

Floods of November-December 1950 in Western Nevada

FLOODS OF 1950

Prepared under the direction of J. V. B. WELLS, Chief, Surface Water Branch

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UNITED STATES DEPARTMENT OF THE INTERIOR

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PREFACE

This report on the floods of November-December 1950 in western Nevada was prepared in the U. S. Geological Survey, Water Resources Division, C. G. Paulsen, chief, under the general direction of J. V. B. Wells, chief, Surface Water Branch. The data for the report were collected and prepared for publication under the direction of M. T. Wilson, district engineer, Salt Lake City, Utah.

The collection of basic records of stage and discharge in the area described in this report is a part of a continuous cooperative program with the following agencies: State of Nevada, Department of the State Engineer, Alfred Merritt Smith, State engineer, and the Walker River Irrigation District; State of California, Department of Public Works, C. H. Purcell, director, and A. D. Edmonston, State engineer; Corps of Engineers, U. S. Army; and the U. S. Bureau of Reclamation. Data furnished by individuals, corporation, or Government agencies are acknowledged where they appear in the text.

Collection of field data necessary for the determination of peak discharges by indirect methods was coordinated by Hollister Johnson, hydraulic engineer. Personnel of the Ground Water Branch, Carson City district, assisted in the collection of field data during the floods. Personnel of the San Francisco district prepared the isohyetal maps. The report was prepared by L. B. Sawyer, engineer-in-charge, Carson City, Nev., and W. P. Somers, hydraulic engineer.

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FLOODS OF 1950

FLOODS OF NOVEMBER-DECEMBER 1950 IN WESTERN NEVADA

ABSTRACT

Record-breaking floods in the Walker, Carson, and Truckee River basins during November and December 1950 resulted from a rapid sequence of storms and unseasonably high temperatures that melted most of the early snow cover. During the period November 13 to December 8, 1950, total precipitation ranged from about 5 inches at the foot of the Sierra Nevada in Nevada to about 30 inches at the crest in California, near the California-Nevada State line. About half of this total occurred during the period November 16-21. The resulting floods were the greatest in more than 50 years of record. The highest discharge occurred on Truckee River where the greatest damage potential exists--in the urban area of Reno and Sparks.

Notable rates of discharge were 19,900 cfs, or 36.1 cfs per square mile, from 551 square miles in Truckee River at Reno, Nev.; 7,010 cfs, or 212 cfs per square mile, from 33 square miles in Little Truckee River near Hobart Mills, Calif.; and 3,570 cfs, or 119 cfs per square mile, from 30 square miles in East Fork Carson River near Markleeville, Calif.

The estimate of damages compiled by the Corps of Engineers total \$4,360,000 for the area; \$1,982,000 of this was for Reno. Two deaths were reported. The American Red Cross assisted about 200 persons, at an expenditure of about \$7,500. Federal aid for city and county rehabilitation in Nevada totaled \$75,000.

This report contains records of stage and discharge at 20 gaging stations and contents of 2 reservoirs, and a summary of peak discharges at 23 points within or adjacent to the flood area. The report contains also a discussion of the storms and floods, a section on meteorology prepared by the Weather Bureau, and a brief discussion of previous floods.

INTRODUCTION

The floods of November-December 1950 in western Nevada resulted from a series of warm storms after snow had accumulated at the beginning of the winter period. The unusually rapid sequence of storms and resulting floods are noteworthy. Antecedent precipitation had been high, leaving soil moisture above normal. Temperature during much of the runoff period was also high. Records of maximum precipitation, peak discharge, and temperature were exceeded in several instances. Figure 111 is a map showing the area covered by this report; figure 112 is an enlarged map showing locations of the more important streams and towns.

Fall and winter storms ordinarily do not generate annual floods in this area. (The term "annual flood" is defined as the maximum instantaneous discharge in any one year.) However, if a warm storm with heavy precipitation occurs after snow has accumulated at high elevations, the combination of factors can produce floods greater than those occurring during the spring snowmelt period.

Figure 113, a histogram of annual flood peaks at selected stations, shows that the greatest annual flood of record occurred in the 1951 water year (during the present floods) and the next greatest in the 1938 water year (December 1937). Annual floods on East Fork Carson River near Gardnerville, Nev., during the period November-February were recorded in water years 1893, 1938, 1942, 1943, 1945, 1947, and 1951. The first, second, third, fifth, and sixth highest annual floods of record are included in this group, which shows that winter floods are less frequent but more severe than the usual annual spring flood on this stream. The annual flood

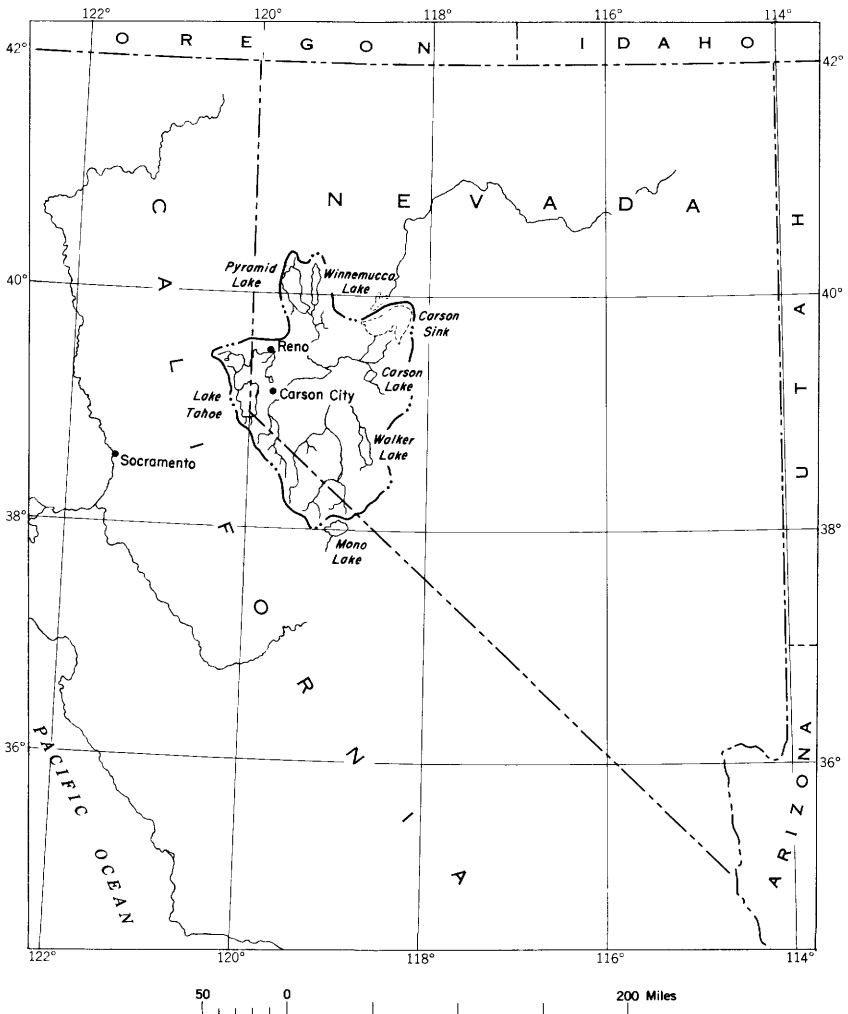


Figure 111.--Index map of area covered by this report.

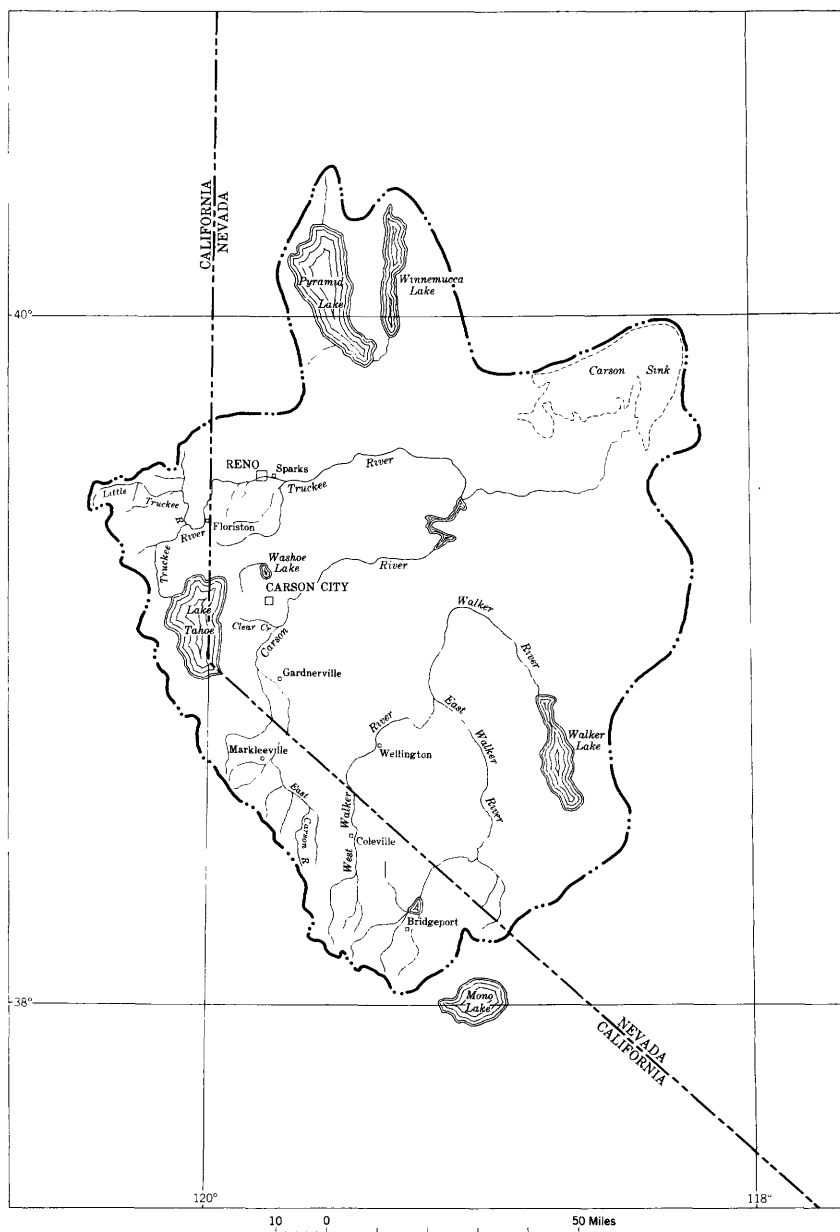


Figure 112.--Map of area showing locations of the more important streams and towns.

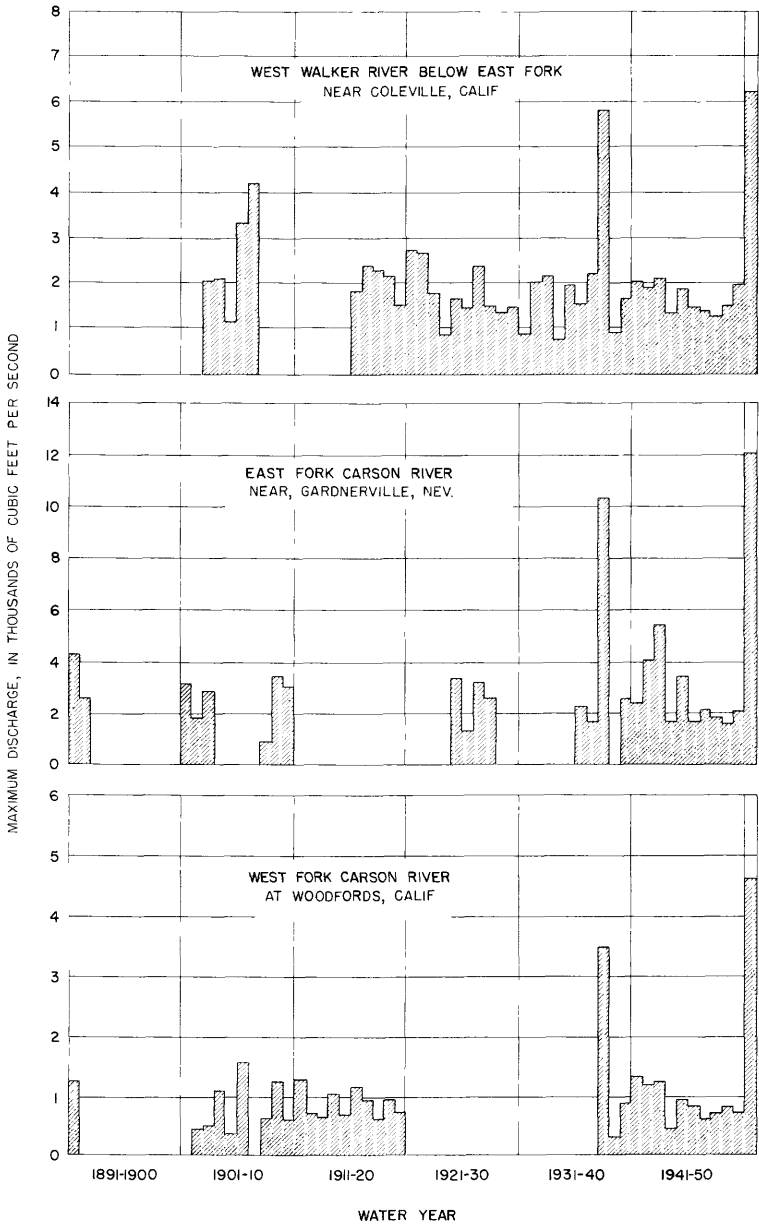


Figure 113.--Histogram of annual floods at selected gaging stations having relatively long periods of record.

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usually occurs in the spring or early summer as a result of a slow rate of snowmelt. It is dependent more upon temperature and the amount of snow accumulation than upon precipitation during the runoff period.

The potential for extreme flood stages ordinarily decreases as the winter season advances. Accumulation of snow by the end of December, often exceeding 25 feet at the higher elevations, is enough to absorb precipitation developing from any one warm storm, thus reducing or eliminating storm runoff from part of the area. Preceding a heavy accumulation of snow, however, a warm storm may melt the entire snow pack and produce extreme flood stages. Records show that winter floods after December have usually been preceded by earlier floods that have reduced or completely melted the previous snow pack and returned the drainage basin to conditions similar to those before the snow began to accumulate. It is not unusual, therefore, to have a repetition of floods during the same winter season. In the 1950 series of peaks on the East Fork Carson River those of November 19, 20, and December 3 all exceeded the second highest annual flood, that of December 11, 1937, which indicates the quick response the stream made to an exceptionally rapid sequence of heavy storms.

The storms that produced the floods in western Nevada were associated with the storms that produced the floods of November-December 1950 in the Central Valley basin of California. Those floods are described in a preceding chapter of this series, Water-Supply Paper 1137-F, Floods of November-December 1950 in Central Valley basin, California.

GENERAL FEATURES OF THE STORMS AND FLOODS

During November and December 1950, floods of unusual magnitude occurred over wide areas of California and Nevada exceeding those previously recorded at many locations. This report pertains to the drainage of the east slope of the Sierra Nevada, particularly in the Walker, Carson, and Truckee River basins as outlined in figure 112.

Meteorology

Prepared by the staff of the United States Weather Bureau

The basins of the Walker, Carson, and Truckee Rivers lie just to the east or leeward of the Sierra Nevada, which is usually an effective barrier to precipitation from eastward moving air. Strong southwesterly flow, however, results in a "spilling over" of precipitation to the leeward side. The greater part of the annual rainfall occurs in winter and is a result of cyclonic activity. Thunderstorms are infrequent in this region.

The floods in the Walker-Carson-Truckee basin area in November-December 1950 were the result of a combination of factors. Precipitation in the area during September and October had been about 300 percent of normal. Heavy rainfall in November was accompanied by mild temperatures which greatly reduced the snow cover. This not only worked hardship on the region because of the record-breaking floods which resulted, but also promised less water for the spring and summer when the region looks to snowmelt for water. Precipitation above the normal in December held the streams near flood stage.

During the first week of November western Nevada was dominated by high pressure. Skies were clear and temperatures soared. The maximum and minimum temperature curves for Reno, Nev. (fig. 114), are typical. Marlette Lake, Nev., at an elevation of 8,000 feet, had minimum temperatures of freezing or above for all but 1 day of the first week of November. On November 8, a great polar high-pressure area swept down over the Pacific Northwest from Canada and by morning of the 9th covered the Walker-Carson-Truckee basin area. Temperatures plunged (see fig. 114) but recovered by the 12th.

A low-pressure area moved into western Nevada from the Pacific Coast at this time, deepening somewhat as it moved slowly eastward. Associated with this pressure area was a trough through western California at about 10,000 feet. This trough deepened in the next 24 hours, moving slightly westward so that it lay just off the California coast. At the same time a strong cold front approached the West Coast at the surface. By evening of the 13th of November the cold front lay through central Washington and Oregon. An area of precipitation in advance of the front covered part of the Walker, Carson, and Truckee River basins. The cold front passage on the 14th caused another dip in temperatures and was accompanied by more precipitation over most of the country west of the Continental Divide.

A strong low-pressure area developed just west of Vancouver Island late on November 14 and continued to deepen rapidly on the 15th. An extremely strong southwesterly circulation was created over the northern California-western Nevada region. This circulation extended to the 700-millibar level, so that warm moist air was being brought into great heights. Rain was reported over the Walker-Carson-Truckee region on the 16th and again on the 17th as the circulation was maintained, although in a weaker form.

On November 18 the southwesterly flow was intensified once more, but this time by the intrusion of the Pacific high-pressure area over the southern half of California. (See fig. 115, Surface weather chart for November 18, 1950.) It was on this day and the following that the precipitation reached its peak. Many stations in

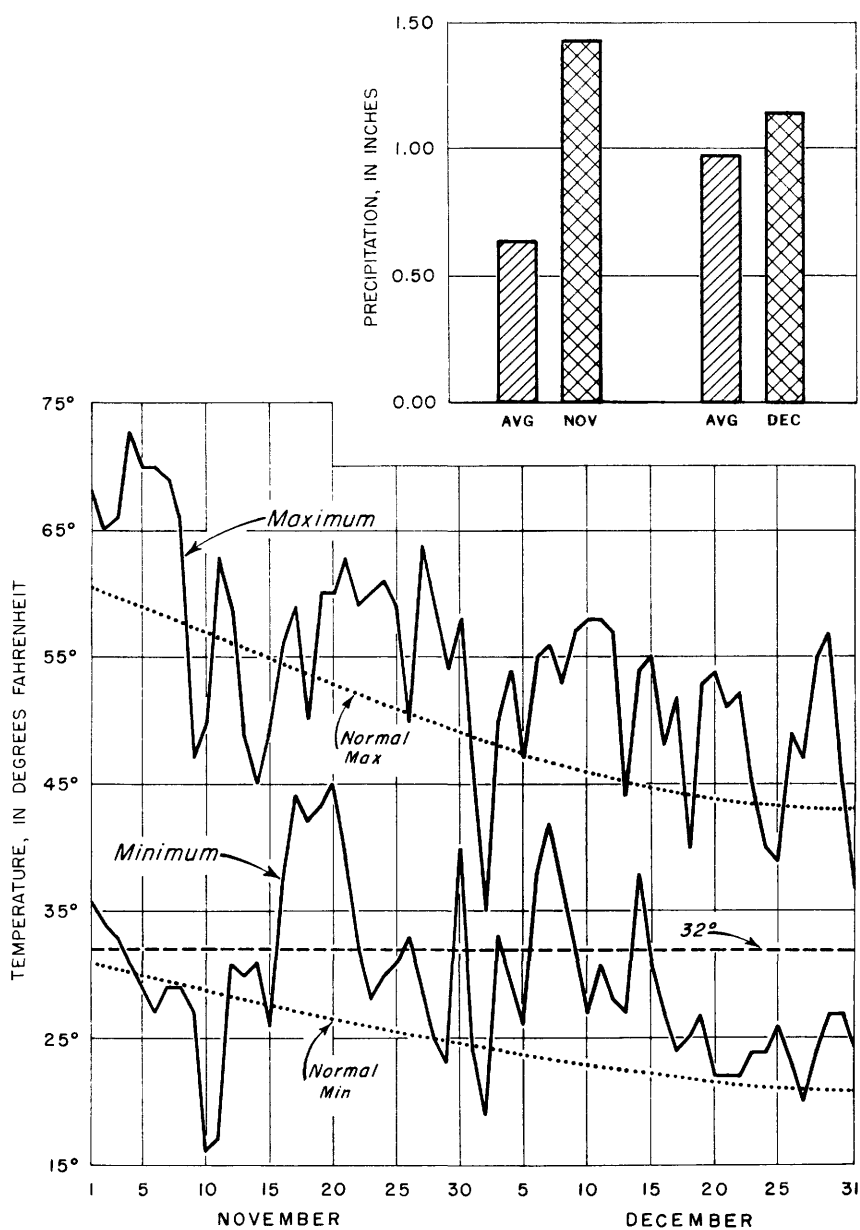


Figure 114.--Maximum and minimum temperature curves and precipitation, Reno, Nev., November-December 1950.

Douglas, Lyon, Ormsby, and Washoe Counties, Nev., registered record-breaking 24-hour totals during this period. At the same time, high temperatures greatly reduced the snow cover. As another intense system approached the West Coast on the 20th, the flow of warm moist air into California and Nevada was strengthened. Precipitation again became heavy and continued through the 21st, although at a lesser rate.

On November 19, Carson City, Minden, and Nixon, Nev., all recorded their greatest one-day precipitation for any month, while on the 18th, Glenbrook, Nev., received its greatest daily amount for November. Truckee Ranger Station, Calif., which normally receives a little more than 2 inches for the entire month of November, recorded almost 7 inches during the period November 17-20, 1950.

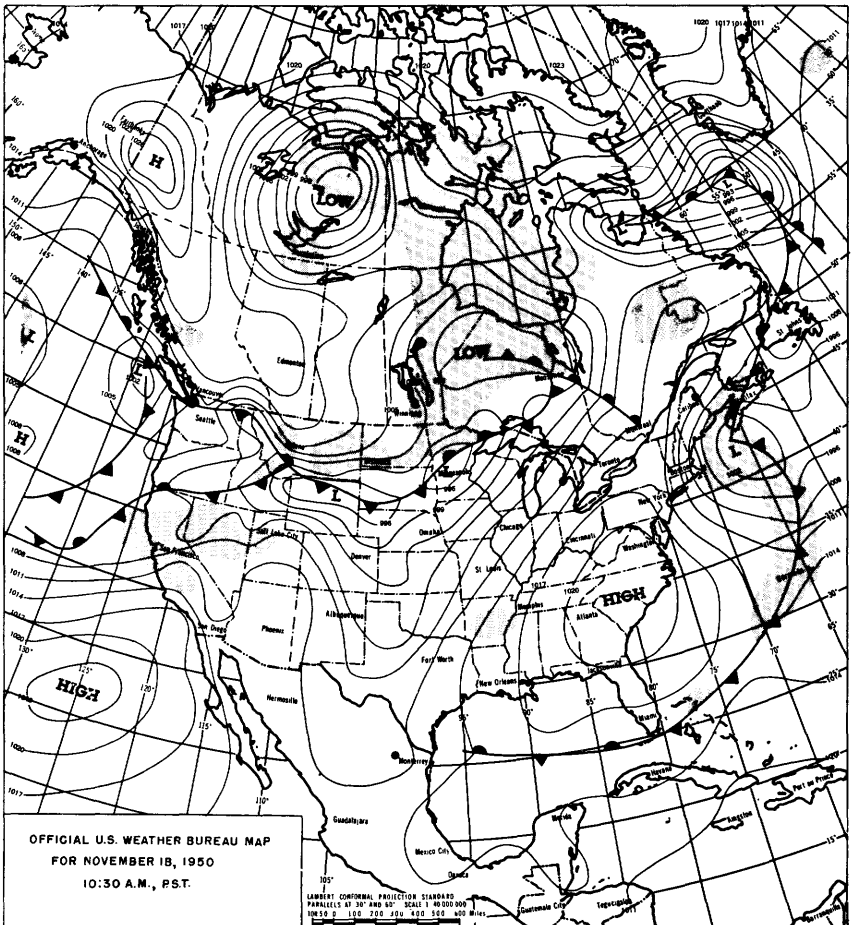


Figure 115.--Surface weather chart for November 18, 1950.

High pressure dominated the Walker-Carson-Truckee area for the remainder of the month, except for the last day when light rain fell over several stations.

Figure 116 compares average November precipitation with precipitation for November 1950 at 3 stations in Nevada and 3 in California. The amount at Tahoe, Calif., was the greatest November total in 41 years of record; at Truckee Ranger Station the amount was the greatest November total in 67 years of record.

Temperatures in Nevada during December were even more consistently above normal than they had been during November (fig. 114). It was the third warmest December of record. In California, December 1950 was the warmest December on record for the period 1897 to the present. Warm rains, which continued for the first 8 days of the month, were a result of the passage of four successive frontal systems that continuously brought warm moist air over the region. These rains kept streams in the Walker, Carson, and Truckee River basins near flood stage from the 3d to the 10th. The peak flows, however, were generally less than during the severe floods of November. Low farmlands east of Reno, Nev., were water covered until the middle of the month.

The Walker-Carson-Truckee River basin area was dominated by high pressure for most of the remaining part of the month except for the passage of a frontal system during December 13-15 when small amounts of precipitation were recorded. The month closed, however, with the passage of a strong frontal system on the 30th.

Northern counties of Nevada averaged near 150 percent of normal December precipitation, with the major part of the precipitation falling during the first 8 days of the month and the closing days. In the California part of the basins December precipitation averaged about 140 percent of normal.

Precipitation and Runoff

Conditions preceding the periods of heavy precipitation favored a high potential runoff. September and October precipitation, about 300 percent of normal, helped to satisfy soil moisture demands or added to high-elevation snow accumulation. During the period November 13-15, precipitation to about 1 inch at the divide of the Sierra Nevada was recorded. Figure 117 shows the areal distribution of precipitation during that period.

The warm storms of November 16-21 broke many records of precipitation. Totals of more than 15 inches were recorded at high elevations. Figure 118 shows the distribution of these storms. Simultaneously, much of the snow pack was melted and a large

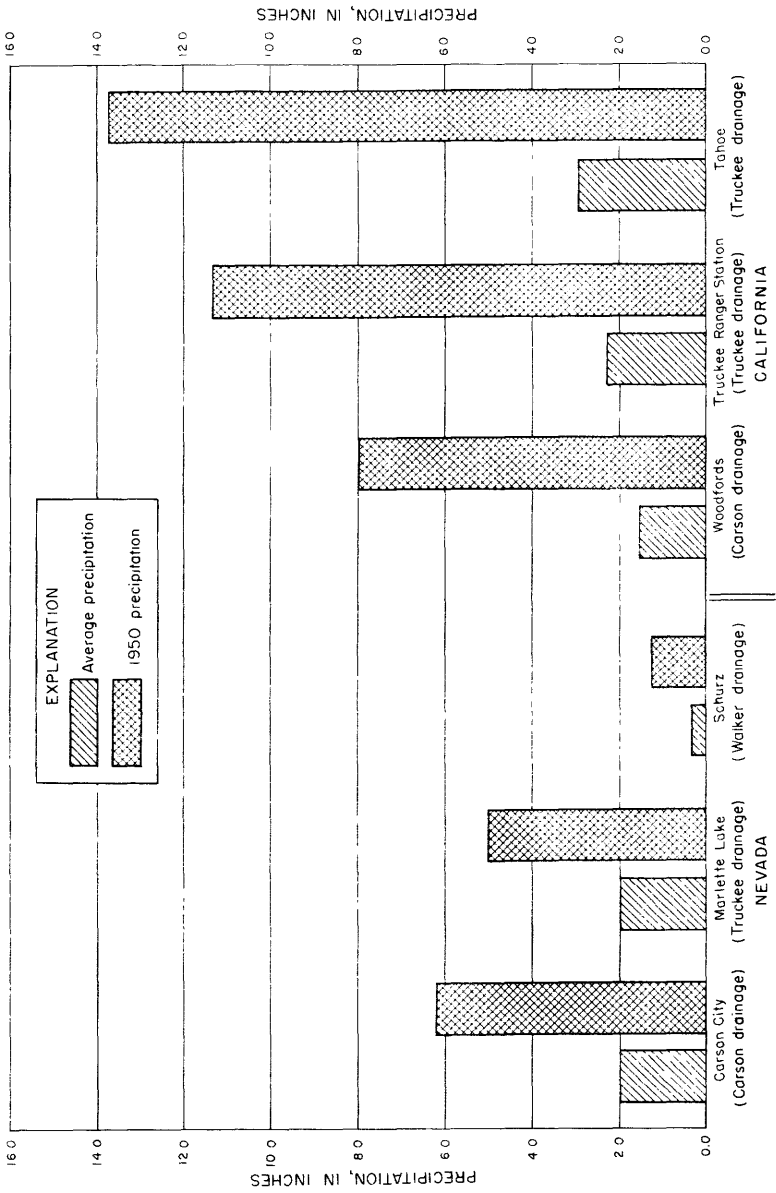


Figure 116.-Comparison of average November precipitation with precipitation in November 1950 in Walker, Carson, and Truckee River basins.

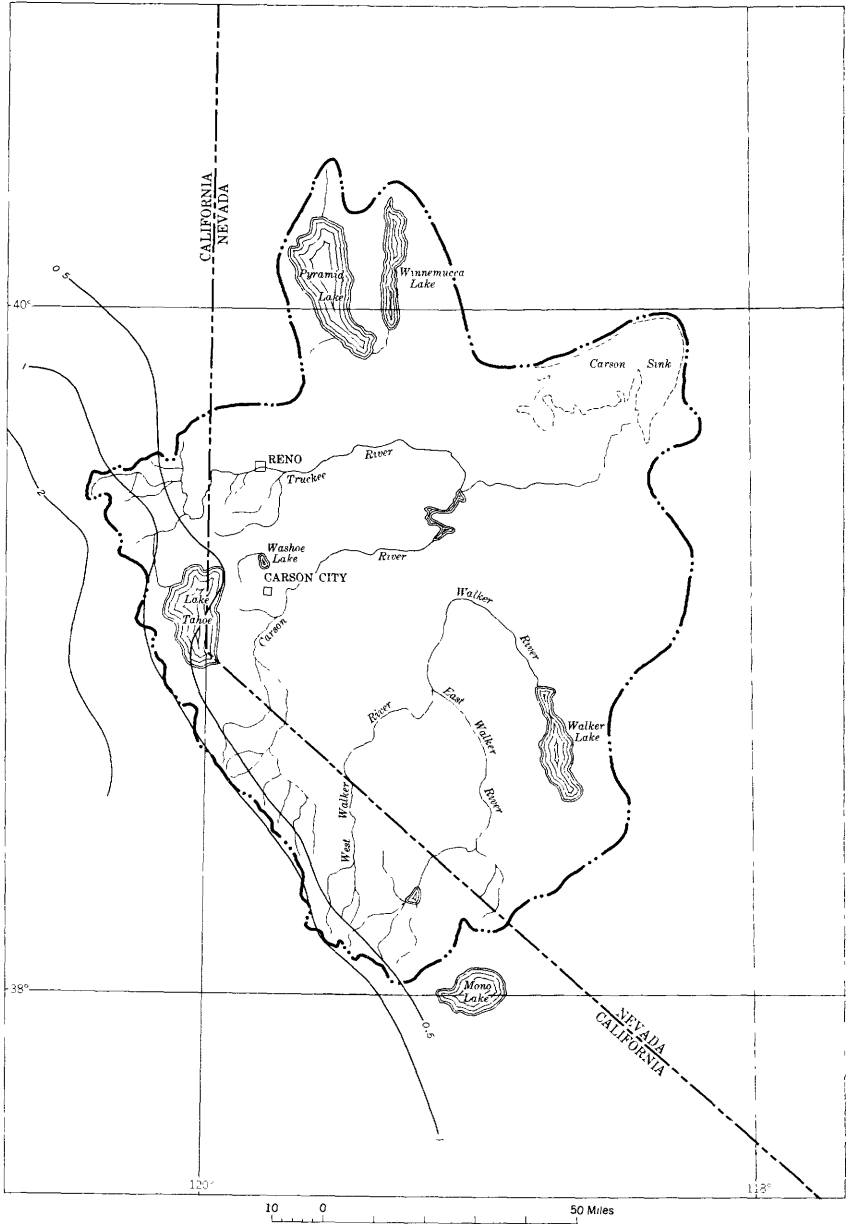


Figure 117.--Isohyetal map of precipitation, November 13-15, 1950.

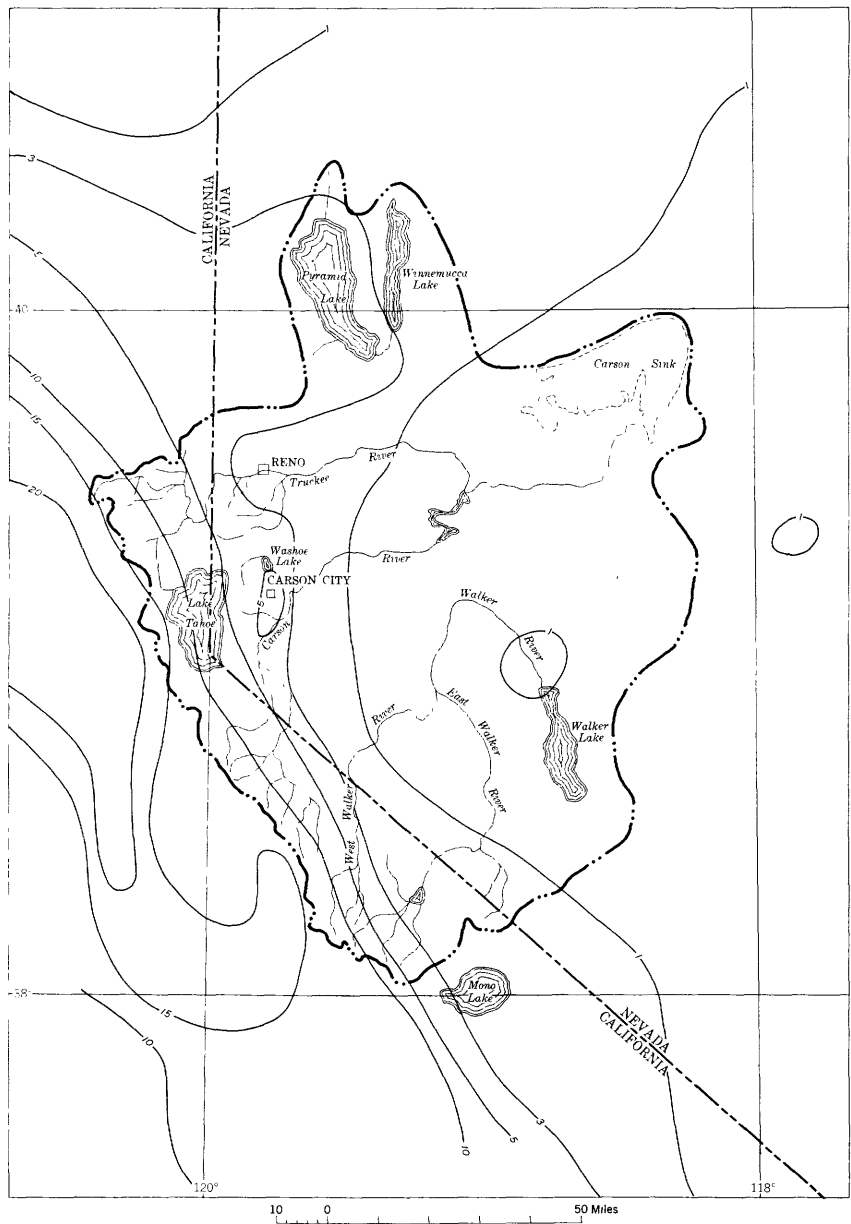


Figure 118.--Isohyetal map of precipitation, November 16-21, 1950.

proportion of its water content was added to surface runoff. Water content of the accumulated snow at the higher elevations probably exceeded 3 inches. This period of storms generated two distinct flood peaks about 48 hours apart. At many points the first peak approached or exceeded the maximum of record. Streams with little valley storage receded rapidly only to rise again to still higher stages. The second peak exceeded the first on most streams in the Walker, Carson, and Truckee River basins and surpassed all previously recorded floods. Because of the unusually short interval between storms, probably more than the usual amount of precipitation of the second storm appeared as flood runoff. As the soil had been saturated and channels filled, there was little opportunity for additional precipitation to infiltrate and recharge ground-water reservoirs, fill channels, enter bank storage, or disappear as evapotranspiration. At high elevations warm wind and rain continued to melt the snow that remained after the first warm storm. This snowmelt augmented flood runoff volumes to an undetermined extent.

Following the floods of November, streams subsided considerably. Little additional precipitation was recorded until early December.

On December 2 precipitation began again--the forerunner of a new series of four warm frontal storms. Figure 119 shows the distribution of precipitation totals for December 2-4 that were in excess of 6 inches on the east slope of the Sierra Nevada. Some streams, notably Clear Creek near Carson City, Nev., and East Fork West Walker River near Coleville, Calif., (see fig. 112) reached maxima of record on December 3. Distribution of precipitation as shown on figure 119 indicates a high rate of rainfall in the local area of Clear Creek during this period. It is very likely that there were higher quantities of precipitation at points in the East Fork of the West Walker River basin than are shown on the map. Not enough precipitation records are available to show the many variations in rainfall that would normally develop in an area with such large changes in topography. Previously flooded areas were alert to the possibility of recurrence of damaging floods and were better prepared to meet the threat with temporary measures. During the period December 6-8 more than 4 inches of precipitation was recorded over parts of the basins (fig. 120), but in general the resulting flood peaks were appreciably lower than those of November.

Figure 121 shows the areal distribution of total precipitation for the period November 13 to December 8. As much as 30 inches is shown near the crest of the Sierra Nevada for the 26-day period. The quantity of snowmelt for the period is not known, but a sizable amount probably was supplied by the melting snow. Water content of snow at the higher altitude undoubtedly exceeded 3 inches just before the floods began.

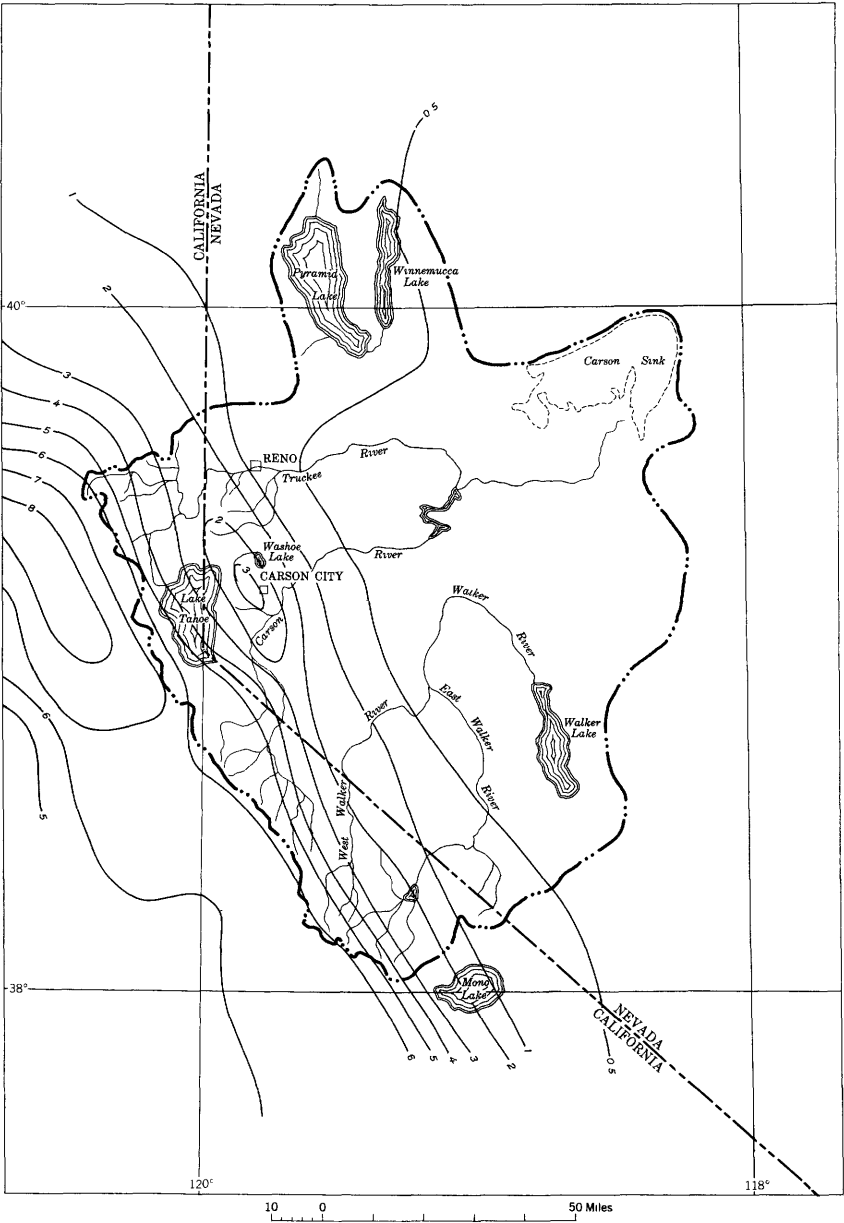


Figure 119.--Isohyetal map of precipitation, December 2-4, 1950.

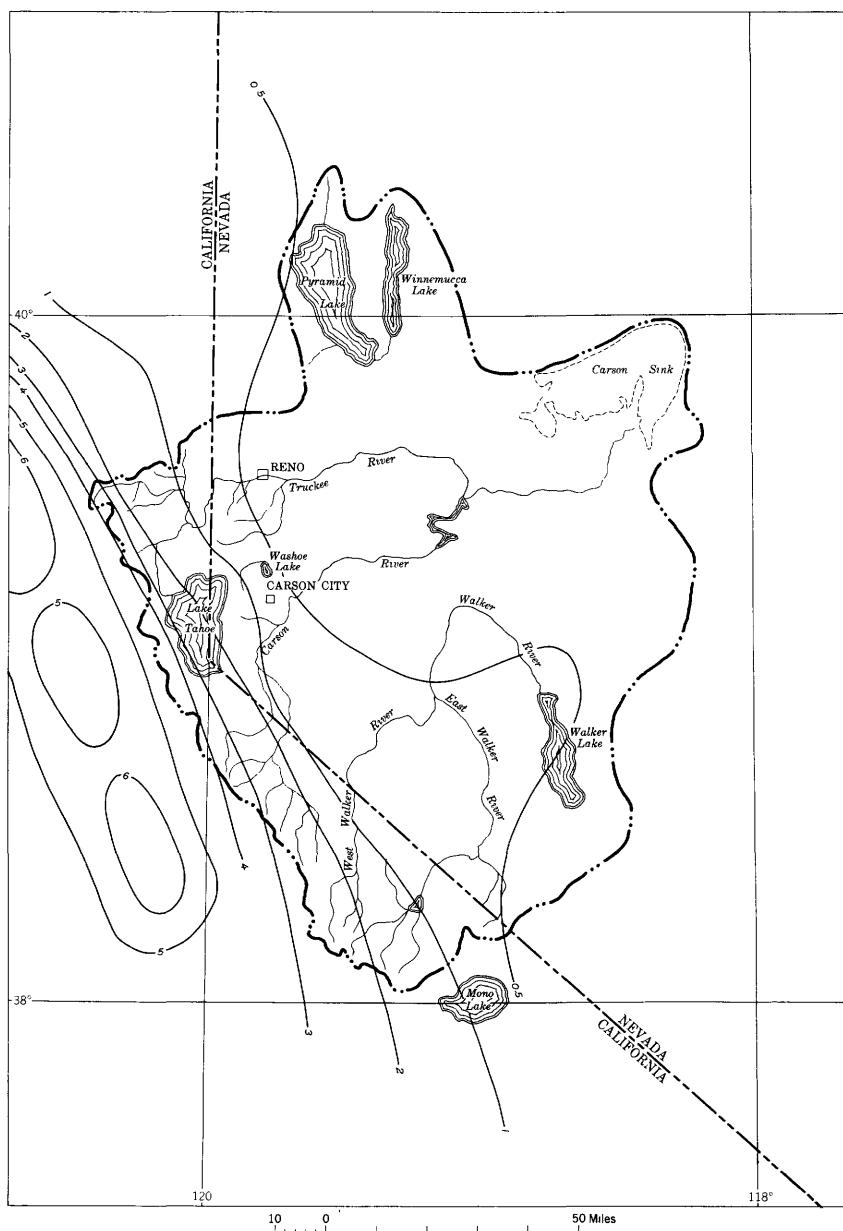


Figure 120.--Isohyetal map of precipitation, December 6-8, 1950.

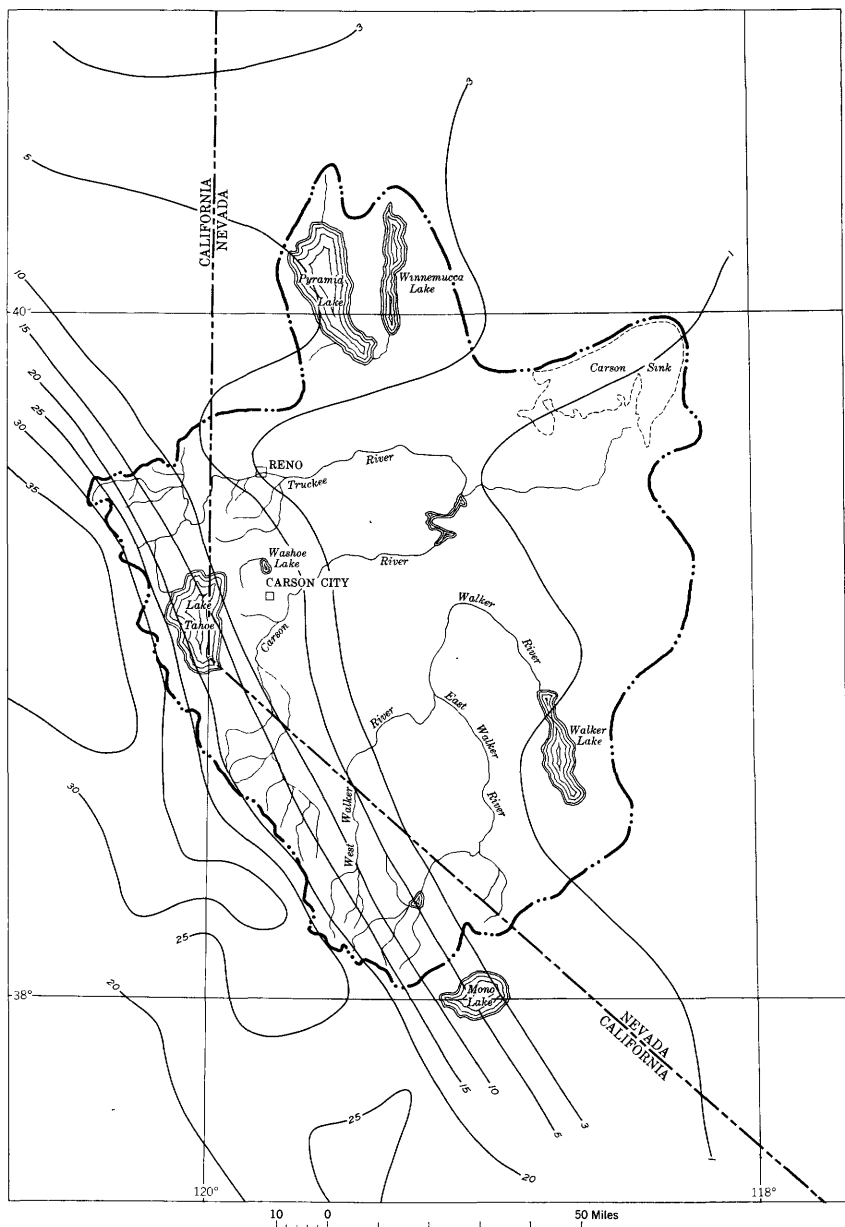


Figure 121.--Isohyetal map of total precipitation for period November 13 to December 8, 1950.

Discharge hydrographs at selected gaging stations, figures 122-124, show time distribution of the discharges during the period November 17 to December 13. The effects of reservoir and channel storage and the relative size of the several peaks are represented graphically by these hydrographs.

Description of the Floods

The most concentrated and destructive effects of the flood occurred in Reno. Because of the infrequent occurrence of floods of this magnitude, the urban development of the adjacent cities of Reno and Sparks has encroached upon Truckee River flood plains. Embankments and retaining walls have been gradually narrowing the channel through the urban area. Dams forming ponds in park areas were considered serious encroachments by some officials planning preventive measures. Low bridges with openings inadequate for the passage of floods of this magnitude cross the river at many points. Great masses of flood-borne debris reduced the effective carrying capacity of bridge openings at several locations (see fig. 125). Water was 3 feet deep on some of the main business streets of Reno, with velocities high enough to move parked automobiles and several were tipped over by the raging currents.

Hastily erected dikes and sandbag barriers averted some flooding. News reports tell of a dike built by the city engineer of Sparks that prevented flooding of three-fourths of the city. There the major damage was inundation of the sewage disposal plant. Municipal improvements damaged in Reno included bridge approaches, roadways, sidewalks, parks, sewage disposal plant, and sewer mains crossing the river. Largest monetary loss was suffered by business establishments adjacent to the Truckee River in Reno. Stocks of department stores, furniture stores, automobile agencies, and many other businesses were badly damaged. The U. S. Post Office, two of the largest hotels in the city, and a bank--all adjacent to the channel--were heavily damaged. Water stood almost 4 feet deep on the main floor of the Riverside Hotel. Garages, theaters, and other establishments had extensive damage (see fig. 126). As this area is dependent to a great extent on tourist and visitor trade, the reduction of travel over a wide area caused considerable loss in day-to-day business.

Because of continued stormy weather conditions in early December, protective barriers of sandbags and dikes were left in place. On December 15 the materials were removed from streets and sidewalks but were stockpiled nearby for use if the river were to threaten again.

The peak on the Truckee River, although greatly reduced by natural detention in the Truckee Meadows area just downstream from Reno, reached Nixon on the Pyramid Lake Indian Reservation

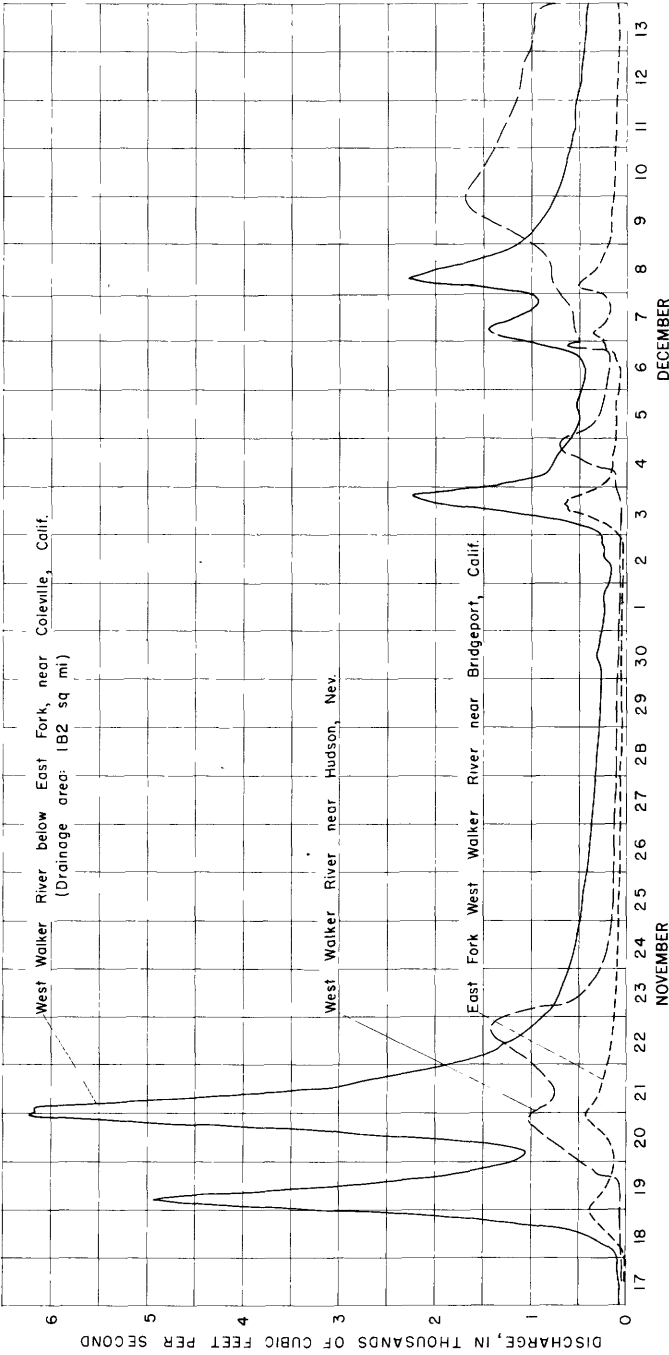


Figure 122.--Graphs of discharge at selected gaging stations in Walker River basin, November-December 1950.

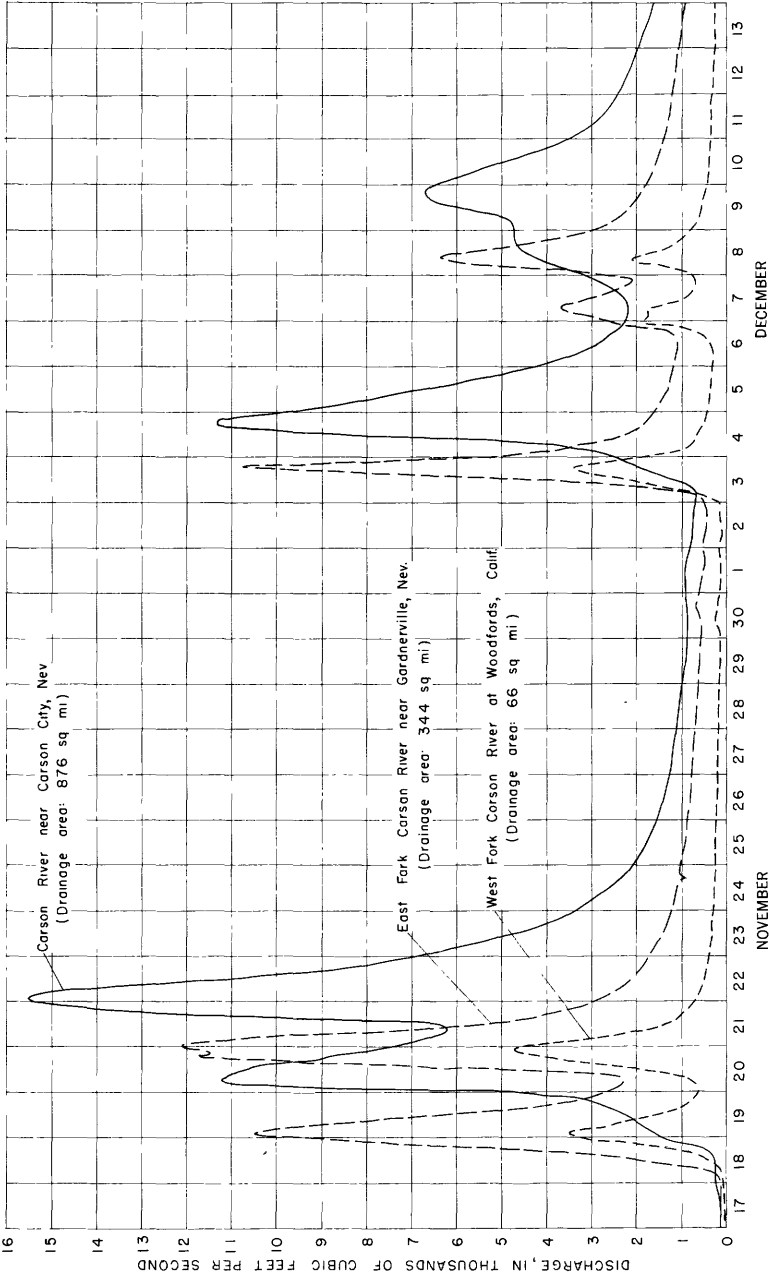


Figure 123.--Graphs of discharge at selected gaging stations in Carson River basin, November-December 1950.

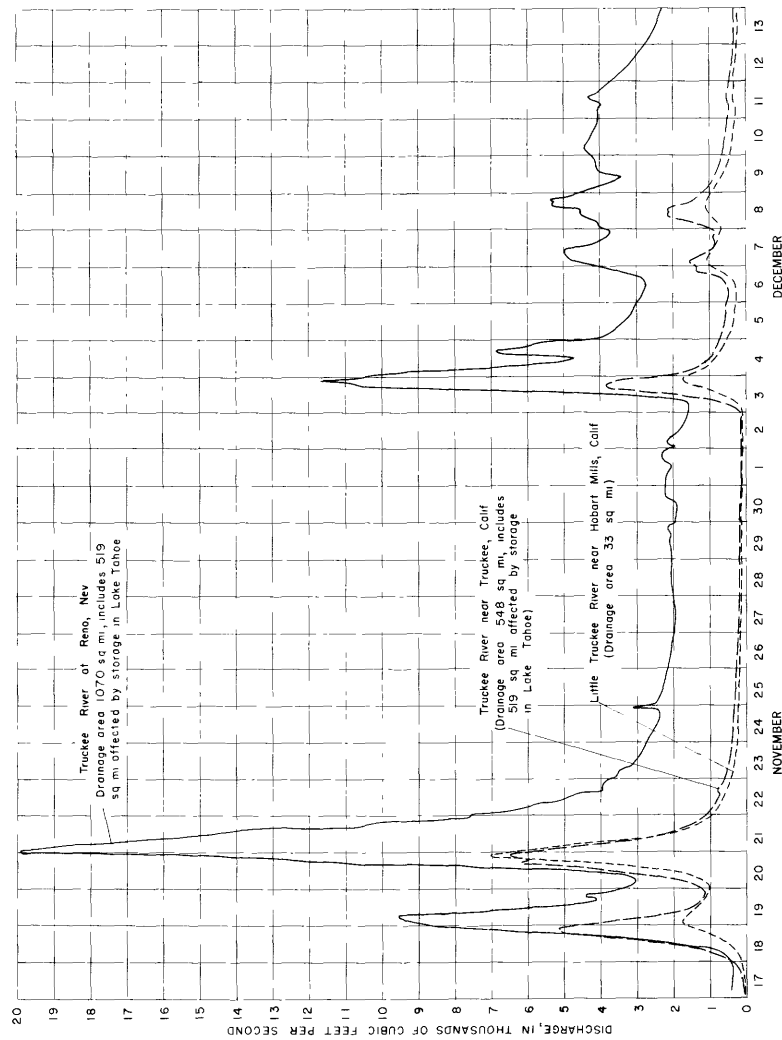


Figure 124.--Graphs of discharge at selected gaging station in Truckee River basin, November-December 1950.



Figure 125.--Sierra Street bridge in Reno, looking upstream, during recession of flood. Note debris lodged against bridge and highwater line on building to right. Photograph by Christensen, Reno, Nev.



Figure 126.--View at First and Center Streets, Reno, after crest had passed. Waves indicate velocity of water. Photograph by Bennett Photo Co., Reno, Nev.

about 36 hours after the crest at Reno. About 3,500 acres of agricultural land east of Reno were inundated by the Truckee River. News reports indicate that between 100 and 200 persons were driven from their ranch homes, and at least 15 families were left completely homeless.

On other streams fewer persons or structures were affected directly by flooding, for principal centers of population are out of overflow areas of the larger rivers. Ranches and farms had large areas inundated and some fertile agricultural land was covered with coarse deposits of deleterious material. Valuable herds of livestock were threatened and some losses were reported. Travel was materially reduced, and recovery from the devastation was hampered by the recurring storms and ensuing floods.

Highways were unusable for extended periods. Sections of transcontinental routes, U. S. Highways 40, 50, and 395 serve a large proportion of the traveling public in the area. Roads and highways crossing the floor of Carson Valley were inundated too deep for fording while the Carson River was at flood stage. Where highways are near the base of mountain slopes, heavy deposits of mud, rock, and debris were left by ordinarily small streams. Deposits left by Ophir Creek closed U. S. Highway 395 between Carson City and Reno for several days. Slides and slumps of saturated earth blocked other highways, particularly in canyon sections. Two men and two vehicles on traffic duty were reported carried off the highway and down a steep embankment by a slide in Truckee Canyon. In confined reaches of canyons where roads are built close to streams, many washouts were reported. (See fig. 127) U. S. Route 40 in Truckee Canyon was reopened for limited use after being out of service for more than a week. Several sections of highway on U. S. Route 395 in the West Walker River Canyon south of Coleville, Calif., were destroyed. Traffic was rerouted through Wellington, Sweetwater, and Bridgeport and also convoyed over sections under repair on all major highways for extended periods.

Many bridges or approaches were reported damaged or destroyed. On November 20 the Reno Gazette reported that at least six bridges on county or State secondary routes in the Gardnerville-Markleeville-Coleville area had been washed out and others were believed in danger of failing. When the bridge at Floriston, Calif., was washed out by the Truckee River, the residents were isolated except for a footbridge. At many points repairs to bridges and highways were in vain because the rises of early December wiped out partly completed work and postponed complete recovery.

Many agricultural facilities, such as diversion dams, headgates, drains, and canal sections were seriously damaged or destroyed; this loss did not materially interfere with agricultural production, for the floods occurred during the nongrowing season. Enough time was available for necessary replacements or repairs before the beginning of the next season.

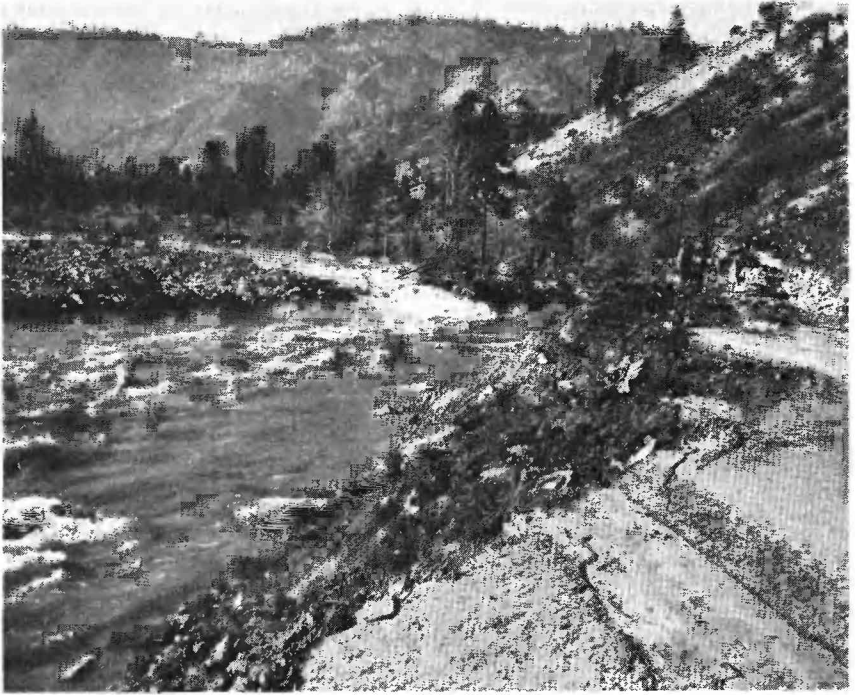


Figure 127.--Destruction of highway in Truckee Canyon on U. S. Route 40. At this point, about 300 yards of road was completely destroyed. Photograph by U. S. Forest Service, Nov. 23, 1950.

The soil mantle of the watersheds underwent considerable change in some areas. Dr. L. E. Dunn, of the University of Nevada, in a news article reported that fine sediment in the Truckee River during the flood carried about three times as much organic matter as is present in most Nevada soils. This implies that much of the most valuable part of soils eroded by runoff probably was carried to Pyramid Lake, whereas less fertile heavier materials were deposited along the way, in some places covering fertile farmland with unproductive soil. The removal of organic material from the watershed also reduced the ability of the soil mantle to detain runoff.

Storage

Streams with adequate storage facilities for irrigation supplies were prepared early to meet demands for the next season; streams without adequate storage provisions were in an unfavorable position to supply future irrigation requirements because a large part of the winter's total snow accumulation had already been dissipated as flood runoff.

In the Walker River basin Bridgeport Reservoir on East Walker River stored runoff until about December 15 when controlled release began. Topaz Reservoir, an off-stream reservoir, similarly stored runoff until about December 9. This storage reduced flood peaks greatly, delayed high discharge downstream, and conserved water for future use. Walker Lake, which had declined an average of 2.1 feet annually during the previous 10 years, showed no net change in stage during the period of flood runoff through March 1951. This decrease in rate of decline is typical of spring runoff periods. Upstream storage and detention of flood volumes in the basin reduced the waste to Walker Lake.

The Carson River, with little reservoir storage upstream, responded quickly with high peak discharges. Some attenuation of peaks resulted from storage in the broad overflow areas of Carson Valley. This condition is part of the natural regimen of the stream and could be expected to behave similarly with each extreme flood. Lake Lahontan on the lower Carson River gained about 70,000 acre-feet of storage during the 10-day flood period in November, brightening the prospect for irrigation during the coming season. The storms of December added more volume to the Carson River basin; release from Lake Lahontan was begun December 3 in anticipation of the increased inflow. The rate of release was influenced by the degree of flooding of ranch lands downstream and by the limitation of the little-used natural channel. According to the Reno Gazette all possible means of controlled disposal were used. Early in December the reservoir was practically filled and large controlled releases were made without excessive damage downstream.

The high rate of runoff from the drainage area above the outlet of Lake Tahoe was stored with negligible outflow until December 15. Dr. H. P. Boardman, emeritus professor of civil engineering, University of Nevada, reported in the Reno Gazette that Lake Tahoe rose 1.89 feet during the period November 13 to December 6. This rise represents a storage increase on about 193 square miles of lake surface, or 233,000 acre-feet. The storage capacity of Lake Tahoe is large compared with the yield of the contributing area. During all major floods for the period of record, outflow from Lake Tahoe has been insignificant compared with peak discharge downstream. Boca Reservoir on Little Truckee River, with usable capacity of 41,000 acre-feet, was filled, and overflowed late on November 19 while the first rise on the Truckee River was in progress. Spill continued during the second and larger rise so that this reservoir was not effective in reducing the peak flood on the Truckee River, which caused so much damage in Reno. Manipulation of the contents of Boca Reservoir was carried out during the recession of the second rise to provide storage capacity to reduce peaks on the Truckee River. Pyramid Lake at the lower end of the Truckee River showed a rapid rise of about 1.7 feet from November 15 to

December 10. The rise continued through the winter and on February 26, 1951, the stage had increased an additional 2.2 feet, a total of about 3.9 feet. Although Pyramid Lake shows moderate rises during the spring runoff season, the trend has been downward since 1870; for the past 10 years the average annual decline has been 1.5 feet.

DAMAGES

Damages by the floods have been estimated by several agencies, including a detailed report by the Corps of Engineers, U.S. Army. A canvass of the area was made to determine the amount of flood damage. Table 1, a copy of the summary tabulation, gives details of damages by class and basin. The Soil Conservation Service estimated damages along the Carson River between Dayton and Weeks as over \$120,000. Irrigation ditches and structures, highways, bridges, fall feed, fences, baled hay, farm machinery, and homes were damaged in that area. According to the State highway engineer, western Nevada highways and bridges sustained an estimated \$250,000 damage. News reports on December 16 stated that the Red Cross furnished aid totaling about \$7,500 to about 200 persons. Federal funds totaling \$75,000 were divided among western Nevada cities and counties for flood recovery work.

Two deaths were attributed to the floods, according to news reports on November 21.

MEASUREMENT OF FLOOD DISCHARGE

Current-meter measurements of discharge are the primary means of defining the stage-discharge relation at gaging stations. Cableways and bridges are the principal structures from which discharge measurements are made. However, during floods of short duration, high stages, and widespread occurrence it is virtually impossible to make current-meter measurements near the peak at all gaging stations in the flood area.

When the stage-discharge relation requires a long extension above current-meter measurements, indirect methods of determination of peak flow are used. Among the indirect methods commonly used are slope-area method, contracted-opening method, and computation of peak flow over a dam. These methods require collection of considerable field data: selection of a suitable site; careful surveys of high-water profiles, cross sections, and plans of sites; experienced selection of coefficients and analysis of field data; and thorough testing of the reasonableness of results. These indirect methods for determining flood flows are fully discussed in

Table 1. --Flooded areas and flood damages, Walker, Carson, and Truckee River basins November and December 1950 Floods
[Compiled by Corps of Engineers]

Stream and reach	Flooded areas (acres)	Direct flood damage, in dollars					Total
		Agricultural	Residential	Commercial and industrial	Public institutions and utilities	Loss to traveling public	
Truckee River							
Lake Tahoe shoreline.....	120	0	5,000	5,000	0	0	10,000
Lake Tahoe to Donner Creek...	100	0	3,000	24,000	0	0	27,000
Donner Creek to Farad.....	200	0	0	0	103,000	0	103,000
Farad to Reno.....	500	23,000	13,000	9,000	435,000	66,000	545,000
Reno.....	200	0	136,000	1,580,000	256,000	10,000	1,982,000
Reno to Vista.....	3,800	220,000	0	0	89,000	6,000	315,000
Vista to Derby Dam.....	100	42,000	0	0	30,000	0	72,000
Derby Dam to Pyramid.....	1,250	37,000	0	0	61,000	0	98,000
Total, Truckee River.....	6,270	322,000	157,000	1,618,000	974,000	82,000	3,153,000
Carson River							
East Fork to Centerville.....	700	72,000	0	0	47,000	1,000	120,000
West Fork to Centerville.....	3,000	71,000	0	0	54,000	2,000	127,000
East and West Forks, Center-ville to Carson.....	22,000	208,000	6,000	0	130,000	8,000	352,000
Main Carson, Carson to Lahontan.....	7,000	151,000	0	0	5,000	8,000	164,000
Main Carson, below Lahontan..	300	35,000	0	0	26,000	1,000	62,000
Total, Carson River.....	33,000	537,000	6,000	0	262,000	20,000	825,000
Walker River.....	2,000	143,000	5,000	0	230,000	4,000	382,000
Grand total.....	41,270	1,002,000	168,000	1,618,000	1,466,000	106,000	4,360,000

Water-Supply Paper 888. Of the 20 gaging-station records presented in detail in this report, 15 rating curves were extended to peak stages on the basis of determination of peak discharge by indirect methods, and 5 rating curves were adequately defined by current-meter measurements. Indirect methods were used at 3 additional locations to determine peak flow.

STAGES AND DISCHARGES AT STREAM-GAGING STATIONS

Explanation of Data

The data presented for each stream-gaging station are as follows: A description of the station; a table of (1) daily mean discharges for the period November 1 to December 31, 1950, (2) monthly figures of mean discharge in cubic feet per second, (3) monthly runoff, in acre-feet, and (4) monthly runoff, in inches; and a table of stage and discharge at certain intervals during each day of the flood periods November 17-26 and November 30 to December 13, with supplemental records added as footnotes to furnish adequate detail of the behavior of each stream during the flood period.

Records of stage and contents of important lakes and reservoirs are also presented as completely as possible.

The description of the station gives information on the location, datum, effective drainage area above the gage, type and completeness of gage-height record, method of obtaining discharge records, the maximum stage and discharge during the flood, the maximum flood previously known, and additional details concerning diversions, storage, regulation, and other factors of importance to a complete description of the record.

The records of stage were obtained mostly by automatic water-stage recorders. Some records were obtained by occasional gage readings. Methods and departures from the general procedure are noted under "Gage-height record," in the description of the station.

The sequence of presentation is Walker Lake basin, Carson River basin, and Pyramid and Winnemucca Lakes basin (Truckee River basin). Records are given in downstream order of main stem stations, followed by tributaries in downstream order.

Walker Lake Basin

Walker Lake near Hawthorne, Nev.

Location.--Lat 33°35', long 113°42', in NE¹/₄ sec. 2, T. 3 N., R. 29 E., at United States Naval Depot and 3 miles northwest of Hawthorne.

Gage-height record.--Elevation determined by spirit leveling from bench mark. Elevation of bench mark is 4,053.41 ft above mean sea level, adjustment of 1912. Occasional elevations obtained.

Maxima.--November-December 1950: Elevation observed, 3,995.7 ft Nov. 4, 1923 to October 1950: Elevation observed, 4,051.3 ft Mar. 13, 1928 (Indian Service). An elevation of 4,073.0 ft, adjustment of 1912, was observed Sept. 27, 1902, by Geological Survey.

Cooperation.--Records furnished by United States Navy Department.

Elevation, in feet, above mean sea level, period
September 1950 to March 1951

Date	Elevation	Date	Elevation
Sept. 30	3,999.0	Dec. 11	3,993.4
Oct. 6	3,999.0	Feb. 15	3,993.9
Nov. 4	3,993.7	Mar. 23	3,999.0

WALKER LAKE BASIN

925

Bridgeport Reservoir near Bridgeport, Calif.

Location.--Lat 38°19'30", long 119°12'50", in SE¼ sec. 34, T. 6 N., R. 25 E., at Bridgeport Dam on East Walker River, 4½ miles north of Bridgeport. Datum of gage is at mean sea level.

Drainage area.--362 sq mi.

Gage-height record.--Float gage readings made about 8 a.m. daily.

Maxima.--November-December 1950: Contents, 35,960 acre-ft Dec. 13 (elevation, 6,457.68 ft).

1926 to October 1950: Contents, 44,580 acre-ft June 12, 1938 (elevation, 6,460.7 ft).

Remarks.--Reservoir is formed by earthfill, rock-faced dam. Storage began Dec. 8, 1923; dam completed in November 1924. Capacity, 42,460 acre-ft between elevations 6,412 ft (still of outlet gage) and 6,460 ft (crest of spillway). No dead storage. Water is used for Walker River Irrigation District. Contents correspond to gage readings made about 8 a.m. daily. Elevations and capacity table furnished by Walker River Irrigation District.

Elevation, in feet, and contents, in acre-feet, at 8 a.m. of indicated day 1950

Day	November		December	
	Elevation	Contents	Elevation	Contents
1	6,439.60	5,920	6,452.70	24,040
2	6,439.80	6,080	6,452.85	24,350
3	6,440.00	6,240	6,453.50	25,760
4	6,440.20	6,420	6,454.40	27,780
5	6,440.35	6,550	6,454.95	29,040
6	6,440.50	6,680	6,455.30	29,880
7	6,440.60	6,770	6,455.70	30,850
8	6,440.75	6,900	6,456.45	32,710
9	6,440.85	6,990	6,457.15	34,510
10	6,440.95	7,080	6,457.30	34,900
11	6,441.05	7,170	6,457.45	35,300
12	6,441.20	7,310	6,457.60	35,700
13	6,441.35	7,460	6,457.68	35,960
14	6,441.50	7,600	6,457.61	35,700
15	6,441.60	7,700	6,457.41	35,170
16	6,441.75	7,840	6,457.28	34,900
17	6,441.90	7,980	6,457.10	34,380
18	6,442.00	8,130	6,456.95	33,980
19	6,444.60	10,910	6,457.00	34,110
20	6,446.00	12,630	6,456.95	33,980
21	6,447.40	14,580	6,457.02	34,110
22	6,449.00	17,060	6,457.10	34,380
23	6,449.90	18,610	6,457.15	34,510
24	6,450.60	19,880	6,457.25	34,770
25	6,451.00	20,620	6,457.25	34,770
26	6,451.40	21,400	6,457.30	34,900
27	6,451.70	21,990	6,457.35	35,040
28	6,451.95	22,480	6,457.40	35,170
29	6,452.20	23,000	6,457.40	35,170
30	6,452.45	23,520	6,457.40	35,170
31			6,457.45	35,300
Change in contents during month.	-	+17,720	-	+11,780

FLOODS OF 1950 IN WESTERN NEVADA

East Walker River near Bridgeport, Calif.

Location.--Lat 38°19'40", long 119°12'50", in SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 34, T. 6 N., R. 25 E., 1,500 ft downstream from Bridgeport Reservoir, 5 miles north of Bridgeport, and 10 miles upstream from Sweetwater Creek.

Drainage area.--362 sq mi.

Gage-height record.--Water-stage recorder graph.

Discharge record.--Stage-discharge relation defined by current-meter measurements. Backwater from aquatic vegetation Nov. 1-12.

Maxima.--November-December 1950: Discharge, 580 cfs 4 p.m. Dec. 14 to 10 a.m. Dec. 16 (gage height, 2.66 ft).
1921 to October 1950: Discharge, 1,240 cfs Jan. 22, 1943 (gage height, 4.5 ft).

Remarks.--Diversion for irrigation of meadow and pasture lands near Bridgeport. Flow regulated by Bridgeport Reservoir (see preceding page).

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	3.8	5.0	9	3.8	55	17	3.0	449	25	4.9	119
2	3.8	5.0	10	3.8	182	18	3.2	358	26	5.0	117
3	3.8	5.3	11	3.8	210	19	3.4	244	27	5.0	117
4	3.8	5.4	12	2.9	296	20	3.6	154	28	5.0	117
5	3.8	5.4	13	.7	424	21	4.1	122	29	5.0	117
6	3.8	5.4	14	.6	514	22	4.6	122	30	5.0	117
7	3.8	5.5	15	1.5	580	23	4.7	119	31		117
8	3.8	5.9	16	3.0	533	24	4.7	119			
Monthly mean discharge, in cfs.....										3.72	172
Runoff, in acre-feet.....										222	10,600
Runoff, in inches.....										-	-

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1950

Hour	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge
	November 17	November 18	November 19	November 20	November 21	November 22	November 23	November 24	November 25	November 29	November 30	December 1
2												
4												
6												
8												
10	0.15	3.0	0.16	3.2	0.17	3.4	0.18	3.6	0.19	3.8	0.22	4.7
2												
4												
6												
8												
10												
12	.15	3.0	.16	3.2	.17	3.4	.18	3.6	.21	4.4	.22	4.7
	November 23	November 24	November 25	November 29	November 30	December 1						
4												
8	0.22	4.7	0.22	4.7	0.23	5.0	0.23	5.0	0.23	5.0	0.23	5.0
4												
8												
12	.22	4.7	.22	4.7	.23	5.0	.23	5.0	.23	5.0	.23	5.0
	December 2	December 3	December 4	December 5	December 6	December 7						
2												
4												
6												
8												
10	0.23	5.0	0.24	5.4	0.24	5.4	0.24	5.4	0.24	5.4	.24	5.4
2												
4												
6												
8												
10												
12	.23	5.0	.24	5.4	.24	5.4	.24	5.4	.24	5.4	.24	5.4
	December 8	December 9	December 10	December 11	December 12	December 13						
4	0.27	6.4										
8	.25	5.8	0.25	5.8	1.53	210	1.53	210	1.53	210	2.22	425
4												
8												
12	.25	5.8	1.27	147	1.53	210	1.53	210	2.21	421	2.22	425

Supplemental record.--Dec. 9, 2:30 p.m., 0.25 ft, 5.8 cfs; 3:45 p.m., 1.10 ft, 111 cfs; 6 p.m., 1.27 ft, 147 cfs; Dec. 10, 10 a.m., 1.27 ft, 147 cfs; 11 a.m., 1.53 ft, 210 cfs; Dec. 12, 1 p.m., 1.53 ft, 210 cfs; 3 p.m., 2.13 ft, 394 cfs; 4:30 p.m., 2.13 ft, 394 cfs; 5 p.m., 2.23 ft, 428 cfs; Dec. 14, 4 p.m. to Dec. 16, 10 a.m., 2.66 ft, 580 cfs.

WALKER LAKE BASIN

927

East Walker River above Strosnider ditch, near Mason, Nev.

Location.--Lat 38°49', long 119°03', in sec. 14, T. 11 N., R. 26 E., 0.9 mile upstream from head of Strosnider ditch, 12 miles southeast of Mason, and 13½ miles southeast of Yerington.

Gage-height record.--Water-stage recorder graph.

Discharge record.--Stage-discharge relation defined by current-meter measurements.

Maxima.--November-December 1950: Discharge, 479 cfs 5 p.m. Dec. 16 (gage height, 3.38 ft).

1947 to October 1950: Discharge, 246 cfs May 28, 1947 (gage height, 2.30 ft).

Remarks.--Diversions above and below station for irrigation. Flow regulated by Bridgeport Reservoir (see p. 925).

Mean discharge in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	33	28	9	23	60	17	20	462	25	37	133
2	32	27	10	23	59	18	20	414	26	32	133
3	28	28	11	22	163	19	22	336	27	31	131
4	27	91	12	22	202	20	48	267	28	30	131
5	26	73	13	21	266	21	46	200	29	31	133
6	26	52	14	21	369	22	42	166	30	31	133
7	25	47	15	20	450	23	39	146	31		133
8	25	55	16	20	474	24	37	141			
Monthly mean discharge, in cfs										28.7	178
Runoff, in acre-feet										1,710	10,920
Runoff, in inches										-	-

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1950

Hour	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge
	November 17		November 18		November 19		November 20		November 21		November 22	
2							1.28	51				
4							1.28	51				
6							1.27	50	1.25	47	1.19	41
8							1.26	48				
10							1.24	46				
N	0.95	20	0.95	20	0.96	21	1.22	44	1.23	45	1.20	42
2							1.21	43				
4							1.23	45				
6							1.27	50	1.22	44	1.21	43
8							1.27	50				
10							1.27	50				
12	.95	20	.96	21	1.23	45	1.27	50	1.20	42	1.20	42
	November 23		November 24		November 25		November 29		November 30		December 1	
4	1.18	40	1.16	38	1.15	37	1.09	31	1.10	32	1.05	28
8	1.18	40	1.16	38	1.15	37	1.09	31	1.10	32	1.05	28
N	1.17	39	1.15	37	1.15	37	1.09	31	1.10	32	1.05	28
4	1.16	38	1.15	37	1.15	37	1.10	32	1.09	31	1.05	28
8	1.16	38	1.15	37	1.15	37	1.10	32	1.07	30	1.04	27
12	1.16	38	1.15	37	1.15	37	1.10	32	1.06	29	1.04	27
	December 2		December 3		December 4		December 5		December 6		December 7	
2					1.05	28						
4					1.05	28	1.53	87	1.31	54		
6					1.05	28						
8					1.06	29	1.46	76	1.30	53		
10					1.06	29						
N	1.04	27	1.05	28	1.90	152	1.41	68	1.29	52	1.25	47
2					2.04	180						
4					1.98	168	1.38	64	1.28	51		
6					1.87	146						
8					1.78	129	1.36	61	1.27	50		
10					1.69	113						
12	1.04	27	1.05	28	1.64	105	1.33	57	1.26	48	1.25	47
	December 8		December 9		December 10		December 11		December 12		December 13	
4	1.29	52	1.28	51	1.31	54	1.79	131	2.13	198	2.18	208
8	1.33	57	1.37	63	1.30	53	1.86	144	2.14	200	2.19	210
N	1.35	60	1.39	66	1.38	51	2.01	174	2.15	202	2.38	248
4	1.33	57	1.37	63	1.27	50	2.06	184	2.16	204	2.70	318
8	1.31	54	1.35	60	1.27	50	2.10	192	2.16	204	2.80	341
12	1.30	53	1.33	57	1.68	112	2.12	196	2.17	206	2.84	350

Supplemental record.--Nov. 19, 11 p.m., 0.96 ft, 21 cfs; Dec. 4, 11 a.m., 1.45 ft, 74 cfs; Dec. 10, 10 p.m., 1.61 ft, 100 cfs; Dec. 13, 10 a.m., 2.20 ft, 212 cfs; Dec. 16, 5 p.m., 3.38 ft, 479 cfs.

West Walker River below East Fork, near Coleville, Calif.

Location.--Lat 38°22'45", long 119°27'00", in SE¼ sec. 9, T. 6 N., R. 23 E., 75 ft downstream from East Fork, 200 ft upstream from bridge on U. S. Highway 395, and 13 miles southeast of Coleville.

Drainage area.--182 sq mi.

Gage-height record.--Water-stage recorder graph.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 1,800 cfs and extended above on basis of slope-area determination at peak stage. Shifting-control method used Nov. 18-20.

Maxima.--November-December 1950: Discharge 6,220 cfs 11 p.m. Nov. 20 (gage height, 8.10 ft).

1938 to October 1950: Discharge, 2,490 cfs June 9, 1938 (gage height, 4.90 ft, site and datum then in use), from rating curve extended above 1,600 cfs.

Discharge known prior to 1938, 5,800 cfs Dec. 11, 1937, by slope-area determination.

Remarks.--Station is above diversions except a few small ranch ditches. Flow very slightly regulated by Poor Lake Reservoir (capacity unknown), 7 miles upstream.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	77	231	9	83	923	17	79	310	25	439	201
2	80	216	10	71	663	18	786	293	26	380	186
3	93	1,220	11	70	555	19	3,010	282	27	334	177
4	102	842	12	66	480	20	2,750	254	28	293	180
5	100	516	13	67	421	21	3,800	239	29	266	179
6	93	543	14	58	446	22	1,250	221	30	278	169
7	85	1,140	15	56	380	23	709	211	31		161
8	85	1,700	16	75	337	24	525	211			
Monthly mean discharge, in cfs.....										539	448
Runoff, in acre-feet.....										32,050	27,540
Runoff, in inches.....										3.30	2.84

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1950

Hour	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge
	November 17		November 18		November 19		November 20		November 21		November 22	
2	1.60	77	1.76	103	6.61	3,860	4.21	1,110	8.06	6,160	4.65	1,720
4	1.58	74	1.87	123	7.16	4,680	4.13	1,060	7.86	5,850	4.46	1,560
6	1.56	71	2.19	194	7.26	4,850	4.12	1,050	7.42	5,190	4.30	1,430
8	1.55	70	2.50	279	7.01	4,480	4.30	1,190	6.94	4,520	4.15	1,320
10	1.55	70	2.71	346	6.91	3,690	4.69	1,500	6.50	3,900	4.08	1,270
N	1.56	71	2.98	443	6.06	3,070	5.16	1,940	6.08	3,350	3.97	1,190
2	1.60	77	3.35	597	5.63	2,510	5.70	2,590	5.74	2,920	3.89	1,130
4	1.64	83	3.80	828	5.28	2,100	6.21	3,280	5.61	2,760	3.81	1,080
6	1.67	88	4.35	1,210	5.02	1,820	6.86	4,210	5.41	2,520	3.73	1,020
8	1.68	90	4.88	1,660	4.80	1,600	7.51	5,240	5.21	2,300	3.65	972
10	1.70	93	5.36	2,190	4.58	1,400	7.98	6,000	5.04	2,110	3.57	920
12	1.71	95	5.88	2,820	4.38	1,240	8.07	6,170	4.84	1,910	3.50	876
	November 23		November 24		November 25		November 29		November 30		December 1	
4	3.37	799	2.90	561	2.65	458	2.10	276	2.03	257	1.97	241
8	3.25	732	2.84	535	2.62	446	2.06	265	2.11	279	1.93	231
N	3.17	690	2.80	518	2.59	434	2.04	260	2.23	313	1.88	218
4	3.12	664	2.77	506	2.57	427	2.03	257	2.13	284	1.93	231
8	3.06	635	2.74	493	2.55	420	2.06	265	2.10	276	1.96	239
12	2.97	592	2.70	477	2.54	416	2.03	257	2.03	257	1.80	199
	December 2		December 3		December 4		December 5		December 6		December 7	
2	1.74	186	2.24	316	4.04	1,240	2.90	561	2.65	458	3.95	1,180
4	1.68	173	2.50	401	3.77	1,050	2.85	540	2.64	454	4.18	1,340
6	1.65	167	2.82	527	3.59	933	2.81	522	2.62	446	4.33	1,450
8	1.65	167	3.20	705	3.39	810	2.76	502	2.61	442	4.23	1,370
10	1.74	186	3.60	939	3.36	793	2.74	493	2.61	442	4.08	1,270
N	1.92	228	4.03	1,230	3.33	776	2.75	498	2.61	442	3.90	1,140
2	1.95	236	4.43	1,530	3.29	754	2.79	514	2.72	485	3.78	1,060
4	1.96	239	4.83	1,900	3.24	727	2.83	531	2.72	485	3.68	991
6	2.02	254	5.04	2,110	3.17	690	2.80	518	2.85	540	3.61	946
8	2.04	260	5.15	2,240	3.10	654	2.76	502	3.20	705	3.57	920
10	2.03	257	4.82	1,890	3.02	616	2.71	481	3.52	889	3.60	939
12	2.07	268	4.42	1,530	2.97	592	2.68	469	3.78	1,060	3.80	1,070
	December 8		December 9		December 10		December 11		December 12		December 13	
4	4.73	1,800	3.79	1,060	3.21	710	2.92	570	2.76	502	2.58	431
8	5.18	2,270	3.63	958	3.15	680	2.92	570	2.71	481	2.54	416
N	4.93	2,000	3.53	895	3.11	659	2.85	540	2.70	477	2.53	412
4	4.53	1,620	3.46	852	3.08	644	2.87	548	2.69	473	2.56	423
8	4.21	1,360	3.37	799	3.02	616	2.86	544	2.66	461	2.54	416
12	3.98	1,200	3.28	748	2.97	594	2.81	522	2.62	446	2.51	405

Supplemental record.--Nov. 19. 5:30 a.m., 7.30 ft, 4,910 cfs; Nov. 20, 11 p.m., 8.10 ft, 6,220 cfs; Dec. 2, 12:30 p.m., 1.99 ft, 246 cfs; 1:30 p.m., 1.99 ft, 246 cfs; Dec. 8, 2 a.m., 4.22 ft, 1,370 cfs; 6 a.m., 5.06 ft, 2,140 cfs; 10 a.m., 5.10 ft, 2,180 cfs.

WALKER LAKE BASIN

929

West Walker River near Hudson, Nev.

Location.--Lat 38°49', long 119°14', in SW $\frac{1}{4}$ sec. 18, T. 11 N., R. 25 E., half a mile upstream from Wilson Canyon and 3 miles southeast of Hudson.

Gage-height record.--Water-stage recorder graph.

Discharge record.--Stage-discharge relation defined by current-meter measurements. Shifting-control method used Nov. 19-22, Dec. 18-31.

Maxima.--November-December 1950: Discharge, 1,690 cfs 1 a.m. Dec. 10 (gage height, 5.36 ft).
1921-25, 1947 to October 1950: Discharge, 2,530 cfs June 7, 1922 (gage height, 6.35 ft, at approximately same site but different datum).

Remarks.--Flow somewhat regulated by storage in Topac Reservoir (see p.931). Many diversions above station for irrigation.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	60	67	9	43	1,380	17	46	498	25	140	309
2	58	61	10	45	1,540	18	49	263	26	116	302
3	50	70	11	45	1,270	19	162	290	27	108	283
4	50	415	12	45	1,090	20	806	372	28	96	272
5	49	340	13	47	942	21	828	356	29	91	272
6	47	248	14	47	614	22	1,250	336	30	66	275
7	47	578	15	47	566	23	587	325	31		272
8	46	811	16	47	542	24	211	313			
Monthly mean discharge, in cfs.										178	493
Runoff, in acre-feet.										10,610	30,290
Runoff, in inches.										-	-

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1950

Hour	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge
	November 17		November 18		November 19		November 20		November 21		November 22	
2							2.50	534	3.43	932	3.67	1,010
4			1.05	46	1.18	67	2.65	598	3.20	838	3.83	1,070
6							2.83	678	3.04	772	3.94	1,110
8			1.05	46	1.20	70	2.95	736	2.97	744	4.08	1,160
10							3.08	789	2.95	736	4.25	1,230
N	1.05	46	1.06	47	1.20	70	3.20	838	2.95	736	4.41	1,290
2					1.20	70	3.31	883	3.01	760	4.59	1,370
4			1.08	50	1.42	122	3.41	924	3.10	797	4.69	1,410
6					2.00	317	3.48	953	3.20	838	4.72	1,420
8			1.10	53	2.13	336	3.58	994	3.34	887	4.70	1,410
10					2.25	426	3.60	1,000	3.44	920	4.55	1,350
12	1.05	46	1.14	60	2.40	490	3.57	990	3.56	969	4.37	1,280
	November 23		November 24		November 25		November 29		November 30		December 1	
4	3.63	973	1.85	260							1.20	70
8	2.69	590	1.76	228							1.18	67
N	2.36	458	1.68	200	1.48	138	1.30	91	1.28	87	1.18	67
4	2.19	391	1.63	184							1.16	63
8	2.04	333	1.58	168								
12	1.93	290	1.55	159	1.44	127	1.29	89	1.25	80	1.16	63
	December 2		December 3		December 4		December 5		December 6		December 7	
2					1.40	116	2.61	558				
4			1.14	60	1.41	119	2.35	454	1.72	214	2.57	542
6					1.40	116	2.18	387				
8			1.14	60	1.57	165	2.08	348	1.68	200	2.61	558
10					2.18	387	2.00	317				
N	1.14	60	1.15	61	2.42	482	1.94	294	1.65	190	2.62	562
2					2.57	542	1.90	279				
4			1.18	67	2.72	602	1.86	264	1.62	181	2.66	578
6					2.87	662	1.83	253				
8			1.27	85	2.96	699	1.80	242	1.82	249	2.79	630
10					2.99	711	1.77	232	2.76	618		
12	1.14	60	1.37	108	2.68	666	1.76	228	2.45	494	2.96	699
	December 8		December 9		December 10		December 11		December 12		December 13	
4	3.13	768	3.92	1,090	5.28	1,660	4.53	1,340	3.99	1,120	3.64	977
8	3.20	797	4.30	1,250	5.15	1,600	4.45	1,310	3.95	1,100	3.62	969
N	3.22	805	4.64	1,390	5.02	1,550	4.35	1,270	3.92	1,090	3.59	957
4	3.24	813	5.05	1,560	4.66	1,480	4.25	1,230	3.89	1,080	3.58	953
8	3.35	858	5.25	1,650	4.72	1,420	4.17	1,190	3.86	1,170	3.54	936
12	3.62	969	5.35	1,690	4.65	1,390	4.09	1,160	3.72	1,010	2.98	707

Supplemental record.--Nov. 19, 3 p.m., 1.20 ft, 70 cfs; Nov. 23, 2 a.m., 4.09 ft, 1,160 cfs; 6 a.m., 3.07 ft, 744 cfs; 10 a.m., 2.49 ft, 510 cfs; Dec. 4, 7 a.m., 1.40 ft, 116 cfs; 9:45 p.m., 3.00 ft, 715 cfs; Dec. 6, 7 p.m., 1.61 ft, 177 cfs; Dec. 8, 6 p.m., 3.25 ft, 818 cfs; Dec. 10, 1 a.m., 5.36 ft, 1,690 cfs.

FLOODS OF 1950 IN WESTERN NEVADA

East Fork West Walker River near Bridgeport, Calif.

Location.--Lat 38°21'30", long 119°26'30", in NW¼NW¼ sec. 22, T. 6 N., R. 23 E., three-quarters of a mile north of Sonora Junction, 1½ miles upstream from mouth, and 14 miles northwest of Bridgeport. Altitude of gage is 6,790 ft (from topographic map).

Drainage area.--63 sq mi.

Gage-height record.--Water-stage recorder graph.

Discharge records.--Stage-discharge relation defined by current-meter measurements below 300 cfs and extended to peak stage on basis of slope-area determinations at gage heights, 2.24 and 2.60 ft. Shifting-control method used Nov. 1-9, 12, 13. Stage-discharge relation affected by ice Nov. 10, 11, 14-16, Dec. 31.

Maxima.--November-December 1950: Discharge, 650 cfs 3 p.m. Dec. 3 (gage height, 2.60 ft).

1944 to October 1950: Discharge, 660 cfs Feb. 2, 1945 (gage height, 2.69 ft), from rating curve extended above 270 cfs on basis of velocity-area study.

Remarks.--Small diversions above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	20	44	9	18	166	17	21	68	25	75	48
2	19	49	10	17	130	18	192	64	26	66	44
3	20	394	11	17	112	19	233	61	27	59	44
4	20	161	12	17	99	20	235	57	28	54	46
5	19	103	13	16	89	21	286	53	29	50	42
6	18	128	14	15	100	22	151	50	30	56	40
7	18	227	15	15	81	23	108	50	31		40
8	18	335	16	17	71	24	88	53			
Monthly mean discharge, in cfs.....										65.3	98.4
Runoff, in acre-feet.....										3,880	6,050
Runoff, in inches.....										1.16	1.80

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1950

Hour	Gage height		Dis-charge		Gage height		Dis-charge		Gage height		Dis-charge		Gage height		Dis-charge	
	November 17		November 18		November 19		November 20		November 21		November 22		November 23		November 24	
2			0.94	24	2.17	378	1.48	117	2.20	392	1.69	180				
4			1.05	36	2.12	354	1.48	117	2.15	368	1.65	167				
6			1.35	86	2.02	309	1.54	134	2.07	332	1.62	157				
8			1.47	114	1.93	271	1.61	154	2.00	300	1.60	151				
10	0.88	20	1.58	145	1.82	227	1.70	183	1.97	287	1.59	142				
N			1.74	197	1.75	201	1.75	201	1.92	266	1.60	151				
2			1.87	246	1.72	190	1.85	233	1.90	258	1.60	151				
4			1.90	258	1.67	173	1.98	292	1.88	250	1.59	148				
6			2.02	309	1.65	167	2.10	345	1.86	242	1.57	142				
8			2.05	322	1.58	145	2.18	383	1.83	231	1.55	136				
10			2.13	359	1.53	131	2.20	392	1.78	212	1.52	128				
12	.92	23	2.18	383	1.50	122	2.22	402	1.73	194	1.50	122				
November 23			November 24		November 25		November 29		November 30		December 1					
4	1.47	114	1.38	93	1.31	77	1.15	50	1.15	50	1.10	42				
8	1.45	110	1.36	88	1.30	75	1.14	48	1.26	68	1.09	41				
N	1.45	110	1.35	86	1.30	75	1.15	50	1.24	64	1.10	42				
4	1.44	107	1.35	86	1.30	75	1.16	51	1.19	56	1.17	52				
8	1.41	100	1.34	84	1.29	73	1.16	51	1.16	51	1.11	44				
12	1.39	95	1.33	82	1.28	71	1.15	50	1.12	45	1.05	36				
December 2			December 3		December 4		December 5		December 6		December 7					
2	1.04	35	1.39	95	1.76	227					1.87	271				
4	1.05	36	1.58	145	1.66	190	1.35	102	1.29	89	2.05	355				
6	1.09	41	1.60	219	1.59	167					1.96	312				
8	1.14	46	2.02	309	1.54	152	1.32	96	1.29	89	1.83	255				
10	1.15	50	2.23	406	1.52	146					1.71	208				
N	1.19	56	2.57	622	1.56	158	1.36	105	1.31	93	1.65	187				
2	1.21	59	2.54	616	1.56	158			1.37	107	1.63	180				
4	1.20	57	2.55	622	1.54	152	1.39	112	1.44	124	1.61	173				
6	1.16	51	2.56	628	1.50	140			1.48	135	1.57	161				
8	1.15	50	2.36	517	1.45	127	1.35	102	1.76	227	1.58	164				
10	1.18	54	2.12	390	1.41	117			1.76	227	1.69	201				
12	1.26	68	1.92	293	1.38	109	1.31	93	1.84	259	1.85	263				
December 8			December 9		December 10		December 11		December 12		December 13					
4	2.35	512	1.63	180	1.48	135	1.40	114	1.34	100	1.27	85				
8	2.23	448	1.59	167	1.45	127	1.39	112	1.34	100	1.27	85				
N	1.96	312	1.59	167	1.46	130	1.38	109	1.33	98	1.29	89				
4	1.85	263	1.58	164	1.47	132	1.40	114	1.34	100	1.32	96				
8	1.78	234	1.54	152	1.44	124	1.39	112	1.33	98	1.30	91				
12	1.69	201	1.50	140	1.42	119	1.37	107	1.30	91	1.28	87				

Supplemental record.--Nov. 20, 11 p.m., 2.23 ft, 407 cfs; Nov. 30, 9 a.m., 1.28 ft, 71 cfs; Dec. 1, 5 p.m., 1.17 ft, 52 cfs; Dec. 3, 11:30 a.m., 2.42 ft, 517 cfs; 1 p.m., 2.53 ft, 611 cfs; 3 p.m., 2.60 ft, 650 cfs; 5 p.m., 2.54 ft, 616 cfs; Dec. 6, 5:30 p.m., 1.45 ft, 127 cfs; 7 p.m., 1.68 ft, 197 cfs; 8:30 p.m., 1.76 ft, 227 cfs; 11 p.m., 1.76 ft, 227 cfs; Dec. 7, 1 a.m., 1.82 ft, 250 cfs; 5 a.m., 2.05 ft, 355 cfs; 7:30 p.m., 1.56 ft, 158 cfs; Dec. 8, 1 a.m., 1.96 ft, 312 cfs; 2 a.m., 2.21 ft, 437 cfs; 3 a.m., 2.33 ft, 501 cfs; 6 a.m., 2.27 ft, 469 cfs; 10 a.m., 2.08 ft, 370 cfs; Dec. 9, 10 a.m., 1.57 ft, 161 cfs.

WALKER LAKE BASIN

931

Topaz Reservoir near Topaz, Calif.

Location.--Lat 38°41', long 119°31', in sec. 28, T. 10 N., R. 22 E., 6 miles north of Topaz. Datum of gage is at mean sea level (levels by Walker River Irrigation District).

Gage-height record.--Float and staff gages at outlet works read at unscheduled times.

Maxima.--November-December 1950: Contents, 51,150 acre-ft Dec. 3, 1951 (elevation, 5,001.30 ft).
1931 to October 1950: Contents, 60,240 acre-ft June 30, 1941 (elevation, 5,005.35 ft).

Remarks.--Topaz Reservoir, formerly known as Alkali Lake, was formed by the diversion of water from West Walker River through a feeder canal and the construction of an outlet tunnel through a low saddle in rim of lake. Storage began Jan. 30, 1922. Usable capacity, 59,440 acre-ft between elevations 4,972.3 ft (lowest practical elevation for diversion through tunnel, bottom of outlet tunnel at elevation 4,970 ft) and 5,005 ft (3 ft below top of levee). Capacity of reservoir increased from about 45,000 acre-ft to 59,440 acre-ft in October 1937 by an earthfill, rock-faced levee at south end. Water is used for irrigation in Walker River Irrigation District. Elevations furnished by Walker River Irrigation District.

Elevation, in feet, and contents, in acre-feet, on indicated day, 1950

Day	November		December	
	Elevation	Contents	Elevation	Contents
1	4,981.63	14,790	4,996.22	40,510
2	4,981.66	14,840	4,996.52	41,110
3	4,981.75	14,990	4,996.93	41,940
4	4,981.89	15,220	4,998.78	45,760
5	4,982.03	15,450	4,999.58	47,450
6	4,982.18	15,700	5,000.15	48,670
7	4,982.31	15,910	5,000.43	49,270
8	4,982.43	16,110	5,000.96	50,410
9	4,982.55	16,310	5,001.30	51,150
10	4,982.65	16,470	5,001.15	50,830
11	4,982.72	16,590	5,000.74	49,940
12	-	-	5,000.48	49,380
13	4,982.90	16,880	5,000.21	48,800
14	-	-	5,000.20	48,770
15	4,983.09	17,200	5,000.29	48,970
16	-	-	5,000.29	48,970
17	-	-	5,000.27	49,920
18	-	-	5,000.45	49,310
19	4,984.60	19,720	5,000.52	49,460
20	4,986.46	22,860	5,000.52	49,460
21	4,988.46	26,290	5,000.52	49,460
22	4,990.82	30,410	5,000.52	49,460
23	4,992.00	32,510	5,000.53	49,480
24	4,992.91	34,160	5,000.53	49,480
25	4,993.56	35,350	5,000.54	49,510
26	4,994.18	36,520	5,000.54	49,510
27	4,994.65	37,420	5,000.54	49,510
28	4,995.09	38,270	-	-
29	4,995.50	39,070	-	-
30	4,995.87	39,810	5,000.57	49,570
31	-	-	5,000.54	49,510
Change in contents during month	-	+25,100	-	+9,700

Humboldt-Carson Sink Basin

Carson River Basin

East Fork Carson River above Soda Springs ranger station, near Markleeville, Calif.

Location.--Lat 38°30', long. 119°41', in sec. 28, T. 8 N., R. 21 E., half a mile downstream from Murray Canyon Creek, 2 miles southwest of Soda Springs ranger station, and 14 miles southeast of Markleeville. Altitude of gage is 6,820 ft (from topographic map).

Drainage area.--30 sq mi.

Gage-height record.--Water-stage recorder graph.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 320 cfs and extended above on basis of slope-area determination at peak stage. Shifting-control method used Nov. 1-7.

Maxima.--November-December 1950: Discharge, 3,570 cfs 9:30 p.m. Nov. 20 (gage height, 7.62 ft).

1946 to October 1950: Discharge, 652 cfs May 31, 1950 (gage height, 4.27 ft).

Remarks.--No diversion above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	17	78	9	16	248	17	24	83	25	156	47
2	20	77	10	12	185	18	795	78	26	134	44
3	23	388	11	12	157	19	1,130	70	27	114	41
4	22	207	12	12	135	20	1,920	64	28	101	40
5	21	131	13	12	118	21	1,220	60	29	91	38
6	18	205	14	9.6	124	22	360	55	30	95	36
7	16	384	15	13	101	23	234	51	31		32
8	16	593	16	16	91	24	184	50			
Monthly mean discharge, in cfs.....										227	129
Runoff, in acre-feet.....										13,510	7,950
Runoff, in inches.....										8.45	4.97

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1950

Hour	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge
	November 17		November 18		November 19		November 20		November 21		November 22	
2			1.82	54	6.52	2,230	3.53	371	6.68	2,410	3.83	472
4	1.34	19	1.93	67	6.43	2,130	3.55	378	6.24	1,940	3.72	433
6			2.07	83	6.25	1,950	3.89	494	5.75	1,520	3.63	403
8	1.34	19	2.49	143	5.62	1,430	5.20	1,160	5.43	1,300	3.55	378
10			3.04	245	4.95	1,010	6.03	1,750	5.10	1,100	3.49	359
N	1.37	20	3.69	423	4.52	772	6.48	2,190	4.86	957	3.43	342
2			4.32	675	4.24	639	6.73	2,470	4.71	872	3.39	330
4	1.41	22	5.02	1,050	4.07	566	6.85	2,610	4.59	808	3.35	320
6			5.76	1,530	3.95	518	7.16	2,980	4.42	723	3.30	306
8	1.57	32	6.05	1,760	3.82	468	7.45	3,540	4.25	644	3.26	296
10			6.51	2,220	3.68	419	7.55	3,480	4.07	566	3.21	284
12	1.74	46	6.69	2,420	3.58	387	7.17	2,990	3.94	514	3.16	272
	November 23		November 24		November 25		November 29		November 30		December 1	
4	3.09	256	2.79	196	2.60	162	2.16	95	2.13	91	2.05	81
8	3.02	241	2.74	187	2.57	157	2.14	92	2.27	110	2.00	75
N	2.96	229	2.70	180	2.54	152	2.13	91	2.20	100	2.03	78
4	2.93	223	2.69	178	2.54	152	2.12	90	2.16	95	2.05	81
8	2.89	215	2.68	176	2.54	152	2.11	88	2.12	90	2.01	76
12	2.84	206	2.65	171	2.50	145	2.10	87	2.08	85	1.99	74
	December 2		December 3		December 4		December 5		December 6		December 7	
2	1.96	70	2.25	107	3.27	298			2.31	116	3.75	444
4	1.98	72	2.43	134	3.11	260			2.30	114	4.05	559
6	2.03	78	2.63	167	2.98	233	2.45	137	2.30	114	4.03	549
8	2.10	87	2.88	213	2.89	215			2.30	114	3.82	468
10	1.96	70	3.20	281	2.81	200			2.32	117	3.59	390
N	1.99	74	3.79	458	2.74	187	2.40	129	2.34	120	3.42	339
2	2.04	80	4.24	639	2.70	180			2.55	154	3.28	301
4	2.02	77	4.38	704	2.66	173			2.70	180	3.21	284
6	2.01	76	4.38	704	2.62	166	2.37	124	2.86	209	3.18	276
8	2.00	75	4.04	553	2.58	159			3.58	387	3.15	270
10	2.04	80	3.78	454	2.55	154			3.96	521	3.30	306
12	2.12	90	3.53	371	2.52	148	2.32	117	3.83	472	3.56	381
	December 8		December 9		December 10		December 11		December 12		December 13	
4	4.62	824	3.20	281	2.80	198	2.60	162	2.49	143	2.35	122
8	4.79	916	3.09	256	2.76	191	2.57	157	2.45	137	2.34	120
N	4.19	617	3.01	239	2.71	182	2.56	155	2.43	134	2.32	117
4	3.80	461	2.96	229	2.69	178	2.57	157	2.41	131	2.31	116
8	3.54	374	2.91	219	2.67	175	2.56	155	2.40	129	2.29	113
12	3.34	317	2.85	208	2.63	167	2.52	148	2.37	124	2.29	113

Supplemental record.--Nov. 18, 7:10 a.m., 2.44 ft, 135 cfs; 7:20 a.m., 2.31 ft, 116 cfs; 11:30 p.m., 6.73 ft, 2,470 cfs; Nov. 19, 3:30 a.m. 6.36 ft, 2,060 cfs; 4:30 a.m., 6.47 ft, 2,180 cfs; Nov. 20, 3 p.m., 6.85 ft, 2,610 cfs; 9:30 p.m., 7.62 ft, 3,570 cfs; Dec. 3, 5:15 p.m., 4.44 ft, 733 cfs; Dec. 6, 9:30 p.m., 3.98 ft, 529 cfs; Dec. 7, 1:30 a.m., 3.73 ft, 436 cfs; 5 a.m., 4.07 ft, 566 cfs; Dec. 8, 7:30 a.m., 4.82 ft, 934 cfs.

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Supplemental record.-Nov. 19, 2:30 a.m., 9.07 ft, 10,500 cfs; Nov. 20, 7 p.m., 9.53 ft, 11,700 cfs; Nov. 21, 12:45 a.m., 9.66 ft, 12,100 cfs; Nov. 24, 5 p.m., 2.82 ft, 878 cfs; 6 p.m., 3.02 ft, 1,010 cfs; Dec. 3, 7:45 p.m., 9.14 ft, 10,700 cfs; Dec. 7, 7 a.m., 5.68 ft, 3,630 cfs; Dec. 8, 2 a.m., 5.10 ft, 2,930 cfs; 6 a.m., 6.71 ft, 5,160 cfs; 10 a.m., 7.34 ft, 6,320 cfs; 2 p.m., 6.75 ft, 5,220 cfs.

FLOODS OF 1950 IN WESTERN NEVADA

Carson River near Carson City, Nev.

Location.--Lat 39°06'30", long 119°42'30", in NW $\frac{1}{4}$ sec. 2, T. 14 N., R. 20 E., 2 miles downstream from Clear Creek, 2 $\frac{1}{2}$ miles upstream from bridge on road to Mexican Dam, and 5 miles southeast of Carson City. Altitude of gage is 4,620 ft (from river-profile map).

Drainage area.-- 876 sq mi.

Gage-height record.--Water-stage recorder graph except for periods 12 p.m. Nov. 19 to 6 p.m. Nov. 20, 6 p.m. Nov. 21 to 12 m. Nov. 24, 6 a.m. Dec. 4 to 2 p.m. Dec. 5, and 4 to 8 a.m. Dec. 8, when gage heights were obtained from graph based on floodmarks, engineers' observations, and information from highway crews.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 6,100 cfs and extended to peak stage on basis of computation of peak flow over dam, measurement made by timing drift at gage height, 9.60 ft, and slope-area determination at gage height, 8.40 ft. Shifting-control method used Dec. 11-31.

Maxima.--November-December 1950: Discharge, 15,500 cfs 1-2 a.m. Nov. 22 (gage height, 11.4 ft, from floodmark).
1939 to October 1950: Discharge, 8,500 cfs Jan. 22, 1943 (gage height, 8.40 ft), by slope-area determination.

Remarks.--Many diversions above station for irrigation. Flow slightly regulated by several small reservoirs on tributaries.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	307	885	9	186	5,770	17	182	1,290	25	1,740	755
2	237	745	10	180	4,900	18	457	1,170	26	1,370	729
3	224	1,310	11	164	2,820	19	2,490	1,100	27	1,170	684
4	240	7,280	12	164	2,160	20	9,480	1,010	28	1,020	653
5	250	6,860	13	158	1,780	21	9,080	942	29	902	653
6	237	2,950	14	153	1,600	22	11,400	890	30	838	653
7	217	2,400	15	143	1,770	23	4,850	824	31		647
8	202	4,230	16	138	1,500	24	2,620	782			
Monthly mean discharge, in cfs.....										1,693	1,992
Runoff, in acre-feet.....										100,800	122,500
Runoff, in inches.....										2.16	2.62

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1950

Hour	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge
	November 17		November 18		November 19		November 20		November 21		November 22	
2	1.29	156	1.54	230	3.73	1,800	8.4	7,940	7.94	7,120	11.4	15,500
4	1.31	161	1.56	237	3.88	1,740	9.65	10,600	7.72	6,770	11.35	15,400
6	1.32	164	1.57	240	4.02	1,880	9.80	11,200	7.56	6,520	11.10	14,600
8	1.34	169	1.59	247	4.17	2,040	9.85	11,000	7.40	6,260	10.8	13,700
10	1.35	172	1.62	257	4.28	2,160	9.8	11,000	7.36	6,200	10.4	12,600
N	1.37	179	1.68	278	4.38	2,270	9.68	10,700	7.47	6,370	9.9	11,200
2	1.39	183	1.78	314	4.53	2,430	9.5	10,200	8.28	7,720	9.5	10,200
4	1.41	189	1.94	375	4.76	2,690	9.2	9,520	8.42	10,000	9.1	9,300
6	1.44	198	2.20	488	4.93	2,880	8.9	8,900	10.3	12,500	8.7	8,500
8	1.47	208	2.73	796	5.20	3,200	8.67	8,440	10.8	13,700	8.4	7,940
10	1.50	217	3.25	1,190	5.77	3,920	8.44	8,010	11.1	14,600	8.1	7,400
12	1.52	224	3.56	1,440	6.32	4,670	8.20	7,580	11.3	15,200	7.8	6,900
	November 23		November 24		November 25		November 29		November 30		December 1	
4	7.3	6,100	5.10	3,080	4.07	1,930	2.91	928	2.79	838	2.87	898
8	6.8	5,350	4.88	2,820	3.96	1,820	2.89	912	2.78	831	2.91	928
N	6.3	4,640	4.68	2,600	3.85	1,710	2.88	905	2.78	831	2.91	928
4	5.9	4,090	4.43	2,320	3.78	1,640	2.85	890	2.78	831	2.87	898
8	5.6	3,700	4.29	2,170	3.71	1,580	2.84	875	2.79	838	2.78	851
12	5.35	3,380	4.17	2,040	3.64	1,520	2.82	860	2.81	852	2.74	803
	December 2		December 3		December 4		December 5		December 6		December 7	
2			2.55	678	4.84	2,770	9.1	9,300	5.77	3,920	4.33	2,210
4	2.71	782	2.56	684	5.12	3,100	8.65	8,800	5.53	3,610	4.32	2,200
6			2.61	716	5.55	3,640	8.55	8,210	5.32	3,340	4.31	2,190
8	2.68	762	2.72	789	6.25	4,570	8.25	7,670	5.16	3,150	4.30	2,180
10			2.90	920	7.25	6,020	8.0	7,220	5.00	2,960	4.33	2,210
N	2.67	755	3.20	1,150	8.20	7,580	7.7	6,740	4.87	2,810	4.37	2,260
2			3.49	1,380	9.1	9,300	7.45	6,340	4.75	2,680	4.41	2,300
4	2.63	729	3.79	1,650	9.8	11,000	7.10	5,800	4.64	2,550	4.51	2,410
6			4.03	1,890	9.94	11,300	6.88	5,470	4.56	2,470	4.65	2,540
8	2.59	703	4.23	2,100	9.9	11,200	6.58	5,030	4.48	2,380	4.78	2,710
10			4.56	2,250	9.7	10,700	6.30	4,640	4.41	2,300	4.95	2,880
12	2.55	678	4.55	2,460	9.4	9,980	6.03	4,260	4.36	2,250	5.12	3,100
	December 8		December 9		December 10		December 11		December 12		December 13	
4	5.5	3,570	6.39	4,770	7.19	5,940	5.16	3,160	4.39	2,300	4.01	1,900
8	5.9	4,090	6.68	5,170	6.87	5,460	4.96	2,920	4.32	2,220	3.94	1,830
N	6.16	4,440	7.15	5,880	6.49	4,910	4.83	2,770	4.24	2,140	3.68	1,770
4	6.31	4,650	7.58	6,550	6.07	4,320	4.71	2,640	4.20	2,090	3.84	1,730
8	6.35	4,710	7.67	6,690	5.71	3,840	4.60	2,520	4.14	2,030	3.79	1,680
12	6.34	4,700	7.52	6,450	5.42	3,470	4.49	2,400	4.07	1,950	3.75	1,640

Supplemental record.--Nov. 22, 1 a.m., 11.4 ft, 15,500 cfs; Dec. 4, 7 p.m., 9.94 ft, 11,500 cfs.

935

Location.--Lat 39°17', long 119°18', in SE $\frac{1}{4}$ sec. 32, T. 17 N., R. 24 E., 2 miles west of Fort Churchill and 6 miles east of Clifton. Altitude of gage is 4,200 ft (from topographic map).

Gage-height record.--Water-stage recorder graph.

Maxima.--November-December 1950: Daily discharge, 7,850 cfs Nov. 23.

1911 to October 1950: Daily discharge, 6,300 cfs, Jan. 24, 1943 (at site then in use).

Remarks.--Several diversions above station for irrigation.

[illegible]

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1950

[illegible]

FLOODS OF 1950 IN WESTERN NEVADA

Silver King Creek near Coleville, Calif.

Location.--Lat 38°31', long 119°36', in sec. 30, T. 8 N., R. 22 E., a quarter of a mile downstream from Poison Valley, 2½ miles east of Soda Springs ranger station, and 6½ miles southwest of Coleville. Altitude of gage is 7,650 ft (from topographic map).

Drainage area.--30 sq mi.

Gage-height record.--Water-stage recorder graph.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 180 cfs and extended above on basis of slope-area determination at peak stage. Shifting-control method used Nov. 1-15. Stage-discharge relation affected by ice during parts of Nov. 30 and Dec. 2.

Maxima.--November-December 1950: Discharge, 748 cfs 8:30 p.m. Nov. 20 (gage height, 5.47 ft).

1946 to October 1950: Discharge, 220 cfs May 31, 1950 (gage height, 2.62 ft).

Remarks.--No diversion or regulation above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	15	71	9	14	208	17	37	90	25	126	54
2	15	74	10	13	172	18	284	84	26	111	53
3	15	339	11	18	153	19	415	81	27	96	52
4	15	196	12	16	133	20	494	74	28	89	52
5	14	140	13	15	121	21	397	68	29	81	50
6	13	185	14	14	127	22	229	66	30	78	45
7	13	274	15	31	106	23	176	62	31		45
8	13	342	16	24	96	24	146	59			
Monthly mean discharge, in cfs.....										101	118
Runoff, in acre-feet.....										5,990	7,280
Runoff, in inches.....										3.74	4.55

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1950

Hour	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge
	November 17		November 18		November 19		November 20		November 21		November 22	
2			1.59	44	5.17	694	2.62	220	4.68	586		
4	1.56	41	1.69	57	5.02	667	2.62	224	4.32	514	3.02	254
6			1.86	81	4.66	602	2.88	269	4.02	454		
8	1.53	38	2.11	123	4.03	490	3.38	364	3.81	412	2.92	234
10			2.45	188	3.51	389	3.97	476	3.68	382		
N	1.47	32	2.38	174	3.28	341	4.29	535	3.57	364	2.88	226
2			3.00	292	3.12	315	4.65	600	3.48	346	2.89	228
4	1.49	34	3.38	364	3.00	292	4.77	622	3.41	332	2.86	222
6			4.16	512	2.87	267	5.14	688	3.33	316		
8	1.51	36	4.37	550	2.75	244	5.44	742	3.25	300	2.78	206
10			5.00	663	2.67	229	5.42	736	3.18	286		
12	1.53	38	4.88	641	2.62	220	5.07	664	3.11	272	2.71	193
	November 23		November 24		November 25		November 29		November 30		December 1	
4	2.67	185	2.49	151	2.58	130	2.08	81	2.08		2.01	71
8	2.63	178	2.47	147	2.36	127	2.06	78	2.28		1.97	66
N	2.61	174	2.46	145	2.35	125	2.06	78	2.29		2.02	72
4	2.62	176	2.47	147	2.36	127	2.11	86	2.18		2.08	81
8	2.36	164	2.43	140	2.33	121	2.08	81	2.11		1.98	67
12	2.53	159	2.40	134	2.31	118	2.06	78	2.03	74	1.96	64
	December 2		December 3		December 4		December 5		December 6		December 7	
2			2.57	166	3.02	254			2.37	129	3.31	312
4	2.06		2.81	212	2.90	230	2.44	142	2.36	127	3.54	358
6			3.05	260	2.82	214			2.36	127	3.48	346
8	2.15		3.25	300	2.74	199	2.41	136	2.37	129	3.28	306
10			3.64	378	2.69	189			2.38	130	3.10	270
N	2.20		4.04	458	2.69	189	2.45	144	2.43	140	2.97	244
2			4.35	520	2.68	187			2.58	168	2.93	236
4	2.09	83	4.13	476	2.65	182	2.44	142	2.69	189	2.90	230
6			3.78	406	2.59	170			2.93	236	2.86	222
8	2.03	74	3.52	354	2.55	162	2.40	134	3.29	308	2.84	214
10			3.37	324	2.51	155			3.34	318	3.02	258
12	2.26	109	3.18	286	2.48	149	2.37	129	3.20	290	3.25	300
	December 8		December 9		December 10		December 11		December 12		December 13	
4	4.02	454	2.86	222	2.63	178	2.50	153	2.41	136	2.33	121
8	3.91	432	2.79	208	2.61	174	2.48	149	2.39	132	2.31	118
N	3.48	346	2.77	204	2.59	170	2.48	149	2.38	130	2.31	118
4	3.24	298	2.78	206	2.61	174	2.55	162	2.42	138	2.36	127
8	3.05	260	2.72	195	2.57	166	2.50	153	2.38	130	2.33	121
12	2.94	238	2.67	185	2.53	159	2.45	144	2.35	125	2.31	118

Supplemental record.--Nov. 18, 11:30 a.m., 2.67 ft, 229 cfs; 1 p.m., 2.58 ft, 212 cfs; 1:30 p.m., 3.15 ft, 320 cfs; 11 p.m., 4.78 ft, 623 cfs; Nov. 19, 3 a.m., 5.27 ft, 712 cfs; Nov. 20, 3 p.m., 4.78 ft, 623 cfs; 8:30 p.m., 5.47 ft, 748 cfs; Dec. 3, 1 p.m., 4.33 ft, 516 cfs; Dec. 6, 9 p.m., 3.38 ft, 326 cfs; Dec. 7, 1 a.m., 3.18 ft, 286 cfs; 5 a.m., 3.57 ft, 364 cfs; Dec. 8, 2 a.m., 3.57 ft, 364 cfs; 5 a.m., 4.07 ft, 464 cfs; 6 a.m., 3.96 ft, 442 cfs; 10 a.m., 3.68 ft, 386 cfs.

CARSON RIVER BASIN

937

Wolf Creek near Markleeville, Calif.

Location.--Lat 38°32', long 119°43', in sec. 24, T. 8 N., R. 20 E., three-quarters of a mile downstream from Bull Canyon Creek and 12 miles southwest of Markleeville.
Altitude of gage is 7,350 ft (from topographic map).

Drainage area.--9.8 sq mi.

Gage-height record.--Water-stage recorder graph except for period 4-8 a.m. Nov. 21, for which graph was interpolated.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 160 cfs and extended above on basis of slope-area determination at peak stage.

Maxima.--November-December 1950: Discharge, 1,480 cfs 5:30 p.m. Nov. 20 (gage height, 7.10 ft).
1946 to October 1950: Discharge, 224 cfs May 26, 1948, May 31, 1950; gage height, 3.95 ft May 31, 1950.

Remarks.--No diversion or regulation above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	12	65	9	11	160	17	15	47	25	107	32
2	12	64	10	9.5	116	18	18	329	42	93	31
3	16	218	11	9.5	94	19	375	39	27	83	30
4	17	159	12	9.0	79	20	827	38	28	76	29
5	14	111	13	8.4	71	21	458	37	29	73	28
6	13	137	14	7.3	65	22	219	35	30	73	28
7	12	220	15	8.7	56	23	155	34	31		26
8	12	308	16	9.5	51	24	125	34			
Monthly mean discharge, in cfs.....										106	80.1
Runoff, in acre-feet.....										6,330	4,930
Runoff, in inches.....										12.10	9.43

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1950

Hour	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge
	November 17		November 18		November 19		November 20		November 21		November 22	
2			2.00	28	5.88	759	3.79	204	5.58	672	3.28	258
4	1.58	12	2.11	32	5.69	683	3.95	224	5.50	650	3.20	248
6			2.30	42	5.13	485	4.73	368	5.08	552	3.11	236
8	1.58	12	2.55	60	4.75	373	5.92	776	4.76	489	3.05	228
10			3.00	105	4.47	308	6.31	966	4.48	440	3.01	223
N	1.63	13	3.55	172	4.24	266	6.52	1,090	4.34	416	2.96	217
2			4.38	290	4.11	246	6.26	938	4.16	388	2.94	214
4	1.75	18	5.18	501	3.98	228	6.33	978	3.99	362	2.87	205
6			5.44	590	3.85	212	6.93	1,360	3.81	334	2.82	199
8	1.80	19	5.94	784	3.81	206	6.71	1,210	3.66	312	2.76	191
10			6.22	916	3.70	192	6.55	1,110	3.51	290	2.71	185
12	1.91	24	6.02	819	3.67	188	6.20	905	3.38	272	2.66	179
	November 23		November 24		November 25		November 29		November 30		December 1	
4	2.56	167	2.25	132	2.04	111	1.60	72	1.56	69	1.47	63
6	2.47	157	2.20	127	2.01	108	1.59	71	1.69	79	1.49	64
N	2.45	154	2.18	125	2.00	107	1.58	71	1.64	75	1.53	67
4	2.41	150	2.17	124	1.99	106	1.58	71	1.60	72	1.53	67
6	2.35	144	2.11	118	1.96	103	1.57	70	1.56	69	1.50	65
12	2.30	138	2.08	115	1.93	100	1.56	69	1.53	67	1.47	63
	December 2		December 3		December 4		December 5		December 6		December 7	
2			1.65	76	2.84	201	2.17	124	1.90	97	3.40	275
4	1.46	62	1.86	93	2.73	188	2.14	121	1.89	96	3.41	276
6			2.14	121	2.62	174	2.11	118	1.90	97	3.34	267
8	1.46	62	2.54	165	2.55	166	2.08	115	1.92	99	3.09	234
10			3.18	245	2.50	160	2.05	112	1.91	98	2.92	212
N	1.47	63	3.60	303	2.44	153	2.03	110	1.98	105	2.80	196
2			3.68	315	2.39	148	2.01	108	2.17	124	2.73	188
4	1.48	64	3.73	322	2.36	145	1.99	106	2.20	127	2.69	183
6			3.58	300	2.31	139	1.97	104	2.61	175	2.66	177
8	1.48	64	3.42	278	2.27	135	1.95	102	3.15	242	2.64	177
10			3.19	247	2.24	131	1.93	100	3.02	225	2.93	213
12	1.56	69	2.98	219	2.20	127	1.92	99	3.01	223	3.22	251
	December 8		December 9		December 10		December 11		December 12		December 13	
4	4.35	418	2.69	183	2.17	124	1.91	98	1.72	82	1.61	73
6	4.22	397	2.54	165	2.11	118	1.87	94	1.70	80	1.59	71
N	3.63	308	2.45	154	2.08	115	1.85	92	1.67	78	1.58	71
4	3.32	284	2.40	149	2.07	114	1.86	93	1.66	77	1.57	70
6	3.02	225	2.31	139	2.01	108	1.82	90	1.65	76	1.56	69
12	2.86	204	2.23	130	1.96	103	1.76	85	1.63	74	1.55	68

Supplemental record.--Nov. 18, 6:25 a.m., 2.25 ft, 46 cfs; 6:30 a.m., 2.85 ft, 88 cfs; 7 a.m., 2.44 ft, 51 cfs; Nov. 19, 3 a.m., 5.95 ft, 788 cfs; Nov. 20, 11:30 a.m., 6.60 ft, 1,140 cfs; 1 p.m., 6.56 ft, 1,120 cfs; 3:30 p.m., 6.15 ft, 880 cfs; 5:30 p.m., 7.10 ft, 1,480 cfs; Nov. 30, 6 a.m., 1.72 ft, 82 cfs; Dec. 3, 3:30 p.m., 3.75 ft, 326 cfs; Dec. 7, 3 a.m., 3.45 ft, 282 cfs; Dec. 8, 2 a.m., 3.85 ft, 340 cfs; 5:30 a.m., 4.34 ft, 416 cfs; 6:30 a.m., 4.41 ft, 428 cfs; 10 a.m., 3.86 ft, 342 cfs; 2 p.m., 3.49 ft, 288 cfs; 6 p.m., 3.16 ft, 243 cfs; 10 p.m., 2.95 ft, 216 cfs.

Silver Creek below Pennsylvania Creek, near Markleeville, Calif.

Location.--Lat 38°36', long 119°47', in sec. 28, T. 9 N., R. 20 E., a quarter of a mile downstream from Pennsylvania Creek and $\frac{5}{8}$ miles south of Markleeville.

Drainage area.--20 sq mi.

Gage-height record.--Water-stage recorder graph except periods, Nov. 11-13 (recorder clock stopped) and 12 p.m. Nov. 20 to Nov. 28 (faulty intake action). During the latter period a graph was drawn, based on high-water marks, engineers' notes, and appearance of recorder graph.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 350 cfs and extended above on basis of slope-area determination at peak stage. Discharge for period of no gage-height record Nov. 11-13 interpolated. Shifting-control method used Nov. 1-20, Dec. 19-31.

Maxima.--November-December 1950: Discharge, 1,260 cfs 5 p.m. Nov. 20 (gage height, 7.95 ft).

1946 to October 1950: Discharge, 411 cfs May 26, 1948 (gage height, 3.84 ft).

Remarks.--No diversion above station. Flow partly regulated by three small reservoirs (total capacity, about 1,700 acre-ft).

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	16	47	9	11	210	17	16	63	25	117	39
2	18	46	10	9.2	155	18	474	59	26	92	35
3	25	290	11	8.6	123	19	388	57	27	74	33
4	20	174	12	7.9	103	20	742	57	28	61	32
5	18	101	13	7.2	88	21	516	49	29	54	31
6	15	171	14	6.6	96	22	308	45	30	54	29
7	14	291	15	8.9	80	23	215	42	31		25
8	13	420	16	10	72	24	156	40			
Monthly mean discharge, in cfs										116	103
Runoff, in acre-feet										6,890	6,150
Runoff, in inches										6.46	5.77

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1950

Hour	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge
	November 17		November 18		November 19		November 20		November 21		November 22	
2			2.29	49	5.32	708	2.98	166	5.1	690		
4	1.61	12	2.56	73	5.30	700	3.04	181	4.8	632	3.3	354
6			2.88	123	4.68	575	3.61	317	4.6	594		
8	1.61	12	3.09	174	4.28	497	4.92	614	4.4	556	3.2	336
10			3.68	337	3.83	379	5.64	782	4.2	518		
N	1.64	13	4.13	459	3.48	278	6.30	942	4.1	499	3.0	300
2			4.85	594	3.40	262	7.43	1,160	3.9	462		
4	1.73	17	5.57	766	3.28	236	7.25	1,120	3.8	444	2.9	283
6	1.79	19	6.16	914	3.15	210	7.30	1,130	3.7	426		
8	1.83	21	6.25	930	2.98	166	7.42	1,150	3.6	408	2.8	266
10	1.94	26	6.05	890	2.93	154	6.10	890	3.5	390		
12	2.07	34	5.60	770	2.86	137	5.5	770	3.4	372	2.7	249
	November 23		November 24		November 25		November 29		November 30		December 1	
4	2.65	240	2.2	170	1.9	127	1.17	57	1.29	54	1.20	46
8	2.55	224	2.15	162	1.85	120	1.16	56	1.34	59	1.20	46
N	2.5	216	2.1	155	1.85	120	1.14	54	1.30	55	1.25	50
4	2.4	200	2.05	148	1.8	113	1.28	53	1.29	54	1.24	49
8	2.35	192	2.0	141	1.75	106	1.27	52	1.27	52	1.20	46
12	2.3	185	1.95	134	1.7	100	1.26	51	1.25	50	1.17	43
	December 2		December 3		December 4		December 5		December 6		December 7	
2			1.48	74	2.69	247			1.61	89	3.68	422
4	1.15	41	1.74	105	2.51	218	1.77	109	1.61	89	3.50	390
6			1.96	135	2.37	196			1.61	89	3.32	358
8	1.18	44	2.38	197	2.29	184	1.72	103	1.64	93	3.08	314
10			3.12	322	2.23	174			1.65	94	2.82	269
N	1.22	47	3.65	417	2.17	166	1.69	99	1.75	106	2.68	246
2			3.70	426	2.12	158			2.14	161	2.58	229
4	1.20	46	3.78	440	2.07	151	1.67	96	2.12	158	2.53	221
6			3.85	453	1.99	140			2.96	293	2.51	218
8	1.21	46	3.45	381	1.92	130	1.64	93	3.31	356	2.45	208
10			3.23	341	1.88	124			3.14	325	2.84	273
12	1.34	59	2.93	288	1.83	117	1.62	90	3.18	332	3.24	343
	December 8		December 9		December 10		December 11		December 12		December 13	
4	4.32	541	2.64	239	2.18	167	1.89	126	1.75	106	1.63	92
8	4.30	537	2.50	216	2.12	158	1.87	123	1.74	105	1.61	89
N	3.70	426	2.42	203	2.07	151	1.89	126	1.73	104	1.60	88
4	3.49	388	2.37	196	2.10	155	1.88	124	1.72	103	1.59	87
8	3.03	305	2.29	184	2.02	144	1.83	117	1.68	98	1.57	84
12	2.81	268	2.24	176	1.94	133	1.78	110	1.66	95	1.57	84

Supplemental record.--Nov. 18, 3:30 p.m., 5.67 ft, 790 cfs; 6:30 p.m., 6.00 ft, 870 cfs; 8:30 p.m., 6.33 ft, 950 cfs; 9 p.m., 5.50 ft, 750 cfs; 10:30 p.m., 6.35 ft, 910 cfs; Nov. 19, 2:30 a.m., 5.60 ft, 770 cfs; Nov. 20, 2:30 p.m., 7.77 ft, 1,220 cfs; 4:30 p.m., 6.97 ft, 1,050 cfs; 5 p.m., 7.95 ft, 1,260 cfs; 7:30 p.m., 6.68 ft, 1,010 cfs; Dec. 3, 1 p.m., 3.79 ft, 442 cfs; Dec. 6, 5 p.m., 2.19 ft, 168 cfs; 7 p.m., 3.33 ft, 359 cfs; Dec. 7, 11 p.m., 3.16 ft, 329 cfs; Dec. 8, 2 a.m., 3.98 ft, 478 cfs; 4:30 a.m., 4.43 ft, 562 cfs; 6 a.m., 4.31 ft, 539 cfs; 7 a.m., 4.48 ft, 571 cfs; 10 a.m., 3.88 ft, 458 cfs.

CARSON RIVER BASIN

939

Markleeville Creek above Grover Hot Springs, near Markleeville, Calif.

Location.--Lat 38°42', long 119°51', in SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 23, T. 10 N., R. 19 E., half a mile upstream from Buck Creek, 4 miles upstream from mouth, and 4 miles west of Markleeville. Altitude of gage is 5,880 ft (from river-profile map, extended).

Drainage area.--14 sq mi.

Gage-height record.--Water-stage recorder graph except for periods, 10 p.m. Nov. 19 to 2 a.m. Nov. 20, 12 p.m. Nov. 21 to noon Nov. 25, for which graph was drawn based on appearance of chart and engineer's notes.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 330 cfs and extended above on basis of slope-area determination at peak stage. Shifting control method used Nov. 1-18, 21-25, Nov. 29 to Dec. 3, Dec. 17-31.

Maxima.--November-December 1950: Discharge, 1,740 cfs 2 p.m. Nov. 20 (gage height, 8.49 ft).
1946 to October 1950: Discharge, 399 cfs May 26, 1948 (gage height, 5.17 ft).

Remarks.--No diversion above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	6.3	39	9	5.6	168	17	8.3	45	25	81	26
2	7.6	39	10	4.7	114	18	370	42	26	58	23
3	10	282	11	4.5	96	19	568	38	27	50	22
4	9.7	152	12	4.3	79	20	1,100	36	28	45	21
5	9.0	83	13	4.3	66	21	582	33	29	47	20
6	6.7	142	14	3.4	70	22	187	31	30	47	19
7	5.9	258	15	2.9	59	23	134	28	31		20
8	5.9	537	16	5.2	51	24	105	28			
Monthly mean discharge, in cfs										116	86.0
Runoff, in acre-feet										6,900	5,290
Runoff, in inches										9.24	7.08

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1950

Hour	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge
	November 17		November 18		November 19		November 20		November 21		November 22	
2			2.70	25	7.25	1,120	4.6	239	7.42	1,200		
4	2.14	6.5	2.96	38	7.14	1,070	4.81	283	6.92	978	4.4	212
6			3.20	54	6.68	882	5.42	435	6.47	798		
8	2.13	6.3	3.37	70	6.12	658	6.64	866	6.03	622	4.3	195
10			3.68	106	5.68	504	7.62	1,300	5.67	501		
N	2.13	6.3	4.09	158	5.35	418	8.43	1,700	5.46	445	4.2	180
2			4.50	220	5.17	372	8.49	1,740	5.30	408		
4	2.19	7.7	5.28	400	5.02	335	8.18	1,580	5.16	375	4.2	180
6			5.97	538	4.85	293	8.10	1,540	4.97	330		
8	2.31	11	6.97	998	4.66	251	7.79	1,380	4.79	286	4.1	165
10			7.34	1,160	4.5	220	7.77	1,380	4.66	259		
12	2.50	17	7.40	1,190	4.4	203	7.71	1,340	4.5	230	4.0	151
	November 23		November 24		November 25		November 29		November 30		December 1	
4	4.0	151	3.7	119	3.4	83	3.02	48	2.96	44	2.87	38
6	3.9	138	3.6	107	3.4	83	3.00	47	3.02	48	2.76	33
N	3.8	131	3.6	107	3.36	79	2.98	45	3.05	50	2.92	42
4	3.8	131	3.5	95	3.36	79	3.01	48	3.06	51	3.02	48
8	3.7	119	3.5	95	3.36	78	2.99	46	3.00	47	2.85	38
12	3.7	119	3.5	95	3.32	74	2.97	45	2.94	43	2.82	36
	December 2		December 3		December 4		December 5		December 6		December 7	
2			3.05	50	4.60	239	3.61	96	3.38	70	5.29	402
4	2.80	35	3.23	65	4.34	193	3.58	93	3.37	69	5.38	425
6			3.40	82	4.17	168	3.54	88	3.38	70	5.18	375
8	2.82	36	3.65	111	4.06	152	3.52	85	3.38	70	4.84	291
10			4.17	176	3.97	140	3.50	83	3.40	72	4.55	230
N	2.90	41	5.00	335	3.92	134	3.49	82	3.45	78	4.40	203
2			5.53	462	3.88	129	3.48	81	3.62	97	4.30	187
4	2.93	43	5.72	516	3.84	124	3.46	79	3.95	135	4.23	176
6			5.82	546	3.79	118	3.45	78	4.20	172	4.17	168
8	2.88	40	5.57	472	3.73	111	3.42	74	4.95	318	4.12	161
10			5.27	398	3.68	105	3.40	72	5.08	350	4.24	178
12	2.92	42	4.93	312	3.64	100	3.39	71	5.05	342	4.64	247
	December 8		December 9		December 10		December 11		December 12		December 13	
4	6.08	642	4.36	197	3.83	123	3.61	96	3.50	83	3.36	68
6	6.56	834	4.19	171	3.76	114	3.59	94	3.47	80	3.34	66
N	6.10	650	4.09	157	3.72	109	3.60	95	3.45	78	3.33	65
4	5.58	475	4.06	152	3.74	112	3.65	101	3.46	79	3.34	66
8	5.04	340	3.98	141	3.70	107	3.60	95	3.43	75	3.31	63
12	4.62	243	3.90	131	3.65	101	3.54	88	3.39	71	3.30	62

Supplemental record.--Nov. 18, 11 p.m., 7.43 ft, 1,200 cfs; Nov. 20, 1 p.m., 8.39 ft, 1,680 cfs; 3 p.m., 8.22 ft, 1,600 cfs; 9 p.m., 7.84 ft, 1,410 cfs; Dec. 1, 11 a.m., 2.60 ft, 35 cfs; 1:30 p.m., 2.92 ft, 42 cfs; Dec. 3, 5:30 p.m., 5.86 ft, 558 cfs; Dec. 8, 2 a.m., 5.31 ft, 408 cfs; 6 a.m., 6.50 ft, 810 cfs; 10 a.m., 6.43 ft, 782 cfs.

FLOODS OF 1950 IN WESTERN NEVADA

Pleasant Valley Creek above Raymond Canyon Creek, near Markleeville, Calif.

Location.--Lat 38°39', long 119°50', in SE $\frac{1}{4}$ sec. 12, T. 9 N., R. 19 E., $1\frac{1}{2}$ miles upstream from Raymond Canyon Creek, $4\frac{1}{2}$ miles upstream from mouth, and 5 miles southwest of Markleeville.

Drainage area.--16 sq mi.

Gage-height record.--Water-stage recorder until 7 a.m. Nov. 20 when gage was destroyed by flood.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 340 cfs and extended to maximum recorded stage of 5.96 ft by logarithmic plotting. No record after 7 a.m. Nov. 20.

Maxima.--November-December 1950: Discharge, 2,500 cfs Nov. 20 (gage height, not determined), by slope-area determination $1\frac{1}{2}$ miles downstream.
1946 to October 1950: Discharge, 495 cfs May 26, 1948 (gage height, 3.78 ft).

Remarks.--Flow partly regulated by four small reservoirs (total capacity, about 850 acre-ft).

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	10		9	8.5		17	12		25	-	
2	14		10	6.6		18	685		26	-	
3	22		11	6.1		19	347		27	-	
4	18		12	5.5		20	-		28	-	
5	16		13	5.2		21	-		29	-	
6	12		14	4.2		22	-		30	-	
7	10		15	5.0		23	-		31	-	
8	12		16	5.2		24	-				
Monthly mean discharge, in cfs.....										-	
Runoff, in acre-feet.....										-	
Runoff, in inches.....										-	

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1950

Hour	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge
	November 17		November 18		November 19		November 20		November 21		November 22	
2	1.73	6.9	2.23	39	3.73	590	2.94	221				
4			2.38	61	3.68	564	3.37	406				
6	1.73	6.9	2.58	100	3.51	475	4.35	937				
8	1.74	7.2	2.92	203	3.42	430	-	-				
10	1.78	7.6	3.21	322	3.23	340	-	-				
N	1.80	9.2	3.66	553	3.10	263	-	-				
2	1.84	11	4.14	816	3.00	243	-	-				
4	1.87	12	4.32	920	2.90	206	-	-				
6	1.91	14	4.73	1,170	2.86	192	-	-				
8	1.99	18	5.48	1,650	2.84	196	-	-				
10	2.07	23	5.96	1,970	2.83	182	-	-				
12	2.17	31	4.11	800	2.87	196	-	-				
	November 23		November 24		November 25		November 29		November 30		December 1	
4												
8												
N												
4												
8												
12												
	December 2		December 3		December 4		December 5		December 6		December 7	
2												
4												
6												
8												
10												
N												
2												
4												
6												
8												
10												
12												
	December 8		December 9		December 10		December 11		December 12		December 13	
4												
8												
N												
4												
8												
12												

Supplemental record.--Nov. 18, 3 p.m., 4.27 ft, 891 cfs; 3:30 p.m., 4.40 ft, 966 cfs; 5 p.m., 4.65 ft, 1,120 cfs; 5:30 p.m., 4.80 ft, 1,210 cfs; 11 p.m., 4.82 ft, 1,220 cfs; Nov. 19, 3 a.m., 3.76 ft, 606 cfs; 5 a.m., 3.46 ft, 450 cfs; Nov. 20, 7 a.m., 5.29 ft, 1,520 cfs.

CARSON RIVER BASIN

941

West Fork Carson River above Woodfords, Calif.

Location.--Lat 38°47', long 119°54', in sec. 31, T. 11 N., R. 19 E., 1 mile above Horseshief Canyon Creek and 4 miles west of Woodfords. Altitude of gage is 8,860 ft (from river-profile map).

Drainage area.--53 sq mi.

Gage-height record.--Water-stage recorder graph except for period 1 a.m. to 4 p.m. Nov. 22 for which graph was drawn on basis of normal recession and by comparison with gage-height record for station downstream at Woodfords.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 630 cfs and extended above on basis of slope-area determination at peak stage.

Maxima.--November-December 1950: Discharge, 4,600 cfs 8:45 p.m. Nov. 20 (gage height, 9.62 ft).

1946 to October 1950: Discharge, 793 cfs Apr. 24, 1949 (gage height, 5.39 ft).

Remarks.--Flow slightly regulated by several small reservoirs (total capacity, about 1,500 acre-ft).

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	38	118	9	28	490	17	47	170	25	193	108
2	36	113	10	24	329	18	1,160	159	26	168	99
3	40	1,850	11	24	283	19	1,630	152	27	148	92
4	38	639	12	23	244	20	2,540	139	28	135	92
5	36	302	13	23	214	21	1,670	131	29	123	90
6	32	599	14	21	290	22	460	123	30	164	79
7	30	1,080	15	24	223	23	287	114	31		81
8	29	1,350	16	20	188	24	227	112			
Monthly mean discharge, in cfs.....										314	324
Runoff, in acre-feet.....										18,680	19,940
Runoff, in inches.....										6.61	7.05

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1950

Hour	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge
	November 17		November 18		November 19		November 20		November 21		November 22	
2	1.52	30	2.32	101	8.63	3,230	4.67	571	8.88	3,510	4.72	586
4	1.54	31	2.65	142	8.11	2,710	4.84	624	8.33	2,930	4.60	550
6	1.54	31	3.16	219	7.80	2,420	5.12	723	7.59	2,230	4.49	518
8	1.55	32	3.49	278	7.47	2,130	5.79	1,020	7.06	1,800	4.40	493
10	1.57	33	4.28	461	6.95	1,700	7.12	1,850	6.62	1,480	4.32	471
N	1.65	38	4.99	678	6.38	1,340	8.13	2,730	6.23	1,250	4.23	448
2	1.81	50	5.73	985	5.88	1,060	8.69	3,300	5.88	1,060	4.16	430
4	1.97	64	6.56	1,450	5.51	884	9.20	3,860	5.67	956	4.08	410
6	1.97	64	7.48	2,130	5.26	779	9.60	4,340	5.49	876	4.01	392
8	1.96	63	8.10	2,700	5.01	684	9.78	4,560	5.33	807	3.93	373
10	2.08	75	8.47	3,070	4.78	604	9.72	4,480	5.07	704	3.86	357
12	2.17	85	8.77	3,390	4.63	559	9.51	4,230	4.88	638	3.78	339
	November 23		November 24		November 25		November 29		November 30		December 1	
4	3.66	313	3.27	238	3.05	201	2.52	125	2.61	136	2.50	122
8	3.54	288	3.21	228	3.01	195	2.47	118	3.16	219	2.37	107
N	3.49	278	3.18	223	2.98	190	2.49	121	2.97	188	2.42	112
4	3.51	282	3.19	224	2.98	190	2.53	126	2.80	163	2.54	127
8	3.43	267	3.15	218	2.95	186	2.52	125	2.70	149	2.52	125
12	3.35	252	3.10	209	2.92	181	2.49	121	2.60	135	2.26	95
	December 2		December 3		December 4		December 5		December 6		December 7	
2	2.16	84	4.38	488	6.09	1,160	3.77	336	3.40	261	6.98	1,740
4	2.15	83	5.08	708	5.52	889	3.68	317	3.37	256	6.96	1,720
6	2.16	84	5.83	1,040	5.13	727	3.64	308	3.42	265	6.87	1,660
8	2.21	89	6.54	1,430	4.81	614	3.58	296	3.50	280	6.48	1,400
10	2.38	108	7.04	1,780	4.61	553	3.55	290	3.60	300	5.91	1,080
N	2.43	114	7.54	2,190	4.50	521	3.58	296	3.66	313	5.44	853
2	2.45	116	8.11	2,710	4.43	501	3.65	310	3.98	385	5.11	719
4	2.54	127	8.41	3,010	4.34	477	3.63	306	4.44	504	4.90	645
6	2.49	121	8.54	3,140	4.24	450	3.58	296	5.11	719	4.80	610
8	2.46	117	8.08	2,680	4.10	415	3.53	286	6.11	1,180	4.77	601
10	2.64	141	7.40	2,070	3.98	385	3.47	274	6.89	1,670	4.61	614
12	3.33	248	6.78	1,600	3.86	357	3.43	267	7.06	1,800	5.14	731
	December 8		December 9		December 10		December 11		December 12		December 13	
4	6.55	1,440	4.69	577	3.84	352	3.50	280	3.36	254	3.12	212
8	7.32	2,010	4.43	501	3.75	332	3.47	274	3.30	243	3.10	209
N	6.92	1,690	4.28	461	3.70	321	3.55	290	3.28	240	3.12	212
4	6.23	1,250	4.19	438	3.72	325	3.57	294	3.32	247	3.18	223
8	5.66	952	4.08	410	3.63	306	3.51	282	3.26	236	3.13	217
12	5.14	731	3.95	378	3.57	294	3.42	265	3.18	223	3.09	207

Supplemental record.--Nov. 19, 12:15 a.m., 8.79 ft, 3,410 cfs; Nov. 20, 1 a.m., 4.62 ft, 556 cfs; 8:45 p.m., 9.82 ft, 4,600 cfs; Dec. 3, 5:30 p.m., 8.59 ft, 3,190 cfs; Dec. 6, 11:30 p.m., 7.08 ft, 1,810 cfs; Dec. 8, 2 a.m., 5.76 ft, 1,000 cfs; 6 a.m., 7.18 ft, 1,890 cfs; 7:30 a.m., 7.33 ft, 2,010 cfs; 2 p.m., 6.57 ft, 1,450 cfs; 6 p.m., 5.96 ft, 1,100 cfs; 10 p.m., 5.40 ft, 835 cfs.

West Fork Carson River at Woodfords, Calif.

Location.--Lat 38°46'00", long 119°50'00", in SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 34, T. 11 N., R. 19 E., 0.3 mile downstream from bridge on State Route 8, 0.8 mile west of Woodfords, and 3 3/4 miles downstream from Willow Creek. Altitude of gage is 5,760 ft (from river-profile map).

Drainage area.--66 sq mi.

Gage-height record.--Water-stage recorder graph except for period 4 p.m. Nov. 18 to 2 p.m. Nov. 22 during which graph was drawn on basis of fragmentary gage-height record, high-water marks, engineer's notes, and records for station above Woodfords. Graph for period Noon to 12 p.m. Dec. 3 corrected for intake lag on basis of record at station above Woodfords.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 1,000 cfs and extended above on basis of determination at peak stage. Shifting-control method used Nov. 1-17.

Maxima.--November-December 1950: Discharge, 4,730 cfs 10 p.m. Nov. 20 (gage height, 8.35 ft, from floodmarks).

1900-20, 1936 to October 1950: Discharge, 1,570 cfs May 9, 10, 1902 (gage height, 6.6 ft, datum then in use).

Flood of Dec. 11, 1937, reached a stage of 9.0 ft (present datum), from floodmarks (discharge, 3,500 cfs, by slope-area method).

Remarks.--One small diversion above station for irrigation. Flow slightly regulated by several small reservoirs (total capacity, about 1,500 acre-ft).

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	45	130	9	35	558	17	50	195	25	216	122
2	45	115	10	30	379	18	898	178	26	166	111
3	48	1,880	11	30	327	19	1,760	169	27	163	104
4	48	720	12	30	280	20	2,380	156	28	147	100
5	45	341	13	30	246	21	1,830	146	29	139	100
6	40	580	14	29	323	22	523	136	30	161	90
7	37	1,120	15	27	253	23	329	128	31		84
8	36	1,360	16	26	213	24	253	124			
Monthly mean discharge, in cfs.....										321	347
Runoff, in acre-feet.....										19,110	21,360
Runoff, in inches.....										5.27	5.89

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1950

Hour	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge
	November 17		November 18		November 19		November 20		November 21		November 22	
2	1.27	38	1.92	93			620		3,700			660
4	1.27	38	2.05	107		3,400		700		3,200		620
6	1.29	39	2.31	138		2,600		800		2,500		590
8	1.30	40	2.79	206		2,300		1,000		2,000		560
10	1.30	40	3.14	267		1,900		1,500		1,600		530
N	1.31	40	3.80	421		1,500		2,000		1,400		510
2	1.33	42	4.57	660		1,200		2,700		1,200		490
4	1.33	49		950		1,000		3,500		1,050	3.42	467
6	1.43	63		1,400		860		4,000		1,000	3.37	452
8	1.60	76		2,000		750		4,400		920	3.29	428
10	1.77	78		2,900		660		4,730		800	3.23	411
12	1.77	78		3,200		630		4,500		720	3.16	391
	November 23		November 24		November 25		November 29		November 30		December 1	
4	3.03	357	2.65	268	2.43	224	1.91	136	1.91	136	1.93	140
8	2.94	334	2.59	255	2.40	218	1.88	132	2.44	226	1.83	125
N	2.67	317	2.55	247	2.38	214	1.85	128	2.40	218	1.77	117
4	2.89	322	2.55	247	2.37	213	1.89	134	2.22	186	1.68	132
8	2.63	307	2.53	243	2.35	209	1.92	138	2.12	169	1.91	136
12	2.74	287	2.48	233	2.32	204	1.88	132	2.03	155	1.75	114
	December 2		December 3		December 4		December 5		December 6		December 7	
2	1.64	101	3.12	380	5.25	1,280	3.13	383	2.76	291	5.85	1,740
4	1.56	92	3.90	628	4.73	985	3.07	367	2.74	287	5.86	1,750
6	1.54	89	4.43	840	4.35	804	3.00	349	2.73	285	5.79	1,690
8	1.55	90	5.16	1,230	4.10	700	2.97	342	2.81	302	5.45	1,420
10	1.59	95	5.71	1,630	3.91	630	2.93	332	2.87	317	5.05	1,160
N	1.77	117	6.30	2,130	3.78	584	2.90	324	2.95	336	4.61	925
2	1.82	124	6.82	2,650	3.72	564	2.95	336	3.13	383	4.32	791
4	1.85	128	7.15	3,020	3.64	537	2.97	342	3.48	486	4.13	712
6	1.92	138	7.42	3,360	3.55	508	2.93	332	3.98	655	4.04	677
8	1.89	134	7.20	3,080	3.43	470	2.89	322	4.83	1,040	4.00	662
10	1.90	135	6.67	2,490	3.30	431	2.83	307	5.58	1,520	4.04	677
12	2.12	169	6.04	1,900	3.21	405	2.79	298	5.95	1,820	4.22	748
	December 8		December 9		December 10		December 11		December 12		December 13	
4	5.18	1,240	4.00	662	3.21	405	2.90	324	2.77	293	2.57	251
8	6.24	2,080	3.76	577	3.13	383	2.87	317	2.70	278	2.51	239
N	5.87	1,760	3.59	521	3.08	370	2.90	324	2.67	272	2.50	237
4	5.25	1,280	3.53	502	3.09	372	2.97	342	2.71	280	2.58	253
8	4.77	1,000	3.41	464	3.03	357	2.92	329	2.67	272	2.55	247
12	4.36	808	3.30	431	2.97	342	2.83	307	2.63	263	2.51	239

Supplemental record.--Nov. 19, 1 a.m., 7.52 ft, 3,490 cfs; Nov. 20, 10 p.m., 8.35 ft, 4,730 cfs; Nov. 30, 9 a.m., 2.50 ft, 237 cfs; Dec. 1, 10 a.m., 1.74 ft, 113 cfs; Dec. 3, 6:30 p.m., 7.45 ft, 3,400 cfs; Dec. 8, 2 a.m., 4.65 ft, 945 cfs; 6 a.m., 5.87 ft, 1,760 cfs; 10 a.m., 6.12 ft, 1,970 cfs; 2 p.m., 5.52 ft, 1,480 cfs; 6 p.m., 5.04 ft, 1,150 cfs;

CARSON RIVER BASIN

943

Clear Creek near Carson City, Nev.

Location.--Sharp-crested weir, lat 39°07', long 119°49', in sec. 1, T. 14 N., R. 19 E., 5 miles upstream from mouth and 4 miles southwest of Carson City. Altitude of gage is 4,700 ft (from river-profile map).

Drainage area.--15 sq mi.

Gage-height record.--Water-stage recorder graph.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 51 cfs and extended above on basis of computation of peak flow over weir. Shifting-control method used Nov. 1-15.

Maxima.--November-December 1950: Discharge, 56 cfs 5:30 p.m. Dec. 3 (gage height, 1.95 ft).

1948 to October 1950: Discharge, 44 cfs Jan. 22, 1950 (gage height, 1.58 ft).

Remarks.--Four small diversions for irrigation of about 150 acres of hay meadows and pasture above station. Practically all remaining flow diverted below station for irrigation.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	5.0	11	9	3.8	21	17	7.2	12	25	12	8.6
2	5.0	10	10	4.0	18	18	35	11	26	11	8.2
3	5.0	41	11	4.5	18	19	27	11	27	11	7.9
4	4.7	23	12	4.5	16	20	29	10	28	11	7.9
5	4.5	20	13	4.7	14	21	26	9.6	29	10	7.9
6	4.3	22	14	5.2	18	22	18	9.2	30	12	8.2
7	4.0	23	15	5.2	14	23	14	8.9	31		7.9
8	4.0	29	16	19	12	24	13	8.6			
Monthly mean discharge, in cfs										10.8	14.6
Runoff, in acre-feet										840	898
Runoff, in inches										0.80	1.12

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1950

Hour	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge
	November 17		November 18		November 19		November 20		November 21		November 22	
2	0.48	7.0	0.89	15	1.53	38	0.71	19	1.21	34		
4	.45	7.7	.86	22	1.15	33	.77	19	1.11	31	0.78	19
6	.45	6.7	.96	27	1.07	30	.77	19	1.05	29		
8	.44	6.4	1.02	28	1.01	28	.88	23	1.00	28	.76	18
10	.44	6.4	1.06	30	.97	26	1.00	28	.96	26		
N	.44	6.4	1.44	41	.92	25	1.05	23	.93	25	.74	17
2	.14	6.4	1.00	45	.99	23	1.10	31	.90	24		
4	.45	6.7	1.60	45	.85	22	1.18	34	.86	22	.73	17
6	.47	7.3	1.57	45	.83	21	1.09	31	.85	22		
8	.48	7.6	1.68	49	.92	21	1.38	39	.84	21	.70	16
10	.53	9.2	1.69	48	.73	19	1.48	42	.82	21		
12	.64	13	1.62	46	.77	19	1.42	40	.81	20	.70	16
	November 23		November 24		November 25		November 29		November 30		December 1	
4	0.63	15	0.84	13			0.57	11	0.58	11	0.58	11
6	.63	15	.83	13			.57	11	.68	15	.57	11
N	.67	14	.83	13	0.82	12	.56	10	.63	13	.53	9.2
4	.65	14	.83	13			.56	10	.59	11	.58	11
6	.65	14	.82	12			.56	10	.58	11	.58	11
12	.64	13	.62	12	.60	12	.55	10	.58	11	.55	10
	December 2		December 3		December 4		December 5		December 6		December 7	
2			0.92	21	1.57	39	0.97	23	0.72	18	1.00	28
4	0.54	9.6	.90	24	1.17	33	.85	22	.76	16	.98	27
6			1.07	30	1.12	32	.83	21	.77	19	.97	27
8	.53	9.2	1.50	43	1.07	30	.82	21	.86	22	.84	21
10			1.64	47	1.04	29	.81	20	.91	20	.83	21
N	.53	9.2	1.72	49	1.32	23	.82	21	.79	19	.82	21
2			1.72	50	.98	27	.81	20	.85	22	.81	20
4	.56	10	1.95	53	.95	26	.80	20	.84	21	.82	21
6			1.90	54	.93	25	.79	19	.86	22	.83	21
8	.57	11	1.69	48	.92	25	.78	19	1.09	31	.95	22
10			1.61	46	.90	24	.77	19	1.08	30	.88	23
12	.67	14	1.48	42	.89	23	.77	19	1.05	29	.96	26
	December 8		December 9		December 10		December 11		December 12		December 13	
4	1.00	28	0.85	22	0.78	19	0.72	16	0.71	16		
6	1.13	32	.84	21	.77	19	.71	16	.70	16		
N	1.20	34	.83	21	.76	18	.77	19	.70	16	0.66	14
4	1.00	28	.81	20	.74	17	.78	19	.68	15		
6	.93	25	.80	20	.74	17	.74	17	.68	15		
12	.88	23	.79	19	.73	17	.73	17	.67	14	.65	14

Supplemental record.--Nov. 18, 7 a.m., 1.05 ft, 29 cfs; 10:45 a.m., 1.11 ft, 31 cfs; 3 p.m., 1.64 ft, 47 cfs; Nov. 20, 9:30 p.m., 1.53 ft, 43 cfs; Dec. 3, 5 p.m., 1.95 ft, 56 cfs; Dec. 4, 5:30 a.m., 1.50 ft, 37 cfs; Dec. 6, 7:30 a.m., 0.86 ft, 22 cfs; 9 p.m., 1.13 ft, 32 cfs; Dec. 8, 7 a.m., 1.22 ft, 35 cfs; Dec. 11, 1 p.m., 0.84 ft, 21 cfs.

Pyramid and Winnemucca Lakes Basin

Pyramid Lake near Nixon, Nev.

Location.--Lat 39°50'30", long 118°28'00", in SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 24, T. 23 N., R. 22 E., at southwest corner of concrete bridge No. 296 B, 150 ft southwest of milepost 297, 6 miles west of Nixon, and 11.5 miles south along Southern Pacific Railroad from station at Sutcliffe.

Gage-height record.--Lake elevations determined by leveling from bench mark N 21 of U. S. Coast and Geodetic Survey. Elevation of bench mark is 3,940.04 ft above mean sea level, datum of 1929. Occasional elevations obtained.

Maxima.--November-December 1950: Elevation observed, 3,804.01 ft Dec. 29.
1926 to October 1950: Elevation observed, 3,848.5 ft, datum of 1929, June 1926.

Elevation, in feet, above mean sea level, period
September 1950 to February 1951

Date	Elevation	Date	Elevation
Sept. 25	3,802.11	Dec. 29	3,804.01
Nov. 15	3,801.43	Jan. 19	3,804.46
Dec. 10	3,803.10	Feb. 26	3,805.27

PYRAMID AND WINNEMUCCA LAKES BASIN

945

Truckee River near Truckee, Calif.

Location.--Lat 39°17'30", long 120°12'30", in SW¹/₄NE¹/₄ sec. 28, T. 17 N., R. 16 E., 1.4 miles upstream from Donner Creek and 2¹/₂ miles southwest of Truckee. Altitude of gage is 5,920 ft (from topographic map).

Drainage area.--548 sq mi, includes 519 sq mi affected by storage in Lake Tahoe.

Gage-height record.--Water-stage recorder graph except for period 4 p.m. Nov. 22 to 8 a.m. Nov. 23 when graph was interpolated.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 2,300 cfs and extended above on basis of slope-area determination at peak stage. Shifting-control method used Nov. 18 to Dec. 3.

Maxima.--November-December 1950: Discharge, 6,480 cfs 10:30 p.m. Nov. 20 (gage height, 7.62 ft).

1944 to October 1950: Discharge, 1,110 cfs Feb. 2, 1945 (gage height, 3.34 ft); gage height, 6.07 ft Jan. 25, 1949 (ice jam).

Remarks.--Flow regulated by Lake Tahoe. Above Lake Tahoe outlet 519 sq mi was non-contributing during peak of November 1950.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	157	131	9	190	856	17	152	1,060	25	293	1,380
2	170	113	10	167	578	18	2,590	1,120	26	237	1,370
3	194	2,010	11	52	494	19	1,990	1,150	27	204	1,550
4	194	1,170	12	48	411	20	3,920	1,170	28	184	1,350
5	194	601	13	52	350	21	2,750	1,220	29	162	1,360
6	194	730	14	50	542	22	820	1,270	30	164	1,380
7	194	1,070	15	46	613	23	511	1,410	31		1,370
8	194	1,670	16	67	882	24	372	1,400			
Monthly mean discharge, in cfs.....										551	1,019
Runoff, in acre-feet.....										32,770	62,640
Runoff, in inches.....										-	-

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1950

Hour	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge
	November 17		November 18		November 19		November 20		November 21		November 22	
2	1.41	92	2.48	546	5.94	3,910	3.65	1,380	6.90	5,340	3.19	1,020
4	1.42	94	2.76	715	5.42	3,190	3.77	1,490	6.60	4,890	3.10	944
6	1.43	97	3.09	940	4.90	2,550	4.15	1,840	6.01	4,000	3.02	890
8	1.44	99	3.44	1,220	4.42	2,080	4.92	2,570	5.43	3,200	2.95	838
10	1.45	102	3.77	1,490	4.05	1,740	5.48	3,260	4.88	2,550	2.88	789
N	1.46	105	4.49	2,150	3.79	1,510	5.89	3,840	4.51	2,170	2.84	768
2	1.52	121	5.28	3,000	3.59	1,350	6.32	4,470	4.21	1,890	2.82	754
4	1.60	144	5.86	3,780	3.49	1,250	7.15	5,730	3.96	1,660	2.90	803
6	1.69	173	6.34	4,600	3.39	1,180	7.36	6,070	3.75	1,460	2.84	768
8	1.84	228	6.72	5,070	3.31	1,110	7.45	6,210	3.57	1,310	2.75	712
10	2.04	315	6.75	5,120	3.34	1,140	7.59	6,430	3.42	1,200	2.70	679
12	2.26	425	6.40	4,590	3.47	1,230	7.28	5,940	3.30	1,100	2.65	646
	November 23		November 24		November 25		November 29		November 30		December 1	
4	2.55	584	2.22	402	2.04	314	1.67	168	1.67	168	1.58	139
8	2.45	527	2.18	382	2.01	301	1.65	162	1.75	194	1.54	126
N	2.38	489	2.15	368	1.99	293	1.65	162	1.67	168	1.55	129
4	2.36	478	2.13	359	1.96	280	1.65	162	1.64	156	1.56	134
8	2.31	452	2.10	345	1.95	276	1.64	156	1.61	148	1.54	126
12	2.26	426	2.07	331	1.92	260	1.64	156	1.61	148	1.51	119
	December 2		December 3		December 4		December 5		December 6		December 7	
2	1.49	114	1.81	215	4.16	1,880			2.36	499	3.71	1,500
4	1.48	111	2.12	354	3.82	1,590	2.65	672	2.35	494	3.74	1,520
6	1.46	107	2.46	532	3.59	1,400			2.36	499	3.46	1,290
8	1.45	104	3.03	898	3.40	1,240	2.58	627	2.40	521	3.20	1,080
10	1.46	107	3.92	1,630	3.25	1,120			2.40	521	3.05	960
N	1.49	114	4.24	1,920	3.14	1,030	2.52	590	2.44	544	2.97	898
2	1.47	109	5.41	3,170	3.07	976			2.54	602	2.93	868
4	1.48	111	5.70	3,570	2.99	912	2.47	561	2.62	652	2.92	860
6	1.49	114	5.89	3,840	2.92	860			2.92	860	2.98	905
8	1.50	116	5.77	3,670	2.86	817	2.42	532	3.42	1,260	2.95	882
10	1.51	119	5.34	3,080	2.80	775			3.55	1,360	2.91	852
12	1.60	145	4.59	2,250	2.75	740	2.38	510	3.54	1,350	3.02	936
	December 8		December 9		December 10		December 11		December 12		December 13	
4	3.64	1,440	3.11	1,010	2.59	633	2.34	489	2.24	436	2.10	368
8	4.42	2,100	2.96	890	2.53	596	2.31	472	2.21	421	2.07	354
N	4.44	2,120	2.87	824	2.49	572	2.42	532	2.19	411	2.05	345
4	4.07	1,800	2.79	768	2.45	550	2.38	510	2.16	397	2.05	345
8	3.64	1,440	2.72	719	2.41	527	2.32	478	2.14	387	2.02	331
12	3.32	1,180	2.65	672	2.37	505	2.28	457	2.12	378	2.03	336

Supplemental record.--Nov. 18, 9:30 p.m., 6.76 ft, 5,130 cfs; Nov. 20, 5:15 p.m., 7.43 ft, 6,180 cfs; 6:30 p.m., 7.32 ft, 6,000 cfs; 10:30 p.m., 7.62 ft, 6,480 cfs; Dec. 6, 9:30 p.m., 3.57 ft, 1,380 cfs; Dec. 7, 3 a.m., 3.79 ft, 1,570 cfs; Dec. 8, 10 a.m., 4.48 ft, 2,150 cfs; 12:30 p.m., 4.48 ft, 2,150 cfs; 2 p.m., 4.37 ft, 2,060 cfs.

Truckee River at Reno, Nev.

Location.--Lat 39°32', long 119°47', in sec. 12, T. 19 N., R. 19 E., half a mile east of Reno and 5 miles upstream from Steamboat Creek. Altitude of gage is 4,440 ft (from topographic map).

Drainage area.--1,070 sq mi, includes 519 sq mi affected by storage in Lake Tahoe.

Gage-height record.--Water-stage recorder graph.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 14,000 cfs and extended to peak stage on basis of logarithmic plotting. Discharge for periods of changing stage, Nov. 18-22, Dec. 3-11, computed by using rate of change of stage as a factor.

Maxima.--November-December 1950: Discharge, 19,900 cfs 1 a.m. Nov. 21 (gage height, 13.55 ft); gage height, 13.83 ft 3 a.m. Nov. 21.

1906-19, 1947 to October 1950: Discharge observed, 14,000 cfs Mar. 18, 1907 (gage height, 8.2 ft, site and datum then in use).

Remarks.--Flow regulated by Lake Tahoe, Boca Reservoir, Donner and Independence Lakes, and by several powerplants. Many diversions above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	390	2,170	9	362	4,000	17	410	2,770	25	2,300	2,090
2	390	1,900	10	336	4,250	18	2,870	2,750	26	2,040	2,050
3	395	5,410	11	362	4,060	19	6,320	2,780	27	1,980	1,990
4	410	6,580	12	358	3,200	20	7,450	2,870	28	2,030	1,680
5	362	3,440	13	362	2,500	21	14,100	2,840	29	2,080	1,880
6	328	3,030	14	362	2,720	22	4,980	2,520	30	2,040	1,880
7	349	4,400	15	356	2,730	23	3,090	2,220	31		1,790
8	376	4,670	16	381	2,760	24	2,550	2,140			
Monthly mean discharge, in cfs.....										2,006	2,963
Runoff, in acre-feet.....										119,400	182,200
Runoff, in inches.....										-	-

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1950

Hour	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge
	November 17		November 18		November 19		November 20		November 21	
2		2.59	430	9.74	9,010	6.24	3,120	13.75	19,400	8.77
4	2.58	430	2.86	573	10.13	9,490	6.15	3,020	13.78	13,700
6			3.11	716	10.17	9,570	6.19	3,070	13.68	17,700
8			3.38	887	9.77	8,010	6.38	3,280	13.32	16,600
10			4.00	1,450	9.22	6,820	6.39	4,220	12.99	15,500
N	2.53	405	4.78	2,020	8.62	5,770	7.63	5,240	12.59	14,400
2			5.61	2,780	7.92	4,770	8.24	6,550	12.12	14,100
4			6.51	3,680	7.38	4,210	9.46	9,640	11.50	11,100
6	2.50	390	7.02	4,350	7.18	4,580	10.59	11,900	10.89	10,400
8			7.91	5,830	6.13	4,110	11.13	12,700	10.50	9,610
10			8.84	7,440	7.89	3,830	11.82	15,400	9.80	7,620
12	2.55	415	9.33	8,470	6.42	3,320	13.10	19,200	9.45	7,590
	November 23		November 24		November 25		November 29		November 30	
4	6.59	3,520	5.77	2,630	5.49	2,350	5.15	2,040	5.08	1,920
6	6.26	3,150	5.69	2,550	5.45	2,320	5.19	2,080	5.03	1,940
N	6.12	2,990	5.61	2,470	5.39	2,260	5.23	2,120	4.98	1,890
8	6.01	2,870	5.55	2,410	5.34	2,220	5.19	2,080	5.34	2,220
10	5.94	2,800	5.52	2,380	5.31	2,190	5.22	2,110	5.35	2,220
12	5.87	2,730	5.88	2,740	5.28	2,160	5.05	1,960	5.34	2,220
	December 2		December 3		December 4		December 5		December 6	
2	5.35	2,220	4.63	1,600	10.41	9,480	7.07	3,950	6.09	2,960
4	5.29	2,170	4.61	1,590	10.01	8,450	6.83	3,790	6.03	2,890
6	5.24	2,130	4.62	1,600	9.31	6,790	6.70	3,650	6.00	2,880
8	5.15	2,040	4.74	1,690	8.60	5,640	6.60	3,550	5.99	2,850
10	5.02	1,950	5.56	2,420	8.05	5,150	6.50	3,410	5.96	2,820
N	4.89	1,810	6.37	3,270	7.63	4,710	6.40	3,300	5.92	2,780
2	4.81	1,750	7.38	5,030	8.00	5,990	6.33	3,220	5.92	2,780
4	4.79	1,730	9.07	8,710	8.65	6,840	6.28	3,170	5.95	2,810
6	4.76	1,710	10.00	10,600	8.70	6,470	6.24	3,120	6.27	3,160
8	4.74	1,690	10.51	11,000	8.50	6,070	6.21	3,090	6.45	3,360
10	4.71	1,670	10.82	11,000	8.34	5,800	6.18	3,060	6.68	3,630
12	4.66	1,630	10.67	10,500	8.07	4,950	6.14	3,010	6.95	4,010
	December 8		December 9		December 10		December 11		December 12	
4	7.04	4,060	7.06	4,020	7.28	4,410	7.05	4,080	6.59	3,520
6	7.33	4,500	6.64	3,580	7.29	4,360	7.05	4,080	6.42	3,420
N	7.38	4,510	6.78	3,780	7.20	4,270	7.15	4,270	6.25	3,140
8	7.63	5,350	7.08	4,110	7.13	4,180	7.10	4,100	6.15	3,020
10	7.95	5,320	7.10	4,140	7.08	4,110	6.95	3,950	6.03	2,890
12	7.56	4,620	7.19	4,260	7.05	4,080	6.80	3,770	5.93	2,790

Supplemental record.--Nov. 19, 5:30 p.m., 7.09 ft, 4,130 cfs; 6:30 p.m., 7.26 ft, 4,350 cfs; Nov. 21, 1 a.m., 13.55 ft, 19,900 cfs; 3 a.m., 13.83 ft, 19,000 cfs; Nov. 22, 5 p.m., 6.92 ft, 3,910 cfs; 9 p.m., 6.90 ft, 3,900 cfs; Nov. 24, 9 p.m., 5.52 ft, 2,380 cfs; 10 p.m., 5.79 ft, 2,650 cfs; 11 p.m., 6.22 ft, 3,100 cfs; Nov. 29, 3 p.m., 5.25 ft, 2,140 cfs; 11 p.m., 5.23 ft, 2,120 cfs; Nov. 30, 2 p.m., 5.04 ft, 1,950 cfs; Dec. 1, 2 p.m., 5.05 ft, 1,960 cfs; 6 p.m., 5.29 ft, 2,170 cfs; 7 p.m., 5.31 ft, 2,190 cfs; Dec. 3, 9:15 p.m., 10.78 ft, 11,700 cfs; 9:30 p.m., 10.81 ft, 11,200 cfs; Dec. 4, 12:30 p.m., 7.59 ft, 4,810 cfs; 5 p.m., 8.73 ft, 6,670 cfs; Dec. 7, 11 p.m., 6.75 ft, 3,710 cfs; Dec. 8, 2 a.m., 7.02 ft, 4,070 cfs; 6 a.m., 7.12 ft, 4,220 cfs; 10 a.m., 7.42 ft, 4,570 cfs; 2 p.m., 7.55 ft, 4,940 cfs; 6 p.m., 7.91 ft, 5,290 cfs; 7 p.m., 7.96 ft, 5,370 cfs; 10 p.m., 7.80 ft, 4,970 cfs; Dec. 9, 2 a.m., 7.30 ft, 4,300 cfs; 6 a.m., 6.84 ft, 3,790 cfs; 10 a.m., 6.50 ft, 3,410 cfs; 2 p.m., 7.02 ft, 4,070 cfs; 6 p.m., 7.10 ft, 4,140 cfs; 10 p.m., 7.14 ft, 4,190 cfs; Dec. 10, 6 a.m., 7.33 ft, 4,440 cfs; Dec. 11, 10 a.m., 6.98 ft, 3,990 cfs; 2 p.m., 7.25 ft, 4,340 cfs.

PYRAMID AND WINNEMUCCA LAKES BASIN

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Little Truckee River near Hobart Mills, Calif.

Location.--Lat 39°30', long 120°16', in sec. 14, T. 19 N., R. 15 E., half a mile upstream from Independence Creek and 7½ miles northwest of Hobart Mills. Altitude of gage is 6,330 ft (from topographic map).

Drainage area.--33 sq mi.

Gage-height record.--Water-stage recorder graph.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 1,100 cfs and extended above on basis of slope-area determination at peak stage. Shifting-control method used Nov. 26-28, Dec. 19-31.

Maxima.--November-December 1950: Discharge, 7,010 cfs 10 p.m. Nov. 20 (gage height, 7.53 ft).
1946 to October 1950: Discharge, 792 cfs May 24, 1950 (gage height, 4.49 ft).

Remarks.--One transmountain diversion to Sierra Valley above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	40	110	9	28	674	17	70	200	25	204	104
2	39	91	10	22	376	18	675	176	26	176	95
3	54	232	11	22	338	19	1,380	166	27	155	82
4	58	920	12	20	307	20	3,130	149	28	136	78
5	49	377	13	19	240	21	2,850	138	29	122	80
6	39	414	14	19	456	22	658	125	30	129	74
7	32	688	15	21	328	23	343	114	31		69
8	30	958	16	17	240	24	244	107			
Monthly mean discharge, in cfs.....										359	300
Runoff, in acre-feet.....										21,380	18,460
Runoff, in inches.....										12.15	10.49

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1950

Hour	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge	Gage height	Dis-charge
	November 17		November 18		November 19		November 20		November 21		November 22	
2	1.66	32	2.55	180	5.76	1,750	4.92	1,020	7.32	5,900	4.72	900
4	1.74	41	2.73	218	5.71	1,690	5.06	1,100	7.16	5,170	4.58	837
6	1.79	46	2.97	273	5.66	1,640	5.31	1,290	6.93	4,240	4.45	774
8	1.81	50	3.30	364	5.60	1,570	5.48	1,450	6.65	3,380	4.33	720
10	1.85	56	3.59	455	5.53	1,500	5.70	1,680	6.32	2,600	4.20	668
N	1.92	67	3.89	558	5.43	1,400	6.07	2,180	6.03	2,100	4.10	628
2	1.95	72	4.23	692	5.30	1,280	6.43	2,860	5.79	1,780	4.02	596
4	1.99	78	4.57	842	5.19	1,190	6.73	3,630	5.60	1,560	3.94	566
6	2.04	87	4.88	994	5.08	1,120	7.13	5,050	5.40	1,350	3.86	537
8	2.13	102	5.24	1,230	4.98	1,050	7.42	6,410	5.23	1,210	3.77	502
10	2.24	121	5.45	1,420	4.91	1,010	7.53	7,010	5.00	1,050	3.69	475
12	2.40	151	5.63	1,600	4.88	994	7.47	6,680	4.87	978	3.50	413
November 23			November 24		November 25		November 29		November 30		December 1	
4	3.45	397	2.98	261	2.78	215	2.28	125	2.27	125	2.21	116
8	3.52	355	2.93	247	2.75	209	2.25	119	2.34	140	2.12	100
N	3.25	334	2.90	240	2.72	203	2.24	119	2.29	130	2.18	111
4	3.22	326	2.88	235	2.71	200	2.27	125	2.28	128	2.20	114
8	3.13	298	2.85	229	2.68	194	2.25	121	2.27	127	2.18	111
12	3.05	278	2.82	222	2.65	190	2.23	118	2.28	128	2.05	88
December 2			December 3		December 4		December 5		December 6		December 7	
2			2.21	116	5.53	1,500	3.66	478	3.05	293	4.92	1,020
4	1.98	77	2.45	160	5.30	1,280	3.56	445	3.03	288	5.01	1,070
6			2.78	229	5.10	1,130	3.46	413	3.02	285	5.00	1,060
8	1.97	75	3.27	355	4.88	994	3.38	388	3.03	288	4.93	1,020
10			3.79	523	4.69	896	3.33	373	3.05	293	4.81	956
N	2.10	97	4.28	712	4.53	824	3.29	361	3.10	306	4.67	886
2	2.18	111	4.73	915	4.41	770	3.28	358	3.23	343	4.55	832
4	2.14	104	5.20	1,200	4.28	712	3.24	346	3.49	423	4.44	783
6			5.50	1,470	4.16	664	3.19	331	3.76	512	4.39	760
8	2.10	97	5.70	1,680	4.03	612	3.14	317	4.02	608	4.38	756
10			5.75	1,740	3.89	558	3.11	309	4.54	738	4.32	729
12	2.10	97	5.70	1,680	3.77	516	3.08	301	4.67	886	4.23	692
December 8			December 9		December 10		December 11		December 12		December 13	
4	4.39	760	4.57	842	3.49	423	3.07	298	3.23	343	2.87	249
8	4.74	920	4.35	742	3.39	391	3.05	293	3.15	320	2.83	240
N	5.00	1,060	4.13	652	3.33	373	3.36	382	3.10	306	2.80	233
4	5.08	1,120	3.93	573	3.25	349	3.30	364	3.04	290	2.83	240
8	5.00	1,060	3.77	516	3.19	331	3.28	358	2.99	278	2.78	229
12	4.84	972	3.62	465	3.13	314	3.26	352	2.93	263	2.79	231

Supplemental record.--Nov. 19, 1:45 a.m., 5.79 ft, 1,790 cfs; Dec. 8, 1 a.m., 4.23 ft, 692 cfs; 5 p.m., 5.09 ft, 1,120 cfs.

SUMMARY OF FLOOD STAGES AND DISCHARGES

The results of the determinations of maximum flood flows at existing stream-gaging stations and other places on streams in the area covered by this report are summarized and presented in table 2, "Summary of flood stages and discharges." The numbers in the first column of this table refer to those on figure 128, and will aid in identifying the places where the discharge was determined.

In addition to the flood peak data for the flood of October-November 1950, table 2 includes data for the maximum flood previously experienced except at discontinued stations where the maximum during the period of record or other determinations of maximum flow were not significantly high.

The discharges for the existing stream-gaging stations were determined by methods described in greater detail in the presentation of the individual stations under the section "Stages and discharges at stream-gaging stations." For stream-gaging stations where records have been systematically collected for several years, the method of determination of the flood flows is based on a comprehensive study of the stage-discharge relationship during the complete period of record. Where the maximum discharge was recorded other than in the usual manner, reference is made to the method of determination. Supplementary information is shown by a footnote when warranted.

Figure 129 shows the November-December 1950 flood discharges (listed in table 2) in cubic feet per second per square mile, plotted against the corresponding drainage areas. The flood discharges are given as observed and may have been affected by artificial storage change, by release of storage of water resulting from natural channel changes upstream--such as the damming and releasing of debris, by diversions, or by similar factors. The drainage area used in the computations does not include the noncontributing area where known. The detailed information is presented under "Remarks" in the station description found in the preceding section, "Stages and discharges at stream-gaging stations."

The basic data and computations are filed in the district office or suboffices of the Salt Lake City district.

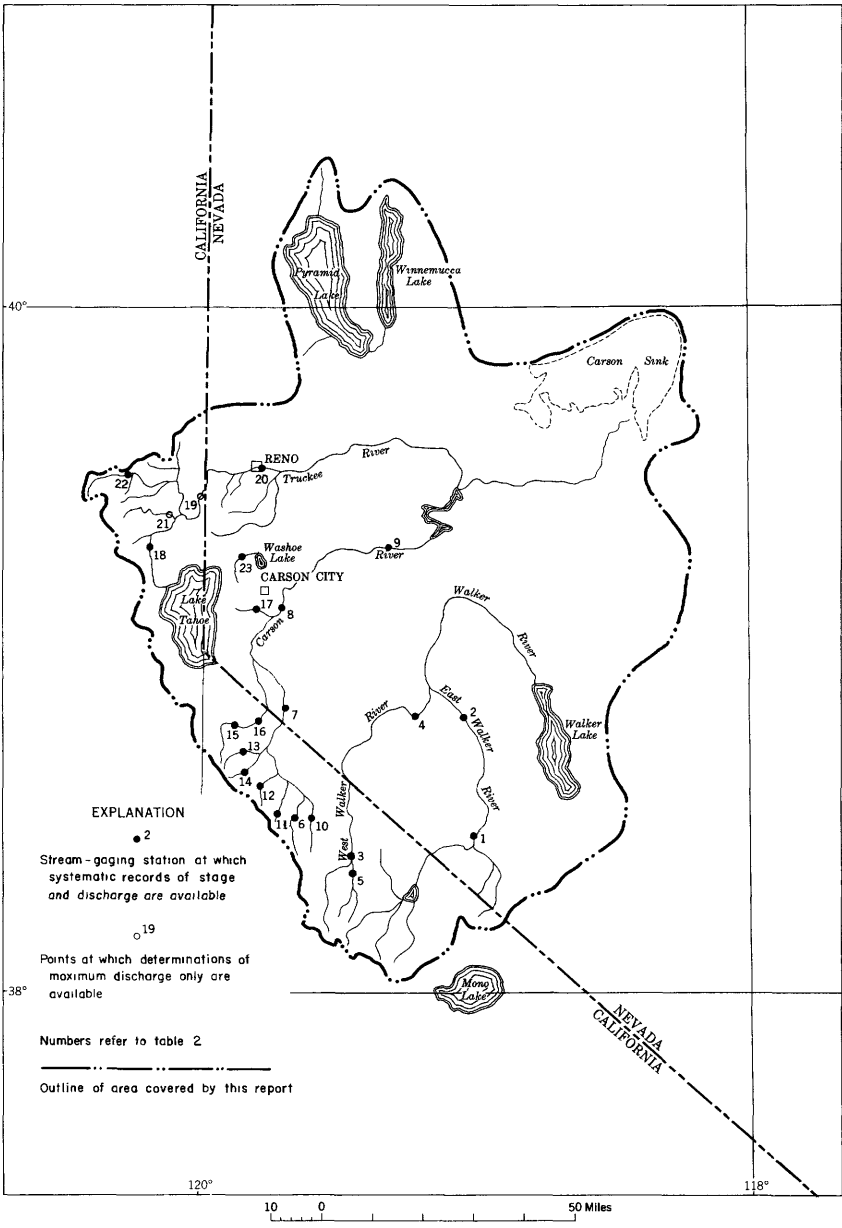


Figure 128.--Map of western Nevada and eastern California showing flood-determination points, November-December 1950.

Table 2. - Summary of flood stages and discharges in Walker, Carson, and Truckee River basins in Nevada and California, November-December 1950
 [Maximum discharges for the floods of November-December 1950 were obtained from gaging station records, except as otherwise indicated by the following symbols:
 D, Computed flow over dam or weir; S, Slope-area determination]

No. on figs. 128, 129	Stream and place of determination	Drainage area (square miles)	Period of record (to 1950)	Maximum flood previously known				Maximum during November-December 1950			
				Date	Gage height (feet)	Discharge (cfs)	Cfs per square mile	Date and hour	Gage height (feet)	Discharge (cfs)	Cfs per square mile
WALKER LAKE BASIN Walker River Basin											
1	East Walker River near Bridgeport, Calif.	362	a1911-14, 1921- 1947-	Jan. 22, 1943	4.5	b1,240	-	Dec. 14, 4 p.m. to Dec. 16, 10 a.m.	2.66	b580	-
2	East Walker River above Strosnider ditch, near Mason, Nev.	-	1947-	May 28, 1947	2.30	b246	-	Dec. 16, 5 p.m.	3.38	b479	-
3	West Walker River below East Fork, near Coleville, Calif.	182	1938-	Dec. 11, 1937 June 9, 1938	- d4.90	c5,800 2,490	31.9 13.7	Nov. 20, 11 p.m.	8.10	6,220S	34.2
4	West Walker River near Hudson, Nev.	-	1921-25, 1947-	June 7, 1922	e6.35	2,530	-	Dec. 10, 1 a.m.	5.36	b1,690	-
5	East Fork West Walker River near Bridgeport, Calif.	63	1944-	Feb. 2, 1945	2.69	660	10.5	Dec. 3, 3 p.m.	2.60	650S	10.3
HUMBOLDT-CARSON SINK BASIN Carson River Basin											
6	East Fork Carson River above Soda Springs ranger station, near Markleville, Calif.	30	1946-	May 31, 1950	4.27	652	21.7	Nov. 20, 9:30 p.m.	7.62	3,570S	119
7	East Fork Carson River near Gardnerville, Nev.	344	1890-93, 1900-1906, 1908-10, 1917, 1924-29, 1935-37, 1939-	Dec. 11, 1937	f9.0	10,300	29.9	Nov. 21, 12:45 a.m.	9.66	12,100S	35.2
8	Carson River near Carson City, Nev.	876	1939-	Jan. 22, 1943	8.40	8,500	9.70	Nov. 22, 1-2 a.m.	f11.4	15,500D	17.7
9	Carson River near Fort Churchill, Nev.	1,450	1911-	Jan. 24, 1943	-	g6,300	4.34	Nov. 23	-	g7,850	5.41
10	Silver King Creek near Coleville, Calif.	30	1946-	May 31, 1950	2.62	220	7.33	Nov. 20, 8:30 p.m.	5.47	748S	24.9

SUMMARY OF FLOOD STAGES AND DISCHARGES

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11	Wolf Creek near Markleeville, Calif.	9.8	1946-	May 28, 1948 May 31, 1950	3.95	224	22.9	Nov. 20, 5:30 p.m.	7.10	1.480S	151
12	Silver Creek below Pennsylvania Creek, near Markleeville, Calif.	20	1946-	May 26, 1948	3.84	411	20.6	Nov. 20, 5 p.m.	7.95	1,260S	63.0
13	Markleeville Creek above Grover Hot Springs, near Markleeville, Calif.	14	1946-	May 26, 1948	5.17	399	28.5	Nov. 20, 2 p.m.	8.49	1,740S	124
14	Pleasant Valley Creek above Raymond Canyon Creek, near Markleeville, Calif.	16	1946-	May 26, 1948	3.78	495	30.9	Nov. 20	(h)	2,500S	156
15	West Fork Carson River above Woodfords, Calif.	53	1946-	Apr. 24, 1949	5.39	793	15.0	Nov. 20, 8:45 p.m.	9.82	4,600S	86.8
16	West Fork Carson River at Woodfords, Calif.	66	1900-20, 1938-	May 9, 10, 1906 Dec. 11, 1937	16.8 9.0	1,570 3,500	23.8 53.0	Nov. 20, 10 p.m.	18.35	4,730S	71.7
17	Clear Creek near Carson City, Nev.	15	1948-	Jan. 22, 1950	1.58	44	2.93	Dec. 3, 5:30 p.m.	1.95	56D	3.73
PYRAMID AND WINNEMUCCA LAKES BASIN Truckee River Basin											
18	Truckee River near Truckee, Calif.	548	1944-	Feb. 2, 1945 Jan. 25, 1949	3.34 m6.07	1,100 -	2.01 -	Nov. 20, 10:30 p.m.	7.62	k6.480S	k223
19	Truckee River at Farad, Calif.	j940	1938-43	May 15, 1938	-	g6,770	7.20	Nov. 21, 1 a.m.	(n)	p17,500S	p41.6
20	Truckee River at Reno, Nev.	j1,070	1906-19, 1947-	Mar. 18, 1907	d,q8.2	14,600	13.6	Nov. 21, 1 a.m.	r13.83	s19,900	s36.1
21	Prosser Creek near Boca, Calif.	-	1889-90, 1902-3	-	-	-	-	-	-	4,260S	-
22	Little Truckee River near Hobart Mills, Calif.	33	1946-	May 24, 1950	4.49	792	24.0	Nov. 20, 10 p.m.	7.53	7,010S	212
23	Franktown Creek at Franktown, Nev.	14	1948-	June 15, 1950	3.55	165	11.8	Dec. 3 or 4	(n)	800S	57.1

a 1911-14, gage heights only at site $1\frac{1}{2}$ miles upstream.
b Affected by regulation.
c Greatest known prior to 1938; by slope-area determination.
d Site and datum then in use.
e Approximately present site but different datum.
f From floodmark.
g Daily mean discharge.
h Gage destroyed by flood on Nov. 20, 1950.
i Datum then in use.
j 519 sq mi above Lake Tahoe outlet noncontributing during peak of November 1950.
k From 29 sq mi below Lake Tahoe.
l From floodmark.
m Caused by ice jam.
n Gage destroyed by flood.
p From 421 sq mi below Lake Tahoe.
q Observed.
r Occurred at 3 a.m. Nov. 21, discharge affected by rate of change of stage.
s From 551 sq mi below Lake Tahoe.

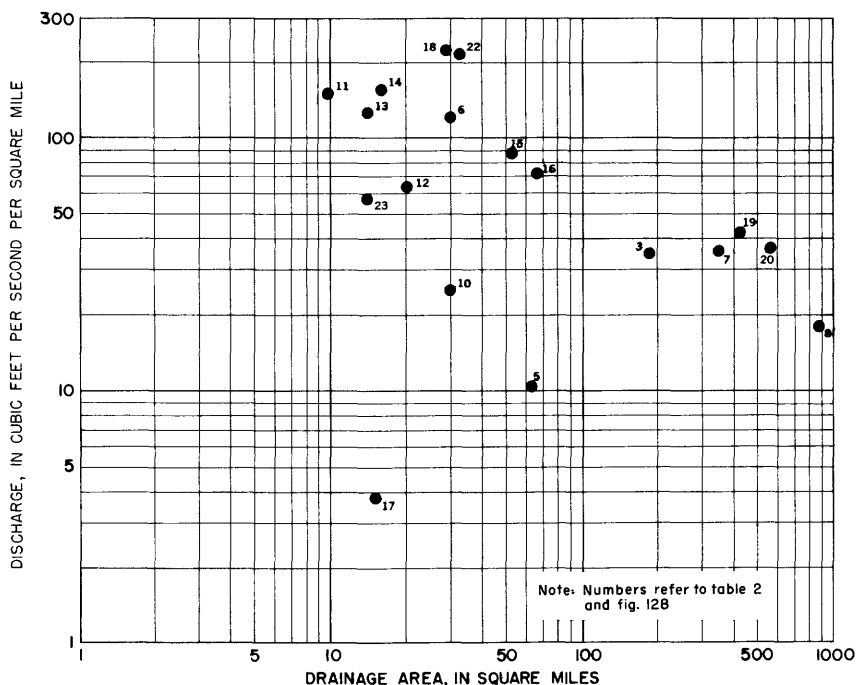


Figure 129.--Relation of unit runoff to size of drainage basin, November-December 1950.

RECORDS OF PREVIOUS FLOODS

Notable floods on major streams from the Sierra Nevada tributary to the Great Basin occurred in December 1861 to January 1862, December 1867, January 1886, January-February and May 1890, December 1892, March 1907, January 1914, March 1928, and December 1937. Brief descriptions of these floods (except the flood of 1937), based largely on newspaper and pioneer accounts, are presented in Water-Supply Paper 843, p. 476-479. Probably the greatest of these floods were those of 1861-62, 1867, 1907, 1928, and 1937. The following descriptions are abstracted from Water-Supply Paper 843.

Floods of 1861-62

Rain or snow fell every day for 54 consecutive days after December 24. Owens River at overflow was from a quarter of a mile to 1 mile wide in places. It was reported that the level of Owens Lake rose 12 feet as a result of the flood waters. There was reported loss of life on Bodie Creek in the Walker Lake basin.

Floods occurred in the Carson River basin in December, but the greatest runoff evidently took place in January. Several persons were reported to have been drowned and a number of buildings washed away at Empire and Dayton, Nev. Water in Empire was said to have been from 6 to 8 feet deep; at Dayton and on the river downstream the flood was called the greatest known to that time.

Floods of 1867

The East Walker River was said to have been higher than ever before known, as a result of almost continuous storms on December 8 and 9, and December 16-31. There were also damaging floods on the West Walker River. The Carson River flooded the town of Empire and Dayton. It remained at flood stage for several days, reaching a height at Empire reported to have been within 2 feet of the maximum stage of 1861-62. The Truckee River was reported to have overflowed beyond its channel for miles and washed out bridges on the main river and its tributaries.

Flood of 1907

This flood was more severe on the Truckee River than on the other streams. The maximum observed discharge of the Truckee River at Iceland, Calif., was 15,300 cfs on March 18; since that time the flood has been closely approached only in 1928 and 1937 until it was likely surpassed in 1950. A news dispatch from Reno called the 1907 flood the highest in Nevada for 37 years. The relative ranking of the 1907 and 1950 floods cannot be accurately determined, for, in early years, observations were made only once or twice daily, whereas instantaneous peaks were recorded in 1950.

Flood of 1928

As in 1907, the flood of 1928 was more severe in the Truckee River basin than in the other basins. The maximum daily discharge of the Truckee River at Iceland, Calif., was 12,000 cfs on March 25, as compared with a mean of 12,300 cfs on December 11, 1937, when the peak discharge was 15,500 cfs.

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