET, evapotranspiration; PRISM, Parameter-elevation Regressions on Independent Slopes Model; acre-ft/yr, acre-feet per year; ft, feet; in., inches; <, less than; >; greater than; ≥, greater than or equal to. Precipitation volume where precipitation is ≥8 in/yr unless noted otherwise]

HA no. (see fig. 1)	Hydrographic area name	Precipitation, acre-ft/yr	Recharge, acre-ft/yr	Source of precipitation data	Comments	Reference
		67,000	10,000	Altitude-precipitation relation	Water-budget method, maximum estimate	Maurer and Thodal, 2000
105	Carson Valley	254,000	25,000	Altitude-precipitation relation	Maxey-Eakin method, precipitation >24 in. assumed equal to 2.0 ft; >30 in. assumed equal to 2.6 ft	Glancy and Katzer, 1976
		350,000	49,000	Spane, 1977	Maxey-Eakin method, precipitation >26 in. assumed equal to 2.2 ft; >40 in. assumed equal to 3.3 ft	Maurer, 1986
106	Antelope Valley	66,700	5,000	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >24 in. assumed equal to 2.0 ft	Glancy, 1971
107	Smith Valley	210,000	17,000	Altitude-precipitation relation	Maxey-Eakin method, precipitation >20 in. assumed equal to 2.0 ft; >12 in. assumed equal to 1.1 ft	Rush and Schroer, 1976
108	Mason Valley	32,000	2,000	Not specified	Maxey-Eakin method	Huxel and Harris, 1969
109	East Walker Area	191,000	22,000	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.8 ft; >15 in. assumed equal to 1.5	Glancy, 1971
110	Walker Lake Valley	101,000	6,500	Hardman and Mason, 1949	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.75 ft; assumed minor recharge on west side Walker Lake subarea	Everett and Rush, 1967
111	Alkali Valley	32,400	1,800	Hardman and Mason, 1949	Maxey-Eakin method, precipitation >15 in. assumed equal to 1.5 ft	Van Denburgh and Glancy, 1970
112	Mono Valley	16,000	700	Hardman and Mason, 1949	Maxey-Eakin method, precipitation >12 in. assumed equal to 1.1 ft	Van Denburgh and Glancy, 1970
113	Huntoon Valley	22,200	800	Hardman and Mason, 1949	Maxey-Eakin method, precipitation >12 in. assumed equal to 1.1 ft	Van Denburgh and Glancy, 1970
114	Teels Marsh Valley	38,400	1,300	Hardman and Mason, 1949	Maxey-Eakin method, precipitation >12 in. assumed equal to 1.1 ft	Van Denburgh and Glancy, 1970
115	Adobe Valley	6,400	300	Hardman and Mason, 1949	Maxey-Eakin method, precipitation >12 in. assumed equal to 1.1 ft	Van Denburgh and Glancy, 1970
116	Queen Valley	25,100	2,000	Hardman and Mason, 1949	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.8 ft	Van Denburgh and Glancy, 1970
117	Fish Lake Valley	255,000	33,000	Altitude-precipitation relation	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.8 ft	Rush and Katzer, 1973

Appendix 1. Estimates of natural recharge for hydrographic areas of Nevada—Continued

[Abbreviations: HA, hydrographic area; --, placeholder; ET, evapotranspiration; PRISM, Parameter-elevation Regressions on Independent Slopes Model; acre-ft/yr, acre-feet per year; ft, feet; in., inches; <, less than; >; greater than; ≥, greater than or equal to. Precipitation volume where precipitation is ≥8 in/yr unless noted otherwise]

HA no. (see fig. 1)	Hydrographic area name	Precipitation, acre-ft/yr	Recharge, acre-ft/yr	Source of precipitation data	Comments	Reference
		251,000	26,800	Altitude-precipitation relation	Chloride-balance method	Dettinger, 1989
118	Columbus Salt Marsh Valley	13,300	700	Hardman and Mason, 1949	Maxey-Eakin method	Van Denburgh and Glancy, 1970
119	Rhodes Salt Marsh Valley	11,600	500	Hardman and Mason, 1949	Maxey-Eakin method	Van Denburgh and Glancy, 1970
120	Garfield Flat	9,400	300	Hardman and Mason, 1949	Maxey-Eakin method, precipitation >12 in. assumed equal to 1.1 ft	Van Denburgh and Glancy, 1970
121	Soda Spring Valley	19,600	700	Hardman and Mason, 1949	Maxey-Eakin method, precipitation >15 in. assumed equal to 1.5 ft; >8 in. assumed equal to 0.8 ft	Van Denburgh and Glancy, 1970
122	Gabbs Valley	383,000	5,000	Hardman and Mason, 1949	Maxey-Eakin method	Eakin, 1962c
		381,000	4,900	Altitude-precipitation relation	Chloride-balance method	Dettinger, 1989
123	Rawhide Flats	5,000	150	Hardman and Mason, 1949	Maxey-Eakin method	Everett and Rush, 1967
124	Fairview Valley	16,600	500	Hardman, 1936	Maxey-Eakin method	Cohen and Everett, 1963
		74,000	2,300	Altitude-precipitation relation	Maxey-Eakin method	Harrill and Hines, 1995
125	Stingaree Valley	--	--	--	See sum of HAs	--
126	Cowkick Valley	--	--	--	See sum of HAs	--
127	Eastgate Valley Area	--	--	--	See sum of HAs	--
	Sum of HAs 125, 126, 127	94,100	6,000	Hardman, 1936	Maxey-Eakin method	Cohen and Everett, 1963
		171,000	6,700	Altitude-precipitation relation	Maxey-Eakin method, precipitation >15 in. assumed equal to 1.46 ft	Harrill and Hines, 1995
128	Dixie Valley	116,200	6,000	Hardman, 1936	Maxey-Eakin method	Cohen and Everett, 1963
		246,900	8,900	Altitude-precipitation relation	Maxey-Eakin method, precipitation >15 in. assumed equal to 1.46 ft	Harrill and Hines, 1995
129	Buena Vista Valley		10,000	Hardman, 1936	Maxey-Eakin method	Loeltz and Phoenix, 1955
130	Pleasant Valley	44,900	3,000	Hardman, 1936	Maxey-Eakin method	Cohen and Everett, 1963
		92,000	3,300	Altitude-precipitation relation	Maxey-Eakin method, precipitation >15 in. assumed equal to 1.46 ft	Harrill and Hines, 1995

Appendix 1. Estimates of natural recharge for hydrographic areas of Nevada—Continued

[Abbreviations: HA, hydrographic area; --, placeholder; ET, evapotranspiration; PRISM, Parameter-elevation Regressions on Independent Slopes Model; acre-ft/yr, acre-feet per year; ft, feet; in., inches; <, less than; >; greater than; ≥, greater than or equal to. Precipitation volume where precipitation is ≥8 in/yr unless noted otherwise]

HA no. (see fig. 1)	Hydrographic area name	Precipitation, acre-ft/yr	Recharge, acre-ft/yr	Source of precipitation data	Comments	Reference
131	Buffalo Valley	--	--	--	No estimate available	--
132	Jersey Valley	16,970	800	Hardman, 1936	Maxey-Eakin method	Cohen and Everett, 1963
		41,000	1,400	Altitude-precipitation relation	Maxey-Eakin method	Harrill and Hines, 1995
133	Edwards Creek Valley	111,400	8,000	George Hardman, unpublished map, 1962	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.75 ft	Everett, 1964
134	Smith Creek Valley	119,000	12,000	George Hardman, unpublished map, 1962	Maxey-Eakin method, used precipitation ≥12 in., precipitation >20 in. assumed equal to 1.75 ft	Everett and Rush, 1964
		92,000	9,600	Altitude-precipitation relation	Maxey-Eakin method, used precipitation ≥10 in.	Thomas and others, 1989
		92,000	8,300	Altitude-precipitation relation	Chloride-balance method	Thomas and others, 1989
135	Ione Valley	90,000	8,000	George Hardman, unpublished map, 1962	Maxey-Eakin method, used precipitation ≥12 in., precipitation >20 in. assumed equal to 1.75 ft	Everett and Rush, 1964
136	Monte Cristo Valley	12,200	500	Hardman and Mason, 1949	Maxey-Eakin method, precipitation >12 in. assumed equal to 1.1 ft	Van Denburgh and Glancy, 1970
137	Big Smoky Valley	741,000	77,000	Altitude-precipitation relation	Maxey-Eakin method, precipitation >20 in. assumed equal to 2 ft, >15 in. assumed equal to 1.5 ft	Rush and Schroer, 1970
		--	74,000	Not specified	Model results	Handman and Kilroy, 1997
138	Grass Valley	211,000	13,000	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.75 ft	Everett and Rush, 1966
139	Kobeh Valley	110,000	11,000	Hardman, 1936	Maxey-Eakin method, used precipitation ≥12 in., precipitation >20 in. assumed equal to 1.75 ft	Rush and Everett, 1964
140	Monitor Valley	392,500	23,300	Hardman, 1936	Maxey-Eakin method, used precipitation ≥7 in., precipitation >18 in. assumed equal to 1.7 ft	Rush and Everett, 1964
141	Ralston Valley	340,000	16,000	George Hardman, unpublished map, 1962	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.75 ft	Eakin, 1962d
		115,000	5,000	Altitude-precipitation relation	Maxey-Eakin method, precipitation >15 in. assumed equal to 1.5 ft	Rush, 1968a
142	Alkali Spring Valley	2,800	100	Altitude-precipitation relation	Maxey-Eakin method, precipitation >8 in. assumed equal to 0.8 ft	Rush, 1968a
143	Clayton Valley	34,700	1,500	Altitude-precipitation relation	Maxey-Eakin method, precipitation >15 in. assumed equal to 1.5 ft	Rush, 1968a

Appendix 1. Estimates of natural recharge for hydrographic areas of Nevada—Continued

[Abbreviations: HA, hydrographic area; --, placeholder; ET, evapotranspiration; PRISM, Parameter-elevation Regressions on Independent Slopes Model; acre-ft/yr, acre-feet per year; ft, feet; in., inches; <, less than; >; greater than; ≥, greater than or equal to. Precipitation volume where precipitation is ≥8 in/yr unless noted otherwise]

HA no. (see fig. 1)	Hydrographic area name	Precipitation, acre-ft/yr	Recharge, acre-ft/yr	Source of precipitation data	Comments	Reference
144	Lida Valley	13,400	500	Altitude-precipitation relation	Maxey-Eakin method, precipitation >12 in. assumed equal to 1.1 ft	Rush, 1968a
		--	1,900	Altitude-precipitation relation	Modified Maxey-Eakin method	D'Agnese and others, 1997
145	Stonewall Flat	1,900	100	Altitude-precipitation relation	Maxey-Eakin method, precipitation >12 in. assumed equal to 1.1 ft	Rush, 1968a
		--	800	Altitude-precipitation relation	Modified Maxey-Eakin method	D'Agnese and others, 1997
146	Sarcobatus Flat	37,500	1,200	Hardman and Mason, 1949	Maxey-Eakin method	Malmberg and Eakin, 1962
		--	1,500	Altitude-precipitation relation	Modified Maxey-Eakin method	D'Agnese and others, 1997
147	Gold Flat	94,000	3,800	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >15 in. assumed equal to 1.5 ft	Rush, 1971
		--	6,600	Altitude-precipitation relation	Modified Maxey-Eakin method	D'Agnese and others, 1997
148	Cactus Flat	15,000	600	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >15 in. assumed equal to 1.5 ft	Rush, 1971
		--	3,100	Altitude-precipitation relation	Modified Maxey-Eakin method	D'Agnese and others, 1997
149	Stone Cabin Valley	362,000	16,000	George Hardman, unpublished map, 1962	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.75 ft	Eakin, 1962d
		103,000	5,000	Altitude-precipitation relation	Maxey-Eakin method, precipitation >15 in. assumed equal to 1.5 ft	Rush, 1968a
150	Little Fish Lake Valley	181,000	11,000	Altitude-precipitation relation	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.75 ft	Rush and Everett, 1966b
		236,430	9,700	PRISM 1997	Revised Maxey-Eakin method	Nichols, 2000
151	Antelope Valley	108,100	4,100	Hardman, 1936	Maxey-Eakin method, used precipitation ≥7 in., precipitation >18 in. assumed equal to 1.7 ft	Rush and Everett, 1964
152	Stevens Basin	8,500	200	Hardman, 1936	Maxey-Eakin method, used precipitation ≥7 in.	Rush and Everett, 1964
153	Diamond Valley	304,000	16,000	Hardman and Mason, 1949	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.75 ft	Eakin, 1962e
		319,000	21,000	Altitude-precipitation relation	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.8 ft	Harrill, 1968
		227,000	10,500	Altitude-precipitation relation	Chloride-balance method, southern part of HA	Dettinger, 1989

Appendix 1. Estimates of natural recharge for hydrographic areas of Nevada—Continued

[Abbreviations: HA, hydrographic area; --, placeholder; ET, evapotranspiration; PRISM, Parameter-elevation Regressions on Independent Slopes Model; acre-ft/yr, acre-feet per year; ft, feet; in., inches; <, less than; >; greater than; ≥, greater than or equal to. Precipitation volume where precipitation is ≥8 in/yr unless noted otherwise]

HA no. (see fig. 1)	Hydrographic area name	Precipitation, acre-ft/yr	Recharge, acre-ft/yr	Source of precipitation data	Comments	Reference
154	Newark Valley	335,000	17,500	Hardman and Mason, 1949	Maxey-Eakin method	Eakin, 1960
		515,471	49,000	PRISM 1997	Revised Maxey-Eakin method	Nichols, 2000
155	Little Smoky Valley	140,000	5,400	Altitude-precipitation relation	Maxey-Eakin method	Rush and Everett, 1966b
		523,359	13,000	PRISM 1997	Revised Maxey-Eakin method	Nichols, 2000
156	Hot Creek Valley	--	10,600	Hardman, 1936	Maxey-Eakin method	Eakin and others, 1951
		153,000	7,000	Altitude-precipitation relation	Maxey-Eakin method	Rush and Everett, 1966b
		424,067	5,800	PRISM 1997	Revised Maxey-Eakin method	Nichols, 2000
157	Kawich Valley	88,000	3,500	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >15 in. assumed equal to 1.5 ft	Rush, 1971
		--	7,500	Altitude-precipitation relation	Modified Maxey-Eakin method	D'Agnese and others, 1997
158	Emigrant Valley	75,720	3,204	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.8 ft; >8 in. assumed equal to 0.8 ft	Rush, 1971
		--	13,000	Altitude-precipitation relation	Modified Maxey-Eakin method	D'Agnese and others, 1997
159	Yucca Flat	19,300	700	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >12 in. assumed equal to 1.1 ft	Rush, 1971
		--	1,900	Altitude-precipitation relation	Modified Maxey-Eakin method	D'Agnese and others, 1997
160	Frenchman Flat	3,200	100	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >8 in. assumed equal to 0.8 ft	Rush, 1971
		--	1,000	Altitude-precipitation relation	Modified Maxey-Eakin method	D'Agnese and others, 1997
161	Indian Springs Valley	--	4,700	Not specified	Maxey-Eakin method	Maxey and Jameson, 1948
		115,000	10,000	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.8 ft	Rush, 1971
		--	8,200	Altitude-precipitation relation	Modified Maxey-Eakin method	D'Agnese and others, 1997
162	Pahrump Valley	--	23,000	Not specified	Maxey-Eakin method	Maxey and Jameson, 1948
		--	20,200	Altitude-precipitation relation	Modified Maxey-Eakin method	D'Agnese and others, 1997

Appendix 1. Estimates of natural recharge for hydrographic areas of Nevada—Continued

[Abbreviations: HA, hydrographic area; --, placeholder; ET, evapotranspiration; PRISM, Parameter-elevation Regressions on Independent Slopes Model; acre-ft/yr, acre-feet per year; ft, feet; in., inches; <, less than; >; greater than; ≥, greater than or equal to. Precipitation volume where precipitation is ≥8 in/yr unless noted otherwise]

HA no. (see fig. 1)	Hydrographic area name	Precipitation, acre-ft/yr	Recharge, acre-ft/yr	Source of precipitation data	Comments	Reference
163	Mesquite Valley	28,400	1,400	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.8 ft	Glancy, 1968a
		30,000	1,600	Altitude-precipitation relation	Chloride-balance method	Dettinger, 1989
		--	2,200	Altitude-precipitation relation	Modified Maxey-Eakin method	D'Agnese and others, 1997
164	Ivanpah Valley	13,350	700	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.8 ft	Glancy, 1968a
165	Jean Lake Valley	2,200	100	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >12 in. assumed equal to 1.1 ft	Glancy, 1968a
166	Hidden Valley	0	minor	George Hardman, unpublished map, 1965	Maxey-Eakin method	Glancy, 1968a
167	Eldorado Valley	37,000	1,100	Altitude-precipitation relation	Maxey-Eakin method, precipitation >12 in. assumed equal to 1.08 ft	Rush and Huxel, 1966
168	Three Lakes Valley	41,100	2,000	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.8 ft	Rush, 1971
		--	1,200	Altitude-precipitation relation	Modified Maxey-Eakin method	D'Agnese and others, 1997
169	Tikapoo Valley	115,000	6,000	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.8 ft	Rush, 1971
		--	9,800	Altitude-precipitation relation	Modified Maxey-Eakin method	D'Agnese and others, 1997
170	Penoyer Valley	95,300	4,300	Hardman and Mason, 1949	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.8 ft	Van Denburgh and Rush, 1974
		97,300	3,200	Altitude-precipitation relation	Chloride-balance method	Dettinger, 1989
			13,500	Hardman, 1936	Maxey-Eakin method	Eakin and others, 1951
171	Coal Valley	62,000	2,000	George Hardman, unpublished map, 1962	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.75 ft	Eakin, 1963a
172	Garden Valley	137,000	10,000	George Hardman, unpublished map, 1962	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.75 ft	Eakin, 1963a
173	Railroad Valley	817,200	50,400	Hardman, 1936	Maxey-Eakin method	Eakin and others, 1951
		750,500	52,000	Hardman and Mason, 1949	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.8 ft	Van Denburgh and Rush, 1974
		746,000	33,300	Altitude-precipitation relation	Chloride-balance method	Dettinger, 1989

Appendix 1. Estimates of natural recharge for hydrographic areas of Nevada—Continued

[Abbreviations: HA, hydrographic area; --, placeholder; ET, evapotranspiration; PRISM, Parameter-elevation Regressions on Independent Slopes Model; acre-ft/yr, acre-feet per year; ft, feet; in., inches; <, less than; >; greater than; ≥, greater than or equal to. Precipitation volume where precipitation is ≥8 in/yr unless noted otherwise]

HA no. (see fig. 1)	Hydrographic area name	Precipitation, acre-ft/yr	Recharge, acre-ft/yr	Source of precipitation data	Comments	Reference
173B	Railroad Valley (Northern Part)	618,000	46,000	Hardman and Mason, 1949	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.8 ft	Van Denburgh and Rush, 1974
		616,000	28,400	Altitude-precipitation relation	Chloride-balance method	Dettinger, 1989
		1,089,249	61,000	PRISM 1997	Revised Maxey-Eakin method	Nichols, 2000
174	Jakes Valley	--	13,000	Hardman, 1936	Maxey-Eakin method	Maxey and Eakin, 1949
		289,477	38,500	PRISM 1997	Revised Maxey-Eakin method	Nichols, 2000
175	Long Valley	297,000	10,000	Hardman and Mason, 1949	Maxey-Eakin method, precipitation >15 in. assumed equal to 1.33 ft	Eakin, 1961b
		452,367	48,000	PRISM 1997	Revised Maxey-Eakin method	Nichols, 2000
176	Ruby Valley	696,000	68,000	Hardman, 1936	Maxey-Eakin method, precipitation >20 in. assumed equal to 2.1 ft	Eakin and others, 1951
		867,225	146,000	PRISM 1997	Revised Maxey-Eakin method	Nichols, 2000
177	Clover Valley	224,000	20,700	Hardman, 1936	Maxey-Eakin method, precipitation >20 in. assumed equal to 2.1 ft	Eakin and others, 1951
		363,328	59,000	PRISM 1997	Revised Maxey-Eakin method	Nichols, 2000
178	Butte Valley	240,000	19,000	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.8 ft	Glancy, 1968b
		243,000	14,600	Altitude-precipitation relation	Chloride-balance method	Dettinger, 1989
		700,905	69,000	PRISM 1997	Revised Maxey-Eakin method	Nichols, 2000
179	Steptoe Valley	810,000	85,000	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.75 ft	Eakin and others, 1967
		1,344,191	132,000	PRISM 1997	Revised Maxey-Eakin method	Nichols, 2000
180	Cave Valley	206,000	14,000	George Hardman, unpublished map, 1962	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.75 ft	Eakin, 1962f
181	Dry Lake Valley	118,000	5,000	George Hardman, unpublished map, 1962	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.75 ft	Eakin, 1963b
182	Delamar Valley	34,000	1,000	George Hardman, unpublished map, 1962	Maxey-Eakin method	Eakin, 1963b
183	Lake Valley	229,000	13,000	George Hardman, unpublished map, 1962	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.75 ft	Rush and Eakin, 1963

Appendix 1. Estimates of natural recharge for hydrographic areas of Nevada—Continued

[Abbreviations: HA, hydrographic area; --, placeholder; ET, evapotranspiration; PRISM, Parameter-elevation Regressions on Independent Slopes Model; acre-ft/yr, acre-feet per year; ft, feet; in., inches; <, less than; >; greater than; ≥, greater than or equal to. Precipitation volume where precipitation is ≥8 in/yr unless noted otherwise]

HA no. (see fig. 1)	Hydrographic area name	Precipitation, acre-ft/yr	Recharge, acre-ft/yr	Source of precipitation data	Comments	Reference
184	Spring Valley	791,000	75,000	Hardman, 1936	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.75 ft	Rush and Kazmi, 1965
		787,000	61,600	Altitude-precipitation relation	Chloride-balance method	Dettinger, 1989
		1,141,444	104,000	PRISM 1997	Revised Maxey-Eakin method	Nichols, 2000
185	Tippett Valley	114,000	6,900	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.8 ft	Harrill, 1971
		211,905	12,500	PRISM 1997	Revised Maxey-Eakin method	Nichols, 2000
186	Antelope Valley	117,000	4,700	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.8 ft	Harrill, 1971
		246,551	17,000	PRISM 1997	Revised Maxey-Eakin method	Nichols, 2000
187	Goshute Valley	592,875	41,000	PRISM 1997	Revised Maxey-Eakin method	Nichols, 2000
188	Independence Valley	203,000	9,300	Hardman, 1936	Maxey-Eakin method	Eakin and others, 1951
		394,414	50,000	PRISM 1997	Revised Maxey-Eakin method	Nichols, 2000
189	Thousand Springs Valley	325,000	12,000	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >15 in. assumed equal to 1.5 ft; >12 in. assumed equal to 1.1 ft	Rush, 1968b
190	Grouse Creek Valley	19,100	700	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >12 in. assumed equal to 1.1 ft	Rush, 1968b
191	Pilot Creek Valley	40,000	2,400	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.8 ft	Harrill, 1971
192	Great Salt Lake Desert	77,600	4,800	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.8 ft	Harrill, 1971
193	Deep Creek Valley	44,700	2,200	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.8 ft	Harrill, 1971
194	Pleasant Valley	--	--	--	Estimate for Nevada and Utah parts combined	Hood and Rush, 1965
195	Snake Valley	--	--	--	Estimate for Nevada and Utah parts combined	Hood and Rush, 1965
196	Hamlin Valley	--	--	--	Estimate for Nevada and Utah parts combined	Hood and Rush, 1965
197	Escalante Desert	76,000	2,300	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >15 in. assumed equal to 1.3 ft	Glancy and Van Denburgh, 1969
198	Dry Valley	--	--	--	No estimate available	--

Appendix 1. Estimates of natural recharge for hydrographic areas of Nevada—Continued

[Abbreviations: HA, hydrographic area; --, placeholder; ET, evapotranspiration; PRISM, Parameter-elevation Regressions on Independent Slopes Model; acre-ft/yr, acre-feet per year; ft, feet; in., inches; <, less than; >; greater than; ≥, greater than or equal to. Precipitation volume where precipitation is ≥8 in/yr unless noted otherwise]

HA no. (see fig. 1)	Hydrographic area name	Precipitation, acre-ft/yr	Recharge, acre-ft/yr	Source of precipitation data	Comments	Reference
199	Rose Valley	--	--	--	No estimate available	--
200	Eagle Valley	--	--	--	No estimate available	--
201	Spring Valley	177,000	10,000	Hardman, 1936	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.75 ft	Rush, 1964
202	Patterson Valley	137,000	6,000	Hardman, 1936	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.75 ft	Rush, 1964
203	Panaca Valley	--	--	--	No estimate available	--
204	Clover Valley	--	--	--	No estimate available	--
205	Lower Meadow Valley Wash	--	--	--	No estimate available	--
206	Kane Springs Valley	10,000	500	George Hardman, unpublished map, 1962	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.75 ft	Eakin, 1964
207	White River Valley	--	40,000	Hardman, 1936	Maxey-Eakin method	Maxey and Eakin, 1949
208	Pahroc Valley	57,000	2,200	George Hardman, unpublished map, 1962	Maxey-Eakin method, precipitation >15 in. assumed equal to 1.46 ft	Eakin, 1963c
209	Pahranagat Valley	43,000	1,800	George Hardman, unpublished map, 1962	Maxey-Eakin method, precipitation >15 in. assumed equal to 1.46 ft	Eakin, 1963c
210	Coyote Spring Valley	39,000	2,100	George Hardman, unpublished map, 1962	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.75 ft	Eakin, 1964
211	Three Lakes Valley	56,000	6,000	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >20 in. assumed equal to 1.8 ft	Rush, 1971
			7,300	Altitude-precipitation relation	Modified Maxey-Eakin method	D'Agnese and others, 1997
212	Las Vegas Valley	161,200	30,000	Not specified	Maxey-Eakin method, minimum recharge from Spring and Sheep Mountains	Maxey and Jameson, 1948
		161,200	35,000	Not specified	Maxey-Eakin method, maximum recharge from Spring and Sheep Mountains	Maxey and Jameson, 1948
		--	25,000	Hardman and Mason, 1949	Average of 3 methods	Malmberg, 1965
		--	30,000	--	Model results	Harrill, 1976
		332,500	28,000	Altitude-precipitation relation	Chloride-balance method	Dettinger, 1989

Appendix 1. Estimates of natural recharge for hydrographic areas of Nevada—Continued

[Abbreviations: HA, hydrographic area; --, placeholder; ET, evapotranspiration; PRISM, Parameter-elevation Regressions on Independent Slopes Model; acre-ft/yr, acre-feet per year; ft, feet; in., inches; <, less than; >; greater than; ≥, greater than or equal to. Precipitation volume where precipitation is ≥8 in/yr unless noted otherwise]

HA no. (see fig. 1)	Hydrographic area name	Precipitation, acre-ft/yr	Recharge, acre-ft/yr	Source of precipitation data	Comments	Reference
		--	33,000	--	Model results	Morgan and Dettinger, 1996
213	Colorado Valley	5,800	200	Altitude-precipitation relation	Maxey-Eakin method, precipitation >12 in. assumed equal to 1.0 ft	Rush and Huxel, 1966
214	Piute Valley	55,800	1,700	Altitude-precipitation relation	Maxey-Eakin method, precipitation >8 in. assumed equal to 0.75 ft. Amounts are total for basin, half of recharge occurs in Nevada	Rush and Huxel, 1966
215	Black Mountains Area	2,200	70	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >8 in. assumed equal to 0.8 ft	Rush, 1968c
216	Garnet Valley	11,000	400	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >12 in. assumed equal to 1.1 ft	Rush, 1968c
217	Hidden Valley	11,000	400	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >12 in. assumed equal to 1.1 ft	Rush, 1968c
218	California Wash	2,000	60	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >8 in. assumed equal to 0.8 ft	Rush, 1968c
219	Muddy River Springs Area	--	--	--	No estimate available	--
220	Lower Moapa Valley	1,200	40	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >8 in. assumed equal to 0.8 ft	Rush, 1968c
221	Tule Desert	62,000	2,100	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >15 in. assumed equal to 1.3 ft	Glancy and Van Denburgh, 1969
222	Virgin River Valley	98,700	3,600	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >15 in. assumed equal to 1.3 ft	Glancy and Van Denburgh, 1969
223	Gold Butte Area	27,600	1,000	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >12 in. assumed equal to 1.1 ft	Rush, 1968c
224	Greasewood Basin	14,900	600	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >12 in. assumed equal to 1.1 ft	Rush, 1968c
225	Mercury Valley	5,200	250	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >15 in. assumed equal to 1.5 ft	Rush, 1971
226	Rock Valley	900	30	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >8 in. assumed equal to 0.8 ft	Rush, 1971
	Sum of HAs 225, 226	--	400	Altitude-precipitation relation	Modified Maxey-Eakin method	D'Agnese and others, 1997

Appendix 1. Estimates of natural recharge for hydrographic areas of Nevada—Continued

[Abbreviations: HA, hydrographic area; --, placeholder; ET, evapotranspiration; PRISM, Parameter-elevation Regressions on Independent Slopes Model; acre-ft/yr, acre-feet per year; ft, feet; in., inches; <, less than; >; greater than; ≥, greater than or equal to. Precipitation volume where precipitation is ≥8 in/yr unless noted otherwise]

HA no. (see fig. 1)	Hydrographic area name	Precipitation, acre-ft/yr	Recharge, acre-ft/yr	Source of precipitation data	Comments	Reference
227	Fortymile Canyon	61,000	2,300	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >12 in. assumed equal to 1.1 ft; >15 in. assumed equal to 1.5 ft	Rush, 1971
		--	700	Altitude-precipitation relation	Modified Maxey-Eakin method	D'Agnese and others, 1997
228	Oasis Valley	33,500	1,000	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >12 in. assumed equal to 1.1 ft	Rush, 1971
		--	3,000	Altitude-precipitation relation	Modified Maxey-Eakin method	D'Agnese and others, 1997
229	Crater Flat	6,700	220	George Hardman, unpublished map, 1965	Maxey-Eakin method, precipitation >12 in. assumed equal to 1.1 ft	Rush, 1971
		--	100	Altitude-precipitation relation	Modified Maxey-Eakin method	D'Agnese and others, 1997
230	Amargosa Desert	90,000	1,500	Hardman and Mason, 1949	Maxey-Eakin method	Walker and Eakin, 1963
		--	400	Altitude-precipitation relation	Modified Maxey-Eakin method	D'Agnese and others, 1997
231	Grapevine Canyon	1,070	50	Altitude-precipitation relation	Maxey-Eakin method, precipitation >12 in. assumed equal to 1.1 ft	Rush, 1968a
232	Oriental Wash	8,500	300	Altitude-precipitation relation	Maxey-Eakin method, precipitation >12 in. assumed equal to 1.1 ft	Rush, 1968a

[a]Stagecoach subbasin is an unofficial name.

Appendix 2. Estimates of interbasin flow for hydrographic areas of Nevada

[Values are in acre-feet per year; inflow are positive and outflow are negative values. Abbreviations: --, placeholder; HA, hydrographic area; <, less than]

HA no. (see fig. 1)	Hydrographic area name	Interbasin flow	Direction of flow	Comments	Reference
1	Pueblo Valley	-1,000	To Oregon	Estimated as residual	Sinclair, 1963a
2	Continental Lake Valley	--	--	No interbasin flow discussed	Sinclair, 1963a
3	Gridley Lake Valley	--	--	No interbasin flow discussed	Sinclair, 1963a
4	Virgin Valley	--	--	No interbasin flow discussed	Sinclair, 1963a
5	Sage Hen Valley	--	--	No estimate available	
6	Guano Valley	--	--	No interbasin flow discussed	Sinclair, 1963b
7	Swan Lake Valley	--	--	No estimate available	--
8	Massacre Lake Valley	--	--	Possible outflow to Long Valley	Sinclair, 1963b
9	Long Valley	--	--	Possible inflow from New Year Lake area, Massacre Lake, and Boulder Valley	Sinclair, 1963b
10	Macy Flat	--	--	No estimate available	--
11	Coleman Valley	--	--	No interbasin flow discussed	Sinclair, 1963b
12	Mosquito Valley	--	--	Possible inflow from Warner Valley	Sinclair, 1963b
13	Warner Valley	--	--	No estimate available	--
14	Surprise Valley	--	--	Discharges to California	Sinclair, 1963b
15	Boulder Valley	--	--	Possible outflow to Long Valley	Sinclair, 1963b
16	Duck Lake Valley	--	--	No interbasin flow discussed	Sinclair, 1963c
17	Pilgrim Flat	-500	To California	Darcy’s Law	Glancy and Rush, 1968
18	Painter Flat	--	--	Probably no significant underflow to Sano Valley	Glancy and Rush, 1968
19	Dry Valley	-180	To Smoke Creek Desert	Darcy’s Law	Glancy and Rush, 1968
20	Sano Valley	--	--	Probably no significant underflow to Painters Flat	Glancy and Rush, 1968
21	Smoke Creek Desert	200	From San Emidio Desert	Darcy’s Law	Glancy and Rush, 1968
		180	From Dry Valley (HA 19)	Darcy’s Law	Glancy and Rush, 1968
		5,300	From Honey Lake Valley	Ground-water model	Handman and others, 1990

Appendix 2. Estimates of interbasin flow for hydrographic areas of Nevada—Continued

[Values are in acre-feet per year; inflow are positive and outflow are negative values. Abbreviations: --, placeholder; HA, hydrographic area; <, less than]

HA no. (see fig. 1)	Hydrographic area name	Interbasin flow	Direction of flow	Comments	Reference
22	San Emidio Desert	-200	To Smoke Creek Desert	Darcy's Law	Glancy and Rush, 1968
		<-100	To Black Rock Desert	Darcy's Law	Glancy and Rush, 1968
23	Granite Basin	--	--	No interbasin flow discussed	Sinclair, 1963d
24	Hualapai Flat	--	--	Assumed negligible	Sinclair, 1962a
		-400	To Black Rock Desert	--	Harrill, 1969
25	High Rock Lake Valley	--	--	No interbasin flow discussed	Sinclair, 1963d
26	Mud Meadow	--	--	No interbasin flow discussed	Sinclair, 1963d
27	Summit Lake Valley	--	--	No interbasin flow discussed	Sinclair, 1963d
28	Black Rock Desert	2,700	From Pine Forest Valley	Darcy's Law	Sinclair, 1962b
		--	--	Underflow from San Emidio Desert negligible	Sinclair, 1963d
		<100	From San Emidio Desert	Darcy's Law	Glancy and Rush, 1968
		400	From Hualapi Flat	Darcy's Law	Harrill, 1969
		120 to 1,200	From Desert Valley	Ground-water model	Berger, 1995
29	Pine Forest Valley	200 to 300	From Kings River Valley	Estimate not described	Sinclair, 1962b
		<200	From Desert Valley	Assumed value	Sinclair, 1962c
		100 to 400	From Desert Valley	Ground-water model	Berger, 1995
		-2,700	To Black Rock Desert	Darcy's Law	Sinclair, 1962b
30	Kings River Valley	1,000	From HA 30 (A) Rio King Subarea	Darcy's Law	Malmberg and Worts, 1966
		-1,000	To HA 30 (B) Sod House Subarea	Darcy's Law	Malmberg and Worts, 1966
		-200 to -300	To Pine Forest Valley	Estimate method not described	Sinclair, 1962b
31	Desert Valley	300	From Quinn River Valley	Darcy's Law	Huxel and others, 1966
		<100	From Silver State Valley	Darcy's Law	Huxel and others, 1966

Appendix 2. Estimates of interbasin flow for hydrographic areas of Nevada—Continued

[Values are in acre-feet per year; inflow are positive and outflow are negative values. Abbreviations: --, placeholder; HA, hydrographic area; <, less than]

HA no. (see fig. 1)	Hydrographic area name	Interbasin flow	Direction of flow	Comments	Reference
		<-200	To Pine Forest Valley	Assumed value	Sinclair, 1962c
		-100 to -400	To Pine Forest Valley	Ground-water model	Berger, 1995
		-120 to -1,200	To southwest, presumably to Black Rock Desert	Ground-water model	Berger, 1995
32	Silver State Valley	<-100	To Desert Valley	Darcy's Law	Huxel and others, 1966
33	Quinn River Valley	minor	From Oregon Canyon	Darcy's Law	Huxel and others, 1966
		5,000	From HA 33 (B) Orovada Subarea	Darcy's Law	Huxel and others, 1966
		-5,000	To HA 33(A) McDermitt Subarea	Darcy's Law	Huxel and others, 1966
		-300	To Desert Valley	Darcy's Law	Huxel and others, 1966
34	Little Owyhee River Area	--	--	Underflow possible, small, not estimated	Moore and Eakin, 1968
35	South Fork Owyhee River Area	--	--	Underflow possible, small, not estimated	Moore and Eakin, 1968
36	Independence Valley	--	--	No interbasin flow discussed	Eakin, 1962a
37	Owyhee River Area	--	--	Underflow possible, small, not estimated	Moore and Eakin, 1968
38	Bruneau River Area	--	--	Underflow possible, small, not estimated	Moore and Eakin, 1968
39	Jarbidge River Area	--	--	Underflow possible, small, not estimated	Moore and Eakin, 1968
40	Salmon Falls Creek Area	--	--	Underflow possible, small, not estimated	Moore and Eakin, 1968
41	Goose Creek Area	--	--	Underflow possible, small, not estimated	Moore and Eakin, 1968
42	Marys River Area	--	--	No estimate available	--
43	Starr Valley Area	--	--	No estimate available	--
44	North Fork Area	--	--	No estimate available	--
45	Lamoille Valley	--	--	No estimate available	--
46	South Fork Area	-9,000	To S. Fork Humboldt River	Stream measurements	Rush and Everett, 1966a
47	Huntington Valley	--	--	No interbasin flow discussed	Rush and Everett, 1966a

Appendix 2. Estimates of interbasin flow for hydrographic areas of Nevada—Continued

[Values are in acre-feet per year; inflow are positive and outflow are negative values. Abbreviations: --, placeholder; HA, hydrographic area; <, less than]

HA no. (see fig. 1)	Hydrographic area name	Interbasin flow	Direction of flow	Comments	Reference
		-19,000	To Ruby Valley	--	Nichols, 2000
48	Dixie Creek-Tenmile Creek Area	--	--	No interbasin flow discussed	Rush and Everett, 1966a
49	Elko Segment	300	From Pine Valley	Darcy's Law	Eakin, 1961a
50	Susie Creek Area	--	--	Ground-water discharges to Humboldt River	Maurer and others, 1996
51	Maggie Creek Area	--	--	Ground-water discharges to Humboldt River	Maurer and others, 1996
52	Marys Creek Area	--	--	Ground-water discharges to Humboldt River	Maurer and others, 1996
	Sum of 50, 51, 52	-8,600	To Humboldt River	Total discharge to river	Maurer and others, 1996
53	Pine Valley	-300	To Elko Segment	Darcy's Law	Eakin, 1961a
		-5,000	To Pine Creek	Stream measurements	Eakin, 1961a
		-9,000	To Diamond Valley	Estimated as residual	Harrill, 1968
54	Crescent Valley	300	From Carico Lake Valley	Assumed value	Zones, 1961
		400	From Whirlwind Valley	Assumed value equal to recharge	Olmsted and Rush, 1987
55	Carico Lake Valley	3,000	From Upper Reese River Valley	Darcy's Law	Berger, 2000
		-300	To Crescent Valley	Assumed value	Zones, 1961
56	Upper Reese River Valley	-500	To Middle Reese River Valley	Assumed value	Crosthwaite, 1963
		<-500	To Middle Reese River Valley	Assumed value	Eakin and others, 1965
		-3,000	To Carico Lake Valley	Darcy's Law	Berger, 2000
57	Antelope Valley	-6,000	To Middle Reese River Valley	Darcy's Law, estimate not supported by Plume and Ponce (1999)	Crosthwaite, 1963
58	Middle Reese River Valley	6,000	From Antelope Valley (HA 57)	Darcy's Law, estimate not supported by Plume and Ponce (1999)	Crosthwaite, 1963
		500	From Upper Reese River Valley	Assumed value	Crosthwaite, 1963

Appendix 2. Estimates of interbasin flow for hydrographic areas of Nevada—Continued

[Values are in acre-feet per year; inflow are positive and outflow are negative values. Abbreviations: --, placeholder; HA, hydrographic area; <, less than]

HA no. (see fig. 1)	Hydrographic area name	Interbasin flow	Direction of flow	Comments	Reference
		<500	From Upper Reese River Valley	Assumed value	Eakin and others, 1965
		-9,000	To Lower Reese River Valley	Darcy's Law	Crosthwaite, 1963
59	Lower Reese River Valley	9,000	From Middle Reese River Valley	Darcy's Law	Crosthwaite, 1963
		8,000	From Buffalo Valley	Estimate not supported by Plume and Ponce (1999)	Rush and others, 1971
		-3,000	Presumably to Humboldt River	Total outflow from Lower Reese River and Buffalo Valley	Eakin and Lamke, 1966
60	Whirlwind Valley	-400	To Humboldt River	Darcy's Law	Olmsted and Rush, 1987
		-400	To Crescent Valley	Assumed value equal to recharge	Olmsted and Rush, 1987
61	Boulder Flat	-12,000	To Clovers Area	Darcy's Law	Maurer and others, 1996
62	Rock Creek Valley	-2,800	To Clovers Area	Darcy's Law	Maurer and others, 1996
63	Willow Creek Valley	-4,300	To Clovers Area	Darcy's Law	Maurer and others, 1996
64	Clovers Area	4,300	From Willow Creek Valley	Darcy's Law	Maurer and others, 1996
		2,800	From Rock Creek Valley	Darcy's Law	Maurer and others, 1996
		12,000	From Boulder Flat	Darcy's Law	Maurer and others, 1996
65	Pumpernickel Valley	--	--	No estimate available	--
66	Kelly Creek Area	--	--	No estimate available	--
67	Little Humboldt Valley	-300	To Paradise Valley	Darcy's Law	Harrill and Moore, 1970
68	Hardscrabble Area	trace	To Paradise Valley		Harrill and Moore, 1970
69	Paradise Valley	300	From Little Humboldt Valley	Darcy's Law	Harrill and Moore, 1970
		trace	From Hardscrabble Area	Darcy's Law	Harrill and Moore, 1970
		-3,500	To Humboldt River	Stream measurements	Cohen, 1963
70	Winnemucca Segment	-3,000	To Imlay Area	Not described	Eakin, 1962b
71	Grass Valley	-6,000	To Humboldt River	Stream measurements	Cohen, 1964

Appendix 2. Estimates of interbasin flow for hydrographic areas of Nevada—Continued

[Values are in acre-feet per year; inflow are positive and outflow are negative values. Abbreviations: --, placeholder; HA, hydrographic area; <, less than]

HA no. (see fig. 1)	Hydrographic area name	Interbasin flow	Direction of flow	Comments	Reference
72	Imlay Area	3,000	From Winnemucca Segment	Not described	Eakin, 1962b
		-1,000	To Lovelock Valley	Assumed value	Eakin, 1962b
73	Lovelock Valley	1,000	From Imlay Area	Assumed value	Eakin, 1962b
		-2,000	To Carson Desert	Darcy's Law	Everett and Rush, 1965
		-60	To White Plains	Darcy's Law	Glancy and Katzer, 1976
74	White Plains	60	From Lovelock Valley	Darcy's Law	Glancy and Katzer, 1976
		-20	To Carson Desert	Darcy's Law	Glancy and Katzer, 1976
75	Bradys Hot Springs Area	1,000	From Fernley Area	Darcy's Law	Harrill, 1970
		200	From Fireball Valley	Assumed value equal to recharge	Harrill, 1970
76	Fernley Area	-1,000	To Bradys Hot Springs Area	Darcy's Law	Harrill, 1970
		-2,100	To Tracy Segment	Darcy's Law	Van Denburgh and others, 1973
		-2,100	To Dodge Flat	Darcy's Law	Van Denburgh and others, 1973
		-800	To Carson Desert	Darcy's Law	Glancy and Katzer, 1976
77	Fireball Valley	-200	To Bradys Hot Springs Area	Assumed value equal to recharge	Harrill, 1970
78	Granite Springs Valley	1,000	From Kumiva Valley	Assumed value equal to recharge	Harrill, 1970
79	Kumiva Valley	-1,000	To Granite Springs Valley	Assumed value equal to recharge	Harrill, 1970
80	Winnemucca Lake Valley	400	From Pyramid Lake Valley	Darcy's Law	Van Denburgh and others, 1973
81	Pyramid Lake Valley	200	From Warm Springs Valley	Darcy's Law	Rush and Glancy, 1967
		300	From Dodge Flat	Darcy's Law	Van Denburgh and others, 1973
		1,500	From Honey Lake Valley	Ground-water model	Handman and others, 1990
		-400	To Winnemucca Lake Valley	Darcy's Law	Van Denburgh and others, 1973
82	Dodge Flat	700	From Tracy Segment	Darcy's Law	Van Denburgh and others, 1973
		2,100	From Fernley Area	Darcy's Law	Van Denburgh and others, 1973
		-300	To Pyramid Lake Valley	Darcy's Law	Van Denburgh and others, 1973

Appendix 2. Estimates of interbasin flow for hydrographic areas of Nevada—Continued

[Values are in acre-feet per year; inflow are positive and outflow are negative values. Abbreviations: --, placeholder; HA, hydrographic area; <, less than]

HA no. (see fig. 1)	Hydrographic area name	Interbasin flow	Direction of flow	Comments	Reference
83	Tracy Segment	2,100	From Fernley Area	Darcy's Law	Van Denburgh and others, 1973
		-700	To Dodge Flat	Darcy's Law	Van Denburgh and others, 1973
84	Warm Springs Valley	280	From Spanish Springs Valley	Ground-water model	Hardiaris, 1988
		-200	To Pyramid Lake Valley	Darcy's Law	Rush and Glancy, 1967
85	Spanish Springs Valley	-100	To Truckee Meadows	Darcy's Law	Rush and Glancy, 1967
		-280	To Warm Springs Valley	Ground-water model	Hardiaris, 1988
86	Sun Valley	-25	To Truckee Meadows	Darcy's Law	Rush and Glancy, 1967
87	Truckee Meadows	25	From Sun Valley	Darcy's Law	Rush and Glancy, 1967
		100	From Spanish Springs Valley	Darcy's Law	Rush and Glancy, 1967
		700	From Truckee Canyon Segment	Darcy's Law	Van Denburgh and others, 1973
		300	From Pleasant Valley	Darcy's Law	Van Denburgh and others, 1973
88	Pleasant Valley	50	From Washoe Valley	Darcy's Law	Van Denburgh and others, 1973
		-300	To Truckee Meadows	Darcy's Law	Van Denburgh and others, 1973
89	Washoe Valley	-50	To Pleasant Valley	Darcy's Law	Van Denburgh and others, 1973
		minor	--	Assumed value	Rush, 1967
90	Lake Tahoe Basin	--	--	No estimate available	--
91	Truckee Canyon Segment	400	From California	Darcy's Law	Van Denburgh and others, 1973
		-700	To Truckee Meadows	Darcy's Law	Van Denburgh and others, 1973
92	Lemmon Valley	--	--	No outflow identified	Rush and Glancy, 1967
93	Antelope Valley	--	--	No outflow identified	Rush and Glancy, 1967
94	Bedell Flat	<-200	To Red Rock Valley	Darcy's Law	Rush and Glancy, 1967
95	Dry Valley	-2,200	To California	Darcy's Law	Rush and Glancy, 1967
96	Newcomb Lake Valley	--	--	No outflow identified	Rush and Glancy, 1967
97	Honey Lake Valley	600	From California side of basin	Darcy's Law	Rush and Glancy, 1967

Appendix 2. Estimates of interbasin flow for hydrographic areas of Nevada—Continued

[Values are in acre-feet per year; inflow are positive and outflow are negative values. Abbreviations: --, placeholder; HA, hydrographic area; <, less than]

HA no. (see fig. 1)	Hydrographic area name	Interbasin flow	Direction of flow	Comments	Reference
		--	--	No outflow identified	Rush and Glancy, 1967
		-5,300	To Smoke Creek Desert	Ground-water model	Handman and others, 1990
		-1,500	To Pyramid Lake Valley	Ground-water model	Handman and others, 1990
98	Skedaddle Creek Valley	--	--	No interbasin flow discussed	Glancy and Rush, 1968
99	Red Rock Valley	<200	From Bedell Flat	Darcy's Law	Rush and Glancy, 1967
100	Cold Spring Valley	--	--	No outflow identified	Rush and Glancy, 1967
101	Carson Desert	2,000	From Lovelock Valley	Darcy's Law	Everett and Rush, 1965
		20	From White Plains	Darcy's Law	Glancy and Katzer, 1976
		800	From Fernley Area	Darcy's Law	Glancy and Katzer, 1976
102	Churchill Valley	150	From Mason Valley	Darcy's Law	Huxel and Harris, 1969
		70	From Dayton Valley	Darcy's Law	Glancy and Katzer, 1976
		170	From Dayton Valley	Ground-water model	Harrill and Preissler, 1994
103	Dayton Valley	1,600	From Eagle Valley	Darcy's Law	Worts and Malmberg, 1966
		1,500	From Eagle Valley	Darcy's Law	Arteaga and Durbin, 1978
		2,200	From Eagle Valley	Darcy's Law	Maurer, 1997
		15	From Carson Valley	Darcy's Law	Glancy and Katzer, 1976
		-70	To Churchill Valley	Darcy's Law	Glancy and Katzer, 1976
		-170	To Churchill Valley	Ground-water model	Harrill and Preissler, 1994
104	Eagle Valley	-1,200	To Carson Valley near Clear Creek	Stream measurements	Arteaga and Durbin, 1978
		-400	To Carson Valley from beneath Clear Creek	Darcy's Law	Maurer and Thodal, 2000
		-600	To Carson Valley beneath upper Clear Creek watershed	Darcy's Law	Worts and Malmberg, 1966

Appendix 2. Estimates of interbasin flow for hydrographic areas of Nevada—Continued

[Values are in acre-feet per year; inflow are positive and outflow are negative values. Abbreviations: --, placeholder; HA, hydrographic area; <, less than]

HA no. (see fig. 1)	Hydrographic area name	Interbasin flow	Direction of flow	Comments	Reference
		-2,500	To Carson Valley beneath upper Clear Creek watershed	Estimated as residual	Maurer and Berger, 1997
		-1,600	To Dayton Valley	Darcy’s Law	Worts and Malmberg, 1966
		-1,500	To Dayton Valley	Darcy’s Law	Arteaga and Durbin, 1978
		-2,200	To Dayton Valley	Darcy’s Law	Maurer, 1997
105	Carson Valley	400	From Eagle Valley beneath Clear Creek	Darcy’s Law	Maurer and Thodal, 2000
		2,500	From Eagle Valley from beneath upper Clear Creek watershed	Estimated as residual	Maurer and Berger, 1997
		7,150	From California	Darcy’s Law	Glancy and Katzer, 1976
		600	From Eagle Valley beneath Clear Creek	Darcy’s Law	Worts and Malmberg, 1966
		-15	To Dayton Valley	Darcy’s Law	Glancy and Katzer, 1976
		1,200	From Eagle Valley near Clear Creek	Stream measurements	Arteaga and Durbin, 1978
106	Antelope Valley	1,000	From California	Darcy’s Law	Glancy, 1971
		-200	To Smith Valley	Darcy’s Law	Glancy, 1971
107	Smith Valley	200	From Antelope Valley (HA 106)	Darcy’s Law	Glancy, 1971
		-250	To Mason Valley	Darcy’s Law, total outflow divided evenly with East Walker Area	Huxel and Harris, 1969
108	Mason Valley	150	From East Walker Area	Darcy’s Law	Glancy, 1971
		250	From East Walker Area	Darcy’s Law, total inflow divided evenly with Smith Valley	Huxel and Harris, 1969
		250	From Smith Valley	Darcy’s Law, total inflow divided evenly with East Walker Area	Huxel and Harris, 1969
		-150	To Churchill Valley	Darcy’s Law	Huxel and Harris, 1969

Appendix 2. Estimates of interbasin flow for hydrographic areas of Nevada—Continued

[Values are in acre-feet per year; inflow are positive and outflow are negative values. Abbreviations: --, placeholder; HA, hydrographic area; <, less than]

HA no. (see fig. 1)	Hydrographic area name	Interbasin flow	Direction of flow	Comments	Reference
		-700	To Walker Lake Valley through Walker Gap	Darcy's Law	Huxel and Harris, 1969
		-700	To Walker Lake Valley through Parker Gap	Darcy's Law	Huxel and Harris, 1969
109	East Walker Area	200	From California	Darcy's Law	Glancy, 1971
		-150	To Mason Valley	Darcy's Law	Glancy, 1971
		-250	To Mason Valley	Darcy's Law, total outflow divided evenly with East Walker Area	Huxel and Harris, 1969
110	Walker Lake Valley	600	From Mason Valley beneath Walker River	Not described	Everett and Rush, 1967
		700	From Mason Valley through Walker Gap	Darcy's Law	Huxel and Harris, 1969
		700	From Mason Valley through alluvial divide 3 miles south-east of river	Not described	Everett and Rush, 1967
		700	From Mason Valley through Parker Gap	Darcy's Law	Huxel and Harris, 1969
		300 to 400	From Huntoon Valley, some may go to Teels Marsh Valley	Estimated as residual	Van Denburgh and Glancy, 1970
		300	From Soda Springs Valley	Estimated as residual	Van Denburgh and Glancy, 1970
111	Alkali Valley	-1,400	To California	Estimated as residual	Van Denburgh and Glancy, 1970
112	Mono Valley	-700	To California	Estimated as residual	Van Denburgh and Glancy, 1970
113	Huntoon Valley	-300 to -400	To Teels Marsh or Walker Lake Valleys	Estimated as residual	Van Denburgh and Glancy, 1970
114	Teels Marsh Valley	300 to 400	From Huntoon Valley, some may go to Walker Lake	Estimated as residual	Van Denburgh and Glancy, 1970
115	Adobe Valley	-300	To California	Estimated as residual	Van Denburgh and Glancy, 1970
116	Queen Valley	-2,000	To California	Estimated as residual	Van Denburgh and Glancy, 1970

Appendix 2. Estimates of interbasin flow for hydrographic areas of Nevada—Continued

[Values are in acre-feet per year; inflow are positive and outflow are negative values. Abbreviations: --, placeholder; HA, hydrographic area; <, less than]

HA no. (see fig. 1)	Hydrographic area name	Interbasin flow	Direction of flow	Comments	Reference
117	Fish Lake Valley	-200	To Columbus Salt Marsh Valley through alluvium	Darcy's Law	Van Denburgh and Glancy, 1970
		-3,000	To Columbus Salt Marsh Valley through bedrock, total amount from Fish Lake and Big Smoky Valleys	Estimated as residual	Van Denburgh and Glancy, 1970
		-3,000	To unidentified basins	Assumed value	Rush and Katzer, 1973
118	Columbus Salt Marsh Valley	200	From Fish Lake Valley	Darcy's Law	Van Denburgh and Glancy, 1970
		3,000	From Fish Lake and Big Smoky Valleys	Estimated as residual	Van Denburgh and Glancy, 1970
119	Rhodes Salt Marsh Valley	300	From eastern Soda Spring Valley	Darcy's Law	Van Denburgh and Glancy, 1970
		100	From Garfield Flat	Assumed value	Van Denburgh and Glancy, 1970
120	Garfield Flat	-100	To Rhodes Salt Marsh Valley	Assumed value	Van Denburgh and Glancy, 1970
		-200	To eastern Soda Spring Valley	Assumed value	Van Denburgh and Glancy, 1970
121	Soda Spring Valley	300	From HA 121(A) Eastern Part	Darcy's Law	Van Denburgh and Glancy, 1970
		200	From Garfield Flat	Assumed value	Van Denburgh and Glancy, 1970
		-300	To HA 121 (B) Western Part	Darcy's Law	Van Denburgh and Glancy, 1970
		-300	To Rhodes Salt Marsh Valley	Darcy's Law	Van Denburgh and Glancy, 1970
		-300	To Walker Lake	Estimated as residual	Van Denburgh and Glancy, 1970
122	Gabbs Valley	--	--	No interbasin flow discussed	Eakin, 1962c
123	Rawhide Flats	--	--	Possible inflow from Fallon area	Everett and Rush, 1967
124	Fairview Valley	-500	To Dixie Valley	Estimated as residual	Cohen and Everett, 1963
		-2,300	To Dixie Valley	Estimated as residual	Harrill and Hines, 1995
125	Stingaree Valley	--	--	See sum of HAs	--
126	Cowkick Valley	--	--	See sum of HAs	--

Appendix 2. Estimates of interbasin flow for hydrographic areas of Nevada—Continued

[Values are in acre-feet per year; inflow are positive and outflow are negative values. Abbreviations: --, placeholder; HA, hydrographic area; <, less than]

HA no. (see fig. 1)	Hydrographic area name	Interbasin flow	Direction of flow	Comments	Reference
127	Eastgate Valley Area	--	--	See sum of HAs	--
	Sum of HAs 125, 126, 127	-5,600	To Dixie Valley	Estimated as residual	Cohen and Everett, 1963
		-6,300	To Dixie Valley	Estimated as residual	Harrill and Hines, 1995
128	Dixie Valley	500	From Fairview Valley	Estimated as residual	Cohen and Everett, 1963
		2,300	From Fairview Valley	Estimated as residual	Harrill and Hines, 1995
		5,600	From HAs 125, 126, 127	Estimated as residual	Cohen and Everett, 1963
		6,300	From HAs 125, 126, 127	Estimated as residual	Harrill and Hines, 1995
		800	From Pleasant Valley	Estimated as residual	Cohen and Everett, 1963
		1,100	From Pleasant Valley	Estimated as residual	Harrill and Hines, 1995
		500	From Jersey Valley	Estimated as residual	Cohen and Everett, 1963
		1,100	From Jersey Valley	Estimated as residual	Harrill and Hines, 1995
129	Buena Vista Valley	--	--	No interbasin flow discussed	Loeltz and Phoenix, 1955
130	Pleasant Valley	-800	To Dixie Valley	Estimated as residual	Cohen and Everett, 1963
		-1,100	To Dixie Valley	Estimated as residual	Harrill and Hines, 1995
131	Buffalo Valley	-8,000	To Lower Reese River Valley	Estimate not supported by Plume and Ponce (1999)	Rush and others, 1971
132	Jersey Valley	-1,100	To Dixie Valley	Estimated as residual	Harrill and Hines, 1995
		-500	To Dixie Valley	Estimated as residual	Cohen and Everett, 1963
133	Edwards Creek Valley	--	--	No interbasin flow discussed	Everett, 1964
134	Smith Creek Valley	0		Reported value	Everett and Rush, 1964
		--	--	No interbasin flow discussed	Thomas and others, 1989
135	Ione Valley	-2,000 to -3,000	To Big Smoky Valley	Darcy's Law	Everett and Rush, 1964
136	Monte Cristo Valley	--	--	No interbasin flow discussed	Van Denburgh and Glancy, 1970

Appendix 2. Estimates of interbasin flow for hydrographic areas of Nevada—Continued

[Values are in acre-feet per year; inflow are positive and outflow are negative values. Abbreviations: --, placeholder; HA, hydrographic area; <, less than]

HA no. (see fig. 1)	Hydrographic area name	Interbasin flow	Direction of flow	Comments	Reference
137	Big Smoky Valley	2,000 to 3,000	From Ione Valley	Darcy's Law	Everett and Rush, 1964
		2,500	From regional system	Ground-water model	Handman and Kilroy, 1997
		-13,000	To Clayton Valley	Estimated as residual, checked against Darcy's Law	Rush, 1968a
		-3,000	To Columbus Salt Marsh Valley, total amount from Fish Lake and Big Smoky Valleys	Estimated as residual	Van Denburgh and Glancy, 1970
		-2,700	To south, HA not specified	Ground-water model	Handman and Kilroy, 1997
138	Grass Valley	--	--	No interbasin flow discussed	Everett and Rush, 1966
139	Kobeh Valley	6,000	From Monitor Valley	Darcy's Law	Rush and Everett, 1964
		-150	To Diamond Valley	Darcy's Law and assumed stream inflow recharges	Harrill, 1968
140	Monitor Valley	-6,000	To Kobeh Valley	Darcy's Law	Rush and Everett, 1964
141	Ralston Valley	--	--	No estimate, but could be large flow to Stonewall Flat and toward Clayton Valley	Eakin, 1962d
		-1,000	To Death Valley regional flow system	Ground-water model	D'Agnese and others, 1997
		-2,500	To Alkali Springs Valley	Estimated as residual	Rush, 1968a
142	Alkali Spring Valley	2,500	From Ralston Valley	Estimated as residual	Rush, 1968a
		3,000	From Stone Cabin Valley	Estimated as residual	Rush, 1968a
		-5,000	To Clayton Valley	Estimated as residual	Rush, 1968a
143	Clayton Valley	13,000	From Big Smoky Valley	Estimated as residual, checked against Darcy's Law	Rush, 1968a
		5,000	From Alkali Springs Valley	Estimated as residual	Rush, 1968a
144	Lida Valley	200	From Stonewall Flat	Darcy's Law	Rush, 1968a
		-700	To Sarcobatus Flat	Equal to recharge plus inflow	Rush, 1968a

Appendix 2. Estimates of interbasin flow for hydrographic areas of Nevada—Continued

[Values are in acre-feet per year; inflow are positive and outflow are negative values. Abbreviations: --, placeholder; HA, hydrographic area; <, less than]

HA no. (see fig. 1)	Hydrographic area name	Interbasin flow	Direction of flow	Comments	Reference
145	Stonewall Flat	600	From Cactus Flat	Equal to recharge	Rush, 1971
		-200	To Lida Valley	Darcy's Law	Rush, 1968a
		-700	To Sarcobatus Flat	Equal to recharge plus inflow	Rush, 1971
146	Sarcobatus Flat	700	From Lida Valley	Equal to recharge plus inflow	Rush, 1968a
		700	From Stonewall Flat	Equal to recharge plus inflow	Rush, 1971
		-500	To Grapevine Canyon	Estimated as residual	Malmberg and Eakin, 1962
147	Gold Flat	--	--	No estimate, contributes to Ash Meadow Springs	Rush, 1971
148	Cactus Flat	-600	To Stonewall Flat	Equal to recharge	Rush, 1971
149	Stone Cabin Valley	--	--	No estimate, but could be large flow to Stonewall Flat and toward Clayton Valley	Eakin, 1962d
		200	From Little Fish Lake Valley	Darcy's Law	Rush and Everett, 1966b
		-3,000	To Alkali Spring Valley	Estimated as residual	Rush, 1968a
150	Little Fish Lake Valley	-200	To Stone Cabin Valley	Darcy's Law	Rush and Everett, 1966b
		0	To and from other basins	--	Nichols, 2000
151	Antelope Valley	200	From Stevens Basin	Equal to recharge	Rush and Everett, 1964
		--	--	Outflow restricted by recent faulting	Rush and Everett, 1964
152	Stevens Basin	-200	To Antelope Valley or Diamond Valley	Equal to recharge	Rush and Everett, 1964
153	Diamond Valley	--	--	No interbasin flow discussed	Eakin, 1962e
		200	From Stevens Basin	Equal to recharge	Rush and Everett, 1964
		9,000	From Pine Valley	Estimated as residual	Harrill, 1968
		150	From Kobeh Valley	Darcy's Law and assume stream inflow recharges	Harrill, 1968
154	Newark Valley	1,000	From Little Smoky Valley	Darcy's Law	Eakin, 1960
		10,000	From Long Valley	--	Nichols, 2000

Appendix 2. Estimates of interbasin flow for hydrographic areas of Nevada—Continued

[Values are in acre-feet per year; inflow are positive and outflow are negative values. Abbreviations: --, placeholder; HA, hydrographic area; <, less than]

HA no. (see fig. 1)	Hydrographic area name	Interbasin flow	Direction of flow	Comments	Reference
		1,500	From Little Smoky Valley	--	Nichols, 2000
		0	Outflow	--	Nichols, 2000
155	Little Smoky Valley	0	Inflow	--	Nichols, 2000
		-1,000	To Newark Valley	Darcy's Law	Eakin, 1960
		-1,500	To Newark Valley	--	Nichols, 2000
		-2,300	To Railroad Valley	Assumed value equal to spring discharge	Rush and Everett, 1966b
		-5,500	To Railroad Valley	--	Nichols, 2000
156	Hot Creek Valley	0	Inflow	--	Nichols, 2000
		-700	To Railroad Valley	--	Eakin and others, 1951
		-800	To HA 173 (A) Northern Part	--	Nichols, 2000
157	Kawich Valley	1,000	From Railroad Valley	Interbasin flow may be more	Blankennagel and Weir, 1973
158	Emigrant Valley	--	--	--	--
159	Yucca Flat	--	--	--	--
160	Frenchman Flat	--	--	--	--
161	Indian Springs Valley	--	--	--	--
162	Pahrump Valley	-700	To Mesquite Valley	Estimated as residual	Glancy, 1968a
163	Mesquite Valley	700	From Pahrump Valley	Estimated as residual	Glancy, 1968a
164	Ivanpah Valley	800	From California	Equal to recharge in California side of basin	Glancy, 1968a
		-1,500	To Las Vegas Valley	Equal to recharge	Glancy, 1968a
165	Jean Lake Valley	-100	To Las Vegas Valley	Equal to recharge	Glancy, 1968a
166	Hidden Valley	minor	To Eldorado Valley	Equal to recharge east of McClanahan fault	Glancy, 1968a
167	Eldorado Valley	minor	From Hidden Valley	Equal to recharge east of McClanahan fault	Glancy, 1968a
		-1,100	To Colorado River	Equal to recharge	Rush and Huxel, 1966
168	Three Lakes Valley	--	--	--	--

Appendix 2. Estimates of interbasin flow for hydrographic areas of Nevada—Continued

[Values are in acre-feet per year; inflow are positive and outflow are negative values. Abbreviations: --, placeholder; HA, hydrographic area; <, less than]

HA no. (see fig. 1)	Hydrographic area name	Interbasin flow	Direction of flow	Comments	Reference
169	Tikapoo Valley	--	--	--	--
170	Penoyer Valley	--	--	No outflow identified	Van Denburgh and Rush, 1974
171	Coal Valley	-1,700	To Carbonate aquifer	Estimated as residual, proportioned by recharge to each valley	Eakin, 1963a
172	Garden Valley	-8,300	To Carbonate aquifer	Estimated as residual, proportioned by recharge to each valley	Eakin, 1963a
173	Railroad Valley	13,000	From Long Valley to HA 173 (A) Northern Part	--	Nichols, 2000
		2,300	From Little Smoky Valley	Equal to spring discharge	Rush and Everett, 1966b
		5,500	From Little Smoky Valley to HA 173 (A) Northern Part	--	Nichols, 2000
		700	From Hot Creek Valley	--	Eakin and others, 1951
		800	From Hot Creek Valley to HA 173 (A) Northern Part	--	Nichols, 2000
		700	From Jakes Valley to HA 173 (A) Northern Part	--	Nichols, 2000
		4,000	From HA 173 (A) Northern Part	Not described	Van Denburgh and Rush, 1974
		4,000	From HA 173 (A) Northern Part	--	Nichols, 2000
		-4,000	To HA 173 (B) Southern Part	Not described	Van Denburgh and Rush, 1974
		-4,000	To HA 173 (B) Southern Part	--	Nichols, 2000
		0	Outflow from northern part	--	Nichols, 2000
		-1,000	To Kawich Valley	Interbasin flow may be more	Blankennagel and Weir, 1973
174	Jakes Valley	14,000	From Long Valley	--	Nichols, 2000
		-51,200	To White River Valley	--	Nichols, 2000
		-700	To HA 173 (A) Northern Part--		Nichols, 2000
175	Long Valley	0	Inflow	--	Nichols, 2000

Appendix 2. Estimates of interbasin flow for hydrographic areas of Nevada—Continued

[Values are in acre-feet per year; inflow are positive and outflow are negative values. Abbreviations: --, placeholder; HA, hydrographic area; <, less than]

HA no. (see fig. 1)	Hydrographic area name	Interbasin flow	Direction of flow	Comments	Reference
		-7,800	To bedrock	Estimated as residual	Eakin, 1961b
		-10,000	To Newark Valley	--	Nichols, 2000
		-14,000	To Jakes Valley	--	Nichols, 2000
		-13,000	To HA173 (A) Northern Part	--	Nichols, 2000
176	Ruby Valley	800	From Butte Valley	Darcy's Law	Glancy, 1968b
		19,000	From Huntington Valley	--	Nichols, 2000
		2,000	From Butte Valley	--	Nichols, 2000
		0	Outflow	--	Nichols, 2000
177	Clover Valley	22,500	From Butte Valley	--	Nichols, 2000
		3,000	From Independence Valley (HA 188)	--	Nichols, 2000
		0	Outflow	--	Nichols, 2000
178	Butte Valley	0	Inflow	--	Nichols, 2000
		-22,500	To Clover Valley	--	Nichols, 2000
		-2,000	To Ruby Valley	--	Nichols, 2000
		-800	To Ruby Valley	Darcy's Law	Glancy, 1968b
179	Steptoe Valley	0	Inflow	--	Nichols, 2000
		-4,000	To Goshute Valley	--	Nichols, 2000
180	Cave Valley	-13,700	To bedrock	Estimated as residual	Eakin, 1962f
181	Dry Lake Valley	-4,800	To Carbonate	Estimated as residual, proportionate to recharge	Eakin, 1963b
182	Delamar Valley	-900	To Carbonate	Estimated as residual, proportionate to recharge	Eakin, 1963b
183	Lake Valley	-3,000	To Patterson Valley	Darcy's Law	Rush and Eakin, 1963
184	Spring Valley	2,000	From Tippett Valley	Equal to recharge	Harrill, 1971

Appendix 2. Estimates of interbasin flow for hydrographic areas of Nevada—Continued

[Values are in acre-feet per year; inflow are positive and outflow are negative values. Abbreviations: --, placeholder; HA, hydrographic area; <, less than]

HA no. (see fig. 1)	Hydrographic area name	Interbasin flow	Direction of flow	Comments	Reference
		0	Inflow	--	Nichols, 2000
		-4,000	To Hamlin Valley	--	Rush and Kazmi, 1965
		-10,000	To Hamlin Valley	--	Nichols, 2000
		-4,000	To Snake Valley	--	Nichols, 2000
185	Tippett Valley	0	Inflow	--	Nichols, 2000
		-2,000	To Spring Valley (HA 184)	Equal to recharge	Harrill, 1971
		-5,000	To Great Salt Lake Desert	Equal to recharge	Harrill, 1971
		-6,000	To Great Salt Lake Desert	--	Nichols, 2000
		-3,600	To Snake Valley	--	Nichols, 2000
186	Antelope Valley	300	From Goshute Valley	Darcy's Law	Harrill, 1971
		500	From Goshute Valley	--	Nichols, 2000
		-5,000	To Great Salt Lake Desert	Estimated as residual	Harrill, 1971
		-13,500	To Great Salt Lake Desert	--	Nichols, 2000
187	Goshute Valley	4,000	From Steptoe Valley	--	Nichols, 2000
		-1,000	To Pilot Creek Valley	Ground-water model	Harrill, 1971
		-300	To Antelope Valley (HA 186)	Darcy's Law	Harrill, 1971
		-500	To Antelope Valley (HA 186)	--	Nichols, 2000
		-1,000	To Great Salt Lake Desert	Ground-water model	Harrill, 1971
		-2,000	To Great Salt Lake Desert	--	Nichols, 2000
188	Independence Valley	0	Inflow	--	Nichols, 2000
		-3,000	To Clover Valley	--	Nichols, 2000
189	Thousand Springs Valley	--	--	No indication of inflow	Rush, 1968b
		-1,800	To Utah	Darcy's Law, could be large interbasin flow through carbonates	Rush, 1968b
190	Grouse Creek Valley	--	--	--	--

Appendix 2. Estimates of interbasin flow for hydrographic areas of Nevada—Continued

[Values are in acre-feet per year; inflow are positive and outflow are negative values. Abbreviations: --, placeholder; HA, hydrographic area; <, less than]

HA no. (see fig. 1)	Hydrographic area name	Interbasin flow	Direction of flow	Comments	Reference
191	Pilot Creek Valley	1,000	From Goshute Valley	Ground-water model	Harrill, 1971
		-300	To Great Salt Lake Desert	Darcy's Law	Harrill, 1971
192	Great Salt Lake Desert	300	From Pilot Creek Valley	Darcy's Law	Harrill, 1971
		1,000	From Goshute Valley	Ground-water model	Harrill, 1971
		2,000	From Goshute Valley	--	Nichols, 2000
		5,000	From Tippett Valley	Equal to recharge	Harrill, 1971
		6,000	From Tippett Valley	--	Nichols, 2000
		5,000	From Antelope Valley (HA 186)	Estimated as residual	Harrill, 1971
		13,500	From Antelope Valley (HA 186)	--	Nichols, 2000
193	Deep Creek Valley	--	--	--	--
194	Pleasant Valley	--	--	--	--
195	Snake Valley	4,000	From Spring Valley (HA 184)	--	Nichols, 2000
		3,600	From Tippett Valley	--	Nichols, 2000
196	Hamlin Valley	4,000	From Spring Valley (HA 184)	Darcy's Law	Rush and Kazmi, 1965
		10,000	From Spring Valley (HA 184)	--	Nichols, 2000
197	Escalante Desert	-2,300	To Utah	Equal to recharge	Glancy and Van Denburgh, 1969
198	Dry Valley	--	--	--	--
199	Rose Valley	--	--	--	--
200	Eagle Valley	--	--	--	--
201	Spring Valley	--	--	--	--
202	Patterson Valley	3,000	From Lake Valley	Darcy's Law	Rush and Eakin, 1963
203	Panaca Valley	--	--	--	--
204	Clover Valley	--	--	--	--
205	Lower Meadow Valley Wash	-7,000	To California Wash	--	Rush, 1968c

Appendix 2. Estimates of interbasin flow for hydrographic areas of Nevada—Continued

[Values are in acre-feet per year; inflow are positive and outflow are negative values. Abbreviations: --, placeholder; HA, hydrographic area; <, less than]

HA no. (see fig. 1)	Hydrographic area name	Interbasin flow	Direction of flow	Comments	Reference
206	Kane Springs Valley	--	--	--	--
207	White River Valley	51,200	From Jakes Valley	--	Nichols, 2000
		-17,500	To Pahroc Valley	Estimated as residual	Maxey and Eakin, 1949
208	Pahroc Valley	17,500	From White River Valley	Estimated as residual	Maxey and Eakin, 1949
209	Pahranagat Valley	--	--	May be large outflow through carbonates, small outflow through alluvium at south end	Eakin, 1963c
210	Coyote Spring Valley	--	--	--	--
211	Three Lakes Valley	--	--	--	--
212	Las Vegas Valley	1,500	From Ivanpah Valley	Equal to recharge	Glancy, 1968a
		100	From Jean Lake Valley	Equal to recharge	Glancy, 1968a
		-400	To Black Mountains Area	Darcy's Law	Rush, 1968c
		-1,200	To Black Mountains Area	Ground-water model	Harrill, 1976
		-2,000	To Black Mountains Area	Ground-water model	Morgan and Dettinger, 1996
213	Colorado Valley	--	--	200 acre-feet recharge lost to evapotranspiration or underflow to Colorado River	Rush and Huxel, 1966
214	Piute Valley	700	From California	--	Rush and Huxel, 1966
		-2,400	To California	Equal to recharge	Rush and Huxel, 1966
215	Black Mountains Area	400	From Las Vegas Valley	Darcy's Law	Rush, 1968c
		1,200	From Las Vegas Valley	Ground-water model	Harrill, 1976
		2,000	From Las Vegas Valley	Ground-water model	Morgan and Dettinger, 1996
		-100	To Lake Mead	Assumed value equal to recharge	Rush, 1968c
216	Garnet Valley	400	From Hidden Valley	Equal to recharge	Rush, 1968c
		-800	To California Wash	Equal to recharge plus inflow	Rush, 1968c
217	Hidden Valley	-400	To Garnet Valley	Equal to recharge	Rush, 1968c

Appendix 2. Estimates of interbasin flow for hydrographic areas of Nevada—Continued

[Values are in acre-feet per year; inflow are positive and outflow are negative values. Abbreviations: --, placeholder; HA, hydrographic area; <, less than]

HA no. (see fig. 1)	Hydrographic area name	Interbasin flow	Direction of flow	Comments	Reference
218	California Wash	800	From Garnet Valley	--	Rush, 1968c
		7,000	From Lower Meadow Valley Wash	--	Rush, 1968c
219	Muddy River Springs Area	--	--	--	--
220	Lower Moapa Valley	-1,100	To Lake Mead	Darcy’s Law	Rush, 1968c
221	Tule Desert	-2,100	To Virgin River Valley	Equal to recharge	Glancy and Van Denburgh, 1969
222	Virgin River Valley	2,100	From Tule Desert	Equal to recharge	Glancy and Van Denburgh, 1969
		50,000	From Utah	Equal to spring discharge to Virgin River	Glancy and Van Denburgh, 1969
		1,000	From Utah	Darcy’s Law, through alluvium	Glancy and Van Denburgh, 1969
		-40,000	To Lake Mead	Estimated as residual, may be too large	Glancy and Van Denburgh, 1969
223	Gold Butte Area	-1,000	To Lake Mead	Equal to recharge	Rush, 1968c
224	Greasewood Basin	-600	To Arizona	Equal to recharge	Rush, 1968c
225	Mercury Valley	--	--	--	--
226	Rock Valley	--	--	--	--
227	Fortymile Canyon	--	--	--	--
228	Oasis Valley	--	--	--	--
229	Crater Flat	--	--	--	--
230	Amargosa Desert	--	--	--	--
231	Grapevine Canyon	500	From Sarcobatus Flat	Estimated as residual	Malmberg and Eakin, 1962
		-400	To Death Valley	Equal to spring discharge	Rush, 1968a
232	Oriental Wash	-300	To Death Valley	Estimated as residual	Rush, 1968a

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