STATE OF NEVADA

DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES

WATER RESOURCES BULLETIN NO. 30

INTERIM INVENTORY OF SURFACE WATER RESOURCES OF NEVADA

By

ROBERT D. LAMKE

and

DONALD O. MOORE

Prepared in cooperation with the

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

1965

CONTENTS

	Page
Summary	1
Explanation of terms	2
Introduction	3
Purpose and scope	3
Acknowledgments	3
Physical and hydrologic description	3
Topography and drainage	3
Climate	4
Available basic data	6
Variations in streamflow	7
Time	7
Location	8
Methods of analysis	8
Reference period	8
Adjustment to virgin flow	10
Ungaged runoff	10
Intrastate runoff	10
Colorado River basin	10
East-central basins	12
Central basins	13
Death Valley basins	14
Sierra Nevada basins	14
Humboldt River basin	15

Page

Intrastate runoff (continued)

Northwestern basins 16

Snake River basin 17

Summary 19

Interstate runoff 20

Colorado River basin 20

East-Central basins 21

Central basins 22

Death Valley basins 22

Sierra Nevada basins 22

Northwestern basins 24

Snake River basin 25

Summary 26

Estimated surface-water supply 27

Springs 30

Reservoirs and lakes 32

Current status of data-collection programs 33

Selected references 35

Appendix 39

ILLUSTRATIONS

		Follows Page
Figure 1.	Precipitation map of Nevada	5
Figure 2.	Map of Nevada showing location of gaging stations	6
Figure 3.	Graphs showing average seasonal pattern of streamflow	7
Figure 4.	Graphs and map showing average seasonal pattern of precipitation	7
Figure 5.	Graphs showing cumulative departure from average annual streamflow for period of continuous streamflow record	7
Figure 6.	Graphs showing cumulative departure from average annual streamflow, 1912-63	9
Figure 7.	Map showing principal basins in Nevada	11
Figure 8.	Map showing the better-known springs of Nevada	30
Figure 9.	Graphs showing variations in stage of Walker and Pyramid Lakes, 1928-63	32

TABLES

			Page
Table	A.	Estimated average annual precipitation and runoff for the basins within Nevada	19
	B.	Estimated average annual surface-water inflow, outflow, and net gain or loss for the basins of Nevada	27
	C.	Estimated average annual surface-water supply of Nevada	29
	1.	Selected streamflow records of Nevada and adjacent States	In Appendix
	2.	Larger and better-known springs of Nevada	In appendix
	3.	Major reservoirs and lakes in Nevada	In appendix

INTERIM INVENTORY OF SURFACE-WATER RESOURCES OF NEVADA

By
Robert D. Lamke and Donald O. Moore

SUMMARY

The purpose of this report is to make an interim inventory of the surface-water resources of Nevada. The primary effort was to determine the runoff originating within Nevada. Data and estimates of the amount of streamflow entering and leaving the State as well as information on springs, reservoirs, and lakes are included. Many of these data and estimates were compiled from material available in various publications. The principal inventory items for the State of Nevada are summarized below:

Inventory item	Subitem (acre-feet)	Total (acre-feet)
Average annual estimates		
(1) Precipitation (9 inches)	--	54,000,000
(2) Runoff originating within State	(3,490,000)	--
Rounded	3,500,000	
(3) Streamflow entering State	(1,470,000)	--
Rounded	1,500,000)	
(4) Streamflow leaving State	(845,000)	--
(5) Surface-water supply, 1912-63 conditions (2)+(3)-(4)	--	4,100,000
(6) Virgin flow entering State	(1,660,000)	--
Rounded	1,700,000	
(7) Virgin flow leaving State	(970,000)	--
	1,000,000	
(8) Surface-water resources, virgin-flow conditions (2)+(6)-(7)	--	4,200,000
(9) Flow from springs, greater than	--	300,000
Water stored in lakes and reservoirs, Oct. 1, 1963, about	--	170,000,000
Usable storage capacity of reservoirs, about	--	30,000,000

Although the estimated average runoff originating within the State is about 3,500,000 acre-feet per year, the agricultural economy of western Nevada is dependent principally upon the large surface-water inflow from California. The estimated net inflow under 1912-63 conditions to the Sierra Nevada basins of Nevada was about 1,200,000 acre-feet per year, compared to runoff originating in these basins in Nevada of nearly 400,000 acre-feet per year. On the other hand, the principal area of outflow is from the Snake River basin in Nevada, from which an estimated 550,000 acre-feet per year flows into Idaho.

The Humboldt River basin, which contains the only major stream system wholly within Nevada and has a total drainage area of about 17,000 square miles, produces an estimated average runoff of about 960,000 acre-feet per year.

Many of the estimates presented in this report are based on fragmentary records or on methods having little data. When more data are available, particularly more adequate areal coverage, a more comprehensive report can be prepared.

EXPLANATION OF TERMS

An explanation or definition of some of the terms that were used in a specific manner in this report is presented below:

Acre-foot. A unit for measuring the volume of water; it is equal to the quantity of water required to cover 1 acre to a depth of 1 foot and is equal to 43,560 cubic feet or 325,851 gallons.

Basin. Total drainage area above the mouth of a stream or within a closed basin.

Basin, closed. A basin of interior drainage, whose only surface discharge is by evaporation and transpiration.

Beneficial consumptive use. The net water losses, attributable to man's activities, along a stream. (See Shamberger, 1954, p. 10.)

Recharge. The processes by which water is absorbed and added to ground-water storage.

Runoff. That part of precipitation that appears in surface streams. The computation of runoff, as presented in this report, is based on virgin-flow records obtained in the headwaters of the major streams and near the base of the mountains on the smaller streams.

Runoff, average annual. The arithmetic average of the runoff over a specified number of years.

Streamflow. The flow that occurs in a natural channel. The term "streamflow" is more general than runoff, as streamflow may be applied to flow whether or not it is affected by diversion or regulation.

Streamflow, average annual. The arithmetic average of the streamflow over a specified number of years.

Virgin flow. Flow of a stream unaltered by diversions or storage. In the context of this report, it is possible for the computed runoff to be more than the virgin flow, as some of the runoff may be lost to evaporation, transpiration, soil moisture, and ground-water recharge upstream of the point of virgin flow measurement.

Water year. The twelve-month period, October 1 through September 30. The water year is designated by the calendar year in which it ends. Thus, the year ended September 30, 1912, is called the "1912 water year".

INTRODUCTION

Purpose and Scope

The purpose of this report is to provide a preliminary inventory of the surface-water resources of Nevada. The principal effort was to determine the surface runoff originating in Nevada. The amount of precipitation falling on Nevada also was estimated. The streamflow entering the State and streamflow leaving the State were computed at sites where they have been measured, and estimated at ungaged sites. Where adequate data were available, an attempt was made to adjust the measured streamflow to the virgin flow by adjusting for upstream storage or diversion. Data on gaged streamflow and on the larger springs, reservoirs, and lakes are summarized in tables.

Much of the information in this report also is in various publications of the U. S. Geological Survey and the Nevada Department of Conservation and Natural Resources, but the data have never been compiled in one report. This report is considered interim in that more time and effort in the field and office would be required to present more detailed streamflow data and to refine the estimates of runoff. Only a part of the components needed to prepare a generalized water budget for Nevada is presented.

This report does not contain a map of the State with the many geographic names mentioned, as it was beyond the scope of this report to prepare one. However, it is assumed that the reader has a knowledge of Nevada and has access to suitable reference maps.

Acknowledgments

This report was prepared by the U. S. Geological Survey under the supervision of G. F. Worts, Jr., district chief. The authors wish to thank T. E. Eakin, whose knowledge of the State was invaluable, and O. C. Kamm, L. A. Moore, V. R. Jesser, L. E. Davis for their aid in computing the data presented in this report. George Hardman of the Nevada Department of Conservation and Natural Resources prepared the precipitation map of Nevada, and he and other personnel of that agency also aided in the listing of springs. Credit is given in the report to various other agencies and people from whose reports the authors have abstracted data.

PHYSICAL AND HYDROLOGIC DESCRIPTION

The amount of surface-water runoff, lake storage, or spring discharge is interrelated with the topography, surface and subsurface geology, the climate, and other less important factors. For example, the amount and type of precipitation is related to the topography, which largely is the result of the geology of the area and past climatic conditions.

Topography and Drainage

Nevada is mainly in the Great Basin section of the Basin and Range physiographic province (Fenneman, 1931), which is characterized by an arid climate and numerous mountain ranges. These mountain ranges are roughly parallel, generally elongated, and north-trending; and they are separated by alluvium-filled basins. Except for the northeastern and southeastern parts of the State, Nevada is characterized by numerous closed basins. A generalized description of the prevalent topography and drainage in Nevada is presented in the following paragraphs.

The drainage basins have moderately steep mountains along most of their boundaries, although some of the boundaries separating adjacent surface-water drainages may be barely above the adjacent valley floors. The steepness of the mountains varies with the character of the rock and with the age and magnitude of the structural deformation which caused the mountains. Land surface in the mountains varies from almost bare rock, to alluvium-covered hills with typical desert vegetation, to high mountain slopes covered with conifers. Stream patterns are well defined within the mountains, although usually the streams have narrow flood plains and moderately sloping banks instead of being in steep-walled gorges. Also, the density of stream channels is relatively low as compared with more humid climates. The higher altitudes and mountainous areas in the State have the greatest amounts of runoff and contain most of the perennial streams. This fact is partly explained by the distribution of precipitation throughout the State, with the higher precipitation generally occurring at higher altitudes.

There is an abrupt change of slope at the base of the mountains, between the mountain fronts and the alluvial aprons. These aprons mainly consist of gently sloping fans built up by erosional debris from the mountains, have the coarser material near the mountains, and may be several miles in width. The apron surface varies from a surface of active deposition of alluvium, to a cover of typical desert brush, to meadow grasses. Many of the Nevada ranches are at the base of the mountains on the alluvial apron. The mountain streams diverge into numerous distributary channels when they flow upon the apron; and most of the streamflow is lost by infiltration into the ground, by evaporation, and by transpiration.

The alluvial slope from one range may extend outward until it meets the slope from another range. Generally, this results in a flat area where water may stand at intervals and where fine-grained deposits accumulate. This flat area is a playa or, when covered with water, a playa lake. The interval between the times when standing water occurs may vary between the occurrence of local thundershowers, between annual snow-melt periods, or between unusual runoff events. The playas generally have little vegetation, except along the margins.

Climate

Nevada is the most arid state in the nation. Most of its area lies in the rain shadow of the Sierra Nevada, which prevents the westerly winds from carrying large amounts of moisture from the Pacific Ocean to the Great Basin. The range of average annual precipitation at U. S. Weather Bureau stations is from 2.39 inches (for period 1942-50) at Lathrop Wells in southern Nevada to 32.30 inches (for period 1953-62) at Coon Creek Summit near the Idaho border. A precipitation map of Nevada, showing the average annual precipitation in inches, is included as figure 1. A tabulation of the area in square miles and percent of the total area in the State within each precipitation zone, as derived from the precipitation map, are listed below:

Precipitation zone	Area (sq. mi.)	Percent of State
Less than 5 inches	17,700	16.0
5 to 8 inches	32,800	29.6
8 to 12 inches	33,200	30.0
12 to 15 inches	18,600	16.9
15 to 20 inches	6,700	6.0
Over 20 inches	1,700	1.5

For the State as a whole, the average annual precipitation, as derived from the precipitation map, is 9.2 inches.

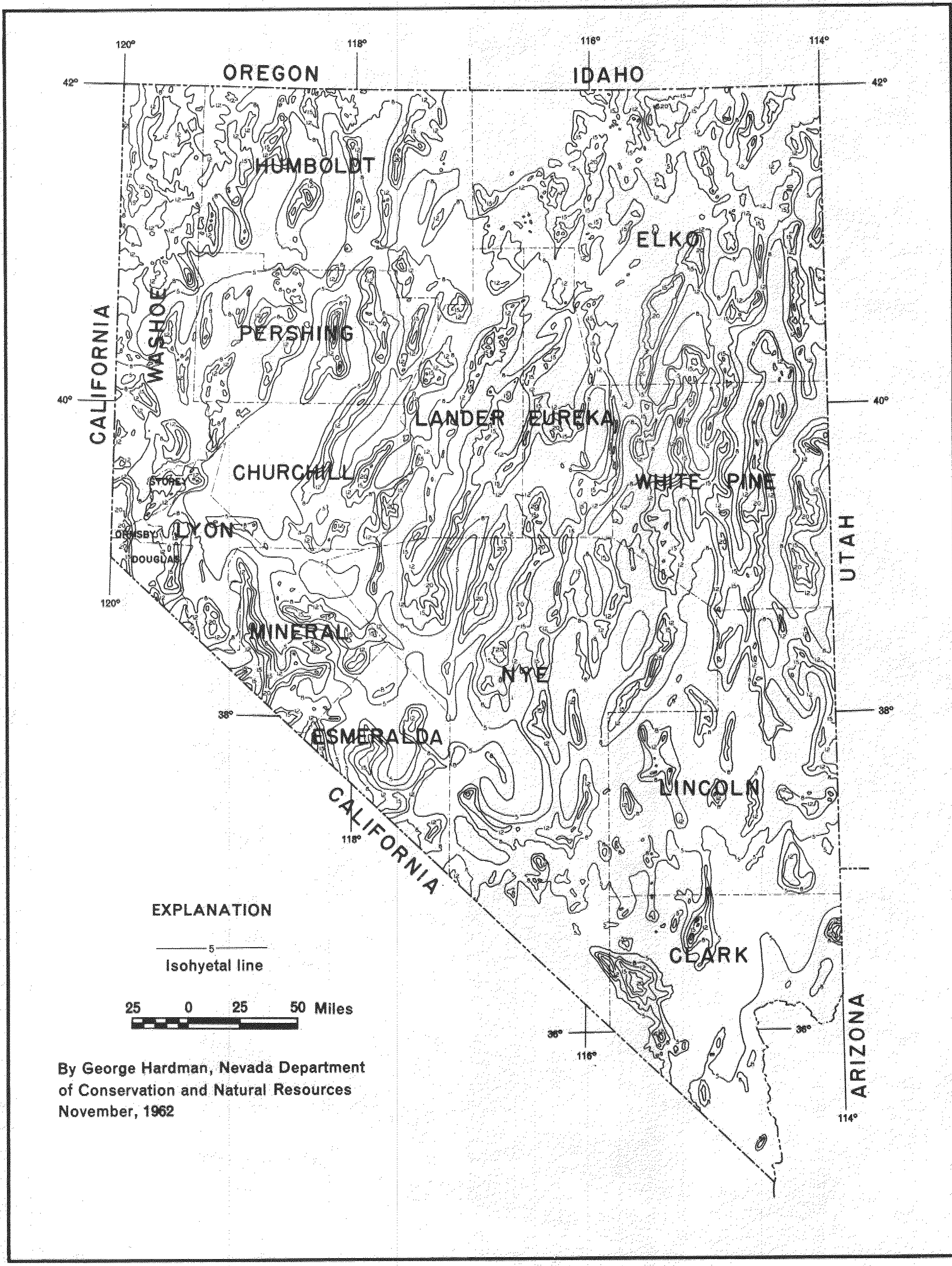

Figure 1.—Precipitation map of Nevada

AVAILABLE BASIC DATA

For Nevada basic data on streamflow since 1890 are available in various U.S. Geological Survey Water-Supply Papers. The Geological Survey publishes streamflow data according to major river basins. Nevada lies within the area covered by Part 9, Colorado River Basin; Part 10, Great Basin; and Part 13, Snake River Basin. Monthly and yearly streamflow data for Nevada streams have been summarized in the following Water-Supply Papers:

Water Year	Part	Water Supply Paper
Prior to 1951	9	1313
	10	1314
	13	1317
1951-1960	9	1733
	10	1734
	13	1737

Beginning with the 1961 water year, the publication format was changed, and streamflow data for Nevada were published for water years 1961, 1962 and 1963 in annual reports entitled, "Surface Water Records of Nevada". Basic data are also available for perusal at the U. S. Geological Survey office in Carson City.

Data on stream-gaging stations whose streamflow records were used in this analysis, and for gaging stations in existence as of September 30, 1963, are summarized in table 1 at the end of the report. The locations of the stations listed in table 1 are shown in figure 2. Station numbers used in table 1 and figure 2 are explained in table 1. Some additional data for out-of-state, short-term, or fragmentary streamflow records also were used in this analysis but are not listed in table 1 nor shown on figure 2.

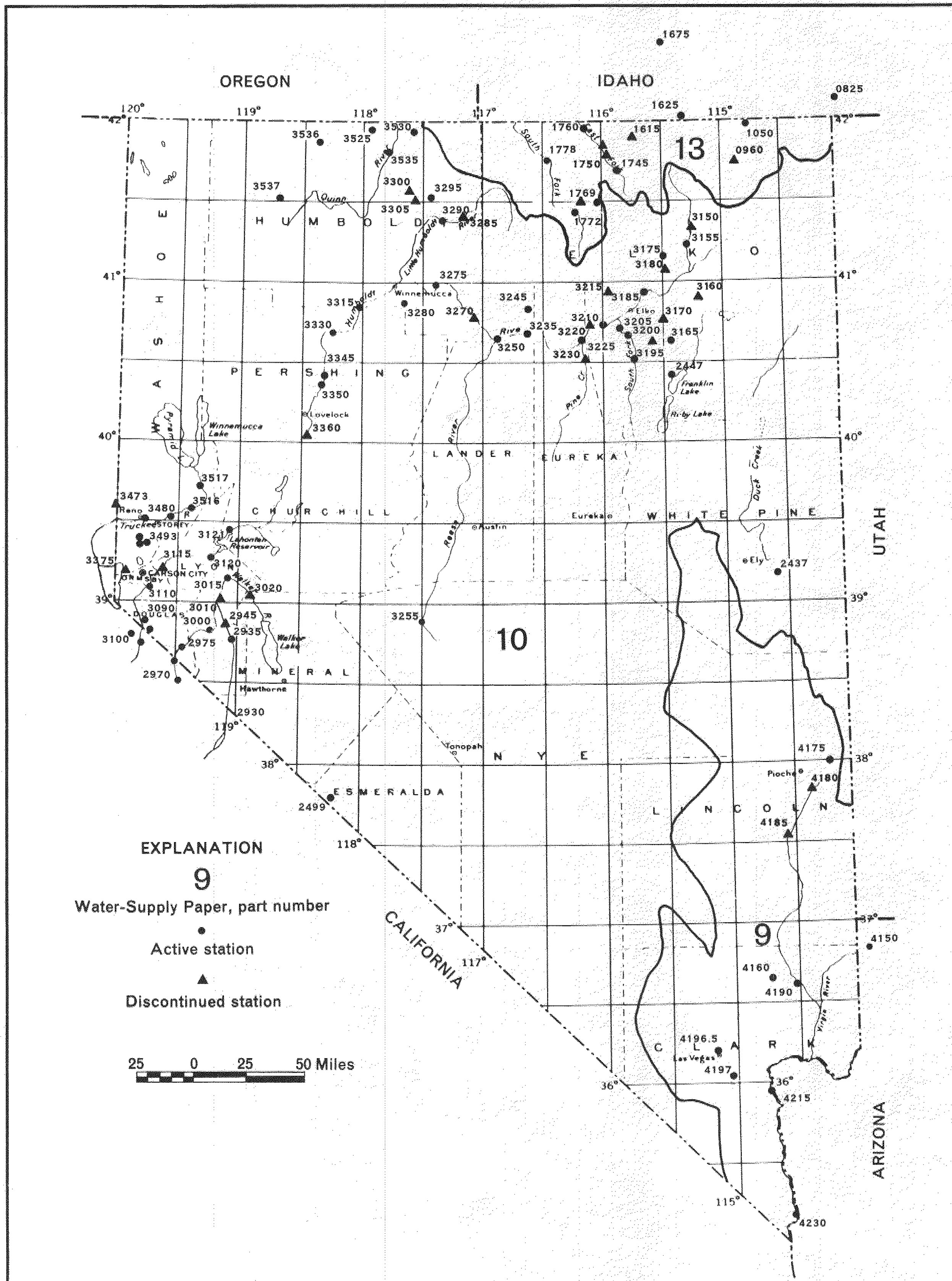

Figure 2.—Map of Nevada showing location of gaging stations

VARIATIONS IN STREAMFLOW

The water we use has its origin in precipitation, which is part of the hydrologic cycle. The cycle may be considered to start with the water in the oceans. This water is evaporated from the ocean surface; the vapor is carried inland; some of the vapor condenses and falls as precipitation. A part of the precipitation is retained temporarily on vegetation, in surface depressions, or in the soil and eventually returns to the atmosphere by evaporation and transpiration. The remainder of the precipitation flows overland and down the channel of surface streams or infiltrates into the soil. Some of the water that infiltrates into the soil percolates downward to recharge the ground water, but much of it moves laterally to springs, rivers, and lakes. This water is subject to evaporation and transpiration throughout its travels. Naturally, this description of the hydrologic cycle is oversimplified; actually all phases are occurring simultaneously and some vapor in the air can originate in inland water sources. Also, it is oversimplified in that surface-water runoff can be flood runoff from snowmelt or thundershowers, or base-flow from springs and seepage from areas of high-water table. Also, it is oversimplified in that the quantities in any part of the cycle vary through wide limits throughout time and space.

Time

Variation with time is one of the most important aspects of streamflow. Streamflow varies from minute to minute and from year to year; it is the year to year or long-term variation with which this report is mainly concerned. The average seasonal pattern of streamflow for various streams and in different areas is shown in figure 3. For comparative purposes, the average seasonal precipitation pattern for representative sites is shown in figure 4. Because the pattern varies from year to year, the average seasonal pattern provides only a rough indication of the amount of flow or precipitation to be expected in any given year.

Figure 5 shows the variations in streamflow from year to year for six selected streams. The flow may be above or below average in any given year or in several successive years. Long-term trends in stream-flow commonly are hard to establish, because of man-made changes in the environment. However, figure 5 shows the past trends as cumulative departure from average streamflow. An upward slope on the line over a period of years indicates a wet period; conversely, a downward slope indicates a dry period.

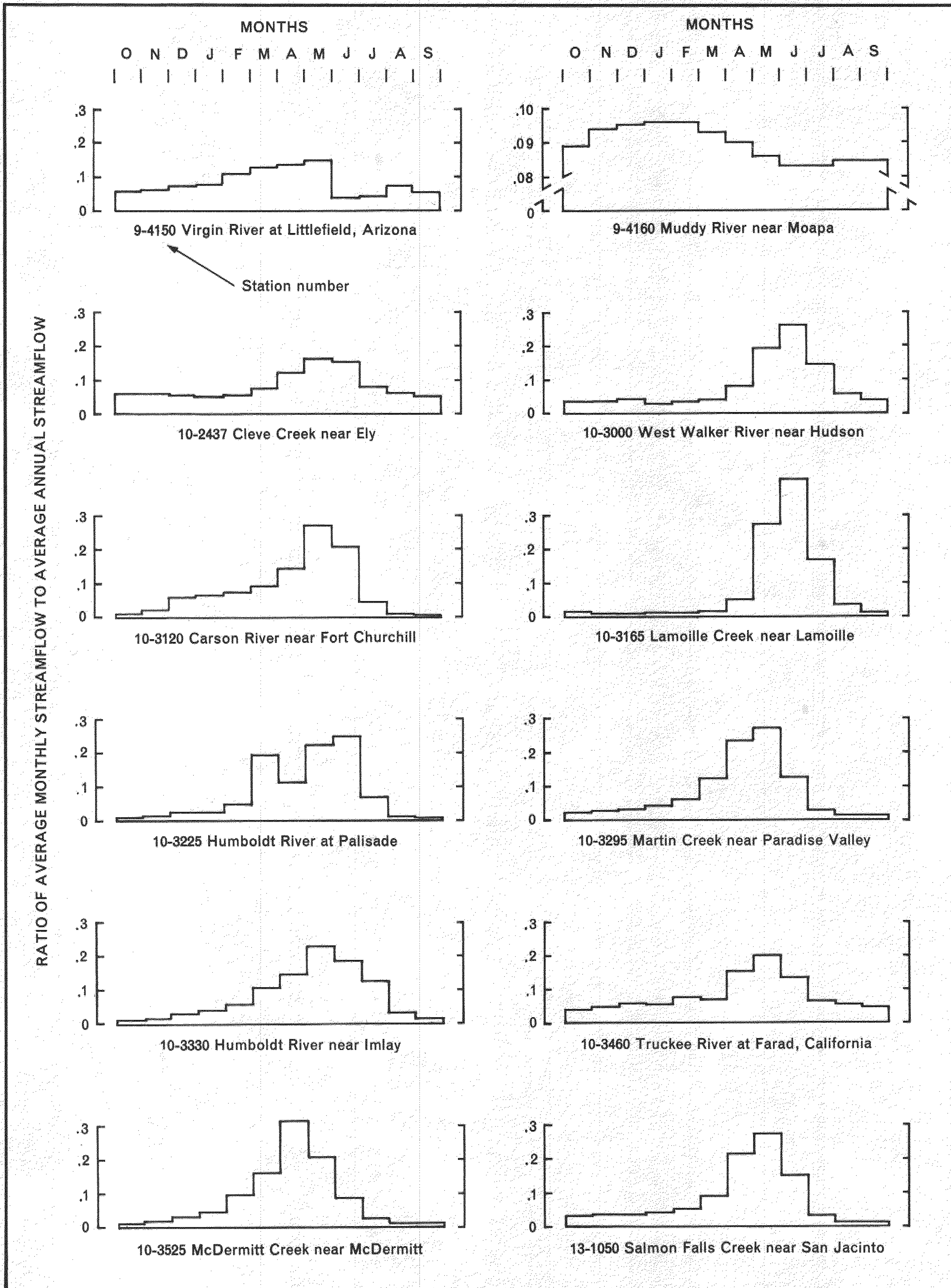

Figure 3.—Graphs showing average seasonal pattern of streamflow

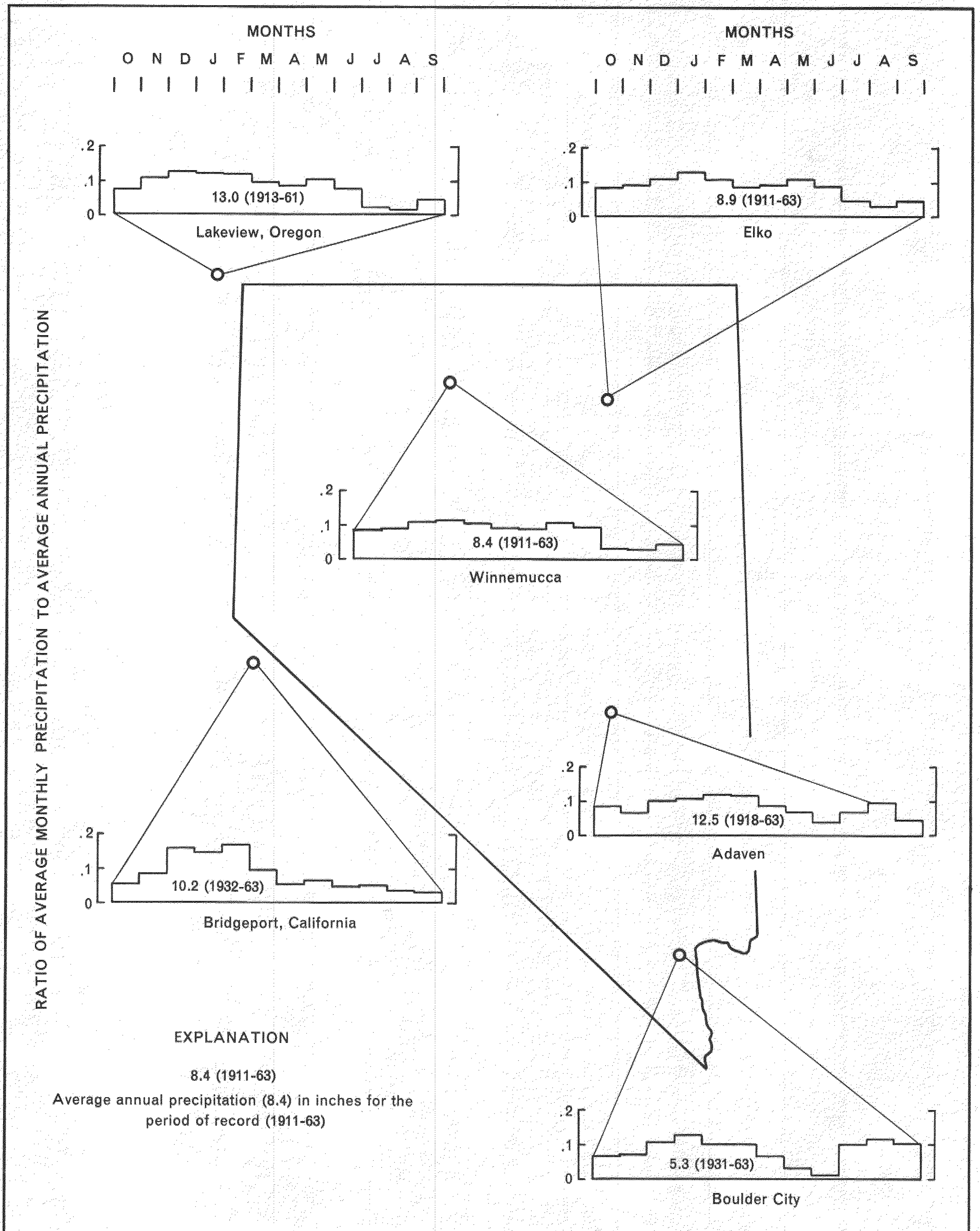

Figure 4.—Graphs and map showing average seasonal pattern of precipitation

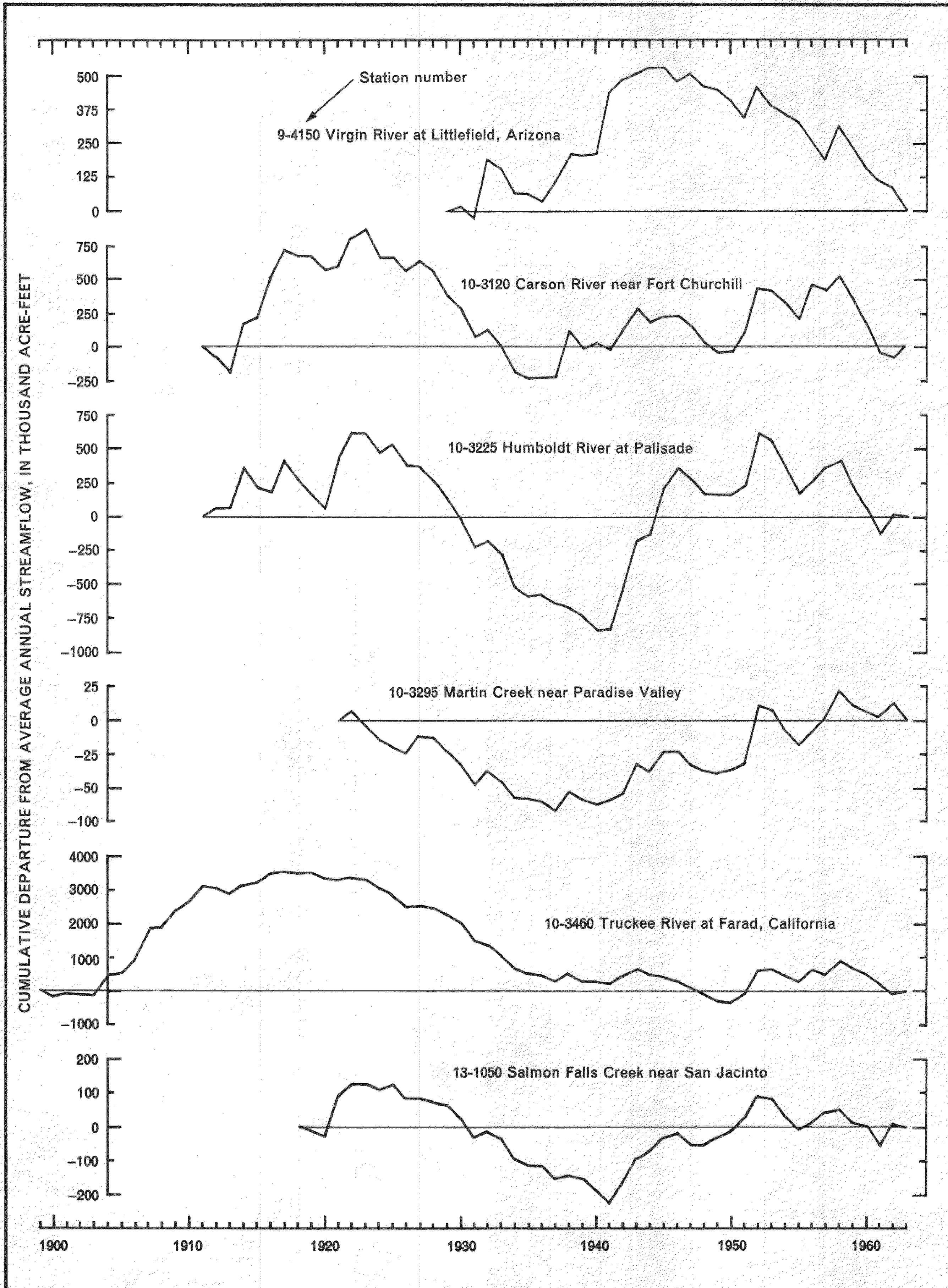

Figure 5.—Graphs showing cumulative departure from average annual streamflow for period of continuous streamflow record

Location

One of the most obvious causes of variations in streamflow from place to place is the size of the drainage area. However, other factors cause variations, some of which are the amount and type of precipitation, air temperature, vegetation, geology, and topography. These factors affect the infiltration, evaporation, and release from ground water to streams and thus control the amount of water that reaches the streams. In Nevada, the most striking variations occur near the mountain fronts on the alluvial aprons. In general, the runoff increases with drainage area in the mountains, but decreases as it reaches the alluvial apron where the runoff is dissipated by infiltration and evapotranspiration.

METHODS OF ANALYSIS

The methods used in this report to analyze and present streamflow and runoff data are briefly described below.

Reference Period

The range from 1 to 64 years in length of record for the 97 gaging stations listed in table 1 indicates the need for adjusting the record to a common reference period. Short-term records may be obtained during a series of wet or dry years (fig. 5) but may not include the variations in flow typical of a longer period. Adjusting the streamflow records to a common reference period produces values that probably reflect the differences in basin characteristics more than variations in climate.

The reference period used was governed by the length of the longest records in the State. In general, the period 1912-63 was used because many of the long-term streamflow records began in 1911.

The principal method used to adjust the streamflow records to a reference period consisted of establishing a relationship between adjacent streams by graphically comparing concurrent streamflow records. Missing streamflow records for one stream were then estimated from the record for the other streams. (See Searcy, 1960, for technique involved.) Other techniques, such as computors and linear regression, are superior, but graphical correlation was used because of the limited time available for this report and because the estimated record was used only to obtain an average annual streamflow figure for the reference period. In a few cases, extended records published in other reports were used. The average annual streamflow for the reference period is given in table 1 for many of the listed gaging stations. In some areas a long-term record was not available; therefore, the cumulative departure graphs of figure 6 were used to determine representative periods. Also, the reference period, 1912-63, was not usable for some streams because of the construction of reservoirs during the period. Where there were only a few short-term streamflow records, no adjustment to a common reference period was made. In areas where no streamflow records were available, the runoff was estimated by a method which is discussed later in the report, and no adjustments were made.

In this report, years used in conjunction with streamflow data refer to water years, except the "period of record" column in table 1, which refers to calendar years.

Figure 6 was prepared using six long-term streamflow records that were obtained in different areas; five of the streamflow records are unaffected by major storage or regulation. The exception is gaging station, Truckee River at Farad, California (10-3460) which has been affected by storage and regulation in Lake Tahoe since 1874 and by other smaller reservoirs and lakes (table 1). All of the streamflow records are affected by upstream diversions, except for gaging station, Martin Creek near Paradise Valley (10-3295) In general, figure 6 indicates two periods of higher than average streamflow from 1912 to 1923 and 1940 to 1952, an average streamflow from 1953 to 1963, and a lower than average streamflow from 1924 to 1939. However, gaging station, Virgin River at Littlefield, Arizona (9-4150), indicates a different trend with higher than average streamflow from 1912 to 1923, average streamflow from 1924 to 1942, and lower than average streamflow from 1943 to 1963.

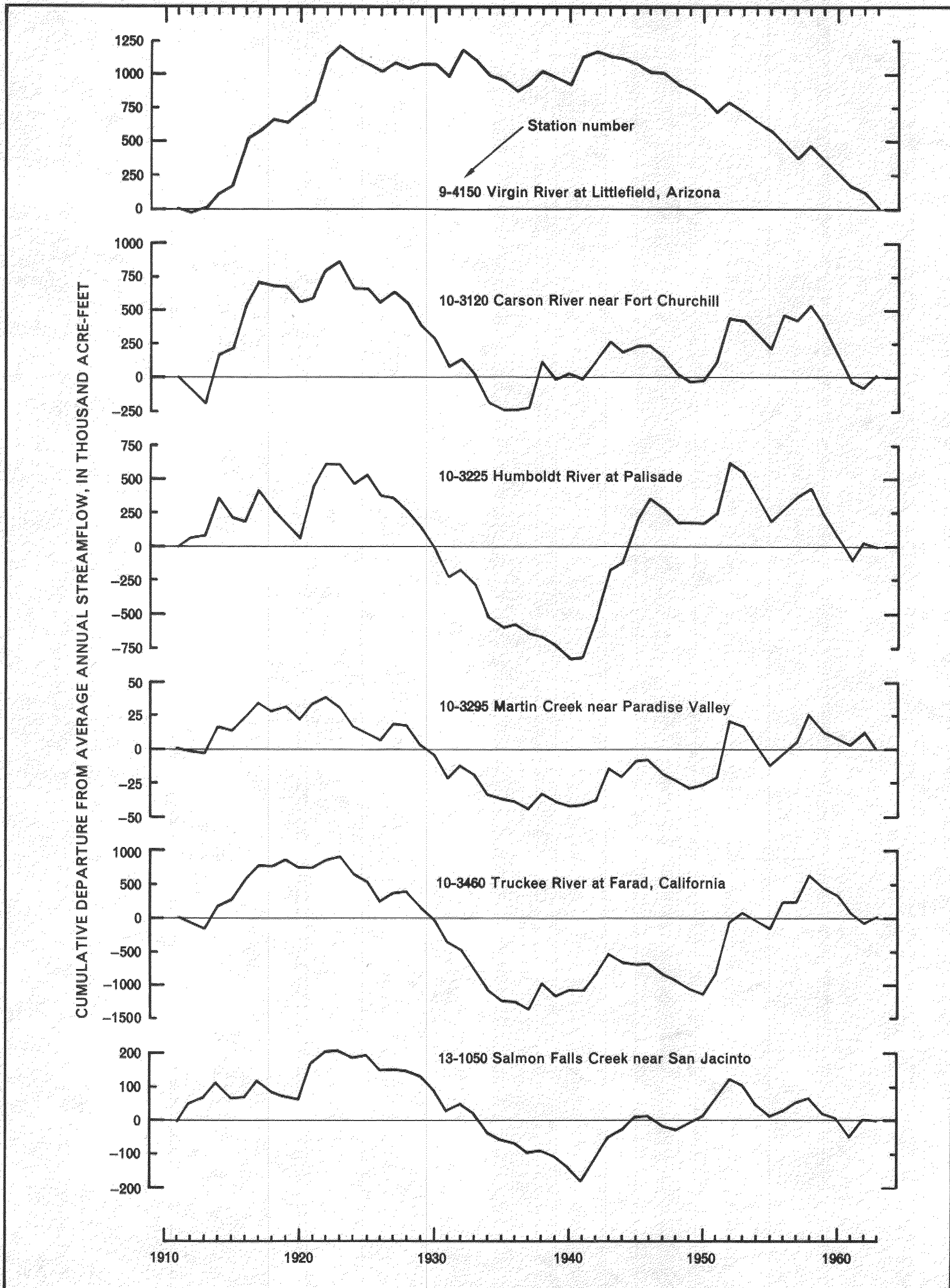

Figure 6.—Graphs showing cumulative departure from average annual streamflow, 1912-63

Adjustment to Virgin Flow

A problem that is much more difficult to resolve than that of extending the records is the adjustment for the changes in streamflow over the years caused by man. Virgin flows for many streams draining the eastern slopes of the Sierra Nevada have been listed in California Water Resources Board, Bulletin 1, for the reference period 1895 to 1947. These data were used and extended from 1947 to 1963 to include the more current records. The virgin flows for other streams near the Nevada border were roughly estimated by adjusting upward the recorded flows to include diversions, reservoir operation, and other activities by man upstream from the stations. More information and time will be required to refine these estimates for future reports and to compile virgin flow figures for stream sites within Nevada.

Ungaged Runoff

As there are many areas in Nevada where no streamflow records are available, the amount of surface-water runoff in these ungaged areas was estimated. A generalized description of the methods used to estimate the runoff is given in the following paragraph.

It was assumed that runoff increases with altitude and that a relationship between altitude and runoff can be derived for sites where streamflow records have been obtained. Essentially, the ungaged areas near the gaged area were assumed to have a similar relationship between altitude and runoff. The farther the ungaged area is from the gaged area, the poorer this assumption becomes. Forty streamflow records throughout the State and in adjacent States near the State line were used in this analysis. These 40 streamflow records were obtained at gaging stations with little or no upstream diversions.

A more detailed description of the method of estimating runoff from ungaged areas is being prepared.

INTRASTATE RUNOFF

The average annual runoff originating within the State was computed to be about 3,500,000 acre-feet. However, it is not practical or economically feasible to develop all this runoff for use. Some of the runoff occurs in small quantities or is of short duration; also, some of it infiltrates and becomes a part of the ground-water system.

For the purposes of this report, the State has been divided into eight major basins, which are shown in figure 7. The hydrologic features and estimated runoff in each basin are discussed briefly in this section of the report. A tabulation of the basins and the estimated amounts of precipitation and runoff occurring within the State are presented at the end of this section.

Colorado River Basin

The Colorado River basin within Nevada includes mainly the White River system, including Meadow Valley and Muddy River drainages, and the Las Vegas Wash drainage. It also includes the topographically closed basins of Cave, Dry Lake, Delamar, Lake, Jakes, and Eldorado Valleys. Long Valley at the extreme north end of the White River system and Garden and Coal Valleys to the west of Pahranagat Valley are listed respectively in the East Central and Central basins but appear to have an underground discharge to the White River system. The area of the basin is 15,700 square miles, of which only about 4,000 square miles contributes significantly to runoff. The relief is the greatest of any of the basins; the altitude ranges from less than 500 feet at the southernmost tip of Nevada to 11,918 feet at Charleston Peak, northwest of Las Vegas. Other high areas are those near Ward Mountain south of Ely, which has an altitude of 10,936 feet, and Troy Peak near Sunnyside, which has an altitude of 11,312 feet.

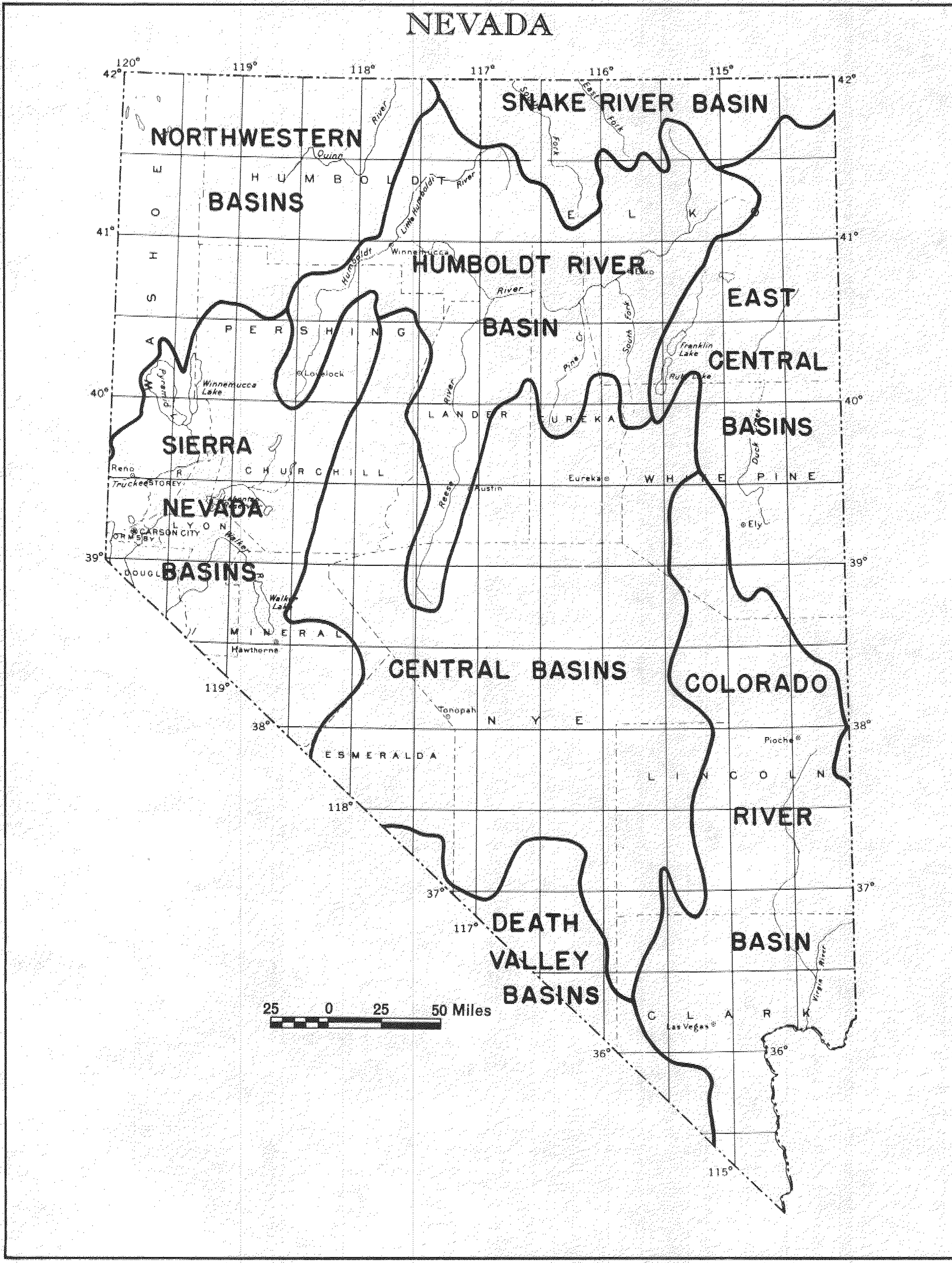

Figure 7.—Map showing principal basins in Nevada

The range of average annual precipitation at U. S. Weather Bureau stations is from 3.91 inches (for period, 1937-62) at Las Vegas to 15.92 inches (for period, 1952-61) at Bunker Peak, and the average annual precipitation (estimated from fig. 1) for the entire basin is 7.2 inches.

The largest streams wholly within Nevada are the White River System and Las Vegas Wash. (See table 1 for streamflow data). However, these streams are not typical of the basin; Muddy River is fed by large springs (Eakin, 1964, p. 14), and the streamflow in Las Vegas Wash is mainly waste water from the Las Vegas area. Meadow Valley Wash near Caliente has an average annual streamflow of about 9,000 acre-feet; however, most of the surface water infiltrates into the ground-water reservoir or is lost by evapotranspiration before the stream enters Muddy River just above Lake Mead. Another significant area of runoff is the upper White River. Stream flow data are fragmentary and short-term for this area, but the average annual runoff in the headwaters north of latitude 39° is estimated to be more than 30,000 acre-feet.

The estimated total runoff within the Colorado River basin is about 140,000 acre-feet, of which about two-thirds is produced in the area above 7,000 feet in altitude, or in about 8 percent of the total area.

East-Central Basins

The East-Central basins are bounded on the west by the Ruby and Butte Mountains and the southern Egan Range, on the south by the Colorado River basin, on the north by the Snake River basin, and on the east by Utah. The basins entirely in Nevada include Independence, Clover, Goshute, Ruby, Antelope, Butte, Steptoe, and Spring Valleys. Also included are the Nevada portions of the Great Salt Lake Desert and Snake and Escalante Valleys. The total area is 12,400 square miles of which about 50 percent contributes tangibly to runoff.

The most significant hydrologic features are the Snake Range, whose highest peak is Wheeler Peak (13,063 feet), the Schell Creek Range, whose highest peak is Schell Peak (11,890 feet), and the combination of high runoff with many peaks over 10,000 feet altitude in the Ruby Mountains. The significance lies in the fact that greater average annual precipitation and consequently greater runoff occurs at higher altitudes. Three percent of the area receives more than 20 inches of precipitation per year, and less than one percent of the area received less than 5 inches per year. The average annual precipitation is about 11.2 inches.

All the streams in the area are comparatively small. They flow roughly parallel to each other down the flanks of the ranges, and when sufficient runoff occurs they enter a channel flowing down the long (north-south) axis of the basin; they ultimately discharge into playas or lakes, of which the swampy areas of Ruby and Franklin Lakes are the most prominent. Many of the streams that lie east or west of these playas or lakes flow directly into them, instead of entering a common channel.

Four of the streams in the study area have streamflow records of significant length:

10-2432.4	Baker Creek at narrows, near Baker
10-2432.6	Lehman Creek near Baker
10-2437	Cleve Creek near Ely
10-2447	Overland Creek near Ruby Valley

Their combined average annual streamflow is about 24,000 acre-feet (unadjusted to a common reference period) from a drainage area of only 58 square miles. Although the drainage areas of these streams cover only a minor part of the total area, they indicate the high runoff potential in the higher parts of the area.

The estimated total average annual runoff within the East-Central basins is about 590,000 acre-feet, of which about two-thirds is produced in the area above 7,000 feet, or in 23 percent of the area.

Central Basins

The Central basins are bounded on the north by the Humboldt River basin, on the east by the Colorado River basin, on the south by Death Valley basins, and on the west by the Sierra Nevada basins (fig. 8). The basins include Long, Newark, Diamond, Little Smoky, Monitor, Grass, Ione, Big Smoky, Dixie, Gabbs, Little Fish Lake, Railroad, Fish Lake, Clayton, Ralston, Stonecabin, Kawich, Garden, Coal, Penoyer, Desert, Emigrant, and Indian Spring Valleys, Yucca and Frenchman Flats, and several small closed basins. Fish Lake Valley has some inflow from California, and is the only valley in the area that is not completely in Nevada. The total area is 30,800 square miles, of which about 20 percent contributes tangibly to runoff.

The most significant geographic features of the Central basins are elongate, north-trending mountain ranges and the intervening closed basins. The Monitor, Toquima, and Toiyabe Ranges are the source of much of the runoff in the area because of their relatively large area and height. Mount Jefferson, at an altitude of 11,949 feet, in the Toquima Range, is the highest peak in these ranges. The Butte Mountains and the White Pine, Grant, and Quinn Canyon Ranges, with peaks from 9,000 to 11,500 feet, border the eastern margin of the area. The relatively low Stillwater Range is the northwestern boundary of the area and the White Mountains are at the southwestern corner. White Mountain Peak (altitude, 14,242 feet) in California, is the highest in the White Mountains; Boundary Peak (13,145 feet) in the same range is the highest point in Nevada.

Only about 1.4 percent of the area receives more than 20 inches of precipitation per year and about 14 percent receives less than 5 inches per year. The U. S. Weather Bureau station at Indian Springs has an average annual precipitation of 3.33 inches for the period 1939-63. The average annual precipitation is about 9.1 inches.

There are no major streams in the area. The longest continuous streamflow record in the area is at gaging station, Chiatovich Creek near Dyer (10-2499), which was begun in 1960. Two gaging stations are being operated in cooperation with the Nevada Department of Highways to obtain flood information at:

10-2458	Newark Valley tributary near Hamilton
10-2494.11	Campbell Creek tributary near Eastgate

Fragmentary streamflow records were obtained in the period 1913-23 on Currant and Duckwater Creeks, which drain into Railroad Valley, and on Birch Creek, which is tributary to Big Smoky Valley (Water Supply Paper 1314, p. 264-266). Because of the scarcity of streamflow data in the area, the runoff figure is only approximate.

The estimated total runoff within the Central basins is about 340,000 acre-feet, of which about three-fourths is produced in the area above 8,000 feet, or in only 5 percent of the total area.

Death Valley Basins

The Death Valley basins are composed of those parts of southern Nevada whose runoff flows into closed basins in California; it is west of the Colorado River basin. The basins included are Amargosa River, which includes the small area tributary to Grapevine Canyon and Oriental Wash in Nevada that drains into Death Valley Wash in California, and Pahrump, Mesquite, and Ivanpah Valleys. The total area is 4,000 square miles, of which only about 200 square miles contributes tangibly to runoff. Almost three-fourths of the storm runoff occurs in Pahrump Valley on the high western slopes of the Spring Mountains. About 56 percent of the area receives less than 5 inches of precipitation per year and only Charleston Peak receives more than 20 inches of precipitation per year. The average annual precipitation is about 5.5 inches.

No perennial streams exist in the area, except for short distances downstream from springs. The springs near Ash Meadows have a perennial discharge of about 17,000 acre-feet (Walker and Eakin, 1963, p. 40), and the springs in Pahrump Valley had a perennial discharge (for period, 1916-37) of about 8,000 acre-feet (Maxey and Jameson, 1948, p. 116). The spring discharge in Pahrump Valley has declined in the last few years because of pumping. Therefore, previous to development, the average annual spring discharge was about 25,000 acre-feet (17,000 + 8,000). However, the source of some of the spring flow in Ash Meadows, which issues from carbonate rocks, is from the Central basins, north of the surface drainage boundaries.

The estimated total average annual runoff of the Death Valley basins is about 30,000 acre-feet, which includes an undetermined part of the total spring discharge originating within the area.

Sierra Nevada Basins

The Sierra Nevada basins include those parts of western Nevada that are tributary to the Walker, Carson, and Truckee Rivers, which flow eastward from the Sierra Nevada crest in California. It also includes other small areas that drain into the terminal points of these rivers, which are Walker Lake, Carson Sink, and Pyramid Lake; as well as including minor closed basins south of Hawthorne and Northeast of Pyramid Lake. Buena Vista Valley, which is northeast of Carson Sink and which is separated from Carson Sink by a low ridge, is included in the Sierra Nevada basins. The Nevada portion of Mono Lake basin, which drains westward into California, is also included. The total area in Nevada is 13,500 square miles, of which about 25 percent contributes tangibly to runoff.

The most significant hydrologic feature in Nevada, contributing to runoff in the area, is the Carson Range of the Sierra Nevada, which lies along the east side of Lake Tahoe and trends northward toward Reno. Mount Rose in this range has an altitude of 10,778 feet, and the U. S. Weather Bureau station on Mount Rose, at an altitude of 7,360 feet, had an annual average precipitation of 29.08 inches for the period, 1960-62. About 26 percent of the study area has an average annual precipitation of less than 5 inches. The average annual precipitation is 8.1 inches.

The three principal streams within the area, the Walker, Carson, and Truckee Rivers, receive most of their flow from California and are discussed under Interstate Runoff. Most of the streams wholly within Nevada are small tributaries of these main streams. Short-term gaging station records have been collected at the following stations:

10-3088	Bryant Creek near Gardnerville
10-3105	Clear Creek near Carson City
10-3476	Hunter Creek near Reno
10-3485	Franktown Creek at Franktown
10-3489	Galena Creek near Steamboat
10-3493	Steamboat Creek at Steamboat
10-3497	Whites Creek near Steamboat

All these streams drain the east side of the Carson Range. (See table 1 for drainage area and discharge.) No discharge records are available for tributary streams in the rest of the area.

The estimated total average runoff occurring within the Nevada part of the Sierra Nevada basins is about 390,000 acre-feet per year, of which about two-thirds originates in the 9 percent of the total area higher than 7,000 feet. About 60 percent of the total runoff originates in the area tributary to the Truckee River and includes 35,000 acre-feet of runoff into Lake Tahoe. Areas tributary to the Carson, Walker, and the numerous minor areas contribute about 10, 10, and 20 percent of the total runoff, respectively.

Humboldt River Basin

The Humboldt River and its tributaries form the Humboldt River basin; the minor closed basin of Buffalo Valley and the semi-closed basins of Crescent and Carico Lake Valleys are also included. The Humboldt Sink is considered to be the downstream end of the river. The drainage area is 16,800 square miles, of which about 60 percent contributes tangibly to runoff.

The most significant hydrologic feature is the many peaks over 10,000 feet in the Ruby Mountains southeast of Elko. The Independence and Jarbidge Mountains, north of Elko, are almost as high, but do not have as much runoff. Also, the Santa Rosa Range, on the west side of the Little Humboldt River is a major runoff contributing area. All of the area, except for a small area around Lovelock, has an average annual precipitation of more than 5 inches. The average annual precipitation for the area is 10.9 inches.

Except for Rock Creek and Pine Creek, the major contributing tributaries are in the headwaters above Palisade. The other major downstream tributaries, Reese River and the Little Humboldt River, seldom contribute surface flow directly to the Humboldt River, even though considerable runoff occurs in their respective basins. Twelve stream-gaging stations have been operated on the main stem of the Humboldt River (table 1). A series of reports, collectively entitled, "Water and related land resources, Humboldt River basin, Nevada", (Nevada Department of Conservation and Natural Resources and U. S. Department of Agriculture, 1962-63) on sub-basins of the Humboldt River, contains detailed information on water resources and uses.

The streamflow data listed in table 1 have not been reduced to a reference period. A 1-year study of the hydrology of the Humboldt River, including an analysis of streamflow records, is currently (1965) being made by the U. S. Geological Survey.

The estimated total average annual runoff within the Humboldt River basin is about 960,000 acre-feet, of which about 65 percent occurs above Palisade and of which more than one-half originates in the 15 percent of the total area higher than 7,000 feet.

Northwestern Basins

The Northwestern basins are bounded on the southeast mainly by the Humboldt River basin, on the south by the Sierra Nevada basins, and on the west and north by California and Oregon; a small portion on the east is bounded by the Snake River basin. Most of the runoff originates in the headwaters of the Quinn River and its tributaries which drain into the Black Rock Desert. Also included in the area are Massacre Lake-Long Valley, Desert Valley, and Duck Flat. The Nevada parts of Honey Lake basin and Surprise Valley, that drain into California, are included, as are the Nevada areas that are tributary to Warner, Guano, and Tum-tum Lakes in Oregon. Other minor drainage areas and closed basins lie within the study area. The total area is 12,200 square miles of which 50 percent contributes tangibly to the runoff.

Much of the runoff occurs along the west side of the Santa Rosa Range at the eastern edge of the study area. Compared to the rest of the Nevada mountains, this range is low in altitude with only about 11 square miles higher than 8,000 feet and the highest peak, Granite Peak, is 9,732 feet above mean sea level. In contrast with other parts of the State, a large proportion of the runoff (about 85 percent) occurs below 7,000 feet, as about 98 percent of the land surface in the study area is lower than 7,000 feet. The Bilk Creek Range, on the west side of Kings River Valley, has a few peaks higher than 8,000 feet. Only about 0.3 percent of the area has an average annual precipitation greater than 20 inches; about 18 percent of the area, mainly the playas and lower altitudes of the Black Rock Desert, has an average precipitation less than 5 inches per year. The average annual precipitation for the study area is 8.8 inches.

Fifteen years of discharge record have been collected on the Quinn River and its tributaries at the following sites:

10-3525	McDermitt Creek near McDermitt
10-3530	East Fork Quinn River near McDermitt
10-3535	Quinn River near McDermitt

Based on the cumulative departure plots of figure 6, these 15 years of record seemingly are roughly comparable to the long-term reference period, 1912-63, in determining the long-term average flow. Other short-term gaging stations have recently been established in the area. (See table 1 for area and discharge.) No streamflow records are available for the rest of the area, which is distinguished by its small perennial and intermittent lakes and reservoirs, such as Massacre, Continental, New Year, Summit, High Rock Lakes and Big Spring, Catnip, and Swan Lake Reservoirs.

The estimated total average annual runoff within the Northwestern basins is about 380,000 acre-feet, of which roughly 40 percent is in the area tributary to Quinn River.

Snake River Basin

The Snake River basin in Nevada includes the following northward flowing streams: Goose Creek, Salmon Falls Creek, Bruneau River, Owyhee River, South Fork Owyhee River, and Little Owyhee River. Streamflow records have been collected on all these streams except Little Owyhee River. However, some of these records are relatively short. A few minor closed basins are included in the area. The total area is 5,300 square miles, of which about 94 percent contributes tangibly to runoff.

Much of the runoff is produced in the mountains that serve as a boundary between the Humboldt River basin and the Snake River basin. The Independence Mountains, with McAfee Peak (10,439 feet) and Jack Peak (10,198 feet), and the Jarbidge Mountains, with Jarbidge Peak (10,789 feet) and Marys River Peak (10,565 feet) are the highest and most extensive mountains in the area. The western part of the basin, which includes the Little Owyhee River drainage and the downstream part of the South Fork Owyhee River, is composed of table land broken by deeply incised coulees and is lower in altitude. In contrast, the rest of the study area has considerable relief and well developed drainage.

About 6 percent of the area averages more than 20 inches of precipitation per year and under 1 percent receives less than 8 inches. The U. S. Weather Bureau precipitation station at Jacks Creek Pass had an average annual precipitation for the period

1948-62 of 32.0 inches, whereas the precipitation station at Contact had an average annual precipitation for the period 1949-60 of 8.6 inches. The average annual precipitation for the study area is about 12.6 inches, the highest of the eight basins in Nevada.

Because most of the water from this area flows into Idaho and Oregon, most of the streams in this area are discussed under Interstate Runoff. However, the following streamflow records are mainly of interest within Nevada:

13-1745	Owyhee River near Gold Creek
13-1750	Owyhee River at Mountain City
13-1755	Owyhee River near Owyhee
13-1760	Owyhee River above China Diversion Dam, near Owyhee
13-1770	Jack Creek near Tuscarora

The first four stations are of interest because streamflow records for different years and sites are available prior to and after the construction of Wild Horse Reservoir in 1938. The streamflow record on Jack Creek, which was started in 1913 and discontinued in 1925, is the only long-term record in the basin of runoff from a small headwater drainage.

The estimated average annual runoff within the Nevada part of the Snake River basin is about 660,000 acre-feet, of which about 45 percent occurs in the 12 percent of the total area higher than 7,000 feet.

Summary

The approximate area, precipitation, and runoff originating wholly within the basins of Nevada are presented in table A.

Table A.--Estimated average annual precipitation and runoff for the basins within Nevada

Basin	Approximate area (sq. mi.)	Precipitation inches	Precipitation Total on basin (acre-feet)	Runoff Acre-feet	Runoff Percent of total
Colorado River basin	15,700	7.2	6,000,000	140,000	4
East-Central basins	12,400	11.2	7,400,000	590,000	17
Central basins	30,800	9.1	14,900,000	340,000	10
Death Valley basins	4,000	5.5	1,200,000	b 30,000	<1
Sierra Nevada basins	13,500	8.1	5,800,000	390,000	11
Humboldt River basin	16,800	10.9	9,700,000	960,000	27
Northwestern basins	12,200	8.8	5,700,000	380,000	11
Snake River basin	5,300	12.6	3,600,000	660,000	19
Statewide total	110,700	a (9.2)	(54,300,000)	(3,490,000)	100
rounded	--	a 9	54,000,000	3,500,000	--

a. Statewide average precipitation.

b. Includes springflow which originates outside the area, mainly in Ralston and Stone Cabin basins.

Table A shows that of the estimated average precipitation of 54,000,000 acre-feet per year that falls on the entire State, only 3,500,000 acre-feet becomes runoff. This is equivalent to about 6½ percent, or 0.6 inch, of the average annual precipitation. Although the average annual precipitation ranges from less than 5 inches in the southern part of the State to more than 30 inches in the Sierra Nevada (Carson Range) and the higher mountains in the northeast, the Statewide average is only about 9 inches, making Nevada the driest State in the nation.

INTERSTATE RUNOFF

The average annual streamflow entering the State was computed to be about 1,500,000 acre-feet; the average annual streamflow leaving the State was computed as about 845,000 acre-feet. The average annual virgin flow entering the State is estimated as about 1,700,000 acre-feet, and the virgin outflow is estimated as about 1,000,000 acre-feet.

The major basins that have interstate runoff are the Colorado River basin, Sierra Nevada basins, and the Snake River basin (fig. 8). The East-Central, Central, Death Valley, and Northwestern basins have a small amount of interstate runoff; the Humboldt River basin does not have any.

Colorado River Basin

The Colorado River flows along part of the southeastern boundary of Nevada; therefore inflow and outflow figures for the main stem are excluded in this report. Las Vegas imports water from Lake Mead--none was imported in 1954 (Shamberger, 1954, p.63) and 6,400 acre-feet was imported in 1963 (H. Winchester, oral communication). Henderson and its industries also import water from Lake Mead--11,100 acre-feet was imported in 1954 (Shamberger, 1954, p. 63) and 17,000 acre-feet in 1963 (Surface Water Records of Nevada, 1963, p. 20). For the purposes of this report, the waste-water outflow in Las Vegas Wash and the storm runoff from about 200 square miles of ungaged area tributary to the Colorado River was assumed to equal the water imported from Lake Mead.

The inflow into the Colorado River basin study area comes mainly from the Virgin River. Gaging station, Virgin River at Littlefield, Arizona (9-4150), recorded an average annual streamflow of 198,000 acre-feet, measured and estimated for the period 1912-63. An average annual inflow of 2,000 acre-feet was estimated for ungaged areas. The virgin inflow is about 35,000 acre-feet greater (U.S. Bureau of Reclamation, 1953, p. 36) than the measured streamflow. The proposed Dixie Project on the Virgin River in Utah would reduce the average annual streamflow by about 46,000 acre-feet (Shamberger, 1954, p. 18).

The outflow from the area occurs mainly in the Virgin River and Muddy River, which flow into Lake Mead. The inflow from storm runoff into the Virgin River has been estimated as about 13,000 acre-feet (G. Hardman, written communication) between the Littlefield gage and Lake Mead. Consumptive use in the same area has been estimated as about 27,000 acre-feet (G. Hardman, written communication) by phreatophytes and about 14,000 acre-feet (Shamberger, 1954, p. 45) by beneficial use. Therefore, the Virgin River as it flows into Lake Mead has an average annual streamflow of about 170,000 acre-feet (198,000 + 13,000 - 27,000 - 14,000). The present average annual discharge into Lake Mead from Muddy River of unused winter flows and drainage water is about 10,000 acre-feet (G. Hardman, written communication). The total average annual inflow to Lake Mead from the Virgin River and Muddy River is about 180,000 acre-feet.

The average annual virgin outflow of the Virgin River is estimated as about 15,000 acre-feet (G. Hardman, written communication) less than the average annual virgin inflow or about 220,000 acre-feet (200,000 + 35,000 - 15,000). Muddy River, prior to construction of Lake Mead, entered a swamp near its mouth; the outflow from this swamp is estimated as about 10,000 acre-feet (G. Hardman, written communication). The total average annual virgin inflow into the Colorado River is estimated as about 230,000 acre-feet.

In summary, the average annual streamflow and virgin flow entering the area are about 200,000 and 235,000 acre-feet respectively. The average annual streamflow and virgin flow leaving are about 180,000 and 230,000 acre-feet, respectively. These figures are rough estimates, because the amount of use is constantly changing over the years, all of the figures were not reduced to a common reference period, the data are somewhat outdated and fragmentary, and the authors' simplifying assumptions are broad.

East-Central Basins

The interstate streamflow from this area consists of water discharging into Utah from the Nevada segments of the Great Salt Lake Desert and Escalante and Snake Valleys.

The surface-water outflow from Nevada on the western edge of the Great Salt Lake Desert consists mainly of storm flow in Thousand Springs Creek and from the Goshute Mountains toward Bonneville Salt Flats. Dake Reservoir on Thousand Springs Creek, about 3 miles upstream from the State line, reduces streamflow to negligible amounts. An estimate was made of about 15,000 acre-feet of virgin outflow per year, based on fragmentary discharge data taken 30 miles upstream from the State line, for Thousand Springs Creek and about 10,000 acre-feet of outflow for the rest of the area. The average annual interstate streamflow was estimated as 10,000 acre-feet and the average annual virgin outflow was estimated as 25,000 acre-feet.

Snake Valley has an estimated average annual runoff of 70,000 acre-feet, of which 35,000 acre-feet may have reached the State line under virgin conditions, and of which maybe 25,000 acre-feet reaches the State line under present conditions. The major runoff contributor is the Snake Range, which is one of the highest ranges in Nevada and whose crest is within 15 miles of the State line. Escalante Valley in Nevada is small and the interstate streamflow is negligible.

In summary, 35,000 acre-feet of streamflow and 60,000 acre-feet of virgin flow were estimated as the amounts of water entering Utah from the East-Central basins of Nevada.

Central Basins

Fish Lake Valley is the only part of the Central basins that has interstate flow. About 70,000 acre-feet of runoff per year occurs in the California part of this valley, of which only about 50 percent flows directly toward Nevada. The other 50 percent flows into Cottonwood Creek, which in turn flows southward, west of the State line, and then turns northward on the low-lying bench land near Oasis, California, and enters Nevada. Streamflow into Nevada in Cottonwood Creek is negligible. The main streamflow contribution to Nevada drains eastward from the White Mountains, of which White Mountain Peak is the highest at 14,242 feet, and enters the ranch area around Dyer. The estimated average annual streamflow and virgin flow at the State line are 25,000 and 30,000 acre-feet, respectively.

Death Valley Basins

Some surface water leaves the State from the Death Valley basins to California as storm runoff, principally in the Amargosa River. During the winter, small amounts of streamflow from the springs near Ash Meadows also flow down the Amargosa River. The totals are negligible compared to the quantities for other basins in the State.

Sierra Nevada Basins

Gaging stations have been maintained near the Nevada-California border on the major streams of the Sierra Nevada basins for a comparatively long time. The California Department of Water Resources made a runoff analysis, which includes the water entering Nevada from California, and published the data in Bulletin No. 1, Water Resources of California, 1951. California used the reference period 1895-1947, whereas this report uses 1912-63. The data in Bulletin No. 1 were adjusted to the 1912-63 reference period. Using the 1895-1947 reference period, the estimated average annual virgin flow entering Nevada was 1,481,000 acre-feet; using the 1912-63 reference period, the estimated average annual virgin flow was 1,345,000 acre-feet, or about 90 percent of the previously estimated inflow. A tabulation of the estimated average annual streamflow and virgin flow, in acre-feet, entering Nevada is listed below:

Station number	Station name or stream	Reference Period	Streamflow	Virgin flow
10-2930	East Walker River near Bridgeport, California	1930-63	97,600	149,000
	East Walker River Tributaries below gage and other minor areas	ungaged	(a)	48,000

Station number	Station name or stream	Reference period	Streamflow	Virgin flow
10-2965	West Walker River near Coleville, California	1912-63	187,000	188,000
	West Walker River tributaries below gage and other minor areas	ungaged	(a)	54,000
10-3090	East Fork Carson River near Gardnerville	1912-63	246,000	251,000
	Area above gage below California border	ungaged	(a)	- 9,000
10-3100	West Fork Carson River at Woodfords, California	1912-63	73,200	73,000
	West Fork Carson River tributaries below gage and other minor areas	ungaged	(a)	36,000
10-3460	Truckee River at Farad, California	1912-63	(b) 505,000	530,000
	Truckee River tributaries below gage and other minor areas	ungaged	(a)	25,000
	Total		1,200,000	1,345,000

a. Not estimated for individual ungaged areas. Total average annual streamflow estimated as about 90,000 acre-feet from ungaged area, which is included in the total streamflow.

b. Includes 35,000 acre-feet of outflow from Lake Tahoe which originates in Nevada.

A reference period 1930-63 was used for East Walker River near Bridgeport because Bridgeport Reservoir was constructed in 1923 and because 1930-63 is considered to be representative of the longer period 1912-63. The virgin flow on the Truckee River does not include lake evaporation, because the evaporation is nearly the same whether or not the lakes are regulated.

The estimated average annual streamflow entering the Sierra Nevada basin in Nevada is 1,200,000 acre-feet.

Data on runoff in Nevada entering Lake Tahoe has been published in Comprehensive Study on Protection of Water Resources Through Controlled Waste Disposal, 1963. That comprehensive study uses the reference period 1902-62, whereas this report uses 1912-63. The runoff listed in that study was adjusted downward from 38,000 acre-feet for the 1902-62 reference period to 35,000 acre-feet for the 1912-63 reference period. This flow comes back into Nevada on the Truckee River and is accounted for at the Farad gage. Outflow from Nevada into California also includes inflow into Mono Lake of about 5,000 acre-feet annually. The total average annual streamflow and virgin flow are each estimated to be about 40,000 acre-feet from Nevada into California.

Northwestern Basins

The major inflow to the Northwestern basins occurs from the Oregon part of the East Fork Quinn River, Quinn River, and McDermitt Creek. Other minor inflows occur from the Oregon parts of the Thousand Creek area and Kings River headwaters, and from California in the Smoke Creek area. The average annual streamflow and virgin flow entering the area are estimated to be 25,000 and 30,000 acre-feet, respectively.

The major outflow from Nevada is to Oregon in the Guano and Warner Lakes drainage. Other outflow occurs into Tum-Tum Lake in Oregon and to Surprise Valley in California. The average annual streamflow and virgin flow leaving the study area is estimated to be about 20,000 acre-feet.

Snake River Basin

Gaging stations have been maintained near the Nevada border on most of the major streams. A tabulation of the average annual streamflow, in acre-feet, leaving the State is presented below:

Station number	Station name or stream	Reference period	Streamflow
13-0825	Goose Creek above Trapper Creek, near Oakley, Idaho.	1912-63	ab 25,000
13-1050	Salmon Falls Creek near San Jacinto	1912-63	ab102,000
13-1615	Bruneau River near Rowland	1912-33	a 84,000
	Bruneau River tributaries below gage	ungaged	a 59,000
13-1625	East Fork Jarbidge River near Three Creek, Idaho	1945-63	45,000
	East Fork Bruneau River tributaries	ungaged	a 23,000
13-1760	Owyhee River above China Diversion Dam, near Owyhee.	1945-63	98,000
13-1778	South Fork Owyhee River near White Rock	1945-63	121,000
	South Fork Owyhee River tributaries below gage.	ungaged	a 5,000
	Little Owyhee River and other minor areas.	ungaged	a 8,000
	Total		570,000

a. Approximate

b. Adjusted to conform to State boundaries

The average annual streamflow given for Goose Creek and Salmon Falls Creek is an estimate of the streamflow at the State Line. This estimate consists of an adjustment, based on runoff-altitude-precipitation relations, to the streamflow measured at gaging stations.

The shorter reference periods, 1912-33 and 1945-63, which are representative of the longer period 1912-63 (fig. 6, Salmon Falls Creek), were used for short-term streamflow records and for the Owyhee River which has been regulated by Wild Horse Reservoir since 1938.

The average annual streamflow and virgin flow entering the area in Nevada from Idaho and Utah are each about 20,000 acre-feet. Goose Creek and Salmon Falls Creek flow from Idaho into Nevada and back into Idaho; Goose Creek also has some tributary drainage in Utah.

The average annual streamflow leaving the State is about 570,000 acre-feet. The average virgin outflow for the Snake River basins as a unit is estimated to be about 620,000 acre-feet per year.

Summary

The estimated average annual streamflow and virgin flow entering and leaving the basins of Nevada are summarized in table B. The Humboldt River basin, the only one of the eight basins having no interstate flow, is also included in the tabulation. The table also shows the difference, or net gain or loss to Nevada for each of the basins.

The table shows that the difference between the average annual interstate inflow and outflow amounted to estimated net gains for Nevada of about 625,000 acre-feet per year for the 1912-63 period and about 700,000 acre-feet per year for virgin-flow conditions.

Half of the basins have a net loss of stream flow. By far the largest net outflow from the State is in the Snake River basin, amounting to an estimated average of 550,000 acre-feet per year for the 1912-63 period. On the other hand, the Sierra Nevada basins supply about twice as much net inflow as the Snake River basins lose by outflow. For the same period the estimated net inflow averaged about 1,200,000 acre-feet per year; under virgin-flow conditions, about 1,300,000 acre-feet per year.

Table B. --Estimated average annual surface-water inflow, outflow, and net gain or loss for the basins of Nevada

	Inflow (1)		Outflow (2)		Difference (1) - (2)	
	Streamflow	Virgin flow	Streamflow	Virgin flow	Streamflow	Virgin flow
Colorado River basin[a]	200,000	235,000	180,000	230,000	20,000	5,000
East-Central basins	0	0	35,000	60,000	- 35,000	- 60,000
Central basins	25,000	30,000	0	0	25,000	30,000
Death Valley Basins	0	0	Minor	Minor	- Minor	- Minor
Sierra Nevada basins	1,200,000	1,345,000	40,000	40,000	1,160,000	1,305,000
Humboldt River basin	0	0	0	0	0	0
Northwestern basins	25,000	30,000	20,000	20,000	5,000	10,000
Snake River basin	20,000	20,000	570,000	620,000	- 550,000	- 600,000
Statewide total rounded	(1,470,000) 1,500,000	(1,660,000) 1,700,000	(845,000) --- ---	(970,000) 1,000,000	(625,000) --- ---	(690,000) 700,000

a. Excludes the main stem of the Colorado River, imports from Lake Mead, flow in Las Vegas Wash, and local storm runoff into the main stem of the Colorado.

ESTIMATED SURFACE-WATER SUPPLY

In the two preceding sections of the report, the magnitude of the average annual surface-water supply of Nevada has been presented as water originating in the State and as water entering and leaving the State. To show the magnitude of the total surface-water supply of Nevada, the estimates listed in the summary tables A and B in the preceding sections are utilized in table C.

Column 1 shows that the estimated average runoff originating in the State is about 3,500,000 acre-feet per year. Column 4 shows that the estimated total surface-water supply in Nevada is about 4,100,000 acre-feet per year. This is a reasonable measure of the average supply for the period 1912-63. Column 5 shows that the estimated virgin flow is about 4,200,000 acre-feet per year. This is a reasonable measure of the average supply available to Nevada prior to the changes (mostly diversions) imposed by the activities of man.

Table C. --Estimated average annual surface-water supply of Nevada

Basin	Intrastate runoff (acre-feet) (1)	Inflow to or outflow from (-) Nevada (acre-feet)		Surface-water supply of Nevada (acre-feet)	
		Streamflow (2)	Virgin flow (3)	Streamflow (1) + (2) (4)	Virgin flow (1)+(3) (5)
Colorado River Basin	140,000	20,000	5,000	160,000	145,000
East-Central basins	590,000	- 35,000	- 60,000	555,000	530,000
Central basins	340,000	25,000	30,000	365,000	370,000
Death valley basins	30,000	- Minor	- Minor	30,000	30,000
Sierra Nevada basins	390,000	1,135,000	1,305,000	1,550,000	1,695,000
Humboldt River basin	960,000	0	0	960,000	960,000
Northwestern basins	380,000	5,000	10,000	385,000	390,000
Snake River basin	660,000	- 550,000	- 600,000	110,000	60,000
Statewide total rounded	(3,490,000) 3,500,000	(625,000) --- ---	(690,000) 700,000	(4,115,000) 4,100,000	(4,180,000) 4,200,000

SPRINGS

A spring is the concentrated discharge of ground water at the land surface. A listing of the larger and better-known springs in Nevada is presented in table 2 of the Appendix. Figure 8 shows the location of the springs listed in table 2.

Springs occur in many forms and have been classified in many ways. One method of classification is by temperature. Springs that have temperatures appreciably higher than the mean annual air temperatures of their localities are thermal springs. There are many thermal springs in Nevada; 174 thermal springs are listed for Nevada by Stearns, Stearns, and Waring (1937, p. 155-166) in Water-Supply Paper 679-B, Thermal Springs in the United States. The Muddy River Springs are the largest thermal springs in Nevada, as well as the largest springs, and have an average discharge of about 22,000 gallons per minute (36,000 acre-feet per year). The next largest concentration of thermal springs in Nevada is Ash Springs, Crystal Springs, and Hiko Spring in the Pahranagat Valley portion of the White River system, which have a total discharge of about 16,000 gallons per minute (25,000 acre-feet per year). Most of the springs in the White River valley, just north of Pahranagat Valley, are thermal and have a combined discharge of about 24,000 gallons per minute (37,000 acre-feet per year). Railroad Valley, Snake Valley, and Steptoe Valley also have concentrations of thermal springs with large discharges. Many other smaller thermal springs are scattered throughout the State.

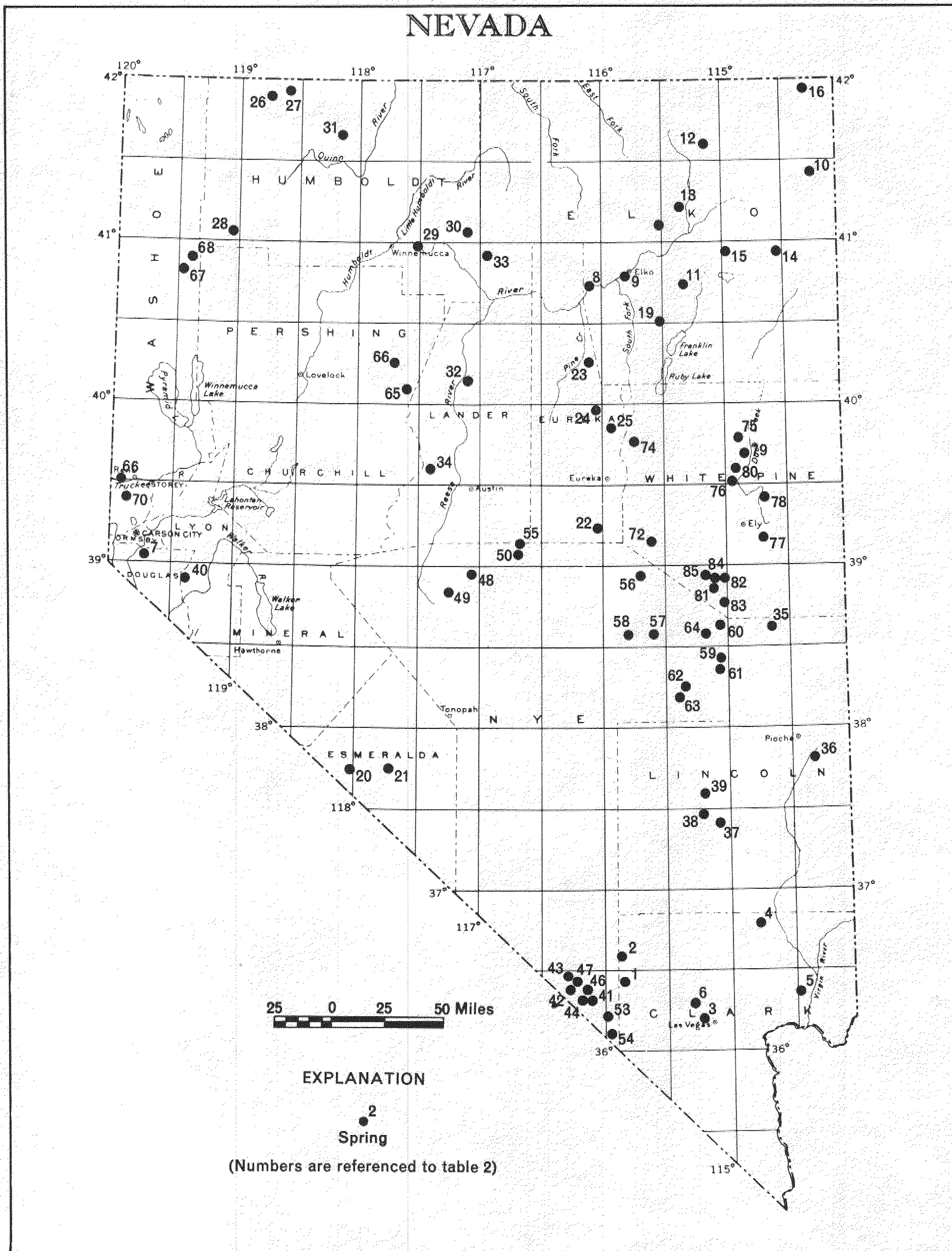

Figure 8.—Map showing the better-known springs of Nevada

Another method of classification of springs is by variability; springs can vary in their rate of discharge, depending mainly upon variations in the rate of ground-water recharge. Intermittent springs discharge only during portions of the year when there is sufficient ground water to maintain a flow. Perennial springs, which flow all year, can also vary in discharge. The lag in time between extremes in ground-water recharge and spring discharge can range from a short period of several days or weeks to several years. The lag in time varies with the size and geologic character of the ground-water aquifer. The Muddy River Springs seem to have a lag of about 20 years between the period of high recharge and high spring discharge (Eakin, 1964, p. 18).

The springs in the White River system have a total discharge of about 100,000 acre-feet per year. However, this amount cannot be added to the average annual runoff to determine the water available, because some of the water that is runoff in the headwaters of White River recharges the ground-water system and probably appears years later farther down the valley as spring flow.

An arbitrary lower discharge limit was established as a criterion as to which springs would be listed in table 2; the limit was 450 gallons per minute for the larger springs and 200 gallons per minute for better-known springs. The discharge in table 2 is given in gallons per minute. To convert to acre-feet per year, which is the discharge unit used throughout the rest of this report, multiply by 1.613. A few springs, which possibly might have been included, have been left out because the discharge figure, location, or name were uncertain.

The discharge of most of the springs mentioned in table 2 has been measured or estimated only once, and many of the springs were measured several years ago. Because of variations in spring flow, the discharge figure given in table 2 may not be the discharge at the present time. Where only a few measurements of the spring discharge were made, the latest discharge figure is listed, or an average is used if the discharge remained fairly constant.

Springs can occur as a well-defined orifice, as several orifices, or as a localized seep area. Often the low-water flow of a stream is supplied by springs in the stream channel or near the stream. For these reasons, an attempt has been made in table 2 to distinguish between the different methods of occurrence.

The 85 springs and spring groups listed in table 2 have a combined discharge of about 260,000 acre-feet per year. Considering that there are several hundred smaller springs not listed, the total spring discharge in Nevada may equal or exceed 300,000 acre-feet per year.

RESERVOIRS AND LAKES

Reservoirs and lakes store the streamflow entering them. The major reservoirs and lakes in Nevada are listed in table 3 in the Appendix.

A reservoir is a pond, lake, or basin, either natural or artificial, used for storage, regulation, and control of water (Langbein, 1960, p. 17). Some of the natural lakes, such as Tahoe and Topaz, are used as reservoirs. Other lakes are the terminal point of rivers, such as Walker and Pyramid Lakes, which are the downstream ends of the Walker and Truckee Rivers, respectively.

The contents of reservoirs vary seasonally with the capacity, the amount of inflow, and the releases from the reservoir. However, the contents of lakes also vary. The most striking variation occured in Winnemucca Lake, which had a surface area of more than 80 square miles in 1882 and a volume of about 3,600,000 acre-feet (Hardman and Venstrom, 1941, p. 82); it has been dry since 1939. Pyramid Lake has ranged in altitude from about 3,879 feet in about 1870 to 3,790 feet in 1962; these altitudes represent contents of about 29,000,000 and 18,000,000 acre-feet, respectively, based upon altitude-approximate volume relationship (Dept. of Interior, 1964, p. 23). Walker Lake, which has an estimated content of about 8,000,000 acre-feet of water at the present time, has ranged in altitude from 4,078 feet in 1908 to 3,976 feet in 1963. At the present time Walker Lake contains about half the water that it did in 1908. Figure 9 shows how Pyramid and Walker Lakes have declined since 1928, when periodic readings of lake stage were started. Between 1928 and 1939, Winnemucca Lake, which with Pyramid Lake received its water supply from Truckee River, decreased in volume from about 3,000,000 acre-feet to zero acre-feet.

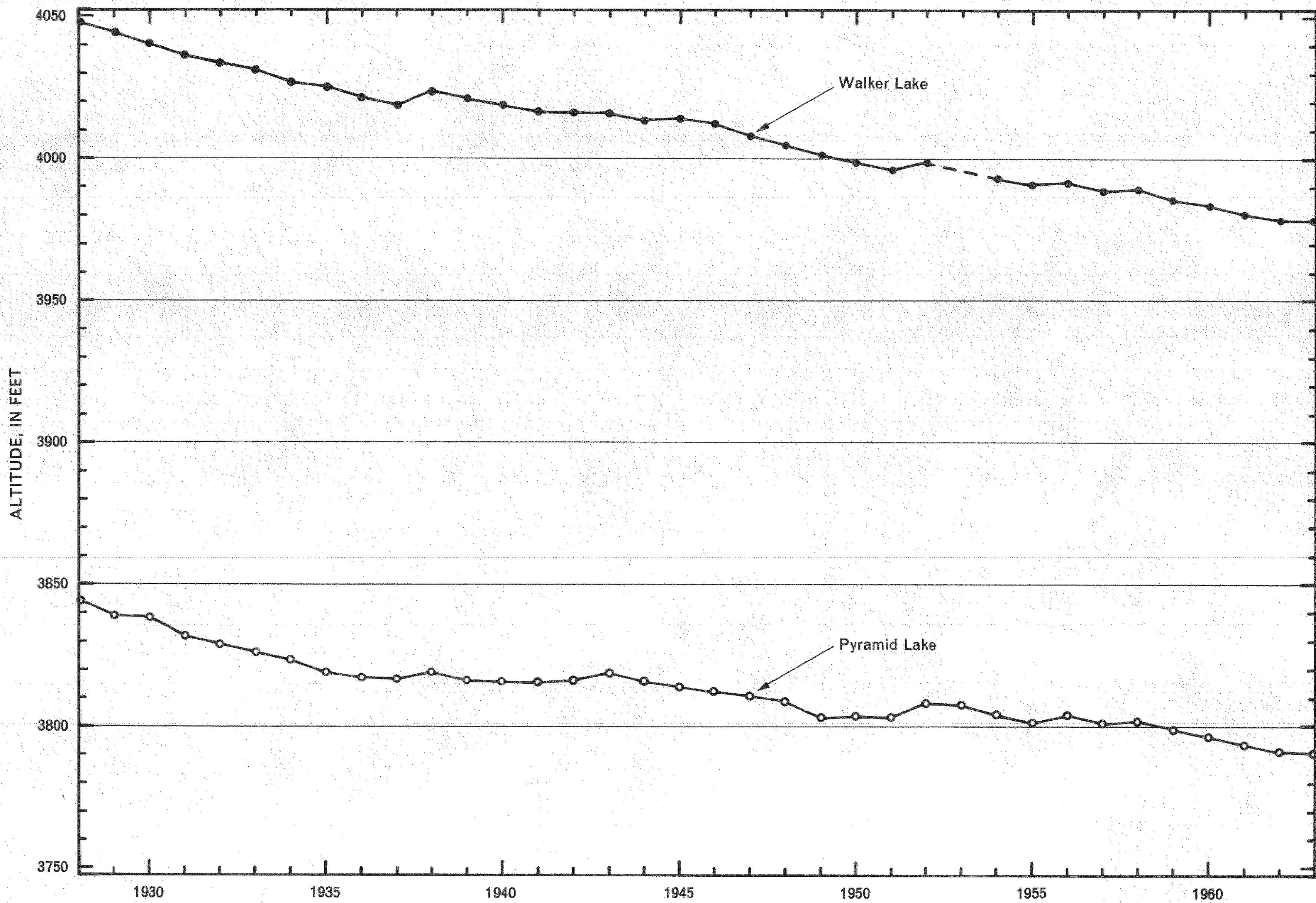

Figure 9.—Graphs showing variations in stage of Walker and Pyramid Lakes, 1928-63

There was about 170,000,000 acre-feet of water stored in the various lakes and reservoirs in and on the borders of Nevada on Oct. 1, 1963. Of this total, Lake Tahoe contained about 122,000,000 acre-feet (U.S. Bureau of Reclamation, 1964, p. 13), Pyramid Lake contained about 18,000,000 acre-feet, and Lake Mead contained about 17,000,000 acre-feet. At the present time there is about 30,000,000 acre-feet of usable storage capacity available in reservoirs in and bordering Nevada. Lake Mead alone has a usable storage capacity of more than 27,000,000 acre-feet. (See table 3.)

Records of stage and, in most cases, contents for those reservoirs and lakes that have station numbers listed in table 3 have been published in the same publications as streamflow data.

CURRENT STATUS OF DATA-COLLECTION PROGRAMS

This report presents some of the figures necessary for the preparation of a generalized water budget for Nevada. The numerical information lacking is the amount of ground water entering and leaving the State, the amount of ground-water recharge, and the evapotranspiration. The necessary ground-water data are being collected in the reconnaissance and areal studies that have been made, are in progress, and are planned by the U.S. Geological Survey in cooperation with the Nevada Department of Conservation and Natural Resources. Also, the problems of the interrelationships between the several components of the hydrologic cycle still remain to be resolved. For example, how much of the surface-water runoff is converted to ground-water recharge? Should the evapotranspiration figure include all of the runoff and ground water that eventually is evaporated and transpired, or should it just include the difference between the precipitation and the combined (not the arithmetic sum) runoff and recharge?

In the preparation of this report, the lack of streamflow data in areas other than in the major stream basins was apparent. However, to obtain more adequate information on the surface-water resources of the State, the U. S. Geological Survey in cooperation with the Nevada Department of Conservation and Natural Resources is systematically installing stream-gaging stations throughout the ungaged areas of Nevada. Also, a program of streamflow measurements at miscellaneous ungaged sites has been started.

All the data presented in this report are related to the quantity and distribution of the available surface water in Nevada; however, the quality of this water is also pertinent to its present and potential uses. Quality of water data are being collected in the reconnaissance and areal studies and at a few streamflow stations. However, to obtain more adequate information, the quality of water program should be increased.

During the course of this study, data on springs also were found to be deficient. This deficiency could be corrected by a systematic program of measurement of the springs of the State. Also, a program of systematic measurements of the size, stage, contents, and quality of the smaller lakes would be desirable.

Because of the present data deficiencies and because of the probability that more adequate data will become available in the future, the U. S. Geological Survey, as part of the cooperative program, plans to prepare in the next several years, a more comprehensive report on water resources of Nevada.

SELECTED REFERENCES

California Department of Water Resources, 1964, West Walker River investigation: Dept. of Water Resources, Bull. 64, 144 p.

California State Water Resources Board, 1951, Water resources of California: State Water Resources Board, Bull. 1, 648 p.

Clark, W. O., and Riddell, C. W., 1920, Exploratory drilling for water and use of ground water for irrigation in Steptoe Valley, Nevada: U.S. Geol. Survey Water-Supply Paper 467, 70 p.

Cohen, Philip, and others, 1963, An evaluation of the water resources of the Humboldt River Valley near Winnemucca, Nevada: Dept. Conserv. Nat. Resources, Bull. 24, 104 p.

Cohen, Philip, and Everett, D. E., 1963, A brief appraisal of the ground-water hydrology of the Dixie-Fairview Valley area, Nevada: Dept. Conserv. Nat. Resources - Reconnaissance Ser. Rept. 23, 40 p.

Eakin, T. E., 1950, Preliminary report on ground water in Fish Lake Valley, Nevada and California: Nevada Dept. Conserv. Nat. Resources, Bull. 11, 37 p.

Eakin, T. E., and others, 1951, Contributions to the hydrology of eastern Nevada: Dept. Conserv. Nat. Resources, Bull. 12, 171 p.

Eakin, T. E., 1960, Ground-water apprisal of Newark Valley: Dept. Conserv. Nat. Resources - Reconnaissance Ser. Rept. 1, 33 p.

________ 1961, Ground-water appraisal of Pine Valley Eureka and Elko Counties, Nevada: Dept. Conserv. Nat. Resources - Reconnaissance Ser. Rept. 2, 41 p.

________ 1963, Ground-water appraisal of Pahranagat and Pahroc Valleys, Lincoln and Nye Counties, Nevada: Nevada Dept. Conserv. Nat. Resources - Reconnaissance Ser. Rept. 21 , 35 p .

Eakin, T. E., 1964, Ground-water appraisal of Coyote Spring and Kane Spring Valleys and Muddy River Springs area, Lincoln and Clark Counties, Nevada: Nevada Dept. Conserv. Nat. Resources - Reconnaissance Ser. Rept. 25, 40 P.

Fenneman, N. M., 1931, Physiography of western United States: New York, McGraw-Hill Book Co., Inc. 534 p.

Goddard, G. C., Jr., 1963, Water-supply characteristics of North Carolina streams: U.S. Geol. Survey Water-Supply Paper 1761, 223 p.

Hardman, George, and Mason, H. G., 1949, Irrigated lands of Nevada: Univ. of Nevada, Bull, 183, 57 p.

Hardman, George, and Venstrom, Cruz, 1941, A 100 year record of Truckee River runoff estimated from changes in levels and volumes of Pyramid and Winnemucca Lakes: Am. Geophys. Union Trans., pt. 1, p. 71-90.

Lake Tahoe Area Council, 1963, Comprehensive Study on Protection of Water Resources of Lake Tahoe Basin through Controlled Waste Disposal: Al Tahoe, California, Engineering-Science, Inc, 157 p.

Langbein, W. B., 1961, Salinity and hydrology of closed lakes, U. S. Geol. Survey Professional paper 412, 20 p.

Langbein, W. B., and Iseri, K. T., 1960, General introduction and hydrologic definitions: U.S. Geol. Water-Supply Paper 1541-A 29 p.

Linsley, R. K., Kohler, M. A., and Paulhus, J.L.H., 1949, Applied hydrology: New York, McGraw-Hill Book Co., Inc. 689 p.

Loeltz, O. J., and Eakin, T. E., 1953, Geology and water resources of Smith Valley, Lyon and Douglas Counties, Nevada: U.S. geol. Survey Water-Supply paper 1228, 89 p.

Maxey, G.B., and Eakin, T.E., 1949, Ground water in White River Valley, White Pine, Nye, and Lincoln Counties, Nevada: Dept. Conserv. Nat. Resources, Bull. 8, 59 p.

Maxey, G. B., and Jameson, C. H., 1948, Geology and water resources of Las Vegas, Pahrump, and Indian Spring Valleys, Clark and Nye Counties, Nevada: Dept. Conserv. Nat. Resources, Bull. 5, 292 p.

Meinzer, O. E., 1917, Geology and water resources of Big Smokey, Clayton, and Alkali Spring Valleys, Nevada: U.S. Geol. Survey Water-Supply Paper 423, 167 p.

Nevada Department of Conservation and Natural Resources and U.S. Department of Agriculture, 1962-63, Water and related land resources, Humboldt River Basin: Nevada Dept. Conserv. Nat. Resources, Rept. 1-6, 6 vol.

Rush, F. E., and Eakin, T.E., 1963, Ground-water appraisal of Lake Valley in Lincoln and White Pine Counties, Nevada: Dept. Conserv. Nat. Resources - Reconnaisance Ser. Rept. 24, 29 p.

Searcy, J. K., 1960, Graphical correlation of gaging station records: U.S. Geol. Survey Water-Supply Paper 1541-C, 100 p.

Shamberger, H.A., 1954, Present and potential use of the waters of the Colorado River and tributaries within Nevada together with related Matters: Carson City, Nevada 140 p.

Sinclair, W. C., 1962, Ground-water resources of Hualapai Flat, Washoe, Pershing, and Humboldt Counties, Nevada: Dept. Conserv. Nat. Resources - Reconnaissance Ser. Rept. 11, 16 p.

________ 1963, Ground-water appraisal of the Black Rock Desert area Northwestern Nevada: Dept. Conserv. Nat. Resources - Reconnaissance Ser. Rept. 20, 32 p.

________ 1963, Ground-water appraisal of the Pueblo Valley - Continental Lake region, Humboldt County, Nevada: Dept. Conserv. Nat. Resources - Reconnaissance Ser. Rept. 22, 25 p.

Stearns, N. D., Stearns, H. T., and Waring, G.S., 1937, Thermal springs in the United States: U.S. Geol. Survey Water-Supply Paper 679-B, 206 p.

U. S. Bureau of Reclamation, 1953, Memorandum supplement to report on water supply of the lower Colorado River Basin project planning report, November 1952: U.S. Bureau of Reclamation, Boulder City, Nevada.

________ 1964, Lake Tahoe Basin California-Nevada, A reconnaissance appraisal to develop a supplemental water supply for Lake Tahoe Basin: U.S. Bureau of Reclamation, Sacramento, California, 53 p.

U. S. Dept. of Interior, 1964, Action program for resource development Truckee and Carson River basins California-Nevada: U. S. Dept. of Interior. 37 p.

U. S. Geological Survey, 1954, Compilation of records of surface water of the United States through September 1950, pt. 9, Colorado River Basin: U.S. Geol. Survey Water-Supply Paper 1313, 749 p.

________ 1956, Compilation of records of surface water of the United States through September 1950, pt. 13, Snake River Basin, U.S. Geol. Survey Water-Supply Paper 1317, 566 p.

________ 1960, Compilation of records of survace water of the United States through September 1950, pt. 10, the Great Basin: U.S. Geol. Survey Water-Supply Paper 1314, 485 p.

________ 1961, Surface-water records of Nevada: U.S. Geol. Survey 1961, 118 p.

________ 1962, Surface-water records of Nevada: U.S. Geol Survey 1962, 132 p.

U. S. Geological Survey, 1963, Surface-water records of Nevada: U.S. Geol. Survey 1963, 130 p.

_________ 1963, Compilation of records of surface water of the United States, October 1950 to September 1960, pt. 13, Snake River Basin: U. S. Geol. Survey Water-Supply Paper 1737, 282 p.

_________ 1963, Compilation of records of surface waters of the United States, October 1950 to September 1960, pt. 10, the Great Basin: U.S. Geol. Survey Water-Supply Paper 1734, 318 p.

_________ 1964, Compilation of records of surface waters of the United States, October 1950 to September 1960, pt. 9, Colorado River Basin: U. S. Geol. Survey Water-Supply Paper 1733, 586 p.

Utah State University and Utah Water and Power Board, 1963, Developing a State water plan, Utah's water resources - problems and needs - a challenge: Utah State University, 122 p.

Walker, G. E., and Eakin, T.E., 1963, Geology and Ground water of Amargosa Desert, Nevada-California: Nevada Dept. Conserv. Nat. Resources - Reconnaissance Ser. Rept. 14, 45 p.

Zones, C. P., 1963, Ground water in the alluvium of Kings River Valley, Humboldt County, Nevada: Dept. Conserv. Nat. Resources, Bull. 16, 38 p.

A P P E N D I X

Table 1.--Selected streamflow records for Nevada and adjacent States.

Stream-gaging stations are listed in a downstream direction along the main stem with all stations on a tributary entering above a main-stem station listed before that station. If a tributary enters between two main-stem stations, it is listed between them. As an added means of identification, each gaging station has been assigned a station number, which also have been assigned in downstream order. The complete number for each station, such as 10-3315.00 includes the part number "10" and a six-digit station number. In this table, the part number and only the essential digits of the station number are shown. In this table, the stations are listed in downstream order by parts.

Station no.	Station name	Location	Drainage area (sq mi)	Period of record	Discharge (acre-feet) Years	Discharge Mean	Discharge Maximum	Discharge Minimum	Discharge for reference period (acre-feet) Years	Mean	Virgin flow	Remarks
09-4150	Virgin River at Littlefield, Arizona.	Lat 36°53', long 113°56', in SW¼SW¼ sec.4, T.40 N., R.15 W., three-eighths of a mile upstream from Littlefield.	a 5,090	1929-	34	166,000	400,000	78,000	1912-63	198,000	234,000	Some diversions for irrigation.
09-4160	Muddy River near Moapa.	Lat 36°42'40", long 114°41'40", in SE¼ sec.15, T.14 S., R.65 E., 5 miles northwest of Moapa.	a 3,820 b40	c1913-18, c1928-32, 1944-	26	33,660	35,930	31,510				Minor diversions for irrigation.
09-4175	Spring Valley Creek near Ursine.	Lat 38°00'10", long 114°12'20", in SW¼ sec.25, T.2 N., R.69 E., 1.7 miles above Ursine, and 18 miles east of Pioche.	293	1962-	1	a 4,000	4,050	4,050				Some diversions for irrigation.
09-4180	Meadow Valley Wash near Panaca	Lat 37°52', long 114°19', sec.13, T.1 S., R.68 E., 6 miles northeast of Panaca.	a450	1944-50	4	2,910	3,970	2,370				do.
09-4185	Meadow Valley Wash near Caliente.	Lat 37°33'20", long 114°33'50", in NE¼ sec.35, T.4 S., R.66 E., 4½ miles southwest of Caliente.	1,670	1951-60	9	9,050	23,950	4,460				Major diversions for irrigation.
09-4190	Muddy River near Glendale.	Lat 36°38'35", long 114°32'20", in SW¼ sec.7, T.15 S., R.67 E., 150 ft downstream from Weiser Wash, 2 miles southeast of Glendale	a 8,120 b 4,170	c1910-11 c1913-14 1950-	13	34,390	38,930	31,710				do.
09-4196.5	Las Vegas Wash at North Las Vegas.	Lat 36°12'40", long 115°06'20", in SW¼NE¼ sec.13, T.20 S., R.61 E., 100 ft upstream from U.S. Highway 91, 3½ miles northeast of Fremont Street, Las Vegas.	--	1962-	1	a 200	197	197				
09-4197	Las Vegas Wash near Henderson.	Lat 36°05'20", long 114°59'05", in SE¼SW¼ sec.30, T.21 S., R.63 E., 3.5 miles north of Henderson.	2,125 b 1,518	1957-	6	14,480	15,670	12,270				do.
09-4215	Colorado River below Hoover Dam.	Lat 36°00'55", long 114°44'16", in SW¼NE¼ sec.29, T.22 S., R.65 E., in powerhouse at downstream side of Hoover dam.	a167,800	1933-	29	10,350,000	17,880,000	5,058,000				do.
09-4230	Colorado River below Davis Dam.	Lat 35°11'30", long 114°34'15", in SE¼NE¼ sec.1, T.32 S., R.66 E., ½ mile downstream from Davis Dam.	a169,300	1905-07, 1949-	14	9,980,000	21,490,000	7,727,000				do.
10-2432.4	Baker Creek at narrows, near Baker.	Lat 38°59', long 114°13', in sec.22, T.13 N., R.69 E., 1 mile downstream from narrows, 4 3/4 miles southwest of Baker.	16.4	1947-55	8	6,170	14,230	4,100				
10-2432.6	Lehman Creek near Baker.	Lat 39°01', long 114°13', in sec.10, T.13 N., R.69 E., 4 3/4 miles west of Baker.	a 11	1947-55	8	3,570	6,560	1,820				
10-2437	Cleve Creek near Ely.	Lat 39°12'50", long 114°32'20", in NW¼ sec.34, T.16 N., R.66 E., 18 miles east of Ely.	31.8	1914-16, 1959-	6	6,130	7,760	3,740				
10-2447	Overland Creek near Ruby Valley.	Lat 40°27'30", long 115°23'30", in SE¼SE¼ sec.23, T.30 N., R.58 E., 2¾ miles north of Ruby Valley Post Office, and 32 miles southeast of Elko.	a9	c1917,1918, 1959-	4	a7,700	10,910	5,790				
10-2499	Chiatovich Creek near Dyer.	Lat 37°50'00", long 118°12'10", in NE¼NW¼ sec.28, T.1 S., R.34 E., 300 ft downstream from Middle Creek, 10 miles northwest of Dyer.	37.3	1960-	3	a5,600	7,660	2,840				
10-2930	East Walker River near Bridgeport, California.	Lat 38°19'40", long 119°12'50", in SW¼NE¼ sec.34, T.6 N., R.25 E., 1,500 ft downstream from Bridgeport Reservoir, 5 miles north of Bridgeport.	362	1921-	40	94,120	240,700	27,200	1930-63	97,600	149,000	Regulated by Bridgeport reservoir since 1923. Some diversions for irrigation
10-2935	East Walker River above Strosnider ditch, near Mason.	Lat 38°48'50", long 119°02'50", in NW¼SE¼ sec.14, T.11 N., R.26 E., 12 miles southeast of Mason.	a 1,100	1947-	16	94,120	219,400	28,000	1930-63	97,700		do.
10-2940 10-2945 10-2950	East Walker River at various locations near Mason and Yerington	At various locations, 8 to 11 miles south to southeast of Mason.	a 1,200	c1902-08, c1910-17, c1921-24	9	149,800	279,500	48,500				Some diversions for irrigation.

Table 1.--Selected streamflow records for Nevada and adjacent States - Continued.

Station no.	Station name	Location	Drainage area (sq mi)	Period of record	Discharge (acre-feet)				Discharge for reference period (acre-feet)			Remarks
					Years	Mean	Maximum	Minimum	Years	Mean	Virgin flow	
10-2965	West Walker River near Coleville, California.	Lat 38°30'55", long 119°27'15", in NW¼NE¼ sec.28, T.8 N., R.23 E., ¼ mile downstream from Rock Creek, 5 miles southeast of Coleville.	245	1902-08, 1909-10, 1915-38, 1957-	34	195,500	483,100	67,900	1912-63	187,000	188,000	Minor diversions for irrigation.
10-2975	West Walker River at Hoye bridge, near Wellington.	Lat 38°43'40", long 119°25'40", in NE¼SE¼ sec.17, T.10 N., R.23 E., 4 miles southwest of Wellington.	504	1910, 1920-23, 1924-32, 1957-	16	a149,000	264,000	59,100				do.
10-3000	West Walker River near Hudson.	Lat 38°48'35", long 119°13'35", in SE¼SW¼ sec.18, T.11 N., R.25 E., 3 miles miles southeast of Hudson.	964	1914-25, 1947-	26	136,100	236,300	54,600				do.
10-3010	Walker River at Mason.	Lat 38°56'55", long 119°11'10", in NE¼ sec.33, T.13 N., R.25 E., 600 ft upstream from highway bridge at Mason.	a 2,300	1911-16, 1921-22	5	321,400	564,000	168,000				do.
10-3015	Walker River near Wabuska.	Lat 39°09'10", long 119°05'50", in SE¼NW¼ sec.20, T.15 N., R.26 E., 4.6 miles east of Wabuska.	a 2,600	1902-07, 1920-35, c1939-	38	107,100	379,000	9,340				do.
10-3020	Walker River at Schurz	Lat 38°57', long 118°48', in sec.36, T.13 N., R.28 E., at railroad bridge at Schurz.	a 2,850	1913-33	20	110,000	480,000	4,780				do.
10-3082	East Fork Carson River below Markleeville Creek, near Markleeville, California	Lat 38°42'50", long 119°45'50", in SW¼NE¼ sec.15, T.10 N., R.20 E., 1½ miles north of Markleeville.	299	1960-	3	a220,000	301,700	114,700				do.
10-3088	Bryant Creek near Gardnerville.	Lat 38°47'38", long 119°40'18", in NE¼NW¼ sec.30, T.11 N., R.21 E., 500 ft upstream from Doud Springs Creek, 11 miles southeast of Gardnerville.	31.5	1961-	2	a 5,000	6,020	4,240				
10-3090	East Fork Carson River near Gardnerville.	Lat 38°50'50", long 119°42'10", in SW¼NE¼ sec.2, T.11 N., R.20 E., 7 miles southeast of Gardnerville.	344	1890-93, c1900-06, 1908-10, 1925-28, c1935-	37	280,900	458,700	119,600	1912-63	246,000	251,000	Minor diversions for irrigation.
10-3100	West Fork Carson River at Woodfords, California.	Lat 38°46'10", long 119°49'55", in NW¼SE¼ sec.34, T.11 N., R.19 E., 0.6 mile southwest of Woodfords.	a 66	1890-92, 1900-07, 1938-	32	82,530	210,000	30,760	1912-63	73,200	73,000	do.
10-3105	Clear Creek near Carson City.	Lat 39°06'50", long 119°47'50", in NE¼NW¼ sec.1, T.14 N., R.19 E., 3½ miles southwest of Carson City.	a 15	1948-62	14	3,920	8,140	1,870				
10-3110	Carson River near Carson City	Lat 39°06'30", long 119°42'40", in SW¼NW¼ sec.2, T.14 N., R.20 E., 5 miles southeast of Carson City.	876	1939-	24	278,700	576,000	75,280	1933-63	274,000		Major diversions for irrigation.
10-3115	Carson River near Empire.	Lat 39°10', long 119°41', in sec.12, T.15 N., R.20 E., 2 miles east of Empire.	988	c1895-96, 1901-23	22	373,600	897,000	181,000				do.
10-3120	Carson River near Fort Churchill.	Lat 39°17'30", long 119°18'40", in SW¼SE¼ sec.32, T.17 N., R.24 E., 2 miles west of Fort Churchill.	a 1,450	1911-	52	258,500	617,000	44,360				do.
10-3150	Marys River near Deeth.	Lat 41°19', long 115°16', in NW¼ sec.31, T.40 N., R.60 E., 300 ft east of Mala Vista ranch house, 19 miles north of Deeth.	355	1903, 1912-28	15	36,850	71,500	12,700				Some diversions for irrigation.
10-3155	Marys River above Hot Springs Creek, near Deeth.	Lat 41°15', long 115°17', in NE¼SE¼ sec.24, T.39 N., R.59 E., 13 miles north of Deeth.	415	1943-	20	41,630	91,880	14,060				do.
10-3160	Secret Creek near Halleck.	Lat 40°52'00", long 115°16'20", in NE¼NW¼ sec.1, T.34 N., R.59 E., 11 miles southeast of Halleck.	a 34	1917-24	5	a 13,400	27,400	6,200				Minor diversions for irrigation.
10-3165	Lamoille Creek near Lamoille.	Lat 40°41'30", long 115°28'30", in NE¼ sec.6, T.32 N., R.58 E., 300 ft downstream from Elko-Lamoille powerplant.	a 25	1915-23, 1943-	27	30,840	46,200	18,050				
10-3170	Lamoille Creek near Halleck.	Lat 40°55'40", 115°26'20", in SW¼ sec.9, T.35 N., R.58 E., 1½ miles southeast of Halleck.	245	1913-19	6	a33,600	84,600	13,400				Major diversions for irrigation.

Table 1--Selected streamflow records for Nevada and adjacent States - Continued.

Station no	Station name	Location	Drainage area (sq mi)	Period of record	Discharge (acre-feet)				Discharge for reference period (acre-feet)			Remarks
					Years	Mean	Maximum	Minimum	Years	Mean	Virgin flow	
10-3175	North Fork Humboldt River at Devils Gate, near Halleck.	Lat 41°11', long 115°33', in SE¼ sec.13, T.38 N., R.57 E., 16 miles north of Halleck.	a 830	1913-21, 1943-	28	51,330	143,600	10,540				Some diversions for irrigation.
10-3180	North Fork Humboldt River near Halleck.	Lat 40°56', long 115°53', in SE¼ sec.9, T.35 N., R.57 E., 150 ft downstream from Southern Pacific Railroad bridge, 6 miles west of Halleck.	a1,020	1898-1900, 1904-14	8	a67,400	174,000	14,620				Major diversions for irrigation.
10-3185	Humboldt River near Elko.	Lat 40°56', long 115°38', in NE¼NE¼ sec.11, T.35 N., R.56 E., 10 miles northeast of Elko.	a2,800	1895-1902, 1944-	26	160,700	348,200	25,800				do.
10-3190	South Fork Humboldt River near Lee.	Lat 40°34', long 115°33', in SE¼ sec.16, T.31 N., R.57 E., 400 ft downstream from Kleckner Creek, 2½ miles east of Lee.	a 54	1945-55	10	48,650	68,590	29,100				Minor diversions for irrigation.
10-3195	Huntington Creek near Lee.	Lat 40°33', long 115°43', in SW¼ sec.19, T.31 N., R.56 E., 6 miles west of Lee.	a770	1948-	15	23,090	63,500	5,360				Major diversions for irrigation.
10-3200	South Fork Humboldt River above Dixie Creek, near Elko.	Lat 40°41'05", long 115°48'45", in NW¼SW¼ sec.5, T.32 N., R.55 E., 10½ miles south of Elko.	a1,150	1948-	15	75,290	145,700	20,200				do.
10-3205	South Fork Humboldt River near Elko.	Lat 40°43'25", long 115°49'45", in NE¼NW¼ sec.30, T.33 N., R.55 E., 10 miles southwest of Elko.	a1,310	1896-1932, 1936-	59	90,500	195,600	11,800				do.
10-3210	Humboldt River near Carlin.	Lat 40°43'40", long 116°00'30", in sec.21, T.33 N., R.53 E., 5½ miles east of Carlin.	a4,310	1943-	20	227,300	512,200	46,060				do.
10-3215	Susie Creek near Carlin.	Lat 40°56', long 115°58', in SW¼ sec.12, T.35 N., R.53 E., 17 miles northeast of Carlin.	82.5	1955-58	3	a4,400	4,580	4,290				Minor diversions for irrigation.
10-3220	Maggie Creek at Carlin.	Lat 40°43'10", long 116°05'40", in sec.26, T.33 N., R.52 E., 700 ft upstream from highway bridge, ½ mile east of Carlin.	a 400	1913-24	9	16,800	33,700	2,950				Some diversions for irrigation.
10-3225	Humboldt River at Palisade.	Lat 40°36'25", long 116°12'05", in SE¼SE¼ sec.35, T.32 N., R.51 E., ½ mile downstream from Palisade.	a5,010	1902-06, 1911-	56	255,600	636,400	25,170	1912-63	251,000		Major diversions for irrigation.
10-3230	Pine Creek near Palisade	Lat 40°35'45", long 116°10'25", in NW¼SE¼ sec.1, T.31 N., R.51 E., 1½ miles southeast of Palisade.	999	1912-14, 1946-58	14	9,630	28,810	3,390				do.
10-3235	Humboldt River near Argenta.	Lat 40°40'45", long 116°38'45", in SE¼NW¼ sec.2, T.32 N., R.47 E., 3 miles east of Argenta.	a7,490	1946-	17	199,100	600,800	43,400				do.
10-3245	Rock Creek near Battle Mountain.	Lat 40°49', long 116°35', in NE¼ sec.17, T.34 N., R.48 E., 22 miles northeast of Battle Mountain	a 875	1896, c1918-25, c1927-29, 1945-63	23	22,660	95,540	2,100				Some diversions for irrigation.
10-3250	Humboldt River at Battle Mountain.	Lat 40°39'15", long 116°55'10", in NE¼NE¼ sec.17, T.32 N., R.45 E., 1 mile northeast of Battle Mountain.	a8,870	1896-98, 1921-24, 1945-	21	218,600	587,100	39,460				Major diversions for irrigation.
10-3255	Reese River near Ione.	Lat 38°51', long 117°28', in NE¼ sec.3, T.11 N., R.40 E., 8 miles southeast of Ione.	a 44	1951-	12	7,530	19,960	1,700				
10-3270	Humboldt River near Valmy.	Lat 40°48', long 117°04', in NE¼NW¼ sec.30, T.34 N., R.44 E., 3½ miles east of Valmy.		1950-58	8	218,600	562,700	34,700				Major diversion for irrigation.
10-3275	Humboldt River at Comus.	Lat 41°00', long 117°19', in SE¼ sec.14, T.36 N., R.41 E., at Comus siding of Southern Pacific Railroad, 9 miles northeast of Golconda.	a12,100	c1894-1926, 1945-	49	198,400	688,100	26,700				do.
10-3280	Pole Creek near Golconda.	Lat 40°54'50", long 117°31'50", in N½NE¼ sec.13, T.35 N., R.39 E., 4 miles southwest of Golconda.	10	1960-	3	a 3,000	3,590	2,020				

Table 1.--Selected streamflow records for Nevada and adjacent States - Continued.

Station no.	Station name	Location	Drainage area (sq mi)	Period of record	Discharge (acre-feet) Years	Mean	Maximum	Minimum	Discharge for reference period (acre-feet) Years	Mean	Virgin flow	Remarks
10-3285	Little Humboldt River at Chimney dam site, near Paradise Valley.	Lat 41°24', long 117°11', in NE¼ sec.36, T.41 N., R.42 E., 300 ft downstream from confluence of North and South Fork, 25 miles east of Paradise Valley.		1941-50	9	17,660	50,160	6,700				Minor diversions for irrigation.
10-3290	Little Humboldt River near Paradise Valley.	Lat 41°25', long 117°22', in SE¼ sec.20, T.41 N., R.41 E., 9½ miles southeast of Paradise Valley.	a 1,030	1921-28, 1943-	25	17,450	64,330	6,170				do.
10-3295	Martin Creek near Paradise Valley.	Lat 41°32'00", long 117°25'40", in NW¼SW¼ sec.12, T.42 N., R.40 E., 7 miles northeast of Paradise Valley.	172	1921-	42	21,940	63,940	5,910	1912-63	22,700		
10-3300	Cottonwood Creek near Paradise Valley.	Lat 41°33', long 117°35', in SW¼ sec.3, T.42 N., R.39 E., 5 miles northwest of Paradise Valley.		1925-34	9	3,920	7,990	987				Minor diversions for irrigation.
10-3305	Cottonwood Creek at Paradise Valley.	Lat 41°31'00", long 117°32'30", in NW¼ sec.25, T.42 N., R.39 E., 300 ft west of Paradise Valley Post Office	57.4	1944-51	7	7,310	15,960	916				Some diversions for irrigation.
10-3309	Humboldt River near Winnemucca.	Lat 41°00'00", long 117°43'15", in SW¼NE¼ sec.17, T.36 N., R.38 E., 2 miles north of Winnemucca.	a14,600	1960-63	3	a141,000	258,800	22,800				Major diversions for irrigation.
10-3315	Humboldt River near Rose Creek.	Lat 40°52'05", long 117°59'45", in SE¼NW¼ sec.36, T.35 N., R.35 E., 5½ miles southwest of Rose Creek, 15½ miles southwest of Winnemucca.	a15,200	1948-	15	154,200	535,800	21,480				do.
10-3330	Humboldt River near Imlay.	Lat 40°41'30", long 118°12'10", in SE¼SW¼ sec.25, T.33 N., R.33 E., 4 miles northwest of Imlay.	a15,700	1935-41, 1945-	24	118,000	522,200	18,830				do.
10-3350	Humboldt River near Rye Patch.	Lat 40°28'00", long 118°18'20", in SE¼NE¼ sec.18, T.30 N., R.33 E., 1,000 ft downstream from Rye Patch Dam, 1½ miles northwest of Rye Patch.	a16,100	1896-1922 1924-32 1935-41, 1943-	49	140,500	504,000	6,220				Regulated by Rye Patch Reservoir since 1936. Major diversions for irrigation.
10-3360	Humboldt River near Lovelock.	Lat 40°03'05", long 118°28'05", in SE¼NW¼ sec.11, T.25 N., R.31 E., 9 miles south of Lovelock.	a16,600	1912-27, 1950-59	20	53,860	344,000	0				Major diversions for irrigation
10-3375	Truckee River at Tahoe City, California.	Lat 39°10'00", long 120°08'40", in NE¼NW¼ sec.7, T.15 N., R.17 E., at Tahoe City, 510 ft downstream from dam at outlet of Lake Tahoe.	507	1895-96, 1900-	63	173,800	657,000	4,690	1912-63	143,000		Regulated by Lake Tahoe since 1874.
10-3460	Truckee River at Farad, California.	Lat 39°25'41", long 120°01'59", in NE¼ sec.12, T.18 N., R.17 E., 0.7 mile downstream from Farad powerplant, 3.5 miles upstream from California-Nevada State line.	932	1890, 1899-	64	566,100	1,430,000	133,000	1912-63	505,000	530,000	Regulated by Lake Tahoe, Prosser Creek and Boca Reservoirs, Donner and Independence Lakes.
10-3473	Dog Creek near Verdi.	Lat 39°33'55", long 120°01'25", in SW¼SW¼ sec.30, T.20 N., R.18 E., 4 miles northwest of Verdi.	16.2	1956-61	5	2,710	8,410	330				
10-3476	Hunter Creek near Reno.	Lat 39°29'25", long 119°53'55", in SW¼SW¼ sec.19, T.19 N., R.19 E., 5 miles southwest of Reno.	a 11.5	1961-	2	a 7,000	9,280	4,980				
10-3480	Truckee River at Reno.	Lat 39°31'55", long 119°47'05", in NW¼ sec.7, T.19 N., R.20 E., ½ mile east of Reno.	1,067	1906-21, 1925-26, 1930-35, 1943-	37	472,800	1,370,000	76,750				Regulated by Lake Tahoe, Prosser Creek, and Boca Reservoirs, Donner and Independence Lakes.
10-3485	Franktown Creek at Franktown.	Lat 39°16', long 119°51', in sec.9, T.16 N., R.19 E., ½ mile west of Franktown.	a 14	1948-55	6	10,060	20,200	5,560				Minor diversions for irrigation
10-3489	Galena Creek near Steamboat.	Lat 39°21'45", long 119°49'30", in SW¼SW¼ sec.2, T.17 N., R.19 E., 1 mile upstream from Jones Creek, 12 miles south of Reno.	a 8.5	1961-	2	a 5,500	6,340	4,560				do.
10-3493	Steamboat Creek at Steamboat.	Lat 39°22'40", long 119°44'33", in S½ sec.33, T.18 N., R.20 E., ¼ mile southwest of Steamboat.	123	1961-	2	a 6,500	8,420	4,540				Partly regulated. Major diversions for irrigation.
10-3497	Whites Creek near Steamboat.	Lat 39°23'05", long 119°50'20", in SE¼NW¼ sec.34, T.18 N., R.19 E., 10 miles south of Reno.	a 9	1961-	2	a 4,500	5,670	3,270				
10-3500	Truckee River at Vista.	Lat 39°31'05", long 119°40'58", in NW¼NE¼ sec.13, T.19 N., R.20 E., 0.9 miles southeast of Vista.	1,429	1899-1907, 1932-54, 1958-	35	564,000	1,660,000	144,900	1930-63	478,000		Regulated by Lake Tahoe, Prosser Creek, and Boca Reservoirs, Donner and Independence Lakes.

Table 1.--Selected streamflow records for Nevada and adjacent States - Continued.

Station no.	Station name	Location	Drainage area (sq mi)	Period of record	Discharge (acre-feet)				Discharge for reference period (acre-feet)			Remarks
					Years	Mean	Maximum	Minimum	Years	Mean	Virgin flow	
10-3505	Truckee River at Clarks.	Lat 39°34', long 119°30', in SE¼ sec.26, T.20 N., R.22 E., at highway bridge at Clarks.	a 1,600	1907-16	8	752,200	1,150,000	382,000				Regulated by Lake Tahoe, Prosser Creek, and Boca Reservoirs, Donner and Independence Lakes. Drainage revised.
10-3516	Truckee River below Derby Dam, near Wadsworth.	Lat 39°35'05", long 119°26'25", in NW¼SE¼ sec.19, T.20 N., R.23 E., 1,500 ft downstream from Derby Dam.	1,670	1909-10, 1916, 1918-	44	197,600	936,800	7,450	1930-63	205,000		Truckee Canal diverts water at Derby Dam out of basin to Lahontan Reservoir.
10-3517	Truckee River near Nixon.	Lat 39°46'40", long 119°20'10", in SW¼NW¼ sec.18, T.22 N., R.24 E., 4 miles south of Nixon.	1,869	1957-	6	159,300	520,800	18,250				do.
10-3525	McDermitt Creek near McDermitt.	Lat 41°58', long 117°50', in SE¼SE¼ sec.8, T.47 N., R.37 E., 6½ miles southwest of McDermitt.	225	1948-	15	21,360	67,770	5,270				
10-3530	East Fork Quinn River near McDermitt.	Lat 41°59', long 117°35', in sec.9, T.47 N., R.39 E., 1 mile downstream from South Fork, 7 miles east of McDermitt.	a 140	1948-	15	18,030	53,950	5,150				
10-3535	Quinn River near McDermitt.	Lat 41°47', long 117°48', in SW¼ sec.15, T.45 N., R.37 E., 15½ miles south of McDermitt.	a 1,100	1948-	15	22,150	114,200	568				Major diversions for irrigation.
10-3536	Kings River near Orovada.	Lat 41°54'25", long 118°18'30", in SW¼SE¼ sec.31, T.47 N., R.33 E., 5 miles upstream from Kings River Ranch, 36 miles northwest of Orovada.	15.9	1962-	1	a 3,300	3,290	3,290				
10-3537	Leonard Creek near Denio.	Lat 41°31'40", long 118°42'45", in SE¼ sec.25, T.42 N., R.28 E., 2/3 mile upstream from Leonard Creek Ranch, 32 miles south of Denio.	a 52	1960-	3	a 2,200	2,640	1,520				
13-0825	Goose Creek above Trapper Creek, near Oakley, Idaho.	Lat 42°07'10", long 113°56'20", in sec.13, T.15 S., R.21 E., 5 miles south of Oakley Dam, 9 miles southwest of Oakley.	633	1911-16, 1919-	49	32,140	105,000	11,080	1912-63	32,400		Some diversions for irrigation
13-0960	Salmon Falls Creek above upper Vineyard ditch, near Contact.	Lat 41°44', long 114°53', near NW corner sec.5, T.44 N., R.63 E., 6 miles southwest of Contact.	a 461	1914-15, 1948-62	14	66,170	109,800	27,530	1945-63	64,200		do.
13-1050	Salmon Falls Creek near San Jacinto.	Lat 41°56'40", long 114°41'40", in NE¼SW¼ sec.23, T.47 N., R.64 E., 5 miles north of San Jacinto.	a 1,450	c1909-16, 1918-	51	95,560	208,000	32,920	1912-63	96,100		do.
13-1615	Bruneau River near Rowland.	Lat 41°55'50", long 115°40'30", in SE¼ sec.29, T.47 N., R.56 E., ½ mile upstream from Rowland.	a 390	1913-18	5	87,600	126,000	50,000	1912-33	a84,000		Minor diversions for irrigation.
13-1625	East Fork Jarbidge River near Three Creek, Idaho.	Lat 42°02', long 115°22', in SE¼SE¼ sec.14, T.16 N., R.8 E., 11 miles southwest of Three Creek.	a 89	1928-33, 1953-	14	38,950	58,250	20,600	1945-63	45,400		
13-1675	East Fork Bruneau River near Hot Spring, Idaho.	Lat 42°33'25", long 115°30'35", in SW¼NW¼ sec.15, T.16 S., R.9 E., 20 miles southeast of Hot Spring.	a 620	c1910-15, 1948-	18	22,300	39,300	5,580				Minor diversions for irrigation.
13-1745	Owyhee River near Gold Creek.	Lat 41°41'10", long 115°51'30", in NW¼NW¼ sec.25, T.44 N., R.54 E., 500 ft downstream from Wild Horse Dam.	a 209	c1916-25, 1936-	35	29,680	63,730	9,050	1945-63	28,300		Regulated by Wild Horse Reservoir since 1938.
13-1750	Owhyee River at Mountain City.	Lat 41°50'10", long 115°57'50", in SW¼ sec.35, T.46 N., R.53 E., at Mountain City.	a 350	c1913-14, 1926-49	21	69,400	152,500	10,900	1912-33	a77,000		Minor diversions for irrigation.
13-1755	Owhyee River near Owyhee.	Lat 41°52'20", long 116°02'30", in E½ sec.21, T.46 N., R.53 E., 8 miles southeast of Owhyee.	a 380	c1913-26	8	80,400	122,000	39,500	1912-33	a77,000		do.

Table 1.--Selected streamflow records for Nevada and adjacent States - Continued.

Station no.	Station name	Location	Drainage area (sq mi)	Period of record	Discharge (acre-feet)				Discharge for reference period (acre-feet)			Remarks
					Years	Mean	Maximum	Minimum	Years	Mean	Virgin flow	
13-1760	Owyhee River above China diversion dam, near Owyhee.	Lat 41°55'20", long 116°04'10", in NW¼ sec.6, T.46 N., R.53 E., 2 miles southeast of Owyhee.	458	1939-	24	98,460	200,300	38,195	1945-63	98,000		Regulated by Wild Horse Reservoir since 1938.
13-1769	Jack Creek below Schoonover Creek, near Tuscarora.	Lat 41°30'30", long 116°04'20", in NW¼SE¼ sec.25, T.42 N., R.52 E., 16 miles northeast of Tuscarora.	19.8	1962-	1	a15,000	14,750	14,750				
13-1770	Jack Creek near Tuscarora.	Lat 41°30', long 116°06', in sec.35, T.42 N., R.52 E., 12 miles northeast of Tuscarora.	a 31	1913-25	11	22,500	43,200	11,800	1912-33	a21,000		
13-1772	South Fork Owhyee River at Spanish Ranch, near Tuscarora.	Lat 41°25'40", long 116°10'40", in NW¼NW¼ sec.30, T.41 N., R.52 E., 8 miles north of Tuscarora.	a 330	1959-	4	a35,000	63,600	12,040				Some diversions for irrigation.
13-1778	South Fork Owhyee River near White Rock.	Lat 41°48', long 116°29', in NE¼ sec.16, T.45 N., R.49 E., 500 ft downstream from Rye Grass Creek, 17 miles northwest of White Rock.	a 1,080	1955-	8	100,600	181,600	23,620	1945-63	121,000		do.

a. Approximate.

b. Contributing area.

c. Fragmentary.

Table 2.--Larger and better-known springs of Nevada.

More detailed information on these springs is available in the reference listed. The abbreviations listed under references refer to:
WRB - Nevada Water Resources Bulletin.
Rec.- Nevada reconnaissance series report
WSP - U.S. Geological Survey Water-Supply Paper.

Map no.	Name	Location	Discharge (gallons per minute)	Date measured	Reference	Remarks
		CLARK COUNTY				
1	Cold Creek	SE¼ sec.1, T.18 S., R.54 E., 15 miles southwest of Indian Springs.	690	11-09-44	WRB 5, p. 76	
2	Indian Springs	NW¼ sec.16, T.16 S., R.56 E., at south edge of Indian Springs.	400 est.	3-18-46	do.	
3	Las Vegas Springs	SE¼SE¼ sec.30 and NE¼NE¼ sec.31, T.20 S., R.61 E., at west edge of Las Vegas.	1,400 dry	For period 1924-46 1963	WRB 5, p. 79 USGS files	Combined flow in Little, Open and Big Springs.
4	Muddy River Springs	SE¼ sec.15, T.14 S., R.65 E., 5 miles northwest of Moapa.	22,300	For period 1913-63	Rec. 25, p. 1	Several springs measured at gaging station 9-4160 Muddy River near Moapa.
5	Rogers Spring	SE¼SE¼ sec.12, T.18 S., R.67 E., 12 miles south of Overton.	880	10-25-63	USGS files	
6	Tule Springs	SW¼ sec.9, T.19 S., R.60 E., 12 miles northwest of Las Vegas.	300 dry	For period 1922-46 1963	WRB 5, p. 80 USGS files	
		DOUGLAS COUNTY				
7	Walley's Hot Springs	SE¼SW¼ sec.21, T.14 N., R.20 E., 7 miles southeast of Carson City.	600 est.	For period 1961-64	USGS files	
		ELKO COUNTY				
8	Carlin Springs	Sec.33, T.33 N., R.52 E., 1½ miles southwest of Carlin.	2,700 est.		Dept. of Conservation	Carlin water supply.
9	Elko Hot Spring	SE¼ sec.21, T.34 N., R.55 E., 1 mile southwest of Elko.	450 est.		do.	
10	Gamble Ranch Springs	Sec.5, T.40 N., R.69 E., 7 miles north of Montello.	900 est.		do.	
11	Holland Springs	NE¼ sec.20, T.33 N., R.58 E., 1½ miles northeast of Lamoille.	900 est.		do.	Several springs.
12	Hot Creek Springs	Sec.32, T.43 N., R.60 E., 35 miles north of Deeth.	450 est.		do.	
13	Hot Springs	Sec.15, T.39 N., R.59 E., 14 miles north of Deeth.	350		do.	
14	Johnson Springs	SE¼ sec.29, T.36 N., R.66 E., 4 miles south of Oasis.	1,500 est.	1949	WRB 12, p. 28	Several springs.
15	Ralphs Warm Springs	NE¼ sec.30, T.36 N., R.62 E., 8 miles south of Wells.	450 est.	1948	WRB 12, p.108	
16	Spring	NW¼ sec.22, T.47 N., R.68 E., 23 miles east of Jackpot.	850 est.	Prior to 1923	WSP 679B, p. 156	One spring on west side of Goose Creek.
17	Spring Creek	Sec.8, T.37 N., R.57 E., 22 miles northeast of Elko.	2,000 est.		Dept. of Conservation.	
18	Warm Spring	SE¼ sec.12, T.33 N., R.61 E., 24 miles south of Wells.	2,000 est.	1948	WRB 12, p.108	
19	Willow Creek Springs	Sec.31, T.31 N., R.57 E., 5 miles northeast of Jiggs.	600 est.		Dept. of Conservation	
		ESMERALDA COUNTY				
20	Fish Lake Spring	SW¼ sec.25, T.2 S., R.35 E., 3 miles east of Dyer.	1,300 est.	12-01-49	WRB 11, p. 25	
21	Waterworks Springs	NE¼ sec.22, T.2 S., R.39 E., at Silver Peak.	500 est.	1917	WSP 423, p.153	Eleven springs.
		EUREKA COUNTY				
22	Fish Creek Springs (Sara Ranch Springs)	Sec.8, T.16 N., R.53 E., 17 miles south of Eureka.	4,000	Prior to 1935	WSP 679B, p. 162	
23	Hot Springs	Sec.12, T.28 N., R.52 E., 27 miles south of Carlin.	2,000 est.	1960	Rec. 2, p. 26	Six springs.
24	Shipley Hot Springs (Sadler Springs)	NE¼SE¼ sec.23, T.24 N., R.52 E., 31 miles north of Eureka	5,000	1960	USGS files	
25	Thompson Ranch Springs (Jacobson Ranch Springs)	SW¼ sec.3, T.23 N., R.54 E., 28 miles north of Eureka.	900 est.	Prior to 1935	WSP 679 B, p. 162	

Table 2.--Larger and better-known springs of Nevada - Continued.

Map no.	Name	Location	Discharge (gallons per minute)	Date measured	Reference	Remarks
			HUMBOLDT COUNTY			
26	Bog Hot Springs	Sec.18, T.46 N., R.28 E., 10 miles southwest of Denio.	1,000 est.	1963	Rec.22, p. 13	
27	Continental Hot Springs	Sec.13, T.46 N., R.28 E., 6 miles southwest of Denio.	200 est.	1963	do.	
28	Double Hot Springs	NW¼ sec.4, T.36 N., R.26 E., 19 miles northwest of Sulphur.	250 est.	Prior to 1963	Rec. 20, p. 24	
29	Golconda Hot Springs	SE¼ sec.29, T.36 N., R.40 E., at Golconda.	200 est.	1962	WRB 24, p. 73	Total flow of thermal springs.
30	Hot Springs	Sec.35, T.37 N., R.43 E., 33 miles northeast of Winnemucca.	2,000 est.		Dept. of Conservation	
31	Nine Mile Springs	Sec.10, T.44 N., R.33 E., 25 miles northwest of Orovada.	450 est.	1961	WRB 16, p. 19	Several springs.
			LANDER COUNTY			
32	Hot Springs	NE¼ sec.23, T.27 N., R.43 E., 34 miles south of Battle Mountain.	450 est.	1918	WSP 679B, p.161	Several springs.
33	Izzenhood Ranch Springs	T.35 N., R.45 E., 20 miles north of Battle Mountain.	1,000 est.	1917	WSP 679B, p.160	
34	New Pass Spring	Sec.14, T.20 N., R.40 E., 25 miles west of Austin.	450 est.		Dept. of Conservation.	
			LINCOLN COUNTY			
35	Geyser Ranch Spring complex	Secs.1 and 12, T.9 N., R.65 E., 25 miles southeast of Lund.	1,400	8-06-63	Rec. 24, p. 24	Several springs.
36	Panaca Spring	Sec.4, T.2 S., R.68 E., 2 miles north of Panaca.	4,900	1963	USGS files	
	<u>Pahranagat Valley Springs</u>					
37	Ash Springs	Sec.6, T.6 S., R.61 E., 6½ miles north of Alamo.	8,000	6-17-63	Rec. 21, p. 20	Six main springs.
38	Crystal Springs	SE¼ sec.10, T.5 S., R.60 E., 5 miles south of Hiko.	5,000	6-17-63	do.	
39	Hiko Spring	Sec.14, T.4 S., R.60 E., at Hiko	3,000	6-17-63	do.	
			LYON COUNTY			
40	Nevada Hot Spring (Hinds Hot Springs)	Sec.16, T.12 N., R.23 E., 8 miles northwest of Smith.	550	10-21-49	WSP 1228, p. 48	Several springs.
			NYE COUNTY			
	<u>Ash Meadows Springs</u>					
41	Big Spring (Deep Spring and Ash Meadows Spring)	NE¼ sec.19, T.18 S., R.51 E., 9 miles northeast of Death Valley Junction, Calif.	1,000	7-26-62	Rec. 14, p. 27	
42	Crystal Pool	NE¼ sec.3, T.18 S., R.50 E., 10 miles northeast of Death Valley Junction, Calif.	2,800	7-29-62	Rec. 14, p. 26	
43	Fairbanks Spring	NE¼ sec.9, T.17 S., R.50 E., 11 miles south of Lathrop Wells.	1,700	7-23-62	Rec. 14, p. 25	
44	Jack-Rabbit Spring (Roger's Spring)	NW¼ sec.18, T.18 S., R.51 E., 10 miles northeast of Death Valley Junction, Calif.	590	7-27-62	Rec. 14, p. 26	
45	Longstreet Spring	NE¼ sec.22, T.17 S., R.50 E., 13 miles northeast of Death Valley Junction, Calif.	1,000	7-29-62	Rec. 14, p. 25	
46	Point of Rocks Springs (King Springs)	SE¼ sec.7, T.18 S., R.51 E., 11 miles northeast of Death Valley Junction, Calif.	1,100	7-25-62	Rec. 14, p. 26	
47	Rogers Spring	NE¼ sec.15, T.17 S., R.50 E., 12 miles southeast of Lathrop Wells.	740	7-29-62	Rec. 14, p. 25	
48	Charnock Springs	Sec.28, T.13 N., R.44 E., 8½ miles southeast of Millet.	450 est.	1913	WSP 423, p. 91	Main spring
49	Darroughs Hot Springs	NW¼ sec.17, T.11 N., R.43 E., 14 miles south of Millet.	450 est.		Dept. of Conservation	Several springs.
50	Diana's Punch Bowl Spring	Sec.22, T.14 N., R.47 E., 38 miles southeast of Austin.	900 est.	4-15-64	USGS files	Located near Diana's Punch Bowl.
51	Hot Creek Spring	T.8 N., R.50 E., 56 miles northeast of Tonopah.	4,000 est.		Dept. of Conservation	
52	Klobe Spring	Sec.28, T.18 N., R.50 E., 22 miles southwest of Eureka.	450 est.	4-15-64	USGS files	Two springs.

Table 2.--Larger and better-known springs of Nevada - Continued.

Map no.	Name	Location	Discharge (gallons per minute)	Date measured	Reference	Remarks
		NYE COUNTY (continued)				
	Pahrump Valley Springs					
53	Pahrump Springs (Bennetts Springs)	SW¼SE¼ sec.14, T.20 S., R.53 E., at Pahrump.	2,500 dry	7-18-43 1963	WRB 5, p. 48 USGS files	Two large springs. Increased pumping.
54	Manse Springs	Sec.3, T.21 S., R.54 E., 7 miles southeast of Pahrump.	500 est.	1959	USGS files	Two springs. Flow declining.
55	Potts Ranch Spring	Sec.2, T.14 N., R.47 E., 36 miles southeast of Austin.	450 est.	4-15-64	do.	Several springs.
	Railroad Valley Springs					
56	Big Warm Spring (Duckwater Springs)	Sec.21, T.12 N., R.56 E., 1 mile south of Duckwater.	6,200	Average for 1916	WRB 12, p. 145	
57	Blue Eagle Springs	SE¼ sec.11, T.8 N., R.57 E., 12 miles south of Currant.	2,270	2-13-48	WRB 12, p. 148	Two main springs.
58	Lockes Springs	SW¼ sec.15, T.8 N., R.55 E., 20 miles southwest of Currant.	2,000	2-07-34	do.	Big Spring (900 gpm), Hot Spring (200 gpm), Reynolds Spring (300 gpm), Stockyard Spring (600 gpm).
	White River Valley Springs					
59	Butterfield Springs	NW¼ sec.28, T.7 N., R.62 E., 30 miles south of Lund.	1,100 est.	1948	WRB 8, p. 37	Two orifices.
60	Emigrant Springs	SE¼ sec.19, T.9 N., R.62 E., 16 miles south of Lund.	1,400 est.	1948	do.	Several springs.
61	Flag Springs	SE¼ sec.32, T.7 N., R.62 E., 30 miles south of Lund.	1,100 est.	1948	do.	Several springs.
62	Hot Creek Spring	NE¼ sec.18, T.6 N., R.61 E., 34 miles south of Lund.	6,900 est.	4-06-35	do.	
63	Moon River Spring	NW¼ sec.25, T.6 N., R.60 E., 37 miles south of Lund.	900 est.	1935	do.	
64	Mormon Springs	SE¼ sec.32, T.9 N., R.61 E., 20 miles southwest of Lund.	2,000 est.	1948	do.	
		PERSHING COUNTY				
65	McCoy Springs	SW¼ sec.33, T.26 N., R.39 E., 62 miles south of Winnemucca.	670 est.	6-07-59	Rec. 23, p. 31	Several springs.
66	Springs	SW¼ sec.11, T.27 N., R.38 E., 52 miles south of Winnemucca.	500 est.	7-31-59	do.	Several springs.
		WASHOE COUNTY				
67	Boiling Springs	NW¼ sec.15, T.34 N., R.23 E., 1 mile northwest of Gerlach.	200 est.	Prior to 1963	Rec. 20, p. 24	
68	Hot Springs	SW¼ sec.1, T.34 N., R.23 E., 15 miles north of Gerlach.	500 est.	1961	Rec. 11, table 2	Many spring pools.
69	Lawton Hot Springs	Sec.13, T.19 N., R.18 E., 5½ miles west of Reno.	250	2-11-58	USGS files	Several springs.
70	Steamboat Springs	Sec.33, T.18 N., R.20 E., south of Reno.	825	6-13-45	do.	Total flow from springs in general area.
		WHITE PINE COUNTY				
71	Big Spring	T.10 N., R.70 E., 17 miles south of Garrison, Utah.	10,000 est.	1927	WSP 679B, p. 163	Probably base flow in Big Spring Creek.
72	Green Spring	SW¼ sec.33, T.15 N., R.57 E., 33 miles southeast of Eureka.	680	4-29-48	WRB 12, p. 148	
73	North Creek Spring	SW¼ sec.19, T.10 N., R.65 E., 40 miles south of Ely.	700	8-04-63	Rec. 24, p. 24	
74	Simonsen Warm Springs	T.22 N., R.56 E., 25 miles northeast of Eureka.	1,000 est.	1960	Rec. 1, p. 12	Several springs.
	Steptoe Valley Springs					
75	Borchert John Spring	Sec.16, T.22 N., R.63 E., 26 miles north of McGill.	800	5-22-18	WSP 467, p. 49	
76	Campbell Ranch Springs	Sec.5, T.19 N., R.63 E., 12 miles northwest of McGill.	1,200	9-06-17	WSP 467, p. 47	Outflow from two largest spring groups, over 500 small springs in seep area.
77	Comins Springs (Commings Springs)	Secs.20 and 21, T.15 N., R.64 E., 8 miles southeast of Ely.	3,000 est.	Prior to 1918	WSP 467, p. 49	Several springs.
78	McGill Warm Springs	SE¼NW¼ sec.21, T.18 N., R.64 E., at northwest corner of McGill.	4,500 est.	1918	WSP 467, p. 46	Main spring only.

Table 2.--Larger and better-known springs of Nevada - Continued.

Map no.	Name	Location	Discharge (gallons per minute)	Date measured	Reference	Remarks
		WHITE PINE COUNTY (continued)				
	Steptoe Valley Springs (continued)					
79	Monte Neva Hot Springs (Melvin Hot Springs)	SW¼ sec.24, T.21 N., R.63 E., 19 miles north of McGill.	620	8-21-17	WSP 467, p. 47	Main spring only.
80	Murry Springs (Murray Springs)	SE¼SE¼ sec.20, T.16 N., R.63 E., 1 mile south of Ely.	3,300	Average for 1906-51	USGS files	Several springs, water supply for Ely.
	White River Valley Springs					
81	Arnoldson Spring	SE¼SE¼ sec.12, T.12 N., R.61 E., in Preston.	1,500	Average for 1910-47	WRB 8, p. 38, 39	
82	Cold Spring	NW¼ sec.12, T.12 N., R.61 E., at northwest corner of Preston.	630	Average for 1910-47	do.	
83	Lund Spring	NE¼ sec.4, T.11 N., R.62 E., at southwest corner of Lund.	2,860	3-06-36	WRB 8, p. 37	
84	Nicolas Spring	SW¼SE¼ sec.12, T.12 N., R.61 E., in Preston.	1,200	Average for 1910-47	WRB 8, p. 38, 39	
85	Preston Big Spring	NE¼ sec.2, T.12 N., R.61 E., 1½ mile northwest of Preston.	3,800	Average for 1910-47	do.	

Table 3.--Major reservoirs and lakes in Nevada.

RESERVOIRS

Station no.	Reservoir name	Latitude	Longitude	Basin	Stream	Owner or operator	Drainage area (Square miles)	Dam type	Volume of material (cubic yards)	Crest length (feet)	Date completed	Use	Storage: Total (acre-feet)	Storage: Usable (acre-feet)
	Bishop Creek	41°15'	114°48'	Humboldt River	Bishop Creek	Pacific Reclamation Co.	a68	Earth fill		300	1912	Irrigation	30,000	30,000
10-3121	Lahontan	39°28'	119°04'	Carson River	Carson River	Bureau of Reclamation		Earth fill	733,000	5,400	1915	Irrigation, power	273,600	273,600
9-4210	Lake Mead	36°01'	114°44'	Colorado River	Colorado River	do.	167,800	Concrete arch	3,250,000	1,244	1926	Flood control, irrigation, navigation, municipal power	29,827,000	27,207,000
9-4225	Lake Mohave	35°12'	114°34'	Colorado River	Colorado River	do.	169,300	Earth fill	3,642,000	1,600	1949	Irrigation, power	1,818,300	1,809,800
10-3370	Lake Tahoe	39°10'	120°08'	Truckee River	Truckee River	Truckee-Carson Irrigation District	506	Concrete			Storage began 1874	Irrigation, power, municipal	122,000,000	744,600
	Pitt-Taylor No. 1	40°36'	118°18'	Humboldt River	Humboldt River	Humboldt-Lovelock Irrigation Light and Power Co.		Earth fill			1914	Irrigation	28,900	28,900
	Pitt-Taylor No. 2	40°38'	118°16'	do.	do.	do.		Earth fill			1914	do.	20,800	20,800
10-3345	Rye Patch	40°28'	118°18'	do.	do.	Pershing County Conservation District	a16,100	Earth fill	356,000	914	1936	do.	179,100	179,100
10-2970	Topaz	38°41'	119°31'	Walker River	West Walker Feeder Canal	Walker River Irrigation District					1937	do.	a63,000	59,440
	Weber	39°03'	118°51'	Walker River	Walker River	Bureau of Indian Affairs		Earth fill	86,432		1935	do.	13,000	13,000
10-1740	Wild Horse	41°41'	115°51'	Owyhee River	Owyhee River	do.	209	Concrete arch	4,638	100	1937	do.	32,690	32,690
	Willow Creek	41°15'	116°35'	Humboldt River	Willow Creek	Ellison Ranching Company	a110	Concrete		505	1924	do.	18,064	18,064

LAKES

Station no.	Lake name	Latitude	Longitude	River	Drainage area	Maximum surface area (square miles)	Present surface area (square miles)	Remarks
	Carson	39°18'	118°43'	Carson River		41	nearly dry	
	Franklin	40°24'	115°24'	Franklin River		32	--	
10-3365	Pyramid	40°03'	119°34'	Truckee River	2,650	221	180	Mean depth 167 feet. Maximum stage observed 3,879 feet in 1870, minimum stage observed 3,790.0 feet on Nov. 15, 1962. See text.
	Ruby	40°16'	115°26'			37	--	
10-3370	Tahoe	39°10'	120°08'	Truckee River		193	192	See Reservoir table. Maximum depth 1,647 feet.
10-2885	Walker	38°44'	118°43'	Walker River	3,500	125	105	Mean depth 120 feet, maximum stage observed 4,078.0 feet on Sept. 27, 1908, minimum stage observed 3,976.0 feet on Apr. 21, 1963. See text.
	Winnemucca	40°07'	119°20'	Truckee River		a80	dry	Maximum stage observed 3,855 feet in 1882. See text.

a. Approximate.