Floods of November-December 1950 in the Central Valley Basin California

Floods of 1950

Prepared under the direction of C. G. PAULSEN, *Chief Hydraulic Engineer*

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1137-F

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PREFACE

This report on the floods of November-December 1950 was prepared by the U. S. Geological Survey, Water Resources Division, under the general direction of C. G. Paulsen, chief hydraulic engineer, and J. V. B. Wells, chief, Surface Water Branch.

Basic records of discharge in the area covered by this report are collected in cooperation with the Department of Public Works of California, through the State engineer; the city and county of San Francisco; the Bureau of Reclamation, Department of the Interior; and the Corps of Engineers, Department of the Army. The basic records are supplemented by the detailed records of the flood contained in this report.

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FLOODS OF NOVEMBER-DECEMBER 1950 IN THE CENTRAL VALLEY BASIN, CALIFORNIA

ABSTRACT

The flood of November-December 1950 in the Central Valley basin was the greatest in most parts of the basin since the turn of the century and probably was exceeded in the lower San Joaquin River basin only by the historic flood of 1862. In respect to monetary loss, the 1950 flood was the most disastrous in the history of the basin. Loss of life was remarkably small when one considers the extensive damage and destruction to homes and other property, which is estimated at 33 million dollars. Outstanding features of the flood were its unprecedented occurrence so early in the winter flood season, its magnitude in respect to both peak and volume in most major tributaries, and the occurrence of a succession of near-peak flows with a period of three weeks.

The flood was caused by a series of storms during the period November 16 to December 8, which brought exceptionally warm, moisture-laden air inland against the Sierra Nevada range and caused intense rainfall, instead of snowfall, at unusually high altitudes. Basin-wide totals of rainfall during the period ranged from 30 inches over the Yuba and American River basins to 13 inches over the upper Sacramento and Feather River basins.

Based on continuous records of discharge on major tributaries for periods ranging from 22 to 55 years and averaging about 43 years, the 1950 flood peaks were the greatest of record on the American, Cosumnes, Mokelumne, Stanislaus, Tuolumne, Merced, Chowchilla, Fresno, lower San Joaquin, Kings, Kaweah, Tule, and Kern Rivers. Second highest peak of record occurred during the flood of March 1928 on the Yuba, American and Mokelumne Rivers; the flood of March 1940 on Cosumnes River; the flood of January 1911 on the Stanislaus and Tuolumne Rivers; the flood of December 1937 on the Merced, Kings, and Kaweah Rivers; the flood of March 1938 on the Chowchilla, Fresno, and lower San Joaquin Rivers; and the flood of March 1943 on the Tule and Kern Rivers. Peak discharges for 1950 did not exceed previous maxima on Bear, Yuba, Feather, and upper Sacramento Rivers, nor on west side tributaries of lower Sacramento River, Calaveras River, and upper San Joaquin River (above Friant Reservoir).

Notable high rates of discharge were 354 cfs per square mile from 39.5 square miles in North Fork of Middle Fork Tule River, 225 cfs per square mile from 198 square miles in Rubicon River, 115 cfs per square mile from 999 square miles in North Fork of American River and 93.7 cfs per square mile from 1,921 square miles in American River at Fair Oaks.

This report presents a general description of the 1950 flood, details and estimates of the damage incurred, records of stage and discharge for the period of the flood at 171 stream-gaging stations, records of storage in 14 reservoirs, a summary of peak discharges with comparative data for previous floods at 252 measurement points, and tables showing crest stages along the main stem and major tributary channels of the Sacramento and San Joaquin Rivers.

The report also includes a discussion of meteorologic and hydrologic conditions associated with the flood, examples of the flood regulation afforded by storage reservoirs, a brief study of runoff characteristics, and a summary and comparison with previous floods in the Central Valley basin.

INTRODUCTION

During the latter part of November and the early part of December 1950 the Central Valley basin of California was ravaged by a series of floods in which discharges of record breaking magnitude occurred on virtually very major tributary from American River on the north to Kern River on the south. Although the loss of only two lives is known to have been directly attributable to the floods, many residents had narrow escapes, and approximately 25,000 persons throughout the flooded areas were evacuated from their homes. According to a survey by the Corps of Engineers, property damage is estimated at 33 million dollars--about 40 percent was damage to agricultural properties, 40 percent to public and private utilities and institutions, and 20 percent to residential, commercial, and industrial properties.

The United States Geological Survey, operating through the California district office, maintains more than 200 river-measurement stations within the Central Valley basin as a part of the regular Nation-wide stream-gaging program for the investigation of the water resources of the Nation. Most stations have been maintained by the Geological Survey in cooperation with the State of California and its political subdivisions, and with other Federal agencies. Many of these stations have been operated long enough to supply systematic records of stream stages, discharges, and volumes of flow which cover the range from drought to extraordinary flood conditions.

Because of the record-breaking proportions of the November-December 1950 flood, the streamflow records collected in the area during the flood period are of great importance in regard to studies currently being made for the further development of the water resources of the Central Valley and of the State of California. This is especially true with respect to all contemplated projects in which volumes of flood flows and rates of flood discharges are essential considerations.

As soon as the magnitude of the flood became apparent, immediate action was taken to collect and compile all available data concerning the maximum stages and discharges of streams throughout the flooded area. The work of the Geological Survey, including the preparation of this report, was done as a part of the current program for the investigation of the water resources and was supplemented by a Federally-matched contribution of $12,500 from the Department of Public Works of California, through the State Engineer, and by a contribution of $5,000 from the United States Bureau of Reclamation through its Region 2 Office.

This chapter presents the records of stages and discharges of rivers in the Central Valley basin during the floods of November-December 1950, discussions of the meteorologic and hydrologic

aspects, and other information related to the flood, including a review and summary of past floods.

Figure 74 shows the area covered by this report and the areas in which flooding was most severe, and plate 15 is a detailed map showing the location of flood-determination points.

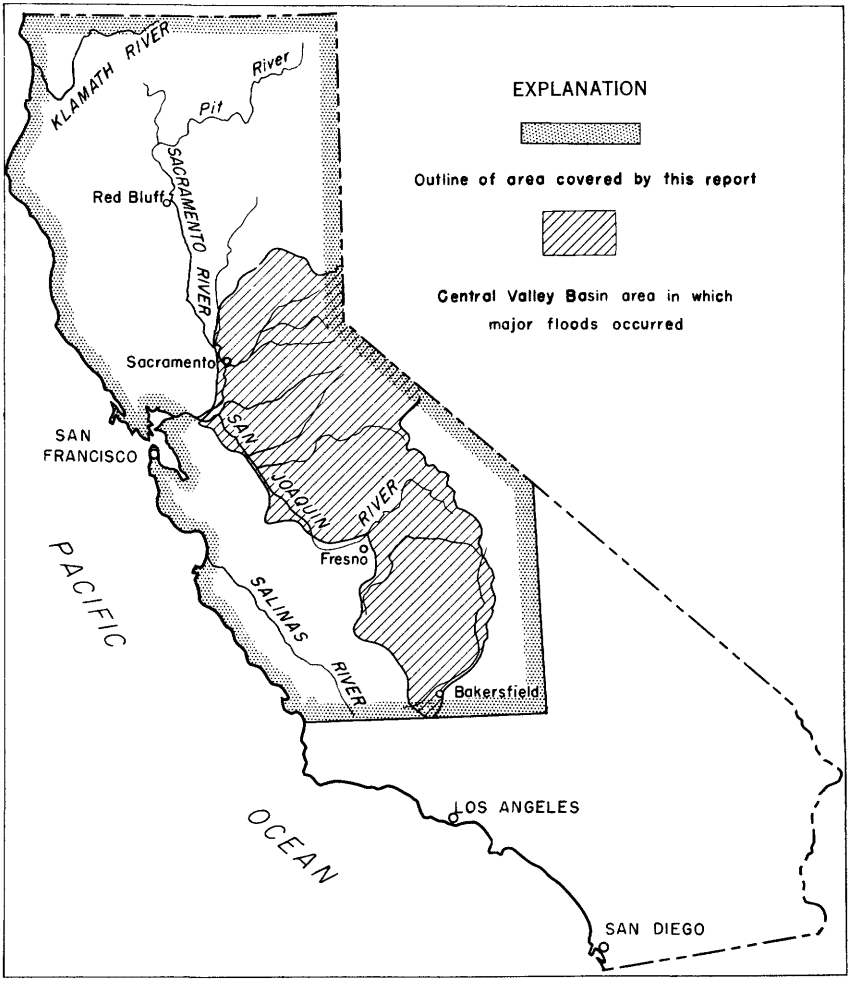

Figure 74. --Map showing location of area covered by this report.

ADMINISTRATION AND PERSONNEL

The data and text presented in this report were collected and prepared by personnel of the San Francisco district, Surface Water Branch, under the general supervision of R. C. Briggs, district engineer. The field and office work were under the immediate supervision of H. M. Stafford, engineer-in-charge, and H. F. Matthai, hydraulic engineer, Sacramento, California. Valuable assistance in the field and office work was given by J. M. Terry, hydraulic engineer, detailed from Chattanooga, Tenn.; Hollister Johnson, hydraulic engineer, Surface Water Branch, served as advisory and consulting engineer.

ACKNOWLEDGMENTS

The information in this report has been obtained from many sources, including individuals, corporations, and governmental organizations--local, state, and Federal. Financial cooperation in the preparation of this report was furnished by the Department of Public Works of California, through A. D. Edmonston, State Engineer; and by the Bureau of Reclamation, U. S. Department of the Interior. Assistance in the form of records and data was furnished by the agencies named above and by the Corps of Engineers, Department of the Army; Weather Bureau, Department of Commerce; Forest Service, Department of Agriculture; National Park Service, Department of the Interior; Merced Irrigation District; Modesto & Turlock Irrigation Districts; Tulare Lake Basin Water Storage District; East Bay Municipal Utility District; City of San Francisco, Public Utilities Commission; Kings River Water Association; Kern County Land Company; San Joaquin Canal Company; Pacific Gas & Electric Co.; Southern California Edison Co.; Nevada Irrigation District; Oakdale and South San Joaquin Irrigation Districts; and H. H. Holley of Visalia.

GENERAL DESCRIPTION OF THE FLOODS

The floods of November-December 1950 in the Central Valley basin were the result of an extended series of intense warm storms that brought heavy precipitation to the Sierra Nevada sections of the drainage areas from Yuba River on the north to Kern River on the south. This storm series, which began about November 16 and ended December 8, was remarkable in at least four aspects: (1) It occurred at an early date. November storms in this region are usually of small magnitude and seldom produce floods because of the dry conditions of the watersheds. (2) The extremely warm temperature of the incoming moisture-laden air caused rain to fall at high elevations in the mountains with the result that most of the accumulated snow was melted away. (3) The broad areal extent of the storms, with their flood-producing precipitation,

covered almost the entire length of the Sierra Nevada and both eastern and western slopes. (4) The short intervals between component storms prevented normal water retention by the watersheds.

During the last days of October a general storm caused heavy rain over the northern end of Sacramento River basin and extended as far south as American River. This storm wet the mountain watersheds and deposited a shallow snow cover at higher elevations. The storm resulted in major floods in the coastal basins of southwestern Oregon and the Smith and the Klamath River basins of northwestern California; a report of these October 1950 floods is contained in Water-Supply Paper 1137-E.

During November 13-15 a cool storm of moderate intensity caused 1 to 3 inches of mixed rain and snow to fall in the area from Yuba River south to Kern River. As a result of this storm a shallow blanket of snow extended down the Sierra Nevada slopes to altitudes of about 4,000 feet in the Sacramento River basin, 5,000 feet in the San Joaquin River basin, and 6,000 feet in the Tulare Lake and Kern River basins.

On November 16-18 the region was subjected to a storm of record-breaking magnitude that brought extremely warm air inland against the entire range of the Sierra Nevada and caused intense rainfall at unusually high altitudes. During this storm an average of about 10 inches of rain fell on all the mountain drainage basins from Yuba River to Kern River; some basins received as much as 13 inches. At two stations more than 13 inches of rain fell in 24 hours. The melting of most of the accumulated snow cover by the warm rains contributed to the record-breaking flood peaks that followed this storm.

On November 19-21 another wave of the storm caused renewed intense rainfall over the area from the Yuba to the Mokelumne River basins. This rain, falling on already saturated watersheds, caused still higher flood peaks on the Yuba, Bear, American, and Mokelumne Rivers.

To the west of the Central Valley basin, the storms of November 16-21 brought flood-producing rainfalls to the coastal drainages between San Francisco Bay and Monterey Bay. In these areas the total storm precipitation generally was slightly higher than that of the storms which produced the previous maximum floods of record.

From November 22 to December 1 there was very little rainfall, but on December 2-4 another warm storm deposited from 2 to 6 inches of rain over the basins from the Yuba to the Kern. New floods occurred but the peaks were generally lower than those

resulting from the November storms. This storm also deposited about 5 inches of rain over the Coast Ranges near Clear Lake and caused minor tributaries of that lake to rise to moderate peaks. In the North Coastal and Central Coastal areas, heavy rains resulted in flooding in the Eel River delta, on the lower reaches of the Smith River, and, in general, throughout the Russian River basin and the lower reaches of Corte Madera, San Lorenzo, and Alameda Creeks.

The storm series was brought to a close by another warm storm on December 6-8, which laid down 3 to 5 inches of rain over the Yuba to the Mokelumne river basins, 2 to 4 inches over the Stanislaus to the San Joaquin River basins, and somewhat less than an inch over the Kings to the Kern River basins.

During the entire series of storms, the rainfall over the upper Sacramento and the Feather River basins averaged about 13 inches, over the Yuba and the American River basins, about 30 inches over the Mokelumne to the upper San Joaquin River basins, about 22 inches; and over the Kings to the Kern River basins, about 17 inches.

The results of the severe and intense storms during November and December were record-breaking flood flows on virtually every major tributary to the Central Valley basin from American River on the north to Kern River on the south. The period of record on these streams ranges from 22 to 55 years and averages about 43 years; previous records broken by the November-December 1950 floods include those established during the floods of 1907, 1909, 1911, 1914, 1916, 1928, 1937, 1940, 1942, and 1943. In most instances, however, the previous maximum flow of record occurred in the floods of 1928, 1937, or 1938. North of the Yuba River, the Feather and the upper Sacramento Rivers did not approach previous record flows. Comparison with previous major floods is shown in figure 75 by the graphs of maximum annual peak discharge in 5 Central Valley basin rivers including Feather River on the north and Kaweah river on the south. A further comparison is shown in figures 76 and 77 by flood hydrographs of daily discharge for 7 rivers including Feather River on the north and Kern River on the south.

From the Yuba River south to the Mokelumne River, two major peaks occurred about 2 days apart as a result of the intense storm waves of November 16-18 and 19-21. In all cases, the second peak was larger than the first and was the one which exceeded any previous flow of record. From the Calveras River south to the Kern River, the major peak resulted from the first storm--in fact, south of the San Joaquin River the second peak did not occur.

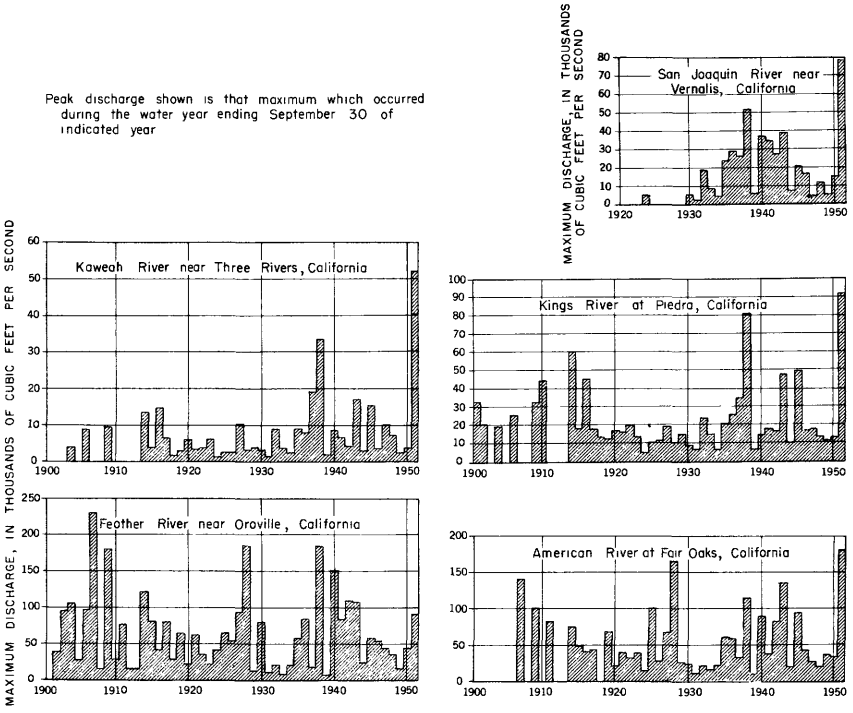

Figure 75. --Maximum annual floods in 5 Central Valley basin rivers.

The additional rainfall which occurred during the two storms of early December caused flows in most of the streams to rise again, but in general the December peaks were lower than those which occurred in November. However, one notable exception was the lower San Joaquin River, which, on December 10, reached its greatest flow of record at the gaging station near Vernalis as a result of the combined contributions from the various east-side tributaries. See figure 78. The November peak on the lower San Joaquin River was lower than that of December principally because of the retarding effect (during the November storms) of the many storage reservoirs on the tributaries. Most of these reservoirs were full or nearly full at the time of the December peaks, and therefore, they were generally ineffective in reducing flood flows in the lower reaches of the river system.

As a result of the record flows in most of the streams of the Central Valley basin, virtually every major stream overflowed its banks at some point--with the notable exception of the Sacramento River main stem. Many levee breaks occurred during the floods. The most significant of these overflows were on the south bank of the Yuba River in the vicinity of Hammonton, on the south bank of the Bear River downstream from U. S. Highway 99E, on the north bank of the American River upstream from H Street Bridge, Sacramento, on the eastern tributaries of the San Joaquin River, and

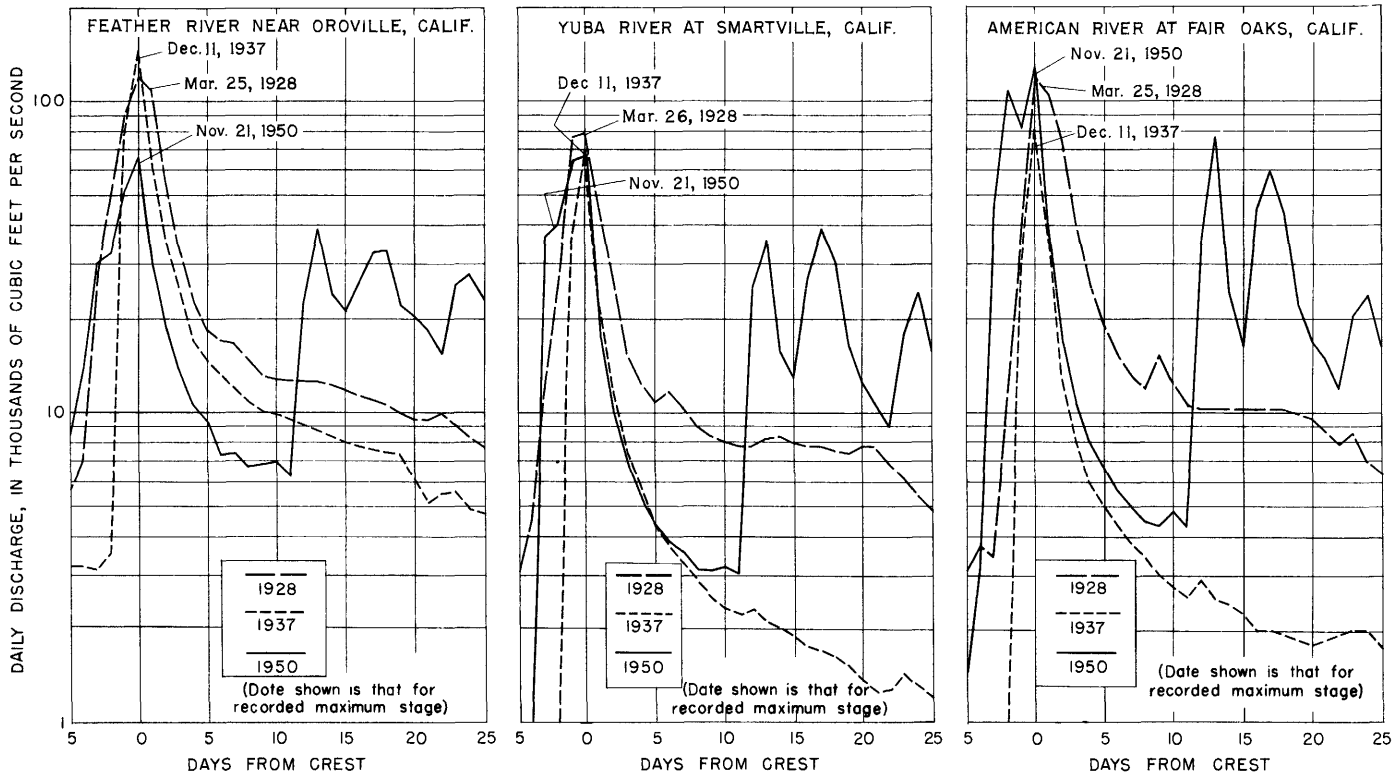

Figure 76. --Graphs of daily discharge for major floods of record at various stream-gaging stations in Sacramento River basin.

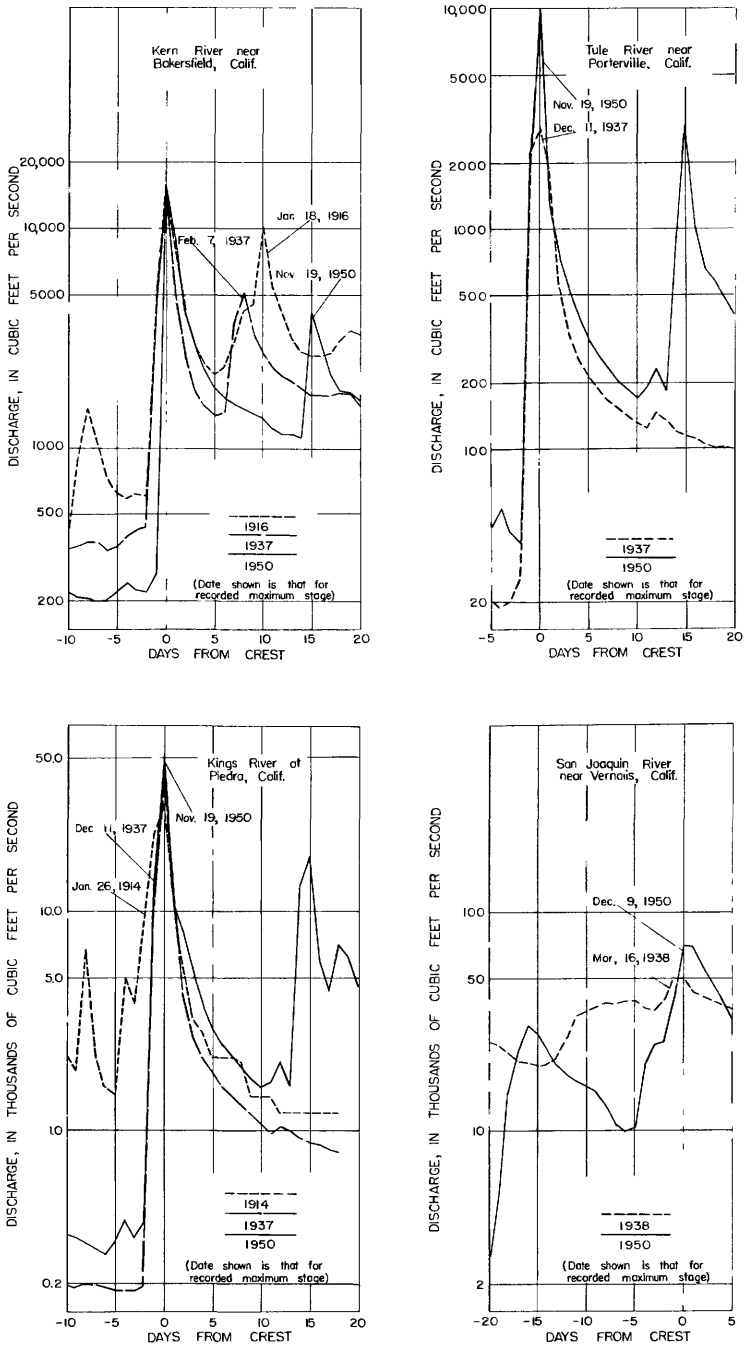

Figure 77. --Graphs of daily discharge for major floods of record at various stream-gaging stations in San Joaquin River basin.

Figure 78. --Durham Ferry bridge over San Joaquin River near Vernalis. Mouth of Stanislaus River in background. Note Survey gage at end of bridge in lower right. Photo by Corps of Engineers.

along the San Joaquin River proper. Most of the inundated areas consisted of agricultural property, although many suburban areas and parts of urban communities were flooded. Some areas, notably those north and east of the American River in the vicinity of Sacramento, were inundated as many as three and four times as a result of successive flood peaks. The total area flooded one or more times in the Central Valley basin is estimated by the Corps of Engineers at about 669,000 acres.

On the eastern slope of the Sierra Nevada, the same intense November storms that caused the floods in the Central Valley basin resulted in record-breaking flows in the basins of the Truckee, Carson, and Walker Rivers. Behavior of the flood runoff in these streams paralleled that of the group from the Yuba River to the Mokelumne River; in each, two peaks occurred, one on November 19 and one on November 21; the latter peak substantially exceeded any previous flow of record. Extensive areas in western Nevada were flooded, and as a result of inundation by the Truckee River of a considerable portion of the business district of the city of Reno, that city sustained far greater damage than any other city, either in California or Nevada. A report of the November-December 1950 floods in the Truckee, Carson, and Walker River basins in California and Nevada is contained in a separate Water-Supply Paper of the series of annual flood reports.

On the Yuba River, the peak discharge of 109,000 cfs on November 21 at Narrows Dam plus the simultaneous flow of Deer Creek amounted to 114,000 cfs. Representing the peak discharge at the former gaging station site at Smartville, this figure compares with a record of 120,000 cfs at that site during the flood of March 1928. Surpassing all previous records, however, was the occurrence during the 1950 floods of four major peaks within a period of 21 days. As recorded at the Narrows Dam station, these peaks amounted to 69,400 cfs on November 18, 109,000 cfs on November 21, 68,100 cfs on December 3, and 49,000 cfs on December 8.

Upstream from Narrows Dam, State and county roads suffered severe damage, and limited damage occurred to residential and mining properties adjacent to the river at Downieville. Figure 79 shows the complete washout of a section of the highway between Downieville and Sierra City by floodwaters of the North Yuba River. Downstream from Narrows Dam the river left its channel at the foothill line just upstream from the town of Hammonton. Marigold and Hammonton, small mining towns, were partially flooded and damage occurred to properties and facilities of the Yuba Consolidated Gold Fields, Inc. The general overflow, covering an area of about 43,000 acres, extended westward to the east levee of Feather River and southward to the Bear River. The greater part of this area is agricultural property, but there were extensive residential districts and several large industrial enterprises

Figure 79. --Destruction of highway between Downieville and Sierra City by floodwaters of North Yuba River. Photo by California Division of Highways.

within the area. Highly developed residential subdivisions and the communities of Linda, Olivehurst, Arboga, and Ostrom were flooded. Evacuation of residents from Linda district began about 4 a. m. of November 21 and Olivehurst area residents were evacuated about 8:30 a. m. The refugees poured into Marysville in automobiles, trucks and school buses. Many towed trailers loaded with household goods or livestock. No deaths were caused by the flood, but according to a story in the Sacramento Bee about 8,000 people were evacuated from the area.

On the Bear River, the peak discharge near Wheatland on November 21 was less than the previous maximum of record (31,000 cfs during the flood of January 1943). However, the November-December 1950 flood runoff was of unusual duration. As a result of the November 21 peak, a break occurred in the south bank levee about 600 feet downstream from U. S. Highway 99E. The overflow spread to the east across the highway, to the south for about 3.5 miles, and to the southwest for about 4 miles; approximately 2,900 acres were inundated, including an extensive orchard belt. The floodwaters were then intercepted by natural courses draining into Yankee Slough (a leveed channel which flows westward about 3 miles into Bear River). A break occurred in the south levee of Yankee Slough near the Rio Oso area and just southeast of the confluence with Bear River. Bear River backwater and Yankee Slough flows, augmented by overflow from the Bear River break upstream, flowed in a general southwesterly direction and inundated an additional agricultural area of about 13,600 acres. Three major railroads, a primary State highway, and an extensive part of the county road system, all located within the flooded area, were damaged extensively.

On the American River, the records for the Fair Oaks gaging station indicate that the November-December 1950 floods broke all records with respect to peak discharge, duration of high flows, and flood volume. The maximum discharge previously recorded during the floods of March 1928 was first equaled by the peak of 163,000 cfs on November 19, and then it was exceeded by the record peak of 180,000 cfs during the second rise on November 21. The third rise on December 4 reached a peak of 136,000 cfs and the final rise of the series reached 86,000 cfs on December 8. The total runoff November 18 to 30 was 924,700 acre-feet; December 3 to 13, 729,300 acre-feet; and November 18 to December 13, 1,672,000 acre-feet. The average annual runoff, based on 45 years of record, is about 2,650,000 acre-feet; only a small part of this runoff normally occurs during November and December.

At the H Street Bridge station at Sacramento, the American River reached a crest stage of 44.04 feet on November 19, thus exceeding the highest previously recorded stage of 43.4 feet on March 26, 1928. On the morning of November 21 the river reached

a record stage of 45.73 feet. The excessive flow of the American River caused a record stage of 30.14 feet on the Sacramento River at the I Street bridge, Sacramento. See figure 80. Previously recorded high at this station was 29.6 feet on January 17, 1909, which was prior to construction of the Sacramento weir. The previously recorded high since the weir has been in operation was 29.5 feet on March 26, 1928. During the period November 19-27 and again during December 7-13, the gates (48 total, each 38.1 feet long) of the Sacramento weir were opened when necessary and discharged most of the American River floodwaters safely into Yolo bypass. Figure 81 is a photograph of the weir on November 21 when the crest of the flood was near its peak.

Upstream from the foothill line at Folsom, American River floodwaters caused heavy damage to power installations and State and county roads. At Coloma, site of gold discovery in California, about 100 acres were flooded, causing damage to a State Park, a State highway, residential property and tourist cabins, and forcing the evacuation of about 50 people from their riverside homes. About 12 miles downstream from Folsom the floodwaters overtopped the right bank and flooded about 5,000 acres of agricultural and residential property east of the city of Sacramento. The flood flow then entered the overflow channel between the levees (which protected the cities of Sacramento and North Sacramento) and joined the Sacramento River. Floodwaters backed up Arcade Creek, which enters the floodway, and flooded about 2,400 acres of residential and agricultural property in the Del Paso Heights area. On the right bank, upstream from H Street Bridge, the levees offered only partial protection during small floods, and numerous breaks from previous floods had not been repaired. During the rise of November 19 the floodwaters flowed through these unrepaired breaks and breached the lower part of the levee in several places. The peak flow of November 21 overtopped the entire levee, and in addition to the reinundation of the suburban area east of Sacramento, this overflow caused a break in a local levee across a natural drain and resulted in the flooding of the highly developed residential property in the Sierra Oaks Vista subdivision. See figure 82. The damage to residential, commercial, industrial and agricultural property and to roads, highways and power facilities within the flooded area was severe. The depth of water ranged from about 1 foot to more than 6 feet on the floors of most of the flooded buildings, and many houses were flooded four times during the overflow period. Although the domestic groundwater supply serving the flooded and adjacent areas became contaminated, effective chlorination measures were taken, and no serious outbreak of disease was reported. One death in Yolo County, reported by the Sacramento Bee, concerned an elderly man who was drowned when water covered his cabin in the bottomlands of the Sacramento River near the mouth of the American River. Approximately 4,500 persons were evacuated from the overflow area during the flood period.

Figure 80.--Crest of Sacramento River at Tower bridge, about 5 blocks downstream from I Street bridge, Sacramento, November 21, 1950. Photo by California Water Resources Board.

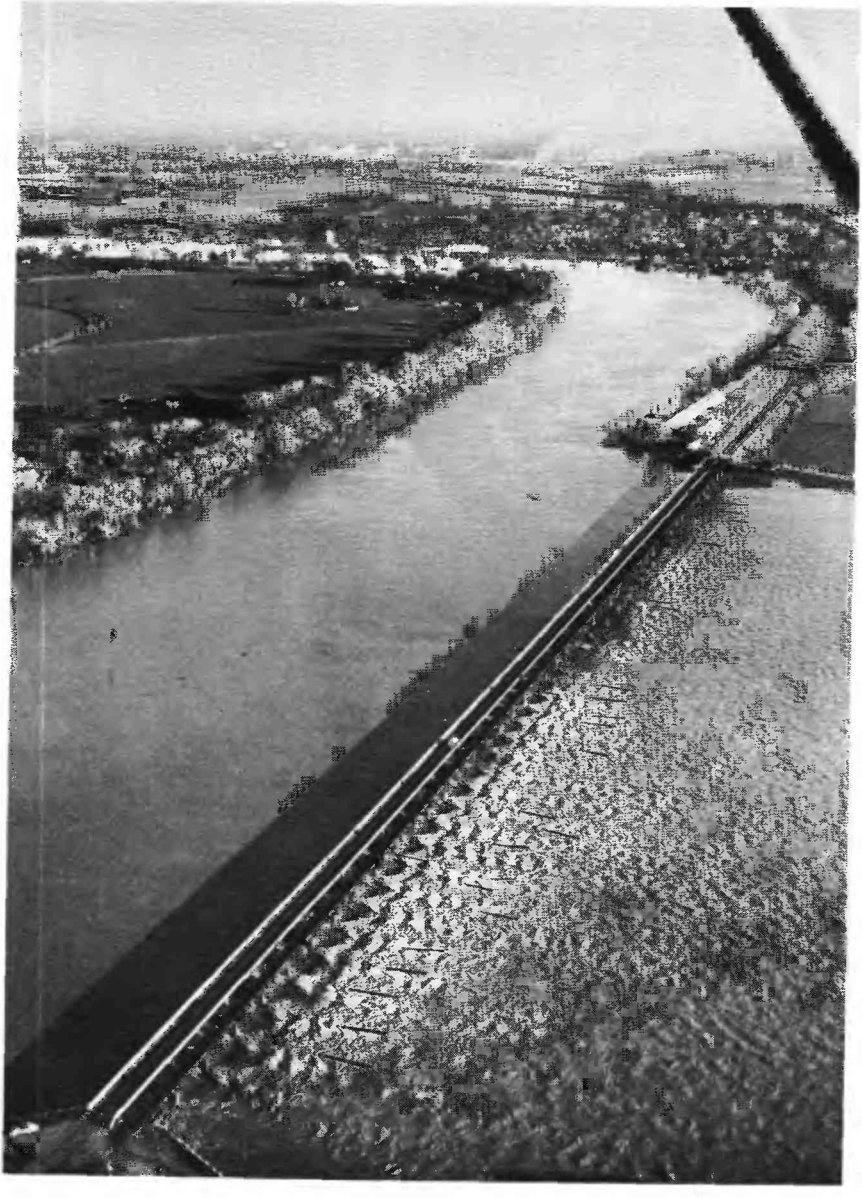

Figure 81. --Sacramento Weir on Sacramento River, November 21, 1950. At time of photograph, head on weir was 7.8 feet and discharge about 108,000 cfs. Photo by California Water Resources Board.

Figure 82. --H Street bridge across American River, east Sacramento, November 21, 1950. East levee overflow in background. Geological Survey gage in left foreground. Photo by California Division of Highways.

In the relatively lower drainage area of the Cosumnes River, the November 18 peak discharge of 27,600 cfs at the Michigan Bar gaging station was only slightly greater than the previous maximum of record which occurred in March 1940. The November 18, 19 flood flow broke through the north-bank levee near Sloughhouse, flowed with considerable force across farm lands to the bluff which forms the north bank of Deer Creek, followed that bluff to the confluence of Deer Creek and Cosumnes River above the Southern Pacific Railroad crossing, then flowed across the bottom lands to join floodwaters of the Mokelumne River near the community of Thornton. Approximately 17,600 acres of agricultural lands were inundated to depths of as much as 8 feet.

On the Mokelumne River, a flood peak of 29,100 cfs on November 21, at the Mokelumne Hill gaging station upstream from Pardee Reservoir, exceeded by 5,800 cfs the previous maximum of record established by the March 1928 floods. Pardee Reservoir was filled by the inflow from the first flood rise on November 18, and the November 21 peak had to be passed over the spillway; this resulted in record peaks of 26,700 cfs and 28,800 cfs respectively at the downstream stations at Lancha Plana and near Clements. At the Mokelumne Hill gaging station the record flood peak of 33,700 cfs occurred on December 3. The floodwaters inundated bottom lands on both sides of the river from the foothill line to the mouth. The merging of the floodwaters of Mokelumne River with those of its valley-flood tributaries, Cosumnes River and Dry Creek, created a lake of about 8,700 acres. All levees along the river were overtopped except those protecting the community of Thornton. Including the lake and the flood plain above it (ranging up to 2 miles in width), approximately 22,000 acres were inundated by Mokelumne River floodwaters. The suburbs of Lodi were flooded by the November peak but they were not affected by subsequent peaks. Inundation depths ranged as high as 5 feet during the 3-day flood period. Most of the flooded urban property at Lodi was of the better residential type. Flooded croplands included substantial acreages of truck, alfalfa, orchards and vineyards; inundation depths ranged as high as 8 feet and the flooding lasted as long as 6 weeks. Severe damage suffered by utilities and public property included power installations at Pardee Reservoir, a fish ladder of the California Division of Fish and Game near Woodbridge, State and county roads and bridges, railroads, and transmission lines throughout the flooded area.

Between the drainage basins of the Calaveras River on the north and Stanislaus River on the south, November-December floodwaters of Duck Creek (one of three small streams tributary to the San Joaquin River), overflowed its banks and inundated residential areas on the outskirts of Stockton. Substantial residential damage resulted from water ranging as deep as 20 inches over floors. Some damage occurred also to a number of small commercial establishments, including motor courts, garages, grocery stores and a tavern.

The November-December flood flows of the Stanislaus River broke all previous records. The peak inflow of 90,000 cfs to Melones Reservoir, which occurred on November 19, compares with the previously recorded maximum discharge of 60,000 cfs downstream at the Knights Ferry station during the flood of January 1911, prior to the construction of Melones Reservoir. As recorded at the gaging station below Melones powerhouse, the maximum discharge from the reservoir occurred on November 21 and amounted to 49,500 cfs. Second and third peak outflows of 48,400 and 44,600 cfs occurred on December 3 and 8, respectively.

The flooded area during the November-December floods extended from the vicinity of Knights Ferry to the San Joaquin River and included approximately 15,000 acres of highly productive agricultural lands. Where the Stanislaus River floodwaters intermingled with those of the San Joaquin River, an area about 4 miles wide was inundated. All of the smaller privately-constructed levees were overtopped and those of the reclamation districts along the lower reaches were breached in a number of places (see fig. 78). Urban communities in the basin are located on higher ground and were not flooded.

Because there was about 350,000 acre-feet of storage space available in Lake Eleanor, Hetch Hetchy, and Don Pedro Reservoirs at the time of the November storm, the November 21 discharge of the Tuolumne River below Don Pedro Reservoir (as recorded at the station near La Grange) was controlled to a peak of 28,900 cfs. The actual peak inflow to Don Pedro Reservoir of 86,000 cfs substantially exceeded the previously recorded maximum discharge of 60,300 cfs at the La Grange station during the flood of January 1911 (prior to the construction of any of the three reservoirs mentioned above). The regulation afforded by Don Pedro Reservoir was adequate to control the December 3 peak inflow of 64,000 cfs to a discharge of 9,790 cfs at the La Grange station. However, because the reservoir was nearly full just prior to the storm of December 7, 8, the peak inflow of 66,000 cfs on December 8 was only slightly reduced to an outflow of 61,000 cfs as recorded at the La Grange station.

Downstream from the foothill line the river overflowed its banks and inundated an irregular strip of land varying in width to about 2 miles. Most of the small levees constructed by farmers were overtopped and breached. In the city of Modesto a considerable section of residential and commercial properties adjacent to the river was inundated to depths ranging from a few inches to 6 feet, forcing about 4,000 persons to leave their homes. The damage to foundations, floors, and furnishings was severe. Depth of flooding of agricultural areas ranged as high as 18 feet, and altogether, approximately 8,000 acres of urban and agricultural land were inundated.

On the Merced River, the flood peak of November 18 established a new record of 83,000 cfs at the Bagby gaging station upstream from Lake McClure, as determined by inflow to the lake. The Bagby gaging station was completely demolished. Previous maximum discharge of record upstream from Lake McClure was 59,000 cfs during the flood of December 1937. Storage space in Lake McClure was adequate to reduce the November flood inflow to less than 2,000 cfs. However, because of the high stages of the lake during the December floods, large releases were required; the peak, as recorded at the Exchequer gaging station on December 4, amounted to 46,200 cfs. Previous maximum discharge at this station was 22,000 cfs during the flood of January 1916 (prior to the construction of Exchequer Dam, which was completed in 1926).

In Yosemite National Park, floodwaters of the Merced River during the November storms caused large damage to roads and trails, buildings, tourist lodges, and other improvements; the damage was estimated by National Park Service engineers at more than $500,000. Floods from the December storms intensified the damage and delayed reconstruction. Between Yosemite and Lake McClure, flooding of the "All Year Highway", State Route 140, in the vicinity of El Portal and Briceburg caused damage estimated by the California Division of Highways at $1,200,000. See figure 83. The highway was closed, and travel to Yosemite was routed over alternate routes for several months. Downstream from Lake McClure, the December releases from the lake washed out the left abutment of a small dam operated in connection with Merced Falls powerhouse. Overflow caused flooding and subsequent evacuation of the towns of Snelling and Cressey. A strip of land as wide as 3 miles was inundated. In all, about 19,600 acres of agricultural and urban land were inundated to depths ranging from a few inches to about 10 feet.

Flood flows of November and December in the Merced County Stream Group caused extensive flooding in the vicinity of the city of Merced. The drainage area of this group, including Bear, Black Rascal, Burns, Mariposa, Miles, Owens, and Deadmans Creeks, lies between the drainage basins of Merced River on the north and Chowchilla River on the south. Breaking out at two locations east of Merced, the floodwaters of Bear Creek flowed in a southwesterly direction and inundated east Merced residential areas and large orchards east of the city. The waters then crossed the Yosemite Highway and Santa Fe Railway through relief openings and inundated more orchards, numerous suburban homes, and dairy ranches and finally crossed U. S. Highway 99 and the Southern Pacific Railroad through relief openings and inundated more rural residences and dairy ranches. North of the city, Black Rascal Creek overflowed its banks and inundated a strip about half a mile wide and 4 miles long. West of the city, floodwaters backed up over lowlands north of State Highway 140, spilled over the highway and across croplands south to Bear Creek, and covered the entire delta area.

Figure 83. --Damage to State Route 140 into Yosemite Valley in Merced River Canyon east of El Portal. Photo by California Division of Highways.

A total area of about 27,000 acres of agricultural lands and residential and commercial properties were flooded.

The flood peak of November 18 washed out the gaging station on Chowchilla River at Buchanan damsite. This peak of 22,500 cfs, determined by slope-area measurements, established a new record. The maximum discharge previously recorded was 18,900 cfs during the flood of March 1938.

Virtually all the flooding in the Chowchilla River basin took place in the city of Chowchilla and in areas south and southwest of the city and was caused by overflows from Ash and Berenda Sloughs (distributaries of Chowchilla River). Ash Slough waters broke through a protective levee on the north side of the city and flowed southward, inundating more than half of the city to depths ranging from a few inches to 3 feet. A railroad spur embankment at the easterly boundary of the city channeled the floodwaters to agricultural areas south of the city. A few hours after the Ash Slough break-through, Berenda Slough, southeast of the city, overflowed at the bridge on U. S. Highway 99 and poured into the city between the railroad embankment and high ground north of U. S. Highway 99; this water formed a lake between the railroad fill on the south, high ground on the west and north, and the left bank of Berenda Slough on the east. This lake area, inundated with as much as 4 feet of water, contained a number of commercial establishments, including a motel and bus depot, some cafes, service stations, and garages. See figure 84. Altogether, about 12,000 acres of urban and agricultural lands were inundated. As reported in the Fresno Bee, one man was drowned by Berenda Slough floodwaters; this person was a transient who had been asleep under the Berenda Slough Bridge when the floodwaters arrived.

On the Fresno River, the peak of 8,540 cfs at the gaging station near Knowles on November 19 was the maximum for a period of record of 37 years; the greatest discharge previously recorded was 7,630 cfs during the flood of March 1938. Areas flooded from Fresno River and from overflow into Cottonwood Creek amounted to 4,900 acres of agricultural land. About 4,000 acres of these croplands were flooded when protective levees downstream from the city of Madera were breached at several points.

Although the volume of the November-December inflows to Friant Reservoir from the upper San Joaquin River Basin were large for so early in the flood season, the peak discharge was not record breaking. Inflows were completely regulated by the reservoir, and the maximum release as recorded at the gaging station below Friant was 5,050 cfs on December 18. Compared to the peak discharge of 48,100 cfs on November 19 below Kerckhoff powerhouse and upstream from the reservoir, the maximum discharge of record below Friant was 77,200 cfs during the flood of December 1937 (prior to the construction of the reservoir).

Figure 84.--U. S. Highway 99 at south city limits of Chowchilla covered by water 2 to 3 feet deep. Photo by Wessels' Studio, Chowchilla.

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In the lower San Joaquin River the regulation afforded by the reservoirs on the major tributaries, Stanislaus, Tuolumne and Merced Rivers, was such that during the November flood period the discharge at the Vernalis gaging station did not exceed a peak of about 33,000 cfs on November 23. However, during the December 3-10 flood period the tributary reservoirs were nearly full or spilling and maximum releases to maintain flood control capacity were being made. The result was a record-breaking peak discharge of 79,000 cfs at the Vernalis gage on December 9. See figure 78. Previously recorded maximum discharge at this station was 51,200 cfs during the floods of March 1938. At Mossdale Bridge, at the edge of the San Joaquin River Delta, the flows of December 9, 10 produced a record-breaking stage of 24.75 feet.

Floodwaters of the San Joaquin River spread over low-lying lands on both sides of the river, breached protective levees, and intermingled with the floodwaters of the tributaries to inundate approximately 44,000 acres of valley-floor lands, between the mouth of the Merced River and the head of delta tidal channels below Mossdale, with waters as deep as 8 feet. Pouring through breached levees upstream from Mossdale, the floodwaters inundated an area which included residences in and around Mossdale, resorts containing permanent homes and summer cottages, commercial establishments, the $20,000,000 State of California Vocational Institution under construction near Trach, main lines of the Southern Pacific and Western Pacific Railroads, and U. S. Highway 50 between Stockton and Tracy. Sections of the Southern Pacific Railroad and of the east-bound lane of U. S. Highway 50 were completely washed out. See figures 85, 86, and 87. Between Mossdale and Stockton, farmlands, residences, and some commercial establishments were inundated when the east levee was breached near Brant Bridge. The Sacramento Bee, December 11, reported that about 3,200 persons were forced to evacuate their homes as a result of the flooding from the lower San Joaquin River and its tributaries.

In the delta area of the river, exceptionally high tides during the December flood period greatly increased the flood hazard, and on December 10, failure of the levees surrounding Venice Island completely inundated this tract of 3,000 acres of highly productive peat land and displaced five families. The high tides substantially prolonged the normally slow recession of flood flows in the lower river, and as a result, some of the flooded areas remained under water for a period of 10 days or longer.

On Kings River, the flow at Piedra (at the foothill line) rose sharply from a relatively low stage on the afternoon of November 18 to a record peak of 91,000 cfs early on the morning of November 19. Previously recorded maximum discharge in the 55 years of record was 80,000 cfs during the floods of December 1937. In a second peak of 36,800 cfs which occurred on December 4, the rise

Figure 85. --Lower San Joaquin River floods area near Mossdale, in background. Break in east levee of Paradise cut just upstream from Western Pacific Railroad in foreground. Photo by California Water Resources Board.

Figure 86. --Washout of Southern Pacific railroad track near Mossdale. Photo by California Water Resources Board.

was not as sharp nor was the recession as rapid as that of November 19. However, as a result of the sustained flow and previous saturation of the channel and overbank areas, flood peaks in the lower reaches and the north (to San Joaquin River) and south (to Tulare Lake) distributaries were as high as in the November 18-21 flood.

Upstream from Piedra the November 19 floodwaters washed out a newly completed weir and the coffer dam and foundation work of the Pine Flat Dam under construction by the Corps of Engineers. Estimated at more than $900,000, this was the most costly single item of property damaged by the flood. A motion picture theater with a seating capacity of approximately 300, located on the north bank of the river at Piedra, was completely destroyed--the theater was not open on the day of the flood. Thirty-five people living on an island near Piedra were marooned by the sudden rise of the river but were saved by rescue workers.

From Piedra to U. S. Highway 99 (immediately south of Kingsburg) about 17,000 acres of highly productive agricultural lands were flooded; most of the land was in Centerville Bottoms. Including residents in the vicinity of Sanger and Centerville and farm families throughout the area, about 500 persons were forced to evacuate their homes. Loss of livestock in the area was especially severe; it was reported that about 30,000 turkeys, valued at $500,000, were lost.

Downstream from U. S. Highway 99, the flooded area (mostly highly developed agricultural lands) included about 36,100 acres between the highway and Crescent Weir, 13,000 acres between Crescent Weir and San Joaquin River along the north distributaries (including Fresno Slough and Fresno Slough "James" bypass), and 3,000 acres along the south distributaries to Tulare Lake. As the result of breaks in the river levees at numerous points near Laton, that community of 400 residents was virtually surrounded by the floodwaters. Farther downstream the floods encroached upon Riverdale and fringe communities near Hanford. The second flood, December 4-6, covered a smaller area than the November 19-21 flood, but Laton was again surrounded and the flooding along the north and south distributaries was nearly the same.

In the Tulare Lake area, inflow from the Kings, Kaweah, and Tule Rivers during the November 19-21 flood was confined to 12 sections of land (recently planted to barley) by emergency levees which were constructed as soon as it became apparent that the floodwaters would enter the lake. A high wind on December 10 caused waves that broke the last of the emergency levees. This permitted inflow that inundated $4\frac{1}{2}$ additional sections of land; the total flooded area amounted to 10,600 acres.

Figure 87. --Lower San Joaquin River floods Stewart Tract and four-lane U. S. Highway 50 near Mossdale. Parallel highway to left of one shown is completely inundated. Photo by California Water Board.

On the Kaweah River, the flood of November 19 was the largest with respect to both peak and volume since stream gaging was begun on that river in 1903. By slope-area determination near Three Rivers (the gaging station was destroyed) the peak discharge was determined at 52, 000 cfs. The maximum discharge previously recorded was 33, 300 cfs during the flood of December 1937.

Upstream from the foothill line the floodwaters destroyed 7 highway bridges, damaged an extensive stretch of highway, and destroyed or damaged 25 homes. Several houses in the town of Three Rivers were washed into the river.

Downstream from the foothills, severe damage occurred to Terminus Beach, two gravel plants, and a number of homes. Below the community of Lemon Cove, debris lodging against the bridge and trestle of the Visalia Electric Company formed a dam that diverted floodwaters toward the town of Woodlake. Six homes were

destroyed and others were extensively damaged. In Woodlake, about 50 homes were flooded to depths varying from a few inches to more than 3 feet. The trestle of the Visalia Electric Company eventually collapsed and resulted in the destruction of several thousand feet of railroad track and embankment.

From Woodlake to the vicinity of Visalia, the flooded area (mostly in orchard or pasture) was from 2 to 4 miles in width. Extensive flooding of business and commercial sections in the city of Visalia were the result of overflow from Mill Creek, a distributary of the Kaweah River. The water averaged from 6 to 12 inches in depth, although in several places it was about 18 inches deep. Wide areas of cotton, pasture, and grain lands were flooded south of Visalia along various canals and distributary channels, and east of the city along the St. Johns River and Cross Creek distributaries. Damage to buildings, machinery, lumber, fences, and livestock was extensive.

The total area flooded by the Kaweah River was about 48,000 acres; it included urban and suburban areas of about 50 acres in, or near, the towns of Three Rivers, Lemon Cove, Woodlake, Farmersville, and the city of Visalia. No lives were lost, although many houses and automobiles were swept away, and a number of people had very narrow escapes. It was reported that 2,000 persons in the Visalia area and 200 persons in Woodlake were evacuated during the height of the flood.

For the 49-year period of record on the Tule River at the station near Porterville, the 1950 peak discharge of 25,500 cfs on November 19 compares with the previous maximum of 15,500 cfs during the flood of March 1943.

Upstream from the gaging station, the flooding caused severe damage to improvements in Sequoia National Forest, to homes and bridges, and to many sections of highways. Between the city of Porterville and the Friant-Kern Canal crossing, and between that crossing and U. S. Highway 99, the floodwaters spread over highly productive agricultural areas to a width of 3 or 4 miles adjacent to the canal and highway. Three major breaks in the levees resulted in erosion and depostion of sand and silt. Substantial damage occurred to cotton, alfalfa, and potato crops, to improvements and stored supplies, and to the land itself. Between U. S. Highway 99 and the Santa Fe Railroad, a major levee break caused deep erosion of pasture land. The United Concrete Corporation plant on U. S. Highway 99 was heavily damaged, and was closed for 2 weeks. In and near Porterville and the community of Woodville, urban and suburban areas totalling about 100 acres were flooded. The flooding in Porterville was shallow and damage was largely confined to a small portion of the residential area. Roads and bridges suffered severe damage throughout the Tule River basin. The total area flooded was about 32,000 acres.

On the Kern River the flood of November 19 produced peak flows greatly exceeding all previous records within a period of 38 years at the station near Kernville (upstream from the South Fork) and within a period of 54 years at the valley station near Bakersfield. Near Kernville, the peak discharge of 27,000 cfs compares with the previous maximum of 9,690 cfs in January 1916. Near Bakersfield, the November 19 peak was 36,000 cfs as compared to the record of 21,700 cfs established during the flood of March 1943. On the South Fork of the Kern River the November 1950 flood peak was less than that of March 1938, the maximum of record.

Upstream from the head of the lower canyon near the Isabella Dam site, the floodwaters covered portions of the town of Kernville and most of the town of Isabella and forced a mass evacuation of about 1,000 inhabitants. A State of California fish hatchery adjacent to the river was flooded as well as the Kern No. 3 power plant of the Southern California Edison Co., the outlet tunnel of the Isabella Dam (under construction by the Corps of Engineers), summer homes, commercial recreational developments, and recreational developments of the United States Forest Service.

In the lower canyon, floodwaters damaged several commercial recreational establishments, two power plants, Forest Service facilities, and the State highway.

Downstream from the lower canyon in the foothill and valley areas, the floodwaters inundated much of Hart Memorial Park, a Kern County Park, parts of the Fruitvale oil field and the town of Oildale, and a considerable area of urban and suburban dwellings on the north side of the river opposite the city of Bakersfield. The south bank levees protecting Bakersfield almost failed; heroic efforts by hundreds of volunteers and the use of heavy equipment for patrolling and patching the levees saved the city from inundation.

As a result of overbank flow west of Bakersfield, a large portion of the floodwaters entered Goose Lake Slough (Jerry Slough), a distributary leading northwestward to the bed of Tulare Lake; the remainder of the flow entered the normally dry and cultivated bed of Buena Vista Lake. Because the flow in Goose Lake Slough did not extend beyond the old Goose Lake bed, none of the Kern River floodwaters entered Tulare Lake. During the December 2-4 storm, which produced a peak of 7,850 cfs at Bakersfield, the maximum inflow to Buena Vista Lake was greater than that during the November floods, and flow to the lake was continuous from about November 20 until the middle of December. In Goose Lake Slough it was continuous until December 7 or 8.

Flooding in Buena Vista Lake engulfed an area of about 6,300 acres, which was devoted largely to grain and irrigated and dry pasture. Many fences, pumps, canals and levees were flooded. Along Goose Lake Slough about 18,500 acres were flooded--although much of this area was in pasture or was undeveloped, a large area of cotton and alfalfa was flooded.

The total inundated area on the Kern River was about 37,300 acres.

FLOOD DAMAGES

Although many residents had narrow escapes, only two deaths have been directly attributed to the November-December 1950 floods in the Central Valley basin. This remarkably small loss of life for such a large and widespread flood was due in large measure to the excellent coordination and effectiveness of the flood warning and evacuation activities of the many Federal, State, county, and local agencies concerned, and of the American Red Cross. On November 21 the Governor of California proclaimed a state of emergency, which prevailed until the middle of December. Units of the National Guard were called out for patrol and rescue operations in critical areas, and the heads of State departments such as highways, public health, water resources and highway patrol were authorized to use State personnel, equipment, and facilities to prevent and alleviate actual or threatened flood damage. Approximately 25,000 persons were evacuated from their homes during the entire flood period.

In rendering assistance to 2,970 families (flood victims within 12 counties in the Central Valley basin), the American Red Cross reported an expenditure as follows:

Rescue, transportation and mass shelter	$ 14,583
Food, clothing and other maintenance	109,196
Building and repair	87,444
Household furnishings	106,649
Medical, nursing and sanitation	2,987
Farm supplies, livestock and equipment	8,645
Occupational training, equipment and supplies	4,112
Family service, accounting and other administration	86,500
Total	$ 420,116

For the same area, the American Red Cross reported that 31 persons were injured, 96 buildings (including 47 dwellings) were destroyed, 3,484 buildings (including 3,055 dwellings) were damaged, and a total of 4,782 families suffered loss.

Immediately after the floods, surveys of flood damage were begun by the Corps of Engineers, U. S. Forest Service, National Park Service, Soil Conservation Service, and various State and county agencies and other organizations. The survey by the Corps of Engineers included the assembly of all available reports of damage by other agencies and by personal interviews with a large percentage of the property owners, local organizations, public utilities, and private firms. The assembled data on flood damage was published by the Sacramento District, Corps of Engineers, in a report entitled, "Report on November-December 1950 Floods, Sacramento-San Joaquin River Basins, California; and Truckee, Carson and Walker Rivers, California and Nevada".

As taken from that report, table 1 gives the flood damage in the Central Valley basin by stream basins under five categories of damage. Excluding only the damage to United States Forest Service property, the damage in the Central Valley basin included the flooding of 669,400 acres and amounted to a total of $31,525,000, distributed as follows:

Type of damage	Amount	Percent of total
Agricultural	$ 12,815,000	41
Residential	3,301,000	10
Commercial and industrial	2,488,000	8
Public institutions and public and private utilities.	12,393,000	39
Loss to traveling public	528,000	2
Total	$ 31,525,000	100

As reported by the United States Forest Service, the flood damage (largely to bridges, roads, camp grounds, and mountain meadows), amounted to $1,465,500, distributed among six National Forests as follows:

Plumas	$ 158,500
Tahoe	304,100
El Dorado	327,200
Stanislaus	136,800
Sierra	295,700
Sequoia	243,200
Total	$ 1,465,500

With respect to the five categories of damage as reported by the Corps of Engineers (table 1): Agricultural damage included damage to crops, farm improvements, and stored supplies; loss of livestock and poultry; and erosion of land and deposition of debris. Residential damage referred mostly to damage to foundations, floors, furnishings and yards. Commercial and industrial damage included lumber mills, sand and gravel plants, wineries,

oil field installations, a large concrete pipe plant, and many stores. Public institutions and public and private utilities damage included highways, railroads, levee systems, telephone and power lines, power plants, water and sewer lines, schools, and numerous other items. Included in this category were expenditures by the American Red Cross and by Federal, State, and local agencies for flood-fighting activities, and the cost of emergency repairs to flood-control works and of flood-damage surveys by the Corps of Engineers. Loss to the traveling public was estimated as the cost incurred by more circuitous routes because of damaged highways.

Damage to State highways and bridges amounted to $2,800,000. This damage was confined mainly to routes in the southern portion of Sacramento Valley, the eastern portion of San Joaquin Valley, and the routes crossing the Sierra Nevada from Bakersfield northward to Downieville. The major bridge loss in the Central Valley was the destruction of the Paradise Cut Overflow bridge on U. S. 50, west of Mossdale (fig. 85), and the loss of the Goose Slough bridge on State Route 139 in Kern County. Among the larger single items of highway damage, was the $1,250,000 damage to the All-Year Highway to Yosemite Valley in the Merced River Canyon (see fig. 83). About $1,200,000 of the total damage to State highways occurred on main transcontinental and through-State routes. These routes were closed to all traffic for as much as 9-day periods (for U. S. Highway 40 over Donner Summit).

Other damage to public and private utilities comprised widespread damage to county roads and bridges amounting to $2,250,000; damage of $700,000 to railroads--major items were the destruction and flooding of track and embankment of the Southern Pacific Railroad in the lower San Joaquin River basin (fig. 86) and of the Visalia Electric Company in the Kaweah River basin; damage to power plants and transmission lines amounting to $850,000, and damage to telephone lines amounting to $50,000.

Damage to levees, including the cost of emergency repairs, amounted to $2,500,000 (see figs. 85, 87, and 88).

Excluding United States Forest Service properties, State highways, and levees, damage totalling $2,200,000 was sustained by the utilities, installations, and other properties of Federal agencies (including the Corps of Engineers, Bureau of Reclamation, Soil Conservation Service, and National Park Service), and of State agencies (including the Divisions of Forestry, Fish and Game, and Beaches and Parks, and the Department of Corrections). The largest single item of damage included in this total was the $900,000 damage to the contractor's plant and Government facilities at the site of Pine Flat Dam (under construction by the Corps of Engineers on the Kings River). In Yosemite National Park, damage to roads and trails, buildings, and other improvements amounted to $509,000. Damage

Table 1. --Flooded areas and flood damages, Central Valley basin, November-December 1950
[Compiled by Corps of Engineers]

Stream basin	Flooded area in acres	Direct flood damage in thousands of dollars					
		Agricultural	Residential	Commercial and industrial	Public institutions and utilities	Loss to traveling public	Total
Sacramento River (main stem)and bypasses	111,700	187	7	20	136	78	428
Streams on western Sierra slopes a/	9,000	30	0	0	11	0	41
Clear Lake and tributaries	5,700	30	8	11	5	0	54
Streams on eastern slope of Coast Range b/	12,800	41	49	12	36	11	149
Feather River	18,600	76	0	0	197	0	273
Yuba River	43,400	506	1,189	905	1,384	50	4,034
Bear River	16,700	130	0	0	148	0	278
American River	9,100	512	1,421	388	1,031	153	3,505
Sacramento-San Joaquin Delta	18,200	519	0	0	653	0	1,172
Cosumnes River	17,600	214	0	0	20	0	234
Dry Creek	3,900	11	0	0	0	0	11
Mokelumne River	22,100	812	33	154	675	0	1,674
Bear Creek (San Joaquin County)	2,100	79	0	0	35	0	114
Calaveras River	3,000	180	6	1	65	0	252
Littlejohn Creek Group c/	2,500	46	43	9	6	0	104
Stanislaus River	15,000	883	10	48	196	0	1,137
Tuolumne River	8,100	296	224	76	54	0	650
Merced River	19,800	372	24	13	1,996	30	2,435
Merced County Stream Group d/	27,000	140	5	41	210	0	396
Chowchilla River	12,000	158	15	34	109	41	357
Fresno River	4,900	123	0	0	90	0	213
Upper San Joaquin River e/	0	0	0	0	21	0	21
Lower San Joaquin River f/	88,200	2,604	71	17	1,821	130	4,643

Kings River	69,300	2,314	20	183	1,430	0	3,947
Kaweah River	47,600	370	89	148	726	0	1,333
Tule River	32,400	544	61	249	350	0	1,204
Kern River	37,300	957	26	179	800	35	1,997
Tulare Lake	10,600	676	0	0	134	0	810
Minor streams in Tulare Lake basin g/	800	5	0	0	54	0	59
Total, Central Valley basin	669,400	12,815	3,301	2,488	12,393	528	31,525

a Sacramento River tributaries upstream from Feather River, including Antelope; Deer, Chico, Little Chico, Butte and Dry (Linda) Creeks, and Cherokee Canal.
b Includes Walnut, Putah, Cache, Willow, Stony, and Thomes Creeks.
c Includes Duck Creek.
d Includes Bear, Burns, Owens, Mariposa, Miles, and Black Rascal Creeks.
e Above Friant Dam.
f Friant Dam to delta tidal channels.
g Includes Deer, Poso, White, Big Dry, and Caliente Creeks.

Figure 88. --American River damages levee protecting City of Sacramento. View looking south (upstream), H Street bridge in background. Photo in figure 86 taken from right end of bridge in photo above. Photo by California Water Resources Board.

to the canal and to the contractor's equipment amounting to $405,000 was sustained when Los Banos Creek, a west-side tributary of the San Joaquin River, overflowed into the incompleted Delta-Mendota Canal (under construction by the Bureau of Reclamation). Of the State agencies, totals of damage reported were $8,000 by the Division of Forestry; $89,000 by the Division of Fish and Game--of which $57,000 was damage to a fish ladder on the Mokelumne River near Woodbridge, and $19,000 was damage to installations on the Kern River; $26,000 by the Division of Beaches and Parks--most of which was damage to the State park at Coloma on the American River; and $123,200 by the Department of Corrections--of which $108,200 was damage to the California Vocational Institution under construction near Tracy.

Exclusive of roads and bridges, the damage to other utilities and properties of county and city agencies totaled to $350,000.

Accurate comparision of the November-December 1950 damage total of $33,000,000 with estimates of damage caused by previous major floods in the Central Valley basin is difficult because of the differences in the value of the dollar, in the nature, occurrence, period, and areal coverage of the floods, in the extent of development and population within the flood plain, in the extent of flood-control construction and operation, and in the relative degree of accuracy and comprehensiveness of the damage estimates. The last preceding serious floods, those of 1937-38, covered two separate flood periods: the flood of December 1937 and the floods of January to March 1938. Based upon 1937-38 costs, the total damage in the Central Valley basin resulting from the floods of December 1937 to March 1938 is estimated by the Corps of Engineers to have amounted to $21,000,000.

Allowing for the decrease in damage which would have been afforded by the additional flood-control works in operation in 1950-51 and allowing for the monetary increase of much higher 1950-51 costs and greater present-day development in the flood plain, it is estimated by the Corps of Engineers that recurrence in December 1950 and January to March 1951 of floods of the same magnitude as those of 1937-38 would have caused damage in the Central Valley basin amounting to about $54,000,000.

METEOROLOGIC FEATURES OF THE FLOODS

Meteorology

Prepared by the staff of the United States Weather Bureau

The Central Valley of California is rimmed by mountains on all sides except for the gap through which the Sacramento and San Joaquin Rivers escape to the Pacific. The Valley is bordered by the Coastal Range on the west, the Sierra Nevada on the east, the Tehachapi Mountains on the south, and the Klamath Mountains, Mount Shasta, the Upper Pit River Plateau, and the Warner Range on the north. Like most of California, the Central Valley has its dry season in summer and its wet season in winter, with the peak precipitation usually occurring in January. Winter rainfall is almost completely the result of a strong southwesterly flow of warm, moist, unstable air from the Pacific. It is upon the persistence of this flow that the occurrence of a flood depends--a duration of two or more days is necessary. Although frontal passages may be frequent during flood rains they are relatively unimportant when they do not appreciably disturb the southwesterly current of air. 1/ Although some moisture is wrung out of the air as it rises over the Coastal Mountains, a great deal more is released as the air is lifted by the higher Sierra Nevada. Some air is funnelled into the Valley through the western break in the Coastal Mountains in the vicinity of the Golden Gate. This moisture-laden air tends to pile up at the northern end of the Valley, and as it is lifted by the Klamath and Warner Mountains and Mt. Shasta, a great quantity of precipitation results.

October 1950 was the warmest October in California since 1933. In addition, it was the wettest October since 1899, with an average precipitation total almost 300 percent of normal. The rain was heaviest during the last week of the month, especially in the upper Sacramento valley where it produced heavy runoff.

November 1950 was also unusually warm and wet, with an average precipitation total about 225 percent of normal. Blue Canyon, 5,280 feet high in the Sierra Nevada, received 26.75 inches of precipitation for the month. This was not only the greatest precipitation total in California for November 1950, but it was also the greatest November total in Blue Canyon's 51 years of record. At many other stations in the Central Valley, as shown in table 2, the November pre-

1/ Hydrometeorological Section, U. S. Weather Bureau, Hydrometeorological Report No. 3, Maximum Possible Precipitation over the Sacramento Basin, 1943, pp. 52-53.

cipitation total was the greatest for the period of record. At Colfax and Soda Springs, in the Sierra Nevada, it was the greatest in 80 years of record, and at Sacramento, November 1950 was the wettest since 1892 and the warmest since 1932. In spite of the warmth, snow was reported at many stations in the Sierra Nevada during the month of November; Snow Laboratory Central Sierra received the greatest total, 39.9 inches.

During the first 8 days of November 1950, a wedge of high pressure from the Pacific was centered over northern California. Winds in the Central Valley were light, skies were clear, and temperatures consistently averaged well above normal. See figures 89 and 90. On November 9, however, a great mass of polar air from western Canada moved southward to the Mexican border. During the next four days, temperatures fell steadily at most stations in the Valley.

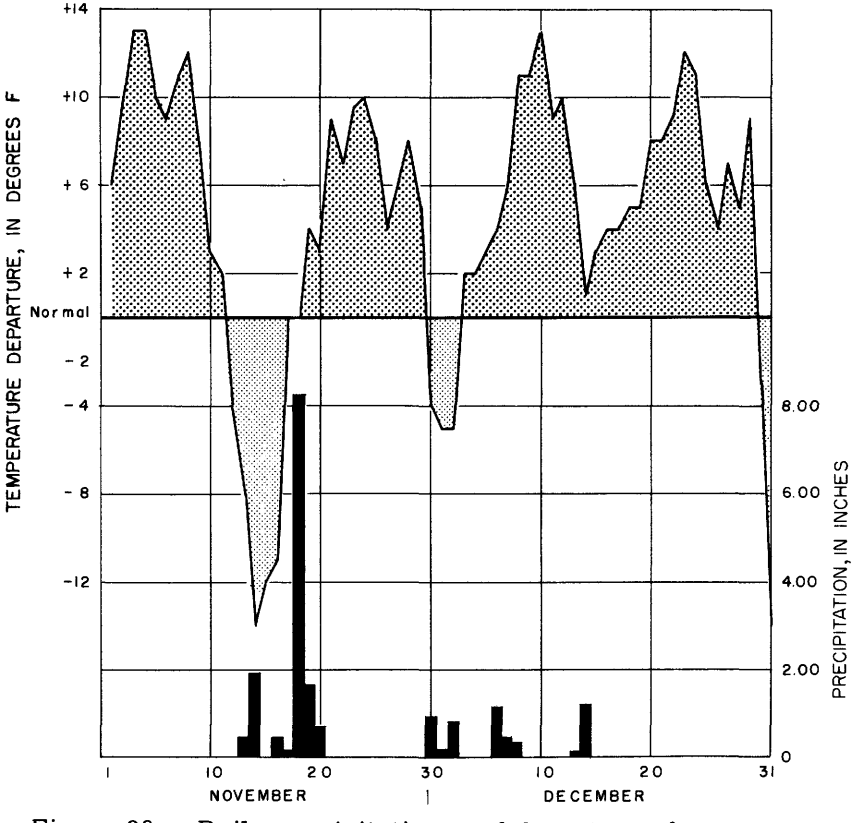

Figure 89.--Daily precipitation, and departure of average temperature from normal, Huntington Lake (elev. 7,020 ft), San Joaquin River basin, November and December 1950.

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Table 2. --Comparative November precipitation data at selected weather stations

Station	November 1950		All Novembers during period of record ending in 1949					
	Total for month (inches)	Greatest daily total (inches)	Length of record (years)	Greatest monthly total (inches)	Year	Length of record (years)	Greatest daily amount (inches)	Year
Ash Mountain	6.13	3.19	25	7.62	1926	25	2.91	1946
Auberry	9.03	3.94	35	8.86	1926	34	4.24	1926
Auburn	13.92	3.76	79	15.24	1885	51	2.95	1926
Blue Canyon Weather Bureau, airport	26.75	8.66	51	23.31	1903	49	5.00	1909
Bowman Dam	23.89	6.58	67	31.27	1903	40	5.52	1946
Bullards Bar powerhouse	23.78	6.91	9	17.83	1942	9	6.37	1942
Calaveras, Big Trees	19.66	6.70	10	12.57	1946	10	6.16	1946
Colfax	18.40	5.10	80	18.38	1903	52	5.02	1903
Crocker Station	14.51	4.00	18	17.43	1900	5	3.30	1949
Deer Creek powerhouse	26.04	7.37	43	21.80	1926	42	5.80	1930
Dobbins Colgate Forebay	16.50	5.45	46	14.18	1920	47	4.71	1912
Dudleys	17.56	8.41	41	12.77	1926	40	4.50	1926
Giant Forest	18.87	9.55	29	18.73	1926	29	5.97	1924
Grant Grove	14.51	6.12	10	11.85	1944	10	5.70	1949
Hetch Hetchy	14.66	6.74	39	11.06	1926	36	3.88	1946
Huntington Lake	13.65	5.29	35	10.21	1926	34	3.70	1946
Kernville	4.00	3.15	56	5.09	1900	48	1.84	1926
Lake Eleanor	18.62	7.50	40	12.28	1942	38	5.41	1942
Lake Spaulding	23.90	6.44	56	20.36	1903	52	5.92	1946
Mariposa	13.63	7.30	42	9.42	1926	42	4.00	1924

Meadow Lake	10.90	4.23	2	3.79	1949	2	2.91	1949
North Fork ranger station	14.37	8.67	46	10.00	1944	44	5.80	1946
Portola	7.25	1.94	35	6.71	1926	35	2.40	1915-46
Salt Springs powerhouse	14.37	4.56	3	4.08	1949	3	2.01	1949
Soda Springs	21.14	5.35	80	13.60	1885	51	3.60	1922
Sonora	10.61	5.33	63	10.29	1900	43	4.90	1919
South entrance Yosemite National Park	17.33	6.63	9	13.60	1946	9	7.14	1942
Springville Tule Dam, headworks	20.50	10.27	48	9.19	1946	38	5.16	1924
Tahoe	13.75	4.56	41	10.61	1926	40	3.55	1944
Three Rivers	7.86	4.10	41	6.56	1926	40	2.31	1926
Tiger Creek powerhouse	19.93	6.94	43	15.84	1926	43	6.42	1942
Truckee ranger station	11.37	2.90	67	8.94	1875	38	3.12	1944
Twin Lakes	14.79	4.82	31	11.90	1926	30	3.90	1942
West Point, 3 miles southwest of	13.81	5.43	56	13.20	1926	49	5.00	1942
Woodfords	8.06	3.90	18	9.11	1946	18	3.57	1946
Yosemite National Park	15.07	5.63	46	11.96	1926	45	3.37	1926

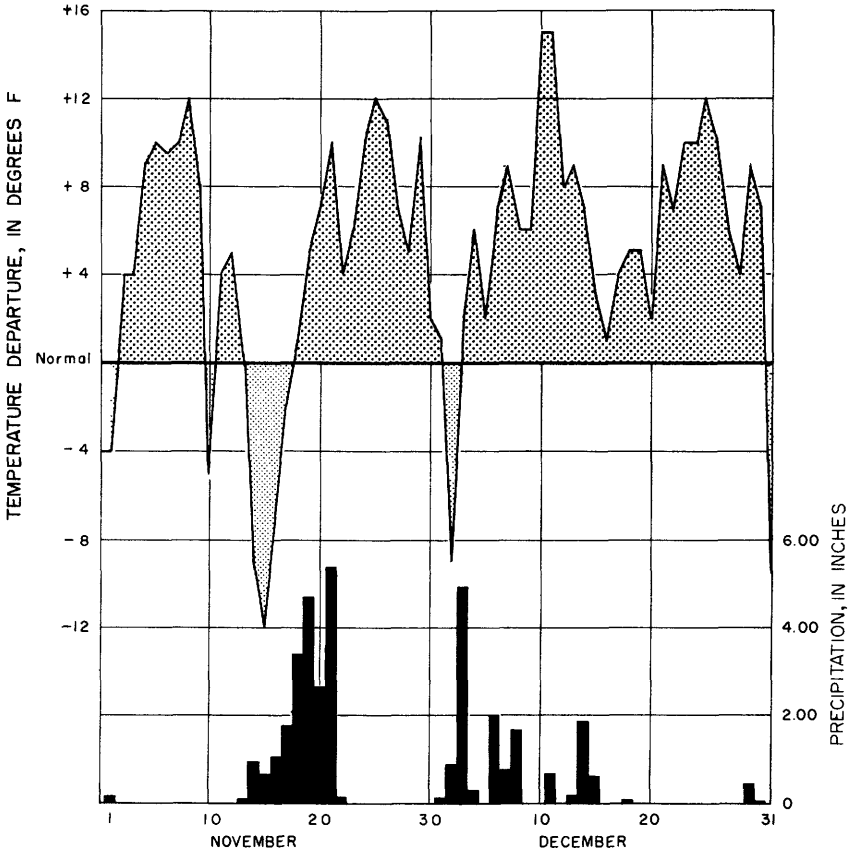


Figure 90. --Daily precipitation, and departure of average temperature from normal, Soda Springs (elev. 6, 752 ft), Sacramento River basin, November and December 1950.

A sharp trough developed off the California coast at about 10, 000 feet during November 12 to 13 and created a strong southwesterly flow over the Central Valley. By the 15th, an intense surface Low, which lay just west of Vancouver Island, produced a northeastward flow of warm moist Pacific air over the Valley. Precipitation, which had begun on the 13th and continued, became more intense. Hardest hit during this time was the upper Sacramento River basin which received its heaviest rainfall on the 16th. During the same period, Sacramento recorded 1. 33 inches of rain in 12 hours. Inskip Inn, also in the Sacramento River drainage area, received 5. 68 inches in 22 hours. On the 17th, Blue Canyon received 3. 23 inches in 21 hours, while Bucks Lake received 3. 83 inches during its all-day precipitation.

By morning of the 18th, the Low off Vancouver was greatly weakened, and the eastward extension of the Pacific High again began to manifest itself. Its position at the southern end of the California coast created anew the strong southwesterly current over the Central Valley. See figure 91, the surface weather map for 1:30 p. m. EST, November 18, 1950. Note the tight pressure gradient on the north side of the High off the California coast, and the fact that no Low lies over the Valley, nor is there a front in the region. Later that afternoon a Low developed in southern Oregon, thus increasing even further the pressure gradient to the south not only at the surface, but also at 850 and 700 millibars. The heaviest precipitation during this time was concentrated on the central Sierras. As the Oregon Low moved eastward, pressures rose faster in the northern part of the Central Valley than in the southern part, with a resultant

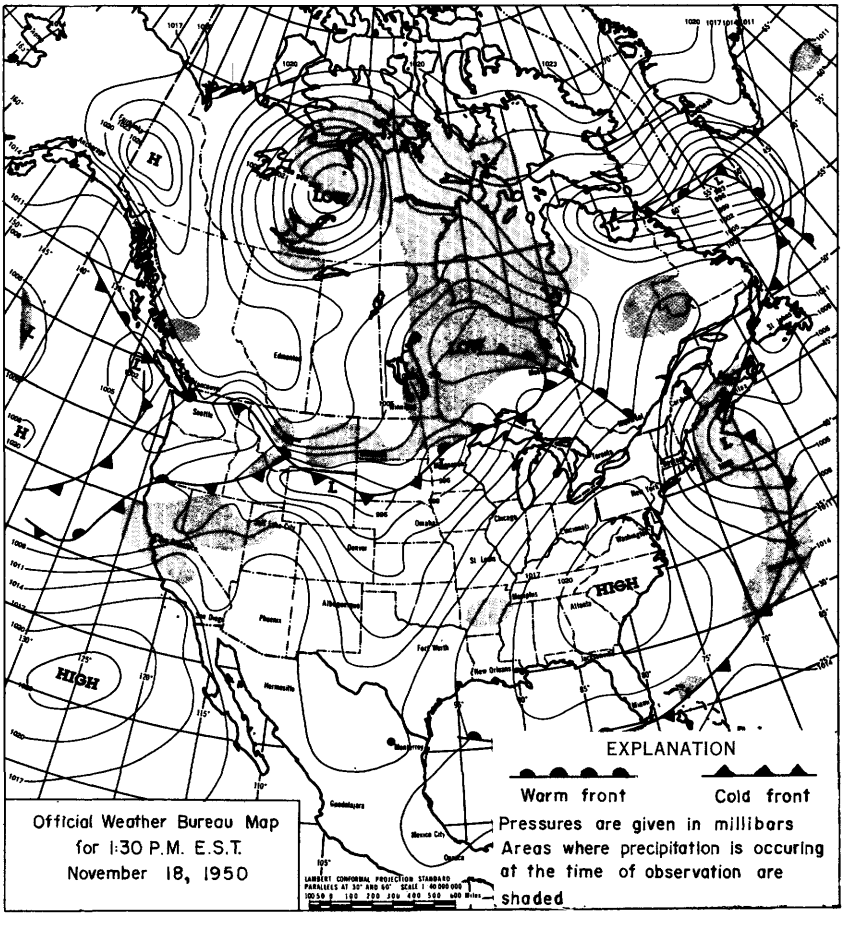


Figure 91. --Surface weather map for November 18, 1950

decrease in gradient. This decrease in intensity of the southwesterly flow caused the precipitation to slacken in many areas on the 19th. The High nosing into California built up again on the 20th. Pressures rose faster to the south this time, increasing the gradient and, therefore, intensifying the southwesterly flow, with a resultant increase in precipitation. During the period November 18-21, precipitation in the foothills and mountain districts of the lower Sacramento River basin was the heaviest on record for so early in the season. In the upper San Joaquin River and Tulare Lake basins, as much as 15 inches were reported in the mountains at the 5,500-foot level for the 18th and 19th. Giant Forest, at 3,397 feet, received 11 inches in 22 hours on the 18th and an additional 3.52 inches on the 19th. Heavy precipitation extended as high as 10,000 feet and resulted in the largest river runoff and flooding in the area's history.

The position of the wedge shifted to southern Oregon on November 21, cutting off the southwesterly flow, and by afternoon of that day, rain ceased almost entirely over the Central Valley. The small amount of precipitation during the remainder of the month was a result of the development of a persistent High in the Great Basin.

December 1950 was California's warmest December on record for the period from 1897 to 1950. At the Weather Bureau Office at Sacramento the average daily minimum temperature was the highest since records began in 1877, and the average daily maximum temperature equaled the record high which occurred in 1940. The Sacramento precipitation during December 1950 averaged more than 10 percent above normal. At some stations in the Central Valley, however, precipitation totals were as much as 230 percent of normal. The greatest monthly precipitation total, 21.15 inches, occurred at Camptonville ranger station on the Yuba River in the Sacramento River basin. Although many Decembers have received more precipitation, the seasonal accumulation of 13.19 inches at the end of December 1950 in Sacramento was the greatest since 1889. Soda Springs, 6,752 feet in elevation, reported 27 inches of snow--the greatest amount recorded during December 1950. Snow Laboratory Central Sierra, at 6,902 feet, reported 25.3 inches and Twin Lakes, at 7,920 feet, reported 16.5 inches.

On December 2 the approach of an active frontal system from the Pacific created a strong southwesterly flow of warm moist air over most of the Central Valley of California. Although the frontal system moved inland on the 3rd, a strong cyclonic circulation remained off the West Coast and maintained the strong southwesterly flow over the Central Valley. Precipitation, which started about noon on the 2nd, continued until the afternoon of the 4th. In a 40-hour period from the 2nd to the 4th, Brush Creek ranger station

recorded 7.67 inches of precipitation. Of this total, 6.31 inches fell on the 3rd. Blue Canyon and Bowman Dam each reported totals greater than 7 inches for the 2nd through the 4th.

The Pacific High reasserted itself on the evening of the 4th, but its influence was short-lived. The approach of a new frontal system from the Pacific on the 5th again created a southwesterly flow along the West Coast. Precipitation, which started on the afternoon of the 5th, continued through the 8th, and the Great Basin High began to develop as it had in November. Many stations recorded 5 inches or more of precipitation during this period. As a result of these rains, there was flooding along the San Joaquin River below the mouth of the Merced River.

By the morning of the 9th the Great Basin High was fully developed and dominated all of California. The High maintained its influence over the Central Valley until December 29, except for three brief breaks. The first of these breaks came on the 11th, when the approach of a Pacific cold front produced a southwesterly flow over the Sacramento and San Joaquin River basins for a period of about 24 hours. Most stations recorded less than an inch of precipitation during this period.

The second break in the regime of the Great Basin High came on the afternoon of the 13th. In this case, the strongest southwesterly flow came after the Pacific front passed. A Low, which remained off the West Coast, maintained the flow over the Central Valley. The major part of the precipitation fell on the 14th. In the upper Sacramento valley rain had been almost continuous during the first half of December, and on the 14th the Sacramento River rose to near flood stage.

The third break in the dominance of the Great Basin High came on the evening of the 25th, and was occasioned by the approach of a weak cold front from the Pacific. The precipitation which fell in the Central Valley was very light and of short duration. The Great Basin High returned to prominence by noon of the 26th, and remained the controlling influence until late on the 29th, when an active Pacific cold front approached the California shore. The passage of this front across the Central Valley on the 30th resulted in the last rains of the month. Although precipitation was spread over most of the Sacramento and San Joaquin River basins on that day, the amounts were small. On the last day of December a strong High, extending to 10,000 feet, was centered off the West Coast, with a resultant circulation from the north over the Central Valley.

Precipitation

The storms of November and December 1950 were general over all of California north of the Tehachapi Mountains. Heavy rain, orographically influenced, fell on both the Coast Range and Sierra Nevada, but because the ensuing floods were of record-breaking proportions only in the Central Valley basin, greater emphasis is placed on that area in this discussion--the Central Valley basin comprises the drainage areas of Kern River, Tulare Lake, San Joaquin River, and Sacramento River.

There were four distinct storms in November and December, occurring during the periods November 13-15, 16-21, December 2-4, and December 6-8. Isohyetal maps giving a somewhat generalized picture of these events are found in plates 16-19. A fifth isohyetal map, plate 20, shows the total precipitation for the period November 13 to December 8. The isohyetal maps are based on Weather Bureau records for approximately 550 precipitation stations and the shape of the normal annual isohyets for California. In addition, a graphical presentation of the phases of the November storms in the Central Valley is found in figure 92. On this figure are plotted accumulative precipitation graphs for the period November 13-21 at four Sierra Nevada sites where recording gages are operated. These sites were selected to give wide areal coverage. Blue Canyon is on the watershed dividing the American and Bear River basins, Tiger Creek powerhouse is in the Mokelumne River basin, Huntington Lake is in the upper San Joaquin River basin (drainage above Millerton Lake), and Giant Forest is in the Kaweah River basin.

The storm of November 13-15 brought 1 to 3 inches of precipitation over large areas in northern and central California. Along the coast, the heaviest precipitation occurred on the lower Smith River and on the tributaries of the lower Klamath River. In the Central Valley, the heaviest precipitation reported (as much as 6 inches) was localized in an area near Shasta Lake. On the western slope of the Sierra Nevada, where precipitation ranged from 1 to 3 inches, snow was deposited above altitudes of 4,000 feet in the Sacramento River basin, 5,000 feet in the San Joaquin River basin, and 6,000 feet in the Tulare Lake basin. Because of the low precipitation intensities that prevailed generally, there was no significant runoff from this storm.

The storm of November 16-21 was one of record-breaking proportions. The first day of this storm added snow to the pack in the Sacramento River basin above 6,000 feet. High temperatures prevailed after November 16 however, and all subsequent precipitation in this storm was in the form of rain. Heavy orographic rain, influenced by high wind velocities, increased in intensity on November 18 and continued into the morning of November 19.

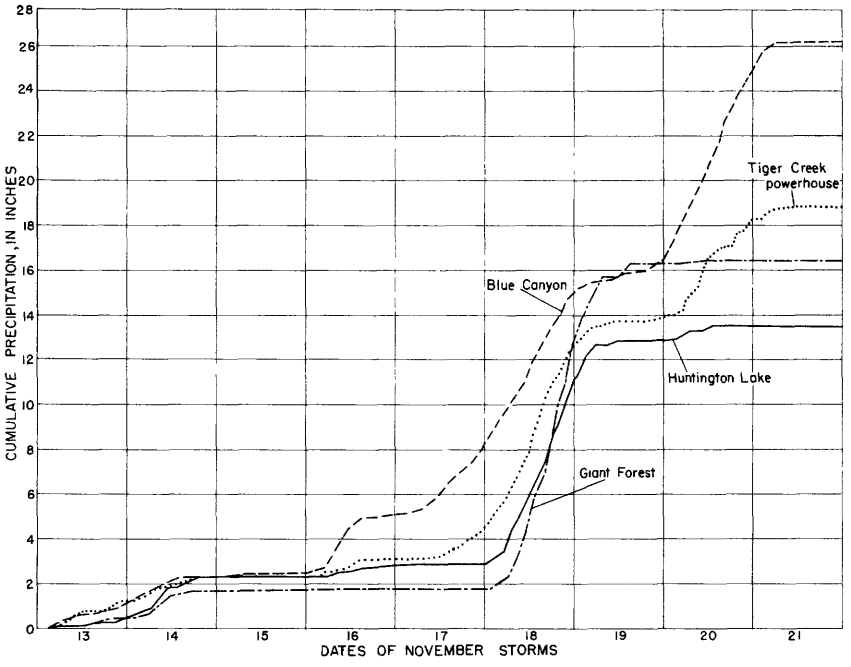


Figure 92. --Cumulative precipitation at representative points during storms of November 13-21, 1950.

In the southern Sierra Nevada there was little precipitation after the morning of November 19. Over the northern and central Sierra Nevada, however, there was a lull for only part of a day before the occurrence of another wave of the storm. Rain commenced falling on the evening of November 19 on the Feather River basin, and the precipitation belt moved south, becoming less intense as it progressed. Intense rainfall fell from the Feather River basin south to the Mokelumne River basin, but in the Tulare Lake and Kern River basins the effect of the storm wave was hardly felt. In the basins of the lower Sacramento River tributaries, rainfall on November 20 exceeded that on November 18. On November 21 precipitation ceased.

As a result of the storm of November 16-21, flood-producing rainfall occurred in the coastal area between San Francisco Bay and Monterey Bay. In two localized areas near Monterey Bay the total precipitation exceeded 20 inches. The maximum daily precipitation occurred in this flood area on November 18. In the upper Sacramento River basin (drainage above Red Bluff), precipitation during the storm period was relatively light; the heaviest rainfall was received November 16. In the Central Valley from the Feather River basin south to the Kern River basin, total precipitation averaged about 13 inches. Over large areas in the Sierra Nevada

the storm precipitation exceeded 20 inches and caused record-breaking floods on a great many of the streams draining this mountain range. Although $8\frac{1}{2}$ inches of rain were received at Blue Canyon on November 20 (see fig. 92), it is interesting to note that the total rainfall recorded during the preceding 7 days amounted to 16 inches.

There was little precipitation after November 21 until the storm of December 2-4. Precipitation from this storm was considerably less than that during the storm of November 16-21, except in the coastal area north of the San Francisco Bay drainage. In this coastal area the heaviest rainfall occurred in the Smith River and Russian River basins, some sections of which received precipitation in excess of eight inches. In Central Valley basins on the western slope of the Sierra Nevada precipitation averaged five inches, and in some localities it exceeded eight inches. At the higher elevations the initial precipitation was in the form of snow, but this changed to rain after the first few hours.

There was a lull on December 5, which was followed by the storm of December 6-8. This storm was of lesser magnitude than the preceding one. In the coastal area, the precipitation was insufficient to produce flooding in any of the larger basins--although precipitation exceeded eight inches at one locality near Monterey Bay. In the Central Valley, storm precipitation averaged four inches in the Sierra Nevada from Feather River south to Tuolumne River and in some localities exceeded seven inches. South of Tuolumne River, the precipitation gradually decreased until there was little or no rain in the Kern River.

Approximate storm precipitation totals for selected basins in the Central Valley were obtained by planimetering the isohyetal maps. Because, in general, excessively high runoff rates occurred only in the Sierra Nevada streams, only one stream on the west of the valley, Cache Creek, was included. The totals obtained for each of the four storms are shown graphically in figure 93. Cache Creek basin is presented first, followed by the other basins in north-to-south order. The heaviest basin-wide precipitation is seen to have occurred in the Yuba and American River basins.

The data presented in figure 93 are summarized in table 3. The basins are listed in the usual Geological Survey publication order, and total storm precipitation is tabulated for the periods November 13-15, 16-21, December 2-4, 6-8, and November 13 to December 8. The totals shown for the period November 13 to December 8 represent planimetered values from the isohyetal map, plate 20, and in every case they agree within half an inch with the corresponding sums of the tabular values for the four individual storms. The maximum 24-hour precipitation total is also tabulated for each basin. In every case this maximum occurred during the

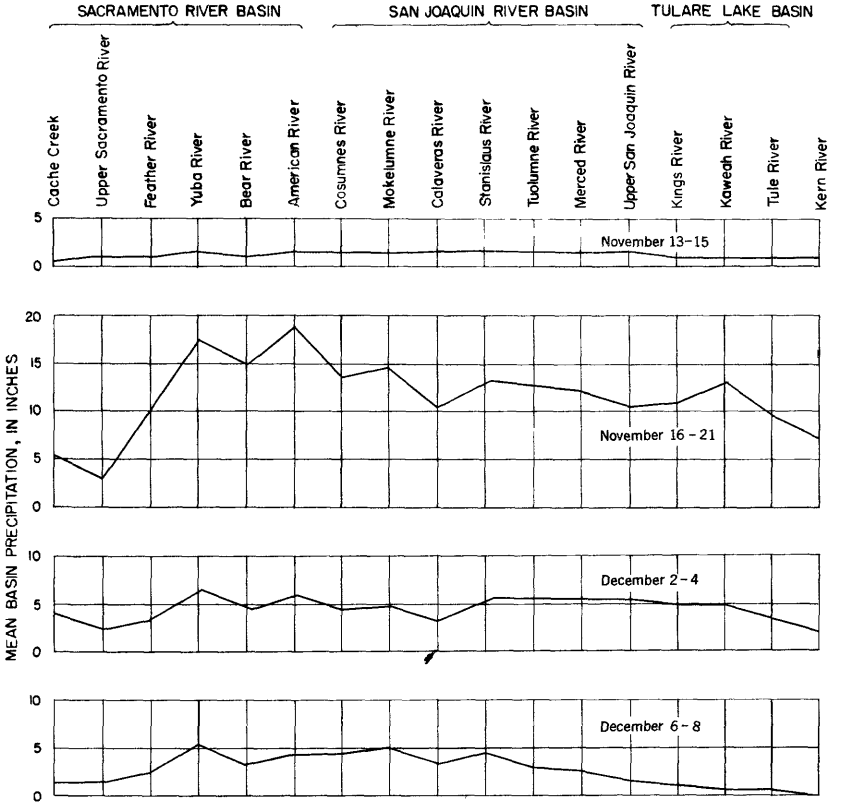


Figure 93. --Mean basin precipitation for individual storms during November and December 1950.

storm of November 16-21. To obtain these figures, use was made of the ratio between maximum 24-hour precipitation and total storm precipitation during the period November 16-21, at representative recording precipitation stations. For purposes of comparison, the corresponding basin-wide totals for the storm of December 9-12, 1937 have been shown also. The 1937 storm produced, in general, the greatest recent floods for which adequate comparative data are available. The basin totals were obtained from table 7 of Geological Survey Water-Supply Paper 843, "The Floods of December 1937 in Northern California." Maximum 24-hour precipitation for the 1937 storm was derived in much the same manner as that described above for the 1950 storm. Ratios of maximum 24-hour precipitation to total storm precipitation were obtained from a storm study made by the Sacramento District, Corps of Engineers.

It will be noted that only in the upper Sacramento River basin and in Cache Creek basin did the total precipitation of the storm of 1937 exceed that of the storm of November 16-21, 1950. Only in these same two basins and in the Feather River and Yuba River basins, were the 24-hour intensities greater in 1937.

While fairly high precipitation intensities were sustained for long periods at some stations on November 18 and November 20, 1950, no intensities as great as one inch per hour were observed at any of the numerous recording gages in the Central Valley basin. It is possible, however, that this intensity may have been exceeded near the outstanding storm centers. The greatest hourly value recorded was 0.9 inch at Giant Forest on November 18, and a like quantity at Blue Canyon on November 20.

Comparison of hourly precipitation intensities for the November 1950 and December 1937 storms is limited in that there were only 14 recording precipitation gages in operation in California in 1937, and none of these were in locations where the total storm precipitation was heaviest. The maximum recorded intensity in 1937 was 0.98 inch per hour at San Joaquin Experimental Range (gage location called O'Neals in 1937), and the only records at all comparable for the two storms are those for this station in the upper San Joaquin River basin and for Georgetown in the American River basin. These records are plotted on figure 94 as accumulative precipitation graphs for the storms of November 16-21, 1950 and December 9-12, 1937. Maximum hourly precipitation at San Joaquin Experimental Range in 1950 was 0.46 inch as compared to 0.98 inch in 1937. At Georgetown the maximum intensity was 0.51 inch per hour in 1950 and 0.60 inch per hour in 1937.

By way of further comparison of precipitation during the November 1950 and December 1937 storms, table 4 gives for each of these storms the maximum 24-hour, 48-hour, and 96-hour precipitation catches and the total storm precipitation, as recorded at 17 representative stations in the Central Valley basin. Because San Joaquin Experimental Range and Georgetown are the only stations listed where recording precipitation gages were operated in 1937, the 1937 and 1950 figures for 24 hours and 48 hours for all stations other than these two are not strictly comparable. Where, in 1950, these figures represent absolute maximum 24-hour and 48-hour catches, in 1937 they merely represent the maximum 24-hour and 48-hour catches preceding the time of observation. All precipitation figures for 96 hours are comparable, however, because this period covers the duration of the 1937 storm.

From the data in tables 3 and 4, the following general comparisons with respect to the November 1950 and December 1937 storms may be noted. For all of the listed periods, the 1937 storm was significantly larger in the upper Sacramento River basin, and

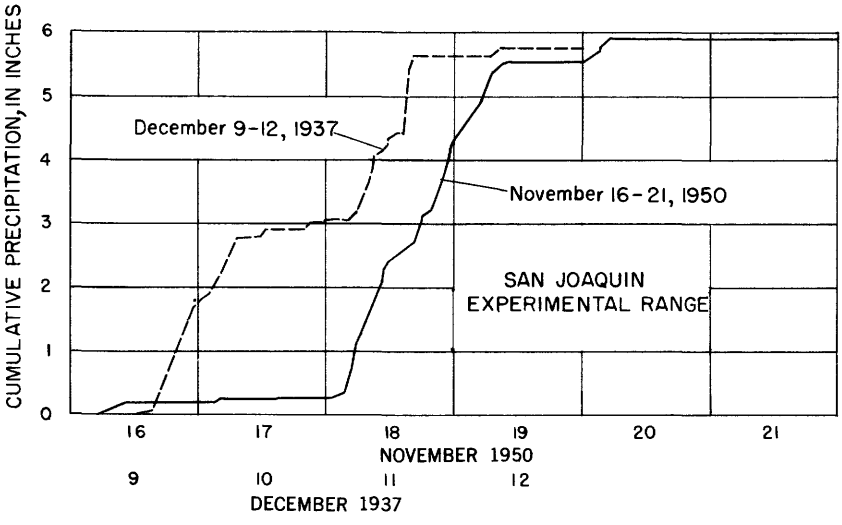
Table 3. --Average basin-wide precipitation and maximum 24-hour precipitation, storms of November-December 1950, and December 1937

Drainage basin above indicated stream-gaging station	Total basin-wide precipitation, in inches, for periods indicated							
	Storms of November-December 1950					Storm of December 1937		
	Nov. 13-15	Nov. 16-21	Dec. 2-4	Dec. 6-8	Nov. 13 to Dec. 8	Maximum 24-hour period	Dec. 9-12	Maximum 24-hour period
Kern River basin								
Kern River near Bakersfield	1	7	2	0	10	6	5.1	3.0
Tulare Lake basin								
Tule River near Porterville	1	9.5	3.5	.5	14	8	9.4	4.9
Kaweah River near Three Rivers	1	13	5	.5	19	11	11.9	6.2
Kings River at Piedra	1	11	5	1	18	9	9.7	4.4
San Joaquin River basin								
San Joaquin River below Friant	1.5	10.5	5.5	1.5	19	9	9.3	4.3
Merced River at Exchequer	1.5	12	5.5	2.5	21	9	11.7	5.4
Tuolumne River above La Grange Dam, near La Grange	1.5	12.5	5.5	3	22	8	9.5	4.3
Stanislaus River below Melones powerhouse	1.5	13	5.5	4.5	24	7	9.4	4.8
Calaveras River at Jenny Lind	1.5	10.5	3.5	3.5	19	5	6.0	3.5
Mokelumne River at Woodbridge	1.5	14.5	5	5	26	7	7.7	4.4
Cosumnes River at Michigan Bar	1.5	13.5	4.5	4.5	24	6	7.0	4.0
Sacramento River basin								
Sacramento River near Red Bluff	1	3	2.5	1.5	8	1.5	6.7	4.5
Feather River near Oroville	1	10	3.5	2.5	17	3.5	9.8	6.6
Yuba River at Narrows Dam	1.5	17.5	6.5	5.5	31	6	12.4	6.8
Bear River near Wheatland	1	15	4.5	3.5	24	5.5	8.8	4.1
American River at Fair Oaks	1.5	19	6	4.5	31	7	9.0	3.8
Cache Creek at Yolo	.5	5.5	4	1.5	12	2.5	7.3	4.6

Table 4. --Comparative precipitation data for storms of November 16-21, 1950 and December 9-12, 1937

Precipitation station and subbasin	Maximum precipitation, in inches, during period indicated						Total storm precipitation	
	24 hours		48 hours		96 hours			
	Nov. 1950	Dec. 1937	Nov. 1950	Dec. 1937	Nov. 1950	Dec. 1937	Nov. 1950	Dec. 1937
Kern River and Tulare Lake basins								
Springville Tule headworks Dam (Tule) a/	b15.0	8.08	b17.0	11.78	17.59	14.68	17.59	14.68
Springville ranger station (Tule)	4.91	2.50	5.53	4.81	5.67	4.82	5.67	4.82
Giant Forest (Kaweah)	13.16	8.26	14.52	13.71	14.66	16.28	14.73	16.28
Balch powerhouse (Kings)	b7.6	5.53	8.83	9.53	8.85	10.27	8.85	10.27
San Joaquin River basin								
San Joaquin Exp. Range (upper San Joaquin)	4.41	3.79	5.27	5.43	5.90	5.75	5.90	5.75
Huntington Lake (upper San Joaquin)	9.11	4.70	9.99	9.01	10.89	10.14	11.20	10.14
Florence Lake (upper San Joaquin)	5.95	3.15	6.60	6.20	6.71	7.31	6.71	7.31
Wawona ranger station (Merced)	9.41	6.00	10.41	11.50	11.80	12.42	12.19	12.42
Yosemite National Park (Merced)	8.27	5.94	9.43	10.54	11.04	11.54	12.30	11.54
North Groveland 2 (Tuolumne)	6.39	4.05	7.31	6.83	9.09	8.27	9.90	8.27
Tiger Creek powerhouse (Mokelumne) c/	8.14	4.01	10.45	7.67	15.64	8.63	16.57	8.63
Sacramento River basin								
Georgetown (American)	7.25	4.39	9.55	7.10	17.41	7.63	19.15	7.63
Blue Canyon (American and Bear)	8.66	5.27	10.60	8.55	20.93	9.78	23.75	9.78
Grass Valley (Bear)	6.07	5.88	7.76	10.34	14.07	10.78	16.68	10.78
Bowman Dam (Yuba)	7.74	7.83	9.85	13.14	19.05	13.78	21.74	13.78
Brush Creek ranger station (Feather)	6.13	11.60	7.18	17.95	13.87	18.91	17.83	18.91
Montgomery Creek (upper Sacramento)	3.81	7.92	5.38	12.50	6.16	14.77	6.96	14.77

a Also used as precipitation index for Kern River basin.
b Increment computed on basis of records for nearby recording precipitation gages.
c Also used as precipitation index for other basins tributary to lower San Joaquin River.



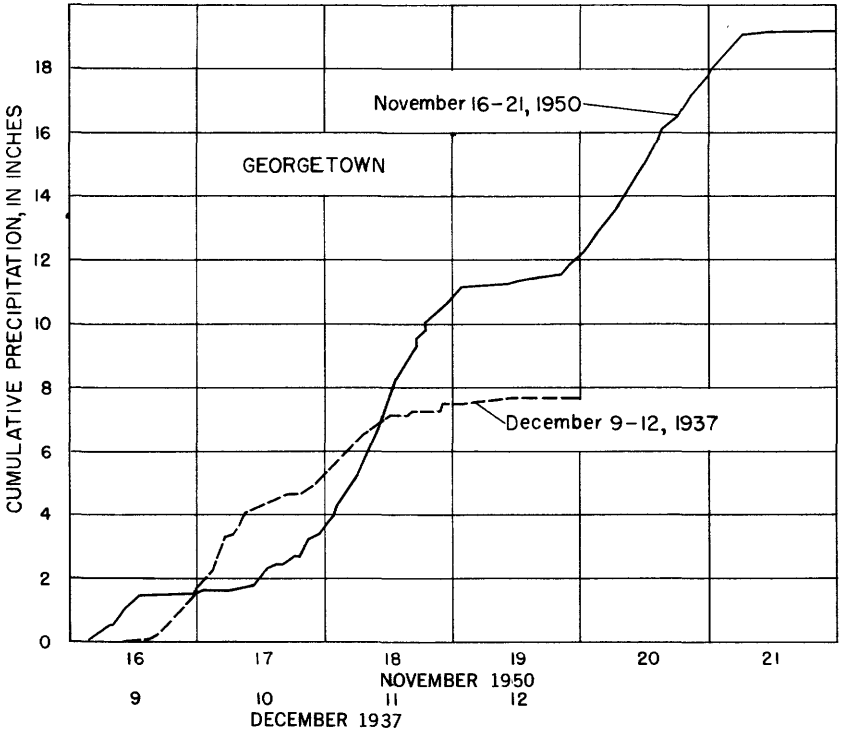


Figure 94. --Comparison of precipitation during storms of December 9-12, 1937, and November 16-21, 1950.

significantly smaller in the Kern River basin and in the Sierra Nevada between Stanislaus and Bear Rivers. In the Sierra Nevada between Tule River and Tuolumne River, a significantly larger 24-hour precipitation occurred in 1950, but for the other periods the precipitation of the two storms was roughly equivalent. In the Yuba River basin, maximum 24-hour precipitation was somewhat comparable in the two storms, maximum 48-hour precipitation was greater in 1937, but the maximum 96-hour precipitation and total storm precipitation were both substantially larger in 1950. In the Feather River basin, total storm precipitation was roughly equal in the two storms, but for the three shorter periods the precipitation was much heavier in 1937. It is interesting to note that, in the central Sierra Nevada from Mokelumne River north to Bear River, total precipitation during the November 1950 storm was twice that received in the 1937 storm. The storm burst of November 19-20, 1950, especially heavy in these areas, was largely responsible.

Snow was not an important factor in the floods of November and December 1950. Actual snow data are meager because the storms occurred before the start of the seasonal snow surveys. It is known that prior to November 13 only scattered snow patches were to be found, and these in general were above an altitude of 7,000 feet. The storm of November 13-15 brought snow to the Sacramento River basin above elevation 4,000 feet, to the San Joaquin River basin above elevation 5,000 feet, and to Tulare Lake basin above elevation 6,000 feet. The first day of the November 16-21 storm also added snow to the pack in the Sacramento River basin above an altitude of 5,000 feet. However, high temperatures prevailed after November 16, and because subsequent precipitation consisted of rain, the snow pack depleted rapidly. Table 5 presents the available data on snow depths during the period of the November storms.

Data on the water equivalent of the snow pack are available only for the Snow Laboratory Central Sierra at an altitude of 6,900 feet in the headwaters of Yuba River. On November 16, when snow depth reached a maximum of 33 inches, the density of the pack averaged about 10 percent. After the storm of November 16-21, the remaining snow patches covered about 40 percent of the laboratory basin. The patches averaged about 5 inches in depth with a density ranging from 40 to 45 percent. Despite the fact that all reporting stations were bare of snow after the November storms (as indicated in table 5), U. S. Forest Service photographs show that numerous snow patches remained in the Sierra Nevada above an altitude of 7,000 feet.

Table 5. --Depth of snow on ground in November 1950

Station	Altitude in feet	Inches of snow on date indicated									
		13	14	15	16	17	18	19	20	21	22
Kern River basin											
Embry Mine	9,000	-	-	-	-	24	3	-	-	-	-
Tule River basin											
Springville Tule headworks Dam	4,200	0	T	0	0	0	0	0	0	0	0
Kaweah River basin											
Giant Forest	6,360	T	7	8	6	4	T	0	0	0	0
Kings River basin											
Grant Grove	6,660	1	9	9	6	-	2	0	0	0	0
Upper San Joaquin River basin											
Big Creek powerhouse	4,928	0	6	3	T	0	0	0	0	0	0
Florence Lake	7,350	0	9	7	4	0	0	0	0	0	0
Huntington Lake	7,020	1	15	15	14	11	3	0	0	0	0
Shaver Lake	5,370	0	7	5	3	0	0	0	0	0	0
Merced River basin											
South entrance of Yosemite National Park	5,135	T	8	10	7	4	T	0	0	0	0
Yosemite National Park	3,985	0	0	1	0	0	0	0	0	0	0
Tuolumne River basin											
Hetch Hetchy	4,050	0	T	1	T	0	0	0	0	0	0
Lake Eleanor	4,665	0	3	7	5	T	0	0	0	0	0
Calaveras River basin											
Calaveras ranger station	3,343	0	8	0	0	0	0	0	0	0	0
Mokelumne River basin											
Salt Springs powerhouse	3,700	0	T	T	0	0	0	0	0	0	0
Upper Sacramento River basin											
Alturas ranger station	4,346	2	3	1	0	0	0	0	0	0	0
Manzanita Lake	5,850	T	18	24	26	14	8	6	2	1	0
McCloud	3,270	0	0	3	4	2	1	0	0	0	0
Mineral	4,850	1	9	10	13	8	7	3	T	T	T
Mt. Shasta WB City	3,543	0	T	2	1	0	0	0	0	0	0
Feather River basin											
Canyon Dam	4,555	0	3	4	6	3	0	0	0	0	0
Sierraville ranger station	4,975	0	-	T	0	0	0	0	0	0	0
Westwood High School	5,075	1	3	3	10	5	1	T	T	0	0
Yuba River basin											
Lake Spaulding	5,075	3	13	12	11	5	0	0	0	0	0
Sierra City	4,200	T	2	5	2	T	0	0	0	0	0
Snow Laboratory Central Sierra	6,902	$3\frac{1}{2}$	$22\frac{1}{2}$	$22\frac{1}{2}$	33	$25\frac{1}{2}$	17	$12\frac{1}{2}$	$2\frac{1}{2}$	0	0
Soda Springs	6,752	2	14	18	22	14	12	3	T	0	0
Bear River basin											
Blue Canyon	5,280	4	9	9	6	1	0	0	0	0	0
American River basin											
Foresthill ranger station	3,200	6	-	-	-	-	-	0	0	0	0
Twin Lakes	7,920	2	14	11	16	14	7	5	0	0	0

During the December storms a negligible part of the precipitation fell as snow below 7,000 feet in the Sierra Nevada in basins of streams tributary to the lower Sacramento and San Joaquin Rivers. In the upper Sacramento River basin, where precipitation was much lighter, a larger portion of the storm precipitation was in the form of snow--even as low as 3,000 feet. The rains during December 6-8 removed most of the remaining snow.

MEASUREMENT OF FLOOD DISCHARGES

The general and special methods employed by the Geological Survey in the measurement of maximum flood discharges at regular stream-gaging stations and at locations where regular gaging stations are not maintained have been described in several water-supply papers relating to floods. For examples and a detailed description of the application of these methods in the case of various severe floods special reference is made to Water-Supply Papers 773-E, 816, and 843.

As fully explained in Water-Supply Paper 888, operations at the regular stream-gaging stations consist principally of the development of a stage-discharge relation from which, under normal conditons and from a known stage, the discharge can be determined. The development of a stage-discharge relation is based upon current-meter measurements over the range of stage experienced, or over a sufficient part of the range of stage so that the discharge corresponding to the maximum stage can be obtained by a reasonable extension of the relation. At other places, or for stages higher than those defined by the stage-discharge relation, measurements of peak discharge have been based chiefly on (1) computation of flow over dams, (2) computation of flow by the slope-area method, and (3) computation of flow through contracted openings.

Because of the great areal extent of the November-December 1950 floods and the record-breaking proportions of the flood flows, it was physically impossible to obtain discharge measurements by current meter at peak or even near-peak flows at many of the gaging stations. In some instances the measuring facilities--cable or bridge--were washed out, or access to the station was rendered impassable by the flooding or destruction of approach roads and bridges. At several locations the floodwaters either destroyed or submerged the gage well and instrument shelter with the result that the only stage record obtained was that evidenced by the floodmarks.

As indicated in the records presented in this report, the determination of peak discharge (other than by a stage-discharge relation defined by current-meter measurements) was made by the slope-area method at 42 locations, flow over dams at 16 locations, flow through contracted openings at 6 locations, and by computed inflow to lake based on change in contents at 1 location.

STAGES AND DISCHARGES AT STREAM-GAGING STATIONS

Explanation of Data

One of the foremost purposes of this report is the publication of useful detailed information regarding the stages and discharges of streams during the floods of November-December 1950 that will not be available in the summarized records of river discharge published annually in the water-supply papers of the Geological Survey. The justification for making available such detailed information rests upon the recognized need for records of flood behavior which will show not only the daily mean and maximum rates of discharge during a flood (as usually published for a gaging station) but also the stages and rates of discharge at frequent times throughout the flood period. Such records also will make possible a definition of conditions of stage and discharge at all stations in a basin at a given time during the progress of the flood. These details will furnish the basic information necessary to study the behavior of flood crests, the incidence of crests from different tributaries of stream, the progress of flood crests throughout a river system, and other features useful in deriving the elements necessary for forecasting flood heights and for appraising the characteristics of different basins in the shedding of floodwaters. It furnishes basic information for consideration of the feasibility of reservoirs, channel improvement, forest management, soil treatment, flood forecasting, and other measures with respect to their merits for ameliorating damage and losses caused by floods. Moreover, in view of the record-setting character of the floods of November-December 1950, it is important that full and authentic information concerning them be available for reference and guidance in connection with future urban and industrial development, with highway and bridge construction, and especially with the design of hydraulic structures in their relation to flood channels of streams.

In general, records of gaging stations published in this report relate to streams on which floods occurred or which are situated adjacent to the margins of the flooded regions and serve to define the areal extent of the floods.

The basic data systematically collected at stream-gaging stations consist of records of stage, measurements of discharge, and general information useful in determining the daily flow from the records of gage heights and discharge measurements. Except for a few stations where records of stage are obtained by periodic direct readings on a nonrecording gage, they are obtained by a water-stage recorder which provides a continuous graph of stage. Measurements of discharge are generally made by a current meter. Occasionally, measurements of extraordinary peak flows must be made by auxiliary methods referred to in the preceding section of this report. A typical stream-gaging station is equipped with a water-stage recorder and cableway and a suspended car from which discharge measurements are made. Rating tables showing the discharges for indicated stages are prepared from the results of discharge measurements. At some stations, auxiliary devices are used in the measurement of discharge--such as artificial controls, turbines, venturi meters, and gates (calibrated to indicate rates of discharge).

The data presented in the following tabulations comprise, in general, for each stream-gaging station, a description of the station, a table showing the daily discharges throughout the 2-month period of November and December 1950, and a table showing the stage and discharge at selected intervals during each day of the period of major flood flow (generally November 17 to December 13) in sufficient detail to afford reliable definition of the flood hydrograph.

The description of the station gives information concerning the type, location, and datum of the gage, the area of the drainage basin, the gage-height record, and the discharge record. The information regarding the gage-height record describes the method of determining the stage during the flood and is of special technical significance because the flood conditions at some stations prevented use of the usual method of obtaining records of stage and discharge. A statement regarding the stage-discharge relation explains briefly the methods used in the definition of the rating curve over the ranges of stage occurring in the floods of November–December 1950 as well as of the previous maximum flood of record and gives information on conditions that affected the stage-discharge relation. Included also is information with respect to any auxiliary methods used in obtaining the discharge. The maximum stage and discharge at the gaging station are given for the floods of November-December 1950 and for the indicated period of record prior to that time; also, at some stations, data are given for floods antedating such period of record. Miscellaneous notes and comments essential or helpful to an understanding of the record are included as remarks.

In the table of daily mean discharges, the data given for the months of November and December covers not only the period of the flood but also a sufficient period of time before and after the peak to show the relation of the flood discharges to the prevalent discharges of the preceding and following periods. The table shows the monthly mean discharges for the 2 months and the volume of runoff--generally expressed both in acre-feet and in depth in inches over the drainage area. Runoff from canals and from areas of artificially controlled flow is given in acre-feet only. Figures 95 and 96 show hydrographs of daily mean discharge at 20 selected stream-gaging stations for this 2-month period.

The tables showing the stage and discharge at selected intervals during each day of the flood period are designed to present the rise and recession of the flood in detail. In general, each table begins with November 17, well before the beginning of the first major flood rise, and continues through December 13, when the floods had largely passed out of the river systems. This table is accompanied by supplemental records of stage and discharge when necessary to afford an adequate definition of the flood hydrograph.

The stages at indicated times were obtained from records of continuous water-stage recorders insofar as such records were available. For stations at which stage records were interrupted because of some failure in the recording system, the method of computing the missing periods is explained in the paragraphs of the station description relating to the gage-height or discharge records. For stations at which the records of stage consisted of one or more gage readings a day, a graph was usually drawn on the basis of gage readings, floodmarks, and a comparison with the stage graph for one or more nearby stations equipped with water-stage recorders.

Presented in a form similar to the data for the stream-gaging stations, the following tabulations also include records of stage and storage content through the flood period for 14 reservoirs. These records are of special value in showing the influence of storage reservoirs on flood flows--a subject which is discussed in a section of this report entitled "Storage Regulation".

The records are presented in the order regularly used by the Geological Survey in its water-supply papers prior to 1951. Records for gaging stations on the main streams are presented first, in downstream order, and then stations on tributaries are treated beginning with the uppermost. The table of contents lists the stations in the order in which they appear herein; the index presents them alphabetically by stream and place names.

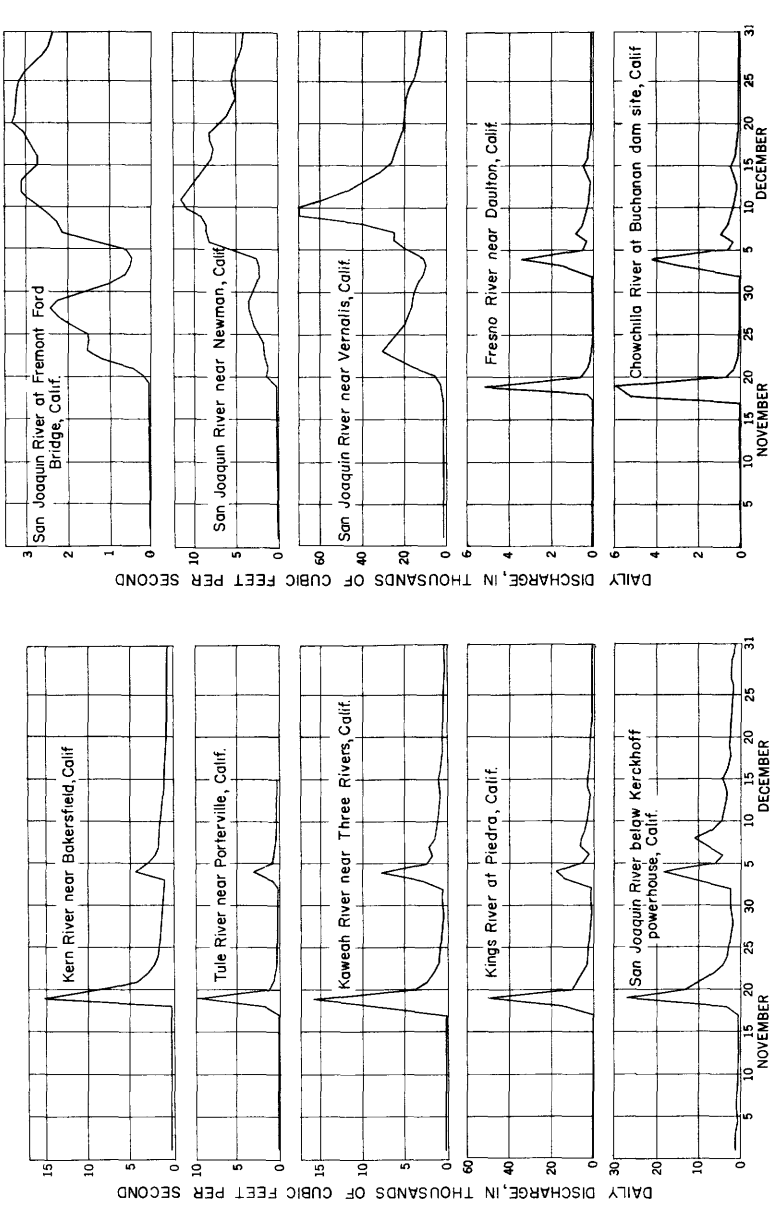


Figure 95.--Graphs of daily discharge at various river-measurement stations on San Joaquin River, and on tributaries above Merced River.

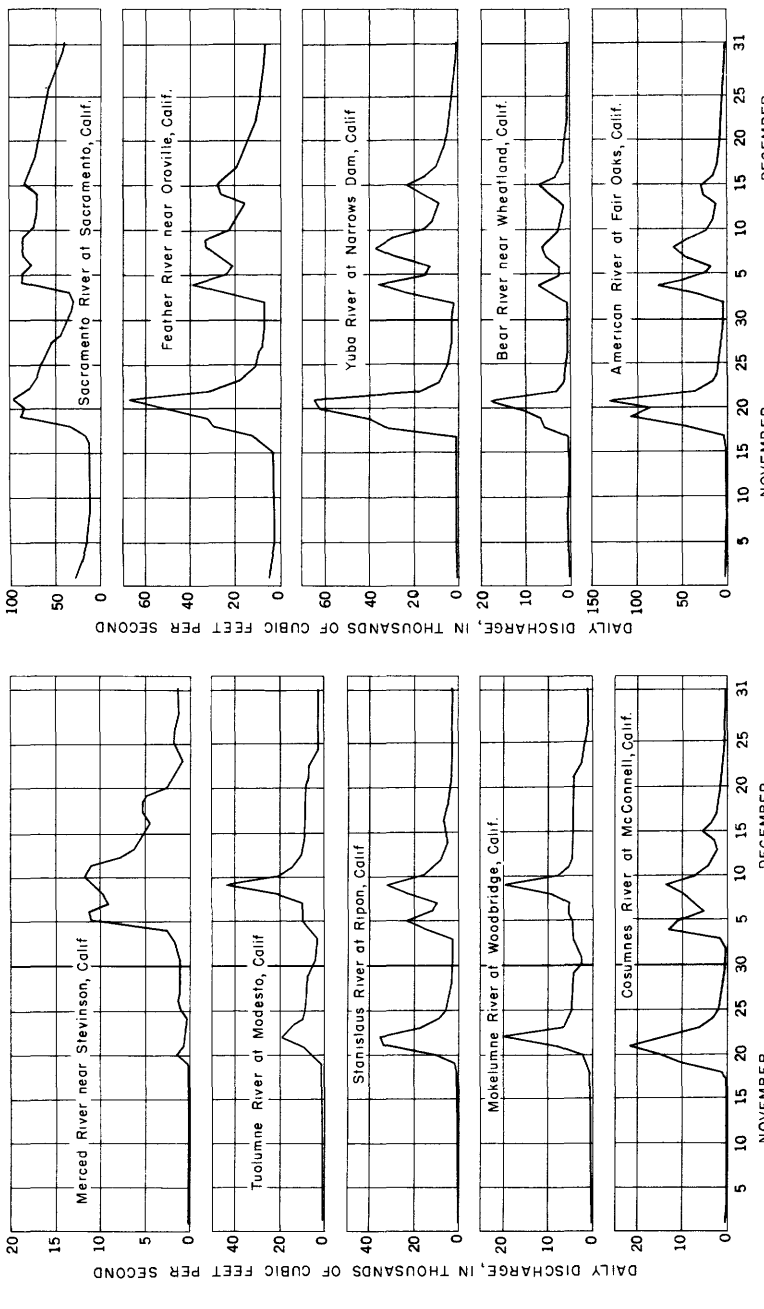


Figure 96.--Graphs of daily discharge at various river-measurement stations on San Joaquin River tributaries below Merced River, and on Sacramento River and tributaries.

The maximum discharges at these stream-gaging stations, with other related information, are listed in table 6 in the section entitled "Summary of flood stages and discharges." The stations are identified on plate 15 by means of the index numbers shown in the first column of the table.

Reference should be made to the water-supply papers of the Geological Survey for other available published records of flow of the streams for which data are presented in this report.

Kern River basin

Kern River near Kernville, Calif.

Location.--Lat 35°56', long. 118°29', in NE¼ sec. 14, T. 23 S., R. 32 E., 3 miles upstream from Salmon Creek and 15 miles north of Kernville. Altitude of gage, about 3,550 ft (from topographic map).

Drainage area.--845 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 4,100 cfs and extended to peak stage on basis of computed flow over dam.

Maxima.--November-December 1950: Discharge, 27,000 cfs 5 a.m. Nov. 19 (gage height, 17.50 ft).
1912 to October 1950: Discharge, 9,690 cfs Jan. 17, 1916 (gage height, 8.8 ft, datum then in use), from rating curve extended above 4,100 cfs as explained above.

Remarks.--Kern River No. 3 Canal diverts 1 mile above station. Extremes and tabulation of discharges at indicated times do not include flow in this canal. Mean discharge figures are the combined flow of Kern River and Kern River No. 3 Canal.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	226	752	9	190	1,150	17	220	740	25	1,000	551
2	210	647	10	188	1,030	18	2,120	708	26	869	537
3	204	1,510	11	183	952	19	12,900	691	27	784	514
4	205	3,060	12	181	898	20	2,970	661	28	726	499
5	208	1,700	13	190	832	21	2,220	632	29	690	504
6	205	1,390	14	212	901	22	1,680	606	30	720	495
7	198	1,400	15	196	902	23	1,340	582	31		476
8	194	1,300	16	190	782	24	1,140	569			
Monthly mean discharge, in cfs										1,085	903
Runoff, in acre-feet										64,580	55,540
Runoff, in inches										1.43	1.23

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 18		November 19		November 20		November 21		November 22		November 23	
2	2.68	2.0	16.65	21,900	9.70	3,590	8.64	2,330				
4	2.69	2.1	17.12	24,700	9.48	3,280	8.52	2,210	7.62	1,470	6.99	1,090
6	2.72	2.5	17.37	26,200	9.30	3,060	8.39	2,090				
8	2.78	3.4	16.50	21,000	9.18	2,920	8.31	2,020	7.52	1,410	6.90	1,040
10	2.83	4.3	14.50	12,800	9.16	2,890	8.21	1,930				
N	6.0	514	13.17	9,580	9.15	2,880	8.11	1,840	7.40	1,340	6.83	998
2	7.27	1,150	12.27	7,750	9.15	2,880	8.01	1,760				
4	7.48	1,290	11.61	6,550	9.10	2,820	7.93	1,690	7.26	1,260	6.66	910
6	8.75	2,380	11.05	5,610	8.97	2,680	7.87	1,650				
8	10.02	4,040	10.57	4,860	8.89	2,590	7.81	1,610	7.14	1,180	6.62	890
10	11.90	7,070	10.25	4,380	8.83	2,520	7.76	1,570				
12	13.70	10,800	9.95	3,940	8.75	2,440	7.72	1,540	7.05	1,130	6.56	860
	November 24		November 25		November 26		November 29		November 30		December 1	
4	6.50	830	5.84	518	5.25	294	4.27	89	3.91	55	4.93	200
8	6.46	810	5.79	496	5.21	280	4.24	85	3.87	52	4.75	162
N	6.41	785	5.74	476	5.16	265	4.22	83	3.91	55	4.62	137
4	6.32	740	5.50	380	5.10	247	4.16	77	4.33	96	4.45	110
8	6.29	725	5.40	345	5.04	230	4.10	72	5.11	250	4.30	92
12	5.99	586	5.32	317	4.97	210	4.01	64	5.09	244	4.18	79
	December 2		December 3		December 4		December 5		December 6		December 7	
2			3.35	18	10.11	4,160	7.35	1,310				
4	4.09	71	3.37	18	9.86	3,810	7.26	1,260	6.57	865	6.31	735
6			3.52	27	9.55	3,380	7.17	1,200				
8	3.95	58	3.92	56	9.10	2,820	7.09	1,150	6.48	820	6.39	775
10			4.62	137	8.70	2,390	7.01	1,110				
N	3.75	42	5.60	420	8.38	2,080	6.93	1,060	6.38	770	6.45	805
2			6.26	710	8.13	1,860	6.87	1,020				
4	3.52	27	6.58	870	7.94	1,700	6.82	992	6.30	730	6.49	825
6			7.05	1,130	7.78	1,590	6.77	965				
8	3.38	19	8.25	1,960	7.65	1,500	6.68	920	6.24	700	6.48	820
10			9.58	3,420	7.54	1,420	6.67	915				
12	3.35	18	10.12	4,180	7.44	1,360	6.63	895	6.21	685	6.45	805
	December 8		December 9		December 10		December 11		December 12		December 13	
4												
8												
N												
4												
8												
12												

Supplemental record.--Nov. 19, 5 a.m., 17.50 ft, 27,000 cfs; Dec. 4, 1 a.m., 10.17 ft, 4,260 cfs.

Kern River below Isabella dam site, Calif.

Location.--Lat 35°39', long. 118°29', in sec. 19, T. 26 S., R. 33 E., immediately downstream from dam site, 1.2 miles southwest of Isabella and 1.3 miles downstream from South Fork. Altitude of gage, about 2,400 ft (from topographic map).

Drainage area.--2,080 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 1,500 cfs and extended to peak stage on basis of slope-area determination.

Maxima.--November-December 1950: Discharge, 39,000 cfs 8:30 a.m. Nov. 19 (gage height, 23.4 ft).
1945 to October 1950: Discharge, 3,990 cfs Feb. 6, 1950 (gage height, 10.28 ft).

Remarks.--Borel Canal (see p. 571) diverts 5 miles above the station. Flood flow not affected by diversions for irrigation.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	18	409	9	17	984	17	18	316	25	854	54
2	16	208	10	14	830	18	1,150	244	26	614	46
3	13	450	11	17	707	19	21,000	195	27	433	36
4	15	5,660	12	18	604	20	5,830	168	28	319	30
5	13	2,060	13	19	501	21	3,250	135	29	239	27
6	17	1,400	14	19	453	22	1,890	111	30	197	27
7	18	1,240	15	18	658	23	1,320	89	31		27
8	18	1,190	16	18	421	24	1,000	67			
Monthly mean discharge, in cfs										1,279	624
Runoff, in acre-feet										76,130	38,370
Runoff, in inches										0.69	0.35

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			3.74	18	15.20	13,100	12.40	7,220	10.35	4,090	8.82	2,210
4			3.74	18	16.45	16,300	11.73	6,130	10.23	3,920	8.75	2,140
6			3.74	18	19.70	26,100	11.44	5,660	10.11	3,750	8.70	2,100
8			3.76	19	23.15	38,100	11.65	6,000	10.05	3,670	8.63	2,040
10			3.78	20	22.43	35,500	11.89	6,060	9.90	3,460	8.55	1,960
N	3.74	18	3.80	22	21.39	31,800	11.52	5,790	9.73	3,240	8.49	1,910
2			3.80	22	19.02	23,900	11.59	5,900	9.58	3,060	8.38	1,820
4			3.80	22	17.46	19,100	11.46	5,700	9.43	2,880	8.30	1,760
6			3.80	22	16.20	15,600	11.27	5,390	9.29	2,710	8.19	1,670
8			9.50	2,960	15.00	12,600	11.01	5,010	9.13	2,520	8.12	1,620
10			11.95	6,480	14.00	10,300	10.71	4,590	9.00	2,390	8.05	1,580
12	3.74	18	13.65	9,600	13.15	8,600	10.53	4,340	8.91	2,300	7.95	1,510
	November 23		November 24		November 25		November 29		November 30		December 1	
4	7.83	1,440	7.15	1,070	7.02	1,000					6.00	510
8	7.72	1,380	7.11	1,040	6.75	865					6.10	555
N	7.62	1,320	7.03	1,000	6.68	830	5.24	237	5.06	188	5.88	457
4	7.51	1,260	6.98	980	6.60	790					5.72	393
8	7.36	1,180	6.89	935	6.68	830					5.52	323
12	7.24	1,110	6.79	885	6.48	730	5.13	206	5.13	206	5.45	300
	December 2		December 3		December 4		December 5		December 6		December 7	
2	5.35	269	4.82	133	12.07	6,670	9.21	2,610	8.00	1,540	7.43	1,220
4	5.27	246	4.79	127	13.35	9,000	9.08	2,470	7.97	1,520	7.40	1,200
6	5.24	237	4.78	125	13.55	9,400	8.95	2,340	7.93	1,500	7.38	1,190
8	5.19	223	4.80	129	13.04	8,380	8.81	2,200	7.88	1,470	7.39	1,190
10	5.16	215	4.82	133	12.37	7,170	8.71	2,110	7.81	1,430	7.41	1,210
N	5.10	198	4.82	133	11.54	5,820	8.60	2,010	7.76	1,400	7.48	1,240
2	5.08	193	4.82	133	10.85	4,790	8.49	1,910	7.70	1,360	7.50	1,260
4	5.06	188	4.91	152	10.31	4,030	8.37	1,820	7.63	1,330	7.53	1,270
6	5.06	188	5.07	190	9.93	3,500	8.27	1,740	7.58	1,300	7.51	1,260
8	4.98	168	7.24	1,110	9.66	3,150	8.19	1,670	7.53	1,270	7.52	1,270
10	4.91	152	7.76	1,400	9.50	2,960	8.12	1,620	7.49	1,250	7.53	1,270
12	4.86	142	9.63	3,120	9.33	2,760	8.07	1,590	7.46	1,230	7.53	1,270
	December 8		December 9		December 10		December 11		December 12		December 13	
4	7.50	1,260	7.08	1,030	6.75	865	6.50	740	6.28	636		
8	7.45	1,230	7.04	1,010	6.71	845	6.45	715	6.22	609		
N	7.40	1,200	7.00	990	6.69	835	6.44	710	6.18	591	5.97	496
4	7.34	1,170	6.94	960	6.65	815	6.40	690	6.20	600		
8	7.25	1,120	6.88	930	6.60	790	6.37	676	6.15	578		
12	7.16	1,070	6.81	895	6.55	765	6.32	654	6.12	564	5.86	449

Supplemental record.--Nov. 18, 7 p.m., 5.30 ft, 254 cfs; Nov. 19, 8:30 a.m., 23.4 ft, 39,000 cfs; Dec. 1, 2 a.m., 5.18 ft, 220 cfs, 6 a.m., 6.19 ft, 596 cfs; Dec. 4, 5 a.m., 13.59 ft, 9,480 cfs.

Kern River near Democrat Springs, Calif.

Location.--Lat 35°31', long. 118°41', in NE¼ sec. 6, T. 28 S., R. 31 E., 0.5 mile downstream from intake to Kern River No. 1 conduit and 1.2 miles southwest of Democrat Springs.

Drainage area.--2,264 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 2,000 cfs, and extended to peak stage on basis of computed flow over dam.

Maxima.--November-December 1950: Discharge, 40,000 cfs noon Nov. 19 (gage height, 30.7 ft).

Remarks.--Flow slightly affected by diversions. Kern River No. 1 conduit diverts above station. Station established July 1950. Data for computation of peak discharge furnished by Southern California Edison Company.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	Decamber	Day	November	December
1	2.1	536	9	2.1	1,140	17	2.5	546	25	909	310
2	2.1	472	10	2.2	942	18	2.6	502	26	750	297
3	2.1	413	11	2.3	823	19	18,400	465	27	626	280
4	2.1	5,030	12	2.3	752	20	6,440	445	28	538	252
5	2.1	2,510	13	2.4	671	21	3,710	407	29	485	229
6	2.1	1,700	14	2.5	612	22	2,300	381	30	446	232
7	2.1	1,400	15	2.5	770	23	1,570	356	31		216
8	2.1	1,380	16	2.5	626	24	1,120	329			
Monthly mean discharge, in cfs										1,244	807
Runoff, in acre-feet										74,050	49,630
Runoff, in inches										0.61	0.41

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 19		November 20		November 21		November 22		November 23		November 24	
2	12.3	3,170	18.0	9,300	13.83	4,550						
4	16.1	6,920	17.15	8,200	13.56	4,300	11.58	2,580	10.20	1,750	9.20	1,220
6	18.1	9,450	16.35	7,220	13.30	4,070						
8	19.7	12,000	15.60	6,360	13.14	3,930	11.35	2,420	10.01	1,650	9.11	1,180
10	25.8	26,000	15.01	5,710	13.02	3,820						
N	30.7	40,000	15.17	5,890	12.88	3,690	11.12	2,270	9.84	1,550	8.92	1,090
2	29.4	36,200	15.15	5,860	12.82	3,640						
4	27.3	30,100	14.85	5,550	12.53	3,380	10.94	2,160	9.71	1,480	8.84	1,040
6	24.1	21,600	14.86	5,560	12.39	3,250						
8	21.8	16,100	14.75	5,450	12.21	3,090	10.70	2,020	9.56	1,400	8.77	1,020
10	20.3	13,100	14.56	4,260	12.02	2,920						
12	19.0	10,800	14.25	4,950	11.85	2,780	10.44	1,880	9.45	1,350	8.67	978
	November 25		November 26		November 30		December 1		December 2		December 3	
4	8.52	918	8.24	809	6.94	453	6.84	433	7.18	505	6.76	417
8	8.65	970	8.12	767	6.90	445	6.96	457	7.10	487	6.69	403
N	8.58	942	8.02	732	6.90	445	7.80	665	7.00	465	6.67	399
4	8.38	862	7.96	713	6.90	445	7.61	612	6.93	451	6.67	399
8	8.32	838	7.92	701	6.87	439	7.43	565	6.88	441	6.73	411
12	8.40	870	7.85	680	6.85	435	7.28	528	6.84	433	7.02	469
	December 4		December 5		December 6		December 7		December 8		December 9	
2	9.9	1,580	12.25	3,120								
4	13.0	3,800	12.05	2,940	10.38	1,850	9.55	1,400	9.64	1,440	9.13	1,190
6	16.1	6,920	11.90	2,820								
8	16.95	7,940	11.75	2,700	10.23	1,770	9.47	1,360	9.60	1,420	9.09	1,170
10	16.95	7,940	11.57	2,570								
N	16.15	6,980	11.42	2,460	10.12	1,710	9.43	1,340	9.55	1,400	9.03	1,140
2	15.4	6,140	11.28	2,370								
4	14.5	5,200	11.10	2,260	9.98	1,630	9.56	1,400	9.46	1,360	8.96	1,110
6	13.8	4,520	10.95	2,170								
8	13.17	3,950	10.81	2,090	9.82	1,540	9.63	1,440	9.41	1,330	8.90	1,080
10	12.74	3,570	10.69	2,020								
12	12.43	3,290	10.58	1,960	9.67	1,460	9.64	1,440	9.31	1,280	8.82	1,040
	December 8		December 9		December 10		December 11		December 12		December 13	
4												
8												
N												
4												
8												
12												

Supplemental record.--Nov. 19, 1 a.m., 5.29 ft, 2.7 cfs, 3 a.m., 14.9 ft, 5,600 cfs, 5 a.m., 17.3 ft, 8,390 cfs, 7 a.m., 18.8 ft, 10,500 cfs, 9 a.m., 21.0 ft, 14,400 cfs, 11 a.m., 30.4 ft, 39,100 cfs, 1 p.m., 30.2 ft, 38,500 cfs, 3 p.m., 28.6 ft, 34,400 cfs, 5 p.m., 25.6 ft, 25,500 cfs, 7 p.m., 22.9 ft, 18,700 cfs, 9 p.m., 21.0 ft, 14,400 cfs, 11 p.m., 19.7 ft, 12,000 cfs; Dec. 4, 8:30 a.m., 17.0 ft, 8,000 cfs.

Kern River No. 1 conduit near Democrat Springs, Calif.

Location.--Lat 35°30', long. 118°41', in NE¼ NE¼ sec. 13, T. 28 S., R. 30 E., at downstream end of Cow Creek flume, 2.5 mile southwest of Democrat Springs.

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

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

Maxima.--November-December 1950: Daily discharge, 392 cfs Nov. 30.
Station established June 1950.

Remarks.--Flow regulated. Canal diverts from left bank of Kern River, bypassing the Kern River station near Democrat Springs. Station established June 1950.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	258	391	9	211	377	17	221	379	25	380	378
2	244	391	10	201	377	18	271	379	26	375	378
3	229	391	11	195	376	19	157	380	27	384	378
4	221	375	12	196	375	20	171	380	28	391	378
5	223	377	13	199	375	21	363	380	29	391	378
6	224	389	14	226	375	22	370	379	30	392	378
7	222	390	15	235	375	23	380	379	31		378
8	217	388	16	213	378	24	382	378			
Monthly mean discharge, in cfs										271	380
Runoff, in acre-feet										16,150	23,370
Runoff, in inches										-	-

Kern River near Bakersfield, Calif.

Location.--Lat 35°25'54", long. 118°56'43", in SW¼ sec. 2, T. 29 S., R. 28 E., at mouth of lower canyon, 5 miles northeast of Bakersfield. Altitude of gage, about 470 ft (from topographic map).

Drainage area.--2,420 sq mi.

Gage-height record.--Water-stage recorder graph. Gage heights for Nov. 19, 20 furnished by Kern County Land Co.

Discharge record.--Stage-discharge relation for Nov. 19, 20 based on current-meter measurement of 31,000 cfs made by Corps of Engineers, and shape of previous rating curves. Discharge record furnished by Kern County Land Co. except for period 8 a.m. Nov. 19 to 12 p.m. Nov. 20, when it was computed from a discharge hydrograph based on gage heights furnished by them and discharge computed from stage-discharge relation.

Maxima.--November-December 1950: Discharge, 36,000 cfs about 4:30 p.m. Nov. 19 (gage height, 14.2 ft).
1896 to October 1950: Discharge, 21,700 cfs Mar. 9, 1943 (gage height, 10.87 ft).

Remarks.--Flood flow not affected by regulation.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	257	1,165	9	220	1,683	17	221	1,060	25	1,710	792
2	257	1,166	10	209	1,514	18	254	992	26	1,600	760
3	247	1,129	11	207	1,420	19	14,700	921	27	1,510	671
4	227	4,439	12	202	1,314	20	10,600	888	28	1,450	645
5	229	3,061	13	205	1,224	21	4,100	861	29	1,380	613
6	229	2,175	14	223	1,168	22	3,000	847	30	1,240	608
7	232	1,831	15	242	1,182	23	2,290	827	31		597
8	231	1,817	16	226	1,148	24	1,890	803			
Monthly mean discharge, in cfs										1,630	1,268
Runoff, in acre-feet										98,360	77,990
Runoff, in inches										0.76	0.60

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						290	9.30	16,800				
4						300	8.67	14,900				
6					1.74	320	8.09	13,200				
8						2,000		12,000				
10					6.66	9,200		10,000				
N					8.04	13,100	6.59	9,010				
2					11.70	24,800		8,300				
4					13.99	35,000	6.12	7,790				
6					13.45	32,300		7,600				
8					12.28	27,100		7,400				
10					11.16	22,800	5.90	7,240				
12					10.07	19,100	5.55	6,410				

Supplemental record.--Nov. 19, about 4:30 p.m., 14.2 ft, 36,000 cfs.

Borel Canal at Tillie Creek, Calif.
(formerly published as at Tilley Creek)

Location (revised).--Lat 35°42', long. 118°27', in SE¼ sec. 5, T. 26 S., R. 33 E., at point where canal crosses Tillie Creek, 1.4 miles southwest of intake at Kernville. Altitude of gage, about 2,570 ft (from topographic map).

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

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

Maxima.--November-December 1950: Daily discharge, 586 cfs Dec. 24-25.
1925 to October 1950: Daily discharge, 605 cfs June 3-5, 1927, May 22, 1936.

Remarks.--Flow regulated. Canal diverts from Kern River 0.5 mile below Kernville to supply Borel power plant of Southern California Edison Co., 10 miles below station, at which point water is returned to Kern River.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	234	580	9	190	581	17	224	581	25	505	586
2	219	580	10	182	580	18	356	581	26	544	585
3	209	576	11	178	581	19	483	581	27	569	574
4	208	572	12	177	581	20	485	581	28	576	552
5	210	576	13	182	581	21	493	583	29	577	552
6	208	576	14	215	581	22	494	585	30	578	548
7	200	576	15	208	581	23	494	585	31		535
8	194	577	16	191	581	24	494	586			
Monthly mean discharge, in cfs										336	576
Runoff, in acre-feet										19,990	35,410
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												
4												
6												
8												
10												
N												
2												
4												
6												
8												
10												
12												
	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												

South Fork Kern River near Onyx, Calif.

Location.--Broad-crested weir, lat 35°44', long. 118°10', in SW¼ sec. 24, T. 25 S., R. 35 E., three-quarters of a mile north of State Highway 178, 1.4 miles upstream from Canebrake Creek, and 5 miles northeast of Onyx. Altitude of gage, about 2,900 ft (from topographic map).

Drainage area.--531 sq mi.

Gage-height record.--Water-stage recorder graph except for period Nov. 2-13, when there was no gage-height record.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 1,900 cfs and extended to peak stage. Discharge for period of no gage-height record computed on basis of range in stage and records for nearby streams.

Maxima.--November-December 1950: Discharge, 2,180 cfs 11 a.m. Nov. 19 (gage height, 5.88 ft).
1911-14, 1919-42, 1948 to October 1950: Discharge, 3,450 cfs Mar. 2, 1938 (gage height, 6.69 ft), from rating curve extended above 1,900 cfs.

Remarks.--Flood flow not affected by 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	26	82	9	22	149	17	22	92	25	101	63
2	20	74	10	20	133	18	42	87	26	92	62
3	15	80	11	25	121	19	1,380	82	27	86	60
4	16	368	12	28	114	20	515	82	28	77	56
5	16	269	13	27	109	21	255	77	29	72	59
6	20	180	14	26	101	22	182	71	30	72	61
7	25	162	15	24	115	23	142	68	31		59
8	25	160	16	22	104	24	116	67			
Monthly mean discharge, in cfs										117	109
Runoff, in acre-feet										6,960	6,700
Runoff, in inches										0.25	0.24

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			1.78	25	3.38	361	4.33	881				
4			1.83	29	3.92	626	4.10	730	3.19	291		
6			1.84	30	4.51	1,010	3.92	626				
8			1.83	29	5.02	1,420	3.80	560	3.13	271		
10			1.83	29	5.76	2,070	3.60	458				
N	1.73	22	1.83	29	5.85	2,160	3.52	421	3.08	255	2.81	179
2			1.83	29	5.76	2,070	3.44	386				
4			1.84	30	5.54	1,880	3.37	358	3.00	230		
6			1.90	35	5.22	1,590	3.35	350				
8			2.12	57	5.05	1,440	3.39	365	2.97	222		
10			2.35	88	4.84	1,270	3.32	338				
12	1.75	23	2.70	153	4.62	1,100	3.25	312	2.94	213	2.72	158
	November 23		November 24		November 25		November 29		November 30		December 1	
4												
8												
N	2.64	140	2.50	113	2.42	99	2.24	73	2.21	68	2.30	81
4												
8												
12	2.58	128	2.48	110	2.40	96	2.22	70	2.30	81	2.32	84
	December 2		December 3		December 4		December 5		December 6		December 7	
2			2.22	70	3.25	312						
4			2.22	70	3.35	350	3.17	284				
6			2.20	67	3.42	378						
8			2.19	66	3.46	395	3.19	291				
10			2.18	65	3.55	435						
N	2.25	74	2.18	65	3.58	449	3.18	287	2.80	176	2.73	160
2			2.19	66	3.53	425						
4			2.21	68	3.48	403	3.12	268				
6			2.32	84	3.42	378						
8			2.37	92	3.32	338	3.00	230				
10			2.60	132	3.26	316						
12	2.18	65	2.80	176	3.22	301	2.90	202	2.76	167	2.74	162
	December 8		December 9		December 10		December 11		December 12		December 13	
4												
8												
N	2.72	158	2.65	142	2.58	128	2.52	117	2.48	110	2.46	106
4												
8												
12	2.75	164	2.68	149	2.58	128	2.55	122	2.51	115	2.47	108

Supplemental record.--Nov. 19, 11 a.m., 5.88 ft, 2,180 cfs.

South Fork Kern River at Isabella, Calif.

Location.--Lat 35°40', long. 118°28' in NW¼ sec. 20, T. 26 S., R. 33 E., at Isabella, 0.2 mile upstream from mouth. Datum of gage is 2,484.3 ft above mean sea level (river-profile survey).

Drainage area.--985 sq mi.

Gage-height record.--Water-stage recorder graph except for periods 5 a.m. Nov. 19 to Dec. 21 when there was no record. Staff-gage readings were obtained Dec. 9, 12-15, 18-26. Graph for periods Dec. 12-15, 18-21 constructed on basis of twice-daily staff-gage readings.

Discharge record.--Stage-discharge relation defined by current-meter measurements. Backwater from Kern River on Nov. 18, 19 and probably on Nov. 20 and Dec. 4. Discharge for periods of backwater and no gage-height record computed on basis of records for station near Onyx. Shifting-control method used Nov. 1-18, Dec. 9-31.

Maxima.--November-December 1950: Discharge, 1,200 cfs (estimated) Nov. 19; gage height, 12.4 ft, from high-water mark in gage well, about 8 a.m. Nov. 19, affected by backwater from Kern River.
1929 to October 1950: Discharge, 4,100 cfs Feb. 7, 1937, from rating curve extended above 1,600 cfs, verified by velocity-area study; gage height, 6.99 ft Mar. 9, 1943.

Remarks.--Many diversions above station for irrigation; considerable return flow.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	12		9	11	171	17	13	100	25		42
2	9.6		10	9.8	160	18	15	93	26		43
3	8.1		11	12	150	19		74	27	200	46
4	8.9	160	12	13	144	20		66	28		41
5	8.7		13	13	129	21	200	58	29		36
6	12		14	14	129	22		54	30		36
7	13		15	13	121	23		50	31		35
8	13		16	13	110	24		44			
Monthly mean discharge, in cfs										87.1	104
Runoff, in acre-feet										5,180	6,370
Runoff, in inches										0.10	0.12

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			2.53	13	5.17							
4			2.53	13	6.40							
6			2.53	13								
8			2.54	14								
10			2.55	14								
N	2.53	13	2.55	14								
2			2.56	14								
4			2.56	14								
6			2.56	14								
8			2.56	14								
10			2.95	20								
12	2.53	13	4.31	25								
	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, 9 p.m., 2.57 ft, 14 cfs.

Tulare Lake basin

Tulare Lake in Kings County, Calif.

Location.--Lat 36°02'35", long. 119°38'35", near west ¼ corner sec. 6, T. 22 S., R. 22 E., at south end of El Rico Ranch bridge across Tule River, and 6 miles southwest of Corcoran; other gage used at other locations at times. Datum of gages is at mean sea level.

Gage-height record.--Staff gage read at various times. Elevations interpolated for days of no staff-gage readings.

Maxima.--November-December 1950: Elevation observed, 186.50 ft Dec. 10.
1906 to October 1950: Elevation, 196.8 ft June 27, 28, 1941.

Lake elevation of June 27, 28, 1941, was highest known since about 1890.

Remarks.--Tulare Lake receives water from Kings, Kaweah, and Tule Rivers during high-water periods and occasionally from Kern River, Deer Creek, and several small intermittent streams. Its natural boundary has been greatly altered by construction of levees and other reclamation work. Elevation at lowest point of lake bed is about 179 ft above mean sea level. Lake was dry Nov. 1-19, 1950. Record furnished by Tulare Lake Basin Water Storage District.

Elevation in feet, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1		182.85	9		186.30	17	179.0	185.53	25	183.30	185.13
2		182.75	10		186.50	18	179.0	185.48	26	183.35	185.08
3		182.65	11		185.83	19	179.0	185.43	27	183.25	185.03
4		182.80	12		185.78	20	179.20	185.38	28	183.15	184.98
5		183.45	13		185.73	21	181.00	185.33	29	183.05	184.93
6		184.30	14		185.68	22	182.50	185.28	30	182.95	184.88
7		185.15	15	179.0	185.63	23	183.00	185.23	31		184.83
8		185.90	16	179.0	185.58	24	183.20	185.18			
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	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												
4												
6												
8												
10												
N												
2												
4												
6												
8												
10												
12												
	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												

White River near Ducor, Calif.

Location.--Lat 35°49', long. 118°56', in NE¼ sec. 27, T. 24 S., R. 28 E., 500 ft downstream from bridge at Gilliam Ranch, 3 miles downstream from Coke Creek, and 8 miles southeast of Ducor. Altitude of gage, about 695 ft (from topographic map).

Drainage area.--93.7 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 70 cfs and extended to peak stage on basis of rating at former site. Shifting-control method used Nov. 21 to Dec. 31.

Maxima.--November-December 1950: Discharge, 584 cfs 1:30 p.m. Nov. 19 (gage height, 3.73 ft).
1944 to October 1950: Discharge, 1,300 cfs Feb. 2, 1945 (gage height, 6.35 ft, site and datum then in use), by slope-area method.

Flood of Mar. 9, 1943, estimated at 2,300 cfs by Bureau of Reclamation.

Remarks.--Flood flow not affected by 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	0	3.7	9	0	8.2	17	0	5.4	25	1.8	3.8
2	0	2.9	10	0	7.0	18	0	5.1	26	1.4	3.5
3	0	4.5	11	0	6.4	19	113	4.5	27	1.2	3.5
4	0	42	12	0	5.9	20	50	4.3	28	1.2	3.5
5	0	23	13	0	5.5	21	25	4.5	29	1.1	3.5
6	0	15	14	0	5.1	22	10	4.3	30	1.8	3.5
7	0	12	15	0	6.4	23	4.6	4.0	31		4.3
8	0	9.8	16	0	6.0	24	2.3	3.8			
Monthly mean discharge, in cfs										7.11	7.25
Runoff, in acre-feet										423	446
Runoff, in inches										0.08	0.09

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						0	1.74	67				
4						0	1.66	58	1.43	32	1.19	13
6						0	1.57	48				
8						0	1.53	43	1.38	28	1.17	12
10						0	1.50	40				
N					2.14	126	1.47	37	1.32	23	1.13	9.6
2					3.51	495	1.56	47				
4					2.76	258	1.60	51	1.28	20	1.11	8.5
6					2.33	161	1.58	49				
8					2.16	129	1.60	51	1.23	16	1.09	7.6
10					2.02	106	1.58	49				
12					1.84	80	1.53	43	1.20	14	1.07	6.8
	November 23		November 24		November 25		November 29		November 30		December 1	
4	1.05	6.0							.86	1.4	.94	2.7
8	1.03	5.4	.93	2.7	.89	2.0			.86	1.4	1.03	4.8
N	1.01	4.8					.83	1.1	.89	1.8	1.02	4.5
4	.98	4.0	.90	2.1	.86	1.5			.91	2.1	.99	3.8
8	.92	2.7							.91	2.1	.98	3.5
12	.90	2.3	.89	2.0	.86	1.5	.84	1.2	.92	2.3	.97	3.3
	December 2		December 3		December 4		December 5		December 6		December 7	
2			.94	2.5	1.22	13						
4			.94	2.5	1.24	14	1.34	28	1.19	16		
6			.95	2.7	1.53	41						
8	.97	3.1	.97	3.1	1.64	54	1.30	24	1.18	15		
10			.99	3.5	1.78	72						
N			1.00	3.8	1.76	69	1.27	22	1.17	14	1.13	12
2			1.00	3.8	1.66	58						
4	.95	2.7	1.01	4.0	1.56	47	1.24	20	1.16	14		
6			1.02	4.3	1.49	40						
8			1.04	4.8	1.44	36	1.23	19	1.15	13		
10			1.19	11	1.42	35						
12	.94	2.5	1.24	14	1.39	32	1.21	18	1.15	13	1.11	11
	December 8		December 9		December 10		December 11		December 12		December 13	
4												
8												
N	1.09	9.6	1.06	8.0	1.03	6.8	1.02	6.4	1.01	5.7	1.00	5.4
4												
8												
12	1.08	9.0	1.06	8.0	1.02	6.4	1.02	6.4	1.01	5.7	1.00	5.4

Supplemental record.--Nov. 19, 11 a.m., 1.65 ft, 56 cfs, 1 p.m., 2.92 ft, 301 cfs, 1:30 p.m., 3.73 ft, 584 cfs.

North Fork of Middle Fork Tule River near Springville, Calif.

Location.--Lat 36°11', long. 118°42', in sec. 23, T. 20 S., R. 30 E., 1 mile upstream from mouth and 7.8 miles northeast of Springville. Altitude of gage, about 2,850 ft (from topographic map).

Drainage area.--39.5 sq mi.

Gage-height record.--Water-stage recorder graph except for Nov. 19 to Dec. 14, when there was no gage-height record.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 300 cfs and extended to peak stage on basis of an estimate from head on diversion dam downstream. Discharge for period of no gage-height record computed on basis of rainfall-runoff relationship. Backwater corrections applied Dec. 15-31.

Maxima.--November-December 1950: Discharge, 14,000 cfs Nov. 19 (gage height, 13.06 ft, from floodmarks).
1939 to October 1950: Discharge, 2,200 cfs Mar. 9, 1943 (gage height, 7.39 ft), from rating curve extended above 300 cfs by logarithmic plotting.

Remarks.--No storage above station; diversion above station into Pacific Gas & Electric Co. conduit continued throughout the storm periods.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	0.8		9	0.8		17	2.4	22	25		14
2	.8		10	.7		18	1,240	22	26		14
3	.8		11	.7	250	19		19	27		14
4	.7	250	12	.8		20		16	28	1,000	13
5	.8		13	1.4		21	1,000	14	29		11
6	.8		14	4.4		22		16	30		9.1
7	.8		15	2.9	35	23		15	31		10
8	.8		16	2.3	24	24		15			
Monthly mean discharge, in cfs										442	122
Runoff, in acre-feet										26,310	7,500
Runoff, in inches										12.49	3.56

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												
4												
6												
8												
10												
N												
2												
4												
6												
8												
10												
12												
	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												

Tule River near Porterville, Calif.

Location.--Lat 36°05', long. 118°55', in NW¼ sec. 25, T. 21 S., R. 28 E., at highway bridge, 1 mile upstream from South Fork and 6 miles east of Porterville. Altitude of gage, about 580 ft (from topographic map).

Drainage area.--266 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 3,300 cfs and extended to peak stage on basis of slope-area determination.

Maxima.--November-December 1950: Discharge, 25,500 cfs 4:30 a.m. Nov. 19 (gage height, 13.75 ft), including flow in overflow channels on both banks.
1901 to October 1950: Discharge, 13,500 cfs in main channel plus 2,000 cfs (estimated) in overflow channel 0.2 mile east, Mar. 9, 1943 (gage height, 11.3 ft), from rating curve extended above 4,000 cfs on basis of velocity-area studies and logarithmic plotting.

Remarks.--Several small diversions above station for irrigation. Power is developed on Middle Fork and tributaries.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	26	232	9	12	404	17	37	246	25	268	153
2	18	183	10	14	358	18	1,710	230	26	233	149
3	16	909	11	15	322	19	10,000	218	27	205	141
4	14	3,020	12	16	297	20	1,390	200	28	188	135
5	14	988	13	19	272	21	758	186	29	170	131
6	12	656	14	43	310	22	522	177	30	190	130
7	12	582	15	53	346	23	395	168	31		137
8	12	484	16	41	273	24	318	162			
Monthly mean discharge, in cfs										557	394
Runoff, in acre-feet										33,170	24,200
Runoff, in inches										2.34	1.71

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			2.05	38	12.41	17,200	6.57	1,820	5.16	927		
4			2.06	39	13.68	25,000	6.34	1,630	5.06	883		
6			2.10	43	13.14	21,500	6.10	1,460	4.93	829	4.25	561
8			2.16	50	12.35	16,900	5.95	1,360	4.84	792		
10			2.23	58	10.77	9,340	5.86	1,300	4.79	772		
N	2.04	38	2.42	82	9.80	6,320	5.98	1,380	4.71	740	4.13	516
2			3.17	212	9.17	4,990	6.03	1,410	4.65	716		
4			6.90	1,710	8.67	4,180	5.96	1,360	4.58	688		
6			8.67	3,660	8.21	3,550	5.78	1,250	4.52	665	4.03	480
8			9.17	4,520	7.75	2,990	5.58	1,130	4.48	649		
10			9.66	5,600	7.34	2,530	5.42	1,050	4.44	634		
12	2.05	38	10.77	9,080	6.90	2,100	5.29	986	4.39	614	3.93	444
	November 23		November 24		November 25		November 29		November 30		December 1	
4									2.92	159	3.32	256
8									2.91	157	3.22	230
N	3.78	394	3.53	316	3.36	267	2.96	168	2.94	164	3.23	233
4									3.00	177	3.16	215
8									3.20	225	3.14	210
12	3.64	349	3.44	290	3.28	246	2.96	168	3.47	298	3.10	200
	December 2		December 3		December 4		December 5		December 6		December 7	
2			2.97	170	8.99	4,680	5.81	1,270				
4			2.98	172	9.32	5,260	5.66	1,180				
6	3.06	191	3.01	179	8.97	4,650	5.53	1,110	4.60	696		
8			3.11	202	8.42	3,830	5.42	1,050			4.44	634
10			3.63	346	7.89	3,160	5.31	995				
N	3.02	182	4.43	630	7.54	2,750	5.22	954	4.48	649	4.35	599
2			4.91	820	7.15	2,340	5.14	918				
4			5.06	883	6.82	2,030	5.06	883				
6	2.99	175	5.34	1,010	6.56	1,810	4.95	837	4.37	607	4.20	542
8			6.49	1,750	6.35	1,640	4.88	808				
10			7.56	2,780	6.14	1,490	4.80	776				
12	2.96	168	8.36	3,750	5.97	1,370	4.76	760	4.30	580	4.17	531
	December 8		December 9		December 10		December 11		December 12		December 13	
4												
8												
N	4.04	483	3.80	400	3.67	359	3.55	322	3.47	298	3.38	273
4												
8												
12	3.91	438	3.73	378	3.60	337	3.50	307	3.42	284	3.33	259

Supplemental record.--Nov. 19, 4:30 a.m., 13.75 ft, 25,500 cfs; Nov. 30, 10 p.m., 3.50 ft, 307 cfs.

Pacific Gas & Electric Co. conduit near Springville, Calif.

Location.--Lat 36°12', long. 118°39', in NW¼ sec. 18, T. 20 S., R. 31 E., 0.5 mile downstream from intake and 10 miles northeast of Springville. Altitude of gage, about 4,000 ft (from topographic map).

Gage-height record.--Water-stage recorder graph except for period Nov. 1-12, when no gage-height record was obtained.

Discharge record.--Stage-discharge relation defined by current-meter measurements. Discharge for period of no gage-height record computed on basis of flow through Tule River powerhouse.

Maxima.--November-December 1950: Daily discharge, 63 cfs Dec. 16.
1939 to October 1950: Daily discharge, 70 cfs Apr. 16, 1948, May 15-26, 28, 29, 1950.

Remarks.--Flow regulated. Conduit diverts from left bank of North Fork of Middle Fork Tule River in sec. 18, T. 20 S., R. 31 E. Water is used for power development at Tule River powerhouse of Pacific Gas & Electric Co., 3.5 miles downstream and is then returned to river.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	19	53	9	12	44	17	17	58	25	3.9	50
2	20	53	10	12	48	18	19	54	26	3.4	48
3	18	51	11	12	43	19	3.7	55	27	3.1	46
4	10	45	12	12	40	20	2.5	59	28	2.8	44
5	15	49	13	14	37	21	2.0	60	29	30	46
6	8	44	14	17	34	22	1.9	57	30	55	47
7	13	46	15	15	48	23	3.4	54	31		46
8	13	37	16	15	63	24	4.5	52			
Monthly mean discharge, in cfs										12.6	48.7
Runoff, in acre-feet										748	3,000
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												
4												
6												
8												
10												
N												
2												
4												
6												
8												
10												
12												
	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												

South Fork Tule River near Success, Calif.

Location.--Lat 36°03', long. 118°51', in NW¼ sec. 4, T. 22 S., R. 29 E., 4 mile southeast of Success and 5 mile upstream from mouth. Altitude of gage, about 750 ft (from topographic map).

Drainage area.--106 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 1,600 cfs and extended to peak stage on basis of slope-area determination. Shifting-control method used Nov. 1-18.

Maxima.--November-December 1950: Discharge, 7,100 cfs 6 a.m. Nov. 19 (gage height, 8.35 ft).
1930 to October 1950: Discharge, 6,210 cfs Mar. 9, 1943 (gage height, 8.24 ft), from rating curve extended above 1,600 cfs on basis of velocity-area studies and logarithmic plotting.

Remarks.--Several 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	4.2	59	9	1.2	72	17	7.3	54	25	64	51
2	2.5	54	10	.6	66	18	424	53	26	59	50
3	1.7	106	11	.6	62	19	2,470	52	27	57	50
4	1.1	454	12	.5	59	20	349	52	28	55	50
5	.8	183	13	.9	56	21	204	52	29	54	50
6	.4	120	14	12	62	22	128	51	30	57	49
7	.4	99	15	13	64	23	94	51	31		49
8	.5	82	16	7.8	56	24	75	51			
Monthly mean discharge, in cfs										138	78.0
Runoff, in acre-feet										8,220	4,800
Runoff, in inches										1.45	0.85

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			1.17	9.2	5.00	1,640	1.97	383				
4			1.18	9.7	7.78	5,940	1.88	348	1.58	244	1.25	143
6			1.20	11	8.35	7,100	1.81	324				
8			1.21	11	8.32	7,050	1.82	327	1.50	218	1.21	133
10			1.25	13	5.49	2,840	1.85	338				
N			1.27	14	3.84	1,390	1.96	379	1.44	199	1.18	126
2			2.91	300	3.13	928	2.02	403				
4			3.72	645	2.73	715	1.98	387	1.38	180	1.15	119
6			4.43	1,130	2.52	614	1.88	348				
8			4.51	1,190	2.32	524	1.79	316	1.34	168	1.12	112
10			4.41	1,110	2.18	467	1.72	292				
12			4.60	1,270	2.07	423	1.65	268	1.30	156	1.10	108
	November 23		November 24		November 25		November 29		November 30		December 1	
4	1.06	101	0.93	80	0.80	66			0.65	54	0.72	60
8	1.05	99	.92	79	.79	65			.65	54	.69	57
N	1.02	94	.89	75	.78	64			.65	54	.66	55
4	.99	89	.85	71	.76	63			.65	54	.71	59
8	.97	86	.84	70	.75	62			.70	58	.72	60
12	.95	83	.81	67	.74	61			.84	70	.68	57
	December 2		December 3		December 4		December 5		December 6		December 7	
2			0.65	54	2.51	610	1.54	231	1.22	135		
4			.65	54	2.67	685	1.49	215	1.20	130	1.09	106
6			.65	54	2.79	745	1.45	202	1.19	128		
8	0.65	54	.65	54	2.47	592	1.43	196	1.18	126	1.09	106
10			.71	59	2.25	495	1.40	186	1.16	121		
N			.95	83	2.07	423	1.37	177	1.15	119	1.05	99
2			1.25	143	1.93	367	1.35	171	1.14	117		
4	.65	54	1.22	135	1.85	338	1.33	165	1.13	115	1.03	95
6			1.17	123	1.76	306	1.30	156	1.12	112		
8			1.20	130	1.69	282	1.29	153	1.10	108	1.02	94
10			1.34	168	1.63	261	1.26	146	1.10	108		
12	.65	54	1.97	383	1.59	248	1.25	143	1.08	104	.99	89
	December 8		December 9		December 10		December 11		December 12		December 13	
4	0.98	87										
8	.96	84	0.87	73								
N	.95	83			0.80	66	0.75	62	0.71	59	0.67	56
4	.93	80	.85	71								
8	.91	77										
12	.90	76	.83	69	.77	64	.73	60	.70	58	.66	55

Supplemental record.--Nov. 19, 7 a.m., 7.89 ft, 6,270 cfs; Nov. 30, 10 p.m., 0.89 ft, 75 cfs; Dec. 4, 5 a.m., 2.83 ft, 765 cfs.

Middle Fork Kaweah River near Potwisha Camp, Calif.

Location.--Lat 36°30'52", long. 118°47'52", in NE¼ sec. 26, T. 16 S., R. 29 E., 0.7 mile upstream from Marble Fork, and 0.7 mile southeast of Potwisha Camp.

Drainage area.--100 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 1,000 cfs and extended to peak stage on basis of slope-area determination.

Maxima.--November-December 1950: Discharge, 17,500 cfs 12:30 a.m. Nov. 19 (gage height, 15.70 ft).

Remarks.--Flow slightly regulated by diversion into Middle Fork Kaweah River No. 3 conduit. Station established May 1949.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	15	137	9	0.8	314	17	1.5	157	25	242	93
2	6.9	105	10	.8	261	18	2,890	142	26	209	88
3	3.7	1,310	11	.7	224	19	6,110	129	27	188	81
4	2.0	1,360	12	.7	202	20	1,180	121	28	171	75
5	1.1	572	13	.7	179	21	725	113	29	148	72
6	1.0	417	14	1.0	277	22	504	105	30	140	69
7	.9	596	15	.8	234	23	350	100	31		71
8	.8	404	16	.9	179	24	281	96			
Monthly mean discharge, in cfs										473	267
Runoff, in acre-feet										28,120	16,430
Runoff, in inches										5.27	3.08

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	3.89	1.1	4.59	4.1	14.50	12,800	8.74	1,300				
4	3.89	1.1	4.08	1.7	13.60	10,000	8.56	1,160	8.12	852	7.57	573
6	3.88	1.0	4.06	1.7	13.27	9,080	8.43	1,060				
8	3.88	1.0	5.35	32	12.60	7,340	8.53	1,130	7.93	742	7.48	537
10	3.88	1.0	8.55	1,150	12.37	6,790	8.65	1,230				
N	3.87	1.0	9.80	2,380	11.65	5,260	8.67	1,250	7.78	666	7.36	491
2	3.87	1.0	11.20	4,440	10.90	3,900	8.66	1,240				
4	3.87	1.0	11.05	4,170	10.34	3,060	8.63	1,210	7.76	657	7.29	466
6	3.87	1.0	13.20	8,880	9.82	2,400	8.59	1,180				
8	3.88	1.0	13.30	9,160	9.45	2,000	8.51	1,120	7.73	644	7.23	446
10	4.62	4.2	12.90	8,100	9.17	1,700	8.41	1,050				
12	4.93	6.6	15.50	16,600	8.93	1,470	8.30	970	7.65	608	7.15	418
	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			6.09	135	10.12	2,770	7.76	657	7.24	449	7.85	700
4			6.42	202	9.65	2,220	7.70	630	7.19	432	7.89	720
6			6.73	284	9.20	1,730	7.67	616	7.14	414	7.80	675
8			7.43	517	8.88	1,420	7.62	594	7.11	404	7.71	634
10			7.74	648	8.63	1,210	7.59	581	7.07	390	7.65	608
N			8.00	780	8.42	1,050	7.57	573	7.03	376	7.58	577
2			9.05	1,580	8.27	949	7.55	565	7.00	365	7.53	557
4			9.60	2,160	8.18	888	7.51	549	7.01	368	7.51	549
6			9.95	2,560	8.11	846	7.46	529	7.04	379	7.48	537
8			10.05	2,680	8.02	792	7.40	505	7.06	386	7.43	517
10			10.09	2,730	7.91	730	7.35	488	7.29	466	7.39	502
12			10.11	2,750	7.83	690	7.29	466	7.80	675	7.34	484
	December 8		December 9		December 10		December 11		December 12		December 13	
4												
8												
N												
4												
8												
12												

Supplemental records.--Nov. 19, 12:30 a.m., 15.70 ft, 17,500 cfs; Dec. 4, 1 a.m., 10.37 ft, 3,100 cfs.

Middle Fork Kaweah River No. 3 conduit near Potwisha Camp, Calif.

Location.--Lat 36°30'43", long. 118°47'42" in NW¼ sec. 26, T. 16 S., R. 29 E., 0.1 mile downstream from intake, and 0.8 mile southeast of Potwisha Camp.

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

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

Maxima.--November-December 1950: Daily discharge, 58 cfs Nov. 1.

Remarks.--Flow regulated. Conduit diverts from left bank of Middle Fork Kaweah River and bypasses station on Middle Fork Kaweah River near Potwisha Camp. Station established March 1948.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	58	53	9	33	50	17	46	50	25	2.8	52
2	56	52	10	31	50	18	33	51	26	3.2	52
3	55	56	11	27	49	19	0	51	27	0	52
4	53	46	12	25	49	20	0	52	28	0	53
5	49	45	13	28	49	21	0	52	29	19	52
6	43	40	14	43	50	22	0	52	30	53	53
7	38	44	15	39	50	23	0	52	31		53
8	35	50	16	43	50	24	0	52			
Monthly mean discharge, in cfs										27.1	50.4
Runoff, in acre-feet										1,610	3,100
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												
4												
6												
8												
10												
N												
2												
4												
6												
8												
10												
12												
	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												

Kaweah River near Three Rivers, Calif.

Location.--Lat 36°24', long. 118°57', in SW¼ sec. 33, T. 17 S., R. 28 E., 2.5 miles downstream from South Fork and 3 miles southwest of Three Rivers post office. Altitude of gage, about 620 ft (from topographic map).

Drainage area.--520 sq mi.

Gage-height record.--Water-stage recorder graph Nov. 11 to 1:30 a.m. Nov. 19 only. Staff-gage readings obtained Nov. 26, 28, Dec. 1. Graph drawn on basis of once or twice-daily staff-gage readings for periods Dec. 5, 6, 10-22, 26-29.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 11,000 cfs and extended to peak stage on basis of slope-area determination. Stage-discharge relation indefinite Nov. 20 to Dec. 9. Discharge Nov. 1-10, Nov. 19 to Dec. 9, Dec. 23-25, 30, 31 computed on basis of unpublished records for station at McKay Point.

Maxima. -November-December 1950: Discharge, 52,000 cfs about 3:30 a.m. Nov. 19 (gage height, 17.8 ft, from floodmarks).
1903 to October 1950: Discharge, 33,300 cfs Dec. 11, 1937 (gage height, 17.0 ft, present datum), from rating curve extended above 6,000 cfs on basis of velocity-area study.

Remarks.--Diversions above station for irrigation and power development on Middle and East Forks had no effect on flood flow.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	160	700	9	72	1,400	17	109	824	25	900	530
2	140	600	10	78	1,200	18	7,900	757	26	750	514
3	120	3,000	11	75	1,120	19	16,000	696	27	700	479
4	110	8,000	12	69	1,010	20	4,200	667	28	600	462
5	100	2,700	13	68	932	21	2,500	641	29	550	462
6	90	1,900	14	98	1,080	22	1,700	592	30	600	470
7	80	2,300	15	102	1,200	23	1,200	560	31		490
8	70	1,600	16	100	932	24	1,000	540			
Monthly mean discharge, in cfs										1,341	1,237
Runoff, in acre-feet										79,820	76,080
Runoff, in inches										2.88	2.74

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			1.58	107								
4			1.64	119								
6			1.70	131								
8			1.77	146								
10			1.89	174								
N			2.00	202								
2			7.20	4,250								
4			10.70	11,400	9.65	10.300						
6			12.70	18,000								
8			13.45	21,400								
10			14.10	24,800								
12			15.00	30,000								
	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							5.35					
N												
2									4.68			
4					6.16	4,680						
6												
8												
10												
12												
	December 8		December 9		December 10		December 11		December 12		December 13	
4												
8											4.12	947
N									4.20	1,010		
4					4.42	1,180					4.12	947
8												
12												

Supplemental record.--Nov. 18, 1 p.m., 2.12 ft, 236 cfs; Nov. 19, 1:30 a.m., 17.10 ft, 45,700 cfs, 3 p.m., 9.70 ft, 10,400 cfs; Nov. 26, 9:15 a.m., 4.26 ft; Nov. 28, 9:20 a.m., 4.07 ft; Dec. 1, 9:40 a.m., 4.11 ft, 3 p.m., 4.11 ft; Dec. 6, 8:40 a.m., 4.79 ft; Dec. 11, 9:45 a.m., 4.33 ft, 1,110 cfs.

Marble Fork Kaweah River at Potwisha Camp, Calif.

Location.--Water-stage recorder, lat 36°31'18", long. 118°48'01", in SW¼ sec. 23, T. 16 S., R. 29 E., 0.3 mile upstream from Middle Fork, and 0.1 mile north of Potwisha Camp.

Drainage area.--50.6 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 to peak stage on basis of logarithmic plotting and an estimate from head on diversion dam upstream. Discharge for periods Nov. 27 to Dec. 2, Dec. 19 to Jan. 11, when stage-discharge relation was indefinite, was computed on basis of records for Marble Fork Kaweah No. 3 conduit at Potwisha Camp, Middle Fork Kaweah River No. 3 conduit near Potwisha Camp, and Middle Fork Kaweah River near Potwisha Camp.

Maxima.--November-December 1950: Discharge, 4,000 cfs 12 p.m. Nov. 18 (gage height, 10.1 feet).

Remarks.--Flow slightly regulated by diversion into Marble Fork Kaweah River No. 3 conduit. Station established March 1950.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	3.8	36	9	0.1	143	17	0.1	64	25	110	23
2	3.6	14	10	.1	118	18	1,560	55	26	58	19
3	1.4	677	11	.1	103	19	1,840	50	27	16	16
4	.9	601	12	.1	93	20	585	43	28	12	10
5	.1	225	13	.1	77	21	366	39	29	9	7
6	.1	208	14	.1	149	22	237	34	30	41	6.5
7	.1	305	15	.1	114	23	167	28	31		6
8	.1	193	16	.1	80	24	136	26			
Monthly mean discharge, in cfs										171	115
Runoff, in acre-feet										10,170	7,070
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			1.23	0.1	9.05	3,020	5.03	597				
4			1.25	.1	8.54	2,590	4.88	543	4.52	417	4.05	271
6			1.35	.2	9.28	3,230	4.79	510				
8			1.49	.5	8.40	2,480	4.90	550	4.37	367	3.96	246
10			4.80	514	7.50	1,800	5.00	586				
N	1.24	0.1	7.05	1,500	6.86	1,390	5.02	593	4.26	333	3.88	224
2			8.40	2,480	6.74	1,320	5.04	600				
4			8.65	2,680	6.50	1,200	5.00	586	4.28	339	3.86	219
6			8.72	2,740	6.24	1,080	4.99	582				
8			9.48	3,410	5.85	910	4.90	550	4.32	351	3.84	213
10			9.40	3,340	5.45	753	4.79	510				
12	1.23	.1	10.1	4,000	5.22	666	4.70	478	4.16	303	3.77	195
	November 23		November 24		November 25		November 29		November 30		December 1	
4	3.72	182										
8	3.67	170										
N	3.62	157	3.51	130	3.42	110						
4	3.63	160										
8	3.62	157										
12	3.60	152	3.51	130	3.33	89						
	December 3		December 4		December 5		December 6		December 7		December 8	
2	3.08	41	6.58	1,240								
4	3.49	126	6.05	992	4.00	257	3.67	170	4.56	430	3.87	221
6	3.71	180	5.36	719								
8	4.25	330	5.00	586	3.92	235	3.63	160	4.32	351	3.81	206
10	4.43	387	4.78	507								
N	4.62	451	4.64	458	3.87	221	3.81	206	4.00	257	3.71	180
2	5.55	791	4.54	424								
4	6.60	1,250	4.46	397	3.82	208	3.80	203	3.95	243	3.68	172
6	6.52	1,210	4.36	364								
8	6.71	1,300	4.28	339	3.77	195	3.85	216	3.93	237	3.72	182
10	6.75	1,320	4.19	312								
12	6.96	1,450	4.12	291	3.71	180	4.48	403	3.88	224	3.66	167
	December 9		December 10		December 11		December 12		December 13		December	
4												
8												
N	3.54	138	3.45	116	3.38	100	3.34	91	3.26	74		
4												
8												
12	3.51	130	3.43	112	3.38	100	3.33	89	3.24	70		

Marble Fork Kaweah River No. 3 conduit at Potwisha Camp, Calif.

Location.--Lat 36°31'18", long. 118°48'00", in SW¼ sec. 23, T. 16 S., R. 29 E., just downstream from intake, and 0.1 mile north of Potwisha Camp.

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

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

Maxima.--November-December 1950: Daily discharge, 64 cfs Nov. 27, Dec. 30.

Remarks.--Flow regulated. Conduit diverts from left bank of Marble Fork Kaweah River and bypasses station on Marble Fork Kaweah River at Potwisha Camp. Station established March 1948.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	34	46	9	17	47	17	19	47	25	7.4	48
2	29	47	10	15	46	18	22	46	26	36	48
3	31	54	11	13	44	19	0	46	27	64	48
4	30	46	12	12	44	20	0	47	28	63	54
5	28	46	13	12	45	21	0	48	29	61	63
6	23	16	14	16	48	22	0	48	30	52	64
7	19	28	15	14	48	23	0	48	31		62
8	18	46	16	17	48	24	0	48			
Monthly mean discharge, in cfs										21.7	47.2
Runoff, in acre-feet										1,290	2,900
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												
4												
6												
8												
10												
N												
2												
4												
6												
8												
10												
12												
	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												

North Fork Kaweah River at Kaweah, Calif.

Location.--Lat 36°29', long. 118°55', in SE¼ sec. 34, T. 16 S., R. 28 E., 1.2 miles upstream from Mannikin Creek, 1.5 miles north of Kaweah, and 3 miles upstream from mouth. Altitude of gage, about 1,080 ft (from topographic map).

Drainage area.--128 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 3,200 cfs and extended to peak stage on basis of slope-area determination.

Maxima.--November-December 1950: Discharge, 9,150 cfs 1 a.m. Nov. 19 (gage height, 10.85 ft).
1910 to October 1950: Discharge, 8,290 cfs Dec. 11, 1937 (gage height, 11.0 ft), from rating curve extended above 4,000 cfs on basis of velocity-area study.

Remarks.--Flood flow not affected by small 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	17	105	9	9.1	267	17	15	157	25	114	95
2	14	82	10	9.1	226	18	2,140	144	26	101	92
3	12	1,230	11	8.8	202	19	3,800	135	27	90	88
4	11	1,970	12	8.6	179	20	571	125	28	81	84
5	10	584	13	9.1	164	21	310	118	29	74	81
6	9.6	393	14	14	223	22	216	112	30	92	79
7	9.3	490	15	19	239	23	164	106	31		85
8	9.1	338	16	15	179	24	134	101			
Monthly mean discharge, in cfs										270	273
Runoff, in acre-feet										16,040	16,810
Runoff, in inches										2.35	2.46

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			1.80	16	10.80	9,060	4.65	777				
4			1.80	16	9.67	7,130	4.57	706				
6	1.75	14	1.86	18	9.16	6,310	4.47	642	3.90	340	3.62	232
8			1.95	23	8.40	5,120	4.38	589				
10			2.05	29	7.02	3,180	4.40	600				
N	1.76	14	2.39	58	6.36	2,340	4.35	572	3.81	302	3.56	213
2			6.15	2,170	6.08	2,030	4.27	528				
4			6.46	2,520	5.82	1,760	4.19	484				
6	1.80	16	7.87	4,340	5.46	1,410	4.16	468	3.74	275	3.52	201
8			8.65	5,500	5.18	1,160	4.11	440				
10			9.28	6,500	4.98	994	4.06	415				
12	1.80	16	10.75	8,970	4.80	860	4.02	395	3.67	250	3.46	184
	November 23		November 24		November 25		November 29		November 30		December 1	
4									2.73	70	3.12	116
8									2.72	69	3.03	104
N	3.38	164	3.23	133	3.11	114	2.76	73	2.75	72	2.98	98
4									2.81	78	2.98	98
8									3.31	148	2.97	96
12	3.30	146	3.16	122	3.06	108	2.74	71	3.27	141	2.93	92
	December 2		December 3		December 4		December 5		December 6		December 7	
2			2.86	84	7.73	4,140					4.38	589
4			2.95	94	7.65	4,030					4.43	618
6			3.09	112	6.65	2,700	4.49	654	4.05	410	4.46	636
8			3.70	260	6.16	2,120					4.35	572
10			4.09	430	5.79	1,730					4.25	518
N	2.83	80	4.48	648	5.51	1,460	4.33	562	4.00	385	4.17	474
2			4.80	860	5.27	1,240					4.13	452
4			5.87	1,810	5.11	1,100					4.08	425
6			6.47	2,470	4.98	994	4.22	501	3.94	358	4.05	410
8			6.56	2,580	4.86	902					4.02	395
10			7.20	3,410	4.77	839					4.05	410
12	2.80	77	7.57	3,920	4.70	790	4.12	446	4.01	390	3.98	376
	December 8		December 9		December 10		December 11		December 12		December 13	
4												
8												
N	3.90	340	3.71	264	3.60	225	3.53	204	3.44	179	3.38	164
4												
8												
12	3.80	298	3.65	242	3.56	213	3.47	187	3.41	171	3.34	155

Supplemental record.--Nov. 18, 7 p.m., 7.85 ft, 4,310 cfs, 9 p.m., 9.26 ft, 6,470 cfs; Nov. 19, 1 a.m., 10.85 ft, 9,150 cfs, 5:30 a.m., 9.09 ft, 6,190 cfs, 6:30 a.m., 9.32 ft, 6,560 cfs; Nov. 30, 9 p.m., 3.40 ft, 168 cfs; Dec. 4, 3 a.m., 7.79 ft, 4,230 cfs.

Sand Creek near Orange Cove, Calif.

Location.--Lat 36°37'35", long. 119°14'45", in NW¼ sec. 15, T. 15 S., R. 25 E., 3.8 miles east of Orange Cove. Altitude of gage, about 490 ft (from topographic map).

Drainage area.--32 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 120 cfs and extended to peak stage. Shifting-control method used Dec. 4, 5.

Maxima.--November-December 1950: Discharge, 158 cfs 7:30 a.m. Nov. 19 (gage height, 2.87 ft).
1944 to October 1950: Discharge, 410 cfs Feb. 2, 1945 (gage height, 4.00 ft), by slope-area method.
Flood of Mar. 9, 1943, estimated at 1,000 to 1,200 cfs by Alta Irrigation District.

Remarks.--No regulation or diversion above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	0	0	9	0	0.3	17	0	0.2	25	0	0.2
2	0	0	10	0	.2	18	0	.2	26	0	.2
3	0	22	11	0	.1	19	42	.2	27	0	.1
4	0	42	12	0	.1	20	.4	.1	28	0	.2
5	0	3.3	13	0	.1	21	0	.1	29	0	.2
6	0	.9	14	0	.4	22	0	.1	30	0	.2
7	0	2.4	15	0	.6	23	0	.2	31		.3
8	0	.8	16	0	.3	24	0	.2			
Monthly mean discharge, in cfs										1.41	2.46
Runoff, in acre-feet										84	151
Runoff, in inches										0.05	0.09

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	0.46	1.5	0.04	0		
4						0	.33	.8	.01	0		
6					2.60	118	.23	.4	.00	0		
8					2.85	155	.15	.2	.01	0		
10					2.30	80	.13	.2	.02	0		
N					1.92	42	.12	.1	.02	0		
2					1.62	26	.11	.1	.03	0		
4					1.39	18	.10	.1	.04	0		
6					1.18	12	.10	.1	.05	0		
8					.97	7.6	.09	.1		0		
10					.76	4.3	.07	.1		0		
12					.62	2.8	.05	.1		0		
	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				0	2.65	125	0.90	5.6	0.43	1.3	0.40	1.1
4				0	2.43	96	.84	4.8	.41	1.2	.41	1.2
6				0	2.16	64	.78	4.2	.40	1.1	.70	3.6
8				0	1.91	42	.73	3.7	.38	1.0	.74	4.1
10				0	1.76	33	.68	3.3	.37	1.0	.70	3.6
N				0	1.63	26	.65	3.0	.35	.8	.66	3.2
2				0	1.51	21	.61	2.7	.33	.8	.62	2.8
4			2.23	72	1.39	17	.58	2.4	.31	.6	.58	2.4
6			1.97	46	1.28	14	.54	2.0	.30	.6	.54	2.0
8			1.95	44	1.17	11	.51	1.8	.35	.8	.50	1.7
10			2.30	80	1.08	8.2	.48	1.6	.36	.9	.47	1.5
12			2.31	81	.99	6.9	.46	1.5	.38	1.0	.44	1.3
	December 8		December 9		December 10		December 11		December 12		December 13	
4												
8												
N	0.33	0.8	0.20	0.3	0.14	0.2	0.10	0.1	0.08	0.1	0.08	0.1
4												
8												
12	.25	.4	.17	.2	.12	.1	.08	.1	.08	.1	.08	.1

Supplemental record.--Nov. 19, 4:30 a.m., 2.54 ft, 110 cfs, 7:30 a.m., 2.87 ft, 158 cfs; Dec. 3, 3:30 p.m., no flow, 7:30 p.m., 1.87 ft, 39 cfs, 11 p.m., 2.41 ft, 93 cfs; Dec. 4, 2:30 a.m., 2.68 ft, 129 cfs.

Kings River above North Fork, Calif.

Location.--Lat 36°52', long. 119°07', in N½ sec. 27, T. 12 S., R. 26 E (unsurveyed), 1 mile upstream from North Fork and 10 miles southeast of Trimmer. Altitude of gage, about 1,020 ft (from topographic map).

Drainage area.--956 sq mi.

Gage-height record.--Water-stage recorder graph for Nov. 19 only, and high-water mark in gage well.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 11,000 cfs and extended to peak stage on basis of velocity-area studies at gage height 12.02 ft. Discharge for periods of no gage-height record computed on basis of records for station at Piedra.

Maxima.--November-December 1950: Discharge, 44,000 cfs about 1 a.m. Nov. 19 (gage height, 12.23 ft, from high-water mark in gage well).
1927-28, 1931 to October 1950: Discharge, 42,000 cfs Dec. 11, 1937 (gage height, 12.02 ft), from rating curve extended above 11,000 cfs on basis of velocity-area studies.

Remarks.--Flood flow not affected by storage in small reservoirs above station on Ten Mile and Mill Flat Creeks.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	370	1,200	9	230	2,100	17	260	1,300	25	1,400	860
2	310	980	10	230	1,800	18	2,000	1,200	26	1,300	800
3	280	4,900	11	220	1,600	19	15,600	1,100	27	1,200	750
4	280	6,100	12	210	1,400	20	4,600	1,000	28	1,100	740
5	290	2,500	13	190	1,300	21	3,800	980	29	1,000	730
6	280	2,000	14	210	1,800	22	2,700	950	30	1,100	720
7	270	3,200	15	270	1,900	23	2,000	920	31		720
8	250	2,800	16	230	1,400	24	1,600	880			
Monthly mean discharge, in cfs										1,459	1,633
Runoff, in acre-feet										86,840	100,400
Runoff, in inches										17.03	19.70

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	
1					12.23	44,000						
3					10.20	27,900						
5					9.90	25,800						
7					8.80	19,200						
9					8.00	15,000						
11					7.30	11,800						
1					6.85	10,000						
3					6.40	8,260						
5					6.10	7,200						
7					5.87	6,440						
9					5.67	5,810						
11					5.50	5,320						
	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												

Kings River at Piedra, Calif.

Location.--Lat 36°49'02", long. 119°23'08", in NW¼ sec. 8, T. 13 S., R. 24 E., 0.5 mile downstream from highway bridge at Piedra, 2 miles downstream from Mill Creek, and 12 miles northeast of Sanger. Altitude of gage, about 500 ft (from topographic map).

Drainage area.--1,694 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 30,000 cfs and extended to peak stage on basis of slope-area determination.

Maxima.--November-December 1950: Discharge, 91,000 cfs 3 a.m. Nov. 19 (gage height, 21.0 ft).
1895 to October 1950: Discharge, 80,000 cfs Dec. 11, 1937 (gage height, 19.94 ft), from rating curve extended above 30,000 cfs on basis of velocity-area studies.

Remarks.--Flood runoff not affected by storage and regulation above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	550	2,070	9	330	4,580	17	376	2,470	25	2,480	1,600
2	458	1,580	10	321	3,590	18	13,300	2,290	26	2,210	1,560
3	409	13,200	11	300	3,140	19	51,600	2,150	27	1,930	1,460
4	406	18,400	12	282	2,890	20	10,700	1,980	28	1,730	1,380
5	420	5,990	13	267	2,600	21	7,900	1,880	29	1,580	1,370
6	406	4,240	14	303	3,530	22	5,350	1,780	30	1,660	1,350
7	378	7,060	15	384	3,700	23	3,730	1,720	31		1,350
8	353	6,210	16	321	2,780	24	2,920	1,640			
Monthly mean discharge, in cfs										3,778	3,598
Runoff, in acre-feet										224,800	221,200
Runoff, in inches										2.49	2.45

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	370	1.91	434	20.75	88,200	10.5	14,300	9.10	9,980	7.73	6,490
4	1.74	374	1.94	444	20.65	87,200	10.0	12,700	8.95	9,560	7.68	6,380
6	1.74	374	2.00	465	20.0	80,500	9.6	11,500	8.76	9,030	7.56	6,120
8	1.73	370	2.04	461	19.05	71,000	9.25	10,400	8.60	8,600	7.41	5,800
10	1.69	357	2.13	517	17.6	57,500	8.96	9,590	8.41	8,110	7.28	5,540
N	1.68	353	2.27	576	16.6	49,000	8.78	9,080	8.25	7,700	7.15	5,280
2	1.73	370	2.49	676	15.6	41,100	8.82	9,200	8.08	7,290	7.01	5,020
4	1.75	378	5.0	2,640	14.3	32,300	8.83	9,220	7.92	6,910	6.88	4,780
6	1.77	384	12.3	21,400	13.35	26,700	8.87	9,340	7.79	6,620	6.77	4,590
8	1.80	395	15.0	36,800	12.55	22,600	8.94	9,530	7.69	6,400	6.70	4,470
10	1.82	402	17.7	58,400	11.75	19,000	9.11	10,000	7.64	6,290	6.65	4,380
12	1.87	420	19.15	72,000	11.05	16,200	9.19	10,200	7.69	6,400	6.60	4,300
	November 23		November 24		November 25		November 29		December 1		December 2	
4	6.52	4,160	5.84	3,130							4.74	1,750
8	6.39	3,950	5.75	3,000							4.74	1,750
N	6.26	3,750	5.70	2,930	5.38	2,510			5.00	2,050	4.63	1,630
4	6.06	3,440	5.62	2,830							4.48	1,480
8	5.94	3,270	5.50	2,670							4.33	1,340
12	5.98	3,320	5.44	2,590	5.18	2,270			4.75	1,760	4.28	1,290
	December 3		December 4		December 5		December 6		December 7		December 8	
2	4.32	1,330	14.75	35,200	8.22	7,630	6.81	4,730	6.64	4,450	7.49	5,980
4	4.45	1,450	14.80	35,500	8.01	7,120	6.75	4,630	7.90	6,860	7.45	5,900
6	4.65	1,660	13.50	27,600	7.80	6,640	6.58	4,360	8.37	8,000	7.43	5,860
8	4.97	2,010	12.15	20,700	7.67	6,360	6.58	4,360	8.60	8,600	7.55	6,100
10	5.75	3,000	11.15	16,600	7.53	6,060	6.53	4,280	8.56	8,500	8.08	7,290
N	7.90	6,860	10.35	13,800	7.41	5,820	6.50	4,230	8.49	8,310	8.10	7,340
2	10.00	12,700	9.80	12,100	7.25	5,520	6.41	4,100	8.34	7,920	7.86	6,770
4	12.40	21,800	9.40	10,900	7.12	5,280	6.34	3,990	8.12	7,390	7.66	6,340
6	13.67	28,500	9.08	9,920	7.03	5,110	6.29	3,920	7.92	6,910	7.51	6,020
8	14.00	30,500	8.82	9,200	6.96	4,990	6.29	3,920	7.74	6,510	7.36	5,720
10	14.14	31,300	8.61	8,630	6.92	4,920	6.30	3,930	7.61	6,230	7.24	5,500
12	14.40	32,900	8.41	8,110	6.88	4,850	6.38	4,050	7.53	6,060	7.18	5,380
	December 9		December 10		December 11		December 12		December 13		December	
4	6.97	5,010	6.15	3,710								
8	6.86	4,810	6.15	3,710								
N	6.70	4,550	6.05	3,570	5.73	3,140	5.50	2,850	5.31	2,620		
4	6.53	4,280	5.97	3,460								
8	6.40	4,080	5.88	3,330								
12	6.40	4,080	5.96	3,440	5.60	2,970	5.40	2,730	5.18	2,480		

Supplemental record.--Nov. 19, 3 a.m., 21.0 ft, 91,000 cfs; Dec. 4, 3 a.m., 15.0 ft, 36,800 cfs.

South Fork Kings River near Cedar Grove, Calif.

Location.--Lat 36°48'25", long. 118°44'55", in NW¼ sec. 8, T. 13 S., R. 30 E., 0.3 mile downstream from Grizzly Creek and 4.5 miles west of Cedar Grove. Altitude of gage, about 4,000 ft (from topographic map).

Drainage area.--409 sq mi.

Gage-height record.--Water-stage recorder graph from 3 p.m. Nov. 16 to Dec. 31.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 4,100 cfs and extended to peak stage on basis of slope-area determination.

Maxima.--November-December 1950: Discharge, 10,000 cfs 2 a.m. Nov. 19 (gage height, 13.80 ft).

Remarks.--No storage or diversions above station. Station established Nov. 16, 1950.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1		472	9		794	17	120	486	25	614	367
2		408	10		702	18	2,120	463	26	555	351
3		1,220	11		644	19	5,470	440	27	510	332
4		1,190	12		604	20	1,840	418	28	476	325
5		816	13		554	21	1,570	400	29	451	329
6		711	14		590	22	1,090	388	30	487	314
7		1,090	15		575	23	825	380	31		293
8		920	16		520	24	689	375			
Monthly mean discharge, in cfs										1,201	564
Runoff, in acre-feet										33,360	34,650
Runoff, in inches										1.53	1.59

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			6.79	124	13.80	10,000	9.70	1,860				
4			6.82	130	13.37	8,670	9.60	1,760	9.61	1,770	9.04	1,240
6			6.89	144	13.10	7,920	9.50	1,660				
8			7.07	186	13.20	8,190	9.50	1,660	9.50	1,660	8.91	1,130
10			7.44	300	12.80	7,110	9.51	1,670				
N	6.76	119	8.23	663	12.08	5,380	9.55	1,710	9.35	1,520	8.81	1,050
2			9.77	1,937	11.43	4,120	9.62	1,780				
4			11.00	3,450	11.00	3,450	9.80	1,970	9.25	1,420	8.75	1,000
6			11.70	4,600	10.57	2,870	9.85	2,020				
8			11.82	4,840	10.30	2,540	9.85	2,020	9.27	1,440	8.70	970
10			12.20	5,640	10.03	2,220	9.80	1,970				
12	6.77	121	12.65	6,720	9.85	2,020	9.75	1,920	9.17	1,350	8.64	928
	November 23		November 24		November 25		November 29		November 30		December 1	
4									7.78	436	7.90	490
8	8.51	842	8.30	705			7.84	463	7.80	445	7.86	472
N					8.13	606			7.93	505	7.83	458
4	8.43	790	8.22	657			7.77	432	8.00	540	7.82	454
8									7.95	515	7.87	477
12	8.38	757	8.21	651	8.10	590	7.80	445	7.95	515	7.80	445
	December 2		December 3		December 4		December 5		December 6		December 7	
2			7.92	500								
4	7.70	400	8.06	570	9.28	1,450	8.55	868	8.31	712	9.03	1,230
6			8.27	687								
8	7.60	359	8.45	802	9.04	1,240	8.49	829	8.27	687	8.99	1,190
10			8.58	887								
N	7.60	359	8.75	1,010	8.90	1,120	8.43	790	8.24	669	8.90	1,120
2			9.17	1,350								
4	7.72	409	9.73	1,890	8.84	1,070	8.42	783	8.23	663	8.80	1,040
6			9.87	2,050								
8	7.85	468	9.80	1,970	8.77	1,020	8.42	783	8.30	705	8.76	1,010
10			9.70	1,860								
12	7.85	468	9.43	1,590	8.65	935	8.36	744	8.62	914	8.75	1,010
	December 8		December 9		December 10		December 11		December 12		December 13	
4												
8												
N	8.60	900	8.41	777	8.27	687	8.18	634	8.12	601	8.01	545
4												
8												
12	8.55	868	8.38	757	8.26	681	8.17	629	8.09	585	8.01	545

Supplemental record.--Nov. 19, 2:30 a.m., 13.14 ft, 8,030 cfs, 3 a.m., 13.48 ft, 8,990 cfs, 9 a.m., 13.24 ft, 8,300 cfs.

North Fork Kings River near Cliff Camp, Calif.

Location.--Lat 37°00', long. 118°59', in NW¼ sec. 12, T. 11 S., R. 27 E., at Cliff Camp Bridge, 1 mile northwest of Cliff Camp and 2.3 miles downstream from Woodchuck Creek. Datum of gage is 6,143.95 ft above mean sea level, adjustment of 1912 (levels by San Joaquin Light and Power Corp.).

Drainage area.--174 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 4,200 cfs and extended to peak stage on basis of velocity-area studies and by logarithmic plotting.

Maxima.--November-December 1950: Discharge, 9,210 cfs 2 a.m. Nov. 19 (gage height, 15.20 ft).
1921 to October 1950: Discharge, 14,000 cfs Dec. 11, 1937 (gage height, 18.0 ft, from floodmarks), from rating curve extended above 4,200 cfs as explained above.

Remarks.--No storage or diversion above station.

Mean discharge, in second-feet, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	58	308	9	30	725	17	61	322	25	431	239
2	43	223	10	24	546	18	2,850	305	26	380	222
3	43	2,250	11	21	475	19	5,830	291	27	327	200
4	52	1,440	12	18	428	20	1,870	267	28	298	194
5	49	607	13	20	384	21	1,380	259	29	280	198
6	41	585	14	25	529	22	858	252	30	327	192
7	34	1,490	15	22	448	23	590	241	31		173
8	32	1,220	16	39	361	24	478	241			
Monthly mean discharge, in second-feet										550	504
Runoff, in acre-feet										32,750	30,970
Runoff, in inches										3.53	3.34

Gage height, in feet, and discharge, in second-feet, 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	3.48	53	3.67	74	15.20	9,210	8.15	1,780	8.10	1,750	6.98	1,090
4	3.49	54	3.68	76	15.05	8,970	7.80	1,560	7.86	1,600	6.82	1,010
6	3.50	55	3.87	101	14.92	8,780	7.58	1,430	7.63	1,460	6.67	935
8	3.49	54	5.30	402	14.11	7,720	7.75	1,530	7.44	1,340	6.54	870
10	3.48	53	6.93	955	13.23	6,690	7.93	1,640	7.28	1,250	6.42	814
N	3.46	51	8.34	1,600	12.20	5,560	8.06	1,720	7.15	1,180	6.33	774
2	3.46	51	9.84	2,730	11.21	4,510	8.27	1,870	7.08	1,140	6.33	774
4	3.52	57	11.04	3,860	10.82	4,120	8.65	2,140	7.17	1,180	6.35	782
6	3.64	71	12.1	4,990	10.23	3,530	8.90	2,340	7.38	1,310	6.34	778
8	3.72	81	13.66	6,930	9.60	2,950	8.88	2,320	7.53	1,400	6.31	764
10	3.74	83	14.41	8,000	9.06	2,470	8.63	2,120	7.41	1,330	6.28	751
12	3.71	79	15.02	8,920	8.55	2,060	8.34	1,920	7.20	1,200	6.21	720
	November 23		November 24		November 25		November 29		November 30		December 1	
4	6.03	647	5.66	511	5.52	466	4.91	300	4.77	267	5.02	327
8	5.88	588	5.53	469	5.41	433	4.81	276	4.76	265	4.90	298
N	5.74	539	5.44	442	5.30	402	4.63	237	5.23	382	4.85	286
4	5.81	564	5.48	454	5.30	402	4.77	267	5.10	348	4.92	303
8	5.82	567	5.52	466	5.35	416	4.91	300	5.19	371	4.99	320
12	5.78	553	5.61	493	5.43	439	4.84	284	5.19	371	4.75	263
	December 2		December 3		December 4		December 5		December 6		December 7	
2	4.60	230	5.07	340	9.71	3,050	6.22	724	5.69	522	8.17	1,800
4	4.45	200	5.48	454	8.90	2,340	6.12	683	5.64	504	8.36	1,930
6	4.33	177	6.09	671	8.12	1,760	6.01	639	5.59	487	8.14	1,780
8	4.26	164	7.19	1,200	7.56	1,420	5.94	611	5.55	475	8.05	1,720
10	4.25	162	7.98	1,670	7.15	1,180	5.84	574	5.51	463	7.83	1,580
N	4.27	166	8.42	1,970	6.91	1,060	5.79	556	5.51	463	7.59	1,430
2	4.36	182	9.89	3,210	6.79	995	5.82	567	5.52	466	7.38	1,310
4	4.58	226	11.04	4,340	6.72	960	5.86	581	5.57	481	7.30	1,260
6	4.86	288	11.18	4,480	6.65	925	5.84	574	5.66	511	7.24	1,220
8	4.97	315	10.51	3,810	6.58	890	5.82	567	5.85	578	7.19	1,200
10	4.89	296	9.97	3,280	6.46	832	5.77	550	6.79	995	7.20	1,200
12	4.85	286	9.52	2,880	6.32	769	5.74	539	7.88	1,610	7.20	1,200
	December 8		December 9		December 10		December 11		December 12		December 13	
4	7.57	1,420	6.46	832	5.84	574	5.62	497	5.45	445	5.26	391
8	7.70	1,500	6.26	742	5.73	536	5.52	466	5.40	430	5.12	353
N	7.21	1,210	6.09	671	5.65	508	5.47	451	5.35	416	5.13	356
4	6.96	1,080	6.09	671	5.77	550	5.58	484	5.36	419	5.36	419
8	6.92	1,060	6.05	655	5.73	536	5.50	460	5.37	422	5.26	391
12	6.69	945	5.95	615	5.70	525	5.49	457	5.34	413	5.19	371

San Joaquin River basin

San Joaquin River main stem

San Joaquin River above Big Creek, Calif.

Location.--Lat 37°15'00", long. 119°19'10", in NW¼ sec. 11, T. 8 S., R. 24 E., 3 miles upstream from Big Creek. Altitude of gage, about 2,500 ft (from topographic map).

Drainage area.--1,042 sq mi.

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 velocity-area studies.

Maxima.--November-December 1950: Discharge, 40,500 cfs 2 a.m. Nov. 19 (gage height, 22.23 ft).
1922 to October 1950: Discharge, 52,500 cfs Dec. 11, 1937 (gage height, 24.05 ft), from rating curve extended above 14,000 cfs as explained above.

Remarks.--Flood flow affected to a minor degree by storage in Florence Lake.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	389	1,320	9	259	4,650	17	436	1,730	25	1,680	1,110
2	318	1,040	10	235	3,140	18	13,200	1,600	26	1,490	1,060
3	362	12,000	11	200	2,590	19	22,400	1,490	27	1,300	994
4	424	10,700	12	182	2,260	20	8,090	1,370	28	1,160	960
5	382	3,790	13	173	1,950	21	7,490	1,300	29	1,070	960
6	339	2,790	14	247	2,680	22	4,110	1,240	30	1,240	922
7	292	6,730	15	221	2,600	23	2,490	1,190	31		885
8	267	10,300	16	244	1,980	24	1,930	1,150			
Monthly mean discharge, in cfs										2,421	2,854
Runoff, in acre-feet										144,100	175,500
Runoff, in inches										2.59	3.16

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	7.70	365	8.20	556	22.23	40,500	14.25	7,440	15.17	9,580	13.27	5,480
4	7.78	392	8.51	705	22.00	39,100	13.90	6,700	14.90	8,920	13.05	5,080
6	7.84	413	9.45	1,220	21.30	35,000	13.65	6,200	14.62	8,280	12.84	4,730
8	7.88	428	10.85	2,260	20.00	28,100	13.50	5,910	14.37	7,700	12.63	4,400
10	7.90	435	12.75	4,590	18.80	22,700	13.52	5,950	14.22	7,370	12.44	4,120
N	7.91	439	14.35	7,660	17.90	18,900	13.72	6,340	14.17	7,270	12.30	3,920
2	7.92	443	15.90	11,600	17.08	15,700	14.16	7,250	14.03	6,970	12.13	3,690
4	7.94	450	17.60	17,700	16.42	13,300	14.85	8,800	13.85	6,600	12.00	3,520
6	7.97	462	19.00	23,600	15.90	11,600	15.48	10,400	13.70	6,300	11.88	3,370
8	8.02	481	20.65	31,400	15.50	10,500	15.84	11,400	13.70	6,300	11.79	3,260
10	8.06	497	21.60	36,700	15.12	9,450	15.79	11,300	13.71	6,320	11.70	3,150
12	8.09	509	22.05	39,400	14.63	8,300	15.47	10,400	13.60	6,100	11.65	3,090
	November 23		November 24		November 25		November 30		December 1		December 2	
4	11.41	2,820	10.71	2,130	10.32	1,810	9.15	1,040	9.85	1,470	9.42	1,200
8	11.21	2,610	10.60	2,030	10.26	1,760	9.26	1,100	9.72	1,380	9.30	1,120
N	11.05	2,450	10.46	1,920	10.16	1,680	9.44	1,210	9.61	1,310	9.10	1,010
4	10.88	2,280	10.34	1,820	10.07	1,620	9.74	1,400	9.51	1,250	8.94	922
8	10.77	2,180	10.25	1,750	9.98	1,560	9.87	1,480	9.41	1,190	8.90	900
12	10.74	2,160	10.23	1,730	9.94	1,530	9.83	1,450	9.42	1,200	9.13	1,030
	December 3		December 4		December 5		December 6		December 7		December 8	
2	9.61	1,310	18.60	21,900	12.94	4,900	11.51	2,930	13.35	5,620	13.41	5,740
4	9.98	1,560	17.50	17,300	12.73	4,560	11.44	2,850	14.10	7,120	14.45	7,880
6	10.60	2,030	16.50	13,600	12.53	4,260	11.38	2,790	14.38	7,730	16.85	14,900
8	11.50	2,920	15.70	11,000	12.35	3,990	11.32	2,720	14.58	8,180	17.44	17,100
10	12.77	4,620	15.00	9,160	12.20	3,780	11.25	2,650	14.66	8,370	17.16	16,000
N	14.33	7,620	14.50	8,000	12.06	3,600	11.20	2,600	14.50	8,000	16.51	13,600
2	16.60	14,000	14.15	7,220	11.95	3,460	11.17	2,570	14.18	7,290	15.75	11,200
4	18.20	20,200	13.87	6,640	11.85	3,330	11.14	2,540	13.85	6,600	15.08	9,350
6	18.90	23,200	13.62	6,140	11.77	3,230	11.14	2,540	13.60	6,100	14.58	8,180
8	19.60	26,300	13.44	5,800	11.70	3,150	11.32	2,720	13.39	5,700	14.25	7,440
10	19.60	26,300	13.27	5,480	11.65	3,090	11.64	3,080	13.25	5,440	13.99	6,890
12	19.56	26,100	13.12	5,210	11.60	3,030	12.30	3,920	13.15	5,260	13.76	6,420
	December 9		December 10		December 11		December 12		December		December	
4	13.32	5,570	11.94	3,440	11.37	2,780	10.97	2,370				
8	12.96	4,930	11.78	3,250	11.26	2,660	10.93	2,330				
N	12.67	4,460	11.65	3,090	11.17	2,570	10.87	2,270				
4	12.42	4,090	11.54	2,960	11.09	2,490	10.80	2,210				
8	12.23	3,820	11.46	2,880	11.02	2,420	10.73	2,150				
12	12.11	3,660	11.41	2,820	10.97	2,370	10.68	2,100				

Supplemental record.--Dec. 3, 11:00 p.m., 19.72 ft, 26,800 cfs; Nov. 19, 2 a.m., 22.23 ft, 40,500 cfs; Dec. 8, 8:30 a.m., 17.46 ft, 17,200 cfs.

San Joaquin River below Kerckhoff powerhouse, Calif.

Location.--Lat 37°04'45", long. 119°33'35", in NW¼ sec. 10, T. 10 S., R. 22 E., 1.1 miles downstream from Kerckhoff powerhouse and 1.4 miles upstream from Big Sandy Creek. Datum of gage is 563.4 ft above mean sea level (levels by Bureau of Reclamation).

Drainage area.--1,480 sq mi.

Gage-height record.--Water-stage recorder graph and hourly telemark readings.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 20,000 cfs and extended to peak stage on basis of computed flow over Kerckhoff Dam. Because of extreme regulation, daily mean discharge was computed from hourly gage heights.

Maxima.--November-December 1950: Discharge, 48,100 cfs 8 a.m. Nov. 19 (gage height, 38.40 ft).
1936-37, 1942 to October 1950: Discharge, 75,000 cfs Dec. 11, 1937 (gage height, 46.5 ft), from rating curve extended above 20,000 cfs on basis of velocity-area studies, computed flow over Kerckhoff Dam, and peak flow of San Joaquin River near Friant.

Remarks.--Flood runoff affected by 11 power plants and 6 reservoirs with total usable capacity of about 315,000 acre-ft.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	1,360	2,580	9	977	6,570	17	776	3,020	25	2,940	1,820
2	1,010	2,160	10	919	4,460	18	3,170	2,580	26	2,590	1,860
3	1,130	10,400	11	752	4,000	19	27,200	2,810	27	2,140	2,130
4	901	18,000	12	396	3,760	20	13,200	2,650	28	1,990	2,230
5	862	6,160	13	686	3,320	21	10,100	2,580	29	2,160	2,100
6	1,060	4,380	14	793	3,840	22	6,080	2,550	30	2,350	1,700
7	1,030	7,710	15	654	4,670	23	4,090	2,310	31		1,670
8	955	11,000	16	674	3,370	24	3,140	2,110			
Monthly mean discharge, in cfs										3,203	4,210
Runoff, in acre-feet										190,600	258,800
Runoff, in inches										2.41	3.28

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	5.63	90	5.65	92	28.68	21,000	24.47	13,900	23.77	12,900	18.87	6,730
4	5.61	89	5.66	92	30.61	25,100	24.37	13,800	23.49	12,400	17.91	5,830
6	9.36	699	8.44	471	34.96	37,100	24.79	14,400	22.57	11,100	21.24	9,330
8	9.37	702	9.46	727	38.40	48,100	23.65	12,700	22.16	10,500	18.81	6,670
10	9.37	702	10.18	942	36.46	41,900	23.70	12,800	21.60	9,780	18.54	6,400
N	9.35	696	12.25	1,740	33.33	32,200	23.53	12,500	21.08	9,140	18.04	5,950
2	9.36	699	12.25	1,740	31.69	27,700	23.09	11,800	21.45	9,580	17.84	5,770
4	9.36	699	12.28	1,760	30.14	24,000	24.22	13,500	21.30	9,400	17.76	5,690
6	11.68	1,490	15.45	3,780	28.38	20,400	24.37	13,800	20.58	8,540	17.73	5,670
8	11.93	1,600	19.61	7,470	26.90	17,800	24.29	13,600	20.47	8,420	17.14	5,140
10	11.94	1,600	25.32	15,200	25.69	15,800	24.01	13,200	20.38	8,320	17.13	5,130
12	9.75	809	23.29	12,100	24.72	14,300	23.94	13,100	20.07	7,980	17.12	5,120
	November 23		November 24		November 25		November 30		December 1		December 2	
4	17.03	5,040	14.53	3,090	15.02	3,460	13.43	2,360	13.30	2,280	13.63	2,480
8	15.87	4,110	15.76	4,020	14.06	2,760	13.42	2,350	13.18	2,210	12.90	2,060
N	13.94	2,690	15.37	3,720	14.07	2,770	12.94	2,080	13.54	2,430	12.78	2,000
4	15.74	4,000	13.47	2,380	14.09	2,780	12.89	2,060	14.00	2,720	12.78	2,000
8	15.88	4,110	13.54	2,430	14.08	2,780	14.62	3,160	13.98	2,710	12.78	2,000
12	15.71	3,980	15.12	3,530	14.08	2,780	14.11	2,800	13.97	2,710	12.83	2,020
	December 3		December 4		December 5		December 6		December 7		December 8	
2	12.80	2,010	34.70	36,300	19.91	7,800	16.97	4,990	16.47	4,590	18.86	6,720
4	12.85	2,040	33.40	32,400	18.84	6,700	16.14	4,320	16.88	4,910	18.13	6,030
6	13.00	2,120	31.44	27,100	18.88	6,740	15.79	4,040	17.65	5,600	19.51	7,370
8	13.08	2,160	27.81	19,400	18.00	5,910	16.97	4,990	20.00	7,900	22.88	11,500
10	13.13	2,190	26.37	16,900	17.79	5,720	15.21	3,600	20.93	8,960	23.24	12,100
N	14.22	2,870	25.13	14,900	20.18	8,100	15.24	3,620	21.90	10,200	25.11	14,900
2	17.84	5,770	23.83	12,900	20.12	8,030	15.71	3,980	21.53	9,690	25.95	16,200
4	24.28	13,600	21.52	9,680	15.63	3,910	16.05	4,250	20.68	8,660	25.21	15,000
6	29.38	22,400	20.27	8,200	13.00	2,120	16.50	4,610	19.97	7,870	24.00	13,200
8	30.63	25,100	20.30	8,230	17.63	5,580	16.53	4,630	20.92	8,820	23.15	11,900
10	32.06	28,700	20.57	8,530	17.60	5,550	16.53	4,630	20.19	8,110	21.98	10,300
12	33.65	33,100	20.52	8,470	17.24	5,230	16.48	4,590	20.03	7,930	20.72	8,700
	December 9		December 10		December 11		December 12		December 13		December	
4	19.81	7,690	17.05	5,060	16.04	4,240	14.92	3,380	14.36	2,970		
8	19.45	7,310	17.75	5,680	17.50	5,460	16.83	4,870	16.39	4,520		
N	18.27	3,150	17.32	5,300	16.03	4,230	15.49	3,810	14.70	3,220		
4	15.79	4,040	15.60	3,890	15.92	4,150	15.95	4,170	14.70	3,220		
8	18.41	6,280	15.38	3,720	15.35	3,700	15.20	3,590	14.74	3,240		
12	15.25	3,630	13.83	2,620	13.22	2,240	14.18	2,850	15.20	3,590		

Millerton Lake at Friant, Calif.

Location.--Lat 37°00', long. 119°42', in SW¼ sec. 5, T. 11 S., R. 21 E., at Friant Dam on San Joaquin River and immediately upstream from Cottonwood Creek. Datum of gage is at mean sea level (levels by Bureau of Reclamation).

Drainage area.--1,633 sq mi.

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

Maxima.--November-December 1950: Contents, 424,700 acre-ft noon Dec. 13 (elevation, 557.32 ft).
1941 to October 1950: Contents, 473,300 acre-ft June 29, 30, 1948 (elevation, 568.1 ft).

Remarks.--Reservoir is formed by gravity-type concrete dam with spillway near center, completed in December 1942. Control valves installed in February 1944, and spillway gates installed in November 1947. Capacity, 503,200 acre-ft between elevations 375.4 ft (invert of river outlet) and 578.0 ft (top of drum-type spillway gates) above mean sea level. Millerton Lake is one of the storage units in Central Valley project. Records furnished by Bureau of Reclamation.

Contents, in thousands of acre-feet, at 12 p.m. of indicated day, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	79.5	270.7	9	89.3	409.3	17	93.8	416.6	25	248.1	393.9
2	80.9	274.0	10	90.0	417.2	18	102.3	416.4	26	252.9	391.4
3	82.3	297.5	11	90.6	422.1	19	168.2	407.7	27	256.3	389.7
4	83.4	338.6	12	90.4	424.5	20	194.7	404.1	28	259.5	389.3
5	84.4	350.6	13	91.0	424.2	21	216.5	401.3	29	262.8	390.9
6	85.6	358.9	14	91.9	423.7	22	228.8	399.5	30	266.7	392.2
7	86.8	374.3	15	92.4	423.3	23	236.5	398.1	31		393.4
8	88.3	396.9	16	93.1	420.2	24	242.5	396.3			
Change in contents during month, in thousands of acre-feet.....										+188.7	+126.7

Elevation, in feet, and contents, in thousands of acre-feet, at indicated time, 1950

Hour	Gage height	Contents	Gage height	Contents	Gage height	Contents	Gage height	Contents	Gage height	Contents	Gage height	Contents
	November 17		November 18		November 19		November 20		November 21		November 22	
2	446.24	93.1	446.69	93.8	453.90	106.2	483.55	170.6	493.55	197.2	500.72	217.8
4	446.22	93.1	446.72	93.9	456.84	111.6	484.50	173.0	494.35	199.4	501.12	219.0
6	446.20	93.0	446.74	93.9	460.02	117.6	485.35	175.2	495.10	201.5	501.45	219.9
8	446.20	93.0	446.76	93.9	464.15	125.9	486.32	177.7	495.78	203.5	501.90	221.3
10	446.22	93.1	446.81	94.0	468.25	134.6	487.15	179.9	496.41	205.2	502.27	222.4
N	446.26	93.1	446.89	94.1	471.73	142.3	487.59	181.0	497.00	206.9	502.63	223.5
2	446.29	93.2	447.04	94.4	474.48	148.6	488.40	183.2	497.58	208.6	502.93	224.4
4	446.31	93.2	447.22	94.7	476.66	153.7	489.20	185.3	498.18	210.3	503.23	225.3
6	446.35	93.3	447.48	95.1	478.43	157.9	490.16	187.9	498.73	211.9	503.57	226.3
8	446.42	93.4	448.12	96.2	479.86	161.4	491.08	190.4	499.22	213.4	503.86	227.2
10	446.54	93.6	449.70	98.8	481.40	165.2	491.90	192.6	499.73	214.9	504.14	228.0
12	446.65	93.8	451.75	102.3	482.60	168.2	492.67	194.7	500.30	216.5	504.40	228.8
	November 23		November 24		November 25		November 29		November 30		December 1	
4	504.96	230.5	507.34	237.9	509.21	243.8	514.26	260.1	515.29	263.5	516.43	267.3
8	505.43	232.0	507.68	239.0	509.49	244.7	514.44	260.7	515.49	264.1	516.60	267.8
N	505.77	233.0	508.04	240.1	509.73	245.4	514.63	261.3	515.67	264.7	516.77	268.4
4	506.07	233.9	508.30	240.9	510.02	246.3	514.78	261.8	515.81	265.2	517.01	269.2
8	506.55	235.4	508.54	241.7	510.30	247.2	514.94	262.3	516.00	265.8	517.23	269.9
12	506.90	236.5	508.82	242.5	510.58	248.1	515.10	262.8	516.26	266.7	517.44	270.7
	December 2		December 3		December 4		December 5		December 6		December 7	
2	517.56	271.1	518.52	274.3	527.07	304.2	536.71	340.2	539.61	351.4	541.72	359.7
4	517.65	271.4	518.62	274.6	529.07	311.5	537.02	341.4	539.79	352.1	541.91	360.5
6	517.75	271.7	518.72	275.0	530.75	317.7	537.32	342.5	539.98	352.9	542.14	361.4
8	517.82	271.9	518.81	275.3	531.90	322.0	537.66	343.8	540.15	353.5	542.41	362.5
10	517.90	272.2	518.93	275.7	532.82	325.4	537.88	344.7	540.34	354.3	542.76	363.9
N	517.97	272.4	519.10	276.3	533.61	328.4	538.12	345.6	540.48	354.8	543.20	365.6
2	518.04	272.7	519.35	277.1	534.26	330.8	538.48	347.0	540.61	355.4	543.64	367.4
4	518.13	273.0	519.97	279.3	534.75	332.7	538.70	347.9	540.76	355.9	544.03	369.0
6	518.20	273.2	520.75	281.9	535.21	334.4	538.80	348.3	540.94	356.6	544.34	370.2
8	518.27	273.5	522.05	286.4	535.56	335.8	538.97	348.9	541.14	357.4	544.71	371.7
10	518.35	273.7	523.49	291.5	535.95	337.2	539.21	349.9	541.33	358.2	545.05	373.1
12	518.43	274.0	525.18	297.5	536.31	338.6	539.40	350.6	541.51	358.9	545.36	374.3
	December 8		December 9		December 10		December 11		December 12		December 13	
4	545.89	376.5	551.53	399.9	554.09	410.7	555.82	418.2	556.81	422.5	557.22	424.2
8	546.49	378.9	552.02	401.9	554.44	412.2	556.16	419.6	556.95	423.1	557.28	424.5
N	547.53	383.2	552.55	404.2	554.81	413.8	556.33	420.4	557.10	423.7	557.32	424.7
4	548.90	388.9	552.89	405.6	555.12	415.1	556.49	421.1	557.18	424.1	557.30	424.6
8	550.00	393.4	553.36	407.6	555.36	416.2	556.64	421.7	557.23	424.3	557.23	424.3
12	550.83	396.9	553.75	409.3	555.59	417.2	556.72	422.1	557.27	424.5	557.21	424.2

San Joaquin River below Friant, Calif.

Location.--Lat 36°59'04", long. 119°43'24", in SW¼ sec. 7, T. 11 S., R. 21 E., 0.5 mile west of Friant, 1.5 mile downstream from Cottonwood Creek and 2 miles downstream from Friant dam. Datum of gage is 294.00 ft above mean sea level (levels by Bureau of Reclamation).

Drainage area.--1,675 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements. Shifting-control method used Nov. 7-26.

Maxima.--November-December 1950: Discharge, 5,050 cfs 3 - 11 p.m. Dec. 18 (gage height, 7.84 ft).
1907 to October 1950: Discharge, 77,200 cfs Dec. 11, 1937 (gage height, 23.8 ft, site and datum then in use).

Remarks.--Flood flow completely regulated by Millerton Lake.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	311	422	9	409	480	17	322	4,960	25	120	3,020
2	311	422	10	440	480	18	315	4,960	26	113	3,000
3	311	465	11	445	1,360	19	73	5,020	27	348	2,990
4	311	528	12	445	2,500	20	52	4,540	28	232	2,460
5	311	475	13	422	3,430	21	43	4,030	29	414	1,320
6	314	470	14	345	4,420	22	39	3,510	30	418	933
7	341	512	15	318	4,980	23	39	3,020	31		933
8	396	485	16	318	4,980	24	72	3,020			
Monthly mean discharge, in cfs										278	2,391
Runoff, in acre-feet										16,560	147,000
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												
4												
6												
8												
10												
N												
2												
4												
6												
8												
10												
12												
	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												

San Joaquin River near Mendota, Calif.

Location.--Lat 36°48'35", long. 120°22'35", in S½ sec. 7, T. 13 S., R. 15 E., 2.5 miles downstream from Mendota Dam and 4 miles north of Mendota. Datum of gage is 142.53 ft above mean sea level (levels by Bureau of Reclamation).

Drainage area.--4,310 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements. Shifting-control method used Nov. 1 to Dec. 12.

Maxima.--November-December 1950: Discharge, 4,390 cfs 1:30 p.m. Dec. 18 (gage height, 9.41 ft).
1944 to October 1950: Discharge, 6,440 cfs June 19, 1945; gage height, 10.12 ft Feb. 8, 1945.

Remarks.--Flow regulated by Mendota Dam and several reservoirs and power plants above station. Many diversions above station for irrigation. Concerning regulation and diversion see "Remarks" for stations upstream.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	130	216	9	103	3,430	17	128	4,110	25	2,930	2,660
2	132	129	10	95	2,910	18	125	4,360	26	2,180	2,600
3	130	95	11	95	2,950	19	446	4,270	27	1,270	2,520
4	128	98	12	114	2,470	20	571	4,200	28	486	2,530
5	128	144	13	130	2,130	21	230	4,190	29	195	2,510
6	125	1,060	14	134	2,490	22	731	3,840	30	228	1,820
7	121	3,070	15	134	3,070	23	2,090	3,540	31		1,120
8	119	3,840	16	132	3,650	24	3,090	2,950			
Monthly mean discharge, in cfs										555	2,548
Runoff, in acre-feet										33,020	156,700
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 19		November 20		November 21		November 22		November 23		November 24	
2	1.73	128	4.35	828	2.74	298	2.74	286				
4	1.73	128	4.17	764	2.66	278	2.93	333	6.08	1,640	7.91	2,920
6	1.73	128	3.99	702	2.58	259	3.16	394				
8	1.73	128	3.82	644	2.51	242	3.46	480	6.36	1,830	8.09	3,060
10	2.03	180	3.67	594	2.44	226	3.76	574				
N	2.37	254	3.53	549	2.35	206	4.10	668	6.72	2,080	8.19	3,140
2	2.99	411	3.38	501	2.27	189	4.44	906				
4	4.05	744	3.25	462	2.22	178	4.73	912	7.06	2,320	8.27	3,210
6	4.49	896	3.13	427	2.22	178	4.97	1,010				
8	4.61	936	3.02	397	2.29	193	5.25	1,150	7.38	2,550	8.28	3,220
10	4.60	928	2.91	367	2.40	217	5.52	1,310				
12	4.50	880	2.83	346	2.56	254	5.75	1,450	7.67	2,780	8.25	3,190
	November 25		November 26		November 27		December 4		December 5		December 6	
4	8.17	3,170					1.69	92	1.82	112	3.50	501
8	8.07	3,090	7.00	2,310	5.77	1,490	1.70	94	1.85	117	4.24	747
N	7.92	2,970					1.72	96	1.88	122	4.94	1,010
4	7.75	2,830	6.64	2,060	4.99	1,040	1.73	98	1.95	134	5.52	1,330
8	7.56	2,680					1.78	106	2.15	170	5.97	1,620
12	7.36	2,520	6.29	1,810	4.23	747	1.82	112	2.73	303	6.58	2,040
	December 7		December 8		December 9		December 10		December 11		December 12	
2												
4	7.20	2,440	9.00	3,820	8.81	3,710	7.81	2,940	7.83	2,990	7.51	2,770
6												
8	7.73	2,850	8.99	3,820	8.66	3,590	7.74	2,890	7.85	3,010	7.36	2,650
10												
N	8.13	3,170	9.09	3,900	8.48	3,450	7.72	2,870	7.83	2,990	7.13	2,480
2												
4	8.45	3,420	9.07	3,880	8.28	3,290	7.72	2,870	7.77	2,940	6.90	2,320
6												
8	8.70	3,620	9.03	3,850	8.09	3,140	7.75	2,900	7.71	2,900	6.66	2,150
10												
12	8.90	3,780	8.95	3,780	7.94	3,020	7.80	2,940	7.63	2,830	6.48	2,020
	December 13		December 14		December 15		December 16		December 17		December 18	
4	6.46	2,040	6.94	2,380					8.88	3,910		
8	6.52	2,080	7.09	2,480	7.75	3,000	8.50	3,600	9.00	4,020	9.38	4,360
N	6.59	2,130	7.11	2,500					9.13	4,140		
4	6.64	2,170	7.12	2,500	7.95	3,160	8.68	3,740	9.23	4,230	9.40	4,380
8	6.68	2,200	7.21	2,570					9.29	4,280		
12	6.81	2,290	7.38	2,700	8.24	3,390	8.79	3,830	9.34	4,330	9.37	4,350

Supplemental record.--Nov. 19, 9 a.m., 1.74 ft, 130 cfs; Dec. 18, 1:30 p.m., 9.41 ft, 4,390 cfs.

San Joaquin River near Dos Palos, Calif.

Location.--Lat 36°59'40", long. 120°30'00", in N½ sec. 12, T. 11 S., R. 13 E., 0.7 mile downstream from head of Temole Slough and 7 miles east of Dos Palos. Datum of gage is 116.5 ft abcve mean sea level (Corps of Engineers bench mark).

Drainage area.--5,630 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements. Shifting-control method used Dec. 12-31.

Maxima.--November-December 1950: Discharge, 4,140 cfs 6-7 a.m. Dec. 19 (gage height, 10.67 ft).
1944 to October 1950: Discharge, 5,630 cfs Feb. 9, 1945 (gage height, 11.97 ft, site then in use).

Remarks.--Some regulation by reservoirs and power plants above station. Practically entire flow of river and tributaries diverted during irrigation season. Concerning regulation and diversion see "Remarks" for stations upstream.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	0.3	146	9	0.2	3,420	17	0.2	3,460	25	2,800	2,730
2	.3	133	10	.2	2,810	18	.2	3,920	26	2,410	2,600
3	.3	104	11	.2	2,500	19	4.2	4,120	27	1,720	2,520
4	.2	77	12	.2	2,450	20	226	4,050	28	910	2,480
5	.2	71	13	.2	2,050	21	343	4,070	29	322	2,520
6	.2	147	14	.2	2,010	22	221	3,960	30	140	2,320
7	.2	1,090	15	.2	2,360	23	759	3,630	31		1,620
8	.2	2,940	16	.2	2,960	24	2,050	3,200			
Monthly mean discharge, in cfs										397	2,338
Runoff, in acre-feet										23,620	143,700
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 19		November 20		November 21		November 22		November 23		November 24	
2	1.23	0.3	2.33	26	5.29	430	4.43	230				
4	1.25	.4	2.70	49	5.25	418	4.35	218	5.27	424	7.75	1,590
6	1.25	.4	3.18	87	5.20	404	4.29	209				
8	1.25	.4	3.65	132	5.14	387	4.22	199	5.65	547	8.13	1,840
10	1.27	.4	4.05	177	5.07	368	4.19	195				
N	1.50	1.6	4.35	218	4.97	342	4.18	193	6.08	717	8.47	2,080
2	1.71	3.7	4.63	265	4.88	320	4.20	196				
4	1.85	6.0	4.92	330	4.80	301	4.26	204	6.53	915	8.79	2,300
6	1.92	7.6	5.10	376	4.74	288	4.34	216				
8	1.98	9.4	5.21	407	4.66	271	4.45	233	6.94	1,120	9.02	2,490
10	2.08	13	5.27	424	4.59	257	4.68	275				
12	2.14	16	5.29	430	4.50	241	4.86	315	7.35	1,350	9.20	2,630
	November 25		November 26		November 27		December 6		December 7		December 8	
4	9.36	2,760					3.06	77	5.43	473	9.04	2,500
8	9.45	2,830	9.07	2,530	8.12	1,830	3.11	81	5.98	677	9.40	2,790
N	9.50	2,870					3.52	119	6.70	1,000	9.67	3,010
4	9.49	2,860	8.77	2,290	7.79	1,610	3.93	163	7.38	1,370	9.88	3,170
8	9.44	2,820					4.44	231	8.01	1,760	10.13	3,370
12	9.35	2,750	8.44	2,060	7.35	1,350	4.92	330	8.57	2,150	10.22	3,450
	December 9		December 10		December 11		December 12		December 13		December 14	
2	10.24	3,460										
4	10.27	3,490					9.00	2,490	8.32	2,220		
6	10.28	3,490	9.64	2,980	9.03	2,490					7.86	1,920
8	10.29	3,500					8.96	2,480	8.14	2,120		
10	10.28	3,490										
N	10.26	3,480	9.40	2,790	9.04	2,500	8.90	2,470	7.96	2,020	7.96	1,990
2	10.24	3,460										
4	10.20	3,430					8.83	2,450	7.84	1,930		
6	10.15	3,390	9.20	2,630	9.04	2,500					8.13	2,100
8	10.09	3,340					8.70	2,410	7.80	1,900		
10	9.97	3,250										
12	9.88	3,170	9.08	2,530	9.04	2,500	8.55	2,350	7.80	1,900	8.24	2,170
	December 15		December 16		December 17		December 18		December 19		December 20	
4												
8	8.37	2,250	9.19	2,850	9.89	3,370					10.55	4,070
N							10.56	3,920	10.66	4,130		
4	8.64	2,440	9.49	3,090	10.09	3,530					10.50	4,030
8												
12	8.90	2,640	9.73	3,270	10.30	3,700	10.66	4,130	10.60	4,080	10.49	4,030

Supplemental record.--Dec. 6, 9 a.m., 3.41 ft, 108 cfs; Dec. 18, 6 a.m., 10.46 ft, 3,830 cfs, 6 p.m., 10.62 ft, 4,030 cfs; Dec. 19, 6-7 a.m., 10.67 ft, 4,140 cfs, 6 p.m., 10.64 ft, 4,110 cfs.

San Joaquin River at Fremont Ford Bridge, Calif.

Location.--Lat 37°19', long. 120°56', in Orestimba Grant, at Fremont Ford Bridge, Merced County, 2 miles downstream from Salt Slough, 5 miles west of Stevinson, and 5.7 miles upstream from Merced River. Datum of gage is at mean sea level, unadjusted.

Drainage area.--8,090 sq mi.

Gage-height record.--Water-stage recorder graph except 2 a.m. to noon Dec. 10.

Discharge record.--Stage-discharge and stage-fall-discharge relations defined by current-meter measurements. Discharge during periods of backwater from Merced River, Dec. 4-19, computed by using fall between base and auxiliary gages as a factor. Shifting-control method used Nov. 1-20, Nov. 30 to Dec. 4. Discharge for period of no gage-height record computed on basis of partly estimated gage-height record.

Maxima.--November-December 1950: Discharge, 3,330 cfs 12:01 - 2 a.m. Dec. 20; gage height, 68.81 ft 8 - 11 p.m. Dec. 11.
1944 to October 1950: Discharge, 4,140 cfs Feb. 12, 1945 (gage height, 68.60 ft).

Remarks.--Some regulation by reservoirs and power plants above station. See "Remarks" for stations upstream. Practically entire flow of river and tributaries diverted during irrigation season; low flows consist mainly of return water. During periods of high flow, some water bypasses this station through Mud Slough.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	68	1,000	9	54	2,400	17	66	2,830	25	1,530	3,180
2	73	652	10	56	2,690	18	71	2,980	26	1,900	3,050
3	68	525	11	62	2,980	19	84	3,050	27	2,220	2,810
4	63	497	12	68	3,120	20	188	3,310	28	2,410	2,610
5	68	612	13	70	3,120	21	479	3,270	29	2,250	2,480
6	66	1,460	14	68	2,960	22	1,150	3,280	30	1,670	2,410
7	60	2,140	15	66	2,720	23	1,540	3,230	31		2,380
8	55	2,230	16	64	2,720	24	1,510	3,210			
Monthly mean discharge, in cfs										603	2,448
Runoff, in acre-feet										35,890	150,500
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 19		November 20		November 21		November 22		November 23		November 24	
2	58.42	78	58.79	125	59.84	294	61.98	844				
4	58.42	78	58.86	135	59.96	317	62.22	916	63.87	1,510	63.96	1,540
6	58.42	78	58.92	144	60.08	342	62.43	980				
8	58.43	79	59.00	156	60.23	374	62.61	1,040	63.96	1,540	63.91	1,520
10	58.44	80	59.09	170	60.41	414	62.78	1,100				
N	58.44	80	59.19	186	60.59	458	62.94	1,160	64.01	1,560	63.87	1,510
2	58.45	81	59.29	200	60.77	503	63.11	1,220				
4	58.47	83	59.38	216	60.96	553	63.27	1,270	64.02	1,570	63.83	1,490
6	58.49	86	59.47	229	61.14	602	63.41	1,320				
8	58.54	92	59.55	244	61.33	653	63.53	1,370	64.01	1,560	63.79	1,480
10	58.62	102	59.63	256	61.53	709	63.63	1,410				
12	58.71	114	59.73	275	61.74	772	63.72	1,450	63.99	1,560	63.77	1,470
	November 25		November 26		November 27		November 28		November 29		November 30	
4	63.77	1,470	64.47	1,760	65.26	2,130	65.75	2,380	65.75	2,380	64.82	1,910
8	63.79	1,480	64.64	1,840	65.35	2,180	65.80	2,400	65.66	2,330	64.59	1,790
N	63.84	1,500	64.80	1,910	65.45	2,220	65.83	2,420	65.55	2,280	64.36	1,670
4	63.94	1,540	64.93	1,970	65.54	2,270	65.85	2,430	65.40	2,200	64.09	1,540
8	64.10	1,600	65.06	2,030	65.62	2,310	65.85	2,430	65.23	2,120	63.82	1,430
12	64.29	1,680	65.76	2,080	65.71	2,360	65.81	2,410	65.03	2,020	63.55	1,310
	December 2		December 3		December 4		December 5		December 6		December 7	
2					61.16	501	61.51	465	65.38	1,040	67.15	1,960
4	61.90	718	61.32	550	61.16	501	61.63	473	65.62	1,120	67.21	2,000
6					61.17	503	61.79	479	65.85	1,220	67.25	2,050
8	61.77	680	61.27	534	61.18	506	62.04	493	66.05	1,310	67.30	2,090
10					61.19	511	62.37	515	66.23	1,390	67.34	2,130
N	61.64	642	61.22	519	61.21	516	62.78	544	66.39	1,470	67.36	2,170
2					61.22	519	63.25	566	66.54	1,550	67.37	2,180
4	61.55	615	61.18	506	61.23	506	63.80	652	66.67	1,640	67.39	2,220
6					61.23	486	64.21	750	66.81	1,700	67.39	2,240
8	61.46	591	61.18	506	61.26	471	64.55	815	66.92	1,770	67.40	2,260
10					61.32	461	64.85	886	67.01	1,850	67.43	2,290
12	61.38	567	61.16	501	61.40	456	65.13	961	67.08	1,900	67.43	2,290
	December 8		December 9		December 10		December 11		December 12		December 13	
4	67.39	2,270	67.59	2,310			68.77	2,970	68.79	3,090	68.52	3,150
8	67.37	2,220	67.66	2,360			68.75	2,940	68.76	3,110	68.46	3,130
N	67.38	2,200	67.73	2,400	68.44	2,730	68.78	2,970	68.72	3,140	68.41	3,120
4	67.41	2,190	67.81	2,440	68.52	2,770	68.80	3,010	68.67	3,150	68.36	3,100
8	67.46	2,230	67.92	2,480	68.60	2,820	68.81	3,030	68.62	3,150	68.30	3,080
12	67.52	2,260	68.04	2,500	68.66	2,860	68.80	3,050	68.57	3,150	68.25	3,070

San Joaquin River near Newman, Calif.

Location.--Lat 37°21'02", long. 120°58'34", in SW¼ sec. 3, T. 7 S., R. 9 E., at bridge on Hills Ferry road, 300 ft downstream from Merced River and 3.5 miles northeast of Newman. Datum of gage is 51.0 ft above datum of Corps of Engineers.

Drainage area.--9,990 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements. Shifting-control method used Nov. 1 to Dec. 4. Shifts due to backwater were applied Dec. 5-10 on basis of four current-meter measurements.

Maxima.--November-December 1950: Discharge, 11,600 cfs 7 a.m. to 1 p.m. Dec. 11 (gage height, 16.09 ft).
1912 to October 1950: Discharge, 33,000 cfs Mar. 7, 1938 (gage height, 18.50 ft).

Remarks.--Practically entire flow of river and tributaries diverted during irrigation season; low flows consist mainly of return water. See record for Merced River Slough which shows flow bypassing station. Flood flow mainly from Merced River as San Joaquin River was completely regulated by Millerton Lake.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	244	2,620	9	200	9,210	17	214	7,760	25	2,440	5,540
2	247	2,410	10	197	10,900	18	223	8,020	26	2,910	5,400
3	223	2,490	11	203	11,600	19	240	8,110	27	3,240	5,020
4	208	2,750	12	208	11,000	20	1,330	7,040	28	3,520	4,660
5	208	5,320	13	214	10,100	21	1,240	6,040	29	3,570	4,380
6	203	8,200	14	211	9,450	22	1,550	5,580	30	3,180	4,210
7	197	8,550	15	208	8,820	23	1,870	5,040	31		4,150
8	197	8,510	16	214	7,910	24	1,900	5,250			
Monthly mean discharge, in cfs										1,027	6,646
Runoff, in acre-feet										61,110	408,700
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 19		November 20		November 21		November 22		November 23		November 24	
2	2.38	232	3.01	460	4.73	1,380	4.67	1,350	5.43	1,790	5.62	1,910
4	2.38	232	3.64	730	4.62	1,320	4.74	1,390	5.48	1,820	5.61	1,900
6	2.39	235	4.25	1,040	4.51	1,260	4.83	1,440	5.51	1,840	5.59	1,890
8	2.39	235	4.74	1,330	4.42	1,210	4.91	1,480	5.54	1,860	5.58	1,880
10	2.39	235	5.04	1,520	4.37	1,190	4.99	1,530	5.57	1,880	5.56	1,870
N	2.40	238	5.22	1,650	4.34	1,170	5.04	1,560	5.59	1,890	5.55	1,870
2	2.40	238	5.33	1,730	4.33	1,160	5.11	1,600	5.60	1,900	5.54	1,860
4	2.41	241	5.32	1,730	4.35	1,180	5.17	1,640	5.62	1,910	5.53	1,850
6	2.42	244	5.25	1,690	4.38	1,190	5.22	1,670	5.63	1,910	5.55	1,870
8	2.42	244	5.14	1,620	4.44	1,220	5.28	1,700	5.63	1,910	5.63	1,910
10	2.44	250	5.00	1,540	4.51	1,260	5.34	1,740	5.63	1,910	5.72	1,970
12	2.54	282	4.87	1,460	4.60	1,310	5.38	1,760	5.62	1,910	5.83	2,040
	November 25		November 26		November 27		November 28		November 29		December 3	
4	6.08	2,220	6.96	2,800	7.51	3,190	7.90	3,480	8.12	3,660	6.33	2,440
8	6.31	2,370	7.06	2,870	7.56	3,230	7.96	3,520	8.11	3,660	6.37	2,470
N	6.48	2,480	7.13	2,910	7.56	3,230	7.97	3,530	8.03	3,590	6.40	2,490
4	6.61	2,560	7.21	2,970	7.58	3,240	7.97	3,530	7.94	3,520	6.44	2,510
8	6.73	2,640	7.29	3,020	7.66	3,300	8.00	3,550	7.88	3,480	6.49	2,540
12	6.85	2,720	7.41	3,110	7.79	3,390	8.06	3,600	7.84	3,450	6.47	2,530
	December 4		December 5		December 6		December 7		December 8		December 9	
2	6.45	2,520	8.50	3,860	13.75	7,440						
4	6.43	2,500	8.73	4,020	13.92	7,700	14.65	8,670	14.36	8,350	14.73	8,870
6	6.40	2,490	9.10	4,300	14.05	7,900						
8	6.38	2,470	9.63	4,750	14.17	8,090	14.62	8,640	14.41	8,410	14.76	8,920
10	6.38	2,470	10.22	5,260	14.27	8,220						
N	6.43	2,500	10.95	5,570	14.36	8,330	14.57	8,580	14.50	8,500	14.82	9,080
2	6.57	2,580	11.79	5,730	14.44	8,440						
4	6.81	2,730	12.39	5,810	14.50	8,500	14.48	8,480	14.59	8,600	14.95	9,300
6	7.17	2,950	12.70	5,860	14.58	8,590						
8	7.57	3,210	13.05	6,420	14.63	8,650	14.39	8,380	14.65	8,670	15.14	9,680
10	7.96	3,470	13.32	6,820	14.65	8,670						
12	8.28	3,700	13.55	7,150	14.66	8,680	14.39	8,380	14.70	8,720	15.36	10,100
	December 10		December 11		December 12		December 13		December 14		December 15	
4	15.54	10,500	16.08	11,600	15.89	11,300	15.05	10,400	14.40	9,660	13.82	9,030
8	15.66	10,700	16.09	11,600	15.75	11,200	14.93	10,200	14.31	9,560	13.75	8,940
N	15.79	11,000	16.09	11,600	15.61	11,000	14.82	10,100	14.21	9,450	13.66	8,850
4	15.90	11,200	16.07	11,600	15.46	10,800	14.71	10,000	14.11	9,340	13.55	8,720
8	15.98	11,400	16.04	11,500	15.31	10,700	14.60	9,880	14.00	9,220	13.43	8,590
12	16.03	11,500	15.98	11,500	15.18	10,500	14.49	9,760	13.93	9,140	13.26	8,410

San Joaquin River at Grayson, Calif.

Location.--Lat 37°34', long. 121°09' in NW¼ sec. 25, T. 4 S., R. 7 E., at Laird Slough Bridge, 1.5 miles east of Grayson and 5 miles upstream from Tuolumne River. Zero of gage is set to datum of Corps of Engineers.

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

Discharge record.--Stage discharge relation defined by current-meter measurements. Backwater corrections applied Nov. 22 to Dec. 31.

Maxima.--November-December 1950: Discharge, 19,300 cfs 1 a.m. Dec. 12 (gage height, 44.2 ft).
1928 to October 1950: Discharge, 34,000 cfs Mar. 10, 1938 (gage neight, 39.06 ft).

Remarks.--Flood flow partly regulated by many reservoirs and power plants above station. Records furnished by the City of San Francisco.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	540	1,200	9	383	11,600	17	440	9,600	25	1,550	5,000
2	480	3,320	10	390	12,700	18	460	9,100	26	1,350	5,300
3	470	3,060	11	412	16,600	19	550	9,200	27	1,550	5,050
4	450	3,590	12	420	18,900	20	1,350	9,200	28	1,700	4,300
5	430	5,150	13	435	16,200	21	3,050	8,000	29	1,900	3,750
6	420	5,500	14	437	13,900	22	3,700	6,400	30	1,700	3,250
7	410	9,100	15	432	12,300	23	5,600	5,300	31		3,100
8	392	11,750	16	435	10,950	24	2,000	4,750			
Monthly mean discharge, in cfs										1,127	7,972
Runoff, in acre-feet										67,110	490,200
Runoff, in inches										-	-

San Joaquin River at Maze Road, Calif.

Location.--Lat 37°38', long. 121°14', in SW¼ sec. 29, T. 3 S., R. 7 E., at Maze Road bridge, 2.7 miles upstream from Stanislaus River, 6 miles downstream from Tuolumne River and 12.5 miles west of Modesto. Zero of gage is set to datum of Corps of Engineers.

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

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

Maxima.--November-December 1950: Discharge, 64,000 cfs 10 a.m. Dec. 9 (gage height, 39.75 ft).
1932 to October 1950: Discharge, 46,900 cfs Mar. 14, 1938 (gage height, 30.81 ft).

Remarks.--Flood flow partly regulated by many reservoirs and power plants above station. Records furnished by the City of San Francisco.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	1,600	8,500	9	1,530	52,200	17	1,600	15,100	25	13,200	10,400
2	1,610	6,800	10	1,510	45,900	18	1,750	14,800	26	12,900	9,900
3	1,700	6,800	11	1,560	33,300	19	2,000	14,600	27	11,600	9,500
4	1,710	7,000	12	1,580	26,800	20	4,280	14,500	28	11,200	9,200
5	1,680	14,500	13	1,520	20,600	21	8,700	14,400	29	10,900	8,800
6	1,590	15,700	14	1,500	16,100	22	14,200	13,800	30	10,200	8,400
7	1,500	15,800	15	1,550	15,500	23	28,100	13,200	31		8,200
8	1,570	28,300	16	1,580	15,300	24	16,200	11,800			
Monthly mean discharge, in cfs										5,737	16,313
Runoff, in acre-feet										341,400	1,005,000
Runoff, in inches										-	-

San Joaquin River near Vernalis, Calif.

Location.--Lat 37°40'34", long. 121°15'51", in El Pescadero Grant, at Durham Ferry highway bridge, 3 miles downstream from Stanislaus River and 3.4 miles northeast of Vernalis, San Joaquin County. Datum of gage is 8.4 ft above datum of Corps of Engineers.

Drainage area.--14,010 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 53,000 cfs and extended to peak stage. Stage-discharge relation indefinite Nov. 22, 23, Dec. 8-10. Shifting-control method used Nov. 23, 24, Dec. 5-7.

Maxima.--November-December 1950: Discharge, about 79,000 cfs 8 p.m. Dec. 9 (gage height, 27.75 ft), including flow through breaks in levee.
1922 to October 1950: Discharge, 51,200 cfs Mar. 16, 1938 including flow through break in levee; gage height, 27.05 ft Feb. 12, 1938, before break in levee.

Remarks.--Practically entire flow of river and tributaries diverted during irrigation season.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	1,670	13,100	9	1,610	70,000	17	1,870	24,100	25	23,000	15,600
2	1,700	10,800	10	1,660	70,000	18	2,020	22,200	26	19,900	14,400
3	1,770	9,980	11	1,840	56,000	19	2,350	21,100	27	18,000	13,800
4	1,810	10,300	12	1,930	46,900	20	5,260	20,600	28	16,800	13,200
5	1,790	19,900	13	1,890	39,900	21	14,800	20,200	29	15,900	12,600
6	1,680	25,000	14	1,820	32,000	22	23,000	19,500	30	14,900	12,100
7	1,560	25,300	15	1,850	26,800	23	30,000	18,800	31		11,700
8	1,610	40,000	16	1,870	25,500	24	27,200	17,600			
Monthly mean discharge, in cfs										8,102	25,130
Runoff, in acre-feet										482,100	1,545,000
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 18		November 19		November 20		November 21		November 22		November 23	
2			8.14	2,020	9.80	3,530	15.01	9,810	21.35	19,700	24.60	
4	8.03	1,930	8.17	2,050	10.02	3,750	15.79	10,900	21.50	20,000	24.50	
6			8.20	2,070	10.21	3,940	16.57	12,000	21.67	20,300	24.62	
8	8.15	2,030	8.23	2,090	10.42	4,150	17.28	13,000	21.86	20,700	24.84	
10			8.27	2,130	10.63	4,360	17.87	13,800	22.08	21,200	24.94	
N	8.23	2,090	8.31	2,160	10.92	4,660	18.45	14,600	22.28	21,600	24.89	32,700
2			8.39	2,230	11.34	5,120	19.19	15,800	23.02	23,400	24.83	32,400
4	8.22	2,090	8.54	2,370	11.87	5,710	20.00	17,200	23.78	25,700	24.78	32,100
6			8.77	2,570	12.48	6,450	20.74	18,500	24.25	27,100	24.73	31,700
8	8.17	2,050	9.04	2,820	13.15	7,280	21.03	19,100	24.51		24.69	31,300
10			9.31	3,060	13.77	8,080	21.09	19,200	24.67		24.63	30,900
12	8.13	2,010	9.58	3,310	14.37	8,920	21.21	19,400	24.72		24.57	30,300
	November 24		November 25		November 26		December 2		December 3		December 4	
4	24.40	29,200	23.30	24,200	21.89	20,800	16.11	11,400	15.28	10,200	14.87	9,620
8	24.22	28,000	23.08	23,600	21.68	20,300	15.76	10,900	15.15	10,000	14.77	9,480
N	24.05	27,000	22.84	23,000	21.47	19,900	15.53	10,500	15.07	9,900	14.93	9,700
4	23.86	26,100	22.60	22,400	21.27	19,500	15.42	10,400	15.05	9,870	15.42	10,400
8	23.65	25,300	22.35	21,800	21.07	19,100	15.42	10,400	15.05	9,870	16.10	11,300
12	23.48	24,700	22.11	21,200	20.90	18,800	15.38	10,300	14.99	9,790	17.55	13,400
	December 5		December 6		December 7		December 8		December 9		December 10	
2	18.54	14,800	23.30	24,400								
4	19.33	16,000	23.35	24,600	23.52	25,300	23.67		25.90		26.93	
6	19.94	17,100	23.39	24,700								
8	20.63	18,300	23.43	24,900	23.50	25,200	23.87		26.42		26.74	
10	21.26	19,500	23.44	25,000								
N	21.81	20,600	23.45	25,000	23.50	25,200	24.15		27.00		26.56	
2	22.22	21,500	23.46	25,100								
4	22.55	22,200	23.50	25,200	23.48	25,200	24.60		27.60		26.30	
6	22.77	22,800	23.51	25,200								
8	23.04	23,500	23.52	25,300	23.52	25,300	25.00		27.75		26.02	
10	23.16	23,900	23.52	25,300								
12	23.24	24,200	23.52	25,300	23.59	25,600	25.41		27.26		25.77	
	December 11		December 12		December 13		December 14		December 15		December 16	
4												
8	25.23	57,600	24.28	48,100	23.70	41,100	23.18	33,300	22.73	27,200	22.59	25,600
N												
4	24.84	53,900	24.06	45,500	23.52	38,800	22.98	30,200	22.63	26,000	22.58	25,500
8												
12	24.54	50,900	23.87	43,200	23.36	36,300	22.83	28,400	22.60	25,700	22.55	25,200

San Joaquin River tributaries above Fresno River

Florence Lake near Big Creek, Calif.

Location.--Lat 37°17', long. 118°58', in SE¼ sec. 36, T. 7 S., R. 27 E., in gate-house of Ward tunnel intake, near dam on South Fork San Joaquin River, 16 miles northeast of town of Big Creek. Datum of gage is at mean sea level.

Drainage area.--171 sq mi.

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

Remarks.--Lake is formed by multiple arch concrete dam; usable capacity, 64,400 acre-feet between elevations 7,220.9 ft (throat of Venturi tube in Ward tunnel intake) and 7,327.5 ft (top of spillway drum gates) above mean sea level. Water is diverted through Ward tunnel to Huntington Lake and used for power development in Big Creek plants. Records furnished by Southern California Edison Co.

Elevation and contents at 12 p.m. of indicated day, 1950

Day	November		December	
	Elevation (feet)	Contents (acre-feet)	Elevation (feet)	Contents (acre-feet)
1	7,224.38	230	7,252.49	7,550
2	7,224.28	222	7,250.75	6,970
3	7,224.28	222	7,253.08	8,030
4	7,224.29	223	7,255.05	8,980
5	7,224.28	222	7,256.31	9,620
6	7,224.23	218	7,256.42	9,670
7	7,224.20	216	7,256.66	9,800
8	7,224.83	267	7,257.69	10,300
9	7,225.64	344	7,256.74	9,840
10	7,224.73	258	7,255.57	9,240
11	7,224.11	209	7,254.26	8,590
12	7,223.96	198	7,252.84	7,920
13	7,223.98	199	7,251.19	7,170
14	7,223.97	199	7,249.78	6,560
15	7,224.03	203	7,248.02	5,830
16	7,224.21	217	7,246.02	5,050
17	7,224.28	222	7,243.64	4,180
18	7,234.60	1,700	7,241.11	3,330
19	7,238.95	2,680	7,238.26	2,510
20	7,243.21	4,030	7,235.13	1,800
21	7,246.71	5,310	7,232.08	1,230
22	7,248.38	5,980	7,229.33	792
23	7,249.60	6,480	7,227.94	610
24	7,250.70	6,950	7,227.77	590
25	7,251.66	7,380	7,227.66	576
26	7,252.51	7,760	7,227.32	534
27	7,253.25	8,110	7,226.75	466
28	7,253.93	8,430	7,226.32	417
29	7,254.56	8,730	7,226.02	382
30	7,254.16	8,540	7,225.87	367
31			7,225.72	352
Change in contents	-	+8,280	-	-8,190

South Fork San Joaquin River near Florence Lake, Calif.

Location.--Parshall flume, and concrete control, lat 37°16'20", long. 118°57'50", in SE¼ sec. 36, T. 7 S., R. 27 E., just downstream from spillway of Florence Lake Dam, 6 miles upstream from Bear Creek. Altitude of gage, about 7,200 ft (from topographic map).

Drainage area.--171 sq mi.

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

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

Maxima.--November-December 1950: Discharge, 7.4 cfs 10:30 p.m. Nov. 18 (gage height, 9.43 ft).
1921 to October 1950: Discharge, 4,320 cfs June 6, 1940 (gage height, 15.38 ft).

Remarks.--Flow regulated by Florence Lake and by diversion into Ward tunnel. Runoff during flood period was from drainage area between Florence Lake and gage, only.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	3.4	0.1	9	3.5	0.1	17	0.1	0.1	25	0.1	0
2	3.1	.1	10	3.5	.1	18	3.2	.1	26	.1	0
3	3.1	2.5	11	3.4	.1	19	1.2	.1	27	0	0
4	3.4	.4	12	3.4	.1	20	.2	.1	28	0	0
5	3.4	.1	13	3.3	.1	21	.1	0	29	0	0
6	3.1	.3	14	3.4	.3	22	.1	0	30	.4	0
7	3.4	.5	15	2.2	.1	23	.1	0	31		0
8	3.4	.2	16	.2	.1	24	.1	0			
Monthly mean discharge, in cfs										1.83	0.18
Runoff, in acre-feet										109	11
Runoff, in inches										-	-

Ward tunnel at intake, Calif.

Location.--Concrete control, and venturi meter, lat 37°17', long. 118°58', in SE¼ sec. 36, T. 7 S., R. 27 E., in gatehouse at entrance to tunnel. Altitude of gages, about 7,350 ft (from topographic map).

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

Discharge record.--Stage-discharge relation computed from rating for venturi meter.

Maxima.--November-December 1950: Daily discharge, 609 cfs Dec. 7.
1925 to October 1950: Daily discharge, 1,990 cfs Apr. 30, 1926.

Remarks.--Ward tunnel diverts from Florence Lake, a reservoir on South Fork San Joaquin River, to Huntington Lake for use in Big Creek power plants. Flow is completely controlled. Rating for venturi meter furnished by Southern California Edison Co.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	61	562	9	0.2	595	17	45	564	25	0.2	133
2	50	544	10	68	587	18	149	544	26	.2	136
3	46	384	11	53	576	19	454	542	27	.2	137
4	46	.5	12	34	564	20	.2	508	28	.2	129
5	47	.4	13	32	576	21	.2	437	29	.2	119
6	45	372	14	32	574	22	.2	358	30	304	108
7	43	609	15	27	580	23	.2	218	31		95
8	15	221	16	40	572	24	.2	136			
Monthly mean discharge, in cfs										53.1	370
Runoff, in acre-feet										3,160	22,770
Runoff, in inches										-	-

Ward tunnel at outlet, Calif.

Location.--Lat 37°16', long. 119°09', in SE¼ sec. 5, T. 8 S., R. 26 E., just upstream from tunnel outlet at east end of Huntington Lake, 6 miles northeast of Big Creek. Altitude of gage, about 7,000 ft (from topographic map).

Gage-height record.--Water-stage recorder graph except for Dec. 17-31, when stage-graph was computed on basis of telemark readings made at 4-hour intervals.

Discharge record.--Stage-discharge relation computed from records at tunnel intake and inflow from seven tributary creeks.

Maxima.--November-December 1950: Daily discharge, 1,510 cfs Nov. 19.
1927 to October 1950: Daily discharge, 2,080 cfs June 21, 1935.

Remarks.--Flow completely regulated except for Nov. 19 and Dec. 7. Tunnel diverts from Florence Lake to Huntington Lake, receives diversions from Bear and Mono Creeks and at times from several other small tributaries of South Fork San Joaquin River. Telemark readings furnished by Southern California Edison Co.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	133	770	9	48	922	17	109	737	25	263	290
2	116	719	10	104	872	18	418	719	26	240	285
3	112	733	11	107	840	19	1,510	700	27	218	276
4	113	212	12	77	799	20	656	663	28	203	264
5	110	318	13	76	790	21	676	600	29	192	266
6	104	594	14	71	793	22	542	516	30	445	247
7	99	1,090	15	59	773	23	365	398	31		214
8	77	624	16	92	750	24	297	295			
Monthly mean discharge, in cfs										254	583
Runoff, in acre-feet										15,140	35,840
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												
4												
6												
8												
10												
N												
2												
4												
6												
8												
10												
12												
	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												

Bear Creek near Vermilion Valley, Calif.

Location.--Lat 37°20', long. 118°58', in SW¼ sec. 12, T. 7 S., R. 27 E., 2 miles upstream from mouth and 4 miles by trail south of Vermilion Valley. Altitude of gage, about 7,400 ft (from topographic map).

Drainage area.--53.5 sq mi.

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

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

Maxima.--November-December 1950: Discharge, 683 cfs 5 a.m. Nov. 19 (gage height, 5.56 ft). 1921 to October 1950: Maximum discharge, 1,530 cfs July 21, 1936 (gage height, 6.90 ft).

Remarks.--No storage or diversion above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	18	52	9	11	89	17	16	50	25	67	43
2	16	49	10	9.3	78	18	115	48	26	61	41
3	16	106	11	9.3	70	19	355	44	27	54	41
4	17	108	12	9.3	63	20	188	44	28	57	40
5	16	94	13	9.3	57	21	177	44	29	49	35
6	14	97	14	8.5	60	22	120	44	30	49	34
7	14	147	15	12	58	23	89	43	31		34
8	13	115	16	18	54	24	74	43			
Monthly mean discharge, in cfs										56.1	62.1
Runoff, in acre-feet										3,340	3,820
Runoff, in inches										1.17	1.34

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	3.28	15	3.31	17	5.29	535	4.38	172	4.46	190	4.23	143
4	3.28	15	3.35	21	5.52	661	4.33	162	4.40	176	4.18	134
6	3.28	15	3.40	25	5.50	650	4.29	154	4.36	168	4.12	123
8	3.28	15	3.50	35	5.14	460	4.28	152	4.33	162	4.08	117
10	3.28	15	3.66	56	4.90	345	4.29	154	4.30	156	4.04	111
N	3.28	15	3.73	65	4.74	279	4.35	166	4.29	154	4.04	111
2	3.28	15	3.98	102	4.66	250	4.45	188	4.33	162	4.11	122
4	3.29	16	4.37	170	4.61	233	4.58	224	4.45	188	4.09	118
6	3.30	16	4.43	183	4.59	227	4.63	240	4.54	212	4.06	114
8	3.31	17	4.63	240	4.45	188	4.61	233	4.51	203	4.05	112
10	3.31	17	4.74	279	4.36	168	4.58	224	4.40	176	4.01	106
12	3.31	17	4.95	368	4.31	158	4.53	209	4.30	156	3.97	100
	November 23		November 24		November 25		November 29		November 30		December 1	
4	3.91	92	3.81	76	3.75	68	3.61	49	3.57	44	3.62	50
8	3.87	86	3.78	72	3.70	61	3.53	39	3.61	49	3.62	50
N	3.84	81	3.75	68	3.68	58	3.52	38	3.57	44	3.62	50
4	3.94	96	3.82	78	3.79	74	3.72	64	3.60	48	3.67	57
8	3.89	88	3.81	76	3.76	69	3.63	52	3.66	56	3.64	53
12	3.82	78	3.81	76	3.75	68	3.60	48	3.67	57	3.57	44
	December 2		December 3		December 4		December 5		December 6		December 7	
2	3.55	41	3.68	58	4.00	105	3.98	102	3.84	81	4.36	168
4	3.56	43	3.75	68	3.99	104	3.97	100	3.82	78	4.33	162
6	3.57	44	3.78	72	3.98	102	3.96	99	3.80	75	4.37	170
8	3.58	45	3.78	72	3.98	102	3.94	96	3.80	75	4.31	158
10	3.57	44	3.90	90	3.99	104	3.92	93	3.79	74	4.25	146
N	3.58	45	4.22	141	3.99	104	3.92	93	3.79	74	4.22	141
2	3.62	50	4.34	164	4.02	108	3.92	93	3.81	76	4.22	141
4	3.69	60	4.25	146	4.07	116	3.91	92	3.83	80	4.20	137
6	3.68	58	4.19	135	4.08	117	3.90	90	3.90	90	4.18	134
8	3.65	54	4.14	127	4.06	114	3.89	88	4.25	146	4.15	128
10	3.63	52	4.10	120	4.02	108	3.87	86	4.43	183	4.14	127
12	3.63	52	4.07	116	3.99	104	3.85	82	4.42	181	4.13	125
	December 8		December 9		December 10		December 11		December 12		December 13	
4	4.13	125	3.92	93	3.83	80	3.78	72	3.73	65	3.65	54
8	4.09	118	3.88	87	3.80	75	3.77	71	3.71	62	3.63	52
N	4.04	111	3.86	84	3.79	74	3.76	69	3.70	61	3.69	60
4	4.03	110	3.89	88	3.83	80	3.75	68	3.71	62	3.71	62
8	4.04	111	3.90	90	3.85	82	3.75	68	3.72	64	3.67	57
12	3.97	100	3.86	84	3.81	76	3.75	68	3.68	58	3.65	54

Supplemental record.--Nov. 19, 5 a.m., 5.56 ft, 683 cfs; Dec. 3, 1:30 p.m., 4.35 ft, 166 cfs.

Mono Creek near Vermilion Valley, Calif.

Location.--Lat 37°22', long. 118°59', in SW¼ sec. 35, T. 6 S., R. 27 E. (unsurveyed), 1 mile downstream from lower end of Vermilion Valley and 6 miles downstream from North Fork. Altitude of gage, about 7,400 ft (from topographic map).

Drainage area.--92.0 sq mi.

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

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

Maxima.--November-December 1950: Discharge, 1,040 cfs 5:30 a.m. Nov. 19 (gage height, 7.51 ft).
1921 to October 1950: Discharge, 1,760 cfs June 2, 1938 (gage height, 8.62 ft).

Remarks.--No storage or diversion above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	32	127	9	25	180	17	32	113	25	171	96
2	32	115	10	21	159	18	146	111	26	156	94
3	32	122	11	23	148	19	666	105	27	145	94
4	32	183	12	24	140	20	390	100	28	132	98
5	31	189	13	22	127	21	452	100	29	127	90
6	29	159	14	20	132	22	312	98	30	126	86
7	26	229	15	26	127	23	229	98	31		88
8	26	212	16	33	123	24	193	98			
Monthly mean discharge, in cfs										124	127
Runoff, in acre-feet										7,360	7,820
Runoff, in inches										1.50	1.59

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			5.09	37	7.00	745	6.20	349				
4	5.05	32	5.11	39	7.31	916	6.16	332	6.49	490	6.21	354
6			5.13	42	7.50	1,030	6.13	319				
8	5.05	32	5.16	46	7.36	946	6.11	310	6.40	445	6.13	319
10			5.19	51	7.05	772	6.10	306				
N	5.05	32	5.24	59	6.81	650	6.14	323	6.37	430	6.07	294
2			5.34	77	6.66	575	6.24	367				
4	5.05	32	5.55	122	6.60	545	6.32	405	6.37	430	6.07	294
6			5.96	241	6.54	515	6.43	460				
8	5.06	33	6.24	353	6.43	460	6.54	515	6.40	445	6.03	278
10			6.38	420	6.33	410	6.59	540				
12	5.08	36	6.52	490	6.26	377	6.58	535	6.32	405	5.99	262
	November 23		November 24		November 25		November 29		November 30		December 1	
4	5.93	240	5.83	205	5.75	180	5.58	132	5.54	123	5.57	130
8	5.90	229	5.79	192	5.72	170	5.54	123	5.56	127	5.54	123
N	5.88	222	5.77	186	5.70	164	5.52	118	5.52	118	5.53	120
4	5.88	222	5.77	186	5.70	164	5.57	130	5.51	115	5.57	130
8	5.88	222	5.78	189	5.71	167	5.56	127	5.61	140	5.59	135
12	5.86	215	5.78	189	5.72	170	5.55	125	5.62	142	5.49	111
	December 2		December 3		December 4		December 5		December 6		December 7	
2												
4	5.29	71	5.45	102	5.64	148	5.82	202	5.67	156	5.91	233
6												
8	5.35	82	5.43	98	5.66	153	5.80	195	5.64	148	5.93	240
10												
N	5.64	148	5.47	107	5.77	186	5.82	202	5.64	148	5.92	236
2												
4	5.62	142	5.61	140	5.85	212	5.75	180	5.64	148	5.89	226
6												
8	5.57	130	5.64	148	5.87	219	5.72	170	5.69	161	5.87	219
10												
12	5.52	118	5.65	150	5.86	215	5.68	159	5.88	222	5.86	215
	December 8		December 9		December 10		December 11		December 12		December 13	
4												
8												
N												
4												
8												
12												

Supplemental record.--Nov. 19, 5:30 a.m., 7.51 ft, 1,040 cfs.

Huntington Lake near Big Creek, Calif.

Location.--Lat 37°14', long. 119°13', in SW¼ sec. 14, T. 8 S., R. 25 E., in gate tower of dam 1 on Big Creek, 2 miles northeast of town of Big Creek. Datum of gage is at mean sea level.

Drainage area.--79.0 sq mi.

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

Remarks.--Lake is formed by four dams; storage began Apr. 11, 1913. Dams were raised in 1914 and again in 1917. Usable capacity, 89,200 acre-ft between elevations 6,819.9 ft (invert of outlet tunnel No. 1) and 6,950 ft (spillway crest at dam 1) above mean sea level. Additional storage of 600 acre-ft is not available for release. Water is used for power development in Big Creek plants.

Elevation and contents at 12 p.m. of indicated day, 1950

Day	November		December	
	Elevation (feet)	Contents (acre-feet)	Elevation (feet)	Contents (acre-feet)
1	6,937.70	72,300	6,946.34	84,000
2	6,937.40	71,900	6,946.35	84,000
3	6,937.08	71,500	6,948.19	86,600
4	6,936.79	71,100	6,947.19	85,200
5	6,936.69	71,000	6,945.76	83,200
6	6,936.39	70,600	6,944.83	81,900
7	6,936.05	70,200	6,945.15	82,300
8	6,935.67	69,700	6,944.63	81,600
9	6,935.24	69,100	6,944.65	81,600
10	6,934.84	68,600	6,945.19	82,400
11	6,934.54	68,200	6,945.54	82,900
12	6,934.37	68,000	6,945.71	83,100
13	6,934.05	67,600	6,945.84	83,300
14	6,933.33	67,300	6,946.23	83,800
15	6,933.44	66,800	6,946.39	84,100
16	6,933.17	66,500	6,946.45	84,100
17	6,932.81	66,000	6,946.54	84,300
18	6,935.95	70,000	6,946.53	84,300
19	6,941.25	77,000	6,946.56	84,300
20	6,942.97	79,300	6,946.61	84,400
21	6,944.43	81,300	6,946.83	84,700
22	6,945.22	82,400	6,947.24	85,200
23	6,945.67	83,100	6,947.50	85,600
24	6,945.95	83,400	6,947.80	86,000
25	6,946.12	83,700	6,947.98	86,300
26	6,946.40	84,100	6,948.10	86,500
27	6,946.39	84,100	6,948.13	86,500
28	6,946.31	83,900	6,948.14	86,500
29	6,946.19	83,800	6,948.15	86,500
30	6,946.36	84,000	6,948.13	86,500
31			6,948.08	86,400
Change in contents	-	+11,400	-	+2,400

Big Creek below Huntington Lake, Calif.

Location.--Parshall flume and concrete control, lat 37°13'10", long. 119°12'50", in NW¼ sec. 23, T. 8 S., R. 25 E., 800 ft upstream from Grouse Creek and 1,000 ft downstream from Huntington Lake. Altitude of gage, about 6,600 ft (from topographic map).

Drainage area.--80.0 sq mi.

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

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

Maxima.--November-December 1950: Discharge, 34 cfs 9:30 p.m. Nov. 18 and 12 p.m. Dec. 3 (gage height, 3.03 ft).
1925 to October 1950: Discharge, 2,040 cfs June 23, 1925 (gage height, 10.3 ft, datum then in use), siphon spillways operating at Huntington Lake.

Remarks.--Flow almost completely regulated by Huntington Lake, where water is diverted for power development at Big Creek powerhouse No. 1. Runoff during flood period was from drainage area between Huntington Lake and gage, only.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	0.5	1.4	9	0.3	3.7	17	0.5	2.5	25	1.4	1.9
2	.4	1.3	10	.3	3.2	18	15	2.4	26	1.3	1.8
3	.4	14	11	.3	3.0	19	13	2.4	27	1.2	1.8
4	.4	9.0	12	.3	2.8	20	4.2	2.2	28	1.1	1.7
5	.4	4.4	13	.4	2.6	21	2.7	2.2	29	1.1	1.7
6	.4	4.7	14	.4	3.9	22	2.1	2.1	30	1.8	1.7
7	.4	5.4	15	.4	3.0	23	1.8	2.0	31		1.6
8	.4	4.6	16	.4	2.7	24	1.5	1.9			
Monthly mean discharge, in cfs										1.83	3.21
Runoff, in acre-feet										109	198
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												
4												
6												
8												
10												
N												
2												
4												
6												
8												
10												
12												
	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												

Pitman Creek below Tamarack Creek, Calif.

Location.--Lat 37°12', long. 119°12', in NW¼ sec. 35, T. 8 S., R. 25 E., 500 ft downstream from Tamarack Creek, 3 miles upstream from mouth, and 3 miles southeast of town of Big Creek. Altitude of gage, about 7,100 ft (from topographic map).

Drainage area.--22.0 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 530 cfs and extended to peak stage on basis of slope-area determination.

Maxima.--November-December 1950: Discharge, 3,220 cfs 1:30 a.m. Nov. 19 (gage height, 10.77 ft).
1927 to October 1950: Discharge, 2,320 cfs Dec. 11, 1937 (gage height, 9.65 ft), from rating curve extended above 1,000 cfs on basis of velocity-area studies.

Remarks.--No regulation or diversion.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	3.8	60	9	1.3	168	17	3.9	76	25	57	47
2	2.9	46	10	1.1	130	18	808	71	26	51	44
3	2.9	876	11	1.1	112	19	1,420	67	27	46	40
4	2.7	450	12	.9	101	20	284	62	28	42	40
5	2.2	166	13	1.3	89	21	184	58	29	39	40
6	1.8	210	14	4.2	141	22	114	55	30	79	37
7	1.6	369	15	4.1	113	23	82	51	31		33
8	1.5	312	16	2.9	87	24	66	49			
Monthly mean discharge, in cfs										110	135
Runoff, in acre-feet										6,570	8,330
Runoff, in inches										5.60	7.10

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	2.05	3.8	2.08	4.6	10.72	3,170	5.21	258	5.03	227	4.31	137
4	2.05	3.8	2.12	5.7	10.54	2,990	5.09	236	4.94	212	4.24	130
6	2.05	3.8	2.27	10	9.88	2,370	5.08	235	4.87	202	4.18	124
8	2.05	3.8	2.67	24	8.99	1,690	5.24	263	4.80	192	4.12	119
10	2.05	3.8	3.08	43	8.50	1,400	5.37	288	4.71	180	4.07	114
N	2.05	3.8	5.02	225	7.92	1,100	5.45	304	4.65	173	4.03	111
2	2.05	3.8	6.50	560	7.18	783	5.52	318	4.62	169	4.02	110
4	2.05	3.8	7.80	1,040	6.72	626	5.61	338	4.62	169	3.99	107
6	2.06	4.1	9.07	1,750	6.30	504	5.53	321	4.60	167	3.94	103
8	2.06	4.1	9.38	1,970	5.95	416	5.43	300	4.54	160	3.91	100
10	2.07	4.3	10.17	2,630	5.67	351	5.32	278	4.48	154	3.87	97
12	2.07	4.3	10.42	2,870	5.41	296	5.15	247	4.40	146	3.83	93
	November 23		November 24		November 25		November 29		November 30		December 1	
4	3.76	88	3.52	69	3.00	39	2.98	38	3.52	69	2.96	37
8	3.71	84	3.48	67	2.98	38	3.12	45	3.42	62	2.98	38
N	3.67	81	3.46	65	3.00	39	4.08	115	3.35	58	3.35	58
4	3.66	80	3.46	65	3.02	40	4.10	117	3.33	57	3.20	49
8	3.61	76	3.42	62	3.00	39	3.92	101	3.28	54	3.12	45
12	3.55	72	3.40	61	2.98	38	3.66	80	3.13	45	3.36	59
	December 2		December 3		December 4		December 5		December 6		December 7	
2	4.45	151	8.00	1,140	4.81	193	4.34	140	6.39	529	5.48	310
4	5.46	306	6.83	660	4.72	182	4.30	136	6.23	486	6.14	462
6	6.34	515	6.22	483	4.67	175	4.27	133	6.35	518	6.16	468
8	7.00	720	5.87	397	4.61	168	4.25	131	6.06	442	5.87	397
10	6.88	678	5.66	349	4.56	163	4.25	131	5.77	373	5.59	334
N	7.64	973	5.48	310	4.54	160	4.27	133	5.56	327	5.40	294
2	8.48	1,390	5.38	290	4.54	160	4.34	140	5.42	298	5.32	280
4	8.33	1,310	5.28	270	4.53	159	4.49	155	5.36	286	5.27	269
6	8.25	1,270	5.19	254	4.51	157	4.70	179	5.29	272	5.19	254
8	8.24	1,260	5.09	236	4.47	153	5.67	351	5.26	267	5.08	235
10	8.15	1,220	4.99	220	4.42	148	6.53	569	5.17	251	4.96	216
12	8.47	1,390	4.88	203	4.38	144	6.29	501	5.19	254	4.88	203
	December 8		December 9		December 10		December 11		December 12		December 13	
4	4.76	187	4.32	138	4.09	116	3.95	104				
8	4.64	172	4.26	132	4.05	112	3.93	102				
N	4.57	164	4.22	128	4.03	111	3.92	101				
4	4.53	159	4.21	127	4.03	111	3.90	99				
8	4.47	153	4.18	124	4.01	109	3.87	97				
12	4.39	145	4.13	120	3.99	107	3.84	94				

Supplemental record.--Nov. 19, 1:30 a.m., 10.77 ft, 3,220 cfs.

Shaver Lake near Big Creek, Calif.

Location.--Lat 37°09', long. 119°18', in SE¼ sec. 13, T. 9 S., R. 24 E., at dam on Stevenson Creek and 6 miles southwest of town of Big Creek. Datum of gage is at mean sea level.

Drainage area.--29.7 sq mi.

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

Remarks.--Lake is formed by concrete-arch dam; completed and storage began in 1927. Usable capacity, 135,300 acre-ft between elevations 5,225 ft (trash-rack foundation), and 5,370 ft (crest of spillway) above mean sea level. Water is received from Huntington Lake and Pitman Creek through Huntington-Shaver conduit and released for power development in Big Creek plants.

Elevation and contents at 12 p.m. of indicated day, 1950

Day	November		December	
	Elevation (feet)	Contents (acre-feet)	Elevation (feet)	Contents (acre-feet)
1	5,326.35	55,600	5,321.73	49,100
2	5,326.10	55,200	5,322.08	49,600
3	5,325.88	54,900	5,324.79	53,300
4	5,325.78	54,700	5,326.85	56,300
5	5,325.71	54,600	5,328.39	58,600
6	5,325.48	54,300	5,330.00	60,900
7	5,325.25	54,000	5,331.64	63,400
8	5,325.00	53,600	5,333.28	65,900
9	5,324.74	53,300	5,334.32	67,500
10	5,324.48	52,900	5,335.01	68,600
11	5,324.35	52,700	5,335.34	69,100
12	5,324.24	52,600	5,335.64	69,600
13	5,323.95	52,200	5,335.90	70,000
14	5,323.75	51,900	5,336.49	71,000
15	5,323.43	51,400	5,336.85	71,600
16	5,323.06	50,900	5,337.23	72,200
17	5,322.71	50,500	5,337.83	73,100
18	5,324.30	52,700	5,338.12	73,600
19	5,325.47	54,300	5,338.34	74,000
20	5,325.33	54,100	5,338.44	74,200
21	5,325.08	53,700	5,338.30	73,900
22	5,324.78	53,300	5,337.83	73,100
23	5,324.59	53,100	5,337.44	72,500
24	5,324.13	52,400	5,337.15	72,000
25	5,323.63	51,700	5,337.01	71,800
26	5,323.46	51,500	5,336.55	71,100
27	5,322.94	50,800	5,336.01	70,200
28	5,322.36	50,000	5,335.46	69,300
29	5,322.70	50,500	5,334.89	68,400
30	5,322.45	50,100	5.334.68	68,100
31			5,334.31	67,500
Change in contents	-	-5,800	-	+17,400

Huntington-Shaver conduit at outlet, Calif.

Location.--Concrete control, lat 37°10', long. 119°14', in SW¼ sec. 10, T. 9 S., R. 25 E., at tunnel outlet, 4 miles south of town of Big Creek. Altitude of gage, about 6,680 ft (from topographic map).

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 600 cfs and extended to 900 cfs. Discharges above 900 cfs computed as the sum of unpublished records of inflow into the conduit plus estimated tunnel accretion.

Maxima.--November-December 1950: Daily discharge, 1,650 cfs Dec. 4.
1928 to October 1950: Daily discharge, 1,780 cfs June 3, 4, 1938, computed as explained above.

Remarks.--Conduit diverts from Huntington Lake to Shaver Lake, with additions from Pitman Creek and seepage en route.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	5.6	623	9	3.3	1,200	17	4.5	665	25	62	51
2	4.5	604	10	3.3	704	18	180	661	26	55	48
3	4.5	1,430	11	3.1	690	19	46	589	27	50	44
4	4.5	1,650	12	3.1	683	20	19	522	28	45	42
5	4.0	1,480	13	3.1	676	21	66	282	29	42	42
6	3.8	1,530	14	3.1	720	22	114	59	30	219	40
7	3.6	1,640	15	3.3	694	23	83	56	31		35
8	3.3	1,620	16	3.6	676	24	66	54			
Monthly mean discharge, in cfs										37.0	639
Runoff, in acre-feet										2,200	39,290
Runoff, in inches										-	-

North Fork Willow Creek below Crane Valley Reservoir, Calif.

Location.--Lat 37°17', long. 119°32', in SE¼ sec. 26, T. 7 S., R. 22 E., 1,500 ft downstream from Crane Valley Reservoir spillway. Altitude of gage, about 3,200 ft (from topographic map).

Drainage area.--50.8 sq mi.

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

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

Maxima.--November-December 1950: Discharge, 146 cfs 5 - 9 a.m. Dec. 8 (gage height, 3.04 ft).
1940 to October 1950: Discharge, 847 cfs Feb. 11, 1941 (gage height, 5.85 ft).

Remarks.--Flow almost completely regulated by Crane Valley Reservoir (capacity, 45,000 acre-ft) and diversion into Pacific Gas & Electric Co. conduit No. 3 near Crane Valley Reservoir.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	0.6	0.7	9	0.5	1.0	17	0.8	0.8	25	0.6	0.7
2	1.0	.8	10	.5	.8	18	24	.8	26	.5	.7
3	.5	20	11	.6	.7	19	10	.8	27	.5	.8
4	.5	4.4	12	.6	.7	20	1.8	.8	28	.5	.8
5	.5	3.1	13	1.2	.6	21	1.0	.8	29	.5	.8
6	.5	1.7	14	1.6	1.6	22	.8	.8	30	.7	.8
7	.5	2.1	15	.8	.8	23	.6	.7	31		.8
8	.5	97	16	.8	.8	24	.6	.7			
Monthly mean discharge, in cfs										1.80	4.79
Runoff, in acre-feet										107	294
Runoff, in inches										-	-

Pacific Gas & Electric Co. conduit No. 3 near Crane Valley Reservoir, Calif.

Location.--Lat 37°17', long. 119°32', in SE¼ sec. 26, T. 7 S., R. 22 E., 1,000 ft downstream from Crane Valley Dam and powerhouse. Altitude of gage, about 3,300 ft (from topographic map).

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

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

Maxima.- November-December 1950: Daily discharge, 159 cfs Nov. 12, 15-17, 22.
1940 to October 1950: Daily discharge, 164 cfs Sept. 21, 1944.

Remarks.--Flow regulated. Conduit diverts flow from Crane Valley Reservoir and bypasses station on North Fork Willow Creek below Crane Valley Reservoir.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	154	88	9	156	4.7	17	159	2.1	25	35	0.8
2	155	53	10	157	.2	18	136	95	26	.2	85
3	155	.2	11	158	90	19	89	113	27	116	82
4	155	24	12	159	100	20	143	110	28	93	88
5	154	70	13	157	100	21	154	113	29	99	89
6	154	61	14	156	94	22	159	113	30	94	75
7	154	52	15	159	67	23	158	.3	31		.9
8	155	.6	16	159	2.1	24	81	5.9			
Monthly mean discharge, in cfs										134	57.4
Runoff, in acre-feet										7,960	3,530
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												
4												
6												
8												
10												
N												
2												
4												
6												
8												
10												
12												
	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												

Big Sandy Creek near Auberry, Calif.

Location.--Lat 37°03'10", long. 119°32'30", in NE¼NW¼ sec. 23, T. 10 S., R. 22 E., 1.8 miles upstream from mouth, 3 miles west of Prather, and 4 miles southwest of Auberry. Altitude of gage, about 1,240 ft (from topographic map).

Drainage area.--27.8 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 to peak stage.

Maxima.--November-December 1950: Discharge, 1,540 cfs 2:30 a.m. Nov. 19 (gage height, 4.56 ft).
1946 to October 1950: Discharge, 1,120 cfs Apr. 10, 1948 (gage height, 3.49 ft).

Remarks.--No storage or diversion above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	0	3.0	9	0	28	17	0.1	21	25	2.6	10
2	0	1.4	10	0	20	18	187	17	26	2.2	9.6
3	0	466	11	0	16	19	792	15	27	1.6	8.9
4	0	321	12	0	14	20	66	13	28	1.0	8.9
5	0	59	13	.1	12	21	18	12	29	.9	8.9
6	0	38	14	.2	107	22	9.2	12	30	3.1	8.9
7	0	93	15	.1	47	23	6	12	31		8.9
8	0	51	16	.1	27	24	3.8	11			
Monthly mean discharge, in cfs										36.5	47.8
Runoff, in acre-feet										2,170	2,940
Runoff, in inches										1.46	1.98

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			1.15	0.1	4.51	1,510	2.05	98				
4			1.17	.1	4.33	1,390	1.99	79				
6			1.34	.5	4.38	1,430	1.97	73				
8			1.37	.7	3.98	1,170	1.85	68				
10			1.37	.7	3.88	1,100	2.02	89				
N	1.14	0.1	1.42	1.4	3.54	894	1.98	76	1.68	16	1.59	8.9
2			1.48	3.3	2.90	510	1.93	63				
4			1.97	73	2.60	345	1.89	54				
6			2.55	319	2.44	264	1.86	47				
8			2.84	477	2.34	216	1.83	40				
10			3.53	888	2.21	157	1.80	34				
12	1.15	.1	3.66	966	2.11	119	1.78	30	1.63	12	1.56	7.2
	November 23		November 24		November 25		November 29		November 30		December 1	
4									1.40	1.0		
8									1.45	2.2		
N	1.54	6.1	1.49	3.7	1.46	2.6	1.39	0.9	1.46	2.6	1.47	2.9
4									1.50	4.2		
8									1.54	6.1		
12	1.51	4.6	1.48	3.3	1.44	1.9	1.39	.9	1.51	4.6	1.43	1.6
	December 2		December 3		December 4		December 5		December 6		December 7	
2			1.45	2.2	3.58	918					2.18	145
4			1.53	5.6	3.15	660			1.83	40	2.21	157
6			1.70	19	2.75	428	1.94	66			2.17	142
8			1.98	76	2.53	309			1.81	36	2.10	115
10			2.64	367	2.40	245					2.07	105
N	1.41	1.2	2.96	546	2.31	202	1.90	56	1.80	34	2.02	89
2			4.04	1,210	2.23	166					1.97	73
4			3.74	1,010	2.17	142			1.79	32	1.94	66
6			3.05	600	2.13	126	1.87	49			1.92	61
8			3.04	594	2.09	112			1.80	34	1.89	54
10			3.38	798	2.06	102					1.88	51
12	1.43	1.6	3.36	786	2.02	89	1.84	42	1.95	68	1.86	47
	December 8		December 9		December 10		December 11		December 12		December 13	
4	1.87	49										
8	1.95	68										
N	1.91	58	1.76	27	1.71	20	1.68	16	1.66	14	1.65	13
4	1.86	47										
8	1.83	40										
12	1.81	36	1.74	24	1.69	17	1.67	15	1.65	13	1.64	12

Supplemental record.--Nov. 19, 2:30 a.m., 4.56 ft, 1,540 cfs, 5 a.m., 4.18 ft, 1,300 cfs; Dec. 3, 7 p.m., 2.93 ft, 528 cfs.

Fine Gold Creek near Friant, Calif.

Location.--Lat 37°04'00", long. 119°38'50", in NW¼NE¼ sec. 14, T. 10 S., R. 21 E., 1,500 ft downstream from Willow Creek and 5.5 miles northeast of Friant. Altitude of gage, about 620 ft (from topographic map).

Drainage area.--92.8 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements. Shifting-control method used Nov. 15 to Dec. 3.

Maxima.--November-December 1950: Discharge, 6,110 cfs 2 a.m. Nov. 19 (gage height, 15.58 ft).
1936 to October 1950: Discharge, 10,300 cfs Mar. 12, 1938 (gage height, 20.4 ft, from floodmarks), from rating curve extended above 6,500 cfs.

Remarks.--No storage or diversion above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	0	25	9	0	143	17	1.1	89	25	26	59
2	0	21	10	0	119	18	783	83	26	23	55
3	0	1,060	11	0	102	19	2,660	76	27	21	53
4	0	1,450	12	0	92	20	269	70	28	20	53
5	0	238	13	0	84	21	89	68	29	19	51
6	0	161	14	0	199	22	52	65	30	25	51
7	0	342	15	3.8	126	23	38	62	31		51
8	0	202	16	2.6	100	24	32	60			
Monthly mean discharge, in cfs										135	175
Runoff, in acre-feet										8,060	10,730
Runoff, in inches										1.63	2.17

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			1.74	1.2	15.58	6,110	4.50	359				
4			1.77	1.8	14.66	5,400	4.32	302	3.53	117		
6			1.91	5.0	12.82	4,050	4.36	316			3.08	57
8			2.10	12	11.69	3,290	4.50	359	3.41	96		
10			2.90	84	12.00	3,490	4.44	338				
N	1.73	1.1	3.26	130	9.89	2,220	4.29	294	3.34	82	3.02	52
2			3.83	231	8.16	1,480	4.13	246				
4			4.50	393	7.10	1,160	4.01	215	3.27	75		
6			7.77	1,360	6.38	939	3.91	187			2.96	46
8			8.88	1,750	5.73	744	3.81	167	3.20	69		
10			12.08	3,540	5.21	590	3.72	148				
12	1.72	1.0	12.66	3,940	4.80	461	3.63	128	3.14	62	2.92	42
	November 23		November 24		November 25		November 29		November 30		December 1	
4			2.85	38					2.52	19	2.73	28
8			2.79	33					2.55	21	2.68	26
N	2.85	38	2.76	31	2.66	26	2.53	19	2.64	24	2.64	24
4			2.74	29					2.76	31	2.62	23
8			2.72	28					2.76	31	2.60	22
12	2.78	32	2.70	28	2.63	24	2.51	18	2.75	30	2.57	21
	December 2		December 3		December 4		December 5		December 6		December 7	
2			2.59	22	14.00	4,900	4.24	326	3.49	165	4.48	388
4			2.71	27	11.00	2,850	4.12	297	3.46	160	4.65	434
6			3.27	74	10.25	2,420	4.03	276	3.44	157	4.71	450
8			4.32	314	7.49	1,270	3.92	251	3.41	152	4.61	423
10			4.73	436	6.64	1,020	3.85	235	3.38	147	4.61	423
N	2.55	21	6.28	909	6.03	834	3.83	231	3.37	146	4.45	380
2			8.08	1,450	5.57	696	3.76	217	3.35	142	4.28	336
4			9.75	2,160	5.23	595	3.69	203	3.33	140	4.08	287
6			9.30	1,940	4.98	525	3.64	193	3.32	138	3.95	258
8			9.10	1,840	4.73	455	3.61	187	3.38	147	3.87	240
10			10.13	2,350	4.46	383	3.56	178	3.66	197	3.79	223
12	2.56	21	11.66	3,270	4.35	354	3.53	172	4.16	306	3.74	213
	December 8		December 9		December 10		December 11		December 12		December 13	
4	3.73	211	3.43	155								
8	3.76	217	3.39	148								
N	3.79	223	3.35	142	3.18	119	3.05	102	2.96	91	2.90	84
4	3.65	195	3.31	136								
8	3.55	176	3.28	132								
12	3.48	164	3.25	128	3.10	109	3.00	96	2.93	88	2.88	82

Supplemental record.--Nov. 18, 8:30 p.m., 9.50 ft, 2,030 cfs; Nov. 19, 1 a.m., 14.50 ft, 5,280 cfs, 9 a.m., 12.27 ft, 3,670 cfs; Dec. 3, 9 a.m., 4.50 ft, 393 cfs, 3:30 p.m., 9.50 ft, 2,030 cfs, 4:30 p.m., 9.82 ft, 2,190 cfs, 5:30 p.m., 9.50 ft, 2,030 cfs, 7:30 p.m., 8.94 ft, 1,780 cfs, 8:30 p.m., 9.50 ft, 2,100 cfs; Dec. 4, 5 a.m., 9.50 ft, 2,030 cfs; Dec. 7, 2:30 a.m., 4.50 ft, 393 cfs, 5:30 a.m., 4.72 ft, 453 cfs.

Cottonwood Creek near Friant, Calif.

Location.--Lat 37°00'05", long. 119°43'10", in SE¼ sec. 6, T. 11 S., R. 21 E., 1 mile upstream from mouth and 1 mile northwest of Friant. Altitude of gage, about 355 ft (from topographic map).

Drainage area.--38 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 100 cfs and extended to peak stage on basis of shape of previous stage-discharge relation defined to 400 cfs. Shifting-control method used Dec. 4-31.

Maxima.--November-December 1950: Discharge, 214 cfs 4 a.m. Dec. 4 (gage height, 3.14 ft).
1942 to October 1950: Discharge, 569 cfs Jan. 22, 1943 (gage height, 3.89 ft).

Remarks.--No diversion above station. Creek is tributary to San Joaquin River between Friant Dam and gaging station downstream.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	0	1.9	9	0	18	17	0	13	25	0.9	9.0
2	0	1.1	10	0	16	18	1.0	12	26	.7	8.2
3	0	49	11	0	14	19	48	11	27	.7	7.6
4	0	90	12	0	12	20	14	9.8	28	.6	7.6
5	0	26	13	0	11	21	4.7	10	29	.6	7.6
6	0	23	14	.1	30	22	2.1	9.8	30	1.3	7.6
7	0	57	15	0	19	23	1.5	9.4	31		8.2
8	0	25	16	0	15	24	1.0	8.6			
Monthly mean discharge, in cfs										2.57	17.7
Runoff, in acre-feet										153	1,090
Runoff, in inches										0.08	0.54

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	0.85	2.2						
4			0.79	1.3	.97	4.7						
6			.84	2.0	.94	4.0	1.40	12				
8			.83	1.9	1.08	7.9						
10			.76	1.0	2.35	82						
N			.70	.4	2.37	84	1.37	11	1.14	4.2	1.00	2.0
2			.67	.3	2.71	136						
4			.65	.2	2.40	88						
6			.65	.2	2.05	53	1.48	16				
8			.64	.2	2.35	81						
10			.86	2.4	1.70	28						
12			.97	4.7	1.80	35	1.29	8	1.06	2.6	.99	1.9
	November 23		November 24		November 25		November 29		November 30		December 1	
4												
8												
N	0.94	1.4	0.89	1.0	0.86	0.9	0.81	0.6	0.88	1.0	0.99	1.9
4												
8												
12	.91	1.1	.87	.9	.85	.8	.80	.6	1.03	2.3	.92	1.2
	December 2		December 3		December 4		December 5		December 6		December 7	
2			0.90	1.0	2.87	164			1.74	20	2.61	103
4			.97	1.7	3.14	214			1.73	20	2.56	96
6			1.07	2.8	2.85	149			1.72	19	2.44	78
8			1.16	4.6	2.61	103			1.71	19	2.33	66
10			1.20	5.4	2.42	76			1.71	19	2.24	57
N	0.88	1.0	1.49	17	2.31	64	1.83	25	1.70	18	2.17	51
2			2.20	66	2.21	55			1.70	18	2.10	45
4			2.35	81	2.15	52			1.69	18	2.03	39
6			2.55	111	2.08	43			1.70	18	1.99	36
8			2.56	113	2.03	38			1.83	25	1.96	34
10			2.57	114	1.99	36			2.09	44	1.94	32
12	.88	1.0	2.71	137	1.95	33	1.75	21	2.27	61	1.92	31
	December 8		December 9		December 10		December 11		December 12		December 13	
4												
8												
N	1.83	25	1.69	18	1.64	16	1.60	14	1.57	12	1.54	11
4												
8												
12	1.74	20	1.67	17	1.62	15	1.59	13	1.56	12	1.53	11

Supplemental record.--Nov. 19, 11 p.m., 1.65 ft, 25 cfs; Nov. 20, 3 p.m., 1.58 ft, 21 cfs; Dec. 1, 2 a.m., 1.09 ft, 3.2 cfs.

Little Dry Creek near Friant, Calif.

Location.--Lat 36°56'25", long. 119°40'55", in SE¼ sec. 28, T. 11 S., R. 21 E., 3.5 miles southeast of Friant and 4 miles upstream from mouth. Datum of gage is 357.02 ft above mean sea level (levels by State of California).

Drainage area.--58 sq mi.

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

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

Maxima.--November-December 1950: Discharge, 556 cfs 4:30 p.m. Dec. 3 (gage height, 3.99 ft).
1941 to October 1950: Discharge, 1,530 cfs Feb. 1, 1945 (gage height, 4.58 ft), from rating curve extended above 360 cfs by logarithmic plotting.

Remarks.--No storage or large diversions above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	0	0.6	9	0	19	17	0	13	25	0.6	7.3
2	0	.4	10	0	15	18	.2	12	26	.4	6.7
3	0	153	11	0	12	19	202	10	27	.3	6.4
4	0	158	12	0	10	20	26	8.3	28	.2	6.1
5	0	39	13	0	9.5	21	7.8	8.3	29	.2	6.1
6	0	23	14	0	31	22	3.3	8.0	30	.4	5.9
7	0	62	15	0	27	23	1.6	7.6	31		6.1
8	0	30	16	0	15	24	.9	7.3			
Monthly mean discharge, in cfs										8.13	23.3
Runoff, in acre-feet										484	1,440
Runoff, in inches										0.16	0.46

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				0	1.14	0.2	2.03	35	1.76	12		
4				0	3.67	419	1.97	28	1.74	11	1.53	4.3
6				0	3.68	423	1.93	24	1.70	9.0		
8			1.12	.2	3.61	398	1.89	20	1.68	8.3	1.50	3.6
10			1.15	.2	3.39	324	1.86	18	1.66	7.6		
N			1.15	.2	3.11	245	2.00	31	1.64	7.0	1.48	3.2
2			1.14	.2	2.86	184	2.06	39	1.62	6.4		
4			1.12	.2	2.57	124	1.99	30	1.61	6.1	1.46	2.9
6			1.11	.1	2.41	95	1.92	23	1.60	5.9		
8			1.11	.1	2.32	79	1.86	18	1.58	5.4	1.44	2.5
10			1.26	.7	2.18	56	1.83	16	1.57	5.2		
12			1.22	.5	2.10	44	1.80	14	1.56	4.9	1.42	2.2
	November 23		November 24		November 25		November 29		November 30		December 1	
4									1.13	0.2		
8									1.22	.5	1.24	0.6
N	1.37	1.5	1.30	0.9	1.23	0.6	1.13	0.2	1.26	.7		
4									1.24	.6	1.23	.6
8									1.21	.4		
12	1.33	1.1	1.26	.7	1.21	.4	1.13	.2	1.19	.4	1.22	.5
	December 2		December 3		December 4		December 5		December 6		December 7	
2			1.22	0.5	3.40	327	2.17	54	1.95	26	2.08	41
4	1.21	0.4	1.28	.8	3.37	318	2.14	50	1.94	25	2.39	91
6			1.34	1.2	3.11	245	2.12	47	1.93	24	2.43	98
8	1.19	.4	1.36	1.4	2.82	175	2.10	44	1.92	23	2.38	89
10			1.43	2.3	2.63	136	2.07	40	1.91	22	2.32	79
N	1.18	.3	2.60	130	2.51	113	2.05	38	1.90	21	2.25	67
2			2.87	186	2.44	100	2.03	35	1.90	21	2.20	59
4	1.18	.3	3.91	520	2.38	89	2.02	34	1.89	20	2.16	53
6			3.62	401	2.33	80	2.00	31	1.88	20	2.13	48
8	1.17	.3	3.11	245	2.28	72	1.98	29	1.90	21	2.10	44
10			2.96	207	2.24	65	1.97	28	1.96	27	2.08	41
12	1.19	.4	3.25	283	2.20	59	1.96	27	1.99	30	2.06	39
	December 8		December 9		December 10		December 11		December 12		December 13	
4	2.02	34										
8	2.00	31										
N	2.00	31	1.87	19	1.81	15	1.76	12	1.73	10	1.71	9.5
4	1.98	29										
8	1.95	26										
12	1.92	23	1.83	16	1.78	13	1.75	12	1.72	10	1.70	9

Supplemental record.--Nov. 19, 2:30 a.m., 2.83 ft, 178 cfs, 3 a.m., 3.04 ft, 227 cfs, 3:30 a.m., 370 ft, 430 cfs; Nov. 20, 1 p.m., 2.09 ft, 43 cfs; Dec. 3, 11 a.m., 1.50 ft, 3.6 cfs, 4:30 p.m., 3.99 ft, 556 cfs; Dec. 4, 3 a.m., 3.43 ft, 337 cfs.

James bypass near San Joaquin, Calif.

Location.--Lat 36°39', long. 120°11', in SW¼ sec. 1, T. 15 S., R. 16 E., 3.1 miles north of San Joaquin. Altitude of gage, 165 ft.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements. Shifting-control method used Nov. 27 to Dec 5.

Maxima.--November-December 1950: Discharge, 4,600 cfs 4-6 a.m. Dec. 7 (gage height, 12.53 ft).
1929 to October 1950: Discharge, 4,780 cfs May 19, 1938, from records of Kings River Water Association.

Remarks.--Diversions above station for irrigation. James bypass carries overflow from Kings River to San Joaquin River.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	0	8.7	9	0	2,490	17	0	530	25	2,330	8.5
2	0	5.5	10	0	2,860	18	0	191	26	1,470	6.6
3	0	4.6	11	0	2,500	19	0	43	27	661	5.5
4	0	4.9	12	0	1,370	20	0	20	28	188	4.3
5	0	348	13	0	661	21	523	15	29	23	4.2
6	0	2,570	14	0	230	22	1,960	26	30	14	5.0
7	0	4,330	15	0	63	23	3,520	27	31		5.0
8	0	3,260	16	0	79	24	3,280	14			
Monthly mean discharge, in cfs										466	700
Runoff, in acre-feet										27,710	43,020
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												
4												
6												
8												
10												
N												
2												
4												
6												
8												
10												
12												
	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												

Fresno River basin

Fresno River near Knowles, Calif.

Location.--Concrete control, lat 37°14', long. 119°46', in NW¼ sec. 15, T. 8 S., R. 20 E., at Fresno Crossing, 0.1 mile downstream from Bean Gulch and 6 miles northeast of Knowles. Altitude of gage, about 1,140 ft (from topographic map).

Drainage area.--132 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 6,000 cfs and extended to peak stage. Shifting-control method used Nov. 1-13, Dec. 7-31.

Maxima.--November-December 1950: Discharge, 8,540 cfs 2 a.m. Nov. 19 (gage height, 9.31 ft).
1911-1913, 1915 to October 1950: Discharge, 7,630 cfs Mar. 12, 1938 (gage height, 8.67 ft).

Remarks.--Flood flows not affected by diversions above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	12	44	9	5.1	187	17	26	117	25	52	66
2	7.6	37	10	5.1	132	18	1,470	98	26	46	69
3	6.0	1,640	11	5.1	106	19	3,300	91	27	41	69
4	5.4	1,870	12	6.4	84	20	266	87	28	37	66
5	5.1	298	13	8.0	75	21	133	80	29	31	69
6	4.5	202	14	23	262	22	90	75	30	35	69
7	4.5	432	15	23	212	23	74	72	31		69
8	4.2	297	16	15	137	24	59	69			
Monthly mean discharge, in cfs										193	232
Runoff, in acre-feet										11,500	14,240
Runoff, in inches										1.63	2.02

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	1.25	14	1.39	32	9.31	8,540	2.52	411				
4	1.25	14	1.38	30	8.55	7,400	2.43	365				
6	1.25	14	1.46	45	7.30	5,600	2.33	317				
8	1.25	14	1.49	51	6.10	3,980	2.25	281				
10	1.25	14	1.64	95	5.16	2,850	2.17	247				
N	1.43	39	1.94	216	4.47	2,090	2.12	226	1.84	126	1.72	90
2	1.42	37	2.27	370	3.91	1,500	2.07	207				
4	1.42	37	3.10	910	3.53	1,140	2.06	203				
6	1.42	37	4.38	2,100	3.25	895	2.06	203				
8	1.42	37	5.30	3,050	3.00	710	2.06	203				
10	1.40	33	8.00	6,580	2.84	600	2.04	195				
12	1.39	32	9.10	8,230	2.64	477	2.01	184	1.74	96	1.69	82
	November 23		November 24		November 25		November 29		November 30		December 2	
4												
8												
N	1.66	74	1.60	59	1.57	52					1.49	35
4												
8												
12	1.63	66	1.57	52	1.56	50					1.49	35
	December 3		December 4		December 5		December 6		December 7		December 8	
2	1.51	39	7.12	5,350			2.05	199	2.67	500	2.19	264
4	1.57	52	5.83	3,660			2.03	191	2.80	580	2.17	256
6	1.86	132	4.85	2,500			2.01	184	2.79	573	2.16	251
8	2.18	251	4.25	1,840	2.33	317	2.00	180	2.73	536	2.17	256
10	2.62	466	3.90	1,490			1.98	173	2.69	512	2.26	297
N	3.50	1,110	3.58	1,180			1.96	166	2.61	464	2.44	385
2	4.17	1,760	3.23	879			1.95	162	2.51	407	2.46	396
4	4.75	2,400	3.06	752	2.17	247	1.95	162	2.44	370	2.35	340
6	5.43	3,180	2.97	689			1.95	162	2.39	345	2.29	311
8	5.62	3,400	2.80	574			2.09	214	2.31	306	2.25	292
10	6.07	3,940	2.70	512			2.37	336	2.26	282	2.20	269
12	7.04	5,240	2.60	454	2.06	203	2.45	375	2.20	256	2.12	233
	December		December 9		December 10		December 11		December 12		December 13	
4			2.08	220	1.88	141	1.80	113				
8			2.04	203	1.87	137	1.79	110	1.72	87		
N			1.98	178	1.85	129	1.78	106			1.68	77
4			1.96	170	1.85	129	1.77	102	1.70	80		
8			1.94	161	1.84	125	1.76	98				
12			1.91	149	1.81	113	1.75	95	1.69	77	1.65	69

Supplemental record.--Nov. 17, 11 a.m., 1.26 ft, 15 cfs; Dec. 3, 11:30 p.m., 7.18 ft, 5,430 cfs; Dec. 4, 1:30 a.m., 7.30 ft, 5,600 cfs.

Fresno River near Daulton, Calif.

Location.--Lat 37°06', long. 119°53', in NW¼ sec. 3, T. 10 S., R. 19 E., 0.5 mile downstream from Willow Creek and 5 miles southeast of Daulton. Altitude of gage, about 385 ft (from topographic map).

Drainage area.--270 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 5,500 cfs and extended to peak stage by logarithmic plotting. Shifting-control method used Nov. 1-3. Stage-discharge relation indefinite Nov. 4-18; discharge computed on basis of two current-meter measurements and records for station near Knowles.

Maxima.--November-December 1950: Discharge, 10,700 cfs 4 a.m. Nov. 19 (gage height, 10.36 ft).
1944 to October 1950: Discharge, 8,090 cfs Feb. 2, 1945 (gage height, 7.10 ft).

Remarks.--Water diverted into Fresno River basin above station from San Joaquin and Merced River basins. Small diversions above station for irrigation. Some regulation at low flow by mining operations above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	8.0	64	9	4	430	17	25	221	25	76	114
2	13	54	10	5	295	18	300	196	26	66	110
3	8.0	1,290	11	5	235	19	5,130	179	27	58	100
4	6	3,490	12	5	194	20	616	156	28	53	98
5	5	595	13	5	172	21	302	142	29	48	102
6	4	324	14	10	312	22	162	129	30	49	102
7	4	842	15	25	474	23	118	122	31		102
8	4	556	16	20	265	24	90	114			
Monthly mean discharge, in cfs										241	374
Runoff, in acre-feet										14,330	22,970
Runoff, in inches										1.00	1.59

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			1.93		9.98	9,710	3.87	862	3.03	400	2.50	186
4	2.03		2.03		10.36	10,700	3.73	778	3.00	385	2.47	177
6			2.17		10.12	10,100	3.59	700	2.97	372	2.45	171
8	2.02		2.21		9.35	8,230	3.51	656	2.91	344	2.42	162
10			2.23		8.52	6,480	3.47	634	2.86	323	2.40	156
N	1.96		2.25		7.55	4,670	3.44	617	2.80	297	2.43	165
2			2.32		6.47	3,100	3.38	584	2.75	277	2.43	165
4	1.92		2.47		5.64	2,210	3.27	524	2.70	257	2.41	159
6			2.68		5.03	1,670	3.20	485	2.65	238	2.37	148
8	1.90		2.82		4.58	1,330	3.11	440	2.60	220	2.36	146
10			4.38		4.28	1,120	3.08	425	2.56	206	2.36	146
12	1.90		6.95	3,620	4.04	966	3.06	415	2.53	196	2.34	140
	November 23		November 24		November 25		November 29		November 30		December 1	
4												
8												
N	2.24	117	2.11	91	2.02	76			1.81	47	1.98	70
4												
8												
12	2.15	98	2.05	81	1.98	70			1.88	56	1.92	61
	December 2		December 3		December 4		December 5		December 6		December 7	
2			1.83	50	8.89	7,220	3.95	828	3.19	381	3.56	581
4	1.90	58	1.85	52	9.49	8,540	3.83	750	3.14	356	3.93	814
6			1.88	56	8.69	6,820	3.76	704	3.12	346	4.08	916
8	1.87	54	1.92	61	7.37	4,370	3.67	647	3.09	331	4.26	1,040
10			2.06	83	6.37	2,980	3.61	611	3.06	317	4.29	1,060
N	1.86	53	?.67	246	5.73	2,300	3.54	569	3.03	302	4.24	1,030
2			3.65	732	5.22	1,830	3.47	528	3.00	288	4.11	937
4	1.86	53	4.90	1,570	4.86	1,520	3.42	501	2.98	279	4.06	902
6			6.03	2,600	4.57	1,290	3.36	469	2.98	279	3.96	834
8	1.84	51	6.75	3,450	4.39	1,140	3.32	448	3.01	293	3.83	750
10			7.23	4,150	4.20	1,000	3.28	428	3.05	312	3.77	710
12	1.83	50	7.65	4,850	4.05	895	3.25	412	3.24	407	3.69	659
	December 8		December 9		December 10		December 11		December 12		December 13	
4	3.54	569										
8	3.43	506										
N	3.40	490	3.24	407	3.00	288	2.88	234	2.78	193	2.72	172
4	3.48	534										
8	3.64	629										
12	3.53	563	3.11	341	2.95	265	2.82	208	2.75	182	2.69	162

Tributaries and diversions between Fresno River and Merced River

Chowchilla River at Buchanan dam site, Calif.

Location.--Lat 37°13', long. 120°00', in SW¼ sec. 22, T. 8 S., R. 18 E., 1.4 mile upstream from Raynor Creek and 5 miles west of Raymond. Datum of gage is 407.30 ft above mean sea level, adjustment of 1912 (levels by Merced Irrigation District).

Drainage area.--238 sq mi.

Gage-height record.--Water-stage recorder graph except for the periods 7 p.m. Nov. 18 to 4 p.m. Nov. 22 and Dec. 7, 8, when there was no gage-height record except for a staff-gage reading on Nov. 20.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 6,000 cfs and extended to peak stage on basis of slope-area determination. Discharge for periods of no gage-height record computed on basis of records for Fresno River near Daulton and unpublished records for Ash Slough at Santa Fe.

Maxima.--November-December 1950: Discharge, 22,500 cfs about 12 p.m. Nov. 18 (gage height, 15.06 ft, from floodmarks).
1921-23, 1930 to October 1950: Discharge, 18,900 cfs Mar. 2, 1938 (gage height, 14.4 ft, from floodmarks), from rating curve extended above 6,000 cfs by logarithmic plotting.

Remarks.--No storage or large diversion above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	0	50	9	0	526	17	14	219	25	74	115
2	0	45	10	0	407	18	5,300	191	26	59	107
3	0	2,760	11	0	335	19	6,000	168	27	50	101
4	0	4,240	12	0	284	20	750	152	28	46	97
5	0	616	13	0	251	21	350	141	29	42	96
6	0	375	14	0	383	22	180	134	30	44	94
7	0	1,000	15	7.9	441	23	126	125	31		95
8	0	650	16	20	265	24	94	119			
Monthly mean discharge, in cfs										439	470
Runoff, in acre-feet										26,100	28,920
Runoff, in inches										2.06	2.28

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			1.89	26								
4	1.60	14	2.02	32								
6			2.16	41								
8	1.57	14	2.21	44								
10			2.24	46			4.7	560				
N	1.57	14	2.30	50								
2			2.50	68								
4	1.56	13	9.40	4,760							3.30	177
6			11.05	8,120								
8	1.57	14										
10												
12	1.74	19									3.13	149
	November 23		November 24		November 25		November 29		November 30		December 1	
4												
8												
N	2.97	124	2.72	92	2.55	74	2.19	42	2.20	43	2.35	54
4												
8												
12	2.85	108	2.63	82	2.48	66	2.24	46	2.23	45	2.28	49
	December 2		December 3		December 4		December 5		December 6		December 7	
2			2.21	44	12.80	13,200						
4			2.25	46	11.83	10,200	5.23	775	4.24	404		
6			2.32	52	10.13	6,100						
8			2.43	61	8.96	4,060	4.95	660	4.15	378		
10			2.80	102	8.17	2,980						
N	2.22	44	4.54	499	7.52	2,320	4.75	580	4.09	360		
2			7.96	2,750	6.95	1,860						
4			9.74	5,370	6.57	1,570	4.61	524	4.03	343		
6			10.29	6,420	6.27	1,360						
8			10.41	6,660	6.02	1,200	4.46	472	4.06	352		
10			10.41	6,660	5.80	1,070						
12	2.20	43	11.38	8,950	5.57	945	4.32	428	4.23	401		
	December 8		December 9		December 10		December 11		December 12		December 13	
4												
8												
N			4.58	513	4.24	404	4.01	338	3.83	290	3.66	249
4												
8												
12			4.40	453	4.11	366	3.86	298	3.70	258	3.65	247

Supplemental record.--Nov. 18, 3 p.m., 8.50 ft, 3,400 cfs, 7 p.m., 12.85 ft, 13,400 cfs; Nov. 29, 6 a.m., 2.19 ft, 42 cfs, 6 p.m., 2.17 ft, 41 cfs.

Salt Slough near Los Banos, Calif.

Location.--Lat 37°09'35", long. 120°48'45", in Sanjon de Santa Rita Grant at San Luis Ranch, 7 miles north of Los Banos, Merced County. Altitude of gage, about 80 ft (from topographic map).

Gage-height record.--Water-stage recorder graph except period 5 a.m. Dec. 24 to 7 a.m. Dec. 28 when there was no gage-height record. Staff-gage reading made on Dec. 27.

Discharge record.--Stage-discharge relation defined by current-meter measurements. Discharge for period of no gage-height record computed on basis of range in stage, one staff-gage reading, and records for San Joaquin River near Dos Palos.

Maxima.--November-December 1950: Discharge, 689 cfs 7 p.m. Dec. 23 (gage height, 7.12 ft).
1944 to October 1950: Discharge, 1,200 cfs May 18, 1945 (gage height, 8.32 ft).

Remarks.--Flow regulated by irrigation operations above station. Salt Slough is a continuation of Pick Anderson Slough system.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	48	70	9	49	228	17	49	213	25	59	600
2	49	57	10	53	509	18	49	451	26	89	520
3	52	48	11	55	571	19	52	584	27	256	440
4	57	43	12	54	507	20	54	626	28	232	403
5	52	40	13	54	351	21	55	647	29	157	380
6	46	42	14	53	218	22	54	665	30	98	377
7	44	41	15	51	138	23	60	685	31		365
8	45	64	16	49	118	24	61	670			
Monthly mean discharge, in cfs										71.2	344
Runoff, in acre-feet										4,240	21,170
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												
4												
6												
8												
10												
N												
2												
4												
6												
8												
10												
12												
	November 26		November 27		November 28		November 29		November 30		December 1	
4	2.63	57	4.27	225	4.58	263	3.86	179	3.25	113	2.85	76
8	2.64	58	4.50	253	4.45	247	3.77	169	3.16	104	2.82	73
N	2.73	65	4.63	270	4.32	231	3.66	157	3.08	96	2.78	69
4	3.05	94	4.70	279	4.19	216	3.56	146	2.99	88	2.76	68
8	3.50	139	4.71	280	4.08	203	3.45	134	2.93	83	2.73	65
12	3.92	185	4.67	275	3.95	188	3.35	123	2.89	79	2.70	63
	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	2.67	61	3.14	102	5.92	462	6.50	569	6.40	550	5.58	405
8	2.72	65	3.60	150	6.12	498	6.53	575	6.31	533	5.39	376
N	2.74	66	4.16	212	6.23	518	6.54	577	6.21	514	5.21	348
4	2.74	66	4.79	291	6.33	537	6.53	575	6.08	490	5.04	325
8	2.74	66	5.33	366	6.40	550	6.51	571	5.91	460	4.85	298
12	2.83	74	5.69	422	6.46	561	6.46	561	5.76	434	4.68	276

San Luis Creek near Los Banos, Calif.

Location.--Lat 37°03'55", long. 121°04'15", in San Luis Gonzaga Grant, 300 ft downstream from Cottonwood Creek, and 11.5 miles west of Los Banos. Altitude of gage, about 231 ft (from topographic map).

Drainage area.--84.7 sq mi.

Gage-height record.--Water-stage recorder graph except for period 8 p.m. Dec. 3 to 4 p.m. Dec. 4, when there was no gage-height record.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 470 cfs and extended to peak stage on basis of slope-area determination. Discharge for Dec. 3, 4 computed on basis of partial gage-height record, and high-water mark in gage well.

Maxima.--November-December 1950: Discharge, 2,760 cfs 5 a.m. Nov. 19 (gage height, 5.60 ft).
1949 to October 1950: No flow during entire period.
Flood of November 1950 was highest since December 1937, from information by local residents.

Remarks.--No storage or large diversions.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	0	0.4	9	0	61	17	0	3.5	25	0.9	1.1
2	0	.4	10	0	29	18	0	2.8	26	.7	1.1
3	0	200	11	0	14	19	616	3.0	27	.6	1.0
4	0	350	12	0	6.8	20	511	1.8	28	.6	1.0
5	0	68	13	0	4.6	21	238	1.5	29	.4	1.0
6	0	32	14	0	8.1	22	57	1.3	30	.4	1.0
7	0	92	15	0	8.3	23	16	1.2	31		1.0
8	0	207	16	0	5.0	24	2.8	1.1			
Monthly mean discharge, in cfs										48.1	35.8
Runoff, in acre-feet										2,860	2,200
Runoff, in inches										0.63	0.49

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					1.95	26	2.83	136	3.77	450		
4					2.60	97	2.78	127	3.62	378	2.48	79
6					5.30	2,070	2.80	130	3.46	310		
8					4.85	1,360	3.21	224	3.33	262	2.37	65
10					4.39	862	4.07	626	3.23	230		
N					4.06	619	4.19	708	3.11	197	2.27	54
2					3.75	440	4.28	775	3.00	170		
4					3.52	335	4.34	822	2.91	151	2.16	43
6					3.36	273	4.17	694	2.82	134		
8					3.18	216	4.29	782	2.75	122	2.08	36
10					3.02	175	4.23	738	2.67	108		
12					2.91	151	4.02	593	2.60	97	2.00	30
	November 23		November 24		November 25		November 30		December 1		December 2	
4	1.93	24	1.62	4.4								
8	1.87	20	1.57	2.9								
N	1.81	16	1.55	2.5	1.45	0.8	1.42	0.4	1.42	0.4	1.42	0.4
4	1.75	12	1.52	1.8								
8	1.70	8.0	1.50	1.4								
12	1.65	5.8	1.48	1.2	1.45	.8	1.42	.4	1.42	.4	1.42	.4
	December 3		December 4		December 5		December 6		December 7		December 8	
2					2.64	103	2.11	39	2.16	43	2.57	92
4					2.57	92	2.08	36	2.29	56	3.82	476
6					2.51	84	2.06	35	2.53	86	3.71	420
8					2.44	74	2.03	32	2.76	123	3.44	303
10					2.39	68	2.01	31	2.77	125	3.27	243
N	1.43	0.6			2.35	63	1.99	29	2.72	116	3.12	199
2					2.31	58	1.98	28	2.67	108	2.99	168
4			3.00	170	2.27	54	1.96	27	2.63	102	2.90	149
6			2.92	153	2.23	50	2.00	30	2.60	97	2.82	134
8	1.46	.9	2.85	140	2.19	46	1.99	29	2.58	94	2.74	120
10			2.77	125	2.17	44	2.01	31	2.56	91	2.67	108
12			2.70	113	2.13	41	2.00	30	2.55	90	2.60	97
	December 8		December 9		December 10		December 11		December 12		December 13	
4			2.49	81								
8			2.39	68								
N			2.31	58	1.98	28	1.77	13	1.67	6.8	1.59	4.3
4			2.23	50								
8			2.18	45								
12			2.12	40	1.87	20	1.70	8.3	1.63	5.3	1.59	4.3

Supplemental record.--Nov. 19, 5 a.m., 5.60 ft, 2,760 cfs; Dec. 7, 5 a.m., 2.29 ft, 56 cfs; Dec. 8, 4:30 a.m., 3.87 ft, 504 cfs.

Merced River basin

Merced River at Happy Isles Bridge, near Yosemite, Calif.

Location.--Lat 37°43'54", long. 119°33'28", at Happy Isles Bridge, 0.4 mile downstream from Illilouette Creek and 2.0 miles southeast of Yosemite National Park Headquarters, Mariposa County. Datum of gage is 4,016.58 ft above mean sea level, datum of 1929.

Drainage area.--181 sq mi.

Gage-height record.--Water-stage recorder graph except for periods Nov. 15 to 10 a.m. Nov. 21 and 2 p.m. Nov. 22 to 3 p.m. Nov. 29. Daily staff-gage readings were obtained Nov. 23-29. These readings and range in stage between readings were used to construct a graph for the period Nov. 21-29.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 4,000 cfs and extended to peak stage on basis of contracted-opening determination. Discharge for periods of no gage-height record computed on basis of records for stations on nearby streams.

Maxima.--November-December 1950: Discharge, 9,260 cfs about 12 p.m. Nov. 18 (gage height, 11.55 ft, from floodmarks).
1915 to October 1950: Discharge, 8,400 cfs Dec. 11, 1937 (gage height, 10.4 ft), from rating curve extended above 4,000 cfs on basis of contracted-opening determination.

Remarks.--Flood flow not affected by a small diversion above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	80	369	9	59	1,140	17	90	401	25	576	276
2	72	308	10	53	808	18	3,500	376	26	514	265
3	82	2,500	11	46	678	19	5,500	359	27	436	250
4	95	1,310	12	41	605	20	4,500	329	28	390	240
5	97	798	13	38	529	21	4,000	323	29	348	234
6	86	1,020	14	44	656	22	1,580	304	30	434	230
7	74	1,960	15	40	540	23	928	293	31		198
8	64	2,090	16	60	459	24	710	284			
Monthly mean discharge, in cfs										818	649
Runoff, in acre-feet										48,670	39,930
Runoff, in inches										5.04	4.14

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											6.32	2,120
4											6.15	1,960
6											6.01	1,830
8											5.87	1,710
10									7.66	3,990	5.72	1,590
N									7.40	3,540	5.61	1,500
2									7.19	3,210	5.53	1,440
4									7.04	3,000		
6									6.93	2,840		
8									6.78	2,640		
10									6.62	2,440		
12									6.47	2,270		
	November 23		November 24		November 25		November 30		December 1		December 2	
4							3.49	342	3.67	405	3.37	304
8	4.85	975					3.64	394	3.59	376	3.35	298
N							3.92	506	3.53	355	3.34	296
4							3.89	493	3.50	345	3.36	301
8							3.87	484	3.52	352	3.38	307
12							3.76	439	3.44	326	3.53	355
	December 3		December 4		December 5		December 6		December 7		December 8	
2	3.81	459	6.05	1,860			4.30	680	6.46	2,260	6.49	2,290
4	4.32	690	5.81	1,660	4.65	862	4.26	660	6.56	2,370	6.80	2,660
6	5.12	1,140	5.62	1,510			4.23	645	6.55	2,360	6.78	2,640
8	5.92	1,750	5.45	1,380	4.56	813	4.21	635	6.41	2,210	6.64	2,470
10	6.48	2,280	5.31	1,280			4.22	640	6.23	2,030	6.50	2,300
N	7.43	3,590	5.20	1,200	4.50	780	4.24	650	6.09	1,900	6.35	2,150
2	7.96	4,540	5.13	1,150			4.34	700	6.02	1,840	6.21	2,010
4	7.81	4,260	5.08	1,120	4.48	770	4.54	802	5.89	1,720	6.10	1,910
6	7.58	3,840	5.00	1,060			5.03	1,080	5.80	1,650	5.98	1,800
8	7.34	3,440	4.92	1,020	4.43	745	6.10	1,910	5.71	1,580	5.83	1,670
10	6.85	2,730	4.84	969			6.55	2,360	5.66	1,540	5.71	1,580
12	6.40	2,200	4.77	928	4.35	705	6.54	2,350	5.82	1,670	5.58	1,480
	December		December 9		December 10		December 11		December 12		December 13	
4			5.42	1,360	4.68	879						
8			5.20	1,200	4.60	835	4.32	690	4.17	616	3.98	531
N			5.02	1,080	4.52	791						
4			4.93	1,020	4.47	765	4.25	655	4.12	594	3.95	518
8			4.84	969	4.44	750						
12			4.76	923	4.41	735	4.23	645	4.06	567	3.92	506

Supplemental record.--Nov. 18, 12 p.m., 11.55 ft, 9,260 cfs; Nov. 24, 2 p.m., 4.30 ft, 680 cfs; Nov. 25, 7:30 p.m., 4.02 ft, 549 cfs; Dec. 7, 5 a.m., 6.61 ft, 2,430 cfs; Dec. 8, 5 a.m., 6.93 ft, 2,700 cfs.

Merced River at Pohono Bridge, near Yosemite, Calif.

Location.--Lat 37°43'01", long. 119°39'55", 0.4 mile upstream from Artist Creek and 4.2 miles southwest of Yosemite Lodge, in Yosemite National Park, Mariposa County. Datum of gage is 3,862.66 ft above mean sea level, datum of 1929.

Drainage area.--321 sq mi.

Gage-height record.--Water-stage recorder graph except for periods 9 p.m. Nov. 18 to 7 p.m. Nov. 22, noon Nov. 24 to 2 p.m. Nov. 29, Dec. 27-31. A staff-gage reading was obtained on Nov. 21.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 6,800 cfs and extended to peak stage on basis of an estimate from head on diversion dam for Yosemite powerhouse 1 mile downstream. Discharge for periods of no gage-height record computed on basis of one staff-gage reading, three ranges in stage, and records for stations on nearby streams.

Maxima.--November-December 1950: Discharge, 23,000 cfs about 1 a.m. Nov. 19 (gage height, 19.98 ft, from floodmark in gage house).
1916 to October 1950: Discharge, 22,000 cfs Dec. 11, 1937 (gage height, 19.1 ft, from floodmarks in gage house), by computation of flow over diversion dam for Yosemite powerhouse 1 mile downstream.

Remarks.--Flood flow not affected by a small diversion above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	156	806	9	94	2,840	17	177	975	25	1,100	626
2	136	629	10	86	1,940	18	6,600	905	26	900	590
3	150	6,980	11	76	1,600	19	11,000	855	27	800	550
4	162	4,500	12	69	1,400	20	8,500	795	28	750	500
5	152	1,900	13	65	1,230	21	7,500	750	29	710	500
6	136	2,290	14	78	1,610	22	3,600	706	30	875	450
7	117	4,830	15	69	1,320	23	1,920	666	31		410
8	102	6,740	16	107	1,100	24	1,420	648			
Monthly mean discharge, in cfs										1,587	1,666
Runoff, in acre-feet										94,430	102,400
Runoff, in inches										5.52	5.98

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	1.72	152	2.58	366								
4	1.74	156	3.07	538								
6	1.75	158	3.73	835								
8	1.75	158	4.88	1,510								
10	1.77	162	6.19	2,550							7.08	3,450
N	1.79	166	7.56	3,980								
2	1.82	172	8.85	5,590								
4	1.84	176	10.07	7,590								
6	1.87	183	11.58	10,800								
8	1.95	200	13.47	15,400							6.20	2,560
10	2.11	236									6.10	2,470
12	2.24	269									5.98	2,360
	November 23		November 24		November 29		November 30		December 1		December 2	
4	5.77	2,180	4.97	1,570			3.43	688	3.85	895	3.27	618
8	5.55	2,000	4.85	1,480			3.55	745	3.72	830	3.13	562
N	5.37	1,860	4.74	1,410			3.93	935	3.61	775	3.19	586
4	5.24	1,760			3.46	702	4.11	1,030	3.57	755	3.29	626
8	5.14	1,690			3.45	698	4.08	1,010	3.55	745	3.37	662
12	5.08	1,650			3.43	688	3.99	965	3.48	711	3.51	725
	December 3		December 4		December 5		December 6		December 7		December 8	
2	3.75	845	10.90	9,280	5.81	2,210	5.01	1,600	9.27	6,210	8.32	4,880
4	4.21	1,090	9.72	6,960	5.69	2,110	4.95	1,560	9.10	5,940	9.58	6,710
6	4.96	1,560	8.69	5,370	5.59	2,030	4.91	1,530	8.97	5,760	10.74	8,930
8	6.13	2,500	7.92	4,400	5.49	1,950	4.89	1,510	8.76	5,460	11.15	9,830
10	7.51	3,920	7.38	3,760	5.41	1,890	4.89	1,510	8.48	5,080	11.04	9,590
N	8.75	5,450	6.99	3,350	5.35	1,840	4.92	1,530	8.14	4,670	10.60	8,640
2	10.20	7,840	6.69	3,040	5.29	1,790	5.02	1,600	7.87	4,340	9.97	7,410
4	11.66	11,000	6.51	2,860	5.26	1,770	5.28	1,790	7.74	4,190	9.33	6,310
6	12.70	13,600	6.37	2,720	5.23	1,750	5.93	2,320	7.61	4,030	8.76	5,460
8	13.29	15,000	6.23	2,590	5.19	1,720	7.26	3,650	7.41	3,810	8.28	4,840
10	13.04	14,500	6.09	2,460	5.14	1,690	8.48	5,080	7.24	3,620	7.89	4,370
12	12.16	12,200	5.94	2,330	5.10	1,660	9.14	6,000	7.36	3,760	7.55	3,960
	December 8		December 9		December 10		December 11		December 12		December 13	
4			7.03	3,390	5.69	2,110	5.14	1,690	4.84	1,480	4.53	1,280
8			6.62	2,970	5.55	2,000	5.06	1,630	4.78	1,440	4.46	1,240
N			6.32	2,670	5.43	1,900	4.99	1,580	4.71	1,390	4.41	1,210
4			6.14	2,510	5.33	1,820	4.93	1,540	4.67	1,360	4.39	1,190
8			6.00	2,380	5.28	1,790	4.90	1,520	4.63	1,340	4.38	1,190
12			5.84	2,240	5.22	1,740	4.89	1,510	4.59	1,310	4.38	1,190

Supplemental record.--Nov. 18, 9 p.m., 14.5 ft, 17,200 cfs; Nov. 19, 19.98 ft, 23,000 cfs; Nov. 21, 3 p.m., 10.15 ft, 7,740 cfs; Nov. 30, 3 p.m., 4.12 ft, 1,030 cfs.

Merced River at Bagby, Calif.

Location.--Lat 37°36'50", long. 120°08'10", in Rancho Mariposa Grant, 800 ft upstream from highway bridge at Bagby, Mariposa County. Altitude of gage about 850 ft (from topographic map). Auxiliary gage at highway bridge at different datum.

Drainage area.--912 sq mi.

Gage-height record.--Station and water-stage recorder record destroyed Nov. 19; no gage-height record Nov. 1-21. Auxiliary wire-weight gage read twice daily Nov. 22 to Dec. 31 with occasional extra readings during storms. Stage graph constructed for Nov. 22, 23, 30, Dec. 3-9, 14, 15 on basis of these readings and record for station at Pohono Bridge.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 12,000 cfs and extended to peak stage on basis of records of change in contents in Lake McClure downstream. Discharge for period of no gage-height record computed on basis of records for stations at Pohono Bridge and Exchequer, and records of change in contents in Lake McClure. Shifting-control method used Nov. 22 to Dec. 3.

Maxima.--November-December 1950: Discharge, 83,000 cfs 4 a.m. Nov. 19 (gage height, 26.96 ft, recorder datum; 72.3 ft, wire-weight gage datum, from floodmarks).
1922 to October 1950: Discharge, 59,000 cfs Dec. 11, 1937 (gage height, 31.0 ft, from floodmarks, site and datum then in use), from rating curve extended above 11,000 cfs on basis of velocity-area studies and records of change in contents in Lake McClure.

Remarks.--No storage or large diversion above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	370	1,710	9	200	6,460	17	400	2,240	25	2,080	1,370
2	300	1,420	10	180	4,360	18	24,000	2,190	26	1,860	1,260
3	320	18,800	11	170	3,530	19	43,000	1,970	27	1,710	1,200
4	340	15,000	12	150	3,050	20	14,000	1,760	28	1,490	1,160
5	320	4,670	13	150	2,360	21	15,000	1,630	29	1,370	972
6	290	7,090	14	170	3,990	22	5,900	1,600	30	1,430	972
7	250	11,000	15	160	3,850	23	3,320	1,490	31		1,020
8	220	14,000	16	220	2,750	24	2,390	1,420			
Monthly mean discharge, in cfs										4,059	4,074
Runoff, in acre-feet										241,500	250,500
Runoff, in inches										4.97	5.15

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											50.52	1,550
4											50.80	1,720
6											51.30	2,010
8											52.00	2,550
10											54.30	5,300
N											57.75	11,400
2											61.3	20,900
4											63.0	26,900
6											64.9	35,000
8											66.5	43,200
10											67.83	51,000
12											67.0	46,000
	November 23		November 24		November 25		Novemher 29		Novemher 30		December 1	
4												
8												
N												
4												
8												
12												
	December 2		December 3		December 4		December 5		December 6		December 7	
2	63.0	26,900	54.7	5,920	53.40	4,000	59.10	14,700	56.00	8,100	56.2	8,460
4	60.6	18,700	54.35	5,380	53.34	3,920	59.00	14,400	57.25	10,400	55.8	7,760
6	60.05	17,100	54.05	4,920	53.28	3,840	58.60	13,400	58.5	13,200	55.5	7,250
8	59.5	15,700	53.82	4,590	53.22	3,770	58.15	12,400	59.9	16,700	55.15	6,660
10	59.0	14,400	53.74	4,480	53.22	3,770	57.70	11,300	61.7	22,200	54.98	6,370
N	58.45	13,100	53.66	4,360	53.45	4,070	57.30	10,500	61.7	22,200	54.80	6,080
2	57.9	11,800	53.63	4,320	54.70	5,920	56.95	9,810	60.2	17,600	54.68	5,890
4	57.35	10,600	53.60	4,280	56.60	9,180	56.60	9,180	59.1	14,700	54.56	5,700
6	56.8	9,540	53.56	4,220	57.65	11,200	56.40	8,820	58.3	12,700	54.48	5,570
8	56.25	8,550	53.52	4,170	58.20	12,500	56.20	8,460	57.7	11,300	54.36	5,390
10	55.7	7,590	53.48	4,110	58.70	13,700	56.00	8,100	57.1	10,100	54.26	5,240
12	55.1	6,570	53.45	4,070	58.95	14,300	55.85	7,840	56.65	9,270	54.16	5,090
	December 8		December 9		December 10		December 11		December 12		December 13	
4												
8												
N												
4												
8												
12												

Supplemental record.--Dec. 8, 11 a.m., 61.8 ft, 22,500 cfs.

Lake McClure at Exchequer, Calif.

Location.--Lat 37°35', long. 120°16', in SW¼ sec. 13, T. 4 S., R. 15 E., at Exchequer Dam on Merced River, 5 miles northeast of Merced Falls. Datum of gage is at mean sea level (levels by Merced Irrigation District).

Drainage area.--1,020 sq mi.

Gage-height record.--Daily readings at 12 p.m. of indicator in powerhouse, except for Dec. 4, 5, when there was no gage-height record.

Remarks.--Lake is formed by concrete gravity-type dam. Usable capacity, 280,900 acre-ft between elevations 442.6 ft (bottom of sluice valve) and 707.0 ft (top of spillway gates) above mean sea level. Water passes through power plant at dam and down Merced River to diversion dam of Merced Irrigation District's main canal.

Elevation and contents at 12 p.m. of indicated day, 1950

Day	November		December	
	Elevation (feet)	Contents (acre-feet)	Elevation (feet)	Contents (acre-feet)
1	531.1	19,100	696.8	255,000
2	532.1	19,700	696.4	254,000
3	533.6	20,500	709.5	288,000
4	534.5	21,000		272,000
5	535.5	21,600		259,000
6	536.3	22,100	699.1	260,800
7	537.0	22,500	702.7	270,000
8	537.6	22,900	705.8	278,100
9	538.0	23,100	700.8	265,100
10	538.6	23,500	696.5	254,200
11	538.9	23,600	695.4	251,500
12	539.2	23,800	693.8	247,500
13	539.5	24,000	691.8	242,700
14	539.8	24,200	692.3	243,900
15	540.5	24,600	692.4	244,200
16	540.8	24,800	690.8	240,300
17	542.1	25,700	688.5	234,800
18	596.4	75,600	687.2	231,800
19	657.0	167,800	687.7	232,900
20	671.6	197,100	688.2	234,100
21	685.1	226,900	689.5	237,200
22	691.0	240,800	690.5	239,600
23	693.3	246,300	690.5	239,600
24	694.3	248,800	690.4	239,400
25	695.0	250,500	690.3	239,100
26	695.6	252,000	690.4	239,400
27	696.0	253,000	690.3	239,100
28	696.3	253,800	690.2	238,900
29	696.5	254,200	690.1	238,600
30	696.5	254,200	689.9	238,200
31			689.7	237,700
Change in contents	—	+235,400	—	-16,500

Merced River at Exchequer, Calif.

Location.--Lat 37°35', long. 120°17', on line between secs. 14 and 23, T. 4 S., R. 15 E., at Exchequer, 0.5 mile downstream from Lake McClure, 0.7 mile downstream from Cotton Creek, and 5 miles northeast of Merced Falls; recording receiver for long distance water-stage transmitter is at power plant 0.5 mile upstream. Altitude of gage, about 400 ft (from topographic map).

Drainage area.--1,035 sq mi.

Gage-height record.--Water-stage recorder graph except for periods 4 p.m. Dec. 3 to 8 a.m. Dec. 5 and Dec. 15-28, when there was no record.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 13,000 cfs and extended to peak stage by computed flow over spillway of dam. Discharge for Dec. 3-5 computed on basis of records for station at Bagby, and records of change in contents in Lake McClure; discharge for Dec. 15-28 computed from record of flow through Exchequer powerhouse.

Maxima.--November-December 1950: Discharge, 46,200 cfs about 3 a.m. Dec. 4 (gage height, 22.6 ft, from floodmarks).
1915 to October 1950: Discharge observed, about 22,000 cfs Jan. 17, 1916 (gage height, 20.0 ft, site and datum then in use), from rating curve extended above 9,000 cfs.

Remarks.--Flow completely regulated by Lake McClure and Exchequer powerhouse except for storm period Dec. 3-6 when lake was full and spilling.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	48	1,810	9	50	14,200	17	51	5,000	25	1,440	1,490
2	50	1,840	10	50	9,890	18	101	3,800	26	1,240	1,220
3	50	4,300	11	50	4,960	19	62	1,560	27	1,230	1,220
4	50	24,000	12	50	4,960	20	52	1,260	28	1,240	1,490
5	50	11,000	13	50	4,800	21	52	28	29	1,230	1,210
6	50	6,430	14	51	3,530	22	51	497	30	1,270	1,210
7	50	7,940	15	51	4,220	23	1,190	1,490	31		1,210
8	50	12,600	16	51	5,000	24	1,540	1,490			
Monthly mean discharge, in cfs										385	4,698
Runoff, in acre-feet										22,910	288,900
Runoff, in inches										0.42	5.23

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												
4												
6												
8												
10												
N												
2												
4												
6												
8												
10												
12												
	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.--Dec. 4, about 3 a.m., 22.6 ft, 46,200 cfs; Dec. 8, 4 p.m., 13.75 ft, 15,800 cfs.

Merced River below Snelling, Calif.

Location.--Lat 37°28'15", long. 120°30'00", in NW¼ sec. 25, T. 5 S., R. 13 E. at Cox Ferry Bridge, 5 miles southwest of Snelling, and 10 miles upstream from Dry Creek. Altitude of gage, about 187 ft (from topographic map).

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

Discharge record.--Stage-discharge relation extended to peak stage by logarithmic plotting based on a near crest measurement of main channel discharge and an estimate of the overflow.

Maxima.--November-December 1950: Discharge, 30,100 cfs 10 a.m. Dec. 4 (gage height, 10.13 ft).
1938 to October 1950: Discharge, 9,500 cfs June 5, 1938 (gage height, 9.1 ft).

Remarks.--Flood flow regulated by Lake McClure (see p.625).

Cooperation.--Record furnished by Division of Water Resources, Department of Public Works, State of California.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	7.4	1,830	9	8.0	15,200	17	11	5,350	25	1,460	1,090
2	8.3	2,110	10	8.3	12,600	18	258	4,280	26	1,270	892
3	7.7	3,370	11	8.3	5,920	19	1,220	1,350	27	1,240	885
4	8.3	22,200	12	8.6	5,520	20	192	915	28	1,230	885
5	9.4	12,500	13	9.0	5,350	21	128	330	29	1,240	885
6	10	7,010	14	9.8	4,410	22	83	78	30	1,250	885
7	9.0	8,100	15	9.8	3,880	23	641	1,130	31		877
8	8.0	11,400	16	11	5,400	24	1,580	1,200			
Monthly mean discharge, in cfs										398	4,769
Runoff, in acre-feet										23,690	293,200
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	0.84	11	0.89	12	4.99	3,070	1.91	146	2.26	248	1.61	84
4	.84	11	.91	14	4.93	2,960	1.88	139	2.03	176	1.64	90
6	.85	11	.92	14	4.32	1,960	1.84	130	1.88	139	1.71	103
8	.85	11	.94	15	4.07	1,610	1.84	130	1.77	114	1.68	97
10	.85	11	.97	16	3.77	1,270	1.87	137	1.72	105	1.64	90
N	.85	11	.99	18	3.27	809	1.98	162	1.68	97	1.60	83
2	.85	11	1.05	22	2.85	513	2.09	194	1.65	92	1.58	79
4	.85	11	1.16	29	2.56	363	2.14	208	1.64	90	1.56	76
6	.86	11	1.22	34	2.36	280	2.13	206	1.63	88	1.54	74
8	.86	11	1.29	42	2.20	224	2.10	197	1.62	86	1.53	72
10	.86	11	4.00	1,510	2.05	179	2.64	407	1.62	86	1.52	71
12	.87	12	4.79	2,720	1.96	155	2.52	350	1.61	84	1.52	71
	November 23		November 24		November 25		November 29		November 30		December 1	
4	1.53	72	4.04	1,580	4.04	1,600	4.00	1,560	3.99	1,540	4.17	1,790
8	1.58	79	4.07	1,620	4.00	1,540	3.41	938	3.46	977	4.20	1,830
N	1.52	71	4.02	1,560	3.45	962	2.70	447	2.73	463	4.21	1,840
4	3.87	1,380	4.05	1,600	4.00	1,540	3.90	1,440	3.92	1,460	4.22	1,860
8	3.94	1,460	4.05	1,600	4.01	1,560	3.96	1,500	3.97	1,510	4.22	1,860
12	3.98	1,500	4.04	1,580	4.02	1,570	3.99	1,540	4.01	1,570	4.35	2,040
	December 2		December 3		December 4		December 5		December 6		December 7	
2	4.38	2,080	4.07	1,650	7.47	11,400	8.20	15,300	6.80	8,460	6.55	7,530
4	4.42	2,130	4.06	1,640	7.77	12,900	8.08	14,600	6.73	8,200	6.68	8,010
6	4.40	2,110	4.06	1,640	9.45	24,100	7.98	14,000	6.66	7,940	6.74	8,230
8	4.40	2,110	4.08	1,660	10.12	30,000	7.90	13,600	6.59	7,680	6.74	8,230
10	4.42	2,130	4.16	1,780	10.13	30,100	7.82	13,200	6.50	7,340	6.71	8,120
N	4.43	2,150	4.20	1,830	10.11	29,900	7.75	12,800	6.40	6,980	6.68	8,010
2	4.45	2,180	4.30	1,970	9.91	28,000	7.63	12,200	6.24	6,440	6.68	8,010
4	4.44	2,160	5.00	3,160	9.70	26,200	7.43	11,200	6.13	6,090	6.75	8,270
6	4.44	2,160	5.88	5,300	9.30	22,900	7.34	10,800	6.07	5,890	6.83	8,570
8	4.45	2,180	6.25	6,440	8.85	19,600	7.24	10,300	5.93	5,460	6.79	8,420
10	4.35	2,040	6.63	7,790	8.57	17,700	7.11	9,760	6.00	5,670	6.75	8,270
12	4.12	1,720	7.06	9,500	8.40	16,500	6.94	4,520	6.35	6,790	6.74	8,230
	December 8		December 9		December 10		December 11		December 12		December 13	
4	6.77	8,340	8.25	15,700	7.97	14,000	6.04	5,830	5.97	5,610	5.78	5,110
8	6.85	8,640	8.09	14,800	7.82	13,200	5.97	5,610	5.96	5,570	5.85	5,300
N	7.06	9,550	8.01	14,300	7.60	12,100	5.98	5,640	5.92	5,460	5.88	5,380
4	8.02	14,300	8.20	15,400	7.77	13,000	5.99	5,670	5.92	5,460	5.89	5,400
8	8.23	15,500	8.20	15,400	7.53	11,800	5.99	5,670	5.92	5,460	5.91	5,460
12	8.36	16,300	8.13	15,000	6.82	8,570	5.99	5,670	5.90	5,400	5.91	5,460

Merced River near Stevinson, Calif.

Location.--Lat 37°22', long. 120°56', in sec. 36, T. 6 S., R. 9 E., 5 miles upstream from mouth and 6 miles northwest of Stevinson. Datum of gage is 56.09 ft above mean sea level (levels by Bureau of Reclamation).

Drainage area.--1,274 sq mi.

Gage-height record.--Water-stage recorder graph except for period 7 a.m. Dec. 5 to 10 a.m. Dec. 6, when there was no gage-height record.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 11,000 cfs and extended to peak stage. Shifting-control method used Nov. 1-19, Dec. 22-31. Discharge for Dec. 5, 6 computed on basis of fragmentary gage-height record, high-water mark in gage well, and records for Merced River Slough near Newman.

Maxima.--November-December 1950: Discharge, 13,600 cfs 3 p.m. Dec. 5 (gage height, 18.05 ft, from high-water mark in gage well).
1944 to October 1950: Discharge, 4,960 cfs May 10, 1945 (gage height, 13.15 ft).

Remarks.--Practically entire flow is diverted above station during irrigation season; some return flow enters above. Flow regulated by Lake McClure (see p.625).

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	175	1,300	9	148	10,800	17	149	5,150	25	1,210	1,690
2	172	1,640	10	144	12,000	18	156	5,320	26	1,400	1,630
3	148	1,910	11	142	11,000	19	208	4,840	27	1,280	1,470
4	143	2,820	12	143	7,770	20	1,570	2,580	28	1,270	1,430
5	140	11,200	13	143	6,160	21	746	1,910	29	1,280	1,390
6	140	11,500	14	143	5,700	22	566	1,340	30	1,290	1,390
7	142	9,130	15	145	5,260	23	430	818	31		1,370
8	145	9,800	16	148	4,500	24	452	1,440			
Monthly mean discharge, in cfs										479	4,718
Runoff, in acre-feet										28,500	290,100
Runoff, in inches										0.42	4.27

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					1.85	161	6.60	1,280	5.55	922	4.37	650
4					1.85	161	7.55	1,660	5.28	856	4.32	639
6					1.85	161	8.13	1,890	5.05	801	4.23	620
8					1.86	162	8.37	1,990	4.84	752	4.14	602
10					1.87	164	8.36	1,980	4.69	719	4.05	584
N					1.87	164	8.17	1,910	4.59	697	3.95	564
2					1.88	165	7.83	1,770	4.53	684	3.85	544
4					1.89	167	7.43	1,610	4.50	677	3.77	528
6					1.90	168	7.03	1,450	4.48	673	3.68	510
8					1.93	172	6.60	1,280	4.47	671	3.62	498
10					2.95	360	6.20	1,120	4.44	664	3.55	484
12					5.11	815	5.85	1,000	4.42	660	3.50	474
	November 23		November 24		November 25		November 29		November 30		December 1	
4	3.42	459	2.98	375	5.87	1,010	6.87	1,390	6.90	1,400	6.92	1,410
8	3.34	444	2.93	366	6.30	1,160	6.62	1,290	6.65	1,300	6.67	1,310
N	3.26	428	2.88	356	6.55	1,260	6.33	1,170	6.33	1,170	6.37	1,190
4	3.18	413	3.14	406	6.71	1,320	6.36	1,180	6.35	1,180	6.36	1,180
8	3.12	402	4.10	594	6.83	1,370	6.62	1,290	6.62	1,290	6.63	1,290
12	3.05	388	5.20	837	6.92	1,410	6.86	1,380	6.87	1,390	6.95	1,420
	December 2		December 3		December 4		December 5		December 6		December 7	
2	7.10	1,480	7.95	1,820	8.08	1,870	13.33	5,040			17.17	10,200
4	7.22	1,530	8.02	1,850	8.00	1,840	14.90	6,440			17.10	10,000
6	7.32	1,570	8.09	1,880	7.96	1,820	16.90	9,510			17.00	9,750
8	7.41	1,600	8.14	1,900	8.12	1,890					16.90	9,510
10	7.48	1,630	8.19	1,920	8.50	2,050					16.80	9,270
N	7.53	1,650	8.23	1,930	9.15	2,380			17.58	11,500	16.68	9,000
2	7.58	1,670	8.27	1,950	10.05	2,860			17.54	11,300	16.57	8,760
4	7.62	1,690	8.30	1,960	10.90	3,370			17.48	11,100	16.45	8,510
6	7.67	1,710	8.31	1,960	11.60	3,820			17.45	11,000	16.36	8,330
8	7.73	1,730	8.30	1,960	12.17	4,220			17.38	10,800	16.33	8,280
10	7.80	1,760	8.24	1,940	12.53	4,470			17.32	10,600	16.39	8,390
12	7.87	1,790	8.16	1,900	12.83	4,680			17.25	10,400	16.52	8,650
	December 8		December 9		December 10		December 11		December 12		December 13	
4	16.82	9,320	17.07	9,920	17.73	12,000	17.61	11,600	16.63	8,890	15.08	6,400
8	17.07	9,920	17.12	10,000	17.73	12,000	17.56	11,400	16.26	8,150	14.95	6,240
N	17.14	10,100	17.32	10,600	17.74	12,100	17.50	11,200	15.90	7,530	14.86	6,130
4	17.14	10,100	17.57	11,400	17.73	12,000	17.41	10,900	15.63	7,120	14.78	6,040
8	17.12	10,000	17.69	11,900	17.71	11,900	17.25	10,400	15.40	6,800	14.70	5,940
12	17.09	9,980	17.73	12,000	17.66	11,800	16.98	9,700	15.22	6,570	14.62	5,850

Tenaya Creek near Yosemite, Calif.

Location.--Lat 37°44'33", long. 119°33'25", in Yosemite National Park, at bridge 0.7 mile upstream from mouth and 2.2 miles east of Yosemite Lodge, Mariposa County. Altitude of gage, about 4,000 ft (from topographic map).

Drainage area.--47 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 890 cfs and extended to peak stage on basis of contracted-opening determination. Shifting-control method used Nov. 1-11, Dec. 14-31.

Maxima.--November-December 1950: Discharge, 6,330 cfs 12 p.m. Nov. 18 (gage height, 8.25 ft).
1904-9, 1912 to October 1950: Discharge, 5,550 cfs Dec. 11, 1937 (gage height, 10.0 ft), from rating curve extended above 2,000 cfs on basis of velocity-area studies.

Remarks.--No storage or diversions above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	32	135	9	13	587	17	87	179	25	254	106
2	29	114	10	12	403	18	2,150	163	26	208	98
3	38	1,090	11	11	323	19	3,070	152	27	173	91
4	38	557	12	10	273	20	2,300	140	28	146	88
5	27	340	13	10	232	21	2,060	130	29	128	84
6	21	503	14	12	290	22	737	121	30	167	82
7	16	725	15	12	244	23	438	115	31		72
8	14	1,230	16	33	204	24	318	111			
Monthly mean discharge, in cfs										419	290
Runoff, in acre-feet										24,920	17,820
Runoff, in inches										9.94	7.11

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			2.40	202	8.07	5,910	4.95	1,110	6.71	3,200	4.80	1,000
4	1.87	54	2.59	269	7.64	4,980	4.88	1,060	6.51	2,870	4.68	918
6			2.74	325	7.47	4,630	4.98	1,130	6.33	2,600	4.55	840
8	1.89	58	3.44	616	7.04	3,790	5.30	1,400	6.12	2,310	4.44	777
10			6.10	940	6.50	2,850	5.62	1,710	5.92	2,050	4.33	720
N	1.92	65	4.72	1,280	6.12	2,310	5.86	1,980	5.73	1,830	4.25	682
2			5.48	1,810	5.92	2,050	6.37	2,660	5.58	1,670	4.21	664
4	2.00	83	6.08	2,420	5.83	1,950	6.77	3,300	5.51	1,600	4.15	638
6			7.13	4,000	5.70	1,800	6.78	3,320	5.41	1,500	4.11	620
8	2.18	132	7.57	4,850	5.48	1,570	6.86	3,460	5.26	1,360	4.05	593
10			8.02	5,800	5.26	1,360	7.08	3,860	5.11	1,240	3.98	562
12	2.40	202	8.25	6,330	5.08	1,210	7.08	3,860	4.95	1,110	3.94	545
	November 23		November 24		November 25		November 30		December 1		December 2	
4					3.20	277	2.52	119	2.67	146	2.38	98
8	3.72	455	3.35	323	3.13	257	2.75	162	2.60	133	2.37	97
N					3.08	243	2.89	194	2.58	130	2.43	106
4	3.58	402	3.28	301	3.06	237	2.88	191	2.61	135	2.49	114
8					3.09	245	2.84	182	2.58	130	2.49	114
12	3.49	370	3.25	292	3.07	240	2.73	158	2.48	113	2.88	191
	December 3		December 4		December 5		December 6		December 7		December 8	
2	3.16	265	4.42	770			3.16	294	4.58	858	5.10	1,230
4	3.49	370	4.26	692			3.14	290	4.53	828	5.42	1,510
6	3.84	503	4.13	634			3.12	285	4.52	822	5.67	1,770
8	4.16	642	4.03	588	3.36	347	3.14	290	4.38	750	5.70	1,800
10	4.70	930	3.95	555			3.15	292	4.27	696	5.52	1,610
N	5.27	1,370	3.87	523			3.20	304	4.20	665	5.24	1,350
2	5.86	1,980	3.81	499			3.37	350	4.24	683	5.00	1,150
4	5.92	2,050	3.76	480	3.28	325	3.55	406	4.21	670	4.82	1,010
6	5.69	1,790	3.72	465			4.10	620	4.11	624	4.70	930
8	5.42	1,510	3.64	437			4.93	1,090	4.05	598	4.58	858
10	4.92	1,090	3.57	412			5.00	1,150	4.11	620	4.47	795
12	4.60	870	3.52	395	3.19	302	4.78	986	4.47	795	4.37	745
	December		December 9		December 10		December 11		December 12		December 13	
4			4.25	688								
8			4.09	616	3.57	412	3.28	325	3.10	280	2.89	233
N			3.97	563								
4			3.91	539	3.48	382	3.24	314	3.04	266	2.88	231
8			3.83	507								
12			3.74	473	3.40	358	3.19	302	2.93	242	2.83	220

Supplemental record.--Nov. 18, 7 p.m., 7.47 ft, 4,650 cfs, 9 p.m., 7.67 ft, 5,060 cfs; Nov. 19, 1 a.m., 8.10 ft, 5,980 cfs, 5 a.m., 7.50 ft, 4,690 cfs; Nov. 20, 4:30 p.m., 6.85 ft, 3,440 cfs, 5 p.m., 6.74 ft, 3,250 cfs, 11 p.m., 7.14 ft, 3,980 cfs; Nov. 30, 9 a.m., 2.95 ft, 208 cfs, 11 a.m., 2.96 ft, 211 cfs, 1 p.m., 2.85 ft, 184 cfs; Dec. 3, 3:30 p.m., 5.93 ft, 2,070 cfs; Dec. 6, 9 p.m., 5.08 ft, 1,210 cfs; Dec. 8, 7:30 a.m., 5.72 ft, 1,820 cfs.

South Fork Merced River near El Portal, Calif.

Location.--Lat 37°39', long. 119°53', in NE¼ sec. 29, T. 3 S., R. 19 E., 1,400 ft above mouth, and 6.2 miles west of El Portal. Altitude of gage, about 1,400 ft (from topographic map).

Drainage area.--239 sq mi.

Gage-height record.--Water-stage recorder graph Nov. 15 to Dec. 31.

Discharge record.--Stage-discharge relation subsequent to flood defined by current-meter measurements below 2,700 cfs and extended to peak stage on basis of slope-area determination.

Maxima.--November-December 1950: Discharge, 37,600 cfs 1 a.m. Nov. 19 (gage height, 17.63 ft).

Remarks.--Flood flow not affected by diversions above station. Station established Nov. 14, 1950.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1		477	9		1,770	17		640	25	604	364
2		360	10		1,190	18	9,020	579	26	531	346
3		6,140	11		955	19	13,900	535	27	458	326
4		4,320	12		824	20	4,440	491	28	405	308
5		1,430	13		711	21	2,950	458	29	370	308
6		1,210	14		1,150	22	1,420	430	30	441	300
7		3,380	15		984	23	890	408	31		279
8		4,260	16		750	24	709	386			
Monthly mean discharge, in cfs										–	1,164
Runoff, in acre-feet										–	71,540
Runoff, in inches										–	5.61

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 16		November 17		November 18		November 19		November 20		November 21	
2	2.62		3.50		3.62	42	17.56	37,000	9.06	3,160	9.74	4,180
4	2.60		3.65		3.85	70	16.42	28,900	8.78	2,820	9.39	3,630
6	2.60		3.71		4.17	117	15.10	21,000	8.58	2,580	9.20	3,360
8	2.62		3.68		5.05	328	13.68	14,400	8.60	2,600	9.05	3,150
10	2.62		3.64		6.55	962	12.59	10,800	9.23	3,400	8.90	2,960
N	2.65		3.60		8.52	2,510	11.73	8,320	10.04	4,670	8.70	2,720
2	2.78		3.55		10.37	5,270	11.08	6,700	10.34	5,210	8.54	2,530
4	2.85		3.52		12.08	9,240	10.66	5,820	10.79	6,080	8.41	2,390
6	2.89		3.48		14.32	17,100	10.38	5,280	11.14	6,850	8.38	2,360
8	2.98		3.47		15.75	24,700	10.09	4,760	10.90	6,300	8.41	2,390
10	3.30		3.50		16.50	29,400	9.72	4,150	10.45	5,410	8.34	2,320
12	3.40		3.52		17.32	35,200	9.39	3,630	10.09	4,760	8.15	2,130
	November 22		November 23		November 24		November 30		December 1		December 2	
4	7.74	1,760	6.61	996	6.19	775	5.11	346	5.67	543	5.30	405
8	7.41	1,510	6.50	935	6.14	750	5.14	355	5.57	503	5.20	373
N	7.15	1,330	6.39	875	6.06	712	5.20	373	5.48	468	5.08	337
4	6.95	1,200	6.29	825	5.98	676	5.54	491	5.38	433	5.03	323
8	6.82	1,120	6.22	790	5.90	640	5.77	583	5.34	419	5.04	326
12	6.73	1,060	6.20	780	5.87	626	5.76	579	5.33	416	5.22	379
	December 3		December 4		December 5		December 6		December 7		December 8	
2	5.30	405	11.95	8,880	7.76	1,780	6.84	1,130	9.64	4,020	8.34	2,320
4	5.48	461	11.12	6,800	7.63	1,670	6.79	1,100	9.72	4,150	9.87	4,390
6	5.83	608	10.48	5,460	7.51	1,580	6.74	1,070	9.73	4,170	11.06	6,650
8	6.95	1,200	9.98	4,570	7.40	1,500	6.69	1,040	9.96	4,540	11.11	6,780
10	8.90	2,960	9.57	3,910	7.31	1,440	6.65	1,020	9.74	4,180	10.73	5,960
N	10.33	5,190	9.20	3,360	7.22	1,370	6.63	1,010	9.33	3,540	10.34	5,210
2	11.75	8,380	8.90	2,960	7.14	1,320	6.62	1,000	8.98	3,060	9.91	4,460
4	12.98	11,900	8.62	2,620	7.09	1,290	6.63	1,010	8.76	2,790	9.51	3,820
6	13.01	12,000	8.40	2,380	7.05	1,260	6.69	1,040	8.62	2,620	9.19	3,350
8	12.98	11,900	8.23	2,210	7.01	1,240	6.93	1,180	8.40	2,380	8.93	3,000
10	13.06	12,200	8.06	2,040	6.95	1,200	7.52	1,590	8.24	2,220	8.69	2,710
12	12.77	11,300	7.90	1,900	6.89	1,160	9.38	3,610	8.15	2,130	8.48	2,470
	December		December 9		December 10		December 11		December 12		December 13	
4			8.13	2,110	7.12	1,310	6.66	1,020	6.37	865	6.13	745
8			7.88	1,880	7.02	1,240	6.59	984	6.33	845	6.09	726
N			7.64	1,680	6.92	1,180	6.53	952	6.29	825	6.05	708
4			7.47	1,550	6.83	1,120	6.47	918	6.24	800	6.00	685
8			7.34	1,460	6.76	1,080	6.42	891	6.21	785	5.99	680
12			7.23	1,380	6.71	1,050	6.40	880	6.17	765	5.99	680

Supplemental record.--Nov. 18, 9:30 p.m., 16.59 ft, 30,000 cfs; Nov. 19, 1 a.m., 17.63 ft, 37,600 cfs; Nov. 20, 7 a.m., 8.55 ft, 2,540 cfs; Nov. 30, 6 p.m., 5.80 ft, 595 cfs; Dec. 3, 4:30 p.m., 13.32 ft, 13,100 cfs; Dec. 7, 5 a.m., 9.68 ft, 4,090 cfs, 7:30 a.m., 9.97 ft, 4,550 cfs; Dec. 8, 7 a.m., 11.20 ft, 7,000 cfs.

Merced River Slough near Newman, Calif.

Location.--Lat 37°22', long. 120°58', in NE¼ sec. 3 T. 7 S., R. 9 E., 0.1 mile downstream from bridge, 0.2 mile downstream from head of slough between Merced and San Joaquin Rivers, and 4.5 miles northeast of Newman. Datum of gage is 54.44 ft above mean sea level (levels by Bureau of Reclamation).

Gage-height record.--Water-stage recorder graph except for period Nov. 19-22 when there was no gage-height record.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 3,400 cfs and extended to peak stage. Shifting-control method used Dec. 4, 5. Discharge for period of no gage-height record computed on basis of records for Merced River near Stevinson.

Maxima.--November-December 1950: Discharge, 6,410 cfs 4 p.m. Dec. 5 (gage height, 11.29 ft), including flow in North Slough and overflow.
1944 to October 1950: Discharge, 990 cfs May 10, 12, 1945 (gage height, 7.50 ft).

Remarks.--Slough flows from Merced River to San Joaquin River, bypassing gaging station on San Joaquin River near Newman.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	0	39	9	0	3,990	17	0	1,030	25	23	252
2	0	72	10	0	5,680	18	0	1,110	26	48	234
3	0	117	11	0	4,710	19	0	980	27	42	186
4	0	253	12	0	2,610	20	70	435	28	43	163
5	0	4,120	13	0	1,800	21	5	296	29	44	147
6	0	4,940	14	0	1,490	22	0	192	30	41	141
7	0	2,990	15	0	1,220	23	0	68	31		137
8	0	3,120	16	0	838	24	0	180			
Monthly mean discharge, in cfs										10.5	1,404
Runoff, in acre-feet										627	86,360
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												
4												
6												
8												
10												
N												
2												
4												
6												
8												
10												
12												
	November 23		November 24		November 25		December 1		December 2		December 3	
4							3.07	50	3.17	56	3.91	105
8							2.97	44	3.35	67	4.02	114
N							2.75	34	3.48	75	4.08	118
4							2.64	28	3.57	81	4.17	126
8							2.73	32	3.65	86	4.23	130
12							2.95	44	3.77	95	4.12	122
	December 4		December 5		December 6		December 7		December 8		December 9	
2	4.04	115	8.15	626	11.23	5,870	10.86	3,690				
4	3.95	108	8.73	799	11.21	5,690	10.82	3,530	10.55	2,700	10.76	3,310
6	3.89	103	9.52	1,470	11.18	5,460	10.78	3,380				
8	3.89	103	10.18	2,720	11.16	5,320	10.73	3,210	10.67	3,020	10.77	3,350
10	4.10	120	10.78	3,980	11.13	5,110	10.68	3,060				
N	4.62	162	11.13	5,110	11.11	4,970	10.64	2,940	10.76	3,310	10.84	3,610
2	2.52	246	11.27	6,230	11.07	4,720	10.59	2,800				
4	6.27	330	11.29	6,410	11.04	4,540	10.53	2,650	10.78	3,380	10.98	4,210
6	6.88	408	11.28	6,320	11.02	4,420	10.48	2,540				
8	7.34	472	11.27	6,230	10.98	4,210	10.45	2,480	10.78	3,380	11.12	5,040
10	7.64	521	11.27	6,230	10.94	4,030	10.45	2,480				
12	7.89	569	11.26	6,140	10.90	3,850	10.46	2,500	10.77	3,350	11.18	5,460
	December 10		December 11		December 12		December 13		December 14		December 15	
4	11.20	5,600	11.14	5,180	10.72	3,180	10.13	1,940	9.87	1,560	9.70	1,370
8	11.21	5,690	11.12	5,040	10.58	2,770	10.08	1,860	9.84	1,520	9.68	1,350
N	11.22	5,780	11.09	4,840	10.44	2,460	10.03	1,790	9.81	1,490	9.60	1,290
4	11.23	5,870	11.04	4,540	10.34	2,270	9.98	1,720	9.77	1,440	9.46	1,170
8	11.21	5,690	10.96	4,120	10.26	2,140	9.94	1,670	9.75	1,420	9.24	1,020
12	11.18	5,460	10.85	3,650	10.18	2,010	9.90	1,620	9.73	1,400	8.98	894

Orestimba Creek basin

Orestimba Creek near Newman, Calif.

Location.--Lat 37°19'09", long. 121°07'14", in NW¼ sec. 20 T. 7 S., R. 8 E., at highway bridge, 3 miles downstream from Oso Creek and 5 miles west of Newman. Datum of gage is 191.86 ft above mean sea level (unadjusted).

Drainage area.--129 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 1,300 cfs and extended to peak stage on basis of slope-area determinations at gage heights 4.26 and 5.24 ft.

Maxima.--November-December 1950: Discharge, 2,470 cfs 10:30 p.m. Dec. 3 (gage height, 4.49 ft).
1932 to October 1950: Discharge, 4,900 cfs Jan. 21, 1943 (gage height, 5.95 ft), from rating curve extended above 1,200 cfs on basis of slope-area determinations as explained above and by logarithmic plotting.

Remarks.--No storage or large diversion.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	0	0	9	0	242	17	0	18	25	2.8	5.5
2	0	0	10	0	98	18	2.5	15	26	1.0	4.5
3	0	304	11	0	55	19	450	12	27	0	3.9
4	0	738	12	0	38	20	258	10	28	0	3.3
5	0	142	13	0	29	21	155	8.4	29	0	3.1
6	0	72	14	0	30	22	40	7.2	30	0	3.1
7	0	109	15	0	32	23	14	6.1	31		3.1
8	0	935	16	0	22	24	6.0	5.5			
Monthly mean discharge, in cfs										31.0	95.3
Runoff, in acre-feet										1,840	5,860
Runoff, in inches										0.27	0.85

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				0	2.60	570	1.38	72	2.09	286		
4				0	3.46	1,280	1.32	63	1.98	238	1.26	55
6				0	3.06	916	1.26	55	1.89	205		
8				0	2.68	626	1.22	50	1.80	175	1.18	46
10				0	2.42	457	1.30	60	1.73	153		
N				0	2.18	330	2.15	315	1.66	133	1.09	38
2				0	2.00	245	2.25	365	1.59	115		
4				0	1.85	192	2.32	401	1.53	101	1.02	33
6				0	1.70	144	2.57	550	1.48	90		
8				0	1.59	115	2.48	493	1.43	81	.94	26
10				0	1.51	96	2.33	406	1.38	72		
12			1.25	54	1.44	83	2.22	350	1.33	64	.88	22
	November 23		November 24		November 25		November 29		November 30		December 1	
4	0.83	19	0.58	8.0	0.43	3.3						
8	.78	16	.56	7.2	.42	3.1						
N	.73	14	.52	5.8	.40	2.9						
4	.68	12	.48	4.5	.38	2.5						
8	.65	10	.47	4.2	.37	2.3						
12	.62	9.3	.45	3.9	.36	2.1						
	December 3		December 4		December 5		December 6		December 7		December 8	
2		0	3.86	1,700	1.89	205			1.33	64	1.72	150
4		0	3.46	1,280	1.84	188	1.43	81	1.39	74	3.87	1,710
6		0	3.14	986	1.79	172			1.48	90	3.75	1,580
8		0	2.89	778	1.74	156	1.39	74	1.51	96	3.66	1,480
10		0	2.67	619	1.70	144			1.55	106	3.47	1,290
N		0	2.53	524	1.67	136	1.35	68	1.63	125	3.25	1,080
2		0	2.39	440	1.63	125			1.65	130	3.02	882
4		0	2.29	385	1.60	117	1.33	64	1.64	128	2.85	748
6		0	2.20	340	1.57	110			1.63	125	2.71	647
8	2.10	290	2.10	290	1.54	103	1.36	69	1.61	120	2.58	557
10	4.38	2,320	2.03	258	1.51	96			1.69	141	2.48	493
12	4.36	2,290	1.95	226	1.48	90	1.33	64	1.68	139	2.38	434
	December 9		December 10		December 11		December 12		December 13		December 14	
4	2.20	340	1.61	120							0.94	26
8	2.03	258	1.55	106	1.28	58					.95	27
N	1.93	219	1.50	94			1.08	37	0.97	29	.95	27
4	1.84	188	1.45	84	1.22	50					.97	29
8	1.76	163	1.41	77							1.09	38
12	1.69	141	1.37	70	1.17	45	1.02	33	.94	26	1.11	40

Supplemental record.--Nov. 18, 11 p.m., 1.02 ft, 33 cfs; Nov. 19, 2:30 a.m., 3.65 ft, 1,470 cfs; Nov. 20, 11 a.m., 2.08 ft, 281 cfs; Dec. 3, 7 p.m., 1.92 ft, 215 cfs, 9 p.m., 3.00 ft, 865 cfs, 10:30 p.m., 4.49 ft, 2,470 cfs, 11 p.m., 4.46 ft, 2,420 cfs; Dec. 8, 3 a.m., 3.74 ft, 1,560 cfs.

Tuolumne River basin

Hetch Hetchy Reservoir at Hetch Hetchy, Calif.

Location.--Lat 37°57', long. 119°47', in NW¼ sec. 16, T. 1 N., R. 20 E., at O'Shaughnessy Dam on Tuolumne River at Hetch Hetchy in Yosemite National Park, 1.5 miles downstream from Falls Creek. Datum of gage is at mean sea level (levels by city of San Francisco).

Drainage area.--460 sq mi.

Gage-height record.--Water-stage recorder graph except Dec. 3-10, when a stage-graph was based on 7 a.m. daily staff readings.

Remarks.--Reservoir is formed by concrete gravity-type dam, completed to crest elevation 3,726.5 ft in 1923 and raised to 3,912.0 ft in 1937; storage began Apr. 6, 1923; 10-ft drum gates were installed on spillway in 1949. Usable capacity, 360,400 acre-ft between elevations, 3,512.0 ft (somewhat above bottom outlet) and 3,806.0 ft (top of drum-type spillway gates) above mean sea level. Water flows down Tuolumne River 15 miles to Early intake, where part is diverted through Hetch Hetchy aqueduct to Moccasin Creek power plant. At Moccasin Creek diversion dam, water re-enters Hetch Hetchy aqueduct and flows into Crystall Springs Reservoir, which supplies city of San Francisco. Surplus water is spilled into Don Pedro Reservoir at Red Mountain Bar. Hetch Hetchy Reservoir is main storage unit of Hetch Hetchy water-supply system for San Francisco. Records show contents at 12 p.m., all of which is available for release.

Elevation and contents at 12 p.m. of indicated day, 1950

Day	November		December	
	Elevation (feet)	Contents (acre-feet)	Elevation (feet)	Contents (acre-feet)
1	3,722.3	209,700	3,801.5	351,500
2	3,721.8	208,900	3,801.6	351,700
3	3,721.4	208,200	3,810.4	369,100
4	3,721.0	207,600	3,808.8	365,900
5	3,720.5	206,800	3,807.7	363,700
6	3,720.0	206,000	3,808.7	365,700
7	3,719.4	205,100	3,809.9	368,100
8	3,718.8	204,100	3,809.6	367,500
9	3,718.2	203,200	3,808.4	365,100
10	3,717.4	201,900	3,806.8	361,900
11	3,716.8	200,900	3,804.4	357,200
12	3,716.0	199,700	3,801.8	352,100
13	3,715.2	198,400	3,799.0	346,600
14	3,714.6	197,500	3,797.1	343,000
15	3,713.9	196,400	3,795.7	340,300
16	3,713.5	195,700	3,796.1	341,000
17	3,713.4	195,600	3,796.3	341,400
18	3,734.5	229,700	3,796.2	341,200
19	3,757.6	269,400	3,796.2	341,200
20	3,774.3	299,800	3,796.2	341,200
21	3,790.5	330,300	3,796.1	341,000
22	3,795.1	339,100	3,795.9	340,600
23	3,797.1	343,000	3,795.8	340,400
24	3,798.4	345,500	3,795.6	340,100
25	3,799.2	347,000	3,795.4	339,700
26	3,799.8	348,200	3,795.2	339,300
27	3,800.2	349,000	3,794.9	338,700
28	3,800.6	349,800	3,794.7	338,300
29	3,800.7	350,000	3,794.4	337,700
30	3,801.2	350,900	3,794.1	337,200
31			3,793.8	336,600
Change in contents	—	+140,600	—	-14,300

Tuolumne River near Hetch Hetchy, Calif.

Location.--Lat 37°56', long. 119°48', in SE¼ sec. 17, T. 1 N., R. 20 E., in Yosemite National Park, 1 mile downstream from O'Shaughnessy Dam at Hetch Hetchy and 2.5 miles downstream from Falls Creek. Altitude of gage, about 3,450 ft (from topographic map).

Drainage area.--462 sq mi.

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

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

Maxima.--November-December 1950: Discharge, 9,310 cfs 2 p.m. Dec. 8 (gage height, 12.65 ft).
1915 to October 1950: Discharge, 12,900 cfs June 1, 1943 (gage height, 13.90 ft), from rating curve extended above 10,000 cfs.

Remarks.--Flood flow completely regulated by Hetch Hetchy Reservoir except Dec. 3-9.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	739	769	9	739	5,210	17	736	800	25	760	790
2	748	772	10	742	3,870	18	725	800	26	760	790
3	745	2,570	11	745	3,980	19	575	800	27	760	787
4	745	6,540	12	742	4,110	20	804	800	28	760	784
5	745	3,050	13	739	4,030	21	864	797	29	760	784
6	745	2,450	14	739	3,970	22	867	797	30	763	781
7	742	5,960	15	736	2,640	23	781	797	31		778
8	739	8,110	16	736	808	24	757	794			
Monthly mean discharge, in cfs										751	2,281
Runoff, in acre-feet										44,700	140,300
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												
4												
6												
8												
10												
N												
2												
4												
6												
8												
10												
12												
	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	6.19	787	12.43	8,690	10.23	3,920	8.80	2,260	10.83	4,950	11.32	5,950
4	6.23	800	12.37	8,530	10.06	3,650	8.71	2,180	11.11	5,510	11.59	6,570
6	6.29	822	12.23	8,170	9.93	3,470	8.67	2,150	11.33	5,980	11.93	7,390
8	6.38	853	12.00	7,570	9.78	3,270	8.64	2,120	11.47	6,280	12.27	8,270
10	6.47	884	11.78	7,020	9.64	3,100	8.60	2,090	11.56	6,490	12.51	8,920
N	6.57	920	11.53	6,420	9.51	2,940	8.54	2,040	11.58	6,540	12.63	9,250
2	6.54	909	11.30	5,910	9.39	2,820	8.53	2,030	11.55	6,470	12.65	9,310
4	8.45	1,970	11.10	5,490	9.29	2,720	8.60	2,090	11.49	6,330	12.61	9,200
6	10.27	3,980	10.91	5,110	9.19	2,620	8.91	2,360	11.41	6,150	12.51	8,920
8	11.40	6,130	10.71	4,730	9.00	2,440	9.50	2,930	11.31	5,930	12.41	8,640
10	12.18	8,040	10.55	4,440	8.95	2,400	10.15	3,790	11.23	5,760	12.24	8,190
12	12.40	8,610	10.38	4,160	8.85	2,300	10.52	4,390	11.23	5,760	12.04	7,670
	December 8		December 9		December 10		December 11		December 12		December 13	
4	11.65	6,710	9.99	3,560	10.12	3,740						
8	11.27	5,840	10.05	3,640	9.94	3,490						
N	10.54	4,420	9.76	3,240	10.39	4,170						
4	10.29	4,010	10.32	4,060	10.38	4,160						
8	10.55	4,440	10.67	4,660	10.38	4,160						
12	10.27	3,980	10.37	4,140	10.37	4,140						

Tuolumne River above La Grange Dam, near La Grange, Calif.

Location.--Lat 37°42'35", long. 120°24'45", in NE¼ sec. 3, T. 3 S., R. 14 E., 0.5 mile downstream from Don Pedro Dam, 3.5 miles upstream from La Grange Dam, and 5 miles upstream from La Grange. Altitude of gage, about 330 ft (from topographic map).

Drainage area.--1,540 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 9,000 cfs and extended to peak stage by computed flow over Don Pedro and La Grange Dams.

Maxima.--November-December 1950: Discharge, 61,000 cfs 11:30 a.m. Dec. 8 (gage height, 43.8 ft).
1895 to October 1950: Discharge, 60,300 cfs Jan. 31, 1911 (gage height, 16.45 ft, at site at La Grange Dam, from graph constructed on basis of frequent gage readings), from rating curve extended above 18,000 cfs; gage height at present site (since March 1915), 29.6 ft Mar. 25, 1928 (discharge, 38,100 cfs).

Remarks.--Flow partly regulated by Don Pedro and Hetch Hetchy Reservoirs.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	833	3,120	9	828	27,400	17	823	9,170	25	8,700	2,350
2	805	2,880	10	797	15,200	18	764	9,060	26	8,530	2,340
3	801	4,450	11	676	11,200	19	3,970	9,000	27	8,380	2,390
4	701	8,780	12	570	9,990	20	8,450	8,420	28	7,690	2,400
5	552	8,860	13	842	9,360	21	23,500	7,730	29	6,250	2,400
6	794	8,850	14	841	9,290	22	16,400	6,460	30	4,150	2,400
7	818	15,400	15	864	9,320	23	9,820	3,430	31		2,390
8	825	46,800	16	943	9,240	24	8,720	2,380			
Monthly mean discharge, in cfs										4,288	8,788
Runoff, in acre-feet										255,100	540,400
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	4.42	52	4.57	71	5.06	157	13.44	7,220	16.96	12,500	21.90	20,400
4	4.38	48	4.48	60	4.77	102	13.46	7,240	17.92	14,100	21.22	19,400
6	6.56	642	6.10	445	5.22	192	13.55	7,370	22.65	21,600	21.22	19,400
8	7.25	1,010	6.99	854	6.36	552	14.39	8,600	26.27	27,700	20.57	18,300
10	7.40	1,100	7.32	1,050	7.83	1,400	14.49	8,760	26.70	28,400	19.95	17,300
N	7.10	920	7.17	962	12.15	5,480	14.49	8,760	26.97	28,800	19.30	16,300
2	7.04	884	6.92	816	13.33	7,060	14.50	8,770	26.76	28,500	18.60	15,200
4	7.63	1,260	7.18	968	13.39	7,150	14.52	8,800	26.24	27,600	18.13	14,400
6	8.23	1,710	8.17	1,670	13.47	7,260	14.56	8,860	25.57	26,500	17.70	13,700
8	7.39	1,030	7.41	1,110	13.49	7,270	14.58	8,890	24.82	25,200	17.28	13,000
10	6.51	620	6.50	615	13.48	7,270	14.60	8,920	24.00	23,800	16.91	12,500
12	6.39	566	6.32	534	13.26	6,960	16.27	11,400	23.01	22,200	16.51	11,800
	November 23		November 24		November 25		November 29		November 30		December 1	
4	15.37	10,100	13.79	7,710	13.94	7,930	12.73	6,230	11.31	4,500	8.57	1,990
8	15.58	10,400	14.62	8,950	14.58	8,890	13.56	7,380	12.35	5,740	10.14	3,360
N	15.18	9,790	14.60	8,920	14.56	8,860	12.38	5,770	10.16	3,370	10.15	3,360
4	14.38	9,340	14.60	8,920	14.55	8,840	12.38	5,770	10.16	3,370	10.14	3,360
8	14.63	8,970	14.60	8,920	14.53	8,820	12.36	5,750	10.15	3,360	10.14	3,360
12	14.57	8,880	14.58	8,890	14.53	8,820	12.35	5,740	10.10	3,320	10.10	3,320
	December 2		December 3		December 4		December 5		December 6		December 7	
2	8.69	2,080	7.69	1,300	13.77	7,680	14.08	8,140	14.08	8,140	14.17	8,280
4	8.68	2,070	7.64	1,270	13.81	7,740	14.08	8,140	14.07	8,120	14.07	8,120
6	9.78	3,030	8.42	1,870	13.96	7,960	14.07	8,120	14.07	8,120	14.17	8,280
8	10.13	3,350	9.26	2,560	14.61	8,940	14.72	9,100	14.72	9,100	14.38	8,590
10	10.13	3,350	10.17	3,380	14.62	8,950	14.73	9,120	14.71	9,080	15.01	9,540
N	10.14	3,360	10.18	3,390	14.68	9,040	14.73	9,120	14.71	9,080	17.70	13,700
2	10.14	3,360	11.73	4,980	15.06	9,610	14.73	9,120	14.70	9,070	20.48	18,200
4	10.14	3,360	11.76	5,010	14.69	9,060	14.73	9,120	14.70	9,070	22.70	21,700
6	9.26	2,560	13.66	7,520	14.70	9,070	14.73	9,120	14.70	9,070	24.26	24,200
8	9.26	2,560	13.84	7,780	14.71	9,080	14.72	9,100	14.72	9,100	24.13	24,000
10	9.26	2,560	14.50	8,770	14.71	9,080	14.72	9,100	14.72	9,100	24.08	23,900
12	9.26	2,560	14.44	8,680	14.71	9,080	14.71	9,080	14.72	9,100	24.16	24,100
	December 8		December 9		December 10		December 11		December 12		December 13	
4	28.69	31,800	29.29	32,900	19.06	16,200	15.56	10,900	14.72	9,680	13.99	8,580
8	39.00	51,400	27.70	30,100	19.33	16,600	16.31	12,100	15.39	10,700	14.63	9,540
N	43.54	60,500	25.75	26,800	18.65	15,600	15.95	11,500	15.12	10,300	14.63	9,540
4	41.30	56,000	23.83	23,700	18.41	15,200	15.44	10,800	14.65	9,580	14.61	9,520
8	37.32	48,000	22.37	21,400	16.51	12,400	15.44	10,800	14.65	9,580	14.60	9,500
12	33.46	40,600	20.78	18,800	16.32	12,100	15.41	10,700	14.62	9,530	14.58	9,470

Supplemental records.--Nov. 21, 11:30 a.m., 22.0 ft, 28,900 cfs; Dec. 8, 2 a.m., 23.88 ft, 23,600 cfs, 6 a.m., 35.1 ft, 43,800 cfs; 10 a.m., 43.06 ft, 59,500 cfs, 11:30 a.m., 43.8 ft, 61,000 cfs, 2 p.m., 42.72 ft, 58,800 cfs, 6 p.m., 39.40 ft, 52,200 cfs, 10 p.m., 35.32 ft, 44,200 cfs.

Don Pedro Reservoir near La Grange, Calif.

Location.--Lat 37°42'48", long. 120°24'14", in SW¼ sec. 35, T. 2 S., R. 14 E., at Don Pedro Dam on Tuolumne River, 1 mile downstream from Rogers Creek and 5.5 miles upstream from La Grange. Datum of gage is at mean sea level (levels by Turlock Irrigation District).

Drainage area.--1,539 sq mi.

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

Remarks.--Reservoir is formed by concrete gravity-type dam, completed about Jan. 1, 1923; storage began Nov. 14, 1922. Usable capacity 260,000 acre-ft between elevations 476 ft (mutually agreed-upon minimum) and 605.55 ft (top of drum-type spillway gates) above mean sea level. Water passes through power plant at dam and down Tuolumne River to La Grange Dam, 4 miles downstream, where it is diverted into Turlock and Modesto Canals for irrigation. This reservoir is operated jointly by Turlock and Modesto Irrigation Districts. Records include 30,000 acre-ft not available for release (mutually agreed-upon minimum).

Elevation and contents at 12 p.m. of indicated day, 1950

Day	November		December	
	Elevation (feet)	Contents (acre-feet)	Elevation (feet)	Contents (acre-feet)
1	525.7	86,900	571.9	190,800
2	526.3	87,800	571.4	189,400
3	527.0	89,000	587.1	233,900
4	527.8	90,400	600.0	272,900
5	528.5	91,500	601.0	276,000
6	528.8	92,100	600.7	275,100
7	529.1	92,600	605.3	289,600
8	529.2	92,700	603.3	283,300
9	529.2	92,700	598.6	268,600
10	529.3	92,900	596.1	260,800
11	529.5	93,300	594.8	256,900
12	529.7	93,600	593.7	253,500
13	529.7	93,600	592.4	249,600
14	529.9	94,000	593.9	254,100
15	530.3	94,700	594.5	256,000
16	530.6	95,200	591.9	248,100
17	532.0	97,700	588.8	238,900
18	559.2	157,900	585.3	228,600
19	590.8	244,800	581.5	217,600
20	600.5	274,500	577.8	207,100
21	603.3	283,300	574.5	197,900
22	599.1	270,100	571.8	190,500
23	596.2	261,100	571.0	188,300
24	592.9	251,100	570.9	188,100
25	589.2	240,100	570.7	187,500
26	585.1	228,000	570.5	187,000
27	580.7	215,300	570.2	186,200
28	576.8	204,300	569.9	185,400
29	573.9	196,300	569.5	184,300
30	572.4	192,100	569.2	183,500
31			568.7	182,200
Change in contents		+106,300		-9,900

Tuolumne River at Modesto, Calif.

Location.--Lat 37°37'40", long. 120°59'20", in SW¼ sec. 33, T. 3 S., R. 9 E., at railroad bridge at Modesto, 0.3 mile downstream from Dry Creek. Datum of gage is mean sea level, unadjusted (levels by Modesto Irrigation District).

Gage-height record.--Water-stage recorder graph except Dec. 24, 25.

Discharge record.--Stage-discharge relation defined by current-meter measurements. Discharge for Dec. 24, 25 computed on basis of unpublished record for station at Hickman Bridge.

Maxima.--November-December 1950: Discharge, 57,000 cfs 5 a.m. Dec. 9 (gage height, 69.19 ft).
1943 to October 1950: Discharge, 8,070 cfs Feb. 5, 1945 (gage height, 51.32 ft).

Remarks.--Flow regulated by reservoirs and power plants above station. Many diversions above station for irrigation. See "Remarks" for Tuolumne River above La Grange Dam, near La Grange.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	946	3,940	9	942	43,800	17	1,040	8,640	25	8,240	2,850
2	1,040	3,600	10	922	20,700	18	1,040	8,460	26	8,400	2,770
3	1,120	3,310	11	892	13,800	19	1,110	8,330	27	8,340	2,770
4	1,130	6,990	12	836	10,700	20	5,600	8,220	28	8,170	2,770
5	1,050	9,880	13	775	9,210	21	9,450	7,430	29	7,210	2,760
6	922	9,260	14	826	8,700	22	18,900	6,890	30	5,780	2,730
7	1,020	9,770	15	910	8,790	23	15,300	5,680	31		2,720
8	1,010	21,500	16	903	8,860	24	9,890	3,150			
Monthly mean discharge, in cfs										4,124	8,677
Runoff, in acre-feet										245,400	533,500
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 19		November 20		November 21		November 22		November 23		November 24	
2	39.16	986	40.50	1,530	52.00	7,950	59.00	15,200				
4	39.15	982	43.50	3,000	52.16	8,080	60.07	16,800	60.60	17,600	55.62	11,200
6	39.16	986	46.20	4,390	52.33	8,210	61.00	18,300				
8	39.20	1,000	48.00	5,350	52.55	8,390	61.64	19,400	59.87	16,500	54.75	10,400
10	39.30	1,040	49.05	5,980	52.79	8,600	62.02	20,100				
N	39.49	1,120	49.77	6,410	53.09	8,850	62.22	20,500	59.10	15,400	54.07	9,720
2	39.71	1,210	50.30	6,730	53.50	9,210	62.29	20,600				
4	39.84	1,260	50.68	6,980	54.09	9,740	62.22	20,500	58.15	14,100	53.32	9,050
6	39.85	1,260	51.02	7,210	54.78	10,400	62.07	20,200				
8	39.79	1,240	51.34	7,440	55.62	11,200	61.84	19,700	57.25	13,000	52.87	8,660
10	39.69	1,200	51.60	7,640	56.42	12,100	61.57	19,300				
12	39.63	1,170	51.80	7,790	57.75	13,600	61.27	18,700	56.43	12,100	52.67	8,490
	November 25		November 29		November 30		December 1		December 2		December 3	
4	52.55	8,390	51.53	7,580	49.35	6,160	46.36	4,450	45.04	3,720	44.96	3,680
8	52.50	8,350	51.33	7,430	49.12	6,020	45.84	4,160	45.15	3,780	44.64	3,520
N	52.32	8,210	51.07	7,250	48.85	5,860	45.20	3,810	45.07	3,740	44.23	3,320
4	52.10	8,030	50.64	6,950	48.32	5,540	44.63	3,520	44.46	3,430	43.54	2,970
8	52.14	8,060	50.32	6,740	48.08	5,400	44.45	3,420	44.31	3,360	43.31	2,860
12	52.37	8,250	49.78	6,420	47.27	4,950	44.81	3,600	44.76	3,580	44.56	3,480
	December 4		December 5		December 6		December 7		December 8		December 9	
2	45.60	4,030	54.33	9,960	53.72	9,410	53.50	9,210	57.04	12,700	68.80	52,900
4	46.85	4,720	54.50	10,100	53.70	9,390	53.55	9,260	57.94	13,800	69.17	56,800
6	48.20	5,470	54.58	10,200	53.70	9,390	53.62	9,320	58.94	15,200	69.17	56,800
8	49.35	6,160	54.60	10,200	53.66	9,350	53.70	9,390	59.94	16,600	68.95	54,400
10	50.20	6,670	54.57	10,200	53.63	9,330	53.80	9,480	60.77	17,900	68.61	51,000
N	50.98	7,190	54.45	10,100	53.58	9,280	53.84	9,520	61.44	19,000	68.05	45,900
2	51.68	7,700	54.28	9,920	53.48	9,190	53.87	9,540	62.10	20,200	67.42	41,000
4	52.35	8,230	54.10	9,750	53.40	9,120	54.05	9,700	62.94	21,900	66.80	37,000
6	52.88	8,670	53.95	9,620	53.40	9,120	54.34	9,970	64.00	24,700	66.17	33,400
8	53.33	9,060	53.85	9,520	53.38	9,100	54.84	10,400	65.50	30,200	65.68	31,100
10	53.70	9,390	53.80	9,480	53.38	9,100	55.44	11,000	66.85	37,300	65.12	28,700
12	54.05	9,700	53.76	9,440	53.45	9,160	56.14	11,800	68.08	46,100	64.60	26,700
	December 10		December 11		December 12		December 13		December 14		December 15	
4	63.63	23,600	59.28	15,600	55.73	11,300	54.05	9,700	53.00	8,780	52.89	8,680
8	62.90	21,800	58.48	14,500	55.37	11,000	53.75	9,440	53.00	8,780	52.95	8,730
N	62.20	20,400	57.72	13,600	55.05	10,600	53.50	9,210	53.00	8,780	53.05	8,820
4	61.35	18,900	57.00	12,700	54.65	10,300	53.14	8,890	52.81	8,610	53.08	8,840
8	60.61	17,600	56.45	12,100	54.45	10,100	52.90	8,690	52.76	8,570	53.10	8,860
12	59.95	16,600	56.11	11,700	54.30	9,940	52.92	8,710	52.84	8,640	53.19	8,940

Falls Creek near Hetch Hetchy, Calif.

Location.--Lat 37°58', long. 119°46', in NE¼ sec. 3, T. 1 N., R. 20 E., in Yosemite National Park, 0.2 mile upstream from Wampana Falls, 1 mile upstream from mouth, and 2 miles northeast of Hetch Hetchy. Altitude of gage, about 5,600 ft (from topographic map).

Drainage area.--45.2 sq mi.

Gage-height record.--Water-stage recorder graph except 3:00 p.m. Nov. 20 to 11:30 a.m. No. 29.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 2,500 cfs and extended to peak stage on basis of velocity-area studies. Discharge for period of no gage-height record was computed on basis of records for Cherry and Eleanor Creeks.

Maxima.--November-December 1950: Discharge, 6,660 cfs 3 a.m. Nov. 19 (gage height, 9.0 ft).
1915 to October 1950: Discharge, 6,300 cfs Dec. 11, 1937 (gage height, 8.90 ft), from rating curve extended above 1,300 cfs as explained above.

Remarks.--No diversion or regulation.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	64	124	9	54	776	17	185	105	25	180	58
2	62	100	10	43	326	18	2,590	90	26	150	56
3	101	1,720	11	34	206	19	4,580	84	27	130	52
4	121	1,180	12	28	154	20	3,500	73	28	120	50
5	104	359	13	26	124	21	1,300	69	29	115	50
6	83	388	14	34	321	22	700	65	30	126	49
7	64	1,140	15	35	210	23	400	62	31		48
8	58	1,830	16	101	133	24	220	61			
Monthly mean discharge, in cfs										510	325
Runoff, in acre-feet										30,360	19,960
Runoff, in inches										12.6	8.28

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 16		November 17		November 18		November 19		November 21		November 22	
2			3.58	144	4.79	517	8.92	6,370				
4	2.94	40	3.54	135	5.25	732	8.95	6,480				
6			3.52	131	5.74	1,060	8.82	6,030				
8	2.98	43	3.50	127	6.27	1,480	8.68	5,560				
10			3.48	123	6.55	1,720	8.55	5,140				
N	3.02	47	3.51	129	7.05	2,240	8.41	4,720				
2			3.62	152	7.51	2,870	8.22	4,230				
4	3.72	175	3.80	194	7.91	3,570	7.94	3,700				
6			3.82	199	8.12	4,000	7.67	3,280				
8	3.75	182	3.98	242	8.35	4,560	7.40	2,880				
10			4.36	359	8.58	5,240	7.15	2,540				
12	3.65	160	4.48	402	8.75	5,790	6.98	2,330				
	November 23		November 24		November 25		November 30		December 1		December 2	
4							3.27	102	3.47	139	3.28	104
8							3.43	131	3.43	131	3.22	94
N							3.46	137	3.39	123	3.16	85
4							3.45	135	3.37	120	3.14	83
8							3.44	133	3.32	111	3.18	88
12							3.45	135	3.31	109	3.83	228
	December 3		December 4		December 5		December 6		December 7		December 8	
2	4.44	397	6.91	2,240	4.74	487	3.88	240	5.65	1,010	5.89	1,200
4	4.93	552	6.63	1,920	4.63	454	3.83	228	5.85	1,170	6.10	1,390
6	5.32	764	6.32	1,600	4.53	424	3.81	222	5.91	1,220	6.50	1,780
8	5.70	1,050	6.03	1,330	4.44	397	3.80	220	6.08	1,370	6.85	2,170
10	6.06	1,350	5.83	1,150	4.34	367	3.78	215	6.07	1,360	6.93	2,270
N	6.52	1,800	5.63	994	4.26	343	3.78	215	5.93	1,240	6.96	2,300
2	6.86	2,180	5.46	862	4.18	319	3.93	252	5.87	1,190	6.92	2,250
4	7.19	2,600	5.29	744	4.12	301	4.13	304	5.83	1,150	6.81	2,120
6	7.43	2,920	5.15	660	4.07	288	4.73	484	5.74	1,080	6.64	1,930
8	7.47	2,980	5.04	600	4.02	275	5.35	785	5.63	994	6.48	1,760
10	7.26	2,690	4.94	556	3.98	265	5.49	883	5.55	930	6.30	1,580
12	7.09	2,470	4.84	519	3.93	252	5.59	962	5.63	994	6.15	1,440
	December 9		December 10		December 11		December 12		December 13		December	
4	5.80	1,130	4.44	397	3.86	235	3.60	170	3.45	135		
8	5.48	876	4.29	352	3.78	215	3.57	162	3.43	131		
N	5.17	672	4.16	313	3.72	200	3.52	150	3.38	121		
4	4.96	564	4.04	280	3.68	190	3.48	141	3.33	112		
8	4.77	496	3.98	265	3.65	182	3.48	141	3.34	114		
12	4.61	448	3.92	250	3.62	175	3.47	139	3.38	121		

Supplemental record.--Nov. 19, 3 a.m., 9.0 ft, 6,660 cfs; Dec. 2, 2 a.m., 3.30 ft, 107 cfs, 6 a.m., 3.25 ft, 99 cfs, 10 a.m., 3.18 ft, 88 cfs, 2 p.m., 3.14 ft, 83 cfs, 6 p.m., 3.15 ft, 84 cfs, 10 p.m., 3.36 ft, 118 cfs; Dec. 9, 2 a.m., 5.98 ft, 1,280 cfs, 6 a.m., 5.64 ft, 1,000 cfs, 10 a.m., 5.31 ft, 757 cfs, 2 p.m., 5.03 ft, 595 cfs, 6 p.m., 4.86 ft, 526 cfs, 10 p.m., 4.68 ft, 469 cfs.

Cherry Creek near Hetch Hetchy, Calif.

Location.--Lat 38°00', long. 119°54', in SW¼ sec. 28 T. 2 N., R. 19 E., 2.5 miles northwest of Lake Eleanor Dam, 4 miles upstream from Eleanor Creek, and 7.5 miles northwest of Hetch Hetchy. Altitude of gage, about 4,500 ft (from topographic map).

Drainage area.--111 sq mi.

Gage-height record.--Water-stage recorder graph except for periods 4 p.m. Nov. 18 to 11 a.m. Nov. 21, when graph was drawn on basis of cable gage readings 500 ft downstream, and 6 p.m. Dec. 5 to 3:30 p.m. Dec. 9, 4 a.m. Dec. 10 to 11 a.m. Dec. 16, 10 a.m. to 6 p.m. Dec. 17, 6 a.m. Dec. 18 to 12 p.m. Dec. 31, when there was no gage-height record.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 7,600 cfs and extended to peak stage on basis of velocity-area studies. Discharge during periods of no gage-height record was computed on basis of records for Eleanor and Falls Creeks. Shifting-control method used Nov. 21 to Dec. 5.

Maxima.--November-December 1950: Discharge, 13,400 cfs 12 p.m. Nov. 18 (gage height, 20.17 ft).
1910 to October 1950: Discharge, 18,100 cfs Dec. 11, 1937 (gage height, 25.1 ft, from floodmarks) from rating curve extended above 4,000 cfs on basis of velocity-area studies.

Remarks.--No diversions or regulation.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	410	238	9	198	2,000	17	773	334	25	441	155
2	452	187	10	151	800	18	7,950	280	26	319	150
3	596	5,010	11	121	500	19	8,220	240	27	231	145
4	461	1,710	12	102	330	20	8,380	225	28	172	140
5	385	664	13	102	270	21	6,560	200	29	154	138
6	318	1,000	14	187	1,300	22	1,930	180	30	357	133
7	244	2,600	15	220	760	23	957	170	31		130
8	212	4,400	16	349	434	24	616	160			
Monthly mean discharge, in cfs										1,386	806
Runoff, in acre-feet										82,450	49,550
Runoff, in inches										13.9	8.37

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	3.09	499	6.86	2,400	19.70	12,900	10.34	4,930	16.49	10,000	7.77	2,860
4	3.14	518	8.25	3,340	19.05	12,300	10.94	5,410	16.12	9,710	7.34	2,560
6	3.18	533	9.94	4,610	18.10	11,500	12.08	6,320	15.07	8,760	7.02	2,300
8	3.17	529	11.30	5,700	17.17	10,600	12.16	7,190	14.04	7,890	6.71	2,080
10	3.11	507	13.35	7,340	15.58	9,220	14.19	8,010	12.86	6,950	6.51	1,940
N	3.12	510	14.50	8,260	12.00	6,260	15.42	9,080	12.00	6,260	6,32	1,800
2	3.35	592	15.67	9,300	11.27	5,680	16.38	9,940	11.05	5,500	6.14	1,680
4	3.95	830	17.03	10,500	11.00	5,460	16.75	10,300	10.46	5,030	6.00	1,580
6	4.39	1,020	17.78	11,200	10.80	5,300	17.00	10,500	9.74	4,440	5.84	1,480
8	4.68	1,160	18.77	12,100	10.63	5,160	17.19	10,700	9.14	3,960	5.66	1,350
10	5 12	1,390	19.82	13,000	10.48	5,040	17.10	10,600	8.66	3,530	5.54	1,280
12	6.00	1,880	20.17	13,400	10.35	4,940	16.68	10,200	8.25	3,220	5.43	1,220
	November 23		November 24		November 25		November 29		November 30		December 1	
4	5.22	1,130	4.35	715	3.89	500	2.93	155	2.93	155	3.41	303
8	5.00	1,020	4.23	655	3.83	472	2.93	155	3.16	218	3.25	247
N	4.81	935	4.12	603	3.75	438	2.93	155	4.15	616	3.09	197
4	4.65	855	4.02	558	3.68	410	2.92	153	3.79	454	3.14	212
8	4.55	810	3.95	526	3.61	382	2.92	153	3.77	446	3.12	206
12	4.45	765	3.91	508	3.60	378	2.92	153	3.53	350	3.01	175
	December 2		December 3		December 4		December 5		December 6		December 7	
2	2.94	157	5.06	1,060	8.13	3,120	4.64	850				
4	2.94	157	5.90	1,520	7.28	2,500	4.53	795				
6	2.93	155	7.25	2,470	6.66	2,050	4.43	745				
8	2.92	153	8.65	3,520	6.24	1,740	4.34	700				
10	2.89	145	11.25	5,660	5.90	1,520	4.23	645				
N	2.89	145	13.10	7,140	5.68	1,370	4.19	626				
2	2.89	145	14.00	7,860	5.54	1,280	4.19	626				
4	2.91	150	14.60	8,340	5.40	1,210	4.17	616				
6	2.92	153	14.40	8,180	5.26	1,150	4.10	585				
8	2.93	155	12.65	6,780	5.10	1,070	4.02	549				
10	3.36	285	10.70	5,220	4.92	986	3.96	522				
12	4.35	715	9.40	4,140	4.77	915	3.92	504				
	December 8		December 9		December 10		December 11		December 12		December 13	
4												
8												
N												
4												
8												
12												

Supplemental record.--Dec. 3, 4:30 p.m., 14.65 ft, 8,380 cfs.

Lake Eleanor near Hetch Hetchy, Calif.

Location.--Lat 37°58', long. 119°53', in NW¼ sec. 3, T. 1 N., R. 19 E., at dam on Eleanor Creek, 1.7 mile upstream from Miguel Creek and 5.5 miles northwest of Hetch Hetchy. Datum of gage is at mean sea level (levels by City of San Francisco).

Drainage area.--79 sq mi.

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

Remarks.--Reservoir is formed by multiple-arch dam completed in 1918; storage began June 23, 1918. Usable capacity, 26,100 acre-ft between elevations 4,620.9 ft (natural outlet of old lake) and 4,660.0 ft (top of 5-ft flashboards) above mean sea level. Water is released down Eleanor Creek for power development and domestic supply as part of Hetch Hetchy system of city of San Francisco.

Elevation and contents at 12 p.m. of indicated day, 1950

Day	November		December	
	Elevation (feet)	Contents (acre-feet)	Elevation (feet)	Contents (acre-feet)
1	4,642.9	11,000	4,657.8	24,100
2	4,643.4	11,400	4,657.8	24,100
3	4,644.0	11,900	4,662.0	28,100
4	4,644.4	12,200	4,659.5	25,700
5	4,644.7	12,400	4,658.6	24,800
6	4,645.0	12,700	4,659.2	25,400
7	4,645.2	12,900	4,660.2	26,300
8	4,645.3	12,900	4,660.4	26,500
9	4,645.3	12,900	4,659.7	25,900
10	4,645.3	12,900	4,659.0	25,200
11	4,645.3	12,900	4,658.7	24,900
12	4,645.2	12,900	4,658.7	24,900
13	4,645.2	12,900	4,658.9	25,100
14	4,645.2	12,900	4,659.5	25,700
15	4,645.1	12,800	4,658.8	25,000
16	4,645.6	13,200	4,658.3	24,600
17	4,646.9	14,300	4,658.1	24,400
18	4,662.7	28,800	4,658.0	24,300
19	4,661.0	27,100	4,658.2	24,500
20	4,658.3	24,600	4,658.4	24,700
21	4,660.4	26,500	4,658.5	24,800
22	4,659.0	25,200	4,658.6	24,800
23	4,658.5	24,800	4,658.6	24,800
24	4,658.2	24,500	4,658.7	24,900
25	4,658.0	24,300	4,658.7	24,900
26	4,657.9	24,200	4,658.6	24,800
27	4,657.9	24,200	4,658.5	24,800
28	4,657.8	24,100	4,658.5	24,800
29	4,657.8	24,100	4,658.5	24,800
30	4,657.8	24,100	4,658.4	24,700
31			4,658.4	24,700
Change in contents	-	+13,600	-	+600

Eleanor Creek near Hetch Hetchy, Calif.

Location.--Concrete control, lat 37°58', long. 119°53', in SW¼ sec. 3, T. 1 N., R. 19 E., in Yosemite National Park, 0.6 mile downstream from Lake Eleanor Dam, 1.1 miles upstream from Miguel Creek, and 5.5 miles northwest of Hetch Hetchy. Altitude of gage, about 4,600 ft (from topographic map).

Drainage area.--80 sq mi.

Gage-height record.--Water-stage recorder graph except 1 a.m. Nov. 19 to 6 a.m. Nov. 21 when graph was drawn on basis of range in stage, floodmarks and graphs for Falls and Cherry Creeks.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 1,800 cfs and extended to peak stage on basis of velocity-area studies. Shifting-control method used Dec. 16-31.

Maxima.--November-December 1950: Discharge, 11,700 cfs about 3 a.m. Nov. 19 (gage height, 14.95 ft).
1909 to October 1950: Discharge, 10,500 cfs Dec. 11, 1937 (gage height, 13.95 ft), from rating curve extended above 1,500 cfs on basis of velocity-area studies.

Remarks.--Flood flow slightly regulated by Lake Eleanor 0.6 mile upstream.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	10	255	9	25	2,050	17	71	425	25	384	136
2	10	248	10	38	1,100	18	1,460	261	26	293	136
3	10	3,360	11	38	708	19	8,270	104	27	245	132
4	10	3,270	12	56	325	20	7,860	113	28	210	130
5	11	1,240	13	89	178	21	4,790	126	29	184	127
6	11	832	14	94	1,120	22	1,880	132	30	202	126
7	11	2,300	15	93	1,070	23	900	136	31		113
8	11	4,580	16	97	649	24	559	136			
Monthly mean discharge, in cfs										931	826
Runoff, in acre-feet										55,380	50,810
Runoff, in inches										13.00	11.90

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 18		November 19		November 20		November 21		November 22		November 23	
2	2.45	64	14.9	11,600	10.25	5,920	11.33	7,120	7.18	2,590		
4	2.54	74	14.7	11,400	11.05	6,800	10.98	6,700	7.01	2,420	5.44	1,070
6	2.63	85	14.1	10,600	11.55	7,380	10.47	6,160	6.85	2,320		
8	2.39	58	13.55	9,880	12.1	8,040	10.00	5,640	6.69	2,100	5.29	974
10	2.43	62	13.05	9,240	12.4	8,400	9.53	5,120	6.55	1,960		
N	2.50	70	12.6	8,650	12.75	8,840	8.93	4,460	6.40	1,830	5.14	887
2	2.64	86	12.05	7,980	12.95	9,100	8.48	3,970	6.24	1,690		
4	2.52	72	11.0	6,740	12.7	8,780	8.13	3,580	6.13	1,590	5.01	816
6	4.95	862	10.3	5,970	12.5	8,520	7.94	3,370	5.94	1,440		
8	8.00	3,430	9.5	5,090	12.25	8,220	7.76	3,180	5.83	1,350	4.82	720
10	11.80	7,680	9.0	4,540	12.0	7,920	7.58	2,990	5.73	1,270		
12	13.55	9,880	9.55	5,140	11.7	7,560	7.38	2,790	5.63	1,200	4.72	670
	November 24		November 25		November 29		November 30		December 1		December 2	
4	4.62	624	4.15	425	3.40	195	3.19	154	3.62	251	3.61	248
8	4.54	588	4.08	398	3.39	193	3.25	166	3.64	257	3.58	240
N	4.50	570	4.03	380	3.33	181	3.49	218	3.64	257	3.56	235
4	4.41	530	3.98	363	3.30	175	3.55	232	3.65	260	3.54	230
8	4.29	481	3.93	346	3.29	173	3.57	238	3.64	257	3.63	254
12	4.21	449	3.89	332	3.27	169	3.59	242	3.63	254	3.79	302
	December 3		December 4		December 5		December 6		December 7		December 8	
2	4.00	370	9.67	5,280	6.26	1,700	5.07	848	6.32	1,760	7.41	2,820
4	4.42	534	9.03	4,570	6.12	1,590	4.98	800	6.63	2,040	8.12	3,570
6	4.88	750	8.40	3,880	5.96	1,460	4.92	770	6.83	2,240	10.03	5,670
8	5.51	1,120	8.04	3,480	5.82	1,350	4.88	750	6.99	2,400	10.96	6,700
10	6.37	1,800	7.80	3,220	5.71	1,260	4.83	725	7.09	2,500	10.94	6,670
N	7.21	2,620	7.58	2,990	5.60	1,180	4.77	695	7.15	2,560	10.49	6,180
2	8.15	3,600	7.35	2,760	5.49	1,100	4.75	685	7.14	2,550	9.54	5,130
4	9.98	5,620	7.14	2,550	5.41	1,050	4.78	700	7.09	2,500	9.18	4,740
6	11.07	6,820	6.94	2,350	5.33	998	4.91	765	7.03	2,440	8.61	4,110
8	11.39	7,190	6.77	2,180	5.24	944	5.18	909	6.96	2,370	8.13	3,580
10	11.00	6,740	6.61	2,020	5.17	904	5.57	1,160	6.90	2,310	7.73	3,140
12	10.38	6,060	6.45	1,880	5.12	876	6.00	1,490	6.99	2,400	7.42	2,830
	December 9		December 10		December 11		December 12		December 13		December	
4	7.08	2,490	5.75	1,290	4.97	795	4.53	584	2.92	113		
8	6.83	2,240	5.59	1,170	4.84	730	4.46	552	3.00	124		
N	6.60	2,010	5.44	1,070	4.75	685	3.47	212	3.44	205		
4	6.36	1,790	5.32	992	4.70	660	3.13	144	3.51	222		
8	6.15	1,610	5.18	909	4.67	646	2.81	98	3.56	235		
12	5.93	1,430	5.08	854	4.60	615	2.87	106	3.57	238		

Supplemental record.--Nov. 19, about 3 a.m. 14.95 ft, 11,700 cfs.

South Fork Tuolumne River near Oakland Recreation Camp, Calif.

Location.--Lat 37°49', long. 120°00', in SE¼ sec. 29, T. 1 S., R. 18 E., at Cliff House, 75 ft downstream from highway bridge on Big Oak Flat road, 0.5 mile southwest of Oakland Recreation Camp, and 0.6 mile upstream from Middle Tuolumne River. Altitude of gage, about 2,800 ft (from topographic map).

Drainage area.--87.6 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 1,970 cfs and extended to peak stage by velocity-area study.

Maxima.--November-December 1950: Discharge, 4,540 cfs 10 p.m. Nov. 18 (gage height, 8.68 ft).
1923 to October 1950: Discharge, 6,950 cfs Dec. 11, 1937 (gage height, 10.00 ft), from rating curve extended above 1,000 cfs on basis of velocity-area studies.

Remarks.--No diversion or regulation.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	34	107	9	15	624	17	72	268	25	154	153
2	26	92	10	15	416	18	1,800	240	26	134	144
3	24	1,450	11	14	333	19	1,620	219	27	117	136
4	24	985	12	14	288	20	742	204	28	104	131
5	21	407	13	14	254	21	824	195	29	95	126
6	19	452	14	24	476	22	325	181	30	103	126
7	17	875	15	27	413	23	237	170	31		124
8	16	1,570	16	52	308	24	185	160			
Monthly mean discharge, in cfs										229	375
Runoff, in acre-feet										13,620	23,060
Runoff, in inches										2.92	4.94

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 16		November 17		November 18		November 19		November 20		November 21	
2			2.55	99	2.54	98	8.00	3,510	4.30	525	5.41	1,160
4	1.51	20	2.50	93	2.89	146	7.85	3,300	4.23	494	5.30	1,090
6			2.42	84	3.66	295	6.85	2,180	4.19	476	5.60	1,270
8	1.58	22	2.34	75	4.50	625	6.15	1,660	4.20	480	5.39	1,140
10			2.27	68	5.12	982	5.80	1,410	4.30	525	5.09	964
N	1.75	29	2.22	63	5.79	1,400	5.42	1,160	4.71	740	4.87	832
2			2.17	58	6.18	1,680	5.08	958	4.95	880	4.64	702
4	2.20	61	2.15	56	7.19	2,520	4.94	874	5.06	946	4.46	605
6			2.13	55	8.03	3,550	4.78	779	5.24	1,050	4.31	530
8	2.69	117	2.17	58	8.22	3,820	4.70	735	5.27	1,070	4.19	476
10			2.25	66	8.68	4,540	4.54	647	5.07	952	4.08	432
12	2.64	110	2.35	76	8.20	3,790	4.41	580	5.09	964	4.00	400
	November 22		November 23		November 24		November 25		December 1		December 2	
4	3.89	362	3.52	260	3.22	199	3.00	162	2.66	113	2.52	95
8	3.81	338	3.47	248	3.18	192	2.98	159	2.66	113	2.49	92
N	3.74	317	3.41	235	3.14	185	2.95	154	2.63	109	2.44	86
4	3.68	300	3.36	225	3.10	178	2.92	150	2.57	101	2.43	85
8	3.65	292	3.30	213	3.07	173	2.90	147	2.56	100	2.47	90
12	3.59	278	3.26	206	3.02	165	2.87	142	2.55	99	2.59	104
	December 3		December 4		December 5		December 6		December 7		December 8	
2	2.74	124	6.15	1,660	4.25	502	3.76	323	5.49	1,200	5.62	1,280
4	2.99	160	5.90	1,480	4.18	472	3.75	320	5.31	1,100	7.22	2,550
6	3.45	244	5.57	1,250	4.13	452	3.73	314	5.14	994	7.33	2,670
8	4.10	440	5.30	1,090	4.07	428	3.71	308	5.00	910	7.02	2,340
10	4.99	904	5.01	916	4.02	408	3.69	302	4.81	796	6.62	1,990
N	5.80	1,410	4.91	856	3.98	393	3.69	302	4.76	768	6.14	1,650
2	6.86	2,180	4.74	757	3.94	379	3.72	311	4.76	768	5.82	1,420
4	7.25	2,580	4.61	686	3.91	368	3.75	320	4.79	784	5.52	1,220
6	7.46	2,820	4.53	642	3.88	359	3.90	365	4.76	768	5.30	1,090
8	7.63	3,030	4.46	605	3.85	350	4.37	560	4.62	691	5.08	958
10	7.13	2,450	4.37	560	3.82	341	5.38	1,140	4.55	652	5.00	910
12	6.78	2,110	4.31	530	3.79	332	5.75	1,380	4.73	752	4.88	838
	December 9		December 10		December 11		December 12		December 13		December	
4	4.71	740	4.14	456	3.86	353	3.68	300	3.53	262		
8	4.57	664	4.08	432	3.82	341	3.66	295	3.52	260		
N	4.46	605	4.03	412	3.79	332	3.64	290	3.49	253		
4	4.36	555	3.99	396	3.76	323	3.61	282	3.47	248		
8	4.28	516	3.94	379	3.73	314	3.58	275	3.46	246		
12	4.21	484	3.89	362	3.71	308	3.56	270	3.44	242		

Middle Tuolumne River at Oakland Recreation Camp, Calif.

Location.--Lat 37°50', long. 120°00', in NW¼ sec. 28, T. 1 S., R. 18 E., at Oakland Recreation Camp, 0.5 mile upstream from South Fork Tuolumne River and 4 miles east of Buck Meadows post office. Altitude of gage, about 2,800 ft (from topographic map).

Drainage area.--71.0 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 1,400 cfs and extended to peak stage by logarithmic plotting.

Maxima.--November-December 1950: Discharge, 2,810 cfs 2:30 a.m. Nov. 19 (gage height, 10.45 ft).
1917 to October 1950: Discharge, 2,910 cfs Dec. 11, 1937 (gage height, 10.4 ft, from floodmarks), from rating curve extended above 1,000 cfs on basis of velocity-area studies.

Remarks.--No diversion or regulation.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	16	117	9	7.0	479	17	24	221	25	146	126
2	12	100	10	6.6	346	18	892	199	26	128	119
3	11	1,240	11	6.2	296	19	1,490	182	27	118	115
4	12	896	12	5.6	267	20	595	170	28	109	112
5	12	384	13	5.6	234	21	812	158	29	102	112
6	11	401	14	11	375	22	339	148	30	113	111
7	8.5	984	15	8.4	331	23	222	138	31		103
8	7.6	1,020	16	17	254	24	171	131			
Monthly mean discharge, in cfs										181	318
Runoff, in acre-feet										10,750	19,570
Runoff, in inches										2.84	5.17

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	1.82	26	2.43	62	10.39	2,770	4.86	510	6.61	1,020	4.62	450
4	1.76	23	2.91	108	10.33	2,740	4.71	472	6.70	1,060	4.42	404
6	1.72	22	3.62	234	9.84	2,470	4.63	452	6.57	1,010	4.28	373
8	1.70	21	3.81	273	8.80	1,930	4.53	429	6.60	1,020	4.19	353
10	1.68	20	4.31	384	7.77	1,450	4.48	417	6.46	971	4.11	335
N	1.67	20	5.25	620	7.03	1,170	4.65	458	6.15	870	4.05	322
2	1.66	19	6.28	938	6.44	964	5.03	552	5.78	759	3.98	307
4	1.68	20	7.06	1,180	6.03	834	5.40	645	5.40	645	3.93	296
6	1.70	21	7.70	1,420	5.71	738	5.55	690	5.19	592	3.90	289
8	1.81	26	8.60	1,830	5.47	666	6.01	828	5.06	560	3.87	282
10	2.09	40	9.58	2,330	5.28	615	6.40	950	4.94	530	3.84	276
12	2.20	46	10.09	2,610	5.08	565	6.31	918	4.78	490	3.81	269
	November 23		November 24		November 25		November 30		December 1		December 2	
4	3.71	248	3.39	184	3.21	153	2.79	101	3.04	128	2.84	106
8	3.63	231	3.35	177	3.19	150	2.83	105	2.99	122	2.79	101
N	3.57	219	3.31	170	3.16	145	2.87	109	2.93	115	2.69	92
4	3.50	205	3.27	163	3.13	140	2.95	118	2.88	110	2.71	94
8	3.46	197	3.24	158	3.12	139	3.04	128	2.86	108	2.78	100
12	3.43	192	3.23	156	3.10	136	3.07	132	2.86	108	2.90	112
	December 3		December 4		December 5		December 6		December 7		December 8	
2	3.10	136	7.97	1,530	4.69	468	4.04	320	7.37	1,290	6.50	985
4	3.51	207	7.39	1,300	4.58	440	4.02	315	7.38	1,290	6.67	1,040
6	3.94	298	6.90	1,120	4.49	420	3.98	307	7.00	1,160	7.34	1,280
8	4.85	508	6.46	971	4.38	395	3.97	304	6.80	1,090	7.69	1,420
10	6.20	885	6.11	858	4.32	381	3.96	302	6.54	999	7.45	1,320
N	7.40	1,300	5.80	765	4.26	368	3.95	300	6.30	915	7.05	1,180
2	8.13	1,600	5.51	678	4.21	357	3.98	307	6.13	964	6.66	1,040
4	8.91	1,980	5.34	630	4.17	348	4.02	315	6.01	828	6.31	918
6	9.65	2,370	5.17	588	4.16	346	4.26	368	5.98	819	6.03	834
8	9.57	2,320	5.04	555	4.13	340	4.96	535	5.84	777	5.78	759
10	9.38	2,220	4.89	518	4.10	333	5.77	756	5.71	738	5.57	696
12	8.72	1,980	4.79	492	4.07	326	6.67	1,040	6.05	840	5.38	640
	December 9		December 10		December 11		December 12		December 13		December	
4	5.08	565	4.28	373	3.98	307	3.86	280	3.69	244		
8	4.81	498	4.21	357	3.95	300	3.83	274	3.65	236		
N	4.67	462	4.14	342	3.93	296	3.80	267	3.63	231		
4	4.51	424	4.09	331	3.90	289	3.77	261	3.62	229		
8	4.44	408	4.05	322	3.88	285	3.75	256	3.60	225		
12	4.36	390	4.02	315	3.87	282	3.72	250	3.60	225		

Supplemental record.--Nov. 19, 2:30 a.m., 10.45 ft, 2,810 cfs; Dec. 3, 6:30 p.m., 9.70 ft, 2,400 cfs; Dec. 7, 3 a.m., 7.48 ft, 1,330 cfs.

Woods Creek near Jacksonville, Calif.

Location.--Lat 37°51', long. 120°24', in SW¼ sec. 12, T. 1 S., R. 14 E., 1.5 miles upstream from mouth and 1.5 miles northwest of Jacksonville. Altitude of gage, about 645 ft (from topographic map).

Drainage area.--98.4 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 2,400 cfs and extended to peak stage by velocity-area studies. Shifting control method used Nov. 1-18.

Maxima.--November-December 1950: Discharge, 3,820 cfs 7 p.m. Nov. 18 (gage height, 11.75 ft).

1925 to October 1950: Discharge, 13,500 cfs Feb. 9, 1938, from rating curve extended above 1,000 cfs on basis of velocity-area studies; gage height, 13.5 ft, present datum, Feb. 3, 1945.

Remarks.--At times small amounts of water from Stanislaus River Basin are spilled into Woods Creek above station; flood flow not affected.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	16	51	9	4.2	458	17	75	130	25	57	69
2	8.6	47	10	3.8	234	18	2,190	116	26	48	66
3	6.0	1,900	11	3.6	162	19	1,710	101	27	42	62
4	5.0	896	12	3.6	129	20	941	91	28	45	60
5	4.7	217	13	4.7	114	21	399	85	29	45	58
6	4.2	496	14	10	639	22	141	79	30	48	60
7	4.0	1,320	15	13	248	23	90	75	31		68
8	4.5	2,260	16	23	162	24	70	72			
Monthly mean discharge, in cfs										201	340
Runoff, in acre-feet										11,940	20,880
Runoff, in inches										2.28	3.98

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 16		November 17		November 18		November 19		November 20		November 21	
2	2.02	8	3.40	120	2.88	63	10.84	3,260	4.62	344	5.62	627
4	2.02	8	3.45	127	3.30	107	10.20	2,880	4.85	398	5.38	554
6	2.03	8	3.33	111	4.91	413	9.78	2,630	6.20	845	5.21	503
8	2.04	8	3.17	92	7.25	1,290	9.15	2,270	7.49	1,400	5.04	452
10	2.05	9	3.02	76	8.91	2,140	8.44	1,880	7.40	1,360	4.95	425
N	2.06	9	2.91	66	9.35	2,380	7.81	1,560	6.97	1,170	4.79	382
2	2.09	10	2.83	59	10.85	3,270	7.25	1,290	7.42	1,370	4.57	334
4	2.17	13	2.76	53	11.60	3,720	6.56	989	6.90	1,140	4.42	304
6	2.26	17	2.70	48	11.60	3,720	5.80	690	6.40	925	4.25	273
8	2.39	25	2.08	46	11.63	3,740	5.40	560	6.38	917	4.08	242
10	3.20	95	2.71	49	11.45	3,630	5.11	473	6.23	857	3.94	218
12	3.36	115	2.76	53	11.41	3,610	4.80	385	5.93	737	3.83	201
	November 22		November 23		November 24		November 25		November 30		December 1	
4	3.65	173	3.06	96	2.85	75	2.71	61	2.53	45	2.59	50
8	3.51	153	3.04	94	2.83	73	2.68	58	2.56	48	2.60	51
N	3.38	135	3.00	90	2.80	70	2.67	57	2.58	49	2.62	53
4	3.29	124	2.96	86	2.78	68	2.65	56	2.59	50	2.61	52
8	3.19	111	2.92	82	2.76	66	2.63	54	2.59	50	2.61	52
12	3.11	101	2.88	78	2.74	64	2.61	52	2.59	50	2.58	49
	December 2		December 3		December 4		December 5		December 6		December 7	
2	2.57	49	2.76	66	8.70	2,020	4.34	289	3.57	162	8.33	1,820
4	2.56	48	3.10	100	7.87	1,600	4.22	268	3.54	158	8.82	2,090
6	2.55	47	4.15	255	7.12	1,230	4.11	248	3.51	153	9.25	2,330
8	2.54	46	6.72	1,050	6.45	945	4.02	230	3.48	149	8.63	1,990
10	2.53	45	8.70	2,020	6.02	773	3.94	218	3.46	146	7.50	1,410
N	2.52	45	10.32	2,950	5.66	641	3.87	207	3.46	146	6.79	1,090
2	2.52	45	10.60	3,120	5.37	551	3.81	198	3.46	146	6.26	869
4	2.52	45	10.37	2,980	5.15	485	3.75	188	3.51	153	5.94	741
6	2.52	45	10.48	3,050	4.95	425	3.68	177	4.68	356	5.66	641
8	2.54	46	10.70	3,180	4.78	380	3.63	170	7.22	1,280	5.43	569
10	2.58	49	10.06	2,800	4.63	346	3.61	167	8.78	2,070	5.51	593
12	2.64	55	9.38	2,400	4.47	314	3.59	165	8.48	1,900	7.48	1,400
	December 8		December 9		December 10		December 11		December 12		December 13	
4	10.90	3,300	5.55	605	4.24	271	3.68	177	3.37	134	3.25	118
8	11.15	3,450	5.25	515	4.11	248	3.61	167	3.35	132	3.24	117
N	9.75	2,610	4.94	422	4.01	230	3.56	160	3.32	128	3.22	115
4	8.23	1,780	4.66	352	3.91	214	3.52	155	3.31	126	3.19	111
8	6.83	1,100	4.52	324	3.82	199	3.47	148	3.28	122	3.17	108
12	6.00	765	4.37	295	3.74	186	3.42	141	3.26	120	3.24	117

Supplemental record.--Nov. 18, 7 p.m., 11.75 ft, 3,820 cfs; Dec. 8, 2 a.m., 9.76 ft, 2,620 cfs, 6 a.m., 11.23 ft, 3,500 cfs, 7 a.m., 11.38 ft, 3,590 cfs, 10 a.m., 10.50 ft, 3,060 cfs, 2 p.m., 9.16 ft, 2,280 cfs, 6 p.m., 7.46 ft, 1,390 cfs, 10 p.m., 6.37 ft, 913 cfs.

Modesto Canal near La Grange, Calif.

Location.--Concrete control, lat 37°40'04", long. 120°27'26", in SW¼ sec. 17, T. 3 S., R. 14 E., 0.5 mile northeast of La Grange and 1 mile downstream from intake at La Grange Dam. Datum of gage is 272.4 ft above mean sea level (levels by Modesto Irrigation District).

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

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

Maxima.--November-December 1950: Daily discharge, 632 cfs Nov. 22.
1903 to October 1950: Daily discharge, 1,820 cfs July 1, 1935.

Remarks.--Flow regulated. Canal diverts from right bank of Tuolumne River at La Grange Dam for irrigation in Modesto and Waterford irrigation districts.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	17	3.0	9	207	0	17	205	1.9	25	213	1.5
2	17	3.0	10	205	0	18	203	1.9	26	4.4	1.5
3	8.1	3.5	11	192	1.0	19	207	1.9	27	4.1	1.5
4	3.5	2.7	12	176	2.2	20	206	1.9	28	4.1	1.5
5	3.0	2.4	13	194	2.0	21	514	1.9	29	3.8	1.5
6	3.5	2.7	14	203	2.0	22	632	1.7	30	3.2	1.5
7	154	3.0	15	203	2.0	23	628	1.7	31		1.5
8	212	1.4	16	210	1.9	24	630	1.5			
Monthly mean discharge, in cfs										182	1.86
Runoff, in acre-feet										10,840	114
Runoff, in inches										-	-

Turlock Canal near La Grange, Calif.

Location.--Concrete control, lat 37°40'00", long. 120°26'25", near north line of NW¼ sec. 21, T. 3 S., R. 14 E., 2,400 ft downstream from intake at La Grange Dam and 1.2 miles east of La Grange. Altitude of gage, about 265 ft (from topographic map).

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

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

Maxima.--November-December 1950: Daily discharge, 70 cfs Nov. 15.
1898 to October 1950: Daily discharge, 2,280 cfs June 12, 1949.

Remarks.--Flow regulated. Canal diverts from left bank of Tuolumne River at La Grange Dam for irrigation in Turlock Irrigation District and to supply town of La Grange.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	38	2.8	9	8.0	8.6	17	6.2	2.2	25	5.0	1.4
2	17	5.9	10	7.1	7.0	18	6.2	1.7	26	4.9	1.2
3	10	4.8	11	6.2	3.6	19	5.7	1.9	27	3.4	1.2
4	9.2	2.4	12	4.9	4.0	20	5.8	2.6	28	3.0	1.2
5	8.6	4.6	13	6.2	2.9	21	9.7	1.7	29	3.0	1.7
6	9.2	2.6	14	7.1	2.6	22	12	1.9	30	2.8	1.4
7	9.2	3.1	15	70	2.4	23	8.6	1.7	31		1.4
8	8.6	1.7	16	7.1	2.2	24	6.2	1.4			
Monthly mean discharge, in cfs										10.3	2.77
Runoff, in acre-feet										613	170
Runoff, in inches										-	-

Stanislaus River basin

Middle Fork Stanislaus River at Kennedy Meadows, Calif.

Location.--Lat 38°18', long. 119°45', in NE¼ sec. 11, T. 5 N., R. 20 E., at upper end of Kennedy Meadows, 1 mile upstream from Deadman Creek and 2 miles downstream from Relief Reservoir. Altitude of gage, about 6,450 ft (from topographic map).

Drainage area.--49.5 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 900 cfs and extended to peak stage on basis of slope-area determination.

Maxima.--November-December 1950: Discharge, 1,700 cfs 7 p.m. Nov. 20 (gage height, 6.66 ft).
1938 to October 1950: Discharge, 1,160 cfs June 1, 1943 (gage height, 6.17 ft).

Remarks.--Flow regulated by Relief Reservoir (contents, in acre-feet, 1950: 8,650 Oct. 31; 12,500 Nov. 30; 9,400 Dec. 31).

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	239	286	9	224	474	17	204		25	356	140
2	240	280	10	217	385	18	709	200	26	336	
3	246	539	11	215	349	19	1,010		27	316	
4	246	424	12	211	324	20	1,160		28	309	110
5	239	341	13	208	308	21	1,090		29	297	
6	235	374	14	204	321	22	648		30	294	
7	229	533	15	199	260	23	476	140	31		
8	227	699	16	199	200	24	388				
Monthly mean discharge, in cfs										372	266
Runoff, in acre-feet										22,160	16,380
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	3.43	201	3.60	231	6.50	1,580	4.78	570	6.54	1,600	5.15	728
4	3.43	201	3.68	246	6.34	1,460	4.83	590	6.33	1,450	5.17	736
6	3.42	199	3.87	285	6.16	1,320	5.10	705	6.17	1,330	5.11	710
8	3.42	199	4.10	342	5.95	1,180	5.39	845	5.99	1,200	5.06	687
10	3.42	199	4.29	397	5.71	1,020	5.66	991	5.83	1,090	5.02	669
N	3.42	199	4.70	539	5.55	928	5.95	1,180	5.68	1,000	4.97	647
2	3.45	204	5.20	750	5.39	845	6.30	1,420	5.60	955	4.91	622
4	3.46	206	5.59	950	5.24	770	6.44	1,530	5.50	900	4.87	606
6	3.48	210	5.80	1,080	5.11	710	6.59	1,640	5.34	820	4.84	594
8	3.49	211	6.06	1,250	4.97	647	6.61	1,660	5.34	820	4.80	578
10	3.50	213	6.45	1,540	4.87	606	6.65	1,690	5.20	750	4.78	570
12	3.51	215	6.52	1,590	4.79	574	6.56	1,620	5.14	723	4.70	539
	November 23		November 24		November 25		November 26		December 1		December 2	
4	4.65	520	4.32	406	4.17	362	4.10	342	3.88	288	3.83	277
8	4.59	498	4.27	391	4.17	362	4.08	337	3.87	285	3.83	277
N	4.54	480	4.25	385	4.15	356	4.09	339	3.86	283	3.84	279
4	4.46	452	4.23	379	4.13	350	4.08	337	3.88	288	3.85	281
8	4.38	426	4.21	373	4.13	350	4.04	326	3.87	285	3.85	281
12	4.35	416	4.19	367	4.12	348	4.03	324	3.86	283	3.89	290
	December 3		December 4		December 5		December 6		December 7		December 8	
2	3.95	304	4.64	517	4.16	359	4.01	319	4.82	586	5.32	810
4	4.08	337	4.55	484	4.15	356	4.01	319	4.88	610	5.38	840
6	4.21	373	4.48	459	4.12	348	4.02	321	4.84	594	5.39	845
8	4.39	429	4.40	432	4.11	345	4.03	324	4.72	547	5.27	785
10	4.65	520	4.35	416	4.11	345	4.03	324	4.62	509	5.15	728
N	4.91	622	4.33	410	4.10	342	4.07	334	4.59	498	5.08	696
2	5.03	674	4.29	397	4.08	337	4.15	356	4.54	480	5.03	674
4	5.10	705	4.27	391	4.06	332	4.17	362	4.54	480	4.96	643
6	5.22	760	4.23	379	4.06	332	4.29	397	4.52	473	4.88	610
8	5.07	692	4.19	367	4.05	329	4.62	509	4.58	495	4.83	590
10	4.92	626	4.19	367	4.04	326	4.62	509	4.70	539	4.77	566
12	4.78	570	4.18	364	4.01	319	4.65	520	4.98	652	4.74	555
	December 9		December 10		December 11		December 12		December 13		December	
4	4.64	517	4.30	400	4.14	353	4.06	332	3.98	311		
8	4.55	484	4.27	391	4.13	350	4.04	326	3.97	309		
N	4.49	463	4.25	385	4.13	350	4.04	326	3.97	309		
4	4.47	456	4.23	379	4.13	350	4.02	321	3.97	309		
8	4.42	439	4.19	367	4.10	342	3.99	314	3.95	304		
12	4.37	422	4.16	359	4.08	337	3.99	314	3.94	302		

Supplemental record.--Nov. 18, 11:30 p.m., 6.55 ft, 1,610 cfs; Nov. 20, 7 p.m., 6.66 ft, 1,700 cfs.

Middle Fork Stanislaus River at Sand Bar Flat, near Avery, Calif.

Location.--Lat 38°11', long. 120°09', in sec. 19, T. 4 N., R. 17 E., 1 mile upstream from diversion dam of Pacific Gas & Electric Co. at Sand Bar Flat, and 11 miles southeast of Avery. Altitude of gage, about 2,650 ft (from topographic map).

Drainage area.--318 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 6,000 cfs and extended to peak stage by logarithmic plotting.

Maxima.--November-December 1950: Discharge, 23,300 cfs 12 p.m. Nov. 18 (gage height, 18.13 ft).
1905 to October 1950: Discharge, 26,500 cfs Dec. 11, 1937 (gage height, 21.0 ft, from floodmarks), from rating curve extended above 6,000 cfs as explained above.

Remarks.--Flow slightly affected by storage in Relief Reservoir. Water diverted by Philadelphia Canal (see p.655) from South Fork Stanislaus River through Spring Gap powerhouse into Middle Fork above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	442	1,110	9	381	4,570	17	557	1,620	25	1,670	1,030
2	436	982	10	366	3,340	18	10,300	1,480	26	1,450	985
3	480	9,600	11	358	2,730	19	12,600	1,380	27	1,280	940
4	496	5,800	12	353	2,230	20	14,300	1,300	28	1,180	912
5	458	3,040	13	355	1,920	21	11,500	1,220	29	1,100	894
6	427	3,170	14	374	2,910	22	4,050	1,170	30	1,150	872
7	401	6,710	15	342	2,260	23	2,680	1,120	31		849
8	390	11,000	16	390	1,820	24	1,980	1,070			
Monthly mean discharge, in cfs										2,408	2,582
Runoff, in acre-feet										143,300	158,700
Runoff, in inches										8.45	9.36

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	5.14	520	7.10	1,400	17.85	22,300	10.82	4,910	17.33	20,600	10.93	5,060
4	5.17	530	7.82	1,870	17.20	20,100	10.69	4,730	16.62	18,200	10.70	4,740
6	5.16	526	9.10	2,930	17.0	19,400	10.70	4,740	15.80	15,700	10.48	4,450
8	5.14	520	10.35	4,290	16.35	17,400	12.17	7,090	15.00	13,400	10.35	4,290
10	5.11	509	11.60	6,090	14.84	13,000	15.00	13,400	14.19	11,300	10.19	4,100
N	5.11	509	13.00	8,680	13.76	10,300	16.70	18,500	13.43	9,590	10.04	3,920
2	5.14	520	14.44	11,900	12.95	8,580	17.17	20,000	12.86	8,400	9.93	3,790
4	5.17	530	15.70	15,400	12.37	7,450	17.55	21,300	12.48	7,660	9.82	3,670
6	5.20	540	16.52	17,900	12.06	6,890	17.35	20,600	12.22	7,180	9.71	3,550
8	5.30	575	17.10	19,800	11.68	6,230	17.68	21,800	11.80	6,430	9.61	3,440
10	5.54	659	17.65	21,600	11.30	5,610	17.60	21,500	11.46	5,870	9.49	3,320
12	6.35	1,000	18.13	23,300	11.00	5,160	17.45	21,000	11.19	5,440	9.36	3,190
	November 23		November 24		November 25		November 26		December 1		December 2	
4	9.17	3,000	8.16	2,130	7.68	1,780	7.31	1,530	6.74	1,200	6.39	1,020
8	8.98	2,820	8.03	2,020	7.59	1,710	7.24	1,480	6.61	1,140	6.29	975
N	8.83	2,690	7.93	1,950	7.52	1,660	7.18	1,450	6.51	1,080	6.21	935
4	8.66	2,530	7.83	1,880	7.46	1,620	7.12	1,410	6.46	1,060	6.21	935
8	8.44	2,350	7.80	1,860	7.38	1,570	7.05	1,370	6.42	1,040	6.30	980
12	8.29	2,230	7.75	1,820	7.36	1,560	7.01	1,350	6.44	1,050	6.43	1,040
	December 3		December 4		December 5		December 6		December 7		December 8	
2	6.55	1,100	13.65	10,100	9.65	3,480	8.73	2,600	12.50	7,700	13.20	9,080
4	6.95	1,310	12.65	7,980	9.49	3,320	8.65	2,520	12.90	8,480	15.20	14,000
6	8.17	2,140	11.95	6,690	9.40	3,230	8.56	2,450	13.08	8,840	16.12	16,600
8	9.75	3,600	11.50	5,930	9.33	3,160	8.48	2,380	12.80	8,280	16.48	17,800
10	11.60	6,090	11.13	5,360	9.24	3,070	8.42	2,340	12.27	7,270	15.60	15,100
N	13.45	9,630	10.79	4,870	9.18	3,010	8.46	2,370	11.76	6,360	14.65	12,500
2	15.23	14,000	10.51	4,490	9.08	2,910	8.54	2,430	11.35	5,690	13.85	10,500
4	16.33	17,300	10.33	4,270	9.01	2,850	8.79	2,650	11.08	5,280	13.10	8,880
6	16.94	19,200	10.19	4,100	8.98	2,820	9.30	3,130	10.99	5,150	12.52	7,740
8	16.90	19,100	10.04	3,920	8.93	2,780	10.00	3,870	11.05	5,240	12.12	7,000
10	15.55	14,900	9.91	3,770	8.88	2,730	11.70	6,260	11.09	5,300	11.80	6,430
12	14.70	12,600	9.79	3,640	8.81	2,670	12.40	7,510	11.70	6,260	11.52	5,960
	December 9		December 10		December 11		December 12		December 13		December	
4	11.09	5,300	9.74	3,580	9.05	2,800	8.47	2,380	8.00	2,000		
8	10.70	4,740	9.62	3,450	8.94	2,790	8.34	2,270	7.93	1,950		
N	10.44	4,400	9.49	3,320	8.86	2,710	8.24	2,190	7.87	1,910		
4	10.24	4,160	9.37	3,200	8.80	2,660	8.17	2,140	7.82	1,870		
8	10.07	3,950	9.25	3,080	8.74	2,610	8.12	2,100	7.79	1,850		
12	9.91	3,770	9.16	2,990	8.63	2,510	8.07	2,060	7.76	1,830		

Supplemental record.--Nov. 20, 7:30 p.m., 17.71 ft, 21,900 cfs; Dec. 3, 7 p.m., 17.12 ft, 19,800 cfs; Dec. 8, 7:30 a.m., 16.52 ft, 17,900 cfs.

Melones Reservoir at Melones Dam, Calif.

Location.--Lat 37°57'15", long. 120°30'45", near center of sec. 11, T. 1 N., R. 13 E., at Melones Dam on Stanislaus River 0.1 mile downstream from Bear Creek. Datum of gage is at mean sea level.

Drainage area.--897 sq mi.

Gage-height record.--Staff gage read once daily with supplementary readings during the periods Nov. 19-23 and Dec. 1-14.

Remarks.--Reservoir is formed by concrete overflow dam; storage began Aug. 21, 1926; dam completed in December 1926. Capacity for power development 1 mile below dam is 106,100 acre-ft between elevation 628.0 ft (minimum operating level) and 735.0 ft (top of drum-type spillway gates) above mean sea level; usable capacity for irrigation, 110,000 acre-ft between elevations 610.0 ft (floor of outlet tunnel) and 735.0 ft above mean sea level. Figures given herein represent total contents, of which 2,630 acre-ft is not available for release. Released water flows down Stanislaus River to Goodwin Dam, where it is diverted into Oakdale and South San Joaquin Canals for irrigation. Records furnished by Pacific Gas & Electric Co.

Elevation and contents at 8 a.m. of indicated day, 1950

Day	November		December	
	Elevation (feet)	Contents (1,000's of acre-ft)	Elevation (feet)	Contents (1,000's of acre-ft)
1	661.0	22.2	726.0	96.7
2	662.7	23.4	726.0	96.7
3	664.3	24.5	725.3	95.5
4	666.5	26.1	733.0	108.9
5	667.6	27.0	730.0	103.5
6	669.0	28.1	728.3	100.6
7	670.1	29.0	730.8	104.9
8	670.5	29.3	731.9	106.9
9	670.6	29.4	729.1	101.9
10	670.0	28.9	729.9	103.3
11	669.0	28.1	728.8	101.4
12	668.0	27.3	727.9	99.9
13	666.8	26.4	727.3	98.9
14	666.0	25.8	725.7	96.2
15	665.0	25.0	726.5	97.5
16	664.5	24.7	725.7	96.2
17	664.3	24.5	725.3	95.5
18	666.7	26.3	725.1	95.2
19	732.0	107.1	724.9	94.8
20	730.5	104.4	724.7	94.5
21	734.8	112.2	724.6	94.3
22	728.8	101.4	723.4	92.3
23	728.8	101.4	722.7	91.2
24	728.8	101.4	721.9	89.9
25	728.1	100.2	720.8	88.2
26	727.5	99.2	719.5	86.2
27	726.8	98.0	718.3	84.4
28	726.5	97.5	716.7	82.0
29	726.1	96.8	715.3	79.9
30	725.7	96.2	713.7	77.6
31			712.1	75.2
Change in contents	-	+75.9	-	-21.0

Stanislaus River below Melones powerhouse, Calif.

Location.--Lat 37°56'50", long. 120°31'45", near line between secs. 10 and 15, T. 1 N., R. 13 E., 300 ft downstream from powerhouse, 0.5 mile upstream from Bear Gulch, and 1 mile downstream from Melones Dam. Altitude of gage, about 500 ft (from topographic map).

Drainage area.--898 sq mi.

Gage-height record.--Water-stage recorder graph except for the periods 4 p.m. Nov. 20 to 1 p.m. Nov. 27, and 10 p.m. Dec. 3 to 3 p.m. Dec. 5.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 18,000 cfs and extended to peak stage on basis of computed flow over Melones Dam. Discharge for periods of no gage-height record computed from hydrograph based on powerhouse records and records of computed flow over Melones Dam. Because of extreme regulation, supplementary time intervals were used in computing daily mean discharge on Nov. 17-23, 30, Dec. 1-13.

Maxima.--November-December 1950: Discharge, 49,500 cfs 1:30 a.m. Nov. 21 (gage height, 25.18 ft).
1931 to October 1950: Discharge, 22,800 cfs Mar. 31, 1940 (gage height, 17.6 ft).

Remarks.--Flow regulated by Melones powerhouse, Melones Reservoir (see preceding page) and several smaller reservoirs above station. Several diversions above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	137	2,600	9	781	13,900	17	846	4,110	25	4,400	2,890
2	148	2,230	10	845	9,230	18	907	3,620	26	3,600	2,890
3	132	15,800	11	845	7,030	19	17,900	3,280	27	2,720	2,880
4	16	24,800	12	845	5,610	20	28,000	2,980	28	2,400	2,820
5	16	9,400	13	845	5,700	21	38,900	3,450	29	2,290	2,820
6	143	7,560	14	832	6,760	22	11,700	3,100	30	1,820	2,800
7	397	20,000	15	873	6,720	23	5,400	2,910	31		2,800
8	462	31,000	16	846	4,890	24	5,200	2,890			
Monthly mean discharge, in cfs										4,408	7,080
Runoff, in acre-feet										262,300	435,300
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	3.55	22	3.67	24	3.81	48	15.75	17,800		49,300		20,300
4	3.65	22	3.70	29	3.80	46	15.40	16,900		48,600		18,800
6	3.65	22	3.73	33	3.85	58	15.50	17,200		46,700		17,300
8	5.97	1,340	6.01	1,380	13.00	11,300	15.15	16,300		44,100		14,400
10	5.97	1,340	6.02	1,390	19.12	22,400	15.43	17,000		40,600		10,200
N	5.97	1,340	6.03	1,400	20.77	32,900	16.19	19,000		36,300		7,800
2	5.97	1,340	6.05	1,420	20.65	32,500	18.55	25,800		33,100		7,700
4	5.97	1,340	6.07	1,440	20.05	30,500	21.07	34,000		30,400		7,700
6	5.97	1,340	6.10	1,470	18.18	24,600		43,300		28,100		7,600
8	5.97	1,340	6.13	1,500	17.65	23,000		45,300		26,100		7,500
10	3.85	58	3.93	67	16.78	20,600		47,200		24,100		6,700
12	3.67	24	3.83	53	16.14	18,900		48,900		22,200		6,700
	November 23		November 24		November 25		November 30		December 1		December 2	
4		6,500		4,800		4,200	8.24	1,320	8.39	1,490	8.50	1,620
8		7,100		5,700		4,800	8.98	2,200	9.75	3,200	9.68	3,100
N		4,800		5,600		4,700	8.93	2,140	9.61	3,000	9.50	2,850
4		4,200		5,400		4,600	8.90	2,100	9.95	3,500	9.33	2,630
8		5,000		5,300		4,400	8.91	2,110	9.74	3,190	9.22	2,490
12		4,500		4,300		3,600	8.27	1,360	8.43	1,540	7.80	840
	December 3		December 4		December 5		December 6		December 7		December 8	
2	7.92	962		46,700		9,000	11.70	6,400	14.10	11,900	16.30	17,900
4	8.12	1,180		43,300		9,400	11.65	6,310	15.30	15,000	17.10	20,300
6	8.34	1,440		39,200		10,000	11.60	6,220	16.20	17,600	18.40	24,600
8	9.80	3,270		29,300		11,300	12.32	7,700	17.65	22,100	20.25	31,000
10	10.62	4,540		27,900		10,800	11.95	6,900	19.00	26,600	21.40	35,100
N	12.20	7,440		18,900		10,300	12.05	7,110	18.85	26,100		44,600
2	14.4	12,600		18,200		9,800	11.95	6,900	18.50	24,900	23.20	42,000
4	17.0	20,000		17,300	13.05	9,320	12.60	8,320	18.0	23,200	22.50	39,300
6	19.8	29,400		10,400	12.85	8,870	13.10	9,440	17.4	21,300	21.56	35,700
8	22.6	39,700		9,900	12.70	8,540	13.07	9,370	16.85	19,600	20.60	32,300
10	23.6	43,500		8,200	11.73	6,460	12.30	7,660	15.85	16,600	19.38	27,900
12		48,400		8,600	11.72	6,440	13.10	9,440	15.92	16,800	18.60	25,200
	December 9		December 10		December 11		December 12		December 13		December	
4	17.30	21,000	13.17	9,610	12.07	7,150	11.22	5,540	10.60	4,510		
8	14.93	14,000	13.40	10,200	12.37	7,810	11.60	6,220	10.95	5,080		
N	13.02	9,250	13.17	9,610	12.15	7,330	11.44	5,930	11.70	6,400		
4	13.42	10,200	12.95	9,090	11.96	6,920	11.30	5,680	12.20	7,440		
8	13.55	10,500	12.75	8,650	11.82	6,640	11.18	5,480	11.95	6,900		
12	13.20	9,680	12.18	7,400	11.26	5,610	10.60	4,510	10.72	4,700		

Supplemental record.--Nov. 19, 1 p.m., 20.84 ft, 33,100 cfs; Nov. 21, 1:30 a.m., 25.18 ft, 49,500 cfs.

Stanislaus River at Orange Blossom Bridge, Calif.

Location.--Lat 37°47'20", long. 120°45'40", in SE¼ sec. 4, T. 2 S., R. 11 E., at Orange Blossom Bridge 5.7 miles upstream from Oakdale.

Gage-height record.--Water-stage recorder graph except for period 9 p.m. Nov. 20 to 7 a.m. Nov. 21 and 10 a.m. to 5 p.m. Nov. 21 when graph was estimated.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 44,000 cfs and extended to peak stage.

Maxima.--November-December 1950: Discharge, 52,200 cfs 5 a.m. Nov. 21 (gage height, 30.05 ft).
1939 to October 1950: Discharge, 20,000 cfs Mar. 10, 1943 (gage height, 23.5 ft).

Remarks.--Flood flow partly regulated by Melones Reservoir (see p.648)and several smaller reservoirs above station. Several diversions above station. Record furnished by Division of Water Resources, Department of Public Works, State of California.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	127	2,400	9	337	18,900	17	363	4,760	25	4,510	3,140
2	132	2,570	10	533	10,400	18	2,320	4,180	26	3,710	3,160
3	136	9,160	11	473	8,330	19	16,900	3,770	27	3,040	3,150
4	88	32,700	12	381	6,680	20	26,900	3,640	28	2,630	3,150
5	63	10,900	13	321	6,280	21	45,000	3,500	29	2,400	3,150
6	56	8,640	14	324	7,220	22	16,100	3,360	30	2,000	3,050
7	74	20,200	15	318	8,220	23	7,410	3,260	31		2,970
8	221	33,100	16	318	5,840	24	5,550	3,180			
Monthly mean discharge, in cfs										4,759	7,837
Runoff, in acre-feet										283,200	481,900
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	3.91	764	3.94	778	10.91	6,000	23.20	25,600	29.82	51,200	23.55	26,600
4	3.83	728	3.95	782	10.20	5,310	22.05	22,200	30.00	52,000	22.55	23,600
6	3.07	426	3.14	451	8.85	4,080	21.28	20,100	30.01	52,100	21.66	21,100
8	2.43	221	2.50	241	7.55	3,010	21.18	19,800	29.76	50,900	20.82	18,800
10	2.20	161	2.24	171	6.42	2,200	21.37	20,300	29.45	49,500	19.74	17,200
N	2.02	120	2.30	187	9.50	4,660	21.05	19,500	29.10	47,800	18.70	15,600
2	1.94	102	5.80	1,790	20.50	18,400	21.04	19,400	28.65	45,800	17.05	13,300
4	1.88	90	7.70	3,120	25.55	33,400	21.65	21,100	27.90	42,600	14.75	10,300
6	1.83	81	9.60	4,740	26.80	38,100	24.20	28,700	27.10	39,300	13.92	9,290
8	2.60	270	10.75	5,840	26.55	37,200	27.00	38,900	26.35	36,400	13.80	9,150
10	3.65	651	11.24	6,320	25.35	32,700	29.00	47,400	25.45	33,100	13.78	9,130
12	3.84	733	10.99	6,070	24.30	29,100	29.45	49,500	24.48	29,700	13.75	9,090
	November 23		November 24		November 25		November 29		November 30		December 1	
4	13.10	8,330	10.20	5,300	9.26	4,420	6.62	2,320	6.56	2,270	5.90	1,830
8	12.91	8,120	10.13	5,230	8.88	4,080	5.88	1,830	5.10	1,350	5.16	1,380
N	13.08	8,310	10.72	5,810	9.30	4,460	6.12	1,980	5.24	1,420	5.85	1,790
4	11.20	6,290	10.70	5,790	9.62	4,750	7.05	2,620	6.44	2,190	7.75	3,130
8	10.72	5,810	10.40	5,490	9.42	4,560	7.52	2,960	6.40	2,160	8.21	3,500
12	11.00	6,080	10.13	5,230	9.19	4,360	7.68	3,090	6.36	2,140	8.16	3,450
	December 2		December 3		December 4		December 5		December 6		December 7	
2	7.95	3,280	7.20	2,710	28.79	46,200	15.89	11,700	13.40	8,610	16.03	11,900
4	6.58	2,270	5.87	1,810	29.14	47,700	15.42	11,100	12.65	7,770	16.45	12,400
6	5.59	1,630	5.00	1,290	28.87	46,600	15.29	10,900	12.40	7,490	18.57	15,400
8	5.53	1,600	5.33	1,470	28.11	43,200	15.16	10,800	12.30	7,380	19.85	17,300
10	5.55	1,600	6.17	2,000	27.12	39,100	15.29	10,900	12.41	7,500	21.15	19,600
N	6.64	2,320	8.17	3,460	26.32	35,700	15.68	11,400	13.08	8,240	22.80	24,100
2	7.68	3,080	11.55	6,610	24.97	31,100	15.63	11,400	12.94	8,090	23.67	26,800
4	7.73	3,120	13.95	9,280	22.79	24,100	15.34	11,000	12.76	7,890	23.79	27,200
6	7.59	3,000	16.20	12,100	21.32	20,000	15.04	10,600	13.11	8,280	23.37	25,900
8	7.50	2,940	19.85	17,300	20.17	17,800	14.72	10,200	14.20	9,560	22.71	23,900
10	7.44	2,890	24.55	29,800	17.77	14,200	14.44	9,860	16.00	11,800	22.00	21,800
12	7.35	2,820	27.60	41,400	16.68	12,700	14.16	9,520	16.57	12,600	21.59	20,700
	December 8		December 9		December 10		December 11		December 12		December 13	
4	22.84	24,500	24.00	28,100	14.98	10,600	13.25	8,510	11.50	6,600	10.22	5,310
8	23.58	26,800	22.15	22,500	14.84	10,400	12.96	8,170	11.32	6,410	10.11	5,200
N	25.62	33,700	19.65	17,100	15.08	10,700	13.26	8,520	11.81	6,920	10.73	5,810
4	28.12	43,600	15.80	11,600	14.88	10,500	13.08	8,310	11.66	6,770	11.69	6,790
8	27.78	42,100	15.28	11,000	14.47	9,980	12.70	7,890	11.38	6,470	12.36	7,500
12	26.10	35,500	15.45	11,200	14.12	9,540	12.41	7,570	11.12	6,200	12.73	7,940

Supplemental record.--Nov. 21, 5 a.m., 30.05 ft, 52,200 cfs.

Stanislaus River at Ripon, Calif.

Location.--Lat 37°43'50", long. 121°06'35", in SE¼ sec. 29, T. 2 S., R. 8 E., at highway bridge, 1 mile southeast of Ripon and 15 miles upstream from mouth. Datum of gage is at mean sea level, unadjusted (levels by Modesto Irrigation District).

Gage-height record.--Water-stage recorder graph except for period 4 p.m. Dec. 9 to 2 p.m. Dec. 10. Doubtful gage-height record Nov. 30 to Dec. 3.

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

Maxima.--November-December 1950: Discharge, 48,500 cfs 8:30 p.m. Nov. 21 (gage height, 62.78 ft).
1940 to October 1950: Discharge, 19,700 cfs Mar. 11, 1943 (gage height, 59.83 ft). Flood of Feb. 12, 1938 reached a stage of 64.4 ft, from floodmarks.

Remarks.--Flow regulated by reservoirs and power plants above station (see "Remarks" for Stanislaus River below Melones powerhouse). 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	224	2,270	9	315	31,800	17	534	5,590	25	5,610	3,200
2	238	2,550	10	450	16,300	18	558	4,730	26	4,720	3,150
3	245	2,630	11	617	10,500	19	1,960	4,240	27	3,880	3,120
4	251	14,500	12	619	7,820	20	10,600	3,810	28	3,260	3,090
5	206	23,500	13	579	6,160	21	33,400	3,480	29	2,930	3,060
6	172	11,900	14	548	5,670	22	35,000	3,620	30	2,700	3,030
7	152	9,770	15	534	6,260	23	16,300	3,510	31		3,010
8	151	23,300	16	524	6,800	24	8,270	3,290			
Monthly mean discharge, in cfs										4,518	7,602
Runoff, in acre-feet										268,900	467,400
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 18		November 19		November 20		November 21		November 22		November 23	
2	40.30	628	40.50	671	49.70	3,390	58.27	21,400	62.30	45,400		
4	40.17	600	40.62	704	50.36	3,620	58.47	22,500	62.00	43,400	58.15	20,800
6	40.01	567	41.47	913	51.05	3,890	58.55	22,900	61.70	41,400		
8	39.85	534	42.86	1,270	52.06	4,390	58.74	24,000	61.36	39,200	57.60	18,000
10	39.65	494	44.38	1,690	53.50	5,350	59.50	28,200	61.00	37,000		
N	39.52	468	45.73	2,090	55.15	7,800	60.00	31,000	60.62	34,700	57.13	15,700
2	39.46	456	46.90	2,460	56.70	13,800	60.40	33,400	60.24	32,400		
4	39.59	482	47.80	2,750	57.44	17,200	61.60	40,800	59.88	30,300	56.70	13,800
6	39.90	544	48.36	2,930	57.58	17,900	62.50	46,600	59.55	28,400		
8	40.22	611	48.65	3,030	57.67	18,400	62.76	48,300	59.24	26,700	56.37	12,300
10	40.43	656	48.85	3,100	57.85	19,200	62.75	48,300	58.97	25,200		
12	40.51	674	49.20	3,220	58.08	20,400	62.55	47,000	58.71	23,800	56.10	11,100
	November 24		November 25		November 26		November 29		November 30		December 1	
4	55.84	10,100	54.11	5,920	52.96	4,930						
8	55.56	9,060	53.91	5,720	52.81	4,840						
N	55.27	8,160	53.79	5,600	52.68	4,760						
4	54.93	7,170	53.66	5,480	52.52	4,660						
8	54.60	6,530	53.46	5,320	52.22	4,480						
12	54.27	6,110	53.18	5,090	51.79	4,240						
	December 4		December 5		December 6		December 7		December 8		December 9	
2	48.29	2,910	60.47	33,800	56.72	13,800	55.65	9,380	57.54	17,700	60.00	31,000
4	49.30	3,250	60.07	31,400	56.61	13,300	55.56	9,060	58.07	20,400	60.46	33,800
6	50.04	3,510	59.65	29,000	56.51	12,900	55.48	8,790	58.47	22,500	60.77	35,600
8	50.74	3,770	59.24	26,700	56.43	12,500	55.43	8,640	58.70	23,800	60.88	36,300
10	51.50	4,100	58.85	24,600	56.35	12,200	55.42	8,610	58.80	24,300	60.85	36,100
N	52.98	4,940	58.46	22,400	56.29	11,900	55.45	8,700	58.83	24,500	60.68	35,100
2	55.60	9,200	58.11	20,600	56.22	11,600	55.52	8,920	58.82	24,400	60.41	33,500
4	58.48	22,500	57.80	19,000	56.14	11,300	55.63	9,300	58.82	24,400	60.09	31,500
6	59.72	29,400	57.50	17,500	56.08	11,000	55.81	9,940	58.85	24,600		
8	60.67	35,000	57.24	16,200	55.97	10,600	56.07	11,000	58.94	25,100		
10	60.90	36,400	57.04	15,300	55.85	10,100	56.45	12,600	59.15	26,200		
12	60.80	35,800	56.87	14,500	55.75	9,720	56.94	14,800	59.50	28,200		
	December 10		December 11		December 12		December 13		December 14		December 15	
4			56.12	11,200	55.40	8,550	54.53	6,430	53.74	5,550	53.96	5,770
8			56.06	10,900	55.29	8,220	54.42	6,290	53.72	5,530	54.10	5,910
N			55.98	10,600	55.17	7,860	54.33	6,190	53.82	5,630	54.36	6,220
4	56.66	13,600	55.87	10,200	55.04	7,470	54.20	6,030	53.96	5,770	54.59	6,520
8	56.40	12,400	55.70	9,550	54.87	7,020	54.03	5,840	53.99	5,800	54.76	6,800
12	56.23	11,600	55.54	8,990	54.68	6,660	53.86	5,670	53.95	5,760	54.85	6,980

North Fork Stanislaus River near Avery, Calif.

Location.--Lat 38°14', long. 120°17', in sec. 35, T. 5 N., R. 15 E., 700 ft upstream from intake of Utica Canal, 3.5 miles upstream from Beaver Creek, and 5 miles northeast of Avery. Altitude of gage, about 3,400 ft (from topographic map).

Drainage area.--163 sq mi.

Gage-height record.--Water-stage recorder graph except for period 2 p.m. Nov. 18 to noon Dec. 13. Tape gage readings were available once daily Nov. 20-21, 26-29, Dec. 1-2, 6, 8, 13 and twice daily Dec. 3-5, 10-12.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 4,500 cfs and extended to peak stage on basis of slope-area determination. Discharge during period 2 p.m. Nov. 18 to noon Dec. 13 computed on basis of occasional gage readings and records for stations on Middle Fork Stanislaus River.

Maxima.--November-December 1950: Discharge, 29,000 cfs Nov. 18 (gage height, 13.8 ft, from floodmarks in gage well).
1914-22, 1928 to October 1950: Discharge, 31,100 cfs Dec. 11, 1937 (gage height, 14.1 ft, from floodmarks), from rating curve extended above 3,400 cfs as explained above.

Remarks.--Flow partly regulated by four reservoirs. Diversion from Beaver Creek into river, above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	182	600	9	114	3,000	17	314	824	25	850	414
2	165	490	10	109	1,600	18	12,500	736	26	690	390
3	163	11,100	11	106	1,200	19	15,000	667	27	590	362
4	156	5,000	12	105	1,000	20	16,500	607	28	510	346
5	139	1,700	13	109	878	21	8,350	546	29	460	338
6	129	2,000	14	125	2,050	22	2,200	502	30	510	327
7	122	6,500	15	116	1,250	23	1,400	463	31		310
8	116	11,000	16	169	967	24	1,100	440			
Monthly mean discharge, in cfs										2,103	1,858
Runoff, in acre-feet										125,200	114,300
Runoff, in inches										14.40	13.14

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												
4												
6												
8												
10												
N												
2												
4												
6												
8												
10												
12												
	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												
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2												
4												
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	December 8		December 9		December 10		December 11		December 12		December 13	
4												
8												
N												
4												
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12												

South Fork Stanislaus River at Strawberry, Calif.

Location.--Lat 38°12', long. 120°01', in SW¼ sec. 16, T. 4 N., R. 18 E., at Strawberry, 0.1 mile downstream from bridge on State Highway 108, and 0.5 mile downstream from Herring Creek. Altitude of gage, about 5,350 ft (from topographic map).

Drainage area.--45.5 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 1,000 cfs and extended to peak stage on basis of contracted-opening determination at bridge 0.3 mile below station.

Maxima.--November-December 1950: Discharge, 3,900 cfs 2 a.m. Nov. 21 (gage height, 9.25 ft).
1911-17, 1938 to October 1950: Discharge, 1,680 cfs June 4, 1945 (gage height, 6.3 ft), from rating curve extended above 1,000 cfs as explained above.

Remarks.--Flow affected by storage in Strawberry Reservoir (contents, in acre-feet, 1950: 7,450 Oct. 31, 16,000 Nov. 30, 16,500 Dec. 31).

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	56	112	9	61	831	17	74	156	25	264	71
2	63	100	10	59	544	18	914	134	26	214	69
3	70	1,270	11	58	364	19	1,100	121	27	176	64
4	66	1,050	12	59	328	20	2,000	107	28	126	63
5	62	375	13	62	152	21	2,470	96	29	114	59
6	62	465	14	63	193	22	901	85	30	123	64
7	61	1,320	15	64	230	23	495	79	31		66
8	61	1,630	16	67	194	24	352	77			
Monthly mean discharge, in cfs										344	338
Runoff, in acre-feet										20,460	20,760
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	2.15	68	2.73	147	6.47	1,780	4.08	506	9.25	3,900	5.45	1,180
4	2.15	68	2.92	184	6.32	1,690	4.08	506	9.00	3,670	5.33	1,120
6	2.15	68	3.25	256	6.06	1,540	4.48	671	8.65	3,370	5.19	1,040
8	2.15	68	3.57	340	5.65	1,290	5.77	1,360	8.05	2,890	5.06	980
10	2.15	68	4.10	513	5.45	1,170	6.57	1,840	7.50	2,480	4.93	915
N	2.16	69	4.65	750	5.14	1,000	6.88	2,050	7.15	2,240	4.79	845
2	2.17	70	5.30	1,090	4.87	860	6.95	2,100	6.87	2,040	4.72	810
4	2.19	73	5.76	1,360	4.76	805	7.35	2,380	6.55	1,830	4.68	791
6	2.22	76	6.06	1,540	4.50	680	8.40	3,170	6.35	1,710	4.62	764
8	2.25	80	6.50	1,800	4.32	599	8.90	3,580	6.10	1,560	4.52	719
10	2.31	87	6.80	1,990	4.21	554	9.05	3,720	5.86	1,420	4.43	678
12	2.48	109	6.65	1,890	4.10	513	9.05	3,720	5.65	1,290	4.35	642
	November 23		November 24		November 25		November 26		December 1		December 2	
4	4.18	572	3.62	380	3.42	325	2.96	219	2.46	121	2.33	98
8	4.04	519	3.54	357	3.40	320	2.95	217	2.40	110	2.28	90
N	3.94	484	3.50	346	2.98	224	2.93	213	2.37	105	2.25	85
4	3.84	450	3.46	336	2.97	221	2.92	210	2.41	112	2.39	108
8	3.76	424	3.44	330	2.97	221	2.92	210	2.41	112	2.38	107
12	3.68	398	3.43	328	2.96	219	2.92	210	2.37	105	2.46	121
	December 3		December 4		December 5		December 6		December 7		December 8	
2	2.50	128	6.63	1,880	3.92	477	3.26	286	6.08	1,550	6.15	1,590
4	2.74	174	6.12	1,570	3.82	444	3.23	279	6.35	1,710	6.80	1,990
6	3.17	265	5.70	1,320	3.74	417	3.21	274	6.30	1,680	7.25	2,300
8	3.64	386	5.41	1,160	3.66	392	3.21	274	6.12	1,570	6.22	1,630
10	4.22	588	5.14	1,020	3.59	371	3.21	274	5.90	1,440	6.43	1,760
N	5.35	1,120	4.90	900	3.54	357	3.22	277	5.70	1,320	6.55	1,830
2	6.40	1,740	4.70	800	3.50	346	3.34	306	5.47	1,180	6.30	1,680
4	7.11	2,210	4.55	732	3.47	338	3.55	360	5.35	1,120	6.12	1,570
6	7.54	2,510	4.40	665	3.43	328	3.85	454	5.24	1,070	5.94	1,460
8	7.70	2,620	4.26	604	3.38	315	4.82	860	5.12	1,010	5.75	1,350
10	7.38	2,400	4.14	556	3.34	306	5.33	1,120	5.12	1,010	5.55	1,230
12	7.08	2,190	4.02	512	3.30	296	5.72	1,330	5.40	1,150	5.40	1,150
	December 9		December 10		December 11		December 12		December 13		December	
4	5.12	1,010	4.19	576	3.67	395	3.46	336	3.38	315		
8	4.88	890	4.13	552	3.57	366	3.44	330	2.35	102		
N	4.69	796	4.21	584	3.52	352	3.43	328	2.33	98		
4	4.55	732	4.12	548	3.51	349	3.42	325	2.32	96		
8	4.42	674	3.93	480	3.46	336	3.41	323	2.32	96		
12	4.30	620	3.78	430	3.47	338	3.39	318	2.33	98		

Supplemental record.--Dec. 8, 6:30 a.m., 6.13 ft, 1,580 cfs.

South Fork Stanislaus River near Long Barn, Calif.

Location.--Masonry control, lat 38°05', long. 120°11', in sec. 25, T. 3 N., R. 16 E., 600 ft downstream from Lyons Dam, 2 miles west of Long Barn, and 14 miles northeast of Sonora. Altitude of gage, about 4,100 ft (from topographic map).

Drainage area.--67.2 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements between 40 and 1,400 cfs and extended to peak stage on basis of computed flow over Lyons Dam. Shifting-control method used Nov. 1-19. Stage-discharge relation indefinite below 40 cfs during period Dec. 26-31; discharge estimated on basis of trend of gage-height record and reported flow by dam tender.

Maxima.--November-December 1950: Discharge, 4,900 cfs 5 a.m. Nov. 21 (gage height, 9.3 ft).
1937 to October 1950: Discharge, 2,300 cfs June 2, 1938 (gage height, 7.14 ft), from rating curve extended above 1,400 cfs as explained above.

Remarks.--Flow affected by storage in Strawberry and Lyons Reservoirs. Contents of Lyons Reservoir, in acre-ft, 1950: 664 Oct. 31, 4,600 Nov. 30, 4,570 Dec. 31. Tuolumne Canal (see p.655) diverts at Lyons Dam; Philadelphia Canal (see following page) diverts 12 miles above station into basin of Middle Fork Stanislaus River.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	2.2	71	9	2.4	1,180	17	2.8	182	25	303	40
2	2.0	54	10	2.6	732	18	3.8	141	26	204	33
3	2.0	1,250	11	2.6	503	19	1,180	114	27	171	27
4	2.0	1,630	12	2.8	386	20	1,890	99	28	91	24
5	2.0	608	13	2.8	247	21	3,370	85	29	62	15
6	2.2	474	14	2.8	267	22	1,220	65	30	64	14
7	2.2	1,530	15	2.8	316	23	677	57	31		17
8	2.4	1,920	16	2.8	243	24	439	48			
Monthly mean discharge, in cfs										324	399
Runoff, in acre-feet										19,270	24,540
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 18		November 19		November 20		November 21		November 22		November 23	
2	0.16	2.8	0.21	4.0	4.87	893	9.10	4,600	6.30	1,660	4.72	833
4	.17	3.0	.20	3.8	4.75	845	9.20	4,750	6.10	1,540	4.60	785
6	.19	3.5	5.70	1,300	4.77	853	9.20	4,750	5.87	1,400	4.49	747
8	.20	3.8	6.57	1,850	4.83	877	9.00	4,460	5.70	1,300	4.40	716
10	.20	3.8	6.72	1,960	5.40	1,140	8.50	3,780	5.57	1,230	4.32	689
N	.21	4.0	6.60	1,870	6.10	1,540	7.95	3,100	5.45	1,160	4.23	660
2	.22	4.2	6.23	1,620	6.67	1,920	7.65	2,780	5.30	1,090	4.15	634
4	.22	4.2	6.00	1,480	7.20	2,350	7.50	2,630	5.18	1,030	4.10	618
6	.22	4.2	5.67	1,280	7.50	2,630	7.20	2,350	5.09	990	4.02	592
8	.22	4.2	5.50	1,190	8.10	3,280	6.90	2,100	5.00	950	3.96	574
10	.22	4.2	5.25	1,060	8.40	3,650	6.80	2,020	4.94	923	3.91	559
12	.22	4.2	5.05	972	8.95	4,390	6.55	1,840	4.86	889	3.85	541
	November 24		November 25		November 26		November 30		December 1		December 2	
4	3.73	506	3.02	330	2.42	216	1.17	56	1.39	76	1.22	60
8	3.62	476	2.98	322	2.36	205	1.27	64	1.39	76	1.19	57
N	3.45	431	2.95	316	2.33	200	1.29	66	1.39	76	1.13	52
4	3.35	406	2.90	306	2.32	198	1.30	67	1.31	68	1.07	48
8	3.22	375	2.64	256	2.30	195	1.30	67	1.26	63	1.02	44
12	3.08	344	2.51	232	2.28	192	1.38	75	1.23	61	1.25	62
	December 3		December 4		December 5		December 6		December 7		December 8	
2	1.52	89	7.60	2,730	4.58	778	3.53	452	5.50	1,190	5.86	1,390
4	1.96	142	7.30	2,440	4.43	726	3.47	436	6.05	1,500	6.20	1,600
6	2.35	204	6.94	2,130	4.30	682	3.41	421	6.33	1,680	6.60	1,870
8	2.95	316	6.65	1,910	4.16	637	3.37	411	6.60	1,870	7.10	2,260
10	3.65	484	6.25	1,630	4.10	618	3.32	399	6.60	1,870	7.20	2,350
N	4.55	768	6.00	1,480	3.98	580	3.28	389	6.50	1,800	6.95	2,140
2	5.70	1,300	5.68	1,290	3.92	562	3.30	394	6.30	1,660	6.92	2,120
4	6.70	1,940	5.48	1,180	3.90	556	3.32	399	6.15	1,570	6.90	2,100
6	7.40	2,530	5.24	1,060	3.80	526	3.52	449	5.97	1,460	6.75	1,980
8	7.75	2,880	5.04	968	3.70	498	3.87	547	5.80	1,360	6.65	1,910
10	7.80	2,940	4.88	897	3.64	481	4.35	699	5.67	1,280	6.49	1,790
12	7.70	2,830	4.72	833	3.56	460	4.95	928	5.67	1,280	6.30	1,660
	December 9		December 10		December 11		December 12		December 13		December	
4	3.98	1,460	4.63	797	3.95	571	3.35	406	3.07	341		
8	5.65	1,270	4.48	743	3.80	526	3.31	396	3.03	333		
N	5.35	1,120	4.38	709	3.68	492	3.27	387	2.59	246		
4	5.15	1,020	4.38	709	3.57	462	3.22	375	2.18	176		
8	4.95	928	4.31	685	3.49	441	3.17	363	1.94	140		
12	4.82	873	4.13	628	3.41	421	3.14	357	1.89	133		

Supplemental record.--Nov. 21, 5 a.m., 9.3 ft, 4,900 cfs; Dec. 7, 9 a.m., 6.63 ft, 1,890 cfs; Dec. 8, 8:30 a.m., 7.32 ft, 2,460 cfs.

Philadelphia Canal near Strawberry, Calif.

Location.--Concrete control, lat 38°11', long. 120°03', in sec. 30, T. 4 N., R. 18 E., 250 ft downstream from diversion dam on South Fork Stanislaus River and 3 miles southwest of Strawberry post office. Altitude of gage, about 4,800 ft (from topographic map).

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

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

Maxima.--November-December 1950: Daily discharge, 59 cfs Nov. 3.
1939 to October 1950: Daily discharge, 64 cfs Dec. 11, 1941.

Remarks.--Canal diverts from right bank of South Fork Stanislaus River for power development in Spring Gap power plant of Pacific Gas & Electric Co.; tailrace empties into Middle Fork Stanislaus River above station at Sand Bar Flat.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	52	55	9	57	34	17	55	51	25	38	54
2	56	56	10	56	34	18	40	54	26	38	53
3	59	24	11	55	32	19	0	54	27	49	53
4	58	14	12	56	41	20	0	53	28	57	54
5	58	30	13	58	46	21	0	54	29	55	55
6	58	25	14	58	38	22	0	54	30	56	54
7	57	11	15	58	26	23	0	55	31		54
8	57	25	16	57	44	24	14	55			
Monthly mean discharge, in cfs										43.7	43.3
Runoff, in acre-feet										2,600	2,660
Runoff, in inches										-	-

Tuolumne Canal near Long Barn, Calif.

Location.--Concrete control, lat 38°05', long. 120°11', in sec. 25, T. 3 N., R. 16 E., 200 ft downstream from intake, 250 ft downstream from Lyons Reservoir on South Fork Stanislaus River, 2 miles west of Long Barn, and 14 miles northeast of Sonora. Altitude of gage, about 4,100 ft (from topographic map).

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

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

Maxima.--November-December 1950: Daily discharge, 34 cfs Dec. 3.
1937 to October 1950: Daily discharge, 54 cfs June 26, 27, July 1, 1938, June 16-20, 22, 25, 1948.

Remarks.--Canal diverts from left bank of South Fork Stanislaus River for power and domestic use in vicinity of Sonora.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	7.9	30	9	10	19	17	11	29	25	20	29
2	12	29	10	10	19	18	11	28	26	19	29
3	12	34	11	10	19	19	11	28	27	26	29
4	12	30	12	10	26	20	9.4	28	28	29	29
5	12	29	13	10	29	21	9.4	28	29	29	30
6	12	23	14	10	23	22	16	29	30	30	30
7	11	16	15	10	26	23	20	29	31		30
8	9.9	19	16	10	29	24	20	29			
Monthly mean discharge, in cfs										14.3	26.9
Runoff, in acre-feet										852	1,650
Runoff, in inches										-	-

South San Joaquin Canal near Knights Ferry, Calif.

Location.--Concrete control, lat 37°51'20", long. 120°38'15", in sec. 15, T. 1 S., R. 12 E., 0.8 mile downstream from headgate at Goodwin Dam and 4 miles upstream from Knights Ferry. Altitude of gage, about 345 ft (from topographic map).

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

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

Maxima.--November-December 1950: Daily discharge, 566 cfs Nov. 25.

1914 to October 1950: Daily discharge, 1,150 cfs June 14-17, 19-21, 1950.

Remarks.--Flow regulated. Canal diverts from right bank of Stanislaus River at Goodwin Dam for irrigation in Oakdale and South San Joaquin irrigation districts.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	9.8	378	9	215	0.4	17	448	1.4	25	566	89
2	.2	317	10	245	.4	18	457	1.7	26	465	51
3	54	128	11	325	.4	19	378	2.1	27	469	58
4	75	1.0	12	414	.3	20	408	2.0	28	416	66
5	25	.8	13	444	1.6	21	468	2.0	29	377	68
6	25	.6	14	446	1.7	22	468	1.8	30	374	72
7	80	.8	15	447	1.4	23	478	24	31		97
8	188	1.0	16	440	1.5	24	516	84			
Monthly mean discharge, in cfs										324	46.9
Runoff, in acre-feet										19,280	2,890
Runoff, in inches										-	-

Oakdale Canal near Knights Ferry, Calif.

Location.--Lat 37°51'30", long. 120°38'00" in SE¼ sec. 10, T. 1 S., R. 12 E., 1,800 ft downstream from headgate at Goodwin Dam and 4 miles upstream from Knights Ferry. Altitude of gage, about 350 ft (from topographic map).

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

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

Maxima.--November-December 1950: Daily discharge, 1.1 cfs Dec. 3.

1914 to October 1950: Daily discharge, 484 cfs June 6, 13, 1950.

Remarks.--Flow regulated. Canal diverts water from left bank of Stanislaus River at Goodwin Dam for irrigation in Oakdale irrigation district.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	0	0	9	0	0.2	17	0.2	0	25	0.1	0
2	0	0	10	0	.2	18	.1	0	26	0	0
3	0	1.1	11	0	.2	19	.6	0	27	0	0
4	0	.4	12	0	.2	20	.6	0	28	0	0
5	0	.2	13	0	.2	21	.3	0	29	0	0
6	0	.8	14	.4	.1	22	.2	0	30	0	0
7	0	1.0	15	.7	0	23	.2	0	31		0
8	0	.5	16	.2	0	24	.1				
Monthly mean discharge, in cfs										0.12	0.16
Runoff, in acre-feet										7.3	10
Runoff, in inches										-	-

Calaveras River basin

Calaveras River at Jenny Lind, Calif.

Location.--Lat 38°05', long. 120°52', in SW¼ sec. 22, T. 3 N., R. 10 E., at bridge on Milton road, 0.2 mile south of Jenny Lind and 6.5 miles downstream from Cosgrove Creek. Altitude of gage, about 220 ft (from topographic map).

Drainage area.--395 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 6,800 cfs and extended to peak stage.

Maxima.--November-December 1950: Discharge, 7,570 cfs 6 a.m. Nov. 19 (gage height, 11.89 ft).
1907 to October 1950: Discharge observed, 50,000 cfs Jan. 31, 1911 (gage height, 21.0 ft, present datum), from rating curve extended above 11,000 cfs by logarithmic plotting.

Remarks.--Flow regulated by Hogan Reservoir at Stockton flood-control dam beginning in 1930 (usable capacity, 75,000 acre-ft), by Bingham reservoir (capacity, 775 acre-ft) on North Fork Calaveras River.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	88	160	9	17	4,570	17	117	710	25	429	288
2	56	169	10	16	3,350	18	2,280	589	26	302	275
3	38	1,850	11	15	2,500	19	7,070	513	27	245	255
4	31	4,280	12	15	1,230	20	6,690	453	28	207	239
5	24	3,430	13	15	665	21	6,030	402	29	178	229
6	21	2,690	14	27	1,300	22	3,990	367	30	163	223
7	18	3,390	15	47	1,660	23	2,770	337	31		262
8	18	4,710	16	71	994	24	1,200	309			
Monthly mean discharge, in cfs										1,073	1,368
Runoff, in acre-feet										63,840	84,100
Runoff, in inches										3.03	3.99

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			3.05	198	11.82	7,470	11.12	6,500	11.31	6,750	9.76	4,790
4			3.08	207	11.72	7,330	11.14	6,520	11.23	6,640	9.58	4,580
6	2.59	80	3.16	232	11.89	7,570	11.15	6,540	11.12	6,500	9.43	4,410
8			4.10	585	11.83	7,480	11.29	6,730	11.04	6,390	9.28	4,250
10			4.61	810	11.70	7,300	11.30	6,740	10.96	6,290	9.11	4,060
N	2.66	94	5.20	1,110	11.69	7,290	11.32	6,770	10.84	6,130	8.94	3,890
2			6.53	1,880	11.62	7,190	11.30	6,740	10.73	5,990	8.80	3,750
4			8.55	3,250	11.54	7,080	11.31	6,750	10.55	5,660	8.67	3,620
6	2.93	163	9.83	4,500	11.46	6,960	11.31	6,750	10.41	5,570	8.56	3,510
8			10.37	5,160	11.37	6,840	11.32	6,770	10.35	5,500	8.50	3,450
10			11.01	6,080	11.28	6,710	11.32	6,770	10.00	5,080	8.43	3,390
12	3.02	189	11.25	6,440	11.20	6,600	11.38	6,850	9.96	5,030	8.35	3,320
	November 23		November 24		November 25		November 29		November 30		December 1	
4	8.18	3,160	6.40	1,800	3.90	505						
8	7.98	2,980	5.85	1,470	3.77	453						
N	7.75	2,790	5.14	1,080	3.67	413	2.98	177	2.93	163	2.92	160
4	7.51	2,600	4.63	820	3.59	382						
8	7.22	2,370	4.33	684	3.53	359						
12	6.86	2,110	4.09	581	3.48	341	2.95	168	2.91	157	2.93	163
	December 2		December 3		December 4		December 5		December 6		December 7	
2			3.01	186	9.09	4,040			7.96	2,960	7.77	2,810
4			3.14	226	9.30	4,270			7.87	2,890	8.68	3,630
6			3.79	461	9.45	4,440	8.67	3,620	7.77	2,810	8.55	3,500
8			4.11	589	9.52	4,510			7.65	2,710	8.40	3,360
10			4.65	830	9.53	4,520			7.54	2,620	8.38	3,340
N	2.95	168	6.05	1,590	9.50	4,490	8.44	3,400	7.44	2,540	8.43	3,390
2			7.06	2,250	9.44	4,420			7.31	2,440	8.47	3,420
4			7.83	2,850	9.37	4,350			7.18	2,340	8.50	3,450
6			8.40	3,360	9.26	4,230	8.25	3,220	7.34	2,460	8.52	3,470
8			8.87	3,820	9.17	4,130			7.64	2,700	8.60	3,550
10			9.00	3,950	9.07	4,020			7.92	2,930	8.68	3,630
12	2.98	177	9.01	3,960	8.96	3,910	8.05	3,040	7.50	2,590	8.77	3,720
	December 8		December 9		December 10		December 11		December 12		December 13	
4	9.13	4,080	10.02	5,100	8.65	3,600	7.82	2,850	6.19	1,670	4.45	738
8	9.54	4,530	9.80	4,840	8.49	3,440	7.64	2,700	5.75	1,410	4.35	692
N	9.74	4,770	9.57	4,570	8.38	3,340	7.43	2,530	5.22	1,120	4.26	652
4	10.03	5,120	9.34	4,310	8.26	3,230	7.20	2,350	4.94	975	4.19	621
8	10.16	5,270	9.10	4,050	8.12	3,110	6.86	2,110	4.74	875	4.14	601
12	10.13	5,240	8.88	3,830	7.97	2,970	6.56	1,900	4.57	792	4.10	585

Supplemental record.--Nov. 19, 1 a.m., 11.88 ft, 7,550 cfs, 3:30 a.m., 11.22 ft, 6,630 cfs; Dec. 6, 9 p.m., 8.05 ft, 3,040 cfs.

Cosgrove Creek near Valley Springs, Calif.

Location.--Lat 38°09', long. 120°50', in SE¼ sec. 35, T. 4 N., R. 10 E., 0.4 mile upstream from mouth and 2.5 miles south of Valley Springs. Altitude of gage, about 580 ft (from topographic map).

Drainage area.--20.6 sq mi.

Gage-height record.--Water-stage recorder graph except for period Nov. 25 to 12 m Dec. 13.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 660 cfs and extended to peak stage on basis of previous ratings defined below 1,400 cfs. Discharge for period of no gage-height record computed on basis of records for San Domingo Creek near San Andreas and Calaveras River at Jenny Lind.

Maxima.--November-December 1950: Discharge, 1,390 cfs 10:30 p.m. Nov. 18 (gage height, 6.34 ft).
1929 to October 1950: Discharge, 3,180 cfs Dec. 21, 1945 (gage height, 8.38 ft), from rating curve extended above 1,400 cfs on basis of velocity-area studies and logarithmic plotting.

Remarks.--No storage or diversion above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	0	5	9	0	250	17	0	20	25	15	6.8
2	0	4	10	0	100	18	705	15	26	13	6.5
3	0	500	11	0	40	19	351	13	27	12	5.9
4	0	200	12	0	20	20	232	10	28	10	5.9
5	0	75	13	0	15	21	128	9.4	29	8	5.2
6	0	125	14	0	181	22	49	8.6	30	6	6.8
7	0	500	15	0	53	23	28	7.9	31		9.9
8	0	600	16	0	28	24	18	7.5			
Monthly mean discharge, in cfs										52.5	91.4
Runoff, in acre-feet										3,120	5,620
Runoff, in inches										2.84	5.12

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			2.20	0.8	5.25	740	3.24	82	3.90	218		
4			3.91	221	5.05	640	3.53	132	3.70	168		
6			4.55	425	4.93	584	4.58	437	3.67	161	3.05	57
8			4.50	405	4.41	374	4.52	413	3.65	157		
10			4.89	566	4.22	310	4.47	394	3.50	126		
N			4.88	561	3.96	235	4.15	289	3.43	113	2.96	46
2			5.34	787	3.76	182	3.85	205	3.38	105		
4			5.97	1,150	3.59	144	3.63	153	3.31	93		
6			5.94	1,130	3.48	122	3.50	126	3.26	85	2.91	40
8			6.00	1,160	3.37	103	3.52	130	3.21	78		
10			6.32	1,370	3.30	91	4.06	263	3.18	73		
12			6.21	1,300	3.24	82	3.98	240	3.14	68	2.86	35
	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, 10:30 p.m., 6.34 ft, 1,390 cfs.

Stockton diverting canal at Stockton, Calif.

Location.--Lat 37°59', long. 121°17', in Campo de Los Franceses Grant, 200 ft downstream from bridge on Sanguinetti Lane, at north edge of Stockton, San Joaquin County. Altitude of gage, about 21 ft (from topographic map).

Gage-height record.--Water-stage recorder graph except for period Nov. 21 to 11 a.m. Dec. 12 when there was no gage-height record.

Discharge record.--Stage-discharge relation defined by current-meter measurements. Discharge for period of no gage-height record computed on basis of unpublished records for Mormon Slough at Bellota.

Maxima.--November-December 1950: Discharge, 7,950 cfs 8 p.m. Nov. 19 (gage height, 13.42 ft).
1944 to October 1950: Discharge, 7,820 cfs Feb. 3, 1945 (gage height, 12.9 ft, present datum, from floodmarks).

Remarks.--Canal carries practically entire flow of Calaveras River (see p.657), diverting from Mormon Slough at lat 37°57'36", long. 121°12'05" and discharging into Calaveras River 0.2 mile below station. Mormon Slough diverts from Calaveras River at Bellota.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	0	90	9	0	5,000	17	0	920	25	1,200	233
2	0	100	10	0	4,000	18	534	709	26	800	220
3	0	2,500	11	0	3,000	19	6,810	558	27	500	204
4	0	5,000	12	0	1,600	20	7,450	452	28	250	189
5	0	4,000	13	0	916	21	7,000	374	29	150	177
6	0	3,500	14	0	1,600	22	5,000	323	30	100	166
7	0	4,500	15	0	2,480	23	3,500	293	31		174
8	0	6,000	16	0	1,400	24	2,000	258			
Monthly mean discharge, in cfs										1,176	1,643
Runoff, in acre-feet										70,000	101,000
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				0	11.10	5,110						
4				0	11.32	5,350	13.15	7,600				
6				0	11.56	5,630						
8				0	12.13	6,320	[illegible]93	7,310				
10				0	12.70	7,010						
N				0	12.96	7,350	12.93	7,310				
2				0	13.08	7,500						
4				0	13.23	7,700	13.03	7,440				
6			4.80	610	13.39	7,910						
8			6.36	1,370	13.42	7,950	13.03	7,440				
10			8.20	2,490	13.40	7,920						
12			10.20	4,170	13.35	7,860	12.93	7,310				
	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											5.37	1,040
8											5.20	960
N									6.77	1,820	5.08	900
4									6.42	1,610	4.96	838
8									5.97	1,360	4.88	792
12									5.62	1,170	4.83	763

Supplemental record.--Nov. 18, 5 p.m., no flow.

Bear Creek basin

Bear Creek near Lockeford, Calif.

Location.--Concrete control, lat 38°09'15", long. 121°08'15", in NW¼SE¼ sec. 31, T. 4 N., R. 8 E., at county road bridge 0.8 mile southeast of Lockeford. Altitude of gage, about 90 ft (from topographic map).

Drainage area.--48.4 sq mi.

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

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

Maxima.--November-December 1950: Discharge, 834 cfs 7:30 a.m. Dec. 7 (gage height, 9.65 ft).
1930-33, 1943 to October 1950: Discharge, 2,260 cfs Feb. 2, 1945 (gage height, 14.45 ft), from rating curve extended above 1,900 cfs.

Remarks.--No storage or diversion above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	0	1.1	9	0	85	17	0	38	25	4.1	8.9
2	0	1.1	10	0	50	18	154	28	26	3.0	7.8
3	0	321	11	0	32	19	307	23	27	2.2	6.9
4	0	193	12	0	26	20	238	21	28	1.6	6.3
5	0	62	13	0	21	21	81	17	29	1.4	6.0
6	0	108	14	0	301	22	26	14	30	1.1	6.0
7	0	553	15	0	86	23	10	12	31		6.3
8	0	518	16	0	56	24	6.3	9.6			
Monthly mean discharge, in cfs										27.9	84.7
Runoff, in acre-feet										1,660	5,210
Runoff, in inches										0.64	2.02

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 18		November 19		November 20		November 21		November 22		November	
2	1.91	0	8.60	670	3.79	75	4.13	109	3.42	42		
4	2.33	0	8.08	592	3.77	73	4.08	104	3.37	38		
6	2.39	0.2	7.63	528	3.96	92	4.05	101	3.32	34		
8	2.58	2.3	7.09	454	5.43	246	3.96	92	3.25	28		
10	2.59	2.6	6.11	327	6.72	406	3.86	82	3.21	25		
N	2.62	3.3	5.14	214	7.19	467	3.81	77	3.18	23		
2	2.70	5.6	4.57	154	7.07	451	3.80	76	3.15	20		
4	3.85	95	4.22	118	6.51	378	3.75	72	3.12	19		
6	6.31	357	3.99	95	5.62	268	3.67	64	3.09	17		
8	7.22	474	3.87	83	4.83	181	3.60	58	3.07	16		
10	7.97	576	3.82	78	4.34	130	3.53	52	3.05	14		
12	8.57	666	3.81	77	4.17	113	3.47	46	3.03	14		
	November 23		November 24		November 25		November 30		December 1		December 2	
4	3.01	12										
8	2.98	11										
N	2.95	10	2.84	6.3	2.76	4.1	2.58	1.1	2.58	1.1	2.58	1.1
4	2.93	9.2										
8	2.91	8.5										
12	2.89	7.8	2.80	5.1	2.73	3.4	2.58	1.1	2.58	1.1	2.62	1.6
	December 3		December 4		December 5		December 6		December 7		December 8	
2	2.65	2.0	7.38	493	3.79	75	3.20	24	8.37	636	6.85	422
4	2.79	4.8	6.70	403	3.77	73	3.16	21	8.96	724	7.97	576
6	2.89	7.8	5.75	284	3.75	72	3.14	20	9.54	816	8.41	642
8	3.45	44	4.94	193	3.72	69	3.13	19	9.59	824	8.40	640
10	4.96	196	4.39	135	3.68	65	3.11	18	9.16	756	8.53	660
N	6.50	377	4.05	101	3.65	62	3.10	18	8.69	684	8.64	676
2	7.30	482	3.85	81	3.62	60	3.11	18	8.18	607	8.51	656
4	7.63	528	3.80	76	3.59	57	3.18	23	7.25	475	8.26	619
6	8.15	602	3.79	75	3.55	54	3.35	36	5.83	294	7.60	524
8	8.49	654	3.79	75	3.52	51	5.54	259	5.03	203	6.44	369
10	8.52	658	3.79	75	3.49	48	7.55	517	4.82	180	5.28	230
12	8.02	583	3.79	75	3.29	31	8.26	619	5.45	248	4.62	159
	December 9		December 10		December 11		December 12		December 13		December	
4	4.00	96										
8	3.81	77										
N	3.80	76	3.50	49	3.29	31	3.22	26	3.16	21		
4	3.79	75										
8	3.76	72										
12	3.69	66	3.37	38	3.25	28	3.19	23	3.15	20		

Supplemental record.--Nov. 19, 1 a.m., 8.70 ft, 685 cfs; Dec. 3, 9 p.m., 855 ft, 662 cfs, Dec. 7, 7:30 a.m., 9.65 ft, 834 cfs.

Mokelumne River Basin

Salt Springs Reservoir near West Point, Calif.

Location.--Lat 38°30', long. 120°12', in SE¼ sec. 33, T. 8 N., R. 16 E., at Salt Springs Dam on North Fork Mokelumne River, 2 miles upstream from Cold Creek and 18 miles northeast of West Point. Datum of gage is 3,700 ft above mean sea level.

Drainage area.--160 sq mi.

Gage-height record.--Once-daily staff-gage readings with supplementary readings during the periods Nov. 20-22 and Dec. 2-4, 6-8, 14.

Remarks.--Reservoir is formed by concrete-faced rock-fill dam, completed in 1931; storage began in March 1931. Capacity, 139,000 acre-ft between elevations 3,707.25 ft (power-house intake) and 3,957.0 ft (upper operating limit, one foot below top of radial gates) above mean sea level. Additional storage of 1,860 acre-ft is available for release to river through outlet drain at elevation 3,667.75 ft. Water is released through power-house just below dam and discharged into Tiger Creek powerhouse conduit (see p.667). Records show contents available at 5 p.m. for use through powerhouse.

Elevation* and contents at 5 p.m. of indicated day, 1950

Day	November		December	
	Elevation (feet)	Contents (1,000's of acre-ft)	Elevation (feet)	Contents (1,000's of acre-ft)
1	173.8	69.1	246.7	129.3
2	173.1	68.5	246.4	129.0
3	172.8	68.3	251.8	134.0
4	173.6	68.9	249.0	131.4
5	174.2	69.3	248.0	130.5
6	174.4	69.5	247.9	130.4
7	173.9	69.1	250.0	132.3
8	173.4	68.8	251.0	133.3
9	172.7	68.3	248.5	130.9
10	171.4	67.3	248.2	130.7
11	170.4	66.6	247.7	130.2
12	169.5	66.0	247.6	130.1
13	168.4	65.2	246.3	128.9
14	167.4	64.5	244.2	126.9
15	166.4	63.8	242.7	125.6
16	165.1	62.9	243.7	126.5
17	164.6	62.6	244.4	127.1
18	173.4	68.8	244.6	127.3
19	216.4	102.3	244.4	127.1
20	237.0	120.4	244.2	126.9
21	249.5	131.9	243.7	126.5
22	253.5	135.7	243.3	126.1
23	252.0	134.2	243.7	126.5
24	249.8	132.2	243.8	126.6
25	248.8	131.2	243.9	126.7
26	248.4	130.8	243.2	126.0
27	247.9	130.4	242.8	125.7
28	247.3	129.8	242.4	125.3
29	247.0	129.5	241.7	124.6
30	247.0	129.5	240.8	123.8
31			239.9	123.0
Change in contents	-	+60.5	-	-6.5

*Add 3,700.0 ft to obtain elevation above mean sea level.

North Fork Mokelumne River below Salt Springs Dam, Calif.

Location.--Lat 38°29', long. 120°13', in SW¼ sec. 33, T. 8 N., R. 16 E., 0.3 mile downstream from Salt Springs Dam, and 1.7 miles upstream from Cold Creek. Altitude of gage, about 3,600 ft (from topographic map).

Drainage area.--160 sq mi.

Gage-height record.--Water-stage recorder graph except for periods 6 a.m. to 2 p.m. Nov. 21, noon Dec. 1 to 2 p.m. Dec. 4, and Dec. 22.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 3,000 cfs and extended to peak stage on basis of computations of flow over dam and discharge through powerhouse. Discharge for periods of no gage-height record computed from hydrograph based on flow through the dam and powerhouse.

Maxima.--November-December 1950: Discharge, 16,000 cfs 2 a.m. Nov. 21 (gage height, 17.20 ft).
1926 to October 1950: Discharge, 8,740 cfs Mar. 25, 1928 (gage height, 15.62 ft, present datum), from rating curve extended above 4,000 cfs.

Remarks.--Flow regulated since 1931 by Salt Springs Reservoir (see preceding page). Diversion above station through Tiger Creek powerhouse conduit (see p.667).

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	5.0	360	9	5.0	3,200	17	6.8	108	25	1,460	102
2	5.3	128	10	4.8	1,810	18	28	296	26	1,010	282
3	5.9	4,200	11	5.0	1,280	19	291	335	27	650	160
4	5.6	4,850	12	5.0	1,030	20	3,790	332	28	440	198
5	5.3	1,510	13	5.6	2,480	21	8,220	332	29	301	296
6	5.0	1,600	14	6.2	2,230	22	1,800	140	30	377	296
7	5.0	5,760	15	5.9	389	23	3,160	58	31		259
8	5.0	8,860	16	8.4	104	24	2,450	98			
Monthly mean discharge, in cfs										802	1,390
Runoff, in acre-feet										47,750	85,450
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 18		November 19		November 20		November 21		November 22		November 23	
2	1.82	13	2.12	28	6.68	1,550	17.20	16,000	5.25	980	8.31	3,050
4	1.90	16	2.07	25	6.72	1,570	16.90	15,100	4.73	728	8.26	3,010
6	1.96	20	2.04	24	6.74	1,580	16.30	13,600	4.72	724	8.20	2,960
8	2.01	22	2.00	22	6.76	1,600		11,000	4.72	724	8.13	2,900
10	2.09	26	2.04	24	6.77	1,600		8,700	4.67	702	8.07	2,860
N	2.16	31	2.07	25	9.00	3,110		7,000	5.50	1,120	8.15	2,920
2	2.21	35	2.07	25	11.40	5,240	11.10	5,560	6.60	1,760	9.17	3,750
4	2.28	40	2.05	24	11.44	5,290	10.00	4,500	7.67	2,540	8.95	3,560
6	2.25	38	4.00	329	11.48	5,340	8.10	2,880	8.73	3,380	8.80	3,440
8	2.24	37	5.25	790	11.56	5,430	8.45	3,160	8.67	3,340	8.65	3,320
10	2.25	38	6.40	1,390	11.63	5,520	8.75	3,400	8.42	3,140	8.36	3,090
12	2.19	33	6.67	1,540	16.40	15,800	6.60	1,760	8.35	3,080	8.17	2,940
	November 24		November 25		November 26		November 30		December 1		December 2	
4	7.75	2,600	6.48	1,690	5.52	1,130	3.46	268	4.28	542		230
8	7.32	2,270	6.25	1,540	5.45	1,090	3.51	283	4.28	542		10
N	7.65	2,520	6.06	1,430	5.37	1,040	3.52	286		230		10
4	7.85	2,680	5.90	1,340	5.28	995	4.17	500		230		10
8	7.25	2,220	5.65	1,200	4.95	830	4.20	510		230		260
12	6.85	1,930	5.58	1,160	4.88	796	4.28	542		230		260
	December 3		December 4		December 5		December 6		December 7		December 8	
2		260		8,500	6.80	1,900	5.40	1,070	11.50	5,990	10.90	5,360
4		260		7,500	6.65	1,800	5.24	990	12.40	7,030	12.50	7,150
6		260		6,400	6.45	1,670	5.20	970	13.02	7,830	14.00	9,220
8		10		5,400	6.25	1,540	5.19	966	12.92	7,700	15.05	10,900
10		10		4,800	6.10	1,460	5.18	961	12.25	6,850	15.60	12,000
N		400		4,200	6.30	1,580	5.20	970	11.60	6,100	15.60	12,000
2		2,600		3,800	6.11	1,460	5.38	1,060	10.80	5,260	15.35	11,500
4		7,700	8.75	3,400	5.98	1,380	5.60	1,180	10.55	5,010	15.17	11,100
6		11,800	8.30	3,040	5.86	1,320	6.35	1,600	9.90	4,410	13.90	9,060
8		11,500	7.95	2,760	5.73	1,250	7.60	2,480	9.60	4,140	12.55	7,220
10		10,600	7.60	2,480	5.60	1,180	9.35	3,920	9.50	4,050	11.60	6,100
12		9,700	7.00	2,040	5.50	1,120	10.60	5,060	9.80	4,320	10.70	5,160
	December 9		December 10		December 11		December 12		December		December	
4	9.50	4,050	6.82	1,910	5.73	1,250	5.42	1,080				
8	8.65	3,320	6.63	1,780	6.21	1,520	5.52	1,130				
N	8.13	2,900	6.47	1,680	5.85	1,310	5.44	1,090				
4	7.95	2,760	6.90	1,960	5.65	1,200	5.24	990				
8	7.70	2,560	6.54	1,730	5.40	1,070	5.08	916				
12	7.00	2,040	6.28	1,560	5.35	1,040	4.96	862				

Supplemental record.--Dec. 7, 6:30 a.m., 13.07 ft, 7,900 cfs; Dec. 8, 11 a.m., 15.63 ft, 12,100 cfs.

Mokelumne River near Mokelumne Hill, Calif.

Location.--Lat 38°18'40", long. 120°43'10", in sec. 1, T. 5 N., R. 11 E., at highway bridge, 1.2 miles northwest of Mokelumne Hill and 8 miles downstream from confluence of North and South Forks. Altitude of gage, about 650 ft (from topographic map).

Drainage area.--538 sq mi.

Gage-height record.--Water-stage recorder graph except Dec. 16-31 when communication was faulty.

Discharge record.--Stage-discharge relation defined by current-meter measurements. Discharge for Dec. 16-31 computed on basis of unpublished record of flow into Pardee reservoir about 6 miles downstream.

Maxima.--November-December 1950: Discharge, 33,700 cfs 10 p.m. Dec. 3 (gage height, 18.5 ft).
1927 to October 1950: Discharge, 23,300 cfs Mar. 25, 1928 (gage height, 16.10 ft), from rating curve extended above 11,000 cfs on basis of velocity-area studies.

Remarks.--Flood runoff slightly affected by storage and regulation above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	612	1,480	9	582	8,970	17	757	2,200	25	2,770	1,000
2	548	1,410	10	486	5,080	18	12,300	2,100	26	2,030	1,200
3	613	13,200	11	562	3,990	19	15,000	2,000	27	1,860	1,200
4	443	15,100	12	537	3,350	20	17,300	2,000	28	1,630	1,000
5	99	5,040	13	566	3,600	21	20,300	1,800	29	1,390	1,200
6	302	4,370	14	609	5,620	22	4,980	1,600	30	1,230	1,800
7	465	14,200	15	673	4,130	23	4,530	1,500	31		1,200
8	486	20,700	16	672	2,500	24	3,910	1,100			
Monthly mean discharge, in cfs										3,275	4,375
Runoff, in acre-feet										194,900	269,000
Runoff, in inches										6.79	9.38

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	3.14	570	3.81	952	15.75	24,600	7.40	4,780	16.05	25,600	9.13	7,530
4	3.24	620	3.82	958	15.4	23,500	7.73	5,260	16.45	26,800	9.08	7,440
6	3.22	610	4.06	1,120	15.2	22,800	8.40	6,320	17.05	28,800	7.50	4,920
8	3.75	912	3.76	919	14.8	21,600	8.86	7,060	16.65	27,500	7.19	4,490
10	3.64	844	7.20	4,500	13.85	18,800	10.80	10,900	16.2	26,000	7.43	4,820
N	3.34	672	8.92	7,160	12.35	14,500	15.45	23,600	15.35	23,300	7.20	4,500
2	3.29	645	12.5	14,900	10.85	11,000	16.05	25,600	14.6	21,000	7.24	4,560
4	3.31	656	15.5	23,800	9.4	8,020	16.70	27,600	13.25	17,000	6.85	4,020
6	3.35	678	16.35	26,500	8.85	7,040	16.90	28,300	11.5	12,400	6.20	3,210
8	3.60	820	16.35	26,500	8.43	6,370	16.35	26,500	10.3	9,800	6.88	4,060
10	4.09	1,140	16.3	26,400	8.00	5,680	16.1	25,700	9.85	8,900	6.93	4,130
12	4.15	1,180	16.5	27,000	7.53	4,960	16.3	26,400	8.9	7,130	7.55	5,000
	November 23		November 24		November 25		November 29		November 30		December 1	
4	7.18	4,470	7.08	4,330	6.00	2,970						
8	7.35	4,710	6.84	4,010	5.91	2,860						
N	7.05	4,290	6.75	3,900	5.96	2,920						
4	7.10	4,360	6.46	3,520	5.48	2,390						
8	7.18	4,470	6.43	3,490	5.60	2,520						
12	7.40	4,780	6.55	3,640	5.41	2,310						
	December 3		December 4		December 5		December 6		December 7		December 8	
2	4.10	1,150	16.5	27,000	8.23	6,050	6.90	4,090	12.2	14,100	10.65	10,500
4	4.36	1,350	15.4	23,500	8.15	5,920	6.60	3,700	12.5	14,900	12.05	13,700
6	4.56	1,510	14.35	20,200	7.75	5,300	6.30	3,330	13.35	17,300	14.1	19,500
8	5.05	1,950	13.5	17,700	7.83	5,420	6.65	3,760	14.15	19,600	15.9	25,100
10	6.7	3,830	12.5	14,900	7.54	4,980	6.62	3,730	13.75	18,400	16.8	28,000
N	9.5	8,200	11.8	13,100	7.50	4,920	6.63	3,740	13.2	16,900	16.7	27,600
2	12.5	14,900	11.0	11,300	7.75	5,300	6.72	3,860	12.3	14,400	16.3	26,400
4	14.05	19,400	10.8	10,900	6.92	4,120	6.70	3,830	11.65	12,800	15.5	23,800
6	16.25	26,200	9.25	7,750	7.15	4,430	6.75	3,900	10.85	11,000	15.05	22,400
8	17.45	30,100	9.85	8,900	7.13	4,400	7.25	4,570	10.55	10,300	14.45	20,600
10	18.5	33,700	9.3	7,840	7.18	4,470	8.30	6,160	10.6	10,400	13.55	17,800
12	17.75	31,200	8.25	6,080	7.07	4,320	10.95	11,200	10.15	9,500	12.85	15,900
	December 9		December 10		December 11		December		December		December	
4	11.4	12,200	8.0	5,680	7.05	4,290						
8	10.3	9,800	7.8	5,370	6.7	3,810						
N	8.85	7,040	7.55	5,000	6.7	3,810						
4	9.0	7,300	7.3	4,640	6.85	4,010						
8	8.5	6,480	7.2	4,500	6.75	3,880						
12	8.2	6,000	7.3	4,640	6.6	3,680						

Supplemental record.--Nov. 21, 6:30 a.m., 17.15 ft, 29,100 cfs; Dec. 4, 7 p.m., 8.6 ft, 6,640 cfs; Dec. 8, 11 a.m., 16.9 ft, 28,300 cfs.

Mokelumne River at Lancha Plana, Calif.

Location.--Lat 38°13'25", long. 120°53'20", in SW¼ sec. 4, T. 4 N., R. 10 E., 1 mile east of Lancha Plana, 3 miles downstream from Pardee Dam, and 5 miles upstream from Camanche Creek. Datum of gage is 158.95 ft above mean sea level (levels by East Bay Municipal Utility District).

Drainage area.--584 sq mi.

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

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

Maxima.--November-December 1950: Discharge, 26,700 cfs 9:30 a.m. Nov. 21 (gage height, 20.1 ft).
1926 to October 1950: Discharge, 25,700 cfs Mar. 25, 1928 (gage height, 19.65 ft).

Remarks.--Flood runoff only slightly affected by storage in Pardee Reservoir, Salt Springs Reservoir, several smaller reservoirs and four power plants above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	489	4,400	9	706	11,700	17	551	4,500	25	4,530	850
2	503	4,390	10	706	6,160	18	736	4,490	26	4,510	625
3	511	4,470	11	550	4,730	19	3,660	4,480	27	4,500	844
4	510	5,360	12	379	4,490	20	12,800	4,470	28	4,240	844
5	573	5,980	13	459	4,480	21	22,000	1,930	29	1,420	820
6	695	4,610	14	536	4,540	22	7,150	1,890	30	2,450	952
7	634	11,600	15	594	4,500	23	4,870	1,890	31		1,040
8	706	18,300	16	711	4,510	24	4,590	1,490			
Monthly mean discharge, in cfs										2,909	4,366
Runoff, in acre-feet										173,100	268,400
Runoff, in inches										5.56	8.62

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					3.47	780	9.31	6,170	19.70	25,800	11.90	10,100
4					3.52	807	9.22	6,060	19.57	25,600	11.40	9,260
6					3.44	764	9.22	6,060	20.03	26,600	10.93	8,490
8					3.39	737	9.34	6,210	19.44	25,300	10.20	7,380
10					4.30	1,300	9.55	6,480	20.03	26,600	9.85	6,890
N					8.48	5,170	10.25	7,450	19.45	25,300	9.86	6,900
2					8.62	5,330	12.75	11,600	18.65	23,600	9.48	6,390
4					9.17	5,990	15.55	17,100	17.50	21,200	9.17	5,990
6					9.50	6,420	17.75	21,700	15.93	17,900	8.88	5,650
8					9.60	6,550	18.90	24,100	14.65	15,300	8.59	5,300
10					9.55	6,480	19.40	25,200	13.50	13,000	8.46	5,150
12					9.45	6,360	19.47	25,300	12.60	11,400	8.41	5,090
	November 23		November 24		November 25		November 29		November 30		December 3	
4	8.40	5,080										
8	8.28	4,950										
N	8.17	4,830	7.93	4,560	7.90	4,530					7.86	4,490
4	8.10	4,750										
8	8.07	4,720										
12	8.06	4,710	7.91	4,540	7.89	4,520					7.85	4,480
	December 4		December 5		December 6		December 7		December 8		December 9	
2	7.85	4,480	9.95	7,030	8.23	4,890	9.35	6,220	12.40	11,000	15.67	17,300
4	7.85	4,480	9.80	6,820	8.11	4,760	10.36	7,610	12.34	10,900	14.80	15,600
6	7.85	4,480	9.64	6,600	8.00	4,640	11.70	9,770	12.82	11,800	14.08	14,200
8	7.86	4,490	9.42	6,320	7.90	4,530	12.85	11,800	14.03	14,100	13.40	12,900
10	7.87	4,500	9.25	6,100	7.87	4,500	13.85	13,700	16.00	18,000	12.80	11,700
N	7.87	4,500	9.11	5,920	7.83	4,450	14.40	14,800	17.70	21,600	12.40	11,000
2	8.32	4,990	8.86	5,620	7.82	4,440	14.42	14,800	18.82	23,900	11.82	9,980
4	9.05	5,850	8.86	5,620	7.83	4,450	14.25	14,500	19.18	24,700	11.39	9,240
6	9.70	6,680	8.62	5,330	7.96	4,600	13.85	13,700	18.82	23,900	11.09	8,740
8	9.84	6,880	8.51	5,200	7.94	4,570	13.25	12,600	18.30	22,800	10.72	8,150
10	10.05	7,170	8.40	5,080	7.92	4,550	12.85	11,800	17.65	21,500	10.45	7,740
12	10.13	7,280	8.33	5,000	8.25	4,920	12.54	11,300	16.70	19,500	10.27	7,480
	December 10		December 11		December 12		December 13		December		December	
4	9.91	6,970	8.31	4,960								
8	9.52	6,450	8.20	4,830								
N	9.27	6,120	8.08	4,690	7.92	4,500	7.91	4,490				
4	8.97	5,750	7.97	4,560								
8	8.65	5,370	7.93	4,510								
12	8.44	5,120	7.92	4,500	7.90	4,480	7.90	4,480				

Supplemental record.--Nov. [illegible] 9:30 a.m., 20.1 ft, 26,700 cfs.

Mokelumne River near Clements, Calif.

Location.--Lat 38°12'25", long. 121°05'20", in NW¼ sec. 15, T. 4 N., R. 8 E., 700 ft upstream from highway bridge, 1 mile north of Clements, and 3 miles downstream from Murphy Creek. Datum of gage is 67.16 ft above mean sea level (levels by East Bay Municipal Utility District).

Drainage area.--630 sq mi.

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

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

Maxima.--November-December 1950: Discharge, 28,800 cfs 8 a.m. Nov. 21 (gage height, 24.40 ft).
1904 to October 1950: Discharge, 25,600 cfs Mar. 25, 1928 (gage height, 22.45 ft, site and datum then in use) from rating curve extended above 4,500 cfs and verified by comparison with records for station at Lancha Plana.

Remarks.--Flood runoff slightly affected by storage and regulation above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	476	4,120	9	707	15,700	17	577	4,570	25	4,340	915
2	493	4,190	10	707	6,760	18	1,030	4,530	26	4,320	703
3	518	4,640	11	568	4,970	19	2,370	4,510	27	4,280	840
4	515	4,850	12	436	4,580	20	14,500	4,480	28	4,270	860
5	596	6,500	13	471	4,550	21	26,900	2,560	29	1,900	835
6	692	4,720	14	549	4,760	22	10,600	2,000	30	1,720	927
7	643	11,100	15	603	4,590	23	4,970	1,970	31		1,140
8	700	18,200	16	715	4,560	24	4,460	1,740			
Monthly mean discharge, in cfs										3,188	4,560
Runoff, in acre-feet										189,700	280,400
Runoff, in inches										5.64	8.35

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	4.46	715	4.49	726	6.25	1,520	13.91	6,840	23.25	25,600	19.79	17,200
4	4.46	715	4.58	762	6.14	1,470	14.33	7,420	23.94	27,500	18.76	15,000
6	4.44	707	4.63	782	6.00	1,400	14.61	7,820	24.29	28,500	17.83	13,200
8	4.03	558	4.78	842	5.78	1,290	14.77	8,060	24.40	28,800	17.12	11,800
10	3.43	367	5.08	976	5.48	1,160	14.80	8,100	24.33	28,600	16.44	10,700
N	3.06	262	5.14	1,000	5.21	1,030	14.74	8,010	24.34	28,700	15.79	9,610
2	3.05	259	5.27	1,080	5.10	985	14.72	7,980	24.33	28,600	15.07	8,500
4	4.05	565	5.64	1,230	7.70	2,250	14.87	8,200	24.20	28,300	14.69	7,940
6	4.34	669	5.94	1,370	10.32	3,680	15.42	9,030	23.86	27,300	14.30	7,380
8	4.40	692	5.98	1,390	11.65	4,560	17.06	11,700	23.27	25,700	13.87	6,790
10	4.42	700	5.46	1,150	12.54	5,310	19.87	17,400	22.35	23,300	13.46	6,270
12	4.45	711	6.00	1,400	13.35	6,140	22.15	22,800	21.10	20,200	13.07	5,830
	November 23		November 29		November 30		December 3		December 4		December 5	
4	12.45	5,220	8.14	2,470	6.01	1,400	11.32	4,320	11.74	4,630	14.23	7,280
8	12.26	5,050	6.54	1,670	6.00	1,400	11.53	4,470	11.58	4,510	14.18	7,210
N	12.09	4,910	6.27	1,540	5.98	1,390	11.73	4,620	11.50	4,450	13.81	6,710
4	11.94	4,790	6.14	1,470	5.96	1,380	11.97	4,820	11.48	4,440	13.36	6,150
8	11.77	4,660	6.07	1,440	7.68	2,240	12.28	5,070	12.48	5,250	12.89	5,640
12	11.68	4,580	6.03	1,420	10.27	3,650	12.08	4,900	13.86	6,780	12.50	5,270
	December 6		December 7		December 8		December 9		December 10		December 11	
2			12.09	4,910	18.50	14,500	22.50	23,700	14.90	8,250		
4	12.14	4,950	12.47	5,240	18.26	14,000	21.87	22,100	14.54	7,740	11.93	5,250
6			13.24	6,010	17.96	13,400	21.13	21,300	14.30	7,430		
8	11.86	4,730	14.41	7,530	17.88	13,300	20.28	18,300	14.00	7,080	11.73	5,100
10			15.70	9,470	18.16	13,800	19.43	16,400	13.73	6,790		
N	11.53	4,470	17.27	12,100	19.06	15,600	18.65	14,800	13.47	6,530	11.50	4,940
2			18.26	14,000	20.30	18,400	18.00	13,500	13.25	6,340		
4	11.40	4,380	19.00	15,500	21.66	21,600	17.41	12,300	13.05	6,160	11.27	4,780
6			19.43	16,400	22.70	24,200	16.70	11,100	12.88	6,010		
8	11.80	4,680	19.46	16,500	23.10	25,300	16.14	10,200	12.67	5,850	11.11	4,670
10			19.25	16,000	23.12	25,300	15.70	9,470	12.49	5,700		
12	12.15	4,960	18.86	15,200	22.92	22,200	15.28	8,820	12.27	5,530	11.02	4,600
	December 12		December		December		December		December		December	
4												
8												
N	10.98	4,580										
4												
8												
12	10.95	4,560										

Supplemental record.--Dec. 5, 6 a.m., 14.30 ft, 7,380 cfs; Dec. 8, 9:30 p.m., 23.15 ft, 25,400 cfs.

Mokelumne River at Woodbridge, Calif.

Location.--Lat 38°09'30", long. 121°18'10", in NE¼ sec. 34, T. 4 N., R. 6 E., at Woodbridge, 0.4 mile downstream from dam and canal intake of Woodbridge Irrigation District. Datum of gage is 14.9 ft above mean sea level (levels by East Bay Municipal Utility District).

Drainage area.--644 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 5,000 cfs and extended to peak stage on basis of contracted-opening determination. Shifting-control method used Dec. 23-31.

Maxima.--November-December 1950: Discharge, 27,000 cfs 2 a.m. Nov. 22 (gage height, 29.58 ft).
1924 to October 1950: Discharge, about 24,000 cfs (estimated) Mar. 26, 1928 (gage height, 26.58 ft, datum then in use, or about 30.6 ft, present datum).

Remarks.--Flood runoff slightly affected by storage and regulation above station. Some unmeasured runoff bypassed the station during the flood but is believed to be less than five percent of the flood runoff.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	308	2,380	9	527	19,600	17	510	4,450	25	4,700	1,720
2	324	3,390	10	530	7,990	18	633	4,430	26	4,490	1,280
3	341	4,140	11	503	5,460	19	1,160	4,410	27	4,450	1,020
4	336	4,510	12	414	4,890	20	2,310	4,390	28	4,410	1,110
5	371	4,840	13	276	4,560	21	8,990	4,300	29	4,230	1,080
6	438	5,310	14	339	4,480	22	19,500	3,080	30	2,580	1,040
7	505	5,060	15	393	4,550	23	6,220	2,340	31		1,150
8	510	9,130	16	474	4,500	24	5,090	2,180			
Monthly mean discharge, in cfs										2,529	4,283
Runoff, in acre-feet										150,500	263,300
Runoff, in inches										4.38	7.67

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			7.45	382	9.93	865	12.27	1,410	19.08	3,700	29.58	27,000
4			7.65	416	10.10	902	12.91	1,580	19.70	3,940	29.48	26,300
6			7.90	460	10.23	931	13.41	1,730	20.34	4,180	29.42	25,800
8			8.08	492	10.39	966	13.75	1,840	21.00	4,430	29.24	24,600
10			9.36	739	10.53	997	15.81	2,510	22.08	4,860	28.93	22,600
N			9.56	783	13.52	1,770	16.09	2,600	22.45	5,010	28.57	20,400
2			9.42	752	13.08	1,630	15.96	2,560	22.60	5,070	28.17	18,000
4			9.31	728	12.23	1,400	16.14	2,620	23.55	5,450	27.80	15,800
6			9.30	726	11.55	1,230	16.45	2,730	26.30	9,050	27.38	13,600
8			9.40	748	11.04	1,110	16.81	2,860	28.77	21,600	26.95	11,500
10			9.52	774	10.92	1,080	17.32	3,050	29.38	25,600	26.60	10,100
12			9.70	814	11.44	1,210	18.17	3,360	29.54	26,700	26.25	8,880
	November 23		November 24		November 25		November 29		November 30		December 1	
4	25.65	6,940	23.06	5,250	21.92	4,800	20.88	4,380	17.66	3,170	14.27	2,000
8	25.14	6,160	22.80	5,150	21.79	4,750	20.87	4,380	16.60	2,790	14.97	2,220
N	24.63	5,880	22.62	5,080	21.71	4,710	20.81	4,360	15.76	2,490	15.45	2,380
4	24.16	5,690	22.47	5,020	21.62	4,680	20.54	4,260	14.97	2,220	15.97	2,560
8	23.75	5,530	22.26	4,930	21.34	4,570	19.88	4,000	14.38	2,030	16.44	2,730
12	23.37	5,380	22.08	4,860	21.29	4,550	18.85	3,610	14.05	1,930	16.84	2,870
	December 2		December 3		December 4		December 5		December 6		December 7	
4	17.28	3,030	19.85	3,990	20.82	4,360	21.55	4,650	23.38	5,380	22.60	5,070
8	17.77	3,210	20.12	4,100	21.00	4,430	21.54	4,650	23.40	5,390	22.42	5,000
N	18.28	3,400	20.30	4,160	21.24	4,530	21.72	4,720	23.31	5,350	22.31	4,950
4	18.76	3,580	20.45	4,220	21.38	4,580	22.13	4,880	23.18	5,300	22.30	4,950
8	19.19	3,740	20.59	4,270	21.58	4,660	22.72	5,120	23.00	5,230	22.62	5,080
12	19.59	3,890	20.69	4,310	21.59	4,670	23.19	5,310	22.80	5,150	23.76	5,530
	December 8		December 9		December 10		December 11		December 12		December	
2	24.20	5,710	27.55	14,400								
4	25.07	6,100	28.15	17,900	26.72	10,600	24.18	5,700	22.54	5,050		
6	25.88	7,600	28.70	21,200								
8	26.36	9,260	29.05	23,300	26.14	8,490	23.87	5,580	22.31	4,950		
10	26.60	10,100	29.17	24,100								
N	26.70	10,500	29.13	23,800	25.64	6,920	23.57	5,460	22.12	4,880		
2	26.70	10,500	29.00	23,000								
4	26.65	10,300	28.75	21,500	25.23	6,250	23.27	5,340	21.94	4,810		
6	26.60	10,100	28.45	19,700								
8	26.60	10,100	28.10	17,600	24.86	5,980	23.01	5,230	21.80	4,750		
10	26.72	10,600	27.75	15,500								
12	27.02	11,800	27.38	13,600	24.51	5,830	22.76	5,130	21.66	4,690		

Supplemental record.--Dec. 6, 6 a.m., 23.42 ft, 5,400 cfs.

Tiger Creek powerhouse conduit below Salt Springs Dam, Calif.

Location.--Concrete control, lat 38°30', long. 120°13', in SW¼ sec. 33, T. 8 N., R. 16 E., 1,000 ft downstream from Salt Springs Dam and powerhouse. Altitude of gage, about 3,700 ft (from topographic map).

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

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

Maxima.--November-December 1950: Daily discharge, 508 cfs Nov. 13, 15.
1931 to October 1950: Daily discharge, 577 cfs June 22, 1945.

Remarks.--Conduit conveys water of North Fork Mokelumne River from tailrace of Salt Springs powerhouse to forebay of Tiger Creek powerhouse, picking up water en route from Bear River and several small creeks.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	463	304	9	462	192	17	402	308	25	48	252
2	474	439	10	462	192	18	131	357	26	153	357
3	354	283	11	460	279	19	41	378	27	308	381
4	113	170	12	478	322	20	2.8	381	28	392	389
5	83	251	13	508	322	21	2.5	386	29	418	398
6	228	250	14	505	252	22	2.3	371	30	318	402
7	371	220	15	508	302	23	2.3	238	31		385
8	448	197	16	487	322	24	2.3	385			
Monthly mean discharge, in cfs										288	312
Runoff, in acre-feet										17,110	19,170
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												
4												
6												
8												
10												
N												
2												
4												
6												
8												
10												
12												
	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												

Cold Creek near Mokelumne Peak, Calif.

Location.--Lat 38°31', long. 120°13', in sec. 28, T. 8 N., R. 16 E., 2.4 miles upstream from mouth and 6 miles southwest of Mokelumne Peak. Altitude of gage, about 6,000 ft (from topographic map).

Drainage area.--23 sq mi.

Gage-height record.--Water-stage recorder graph except for the periods 4 p.m. Nov. 19 to 10 a.m. Nov. 20 and 6 a.m. Nov. 21 to 11 a.m. Nov. 29.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 1,000 cfs and extended to peak stage on basis of slope-area determination. Discharge for periods of no gage-height record computed on basis of records for nearby streams.

Maxima.--November-December 1950: Discharge, 5,500 cfs 7:30 p.m. Nov. 18 (gage height, 9.69 ft).
1927 to October 1950: Discharge, 4,650 cfs Dec. 11, 1937 (gage height, 8.98 ft), from rating curve extended above 1,000 cfs as explained above.

Remarks.--No storage or diversion above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	37	59	9	20	286	17	131	77	25	75	40
2	42	47	10	27	170	18	3,080	67	26	66	37
3	92	2,250	11	24	127	19	2,410	61	27	60	29
4	77	606	12	28	94	20	2,970	54	28	54	30
5	45	194	13	28	82	21	1,000	50	29	42	28
6	34	639	14	20	265	22	250	44	30	70	30
7	24	1,070	15	40	141	23	150	42	31		35
8	17	1,670	16	18	102	24	100	40			
Monthly mean discharge, in cfs										368	273
Runoff, in acre-feet										21,880	16,790
Runoff, in inches										17.84	13.69

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	1.64	33	5.00	940	9.05	4,730		740	8.17	3,690		
4	1.76	41	5.09	985	8.75	4,370		1,160	8.18	3,700		
6	1.86	48	5.20	1,040	8.50	4,070		1,610	7.70	3,170		
8	1.98	58	5.70	1,360	8.35	3,890		1,800				
10	2.10	68	6.40	1,900	7.55	3,000	6.45	1,940				
N	2.18	76	7.50	2,950	6.20	1,740	8.80	4,430				
2	2.26	85	8.70	4,310	5.60	1,290	9.30	5,030				
4	2.37	97	9.10	4,790	5.0	940	9.28	5,010				
6	2.47	111	9.55	5,330		800	8.60	4,190				
8	3.00	200	9.64	5,440		700	8.25	3,780				
10	3.90	440	9.40	5,150		620	8.20	3,720				
12	4.30	600	9.25	4,970		600	8.25	3,780				
	November 23		November 24		November 25		November 30		December 1		December 2	
4							1.79	43	2.07	65	1.78	43
8							2.00	59	1.98	58	1.69	36
N							2.30	89	1.90	52	1.75	40
4							2.29	88	1.95	55	1.82	46
8							2.23	81	2.00	59	1.85	48
12							2.16	74	1.91	52	2.30	89
	December 3		December 4		December 5		December 6		December 7		December 8	
2	3.00	200	5.60	1,290	3.20	242	2.75	154	6.48	1,970	6.40	1,900
4	4.00	476	5.00	940	3.12	224	2.75	154	6.44	1,940	7.34	2,790
6	5.00	940	4.55	715	3.07	214	2.75	154	6.20	1,740	7.55	3,000
8	5.90	1,500	4.28	591	3.00	200	2.77	158	5.35	1,130	7.34	2,790
10	6.95	2,400	4.06	499	2.95	190	2.89	179	4.80	840	6.90	2,260
N	7.60	3,060	3.91	444	2.92	185	3.18	238	4.43	658	6.30	1,820
2	8.08	3,590	3.80	406	2.92	185	3.85	423	4.26	582	5.90	1,500
4	8.16	3,680	3.69	371	2.89	179	4.49	686	4.30	600	5.28	1,090
6	8.14	3,650	3.59	341	2.85	172	5.40	1,160	4.43	658	4.85	865
8	7.81	3,290	3.47	308	2.82	167	6.20	1,740	4.38	636	4.53	705
10	7.75	3,220	3.37	283	2.79	161	6.16	1,710	4.54	710	4.20	555
12	6.40	1,900	3.27	259	2.77	158	6.10	1,660	5.27	1,080	4.00	476
	December 9		December 10		December 11		December 12		December 13		December	
4	3.65	359	2.96	192	2.64	136	2.45	108	2.24	82		
8	3.42	295	2.87	176	2.60	130	2.39	100	2.24	82		
N	3.28	261	2.79	161	2.56	124	2.32	91	2.24	82		
4	3.17	235	2.75	154	2.55	122	2.24	82	2.24	82		
8	3.11	222	2.78	160	2.55	122	2.24	82	2.24	82		
12	3.05	210	2.70	146	2.50	115	2.24	82	2.29	88		

Supplemental record.--Nov. 18, 7:30 p.m., 9.69 ft, 5,500 cfs; Nov. 20, 3 p.m., 9.40 ft, 5,150 cfs; Dec. 3, 3 p.m., 8.21 ft, 3,730 cfs.

Bear River at Pardoe Camp, Calif.

Location.--Lat 38°32', long. 120°15', in sec. 18, T. 8 N., R. 16 E., at Pardoe Camp, 2 miles downstream from Bear River Reservoir of Pacific Gas & Electric Co. Altitude of gage, about 5,650 ft (from topographic map).

Drainage area.--33.0 sq mi.

Gage-height record.--Water-stage recorder graph destroyed by flood; no gage-height record obtained.

Discharge record.--Peak discharge estimated. Discharge for entire period computed on basis of two discharge measurements, records for station at Tiger Creek Canal Junction (unpublished) and Cold Creek near Mokelumne Peak.

Maxima.--November-December 1950: Discharge, 7,100 cfs Nov. 20 (gage height, 12.62 ft, from floodmark in well).
1927 to October 1950: Discharge, 5,850 cfs Dec. 11, 1937 (gage height, 12.0 ft, from floodmarks), from rating curve extended above 1,500 cfs.

Remarks.--Flow affected by storage in Bear River Reservoir (contents, in acre-feet, 1950: 1,210 Oct. 31; 6,420 Nov. 30; 6,420 Dec. 31).

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1		90	9		400	17	60	140	25	110	60
2		70	10		260	18	2,500	120	26	100	55
3		2,800	11		200	19	2,500	100	27	90	55
4	20	700	12	20	160	20	4,000	90	28	80	50
5		300	13		120	21	1,200	80	29	70	50
6		700	14		400	22	350	75	30	90	50
7		1,200	15		250	23	220	70	31		45
8		2,500	16	30	150	24	150	65			
Monthly mean discharge, in cfs										395	368
Runoff, in acre-feet										23,500	22,620
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												
4												
6												
8												
10												
N												
2												
4												
6												
8												
10												
12												
	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												

Middle Fork Mokelumne River at West Point, Calif.

Location.--Lat 38°23'15", long. 120°31'40", in sec. 10, T. 6 N., R. 13 E., 200 ft downstream from highway bridge, 1 mile south of West Point, and 3.5 miles upstream from South Fork. Altitude of gage, about 2,500 ft (from topographic map).

Drainage area.--67.2 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 1,600 cfs and extended to peak stage on basis of slope-area determination.

Maxima.--November-December 1950: Discharge, 2,820 cfs 8:30 p.m. Nov. 18 (gage height, 7.70 ft).
1911 to October 1950: Maximum discharge observed, 2,550 cfs Jan. 23, 1914 (gage height, 10.0 ft, site and datum then in use), from rating curve extended above 490 cfs.

Remarks.--Flood flow not affected by diversions or storage in Calaveras Reservoir, 6 miles above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	28	96	9	10	740	17	63	274	25	160	138
2	20	88	10	9.6	512	18	1,360	238	26	135	129
3	17	1,240	11	9.2	404	19	1,220	210	27	116	124
4	12	1,020	12	10	340	20	1,190	190	28	102	114
5	12	486	13	14	296	21	980	173	29	93	108
6	12	481	14	28	520	22	425	159	30	93	110
7	12	811	15	24	381	23	274	155	31		104
8	11	1,310	16	36	312	24	202	146			
Monthly mean discharge, in cfs										223	368
Runoff, in acre-feet										13,250	22,630
Runoff, in inches										3.70	6.31

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			2.08	113	6.90	2,260	3.65	470	5.58	1,370	3.88	539
4			2.55	200	6.55	2,020	3.68	479	5.56	1,350	3.78	509
6			3.06	316	6.23	1,790	3.86	533	5.46	1,290	3.70	485
8			3.49	422	5.87	1,560	4.33	692	4.23	1,150	3.61	458
10			4.76	890	5.34	1,210	5.05	1,040	5.05	1,040	3.55	440
N			5.39	1,240	4.97	998	6.06	1,680	4.88	950	3.45	412
2			6.33	1,860	4.72	870	6.11	1,710	4.68	850	3.38	394
4			7.13	2,420	4.45	742	6.13	1,720	4.52	774	3.31	376
6			7.16	2,440	4.20	640	6.01	1,650	4.36	704	3.25	360
8			7.50	2,680	3.98	569	6.04	1,670	4.23	652	3.20	347
10			7.26	2,510	3.82	521	5.94	1,600	4.10	605	3.16	337
12			7.04	2,360	3.71	488	5.79	1,500	3.98	569	3.11	324
	November 23		November 24		November 25		November 29		November 30		December 2	
4	3.04	308	2.67	219	2.45	171					1.96	89
8	2.96	288	2.63	210	2.42	165					1.94	86
N	2.89	272	2.60	203	2.39	159					1.94	86
4	2.83	257	2.55	192	2.37	155					1.93	85
8	2.77	243	2.51	183	2.35	152					1.95	88
12	2.72	231	2.47	175	2.32	146					2.06	102
	December 3		December 4		December 5		December 6		December 7		December 8	
2	2.44	169	6.17	1,750	3.99	572	3.37	391	4.81	915	4.83	925
4	3.14	332	5.71	1,450	3.91	548	3.34	383	4.87	945	5.40	1,250
6	3.74	497	5.31	1,200	3.86	533	3.32	378	4.89	955	5.82	1,520
8	4.26	664	5.06	1,050	3.80	515	3.30	373	4.81	915	6.06	1,680
10	4.88	950	4.91	966	3.73	494	3.27	365	4.76	890	6.10	1,700
N	5.30	1,190	4.76	890	3.68	479	3.34	383	4.60	810	6.00	1,640
2	5.76	1,480	4.61	815	3.64	467	3.40	399	4.46	747	5.78	1,500
4	6.24	1,800	4.46	747	3.58	449	3.45	412	4.38	712	5.54	1,340
6	6.73	2,140	4.36	704	3.54	437	4.18	633	4.37	708	5.30	1,190
8	6.91	2,270	4.26	664	3.49	422	4.37	708	4.28	672	5.12	1,080
10	6.93	2,280	4.18	633	3.45	412	4.47	752	4.32	688	5.00	1,020
12	6.60	2,050	4.08	599	3.40	399	4.57	796	4.47	752	4.91	966
	December 9		December 10		December 11		December 12		December		December	
4	4.71	865	3.94	557	3.52	431	3.24	357				
8	4.56	792	3.86	533	3.47	417	3.21	350				
N	4.40	720	3.79	512	3.42	404	3.18	342				
4	4.27	668	3.71	488	3.36	389	3.13	330				
8	4.15	622	3.64	467	3.31	376	3.10	322				
12	4.03	584	3.57	446	3.28	368	3.07	315				

Supplemental record.--Nov. 18, 8:30 p.m., 7.70 ft, 2,820 cfs; Dec. 3, 9:30 p.m., 7.05 ft, 2,360 cfs; Dec. 8, 9 a.m., 6.18 ft, 1,760 cfs.

South Fork Mokelumne River near West Point, Calif.

Location.--Lat 38°22', long. 120°33', in SW¼ sec. 16, T. 6 N., R. 13 E., 600 ft downstream from Sawyer Bridge, 2 miles upstream from Middle Fork, and 2.5 miles southwest of West Point. Altitude of gage, about 2,000 ft (from topographic map).

Drainage area.--73.8 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 2,100 cfs and extended to peak stage on basis of slope-area determination. Backwater corrections made Nov. 1 to 4 p.m. Nov. 18.

Maxima.--November-December 1950: Discharge, 3,300 cfs 11 p.m. Nov. 18 (gage height, 9.64 ft).
1933 to October 1950: Discharge, 3,760 cfs Feb. 2, 1945 (gage height, 9.55 ft), from rating curve extended above 2,600 cfs.

Remarks.--Flood flow not affected by 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	32	107	9	18	876	17	72	298	25	183	146
2	26	95	10	17	588	18	1,700	265	26	148	136
3	23	1,430	11	19	452	19	1,660	239	27	128	128
4	22	1,130	12	19	376	20	1,360	217	28	115	123
5	20	562	13	25	322	21	1,060	204	29	104	120
6	20	526	14	47	596	22	489	183	30	107	128
7	18	939	15	36	419	23	319	165	31		116
8	18	1,660	16	60	347	24	232	156			
Monthly mean discharge, in cfs										270	421
Runoff, in acre-feet										16,060	25,880
Runoff, in inches										4.08	6.58

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	4.72	90	5.10	142	9.19	2,850	6.62	592	7.84	1,530		
4	4.66	83	5.44	205	9.18	2,840	6.69	634	7.76	1,450	6.58	570
6	4.62	78	6.05	390	9.07	2,730	6.79	694	7.59	1,300		
8	4.54	69	6.54	664	8.54	2,200	7.10	900	7.50	1,220	6.48	520
10	4.52	67	7.20	1,150	7.94	1,620	7.69	1,390	7.37	1,120		
N	4.47	62	7.94	1,770	7.63	1,340	8.42	2,080	7.22	996	6.39	476
2	4.47	62	8.53	2,290	7.40	1,140	8.41	2,070	7.12	916		
4	4.46	61	9.22	2,900	7.20	980	8.29	1,950	7.02	844	6.31	440
6	4.49	64	9.53	3,190	7.03	851	8.09	1,750	6.94	788		
8	4.51	66	9.28	2,970	6.88	748	8.00	1,670	6.86	736	6.24	411
10	4.55	70	9.39	3,070	6.76	676	7.88	1,560	6.78	688		
12	4.74	93	9.62	3,280	6.65	610	7.82	1,510	6.71	646	6.18	387
	November 23		November 24		November 25		November 29		November 30		December 2	
4	6.12	363	5.80	250							5.11	97
8	6.06	339	5.77	242							5.09	95
N	6.00	315	5.73	230	5.55	183					5.08	93
4	5.95	298	5.70	222							5.08	93
8	5.89	277	5.67	214							5.08	93
12	5.84	262	5.63	204	5.47	163					5.21	112
	December 3		December 4		December 5		December 6		December 7		December 8	
2	5.49	168	8.18	1,840	6.72	652	6.33	448	7.16	948	7.44	1,170
4	5.95	298	7.84	1,530	6.68	628	6.31	440	7.30	1,060	7.89	1,570
6	6.30	435	7.60	1,310	6.64	604	6.30	435	7.34	1,090	8.26	1,920
8	6.70	640	7.46	1,190	6.60	580	6.28	427	7.38	1,120	8.46	2,120
10	7.25	1,020	7.34	1,090	6.56	660	6.27	423	7.30	1,060	8.52	2,180
N	7.73	1,430	7.24	1,010	6.53	545	6.29	431	7.17	956	8.38	2,040
2	8.22	1,880	7.15	940	6.50	530	6.33	448	7.06	872	8.24	1,900
4	8.48	2,140	7.06	872	6.47	515	6.35	458	7.02	844	8.08	1,740
6	8.86	2,520	6.99	823	6.44	500	6.60	580	7.00	830	7.89	1,570
8	9.07	2,730	6.92	774	6.41	485	6.87	742	6.96	802	7.70	1,400
10	9.05	2,710	6.86	736	6.38	471	7.00	830	6.98	816	7.55	1,260
12	8.60	2,260	6.79	694	6.36	462	7.02	844	7.09	893	7.45	1,180
	December 9		December 10		December 11		December 12		December		December	
4	7.26	1,030	6.72	652	6.41	485	6.21	399				
8	7.13	924	6.66	616	6.37	466	6.18	387				
N	7.04	858	6.60	580	6.33	448	6.15	375				
4	6.94	788	6.55	555	6.30	435	6.12	363				
8	6.84	724	6.50	530	6.26	419	6.10	355				
12	6.77	682	6.45	505	6.23	407	6.07	343				

Supplemental record.--Nov. 18, 11 p.m., 9.64 ft, 3,300 cfs; Dec. 3, 8:30 p.m., 9.12 ft, 2,780 cfs; Dec. 8, 9 a.m., 8.54 ft, 2,200 cfs.

Woodbridge Canal at Woodbridge, Calif.

Location.--Lat 38°09'10", long. 121°18'00", in SE¼ sec. 34, T. 4 N., R. 6 E., at Woodbridge at point of diversion. Datum of gage is 32.18 ft above mean sea level (levels by East Bay Municipal Utility District).

Gage-height record.--Differential water-stage recorder and gate-opening recorder graphs.

Discharge record.--Stage-discharge relation defined by current-meter measurements. No flow from Nov. 18 to Dec. 31.

Maxima.--November-December 1950: Daily discharge, 173 cfs Nov. 6.

1926 to October 1950: Daily discharge, 454 cfs July 4, 1947.

Remarks.--Flow regulated. Canal diverts from left bank of Woodbridge Reservoir, 0.4 mile above gaging station or Mokelumne River at Woodbridge.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	150		9	117		17	69		25	0	
2	160		10	114		18	0		26	0	
3	166		11	100		19	0		27	0	
4	166		12	150		20	0		28	0	
5	168		13	110		21	0		29	0	
6	173		14	127		22	0		30	0	
7	142		15	114		23	0		31		
8	134		16	140		24	0				
Monthly mean discharge, in cfs										76.7	0
Runoff, in acre-feet										4,560	0
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												
4												
6												
8												
10												
N												
2												
4												
6												
8												
10												
12												
	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												

Dry Creek near Galt, Calif.

Location.--Lat 38°15', long. 121°13', in NE¼ sec. 32, T. 5 N., R. 7 E., 2 miles downstream from Coyote Creek and 4 miles east of Galt.

Drainage area.--325 sq mi.

Gage-height record.--Water-stage recorder graph except for period Dec. 1-8 when there was no gage-height record.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 6,700 cfs and extended to peak stage. Discharge for period of no gage-height record computed on basis of record for Cosumnes River at Michigan Bar.

Maxima.--November-December 1950: Discharge, 9,260 cfs 3 p.m. Nov. 19 (gage height, 13.72 ft).
1926-33, 1944 to October 1950: Discharge, 13,200 cfs Feb. 2, 1945 (gage height, 13.84 ft, present datum).

Remarks.--Flood flow not affected by small 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	0	125	9	0	3,850	17	0	506	25	260	205
2	0	110	10	0	1,260	18	263	388	26	205	194
3	0	1,000	11	0	730	19	6,610	312	27	165	181
4	0	5,200	12	0	578	20	5,860	273	28	139	167
5	0	1,600	13	0	457	21	7,040	248	29	127	157
6	0	1,300	14	0	1,010	22	2,720	234	30	120	151
7	0	2,500	15	0	1,330	23	894	222	31		194
8	0	5,350	16	0	632	24	467	212			
Monthly mean discharge, in cfs										829	990
Runoff, in acre-feet										49,330	60,840
Runoff, in inches										2.85	3.51

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				0	12.43	1,640	13.22	5,490	13.56	8,000	13.10	4,650
4				0	12.70	2,490	13.11	4,720	13.54	7,850	13.02	4,130
6				0	13.13	4,860	13.05	4,320	13.50	7,550	12.93	3,590
8				0	13.40	6,800	13.03	4,200	13.46	7,250	12.85	3,160
10				0	13.56	8,000	13.08	4,420	13.44	7,100	12.76	2,740
N				0	13.67	8,860	13.17	5,140	13.43	7,020	12.67	2,380
2			6.00	56	13.71	9,180	13.28	5,910	13.43	7,020	12.60	2,130
4			11.21	457	13.71	9,180	13.39	6,720	13.43	7,020	12.53	1,910
6			11.62	573	13.68	8,940	13.45	7,180	13.40	6,800	12.46	1,720
8			11.72	616	13.59	8,220	13.49	7,480	13.35	6,420	12.40	1,560
10			12.01	874	13.47	7,330	13.51	7,620	13.28	5,910	12.34	1,430
12			12.20	1,160	13.35	6,420	13.54	7,850	13.18	5,210	12.29	1,320
	November 23		November 24		November 25		November 29		November 30		December 1	
4	12.18	1,130	11.64	581	9.78	290						
8	12.09	984	11.51	534	9.50	270						
N	11.99	839	11.25	465	9.18	248	7.29	127	7.15	119		
4	11.91	751	10.85	396	9.10	242						
8	11.83	684	10.47	348	9.01	236						
12	11.75	632	10.16	317	8.90	228	7.22	123	7.15	119		
	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			13.25	5,700	12.40	1,560	11.96	812	11.73	622	11.40	500
8			13.09	4,580	12.31	1,360	11.91	752	11.68	597	11.33	483
N			12.92	3,530	12.22	1,200	11.86	708	11.62	573	11.18	451
4			12.77	2,780	12.15	1,080	11.83	684	11.58	558	11.05	428
8			12.64	2,270	12.09	986	11.79	654	11.53	540	10.96	414
12			12.51	1,850	12.03	902	11.76	638	11.47	521	10.91	407

Supplemental record.--Nov. 19, 3 p.m., 13.72 ft, 9,260 cfs.

North Fork Cosumnes River at Cosumnes Mine, Calif.

Location.--Lat 38°40', long. 120°32', in SW¼ sec. 34, T. 10 N., R. 13 E., 0.3 mile downstream from Cosumnes Mine, 2.5 miles north of Grizzly Flat, 4.3 miles upstream from Steeley Fork, and 15 miles southeast of Placerville. Altitude of gage, about 3,170 ft (from topographic map).

Drainage area.--36.9 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 320 cfs and extended to peak stage on basis of slope-area determination. Shifting-control method used Nov. 26 to Dec. 3, Dec. 12-31.

Maxima.--November-December 1950: Discharge, 3,940 cfs 1:50 a.m. Nov. 21 (gage height, 9.50 ft).
1948 to October 1950: Discharge, 438 cfs Apr. 21, 1950 (gage height, 4.56 ft).

Remarks.--Flood flow not affected by 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	109	9	10	813	17	39	246	25	218	108
2	17	97	10	10	540	18	1,480	218	26	175	101
3	18	1,520	11	10	400	19	1,690	192	27	143	92
4	17	1,210	12	10	318	20	2,110	173	28	126	87
5	14	631	13	14	264	21	2,170	155	29	112	83
6	13	598	14	16	428	22	716	139	30	120	83
7	12	913	15	13	330	23	404	126	31		76
8	11	1,410	16	25	276	24	286	116			
Monthly mean discharge, in cfs										334	382
Runoff, in acre-feet										19,870	23,510
Runoff, in inches										10.10	11.95

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	2.54	46	3.15	128	8.68	3,120	5.48	781	9.44	3,880	5.84	950
4	2.55	46	3.62	214	8.42	2,880	5.56	817	9.10	3,540	5.72	890
6	2.55	46	4.06	305	7.99	2,490	5.64	853	8.60	3,040	5.60	835
8	2.51	43	4.50	420	7.51	2,080	5.80	930	8.23	2,710	5.50	790
10	2.48	40	5.00	585	6.99	1,660	7.03	1,690	7.68	2,210	5.38	737
N	2.46	39	6.03	1,050	6.54	1,350	8.43	2,890	7.40	1,990	5.27	693
2	2.47	40	7.02	1,690	6.20	1,150	8.91	3,350	7.00	1,670	5.17	653
4	2.49	41	8.01	2,510	5.94	1,000	9.15	3,590	6.72	1,470	5.10	625
6	2.55	46	8.52	2,970	5.78	920	8.49	2,940	6.47	1,310	5.00	585
8	2.14	19	8.77	3,210	5.63	848	8.18	2,660	6.28	1,200	4.92	557
10	2.26	25	8.68	3,120	5.46	772	8.34	2,810	6.08	1,080	4.84	529
12	2.41	35	8.73	3,170	5.45	768	8.49	2,940	5.93	996	4.77	504
	November 23		November 24		November 25		November 29		November 30		December 1	
4	4.65	465	4.09	312	3.75	240	3.11	116	3.09	113	3.12	117
8	4.54	432	4.03	298	3.72	234	3.10	114	3.15	122	3.10	114
N	4.41	393	3.97	284	3.68	226	3.08	111	3.24	138	3.05	106
4	4.32	370	3.91	272	3.64	218	3.07	109	3.15	122	3.04	105
8	4.23	348	3.85	260	3.59	208	3.06	108	3.12	117	3.04	105
12	4.15	328	3.80	250	3.06	113	3.05	105	3.10	114	3.02	101
	December 2		December 3		December 4		December 5		December 6		December 7	
2			3.36	158	7.21	1,840	5.45	767	4.71	484	5.91	986
4	3.00	98	4.11	312	6.91	1,610	5.37	733	4.67	471	6.14	1,110
6			4.93	557	6.61	1,400	5.30	705	4.65	465	6.11	1,100
8	2.98	95	5.60	835	6.46	1,310	5.22	673	4.64	462	5.79	925
10			6.23	1,170	6.26	1,190	5.15	645	4.66	468	5.58	826
N	2.96	92	6.83	1,550	6.11	1,100	5.09	621	4.69	477	5.45	768
2			7.46	2,040	6.01	1,040	5.02	593	4.83	526	5.41	750
4	2.97	93	7.92	2,430	5.91	986	4.97	574	5.06	609	5.51	794
6			8.42	2,880	5.79	925	4.91	554	5.29	701	5.71	885
8	2.99	97	8.28	2,750	5.69	876	4.85	532	5.71	885	5.83	945
10			7.97	2,470	5.62	844	4.80	515	5.81	935	5.80	930
12	3.09	113	7.53	2,090	5.55	812	4.76	501	5.71	885	5.93	996
	December 8		December 9		December 10		December 11		December 12		December 13	
4	6.55	1,360	5.82	940	5.06	609	4.54	432	4.22	340	3.96	276
8	7.29	1,900	5.67	866	4.97	574	4.47	411	4.17	328	3.92	268
N	6.95	1,640	5.54	808	4.86	536	4.43	399	4.13	318	3.89	262
4	6.60	1,390	5.40	745	4.77	504	4.37	382	4.09	308	3.86	256
8	6.19	1,140	5.25	685	4.67	471	4.32	370	4.04	295	3.83	250
12	5.97	1,020	5.15	645	4.60	450	4.26	355	4.00	286	3.86	256

Supplemental record.--Nov. 20, 3:30 p.m., 9.33 ft, 3,740 cfs; Nov. 21, 1:50 a.m., 9.50 ft, 3,940 cfs.

North Fork Cosumnes River near El Dorado, Calif.

Location.--Lat 38°35'20", long. 120°50'35", in SW¼ sec. 35, T. 9 N., R. 10 E., 0.8 mile north of Nashville, 2.6 miles upstream from mouth, and 6 miles south of El Dorado. Altitude of gage, about 840 ft (from topographic map).

Drainage area.--202 sq mi.

Gage-height record.--Water-stage recorder graph except for period 6 a.m. Nov. 19 to 3 p.m. Nov. 20 for which graph was drawn based on recorder graphs for nearby streams.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 3,600 cfs and extended to peak stage on basis of contracted-opening determination.

Maxima.--November-December 1950: Discharge, 10,900 cfs 9 p.m. Nov. 18 (gage height, 12.06 ft).
1911-41, 1948 to October 1950: Discharge, 8,350 cfs Mar. 31, 1940 (gage height, 10.12 ft, site and datum then in use), from rating curve extended above 4,000 cfs.

Remarks.--Flood flow not affected by diversions above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	75	352	9	24	2,920	17	162	1,040	25	762	415
2	48	298	10	22	2,100	18	4,760	884	26	588	382
3	36	3,550	11	21	1,680	19	5,600	775	27	481	355
4	33	4,250	12	20	1,350	20	5,670	676	28	409	330
5	32	2,320	13	22	1,110	21	6,020	600	29	347	313
6	29	2,050	14	77	1,760	22	2,590	539	30	354	335
7	26	3,010	15	79	1,520	23	1,600	490	31		338
8	24	4,300	16	59	1,230	24	1,080	451			
Monthly mean discharge, in cfs										1,035	1,346
Runoff, in acre-feet										61,590	82,760
Runoff, in inches										5.72	7.68

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	2.10	77	3.50	230	11.10	8,960	8.0	3,440	10.22	7,240	7.92	3,330
4	2.67	127	4.03	332	10.65	8,060	8.2	3,730	10.52	7,810	7.77	3,120
6	3.10	172	4.75	542	10.25	7,300	8.5	4,190	10.82	8,400	7.63	2,940
8	3.17	181	5.82	1,100	9.7	6,250	8.8	4,670	10.52	7,810	7.52	2,800
10	3.22	188	6.20	1,400	9.3	5,530	9.1	5,180	10.02	6,860	7.40	2,640
N	3.22	188	7.55	2,840	9.0	5,010	9.5	5,890	9.57	6,020	7.30	2,520
2	3.18	182	8.87	4,470	8.7	4,510	9.8	6,440	9.22	5,390	7.20	2,400
4	3.13	176	9.95	6,720	8.5	4,190	10.07	6,950	8.92	4,870	7.11	2,300
6	3.12	175	11.00	8,760	8.3	3,880	10.42	7,620	8.67	4,460	7.03	2,210
8	3.12	175	11.60	9,960	8.1	3,580	10.27	7,330	8.45	4,110	6.94	2,110
10	3.12	175	11.80	10,400	8.0	3,440	10.27	7,330	8.25	3,800	6.84	2,010
12	3.27	196	11.50	9,760	7.9	3,300	10.27	7,330	8.07	3,540	6.77	1,940
	November 23		November 24		November 25		November 29		November 30		December 1	
4	6.64	1,810	5.98	1,220	5.39	825	4.17	368	3.98	321	4.13	358
8	6.53	1,700	5.87	1,140	5.33	795	4.11	352	3.98	321	4.09	348
N	6.42	1,600	5.78	1,080	5.26	760	4.05	338	4.08	345	4.14	360
4	6.31	1,500	5.68	1,010	5.19	726	4.05	338	4.25	388	4.15	362
8	6.19	1,390	5.59	944	5.11	690	4.03	332	4.28	395	4.04	335
12	6.09	1,310	5.49	884	5.05	662	4.00	325	4.25	388	3.96	317
	December 2		December 3		December 4		December 5		December 6		December 7	
2	3.93	311	4.02	330	9.72	6,290	7.46	2,720	6.75	1,920	7.73	3,070
4	3.91	307	4.30	400	9.32	5,570	7.37	2,600	6.70	1,870	7.87	3,260
6	3.90	305	5.00	640	8.97	4,960	7.29	2,500	6.66	1,830	7.81	3,170
8	3.88	301	6.25	1,440	8.74	4,570	7.22	2,420	6.62	1,790	7.81	3,170
10	3.87	299	7.42	2,670	8.52	4,220	7.16	2,360	6.60	1,770	7.77	3,120
N	3.85	295	8.22	3,760	8.32	3,910	7.10	2,290	6.61	1,780	7.67	2,990
2	3.84	293	8.72	4,540	8.17	3,680	7.05	2,240	6.65	1,820	7.48	2,740
4	3.83	291	9.02	5,040	8.01	3,450	6.99	2,170	6.79	1,960	7.45	2,700
6	3.81	287	9.42	5,750	7.85	3,230	6.94	2,110	6.99	2,170	7.64	2,950
8	3.82	289	10.02	6,860	7.74	3,080	6.90	2,070	7.31	2,530	7.69	3,020
10	3.84	293	10.32	7,430	7.65	2,960	6.83	2,000	7.49	2,760	7.67	2,990
12	3.90	305	10.22	7,240	7.55	2,840	6.78	1,950	7.53	2,810	7.77	3,120
	December 8		December 9		December 10		December 11		December 12		December 13	
4	7.92	3,330	7.93	3,340	7.10	2,290	6.60	1,770	6.25	1,440	5.91	1,170
8	8.17	4,620	7.73	3,070	7.00	2,180	6.54	1,710	6.19	1,390	5.86	1,130
N	9.12	5,390	7.57	2,860	6.93	2,100	6.49	1,660	6.14	1,350	5.81	1,100
4	8.92	4,870	7.43	2,680	6.83	2,000	6.50	1,670	6.08	1,300	5.76	1,060
8	8.51	4,210	7.30	2,520	6.75	1,920	6.40	1,580	6.04	1,270	5.73	1,040
12	8.17	3,680	7.18	2,380	6.68	1,850	6.33	1,520	5.98	1,220	5.75	1,060

Supplemental record.--Nov. 18, 9 p.m., 12.06 ft, 10,900 cfs.

Cosumnes River at Michigan Bar, Calif.

Location.--Lat 38°30'00", long. 121°02'45", in SE¼ sec. 36, T. 8 N., R. 8 E., at highway bridge at Michigan Bar, 5.5 miles southwest of Latrobe and 12 miles downstream from confluence of North and Middle Forks. Altitude of gage, about 190 ft (from topographic map).

Drainage area.--537 sq mi.

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

Discharge record.--Stage-discharge defined by current-meter measurements below 19,000 cfs and extended to peak stage.

Maxima.--November-December 1950: Discharge, 27,600 cfs 11 p.m. Nov. 18 (gage height, 11.85 ft).
1907 to October 1950: Discharge, 26,200 cfs Mar. 31, 1940 (gage height, 11.66 ft), from rating curve extended above 9,000 cfs.
Flood in March 1907 reached a stage of 16.3 ft.

Remarks.--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	206	736	9	58	7,020	17	293	2,070	25	1,590	870
2	133	644	10	55	4,240	18	8,410	1,810	26	1,260	804
3	103	6,850	11	51	3,090	19	15,900	1,590	27	1,030	750
4	86	10,800	12	50	2,460	20	14,800	1,400	28	870	699
5	81	4,600	13	51	2,040	21	16,700	1,260	29	762	665
6	75	4,180	14	99	3,750	22	5,750	1,140	30	725	674
7	70	7,440	15	203	3,130	23	3,100	1,030	31		795
8	64	11,400	16	145	2,440	24	2,080	951			
Monthly mean discharge, in cfs										2,493	2,946
Runoff, in acre-feet										148,400	181,100
Runoff, in inches										5.18	6.32

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	2.75	138	3.44	365	11.66	26,700	7.37	8,090	10.29	20,200	7.36	8,050
4	2.77	143	3.49	390	11.31	25,000	7.80	9,800	10.32	20,300	7.19	7,400
6	2.92	182	3.82	605	10.72	22,100	8.20	11,400	10.54	21,300	7.02	6,790
8	3.12	245	4.24	984	10.22	19,900	8.63	13,100	10.80	22,500	6.85	6,210
10	3.26	294	4.48	1,250	9.55	17,000	8.88	14,200	10.40	20,700	6.73	5,820
N	3.37	334	5.43	2,610	9.04	14,900	9.00	14,700	9.90	18,500	6.61	5,430
2	3.48	385	6.74	5,850	8.52	12,700	9.22	15,600	9.36	16,200	6.50	5,100
4	3.49	390	8.10	11,000	8.08	10,900	9.60	17,200	8.84	14,000	6.40	4,820
6	3.49	390	9.42	16,500	7.73	9,520	10.05	19,100	8.39	12,200	6.31	4,570
8	3.48	385	10.52	21,200	7.40	8,200	10.32	20,300	8.06	10,800	6.21	4,310
10	3.46	375	11.56	26,200	7.12	7,150	10.42	20,800	7.79	9,760	6.12	4,080
12	3.44	365	11.82	27,500	6.94	6,520	10.30	20,200	7.56	8,840	6.06	3,930
	November 23		November 24		November 25		November 29		November 30		December 1	
4	5.93	3,630	5.24	2,290	4.82	1,690						
8	5.78	3,300	5.16	2,170	4.79	1,650			3.94	699	3.99	742
N	5.66	3,050	5.08	2,050	4.75	1,590	4.01	759				
4	5.54	2,820	5.01	1,950	4.70	1,520			3.97	724	3.97	724
8	5.44	2,630	4.96	1,880	4.66	1,470						
12	5.34	2,460	4.89	1,790	4.61	1,400	3.96	716	4.04	786	3.94	699
	December 2		December 3		December 4		December 5		December 6		December 7	
2			4.12	860	9.75	17,800	6.70	5,720	5.92	3,610	7.31	7,860
4	3.89	658	4.33	1,080	9.22	15,600	6.60	5,400	5.86	3,470	7.50	8,600
6			4.61	1,400	8.78	13,800	6.50	5,100	5.81	3,360	7.62	9,080
8	3.87	642	4.94	1,860	8.32	11,900	6.42	4,880	5.77	3,280	7.45	8,400
10			5.36	2,490	8.04	10,800	6.34	4,650	5.74	3,210	7.32	7,900
N	3.86	635	6.19	4,260	7.80	9,800	6.27	4,460	5.74	3,210	7.24	7,590
2			6.78	5,980	7.56	8,840	6.19	4,260	5.78	3,300	7.10	7,080
4	3.84	620	7.56	8,840	7.37	8,090	6.11	4,060	5.96	3,700	6.93	6,480
6			8.16	11,200	7.21	7,480	6.08	3,980	6.46	4,990	6.85	6,210
8	3.85	628	9.28	15,900	7.07	6,970	6.07	3,960	6.61	5,430	6.86	6,240
10			9.93	18,600	6.94	6,520	6.04	3,890	7.05	6,900	6.98	6,650
12	3.90	665	10.00	18,900	6.81	6,070	5.97	3,720	7.26	7,670	7.00	6,720
	December 8		December 9		December 10		December 11		December 12		December 13	
4	7.30	7,820	7.50	8,600	6.37	4,740	5.80	3,340	5.45	2,650	5.15	2,160
8	8.05	10,800	7.24	7,590	6.25	4,410	5.72	3,170	5.39	2,540	5.10	2,080
N	9.17	15,400	7.02	6,790	6.12	4,080	5.66	3,050	5.33	2,440	5.06	2,020
4	8.90	14,300	6.81	6,070	6.09	4,010	5.60	2,930	5.28	2,360	5.02	1,970
8	8.31	11,800	6.64	5,530	6.04	3,890	5.58	2,890	5.24	2,290	4.99	1,930
12	7.86	10,000	6.49	5,070	5.90	3,560	5.50	2,740	5.20	2,230	4.99	1,930

Supplemental record.--Nov. 18, 11 p.m. 11.85 ft, 27,600 cfs.

Cosumnes River at McConnell, Calif.

Location.--Lat 38°22', long. 121°21', in Omochumnes Grant at bridge on U. S. Highway 99, 0.2 mile south of McConnell, 1 mile downstream from Deer Creek and 7 miles north of Galt, Sacramento County. Altitude of gage, about 32 ft (from topographic map).

Drainage area.--730 sq mi.

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

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

Maxima.--November-December 1950: Discharge, 21,900 cfs 6-8 p.m. Nov. 21 (gage height, 44.89 ft).
1943 to October 1950: Discharge, 15,800 cfs Feb. 3, 1945; gage height, 44.03 ft Mar. 4, 1949.
1931-40, 1941-42: Gage height recorded, 45.94 ft, Feb. 23, 24, 1936.

Remarks.--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	281	728	9	51	13,100	17	146	2,420	25	1,990	867
2	166	650	10	47	7,470	18	1,030	2,050	26	1,520	790
3	119	1,850	11	42	4,450	19	9,680	1,780	27	1,200	722
4	97	12,600	12	38	3,060	20	14,000	1,550	28	995	670
5	81	10,900	13	36	2,380	21	20,900	1,360	29	834	619
6	73	5,270	14	39	2,900	22	14,000	1,210	30	732	587
7	67	7,100	15	117	5,380	23	6,150	1,070	31		718
8	60	10,100	16	160	3,370	24	3,040	950			
Monthly mean discharge, in cfs										2,590	3,506
Runoff, in acre-feet										154,100	215,500
Runoff, in inches										3.96	5.54

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	32.27	137	33.21	339	38.75	3,980	44.27	16,000	44.69	19,300	44.72	19,600
4	32.26	135	33.34	373	38.80	4,030	44.06	15,100	44.76	20,100	44.59	18,300
6	32.24	132	33.42	396	39.05	4,310	43.81	14,100	44.81	20,700	44.42	16,900
8	32.23	130	33.43	399	39.48	4,830	43.67	13,600	44.83	21,000	44.17	15,600
10	32.22	128	33.45	405	40.13	5,740	43.45	13,000	44.83	21,000	43.97	14,700
N	32.22	128	33.48	414	40.72	6,720	43.23	12,300	44.82	20,900	43.66	13,600
2	32.22	128	33.58	444	42.04	9,310	43.03	11,800	44.85	21,300	43.35	12,700
4	32.22	128	34.13	642	44.06	15,100	42.95	11,600	44.87	21,600	43.06	11,900
6	32.24	132	35.24	1,160	44.45	17,200	43.27	12,500	44.89	21,900	42.72	11,000
8	32.39	158	37.02	2,320	44.46	17,200	43.95	14,600	44.89	21,900	42.43	10,200
10	32.66	211	38.28	3,460	44.49	17,400	44.34	16,400	44.84	21,200	42.10	9,440
12	32.95	274	38.60	3,810	44.42	16,900	44.58	18,200	44.79	20,500	41.80	8,780
	November 23		November 24		November 25		November 29		November 30		December 1	
4	41.17	7,620	37.99	3,570	36.39	2,240	34.08	876	33.81	754	33.77	738
8	40.63	6,730	37.64	3,250	36.21	2,120	34.04	858	33.77	738	33.80	750
N	40.17	6,050	37.32	2,960	36.03	1,990	33.98	831	33.75	730	33.81	754
4	39.63	5,340	37.04	2,730	35.87	1,890	33.94	813	33.72	718	33.74	726
8	39.08	4,700	36.78	2,520	35.73	1,800	33.89	780	33.70	710	33.67	698
12	38.52	4,100	36.58	2,380	35.10	1,420	33.84	768	33.71	714	33.64	686
	December 2		December 3		December 4		December 5		December 6		December 7	
2	33.65	690	33.43	605	39.65	5,360	44.08	15,200	40.49	6,520	38.81	4,400
4	33.65	690	33.46	616	40.33	6,280	43.88	14,400	40.26	6,170	38.99	4,600
6	33.64	686	33.48	623	41.24	7,740	43.59	13,400	40.05	5,880	39.24	4,870
8	33.62	678	33.54	646	42.44	10,300	43.29	12,500	39.85	5,620	39.54	5,230
10	33.59	666	33.76	734	43.40	12,800	42.92	11,500	39.66	5,370	39.92	5,710
N	33.55	650	34.38	1,020	43.93	14,600	42.56	10,600	39.44	5,110	40.40	6,380
2	33.51	634	35.48	1,650	44.24	15,900	42.25	9,800	39.25	4,880	41.01	7,350
4	33.48	623	36.76	2,510	44.38	16,700	41.91	9,020	39.11	4,730	41.64	8,460
6	33.46	616	37.67	3,270	44.47	17,300	41.60	8,380	38.94	4,540	42.17	9,610
8	33.45	612	38.11	3,690	44.47	17,300	41.27	7,790	38.84	4,430	42.46	10,300
10	33.45	612	38.56	4,140	44.37	16,600	40.96	7,260	38.77	4,350	42.63	10,700
12	33.44	608	39.09	4,710	44.22	15,800	40.72	6,870	38.76	4,350	42.65	10,800
	December 8		December 9		December 10		December 11		December 12		December 13	
4	42.44	10,300	43.79	14,000	41.92	9,020	39.46	5,130	37.79	3,380	36.81	2,550
8	42.17	9,610	43.95	14,600	41.42	8,060	39.13	4,760	37.56	3,170	36.68	2,450
N	41.98	9,180	43.80	14,100	40.96	7,260	38.81	4,400	37.41	3,040	36.56	2,360
4	42.04	9,310	43.47	13,000	40.54	6,590	38.50	4,080	37.26	2,910	36.45	2,280
8	42.52	10,500	42.99	11,700	40.16	6,030	38.22	3,800	37.08	2,760	36.36	2,220
12	43.27	12,500	42.43	10,200	39.80	5,550	37.94	3,520	36.94	2,650	36.28	2,170

Camp Creek near Camino, Calif.

Location.--Lat 38°41', long. 120°33', in NW¼ sec. 28, T. 10 N., R. 13 E., 3 miles upstream from Sly Park Creek and 7.5 miles southeast of Camino. Altitude of gage, about 3,200 ft (from topographic map).

Drainage area.--35.5 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 1,400 cfs and extended to peak stage on basis of slope-area determination.

Maxima.--November-December 1950: Discharge, 2,560 cfs 2 p.m. Nov. 20 (gage height, 5.65 ft).
1948 to October 1950: Discharge, 451 cfs Feb. 6, 1950 (gage height, 2.94 ft).

Remarks.--Flood flow not affected by diversions above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	17	86	9	8.3	684	17	47	213	25	184	94
2	13	75	10	7.9	470	18	990	189	26	147	87
3	11	1,120	11	7.5	346	19	1,170	171	27	120	80
4	11	1,020	12	7.5	274	20	1,480	151	28	103	76
5	10	550	13	13	227	21	1,430	134	29	88	71
6	9.4	470	14	20	347	22	604	123	30	93	71
7	9.0	668	15	13	287	23	349	112	31		66
8	8.6	1,090	16	19	240	24	239	103			
Monthly mean discharge, in cfs										241	313
Runoff, in acre-feet										14,340	19,230
Runoff, in inches										7.57	10.16

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	1.57	44	2.10	161	4.88	1,840	3.30	660	5.29	2,210	3.46	756
4	1.55	42	2.35	230	4.86	1,820	3.33	678	5.24	2,170	3.40	720
6	1.53	39	2.62	324	4.56	1,550	3.39	714	4.99	1,940	3.35	690
8	1.52	38	2.92	455	4.33	1,350	3.45	750	4.75	1,720	3.30	660
10	1.51	37	3.22	612	4.28	1,310	4.33	1,350	4.51	1,510	3.24	624
N	1.51	37	3.90	1,030	4.00	1,100	5.39	2,300	4.29	1,320	3.19	594
2	1.53	39	4.55	1,540	3.78	948	5.65	2,560	4.10	1,170	3.13	562
4	1.57	44	4.72	1,700	3.56	816	5.33	2,250	3.93	1,050	3.09	540
6	1.62	49	4.71	1,690	3.45	750	4.77	1,740	3.83	981	3.04	515
8	1.68	57	4.58	1,570	3.34	684	4.69	1,670	3.73	918	2.99	490
10	1.77	69	4.63	1,620	3.25	630	4.85	1,820	3.64	864	2.94	465
12	1.90	87	4.83	1,800	3.25	630	4.92	1,880	3.56	816	2.90	445
	November 23		November 24		November 25		November 29		November 30		December 1	
4	2.80	399	2.44	259	2.25	200	1.76	92	1.73	86	1.77	94
8	2.73	369	2.41	248	2.22	192	1.75	90	1.79	97	1.77	94
N	2.67	344	2.38	239	2.19	184	1.74	88	1.82	103	1.73	86
4	2.61	320	2.34	226	2.16	176	1.73	86	1.80	99	1.71	83
8	2.55	298	2.31	217	2.13	168	1.72	85	1.75	90	1.69	79
12	2.50	279	2.28	208	2.11	164	1.71	83	1.73	86	1.68	78
	December 2		December 3		December 4		December 5		December 6		December 7	
2	1.68	78	1.84	107	4.49	1,490	3.28	648	2.85	426	3.31	666
4	1.67	76	2.05	150	4.33	1,350	3.23	618	2.83	417	3.45	750
6	1.66	75	2.60	316	4.15	1,210	3.20	600	2.82	412	3.45	756
8	1.66	75	3.04	515	3.97	1,080	3.18	589	2.81	408	3.40	720
10	1.65	73	3.51	786	3.84	988	3.14	567	2.80	403	3.27	642
N	1.65	73	3.93	1,050	3.73	918	3.10	545	2.82	412	3.22	612
2	1.65	73	4.37	1,390	3.65	870	3.07	531	2.85	426	3.20	600
4	1.65	73	4.71	1,690	3.58	828	3.03	511	2.90	450	3.21	606
6	1.65	73	5.17	2,100	3.52	792	2.99	492	3.03	511	3.22	612
8	1.66	75	5.40	2,310	3.44	744	2.96	478	3.16	578	3.33	678
10	1.68	78	5.20	2,130	3.37	702	2.93	464	3.29	654	3.36	696
12	1.73	86	4.86	1,820	3.33	678	2.89	445	3.26	636	3.38	708
	December 8		December 9		December 10		December 11		December 12		December 13	
4	3.65	870	3.52	792	3.06	526	2.73	374	2.51	294	2.33	237
8	4.40	1,410	3.41	726	2.99	492	2.68	355	2.48	284	2.31	231
N	4.37	1,390	3.30	660	2.94	469	2.66	347	2.44	271	2.28	223
4	4.06	1,140	3.23	618	2.88	441	2.62	332	2.42	264	2.27	220
8	3.80	960	3.18	589	2.83	417	2.58	318	2.39	255	2.25	216
12	3.67	882	3.12	556	2.78	395	2.54	304	2.37	249	2.26	218

Sly Park Creek near Pollock Pines, Calif.

Location.--Lat 38°42', long. 120°33', in SE¼ sec. 18, T. 10 N., R. 13 E., 0.5 mile downstream from damsite, 2.5 miles upstream from mouth, 3.5 miles south of Pollock Pines, and 12 miles east of Placerville.

Drainage area.--14.4 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 770 cfs and extended to peak stage. Shifting-control method used Nov. 1 to Dec. 2.

Maxima.--November-December 1950: Discharge, 1,030 cfs 9 p.m. Dec. 3 (gage height, 6.53 ft).
1906, 1948 to October 1950: Discharge, 433 cfs Feb. 6, 1950 (gage height, 4.62 ft).

Remarks.--No storage or diversions above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	5.2	24	9	1.8	438	17	30	98	25	48	33
2	3.8	22	10	1.7	269	18	534	80	26	36	29
3	3.0	564	11	1.7	192	19	484	65	27	28	27
4	2.6	614	12	1.7	150	20	574	56	28	23	25
5	2.4	314	13	3.6	118	21	622	52	29	20	24
6	2.3	268	14	11	198	22	241	45	30	26	28
7	2.0	381	15	7.6	148	23	127	40	31		24
8	1.9	633	16	18	120	24	77	36			
Monthly mean discharge, in cfs										98.0	165
Runoff, in acre-feet										5,830	10,150
Runoff, in inches										7.59	13.21

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	1.79	25	2.58	96	5.90	811	3.74	277	6.09	834	4.24	332
4	1.77	24	3.28	198	5.66	735	3.76	280	6.05	821	4.09	304
6	1.73	22	3.61	254	5.42	664	3.81	289	5.93	783	3.98	284
8	1.70	20	3.85	297	5.10	574	4.18	358	5.75	726	3.87	264
10	1.70	20	4.35	393	4.70	473	5.15	588	5.53	661	3.79	250
N	1.72	21	5.27	621	4.54	435	5.53	696	5.33	604	3.69	233
2	1.82	26	5.65	732	4.32	387	5.70	748	5.17	561	3.61	220
4	1.85	28	5.80	779	4.10	343	5.54	699	5.04	528	3.52	204
6	1.89	31	5.89	808	3.90	306	5.44	670	4.82	473	3.43	190
8	2.06	44	6.20	909	3.73	275	5.95	827	4.68	440	3.36	179
10	2.16	52	6.05	860	3.59	250	6.13	886	4.54	409	3.29	168
12	2.35	70	6.01	847	3.68	266	6.07	866	4.39	376	3.25	161
	November 23		November 24		November 25		November 29		November 30		December 1	
4	3.16	152	2.70	92	2.32	55	1.77	21	1.92	31	1.85	28
8	3.07	138	2.63	84	2.27	51	1.76	20	1.92	31	1.83	26
N	2.97	124	2.57	77	2.23	48	1.75	20	1.83	25	1.78	24
4	2.88	112	2.50	70	2.18	44	1.74	19	1.78	23	1.76	23
8	2.82	105	2.43	63	2.16	42	1.73	19	1.76	22	1.75	22
12	2.77	98	2.37	57	2.13	40	1.73	19	1.83	25	1.73	21
	December 2		December 3		December 4		December 5		December 6		December 7	
2	1.72	22	2.30	68	5.86	808	4.32	393	3.42	226	4.52	438
4	1.72	22	2.81	130	5.73	767	4.24	376	3.38	220	4.35	400
6	1.72	22	3.48	237	5.60	726	4.13	355	3.38	220	4.18	364
8	1.71	21	4.27	383	5.45	682	4.05	340	3.35	214	4.07	343
10	1.71	21	5.02	561	5.26	627	3.96	322	3.33	211	4.01	332
N	1.71	21	5.23	618	5.15	596	3.88	307	3.53	245	3.93	317
2	1.70	20	5.50	696	5.08	577	3.81	295	3.53	245	3.98	326
4	1.70	20	5.84	802	5.01	559	3.75	284	3.67	270	4.34	398
6	1.70	20	6.07	876	4.78	500	3.67	270	4.16	360	4.39	409
8	1.74	23	6.39	982	4.62	461	3.60	257	4.08	345	4.40	411
10	1.81	26	6.24	932	4.52	438	3.53	245	4.08	345	4.42	415
12	1.98	39	5.98	847	4.43	418	3.47	235	4.35	400	4.54	442
	December 8		December 9		December 10		December 11		December 12		December 13	
4	5.22	616	4.83	512	3.92	315	3.28	203	3.03	163	2.77	124
8	5.76	776	4.67	473	3.80	293	3.23	195	2.99	156	2.73	119
N	5.48	690	4.52	438	3.66	268	3.26	200	2.95	150	2.70	115
4	5.27	630	4.34	398	3.50	240	3.18	187	2.90	143	2.66	110
8	5.13	590	4.19	366	3.41	225	3.13	179	2.86	137	2.68	112
12	4.96	546	4.04	338	3.32	209	3.08	171	2.81	130	2.82	131

Supplemental record.--Dec. 3, 9 p.m., 6.53 ft, 1,030 cfs.

Sacramento River basin

Sacramento River main stem

Shasta Lake near Redding, Calif.

Location.--Lat 40°43', long. 122°25', in S½ sec. 15, T. 33 N., R. 5 W., at Shasta Dam on Sacramento River, 2 miles downstream from Squaw Creek and 9.5 miles north of Redding. Datum of gage is at mean sea level (levels by Bureau of Reclamation).

Drainage area.--6,665 sq mi, excludes Goose Lake Basin.

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

Maxima.--November-December 1950: Contents, 3,534,500 acre-ft Dec. 11 (elevation, 1,030.04 ft).
1942 to October 1950: Contents, 3,982,500 acre-ft May 21, 1950 (elevation, 1,047.07 ft).

Remarks.--Reservoir is formed by concrete gravity-type dam completed in 1949; regulation of discharge from reservoir began Dec. 30, 1943. Usable capacity, 4,377,000 acre-ft between elevations 737.75 ft (bottom of lowest set of river outlets) and 1,065.0 ft (top of drum type spillway gates) above mean sea level. 115,700 acre-ft is not available for release. All water passes down Sacramento River, some first passing through power plant at dam. Records, including maxima, show total contents at 12 p.m. Record furnished by Bureau of Reclamation.

Contents, in thousands of acre-feet, at 12 p.m. of indicated day, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	3,075.2	3,333.3	9	3,121.7	3,505.3	17	3,213.2	3,453.7	25	3,306.4	3,309.6
2	3,085.3	3,341.3	10	3,121.5	3,524.7	18	3,242.5	3,413.8	26	3,311.5	3,302.8
3	3,093.9	3,361.6	11	3,127.8	3,534.5	19	3,263.1	3,379.7	27	3,318.5	3,294.9
4	3,102.7	3,379.2	12	3,127.8	3,527.9	20	3,272.0	3,352.0	28	3,321.7	3,288.1
5	3,109.7	3,393.9	13	3,129.4	3,509.3	21	3,284.8	3,336.0	29	3,325.3	3,279.0
6	3,114.1	3,311.4	14	3,130.4	3,512.0	22	3,291.5	3,329.2	30	3,329.7	3,273.7
7	3,117.1	3,436.4	15	3,139.9	3,515.1	23	3,297.5	3,323.6	31		3,267.9
8	3,120.1	3,473.7	16	3,182.7	3,490.7	24	3,301.1	3,316.6			
Change in contents, during month										+270.8	-61.8

Sacramento River at Keswick, Calif.

Location.--Lat 40°36', long. 122°27', in W½ sec. 28, T. 32 N., R. 5 W., 0.6 mile downstream from Keswick Dam, 0.6 mile upstream from Middle Creek, 1.5 miles downstream from Keswick, and 10 miles downstream from Shasta Dam. Datum of gage is 479.81 ft above mean sea level, datum of 1929.

Drainage area.--6,710 sq mi, excludes Goose Lake Basin.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 36,000 cfs and extended to peak stage. Shifting-control method used Nov. 17 to Dec. 8.

Maxima.--November-December 1950: Discharge, 42,100 cfs 10 a.m. Dec. 17 (gage height, 25.60 ft).
1938 to October 1950: Discharge, 186,000 cfs Feb. 28, 1940 (gage height, 47.2 ft, site and datum then in use), from rating curve extended above 75,000 cfs on basis of peak discharge at Kennett plus 4,000 cfs estimated inflow.

Remarks.--Flood flow completely regulated by Shasta Lake beginning Dec. 30, 1943 (see preceding page). 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	4,090	6,150	9	4,090	13,200	17	6,690	37,300	25	6,030	12,700
2	4,050	6,160	10	4,090	12,600	18	8,390	36,100	26	6,110	12,400
3	4,070	6,460	11	4,110	15,600	19	8,390	31,700	27	6,180	12,100
4	4,050	6,270	12	4,100	21,900	20	8,590	26,800	28	6,110	12,100
5	4,050	7,950	13	4,130	26,200	21	8,360	20,000	29	6,140	12,200
6	4,090	8,150	14	4,130	27,300	22	8,060	13,600	30	6,190	10,200
7	4,110	8,390	15	4,140	35,700	23	8,280	12,600	31		10,100
8	4,100	7,470	16	6,550	37,500	24	7,860	12,600			
Monthly mean discharge, in cfs										5,644	16,760
Runoff, in acre-feet										335,900	1,030,000
Runoff, in inches										-	-

Sacramento River near Red Bluff, Calif.

Location.--Lat 40°13'55", long. 122°10'50", in SE¼ sec. 34, T. 28 N., R. 3 W., at lower end of Iron Canyon, 0.5 mile downstream from Sevenmile Creek and 4 miles northeast of Red Bluff. Datum of gage is 252.6 ft above mean sea level (from river-profile survey).

Drainage area.--9,300 sq mi, excludes Goose Lake Basin.

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

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

Maxima.--November-December 1950: Discharge, 70,100 cfs 4 p.m. Dec. 14 (gage height, 16.16 ft).
1895 to October 1950: Discharge, 291,000 cfs Feb. 28, 1940 (gage height, 38.9 ft), from rating curve extended above 200,000 cfs on basis of velocity-area studies and logarithmic plotting.

Remarks.--Flood flow partly regulated by Shasta Lake (see p.680). 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	6,900	8,930	9	5,020	26,300	17	14,400	47,500	25	8,670	16,000
2	6,300	8,550	10	4,950	22,000	18	18,200	45,800	26	7,860	15,700
3	5,840	28,100	11	4,910	23,300	19	13,400	40,900	27	7,830	14,900
4	5,590	32,100	12	4,890	28,800	20	12,700	36,000	28	7,860	14,700
5	5,410	16,500	13	5,000	31,900	21	15,100	28,100	29	7,640	14,700
6	5,280	15,400	14	6,120	54,600	22	12,000	20,700	30	7,750	13,500
7	5,210	21,200	15	5,450	51,000	23	10,900	16,500	31		12,500
8	5,120	21,900	16	11,900	49,600	24	10,400	16,100			
Monthly mean discharge, in cfs										8,287	25,610
Runoff, in acre-feet										493,100	1,574,000
Runoff, in inches										0.99	3.17

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	5.70	17,700	4.48	13,600	4.80	14,700	3.97	12,000	5.15	15,800	4.60	14,000
4	5.50	17,000	5.23	16,100	4.71	14,400	3.94	11,900	5.30	16,300	3.51	13,700
6	5.36	16,500	6.38	20,100	4.63	14,100	3.90	11,800	5.39	16,600	4.32	13,100
8	5.14	15,800	7.17	23,100	4.52	13,800	3.90	11,800	5.30	16,300	3.97	12,000
10	4.84	14,800	7.27	23,500	4.42	13,400	3.97	12,000	5.05	15,500	3.72	11,300
N	4.62	14,100	6.88	21,900	4.33	13,200	4.06	12,300	4.96	14,900	3.62	11,000
2	4.51	13,700	6.22	19,500	4.30	13,100	4.17	12,600	4.70	14,300	3.60	10,900
4	4.42	13,400	5.79	18,000	4.28	13,000	4.26	12,900	4.60	14,000	3.60	10,900
6	4.22	12,800	5.52	17,100	4.20	12,700	4.42	13,400	4.61	14,100	3.69	11,200
8	3.87	11,700	5.25	16,200	4.16	12,600	4.57	13,900	4.78	14,600	3.85	11,600
10	3.57	10,800	5.06	15,500	4.05	12,300	4.68	14,300	4.80	14,700	3.81	11,500
12	3.90	11,800	4.91	15,000	3.97	12,000	4.89	14,900	4.70	14,300	3.72	11,300
	November 23		November 24		November 25		November 29		November 30		December 1	
4	3.70	11,200	3.48	10,500	3.35	10,200	2.48	7,730	2.41	7,540	3.07	9,350
8	3.67	11,100	3.44	10,400	2.82	8,650	2.45	7,640	2.41	7,540	3.15	9,580
N	3.61	10,900	3.43	10,400	2.59	8,020	2.41	7,540	2.41	7,540	2.97	9,070
4	3.58	10,800	3.41	10,300	2.57	7,970	2.44	7,620	2.42	7,560	2.80	8,590
8	3.51	10,600	3.40	10,300	2.60	8,050	2.43	7,590	2.63	8,130	2.76	8,480
12	3.52	10,700	3.38	10,200	2.59	8,020	2.45	7,640	2.85	8,730	2.70	8,320
	December 2		December 3		December 4		December 5		December 6		December 7	
2	2.68	8,270	4.50	13,700	12.07	46,200	6.03	18,800	5.02	15,400	6.54	20,700
4	2.64	8,160	4.94	15,100	11.65	44,000	5.85	18,200	5.00	15,300	6.87	21,900
6	2.60	8,050	5.40	16,700	11.06	41,100	5.71	17,700	4.93	15,100	7.06	22,600
8	2.59	8,020	5.89	18,300	10.35	37,600	5.57	17,200	4.75	14,500	7.08	22,700
10	2.57	7,970	6.59	20,800	9.62	34,000	5.40	16,700	4.60	14,000	7.00	22,400
N	2.52	7,830	7.56	24,700	8.88	30,400	5.25	16,200	4.61	14,100	6.78	21,600
2	2.51	7,810	8.77	29,900	8.21	27,400	5.11	15,700	4.68	14,300	6.46	20,400
4	2.54	7,890	9.96	35,600	7.68	25,200	4.97	15,200	4.80	14,700	6.22	19,500
6	2.70	8,320	11.01	40,800	7.24	23,400	4.83	14,800	4.99	15,300	6.22	19,500
8	3.08	9,370	11.77	44,600	6.86	21,900	4.75	14,500	5.40	16,700	6.55	20,700
10	3.50	10,600	12.23	47,000	6.55	20,700	4.87	14,900	5.83	18,100	6.72	21,300
12	4.05	12,300	12.29	47,400	6.28	19,700	5.02	15,400	6.20	19,400	7.07	22,700
	December 8		December 9		December 10		December 11		December 12		December 13	
4	7.52	24,500	7.42	24,100	7.23	23,300	6.33	19,900	8.43	28,400	8.47	28,600
8	7.18	23,100	8.60	29,200	7.00	22,400	6.34	19,900	8.53	28,800	9.28	32,400
N	7.19	23,200	8.70	29,600	6.81	21,700	6.77	21,500	8.53	28,800	9.40	32,900
4	6.75	21,400	8.30	27,800	6.70	21,300	7.79	25,600	8.38	28,200	9.41	33,000
8	6.09	19,000	7.89	26,000	6.59	20,800	8.40	28,300	8.65	29,400	9.42	33,000
12	5.86	18,200	7.52	24,500	6.43	20,200	8.64	29,400	8.70	29,600	9.62	33,900

Supplemental record.--Dec. 3, 11:30 p.m., 12.30 ft, 47,400 cfs.

Sacramento River at Butte City, Calif.

Location.--Lat 39°27'35", long. 121°59'35", in NE¼ sec. 32, T. 19 N., R. 1 W., 0.5 mile south of Butte City. Zero of gage is set to datum of Corps of Engineers.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 53,000 cfs and extended to peak stage. Shifting-control method used Nov. 1-16.

Maxima.--November-December 1950: Discharge, 67,600 cfs 6 - 7 p.m. Dec. 15 (gage height, 88.15 ft).
1940 to October 1950: Discharge, 170,000 cfs Feb. 7, 1942 (gage height, 96.87 ft), from rating curve extended above 100,000 cfs.

Remarks.--Flow regulated by reservoirs, many diversions for irrigation, and bypasses for flood control. See "Remarks" for Sacramento River at Keswick.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	10,900	9,300	9	5,600	34,400	17	18,700	56,200	25	12,600	19,900
2	8,460	9,860	10	5,560	37,700	18	17,200	51,800	26	10,600	19,200
3	7,520	14,900	11	5,360	30,300	19	21,200	47,900	27	9,540	18,600
4	6,920	42,000	12	5,150	31,200	20	17,500	40,100	28	9,300	17,800
5	6,590	40,800	13	5,110	32,400	21	24,100	34,600	29	9,110	17,400
6	6,080	26,100	14	5,340	36,300	22	21,800	31,000	30	8,870	17,100
7	5,740	25,800	15	6,170	62,400	23	15,800	25,200	31		16,100
8	5,740	31,900	16	7,180	62,000	24	13,600	21,100			
Monthly mean discharge, in cfs										10,440	31,010
Runoff, in acre-feet										621,500	1,907,000
Runoff, in inches										-	-

Sacramento River at Colusa, Calif.

Location.--Lat 39°12'50", long. 121°59'55", at north end of Jimeno Grant, just downstream from highway bridge at Colusa, Colusa County. Zero of gage is set to datum of Corps of Engineers.

Gage-height record.--Water-stage recorder graph except for Nov. 14, 15 when there was no gage-height record.

Discharge record.--Stage-discharge relation defined by current-meter measurements. Discharge for period of no gage-height record computed on basis of records for stations at Butte City and below Wilkins Slough. Shifting-control method used Nov. 1 to Dec. 31.

Maxima.--November-December 1950: Discharge, 36,200 cfs 7 a.m. Dec. 16 (gage height, 63.62 ft).
1940 to October 1950: Discharge, 49,000 cfs Feb. 8, 1942 (gage height, 69.20 ft).

Remarks.--Flow regulated by reservoirs above station and bypasses for flood control. See "Remarks" for Sacramento River at Keswick.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	13,800	9,870	9	5,860	29,900	17	13,000	35,600	25	14,600	21,200
2	9,590	10,600	10	5,750	30,900	18	16,500	35,100	26	13,300	21,600
3	8,100	11,300	11	5,640	30,000	19	18,300	34,700	27	11,500	19,700
4	7,330	24,100	12	5,500	29,100	20	18,900	34,100	28	10,700	18,800
5	6,890	32,900	13	5,340	30,500	21	19,500	33,000	29	10,300	18,100
6	6,480	29,000	14	5,300	31,300	22	23,200	31,400	30	9,900	17,600
7	5,980	24,700	15	6,000	34,400	23	19,700	27,900	31		17,100
8	5,860	27,100	16	6,070	36,100	24	16,200	23,200			
Monthly mean discharge, in cfs										10,840	26,160
Runoff, in acre-feet										644,800	1,608,000
Runoff, in inches										-	-

Sacramento River below Wilkins Slough, Calif.

Location.--Lat 39°00'35", long. 121°49'25", in Jimeno Grant, 1,500 ft downstream from Wilkins Slough, Colusa County, and 6 miles southeast of Grimes. Zero of gage is set to datum of Corps of Engineers.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements. Shifting-control method used Nov. 1 to Dec. 31.

Maxima.--November-December 1950: Discharge, 22,500 cfs 2 p.m. Dec. 16 (gage height, 48.26 ft).
1940 to October 1950: Discharge, 26,600 cfs Feb. 8, 1942 (gage height, 52.29 ft).

Remarks.--Flow regulated by reservoirs, many diversions for irrigation, and bypasses for flood control. See "Remarks" for Sacramento River at Keswick.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	15,400	9,820	9	6,280	21,200	17	10,800	22,400	25	16,000	19,800
2	11,800	9,910	10	6,180	21,400	18	15,600	22,300	26	14,900	19,200
3	9,530	10,300	11	6,090	21,300	19	17,300	22,200	27	13,200	18,600
4	8,340	16,400	12	6,040	21,100	20	19,200	22,000	28	11,900	17,800
5	7,630	21,600	13	5,860	21,300	21	19,200	21,800	29	10,900	17,000
6	7,200	21,300	14	5,770	21,400	22	21,000	21,600	30	10,300	16,500
7	6,620	20,500	15	6,120	21,800	23	19,800	21,200	31		16,000
8	6,330	20,700	16	6,680	22,400	24	17,500	20,400			
Monthly mean discharge, in cfs										11,320	19,390
Runoff, in acre-feet										673,300	1,195,000
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												
4												
6												
8												
10												
N												
2												
4												
6												
8												
10												
12												
	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												

Sacramento River at Knights Landing, Calif.

Location.--Lat 38°48'10", long. 121°42'55", in NE¼ sec. 14, T. 11 N., R. 2 E., just upstream from Southern Pacific Railroad bridge at Knights Landing. Zero of gage is set to datum of Corps of Engineers. Auxiliary gage at upstream end of Fremont weir, 6.0 miles downstream.

Gage-height record.--Water-stage recorder graphs from base and auxiliary gages.

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

Maxima.--November-December 1950: Discharge, 23,400 cfs 5 - 8 a.m. Dec. 17; gage height, 38.37 ft 4 - 6 a.m. Nov. 22.
1940 to October 1950: Discharge, 27,900 cfs Feb. 9, 1942; gage height, 41.83 ft Feb. 8, 1942.

Remarks.--Flow regulated by reservoirs, many diversions for irrigation, and bypasses for flood control; considerable return water from irrigation. See "Remarks" for Sacramento River at Keswick. Discharge computed by using fall between base and auxiliary gages as a factor.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	16,100	10,900	9	6,470	21,300	17	7,490	23,300	25	15,400	20,200
2	12,800	10,900	10	6,380	22,000	18	12,400	22,900	26	14,500	19,800
3	10,600	11,000	11	6,250	22,200	19	12,200	23,000	27	13,300	19,700
4	9,170	13,100	12	6,270	21,800	20	17,300	22,500	28	12,200	19,000
5	8,170	21,800	13	6,030	22,100	21	17,200	22,400	29	11,600	18,000
6	7,520	22,400	14	5,930	21,900	22	19,800	22,000	30	11,200	17,000
7	6,900	21,000	15	6,070	22,200	23	19,800	21,700	31		16,800
8	6,490	20,900	16	6,750	23,100	24	17,500	20,900			
Monthly mean discharge, in cfs										10,990	19,930
Runoff, in acre-feet										654,100	1,225,000
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	18.75	6,820	23.62	10,900	29.87	10,500	35.98	16,000	36.79	17,400	38.36	19,200
4	18.77	6,750	24.16	11,600	30.80	9,440	36.14	16,700	36.93	17,200	38.37	19,400
6	18.82	6,740	24.62	12,100	31.65	9,630	36.24	16,900	37.09	16,900	38.37	19,500
8	18.92	6,710	25.09	12,800	32.51	11,500	36.33	17,400	37.24	16,600	38.35	19,500
10	19.11	6,740	25.52	13,300	32.96	12,300	36.38	17,800	37.42	16,700	38.33	19,600
N	19.43	6,840	25.90	13,500	33.34	12,800	36.41	17,000	37.59	16,700	38.31	19,900
2	19.87	7,000	26.30	13,500	33.70	13,000	36.46	18,000	37.74	16,800	38.28	20,100
4	20.47	7,470	26.75	13,200	34.12	12,900	36.48	18,000	37.89	16,800	38.22	20,200
6	21.11	8,080	27.25	12,700	34.57	13,200	36.49	17,700	38.05	17,300	38.17	20,200
8	21.78	8,730	27.75	12,500	34.99	13,300	36.54	17,600	38.14	17,800	38.10	20,400
10	22.40	9,470	28.35	12,200	35.40	14,100	36.59	17,300	38.24	18,300	38.02	20,300
12	23.03	10,200	29.02	11,700	35.74	15,200	36.67	17,000	38.32	18,900	37.94	20,400
	November 23		November 24		November 25		November 29		November 30		December 1	
4	37.76	20,300	36.57	18,200	35.45	16,000	27.88	11,700	26.39	11,100	25.36	10,800
8	37.59	20,400	36.36	17,800	35.25	15,500	27.58	11,500	26.16	11,200	25.22	10,800
N	37.41	20,100	36.17	17,300	35.10	15,400	27.33	11,600	25.95	11,200	25.16	11,100
4	37.19	19,700	35.99	17,100	34.93	15,300	27.09	11,700	25.77	11,200	25.05	11,000
8	36.99	19,200	35.79	16,600	34.76	15,100	26.83	11,400	25.63	11,200	24.91	10,800
12	36.78	18,800	35.61	16,100	34.57	14,700	26.60	11,300	25.50	11,000	24.82	10,800
	December 2		December 3		December 4		December 5		December 6		December 7	
2	24.77	10,800	24.59	11,000	27.65	8,460	36.98	20,300	37.62	22,800	37.12	21,600
4	24.72	10,800	24.60	11,100	29.07	7,020	37.10	20,700	37.60	22,800	37.10	21,500
6	24.68	10,800	24.60	11,200	30.62	8,040	37.24	21,300	37.56	22,800	37.08	21,400
8	24.64	10,800	24.61	11,200	32.00	9,760	37.33	21,600	37.52	22,600	37.05	21,200
10	24.60	10,800	24.63	11,300	32.93	11,900	37.42	21,900	37.48	22,500	37.03	21,000
N	24.60	11,000	24.64	11,300	33.56	13,700	37.50	22,000	37.45	22,700	37.04	20,800
2	24.56	10,900	24.70	11,300	34.13	14,700	37.55	22,300	37.38	22,300	37.07	20,600
4	24.55	11,000	24.82	11,200	34.80	15,600	37.58	22,200	37.33	22,100	37.10	20,600
6	24.54	11,000	25.02	11,000	35.48	16,600	37.62	22,400	37.28	22,200	37.12	20,500
8	24.56	11,100	25.36	10,600	36.07	18,000	37.62	22,600	37.23	21,900	37.15	20,600
10	24.57	11,100	25.78	10,200	35.50	19,000	37.62	22,600	37.18	22,000	37.18	20,800
12	24.57	11,100	26.48	9,560	36.77	19,700	37.62	22,700	37.14	21,800	37.22	20,500
	December 8		December 9		December 10		December 11		December 12		December 13	
4	37.28	20,900	37.68	21,200	37.97	21,900	37.58	22,400	37.18	21,800	37.02	22,200
8	37.30	20,800	37.79	21,100	37.93	21,900	37.53	22,400	37.14	21,800	37.00	22,100
N	37.35	20,800	37.87	21,300	37.86	22,000	37.43	22,200	37.11	21,600	36.97	21,900
4	37.42	21,200	37.93	21,400	37.79	22,100	37.37	22,200	37.07	21,800	36.96	22,100
8	37.47	21,000	37.94	21,400	37.71	22,100	37.28	22,100	37.04	21,700	36.94	22,200
12	37.58	21,200	37.97	21,700	37.63	22,100	37.23	21,800	37.03	21,800	36.92	22,200

Sacramento River at Verona, Calif.

Location.--Lat 38°46'50", long. 121°36'15", in SE¼ sec. 23, T. 11 N., R. 3 E., 0.8 mile southeast of Verona and 1 mile downstream from Feather River. Zero of gage is set 0.06 ft below datum of Corps of Engineers. Auxiliary gage at Sacramento weir 16 miles downstream; set to datum of Corps of Engineers.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 59,000 cfs. Discharge for periods of backwater from American River, Nov. 18-22, Dec. 3-9, 15, 16, computed on basis of fall between gages at Verona and at Sacramento weir.

Maxima.--November-December 1950: Discharge, 64,300 cfs 6 a.m. Nov. 22; gage height, 37.06 ft 8-9 p.m. Nov. 21.
1926 to October 1950: Discharge, 79,200 cfs Mar. 1, 1940 (gage height, 41.20 ft).

Remarks.--Reservoirs, many diversions, and considerable return water affect flow. When discharge is larger than about 55,000 cfs, flow begins over Fremont weir (just upstream) into Yolo bypass (see p.733). Elevation of crest of Fremont weir is 33.5 ft, datum of Corps of Engineers.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	24,100	26,000	9	10,300	56,400	17	14,300	59,900	25	53,100	50,900
2	20,600	24,400	10	10,100	60,800	18	25,100	58,900	26	49,300	48,100
3	17,000	24,300	11	9,710	58,800	19	25,600	58,000	27	43,500	45,000
4	14,700	17,000	12	10,000	57,600	20	52,200	57,300	28	37,000	41,600
5	13,300	51,600	13	9,860	56,900	21	52,600	56,400	29	32,000	38,400
6	11,800	56,900	14	9,860	56,700	22	63,200	55,600	30	28,400	35,800
7	10,700	51,100	15	10,200	54,700	23	59,700	54,500	31		33,900
8	10,300	52,400	16	11,000	58,800	24	56,200	53,000			
Monthly mean discharge, in cfs										26,520	48,760
Runoff, in acre-feet										1,578,000	2,998,000
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	15.06	11,700	19.31	20,400	28.23	41,100	34.41	48,600	35.44	50,900	36.93	63,500
4	15.14	11,800	19.74	21,300	29.55	18,500	34.46	50,500	35.73	49,700	36.85	64,000
6	15.24	12,000	20.18	22,200	30.85	12,200	34.51	51,900	36.00	48,800	36.77	64,300
8	15.41	12,300	20.57	23,100	31.55	15,700	34.52	52,900	36.28	49,300	36.67	64,000
10	15.64	12,800	20.97	23,900	32.02	18,300	34.54	53,600	36.46	49,200	36.58	63,800
N	16.00	13,500	21.44	25,000	32.35	20,400	34.56	53,600	36.64	50,200	36.51	63,600
2	16.41	14,300	22.06	26,300	32.64	23,600	34.62	53,600	36.81	51,700	36.41	63,300
4	16.86	15,200	22.81	28,100	33.02	28,400	34.70	52,900	36.93	53,000	36.31	63,000
6	17.42	16,400	23.68	30,100	33.39	33,100	34.76	52,100	37.02	54,600	36.20	62,700
8	17.90	17,400	24.62	29,800	33.78	38,200	34.84	53,600	37.06	56,500	36.08	62,300
10	18.40	18,400	25.70	28,500	34.07	42,300	34.98	53,800	37.04	58,900	35.96	62,000
12	18.76	19,200	27.07	25,800	34.29	57,200	35.17	54,200	37.01	61,700	35.86	61,700
	November 23		November 24		November 25		November 29		November 30		December 1	
4	35.61	61,000	34.30	57,200	33.19	54,100	25.08	33,400	23.47	29,600	22.23	26,700
8	35.39	60,300	34.12	56,700	33.02	53,700	24.73	32,600	23.20	29,000	22.06	26,300
N	35.16	59,700	33.92	56,200	32.82	53,100	24.43	31,800	22.94	28,400	21.88	25,900
4	34.93	59,000	33.74	55,700	32.63	52,600	24.15	31,200	22.69	27,800	21.70	25,500
8	34.71	58,400	33.56	55,200	32.44	52,100	23.90	30,600	22.51	27,400	21.58	25,300
12	34.51	57,800	33.39	54,700	32.21	51,500	23.62	29,900	22.36	27,000	21.47	25,000
	December 2		December 3		December 4		December 5		December 6		December 7	
2	21.42	24,900	21.03	24,100	26.60	10,100	35.02	46,500	35.15	56,400	34.62	56,400
4	21.35	24,800	21.00	24,000	28.30	e9,040	35.09	48,000	35.11	56,400	34.65	55,900
6	21.28	24,600	20.98	24,000	29.95	e16,800	35.14	29,000	35.06	56,600	34.67	54,300
8	21.23	24,500	20.98	24,000	31.55	e7,390	35.20	50,200	35.01	56,900	34.73	52,600
10	21.18	24,400	20.98	24,000	32.25	11,800	35.24	51,200	34.95	56,900	34.81	49,900
N	21.12	24,300	21.00	24,000	32.50	15,600	35.27	52,200	34.90	57,300	34.91	47,800
2	21.06	24,100	21.10	24,200	32.85	22,400	35.31	53,200	34.85	57,300	34.97	46,200
4	21.03	24,100	21.37	24,800	33.30	28,800	35.30	53,700	34.79	57,100	35.02	48,000
6	21.00	24,000	21.92	26,000	33.90	34,900	35.29	54,400	34.73	57,100	35.05	48,500
8	21.00	24,000	22.60	27,600	34.35	38,700	35.27	54,900	34.67	57,100	35.11	49,200
10	21.00	24,000	23.60	23,500	34.70	42,300	35.24	55,400	34.63	57,100	35.13	50,300
12	21.01	24,000	25.15	17,800	34.90	44,800	35.16	55,700	34.60	56,600	35.15	51,500
	December 8		December 9		December 10		December 11		December 12		December 13	
4	35.17	53,300	35.75	51,500	35.77	61,400	35.05	59,300	34.53	57,900	34.29	57,200
8	35.21	53,500	35.85	53,800	35.67	61,100	34.93	59,000	34.50	57,800	34.23	57,000
N	35.27	53,500	35.91	57,100	35.57	61,000	34.84	58,800	34.46	57,700	34.20	57,000
4	35.39	51,400	35.91	59,000	35.44	60,500	34.72	58,400	34.41	57,500	34.14	56,800
8	35.46	51,700	35.88	60,700	35.32	60,100	34.66	58,200	34.37	57,400	34.09	56,700
12	35.61	50,800	35.84	61,700	35.19	59,800	34.59	58,100	34.33	57,300	34.06	56,600

Supplemental record.--Dec. 4, 9 a.m., 31.90 ft, 7,460 cfs.

e Reverse flow, due to high American River stages, occurred 3 a.m. (27.40 ft) to 8:30 a.m. (31.75 ft).

Sacramento River at Sacramento, Calif.

Location.--Lat 38°35'10", long. 121°30'15", at I Street Bridge in Sacramento and 0.7 mile downstream from American River. Zero of gage is set 3.10 ft above datum of Corps of Engineers. Auxiliary gage 0.2 mile upstream from Snodgrass Slough and 20 miles downstream from base gage.

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

Discharge record.--Above 30,000 cfs, stage-discharge relation defined by current-meter measurements. Below about 30,000 cfs, gage is in tidal range and discharge is computed by tidal-slope method.

Maxima.--November-December 1950: Discharge, 104,000 cfs 10 a.m. to noon Nov. 21; gage height, 30.14 ft 12 m. Nov. 21.
1893 to October 1950: Discharge recorded, 103,000 cfs Jan. 17, 1909 (gage height, 29.6 ft).

Remarks.--Flood flow partly regulated by Sacramento weir and storage in numerous reservoirs above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	27,500	33,200	9	12,300	88,400	17	16,200	77,400	25	66,200	61,000
2	24,500	31,300	10	12,400	78,600	18	36,100	74,200	26	62,000	58,200
3	20,300	35,300	11	12,100	74,300	19	90,000	72,100	27	55,200	54,300
4	18,300	89,400	12	12,200	73,800	20	86,200	70,400	28	47,200	50,100
5	17,300	86,900	13	12,300	72,900	21	99,400	68,700	29	40,200	46,200
6	15,400	79,200	14	12,300	74,200	22	82,700	67,300	30	35,800	42,800
7	13,600	86,200	15	12,800	84,500	23	73,900	65,800	31		40,700
8	12,600	88,900	16	13,900	81,400	24	69,500	63,800			
Monthly mean discharge, in cfs										37,010	66,820
Runoff, in acre-feet										2,202,000	4,109,000
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					23.60	76,900	26.21	87,300	28.06	95,000	26.74	89,600
4					25.32	83,700	25.89	86,000	28.77	98,000	26.28	87,700
6					27.00	90,500	25.59	84,800	29.39	101,000	25.87	86,000
8					27.82	93,000	25.37	83,900	29.80	102,000	25.48	84,400
10					28.10	95,000	25.31	83,600	30.11	104,000	25.15	83,100
N					28.33	96,000	25.40	84,000	30.14	104,000	24.85	81,900
2			10.74	33,800	28.18	95,400	25.68	85,100	30.05	103,000	24.56	80,800
4			12.38	38,500	28.00	94,600	26.06	86,600	29.70	102,000	24.37	80,000
6			14.32	44,400	27.71	93,400	26.22	87,300	29.30	100,000	24.15	79,100
8			16.47	51,400	27.38	92,100	26.13	86,900	28.65	97,500	23.96	78,400
10			18.76	59,100	27.00	90,500	26.52	88,500	27.99	94,700	23.76	77,600
12			21.35	68,400	26.60	88,900	27.24	91,500	27.30	91,800	23.58	76,900
	November 23		November 24		November 25		November 29		November 30		December 1	
4	23.27	75,800	21.90	70,600	20.98	67,200	13.52	42,100	11.77	36,900	10.62	33,600
8	23.00	74,800	21.75	70,000	20.82	66,600	13.17	41,100	11.49	36,100	10.46	33,100
N	22.75	73,800	21.59	69,400	20.70	66,200	12.85	40,100	11.40	35,900	10.51	33,300
4	22.53	73,000	21.43	68,800	20.56	65,700	12.50	39,100	11.21	35,300	10.49	33,200
8	22.31	72,100	21.31	68,400	20.41	65,100	12.28	38,400	11.04	34,800	10.34	32,800
12	22.10	71,300	21.15	67,800	20.23	64,400	12.06	37,800	10.87	34,300	10.28	32,600
	December 2		December 3		December 4		December 5		December 6		December 7	
2	10.20	32,400	9.53	30,600	22.60	73,400	26.96	90,700	24.72	81,700	23.80	78,000
4	10.03	31,900	9.51	30,500	24.75	81,800	26.79	90,000	24.58	81,100	24.12	79,300
6	9.89	31,500	9.47	30,400	26.70	89,600	26.58	89,200	24.41	80,400	24.61	81,200
8	9.74	31,100	9.47	30,400	27.78	94,100	26.39	88,400	24.26	79,800	25.25	83,800
10	9.71	31,000	9.55	30,600	28.14	95,600	26.19	87,600	24.13	79,300	26.00	86,800
N	9.75	31,200	9.77	31,200	28.05	95,200	26.02	86,800	24.00	78,800	26.61	89,300
2	9.80	31,300	10.05	32,000	27.85	94,400	25.85	86,200	23.88	78,300	27.06	91,200
4	9.73	31,100	10.35	32,800	27.68	93,700	25.68	85,500	23.82	78,100	26.99	90,900
6	9.64	30,900	11.93	34,500	27.58	93,200	25.47	84,600	23.78	77,900	26.97	90,800
8	9.57	30,700	13.30	41,500	27.45	92,700	25.28	83,900	23.69	77,600	26.83	90,200
10	9.52	30,600	16.70	52,400	27.31	92,100	25.10	83,200	23.63	77,400	26.64	89,400
12	9.54	30,600	19.95	63,500	27.17	91,600	24.89	82,300	23.67	77,500	26.39	88,400
	December 8		December 9		December 10		December 11		December 12		December 13	
4	26.00	86,800	27.46	92,800	24.40	80,400	23.01	75,100	22.68	73,800	22.56	73,400
8	26.00	86,800	27.07	91,200	24.16	79,500	22.86	74,500	22.64	73,700	22.45	73,000
N	26.16	87,500	26.43	88,600	23.88	78,400	22.71	74,000	22.66	73,800	22.40	72,800
4	26.80	90,100	25.81	86,100	23.65	77,500	22.62	73,600	22.67	73,800	22.33	72,600
8	27.12	91,400	25.30	84,000	23.45	76,700	22.69	73,900	22.70	73,900	22.29	72,400
12	27.50	93,000	24.80	82,000	23.23	75,900	22.70	73,900	22.67	73,800	22.25	72,200

Feather River basin

North Fork Feather River at Big Bar, Calif.

Location.--Lat 39°48', long. 121°27', in NE¼ sec. 6, T. 22 N., R. 5 E., between railroad and highway bridges, 0.2 mile downstream from Big Bar and 6 miles upstream from intake of power plant at Big Bend. Altitude of gage, about 1,320 ft (from topographic map).

Drainage area.--1,945 sq mi.

Gage-height record.--Water-stage recorder graph except for Nov. 1-3, 11-13, 20-23, and Dec. 11-18. Doubtful gage-height record Nov. 4-6.

Discharge record.--Stage-discharge relation defined by current-meter measurements. Discharge for periods of doubtful or no gage-height record computed on basis of power-house records and records for upstream and downstream stations.

Maxima.--November-December 1950: Discharge, 25,700 cfs 6 p.m. Nov. 20 (gage height, 17.89 ft).

1911-37, 1939 to October 1950: Discharge, 66,900 cfs Dec. 11, 1937 (gage height, 29.7 ft at present site, from floodmarks), from rating curve extended above 34,000 cfs by logarithmic plotting.

Remarks.--Flow regulated by Lake Almanor, Bucks Creek Reservoir, Butt Valley Reservoir, power plants, and diversions.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	2,670	3,510	9	1,630	11,500	17	7,380	10,900	25	4,500	5,130
2	2,600	3,390	10	2,220	8,440	18	11,500	8,700	26	3,620	5,220
3	2,370	6,900	11	1,980	7,700	19	8,720	8,460	27	3,620	4,220
4	1,310	13,500	12	2,190	7,250	20	18,000	8,120	28	3,730	4,350
5	765	10,700	13	2,430	6,200	21	14,200	7,360	29	3,430	4,590
6	1,270	8,900	14	2,210	9,320	22	8,720	6,520	30	3,560	4,430
7	1,550	9,980	15	2,660	10,400	23	6,900	5,530	31		3,950
8	1,970	12,600	16	4,520	11,500	24	5,590	5,450			
Monthly mean discharge, in cfs										4,594	7,572
Runoff, in acre-feet										273,400	465,600
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	
2												
4												
6												
8												
10												
N												
2												
4												
6												
8												
10												
12												
	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												

Feather River near Oroville, Calif.

Location.--Lat 39°32', long. 121°29', in NE¼ sec. 2, T. 19 N., R. 4 E., 75 ft upstream from bridge on Feather River Highway, 2 miles downstream from confluence of North and Middle Forks, and 3 miles northeast of Oroville. Datum of gage is 182.02 ft above mean sea level, datum of 1929.

Drainage area.--3,611 sq mi.

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

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

Maxima.--November-December 1950: Discharge, 92,100 cfs 5 a.m. Nov. 21 (gage height, 54.80 ft).

1902-34 at Oroville: Discharge observed, 230,000 cfs Mar. 19, 1907 (gage height, 28.2 ft, reading on U. S. Weather Bureau staff gage at bridge, probably had been higher during night).

1934 to October 1950 near Oroville: Discharge, 185,000 cfs Dec. 11, 1937 (gage height, 73.6 ft, from floodmarks), from rating curve extended above 62,000 cfs on basis of velocity-area studies and verified by slope-area determination.

Remarks.--Flow partly regulated by power plants, Lake Almanor, Bucks Lake, Butt Valley Reservoir and smaller reservoirs.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	4,290	6,930	9	2,290	33,500	17	13,400	19,300	25	10,700	8,840
2	3,910	6,350	10	2,550	22,400	18	30,000	17,800	26	9,320	9,190
3	3,620	23,500	11	2,640	20,700	19	32,500	15,600	27	7,350	7,820
4	3,090	39,400	12	2,750	18,700	20	51,600	14,200	28	7,470	7,580
5	2,060	24,100	13	3,030	15,600	21	67,100	13,000	29	6,740	7,500
6	2,120	21,200	14	2,950	26,000	22	30,500	11,700	30	6,880	7,380
7	2,540	26,400	15	3,300	28,000	23	19,300	10,500	31		6,840
8	2,550	32,900	16	8,080	23,600	24	13,700	9,570			
Monthly mean discharge, in cfs										11,940	17,290
Runoff, in acre-feet										710,700	1,063,000
Runoff, in inches										3.69	5.52

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	19.92	11,100	31.16	24,500	42.10	46,200	23.07	21,600	54.34	90,000	39.07	38,600
4	20.05	11,200	32.00	25,800	41.51	44,600	30.23	23,200	54.53	90,900	37.48	35,300
6	20.07	11,200	32.36	26,300	40.42	41,800	32.40	26,400	54.40	90,300	36.79	33,900
8	19.98	11,100	33.08	27,400	38.39	37,100	35.39	31,300	52.55	82,200	35.80	32,000
10	19.45	10,600	33.63	28,300	36.60	33,500	42.50	47,300	50.40	73,600	35.60	31,700
N	19.37	10,500	34.00	28,900	34.87	30,400	46.30	58,900	48.00	64,500	34.71	30,100
2	20.43	11,600	34.24	29,300	33.47	28,100	47.30	62,100	46.33	59,000	33.84	28,600
4	22.73	14,000	34.50	29,800	32.07	25,900	47.95	64,300	44.75	54,000	33.02	27,300
6	24.76	16,200	35.73	31,900	31.06	24,400	49.40	69,600	43.16	49,200	32.43	26,400
8	26.30	18,100	37.61	35,500	29.89	22,700	51.15	76,600	41.84	45,500	31.80	25,500
10	27.34	19,300	39.66	39,900	29.47	22,200	52.90	83,600	40.54	42,000	31.22	24,600
12	28.60	21,000	41.20	43,700	29.06	21,800	53.40	85,800	39.82	40,300	30.56	23,700
	December 2		December 3		December 4		December 5		December 6		December 7	
2	15.16	6,950	16.26	7,830	44.05	51,800	33.30	27,800	28.42	20,700	33.20	27,600
4	15.14	6,930	17.21	8,590	43.37	49,800	32.55	26,600	27.90	20,100	34.18	29,200
6	14.80	6,660	18.62	9,860	42.26	46,600	31.60	25,200	27.65	19,700	34.20	29,200
8	14.02	6,080	21.28	12,400	41.22	43,800	31.00	24,300	26.98	18,900	33.48	28,100
10	13.46	5,690	22.84	14,100	40.07	40,900	30.15	23,100	26.62	18,400	32.68	26,800
N	12.92	5,310	26.68	18,500	38.76	37,900	30.40	23,500	26.73	18,600	32.10	26,000
2	12.60	5,100	31.07	24,400	37.74	35,800	30.36	23,400	27.30	19,300	31.42	24,900
4	13.52	5,730	35.89	32,200	36.92	34,100	30.28	23,300	28.45	20,800	31.15	24,500
6	14.90	6,740	39.04	38,500	36.13	32,600	30.04	23,000	30.40	23,500	31.10	24,400
8	15.01	6,830	40.84	42,800	35.16	30,900	29.78	22,600	31.12	24,500	31.22	24,600
10	15.24	7,010	41.56	44,700	34.70	30,100	28.85	21,300	32.08	25,900	31.47	25,000
12	15.54	7,250	42.75	48,000	33.92	28,800	28.75	21,200	32.93	27,200	31.82	25,500
	December 8		December 9		December 10		December 11		December 12		December 13	
2	32.28	26,200	41.47	44,500	31.70	25,400	26.90	18,800	27.85	20,000	24.72	16,200
4	33.37	27,900	40.07	40,900	30.35	23,400	25.35	16,900	27.00	18,900	23.20	14,500
6	33.51	28,100	37.87	36,000	30.05	23,000	26.50	18,300	25.75	17,400	23.75	15,100
8	34.33	29,500	37.65	35,600	29.85	22,700	27.35	19,400	26.64	18,500	24.70	16,200
10	34.25	29,300	36.70	33,700	30.22	23,200	28.00	20,200	27.80	19,900	24.70	16,200
N	34.48	29,700	36.13	32,600	29.60	22,300	29.90	22,800	27.50	19,600	25.45	17,000
2	35.35	31,200	35.16	30,900	30.07	23,000	30.15	23,100	27.45	19,500	25.60	17,200
4	36.85	34,000	33.30	27,800	29.10	21,600	30.38	23,400	26.17	17,900	23.70	15,100
6	38.28	36,900	33.22	27,700	27.65	19,700	29.55	22,300	26.16	17,900	23.60	15,000
8	40.10	41,000	33.60	28,300	28.43	20,800	29.10	21,600	26.24	18,000	23.18	14,500
10	41.82	45,400	33.50	28,100	29.00	21,500	28.60	21,000	26.10	17,800	23.20	14,500
12	41.94	45,700	31.52	25,100	28.30	20,600	28.53	20,900	25.80	17,500	23.55	14,900

Supplemental record.--Nov. 21, 3 a.m., 54.70 ft, 91,600 cfs, 5 a.m., 54.80 ft, 92,100 cfs; Dec. 7, 5 a.m., 34.38 ft, 29,500 cfs; Dec. 8, 11 p.m., 42.08 ft, 46,100 cfs; Dec. 10, 9 p.m., 28.17 ft, 20,400 cfs; Dec. 11, 5 a.m., 25.10 ft, 16,600 cfs, 1 p.m., 30.36 ft, 23,400 cfs, 3 p.m., 29.85 ft, 22,700 cfs; Dec. 12, 11 a.m., 26.90 ft, 18,800 cfs, 1 p.m., 28.17 ft, 20,400 cfs; Dec. 13, 5 a.m., 22.50 ft, 13,800 cfs, 1 p.m., 25.83 ft, 17,500 cfs.

Feather River at Nicolaus, Calif.

Location.--Lat 38°54'00", long. 121°35'05", at Nicolaus, Sutter County, 0.4 mile downstream from highway bridge. Zero of gage is set to datum of Corps of Engineers.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 110,000 cfs and extended to peak stage. Discharge for periods of backwater from Sacramento River and Sutter bypass, Dec. 19-31, computed on basis of flood routing studies. Shifting-control method used Nov. 1-16.

Maxima.--November-December 1950: Discharge, 145,000 cfs 7 p.m. Nov. 21 (gage height, 47.80 ft).
1943 to October 1950: Discharge, 94,000 cfs Dec. 30, 1945 (gage height, 45.23 ft).

Remarks.--Flow partly regulated by reservoirs, many diversions, and power plants. See "Remarks" for Feather River near Oroville.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	7,640	13,900	9	3,790	90,600	17	8,620	50,800	25	31,400	15,600
2	5,410	13,600	10	3,570	77,800	18	17,600	37,800	26	24,600	14,100
3	4,710	16,500	11	3,420	53,300	19	54,200	32,500	27	20,500	13,300
4	4,430	57,400	12	3,610	43,100	20	79,400	28,600	28	17,100	12,700
5	4,420	79,600	13	3,610	36,600	21	129,000	25,000	29	15,700	12,300
6	3,790	54,300	14	3,930	34,800	22	116,000	22,400	30	14,400	12,000
7	3,520	52,000	15	4,140	56,400	23	76,900	19,700	31		11,500
8	3,740	69,600	16	4,330	68,000	24	47,000	17,300			
Monthly mean discharge, in cfs										24,020	36,870
Runoff, in acre-feet										1,429,000	2,267,000
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	25.56	5,440	29.33	11,600	38.33	31,000	43.97	80,100	45.51	102,000	47.36	135,000
4	25.81	5,820	29.49	11,800	39.16	34,000	43.89	79,000	46.01	110,000	47.19	132,000
6	26.24	6,480	29.66	12,100	39.87	37,300	43.82	78,000	46.45	118,000	47.08	130,000
8	26.76	7,320	29.95	12,600	40.59	41,700	43.71	76,400	46.78	124,000	46.85	125,000
10	27.39	8,320	30.52	13,600	41.28	47,300	48.65	75,600	47.12	131,000	46.63	121,000
N	27.93	9,190	31.49	15,400	41.93	53,800	43.61	75,000	47.32	135,000	46.38	117,000
2	28.28	9,780	32.93	18,200	42.50	60,500	43.63	75,300	47.45	137,000	46.14	112,000
4	28.59	10,300	34.24	20,800	42.94	66,200	43.70	76,300	47.82	141,000	45.80	107,000
6	28.79	10,600	35.31	23,000	43.32	71,200	43.90	79,100	47.77	144,000	45.55	103,000
8	28.94	10,900	36.19	25,000	43.66	75,700	44.20	83,300	47.75	144,000	45.32	99,600
10	29.09	11,200	36.90	26,800	43.92	78,000	44.55	88,200	47.69	142,000	45.05	95,600
12	29.19	11,300	37.62	28,700	43.90	79,100	44.95	94,000	47.57	140,000	44.74	90,900
	November 23		November 24		November 25		November 29		November 30		December 1	
4	44.40	86,100	41.94	53,900	39.09	33,700	31.94	16,200	31.11	14,700	30.71	14,000
8	44.05	81,200	41.47	49,100	39.23	34,300	31.73	15,800	30.89	14,300	30.63	13,800
N	43.69	76,200	40.98	44,700	38.32	30,900	31.61	15,600	30.82	14,200	30.65	13,900
4	43.27	70,500	40.52	41,200	37.94	29,700	31.54	15,500	30.83	14,200	30.69	13,900
8	42.84	64,900	40.06	38,300	37.55	28,500	31.44	15,300	30.85	14,200	30.69	13,900
12	43.56	74,300	39.57	35,800	37.16	27,400	31.32	15,100	30.82	14,200	30.69	13,900
	December 2		December 3		December 4		December 5		December 6		December 7	
2	30.65	13,900	30.38	13,400	37.85	29,400	44.44	86,700	42.80	64,400	41.03	45,100
4	30.60	13,800	30.28	13,200	38.83	32,700	44.42	86,400	42.62	62,100	41.03	45,100
6	30.55	13,700	30.22	13,100	39.75	36,700	44.33	85,100	42.41	59,400	41.10	45,700
8	30.48	13,600	30.20	13,100	40.64	42,100	44.25	84,000	42.24	57,400	41.20	46,600
10	30.46	13,500	30.28	13,200	41.45	48,900	44.13	82,300	42.11	55,800	41.37	48,200
N	30.47	13,500	30.61	13,800	42.24	57,400	44.03	80,900	41.91	53,600	41.55	49,900
2	30.48	13,600	31.25	15,000	42.92	66,000	43.81	79,200	41.71	51,500	41.81	52,500
4	30.49	13,600	32.29	16,800	43.44	72,700	43.77	77,300	41.58	50,200	42.06	55,300
6	30.50	13,600	33.60	19,500	43.83	78,100	43.60	74,000	41.40	48,400	42.27	57,700
8	30.50	13,600	34.86	22,000	44.13	82,300	43.42	72,500	41.27	47,200	42.48	60,300
10	30.49	13,600	36.90	24,300	44.37	85,700	43.22	69,900	41.13	46,000	42.66	62,600
12	30.48	13,500	36.86	26,600	44.40	86,100	42.97	66,600	41.06	45,400	42.79	64,300
	December 8		December 9		December 10		December 11		December 12		December 13	
4	42.95	66,400	44.37	85,700	44.45	86,800	42.42	59,500	41.00	44,900	40.25	34,500
8	43.04	67,500	44.69	90,200	44.19	83,200	42.11	55,800	40.86	43,700	40.08	38,400
N	43.10	68,300	44.98	94,500	43.80	77,700	41.79	52,300	40.75	43,000	39.88	37,400
4	43.22	69,900	44.98	94,500	43.47	73,100	41.51	49,500	40.67	42,300	39.67	36,300
8	43.53	73,900	44.92	93,600	43.12	68,600	41.32	47,700	40.56	41,500	39.48	35,400
12	43.90	79,100	44.70	90,300	42.78	64,100	41.13	46,000	40.42	40,500	39.29	34,600

West Branch Feather River near Yankee Hill, Calif.

Location.--Lat 39°42', long. 121°34', in SW¼ sec. 5, T. 21 N., R. 4 E., at highway bridge, 1.4 miles downstream from Concow Creek and 2 miles west of Yankee Hill. Altitude of gage, about 1,100 ft (from topographic map).

Drainage area.--145 sq mi.

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

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

Maxima.--November-December 1950: Discharge, 8,840 cfs 7 p.m. Nov. 20 (gage height, 17.93 ft).
1930 to October 1950: Discharge, 21,400 cfs Dec. 11, 1937 (gage height, 30.3 ft), from rating curve extended above 15,000 cfs.

Remarks.--Flood flow not materially affected by storage totaling 14,160 acre-ft or diversions above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	259	462	9	84	2,940	17	2,270	1,120	25	677	414
2	209	385	10	87	1,600	18	3,850	934	26	564	390
3	187	3,380	11	69	1,600	19	2,490	803	27	523	356
4	158	3,340	12	67	1,280	20	6,100	691	28	482	329
5	130	1,500	13	105	1,020	21	4,800	606	29	397	314
6	107	1,570	14	124	2,890	22	1,780	540	30	469	309
7	96	2,220	15	116	2,220	23	1,120	485	31		271
8	90	3,150	16	1,410	1,450	24	838	442			
Monthly mean discharge, in cfs										989	1,258
Runoff, in acre-feet										58,830	77,380
Runoff, in inches										7.61	10.01

Middle Fork Feather River at Bidwell Bar, Calif.

Location.--Lat 39°33', long. 121°26', in NW¼ sec. 32, T. 20 N., R. 5 E., at highway bridge at Bidwell Bar, 2 miles upstream from confluence with North Fork and 7 miles northeast of Oroville. Altitude of gage, about 290 ft (from topographic map).

Drainage area.--1,353 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 26,000 cfs and extended to peak stage on basis of velocity-area and A$\sqrt{d}$ studies.

Maxima.--November-December 1950: Discharge, 50,200 cfs 3 a.m. Nov. 21 (gage height, 18.25 ft).
1911 to October 1950: Discharge, 93,000 cfs Dec. 11, 1937 (gage height, 24.0 ft, from floodmarks), from rating curve extended above 25,000 cfs on basis of velocity-area and A$\sqrt{d}$ studies.

Remarks.--Flood flow not affected by small reservoirs and diversions above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	1,090	2,470	9	519	15,900	17	4,440	7,710	25	4,690	2,960
2	875	2,120	10	480	10,500	18	15,400	6,520	26	3,740	2,760
3	775	11,900	11	455	9,440	19	16,200	5,660	27	3,120	2,560
4	750	18,300	12	441	8,010	20	27,500	4,940	28	2,700	2,390
5	686	10,400	13	473	6,570	21	32,300	4,380	29	2,390	2,280
6	635	9,930	14	531	11,000	22	12,800	3,930	30	2,380	2,230
7	592	12,700	15	555	12,100	23	8,650	3,480	31		2,150
8	555	16,100	16	1,840	9,160	24	6,130	3,190			
Monthly mean discharge, in cfs										5,123	7,217
Runoff, in acre-feet										304,800	443,800
Runoff, in inches										4.22	6.15

South Fork Feather River at Enterprise, Calif.

Location (revised).--Lat 39°32'15", long. 121°20'45", in NW¼ sec. 6, T. 19 N., R. 6 E., 0.5 mile upstream from McCabe Creek and 1 mile upstream from highway bridge at Enterprise. Altitude of gage, about 640 ft (from topographic map).

Drainage area.--134 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 4,000 cfs and extended to peak stage on basis of computed flow over dam.

Maxima.--November-December 1950: Discharge, 9,580 cfs 9 p.m. Nov. 19 (gage height, 15.9 ft).
1911 to October 1950: Discharge, 17,300 cfs Dec. 10, 1937 (gage height, 20.4 ft), from rating curve extended above 5,000 cfs on basis of velocity-area studies.

Remarks.--Flood flow slightly affected by storage and diversions above station for irrigation. (See records for Palermo Canal on this page.)

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	137	428	9	62	2,820	17	574	1,360	25	721	512
2	111	361	10	56	1,820	18	2,750	1,120	26	591	473
3	93	2,870	11	44	1,700	19	2,360	978	27	506	434
4	85	3,050	12	42	1,360	20	6,030	840	28	448	400
5	82	1,780	13	50	1,080	21	5,470	742	29	390	379
6	78	1,740	14	58	2,130	22	2,200	654	30	400	371
7	70	2,440	15	60	2,340	23	1,320	597	31		345
8	67	3,340	16	333	1,730	24	930	546			
Monthly mean discharge, in cfs										871	1,310
Runoff, in acre-feet										51,800	80,810
Runoff, in inches										7.25	11.31

Palermo Canal at Enterprise, Calif.

Location.--Parshall flume, lat 39°32'05", long. 121°20'40", in NW¼ sec. 6, T. 19 N., R. 6 E., 400 ft downstream from intake at diversion dam on South Fork Feather River, 0.6 mile upstream from McCabe Creek and 1 mile east of highway bridge at Enterprise. Altitude of gage, about 650 ft (from topographic map).

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

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

Maxima.--November-December 1950: Daily discharge, 11 cfs Nov. 4, 5, 7, 8.
1911 to October 1950: Discharge recorded, 43 cfs July 25, 1927.

Remarks.--Canal diverts from left bank of South Fork Feather River 1 mile above Enterprise. Water is used for irrigation near Oroville.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	9.6	5.3	9	10	2.4	17	5.2	3.7	25	5.5	3.7
2	10	5.3	10	10	3.1	18	5.2	3.7	26	5.3	3.7
3	10	5.0	11	10	3.8	19	2.2	3.7	27	5.9	3.7
4	11	2.8	12	10	3.8	20	1.6	3.7	28	6.6	3.7
5	11	2.3	13	10	3.8	21	1.3	3.5	29	6.1	3.7
6	9.4	2.3	14	10	3.8	22	3.7	3.5	30	5.5	3.7
7	11	2.4	15	10	3.8	23	5.9	3.5	31		3.7
8	11	2.4	16	5.5	3.8	24	5.7	3.7			
Monthly mean discharge, in cfs										7.47	3.58
Runoff, in acre-feet										445	220
Runoff, in inches										-	-

Middle Yuba River at Milton, Calif.

Location.--Concrete spillway control, lat 39°31'22", long. 120°35'01", in SW¼ sec. 12, T. 19 N., R. 12 E., at diversion dam of Nevada Irrigation District, at old town site of Milton, 8 miles upstream from South Fork of Middle Yuba River.

Drainage area.--41 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measuremnets below 1,500 cfs and extended to peak stage.

Maxima.--November-December 1950: Discharge, 6,300 cfs 6 p.m. Nov. 20 (gage height, 4.00 ft).
1925-34, 1935 to October 1950: Discharge, 6,800 cfs Dec. 11, 1937 (gage height, 4.18 ft), from rating curve extended above 1,500 cfs by weir formula.

Remarks.--Milton-Bowman tunnel diverts above station to Bowman Lake.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	0	42	9	0	617	17	1.6	207	25	146	42
2	0	33	10	0	342	18	1,910	156	26	110	34
3	0	2,060	11	0	340	19	1,480	143	27	88	22
4	0	900	12	0	262	20	4,450	121	28	73	16
5	0	372	13	0	196	21	2,360	99	29	52	11
6	0	709	14	0	726	22	543	78	30	54	9.0
7	0	1,020	15	0	450	23	300	63	31		2.4
8	0	1,490	16	0	277	24	203	54			
Monthly mean discharge, in cfs										392	351
Runoff, in acre-feet										23,350	21,610
Runoff, in inches										10.68	9.88

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		0	0.74	388	2.37	2,690	1.58	1,390	3.48	5,030	1.10	750
4		0	.95	588	2.16	2,310	1.92	1,910	3.35	4,720	1.03	673
6		0	1.14	798	1.92	1,910	2.50	2,930	2.68	3,280	.98	619
8		0	1.33	1,040	1.71	1,580	2.98	3,900	2.33	2,610	.94	577
10		0	1.50	1,270	1.52	1,300	3.39	4,820	2.00	2,040	.91	546
N		0	1.76	1,660	1.40	1,130	3.56	5,220	1.80	1,720	.88	516
2		0	2.15	2,300	1.34	1,050	3.78	5,750	1.65	1,500	.87	506
4		0	2.48	2,890	1.30	1,000	3.98	6,250	1.53	1,320	.84	478
6		0	2.71	3,340	1.25	935	4.00	6,300	1.42	1,160	.80	440
8		0	2.82	3,560	1.20	870	3.96	6,200	1.33	1,040	.77	414
10		0	2.78	3,480	1.23	909	3.76	5,700	1.25	935	.74	388
12	0.28	78	2.62	3,160	1.37	1,090	3.53	5,150	1.18	846	.73	380
	November 23		November 24		November 25		November 29		November 30		December 1	
4												
8												
N	0.62	292	0.49	201	0.40	143	0.22	50	0.23	54	0.19	38
4												
8												
12	.54	235	.45	175	.36	121	.22	50	.24	58	.18	34
	December 2		December 3		December 4		December 5		December 6		December 7	
2			0.32	99	1.69	1,560	0.80	440	0.63	300	1.83	1,770
4	0.18	34	.50	207	1.50	1,270	.79	431	.62	292	1.66	1,510
6			.80	440	1.35	1,060	.77	414	.63	300	1.41	1,140
8	.18	34	1.16	822	1.27	961	.74	388	.71	363	1.27	961
10			1.76	1,660	1.18	846	.73	380	.73	380	1.16	822
N	.18	34	2.41	2,760	1.13	786	.72	371	.88	516	1.07	717
2			2.96	3,860	1.09	739	.70	354	1.00	640	1.04	684
4	.17	30	3.14	4,250	1.05	695	.68	339	1.14	798	1.07	717
6			3.04	4,030	.98	619	.66	323	1.37	1,090	1.15	810
8	.15	22	2.69	3,300	.94	577	.65	316	1.51	1,280	1.17	834
10			2.20	2,380	.89	526	.65	316	1.66	1,510	1.18	846
12	.24	58	1.87	1,830	.85	488	.64	308	1.84	1,780	1.28	974
	December 8		December 9		December 10		December 11		December 12		December 13	
4	1.53	1,320	1.12	774	0.73	380	0.62	292			0.49	201
8	1.79	1,700	1.02	662	.71	363	.65	316			.48	194
N	1.96	1,980	.95	588	.68	339	.76	406	0.57	256	.48	194
4	1.72	1,800	.88	516	.65	316	.72	371			.46	181
8	1.54	1,330	.82	459	.62	292	.69	346			.43	162
12	1.28	974	.79	431	.62	292	.67	331	.50	207	.60	277

Supplemental record.--Nov. 17, 11 p.m., no flow; Nov. 20, 7 p.m., 3.93 ft, 6,120 cfs; Dec. 8, 10 a.m., 1.94 ft, 1,940 cfs.

Middle Yuba River above Oregon Creek, Calif.

Location.--Lat 39°23', long. 121°05', in SE¼ sec. 28, T. 18 N., R. 8 E., 500 ft upstream from Oregon Creek and 2 miles northeast of North San Juan. Altitude of gage, about 1,450 ft (from topographic map).

Drainage area.--170 sq mi.

Gage-height record.--Water-stage recorder graph. Gage-height record doubtful Dec. 21-31.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 8,200 cfs and extended to peak stage on basis of slope-area determination. Discharge for period of doubtful gage-height record computed on basis of gage-height record and records for North Yuba River below Goodyears Bar.

Maxima.--November-December 1950: Discharge, 19,500 cfs 1 a.m. Nov. 21 (gage height, 15.25 ft).
1941 to October 1950: Discharge, 14,200 cfs Jan. 21, 1943 (gage height, 12.83 ft), from rating curve extended above 6,000 cfs by logarithmic plotting.

Remarks.--Milton-Bowman tunnel (see p.696), above station, has diverted to Bowman Lake since 1928; also small diversions above station. Flood flow not materially affected.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	109	404	9	55	3,620	17	515	1,600	25	815	550
2	90	364	10	53	2,150	18	6,820	1,220	26	653	515
3	83	5,600	11	52	1,750	19	5,920	1,020	27	547	407
4	77	5,000	12	52	1,540	20	11,800	880	28	494	431
5	70	2,700	13	59	1,170	21	10,600	795	29	443	406
6	64	2,570	14	78	2,630	22	2,810	706	30	417	403
7	61	4,390	15	77	3,180	23	1,590	636	31		376
8	58	6,010	16	290	2,180	24	1,060	592			
Monthly mean discharge, in cfs										1,527	1,802
Runoff, in acre-feet										90,870	110,800
Runoff, in inches										10.02	12.22

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	3.79	391	6.44	1,920	11.86	11,000	7.55	3,120	14.94	18,600	8.22	3,770
4	3.73	372	7.30	2,820	11.23	9,570	7.97	3,650	14.49	17,300	7.97	3,460
6	3.70	362	7.71	3,310	10.48	7,970	9.08	5,340	14.04	16,000	7.79	3,250
8	3.70	362	8.28	4,070	9.86	6,730	10.18	7,360	13.39	14,200	7.60	3,020
10	3.77	384	8.83	4,930	9.33	5,760	11.88	11,000	12.42	11,700	7.45	2,860
N	3.84	408	9.26	5,640	8.81	4,900	13.08	13,900	11.42	9,360	7.32	2,710
2	3.97	453	9.98	6,960	8.34	4,160	13.73	15,500	10.47	7,340	7.18	2,560
4	4.08	493	11.28	9,680	8.02	3,720	14.22	16,800	9.94	6,310	7.05	2,420
6	4.33	590	12.05	11,400	7.78	3,400	14.45	17,400	9.47	5,510	6.95	2,300
8	4.68	737	12.52	12,500	7.63	3,220	14.57	17,700	9.12	4,980	6.86	2,210
10	4.93	855	12.33	12,100	7.54	3,110	14.75	18,200	8.77	4,490	6.76	2,110
12	5.43	1,140	12.28	12,000	7.51	3,070	15.17	19,300	8.47	4,090	6.67	2,020
	November 23		November 24		November 25		November 29		November 30		December 1	
4	6.49	1,840	5.68	1,180	5.18	864	4.23	460	4.10	418	4.10	418
8	6.32	1,690	5.58	1,110	5.13	836	4.21	453	4.10	418	4.11	421
N	6.18	1,560	5.49	1,040	5.10	820	4.18	444	4.10	418	4.08	412
4	6.04	1,450	5.41	996	5.05	795	4.15	434	4.09	415	4.03	397
8	5.90	1,340	5.33	948	4.98	760	4.12	424	4.09	415	3.99	385
12	5.78	1,250	5.25	902	4.92	730	4.10	418	4.09	415	3.94	370
	December 2		December 3		December 4		December 5		December 6		December 7	
2	3.94	370	4.24	464	11.12	8,700	7.73	3,180	6.86	2,210	9.35	5,320
4	3.94	370	4.50	554	10.18	6,760	7.63	3,060	6.80	2,150	9.54	5,620
6	3.93	367	5.00	770	9.53	5,610	7.55	2,960	6.75	2,100	9.55	5,640
8	3.92	364	5.62	1,130	9.06	4,890	7.47	2,880	6.73	2,080	9.24	5,160
10	3.91	361	6.85	2,200	8.63	4,300	7.36	2,760	6.73	2,080	8.80	4,530
N	3.90	358	8.35	3,940	8.30	3,870	7.27	2,660	6.78	2,130	8.34	3,920
2	3.89	355	9.90	6,240	8.47	4,090	7.18	2,560	6.93	2,280	8.05	3,560
4	3.88	352	11.70	10,000	8.42	4,030	7.12	2,490	7.09	2,460	8.00	3,500
6	3.87	350	12.60	12,200	8.25	3,800	7.06	2,430	7.45	2,860	7.98	3,480
8	3.89	355	12.70	12,400	8.05	3,560	7.00	2,360	7.76	3,210	8.17	3,700
10	3.96	376	12.43	11,800	7.93	3,420	6.94	2,290	8.28	3,840	8.38	3,970
12	4.06	406	11.90	10,500	7.85	3,320	6.88	2,230	8.85	4,600	8.40	4,000
	December 8		December 9		December 10		December 11		December 12		December 13	
4	8.48	4,100	8.77	4,490	7.12	2,490	6.28	1,650	6.34	1,710	5.80	1,260
8	9.72	5,920	8.30	3,870	6.91	2,260	6.33	1,700	6.23	1,610	5.72	1,200
N	10.62	7,640	7.93	3,420	6.78	2,130	6.38	1,740	6.14	1,530	5.66	1,160
4	10.43	7,260	7.70	3,140	6.62	1,970	6.45	1,800	6.04	1,450	5.60	1,120
8	10.05	6,510	7.44	2,840	6.52	1,870	6.48	1,830	5.95	1,380	5.54	1,080
12	9.33	5,300	7.25	2,640	6.39	1,750	6.40	1,760	5.86	1,310	5.62	1,130

Supplemental record.--Nov. 21, 1 a.m., 15.25 ft, 19,500 cfs; Dec. 8, 10:30 a.m., 10.73 ft, 7,860 cfs.

Yuba River at Narrows Dam, Calif.

Location.--Above spillway of Narrows Dam, flow meter in penstock and wattmeters in powerhouse just below dam, lat 39°14', long. 121°16', in SW¼ sec. 14, T. 16 N., R. 6 E., 1 mile upstream from Deer Creek and 2.5 miles northeast of Smartville. Datum of gage is 526.99 ft above mean sea level (levels by Corps of Engineers).

Drainage area.--1,110 sq mi.

Gage-height record.--Water-stage recorder graph for spill over dam and powerhouse log for flow through powerhouse.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 25,000 cfs and extended to peak stage on basis of computation of flow over spillway of dam of 80,000 cfs.

Maxima.--November-December 1950: Discharge, 109,000 cfs 1 a.m. Nov. 21, including flow through powerhouse.
1941 to October 1950: Discharge, 81,100 cfs Jan. 21, 1943, including flow through powerhouse, from rating curve extended above 25,000 cfs on basis of computation of flow over spillway of dam.

Remarks.--Flood flow partly regulated by four reservoirs (total capacity, 259,400 acre-ft), many smaller reservoirs, and diversions for power and irrigation above station. Daily discharge record includes flow through powerhouse. Discharge at indicated time is spill only.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	725	3,160	9	725	30,200	17	916	10,700	25	5,140	3,560
2	725	3,040	10	725	16,300	18	32,500	8,540	26	4,240	3,360
3	725	23,300	11	730	12,000	19	39,400	7,140	27	3,760	3,080
4	725	35,400	12	730	10,200	20	61,700	6,020	28	3,540	2,830
5	725	15,600	13	730	8,600	21	65,400	5,300	29	3,110	2,680
6	725	12,300	14	730	16,100	22	18,000	4,700	30	3,080	2,600
7	725	26,800	15	730	22,700	23	9,750	4,220	31		2,530
8	725	37,500	16	730	15,000	24	6,740	3,800			
Monthly mean discharge, in cfs										8,964	11,589
Runoff, in acre-feet										533,400	712,600
Runoff, in inches										9.01	12.04

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		0	2.40	5,840	10.80	64,900	4.76	17,100	14.66	108,000	5.99	24,600
4		0	3.58	10,900	10.28	59,700	5.18	19,600	14.31	103,000	5.65	22,400
6		0	4.82	17,500	9.71	54,300	6.27	26,500	13.66	96,000	5.38	20,800
8		0	5.65	22,400	9.03	48,200	7.69	36,800	12.61	84,300	5.16	19,500
10		0	6.55	28,400	8.35	42,300	9.32	50,800	11.53	72,600	4.95	18,200
N		0	7.00	31,500	7.48	35,100	10.74	64,300	10.28	59,700	4.55	16,000
2		0	7.24	33,300	6.72	29,500	11.75	74,900	9.16	49,300	4.33	14,800
4		0	7.43	34,700	6.15	25,700	12.66	84,900	8.05	39,700	4.19	14,000
6	0.01	8.0	8.07	39,900	5.72	22,900	13.28	91,700	7.54	35,600	4.07	13,400
8	.32	264	9.86	55,700	5.40	20,900	13.86	98,300	7.16	32,700	3.97	12,800
10	.67	786	10.89	65,800	5.05	18,800	14.39	104,000	6.70	29,400	3.86	12,300
12	1.35	2,350	11.10	68,000	4.78	17,200	14.67	108,000	6.32	26,800	3.75	11,800
	November 23		November 24		November 25		November 29		November 30		December 1	
4	3.50	10,500	2.65	6,800	2.11	4,780	1.39	2,450	1.35	2,350	1.34	2,320
8	3.30	9,550	2.53	6,330	2.05	4,560	1.37	2,400	1.35	2,350	1.36	2,380
N	3.15	8,880	2.43	5,950	2.00	4,380	1.36	2,380	1.36	2,380	1.40	2,480
4	3.00	8,200	2.35	5,650	1.96	4,240	1.32	2,270	1.38	2,430	1.42	2,540
8	2.86	7,640	2.26	5,320	1.90	4,040	1.35	2,350	1.34	2,320	1.41	2,510
12	2.75	7,200	2.18	5,030	1.85	3,870	1.34	2,320	1.32	2,270	1.39	2,450
	December 2		December 3		December 4		December 5		December 6		December 7	
2			1.45	2,620	10.23	59,200	5.05	18,800	3.59	11,000	5.95	24,400
4	1.36	2,380	1.58	3,000	9.40	51,500	4.87	17,700	3.52	10,600	6.49	27,900
6			1.84	3,840	8.41	42,800	4.70	16,800	3.45	10,200	6.75	29,800
8	1.33	2,300	2.26	5,320	7.72	37,100	4.55	16,000	3.37	9,860	6.81	30,200
10			2.92	7,880	7.19	32,900	4.41	15,200	3.34	9,730	6.72	29,500
N	1.32	2,270	3.75	11,800	6.72	29,500	4.29	14,500	3.34	9,730	6.50	28,000
2			4.70	16,800	6.42	27,400	4.18	13,900	3.38	9,910	6.23	26,200
4	1.30	2,220	6.05	25,000	6.19	25,900	4.08	13,400	3.46	10,300	6.04	25,000
6			7.65	36,500	5.74	23,000	3.96	12,800	3.74	11,700	5.85	23,700
8	1.32	2,270	10.04	57,400	5.60	22,100	3.82	12,100	4.12	13,600	5.75	23,100
10			11.00	67,000	5.51	21,600	3.73	11,600	4.72	16,900	5.75	23,100
12	1.38	2,430	10.84	65,300	5.31	20,400	3.66	11,300	5.33	20,500	5.83	23,600
	December 8		December 9		December 10		December 11		December 12		December 13	
4	6.03	24,900	7.94	38,800	4.92	18,000	3.79	12,000	3.65	11,200	3.18	9,010
8	6.64	30,000	7.17	32,800	4.70	16,800	3.76	11,800	3.55	10,800	3.10	8,650
N	7.65	36,500	6.43	27,500	4.48	15,600	3.74	11,700	3.37	9,860	2.90	7,800
4	8.98	47,700	5.91	24,100	4.28	14,500	3.77	11,800	3.25	9,320	2.84	7,560
8	8.85	46,600	5.52	21,600	4.10	13,500	3.76	11,800	3.19	9,060	2.75	7,200
12	8.65	44,800	5.19	19,600	3.95	12,800	3.72	11,600	3.17	8,960	2.73	7,120

Supplemental record.--Nov. 17, 5:30 p.m., no flow; Nov. 18, 11 p.m., 11.13 ft, 68,400 cfs; Nov. 21, 1 a.m., 14.69 ft, 108,000 cfs; Dec. 3, 10:30 p.m., 11.04 ft, 67,400 cfs; Dec. 8, 5 p.m., 9.04 ft, 48,300 cfs, 10 p.m., 8.86 ft, 46,600 cfs.

Yuba River at Marysville, Calif.

Location.--Lat 39°08'40", long. 121°34'35", at Simpson Lane Bridge in Marysville, Yuba County, about 2 miles upstream from mouth. Zero of gage is set to datum of Corps of Engineers. Auxiliary gage at mouth.

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

Discharge record.--Stage-discharge and stage-fall-discharge relations defined by current-meter measurements below 49,000 cfs and extended to peak stage. Discharge during periods of backwater from Feather River, Nov. 17 to Dec. 2, Dec. 4-31 computed by using fall between base and auxiliary gages as a factor.

Maxima.--November-December 1950: Discharge, 78,800 cfs 2 a.m. Nov. 21; gage height, 72.04 ft 9:50 a.m. Nov. 21.
1943-44, 1945 to October 1950: Discharge, 31,500 cfs Feb. 5, 1950, but may have been greater Dec. 29, 1945; gage height, 65.78 ft Dec. 29, 1945.
Flood of Jan. 22, 1943 reached a stage of 70.45 ft.

Remarks.--Flow regulated by several reservoirs above station. Many diversions above station for power and irrigation.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	948	4,000	9	666	36,300	17	1,310	14,900	25	7,900	5,190
2	764	3,910	10	702	19,200	18	22,400	13,000	26	6,440	4,820
3	728	14,100	11	742	17,400	19	49,600	11,300	27	5,570	4,340
4	702	39,700	12	715	15,800	20	47,000	9,980	28	5,270	3,950
5	679	19,100	13	724	12,900	21	55,300	8,900	29	4,450	3,680
6	666	15,100	14	733	19,700	22	17,400	7,820	30	4,190	3,510
7	661	30,100	15	746	29,000	23	10,500	6,640	31		3,470
8	666	36,700	16	866	19,500	24	8,540	5,830			
Monthly mean discharge, in cfs										8,586	14,188
Runoff, in acre-feet										510,900	872,400
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	47.63	1,590	48.66	1,390	66.92	54,300	63.92	25,400	71.27	78,800	69.78	28,000
4	47.94	1,560	49.04	1,610	67.81	59,200	63.55	24,000	71.50	73,600	69.34	25,900
6	48.11	1,490	51.97	6,060	68.12	60,900	63.30	23,900	71.80	71,100	68.86	23,100
8	48.16	1,410	54.98	11,700	68.11	60,900	63.48	27,700	72.00	67,200	68.30	20,500
10	48.17	1,340	57.25	17,100	67.80	59,100	64.41	37,400	72.02	61,600	67.78	19,200
N	48.17	1,270	59.30	23,100	67.40	56,900	65.56	47,600	71.96	55,800	67.20	16,300
2	48.20	1,250	60.98	28,700	67.13	55,400	67.04	54,900	71.82	50,200	66.69	16,300
4	48.18	1,170	62.28	33,400	66.48	47,000	68.02	60,300	71.59	44,900	66.11	13,400
6	48.18	1,140	63.25	37,400	65.79	38,900	68.91	65,700	71.27	40,400	65.47	9,490
8	48.19	1,130	63.85	40,000	65.30	34,300	69.49	69,400	70.86	34,500	64.94	8,650
10	48.22	1,140	64.65	43,500	64.80	29,900	70.23	74,300	70.50	31,200	64.39	8,670
12	48.39	1,250	65.88	49,100	64.36	27,700	70.84	78,600	70.17	29,500	63.88	9,960
	November 23		November 24		November 25		November 29		November 30		December 1	
4	62.88	10,700	57.77	8,920	84.79	8,310	51.10	4,670	50.67	4,340	50.48	4,040
8	61.91	11,000	57.08	8,410	54.49	8,210	51.00	4,470	50.63	4,210	50.47	3,960
N	60.96	10,300	56.51	8,720	54.18	7,900	50.91	4,360	50.60	4,110	50.47	3,930
4	60.10	10,600	55.88	8,020	53.88	7,710	50.87	4,330	50.58	4,080	50.49	3,950
8	59.30	10,700	55.43	8,230	53.60	7,400	50.76	4,260	50.57	4,120	50.50	4,020
12	58.50	9,390	53.11	8,500	53.34	7,200	50.74	4,430	50.52	4,130	50.48	4,100
	December 2		December 3		December 4		December 5		December 6		December 7	
2	50.46	4,090	50.26	3,910	64.85	44,300	64.71	22,900	60.62	14,800	60.28	23,800
4	50.43	4,030	50.29	3,940	65.40	46,900	64.44	22,100	60.33	14,600	61.00	27,600
6	50.41	3,960	50.43	4,100	66.20	50,700	64.10	20,800	60.07	14,600	61.71	31,000
8	50.39	3,890	50.74	4,470	66.42	51,800	63.76	20,000	59.78	14,200	62.28	33,200
10	50.38	3,890	51.97	6,150	66.42	50,500	63.41	19,400	59.52	14,200	62.70	34,100
N	50.36	3,860	54.39	10,500	66.25	44,100	63.04	18,300	59.27	13,800	62.96	34,000
2	50.34	3,840	56.27	14,600	66.08	38,500	62.70	18,000	59.02	13,500	63.13	33,500
4	50.31	3,830	57.50	17,800	65.85	33,500	62.36	17,700	58.87	13,700	63.16	32,100
6	50.28	3,820	58.55	20,800	65.67	30,300	62.03	17,300	58.79	14,300	63.12	30,600
8	50.27	3,860	60.21	26,100	65.46	27,700	61.68	16,700	58.92	16,000	63.05	29,100
10	50.25	3,900	62.39	34,000	65.18	25,000	61.31	15,800	59.34	18,800	63.01	28,200
12	50.24	3,880	64.37	42,200	64.95	24,000	61.00	15,800	59.77	21,100	62.97	27,600
	December 8		December 9		December 10		December 11		December 12		December 13	
4	63.00	27,400	67.03	47,700	63.91	21,400	60.37	17,400	59.06	17,300	57.58	13,200
8	63.16	28,600	66.79	42,100	63.24	19,700	59.91	17,000	58.91	16,500	57.35	13,200
N	63.98	35,800	66.37	35,600	62.62	18,800	59.57	16,900	58.79	16,000	57.13	13,100
4	64.95	40,500	65.83	30,000	61.98	18,400	59.46	17,900	58.51	14,900	56.80	12,500
8	66.27	48,900	65.23	25,800	61.41	17,700	59.35	18,400	58.20	13,900	56.51	12,300
12	66.92	50,800	64.56	22,500	60.77	16,100	59.19	18,000	57.90	13,800	56.27	12,000

Milton-Bowman tunnel at outlet, Calif.

Location.--Concrete control, lat 39°28', long. 120°37', in sec. 3, T. 18 N., R. 12 E., near upper end of Bowman Lake. Altitude of gage, about 5,600 ft (from topographic map).

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

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

Maxima.--November-December 1950: Daily discharge, 147 cfs Nov. 20.
1928-30, 1931 to October 1950: Daily discharge, 492 cfs Feb. 11, 1941.

Remarks.--Tunnel diverts from Middle Yuba River at Milton, in sec. 12, T. 19 N., R. 12 E., and discharges into Bowman Lake. During low and medium stages practically entire flow of Middle Yuba River is diverted.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	52	87	9	26	103	17	51	91	25	92	83
2	48	85	10	23	95	18	121	91	26	91	82
3	58	118	11	21	95	19	118	90	27	90	80
4	66	106	12	19	94	20	147	88	28	90	80
5	57	98	13	19	91	21	130	87	29	88	80
6	45	103	14	20	103	22	104	85	30	87	80
7	34	109	15	19	97	23	98	84	31		78
8	29	114	16	24	94	24	95	84			
Monthly mean discharge, in cfs										65.4	92.1
Runoff, in acre-feet										3,890	5,660
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												
4												
6												
8												
10												
N												
2												
4												
6												
8												
10												
12												
	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												

Oregon Creek near North San Juan, Calif.

Location.--Lat 39°24', long. 121°05', in SW¼ sec. 22, T. 18 N., R. 8 E., 1 mile upstream from mouth and 3 miles northeast of North San Juan. Altitude of gage, about 1,500 ft (from topographic map).

Drainage area.--35.1 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 2,100 cfs and extended to peak stage.

Maxima.--November-December 1950: Discharge, 3,240 cfs 1 a.m. Nov. 21 (gage height, 9.80 ft).
1910 to October 1950: Discharge observed, about 4,000 cfs Mar. 25, 1928 (gage height, 9.5 ft, site and datum then in use), from rating curve extended above 600 cfs.

Remarks.--Flood flow not affected by 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	17	68	9	6.6	1,090	17	175	390	25	147	105
2	13	64	10	6.3	577	18	1,150	293	26	118	96
3	11	1,340	11	6.3	447	19	742	236	27	101	88
4	9.8	1,100	12	6.3	350	20	2,060	199	28	87	82
5	8.5	496	13	7.2	277	21	1,820	168	29	76	77
6	8.2	531	14	13	689	22	568	140	30	72	76
7	7.5	961	15	17	990	23	291	127	31		71
8	7.2	1,520	16	79	590	24	198	115			
Monthly mean discharge, in cfs										261	431
Runoff, in acre-feet										15,530	26,490
Runoff, in inches										8.30	14.15

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	3.33	93	5.71	584	6.92	1,170	5.43	482	9.54	3,020	6.19	795
4	3.23	84	6.28	840	6.71	1,060	6.00	705	9.24	2,780	6.07	736
6	3.19	81	6.46	930	6.43	915	7.61	1,590	8.88	2,490	5.93	675
8	3.18	80	6.45	925	6.25	825	8.46	2,170	8.46	2,170	5.82	628
10	3.21	83	6.52	966	6.16	780	8.57	2,250	8.11	1,930	5.71	584
N	3.35	94	6.68	1,040	5.96	688	8.66	2,320	7.76	1,680	5.61	544
2	3.70	127	7.25	1,370	5.78	612	8.73	2,370	7.37	1,440	5.51	508
4	4.26	209	7.65	1,610	5.65	560	8.87	2,490	7.08	1,270	5.41	475
6	4.69	284	7.68	1,630	5.50	505	9.09	2,660	6.85	1,130	5.31	445
8	4.87	325	7.66	1,620	5.39	469	9.24	2,780	6.65	1,020	5.22	418
10	5.00	358	7.40	1,460	5.31	445	9.68	3,130	6.44	920	5.14	395
12	5.40	472	7.11	1,290	5.36	460	9.55	3,030	6.31	855	5.07	376
	November 23		November 24		November 25		November 29		November 30		December 1	
4	4.93	340	4.33	220	3.93	158	3.16	79	3.09	73	3.07	72
8	4.81	310	4.26	209	3.89	153	3.14	77	3.10	74	3.10	74
N	4.70	286	4.20	199	3.85	147	3.13	76	3.09	73	3.02	68
4	4.59	264	4.13	188	3.80	140	3.10	74	3.04	69	2.99	65
8	4.48	245	4.05	176	3.75	134	3.09	73	3.03	68	2.96	63
12	4.39	229	3.99	168	3.71	128	3.08	72	3.10	74	2.95	62
	December 2		December 3		December 4		December 5		December 6		December 7	
2	2.94	62	3.52	110	7.70	1,640	5.83	633	5.01	361	6.94	1,180
4	2.93	61	3.83	144	7.45	1,490	5.73	592	4.97	350	6.88	1,150
6	2.92	60	4.46	241	7.16	1,320	5.65	560	4.94	342	6.65	1,020
8	2.91	60	5.25	427	7.00	1,220	5.57	530	4.94	342	6.43	915
10	2.90	59	6.34	870	6.82	1,110	5.50	505	4.98	353	6.35	875
N	2.90	59	7.86	1,750	6.62	1,010	5.44	485	5.13	392	6.28	840
2	2.90	59	8.69	2,340	6.48	940	5.37	463	5.28	436	6.24	820
4	2.92	60	8.77	2,410	6.34	870	5.30	442	5.51	508	6.26	830
6	2.95	62	8.76	2,400	6.24	820	5.24	424	6.01	710	6.50	950
8	3.06	71	8.60	2,270	6.13	765	5.18	406	6.30	850	6.55	975
10	3.17	80	8.36	2,100	6.03	718	5.12	390	6.57	985	6.50	950
12	3.32	92	8.08	1,910	5.91	666	5.07	376	6.81	1,110	6.48	940
	December 8		December 9		December 10		December 11		December 12		December 13	
4	6.65	1,020	7.23	1,360	5.96	688	5.21	415	5.09	381	4.73	293
8	7.25	1,370	6.96	1,200	5.79	616	5.32	448	5.02	363	4.68	282
N	7.78	1,700	6.69	1,040	5.67	568	5.46	492	4.96	348	4.64	274
4	7.94	1,810	6.46	930	5.53	516	5.38	466	4.90	332	4.59	264
8	8.15	1,930	6.30	850	5.40	472	5.28	436	4.84	318	4.54	255
12	7.62	1,590	6.12	760	5.30	442	5.18	406	4.79	306	4.69	284

Supplemental record.--Nov. 21, 1 a.m., 9.80 ft, 3,240 cfs; Dec. 3, 5 p.m., 8.90 ft, 2,510 cfs.

North Yuba River below Goodyears Bar, Calif.

Location.--Lat 39°32', long. 120°56', in SW¼ sec. 11, T. 19 N., R. 9 E., 3.5 miles downstream from Goodyears Creek and 4 miles southwest of Goodyears Bar. Altitude of gage, about 2,450 ft (from topographic map).

Drainage area.--244 sq mi.

Gage-height record.--Water-stage recorder graph except for period Dec. 26-31 when there was no gage-height record.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 6,000 cfs and extended to peak stage on basis of drift-velocity measurement at 18,000 cfs and slope-area determination. Discharge for period of no gage-height record computed on basis of records for stations on nearby streams.

Maxima.--November-December 1950: Discharge, 26,400 cfs 10 p.m. Nov. 20 (gage height, 19.15 ft).
1930 to October 1950: Discharge, 26,000 cfs Dec. 11, 1937 (gage height, 19.0 ft, from floodmarks), from rating curve extended above 6,000 cfs on basis of drift-velocity measurement at 18,000 cfs.

Remarks.--Flood flow not affected by 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	366	903	9	234	6,480	17	1,700	2,730	25	1,850	1,060
2	361	822	10	218	3,820	18	9,870	2,290	26	1,370	1,030
3	420	7,030	11	216	3,200	19	8,200	2,010	27	1,190	1,000
4	370	6,850	12	211	2,800	20	16,200	1,750	28	1,060	950
5	322	3,400	13	223	2,300	21	13,500	1,350	29	960	910
6	283	3,000	14	269	4,650	22	4,840	1,420	30	951	890
7	258	5,890	15	257	4,600	23	2,860	1,300	31		830
8	247	9,300	16	684	3,350	24	2,110	1,190			
Monthly mean discharge, in cfs										2,380	2,900
Runoff, in acre-feet										141,600	178,300
Runoff, in inches										10.88	13.70

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 16		November 17		November 18		November 19		November 20		November 21	
2	2.75	264	4.49	776	9.66	5,410	13.67	12,300	10.43	6,500	17.50	21,800
4	2.92	294	4.50	780	10.36	6,400	13.20	11,300	11.30	7,840	16.40	18,900
6	3.21	350	4.54	798	10.80	7,060	12.77	10,400	13.15	11,200	15.75	17,200
8	3.67	472	4.64	843	11.23	7,730	12.26	9,470	14.17	13,400	15.00	15,400
10	4.37	728	4.87	946	11.60	8,320	11.59	8,300	14.60	14,400	14.26	13,600
N	4.92	970	5.15	1,080	11.93	8,870	11.00	7,360	14.94	15,300	13.62	12,200
2	5.03	1,020	5.59	1,340	12.85	10,600	10.50	6,610	15.65	17,000	13.04	11,000
4	4.95	985	6.31	1,820	13.88	12,800	10.14	6,090	16.45	19,100	12.50	9,900
6	4.81	920	6.95	2,340	14.37	13,900	9.89	5,740	17.85	22,800	12.12	9,220
8	4.68	861	7.74	3,090	14.60	14,400	9.68	5,440	18.60	24,900	11.63	8,370
10	4.58	816	8.45	3,880	14.39	13,900	9.76	5,550	19.15	26,400	11.22	7,710
12	4.54	798	9.14	4,730	14.09	13,300	10.30	6,310	18.77	25,400	10.78	7,030
	November 22		November 23		November 24		November 25		November 30		December 1	
4	10.03	5,930	7.83	3,180	6.90	2,290	6.25	1,780	4.88	951	4.98	1,000
8	9.53	5,240	7.62	2,970	6.77	2,180	6.17	1,720	4.90	960	4.75	892
N	9.08	4,650	7.48	2,830	6.67	2,100	6.08	1,660	4.89	956	4.72	879
4	8.70	4,180	7.34	2,690	6.56	2,010	5.96	1,570	4.89	956	4.70	870
8	8.40	3,820	7.20	2,560	6.47	1,940	5.89	1,520	4.83	928	4.69	866
12	8.10	3,480	7.05	2,420	6.37	1,860	5.84	1,490	4.94	980	4.64	843
	December 2		December 3		December 4		December 5		December 6		December 7	
2	4.62	834	5.09	1,060	12.67	10,200	8.61	4,070	7.46	2,810	10.86	7,150
4	4.59	820	5.35	1,200	12.11	9,200	8.44	3,870	7.44	2,790	10.97	7,320
6	4.55	802	5.84	1,490	11.54	8,220	8.31	3,710	7.40	2,750	10.60	6,760
8	4.53	794	6.49	1,950	11.05	7,440	8.21	3,600	7.38	2,730	10.10	6,030
10	4.51	784	7.80	3,150	10.64	6,820	8.08	3,460	7.44	2,790	9.67	5,430
N	4.45	760	10.40	6,460	10.32	6,340	7.98	3,350	7.51	2,860	9.40	5,070
2	4.43	752	12.83	10,600	10.04	5,950	7.86	3,220	7.83	3,180	9.23	4,850
4	4.51	784	14.10	13,300	9.80	5,610	7.75	3,100	8.29	3,690	9.25	4,880
6	4.61	830	14.38	13,900	9.58	5,300	7.67	3,020	8.69	4,170	9.55	5,260
8	4.72	879	14.05	13,200	9.34	4,990	7.59	2,940	9.33	4,980	9.97	5,850
10	4.82	924	13.60	12,200	9.06	4,630	7.54	2,890	9.92	5,780	10.02	5,920
12	4.92	970	12.94	10,800	8.80	4,300	7.50	2,850	10.50	6,610	9.93	5,790
	December 8		December 9		December 10		December 11		December 12		December 13	
4	10.50	6,610	11.45	8,080	8.79	4,290	7.69	3,040	7.67	3,020	7.04	2,420
8	12.13	9,230	10.72	6,940	8.55	4,000	7.65	3,000	7.50	2,850	6.94	2,330
N	12.95	10,800	10.20	6,170	8.35	3,760	7.84	3,190	7.43	2,780	6.87	2,260
4	12.91	10,700	9.77	5,570	8.17	3,560	8.05	3,420	7.33	2,680	6.82	2,220
8	12.91	10,700	9.42	5,100	8.01	3,380	7.96	3,330	7.24	2,600	6.77	2,180
12	12.18	9,320	9.09	4,670	7.84	3,190	7.84	3,190	7.15	2,520	6.84	2,240

Supplemental record.--Dec. 7, 3 p.m., 9.20 ft, 4,810 cfs, 9 p.m., 10.05 ft, 5,960 cfs; Dec. 8, 10 a.m., 12.80 ft, 10,500 cfs.

North Yuba River below Bullards Bar Dam, Calif.
(Formerly published as North Yuba River at Colgate diversion dam)

Location.--Lat 39°24'15", long. 121°08'30", in SW¼ sec. 24, T. 18 N., R. 7 E., 2,000 ft downstream from Bullards Bar Dam, 3 miles upstream from confluence with Middle Yuba River, and 3 miles northwest of town of North San Juan. Altitude of gage, 1,390 ft (from topographic map).

Drainage area.--481 sq mi.

Gage-height record.--Water-stage recorder graph except for periods 9 p.m. Nov. 18 to 3 a.m. Nov. 19 and Nov. 23 to noon Dec. 13 when there was no record.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 32,000 cfs and extended to peak stage on basis of computed flow over dam at gage height, 29.5 ft. Discharge for periods of no gage-height record computed on basis of flow over or through Bullards Bar Dam and powerhouse records.

Maxima.--November-December 1950: Discharge, 47,100 cfs 1 a.m. Nov. 21 (gage height, 31.3 ft).
1940 to October 1950: Discharge, 44,200 cfs Jan. 21, 1943 (site and datum then in use), from rating curve extended above 23,000 cfs on basis of velocity-area studies and computation of flows over Bullards Bar Dam.

Remarks.--Flood flow only slightly affected by storage in Bullards Bar Reservoir. Bullards Bar powerhouse records furnished by Pacific Gas & Electric Co.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	690	1,700	9	553	14,000	17	1,040	5,530	25	3,200	2,120
2	585	1,500	10	553	8,200	18	18,300	4,600	26	2,600	1,960
3	565	13,000	11	549	6,600	19	17,600	3,980	27	2,200	1,840
4	565	15,000	12	535	5,600	20	27,700	3,380	28	2,000	1,720
5	565	7,800	13	545	4,520	21	29,900	3,080	29	1,800	1,640
6	561	6,200	14	545	7,680	22	9,510	2,760	30	1,600	1,600
7	561	11,000	15	545	9,380	23	5,800	2,500	31		1,540
8	557	16,500	16	549	7,030	24	4,200	2,290			
Monthly mean discharge, in cfs										4,549	5,685
Runoff, in acre-feet										270,700	349,600
Runoff, in inches										10.55	13.63

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	5.67	553	12.75	7,220	24.20	29,000	15.78	11,700	31.08	46,500	16.46	12,800
4	5.67	553	14.05	9,000	22.56	25,200	16.48	12,900	30.33	44,400	15.90	11,900
6	5.68	557	15.40	11,100	21.46	22,800	17.43	14,600	29.19	41,400	15.29	10,900
8	5.68	557	16.75	13,400	20.36	20,400	19.81	19,200	28.00	38,400	14.87	10,200
10	5.69	561	19.66	18,900	19.16	17,900		24,300	26.32	34,200	14.42	9,550
N	5.70	565	19.06	17,700	17.99	15,600		27,200	24.40	29,500	13.53	8,250
2	5.71	569	19.24	18,100	16.93	13,700		32,400	22.60	25,300	13.67	8,450
4	5.73	577	19.96	19,500	16.08	12,200	27.54	37,200	19.60	18,800	13.61	8,360
6	5.73	577	21.21	22,200	15.55	11,300	27.84	38,000	19.58	18,800	13.34	7,990
8	7.10	1,300	22.80	25,800	15.18	10,700	29.33	41,800	18.87	17,300	13.20	7,790
10	9.18	3,110	26.30	34,100	14.98	10,400	30.38	44,600	17.96	15,600	12.97	7,470
12	11.23	5,380	25.90	34,100	15.08	10,600	31.03	46,300	17.12	14,000	12.77	7,210

Hour	November 23		November 24		November 25		November 29		November 30		December 1	
4												
8												
N												
4												
8												
12												

Hour	December 2		December 3		December 4		December 5		December 6		December 7	
2												
4												
6												
8												
10												
N												
2												
4												
6												
8												
10												
12												

Hour	December 8		December 9		December 10		December 11		December 12		December 13	
4												
8												
N											10.48	4,520
4											10.36	4,390
8											10.26	4,280
12											10.24	4,250

Supplemental record.--Nov. 18, 9 a.m., 20.79 ft, 21,300 cfs, 11:30 p.m., 26.9 ft, 35,600 cfs; Nov. 21, 1 a.m., 31.30 ft, 47,100 cfs, 3 p.m., 18.89 ft, 17,400 cfs, 5 p.m., 20.00 ft, 19,600 cfs; Nov. 22, 5 p.m., 13.12 ft, 7,680 cfs, 5:30 p.m., 13.59 ft, 8,340 cfs.

South Yuba River near Cisco, Calif.

Location.--Lat 39°19', long. 120°33', in sec. 19, T. 17 N., R. 13 E., 0.5 mile downstream from Rattlesnake Creek, 1 mile west of Cisco Grove, and 1.2 miles northwest of Cisco. Altitude of gage, about 5,500 ft (from topographic map).

Drainage area.--50.2 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 4,500 cfs and extended to peak stage on basis of slope-area determination.

Maxima.--November-December 1950: Discharge, 11,700 cfs 4 p.m. Nov. 20 (gage height, 15.82 ft).
1942 to October 1950: Discharge, 6,080 cfs Jan. 21, 1943 (gage height, 12.35 ft, former site), from rating curve extended above 2,100 cfs by logarithmic plotting.

Remarks.--Flood flow not affected by storage above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	92	156	9	62	1,030	17	523	307	25	252	213
2	151	140	10	40	493	18	5,630	255	26	199	202
3	248	4,150	11	31	538	19	2,800	224	27	175	189
4	170	1,690	12	26	510	20	8,200	206	28	159	187
5	117	552	13	26	324	21	4,100	191	29	148	177
6	85	1,230	14	26	1,470	22	791	189	30	162	123
7	71	1,970	15	25	706	23	408	227	31		117
8	69	3,130	16	53	441	24	289	219			
Monthly mean discharge, in cfs										837	695
Runoff, in acre-feet										49,820	42,760
Runoff, in inches										18.61	15.97

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	3.21	124	7.90	2,220	11.50	5,720	8.96	3,060	13.55	8,320	6.10	1,150
4	3.26	135	8.77	2,900	10.40	4,450	10.10	4,150	12.78	7,310	5.85	1,030
6	3.30	143	9.25	3,320	9.60	3,650	11.50	5,720	11.85	6,140	5.64	933
8	3.40	165	9.65	3,700	8.70	2,840	12.60	7,080	10.70	4,780	5.45	850
10	3.70	238	10.60	4,670	7.90	2,220	13.20	7,860	9.80	3,850	5.30	790
N	4.08	346	11.85	6,140	7.44	1,900	13.90	8,810	9.10	3,190	5.17	738
2	4.54	499	12.73	7,250	7.15	1,720	14.97	10,400	8.50	2,680	5.07	698
4	4.90	632	13.30	7,990	6.98	1,620	15.84	11,700	8.00	2,290	4.95	651
6	5.33	802	13.66	8,470	6.80	1,520	15.69	11,500	7.52	1,950	4.86	617
8	5.85	1,030	13.66	8,470	6.80	1,520	15.50	11,200	7.10	1,690	4.77	583
10	6.35	1,280	13.41	8,130	7.45	1,900	15.28	10,800	6.70	1,460	4.68	550
12	7.05	1,660	12.47	6,910	8.00	2,290	14.67	9,900	6.38	1,290	4.60	521
	November 23		November 24		November 25		November 30		December 1		December 2	
4	4.45	468	3.98	316							3.17	132
8	4.33	427	3.90	292							3.15	128
N	4.24	397	3.87	284	3.68	236	3.34	163	3.28	151	3.17	132
4	4.16	371	3.82	270							3.23	142
8	4.11	355	3.82	270							3.25	146
12	4.05	337	3.83	273	3.62	222	3.41	177	3.24	144	3.38	171
	December 3		December 4		December 5		December 6		December 7		December 8	
2	3.75	253	9.45	3,500	5.12	718	4.29	414	9.30	3,370	6.96	1,610
4	4.55	503	8.55	2,720	4.98	663	4.27	407	9.24	3,320	8.20	2,440
6	5.90	1,050	7.80	2,150	4.88	624	4.28	410	8.68	2,820	8.95	3,060
8	7.45	1,900	7.15	1,720	4.78	587	4.34	431	7.85	2,180	10.17	4,220
10	9.30	3,370	6.70	1,460	4.68	550	4.48	478	7.15	1,720	10.47	4,530
N	11.10	5,240	6.40	1,300	4.61	525	4.95	651	6.62	1,420	10.36	4,410
2	12.50	6,950	6.20	1,200	4.55	503	5.90	1,050	6.35	1,280	9.98	4,030
4	13.28	7,960	6.00	1,100	4.50	485	6.60	1,410	6.36	1,280	9.42	3,480
6	13.25	7,920	5.80	1,000	4.45	468	7.15	1,720	6.65	1,440	9.03	3,130
8	12.60	7,080	5.62	924	4.42	458	8.64	2,790	6.46	1,330	8.55	2,720
10	11.30	5,480	5.44	846	4.37	441	9.08	3,170	6.30	1,250	8.05	2,320
12	10.00	4,050	5.27	778	4.32	424	9.23	3,310	6.32	1,260	7.51	1,950
	December 8		December 9		December 10		December 11		December 12		December 13	
4			6.55	1,380	4.75	576	4.17	374	4.90	532	4.10	352
8			5.98	1,090	4.60	521	4.12	358	4.67	546	4.02	328
N			5.58	906	4.47	475	4.56	507	4.49	482	3.95	307
4			5.30	790	4.38	444	5.05	690	4.36	437	3.93	301
8			5.10	710	4.32	424	5.16	734	4.28	410	3.88	287
12			4.92	640	4.25	400	5.14	726	4.19	381	4.10	352

Supplemental record.--Nov. 18, 7 p.m., 13.74 ft, 8,590 cfs.

South Yuba River near Washington, Calif.

Location.--Lat 39°22', long. 120°45', in SE¼ sec. 5, T. 17 N., R. 11 E., 0.2 mile downstream from Canyon Creek and 2.3 miles east of Washington. Altitude of gage, about 2,810 ft (from topographic map).

Drainage area.--197 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 6,000 cfs and extended to peak stage on basis of slope-area determination.

Maxima.--November-December 1950: Discharge, 37,100 cfs 7:30 p.m. Nov. 20 (gage height, 23.08 ft).
1942 to October 1950: Discharge, 20,300 cfs Jan. 21, 1943 (gage height, 13.8 ft, site and datum then in use), from rating curve extended above 6,600 cfs by logarithmic plotting.

Remarks.--Flood flows partly regulated by Lake Spaulding (capacity, 70,500 acre-ft), Bowman Lake (see following page), and by many smaller reservoirs. Diversion for power and irrigation above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	137	152	9	89	5,160	17	598	1,280	25	256	336
2	112	140	10	89	2,420	18	11,000	920	26	209	336
3	102	6,320	11	89	1,780	19	7,300	648	27	410	240
4	98	7,110	12	89	1,650	20	23,100	481	28	165	188
5	97	2,200	13	99	1,170	21	12,300	433	29	146	176
6	94	2,540	14	118	3,390	22	1,850	366	30	149	176
7	92	6,830	15	106	3,640	23	707	305	31		168
8	89	10,200	16	407	1,930	24	382	290			
Monthly mean discharge, in cfs										2,016	2,031
Runoff, in acre-feet										120,000	124,900
Runoff, in inches										11.42	11.89

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	6.29	359	9.67	2,310	18.15	19,300	13.20	7,740	21.03	28,900	10.16	2,950
4	6.21	339	9.95	2,630	17.12	16,500	14.50	10,400	20.58	27,300	10.06	2,830
6	6.15	324	10.05	2,750	15.70	13,000	16.05	13,800	18.07	19,100	9.97	2,720
8	6.10	312	10.04	2,740	13.00	7,360	17.10	16,400	16.00	13,700	9.20	1,940
10	6.17	329	10.21	2,950	11.06	4,100	19.50	23,500	14.34	10,000	8.79	1,620
N	6.41	393	10.94	3,940	11.29	4,440	20.70	27,700	13.23	7,800	8.77	1,610
2	6.71	483	15.10	11,700	10.95	3,950	21.10	29,200	12.50	6,440	8.62	1,500
4	6.96	566	19.00	21,900	10.02	2,710	21.45	30,500	12.00	5,670	8.56	1,460
6	7.06	601	19.50	23,500	8.53	1,360	22.45	34,500	11.72	5,220	8.47	1,400
8	7.87	965	19.40	23,200	7.77	915	22.80	35,900	10.86	3,910	7.91	1,050
10	8.48	1,330	19.30	22,900	7.61	835	21.40	30,200	10.72	3,700	7.77	968
12	9.35	1,980	18.75	21,100	11.70	5,070	21.00	28,800	10.28	3,100	7.60	880
	November 23		November 24		November 25		November 30		December 1		December 2	
4	7.55	855	6.56	469	5.84	281	5.12	147	5.23	165	5.08	141
8	7.38	776	6.38	416	5.80	272	5.15	152	5.18	157	5.06	138
N	7.21	704	6.20	368	5.76	263	5.16	154	5.15	152	5.05	136
4	7.08	652	6.09	341	5.63	236	5.13	149	5.12	147	5.05	136
8	6.87	572	5.97	312	5.59	228	5.10	144	5.11	146	5.07	140
12	6.61	484	5.89	293	5.55	220	5.13	149	5.10	144	5.17	155
	December 3		December 4		December 5		December 6		December 7		December 8	
2	5.30	176	17.34	17,100	10.17	2,960	8.25	1,250	13.41	8,150	11.95	5,590
4	5.63	236	13.65	8,630	9.95	2,700	8.24	1,240	13.56	8,450	12.18	5,960
6	6.30	394	13.40	8,130	9.86	2,600	8.26	1,250	13.60	8,530	12.40	6,320
8	7.66	910	12.30	6,150	9.68	2,400	8.28	1,270	13.41	8,150	12.92	7,220
10	8.51	1,430	12.05	5,750	9.71	2,430	8.33	1,300	13.11	7,570	13.39	8,110
N	9.30	2,030	11.46	4,810	9.73	2,450	8.38	1,340	12.18	5,960	14.66	10,700
2	9.93	2,680	11.70	5,190	8.97	1,760	8.70	1,560	12.18	5,960	16.57	15,100
4	10.43	3,300	11.70	5,190	8.94	1,730	8.90	1,700	11.93	5,560	16.22	14,200
6	14.00	9,330	11.60	5,030	8.90	1,700	10.87	3,920	11.93	5,560	15.82	13,200
8	18.77	21,200	11.38	4,690	8.87	1,680	11.33	4,620	11.98	5,640	16.02	13,700
10	19.73	24,300	10.46	3,340	8.84	1,660	12.33	6,200	11.97	5,620	15.14	11,700
12	18.20	19,500	10.25	3,060	8.67	1,540	13.40	8,130	11.95	5,590	14.34	10,000
	December		December 9		December 10		December 11		December 12		December 13	
4			13.21	7,760	10.07	2,840	9.01	1,790	9.10	1,860	8.35	1,320
8			11.66	5,130	9.85	2,580	8.90	1,700	9.00	1,780	8.23	1,230
N			11.17	4,380	9.65	2,370	9.03	1,800	8.78	1,620	8.11	1,160
4			10.85	3,900	9.46	2,180	9.01	1,790	8.67	1,540	7.99	1,090
8			10.61	3,540	9.27	2,000	8.98	1,760	8.58	1,480	7.89	1,030
12			10.32	3,160	9.14	1,890	9.07	1,840	8.47	1,400	7.88	1,030

Supplemental record.--Nov. 20, 7:30 p.m., 23.08 ft, 37,100 cfs; Nov. 22, 12:30 p.m., 9.02 ft, 1,800 cfs; Dec. 8, 1 p.m., 16.72 ft, 15,500 cfs, 5 p.m., 15.62 ft, 12,800 cfs, 6:30 p.m., 16.77 ft, 15,600 cfs; Dec. 9, 2 a.m., 13.69 ft, 8,710 cfs, 6 a.m., 12.23 ft, 6,040 cfs, 10 a.m., 11.40 ft, 4,720 cfs, 2 p.m., 10.95 ft, 4,040 cfs, 6 p.m., 10.74 ft, 3,730 cfs, 10 p.m., 10.47 ft, 3,350 cfs.

Bowman Lake near Graniteville, Calif.

Location.--Lat 39°27', long. 120°39', in SW¼ sec. 5, T. 18 N., R. 12 E., at Bowman Dam on Canyon Creek, 4 miles east of Graniteville. Datum of gage is 5,000.0 ft above mean sea level (levels by Nevada Irrigation District); gage readings have been reduced to elevations above sea level.

Drainage area.--30 sq mi.

Gage-height record.--Staff gage read at irregular intervals. Doubtful gage-height record Nov. 30, contents interpolated.

Maxima.--November-December 1950: Contents observed, 69,400 acre-ft Dec. 7 (elevation, 5,564.5 ft).
1926 to October 1950: Contents observed, 70,500 acre-ft June 16, 17, 1937, June 1, 1943, May 28, 1950 (elevation, 5,565.9 ft).

Remarks.--Lake is formed by one rock-fill and one concrete-arch dam; completed and storage began in November 1926. Capacity, 68,200 acre-ft between elevations 5,400 ft (bottom of outlet tunnel) and 5,563 ft (crest of concrete-arch dam) above mean sea level. Flashboards are occasionally added, increasing elevation to 5,564.5 ft and capacity to 69,400 acre-ft. Lake receives water from Middle Yuba River through Milton-Bowman tunnel (see p.696), and releases it through Bowman-Spaulding Canal (see p.704) which conveys it to reservoirs of Pacific Gas & Electric Co. Water is eventually used for irrigation by Nevada Irrigation District. Record of contents, computed from gage readings made at irregular intervals, shows total contents, all of which is available for release. Record of gage heights furnished by Nevada Irrigation District.

Elevation and contents on indicated day, 1950

Day	November		December	
	Elevation (feet)	Contents (acre-feet)	Elevation (feet)	Contents (acre-feet)
1			5,558.6	64,700
2	5,529.2	42,200		
3			5,559.9	65,700
4			5,563.5	68,600
5	5,528.3	41,600	5,563.6	68,700
6			5,563.6	68,700
7			5,564.5	69,400
8			5,564.0	69,000
9			5,563.7	68,800
10			5,563.7	68,800
11			5,563.6	68,700
12	5,525.0	39,300	5,563.5	68,600
13			5,563.5	68,600
14			5,564.2	69,200
15			5,564.1	69,100
16	5,523.8	38,500	5,564.0	69,000
17			5,563.9	68,900
18			5,563.8	68,800
19	5,536.0	47,000	5,563.7	68,800
20	5,543.9	52,900	5,563.6	68,700
21	5,555.7	62,400	5,563.5	68,600
22			5,563.4	68,500
23	5,556.9	63,300	5,563.3	68,400
24	5,557.4	63,700	5,563.2	68,400
25	5,557.8	64,000	5,562.9	68,100
26	5,558.2	64,400	5,562.7	68,000
27	5,558.6	64,700	5,562.5	67,800
28			5,562.3	67,600
29	5,559.9	65,700	5,562.1	67,500
30	5,563.5	d65,200	5,561.9	67,300
31			5,561.7	67,200
Change in contents	-	+23,000	-	+2,000

d Doubtful gage-height record; contents interpolated.

Canyon Creek below Bowman Lake, Calif.

Location.--Concrete control, lat 39°26', long. 120°40', in SE¼ sec. 7, T. 18 N., R. 12 E., 1 mile downstream from Bowman Lake and 3 miles upstream from Texas Creek. Altitude of gage, about 5,100 ft (from topographic map).

Drainage area.--31.7 sq mi.

Gage-height record.--Water-stage recorder graph except for periods 8 a.m. Nov. 19 to 4 p.m. Nov. 20, 8 a.m. Nov. 24 to 6 a.m. Nov. 28 and 10 p.m. Dec. 21 to 10 a.m. Dec. 22 when there was no gage-height record.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 820 cfs and extended to peak stage on basis of previous rating curve defined to 2,000 cfs. Discharge for periods of no gage-height record computed on basis of partly estimated gage heights or interpolated.

Maxima.--November-December 1950: Discharge, 2,520 cfs 1 p.m. Dec. 4 (gage height, 6.28 ft).
1927 to October 1950: Discharge, 2,030 cfs June 1, 1943; gage height, 5.98 ft June 6, 1936.

Remarks.--Flow partly regulated by Bowman Lake (see preceding page) and diversion into Bowman-Spaulding Canal (see following page). Bowman Lake receives water from Middle Yuba River through Milton-Bowman tunnel (see p.696).

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	1.7	2.0	9	0.8	717	17	34	195	25	5	2.7
2	1.5	2.3	10	.7	318	18	100	150	26	4	2.4
3	1.4	148	11	.9	260	19	28	89	27	3	2.1
4	1.0	1,600	12	1.9	246	20	15	76	28	2.1	1.9
5	.9	402	13	3.7	227	21	36	34	29	1.7	1.9
6	.7	364	14	8.7	625	22	23	14	30	1.7	1.7
7	.7	1,410	15	14	532	23	14	4.5	31		2.0
8	.7	1,460	16	14	285	24	7	3.0			
Monthly mean discharge, in cfs										10.9	296
Runoff, in acre-feet										650	18,210
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	1.84	13	2.40	76	2.32	65			2.22	52		
4	1.85	14	2.42	79	2.20	49			2.30	62	1.97	23
6	1.85	14	2.42	79	2.08	35			2.28	59		
8	1.85	14	2.50	92	2.04	30			2.18	47	1.97	23
10	1.93	22	2.58	106					2.08	35		
N	2.01	27	2.70	127					1.99	25	1.97	23
2	2.03	29	2.78	142					1.98	24		
4	2.09	36	2.67	122			1.86	14	1.98	24	1.98	24
6	2.11	38	2.60	109			1.92	19	1.98	24		
8	2.34	68	2.62	113			1.98	24	1.98	24	1.98	24
10	2.45	84	2.43	81			2.03	29	1.98	24		
12	2.48	89	2.32	65			2.14	42	1.98	24	1.97	23
	November 23		November 24		November 25		November 29		November 30		December 1	
4	1.98	24	1.80	10								
8	1.98	24	1.75	8.9								
N	1.81	11					1.20	1.7	1.20	1.7	1.24	2.1
4	1.72	8.2										
8	1.72	8.2										
12	1.77	9.3					1.19	1.6	1.22	1.9	1.23	2.0
	December 2		December 3		December 4		December 5		December 6		December 7	
2	1.30	2.7	1.60	6.2	5.54	1,450	4.02	491	3.52	324	5.09	1,060
4	1.35	3.2	1.92	19	5.60	1,510	3.92	455	3.52	324	5.24	1,180
6	1.33	3.0	2.14	42	5.54	1,450	3.90	448	3.52	324	5.27	1,210
8	1.30	2.7	2.41	78	5.47	1,380	3.91	452	3.52	324	5.38	1,300
10	1.28	2.5	2.44	82	5.47	1,380	3.68	374	3.52	324	5.60	1,510
N	1.24	2.1	2.44	82	6.10	2,200	3.62	354	3.52	324	5.91	1,900
2	1.23	2.0	2.45	84	6.20	2,380	3.60	348	3.51	321	5.78	1,720
4	1.22	1.9	2.54	99	6.06	2,140	3.58	342	3.53	324	5.64	1,550
6	1.21	1.8	2.60	109	5.79	1,730	3.57	339	3.55	333	5.57	1,480
8	1.20	1.7	2.99	188	5.48	1,390	3.56	336	3.66	367	5.51	1,420
10	1.22	1.9	3.83	424	5.20	1,150	3.55	333	4.10	520	5.48	1,390
12	1.30	2.7	5.18	1,130	4.61	760	3.53	327	4.68	799	5.44	1,360
	December 8		December 9		December 10		December 11		December 12		December 13	
4	5.44	1,360	4.90	930								
8	5.50	1,410	4.70	810								
N	5.60	1,510	4.60	755	3.50	318	3.28	259	3.22	243	3.16	228
4	5.68	1,600	4.08	513								
8	5.61	1,520	3.76	400								
12	5.50	1,410	3.68	374	3.50	264	3.27	256	3.21	241	3.05	212

Supplemental record.--Dec. 4, 1 p.m., 6.28 ft, 2,520 cfs; Dec. 7, 11 a.m., 5.98 ft, 2,010 cfs.

Bowman-Spaulding Canal at intake, Calif.

Location.--Lat 39°27', long. 120°39', in sec. 8, T. 18 N., R. 12 E., 150 ft downstream from intake and 0.2 mile downstream from Bowman Dam. Altitude of gage, about 5,400 ft (from topographic map).

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

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

Maxima.--November-December 1950: Daily discharge, 236 cfs Nov. 8.
1927 to October 1950: Daily discharge, 262 cfs Aug. 2-9, 29, Sept. 10-13, 1928.

Remarks.--Canal diverts from left bank of Canyon Creek below Bowman Lake. Water is delivered to Lake Spaulding and, after passing through several powerhouses, is used for irrigation by Nevada Irrigation District.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	216	176	9	235	128	17	163	172	25	0	223
2	228	175	10	233	136	18	52	172	26	0	224
3	232	46	11	232	157	19	11	177	27	16	223
4	232	25	12	231	157	20	14	187	28	136	227
5	233	90	13	231	165	21	.7	196	29	177	230
6	233	129	14	210	173	22	.4	206	30	177	213
7	234	131	15	197	173	23	.3	209	31		213
8	236	129	16	188	172	24	.1	217			
Monthly mean discharge, in cfs										145	169
Runoff, in acre-feet										8,620	10,420
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												
4												
6												
8												
10												
N												
2												
4												
6												
8												
10												
12												
	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												

Deer Creek near Smartville, Calif.

Location.--Lat 39°13'20", long. 121°16'00", in sec. 23, T. 16 N., R. 6 E., 1 mile upstream from mouth and 2 miles northeast of Smartville. Altitude of gage, about 500 ft (from topographic map).

Drainage area.--83.5 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 5,200 cfs and extended to peak stage.

Maxima.--November-December 1950: Discharge, 5,970 cfs 11 a.m. Nov. 20 (gage height, 10.35 ft).
1935 to October 1950: Discharge, 11,300 cfs Mar. 9, 1943 (gage height, 13.62 ft), from rating curve extended above 5,200 cfs by logarithmic plotting.

Remarks.--Flow partly regulated by Deer Creek Reservoir (capacity, 1,400 acre-ft). Diversions above station for power and irrigation. At times water from South Yuba River is diverted into Deer Creek above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	21	45	9	8.4	769	17	131	574	25	76	358
2	14	40	10	8.1	508	18	3,650	510	26	61	352
3	12	2,320	11	7.8	660	19	784	467	27	53	348
4	10	626	12	8.1	521	20	3,780	422	28	48	342
5	9.5	209	13	8.8	455	21	2,010	398	29	45	340
6	9.5	599	14	13	1,930	22	304	382	30	46	348
7	9.5	923	15	14	1,850	23	181	372	31		340
8	9.2	1,960	16	184	678	24	134	365			
Monthly mean discharge, in cfs										388	646
Runoff, in acre-feet										23,110	39,690
Runoff, in inches										5.19	8.91

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 16		November 17		November 18		November 19		November 20		November 21	
2	1.56	12	2.80	142	6.72	1,980	6.67	1,930	3.29	230	9.36	4,780
4	1.58	13	2.61	112	7.94	3,180	6.08	1,440	4.43	540	8.98	4,330
6	1.62	15	2.50	97	8.89	4,230	5.44	1,020	7.36	2,600	7.87	3,110
8	1.70	20	2.39	83	9.38	4,810	5.04	805	7.89	3,130	7.10	2,340
10	1.84	30	2.36	79	9.09	4,460	4.70	645	9.37	4,790	6.48	1,750
N	2.01	43	2.31	73	8.76	4,090	4.38	523	10.18	5,770	6.10	1,440
2	4.09	425	2.34	77	9.87	5,390	4.11	431	9.83	5,350	5.49	994
4	4.49	562	2.44	89	9.02	4,370	3.87	362	10.00	5,550	5.25	855
6	4.16	447	2.76	136	8.27	3,550	3.70	320	9.75	5,250	4.95	712
8	3.68	315	3.15	203	8.20	3,470	3.56	287	9.36	4,780	4.68	602
10	3.30	232	3.34	240	7.59	2,830	3.41	254	9.25	4,650	4.45	518
12	3.01	178	3.62	301	7.31	2,550	3.29	230	9.67	5,150	4.27	461
	November 22		November 23		November 24		November 25		November 30		December 2	
4	3.99	382	3.15	202	2.83	147	2.38	82			1.98	40
8	3.78	330	3.08	190	2.79	140	2.34	77			1.97	40
N	3.58	283	3.01	178	2.75	134	2.30	72			1.97	40
4	3.45	257	2.97	171	2.72	129	2.28	70			1.96	39
8	3.33	234	2.92	162	2.69	124	2.26	68			1.97	40
12	3.23	216	2.87	154	2.55	104	2.24	65			2.09	50
	December 3		December 4		December 5		December 6		December 7		December 8	
2	2.48	94	5.90	1,280	3.48	263	2.88	156	6.49	1,760	5.23	845
4	3.46	259	5.39	934	3.41	249	2.87	154	5.98	1,340	5.44	964
6	4.78	642	5.03	749	3.34	236	2.86	152	5.56	1,040	6.02	1,380
8	7.72	2,960	4.72	618	3.28	225	2.85	150	5.21	835	7.50	2,740
10	8.28	3,560	4.49	532	3.17	206	2.86	152	4.96	717	8.02	3,270
N	8.06	3,320	4.35	485	3.14	200	2.95	168	4.77	638	7.64	2,880
2	7.32	2,560	4.24	452	3.11	195	3.17	206	4.69	606	7.42	2,660
4	7.67	2,910	4.10	410	3.07	188	3.78	330	4.85	670	7.00	2,240
6	8.65	3,970	3.94	370	3.03	181	6.13	1,460	4.97	722	6.75	2,000
8	8.53	3,830	3.80	335	2.98	173	6.48	1,750	5.05	758	6.63	1,890
10	7.16	2,400	3.66	301	2.96	169	6.30	1,600	5.08	771	6.31	1,610
12	6.53	1,800	3.57	281	2.92	162	6.37	1,660	5.09	776	5.97	1,340
	December		December 9		December 10		December 11		December 12		December 13	
4			5.47	952			4.26	458	4.60	570		
8			5.14	800			4.42	507	4.50	535		
N			4.93	704	4.40	500	5.26	860	4.43	510	4.21	443
4			4.78	642			5.24	850	4.37	491		
8			4.67	598			4.96	717	4.33	479		
12			4.58	563	4.29	467	4.72	618	4.30	470	4.28	464

Supplemental record.--Nov. 20, 11 a.m., 10.35 ft, 5,970 cfs, 1 p.m., 9.85 ft, 5,370 cfs, 3 p.m., 9.77 ft, 5,270 cfs, 5 p.m., 9.57 ft, 5,030 cfs, 7 p.m., 9.70 ft, 5,190 cfs, 9 p.m., 9.10 ft, 4,470 cfs, 11 p.m., 9.62 ft, 5,090 cfs; Nov. 21, 1 a.m., 9.23 ft, 4,630 cfs, 3 a.m., 9.33 ft, 4,750 cfs; Dec. 3, 11 a.m., 8.40 ft, 3,690 cfs, 7 p.m., 9.10 ft, 4,470 cfs; Dec. 9, 2 a.m., 5.65 ft, 1,100 cfs, 6 a.m., 5.27 ft, 865 cfs, 10 a.m., 5.04 ft, 753 cfs, 2 p.m., 4.85 ft, 670 cfs, 6 p.m., 4.72 ft, 618 cfs, 10 p.m., 4.62 ft, 578 cfs.

Dry Creek near Brownsville, Calif.

Location.--Lat 39°28'40", long. 121°15'15", in NW¼ sec. 25, T. 19 N., R. 6 E., 0.2 mile downstream from New York Creek and 0.9 mile northeast of Brownsville. Altitude of gage, about 2,220 ft (from topographic map).

Drainage area.--20.5 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 350 cfs and extended to peak stage on basis of slope-area determination. Shifting-control method used Nov. 1-19.

Maxima.--November-December 1950: Discharge, 834 cfs 6 p.m. Nov. 20 (gage height, 5.39 ft).
1948 to October 1950: Discharge, 822 cfs Feb. 4, 1950 (gage height, 5.39 ft), from rating curve extended above 350 cfs by logarithmic plotting.

Remarks.--Flood flow not affected by diversions above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	7.7	23	9	4.0	172	17	107	97	25	29	41
2	6.1	36	10	3.8	108	18	420	85	26	25	40
3	5.5	462	11	3.8	160	19	164	76	27	23	39
4	4.9	152	12	4.5	98	20	562	64	28	20	38
5	4.7	80	13	6.8	78	21	291	54	29	19	37
6	4.5	177	14	6.8	279	22	81	49	30	22	40
7	4.5	182	15	6.8	191	23	47	46	31		36
8	4.5	318	16	106	119	24	36	43			
Monthly mean discharge, in cfs										67.7	110
Runoff, in acre-feet										4,030	6,780
Runoff, in inches										3.68	6.20

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 16		November 17		November 18		November 19		November 20		November 21	
2	1.25	7.7	2.01	52	3:63	299	3.65	303	2.75	188	4.40	570
4	1.43	15	1.93	46	4.07	402	3.38	249	3.70	395	4.12	500
6	1.87	41	1.88	42	4.17	428	3.20	214	4.66	636	3.78	415
8	2.65	126	1.90	43	4.18	430	3.00	179	4.60	620	3.43	333
10	3.15	205	2.07	58	4.07	402	2.81	148	4.45	582	3.18	278
N	3.18	211	2.29	80	4.07	402	2.64	124	4.35	558	2.98	234
2	3.11	198	2.64	124	4.36	475	2.50	105	4.33	552	2.82	202
4	2.85	154	2.99	177	4.37	478	2.41	94	4.64	631	2.69	176
6	2.59	117	3.01	180	4.41	488	2.32	84	5.39	834	2.61	160
8	2.39	92	2.89	161	4.34	470	2.30	87	4.97	720	2.51	142
10	2.24	75	3.00	179	4.28	455	2.63	123	4.78	669	2.42	127
12	2.12	63	3.21	216	4.00	385	2.68	130	4.47	588	2.36	118
	November 22		November 23		November 24		November 25		November 30		December 1	
4	2.24	100							1.54	23		
8	2.16	89							1.53	22	1.56	24
N	2.08	78	1.81	46	1.69	35	1.62	29	1.51	20		
4	2.01	69							1.49	19	1.50	20
8	1.96	63							1.51	20		
12	1.90	56	1.75	40	1.65	32	1.58	26	1.63	30	1.48	19
	December 2		December 3		December 4		December 5		December 6		December 7	
2	1.47	18	2.93	224					1.98	66		
4	1.47	18	3.36	317	2.80	198			1.98	66	2.91	220
6	1.47	18	3.89	442					2.02	71		
8	1.47	18	4.52	600	2.65	168			2.19	93	2.73	184
10	1.47	18	4.81	677					2.39	122		
N	1.48	19	4.92	706	2.50	140	2.08	78	2.47	135	2.58	154
2	1.50	20	4.75	660					2.88	214		
4	1.59	26	4.50	595	2.40	124			3.12	264	2.55	149
6	1.76	41	4.03	478					3.22	286		
8	1.94	61	3.53	355	2.30	108			3.33	311	2.60	158
10	2.23	98	3.25	293					3.36	317		
12	2.53	145	3.07	253	2.23	98	1.98	66	3.21	284	2.68	174
	December 8		December 9		December 10		December 11		December 12		December 13	
4	2.85	208					2.36	118			2.08	78
8	3.58	366					2.90	218			2.06	76
N	3.58	366	2.58	154	2.30	108	2.85	208	2.20	94	2.04	73
4	3.75	408					2.67	172			2.02	71
8	3.48	344					2.49	138			2.01	69
12	3.09	258	2.40	124	2.20	94	2.37	119	2.11	82	2.41	126

Dry Creek at Virginia Ranch, Calif.

Location.--Lat 39°19'20", long. 121°18'45", in NW¼ sec. 21, T. 17 N., R. 6 E., 0.4 mile south of Virginia Ranch, 2.9 miles southwest of town of Oregon House, and 3.0 miles downstream from Willow Glen Creek. Altitude of gage, about 1,060 ft (from topographic map).

Drainage area.--71.5 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 1,700 cfs and extended to peak stage on basis of slope-area determination. Shifting-control method used Nov. 1-19.

Maxima.--November-December 1950: Discharge, 7,400 cfs 6 a.m. Nov. 20 (gage height, 9.15 ft).
1948 to October 1950: Discharge, 7,090 cfs Feb. 4, 1950 (gage height, 9.02 ft), from rating curve extended above 1,700 cfs on basis of slope-area determination at gage height 9.15 ft and by logarithmic plotting.

Remarks.--Medium and low flows partly regulated by Lake Mildred (capacity, 1,500 acre-ft). Several 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	14	50	9	6.5	729	17	465	317	25	82	114
2	12	45	10	6.2	378	18	3,460	252	26	66	106
3	9.7	3,150	11	6.2	639	19	718	214	27	56	99
4	8.8	751	12	6.5	389	20	5,140	185	28	49	96
5	7.9	281	13	7.6	275	21	2,420	161	29	45	92
6	7.6	714	14	9.1	1,300	22	323	146	30	47	105
7	7.3	941	15	9.4	933	23	165	133	31		96
8	7.0	1,920	16	262	431	24	111	121			
Monthly mean discharge, in cfs										451	489
Runoff, in acre-feet										26,850	30,080
Runoff, in inches										7.04	7.89

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	2.95	159	7.21	3,250	5.61	1,410	4.17	586	8.13	5,110		
4	2.80	132	7.13	3,120	5.14	1,070	6.83	2,780	7.99	4,820	3.77	423
6	2.72	118	7.47	3,680	4.79	864	9.13	7,350	7.73	4,310		
8	2.64	105	7.79	4,270	4.53	730	8.91	6,830	7.41	3,720	3.59	356
10	2.64	105	7.74	4,170	4.29	618	8.69	6,330	6.99	3,020		
N	2.86	142	7.51	3,750	4.07	523	8.41	5,710	5.46	1,330	3.44	304
2	3.82	412	7.74	4,170	3.86	439	8.43	5,760	4.93	978		
4	4.60	750	7.69	4,080	3.69	374	8.47	5,840	4.66	820	3.31	263
6	4.74	820	7.31	3,410	3.57	331	8.60	6,130	4.45	715		
8	4.45	676	7.11	3,090	3.54	321	8.45	5,800	4.27	632	3.20	232
10	4.68	790	6.80	2,630	4.53	730	8.38	5,650	4.14	573		
12	7.05	2,990	6.17	1,870	4.13	547	8.24	5,340	3.99	511	3.11	210
	November 23		November 24		November 25		November 29		November 30		December 1	
4	3.02	187	2.67	123	2.46	90					2.11	48
8	2.95	175	2.63	116	2.43	86					2.20	57
N	2.88	161	2.60	111	2.40	81	2.07	45	2.10	47	2.17	54
4	2.82	150	2.56	105	2.37	77					2.13	50
8	2.77	141	2.53	100	2.35	74					2.10	47
12	2.72	132	2.49	94	2.33	72	2.05	43	2.09	46	2.07	45
	December 2		December 3		December 4		December 5		December 6		December 7	
2	2.05	43	3.66	381	5.33	1,240			3.13	214	6.02	1,800
4	2.04	42	4.67	825	4.92	972	3.53	334	3.12	212	5.37	1,270
6	2.03	42	5.98	1,760	4.66	820			3.12	212	5.03	1,040
8	2.02	41	7.03	3,090	4.46	720	3.42	298	3.12	212	4.80	900
10	2.01	40	7.94	4,720	4.31	650			3.18	227	4.57	775
N	2.01	40	7.95	4,740	4.19	591	3.34	272	3.35	276	4.40	690
2	2.01	40	7.82	4,480	4.08	547			3.76	419	4.30	645
4	2.01	40	7.92	4,680	3.97	503	3.27	252	4.36	672	4.26	627
6	2.03	42	7.92	4,680	3.87	463			5.91	1,700	4.33	658
8	2.07	45	7.61	4,080	3.80	435	3.20	232	5.65	1,480	4.46	720
10	2.17	54	7.28	3,500	3.72	404			5.99	1,770	4.50	740
12	2.50	96	6.75	2,670	3.65	378	3.14	217	6.33	2,140	4.43	705
	December 8		December 9		December 10		December 11		December 12		December 13	
4	4.61	795	4.90	960	3.78	427	3.40	291	3.86	459	3.38	285
8	5.80	1,600	4.55	765	3.71	400	4.56	770	3.74	412	3.35	276
N	6.58	2,440	4.32	654	3.64	374	5.00	1,020	3.64	374	3.31	263
4	6.57	2,430	4.14	573	3.58	352	4.62	800	3.57	348	3.27	252
8	6.49	2,330	3.99	511	3.51	328	4.27	632	3.50	324	3.24	243
12	5.50	1,360	3.87	463	3.44	304	4.03	527	3.44	304	3.52	331

Supplemental record.--Nov. 17, 9 p.m., 4.36 ft, 636 cfs, 11 p.m., 5.80 ft, 1,540 cfs; Nov. 18, 8:30 a.m., 7.82 ft, 4,340 cfs, 3 p.m., 7.87 ft, 4,420 cfs; Nov. 20, 6 a.m., 9.15 ft, 7,400 cfs; Nov. 21, 11 a.m., 6.47 ft, 2,300 cfs; Dec. 3, 1:30 a.m., 3.20 ft, 232 cfs, 11 a.m., 8.13 ft, 5,110 cfs, 1 p.m., 7.28 ft, 3,500 cfs; Dec. 4, 1 a.m., 6.10 ft, 1,880 cfs; Dec. 6, 6:30 p.m., 5.99 ft, 1,770 cfs, 8:30 p.m., 5.59 ft, 1,430 cfs; Dec. 8, 10:30 a.m., 6.83 ft, 2,780 cfs, 1:30 p.m., 6.47 ft, 2,300 cfs, 5 p.m., 6.64 ft, 2,520 cfs; Dec. 11, 5 a.m., 3.40 ft, 291 cfs, 7 a.m., 3.99 ft, 511 cfs.

Bear River near Colfax, Calif.

Location.--Lat 39°07'45", long. 120°57'35", in NW¼ sec. 27, T. 15 N., R. 9 E., 0.2 mile downstream from Colfax-Grass Valley highway bridge, 1.4 miles downstream from Greenhorn Creek, and 2 miles north of Colfax. Altitude of gage, about 1,900 ft (from topographic map).

Drainage area.--105 sq mi.

Gage-height record.--Water-stage recorder graph. Gage-height record doubtful Dec. 22-31.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 3,600 cfs and extended to peak stage on basis of slope-area determination. Shifting-control method used Nov. 1-17. Discharge for period of doubtful gage-height record computed on basis of records for station near Auburn.

Maxima.--November-December 1950: Discharge, 9,620 cfs 6 p.m. Nov. 20 (gage height, 21.40 ft).
1911-17, 1949 to October 1950: Discharge, 5,200 cfs Feb. 17, 1917 (gage height, 14.2 ft, site and datum then in use).

Remarks.--Bear River receives considerable water above station from South Yuba River and North Fork American River by way of Drum and Alta power plants. Storage and diversions above station for irrigation and power.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	201	818	9	146	1,970	17	689	1,180	25	1,070	650
2	180	792	10	164	1,410	18	4,310	1,050	26	994	650
3	175	4,140	11	146	1,420	19	2,300	994	27	952	650
4	172	2,800	12	147	1,180	20	5,760	837	28	944	650
5	171	1,430	13	118	1,080	21	4,600	798	29	869	650
6	115	1,770	14	200	2,830	22	1,770	750	30	830	650
7	141	2,410	15	165	2,470	23	1,290	700	31		600
8	130	3,050	16	552	1,500	24	1,190	650			
Monthly mean discharge, in cfs										1,016	1,372
Runoff, in acre-feet										60,480	84,360
Runoff, in inches										10.80	15.06

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 16		November 17		November 18		November 19		November 20		November 21	
2	6.96	172	8.84	652	13.40	2,520	16.70	4,770	10.61	1,240	19.68	7,650
4	7.09	192	8.43	534	14.58	3,220	15.37	3,760	12.35	1,960	19.68	7,650
6	7.36	247	8.28	482	15.19	3,630	14.46	3,140	15.15	3,600	18.60	6,590
8	7.62	306	8.27	479	15.70	3,990	13.32	2,480	16.70	4,770	17.50	5,450
10	8.00	400	8.00	400	15.92	4,150	11.85	1,720	17.50	5,450	16.58	4,670
N	8.65	596	8.00	400	15.96	4,180	12.10	1,840	17.92	5,830	15.95	4,170
2	9.18	754	8.68	604	16.66	4,740	11.12	1,430	18.90	6,800	15.60	3,920
4	9.34	805	8.83	649	17.50	5,450	10.47	1,190	20.00	8,000	14.50	3,160
6	9.11	733	9.18	754	17.77	5,690	11.17	1,450	21.40	9,620	13.85	2,770
8	9.62	894	9.62	894	17.42	5,380	10.77	1,290	21.14	9,310	12.70	2,140
10	9.43	834	10.28	1,120	17.42	5,380	10.65	1,250	20.20	8,220	12.68	2,120
12	9.20	760	11.15	1,440	17.44	5,400	10.57	1,220	19.58	7,540	12.96	2,280
	November 23		November 24		November 25		November 29		November 30		December 1	
4												
8												
N												
4												
8												
12												
	December 3		December 4		December 5		December 6		December 7		December 8	
2	9.93	1,000	16.48	4,590	11.52	1,590	10.90	1,340	14.34	3,060	12.72	2,150
4	10.25	1,110	15.52	3,860	11.34	1,520	10.87	1,330	14.26	3,020	12.64	2,100
6	10.69	1,270	14.66	3,270	11.39	1,540	10.63	1,250	14.09	2,910	13.20	2,410
8	12.06	1,820	14.06	2,900	11.37	1,530	10.60	1,240	14.07	2,900	13.40	2,520
10	14.10	2,920	14.42	3,110	11.02	1,390	11.62	1,630	13.06	2,330	15.20	3,640
N	16.23	4,390	13.22	2,420	11.00	1,380	11.04	1,400	12.54	2,050	15.44	3,810
2	17.15	5,140	12.43	2,000	10.93	1,350	11.43	1,550	12.44	2,000	15.26	3,680
4	18.60	6,500	12.50	2,030	10.84	1,320	11.70	1,660	12.32	1,940	15.06	3,540
6	19.43	7,370	12.36	1,960	10.84	1,320	12.61	2,090	12.34	1,950	15.26	3,680
8	19.93	7,920	12.32	1,940	10.87	1,330	13.34	2,490	12.40	1,980	14.80	3,360
10	19.08	6,990	12.00	1,790	10.89	1,340	14.23	3,000	12.44	2,000	14.50	3,160
12	17.71	5,640	11.83	1,710	10.90	1,340	14.69	3,290	12.84	2,210	14.03	2,880
	December 8		December 9		December 10		December 11		December 12		December 13	
4												
8												
N												
4												
8												
12												

Supplemental record.--Nov. 16, 8:30 a.m., 9.25 ft, 776 cfs; Nov. 17, 9:30 a.m., 9.40 ft, 824 cfs.

Bear River near Auburn, Calif.

Location.--Lat 39°01', long. 121°05', near south line of sec. 33, T. 14 N., R. 8 E., 300 ft upstream from bridge on State Highway 49, 3.5 miles upstream from Wolf Creek, and 8 miles north of Auburn. Altitude of gage, about 1,300 ft (from topographic map).

Drainage area.--140 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 5,000 cfs and extended to peak stage on basis of computed flow over and through Combie Dam.

Maxima.--November-December 1950: Discharge, 14,800 cfs 9 p.m. Nov. 20 (gage height, 15.00 ft).
1940 to October 1950: Discharge, 19,300 cfs Jan. 21, 1943 (gage height, 16.45 ft, present datum), from rating curve extended above 5,000 cfs on basis of computed flow over and through Combie Dam.

Remarks.--Flood flow slightly regulated by Combie Reservoir and other reservoirs; low flow greatly affected by diversions for power and irrigation.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	10	555	9	412	2,950	17	481	1,480	25	694	545
2	11	552	10	210	2,010	18	3,130	1,160	26	576	540
3	88	3,120	11	138	1,650	19	3,840	972	27	570	540
4	386	4,050	12	138	1,310	20	7,700	790	28	570	535
5	615	1,680	13	230	1,010	21	7,200	673	29	565	520
6	596	1,550	14	298	2,470	22	2,230	643	30	560	520
7	578	3,130	15	292	3,490	23	1,250	570	31		515
8	560	3,700	16	332	2,120	24	900	545			
Monthly mean discharge, in cfs										1,172	1,480
Runoff, in acre-feet										69,740	91,030
Runoff, in inches										9.34	12.19

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	5.82	403	6.31	610	11.40	7,110	7.90	2,030	13.56	11,500	8.58	2,820
4	5.83	407	6.46	685	11.08	6,540	8.11	2,260	13.35	11,000	8.57	2,800
6	5.83	407	6.52	715	10.40	5,410	8.55	2,780	13.04	10,300	8.39	2,590
8	5.84	411	6.54	725	9.80	4,490	9.80	4,490	12.53	9,280	8.17	2,330
10	6.10	515	6.53	720	9.25	3,700	10.90	6,230	11.85	7,940	8.03	2,170
N	6.11	519	6.60	755	8.78	3,070	11.65	7,560	11.10	6,570	7.88	2,010
2	6.12	524	7.60	1,390	8.42	2,620	12.38	8,980	10.45	5,490	8.00	2,140
4	6.11	519	10.20	4,950	8.32	2,500	12.85	9,940	10.10	4,940	7.92	2,050
6	6.10	515	11.45	7,180	8.00	2,140	13.70	11,800	9.65	4,260	7.82	1,940
8	6.11	519	11.86	7,950	7.80	1,920	14.85	14,400	9.36	3,850	7.71	1,830
10	6.16	542	11.80	7,840	7.78	1,900	14.85	14,400	8.97	3,320	7.59	1,710
12	6.23	574	11.58	7,420	7.76	1,880	14 15	12,800	8.71	2,980	7.55	1,670
	November 23		November 24		November 25		November 29		November 30		December 1	
4	7.35	1,480	6.72	965	6.43	764						
8	7.17	1,320	6.70	950	6.41	752						
N	7.01	1,190	6.56	852	6.34	709	6.09	565	6.08	560	6.07	555
4	6.90	1,100	6.68	936	6.23	643						
8	6.85	1,060	6.51	817	6.17	608						
12	6.75	988	6.44	771	6.15	598	6.08	560	6.08	560	6.06	550
	December 2		December 3		December 4		December 5		December 6		December 7	
2			6.12	581	11.45	7,200	7.97	2,110	7.17	1,320	9.35	3,840
4			6.14	592	10.60	5,730	7.85	1,980	7.14	1,290	9.43	3,950
6			6.26	661	10.03	4,840	7.74	1,860	7.12	1,280	9.32	3,800
8			6.44	771	9.61	4,200	7.64	1,760	7.08	1,240	9.19	3,620
10			6.33	703	9.30	3,770	7.60	1,720	7.01	1,190	9.03	3,400
N	6.06	550	6.30	685	9.14	3,550	7.49	1,610	7.06	1,230	8.85	3,160
2			6.32	697	8.94	3,280	7.43	1,550	7.12	1,280	8.60	2,840
4			7.60	1,720	8.61	2,850	7.38	1,500	7.25	1,380	8.43	2,640
6			11.50	7,290	8.43	2,640	7.34	1,470	7.45	1,570	8.33	2,520
8			12.50	9,220	8.32	2,500	7.30	1,430	7.75	1,870	8.28	2,460
10			12.75	9,740	8.25	2,420	7.24	1,380	8.41	2,610	8.27	2,440
12	6.08	560	12.40	9,020	8.16	2,320	7.20	1,340	8.91	3,240	8.27	2,440
	December 8		December 9		December 10		December 11		December 12		December 13	
4	8.49	2,710	9.10	3,490	8.10	2,250	7.52	1,640	7.39	1,510	6.92	1,120
8	8.75	3,040	8.77	3,060	7.72	1,840	7.32	1,450	7.15	1,300	6.78	1,010
N	9.37	3,870	8.55	2,780	7.88	2,010	7.45	1,570	7.00	1,180	6.74	980
4	10.05	4,860	8.50	2,720	7.87	2,000	7.68	1,800	7.14	1,290	6.74	980
8	9.75	4,420	8.27	2,440	7.70	1,820	7.57	1,690	7.08	1,240	6.68	936
12	9.54	4,110	8.26	2,430	7.59	1,710	7.45	1,570	6.96	1,150	6.69	943

Supplemental record.--Nov. 18, 9 p.m., 11.90 ft, 8,030 cfs; Nov. 20, 9 p.m., 15.00 ft, 14,800 cfs; Dec. 9, 6 p.m., 8.21 ft, 2,370 cfs, 10 p.m., 8.36 ft, 2,550 cfs; Dec. 10, 1 p.m., 7.96 ft, 2,100 cfs; Dec. 11, 2 p.m., 7.77 ft, 1,890 cfs.

Bear River near Wheatland, Calif.

Location.--Lat 39°00', long. 121°25', in sec. 3, T. 13 N., R. 5 E., on downstream side of bridge on U. S. Highway 99E, 1 mile southeast of Wheatland and 6.5 miles downstream from Rock Creek. Altitude of gage, about 85 ft (from topographic map).

Drainage area.--295 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 8,700 cfs and extended to peak stage on basis of slope-area determination.

Maxima.--November-December 1950: Discharge, 29,100 cfs 1:30 a.m. Nov. 21 (gage height, 20.83 ft).

1928 to October 1950: Discharge, 31,300 cfs Jan. 21, 1943 (gage height, 16.95 ft, site and datum then in use), of which 25,600 cfs was in main channel and 5,600 cfs through levee break 0.5 mile upstream, determined by contracted-opening method and other data.

Remarks.--Flow regulated by reservoirs and power plants above station. River receives inflow from Yuba River Basin and there are 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	130	710	9	482	4,980	17	631	2,390	25	969	826
2	103	706	10	306	3,040	18	5,930	1,920	26	812	805
3	98	4,100	11	184	2,720	19	6,760	1,580	27	762	790
4	286	7,210	12	182	2,230	20	11,700	1,370	28	740	780
5	592	2,450	13	207	1,690	21	17,800	1,150	29	726	770
6	576	2,390	14	328	4,890	22	3,550	1,020	30	722	765
7	556	5,380	15	320	7,480	23	1,740	920	31		790
8	540	6,350	16	472	3,500	24	1,190	848			
Monthly mean discharge, in cfs										1,980	2,470
Runoff, in acre-feet										117,800	151,900
Runoff, in inches										7.49	9.65

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	4.30	706	4.99	1,020	15.94	12,400	6.78	2,100	20.76	28,700	10.67	5,370
4	4.15	642	6.92	2,190	15.72	12,000	7.10	2,320	19.46	25,900	9.84	4,590
6	4.04	596	8.64	3,530	15.15	11,000	9.22	4,030	19.22	23,900	9.19	4,000
8	3.98	572	10.68	5,380	14.21	9,550	11.88	6,640	18.95	22,000	8.80	3,650
10	3.95	560	11.94	6,700	12.56	7,430	13.28	8,320	18.61	20,200	8.62	3,490
N	3.91	544	12.29	7,110	10.86	5,560	15.16	11,000	18.02	17,800	8.45	3,340
2	3.90	540	11.66	6,400	9.73	4,490	16.58	13,700	17.18	15,300	8.17	3,120
4	3.96	564	11.39	6,100	8.70	3,580	17.27	15,300	16.41	13,500	7.90	2,900
6	4.10	620	11.88	6,640	7.95	2,980	17.94	17,000	15.50	11,600	7.67	2,720
8	4.15	642	13.65	8,800	7.63	2,720	18.88	19,900	14.20	9,540	7.56	2,630
10	4.37	736	15.03	10,800	7.20	2,390	20.10	25,200	12.75	7,660	7.54	2,610
12	4.78	916	15.74	12,000	6.85	2,140	20.70	28,400	11.30	6,000	7.35	2,460
	November 23		November 24		November 25		November 30		December 1		December 2	
4	6.81	2,030	5.67	1,280	5.21	1,030						
8	6.58	1,860	5.56	1,220	5.12	985			4.53	708	4.52	704
N	6.37	1,710	5.48	1,170	5.07	960	4.56	722				
4	6.16	1,570	5.42	1,140	5.04	945			4.53	708	4.51	700
8	5.94	1,430	5.35	1,100	4.98	915						
12	5.77	1,330	5.31	1,080	4.91	880	4.56	722	4.53	708	4.55	718
	December 3		December 4		December 5		December 6		December 7		December 8	
2	4.62	749	15.50	11,600	8.18	3,120	6.56	1,840	10.20	5,740	8.72	4,090
4	4.87	862	15.61	11,800	8.01	2,990	6.51	1,810	10.95	6,640	8.78	4,160
6	5.26	1,060	15.32	11,300	7.77	2,800	6.46	1,770	11.20	6,940	9.10	4,510
8	7.17	2,320	14.50	9,960	7.58	2,640	6.41	1,740	11.05	6,760	9.72	5,190
10	9.13	3,950	13.17	8,180	7.40	2,500	6.36	1,700	10.47	6,060	10.45	6,040
N	10.34	5,040	11.40	6,110	7.25	2,380	6.33	1,680	10.02	5,520	11.18	6,920
2	10.47	5,170	10.18	4,890	7.14	2,290	6.34	1,690	9.63	5,090	11.68	7,520
4	10.16	4,870	9.73	4,490	6.99	2,170	6.55	1,870	9.34	4,770	11.93	7,820
6	10.19	4,900	9.32	4,120	6.88	2,080	7.60	2,860	9.01	4,410	12.16	8,110
8	11.30	6,000	8.86	3,700	6.76	1,990	8.49	3,820	8.79	4,170	12.25	8,220
10	13.55	8,680	8.56	3,430	6.67	1,920	9.08	4,440	8.66	4,030	12.01	7,910
12	14.92	10,600	8.34	3,250	6.61	1,880	9.56	5,020	8.64	4,010	11.68	7,520
	December 9		December 10		December 11		December 12		December 13		December	
4	10.72	6,360	8.10	3,470	6.92	2,400	7.08	2,530	6.22	1,840		
8	9.83	5,310	7.83	3,210	6.86	2,350	6.88	2,360	6.11	1,770		
N	9.20	4,620	7.39	2,810	7.11	2,560	6.59	2,130	6.00	1,690		
4	8.76	4,140	7.45	2,860	7.79	3,170	6.45	2,020	5.87	1,600		
8	8.55	3,920	7.39	2,810	7.77	3,150	6.39	1,970	5.78	1,540		
12	8.20	3,570	7.11	2,560	7.38	2,800	6.33	1,920	5.74	1,510		

Supplemental record.--Nov. 21, 1:30 a.m., 20.83 ft, 29,100 cfs; Dec. 4, 3:30 a.m., 15.63 ft, 11,800 cfs.

Dry Creek near Wheatland, Calif.

Location.--Lat 39°01'35", long. 121°26'10" in Johnson Rancho land grant 2,300 ft upstream from US 99E highway bridge and 1.3 miles northwest of Wheatland.

Drainage area.--99.5 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 2,400 cfs and extended to peak stage by logarithmic plotting.

Maxima.--November-December 1950: Discharge, 4,960 cfs 6:30 p.m. Nov. 20 (gage height, 11.64 ft).
1946 to October 1950: Discharge, 4,150 cfs Feb. 4, 1950 (gage height, 11.16 ft).

Remarks.--Flood flow not affected by 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	38	72	9	0	723	17	37	335	25	126	101
2	18	67	10	0	338	18	1,730	250	26	106	91
3	8.4	1,780	11	0	480	19	937	220	27	92	83
4	3.0	862	12	0	403	20	3,170	179	28	83	76
5	1.1	299	13	0	265	21	2,300	153	29	76	73
6	0.2	534	14	0	1,610	22	445	135	30	73	76
7	0	1,020	15	0	2,180	23	230	119	31		92
8	0	1,540	16	0	521	24	159	108			
Monthly mean discharge, in cfs										321	477
Runoff, in acre-feet										19,110	29,330
Runoff, in inches										3.60	5.53

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		0	3.80	89	7.90	1,760	4.83	329	10.80	4,150	5.76	634
4		0	3.84	96	7.92	1,770	5.30	470	10.50	3,880	5.64	586
6		0	3.94	114	7.45	1,460	6.51	945	10.45	3,840	5.48	524
8		0	7.10	1,250	6.90	1,140	8.67	2,340	9.72	3,180	5.34	482
10		0	8.95	2,560	6.42	900	9.67	3,140	8.84	2,470	5.22	446
N		0	9.38	2,900	6.02	738	10.95	4,280	8.22	1,980	5.13	419
2	3.46	40	9.40	2,920	5.72	618	11.47	4,790	7.65	1,580	5.04	392
4	3.68	70	9.46	2,970	5.51	534	11.55	4,870	7.16	1,290	4.97	371
6	3.87	101	9.15	2,720	5.27	461	11.63	4,950	6.75	1,060	4.89	347
8	3.86	99	8.80	2,280	5.09	407	11.55	4,870	6.43	905	4.82	326
10	3.83	94	8.08	1,890	4.95	365	11.42	4,740	6.18	802	4.77	311
12	3.80	89	8.05	1,860	4.83	329	11.00	4,330	5.94	706	4.72	296
	November 23		November 24		November 25		November 30		December 1		December 2	
4	4.61	266	4.24	175	4.05	135						
8	4.53	245	4.20	166	4.03	131					3.65	66
N	4.45	224	4.16	158	4.00	125	3.70	73	3.69	72		
4	4.38	207	4.13	151	3.98	121					3.63	62
8	4.33	195	4.10	145	3.96	117						
12	4.28	184	4.07	139	3.94	114	3.70	73	3.68	70	3.73	78
	December 3		December 4		December 5		December 6		December 7		December 8	
2	3.92	110	7.95	1,800	4.99	377	4.46	227	7.91	1,770	6.23	822
4	5.07	401	7.16	1,290	4.92	356	4.43	220	7.70	1,620	6.34	866
6	5.54	546	6.65	1,020	4.85	335	4.42	217	7.38	1,420	6.55	965
8	5.85	670	6.30	850	4.79	317	4.39	210	6.91	1,140	7.03	1,210
10	8.70	2,360	6.06	754	4.75	305	4.41	214	6.50	940	7.84	1,720
N	9.54	3,030	5.84	666	4.69	287	4.49	234	6.17	788	8.41	2,130
2	9.45	2,960	5.68	602	4.66	279	4.76	308	5.92	698	8.70	2,360
4	9.01	2,610	5.54	546	4.62	268	5.36	488	5.79	646	8.40	2,120
6	8.64	2,310	5.40	500	4.58	258	6.17	798	5.74	626	8.12	1,910
8	8.76	2,410	5.28	464	4.54	247	6.81	1,090	5.79	646	7.85	1,720
10	9.08	2,660	5.17	431	4.51	240	7.43	1,450	6.00	730	7.56	1,530
12	8.80	2,440	5.08	404	4.48	232	7.79	1,680	6.13	782	7.28	1,360
	December		December 9		December 10		December 11		December 12		December 13	
4			6.65	1,020	5.03	389	4.60	276	5.36	488	4.70	290
8			6.11	774	4.93	359	4.61	268	5.15	425	4.64	274
N			5.74	626	4.83	329	5.50	530	5.01	383	4.60	263
4			5.54	546	4.75	305	5.86	674	4.91	353	4.54	247
8			5.32	479	4.70	290	5.92	698	4.81	323	4.51	240
12			5.16	428	4.66	279	5.66	594	4.74	302	4.54	247

Supplemental record.--Nov. 20, 6:30 p.m., 11.64 ft, 4,960 cfs.

Bear River Canal near Colfax, Calif.

Location.--Lat 39°08', long. 120°57', in SE¼ sec. 22, T. 15 N., R. 9 E., about 500 ft downstream from diversion dam on Bear River, and 2 miles north of Colfax. Altitude of gage, about 1,980 ft (from topographic map).

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

Discharge record.--See "Remarks" paragraph below.

Maxima.--November-December 1950: Daily discharge, 472 cfs Nov. 10, 12.

1912 to October 1950: Daily discharge, 498 cfs May 11, 1945.

Remarks.--Flow regulated. Canal diverts from left bank of Bear River in sec. 22, T. 15 N., R. 9 E. bypassing river station in sec. 27, T. 15 N., R. 9 E. Records of daily discharge furnished by Pacific Gas & Electric Co.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	466	458	9	469	434	17	431	447	25	461	453
2	466	453	10	472	420	18	276	465	26	462	449
3	468	410	11	467	400	19	301	412	27	464	466
4	463	382	12	472	435	20	260	461	28	440	456
5	468	425	13	469	466	21	169	465	29	456	463
6	467	460	14	469	464	22	276	447	30	458	461
7	469	408	15	464	437	23	400	467	31		462
8	469	368	16	439	462	24	417	449			
Monthly mean discharge, in cfs										424	442
Runoff, in acre-feet										25,250	27,180
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												
4												
6												
8												
10												
N												
2												
4												
6												
8												
10												
12												
	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												

American River basin

North Fork American River at North Fork Dam, Calif.

Location.--Above spillway of North Fork Dam, lat 38°56', long. 121°01', in SE¼ sec. 30, T. 13 N., R. 9 E., 2 miles upstream from Middle Fork and 4 miles northeast of Auburn. Datum of gage is 715.0 ft above mean sea level (levels by Corps of Engineers).

Drainage area.--343 sq mi.

Gage-height record.--Water-stage recorder graph, except for Dec. 25, when there was no record.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 22,000 cfs and extended to peak stage by computed flow over spillway of dam. Backwater corrections applied Nov. 1-16, 11 p.m. Nov. 20 to 12 p.m. Dec. 2. Discharge for period of no gage-height record was interpolated.

Maxima.--November-December 1950: Discharge, 46,600 cfs 9:30 p.m. Nov. 20 (gage height, 9.96 ft).
1941 to October 1950: Discharge, 42,600 cfs Jan. 21, 1943 (gage height, 9.53 ft), from rating curve extended above 22,000 cfs on basis of computed flow over spillway of dam.

Remarks.--Some storage and a few diversions above station had no effect on flood discharge.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	293	875	9	133	7,510	17	1,160	3,210	25	1,690	1,080
2	251	752	10	123	4,420	18	15,600	2,900	26	1,380	995
3	300	12,600	11	123	3,720	19	13,700	2,140	27	1,160	915
4	353	11,400	12	113	3,460	20	24,000	1,820	28	1,020	855
5	251	4,540	13	118	2,630	21	23,200	1,590	29	885	815
6	200	4,400	14	159	5,870	22	5,860	1,410	30	855	805
7	164	9,080	15	182	6,040	23	3,240	1,280	31		775
8	143	11,600	16	380	4,320	24	2,180	1,160			
Monthly mean discharge, in cfs										3,307	3,709
Runoff, in acre-feet										196,800	228,000
Runoff, in inches										10.76	12.47

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 16		November 17		November 18		November 19		November 20		November 21	
2	0.55	164	1.52	1,040	3.00	3,080	7.54	26,100	4.10	6,380	9.50	41,800
4	.55	164	1.50	1,020	3.86	5,500	7.12	23,000	4.50	6,000	8.90	36,500
6	.57	176	1.48	995	4.50	8,000	6.56	19,200	5.10	10,900	8.50	33,200
8	.59	188	1.47	985	5.00	10,400	6.12	16,500	5.64	13,800	8.00	29,200
10	.61	200	1.49	1,000	5.40	12,500	5.54	13,200	6.32	17,700	7.42	24,800
N	.64	218	1.51	1,030	5.63	13,700	5.10	10,900	6.84	21,100	6.82	20,600
2	.74	286	1.55	1,070	6.02	15,900	4.80	9,380	7.58	26,400	6.30	17,300
4	.92	424	1.58	1,100	6.90	21,500	4.56	8,260	8.16	30,900	5.86	14,700
6	1.12	591	1.64	1,160	7.50	25,800	4.38	7,500	8.92	37,100	5.44	12,400
8	1.28	735	1.76	1,300	7.69	27,200	4.24	6,920	9.64	43,600	5.16	10,900
10	1.40	855	2.00	1,580	7.86	28,500	4.08	6,300	9.91	46,100	4.94	9,810
12	1.50	955	2.44	2,140	7.73	27,500	4.02	6,080	9.94	46,000	4.73	8,810
	November 22		November 23		November 24		November 25		November 26		December 2	
4	4.38	7,290	3.34	3,740	2.67	2,400	2.24	1,810	1.95	1,460	1.33	795
8	4.15	6,380	3.22	3,450	2.57	2,250	2.19	1,740	1.92	1,420	1.29	755
N	3.93	5,570	3.11	3,210	2.49	2,140	2.14	1,680	1.88	1,370	1.27	735
4	3.76	4,970	3.00	2,980	2.43	2,060	2.09	1,620	1.84	1,330	1.25	715
8	3.60	4,470	2.88	2,750	2.37	1,980	2.05	1,580	1.81	1,300	1.26	725
12	3.47	4,100	2.77	2,560	2.31	1,900	2.00	1,520	1.78	1,260	1.29	755
	December 3		December 4		December 5		December 6		December 7		December 8	
2	1.33	845	6.90	21,500	3.91	5,680	3.20	3,520	5.06	10,700	4.46	7,830
4	1.38	895	6.21	17,100	3.81	5,320	3.17	3,450	5.21	11,500	4.44	7,750
6	1.50	1,020	5.74	14,300	3.73	5,040	3.13	3,360	5.25	11,700	4.52	8,090
8	1.70	1,230	5.34	12,100	3.67	4,840	3.10	3,290	5.22	11,500	4.84	9,570
10	2.80	2,700	5.06	10,700	3.59	4,590	3.08	3,250	4.93	10,000	5.20	11,400
N	5.00	10,400	4.79	9,330	3.53	4,410	3.10	3,290	4.65	8,670	5.69	14,000
2	6.06	16,200	4.60	8,440	3.47	4,240	3.17	3,450	4.44	7,750	5.87	15,100
4	6.94	21,800	4.44	7,750	3.42	4,100	3.32	3,820	4.28	7,080	5.87	15,100
6	7.76	27,700	4.31	7,200	3.36	3,930	3.58	4,560	4.21	6,800	5.78	14,500
8	7.88	28,700	4.22	6,840	3.31	3,800	4.09	6,340	4.22	6,840	5.57	13,400
10	7.70	27,300	4.11	6,420	3.26	3,670	4.40	7,580	4.38	7,500	5.40	12,500
12	7.38	24,900	4.01	6,040	3.24	3,620	4.95	10,100	4.46	7,830	5.20	11,400
	December 9		December 10		December 11		December 12		December 13		December	
4	4.78	9,280	3.72	5,010	3.20	3,520	3.32	3,820	2.86	2,810		
8	4.50	8,000	3.60	4,620	3.16	3,430	3.24	3,620	2.80	2,700		
N	4.28	7,080	3.50	4,320	3.24	3,620	3.16	3,430	2.75	2,620		
4	4.12	6,460	3.42	4,100	3.32	3,820	3.08	3,250	2.69	2,510		
8	3.95	5,820	3.35	3,900	3.41	4,070	3.02	3,120	2.65	2,450		
12	3.83	5,390	3.27	3,700	3.40	4,040	2.95	2,980	2.64	2,430		

Supplemental record.--Nov. 20, 9:30 p.m., 9.96 ft, 46,600 cfs; Dec. 3, 7:30 p.m., 7.92 ft, 29,000 cfs; Dec. 8, 3 p.m., 5.88 ft, 15,100 cfs.

North Fork American River at Rattlesnake Bridge, Calif.

Location.--Lat 38°49', long. 121°06', in SW¼ sec. 9, T. 11 N., R. 8 E., 800 ft downstream from Rattlesnake Bridge, 3 miles downstream from Pilot Creek, and 6 miles south of Auburn. Datum of gage is 343.65 ft above mean sea level (river-profile survey).

Drainage area.--999 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 15,000 cfs, and extended to peak stage on basis of previous ratings defined below 70,000 cfs and summation of North and Middle Fork peak discharges.

Maxima.--November-December 1950: Discharge, 115,000 cfs 1 a.m. Nov. 21 (gage height, 29.50 ft).
1930 to October 1950: Discharge, 95,000 cfs Jan. 21, 1943 (gage height, 26.5 ft), from rating curve extended above 27,000 cfs.

Remarks.--Flow slightly regulated by small reservoirs above station; low flow greatly affected by diversions into North Fork ditch and inflow from Bear and Yuba Basins through South Canal of Pacific Gas & Electric Co.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	1,350	3,080	9	769	20,200	17	2,880	7,600	25	5,080	3,140
2	1,100	2,650	10	736	11,700	18	38,800	6,400	26	4,240	2,950
3	1,310	30,900	11	696	9,600	19	67,400	5,700	27	3,590	2,740
4	1,600	37,500	12	664	8,920	20	63,200	4,980	28	3,200	2,600
5	1,260	14,600	13	664	7,230	21	79,000	4,510	29	2,820	2,490
6	1,020	12,100	14	769	13,000	22	19,000	4,070	30	2,750	2,420
7	900	24,300	15	870	13,200	23	9,440	3,700	31		2,370
8	804	32,500	16	1,010	9,820	24	6,530	3,390			
Monthly mean discharge, in cfs										10,780	10,010
Runoff, in acre-feet										641,600	615,600
Runoff, in inches										12.04	11.55

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	3.18	2,400	5.03	5,380	26.69	98,100	14.38	34,100	29.45	115,000	15.29	28,700
4	3.36	2,650	6.25	7,840	26.67	98,000	14.29	33,700	29.10	112,000	14.49	25,400
6	3.24	2,490	8.22	12,300	25.50	91,600	14.75	35,800	28.75	109,000	13.82	22,900
8	3.27	2,530	10.74	19,900	23.81	82,300	15.91	41,000	27.80	102,000	13.25	20,800
10	3.37	2,670	12.86	27,800	22.34	74,200	17.07	46,400	26.77	95,200	12.71	18,900
N	3.41	2,720	14.46	34,500	20.75	65,400	18.74	54,800	25.06	83,500	12.29	17,500
2	3.49	2,840	15.58	39,500	19.23	57,200	20.56	64,400	22.93	69,600	11.87	16,200
4	3.61	3,000	17.31	47,600	17.99	51,000	22.82	76,800	21.25	59,500	11.45	15,000
6	3.73	3,180	20.00	61,300	16.87	45,400	24.68	87,000	19.61	49,800	11.13	14,100
8	3.88	3,410	22.53	75,200	16.05	41,600	26.65	97,900	18.17	42,000	10.81	13,200
10	4.05	3,680	24.42	85,600	15.32	38,300	28.91	111,000	17.08	36,600	10.55	12,600
12	4.31	4,110	25.91	93,800	14.76	35,800	29.47	115,000	16.12	32,200	10.31	12,000
	November 23		November 24		November 25		November 29		November 30		December 1	
4	9.79	10,700	8.23	7,190	7.25	5,320	5.65	2,820	5.58	2,730	5.88	3,130
8	9.49	10,000	8.04	6,810	7.14	5,120	5.61	2,770	5.56	2,710	5.90	3,160
N	9.20	9,330	7.84	6,420	7.12	5,090	5.69	2,880	5.55	2,700	5.87	3,120
4	8.91	8,660	7.70	6,150	7.05	4,960	5.66	2,840	5.56	2,710	5.87	3,120
8	8.66	8,110	7.59	5,940	6.95	4,800	5.63	2,800	5.61	2,770	5.78	2,990
12	8.44	7,630	7.46	5,700	6.87	4,660	5.60	2,760	5.81	3,030	5.67	2,850
	December 2		December 3		December 4		December 5		December 6		December 7	
2	5.64	2,810	5.52	2,660	22.88	69,300	11.23	17,800	8.57	11,500	13.65	24,800
4	5.61	2,770	5.68	2,860	21.00	58,000	10.90	17,000	8.47	11,300	14.20	26,600
6	5.58	2,730	5.93	3,200	19.20	47,500	10.57	16,200	8.37	11,000	14.73	28,400
8	5.55	2,700	6.46	3,990	18.70	44,800	10.30	15,500	8.28	10,800	15.12	29,800
10	5.52	2,660	7.12	5,090	16.40	34,500	10.02	14,800	8.23	10,700	14.98	29,300
N	5.50	2,630	8.30	7,340	15.35	30,600	9.78	14,300	8.22	10,700	14.20	26,600
2	5.48	2,600	15.15	28,100	14.47	27,500	9.57	13,800	8.28	10,800	13.33	23,800
4	5.45	2,560	19.10	47,000	13.67	24,900	9.33	13,200	8.49	11,300	12.68	21,900
6	5.43	2,540	22.50	67,000	12.94	22,700	9.14	12,800	8.90	12,200	12.19	20,500
8	5.43	2,540	24.50	79,800	12.47	21,200	8.99	12,400	9.54	13,700	11.89	19,600
10	5.45	2,560	25.05	83,400	12.01	19,900	8.82	12,000	10.57	16,200	11.99	19,900
12	5.47	2,590	24.35	78,900	11.63	18,900	8.68	11,700	11.78	19,300	12.57	21,600
	December 8		December 9		December 10		December 11		December 12		December 13	
4	12.85	22,400	13.88	25,600	9.36	13,300	7.62	9,380	7.76	9,680	6.83	7,620
8	13.84	25,400	12.54	21,500	8.92	12,300	7.47	9,240	7.57	9,260	6.70	7,370
N	17.15	37,500	11.57	18,700	8.60	11,600	7.66	9,460	7.37	8,820	6.60	7,180
4	18.25	42,600	10.81	16,700	8.31	10,900	7.79	9,740	7.22	8,500	6.50	6,990
8	17.44	38,800	10.30	15,500	8.07	10,300	7.84	9,840	7.09	8,220	6.42	6,830
12	15.65	31,700	9.75	14,200	7.82	9,800	7.96	10,100	6.96	7,940	6.40	6,800

Supplemental record.--Nov. 19, 3 a.m., 26.85 ft, 99,100 cfs; Nov. 21, 1 a.m., 29.5 ft, 115,000 cfs; Dec. 8, 2 p.m., 18.20 ft, 42,400 cfs, 6 p.m., 18.10 ft, 41,800 cfs.

American River at Fair Oaks, Calif.

Location.--Lat 38°38'15", long. 121°15'55", just upstream from highway bridge at Fair Oaks, Sacramento County, and 10 miles downstream from South Fork. Datum of gage is 64.79 ft above mean sea level (levels by Topographic Division, Geological Survey).

Drainage area.--1,921 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 143,000 cfs and extended to peak stage.

Maxima.--November-December 1950: Discharge, 180,000 cfs 4:30 a.m. Nov. 21 (gage height, 31.85 ft).
1904 to October 1950: Discharge, 163,000 cfs Mar. 25, 1928 (gage height, 31.45 ft, present datum), computed on basis of relation of flood stages at Stockton and Coover stone stable near Folsom to discharges at Fair Oaks.

Remarks.--Flow regulated by reservoirs and power plants above station. Many diversions above station for irrigation. Some inflow from Bear and Yuba River basins.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	2,230	4,820	9	1,170	43,800	17	3,360	12,400	25	7,970	5,500
2	1,640	4,310	10	1,120	22,500	18	46,600	10,200	26	6,600	5,230
3	1,820	35,200	11	1,070	16,800	19	109,000	9,030	27	5,580	5,020
4	2,500	76,400	12	997	14,900	20	81,500	7,980	28	4,960	4,850
5	2,180	24,500	13	953	11,800	21	132,000	7,200	29	4,460	4,700
6	1,690	16,500	14	1,050	20,700	22	35,600	6,620	30	4,320	4,660
7	1,460	45,000	15	1,390	24,000	23	17,000	6,140	31		4,660
8	1,290	60,300	16	1,340	16,600	24	10,600	5,750			
Monthly mean discharge, in cfs										16,450	17,360
Runoff, in acre-feet										978,700	1,067,000
Runoff, in inches										9.55	10.42

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	2.52	1,880	4.77	4,900	30.55	162,000	15.10	42,200	31.63	177,000	17.16	53,100
4	2.93	2,340	5.25	5,720	30.58	163,000	15.10	42,200	31.68	178,000	16.11	47,300
6	3.44	2,960	6.16	7,420	30.05	156,000	15.52	44,300	31.43	174,000	15.20	42,700
8	3.84	3,500	7.74	11,300	29.01	143,000	16.34	48,600	31.07	169,000	14.44	38,900
10	3.87	3,540	10.50	20,400	27.26	125,000	17.73	56,200	30.18	157,000	13.72	35,400
N	3.88	3,550	13.24	31,300	25.53	109,000	19.40	65,800	28.97	143,000	13.16	32,900
2	3.97	3,680	15.83	43,400	23.58	93,400	21.13	76,200	27.47	127,000	12.64	30,600
4	4.02	3,750	18.40	57,400	21.57	79,100	23.06	89,400	25.44	108,000	12.15	28,400
6	4.08	3,830	20.75	72,400	19.59	66,900	26.02	113,000	23.43	92,200	11.75	26,700
8	4.19	4,000	24.33	99,100	18.01	57,800	28.35	136,000	21.66	79,700	11.42	25,400
10	4.34	4,220	27.74	129,000	16.72	50,700	30.10	156,000	19.80	68,200	11.08	24,000
12	4.54	4,530	29.60	150,000	15.78	45,600	31.23	171,000	18.38	59,800	10.78	22,800
	November 23		November 24		November 25		November 29		November 30		December 1	
4	10.22	20,600	7.78	11,800	6.62	8,630	4.53	4,560	4.41	4,380	4.74	4,890
8	9.52	17,800	7.52	11,000	6.42	8,150	4.42	4,400	4.38	4,340	4.79	4,970
N	9.17	16,500	7.29	10,400	6.28	7,820	4.39	4,360	4.35	4,300	4.70	4,830
4	8.79	15,200	7.13	9,940	6.22	7,680	4.46	4,460	4.28	4,190	4.68	4,800
8	8.46	14,000	6.92	9,390	6.12	7,460	4.43	4,420	4.33	4,260	4.70	4,830
12	8.13	12,900	6.76	8,980	6.00	7,200	4.42	4,400	4.49	4,500	4.60	4,670
	December 2		December 3		December 4		December 5		December 6		December 7	
2	4.54	4,580	4.30	4,220	28.20	134,000	12.91	31,800	9.41	17,300	12.19	28,600
4	4.48	4,490	4.33	4,260	27.10	123,000	12.42	29,600	9.23	16,700	13.84	36,000
6	4.43	4,420	4.41	4,380	25.30	107,000	12.02	27,800	9.07	16,100	15.96	46,500
8	4.40	4,370	4.63	4,720	23.20	90,500	11.72	26,600	8.92	15,600	16.98	52,100
10	4.39	4,360	5.18	5,620	21.38	77,900	11.32	25,000	8.82	15,300	17.55	55,200
N	4.34	4,280	6.15	77,530	19.70	67,600	11.05	23,900	8.73	15,000	17.98	57,600
2	4.28	4,190	7.88	12,100	18.13	58,400	10.70	22,500	8.67	14,700	17.80	56,600
4	4.25	4,150	13.05	32,400	16.83	51,300	10.44	21,500	8.67	14,700	16.94	51,900
6	4.23	4,120	18.80	62,200	15.72	45,300	10.21	20,500	8.84	15,300	15.78	45,600
8	4.25	4,150	23.55	93,100	14.83	40,800	10.00	19,700	9.23	16,700	14.85	41,000
10	4.27	4,180	26.97	122,000	14.05	37,000	9.75	18,700	10.00	19,700	14.25	38,000
12	4.28	4,190	28.24	135,000	13.45	34,200	9.57	18,000	10.91	23,300	14.13	37,400
	December 8		December 9		December 10		December 11		December 12		December 13	
4	14.90	41,200	18.24	59,000	11.52	25,800	9.36	17,200	9.18	16,500	8.03	12,600
8	15.45	44,000	16.15	47,500	11.02	23,800	9.11	16,300	8.92	15,600	7.86	12,000
N	17.70	56,000	14.67	40,000	10.61	22,100	9.04	16,000	8.68	14,800	7.74	11,700
4	21.80	80,600	13.55	34,700	10.27	20,800	9.23	16,700	8.51	14,200	7.62	11,300
8	22.40	84,700	12.73	31,000	9.96	19,500	9.35	17,100	8.33	13,600	7.56	11,100
12	20.68	73,500	12.10	28,200	9.62	18,200	9.25	16,800	8.19	13,100	7.50	11,000

Supplemental record.--Nov. 19, 3 a.m., 30.65 ft, 163,000 cfs; Nov. 21, 4:30 a.m., 31.85 ft, 180,000 cfs; Dec. 4, 1 a.m., 28.35 ft, 136,000 cfs; Dec. 8, 6:30 p.m., 22.58 ft, 86,000 cfs.

American River at Sacramento, Calif.

Location.--Lat 38°34'05", long. 121°25'20", at H Street Bridge, just east of Sacramento, Sacramento County, 6.5 miles upstream from mouth. Zero of gage is set to datum of Corps of Engineers. Auxiliary gage on Southern Pacific R. R. bridge at Elvas about three miles downstream.

Gage-height record.--Water-stage recorder graph except for period 6 p.m. Nov. 18 to 1 p.m. Nov. 19, when graph based on hourly telemark readings was used. Gage-height record at auxiliary water-stage recorder doubtful Dec. 20-29.

Discharge record.--Stage-fall-discharge relation defined by current-meter measurements below 82,000 cfs and extended to peak stage. Backwater from Sacramento River during periods Nov. 19-27, Dec. 4-29. Discharge Nov. 19-27, Dec. 4-19 computed by using fall between base and auxiliary gages as a factor; Dec. 20-29 computed on basis of records for station at Fair Oaks.

Maxima.--November-December 1950: Discharge, 106,000 cfs, in main channel only, 9 a.m. Nov. 21 (gage height, 45.73 ft).
1921, 1929-32, 1934 to October 1950: Discharge not determined.

Remarks.--Unmeasured flow on right bank bypassed gage on Nov. 19-22, Dec. 3, 4, 7, 8. Maximum unmeasured flow estimated as 70,000 cfs on Nov. 21. Flood flows not significantly affected by storage, diversions, or inflow from Bear and Yuba River Basins.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	2,460	4,840	9	1,160	44,800	17	2,880	12,100	25	9,230	5,700
2	1,650	4,360	10	1,060	24,000	18	20,500	9,790	26	7,260	5,400
3	1,730	15,200	11	1,010	17,300	19	77,000	8,880	27	5,930	5,200
4	2,310	62,500	12	928	15,800	20	54,700	8,100	28	5,320	4,900
5	2,300	24,600	13	880	12,500	21	94,300	7,300	29	4,700	4,800
6	1,700	16,300	14	892	19,000	22	39,800	6,700	30	4,340	4,680
7	1,440	38,000	15	1,290	23,400	23	18,800	6,300	31		4,660
8	1,270	48,600	16	1,270	15,400	24	11,400	5,900			
Monthly mean discharge, in cfs										12,650	15,710
Runoff, in acre-feet										752,700	966,000
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	19.54	1,360	21.36	4,320	40.66	72,100	36.55	45,200	43.87	92,600	38.77	58,200
4	19.63	1,480	21.56	4,720	42.12	80,900	35.84	42,400	44.70	98,600	37.83	51,000
6	19.86	1,800	21.78	5,160	43.40	89,400	35.44	41,300	45.40	104,000	36.97	47,300
8	20.24	2,370	22.31	6,300	43.96	93,200	35.42	41,900	45.70	106,000	36.09	43,900
10	20.62	2,980	23.38	8,680	43.90	92,800	35.77	44,400	45.70	106,000	35.36	41,100
N	20.87	3,420	25.15	12,800	43.36	89,100	36.45	48,100	45.50	105,000	34.59	38,100
2	20.94	3,540	27.50	18,700	42.62	84,100	37.46	53,500	45.00	101,000	33.75	35,100
4	20.96	3,580	30.10	26,100	41.64	77,900	38.50	59,500	44.36	96,100	33.26	33,400
6	21.03	3,710	32.10	32,800	40.45	70,900	39.35	64,900	43.44	89,600	32.60	29,500
8	21.07	3,780	34.04	40,200	39.34	62,000	40.30	70,000	42.33	82,300	32.10	28,600
10	21.13	3,890	36.55	51,100	38.33	54,700	41.70	78,300	41.22	75,400	31.60	26,500
12	21.23	4,070	39.45	65,400	37.35	48,400	42.83	85,500	39.75	64,500	31.25	24,800
	November 23		November 24		November 25		November 29		November 30		December 1	
4	30.55	23,000	27.68	13,300	26.37	10,200	21.94	5,040	21.66	4,480	21.67	4,500
8	29.80	19,600	27.35	12,300	26.20	9,920	21.83	4,820	21.64	4,440	21.89	4,940
N	29.31	18,300	27.02	11,100	25.99	9,320	21.70	4,560	21.60	4,360	21.98	5,120
4	28.86	16,900	26.76	10,100	25.77	8,730	21.62	4,400	21.56	4,280	21.92	5,000
8	28.45	15,300	26.57	9,570	25.60	8,420	21.67	4,500	21.48	4,130	21.89	4,940
12	28.08	14,500	26.39	9,400	25.43	8,190	21.67	4,500	21.50	4,170	21.89	4,940
	December 2		December 3		December 4		December 5		December 6		December 7	
2	21.85	4,860	21.39	3,960	41.35	76,100	34.43	31,700	30.35	18,100	30.30	21,800
4	21.80	4,760	21.40	3,980	42.43	82,900	33.94	29,300	30.14	17,400	31.35	25,900
6	21.74	4,640	21.43	4,040	42.61	84,100	33.52	28,200	29.93	16,800	32.55	30,900
8	21.69	4,540	21.46	4,090	42.10	80,800	33.06	26,900	29.73	16,200	34.25	36,300
10	21.63	4,420	21.53	4,220	41.17	75,000	32.68	25,100	29.55	15,600	35.55	42,700
N	21.59	4,340	21.70	4,560	40.02	68,400	32.31	23,800	29.40	15,500	36.25	44,400
2	21.56	4,280	22.15	5,480	38.83	58,400	32.00	22,700	29.25	15,300	36.95	48,700
4	21.50	4,170	23.87	9,260	37.89	50,900	31.67	21,500	29.19	15,100	37.12	49,600
6	21.43	4,040	28.00	19,500	37.05	45,200	31.38	20,400	29.12	15,100	36.75	46,200
8	21.40	3,980	33.20	36,500	36.23	40,300	31.10	19,600	29.12	15,300	36.18	42,600
10	21.37	3,920	37.00	53,200	35.64	37,800	30.81	18,800	29.25	16,400	35.44	39,100
12	21.37	3,920	39.10	63,500	35.04	36,500	30.55	18,100	29.65	19,100	34.86	36,700
	December 8		December 9		December 10		December 11		December 12		December 13	
4	34.49	37,400	38.85	59,800	31.70	28,000	28.98	18,000	28.58	17,400	27.80	13,500
8	35.06	40,800	37.35	49,500	31.07	25,500	28.72	17,300	28.45	16,800	27.63	13,200
N	35.68	43,400	35.72	40,500	30.57	23,800	28.46	16,400	28.29	15,700	27.47	12,100
4	37.66	54,200	34.47	37,300	30.06	21,700	28.41	16,600	28.14	15,000	27.37	11,900
8	39.30	64,600	33.35	33,300	29.69	20,200	28.57	17,200	28.08	14,600	27.27	11,600
12	39.68	66,600	32.46	30,100	29.35	19,100	28.63	17,500	27.95	13,600	27.22	11,500

Supplemental record.--Dec. 8, 2 a.m., 34.55 ft, 36,600 cfs, 6 a.m., 34.74 ft, 39,000 cfs, 10 a.m., 35.27 ft, 41,300 cfs, 2 p.m., 36.52 ft, 48,100 cfs, 6 p.m., 38.58 ft, 60,300 cfs, 10 p.m., 39.64 ft, 66,400 cfs.

Middle Fork American River near Auburn, Calif.

Location.--Lat 38°55', long. 121°00', in NW¼ sec. 5, T. 12 N., R. 9 E., at Mountain Quarry Co.'s plant, 1.7 miles upstream from mouth and 3.5 miles northeast of Auburn. Datum of gage is 568.5 ft above mean sea level (river-profile survey).

Drainage area.--619 sq mi.

Gage-height record.--Water-stage recorder graph except for period Nov. 19 to Dec. 31 when there was no gage-height record.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 11,000 cfs and extended to peak stage on basis of slope-area determination.

Maxima.--November-December 1950: Discharge, 68,500 cfs Nov. 20 (gage height, 34.7 ft, from floodmarks).
1911 to October 1950: Discharge, about 62,000 cfs March 25, 1928 (gage height, 35.6 ft, former site and datum; 34.5 ft, present site and datum, from floodmarks).

Remarks.--Flood flow not affected by small storage and diversions above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	696		9	332		17	1,700		25		
2	580		10	304		18	28,600		26		
3	742		11	275		19			27		
4	962		12	242		20			28		
5	643		13	234		21			29		
6	540		14	325		22			30		
7	451		15	354		23			31		
8	377		16	448		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	Discharge	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge
	November 16		November 17		November 18		November 20		November 21		November 22	
2	2.70	308	5.48	1,290	9.57	4,320						
4	2.69	306	5.50	1,300	11.23	6,450						
6	2.70	308	5.66	1,380	13.40	10,300						
8	2.72	313	5.73	1,420	15.50	14,700						
10	2.75	320	5.80	1,450	17.50	19,600						
N	2.87	349	5.96	1,530	19.00	23,500						
2	3.09	405	6.25	1,680	20.60	28,000						
4	3.24	445	6.50	1,820	22.80	34,400						
6	3.48	514	6.85	2,010	25.30	42,200						
8	3.88	643	7.06	2,140	27.25	48,400						
10	4.25	772	7.45	2,400	28.70	53,200						
12	5.00	1,080	8.20	2,980	30.1	57,900						
	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												

Rubicon River near Georgetown, Calif.

Location.--Lat 38°58', long. 120°29', in SE¼ sec. 23, T. 13 N., R. 13 E., 1 mile downstream from Little South Fork Rubicon River and 20 miles east of Georgetown. Altitude of gage, about 3,500 ft (from topographic map).

Drainage area.--198 sq mi (by Bureau of Reclamation).

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 2,700 cfs and extended to peak stage on basis of slope-area determination.

Maxima.--November-December 1950: Discharge, 44,600 cfs 10 p.m. Nov. 18 (gage height, 18.10 ft).
1943 to October 1950: Discharge, 9,620 cfs Feb. 2, 1945 (gage height, 13.25 ft), from rating curve extended above 2,100 cfs by logarithmic plotting.

Remarks.--Flood flows not significantly affected by storage above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	344	712	9	171	4,250	17	1,520	1,270	25	967	499
2	453	558	10	145	2,410	18	19,900	1,080	26	798	454
3	718	15,800	11	123	1,920	19	14,600	926	27	686	424
4	564	6,900	12	113	1,620	20	20,600	815	28	582	400
5	374	2,550	13	114	1,290	21	15,900	720	29	529	379
6	271	3,790	14	131	4,010	22	2,960	644	30	750	373
7	210	7,560	15	129	2,500	23	1,700	588	31		352
8	185	11,900	16	323	1,710	24	1,210	540			
Monthly mean discharge, in cfs										2,902	2,547
Runoff, in acre-feet										172,700	156,600
Runoff, in inches										16.35	14.83

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 16		November 17		November 18		November 19		November 20		November 21	
2	3.05	140	5.38	784	10.19	4,990	17.00	32,500	11.09	6,340	16.80	30,700
4	3.08	144	5.54	860	10.89	6,000	16.43	27,600	11.34	6,800	16.60	29,000
6	3.14	152	5.79	985	11.60	7,320	15.54	21,500	11.92	8,000	16.30	26,600
8	3.21	163	5.95	1,070	12.26	8,790	14.46	16,000	13.25	8,770	15.61	21,900
10	3.38	192	6.05	1,130	12.90	10,400	13.35	11,800	14.72	17,100	14.65	16,800
N	3.60	232	6.07	1,150	14.26	15,100	12.65	9,780	15.49	21,200	13.31	11,700
2	3.96	308	6.19	1,220	15.59	21,800	12.05	8,300	16.14	25,400	12.59	9,620
4	4.54	462	6.60	1,490	16.34	26,900	11.65	7,400	16.88	31,400	11.82	7,770
6	4.65	497	7.20	1,950	16.98	32,300	11.21	6,560	17.35	36,000	11.17	6,490
8	4.84	563	7.60	2,280	17.65	39,200	10.82	5,890	17.00	32,500	10.61	5,560
10	4.96	610	8.30	2,910	18.10	44,600	10.57	5,500	17.10	33,400	10.19	4,990
12	5.15	686	9.50	4,190	17.67	39,400	10.73	5,750	17.15	33,900	9.73	4,420
	November 22		November 23		November 24		November 25		November 30		December 1	
4	9.06	3,670	7.21	1,940	6.37	1,310	5.90	1,030	4.73	517	5.46	811
8	8.59	3,170	7.04	1,810	6.29	1,270	5.83	995	5.02	626	5.32	748
N	8.22	2,820	6.87	1,670	6.18	1,200	5.78	970	5.57	865	5.18	690
4	7.91	2,540	6.73	1,560	6.11	1,160	5.72	940	5.74	950	5.11	662
8	7.66	2,310	6.61	1,480	6.03	1,110	5.63	895	5.60	880	5.06	642
12	7.40	2,100	6.49	1,400	5.97	1,070	5.59	875	5.48	820	5.00	618
	December 2		December 3		December 4		December 5		December 6		December 7	
2	4.98	610	5.35	795	13.48	13,000	8.34	3,150	7.20	2,040	12.29	9,720
4	4.96	602	7.13	1,980	12.60	10,500	8.17	2,970	7.14	1,990	12.36	9,900
6	4.93	590	9.75	4,990	11.83	8,660	8.03	2,810	7.12	1,980	12.13	9,320
8	4.87	566	11.53	8,060	11.10	7,200	7.91	2,690	7.15	2,000	11.76	8,520
10	4.83	552	13.16	12,000	10.95	6,910	7.79	2,570	7.29	2,110	11.31	7,620
N	4.77	531	14.75	18,100	9.94	5,260	7.68	2,460	7.50	2,300	10.78	6,600
2	4.74	520	15.70	23,200	9.55	4,710	7.58	2,370	8.15	2,940	10.32	5,850
4	4.73	517	16.46	28,100	9.30	4,360	7.50	2,300	8.95	3,900	10.10	5,580
6	4.73	517	16.77	30,600	9.07	4,060	7.43	2,240	9.75	4,990	10.53	6,190
8	4.77	531	16.38	27,600	8.87	3,800	7.36	2,170	11.15	7,300	10.88	6,780
10	4.83	552	16.06	25,400	8.68	3,560	7.30	2,120	11.75	8,500	10.87	6,770
12	4.97	606	14.75	18,100	8.52	3,360	7.25	2,080	11.94	8,880	10.91	6,840
	December 8		December 9		December 10		December 11		December 12		December 13	
4	12.15	9,380	10.05	5,420	7.95	2,730	7.06	1,930	6.85	1,760	6.33	1,370
8	14.07	15,200	9.38	4,470	7.76	2,540	6.94	1,830	6.76	1,690	6.26	1,320
N	14.50	17,000	8.92	3,870	7.59	2,380	7.00	1,880	6.67	1,620	6.18	1,270
4	13.60	13,400	8.63	3,500	7.42	2,230	7.20	2,040	6.58	1,550	6.12	1,230
8	12.25	9,620	8.38	3,200	7.28	2,100	7.07	1,940	6.48	1,480	6.07	1,200
12	11.06	7,120	8.16	2,960	7.17	2,020	6.94	1,830	6.41	1,430	6.16	1,260

Georgetown ditch above Pilot Creek, near Georgetown, Calif.

Location.--Wooden control, lat 38°56', long. 120°29', in SW¼ sec. 25, T. 13 N., R. 13 E., 0.5 mile northeast of Uncle Toms Cabin and 20 miles east of Georgetown. Altitude of gage, about 5,070 ft (from topographic map).

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

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

Maxima.--November-December 1950: Daily discharge, 11 cfs Nov. 18.
1947 to October 1950: Daily discharge, 27 cfs Aug. 15-19, 1949, Sept. 30, 1950.

Remarks.--Ditch diverts from Gerle Creek, Rubicon River Basin, into Pilot Creek and at times from Little South Fork Rubicon River. Flow is then diverted from Pilot Creek about 8 miles downstream, for domestic and irrigation purposes in vicinity of Georgetown (see Georgetown ditch near Georgetown, p.721).

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	0	0	9	0	0	17	0	0	25	0	0
2	0	0	10	0	0	18	11	0	26	0	0
3	0	.3	11	0	0	19	6.6	0	27	0	0
4	0	.2	12	0	0	20	3.4	0	28	0	0
5	0	0	13	0	0	21	4.8	0	29	0	0
6	0	0	14	0	0	22	0	0	30	0	0
7	0	0	15	0	0	23	0	0	31		0
8	0	.2	16	0	0	24	0	0			
Monthly mean discharge, in cfs										0.86	0.02
Runoff, in acre-feet										51	1.4
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												
4												
6												
8												
10												
N												
2												
4												
6												
8												
10												
12												
	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												

Pilot Creek near Georgetown, Calif.

Location.--Lat 38°54', long. 120°29', in NE¼ sec. 10, T. 12 N., R. 12 E., 1.8 miles upstream from Mutton Canyon and 12 miles east of Georgetown. Altitude of gage, about 4,000 ft (from topographic map).

Drainage area.--14.5 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 150 cfs and extended to peak stage on basis of slope-area determination. Shifting-control method used Nov. 1-16.

Maxima.--November-December 1950: Discharge, 3,040 cfs 9 p.m. Nov. 18 (gage height, 10.84 ft).
1946 to October 1950: Discharge, 435 cfs probably Feb. 6, 1950 (gage height, 8.78 ft).

Remarks.--Some inflow and diversion above station (see records for Georgetown ditch above Pilot Creek near Georgetown, p.720and Georgetown ditch near Georgetown p. 721, which diverts about 1 mile above station).

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	15	48	9	5.2	395	17	63	123	25	94	55
2	12	44	10	4.9	245	18	1,300	108	26	76	56
3	10	671	11	4.9	191	19	614	97	27	64	48
4	8.7	516	12	4.7	150	20	1,020	86	28	55	45
5	7.6	245	13	6.3	124	21	845	78	29	50	42
6	6.7	212	14	8.3	216	22	282	71	30	53	42
7	5.8	276	15	6.9	171	23	175	65	31		40
8	5.6	677	16	23	142	24	124	59			
Monthly mean discharge, in cfs										165	172
Runoff, in acre-feet										9,820	10,590
Runoff, in inches										12.70	13.69

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	6.30	45	7.57	204	10.09	1,400	8.10	304	10.11	1,420		
4	6.28	44	8.01	285	9.64	975	8.33	360	10.01	1,300	8.25	340
6	6.25	42	8.37	372	9.27	740	8.54	424	9.91	1,200		
8	6.24	41	8.67	469	8.95	581	8.90	559	9.67	998	8.08	300
10	6.29	44	9.13	665	8.72	488	9.29	750	9.49	872		
N	6.36	50	9.74	1,050	8.54	424	9.58	932	9.31	762	7.94	272
2	6.45	57	10.10	1,410	8.39	377	9.91	1,200	9.09	645		
4	6.48	59	10.40	1,890	8.25	340	10.14	1,470	8.93	572	7.82	249
6	6.61	71	10.57	2,270	8.13	311	10.32	1,750	8.78	510		
8	6.80	90	10.79	2,880	8.04	291	10.36	1,820	8.65	462	7.72	231
10	7.03	118	10.80	2,910	7.98	279	10.33	1,760	8.53	421		
12	7.27	153	10.46	2,020	8.05	294	10.22	1,580	8.42	386	7.64	216
	November 23		November 24		November 25		November 29		November 30		December 1	
4	7.53	196	7.16	136	6.90	102	6.39	52	6.42	55	6.38	51
8	7.46	184	7.12	130	6.86	97	6.37	51	6.44	56	6.36	50
N	7.40	174	7.08	124	6.83	94	6.36	50	6.41	54	6.33	47
4	7.34	164	7.03	118	6.80	90	5.35	49	6.37	51	6.32	47
8	7.27	153	6.98	112	6.77	87	6.34	48	6.35	49	6.30	45
12	7.21	144	6.93	106	6.73	83	6.36	50	6.37	51	6.29	44
	December 2		December 3		December 4		December 5		December 6		December 7	
2			6.65	75	9.46	853						
4	6.29	44	6.85	96	9.25	728	7.97	277	7.52	195	8.01	285
6			7.17	138	9.06	631						
8	6.26	42	7.62	213	8.90	559	7.87	258	7.49	189	7.88	260
10			8.15	316	8.74	495						
N	6.25	42	8.70	480	8.61	448	7.78	241	7.57	204	7.80	245
2			9.13	665	8.49	408						
4	6.25	42	9.69	1,010	8.41	383	7.69	225	7.61	211	7.92	268
6			10.08	1,390	8.32	358						
8	6.29	44	10.30	1,710	8.23	334	7.63	214	7.77	240	8.10	304
10			10.10	1,410	8.16	318						
12	6.45	57	9.72	1,040	8.09	302	7.57	204	7.90	264	8.20	327
	December 8		December 9		December 10		December 11		December 12		December 13	
4	8.53	421	8.71	484	7.94	272	7.54	198	7.33	163	7.12	130
8	9.14	670	8.53	421	7.87	258	7.49	189	7.28	155	7.09	126
N	9.55	912	8.38	374	7.79	243	7.57	204	7.24	148	7.06	122
4	9.54	905	8.26	342	7.71	229	7.50	191	7.21	144	7.03	118
8	9.20	701	8.15	316	7.65	218	7.42	177	7.17	138	7.02	117
12	8.94	577	8.05	294	7.60	209	7.37	169	7.14	133	7.13	132

Supplemental record.--Nov. 18, 9 p.m., 10.84 ft, 3,040 cfs.

Georgetown ditch near Georgetown, Calif.

Location.--Lat 38°54', long. 120°37', in NE¼ sec. 10, T. 12 N., R. 12 E., 12 miles east of Georgetown.

Gage-height record.--Water-stage recorder graph except for period Nov. 1-10, when there was no gage-height record.

Discharge record.--Stage-discharge relation defined by current-meter measurements. Discharge for period of no gage-height record computed on basis of records for Pilot Creek near Georgetown. Shifting-control method used Nov. 11 to Dec. 31.

Maxima.--November-December 1950: Daily discharge, 14 cfs Nov. 18.
1947 to October 1950: Daily discharge, 32 cfs July 11, 1950.

Remarks.--Ditch diverts from Pilot Creek, about one mile above gaging station on Pilot Creek, for domestic and irrigation use in vicinity of Georgetown. (Also see Georgetown ditch above Pilot Creek, near Georgetown p.720.)

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	5	1.7	9	4	7.8	17	6.1	3.2	25	2.8	1.6
2	5	1.6	10	4	5.6	18	14	3.0	26	2.4	1.6
3	4.5	5.4	11	3.7	4.5	19	7.8	2.6	27	2.2	2.0
4	4.5	7.8	12	3.7	3.8	20	7.8	2.4	28	2.0	2.8
5	4.5	5.2	13	3.8	3.3	21	10	2.2	29	1.8	2.9
6	4.5	4.6	14	4.0	4.0	22	5.7	2.0	30	1.8	2.8
7	4	5.4	15	3.8	3.8	23	4.1	1.8	31		2.8
8	4	9.4	16	4.9	3.4	24	3.4	1.8			
Monthly mean discharge, in cfs										4.66	3.64
Runoff, in acre-feet										277	224
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												
4												
6												
8												
10												
N												
2												
4												
6												
8												
10												
12												
	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												
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12												
	December 8		December 9		December 10		December 11		December 12		December 13	
4												
8												
N												
4												
8												
12												

South Fork American River near Kyburz, Calif.

Location.--Lat 38°46', long. 120°19', in S½ sec. 29, T. 11 N., R. 15 E., beside Lincoln highway, 0.7 mile downstream from Silver Fork of South Fork and 2 miles west of Kyburz. Altitude of gage, about 4,030 ft (from topographic map).

Drainage area.--196 sq mi.

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

Discharge record.--Stage-discharge relation by current-meter measurements below 6,500 cfs and extended to peak stage on basis of contracted-opening determination.

Maxima.--October-November 1950: Discharge, 14,500 cfs 2 a.m. Nov. 21 (gage height, 9.40 ft).
1922 to October 1950: Discharge, 9,700 cfs Dec. 11, 1937 (gage height, 8.55 ft), from rating curve extended above 4,000 cfs on basis of velocity-area studies.

Remarks.--Flow partly regulated by four reservoirs. El Dorado Canal diverts 0.5 mile above station (see p.726).

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	151	527	9	107	3,140	17	217	944	25	1,010	510
2	188	471	10	91	2,000	18	4,360	832	26	860	417
3	263	6,340	11	51	1,550	19	5,040	752	27	698	381
4	216	3,860	12	18	1,300	20	8,620	669	28	540	361
5	164	1,910	13	61	1,110	21	8,100	614	29	456	357
6	134	2,780	14	89	2,120	22	3,060	560	30	592	381
7	118	5,060	15	75	1,320	23	1,790	535	31		357
8	111	6,460	16	93	1,080	24	1,230	500			
Monthly mean discharge, in cfs										1,283	1,587
Runoff, in acre-feet										76,370	97,580
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	2.62	134	4.58	1,040	7.78	7,330	6.39	3,420	9.40	14,500	6.53	4,060
4	2.66	141	5.04	1,460	7.50	6,400	6.65	3,970	8.90	12,000	6.38	3,760
6	2.68	145	5.56	2,060	7.30	5,800	6.65	3,970	8.50	10,200	6.25	3,530
8	2.70	149	6.05	2,800	7.35	5,950	7.35	5,950	8.20	8,900	6.10	3,260
10	2.82	174	6.49	3,620	7.27	5,710	7.65	6,880	7.95	7,920	6.00	3,100
N	2.84	179	7.10	5,200	7.00	4,900	8.88	11,900	7.75	7,230	5.88	2,920
2	2.89	190	7.25	5,650	6.92	4,660	8.90	12,000	7.50	6,420	5.80	2,810
4	2.93	199	7.60	6,700	6.82	4,390	8.85	11,800	7.35	5,990	5.70	2,670
6	3.02	221	7.65	6,880	6.62	3,900	8.80	11,600	7.15	5,470	5.60	2,530
8	3.22	278	7.55	6,550	6.45	3,540	8.80	11,600	7.00	5,080	5.52	2,430
10	3.55	399	7.60	6,700	6.21	3,080	8.95	12,200	6.85	4,750	5.45	2,340
12	4.06	665	7.56	6,580	6.25	3,150	9.15	13,200	6.67	4,350	5.37	2,230
	November 23		November 24		November 25		November 26		December 1		December 2	
4	5.24	2,070	4.58	1,370	4.18	1,060	3.97	910	3.42	581	3.19	466
8	5.12	1,920	4.48	1,280	4.15	1,040	3.93	884	3.32	530	3.14	443
N	5.00	1,790	4.40	1,220	4.10	1,000	3.90	865	3.27	505	3.15	448
4	4.85	1,630	4.32	1,160	4.07	979	3.87	846	3.27	505	3.20	470
8	4.75	1,530	4.28	1,130	4.03	951	3.82	813	3.27	505	3.23	485
12	4.65	1,340	4.24	1,100	4.00	930	3.73	758	3.22	480	3.40	570
	December 3		December 4		December 5		December 6		December 7		December 8	
2	3.84	826	7.45	6,270	5.43	2,310	4.72	1,500	7.55	6,570	7.23	5,680
4	4.84	1,620	7.05	5,210	5.36	2,220	4.70	1,480	7.70	7,060	7.58	6,660
6	5.66	2,610	6.75	4,530	5.28	2,120	4.68	1,460	7.55	6,570	8.01	8,140
8	6.40	3,800	6.50	4,000	5.22	2,040	4.74	1,520	7.15	5,470	8.13	8,620
10	7.25	5,730	6.35	3,710	5.16	1,970	4.84	1,620	6.90	4,860	7.99	8,060
N	7.75	7,230	6.15	3,350	5.10	1,900	4.94	1,720	6.68	4,380	7.88	7,680
2	8.25	9,100	6.05	3,180	5.05	1,840	5.18	2,000	6.53	4,060	7.66	6,920
4	8.55	10,400	5.90	2,950	4.92	1,700	5.85	2,880	6.48	3,960	7.38	6,070
6	8.65	10,900	5.80	2,810	4.87	1,650	6.20	3,440	6.53	4,060	7.20	5,600
8	8.55	10,400	5.70	2,670	4.83	1,610	7.15	5,470	6.58	4,160	6.98	5,040
10	8.30	9,300	5.60	2,530	4.78	1,560	7.50	6,420	6.58	4,160	6.81	4,660
12	7.90	7,750	5.50	2,400	4.75	1,530	7.40	6,120	6.78	4,600	6.63	4,270
	December 9		December 10		December 11		December 12		December 13		December	
4	6.38	3,760	5.38	2,240	4.86	1,640	4.58	1,370	4.32	1,160		
8	6.16	3,370	5.26	2,090	4.80	1,580	4.54	1,340	4.27	1,120		
N	5.94	3,010	5.16	1,970	4.76	1,540	4.48	1,280	4.24	1,100		
4	5.78	2,790	5.06	1,860	4.72	1,500	4.44	1,250	4.21	1,080		
8	5.64	2,590	5.00	1,790	4.68	1,460	4.40	1,220	4.18	1,060		
12	5.50	2,400	4.92	1,700	4.64	1,430	4.36	1,190	4.18	1,060		

Supplemental record.--Nov. 18, 5 p.m., 7.90 ft, 7,750 cfs.

South Fork American River near Camino, Calif.

Location.--Lat 38°46', long. 120°42', in SW¼ sec. 25, T. 11 N., R. 11 E., 300 ft upstream from Iowa Canyon Creek, 1 mile downstream from intake of American River flume, and 3 miles northwest of Camino. Altitude of gage, about 1,640 ft (from topographic map).

Drainage area.--497 sq mi.

Gage-height record.--Water-stage recorder and graph destroyed Nov. 18. Once-daily recorder readings, Nov. 1-18. Readings from temporary staff gage: Dec. 8-15, 18-23, 25-31 (twice daily); Nov. 25, Dec. 3, 7, 16-17, 24 (once daily); Nov. 27 to Dec. 1, Dec. 4-6 (doubtful gage readings); Nov. 19-24, 26, Dec. 2 (no gage reading). Graph based on gage readings used Nov. 1-4, 11-16, Dec. 13-16.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 24,000 cfs and extended to peak stage on basis of flow at stations upstream and downstream. Discharge for Nov. 17, 18, Dec. 3, 7-10 and periods of doubtful or no gage-height record computed from hydrograph based on occasional gage readings and records for station near Kyburz and Coloma (unpublished).

Maxima.--November-December 1950: Discharge, 46,000 cfs about 2 a.m. Nov. 21 (gage height, 29.4 ft from floodmarks).
1922 to October 1950: Discharge, 34,400 cfs Dec. 11, 1937 (gage height, 25.5 ft, from floodmarks in gage house), from rating curve extended above 14,000 cfs on basis of velocity-area studies.

Remarks.--Flow partly regulated by four reservoirs. Diversion above station by American flume (see p.731) and El Dorado Canal (see p.726).

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	273	1,500	9	91	9,800	17	752	2,950	25	2,570	1,540
2	374	1,300	10	73	6,180	18	17,500	2,700	26	2,150	1,450
3	737	17,000	11	44	4,830	19	21,000	2,410	27	1,850	1,360
4	692	13,000	12	14	3,850	20	23,000	2,200	28	1,600	1,300
5	341	4,900	13	51	3,300	21	26,000	2,050	29	1,500	1,270
6	196	5,800	14	135	6,020	22	8,000	1,850	30	1,600	1,270
7	137	16,000	15	97	4,200	23	4,300	1,700	31		1,290
8	106	20,000	16	255	3,540	24	3,100	1,620			
Monthly mean discharge, in cfs										3,951	4,780
Runoff, in acre-feet										235,100	293,900
Runoff, in inches										8.87	11.09

Echo Lake conduit near Vade, Calif.

Location.--Lat 38°50', long. 120°02', in NW¼ sec. 6, T. 11 N., R. 18 E., 0.5 mile downstream from intake and 2 miles northeast of Vade post office. Altitude of gage, about 7,500 ft (from topographic map).

Gage-height record.--None.

Discharge record.--Estimates of discharge were based on lake tender's occasional observations of flow and condition of intake.

Remarks.--Flood runoff through the conduit occurred subsequent to the regular seasonal diversion. Conduit diverts from Echo Lake in Truckee River Basin into basin of South Fork American River for power and irrigation.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	0		9	0	0	17		0	25		0
2	0	10	10	0	0	18	10	0	26		0
3	0		11	0	0	19		0	27	15	0
4	0		12	0	0	20		0	28		0
5	0	5	13	5	0	21		0	29		0
6	0	0	14		0	22	15	0	30		0
7	0	0	15	10	0	23		0	31		0
8	0	0	16		0	24		0			
Monthly mean discharge, in cfs										8.00	1.45
Runoff, in acre-feet										476	89
Runoff, in inches										-	-

Medley Lakes Outlet near Vade, Calif.

Location.--Lat 38°51', long. 120°08', in NW¼ sec. 32, T. 12 N., R. 17 E., 1 mile downstream from main dam at Medley Lakes and 5 miles northwest of Vade post office. Altitude of gage, about 8,100 ft (from topographic map).

Drainage area.--4.2 sq mi.

Gage-height record.--Water-stage recorder graph except for the period 8 a.m. Nov. 24 to 1 p.m. Nov. 28.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 150 cfs and extended to peak stage by logarithmic plotting. Discharge for period Nov. 24-28 computed on basis of normal recession and records for nearby stations.

Maxima.--November-December 1950: Discharge, 388 cfs 2 p.m. Dec. 8 (gage height, 4.80 ft).
1922 to October 1950: Discharge, 202 cfs June 15, 16, 1929 (gage height, 3.42 ft).

Remarks.--Flow affected by Medley Lakes Reservoir.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	6.8	52	9	5.7	137	17	7.8	39	25	24	35
2	8.0	51	10	5.3	59	18	11	38	26	19	34
3	9.4	101	11	5.1	44	19	112	38	27	15	34
4	10	151	12	4.9	41	20	45	37	28	16	34
5	8.3	74	13	4.7	41	21	112	36	29	46	34
6	7.3	89	14	5.5	42	22	78	36	30	53	34
7	6.5	225	15	6.1	41	23	49	36	31		34
8	6.1	297	16	5.3	39	24	29	36			
Monthly mean discharge, in cfs										24.1	65.1
Runoff, in acre-feet										1,430	4,000
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	0.84	7.3	0.82	6.8	1.86	57	1.90	60	2.63	121	2.13	77
4	.87	8.0	.83	7.0	2.21	84	1.75	49	2.87	145	2.16	80
6	.89	8.6	.84	7.3	2.55	114	1.65	43	2.85	143	2.20	83
8	.89	8.6	.88	8.3	2.80	138	1.58	39	2.64	122	2.22	85
10	.89	8.6	.91	9.1	2.90	148	1.48	33	2.52	111	2.21	84
N	.88	8.3	.93	9.7	2.92	150	1.42	30	2.52	111	2.20	83
2	.87	8.0	.95	10	2.88	146	1.41	29	2.50	109	2.17	81
4	.86	7.8	.98	11	2.80	138	1.48	33	2.47	106	2.12	77
6	.85	7.5	1.01	12	2.65	123	1.54	36	2.44	104	2.08	73
8	.84	7.3	1.07	14	2.48	107	1.63	42	2.34	95	2.04	70
10	.82	6.8	1.24	21	2.27	89	2.00	67	2.23	85	2.00	67
12	.81	6.5	1.51	35	2.08	73	2.36	96	2.14	78	1.96	64
	November 23		November 24		November 29		November 30		December 1		December 2	
4	1.89	59	1.50	34	1.59	39	1.78	51	1.81	54	1.78	51
8	1.81	54		32	1.68	45	1.80	53	1.80	53	1.78	51
N	1.74	49		29	1.73	48	1.81	54	1.79	52	1.78	51
4	1.68	45		26	1.77	51	1.81	54	1.79	52	1.78	51
8	1.62	41		24	1.78	51	1.79	52	1.78	51	1.79	52
12	1.48	33		22	1.78	51	1.79	52	1.78	51	1.81	54
	December 3		December 4		December 5		December 6		December 7		December 8	
2	1.82	54	3.49	210	2.28	89	1.90	60	3.66	229	3.12	170
4	1.83	55	3.41	201	2.22	85	1.89	59	3.99	271	3.30	189
6	1.85	56	3.30	189	2.17	81	1.88	59	4.16	293	3.85	252
8	1.87	58	3.16	174	2.12	77	1.88	59	4.11	286	4.30	313
10	2.06	72	3.02	160	2.08	73	1.89	59	3.87	255	4.55	348
N	2.40	100	2.88	146	2.06	72	1.91	61	3.68	232	4.75	380
2	2.70	128	2.76	134	2.04	70	2.05	71	3.52	213	4.80	388
4	2.75	133	2.65	123	2.00	67	2.22	85	3.39	199	4.70	372
6	2.74	132	2.56	114	1.98	66	2.45	104	3.29	188	4.55	348
8	2.77	135	2.48	107	1.96	64	2.89	147	3.21	179	4.35	320
10	3.05	163	2.40	100	1.94	63	3.15	173	3.12	170	4.08	282
12	3.45	206	2.34	95	1.92	61	3.35	194	3.10	168	3.80	246
	December 9		December 10		December 11		December 12		December 13		December	
4	3.32	191	2.03	69	1.70	46	1.64	42	1.61	41		
8	2.94	152	1.94	63	1.67	44	1.63	42	1.61	41		
N	2.65	123	1.87	58	1.66	44	1.62	41	1.61	41		
4	2.44	104	1.80	53	1.65	43	1.62	41	1.61	41		
8	2.26	88	1.76	50	1.64	42	1.62	41	1.61	41		
12	2.14	78	1.73	48	1.64	42	1.61	41	1.61	41		

Supplemental record.--Dec. 4, 1 a.m., 3.50 ft, 211 cfs; Dec. 7, 7 a.m., 4.19 ft, 298 cfs.

Silver Lake Outlet near Kirkwood, Calif.

Location.--Lat 38°40', long. 120°08', in SW¼ sec. 32, T. 10 N., R. 17 E., 1,000 ft downstream from Silver Lake Dam, and 3 miles southwest of Kirkwood. Altitude of gage, about 7,200 ft (from topographic map).

Drainage area.--14.9 sq mi.

Gage-height record.--Water-stage recorder graph except for period 3 p.m. Nov. 29 to 10 a.m. Dec. 1 when there was no gage-height record.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 200 cfs and extended to peak stage by logarithmic plotting. Discharge for period of no gage-height record computed on basis of record of dam operations.

Maxima.--November-December 1950: Discharge, 675 cfs 1:30 a.m. Nov. 21 (gage height, 6.03 ft).
1922 to October 1950: Discharge, 504 cfs Dec. 11, 1937 (gage height, 5.10 ft), from rating curve extended above 190 cfs.

Remarks.--Flood runoff effected by storage in Silver Lake reservoir; approximate contents, in acre-feet, 1950: 592 Oct. 31, 3,740 Nov. 30, 2,590 Dec. 31.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	25	45	9	22	327	17	17	68	25	123	45
2	25	45	10	21	232	18	57	57	26	93	45
3	26	186	11	21	157	19	423	51	27	73	44
4	26	320	12	20	116	20	427	47	28	60	44
5	26	223	13	20	92	21	606	47	29	51	43
6	27	180	14	19	97	22	406	46	30	47	42
7	26	317	15	19	96	23	282	46	31		41
8	25	381	16	16	80	24	182	46			
Monthly mean discharge, in cfs										110	116
Runoff, in acre-feet										6,570	7,150
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	1.04	16	1.11	21	4.27	371	4.51	410	6.01	672	4.94	479
4	1.04	16	1.15	23	4.50	408	4.51	410	5.97	665	4.82	459
6	1.04	16	1.21	27	4.68	437	4.57	419	5.91	654	4.72	443
8	1.04	16	1.26	30	4.76	450	4.80	456	5.80	634	4.63	429
10	1.04	16	1.30	33	4.79	454	5.02	494	5.70	616	4.54	414
N	1.04	16	1.34	36	4.77	451	5.21	528	5.65	607	4.44	398
2	1.05	17	1.40	41	4.74	446	5.40	562	5.56	591	4.36	386
4	1.05	17	1.47	47	4.70	440	5.56	591	5.50	580	4.28	373
6	1.05	17	1.54	52	4.64	430	5.70	616	5.44	569	4.20	360
8	1.05	17	1.64	61	4.59	422	5.83	639	5.37	557	4.16	354
10	1.06	18	2.70	162	4.54	414	5.95	661	5.24	533	4.12	349
12	1.07	18	3.73	294	4.52	411	6.01	672	5.10	508	4.04	338
	November 23		November 24		November 25		November 30		December 1		December 2	
4	3.89	317	3.11	200	2.47	138		47		45	1.45	45
8	3.77	300	2.98	194	2.38	129		47		45	1.45	45
N	3.64	282	2.86	180	2.31	122		47	1.45	45	1.45	45
4	3.52	265	2.74	166	2.24	115		47	1.45	45	1.45	45
8	3.38	245	2.64	155	2.19	110		46	1.45	45	1.45	45
12	3.25	227	2.55	146	2.14	106		46	1.45	45	1.45	45
	December 3		December 4		December 5		December 6		December 7		December 8	
2	1.47	47	4.14	352	3.53	266	2.78	171	3.76	298	3.99	331
4	1.48	47	4.12	349	3.47	258	2.73	165	3.90	318	4.13	350
6	1.54	52	4.10	346	3.40	248	2.69	161	3.97	328	4.24	366
8	1.72	68	4.04	338	3.33	238	2.65	156	3.98	329	4.36	386
10	2.09	101	3.98	329	3.27	230	2.62	153	3.98	329	4.45	400
N	2.68	160	3.92	321	3.20	220	2.63	154	3.96	326	4.49	406
2	3.32	237	3.87	314	3.14	213	2.66	158	3.93	322	4.50	408
4	3.71	291	3.82	307	3.08	206	2.73	165	3.91	319	4.48	405
6	3.97	328	3.77	300	3.01	197	2.91	185	3.88	315	4.44	398
8	4.10	346	3.72	293	2.95	190	3.20	220	3.86	312	4.39	390
10	4.15	353	3.65	283	2.89	183	3.43	252	3.86	312	4.34	382
12	4.16	354	3.59	275	2.83	176	3.60	276	3.90	318	4.28	373
	December 9		December 10		December 11		December 12		December 13		December	
4	4.16	354	3.51	263	2.82	175	2.35	126	2.06	98		
8	4.09	345	3.40	248	2.72	164	2.30	121	2.02	95		
N	3.98	329	3.27	230	2.65	156	2.24	115	1.98	91		
4	3.85	311	3.16	215	2.56	147	2.19	110	1.95	88		
8	3.75	297	3.04	201	2.49	140	2.14	106	1.92	86		
12	3.64	282	2.92	186	2.41	132	2.09	101	1.91	85		

Supplemental record.--Nov. 21, 1:30 a.m., 6.03 ft, 675 cfs.

Twin Lakes Outlet near Kirkwood, Calif.

Location.--Concrete control, lat 38°42', long. 120°03', in SW¼ sec. 18, T. 10 N., R. 18 E., 500 ft downstream from main dam and outlet gate of Twin Lakes and 1 mile east of Kirkwood. Altitude of gage, about 7,900 ft (from topographic map).

Drainage area.--12.4 sq mi.

Gage-height record.--Water-stage recorder graph for the outlet and once-daily staff gage readings for the spillway. No staff-gage readings Nov. 21-22, 25, 27, Dec. 2-4, 7, 8.

Discharge record.--Stage-discharge relation for the outlet station defined by current-meter measurements. Stage-discharge relation for the spillway defined by current-meter measurements below 60 cfs and extended to peak stage by logarithmic plotting and computations of flow over spillway flashboards.

Maxima.--November-December 1950: Combined daily discharge for outlet and spillway, 405 cfs Dec. 8.
1922 to October 1950: Combined daily discharge for outlet and spillway, 310 cfs June 1, 1943 (possibly exceeded in May 1945).

Remarks.--Flow affected by storage in Twin Lakes Reservoir (contents, in acre-ft, 1950; 14,600 Oct. 31, 21,500 Nov. 30, 20,600 Dec. 31). Flow over Twin Lakes spillway occurred Nov. 21 to Dec. 31 and is included in the table below.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	3.0	42	9	3.0	318	17	3.0	43	25	73	23
2	3.0	55	10	3.0	185	18	9.4	38	26	102	21
3	3.0	366	11	3.0	143	19	5.6	33	27	182	20
4	2.4	264	12	3.0	100	20	50	29	28	72	19
5	2.4	178	13	3.0	73	21	336	28	29	6.8	48
6	2.8	199	14	3.0	133	22	296	26	30	24	60
7	3.0	254	15	3.0	73	23	157	25	31		75
8	3.0	405	16	3.0	54	24	63	23			
Monthly mean discharge, in cfs										47.5	108
Runoff, in acre-feet										2,830	6,650
Runoff, in inches										-	-

El Dorado Canal near Kyburz, Calif.

Location.--Lat 38°46', long. 120°19', in SE¼ sec. 29, T. 11 N., R. 15 E., 400 ft downstream from intake and 2 miles west of Kyburz. Altitude of gage, about 4,100 ft (from topographic map).

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

Discharge record.--Stage-discharge relation defined by current-meter measurements. Stage-discharge relation affected by backwater Nov. 19, 20; discharge based on gate openings and observer's notes.

Maxima.--November-December 1950: Daily discharge, 141 cfs Dec. 29-31.
1922 to October 1950: Daily discharge, 169 cfs June 27-29, 1950.

Remarks.--Flow regulated. Canal diverts from left bank of South Fork American River just below Silver Fork of South Fork; water used for power and irrigation.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	0	116	9	0	94	17	12	91	25	0	122
2	0	116	10	0	96	18	10	108	26	0	132
3	0	122	11	32	94	19	30	121	27	20	136
4	0	98	12	53	94	20	20	121	28	81	139
5	0	82	13	14	94	21	0	122	29	114	141
6	0	85	14	0	98	22	0	122	30	116	141
7	0	94	15	6.6	94	23	0	122	31		141
8	0	98	16	12	92	24	0	122			
Monthly mean discharge, in cfs										17.4	111
Runoff, in acre-feet										1,030	6,840
Runoff, in inches										-	-

Alder Creek near Whitehall, Calif.

Location.--Lat 38°45', long. 120°22', in SW¼ sec. 36, T. 11 N., R. 14 E., 0.8 mile upstream from mouth and 2 miles southeast of Whitehall. Altitude of gage, about 4,000 ft (from topographic map).

Drainage area.--22.8 sq mi.

Gage-height record.--Water-stage graph except for the period Nov. 10-12 and Dec. 21-31. Staff gage reading available Dec. 24 and Jan. 1.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 600 cfs and extended to peak stage on basis of logarithmic plotting. Discharge for periods of no gage-height record computed on basis of weather records and records for stations on nearby streams.

Maxima.--November-December 1950: Discharge, 2,020 cfs 3 p.m. Nov. 20 (gage height, 5.56 ft).
1922 to October 1950: Discharge, about 3,700 cfs Mar. 25, 1928 (gage height, 7.1 ft, from floodmarks), from rating curve extended above 240 cfs by logarithmic plotting.

Remarks.--Small feeder pipe line diverts just above station into El Dorado Canal. Records (except maxima and hourly discharges) include this small diverted flow.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	13	67	9	3.1	452	17	41	174	25	131	55
2	9.4	61	10	3.1	326	18	953	144	26	102	50
3	8.2	898	11	3.0	249	19	819	126	27	86	50
4	6.3	658	12	3.0	200	20	1,080	105	28	78	45
5	5.2	396	13	3.2	164	21	876	90	29	68	45
6	3.9	385	14	3.9	310	22	404	80	30	74	40
7	3.4	526	15	3.3	256	23	257	70	31		40
8	3.2	736	16	8.9	207	24	181	60			
Monthly mean discharge, in cfs										174	228
Runoff, in acre-feet										10,380	14,010
Runoff, in inches										8.54	11.52

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	1.56	22	2.62	221	4.86	1,430	3.52	555	5.05	1,580	3.40	499
4	1.57	23	2.98	333	4.57	1,200	3.55	570	4.62	1,240	3.35	477
6	1.57	23	3.25	434	4.46	1,120	3.57	580	4.38	1,070	3.31	459
8	1.57	23	3.40	499	4.13	894	3.80	700	4.25	975	3.23	426
10	1.56	22	3.87	738	3.92	767	4.45	1,120	4.03	833	3.17	403
N	1.56	22	4.40	1,080	3.78	689	4.77	1,360	3.92	787	3.13	387
2	1.58	23	4.53	1,170	3.64	615	5.21	1,710	3.81	706	3.09	372
4	1.65	30	4.92	1,480	3.56	575	5.05	1,580	3.73	662	3.06	362
6	1.75	41	4.87	1,440	3.48	536	4.71	1,310	3.65	620	3.02	347
8	1.89	60	5.23	1,730	3.42	508	4.64	1,250	3.56	575	2.99	337
10	2.08	91	4.98	1,520	3.42	508	4.77	1,360	3.48	536	2.95	323
12	2.30	137	4.77	1,360	3.46	527	4.69	1,290	3.44	517	2.91	309
	November 23		November 24		November 25		November 26		December 1		December 2	
4	2.85	290	2.54	198	2.32	142	2.16	107	1.94	67	1.85	54
8	2.78	268	2.51	190	2.28	133	2.14	103	1.90	61	1.84	53
N	2.73	253	2.47	179	2.26	128	2.12	99	1.89	60	1.83	51
4	2.67	235	2.43	169	2.23	122	2.10	95	1.88	58	1.83	51
8	2.62	221	2.38	156	2.20	115	2.08	91	1.87	57	1.84	53
12	2.58	209	2.35	149	2.18	111	2.06	88	1.86	55	1.96	71
	December 3		December 4		December 5		December 6		December 7		December 8	
2	2.28	133	4.13	894	3.32	464	2.97	330	3.60	595	3.76	678
4	2.73	253	4.00	815	3.27	443	2.95	323	3.63	610	3.98	803
6	3.08	369	3.87	738	3.23	426	2.95	323	3.56	575	4.23	961
8	3.48	536	3.78	689	3.20	414	2.96	326	3.43	513	4.16	914
10	3.84	722	3.72	656	3.16	399	2.94	320	3.37	486	4.10	875
N	4.20	940	3.67	630	3.13	387	2.98	333	3.32	464	3.97	797
2	4.52	1,160	3.58	585	3.11	380	3.04	354	3.32	464	3.87	738
4	4.87	1,440	3.52	555	3.08	369	3.08	369	3.37	486	3.77	684
6	5.32	1,810	3.47	531	3.06	362	3.27	443	3.43	513	3.72	656
8	4.97	1,520	3.43	513	3.03	351	3.50	545	3.47	531	3.63	610
10	4.62	1,240	3.41	504	3.02	347	3.44	517	3.50	545	3.57	580
12	4.32	1,020	3.36	481	3.00	340	3.46	527	3.66	525	3.50	545
	December 9		December 10		December 11		December 12		December 13		December	
4	3.42	508	3.04	354	2.78	268	2.60	215	2.45	174		
8	3.36	481	3.00	340	2.75	259	2.58	209	2.43	169		
N	3.28	447	2.97	330	2.72	250	2.55	201	2.41	164		
4	3.21	418	2.92	313	2.68	238	2.52	193	2.39	159		
8	3.15	395	2.86	293	2.65	230	2.49	184	2.36	151		
12	3.10	376	2.82	280	2.62	221	2.47	179	2.40	161		

Supplemental record.--Nov. 20, 3 p.m., 5.56 ft, 2,020 cfs; Nov. 21, 1 a.m., 5.25 ft, 1,740 cfs.

Silver Creek at Union Valley, Calif.

Location.--Lat 38°52', long. 120°26', in SE¼ sec. 20, T. 12 N., R. 14 E., 1 mile downstream from confluence of North and Middle Forks, near lower end of Union Valley. Altitude of gage, about 4,530 ft (from topographic map).

Drainage area.--82.7 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 2,200 cfs and extended to peak stage on basis of slope-area determination.

Maxima.--November-December 1950: Discharge, 12,100 cfs 10:30 p.m. Nov. 20 (gage height, 16.55 ft).
1924 to October 1950: Discharge, 10,200 cfs Dec. 11, 1937 (gage height, 15.28 ft), from rating curve extended above 2,200 cfs as explained above.

Remarks.--No storage or diversions above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	98	322	9	61	1,430	17	354	529	25	411	272
2	190	259	10	49	896	18	6,320	459	26	350	252
3	374	6,560	11	41	721	19	5,150	411	27	303	238
4	222	2,340	12	38	624	20	7,560	376	28	269	231
5	134	920	13	43	534	21	5,400	350	29	244	223
6	95	1,750	14	45	1,640	22	1,090	325	30	347	219
7	73	3,590	15	47	974	23	660	301	31		209
8	67	4,960	16	99	657	24	493	283			
Monthly mean discharge, in cfs										1,021	1,060
Runoff, in acre-feet										60,750	65,170
Runoff, in inches										13.77	14.77

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	2.10	184	5.18	1,200	15.25	10,200	7.38	2,390	14.90	9,710	5.76	1,460
4	2.15	194	6.19	1,680	14.20	8,760	8.09	2,860	14.44	9,070	5.52	1,350
6	2.36	236	7.56	2,510	13.15	7,430	8.38	3,070	14.43	9,060	5.30	1,250
8	2.44	252	8.81	3,370	11.78	5,880	9.52	3,890	13.07	7,330	5.13	1,170
10	2.49	263	10.00	4,280	10.60	4,790	12.23	6,350	11.67	5,770	4.95	1,090
N	2.57	280	11.57	5,670	9.67	4,010	14.36	8,970	10.31	4,540	4.81	1,030
2	2.72	315	13.59	7,970	8.77	3,340	15.38	10,400	9.09	3,570	4.70	980
4	2.93	368	14.95	9,780	8.35	3,040	16.37	11,800	8.03	2,820	4.62	948
6	3.14	425	15.48	10,500	8.06	2,840	15.88	11,100	7.38	2,390	4.52	908
8	3.46	519	15.96	11,200	7.60	2,540	15.73	10,900	6.86	2,080	4.43	872
10	3.93	679	16.21	11,600	7.20	2,280	16.52	12,100	6.42	1,810	4.33	832
12	4.45	880	16.00	11,300	6.98	2,150	16.23	11,600	6.06	1,610	4.25	800
	November 23		November 24		November 25		November 29		November 30		December 1	
4	4.09	738	3.50	532	3.18	436	2.43	250	2.43	250	2.97	379
8	3.97	693	3.43	510	3.14	425	2.41	246	2.75	322	2.76	325
N	3.85	650	3.37	491	3.10	414	2.40	244	3.12	420	2.66	301
4	3.76	618	3.32	476	3.05	400	2.38	240	3.04	398	2.65	298
8	3.65	581	3.24	453	2.98	382	2.38	240	3.00	387	2.63	294
12	3.57	554	3.21	445	2.95	374	2.36	236	2.94	371	2.58	283
	December 2		December 3		December 4		December 5		December 6		December 7	
2	2.54	274	3.62	571	10.26	4,500	4.98	1,110	4.17	769	10.56	4,750
4	2.46	257	5.08	1,150	9.18	3,640	4.84	1,040	4.14	757	11.34	5,460
6	2.40	244	7.35	2,370	8.22	2,950	4.73	994	4.13	753	11.48	5,580
8	2.37	238	9.92	4,210	7.44	2,430	4.64	956	4.19	776	10.18	4,430
10	2.35	234	12.60	6,770	6.87	2,080	4.54	916	4.29	816	8.46	3,120
N	2.35	234	14.49	9,140	6.42	1,810	4.46	884	4.45	880	7.53	2,490
2	2.41	246	15.53	10,600	6.13	1,650	4.41	864	5.08	1,150	7.04	2,180
4	2.45	254	16.11	11,400	5.90	1,530	4.38	852	6.45	1,830	7.15	2,250
6	2.48	261	16.01	11,300	5.69	1,430	4.34	836	7.55	2,500	7.68	2,590
8	2.50	265	15.11	10,000	5.50	1,340	4.29	816	8.91	3,440	8.51	3,160
10	2.59	285	13.66	8,060	5.30	1,250	4.24	796	10.38	4,600	8.48	3,140
12	2.87	352	11.77	5,870	5.13	1,170	4.19	776	10.30	4,530	8.49	3,140
	December 8		December 9		December 10		December 11		December 12		December 13	
4	9.87	4,170	6.33	1,760	4.70	980	4.11	746	3.88	661	3.58	558
8	12.98	7,230	5.82	1,490	4.57	928	4.04	719	3.83	643	3.52	538
N	12.57	6,730	5.46	1,320	4.45	880	4.04	719	3.78	625	3.48	526
4	10.87	5,030	5.22	1,210	4.35	840	4.03	715	3.72	605	3.44	513
8	8.64	3,250	5.01	1,120	4.24	796	3.99	700	3.66	584	3.42	506
12	7.16	2,260	4.83	1,040	4.17	769	3.93	679	3.61	567	3.58	558

Supplemental record.--Nov. 20, 4:30 p.m., 16.46 ft, 12,000 cfs, 7 p.m., 15.50 ft, 10,600 cfs, 10:30 p.m., 16.55 ft, 12,100 cfs; Dec. 1, 2 a.m., 3.02 ft, 392 cfs; Dec. 3, 5 p.m., 16.13 ft, 11,500 cfs; Dec. 6, 11 p.m., 10.52 ft, 4,720 cfs; Dec. 7, 5 a.m., 11.64 ft, 5,740 cfs, 9 p.m., 8.57 ft, 3,200 cfs, 11 p.m., 8.40 ft, 3,080 cfs; Dec. 8, 9 a.m., 13.13 ft, 7,410 cfs.

Silver Creek near Placerville, Calif.

Location.--Lat 38°47', long. 120°35', in SW¼ sec. 13, T. 11 N., R. 12 E., 0.2 mile upstream from mouth and 12 miles northeast of Placerville. Altitude of gage, about 2,250 ft (from topographic map).

Drainage area.--176 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 3,900 cfs and extended to peak stage on basis of slope-area determination.

Maxima.--November-December 1950: Discharge, 25,800 cfs 6 p.m. Nov. 18 (gage height, 14.25 ft).
1921 to October 1950: Discharge, 23,000 cfs Dec. 11, 1937 (gage height, 13.8 ft), from rating curve extended above 3,900 cfs as explained above.

Remarks.--No storage or diversion above station.

Mean discharge in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	193	686	9	126	3,460	17	600	1,140	25	972	593
2	239	550	10	109	2,060	18	12,700	1,000	26	820	558
3	492	9,810	11	93	1,600	19	10,200	910	27	696	527
4	438	5,610	12	87	1,360	20	12,500	820	28	625	512
5	270	2,090	13	100	1,170	21	11,300	760	29	555	500
6	191	2,650	14	126	2,610	22	2,640	701	30	671	493
7	154	6,300	15	102	1,840	23	1,560	665	31		470
8	135	8,620	16	232	1,400	24	1,180	625			
Monthly mean discharge, in cfs										2,004	2,003
Runoff, in acre-feet										119,200	123,200
Runoff, in inches										12.70	13.12

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	3.57	404	6.00	1,780	13.10	19,100	8.07	4,050	13.12	19,200	7.78	3,650
4	3.65	431	6.80	2,520	12.60	16,600	8.35	4,470	12.79	17,600	7.50	3,300
6	3.75	466	7.80	3,680	12.15	14,600	8.82	5,270	12.75	17,400	7.29	3,050
8	3.79	480	8.80	5,230	11.52	12,200	9.20	5,990	12.10	14,400	7.10	2,840
10	3.84	499	10.00	7,750	10.75	9,710	10.30	8,490	11.63	12,600	6.92	2,640
N	3.87	511	11.40	11,800	10.40	8,750	11.70	12,800	10.95	10,300	6.79	2,510
2	3.95	542	12.70	17,100	9.70	7,050	12.54	16,400	10.40	8,750	6.62	2,340
4	4.10	604	13.75	22,700	9.24	6,070	13.22	19,700	9.75	7,160	6.50	2,220
6	4.28	685	14.25	25,800	8.94	5,480	13.40	20,700	9.18	5,950	6.40	2,130
8	4.51	797	13.30	20,200	8.68	5,010	13.00	18,600	8.75	5,140	6.30	2,040
10	4.78	948	13.60	21,800	8.35	4,470	13.40	20,700	8.40	4,550	6.21	1,960
12	5.29	1,260	13.55	22,100	8.10	4,090	13.40	20,700	8.09	4,080	6.12	1,880
	November 23		November 24		November 25		November 29		November 30		December 1	
4	5.97	1,760	5.28	1,260	4.90	1,030	3.97	573	3.90	546	4.40	760
8	5.80	1,620	5.20	1,210	4.85	1,000	3.94	562	4.00	585	4.38	750
N	5.70	1,550	5.11	1,160	4.80	970	3.91	550	4.20	665	4.23	678
4	5.59	1,470	5.05	1,120	4.75	942	3.90	546	4.47	795	4.11	629
8	5.46	1,380	5.03	1,110	4.70	915	3.88	538	4.45	785	4.08	617
12	5.36	1,310	4.97	1,070	4.64	882	3.87	535	4.40	760	4.05	605
	December 2		December 3		December 4		December 5		December 6		December 7	
2			4.31	715	10.91	10,200	6.85	2,570	5.84	1,650	9.85	7,390
4	4.01	589	4.91	1,040	10.25	8,360	6.70	2,420	5.80	1,620	10.17	8,160
6			6.05	1,820	9.83	7,340	6.60	2,320	5.79	1,610	10.35	8,620
8	3.93	558	8.06	4,030	9.30	6,190	6.48	2,200	5.78	1,610	10.37	8,670
10			10.10	7,990	8.73	5,100	6.39	2,120	5.79	1,610	9.72	7,090
N	3.82	516	11.07	10,700	8.36	4,490	6.29	2,030	5.87	1,680	8.97	5,540
2			12.06	14,300	8.01	3,960	6.20	1,950	6.07	1,840	8.44	4,610
4	3.78	500	12.71	17,200	7.74	3,600	6.12	1,880	6.47	2,190	8.24	4,290
6			12.81	17,600	7.51	3,310	6.05	1,820	7.40	3,180	8.31	4,410
8	3.87	535	13.01	18,600	7.32	3,080	6.01	1,790	8.31	4,410	8.60	4,870
10			12.46	16,000	7.17	2,920	5.95	1,740	9.23	6,050	9.00	5,590
12	4.05	605	12.20	14,800	7.00	2,730	5.90	1,700	9.70	7,050	9.02	5,630
	December 8		December 9		December 10		December 11		December 12		December 13	
4	9.42	6,430	8.29	4,370	6.60	2,320						
8	10.77	9,770	7.81	3,690	6.45	2,180	5.79	1,610			5.17	1,190
N	11.47	12,000	7.43	3,220	6.29	2,030			5.43	1,360		
4	10.82	9,910	7.15	2,900	6.17	1,920	5.72	1,560			5.06	1,130
8	9.87	7,440	6.91	2,630	6.06	1,830						
12	8.92	5,450	6.75	2,470	5.95	1,740	5.62	1,490	5.26	1,250	5.08	1,140

Supplemental record.--Dec. 8, 10 a.m., 11.51 ft, 12,100 cfs.

South Fork Silver Creek near Ice House, Calif.

Location.--Lat 38°49', long. 120°22', in SW¼ sec. 1, T. 11 N., R. 14 E., 0.5 mile upstream from Peavine Creek, 1.5 miles northeast of Ice House, and 8 miles northeast of Riverton. Altitude of gage, about 5,300 ft (from topographic map).

Drainage area.--28.4 sq mi.

Gage-height record.--Water-stage recorder graph except for period Nov. 1 to 2 p.m. Nov. 24 when there was no gage-height record.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 480 cfs and extended to peak stage on basis of slope-area determination. Discharge for period of no gage-height record computed on basis of records for Silver Creek at Union Valley.

Maxima.--November-December 1950: Discharge, 3,900 cfs probably Nov. 18 (gage height, 6.69 ft, from high-water mark in gage well).
1924 to October 1950: Discharge, 2,200 cfs Dec. 11, 1937 (gage height, 5.80 ft), from rating curve extended above 540 cfs on basis of velocity-area studies.

Remarks.--No storage or diversions above station.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	30	100	9	18	496	17	110	158	25	141	72
2	50	83	10	16	310	18	2,000	135	26	116	67
3	110	1,820	11	13	242	19	1,700	123	27	100	61
4	65	707	12	12	207	20	2,300	108	28	88	60
5	40	307	13	13	171	21	1,800	97	29	78	58
6	25	546	14	14	416	22	350	88	30	122	56
7	22	1,040	15	15	295	23	220	82	31		53
8	20	1,210	16	35	203	24	172	79			
Monthly mean discharge, in cfs										326	305
Runoff, in acre-feet										19,430	18,740
Runoff, in inches										12.83	12.37

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												
4												
6												
8												
10												
N												
2												
4												
6												
8												
10												
12												
	November 23		November 24		November 25		November 29		November 30		December 1	
4					1.81	154	1.41	82	1.41	82	1.60	112
8					1.77	145	1.39	79	1.68	127	1.52	98
N					1.74	139	1.38	78	1.77	145	1.52	98
4			1.88	170	1.72	135	1.37	76	1.73	137	1.51	97
8			1.85	162	1.69	129	1.37	76	1.67	125	1.49	94
12			1.83	158	1.68	127	1.37	76	1.64	119	1.45	88
	December 2		December 3		December 4		December 5		December 6		December 7	
2	1.43	85	2.40	306	4.55	1,260	2.62	370	2.20	250	5.10	1,700
4	1.39	79	3.31	602	4.12	982	2.55	349	2.19	247	5.22	1,820
6	1.36	75	3.90	862	3.77	797	2.50	334	2.21	253	4.70	1,360
8	1.35	74	4.53	1,240	3.60	718	2.44	317	2.31	281	4.18	1,020
10	1.36	75	5.23	1,830	3.48	668	2.40	306	2.38	300	3.84	831
N	1.38	78	5.68	2,330	3.30	598	2.36	295	2.52	340	3.67	750
2	1.40	80	5.90	2,610	3.16	548	2.35	292	3.06	512	3.67	750
4	1.40	80	6.02	2,780	3.05	509	2.33	286	3.48	668	3.68	754
6	1.40	80	6.28	3,170	2.94	472	2.30	278	3.68	754	3.91	867
8	1.41	82	6.02	2,780	2.87	448	2.27	270	4.29	1,080	3.80	811
10	1.47	91	5.73	2,390	2.73	404	2.24	261	4.38	1,140	3.76	792
12	1.73	137	5.18	1,780	2.69	391	2.22	256	4.49	1,210	3.91	867
	December 8		December 9		December 10		December 11		December 12		December 13	
4	4.40	1,150	3.34	613	2.54	346	2.21	253	2.09	221	1.92	179
8	5.12	1,720	3.10	526	2.46	323	2.18	245	2.08	219	1.90	174
N	5.00	1,610	2.94	472	2.40	306	2.16	240	2.04	208	1.87	167
4	4.40	1,150	2.82	432	2.34	289	2.17	242	2.00	198	1.86	165
8	3.86	842	2.72	400	2.30	278	2.12	229	1.97	191	1.86	165
12	3.54	693	2.62	370	2.26	267	2.10	224	1.94	184	1.88	170

Supplemental record.--Nov. 30, 9:30 a.m., 1.81 ft, 154 cfs.

American River flume near Camino, Calif.

Location.--Lat 38°46', long. 120°42', in SW¼ sec. 25, T. 11 N., R. 11 E., 300 ft upstream from Iowa Canyon Creek, 1 mile downstream from diversion dam, and 3 miles northwest of Camino. Altitude of gage, about 1,710 ft (from topographic map).

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

Discharge record.--Stage-discharge relation defined by current-meter measurements. No flow Nov. 20 to Dec. 31.

Maxima.--November-December 1950: Daily discharge, 167 cfs Nov. 7-11, 16.
1922 to October 1950: Daily discharge, 189 cfs Aug. 15, 16, 1942, June 28, 1944.

Remarks.--Flume diverts from right bank of South Fork American River one mile above station, for power development.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	160		9	167		17	166		25	0	
2	160		10	167		18	151		26	0	
3	160		11	167		19	4.7		27	0	
4	163		12	153		20	0		28	0	
5	164		13	155		21	0		29	0	
6	166		14	166		22	0		30	0	
7	167		15	166		23	0		31		
8	167		16	167		24	0				
Monthly mean discharge, in cfs										97.9	0
Runoff, in acre-feet										5,820	0
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												
4												
6												
8												
10												
N												
2												
4												
6												
8												
10												
12												
	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												

Webber Creek near Salmon Falls, Calif.

Location.--Lat 38°45', long. 121°00', in sec. 32, T. 11 N., R. 9 E., 1 mile upstream from mouth and 3.5 miles east of Salmon Falls. Altitude of gage, about 675 ft (from topographic map).

Drainage area.--100 sq mi (by Bureau of Reclamation).

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 4,800 cfs and extended to peak stage.

Maxima.--November-December 1950: Discharge, 6,740 cfs 4 p.m. Nov. 18 (gage height, 14.2 ft).
1943 to October 1950: Discharge, 5,390 cfs Mar. 4, 1949 (gage height, 14.34 ft), from rating curve extended above 900 cfs.

Remarks.--Flood flow possibly affected by storage on headwaters.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	16	68	9	8.9	1,860	17	99	395	25	134	121
2	12	59	10	8.6	726	18	4,230	302	26	106	113
3	11	1,670	11	8.9	470	19	1,190	245	27	87	105
4	11	1,760	12	8.9	484	20	4,410	206	28	74	98
5	10	574	13	14	345	21	2,300	173	29	66	93
6	9.4	428	14	33	371	22	582	154	30	71	88
7	8.6	1,290	15	21	1,100	23	302	142	31		112
8	8.4	1,500	16	72	566	24	185	129			
Monthly mean discharge, in cfs										470	508
Runoff, in acre-feet										27,960	31,230
Runoff, in inches										5.24	5.86

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	6.28	63	10.10	1,370	11.06	2,280	11.78	3,150	12.40	4,010	9.16	817
4	6.22	59	10.73	1,940	10.35	1,570	12.55	4,240	12.15	3,640	9.00	745
6	6.19	56	11.15	2,390	9.89	1,200	13.03	4,960	11.97	3,370	8.85	680
8	6.18	56	12.05	3,480	9.58	1,020	13.33	5,400	11.68	3,030	8.73	632
10	6.19	56	12.90	4,760	9.34	900	13.15	5,140	11.24	2,500	8.63	592
N	6.22	59	13.45	5,580	9.19	830	12.82	4,640	10.84	2,050	8.52	552
2	6.29	64	13.60	5,810	9.08	781	12.76	4,550	10.50	1,710	8.42	517
4	6.46	79	14.20	6,740	8.85	680	12.75	4,540	10.23	1,470	8.35	492
6	6.61	94	14.00	6,410	8.87	688	12.60	4,310	9.95	1,250	8.26	461
8	6.88	127	13.40	5,510	8.87	688	12.60	4,310	9.23	848	8.18	434
10	7.28	191	12.92	4,790	9.18	826	12.62	4,340	9.53	995	8.11	413
12	8.35	492	11.98	3,390	10.95	2,160	12.77	4,560	9.33	895	8.05	395
	November 23		November 24		November 25		November 29		November 30		December 1	
4	7.92	356	7.36	208	7.02	146						
8	7.82	326	7.29	193	6.97	139						
N	7.72	296	7.24	183	6.93	133						
4	7.64	275	7.19	173	6.89	128						
8	7.54	250	7.12	161	6.84	122						
12	7.45	228	7.06	152	6.80	117						
	December 2		December 3		December 4		December 5		December 6		December 7	
2			6.42	75	12.08	3,530	8.97	732	8.13	419	8.90	700
4			6.59	92	11.57	2,890	8.87	688	8.09	407	9.27	866
6			6.93	133	11.13	2,370	8.77	648	8.06	398	10.22	1,470
8			7.35	206	10.69	1,900	8.68	612	8.03	389	10.33	1,550
10			8.35	475	10.37	1,590	8.61	584	8.00	380	10.07	1,350
N			9.60	1,030	10.12	1,390	8.53	556	8.01	383	10.33	1,550
2			10.89	2,100	9.89	1,200	8.47	534	8.04	392	10.47	1,680
4			11.55	2,870	9.71	1,140	8.40	510	8.10	410	10.48	1,690
6			11.81	3,180	9.54	1,000	8.35	492	8.18	434	10.22	1,470
8			12.15	3,640	9.37	915	8.29	472	8.33	486	9.95	1,250
10			12.43	4,060	9.22	844	8.23	450	8.47	534	9.70	1,090
12			12.40	4,010	9.10	790	8.18	434	8.58	573	9.59	1,020
	December 8		December 9		December 10		December 11		December 12		December 13	
4	9.38	920	11.60	2,930	9.24	853	8.44	524	8.14	822	7.88	344
8	9.62	1,040	10.83	2,040	9.08	781	8.36	496	8.27	464	7.86	338
N	9.94	1,240	10.33	1,550	8.92	709	8.27	464	8.21	444	7.85	335
4	9.97	1,270	9.92	1,230	8.78	652	8.19	437	8.10	410	7.87	341
8	11.07	2,290	9.63	1,050	8.67	608	8.12	416	8.02	386	7.90	350
12	12.05	3,480	9.43	945	8.56	566	8.06	398	7.95	365	7.95	365

Supplemental record.--Dec. 3, 11 p.m., 12.50 ft, 4,160 cfs; Dec. 7, 7 a.m., 10.36 ft, 1,580 cfs, 3 p.m., 10.52 ft, 1,730 cfs; Dec. 9, 1 a.m., 12.15 ft, 3,640 cfs.

Colusa and Yolo basins

Yolo bypass near Woodland, Calif.

Location.--Lat 38°40'40", long. 121°38'35", just upstream from Sacramento and Woodland Railroad bridge, 6 miles upstream from Sacramento bypass, 7 miles downstream from Fremont weir, and 7 miles east of Woodland, Yolo County. Auxiliary gage 6 miles downstream. Zero of both gages is set to datum of Corps of Engineers. Second auxiliary gage set to local datum seven miles downstream.

Gage-height record.--Water-stage recorder graphs from second auxiliary gage Nov. 1-18, and from base gage Nov. 19 to Dec. 31.

Discharge record.--Stage-discharge relation defined by current-meter measurements. Backwater from Sacramento weir discharge on Nov. 19. Shifting-control method used Nov. 20 to Dec. 31.

Maxima.--November-December 1950: Discharge, 133,000 cfs 4 - 6 a.m. Nov. 22 (gage height, 29.18 ft).
1940 to October 1950: Discharge, 272,000 cfs Feb. 8, 1942 (gage height, 32.00 ft).

Remarks.--Flow is from Cache Creek and Knights Landing Ridge Cut plus flood water passing over Fremont weir, except that for Nov. 1-18 which is largely return water from irrigation.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	13	600	9	14	62,900	17	18	51,400	25	12,100	5,200
2	13	428	10	13	65,800	18	120	42,800	26	5,420	2,430
3	14	439	11	12	44,600	19	1,000	35,400	27	2,670	1,140
4	16	4,120	12	12	32,200	20	13,300	29,700	28	1,260	866
5	19	36,600	13	11	26,800	21	74,500	24,700	29	874	740
6	20	42,500	14	12	22,900	22	119,000	19,900	30	727	728
7	18	34,300	15	12	34,900	23	65,700	14,300	31		682
8	16	44,200	16	16	55,100	24	29,700	8,830			
Monthly mean discharge, in cfs										10,890	24,100
Runoff, in acre-feet										647,800	1,482,000
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							20.90	4,210	25.98	32,500	29.16	132,000
4							21.35	4,700	26.24	37,000	29.18	133,000
6							21.89	5,370	26.55	43,200	29.18	133,000
8							22.44	6,210	26.85	50,100	29.12	130,000
10							23.20	7,750	27.25	60,500	29.02	126,000
N							23.90	10,300	27.60	71,000	28.90	120,000
2							24.42	13,600	27.90	80,600	28.83	117,000
4							24.84	17,800	28.22	92,100	28.73	113,000
6							25.15	21,300	28.55	105,000	28.62	108,000
8							25.44	24,700	28.82	117,000	28.55	105,000
10							25.65	27,300	29.00	125,000	28.42	100,000
12							25.79	29,400	29.12	130,000	28.28	94,500
	November 23		November 24		November 25		November 29		November 30		December 1	
4	27.95	82,400	26.30	38,200	24.69	16,100	16.73	947	16.31	758	16.07	665
8	27.67	73,100	26.02	33,100	24.42	13,600	16.63	902	16.27	740	15.97	630
N	27.38	64,400	25.75	28,800	24.15	11,500	16.53	857	16.25	732	15.88	603
4	27.10	56,400	25.48	25,200	23.82	9,960	16.46	826	16.20	712	15.77	570
8	26.80	48,800	25.22	22,100	23.44	8,510	16.44	816	16.14	690	15.67	540
12	26.55	43,200	24.94	18,900	23.09	7,480	16.36	780	16.11	679	15.56	507
	December 2		December 3		December 4		December 5		December 6		December 7	
2	15.50	489	15.13	390	15.46	477	24.74	16,700	26.74	47,400	26.10	34,400
4	15.44	471	15.16	398	15.59	516	25.37	23,900	26.72	46,800	26.06	33,700
6	15.39	456	15.16	398	16.06	662	25.79	29,400	26.69	46,100	26.00	32,800
8	15.34	442	15.23	415	16.77	965	26.05	33,600	26.65	45,200	25.99	32,600
10	15.32	438	15.32	438	19.97	3,280	26.25	37,200	26.60	44,200	25.98	32,500
N	15.28	428	15.40	459	21.77	5,210	26.40	40,200	26.53	42,800	25.99	32,600
2	15.22	412	15.40	459	22.07	5,620	26.55	43,200	26.48	41,800	26.02	33,100
4	15.16	398	15.43	468	22.40	6,140	26.63	44,800	26.43	40,800	26.08	34,100
6	15.14	392	15.43	468	22.51	6,330	26.68	45,800	26.37	39,600	26.14	35,100
8	15.11	385	15.45	474	22.76	6,790	26.75	47,600	26.30	38,200	26.20	36,200
10	15.10	382	15.44	471	23.24	7,870	26.76	47,800	26.20	36,200	26.28	37,800
12	15.11	385	15.43	468	23.99	10,800	26.75	47,600	26.13	34,900	26.37	39,600
	December 8		December 9		December 10		December 11		December 12		December 13	
4	26.47	41,600	27.00	53,800	27.60	71,000	26.90	51,400	26.09	34,200	25.73	28,500
8	26.55	43,200	27.20	59,000	27.57	70.100	26.75	47,600	26.02	33,100	25.70	28,000
N	26.80	44,200	27.40	65,000	27.47	67,100	26.62	44,600	25.95	32 000	25.59	26,500
4	26.63	44,800	27.50	68,000	27.35	63,500	26.43	40,800	25.90	31,200	25.53	25,800
8	26.73	47,100	27.60	71,000	27.22	59,600	26.28	37,800	25.83	30,100	25.50	25,500
12	26.83	49,600	27.62	71,600	27.07	55,600	26.18	35,800	25.77	29,100	25.38	24,000

Sacramento weir near Sacramento, Calif.

Location.--Lat 38°36'25", long. 121°33'15", on left bank of Sacramento River opposite center of Sacramento weir, 3.2 miles upstream from American River, and 4 miles northwest of Sacramento. Zero of gage is set to datum of Corps of Engineers.

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

Discharge record.--Discharge computed from flow through gates rated by current-meter measurements. Stage below weir crest and/or gates closed all or part of Nov. 1-19, 26-30, Dec. 1-7, 13-31.

Maxima.--November-December 1950: Discharge, 110,740 cfs noon Nov. 21 (gage height, 32.90 ft).
1926 to October 1950: Discharge, 118,000 cfs Mar. 26, 1928 (gage height, 32.8 ft).

Remarks.--Crest of weir is at elevation 25.0 ft and top of movable gates at 31.0 ft. Weir consists of 48 gates each 38.1 ft long. Flow over weir enters Yolo bypass by way of Sacramento bypass. Flood flow regulated by wier gates. Record furnished by Division of Water Resources, Department of Public Works, State of California.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	0	0	9	0	27,300	17	0	0	25	1,600	0
2	0	0	10	0	12,400	18	0	0	26	32	0
3	0	0	11	0	6,850	19	24,200	0	27	0	0
4	0	3,000	12	0	3,260	20	29,600	0	28	0	0
5	0	432	13	0	550	21	95,900	0	29	0	0
6	0	0	14	0	0	22	39,300	0	30	0	0
7	0	7,310	15	0	0	23	14,000	0	31		0
8	0	19,700	16	0	0	24	5,800	0			
Monthly mean discharge, in cfs										7,014	2,606
Runoff, in acre-feet										417,400	160,300
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 19		November 20		November 21		November 22		November 23		November 24	
2	26.00	0	30.26	24,760	31.12	72,740	30.62	63,390			26.59	8,230
4	28.70	0	29.90	22,260	31.70	84,320	30.22	56,260	27.59	18,030	26.52	7,680
6	30.05	0	29.62	20,060	32.33	97,600	29.84	49,730			26.45	7,080
8	30.98	30,460	29.41	18,600	32.60	103,510	29.50	44,210	27.37	15,590	26.40	6,720
10	31.45	35,450	29.30	17,860	32.84	108,910	29.17	39,050			26.35	6,350
N	31.60	37,230	29.30	17,860	32.92	110,740	28.89	34,910	27.15	13,340	26.26	5,580
2	31.63	37,600	29.41	18,600	32.90	110,270	28.72	32,430			26.23	5,120
4	31.58	36,970	29.66	20,340	32.82	108,490	28.52	29,670	26.97	11,590	26.20	4,670
6	31.44	35,290	30.04	53,130	32.62	103,980	28.32	27,000			26.18	4,440
8	31.23	32,950	29.72	47,750	32.30	96,940	28.16	24,890	26.83	10,300	26.12	4,120
10	30.98	30,300	29.85	49,910	31.84	87,210	27.98	22,680			26.06	3,760
12	30.66	13,940	30.45	30,130	31.12	36,370	27.85	10,535	26.67	4,460	26.00	1,720
	November 25		November 26		December 4		December 5		December 6		December 7	
2	25.94	3,120	25.18	182	25.70	0	31.50	1,970	29.60	0	28.65	0
4	25.87	2,760	25.09	78	25.90	0	31.33	1,100	29.46	0	28.90	0
6	25.81	2,480	24.98	0	30.10	0	31.20	528	29.35	0	29.30	0
8	25.75	2,130		0	31.30	960	31.06	96	29.20	0	29.80	0
10	25.70	1,750		0	31.94	5,040	30.90	0	29.06	0	30.50	0
N	25.64	1,410		0	32.06	6,000	30.72	0	28.95	0	31.03	48
2	25.60	1,160		0	31.99	5,420	30.55	0	28.82	0	31.30	17,330
4	25.52	832		0	31.88	4,560	30.42	0	28.72	0	31.18	16,450
6	25.48	728		0	31.87	4,460	30.28	0	28.69	0	31.16	16,280
8	25.39	546		0	31.85	4,320	30.11	0	28.60	0	31.07	15,710
10	25.34	442		0	31.78	3,790	29.95	0	28.52	0	30.92	14,980
12	25.24	130		0	31.66	1,490	29.80	0	28.52	0	30.65	6,950
	December 8		December 9		December 10		December 11		December 12		December 13	
2	30.45	13,100	31.52	36,270	28.97	15,680	27.78	8,800	27.45	5,370	27.54	1,520
4	30.30	12,530	31.49	35,900	28.84	14,860	27.69	8,320	27.44	5,340	27.49	1,470
6	30.23	12,260	31.39	34,730	28.73	14,160	27.63	8,040	27.43	5,300	27.46	1,440
8	30.25	12,340	31.16	32,180	28.60	13,380	27.56	7,680	27.42	4,560	27.41	1,040
10	30.33	12,640	30.85	29,400	28.50	12,780	27.50	7,400	27.40	3,810	27.39	344
N	30.40	12,910	30.52	26,760	28.39	12,140	27.43	7,060	27.48	2,920	27.40	0
2	30.59	13,660	30.23	24,520	28.30	11,620	27.37	6,100	27.49	2,210	27.40	0
4	30.80	29,000	29.99	22,720	28.20	11,040	27.37	5,760	27.51	1,490	27.38	0
6	30.79	28,920	29.79	21,260	28.12	10,600	27.40	5,190	27.58	1,560	27.32	0
8	31.04	31,020	29.53	19,440	28.04	10,180	27.43	5,300	27.60	1,580	27.29	0
10	31.30	33,700	29.32	18,000	27.96	9,740	27.44	5,340	27.59	1,570	27.28	0
12	31.46	17,780	29.16	8,460	27.85	4,580	27.44	2,670	27.58	780	27.25	0

Clear Lake at Lakeport, Calif.

Location.--Lat 39°03', long. 122°55', in SE¼ sec. 24, T. 14 N., R. 10 W., at municipal wharf on north side of Third Street in Lakeport. Datum of gage is 1,318.59 ft above mean sea level, datum of 1929.

Drainage area.--528 sq mi, includes water surface of lake (65 sq mi).

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

Maxima.--November-December 1950: Daily gage height, 4.53 ft Dec. 31.
1913 to October 1950: Gage height observed, 11.12 ft Jan. 28, 1914.

Remarks.--This natural lake is regulated by a concrete overflow dam at outlet, completed in 1915. Capacity between gage heights 0.00 and 7.56 ft (limits stipulated by court decree of 1920), about 319,000 acre-ft. Daily mean gage-height record furnished by Clear Lake Water Co.

Daily mean gage height, in feet, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	0.27	1.45	9	0.40	3.36	17	0.60	4.21	25	1.38	4.45
2	.33	1.48	10	.40	3.45	18	.72	4.25	26	1.39	4.47
3	.34	1.75	11	.41	3.53	19	.76	4.29	27	1.40	4.49
4	.35	2.50	12	.42	3.62	20	1.00	4.31	28	1.41	4.51
5	.36	2.75	13	.42	3.72	21	1.20	4.35	29	1.42	4.51
6	.37	2.92	14	.43	3.92	22	1.25	4.38	30	1.43	4.52
7	.38	3.10	15	.44	4.04	23	1.30	4.40	31		4.53
8	.39	3.25	16	.45	4.13	24	1.35	4.43			
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	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												
4												
6												
8												
10												
N												
2												
4												
6												
8												
10												
12												
	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												

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Cache Creek at Yolo, Calif.

Location.--Lat 38°43'30", long. 121°48'25", in Rio Jesus Maria Grant, 800 ft upstream from highway bridge and 0.5 mile south of Yolo, Yolo County. Altitude of gage, about 60 ft (from topographic map).

Drainage area.--1,137 sq mi.

Gage-height record.--Water-stage recorder graph except for period Dec. 23-31.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 8,700 cfs and extended to peak stage. Discharge for period of no gage-height record, Dec. 23-31 computed on basis of records for station near Capay.

Maxima.--November-December 1950: Discharge, 11,700 cfs 6 a.m. Dec. 4 (gage height, 17.63 ft).
1903 to October 1950: Discharge, 28,700 cfs plus overflow on right bank estimated as 10,000 cfs, Feb. 28, 1940 (gage height, 29.0 ft).
Stage observed, 29.8 ft Feb. 2, 1915, staff-gage reading.

Remarks.--Many diversions above station for irrigation. Flow regulated by Clear Lake beginning in 1915 (see preceding page).

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	138	50	9	0	1,050	17	1,450	954	25	191	370
2	33	48	10	0	830	18	692	772	26	138	340
3	0	828	11	0	718	19	967	680	27	110	310
4	0	7,480	12	0	835	20	646	605	28	89	280
5	0	2,030	13	0	661	21	874	542	29	75	270
6	0	1,060	14	0	1,930	22	600	492	30	66	290
7	0	1,340	15	0	2,500	23	370	460	31		280
8	0	1,210	16	0	1,400	24	263	400			
Monthly mean discharge, in cfs										223	1,000
Runoff, in acre-feet										13,290	61,500
Runoff, in inches										0.22	1.01

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		0	2.86	893	2.66	783	2.78	849	2.86	893	2.63	766
4	4.62	1,940	2.76	838	2.75	833	2.61	756	2.91	920	2.56	730
6	5.74	2,670	2.62	761	2.92	926	2.51	705	2.88	904	2.47	685
8	5.75	2,670	2.54	720	3.05	998	2.42	660	2.88	904	2.40	650
10	5.12	2,260	2.47	685	3.09	1,020	2.34	620	2.91	920	2.33	615
N	4.32	1,750	2.39	645	3.12	1,040	2.24	573	2.91	920	2.27	586
2	3.77	1,420	2.36	630	3.13	1,040	2.19	550	2.86	893	2.21	560
4	3.36	1,180	2.31	605	3.16	1,060	2.13	524	2.80	860	2.14	528
6	3.10	1,020	2.26	582	3.18	1,070	2.11	514	2.77	844	2.09	506
8	2.92	926	2.24	573	3.13	1,040	2.18	546	2.75	832	2.04	483
10	2.85	888	2.27	586	3.03	986	2.35	625	2.74	827	2.00	465
12	2.86	893	2.48	690	2.90	915	2.57	735	2.70	805	1.95	442
	November 23		November 24		November 25		November 29		November 30		December 1	
4												
8												
N	1.76	364	1.50	262	1.30	190	0.97	76	0.94	66	0.88	47
4												
8												
12	1.62	308	1.39	222	1.22	162	.95	70	.92	60	.87	44
	December 2		December 3		December 4		December 5		December 6		December 7	
2			0.92	60	15.37	9,660	6.11	2,910	3.52	1,270	2.89	910
4			.93	63	16.89	11,000	5.72	2,650	3.42	1,210	3.05	998
6	0.88	47	.94	66	17.63	11,700	5.41	2,450	3.32	1,150	3.23	1,100
8			.96	73	16.97	11,100	5.05	2,220	3.23	1,100	3.42	1,210
10			.97	76	14.97	9,330	4.76	2,030	3.17	1,060	3.76	1,420
N	.88	47	.97	76	12.82	7,660	4.54	1,890	3.10	1,020	4.03	1,580
2			.99	83	11.20	6,450	4.35	1,770	3.04	992	4.05	1,590
4			1.04	100	9.77	5,440	4.17	1,660	3.04	992	4.03	1,580
6	.88	47	1.06	106	8.62	4,630	4.02	1,570	2.98	959	4.00	1,560
8			3.72	1,390	7.74	4,020	3.87	1,480	2.93	932	3.92	1,510
10			8.07	4,250	7.11	3,580	3.73	1,400	2.91	920	3.82	1,450
12	.92	60	12.10	7,120	6.59	3,220	3.62	1,330	2.87	898	3.71	1,390
	December 8		December 9		December 10		December 11		December 12		December 13	
4	3.52	1,270	3.23	1,100	2.87	898	2.53	715	2.90	915	2.47	685
8	3.40	1,200	3.20	1,080	2.80	860	2.52	710	2.87	898	2.44	670
N	3.36	1,180	3.22	1,090	2.74	827	2.47	685	2.80	860	2.43	665
4	3.37	1,180	3.10	1,020	2.68	794	2.44	670	2.68	794	2.39	645
8	3.33	1,160	3.00	970	2.62	761	2.53	715	2.58	740	2.36	630
12	3.28	1,130	2.95	942	2.57	735	2.86	893	2.52	710	2.37	636

Supplemental record.--Nov. 17, 3 a.m., 3.75 ft, 1,410 cfs, 7 a.m., 5.85 ft, 2,740 cfs.

Putah Creek near Winters, Calif.

Location.--Lat 38°31', long. 122°05', in NE¼ sec. 28, T. 8 N., R. 2 W., 6 miles west of Winters and 8 miles downstream from Capell Creek. Datum of gage is 160.75 ft above mean sea level (river-profile survey).

Drainage area.--614 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 5,100 cfs and extended to peak stage on basis of records for station near Davis. Shifting-control method used Nov. 2-15, Dec. 3, 4.

Maxima.--November-December 1950: Discharge, 35,300 cfs 7 p.m. Dec. 3 (gage height, 24.32 ft).
1905 to October 1950: Discharge, 70,500 cfs Feb. 27, 1940 (gage height, 30.5 ft, present datum), by slope-area method.

Remarks.--Flood flow not affected by 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	170	197	9	21	2,520	17	2,360	2,040	25	420	533
2	102	179	10	19	1,610	18	4,680	1,500	26	328	488
3	69	13,800	11	18	1,650	19	3,910	1,210	27	272	443
4	51	9,260	12	18	1,680	20	2,080	1,020	28	242	432
5	39	2,400	13	19	1,160	21	3,280	867	29	217	381
6	33	1,670	14	19	6,130	22	1,520	748	30	208	360
7	28	3,290	15	19	7,040	23	853	657	31		333
8	24	2,280	16	2,630	3,360	24	570	583			
Monthly mean discharge, in cfs										807	2,252
Runoff, in acre-feet										48,040	138,500
Runoff, in inches										1.47	4.23

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 16		November 17		November 18		November 19		November 20		November 21	
2	4.11	23	12.37	4,340	11.13	2,830	13.94	7,000	9.63	1,630	12.03	3,840
4	4.16	25	11.43	3,130	11.12	2,820	13.44	6,070	9.44	1,510	11.93	3,720
6	4.25	28	10.79	2,490	11.10	2,800	12.95	5,230	9.28	1,420	11.80	3,560
8	4.33	34	10.26	2,070	11.15	2,850	12.57	4,640	9.17	1,350	11.67	3,400
10	4.42	39	9.86	1,790	11.32	3,020	12.12	3,970	9.15	1,340	11.67	3,400
N	4.45	41	9.52	1,560	11.61	3,330	11.67	3,400	9.11	1,320	11.66	3,390
2	4.44	41	9.27	1,410	12.65	4,760	11.28	2,980	9.14	1,330	11.66	3,390
4	7.60	646	9.14	1,330	13.68	6,500	10.93	2,630	9.80	1,750	11.62	3,340
6	15.30	9,760	9.40	1,490	14.06	7,220	10.60	2,340	11.26	2,960	11.38	3,080
8	15.23	9,610	10.10	1,960	14.20	7,500	10.32	2,120	11.88	3,660	11.04	2,740
10	14.53	8,160	10.56	2,310	14.24	7,580	10.08	1,950	12.05	3,870	10.74	2,450
12	13.52	6,220	10.93	2,630	14.13	7,360	9.82	1,760	12.07	3,900	10.49	2,250
	November 22		November 23		November 24		November 25		November 30		December 1	
4	10.09	1,950	8.43	984	7.58	639	7.00	460	5.89	204	5.82	193
8	9.63	1,630	8.27	912	7.46	599	6.92	438	5.88	203	5.80	190
N	9.33	1,450	8.10	838	7.35	564	6.85	418	5.86	200	5.80	190
4	9.06	1,290	7.96	780	7.26	536	6.78	399	5.84	196	5.79	188
8	8.83	1,180	7.83	729	7.15	503	6.71	381	5.84	196	5.77	185
12	8.62	1,070	7.70	682	7.08	482	6.66	368	5.82	193	5.75	182
	December 2		December 3		December 4		December 5		December 6		December 7	
2			5.87	201	19.34	19,800	11.49	3,190	9.64	1,640	12.20	4,080
4			6.04	231	17.72	15,500	11.28	2,980	9.55	1,580	12.40	4,380
6			6.33	289	16.42	12,400	11.07	2,770	9.46	1,530	12.34	4,290
8	5.71	176	8.00	796	15.43	10,000	10.87	2,570	9.38	1,480	12.21	4,100
10			9.10	1,310	14.63	8,360	10.69	2,410	9.32	1,440	11.92	3,700
N			14.50	8,100	13.93	6,980	10.55	2,300	9.25	1,400	11.62	3,340
2			19.10	19,000	13.40	6,000	10.40	2,180	9.22	1,380	11.30	3,000
4	5.70	174	20.75	23,800	12.96	5,250	10.28	2,090	9.28	1,420	11.03	2,730
6			24.10	34,400	12.59	4,660	10.13	1,980	9.42	1,500	10.80	2,500
8			24.15	34,600	12.28	4,200	10.00	1,890	10.03	1,910	10.63	2,360
10			22.80	30,400	11.97	3,760	9.87	1,800	10.50	2,260	10.52	2,280
12	5.80	190	21.16	25,000	11.73	3,480	9.73	1,700	11.55	3,260	10.44	2,210
	December 8		December 9		December 10		December 11		December 12		December 13	
4	10.40	2,180	10.88	2,580	9.88	1,810	9.05	1,280	10.22	2,040	8.96	1,240
8	10.54	2,290	11.23	2,930	9.70	1,680	8.98	1,250	9.80	1,750	8.86	1,190
N	10.64	2,370	11.15	2,850	9.53	1,570	9.00	1,260	9.55	1,580	8.76	1,140
4	10.48	2,240	10.70	2,420	9.40	1,490	9.66	1,650	9.36	1,470	8.69	1,100
8	10.52	2,280	10.40	2,180	9.28	1,420	10.88	2,580	9.20	1,370	8.66	1,090
12	10.64	2,370	10.16	2,000	9.17	1,350	10.70	2,420	9.07	1,300	8.76	1,140

Supplemental record.--Nov. 16, 3 p.m., 4.70 ft, 60 cfs, 7 p.m., 15.45 ft, 10,100 cfs; Dec. 3, 7 p.m., 24.32 ft, 35,300 cfs.

Putah Creek near Davis, Calif.

Location.--Lat 38°31'24", long. 121°47'10", in SE¼ sec. 19, T. 8 N., R. 2 E., in Los Putos land grant 3.3 miles southwest of Davis. Altitude of gage, about 45 ft (from topographic map).

Drainage area.--658 sq mi.

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

Discharge record.--Stage-discharge relation defined by current-meter measurements below 8,800 cfs and extended to peak stage partially on basis of slope-area determination and records for station near Winters.

Maxima.--November-December 1950: Discharge, 29,300 cfs 11:30 p.m. Dec. 3 (gage height, 20.88 ft).
1948 to October 1950: Discharge, 23,600 cfs Mar. 12, 1949 (gage height, 17.2 ft), from rating curve extended above 3,000 cfs by logarithmic plotting and velocity-area study.

Remarks.--Flood flow not affected by small diversions above station. There was no overflow downstream from Winters.

Mean discharge, in cubic feet per second, 1950

Day	November	December	Day	November	December	Day	November	December	Day	November	December
1	215	174	9	2.4	2,370	17	2,690	2,310	25	450	570
2	111	166	10	0	1,740	18	3,330	1,710	26	349	525
3	64	7,430	11	0	1,390	19	4,330	1,320	27	282	475
4	40	12,800	12	0	1,820	20	1,690	1,090	28	241	440
5	22	2,880	13	0	1,230	21	3,140	933	29	214	411
6	13	1,710	14	0	3,920	22	1,730	807	30	191	392
7	11	3,070	15	0	5,660	23	970	713	31		365
8	8.4	2,260	16	240	3,960	24	628	636			
Monthly mean discharge, in cfs										699	2,106
Runoff, in acre-feet										41,580	129,500
Runoff, in inches										1.18	3.69

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 16		November 17		November 18		November 19		November 20		November 21	
2		0	8.58	4,350	6.41	2,070	9.92	6,200	6.33	2,000	7.70	3,330
4		0	8.87	4,720	6.80	2,420	9.87	6,120	6.15	1,840	7.79	3,430
6		0	8.64	4,420	7.02	2,630	9.72	5,900	5.99	1,700	7.77	3,410
8		0	7.68	3,310	7.08	2,690	9.37	5,400	5.84	1,580	7.70	3,330
10		0	7.01	2,620	7.07	2,680	8.93	4,800	5.72	1,490	7.60	3,220
N		0	6.57	2,210	7.12	2,730	8.52	4,270	5.62	1,410	7.48	3,090
2		0	6.26	1,930	7.25	2,860	8.12	3,790	5.56	1,360	7.45	3,060
4		0	6.00	1,710	7.55	3,160	7.70	3,330	5.53	1,330	7.44	3,050
6		0	5.78	1,530	8.25	3,950	7.34	2,950	5.50	1,310	7.42	3,030
8		0	5.62	1,410	9.14	5,080	7.03	2,640	5.58	1,370	7.40	3,010
10	5.54	1,340	5.59	1,380	9.65	5,800	6.75	2,380	6.64	2,280	7.25	2,860
12	8.08	3,750	5.91	1,640	9.84	6,080	6.52	2,170	7.45	3,060	7.00	2,610
	November 22		November 23		November 24		November 25		November 30		December 1	
4	6.53	2,180										
8	6.19	1,870										
N	5.92	1,650	5.02	954	4.53	618	4.24	449	3.65	191	3.60	174
4	5.70	1,470										
8	5.52	1,330										
12	5.37	1,210	4.75	765	4.35	510	4.13	392	3.62	181	3.58	168
	December 2		December 3		December 4		December 5		December 6		December 7	
2			3.61	177	19.85	26,800	8.19	3,920	6.25	1,940	6.43	2,100
4	3.58	168	3.62	181	18.29	23,100	7.94	3,620	6.17	1,870	7.04	2,670
6			3.66	194	16.63	19,400	7.70	3,360	6.08	1,790	7.82	3,490
8	3.57	165	3.70	208	14.87	15,500	7.48	3,120	6.00	1,730	8.11	3,820
10			3.80	245	13.23	12,100	7.30	2,930	5.95	1,690	8.15	3,870
N	3.56	162	4.24	449	12.00	9,780	7.13	2,760	5.83	1,590	8.05	3,750
2			6.00	1,710	11.00	8,020	6.97	2,600	5.82	1,590	7.86	3,540
4	3.55	158	9.62	5,750	10.30	6,870	6.82	2,450	5.80	1,570	7.60	3,250
6			14.44	14,600	9.70	5,940	6.70	2,340	5.79	1,560	7.31	2,940
8	3.59	171	18.24	23,000	9.24	5,280	6.57	2,220	5.80	1,570	7.09	2,720
10			20.40	28,100	8.81	4,690	6.46	2,120	5.90	1,650	6.88	2,510
12	3.61	177	20.74	29,000	8.47	4,250	6.36	2,030	6.19	1,880	6.74	2,380
	December 8		December 9		December 10		December 11		December 12		December 13	
4	6.62	2,270	6.56	2,210	6.25	1,940	5.69	1,480	6.64	2,290	5.50	1,330
8	6.60	2,250	6.69	2,330	6.09	1,800	5.50	1,330	6.38	2,050	5.42	1,270
N	6.58	2,230	6.89	2,520	5.97	1,710	5.45	1,300	6.08	1,790	5.34	1,220
4	6.65	2,300	7.02	2,650	5.86	1,620	5.39	1,250	5.84	1,600	5.27	1,170
8	6.60	2,250	6.74	2,380	5.76	1,540	5.42	1,270	5.72	1,510	5.23	1,140
12	6.52	2,180	6.47	2,130	5.68	1,470	6.21	1,900	5.61	1,420	5.21	1,130

Supplemental record.--Nov. 16, 9 p.m., no flow; Dec. 3, 11:30 p.m., 20.88 ft, 29,300 cfs.

SUMMARY OF FLOOD STAGES AND DISCHARGES

The results of the determinations of maximum flood flows at gaging stations on streams in the area covered by this report are summarized and presented in table 6, "Summary of flood stages and discharges." The reference number in the first column of the table is applicable to the map, plate 15, and will aid in identifying the place where the discharge was determined.

In order to better define the areal extent of the floods, data are included in table 6 for stations on streams that were adjacent to the margins of the flooded areas and on streams outside of the Central Valley basin in which contemporary flooding occurred. In general, the tables of daily discharge and of discharge at selected intervals for such stations were not included in the tabulations presented in the section "Stages and discharges at stream-gaging stations."

The discharges in table 6 were determined by methods described generally in the text and explained in detail in the presentation of the individual station records in the preceding sections of this report. Where methods other than the usual "stage-discharge relation" were necessary, that fact is indicated by a symbol and a headnote explanation.

Figure 97 shows the flood discharges (listed in table 6) in cfs per square mile plotted against the corresponding drainage areas. In this connection it is to be noted that the discharges are given in the table as observed and that many (as indicated by the footnotes) are affected by artificial storage or other regulation, on which available information is presented in the preceding section, "Stages and discharges at stream-gaging stations."

The basic data and computations for the determinations of discharge are filed in the California district office of the Geological Survey and may be examined in that office.

Table 6.--Summary of flood stages and discharges in Central Valley and coastal basins in northern California for the flood of 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: C, contracted-opening determination; D, computed flow over dam; L, computed inflow to lake; S, slope-area determination]

No. on pl 15	Stream and place of determination	Drainage area (square miles)	Period of record	Maximum flood previously known				Maximum during present flood			
				Date	Gage height (feet)	Discharge (cfs)	Cfs per square mile	Date and hour	Gage height (feet)	Discharge (cfs)	Cfs per square mile
	SALINAS RIVER BASIN										
1	Salinas River near Pozo	72.5	1942-	Jan. 21, 1943	13.35	5,800	80.0	Nov. 19, 2:30 p. m.	4.33	15	0.21
2	Salinas River above Pilitas Creek, near Santa Margarita.	125	1942-	Jan. 28, 1943	2.49	a562	4.50	Nov. 19, 7 a. m.	0.72	a2.7	.02
3	Salinas River at Paso Robles	389	1939-	Feb. 10-13, 1938 Mar. 9, 1943	16.9 16.2	- 14,200	- 36.5	Dec. 4, 9:30 a. m.	7.14	603	1.55
4	Salinas River near Bradley	2,522	1948-	Feb. 6, 1950	10.66	15,500	6.15	Nov. 19, 5 p. m.	10.18	12,800	5.08
5	Salinas River near Spreckels	4,231	1929-	Mar. 7, 1911 Feb. 12, 1938	26.6 25.0	- 75,000	- 17.7	Nov. 20, 7 a. m.	11.49	1,300	.31
6	Jack Creek near Templeton	25.4	1949-	Feb. 6, 1950	6.30	1,500	59.1	Nov. 19, 7:30 a. m.	5.51	911	35.9
7	Nacimiento River near San Miguel	354	1939-	Jan. 21, 1943	10.45	50,800	144	Nov. 19, 11 a. m.	7.60	16,700	47.2
8	San Antonio River at Pleyto	282	1929-	Feb. 11, 1941	5.58	11,400	40.4	Nov. 19, 2 p. m.	4.20	2,940	10.4
9	Arroyo Seco near Soledad	241	1901-	Feb. 21, 1917 Nov. 25, 1926	- b16.5	- c22,000	- 91.3	Nov. 19, 3 a. m.	12.46	20,600	85.5
	PAJARO RIVER BASIN										
10	Pajaro River near Chittenden	1,188	1939-	February 1938 Apr. 4 or 5, 1941	d31.3 26.2	- 11,100	- 9.34	Nov. 19, 8 a. m.	22.68	7,810	6.57
11	Pacheco Creek near Dunneville	146	1940-	Feb. 2, 1945	d15.8	a7,200	49.2	Dec. 3, 10:30 p. m.	16.4	6,340	43.4
12	Uvas Creek near Morgan Hill	30.2	1930-	Dec. 11, 1937	13.70	8,630	286	Nov. 18, 9:30 p. m.	10.54	4,450	147
13	San Benito River near Willow Creek School.	250	1939-	1937-38 Apr. 4, 1941	e, f9.0 b7.8	- 6,200	- 24.8	-	d4.2	67	.27

14	Tres Pinos Creek near Tres Pinos	209	1922-23, 1939-	February 1938 Apr. 4, 1941	d, e9.0 7.75	- 8,060	- 38.6	Nov. 19, 5:30 a. m.	4.15	642	3.07
	SAN LORENZO RIVER BASIN										
15	San Lorenzo River at Big Trees	110	1937-	Feb. 27, 1940	d21.1	24,000	218	Nov. 18, 12 p. m.	14.50	10,600	96.4
	SAN FRANCISQUITO CREEK BASIN										
16	San Francisquito Creek at Stanford University.	37.7	1931-41, 1950-	Feb. 27, 1940	9.4	a3,100	82.2	Nov. 18	10.4	a3,650	96.8
	STEVENS CREEK BASIN										
17	Stevens Creek near Cupertino	18.1	1930-	Feb. 28, 1940	7.05	a2,390	132	Nov. 19	2.41	a84	4.64
	GUADALUPE RIVER BASIN										
18	Alamitos Creek near Edenvale	35.0	1930-	Dec. 27, 1931	6.60	2,670	76.3	Dec. 8, 2 a. m.	5.75	650	18.6
19	Guadalupe River at San Jose	131	1930-	Feb. 27, 1940	11.88	a8,680	66.3	Nov. 18, 12 p. m.	9.0	2,730	20.8
20	Los Capitancillos Creek at Guadalupe	12.6	1930-	Dec. 28, 1931	4.05	1,160	92.1	Dec. 8, 9 p. m.	2.09	202	16.0
21	Los Gatos Creek below Los Gatos	43.6	1930-	Feb. 27, 1940	b14.71	7,110	163	Nov. 18, 8:30 p. m.	8.59	3,810	87.4
22	Campbell Creek at Saratoga	8.8	1933-	Jan. 21, 1943	4.80	1,650	188	Nov. 18, 8:30 p. m.	4.07	826	93.9
	COYOTE CREEK BASIN										
23	Coyote Creek near Madrone	194	1902-12, 1916-	gMar. 7, 1911	-	h25,000	129	Nov. 22, 3 p. m.	4.00	a230	1.19
24	Coyote Creek near Edenvale	229	1916-	Feb. 10, 1922	d12.8	10,000	43.7	Dec. 8, 6:30 a. m.	3.80	a400	1.75
	ALAMEDA CREEK BASIN										
25	Alameda Creek near Niles	633	1916-	Feb. 10, 1922	b12.44	13,900	22.0	Nov. 19, 3 a. m.	d12.5	15,100	23.9
	SAN LORENZO CREEK BASIN										
26	San Lorenzo Creek at Hayward	38.0	1940, 1946-	Jan. 24, 1942 Feb. 27, 1940	d15.7 i13.13	- c3,440	- 90.5	Dec. 3, 4 p. m.	12.7	2,610S	68.7

a Affected by regulation.
b Site and datum then in use.
c Observed.
d From floodmarks.
e About.
f Site and datum then in use, from floodmarks.
g Probably.
h Furnished by Duryea, Haehl, and Gilman.
i Datum then in use.

Table 6.--Summary of flood stages and discharges in Central Valley and coastal basins in northern California for the flood of November-December 1950--Continued

No. on pl 15	Stream and place of determination	Drainage area (square miles)	Period of record	Maximum flood previously known				Maximum during present flood			
				Date	Gage height (feet)	Discharge (cfs)	Cfs per square mile	Date and hour	Gage height (feet)	Discharge (cfs)	Cfs per square mile
	KERN RIVER BASIN										
27	Kern River near Kernville	845	1912-	Jan. 17, 1916	i8.8	j9,690	11.5	Nov. 19, 5 a.m.	17.50	k27,000D	32.0
28	Kern River below Isabella dam site	2,080	1945-	Feb. 6, 1950	10.28	k3,990	1.92	Nov. 19, 8:30 a.m.	23.4	39,000S	18.8
29	Kern River near Democrat Springs	2,264	1950-	-	-	-	-	Nov. 19, noon	30.7	40,000D	17.7
30	Kern River near Bakersfield	2,420	1896-	Mar. 9, 1943	10.87	21,700	8.97	Nov. 19, 4:30 p.m.	14.2	36,000	14.9
31	South Fork Kern River near Onyz	531	1911-14, 1919-42, 1948-	Jan. 25, 1914 Mar. 2, 1938	m7.1 6.69	- 3,450	- 6.50	Nov. 19, 11 a.m.	5.88	2,180	4.11
32	South Fork Kern River at Isabella	985	1929-	Feb. 7, 1937 Mar. 9, 1943	6.92 6.99	4,100 -	4.16 -	Nov. 19	d, n12.4	p1,200	1.22
	TULARE LAKE BASIN										
33	Los Gatos Creek above Nunez Canyon, near Coalinga.	95.5	1949-	Feb. 6, 1950	1.96	35	.37	Nov. 19	d2.05	41	.43
34	White River near Ducor	93.7	1944-	Mar. 9, 1943 Feb. 2, 1945	- b6.35	q2,300 1,300	- 13.9	Nov. 19, 1:30 p.m.	3.73	584	6.23
35	North Fork of Middle Fork Tule River near Springville.	39.5	1909-12, 1939-	Mar. 9, 1943	7.39	2,200	55.7	Nov. 19	d13.06	14,000D	354
36	Tule River near Porterville	266	1901-	Mar. 9, 1943	11.3	r15,500	58.3	Nov. 19, 4:30 a.m.	13.75	25,500S	95.9
37	South Fork Tule River near Success	106	1930-	Mar. 9, 1943	8.24	6,210	58.6	Nov. 19, 6 a.m.	8.35	7,100S	67.0
38	Middle Fork Kaweah River near Potwisha Camp.	100	1949-	-	-	-	-	Nov. 19, 12:30 a.m.	15.70	17,500S	175
39	Kaweah River near Three Rivers	520	1903-	Dec. 11, 1937	17.0	33,300	64.0	Nov. 19, about 3:30 a.m.	d17.8	52,000S	100
40	Marble Fork Kaweah River at Potwisha Camp.	50.6	1950-	-	-	-	-	Nov. 18, 12 p.m.	10.1	4,000D	79.1

41	North Fork Kaweah River at Kaweah	128	1910-	Dec. 11, 1937	11.0	8,290	64.8	Nov. 19, 1 a.m.	10.85	9,150S	71.5
42	Sand Creek near Orange Cove	32	1944-	Mar. 9, 1943 Feb. 2, 1945	- 4.00	(s) 410	- 12.8	Nov. 19, 7:30 a.m.	2 87	158	4.94
43	Kings River above North Fork	956	1927-28, 1931-	Dec. 11, 1937	12.02	42,000	43.9	Nov. 19, 1 a.m.	12.23	44,000	46.0
44	Kings River at Piedra	1,694	1895-	Dec. 11, 1937	19.94	80,000	47.2	Nov. 19, 3 a.m.	21.0	91,000S	53.7
45	South Fork Kings River near Cedar Grove	409	1950-	-	-	-	-	Nov. 19, 2 a.m.	13.80	10,000S	24.4
46	North Fork Kings River near Cliff Camp	174	1921-	Dec. 11, 1937	d18.0	14,000	80.5	Nov. 19, 2 a.m.	15.20	9,210	52.9
47	North Fork Kings River below Rancheria Creek.	225	1927-	Dec. 11, 1937	d,e23	21,000	93.3	-	20.0	18,000D	80.0
	SAN JOAQUIN RIVER BASIN San Joaquin River main stem										
48	San Joaquin River above Big Creek	1,042	1922-	Dec. 11, 1937	24.05	a52,500	50.4	Nov. 19, 2 a.m.	22.23	a40,500	38.9
49	San Joaquin River below Kerckhoff, powerhouse.	1,480	1936-37, 1942-	Dec. 11, 1937	46.5	a75,000	50.7	Nov. 19, 8 a.m.	38.40	a48,100D	32.5
50	San Joaquin River below Friant	1,675	1907-	Dec. 11, 1937	b23.8	a77,200	46.1	Dec. 18, 3-11 p.m.	7.84	25,050	3.01
51	San Joaquin River near Mendota	4,310	1944-	Feb. 8, 1945 June 19, 1945	10.12 9.93	- a,k6,440	- 1.49	Dec. 18, 1:30 p.m.	9.41	a4,390	1.02
52	San Joaquin River near Dos Palos	5,630	1944-	Feb. 9, 1945	b11.97	a,k5,630	1.00	Dec. 19, 6-7 a.m.	10.67	a4,140	.74
53	San Joaquin River at Fremont Ford Bridge.	8,090	1944-	Feb. 12, 1945	68.60	a,k4,140	.51	Dec. 20, 12:01-2 a.m.	t67.79	a3,330	.41
54	San Joaquin River near Newman	9,990	1912-	Mar. 7, 1938	18.50	a33,000	3.30	Dec. 11, 7 a.m. to 1 p.m.	16.09	a11,600	1.16
55	San Joaquin River at Grayson	-	1928-	Mar. 10, 1938	39.06	a34,000	-	Dec. 12, 1 a.m.	44.2	a19,300	-

a Affected by regulation.
b Site and datum then in use.
d From floodmarks.
e About.
i Datum then in use.
j Not affected by diversions.
k Not adjusted for diversions (or storage).
m Former site, present datum.
n Occurred about 8 a.m., affected by backwater from Kern River.
p Estimated
q Estimated by Bureau of Reclamation.
r Includes 2,000 cfs (estimated) in overflow channel 0.2 mile east.
s Estimated at 1,000 to 1,200 cfs by Alta Irrigation District.
t Maximum gage height, 68.81 ft 8-11 p.m. Dec. 11, 1950.

Table 6.--Summary of flood stages and discharges in Central Valley and coastal basins in northern California for the flood of November-December 1950--Continued

No. on pl 15	Stream and place of determination	Drainage area (square miles)	Period of record	Maximum flood previously known				Maximum during present flood			
				Date	Gage height (feet)	Discharge (cfs)	Cfs per square mile	Date and hour	Gage height (feet)	Discharge (cfs)	Cfs per square mile
	San Joaquin River main stem--Continued										
56	San Joaquin River at Maze Road	-	1932-	Mar. 14, 1938	30.81	a46,900	-	Dec. 9, 10 a. m.	39.75	a64,000	-
57	San Joaquin River near Vernalis	14,010	1922-	Feb. 12, 1938 Mar. 16, 1938	u27.05 26.64	- a,u51,200	- 3.65	Dec. 9, 8 p. m.	27.75	a,v79,000	5.64
	Tributaries above Fresno River										
58	Soutb Fork San Joaquin River near Florence Lake.	171	1921-	June 6, 1940	15.38	a4,320	25.3	Nov. 18, 10:30 p. m.	9.43	s7.4	.04
59	Ward tunnel at intake	-	1925-	Apr. 30, 1926	-	w1,990	-	Dec. 7	-	w609	-
60	Ward tunnel at outlet	-	1927-	June 21, 1935	-	w2,080	-	Nov. 19	-	w1,510	-
61	Bear Creek near Vermilion Valley	53.5	1921-	July 21, 1936	6.90	1,530	28.6	Nov. 19, 5 a. m.	5.56	683	12.8
62	Mono Creek near Vermilion Valley	92.0	1921-	June 2, 1938	8.62	1,760	19.1	Nov. 19, 5:30 a. m.	7.51	1,040	11.3
63	Big Creek below Huntington Lake	80.0	1925-	June 23, 1925	i10.3	a2,040	25.5	Nov. 18, 9:30 p. m. Dec. 3, 12 p. m.	3.03	a34	.42
64	Pitman Creek below Tamarack Creek	22.0	1927-	Dec. 11, 1937	9.65	2,320	105	Nov. 19, 1:30 a. m.	10.77	3,220S	146
65	North Fork Willow Creek below Crane Valley Reservoir.	50.8	1940-	Feb. 11, 1941	5.85	a847	16.7	Dec. 8, 5-9 a. m.	3.04	s146	2.87
66	Big Sandy Creek near Auberry	27.8	1946-	Apr. 10, 1948	3.49	1,120	40.3	Nov. 19, 2:30 a. m.	4.56	1,540	55.4
67	Fine Gold Creek near Friant	92.8	1936-	Mar. 12, 1938	d20.4	10,300	111	Nov. 19, 2 a. m.	15.58	6,110	65.8
68	Cottonwood Creek near Friant	38	1942-	Jan. 22, 1943	3.89	569	15.0	Dec. 4, 4 a. m.	3.14	214	5.63
69	Little Dry Creek near Friant	58	1941-	Feb. 1, 1945	4.58	1,530	26.4	Dec. 3, 4:30 p. m.	3.99	556	9.59
70	James bypass near San Joaquin	-	1929-	May 19, 1938	-	x4,780	-	Dec. 7, 4-6 a. m.	12.53	4,600	-
71	Panoche Creek below Silver Creek, near Panoche,	299	1949-	Sept. 18, 1950	d6.25	2,510	8.39	Dec. 6, 12 p. m.	2.21	16	.05

	Fresno River Basin										
72	Freano River near Knowles	132	1911-13, 1915-	Mar. 12, 1938	8.67	7,630	57.8	Nov. 19, 2 a. m.	9.31	8,540	64.7
73	Fresno River near Daulton	270	1944-	Feb. 2, 1945	7.10	8,090	30.0	Nov. 19, 4 a. m.	10.36	10,700	39.6
	Tributaries and diversions between Fresno River and Merced River										
74	Chowchilla River at Buchanan dam site	238	1921-23,1930-	Mar. 2, 1938	d14.4	18,900	79.4	Nov. 18, about 12 p. m.	d15.06	22,500S	94.5
75	Salt Slough near Los Banos	-	1944-	May 18, 1945	8.32	1,200	-	Dec. 23, 7 p. m.	7.12	689	-
	Los Banos Creek Basin										
76	San Luis Creek near Los Banos	84.7	1949-	-	-	No flow	-	Nov. 19, 5 a. m.	5.60	2,760S	32.6
	Merced River Basin										
77	Merced River at Happy Isles Bridge, near Yosemite.	181	1915-	Dec. 11, 1937	10.4	8,400	46.4	Nov. 18, about 12 p. m.	d11.55	9,260C	51.2
78	Merced River at Pohono Bridge, near Yosemite.	321	1916-	Dec. 11, 1937	d19.1	22,000	68.5	Nov. 19 about 1 a. m.	d19.98	23,000D	71.7
79	Merced River at Bagby	912	1922-	Dec. 11, 1937	f31.0	59,000	64.7	Nov. 19, 4 a. m.	d,y26.96	83,000L	91.0
80	Merced River at Exchequer	1,035	1915-	Jan. 17, 1916	b,c20.0	e22,000	21.3	Dec. 4, about 3 a. m.	d22.6	46,200D	44.6
81	Merced River below Snelling z/	-	1938-	June 5, 1938	9.1	9,500	-	Dec. 4,10 a. m.	10.13	a30,100	-
82	Merced River near Stevinson	1,274	1944-	May 10, 1945	13.15	a4,960	3.89	Dec. 5, 3 p. m.	d18.05	a13,600	10.7
83	Tenaya Creek near Yosemite	47	1904-9, 1912-	Dec. 11, 1937	10.0	5,550	118	Nov. 18, 12 p. m.	8.25	6,330C	135
84	South Fork Merced River near El Portal	239	1950-	-	-	-	-	Nov. 19, 1 a. m.	17.63	37,600S	157
85	Merced River Slough near Newman	-	1944-	May 10, 12, 1945	7.50	990	-	Dec. 5, 4 p. m.	11.29	6,410	-

a Affected by regulation.
b Site and datum then in use.
c Observed.
d From floodmarks.
e About
f Site and datum then in use, from floodmarks.
i Datum then in use.
u Before break in levee.
v Includes flow through break in levee.
w Daily discharges.
x From records of Kings River Water Association.
y Equivalent to 72.3 ft wire-weight gage datum, from floodmarks.
z Furnished by Division of Water Resources, Department of Public Works, State of California.

Table 6.--Summary of flood stages and discharges in Central Valley and coastal basins in northern California for the flood of November-December 1950--Continued

No. on pl 15	Stream and place of determination	Drainage area (square miles)	Period of record	Maximum flood previously known				Maximum during present flood			
				Date	Gage height (feet)	Discharge (cfs)	Cfs per square mile	Date and hour	Gage height (feet)	Discharge (cfs)	Cfs per square mile
	Orestimba Creek Basin										
86	Orestimba Creek near Newman	129	1932-	Jan. 21, 1943	5.95	4,900	38.0	Dec. 3, 10:30 p. m.	4.49	2,470	19.1
	Tuolumne River Basin										
87	Tuolumne River near Hetch Hetchy	462	1915-	June 1, 1943	13.90	a12,900	27.9	Dec. 8, 2 p. m.	12.65	a9,310	20.2
88	Tuolumne River above La Grange Dam, near La Grange.	1,540	1895-	Jan. 31, 1911 Mar. 25, 1928	b16.45 29.6	a60,300 -	39.2 -	Dec. 8, 11:30 a. m.	43.8	a61,000	39.6
89	Tuolumne River at Modesto	-	1943-	Feb. 5, 1945	51.32	a8,070	-	Dec. 9, 5 a. m.	69.19	57,000	-
90	Falls Creek near Hetch Hetchy	45.2	1915-	Dec. 11, 1937	8.90	6,300	139	Nov. 19, 3 a. m.	9.0	6,660	147
91	Cherry Creek near Hetch Hetchy	111	1910-	Dec. 11, 1937	d25.1	18,100	163	Nov. 18, 12 p. m.	20.17	13,400	121
92	Eleanor Creek near Hetch Hetchy	80	1909-	Dec. 11, 1937	13.95	a10,500	131	Nov. 19, about 3 a. m.	14.95	a11,700	146
93	South Fork Tuolumne River near Oakland Recreation Camp.	87.6	1923-	Dec. 11, 1937	10.00	6,950	79.3	Nov. 18, 10 p. m.	8.68	4,540	51.8
94	Middle Tuolumne River at Oakland Recreation Camp,	71.0	1917-	Dec. 11, 1937	d10.4	2,910	41.0	Nov. 19, 2:30 a. m.	10.45	2,810	39.6
95	Woods Creek near Jacksonville	98.4	1925-	Feb. 9, 1938 Feb. 3, 1945	- 13.5	13,500 -	137 -	Nov. 18, 7 p. m.	11.75	3,820	38.8
	Stanislaus River Basin										
96	Middle Fork Stanislaus River at Kennedy Meadows.	49.5	1938-	June 1, 1943	6.17	a1,160	23.4	Nov. 20, 7 p. m.	6.66	1,700S	34.3
97	Middle Fork Stanislaus River at San Bar Flat, near Avery.	318	1905-	Dec. 11, 1937	d21.0	a26,500	83.3	Nov. 18, 12 p. m.	18.13	23,300	73.3
98	Stanislaus River below Melones powerhouse.	898	1931-	Mar. 31, 1940	17.6	a22,800	25.4	Nov. 21, 1:30 a. m.	25.18	49,500D	55.1

99	Stanislaus River at Orange Blossom Bridge. z/	-	1939-	Mar. 10, 1943	23.5	a20,000	-	Nov. 21, 5 a.m.	30.05	52,200	-
100	Stanislaus River at Ripon	-	1940-	Feb. 12, 1938 Mar. 11, 1943	d64.4 59.83	- a19,700	- -	Nov. 21, 8:30 p.m.	62 78	48,500	-
101	Clark Fork Stanislaus River near Dardanelles.	65.7	1950-	-	-	-	-	Nov. 20, 9 p.m.	11.88	4,350S	66.2
102	North Fork Stanislaus River near Avery	163	1914-22, 1928-	Dec. 11, 1937	d14.1	a31,000	191	Nov. 18	d13.8	a29,000S	178
103	South Fork Stanislaus River at Strawberry	45.5	1911-17, 1938-	June 4, 1945	6.3	a1,680	36.9	Nov. 21, 2 a.m.	9.25	a3,900C	85.7
104	South Fork Stanislaus River near Long Barn.	67.2	1937-	June 2, 1938	7.14	a2,300	34.2	Nov. 21, 5 a.m.	9.3	a4,900D	72.9
	Calaveras River Basin										
105	Calaveras River at Jenny Lind	395	1907-	Jan. 31, 1911	aa21.0	50,000	127	Nov. 19, 6 a.m.	11.89	a7,570	19.2
106	San Domingo Creek near San Andreas	27.1	1950-	Feb. 4, 1950	d4.45	928	34.2	Dec. 8	d4.18	728	26.9
107	San Antonio Creek near San Andreas	46.4	1950-	Feb. 4, 1950	d4.5	1,220	26.3	Nov. 18, 5 p.m.	d4.50	1,220	26.3
108	Esperanza Creek near Mokelumne Hill	16.6	1950-	-	-	-	-	Nov. 18	5.1	c2,030S	122
109	Jesus Maria Creek near Mokelumne Hill	34.5	1950-	-	-	-	-	Nov. 18	d7.1	4,380S	127
110	Cosgrove Creek near Valley Springs	20.6	1929-	Dec. 21, 1945	8.38	3,180	154	Nov. 18, 10:30 p.m.	6.34	1,390	67.5
111	Stockton diverting canal at Stockton	-	1944-	Feb. 3, 1945	d12.9	7,820	-	Nov. 19, 8 p.m.	13.42	7,950	-
	Bear Creek Basin										
112	Bear Creek near Lockeford	48.4	1930-33, 1943-	Feb. 2, 1945	14.45	2,260	46.7	Dec. 7, 7:30 a.m.	9.65	834	17.2
	Mokelumne River Basin										
113	North Fork Mokelumne River below Salt Springs Dam.	160	1926-	Mar. 25, 1928	15.62	8,740	54.6	Nov. 21, 2 a.m.	17.20	a16,000D	100
114	Mokelumne River near Mokelumne Hill	538	1927-	Mar. 25, 1928	16.10	23,300	43.3	Dec. 3, 10 p.m.	18.5	a33,700	62.6
115	Mokelumne River at Lancha Plana	584	1926-	Mar. 25, 1928	19.65	25,700	44.0	Nov. 21, 9:30 a.m.	20.1	a26,700	45.7

a Affected by regulation.
b Site and datum then in use.
c Observed.
d From floodmarks.
z Furnished by Division of Water Resources, Department of Public Works, State of California.
aa Present datum.

Table 6.--Summary of flood stages and discharges in Central Valley and coastal basins in northern California for the flood of November-December 1950--Continued

No. on pl 15	Stream and place of determination	Drainage area (square miles)	Period of record	Maximum flood previously known				Maximum during present flood			
				Date	Gage height (feet)	Discharge (cfs)	Cfs per square mile	Date and hour	Gage height (feet)	Discharge (cfs)	Cfs per square mile
	Mokelumne River Basin--Continued										
116	Mokelumne River near Clements	630	1904-	Mar. 25, 1928	b22.45	25,600	40.6	Nov. 21, 8 a.m.	24.40	a28,800	45.7
117	Mokelumne River at Woodbridge	644	1924-	Mar. 26, 1928	ab26.58	n24,000	37.3	Nov. 22, 2 a.m.	29.58	27,000C	41.9
118	Cold Creek near Mokelumne Peak	23	1927-	Dec. 11, 1937	8.98	4,650	202	Nov. 18, 7:30 p.m.	9.69	5,500S	239
119	Bear River at Pardoe Camp	33.0	1927-	Dec. 11, 1937	d12.0	a5,850	177	Nov. 20	d12.62	a,p7,100	215
120	Middle Fork Mokelumne River at West Point.	67.2	1911-	Jan. 23, 1914	b10.0	c2,550	37.9	Nov. 18, 8:30 p.m.	7.70	2,820S	42.0
121	South Fork Mokelumne River near West Point.	73.8	1933-	Feb. 2, 1945	9.55	3,760	50.9	Nov. 18, 11 p.m.	9.64	3,300S	44.7
122	Dry Creek near Galt	325	1926-	Feb. 2, 1945	13.84	13,200	40.6	Nov. 19, 3 p.m.	13.72	9,260	28.5
123	North Fork Cosumnes River at Cosumnes Mine.	36.9	1948-	Apr. 21, 1950	4.56	438	11.9	Nov. 21, 1:50 a.m.	9.50	3,940S	107
124	North Fork Cosumnes River near El Dorado.	202	1911-41, 1948-	Mar. 31, 1940	b10.12	8,350	41.3	Nov. 18, 9 p.m.	12.06	10,900C	54.0
125	Cosumnes River near Plymouth	429	1950-		-	-	-	Nov. 18	d20.5	20,900S	48.7
126	Cosumnes River at Michigan Bar	537	1907-	March 1907 Mar. 31, 1940	16.3 11.66	- 26,200	- 48.8	Nov. 18, 11 p.m.	11.85	27,600	51.4
127	Cosumnes River at McConnell	730	1943-	Feb. 23,24,1936 Feb. 3, 1945	ac45.94	15,800	21.6	Nov. 21, 6-8 p.m.	44.89	21,900	30.0
128	Camp Creek near Camino	35.5	1948-	Feb. 6, 1950	2.94	451	12.7	Nov. 20, 2 p.m.	5.65	2,560S	72.1
129	Sly Park Creek near Pollock Pines	14.4	1906, 1948-	Feb. 6, 1950	4.62	433	30.1	Dec. 3, 9 p.m.	6.53	1,030	71.5

	SACRAMENTO RIVER BASIN Sacramento River main stem										
130	Sacramento River at Delta	427	1944-	Oct. 29, 1950	16.61	30,600	71.7	Nov. 16, 9 a.m.	9.97	7,400	17.3
131	Sacramento River at Keswick	6,710	1938-	Feb. 28, 1940	b47.2	186,000	27.7	Dec. 17, 10 a.m.	25.60	a42,100	6.27
132	Sacramento River near Red Bluff	9,300	1895-	Feb. 28, 1940	38.9	291,000	31.3	Dec. 14, 4 p.m.	16.16	a70,100	7.54
133	Sacramento River at Butte City	-	1940-	Feb. 7, 1942	96.87	a170,000	-	Dec. 15, 6-7 p.m.	88.15	a67,600	-
134	Sacramento River at Colusa	-	1940-	Feb. 8, 1942	69.20	a49,000	-	Dec. 16, 7 a.m.	63.62	a36,200	-
135	Sacramento River below Wilkins Slough	-	1940-	Feb. 8, 1942	52.29	a26,600	-	Dec. 16, 2 p.m.	48.26	a22,500	-
136	Sacramento River at Knights Landing	-	1940-	Feb. 9, 1942	41.83	a27,900	-	Dec. 17, 5-8 a.m.	(ad)	a23,400	-
137	Sacramento River at Verona	-	ae1926-	Mar. 1, 1940	41.20	a,ae79,200	-	Nov. 22, 6 a.m.	af37.06	a64,300	-
138	Sacramento River at Sacramento z/	-	1893-	Jan. 17, 1909	29.6	ac103,000	-	Nov. 21, 10 a.m. to noon	30.14	104,000	-
	Pit River Basin										
139	Pit River near Canby	1,430	1904-05, 1929-	Mar. 8, 1904	i14.0	ac17,000	11.9	Dec. 6, 11 a.m.	3.38	390	.27
140	Pit River at Fall River Mills	4,150	1921-	Dec. 12, 1937	11.8	a28,600	6.89	Dec. 4, 8 p.m.	2.77	a1,210	.29
141	Pit River below Pit No. 4 Dam	4,860	1927-	Dec. 12, 1937	17.90	a30,200	6.21	Dec. 10, 2 a.m.	9.90	a5,750	1.18
142	Pit River at Big Bend	4,920	1910-	Dec. 12, 1937	16.26	a34,200	6.95	Dec. 10, 1 a.m.	10.08	a4,750	.97
143	Pit River near Montgomery Creek	5,170	1944-	Dec. 28, 1945	10.14	a18,600	3.60	Dec. 9, 12:30 p.m.	7.62	a10,800	2.09
144	South Fork Pit River near Likely	248	1928-	Apr. 27, 1932	5.55	a1,060	4.27	Nov. 21, 3-4 a.m.	2.77	119	.48
145	Hat Creek near Hat Creek	155	1926-	Dec. 11, 1937	ag7.75	2,500	16.1	Nov. 21 12:30-3:30 a.m.	3.00	259	1.67

a Affected by regulation.
b Site and datum then in use.
c Observed.
d From floodmarks.
i Datum then in use.
n Occurred about 8 a.m.; affected by backwater from Kern River.
p Estimated.
z Furnished by Division of Water Resources, Department of Public Works, State of California.
ab Datum then in use, or about 30.6 ft, present datum.
ac Recorded.
ad Maximum gage height, 38.37 ft 4-6 a.m. Nov. 22, 1950.
ae 1934-50: Maximum combined discharge of Sacramento River at Verona and Fremont Weir into Yolo Bypass, about 315,000 cfs Mar. 1, 1940.
af Occurred 8-9 p.m. Nov. 21, 1950.
ag In gage well, affected by drawdown.

Table 6. --Summary of flood stages and discharges in Central Valley and coastal basins in northern California for the flood of November-December 1950--Continued

No. on pl 15	Stream and place of determination	Drainage area (square miles)	Period of record	Maximum flood previously known				Maximum during present flood			
				Date	Gage height (feet)	Discharge (cfs)	Cfs per square mile	Date and hour	Gage height (feet)	Discharge (cfs)	Cfs per square mile
	Pit River Basin--Continued										
146	Squaw Creek above Shasta Lake.	65.3	1944-	Oct. 30, 1950	16.50	ah6,750	103	Dec. 15, 10:30 a.m.	12.69	2,770	42.4
147	McCloud River near McCloud	382	1931-	Feb. 28, 1940	8.9	8,820	23.1	Dec. 15, 11 a.m.	3.69	2,610	6.83
148	McCloud River above Shasta Lake	606	1945-	Oct. 29, 1950	20.85	ai15,400	25.4	Dec. 1., 6 a.m.	19.34	12,100	20.0
	Clear Creek Basin										
149	Clear Creek at French Gulch	106	1950-	Oct. 29, 1950	7.85	3,430	32.4	Nov. 16, 9 a.m.	5.45	1,070	10.1
150	Clear Creek near Igo	231	1940-	February 1940 Mar. 1, 1941	e13 12.2	- 19,200	- 83.1	Nov. 16, 6 a.m.	6.86	3,970	17.2
	Cow Creek Basin										
151	Cow Creek near Millville	427	1949-	Feb. 6, 1950	16.48	22,500	52.7	Dec. 14, 10 a.m.	14.26	15,600	36.5
	Cottonwood Creek Basin										
152	Cottonwood Creek near Cottonwood	945	1940-	Mar. 1, 1941	15.4	52,300	55.3	Dec. 14, 1 p.m.	10.31	18,200	19.3
	Battle Creek Basin										
153	Battle Creek near Cottonwood	362	1940-	Dec. 11, 1937 Feb. 6, 1942	d15.8 11.85	aj35,000 12,800	96.7 35.4	Dec. 14, 7:30 a.m.	7.94	5,950	16.4
	Paynes Creek Basin										
154	Paynes Creek near Red Bluff	92.5	1949-	Feb. 4, 1950	7.93	4,590	49.6	Dec. 14, 8 a.m.	6.81	2,260	24.4
	Antelope Creek Basin										
155	Antelope Creek near Red Bluff	124	1940-	December 1937 Feb. 6, 1942	d,e22 13.9	- 10,400	- 83.9	Nov. 16, 8:30 a.m.	8.95	3,740	30.2
	Elder Creek Basin										
156	Elder Creek near Paskenta	95.8	1948-	Mar. 11, 1949	8.78	3,690	38.5	Nov. 16, 6:30 a.m.	7.48	1,670	17.4

157	Elder Creek at Gerber	142	1949-	Feb. 6, 1950	5.72	1,160	8.17	Dec. 3, 10:30 p. m.	6.47	1,660	11.7
	Mill Creek Basin										
158	Mill Creek near Los Molinos	134	1928-	Dec. 11, 1937	d23.4	23,000	172	Nov. 16, 7:30 a. m.	7.48	3,870	28.9
	Thomes Creek Basin										
159	Thomes Creek at Paskenta	188	1921-	Jan. 21, 1943	[illegible]0.92	18,600	98.9	Dec. 3	7.85	6,980	37.1
	Deer Creek Basin										
160	Deer Creek near Vina	200	1911-15, 1920-37, 1939-	Dec. 10, 1937	d19.2	23,800	119	Nov. 16, 8:30 a. m.	7.75	4,500	22.5
	Chico Creek Basin										
161	Chico Creek near Chico	68.3	1930-	Dec. 10, 1937	18.7	8,260	121	Nov. 16, 10:30 a. m.	9.71	2,270	33.2
	Stony Creek Basin										
162	Stony Creek near Hamilton City	764	1941-	Mar. 1, 1941	b6.35	a37,500	49.3	Dec. 4, 5 a. m.	11.25	5,390	7.05
	Butte Creek Basin										
163	Butte Creek near Chico	148	1930-	Dec. 11, 1937	b18.9	17,000	115	Nov. 20, 8 p. m.	6.20	3,850	26.0
	Feather River Basin										
164	North Fork Feather River near Prattville.	507	1905-	Mar. 19, 1907	b16.2	10,000	19.7	Dec. 19-26	6.19	a2,050	4.04
165	North Fork Feather River at Big Bar	1,945	1911-37, 1939-	Dec. 11, 1937	d29.7	a66,900	34.4	Nov. 20, 6 p. m.	17.89	a25,700	13.2
166	Feather River near Oroville	3,611	1902-34, 1934-	Mar. 19, 1907 Dec. 11, 1937	ak28.2 d73.6	c230,000 185,000	63.2 51.2	Nov. 21, 5 a. m.	54.80	92,100	25.5
167	Feather River at Nicolaus	-	1943-	Dec. 30, 1945	45.23	94,000	-	Nov. 21, 7 p. m.	47.80	145,000	-

a Affected by regulation.
c Observed.
d From floodmarks.
e About
ah Flood of Dec. 27, 1945 reached a stage of 16.00 ft (6,150 cfs).
ai Flood of Jan. 7, 1948 reached a stage of 20.25 ft (14,100 cfs).
aj Slope-area determination.
ak Reading on U. S. Weather Bureau staff gage at site at Oroville, 5 miles downstream; probably had been higher during night.

Table 6.--Summary of flood stages and discharges in Central Valley and coastal basins in northern California for the flood of November-December 1950--Continued

No. on pl 15	Stream and place of determination	Drainage area (aquare miles)	Period of record	Maximum flood previously known				Maximum during present flood			
				Date	Gage height (feet)	Discharge (cfs)	Cfs per square mile	Date and hour	Gage height (feet)	Discharge (cfs)	Cfs per square mile
	Feather River Basin--Continued										
168	Butt Creek above Almanor-Butt Creek tunnel, near Prattville.	67.0	1936-37, 1938-	Feb. 28, 1940	b5.75	1,500	22.4	Nov. 20, 8:30 p. m.	3.45	780	11.6
169	Butt Creek below Almanor-Butt Creek tunnel, near Prattville.	67.3	1938-	Mar. 30, 1940	4.37	a2,170	32.2	Nov. 20, 9 p. m.	3.81	a1,640	24.4
170	Indian Creek near Crescent Mills	746	1906-9, 1911-18, 1930-	Feb. 28, 1940	16.07	14,000	18.8	Nov. 21, 7 p. m.	11.74	6,600	8.85
171	Spanish Creek at Keddie	184	1911-	Dec. 11, 1937	12.43	12,400	67.4	Nov. 20, 11 p. m.	8.11	5,330	29.0
172	East Branch North Fork Feather River near Rich Bar.	1,035	1950-	-	-	-	-	Nov. 21, 8 a. m.	11.00	9,820S	9.49
173	West Branch Feather River near Yankee Hill.	145	1930-	Dec. 11, 1937	30.3	a21,400	148	Nov. 20, 7 p. m.	17.93	8,840	61.0
174	Concow Creek near Yankee Hill	14.7	1927-	Jan. 21, 1943	d5.35	a2,060	140	Dec. 3, 6 p. m.	3.08	a982	66.8
175	Middle Fork Feather River near Clio	699	1925-	Mar. 26, 1928	12.0	11,000	15.7	Nov. 20, 11:30 p. m.	12.58	7,170	10.3
176	Middle Fork Feather River below Sloat	835	1940-	gFebruary 1940 Jan. 21, 1943	d13.2 12.65	13,300 12,400	15.9 14.9	Nov. 21, 12:30 a. m.	12.25	13,300	15.9
177	Middle Fork Feather River near Merrimac	1,078	1950-	Dec. 10, 1937	d19.4	-	-	-	d17.1	34,300S	31.8
178	Middle Fork Feather River at Bidwell Bar	1,353	1911-	Dec. 11, 1937	d24.0	93,000	68.7	Nov. 21, 3 a. m.	18.25	50,200	37.1
179	Grizzly Creek near Portola	45.0	1925-32, 1950-	Mar. 26, 1928	i7.50	2,680	59.6	Dec. 3, 4:30p. m.	7.48	1,780S	39.6
180	South Fork Feather River at Enterprise	134	1911-	Dec. 10, 1937	20.4	a17,300	129	Nov. 19, 9 p. m.	15.9	a9,580D	71.5
181	Lost Creek near Clipper Mills	30.1	1927-41, 1948-	Dec. 10, 1937	6.80	3,380	112	Nov. 20, 12 p. m.	5.43	1,870	62.1
182	South Honcut Creek near Bangor	30.5	1950-	-	-	-	-	Nov. 20, 4:30 p. m.	8.68	3,170	104

183	Middle Yuba River at Milton	41	1925-34, 1935-	Dec. 11, 1937	4.18	a6,800	166	Nov. 20, 6 p. m.	4.00	a6,300	154
184	Middle Yuba River above Oregon Creek	170	1941-	Jan. 21, 1943	12.83	a14,200	83.5	Nov. 21, 1 a. m.	15.25	19,500S	115
185	Yuba River at Narrows Dam	1,110	1941-	Jan. 21, 1943	-	a81,100	73.1	Nov. 21, 1 a. m.	-	a109,000D	98.2
186	Yuba River at Marysville	-	1943-44, 1945-	Jan. 22, 1943 Dec. 29, 1945 Feb 5, 1950	70.45 65.78 -	- (am) 31,500	- - -	Nov. 21, 2 a m.	an72.04	78,800	-
187	Oregon Creek near North San Juan	35.1	1910-	Mar. 25, 1928	b9.5	c, e4,000	111	Nov. 21, 1 a. m.	9.80	3,240	92.3
188	North Yuba River below Goodyears Bar	244	1930-	Dec 11, 1937	d19.0	26,000	107	Nov. 20, 10 p. m.	19.15	26,400S	108
189	North Yuba River below Bullards Bar Dam.	481	1940-	Jan. 21, 1943	-	b44,200	91.3	Nov. 21, 1 a. m.	31.3	47,100D	97.9
190	South Yuba River near Cisco	50.2	1942-	Jan. 21, 1943	ap12.35	6,080	121	Nov. 20, 4 p. m.	15.82	11,700S	233
191	South Yuba River near Washington	197	1942-	Jan. 21, 1943	b13.8	a20,300	103	Nov. 20, 7:30 p. m.	23.08	37,100S	188
192	Canyon Creek below Bowman Lake	31.7	1927-	June 6, 1936 June 1, 1943	5.98 5.84	- a2,030	- 64.0	Dec. 4, 1 p. m.	6.28	a2,520	79.5
193	Deer Creek near Smartville	83.5	1935-	Mar. 9, 1943	13.62	11,300	135	Nov. 20, 11 a. m.	10.35	5,970	71.5
194	Dry Creek near Brownsville	20.5	1948-	Feb. 4, 1950	5.39	822	40.1	Nov. 20, 6 p. m.	5.39	834S	40.7
195	Dry Creek at Virginia Ranch	71.5	1948-	Feb. 4, 1950	9.02	7,090	99.2	Nov. 20, 6 a. m.	9.15	7,400S	103
196	Bear River near Colfax	105	1911-17, 1949-	Feb. 17, 1917	b14.2	5,200	49.5	Nov. 20, 6 p. m.	21.40	9,620S	91.6
197	Bear River near Auburn	140	1940-	Jan. 21, 1943	16.45	a19,300	138	Nov. 20, 9 p. m.	15.00	a14,800D	106
198	Bear River near Wheatland	295	1928-	Jan. 21, 1943	b16.95	aq31,300	106	Nov. 21, 1:30 a. m.	20.83	29,100S	98.6
199	Dry Creek near Wheatland	99.5	1946-	Feb. 4, 1950	11.16	4,150	41.7	Nov. 20, 6:30 p. m.	11.64	4,960	49.8

a Affected by regulation.
b Site and datum then in use.
c Observed.
d From floodmarks.
e About.
i Datum then in use.
am Discharge may have been greater than that of Feb. 5, 1950.
an Occurred at 9:50 a. m. Nov. 21.
ap Site then in use.
aq Includes 5,700 cfs through levee break 0.5 mile upstream.

Table 6.--Summary of flood stages and discharges in Central Valley and coastal basins in northern California for the flood of November-December 1950--Continued

No. on pl 15	Stream and place of determination	Drainage area (square miles)	Period of record	Maximum flood previously known				Maximum during present flood			
				Date	Gage height (feet)	Discharge (cfs)	Cfs per square mile	Date and hour	Gage height (feet)	Discharge (cfs)	Cfs per square mile
	AMERICAN RIVER BASIN										
200	North Fork American River at North Fork Dam.	343	1941-	Jan. 21, 1943	9.53	42,600	124	Nov. 20, 9:30 p.m.	9.96	46,600D	136
201	North Fork American River at Rattlesnake Bridge.	999	1930-	Jan. 21, 1943	26.5	95,000	95.1	Nov. 21, 1 a.m.	29.50	115,000	115
202	American River at Fair Oaks	1,921	1904-	Mar. 25, 1928	31.45	163,000	84.9	Nov. 21, 4:30 a.m.	31.85	180,000	93.7
203	American River at Sacramento	-	1943-	-	-	(ar)	-	Nov. 21, 9 a.m.	45.73	as106,000	-
204	Middle Fork American River near Auburn	619	1911-	Mar. 25, 1928	at33.4	e62,000	100	Nov. 20	d34.7	68,500S	111
205	Rubicon River near Georgetown	198	1943-	Feb. 2, 1945	13.25	a9,620	48.6	Nov. 18, 10 p.m.	18.10	44,600S	225
206	Pilot Creek near Georgetown	14.5	1946-	gFeb. 6, 1950	8.78	435	30.0	Nov. 18, 9 p.m.	10.84	3,040S	210
207	South Fork American River near Kyburz	196	1922-	Dec. 11, 1937	8.55	a9,700	49.5	Nov. 21, 2 a.m.	9.40	a14,500C	74.0
208	South Fork American River near Camino	497	1922-	Dec. 11, 1937	d25.5	a34,400	69.2	Nov. 21, about 2 a.m.	d29.4	a46,000	92.6
209	South Fork American River near Lotus	678	-	-	-	-	-	Nov. 21	d20.4	52,200S	77.0
210	Medley Lakes Outlet near Vade	4.2	1922-	June 15, 16, 1929	3.42	202	48.1	Dec. 8, 2 p.m.	4.80	a388	92.4
211	Silver Lake Outlet near Kirkwood	14.9	1922-	Dec. 11, 1937	5.10	a504	33.8	Nov. 21, 1:30 a.m.	6.03	a675	45.3
212	Twin Lakes Outlet near Kirkwood	12.4	1922-	June 1, 1943	-	au310	-	Dec. 8	-	a, au405	-
213	Alder Creek near Whitehall	22.8	1922-	Mar. 25, 1928	d7.1	e, k3,700	162	Nov. 20, 3 p.m.	5.56	k2,020	88.6
214	Silver Creek at Union Valley	82.7	1924-	Dec. 11, 1937	15.28	10,200	123	Nov. 20, 10:30 p.m.	16.55	12,100S	146
215	Silver Creek near Placerville	176	1921-	Dec. 11, 1937	13.8	23,000	131	Nov. 18, 6 p.m.	14.25	25,800S	147
216	South Fork Silver Creek near Ice House	28.4	1924-	Dec. 11, 1937	5.80	2,200	77.5	gNov. 18	d6.69	3,900S	137
217	Webber Creek near Salmon Falls	100	1943-	Mar. 4, 1949	14.34	5,390	53.9	Nov. 18, 4 p.m.	14.2	6,740	67.4

	COLUSA AND YOLO BASINS										
218	Yolo bypass near Woodland	-	1940-	Feb. 8, 1942	32.00	272,000	-	**Nov. 22,** 4-6 a. m.	29.18	133,000	-
219	Sacramento weir near Sacramento z/	-	1926-	Mar. 26, 1928	32.8	118,000	-	Nov. 21, 12 m.	32.90	110,740	-
220	Cache Creek near Lower Lake	av528	1944-	Jan. 4, 1946	8.34	a4,650	8.81	Dec. 3, 1:30 p. m.	0.98	a11	0.02
221	Cache Creek near Capay	1,052	1942-	Jan. 21, 1943	17.54	a23,000	21.9	Dec. 3, 8:30 p. m.	14.09	a14,200	13.5
222	Cache Creek at Yolo	1,137	1903-	Feb. 28, 1940	29.0	aw38,700	34.0	Dec. 4, 6 a. m.	17.63	11,700	10.3
223	Kelsey Creek near Kelseyville	37.4	1946-	Nov. 22, 1946	9.38	2,320	62.0	Dec. 3, 1 p. m.	11.38	3,110	83.2
224	North Fork Cache Creek near Lower Lake	198	1930-	Feb. 28, 1940	13.9	20,000	101	Dec. 3, 3 p. m.	10.54	10,200	51.5
225	Putah Creek near Guenoc	112	1904-06, 1930-	Mar. 10, 1904	i20.1	c24,600	220	Dec. 3, 3 p. m.	15.98	12,700	113
226	Putah Creek near Winters	614	1905-	Feb. 27, 1940	30.5	70,500	115	Dec. 3, 7 p. m.	24.32	35,300	57.5
227	Putah Creek near Davis	658	1948-	Mar. 12, 1949	17.2	23,600	35.9	Dec. 3, 11:30 p. m.	20.88	29,300	44.5
	NAPA RIVER BASIN										
228	Napa River near St. Helena	83.5	1929-32, 1939-	Feb. 6, 1942	14.6	11,800	141	Dec. 3, 4 p. m.	11.9	7,680	92.0
229	Conn Creek near St. Helena	52.0	1929-	Feb. 27, 1940	11.80	7,700	148	Dec. 3, 9 p. m.	6.38	1,320	25.4
	PETALUMA CREEK BASIN										
230	Petaluma Creek near Petaluma	29.6	1948-	Feb. 4, 1950	12.19	1,270	42.9	Dec. 3, 5 p. m.	12.55	1,360	45.9
	NOVATO CREEK BASIN										
231	Novato Creek near Novato	16.9	1946-	Feb. 4, 1950	7.15	978	57.9	Dec. 3, 1 p. m.	7.97	1,130	66.9

a Affected by regulation.
c Observed.
d From floodmarks.
e About.
g Probably.
i Datum then in use.
k Not adjusted for diversions (or storage).

z Furnished by Division of Water Resources, Department of Public Works, State of California.
ar Not determined.
as Main channel only, excludes estimated overflow of 70,000 cfs.
at Present site and datum, from floodmarks.
au Combined daily discharge for outlet and spillway; possibly exceeded in May 1945.
av Includes water surface of Clear Lake (65 sq mi).
aw Includes 10,000 cfs estimated overflow on right bank.

Table 6.--Summary of flood stages and discharges in Central Valley and coastal basins in northern California for the flood of November-December 1950--Continued

No. on pl 15	Stream and place of determination	Drainage area (square miles)	Period of record	Maximum flood previously known				Maximum during present flood			
				Date	Gage height (feet)	Discharge (cfs)	Cfs per square mile	Date and hour	Gage height (feet)	Discharge (cfs)	Cfs per square mile
	RUSSIAN RIVER BASIN										
232	Russian River near Hopland	362	1939-	December 1937 Feb. 28, 1940 Jan. 21, 1943	d,e30.0 - 26.12	- 34,100 -	- 94.2 -	Dec. 3, 5 p. m.	24.7	31,200	86.2
233	Russian River near Healdsburg	791	1939-	December 1937 Feb. 28, 1940	d30.8 30.0	- 67,000	- 84.7	Dec. 4, 1 a. m.	19.5	36,600	46.3
234	Russian River at Guerneville	1,346	1939-	Feb. 28, 1940	46.87	88,400	65.7	Dec. 4, 7:30 a. m.	d34.8	55,600	41.3
235	East Fork Russian River near Calpella	94.0	1941-	Jan. 21, 1943	13.67	ax11,200	119	Dec. 3, 10:30 a. m.	13.4	10,700	114
236	Dry Creek near Cloverdale	88.3	1941-	December 1937 Jan. 21, 1943	d, e18 16.65	- 21,900	- 248	Dec. 3, 10:30 a. m.	15.0	17,800	202
	EEL RIVER BASIN										
237	Eel River at Hullville	289	1922-	Dec. 11, 1937	d22.9	a38,000	131	Dec. 3, 4 p. m.	16.3	a17,000	58.8
238	Eel River at Van Arsdale Dam, near Potter Valley.	347	1909-	Mar. 26, 1928 Dec. 11, 1937	27.0 30.9	a, e40,000 -	115 -	Dec. 3, 5 p. m.	19.55	a18,700	53.9
239	Eel River at Scotia	3,070	1910-15, 1916-	Feb. 2, 1915 Dec. 11, 1937	c55.5 55.1	- 345,000	- 112	Dec. 3, 4	d37.4	160,000	52.1
240	South Fork Eel River near Branscomb	-	1946-	Jan. 7, 1948	8.5	4,200	-	Dec. 3, 7 p. m.	9.4	2,650	-
241	South Fork Eel River near Miranda	547	1940-	Dec. 27, 1945	27.73	73,200	134	Dec. 3, 7 p. m.	16.7	28,100	51.4
242	Van Duzen River at Bridgeville	200	1939-	Jan. 21, 1943	d25.5	21,600	108	Dec. 3, 11 a. m.	d18.0	10,800	54.0
	KLAMATH RIVER BASIN										
243	Klamath River below Fall Creek, near Copco.	4,370	1923-	April 27, May 3, 1938	7.30	a9,660	2.21	Dec. 22, 6 p. m.	5.48	a5,060	1.16

KLAMATH RIVER BASIN--Continued

244	Klamath River at Somesbar	8,480	1927-	Feb. 21, 1927 gDec. 28, 1945	50.8 40.0	- a97,000	- 11.4	Dec. 3, 10:30 p. m.	30.65	a, ay69,000	8.14
245	Fall Creek at Copco	20	1928-	Jan. 7, 1948	3.22	c350	17.5	Dec. 3, 7 p. m.	2.34	az168	8.40
246	Shasta River near Yreka	804	1933-41, 1944-	Feb. 29, 1940	6.72	a2,440	3.03	Dec. 4, 4 a. m.	4.75	a820	1.02
247	*Scott River near Fort Jones*	656	1941-	Unknown Jan. 22, 1943	d,e14 11.65	7,340	11.2	Dec. 4, 6 a. m.	10.25	ba6,160	9.39
248	Salmon River at Somesbar	737	1927-	Dec. 28, 1945	15.82	29,900	40.6	Dec. 3, 7 p. m.	12.18	bb20,500	27.8
249	Trinity River at Lewiston	724	1911-	Feb. 28, 1940	20.8	40,300	55.7	Dec. 9, 1 p. m.	10.11	bc13,700	18.9
250	Trinity River near Douglas City	1,017	1944-	Jan. 7, 1948	30.00	41,800	41.1	Dec. 9, 3 p. m.	17.0	bd16,100	15.8
251	Trinity River near Hoopa	2,840	1911-14, 1916-18, 1931-	Feb. 28, 1940	31.2	124,000	43.7	Dec. 4, 3 a. n.	18.96	be44,800	15.8
	SMITH RIVER BASIN										
252	Smith River near Crescent City	613	1931-	February 1927 Oct. 29, 1950	41.4 d39.51	- 152,000	- 248	Dec. 3, 6 p. m.	29.2	80,700	132

a Affected by regulation.
c Observed.
d From floodmarks.
e About
g Probably
ax Affected by diversion from Eel River through Potter Valley powerhouse.
ay Flood of Oct. 29, 1950 reached a stage of 32.45 ft (74,400 cfs).
az Flood of Oct. 29, 1950 reached a stage of 2.39 ft (176 cfs).
ba Flood of Oct. 30, 1950 reached a stage of 11.22 ft (6,860 cfs).
bb Flood of Oct. 29, 1950 reached a stage of 12.75 ft (21,200 cfs).
bc Flood of Oct. 30, 1950 reached a stage of 21.00 ft (39,300 cfs).
bd Flood of Oct. 30, 1950 reached a stage of 28.57 ft (41,200 cfs).
be Flood of Oct. 30, 1950 reached a stage of 22.08 ft (62,700 cfs).

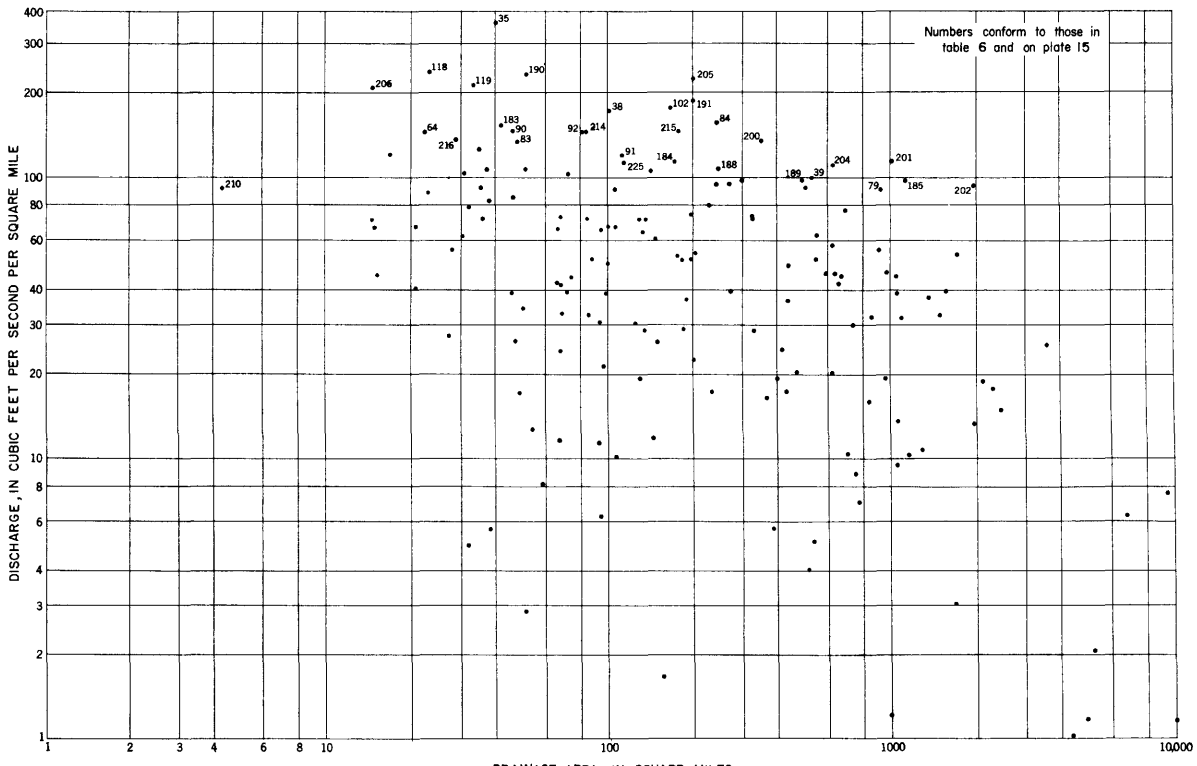

Figure 97. --Relation of unit discharge to size of drainage basin.

FLOOD-CREST STAGES

Records of flood-crest stages as recorded at various gages of the Geological Survey, Weather Bureau, Corps of Engineers, the California Division of Water Resources, and other State and municipal agencies are presented in table 7. Readings were made by the agency operating the gage, as indicated in the table.

As noted previously, the floods of November-December 1950 presented a series of flood peaks which were the result of a succession of storms in the period from November 16 to December 8. In general, maximum stages during the November 18-21 floods occurred on the lower Sacramento River and the Feather and Stanislaus Rivers. On the lower San Joaquin River and on the Tuolumne and Merced Rivers below major storage reservoirs, they occurred during the December 4-10 floods. Table 7 presents the maximum stages recorded during the entire November-December flood period. Consequently, in the case of both the Sacramento River, between Shasta Dam and the American River, and the San Joaquin River, between Friant Dam and the Stanislaus River (where storage regulation and the effect of intervening tributaries and by-pass regulation were controlling factors), the tabulation of crest stages does not represent the continuous downstream travel of a single flood crest.

The stage records of table 7 are of particular value in presenting a limiting factor with respect to the location of future developments along these rivers. Where it is obvious that the downstream travel of a single flood is represented on the table, basic information is furnished in regard to velocity of transmission of flood crests, valley or channel storage, and other aspects of river behavior.

The gages or points of observation are described in the table by reference both to distance and direction from local features and to river distances above the mouth.

Table 7. --Flood-crest stages
[Compiled by California Division of Water Resources]

Stream and location	Miles above mouth	Day and hour 1950	Altitude in feet
Sacramento River			
Redding, downstream from Anderson-Cottonwood Irrigation District diversion dam, left bank. a/	299.7	Nov. 21 12:15 p.m.	444.4
Balls Ferry, left bank a/	283.5	Nov. 18 2 a.m.	363.6

Table 7. --Flood-crest stages--Continued

Stream and location	Miles above mouth	Day and hour 1950	Altitude in feet
Sacramento River--Con.			
Red Bluff, 5 miles upstream, left bank. b/	257.6	Nov. 18 9:30 a.m.	260.5
Red Bluff, bridge c/	252.4	Nov. 18 9 a.m.	247.1
Vina, bridge a/	225.5	Nov. 21 5 a.m.	174.6
Hamilton City, Gianella bridge c/	208.5	Nov. 21 9 a.m.	134.1
Ord Ferry, ferry crossing, right bank. a/	189.8	Nov. 21 1:30 p.m.	100.8
Butte City, 0.5 mile downstream, left bank. b/	174.8	Nov. 21 7 p.m.	75.2
Gordon Pump, 0.25 mile upstream from Moulton Weir, right bank. a/	163.2	Nov. 22 2 a.m.	64.6
Colusa, highway bridge, right bank. b/	148.4	Nov. 22 9:30 a.m.	53.8
Meridian, Sacramento Northern Railway bridge. a/	138.8	Nov. 22 10:30 a.m.	49.6
Tisdale Weir, north end, left bank. a, d/	123.2	Nov. 22 5 p.m.	43.9
Tisdale, at Sutter Mutual Water Company pumping plant, left bank. a/	122.8	Nov. 22 1 p.m.	43.8
Wilkins Slough, 1,500 ft downstream from Recl. Dist. No. 108 irrigation pumping plant, right bank. b/	121.9	Nov. 22 1 p.m.	43.3
Knights Landing, just upstream from Southern Pacific Railroad bridge, left bank. b/	93.0	Nov. 22 4 a.m.	35.3
Fremont Weir, upstream end of weir, right bank. b/	87.0	Nov. 22 2 a.m.	34.2
Fremont Weir, downstream end, right bank. a/	82.0	Nov. 22 2 a.m.	34.3
Verona, 1 mile downstream from Feather River, right bank. b/	78.6	Nov. 21 8-9 p.m.	34.1
Sacramento Weir, 100 ft downstream, right bank. a, d/	63.2	Nov. 21 1 p.m.	30.1
Sacramento, I Street bridge, left bank. c/	59.4	Nov. 21 Noon	30.2

Table 7. --Flood-crest stages--Continued

Stream and location	Miles above mouth	Day and hour 1950	Altitude in feet
Sacramento River--Con.			
Freeport Bridge, Corps of Engineers survey.	46.0	Nov. 21	23.0
Clarksburg, dock of American Crystal Sugar Company, right bank. a/	42.2	Nov. 21	20.9
Snodgrass Slough, a quarter of a mile upstream, left bank. a/	36.7	Nov. 21 3:30 p.m.	17.1
Greens Landing, Corps of Engineers survey.	35.5	Nov. 21	16.6
Walnut Grove, upstream from Georgiana Slough, left bank. a/	26.5	Nov. 21	11.2
Isleton, left bank, e/	17.4	Nov. 21	6.4
Rio Vista, 1 mile downstream, right bank. d/	11.7	Nov. 22	5.1
Collinsville, right bank. a/	0.2	Nov. 22	4.6
Feather River			
Oroville, 75 ft upstream from Feather River highway bridge, left bank. b/	71.0	Nov. 21 5 a. m.	236.8
Oroville, Oroville-Chico highway bridge. c/	65.0	Nov. 21 7 a. m.	153.6
Gridley, Gridley-Oroville highway bridge, left bank. a/	49.7	Nov. 21 11 a. m.	94.7
Yuba City, Yuba City-Marysville Fifth Street bridge, right bank. a/	28.0	Nov. 21 4-5 p.m.	68.6
Below Yuba River, just downstream, right bank. a/	27.0	Nov. 21 3 p. m.	67.6
Shanghai Bend, 5 miles south of Yuba City, right bank. a/	23.0	Nov. 21 5 p. m.	63.1
Nicolaus, 0.4 mile downstream from highway bridge, left bank. b/	9.3	Nov. 21 7 p. m.	44.8
American River			
Folsom, near tailrace of Pacific Gas & Electric Co. power plant, left bank. a/	26.5	Nov. 21 3:30 a.m.	140.2
Fair Oaks, just upstream from highway bridge, right bank. b/	19.2	Nov. 21 4:30 a.m.	96.6
Sacramento, just east, at H Street bridge. b/	6.1	Nov. 21 9 a. m.	42.7

Table 7. --Flood-crest stages--Continued

Stream and location	Miles above mouth	Day and hour 1950	Altitude in feet
American River--Con.			
Elvas, Southern Pacific Railroad bridge. a/	3.5	Nov. 21 9 a.m.	37.6
Garden Highway, highway bridge. a/	0.2	Nov. 21 Noon	30.8
San Joaquin River			
Friant, 2 miles downstream from Friant Dam, left bank. b/	268.1	Dec. 4 4 a.m.	297.7
Whitehouse, 13 miles downstream from Gravelly Ford Canal, right bank. f/	219.8	Dec. 5 6-8 p.m.	171.6
Mendota, 2.5 miles downstream from Mendota Dam, left bank. b/	206.2	Dec. 8 Noon	151.6
Dos Palos, 0.7 mile downstream from Temple Slough, left bank. b/	186.0	Dec. 9 8 a.m.	126.8
Fremont Ford Bridge, 5.7 miles upstream from Merced River. b/	129.5	Dec. 11 8-11 p.m.	68.8
Newman, at Hills Ferry Road bridge, 300 ft downstream from Merced River. b/	123.7	Dec. 11 7 a.m. - 1 p.m.	64.1
Patterson, at Patterson-Turlock highway bridge. a/	104.4	Dec. 11	50.2
Grayson, left bank of Laird Slough channel of San Joaquin River at Westley-Modesto highway bridge, 5 miles upstream from Tuolumne River. a/	96.0	Dec. 12 1 a.m.	41.2
Maze Road, at bridge, 2.2 miles upstream from Stanislaus River. a/	81.8	Dec. 9 10 a.m.	36.8
Vernalis, at Durham Ferry Bridge, 3.0 miles downstream from Stanislaus River. b/	76.7	Dec. 9 8 p.m.	33.2
Mossdale, just downstream from U.S. Highway 40 bridge, right bank. a/	58.9	Dec. 10 7:30 a.m.	24.4
Antioch, at wharf, city water works, left bank. a/	4.5	Dec. 10	5.3

Table 7. - Flood-crest stages--Continued

Stream and location	Miles above mouth	Day and hour 1950	Altitude in feet
Merced River			
Exchequer, 0.5 mile downstream from Lake McClure. b/	62.2	Dec. 4 3 a.m.	422
Snelling, at Merced-Snelling highway bridge. a/	42.1	Dec. 4 10 a.m.	200
Cressy, 400 ft upstream from highway bridge, left bank. a/	27.6	Dec. 4 8:30 p.m.	122.7
Stevinson, right bank. b/	4.6	Dec. 5 3 p.m.	74.1
Tuolumne River			
Above La Grange Dam, 0.5 mile below Don Pedro Dam. b/	57.0	Dec. 8 11:30 a.m.	374
La Grange bridge. a/	50.5	Dec. 8 11:30 a.m.	188.8
Roberts Ferry Bridge, 7.5 miles east of Waterford. a/	39.9	Dec. 8 4 p.m.	128.4
Hickman-Waterford Bridge. a/	31.7	Dec. 8 9 p.m.	96.2
Modesto, Tidewater-Southern Railroad bridge. b/	15.9	Dec. 9 5 a.m.	69.2
Tuolumne City, at highway bridge. g/	3.4	Dec. 9 11 a.m.	44.5
Stanislaus River			
Below Melones powerhouse, 1 mile downstream from Melones Dam. b/	65.3	Nov. 21 1:30 a.m.	525
Orange Blossom Bridge, 5.7 miles above Oakdale. a/	44.7	Nov. 21 5 a.m.	155
Riverbank, at Burneyville Bridge. a/	32.0	Nov. 21 9:45 a.m.	101.0
Ripon, 1 mile southeast at U.S. Highway 99 bridge. b/	16.0	Nov. 21 8:30 p.m.	62.8
Mokelumne River			
Lancha Plana, 3 miles below Pardee Dam, left bank. b/	72.0	Nov. 21 9:30 a.m.	179.0
Clements, 700 ft upstream from Ione highway bridge, left bank. b/	59.4	Nov. 21 8 a.m.	91.6
Woodbridge, 0.4 mile below Woodbridge Irrig. Dist. diversion dam, left bank. b/	38.8	Nov. 22 2 a.m.	44.4

Table 7. --Flood-crest stages--Continued

Stream and location	Miles above mouth	Day and hour 1950	Altitude in feet
Mokelumne River--Con.			
Georgiana Slough, right bank, 300 ft upstream from Mokelumne River. a/	3.4	Nov. 22	4.8

a California Division of Water Resources gage.
b Geological Survey gage.
c Weather Bureau gage.
d Corps of Engineers gage.
e Bureau of Reclamation gage.
f San Joaquin Canal Co. gage.
g Modesto and Turlock Irrigation Districts and city of San Francisco gage.

STORAGE REGULATION

Runoff of most streams in the Central Valley basin is affected by storage. Basic data for practically all important storage reservoirs which altered flood flows during the November-December 1950 floods are given in tabulations of the section entitled "Stages and discharges at stream-gaging stations".

Storage reservoirs in California regulate surface runoff for many purposes, including municipal use, irrigation, hydroelectric power, flood control, navigation, replenishment of underground reservoirs at a controlled rate, assistance in salinity control near tide water, and various combinations of these uses. Some of the uses may be harmoniously combined, others are in conflict; but whatever the use, some advantage generally accrues to flood control. Even if a reservoir is full at the time of a flood peak, there will generally be some reduction in momentary maximum discharge because of increased storage in the section of the stream channel occupied by the reservoir.

In addition to the regulation of flood flows effected by storage reservoirs in the Central Valley basin, additional regulation is made possible by a large volume of storage capacity in many miles of channels and sloughs, many square miles of lowlands (especially along the lower San Joaquin River), in bypass channels, and in other low-lying areas.

The most notable regulation by reservoir storage during the November-December 1950 floods was effected by Millerton Lake at Friant on the San Joaquin River. The gain in storage Novem-

ber 18 to December 11, 1950 was 328, 300 acre-feet, the maximum inflow was 48, 100 cfs on November 19, and the controlled outflow reached 5, 050 cfs on December 18, after the flood crest downstream from Friant had passed. The peak inflow to Millerton Lake had already been reduced by upstream storage . Florence Lake, Huntington Lake, Shaver Lake, and Crane Valley Reservoir, in the headwaters of the San Joaquin River, gained a total of 62, 050 acre-feet during the flood period from November 18 to December 11.

Figure 98 presents two pairs of discharge hydrographs showing the regulatory effect on flood flows of Pardee Reservoir on the Mokelumne River and of Don Pedro Reservoir on the Tuolumne River. Inflow to Pardee Reservoir is given by the record for the gaging station near Mokelumne Hill; outflow is given by the station at Lancha Plana. Outflow from Don Pedro Reservoir is given by the record for the station above La Grange Dam near La Grange.

On the Mokelumne River, storage in Pardee Reservoir (usable capacity 194, 100 acre-feet) absorbed the first flood on November 18, 19, but the reservoir was full during the flood of November 20, 21, and the peak passed downstream without any significant alteration. Releases from the reservoir November 23 to December 2 created enough capacity to hold the runoff of the December 3, 4 flood, but the latter inflow reduced storage space to such an extent that the peak of the fourth flood on December 7-9 was only slightly reduced. Peak inflow to Pardee Reservoir was only slightly affected by storage in upstream reservoirs, the largest of which (Salt Springs Reservoir) gained a total of 67, 600 acre-feet during the entire flood period.

At Don Pedro Reservoir (usable capacity 260, 000 acre-feet), storage space availabe on November 17 was sufficient to contain the runoff of the November flood for two days. The daily mean flow was reduced from an inflow of 47, 800 cfs on November 19 to an outflow of 23, 500 cfs on November 21. This was an important factor in the reduction of crest stages on the lower Tuolumne and San Joaquin Rivers during this flood. The flood of December 3, 4 caused the controlled release to be slightly increased and reduced the available storage space to 17, 000 acre-feet. There was insufficient time to decrease the contents effectively before the succeeding flood of December 7-9; consequently, the resulting peak inflow of 61, 000 cfs was not appreciably regulated by storage. However, reduction of peak inflows to Don Pedro Reservoir by upstream reservoirs is indicated by the fact that Lake Eleanor and Hetch Hetchy Reservoir gained a total of 172, 200 acre-feet during the period from November 18 to December 11.

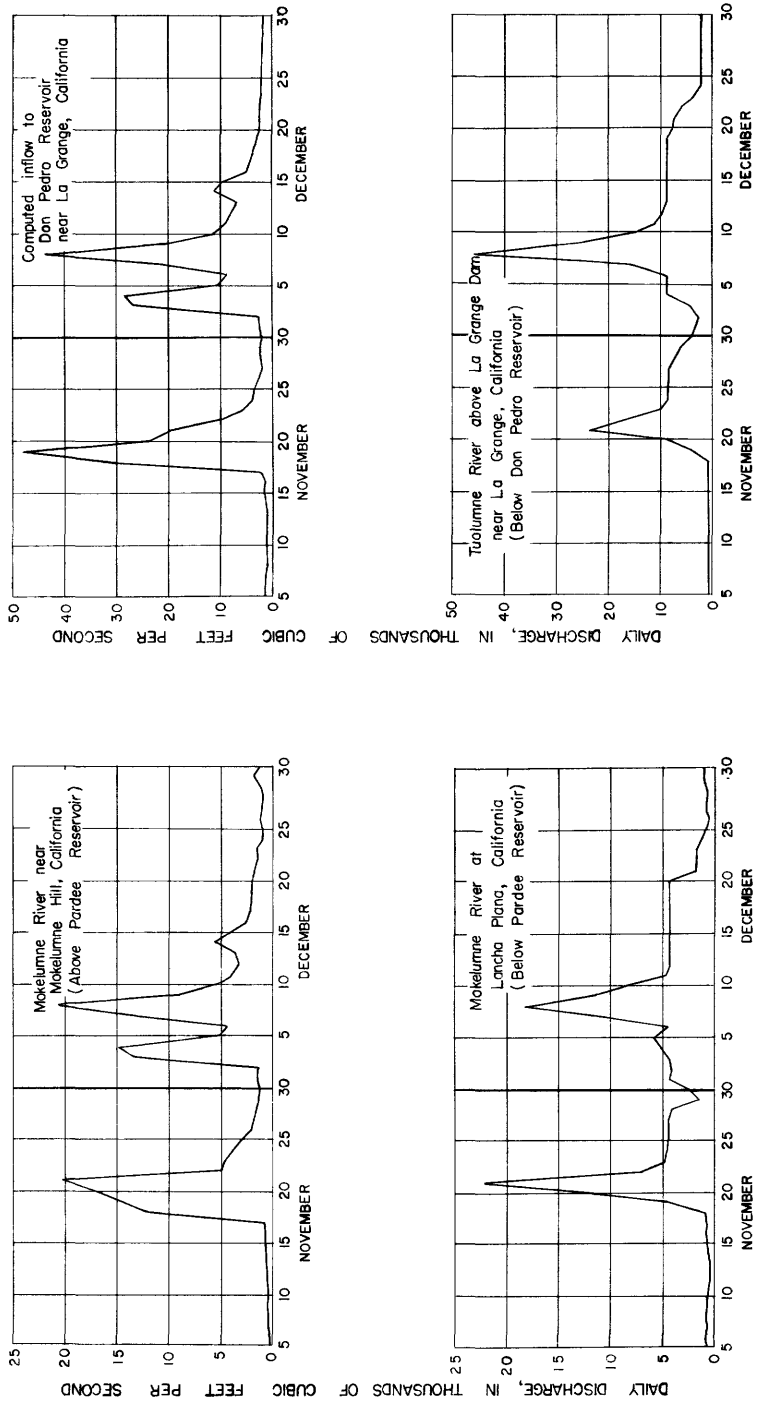

Figure 98.--Regulation of flood discharge, November-December 1950, by reservoirs on Mokelumne and Tuolumne Rivers.

In the lower San Joaquin River, the regulation afforded by the reservoirs on the major tributaries, Stanislaus, Tuolumne and Merced Rivers, was such that during the November flood period the discharge at the Vernalis gaging station did not exceed a peak of about 33,000 cfs on November 23. However, as indicated above in the case of the Tuolumne River, during the December 3-10 flood period the tributary reservoirs were nearly full or spilling, and maximum releases to maintain flood control capacity were being made. The result was a record-breaking peak discharge of 79,000 cfs at the Vernalis gage on December 9.

RUNOFF STUDIES

Runoff characteristics

An important characteristic of flood runoff is the degree of concentration with respect to time. In the area covered by this report there are approximately 250 stream-gaging stations at which continuous records of stage and discharge are obtained. However, as a result of artificial storage for irrigation, power, municipal water supplies, and flood prevention, and of diversions of water upstream from some of the gaging stations, the observed discharge represents natural flow conditions at only about one-third of these stations.

Many studies of surface runoff from rainfall, not associated with snow, have proved that, within the same time interval, similar hydrographs are produced whose ordinates vary with the volume of surface runoff. The development and application of the unit hydrograph is based on this principle. It seems that if similar storm characteristics prevail during an isolated storm such as occurred November 16-21, then the degree to which runoff was concentrated with respect to time may be related largely to inherent basin characteristics--except in basins where snow was involved. Some investigators have chosen the ratio between the average for the calendar day of greatest flow and the average discharge for the period of flood runoff (both computed above a base representing contribution from ground water and surface runoff from antecedent precipitation). Others have used the ratio between momentary peak discharge and discharge for the highest calendar day (with or without correction for ground water contribution). It is obvious that a ratio involving the calendar day is not desirable because it is only by accident that the mean discharge for the highest calendar day will coincide with that for the maximum 24-hour period. For this reason, the ratios shown in table 8 were based on the maximum 24-hour discharge. A comparison of the mean discharge for the highest calendar day with that for the maximum 24-hour period may be made by examining

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Table 8. --Runoff characteristics

No. on pl 15	Stream and point of measurement	Observed discharge (cubic feet per second)			Date and hour of peak discharge	Ratio of momentary peak discharge to maximum 24-hour (percent)
		Maximum calendar day	Maximum 24-hour	Peak discharge		
	KERN RIVER BASIN					
30	Kern River near Bakersfield	14,700	20,100	36,000	Nov. 19, 4:30 p. m.	179
31	South Fork Kern River near Onyx	1,380	1,470	2,180	Nov. 19, 11 a. m.	148
	TULARE LAKE BASIN					
34	White River near Ducor	113	140	584	Nov. 19, 1:30 p. m.	417
36	Tule River near Porterville	10,000	10,800	25,500	Nov. 18, 4:30 a. m.	236
39	Kaweah River near Three Rivers	16,000	a34,500	52,000	Nov. 19, about 3:30 a. m.	151
41	North Fork Kaweah River at Kaweah	3,800	5,210	9,150	Nov. 19, 1 a. m.	176
44	Kings River at Piedra	51,600	58,000	91,000	Nov. 19, 3 a. m.	157

	SAN JOAQUIN RIVER BASIN Tributaries above Fresno River					
61	Bear Creek at Vermilion Valley	355	376	683	Nov. 19, 5 a. m.	182
62	Mono Creek near Vermilion Valley	666	675	1,040	Nov. 19, 5:30 a. m.	154
64	Pitman Creek below Tamarack Creek	1,420	1,980	3,220	Nov. 19, 1:30 a. m.	163
66	Big Sandy Creek near Auberry	792	912	1,540	Nov. 19, 2:30 a. m.	169
67	Fine Gold Creek near Friant	2,660	3,140	6,110	Nov. 19, 2 a. m.	195
68	Cottonwood Creek near Friant	90	116	214	Dec. 4, 4 a. m.	184
69	Little Dry Creek near Friant	b158	267	556	Dec. 3, 4:30 p. m.	208
	Fresno River Basin					
72	Fresno River near Knowles	3,300	4,410	8,540	Nov. 19, 2 a. m.	194
73	Fresno River near Daulton	5,130	5,130	10,700	Nov. 19, 4 a. m.	209
83	Tenaya Creek near Yosemite	3,070	4,130	6,330	Nov. 18, 12 p. m.	153
	Orestimba Creek Basin					
86	Orestimba Creek near Newman	c738	991	2,470	Dec. 3, 10:30 p. m.	250

Table 8--Runoff characteristics--Continued

No. on pl 15	Stream and point of measurement	Observed discharge (cubic feet per second)			Date and hour of peak discharge	Ratio of momentary peak discharge to maximum 24-hour (percent)
		Maximum calendar day	Maximum 24-hour	Peak discharge		
	Tuolumne River Basin					
90	Falls Creek near Hetch Hetchy	4,580	5,160	6,660	Nov. 19, 3 a.m.	129
91	Cherry Creek near Hetch Hetchy	d8,220	11,100	13,400	Nov. 18, 12 p.m.	121
93	South Fork Tuolumne River near Oakland Recreation Camp.	1,800	2,770	4,540	Nov. 18, 10 p.m.	164
	Stanislaus River Basin					
97	Middle Fork Stanislaus River at Sand Bar Flat, near Avery.	e12,600	17,600	23,300	Nov. 18, 12 p.m.	132
	Calaveras River Basin					
110	Cosgrove Creek near Valley Springs.	705	863	1,390	Nov. 18, 10:30 p.m.	161
	Bear Creek Basin					
112	Bear Creek near Lockeford	553	599	834	Dec. 7, 7:30 a.m.	139

	Mokelumne River Basin					
118	Cold Creek near Mokelumne Peak	3,080	4,370	5,500	Nov. 18, 7:30 p. m.	126
120	Middle Fork Mokelumne River at West Point.	1,360	2,020	2,820	Nov. 18, 8:30 p. m.	140
121	South Fork Mokelumne River near West Point.	1,700	2,630	3,300	Nov. 18, 11 p. m.	125
124	North Fork Cosumnes River near El Dorado.	f5,600	7,630	10,900	Nov. 18, 9 p. m.	143
126	Cosumnes River at Michigan Bar	15,900	20,100	27,600	Nov. 18, 11 p. m.	137
	SACRAMENTO RIVER BASIN Feather River Basin					
183	Middle Yuba River at Milton	4,450	5,170	6,300	Nov. 20, 6 p. m.	122
184	Middle Yuba River above Oregon Creek.	11,800	16,400	19,500	Nov. 21, 1 a. m.	119
187	Oregon Creek near North San Juan	2,060	2,630	3,240	Nov. 21, 1 a. m.	123
188	North Yuba River below Goodyears Bar.	16,200	19,800	26,400	Nov. 21, 10 p. m.	133
190	South Yuba River near Cisco	8,200	9,230	11,700	Nov. 20, 4 p. m.	122

Table 8--Runoff characteristics--Continued

No. on pl 15	Stream and point of measurement	Observed discharge (cubic feet per second)			Date and hour of peak discharge	Ratio of momentary peak discharge to maximum 24-hour (percent)
		Maximum calendar day	Maximum 24-hour	Peak discharge		
	SACRAMENTO RIVER BASIN--Con.					
	Feather River basin--Con.					
193	Deer Creek near Smartville	3,780	4,820	5,970	Nov. 20, 11 a.m.	124
194	Dry Creek near Brownsville	562	612	834	Nov. 20, 6 p.m.	136
	American River basin					
200	North Fork American River at North Fork Dam.	24,000	34,800	46,600	Nov. 20, 9:30 p.m.	134
213	Alder Creek near Whitehall	1,080	1,340	2,020	Nov. 20, 3 p.m.	151
214	Silver Creek at Union Valley	7,560	9,850	12,100	Nov. 20, 10:30 p.m.	123
215	Silver Creek near Placerville	12,700	17,700	25,800	Nov. 18, 6 p.m.	146
226	Putah Creek near Winters	13,800	20,100	35,300	Dec. 3, 7 p.m.	176
227	Putah Creek near Davis	12,800	17,700	29,300	Dec. 3, 11:30 p.m.	166

a Computed from partly estimated hydrograph.
b Maximum calendar day of 202 cfs occurred Nov. 19.
c Maximum calendar day of 935 cfs occurred Dec. 8.
d Maximum calendar of 8,380 cfs occurred Nov. 20.
e Maximum calendar day of 14,300 cfs occurred Nov. 20.
f Maximum calendar day of 6,020 cfs occurred Nov. 21.

this table. For example, the maximum 24-hour discharge of Little Dry Creek near Friant was 69 percent greater than that for the corresponding calendar day. This comparison for other stations varied as much as 55 percent. As applied to runoff studies between basins, particularly where flashy streams are involved, it is almost mandatory that the mean discharge for the maximum 24-hour period be used; otherwise, the results will reflect this large variation.

The measure of concentration used in this report is expressed as the ratio between the momentary peak discharge and the maximum 24-hour discharge. This ratio for 41 selected stations is shown in table 8. The table includes the maximum calendar day discharge and maximum 24-hour discharge; both correspond to the particular rise during which the peak discharge occurred. In a few cases the maximum calendar day for the flood occurred on a different date and was greater than that shown in the table.

It is noted that the ratios of momentary peak discharge to maximum 24-hour discharge for stations in table 8 were computed from total discharge figures; that is, the figures include ground water contribution and surface runoff from antecedent precipitation. Direct flow, of course, excludes ground water contribution and surface runoff resulting from antecedent precipitation. Ratios based on total flows are less than those based on direct flow, particularly if ground water contribution and flow resulting from antecedent precipitation do not change appreciably during the 24-hour period of maximum discharge. For this reason the ratios for the November-December 1950 flood should be slightly larger than indicated in table 8. On most streams, however, the peaks of November 1950 were so large and the prior base flow was so low that the resulting ratios should be characteristic and generally comparable with ratios for the flood of December 1937. Runoff intensities for that flood, shown in Water-Supply Paper 843, were based on direct flow. When ratios for the November-December 1950 floods are compared with those for the flood of 1937, all differences in meteorologic and hydrologic conditions must be considered.

In table 8, ratios vary from 119 percent for Middle Yuba River above Oregon Creek, in the Feather River basin, to 417 percent for White River near Ducor, in the Tulare Lake basin. Three basins had ratios of less than 125 percent, and three basins had ratios excceding 200 percent. The largest grouping had ratios between 125 and 200 percent. The ratios reflect the wide range in basin and storm characteristics and in antecedent conditions.

The ratio of momentary peak to 24-hour maximum discharge depends on the shape of the flood crest to a great extent. Influences upon the shape of the flood crest may be classified as follows: first, those relating to the particular meteorologic or hydrologic conditions attending a specific storm; and second, those peculiar to each basin.

The low-intensity storm of November 13-15 caused no significant increase in runoff. Snow was deposited at altitudes above about 5,000 feet. The first day of the storm of November 16-21 added snow to the pack in the Sacramento River basin above 6,000 feet. Higher temperatures prevailed after November 16, and precipitation fell as rain except for the first few hours of the storm of Dec. 2-4, when snow fell at higher altitudes. Ground water contribution and runoff from antecedent precipitation were at seasonably low levels at the beginning of the major storm period, November 16-21, in contrast to somewhat higher levels at the beginning of the storms of December 2-4 and December 6-8.

It may be seen that the runoff intensity of stations at higher altitudes possibly was tempered to some extent by snow during the storm of November 16-21. Stations downstream at lower altitudes would be affected to a lesser degree. It is believed, however, that the warm rains after November 16 had melted practically all snow prior to the time of the earliest peak at 6 p. m. November 18. In fact, this snow water may have increased the peak discharges at high altitudes. At the same time, the shape of the hydrograph would normally be widened; this would decrease the runoff intensity as measured by the ratio of peak discharge to maximum 24-hour discharge.

It may be said, therefore, that possible snow effect during the storm of November 16-21, and inclusion of flow from antecedent conditions during all storms, tended to widen the shape of hydrographs and to decrease relative peak discharge. Ratios for 31 stations in the table were compared to those for the December 1937 flood in Water-Supply Paper 843. Of these, only 6 were greater than those for the December 1937 flood. This cursory comparison indicates that the 1950 flood was less intense.

Basin characteristics

Few basins in California are subject to uniform conditions over their whole area. On the contrary, most basins possess widely varying altitudes and stream gradients, and cross different zones of precipitation, temperature, cover, and soil; therefore runoff is subject to many variable influences. Similarly, runoff intensities as measured by the ratio between momentary peak discharge and maximum 24-hour average discharge, are affected by the same variables. For this reason no attempt will be made to analyze the ratios in table 8. The results are composite, with a few exceptions. Ratios for stations in Tulare Lake basin, San Joaquin River tributary stations above Tuolumne River, and Colusa and Yolo basins were above the average. Ratios for Kern, Tuolumne, and Calaveras River basin stations were about average. Ratios for stations in Stanislaus River, Bear Creek, Mokelumne River, Feather

River, and American River basins were below the average. Man-made works have affected the natural flow characteristics of the majority of streams in California at stream-gaging stations. This greatly restricts the number of stations that may be analysed from the standpoint of runoff intensity and precludes a more meaningful analysis.

Water-Supply Paper 843, "Floods of December 1937 in Northern California", describes in detail the four general types of basins, their characteristics, and the effect of the characteristics upon runoff. It also includes descriptions of individual basins in the area covered by this report.

RECORDS OF PREVIOUS FLOODS

Under the heading, "Records of previous floods," Water-Supply Paper 843 (1939) gave a summary of outstanding floods that occurred in northern California from about 1800 through March 1938. The publication included a list of sources of information and a discussion, by major drainage basins, of the scope and relative magnitude of each notable flood. As explained in that paper, there was very little quantitative data available until the flood of 1907.

The following pages contain a condensation of the information concerning the Central Valley basin that appeared in Water-Supply Paper 843 for the period 1800-1938 and also include facts concerning floods for the period 1939-50. See tables 9-11.

A flood may be considered notable because of the magnitude of one or more of its runoff characteristics, such as peak discharge, peak stage, and total runoff volume, or because of the severity of one or more of its effects, such as area inundated, loss of life and property damage, and interference with transportation and communication facilities. These various factors are not necessarily interrelated and it is not a rarity for the greatest peak discharge of record to occur during a flood which has other characteristics and effects of lesser magnitude. For instance, mining, dredging and construction of levees so changed the regimen of some rivers in the Sacramento River basin that crest stages of recent minor floods were higher than those of early major floods.

Because there are very few records of stage, and even fewer records of discharge, for streams in northern California prior to 1900, comparisons among early floods are necessarily generalized.

Table 9. --Major floods at representative gaging stations in Central Valley, 1900-1950

[In general only the maximum annual peaks, on a water-year basis, are listed; the exception is water-year 1937-38, for which major peaks in both December 1937 and March 1938 were considered. Discharge not adjusted for diversions or change in storage unless so indicated]

Stream and place of determination	Drainage area (sq mi)	Period of record	Momentary peak discharges arranged in order of magnitude											
			1		2		3		4		5		6	
			Date	Discharge (cfs)	Date	Discharge (cfs)	Date	Discharge (cfs)	Date	Discharge (cfs)	Date	Discharge (cfs)	Date	Discharge (cfs)
Kern River near Kernville	845	1912-	11/19/50	27,000	1/17/16	9,690	2/6/37	8,600	1/22/43	8,310	3/2/38	7,000	12/11/37	6,800
Kern River near Bakersfield	2,420	1893-	11/19/50	36,000	3/9/43	21,700	2/7/37	20,000	1/26/14	18,300	1/18/16	18,000	3/3/38	14,600
Tule River near Porterville	266	1901-	11/19/50	25,500	3/9/43	15,500	2/1/45	12,600	2/13/36	a12,000	2/6/37	b12,000	12/11/37	11,300
Kaweah River near Three Rivers	520	1903-	11/19/50	52,000	12/11/37	33,300	2/6/37	18,900	1/22/43	17,000	2/2/45	15,200	1/17/16	14,700
Kings River at Piedra	1,694	1895-	11/19/50	91,000	12/11/37	80,000	1/25/14	59,700	2/2/45	49,300	1/21/43	46,900	1/17/16	45,400
San Joaquin River near Friant c/	1,632	1907-38	12/11/37	77,200	1/25/14	d60,000	3/2/38	41,400	1/31/11	e38,800	2/6/37	36,400	1/14/09	e26,800
San Joaquin River below Friant	1,675	1938-											12/10/09	e26,800
San Joaquin River near Newman f/	9,990	1912-	3/7/38	33,000	3/8/41	22,300	1/27/14	20,700	2/6/16	18,200	6/17/22	17,300	3/20/43	16,700
San Joaquin River near Vernalis g/	14,010	1922-	12/9/50	79,000	3/16/38	51,200	3/12/43	38,900	4/2/40	h37,300	3/5/41	34,400	2/25/36	i28,700
Fresno River near Knowles	132	1911-	11/19/50	8,540	3/12/38	7,630	2/6/37	6,880	2/2/45	4,940	2/21/17	4,500	2/22/36	4,450
Merced River at Kittridge	935	1922-47			12/11/37	59,000	2/2/45	39,800	2/6/37	33,200	3/2/33	30,400	1/21/43	27,000
Merced River at Bagby	912	1947-	11/19/50	83,000										
Tuolumne River above La Grange Dam, near La Grange.	1,540	1915-	12/8/50	61,000							3/25/28	38,100	2/11/38	34,400
Tuolumne River at La Grange Dam	1,540	1895-1917	(j)		1/31/11	60,300	1/25/14	57,900	3/19/07	50,400				
Stanislaus River near Knights Ferry. c/	972	1915-32			1/31/11	60,000	3/19/07	57,100	3/25/28	40,000	1/21/09	36,000	1/25/14	32,200
Stanislaus River below Melones powerhouse.	898	1931-	11/21/50	k49,500										
Mokelumne River near Clements m/	630	1904-	11/21/50	28,800	3/25/28	25,600	3/19/07	25,500	1/30/11	16,700	2/6/25	15,100	1/26/14	13,300
Cosumnes River at Michigan Bar	537	1907-	11/18/50	27,600	3/31/40	26,200	1/27/42	24,500	2/6/25	23,800	3/10/43	22,900	3/25/28	22,900
													2/21/17	22,900
Sacramento River at Antler	461	1910-11 1919-41	2/28/40	58,000	3/26/28	34,000	3/1/41	32,600	11/30/26	28,200	12/10/37	24,900		
Sacramento River at Delta	427	1944-					10/29/50	30,600					1/7/48	24,200

Sacramento River near Red Bluff n/	9,300	1895-	2/28/40	291,000	12/11/37	262,000	2/3/09	a252,000	2/2/15	a239,000	2/16/04	a207,000	2/6/42	203,000
Sacramento River at Sacramento plus Yolo Basin at Lisbon p/		1904-	3/1907	q450,000	1/1909	q390,000	2/1942	365,000	3/1940	355,000	3/1928	280,000	1/1914	270,000
Pit River near Ydalpom	5,350	1910-43	12/10/37	65,000	2/28/40	56,000	12/31/13	r47,000	2/21/27	45,700	2/6/42	44,900	2/25/17	40,700
McCloud River at Baird	665	1910-43	2/28/40	50,000	12/10/37	32,200	2/25/17	27,600	2/2/15	27,300	2/21/36	25,900	1/2/14	24,500
Thomes Creek at Paskenta	188	1921-	1/21/43	18,600	3/26/28	16,600	12/10/37	16,500	2/28/40	14,500	2/28/41	13,200	2/20/27	11,500
Deer Creek near Vina	200	1911-15, 1920-	12/10/07	23,800	2/28/40	18,400	3/26/28	12,200	2/6/42	11,000	2/10/41	10,500	12/21/45	7,280
Feather River at Oroville s/	3,640	1902-34	3/19/07	t230,000	3/26/28	b185,000			1/16/09	b180.000			12/31/13	b122,000
Feather River near Oroville s/	3,611	1934					12/11/37	185,000			2/27/40	152,000		
Middle Fork Feather River at Bidwell Bar	1,353	1911-	12/11/37	93,000	3/26/28	a90,000	2/27/40	60,200	1/21/43	54,300	11/21/50	50,200	2/21/36	38,200
Yuba River at Smartville u/	1,201	1903-41	3/26/28	120,000	11/21/50	v114,000	1/15/09	111,000	3/19/07	100,000	12/11/37	95.000	1/21/43	v88,600
Yuba River at Narrows Dam u/	1,110	1941-			11/21/50	109,000							1/21/43	81,100
American River at Fair Oaks	1,921	1904-	11/21/50	180,000	3/25/28	w163,000	3/19/07	a140,000	1/22/43	136,000	12/11/37	114,000	1/14/09	b101,000
Middle Fork American River near Auburn	619	1911-	11/20/50	68,500	3/25/28	d62,000	1/21/43	58,000	12/11/37	47,900	2/2/45	40,400	2/6/25	36,300
Putah Creek at Winters	654	1905-31							12/31/13	60,000	2/11/25	53,600	1/3/16	53,300
Putah Creek near Winters	614	1930-	2/27/40	70,500	1/21/43	63,000	2/6/42	60,800						

a From revision shown in Water-Supply Paper 861.
b Revised figure not heretofore published.
c Peak discharge affected by storage and diversions after 1925.
d From revision shown in Water-Supply Paper 843.
e From Water-Supply Paper 299.
f Records prior to Oct. 1, 1937 do not include flow that bypassed station at discharges above about 9,000 cfs. Peaks greatly affected by storage, regulation, and diversions.
g Peaks materially affected by storage regulation, and diversions. Only low-water records are available during period 1922-28.
h From revision shown in Water-Supply Paper 931.
i From revision shown in Water-Supply Paper 831.
j Peak inflow to Don Pedro Reservoir on Nov. 21, 1950 computed as 86,000 cfs. Flow affected by storage in Hetch Hetchy Reservoir beginning in 1923.
k Inflow to Melones Reservoir on Nov. 19, 1950, computed as 90, 000 cfs.
m Peak discharge affected by storage and diversions after 1928.
n Peak discharge affected by storage after 1942.
p From "Magnitude, Stage, and Frequency of Flood Flows of Sacramento River at Rio Vista", report by State of California, Department of Public Work, Division of Water Resources, December 1942.
q Estimated.
r From Water-Supply Paper 411
s Peak discharge affected by storage in Lake Almanor after 1912, and later storage in Butt Valley and Bucks Creek Reservoir.
t From revision shown in Water-Supply Paper 881.
u Peak discharge somewhat affected by storage and diversions.
v Computed by adding discharge of Deer Creek to discharge of Yuba River at Narrows Dam.
w Superseded figure of 140,000 cfs in Water-Supply Paper 861.

Table 10. --Comparison of historic floods in Central Valley, 1850-1899

Drainage basin	Estimated order of magnitude of flood peaks, 1850-1900		
	1	2	3
Kern River and Tulare Lake basins.	December 1867	1862	February 1893
San Joaquin River and tributaries, upstream from Merced River.	December 1867	1862	1890
Lower San Joaquin River tributaries including Merced River.	January 1862	1867-8	1890
Lower Sacramento River tributaries including Feather River.	January 1862	1867-8	February 1881
Sacramento River and tributaries, upstream from Feather River.	February 1881	January 1862	1867-8

Note: For some of the streams in the lower Sacramento and lower San Joaquin River basins the flood peaks of November-December 1950 probably exceeded the peaks of the years listed in this table.

Table 11. --Comparison of Central Valley floods, 1900-1950

Drainage basin	Order of magnitude of flood peak discharge				
	1	2	3	4	5
Kern River basin	November 1950	March 1943	February 1937	January 1914	January 1916
Tulare Lake basin	November 1950	December 1937	February 1945	February 1937	January 1914
San Joaquin River and tributaries, upstream from Merced River.	November 1950	December 1937	January 1914	February 1937	March 1938

Table 11.--Comparison of Central Valley floods, 1900-1950--Continued

Drainage basin	Order of magnitude of flood peak discharge				
	1	2	3	4	5
Lower San Joaquin River tributaries including Merced River.	Nov. - Dec. 1950	January 1911	December 1937	March 1907	March 1928
Lower Sacramento River tributaries including Feather River. a/	March 1907	March 1928	November 1950	January 1909	December 1937
Sacramento River and tributaries, upstream from Feather River.	February 1940	December 1937	February 1909	February 1915	February 1942

a/ But not including American River.

The following summary of notable floods covering the period 1800 to 1950 presents a general description of their magnitude and extent, in chronological order.

Floods of 1800 to 1860

Histories of early settlements state that California Indians spoke of a great flood, which was supposed to have occurred about the beginning of the nineteenth century and to have drowned thousands of them. This reference may have been to the flood of 1805, which is said to have covered the entire Sacramento River valley except the Sutter Buttes.

County histories and journals of pioneers mention floods in the lower Sacramento River basin during the seasons 1825-26, 1839-40, 1847, 1849-50, 1852, and 1853.

The floods of 1849-50 are the first for which there are fairly accurate description, and the one of January 1850 undoubtedly was of major proportions. However, it was exceeded at Sacramento in 1852 and an article in a Red Bluff newspaper in 1861 described the 1852 floods as being the highest known to the oldest residents prior to December 1861. On December 31, 1852, the Sacramento River reached a gage height of 21.7 feet at Sacramento.

Floods of 1861 and 1862

The winter season of 1861-62 was remarkable for the prolonged and widespread inundation in the Central Valley basin. A series of floods occurred in December 1861 and January 1862; these months constitute the greatest flood period in the history of California.

In Kern River basin, the flood of about December 25 changed the river channel at the site of the present city of Bakersfield and inundated all except the higher knolls in that vicinity. It seems certain however, that the floods of 1861-62 in this basin were not as great as a later one in 1867.

In Tulare Lake basin, there was an exceptionally great flood on January 11, 1862. The Kings, Kaweah, and Tule Rivers brought down tremendous quantities of timber from the Sierra and deposited them on the plains. In general, this flood probably was the greatest until 1867.

In San Joaquin River basin, there were extreme, successive floods during December 1861 and January 1862. By early January, snow had accumulated to unusual depths in the Sierra. Much of this snow deposit was melted by warm rains and helped to swell the flood volume. The Merced River flooded the town of Snelling, the Stanislaus River washed away most of the town of Knights Ferry, and the Tuolumne and Mokelumne Rivers were correspondingly high and destructive. The flood period of 1861-62 in the lower portion of the San Joaquin River basin is still considered to be the greatest. In the upper San Joaquin basin, the flood of 1861-62 was exceeded in 1867, and perhaps it was exceeded at some points by the momentary peaks of November 1950.

In the Sacramento River basin there was a succession of floods starting on December 8, 1861 and continuing into March 1862. Many reports published during the period described the lower Sacramento and San Joaquin valleys as one vast sea of water. Probably as much as 5,000 to 6,000 square miles of the valley floor were submerged. There was some loss of life and great destruction of property, including the loss of thousands of cattle. Large amounts of mining debris were deposited in river channels during 1861-62 and the following years. This deposition resulted in elevation of river beds and was accompanied by levee building for flood protection in many localities. These changes make it very difficult to make direct or quantitative comparisons between the floods of 1861-62 and those of 1867-68 and later. Records of stage may be misleading. In general it is believed that in the lower Sacramento River basin the floods of 1861-62 were larger, especially in respect to total volume and area inundated.

Floods of 1867 and 1868

Extremely heavy precipitation throughout the Central Valley during December 1867 caused floods that rivaled those of 1861-62. On the lower parts of the Sacramento-San Joaquin River systems the floods carried over into January 1868.

In the Kern River basin the flood, at high stage from December 25, 1867, to January 1, 1868, exceeded the floods of 1861-62 and is considered to be the greatest in that area. A remarkable feature of the flood was the large quantities of logs, including cedar and redwood from the high Sierra, that were deposited on the overflowed lands of Kernville and Bakersfield.

In Tulare Lake basin in 1867-68, the Kings, Kaweah, and Tule Rivers carried flood flows that in general are believed to be the greatest known, exceeding those of 1861-62. Tulare Lake reached about the same elevation as in 1862-63, when it overflowed to the north into San Joaquin River.

In the San Joaquin River basin the flood of 1867-68 probably exceeded any other known flood, including those of 1861-62 and 1950, at points upstream from the mouth of the Merced River. Downstream from the mouth of the Stanislaus River the San Joaquin was not as high as it was in 1861-62.

In the Sacramento River basin the main river and its lower tributaries were at extreme flood stages between December 22, 1867 and January 2, 1868. However, the floods of 1867-68 are believed to have been generally lower in discharge and volume than those of 1861-62. At some points the American and lower Sacramento Rivers were reported at higher stages in 1867-68, but it is probable that these high stages were caused by aggradation of stream beds or by channel contraction due to levee building. In the Sacramento River basin upstream from Feather River the floods of December 1867 were definitely secondary to those of 1861-62.

Floods of 1881

Outstanding flood peaks occurred in the upper part of the Sacramento River valley between January 14 and February 4. In the San Joaquin River, Tulare Lake, and Kern River basins the floods of 1881 were not of major proportions, although flood conditions were reported at some points in the San Joaquin River basin.

There is evidence that the Sacramento River at Red Bluff and the Pit River reached peak discharges greater than in 1862. It is believed that the record high stages on the lower Feather, Yuba, American, and Sacramento River reflected changed channel conditions and that these stages were not the highest discharges of record.

Floods of 1889-90

The winter season of 1889-90 was remarkable for exceptionally heavy precipitation which produced floods of considerable magnitude from December 1889 to February 1890. Heavy snowfall in the Sierra resulted in unusually high runoff from melting snow during May and June 1890. The floods were relatively greater in the San Joaquin River basin, and they are considered to rank as the largest in that area for the period between the floods of 1867-68 and those of 1907.

Floods of 1904

From February 15, 1904 to the end of March, the flood period was almost continuous in the lower Sacramento River basin. Although destruction and property damages were great in the lower basin, peak discharge was not of prime magnitude. Exceptionally high stages were reached only on tributaries of the upper Sacramento River. Moderately high flows occurred on tributaries of the lower San Joaquin River. A detailed discussion of the flood of 1904 is found in Geological Survey Water-Supply Paper 147.

Floods of 1907 and later years

The flood season of 1907 was outstanding, and fairly adequate stream-flow data are available. Since that time, the amount of quantitative information has steadily increased and definite comparisons can be made for the floods from 1907 to date.

The records show that since 1907 the Central Valley has experienced notable floods in 1909, 1911, 1914, 1916, 1928, 1937, 1938, 1940, 1942, 1943, and 1950. Detailed comparison of the flood of 1950 with the other highest floods of record is shown in table 9.

It should be realized that peak discharge for a few early floods on some streams were based on one or two staff-gage observations and may not represent the true momentary peak discharge. With those few exceptions, the discharges in table 9 represent momentary peaks; these peaks are generally based on water-stage recorder records, but in some instances they are determined from floodmarks.

For purposes of comparison, table 9 contains estimated or measured peak discharges from the whole Sacramento valley upstream from the latitude of Sacramento, from 1904 to date. These figures under the heading "Sacramento River at Sacramento plus Yolo Basin at Lisbon" were furnished by the State of California Division of Water Resources.

In order to furnish a general comparison of floods in the past one hundred years in the Central Valley, two tables have been prepared. Table 10 shows the estimated order of magnitude of flood peak discharge during the fifty-year period 1850-1900. It should be noted that the order of magnitude shown does not necessarily agree with records of flood stage. As has been previously emphasized, channel changes due to mining and reclamation activities often caused high stages in the lower stretches of rivers that did not necessarily represent correspondingly high discharge. Table 11 shows, in general, the order of magnitude of flood peaks in various parts of the Central Valley during the fifty-year period 1900-50. This is necessarily generalized information, and local exceptions will be found. Many streams do not have records that extend back as far as 1900, and long-term records on nearby streams served as an index to determine the order of magnitude of floods during the years between 1900 and the dates on which their records began.

In preparing Tables 10 and 11 the engineers of various agencies which have dealt with flood problems were consulted in order that the tables may represent the consensus of opinion of a large and responsible group. These agencies include the California State Division of Water Resources; the Sacramento District of the Corps of Engineers, U. S. Department of the Army; and Region 2, Bureau of Reclamation, U. S. Department of the Interior. All these agencies extended helpful cooperation in preparation of the tables.

It would be interesting to have a comparison, in one table, covering the Central Valley area for the hundred-year period 1850 to 1950. As previously explained, the absence of discharge data during the period 1850-1900 makes such a comparison impractical. However, there are a few instances in which quantitative comparisons may be made for specific streams or gage sites. These are set forth in the succeeding paragraphs.

Comparison of flood peak discharge on Kern and San Joaquin Rivers for floods of 1950 and those of 1867

On pages 437-438 of Water-Supply Paper 843, it is mentioned that drift logs were found at three places on Kern River at elevations much higher than the high-water marks of February 1937, the date of the largest peak on the Kern River during the period 1893 through 1937. About two miles below the confluence of Kern River and South Fork Kern River, the older marks were 40 feet higher than those of 1937; at Borel powerhouse they were 25 feet higher. The discharge of Kern River near Bakerfield for the 1937 peak was 20,000 cfs and for 1950 it was 36,000 cfs. It is believed that the large difference in stage of the early flood over that of 1937 represents considerably more than the 16,000 cfs difference between the 1937 and 1950 floods; in other words, the early flood was higher in discharge than the one of 1950. Because 1867 was the year of the out-

standing early flood in Kern River basin, it is concluded that the discharge in 1867 was higher than the discharge in 1950. This conclusion is supported by 1867 flood heights at Rio Bravo Ranch, which, according to data supplied by eye-witnesses, were 6.4 feet higher than the 1937 stage. The Rio Bravo Ranch site is about a mile below Cottonwood Creek. At a point about 11 miles north of Kernville and 2 miles downstream from Fairview, marks of an early flood were 23 feet above 1937 low water as compared with a 1937 peak of 10 feet above the 1937 low water. It is probable that this large difference amounts to more than the 18,400 cfs difference in discharge between the peak of February 1937 and that of November 1950 (at the nearby gaging station), and that the early flood (probably that of 1867) exceeded the flood of 1950.

From information given on page 441 of Water-Supply Paper 843, it is noted that on Kings River, an early flood (probably that of 1867) was seven feet higher than the flood of December 1937 in the vicinity of Pine Flat, and three feet higher at a point about one mile below Piedra. The discharge for the 1937 flood was 80,000 cfs, and for the 1950 flood it was 91,000 cfs. It is believed that this difference in stage amounts to more than the 11,000 cfs in discharge, and that the 1867 peak was therefore greater than the 1950 peak.

On San Joaquin River in the vicinity of Friant, the case for the 1867 flood is even stronger. From page 447 of Water-Supply Paper 843, it is noted that at Temperance Flat the 1867 peak was 19 feet higher than the peak of December 1937 (discharge 77,200 cfs below Friant); and at the old townsite of Millerton the 1867 peak was 12 feet higher than the 1937 peak. In contrast, the peak of November 1950 below Kerckhoff powerhouse (just above the flow line of Millerton Lake) was only 48,100 cfs and was only slightly affected by upstream storage. Because the flood of 1937 was, therefore, greater than that of 1950, there seems to be no question that the flood of 1867 was the greatest on the upper San Joaquin River--at least for the hundred-year period 1850 to 1950.

Comparison of flood peak discharge on American River for floods of 1950 and those of 1862

It is believed safe to make one other quantitative comparison between the flood of 1950 and an earlier major flood. It has been stated that the flood of 1862 should be ranked as highest of those occurring during the period 1850-99 on lower tributaries of the Sacramento River. Elevation of that flood on American River was marked at the Stockton and Coover stone stable, the walls of which are still standing about one and one-half miles upstream from Folsom. The American River channel in that vicinity is steep and rocky, and probably it is not subject to the effect of mining debris deposition that upset stage-discharge relations at so many other gage sites in the Sacramento River valley.

As shown in table 12, the peak of January 10, 1862 reached an elevation of 183.0 feet at the stone stable, whereas the peak of November 21, 1950, the next highest since 1862, reached an elevation of 175.5 (or possibly 175.8) feet at the same location. Discharge at the gaging station at Fair Oaks is practically the same as at the stone stable (except for low flows), and as a matter of interest, discharge for the six highest peaks of record has been included in the table. It is concluded that discharge for the 1862 flood peak on the American River was appreciably larger than for the flood peak of 1950.

Table 12. --Stages of American River at Stockton and Coover stone stable, near Folsom, and corresponding discharge at Fair Oaks.

Date	Stage in feet above mean sea level	Discharge in cfs	Reference
Jan. 10, 1862	a, b 183.0	Not computed	-
Mar. 19, 1907	a 171.8 b 171.5	140,000	W. S. P. 843, 861
Jan. 14, 1909	Not known	101,000	W. S. P. 843
Mar. 25, 1928	a 175.0 c 174.3 d 174.5	163,000	See page 517
Dec. 11, 1937	a 171.1 e 170.5	114,000	W. S. P. 843, 861
Jan. 22, 1943	a 172.9	136,000	W. S. P. 981
Nov. 21, 1950	a 175.8 f 175.5	180,000	See page 517

a From a Corps of Engineers report compiled in 1941, amended 1943, 1951.

b Givan, A. and Grunsky, C. E., Flood Discharge of American River (1912).

c Barton, A. M., Report to Trustees, American River Flood Control District, December 1929.

d Wells, A. M., Flood Discharge of American River, Mar. 25, 1928 (in files of State Division of Water Resources).

e Gross, Joseph W., Sacramento, Calif.

f Observation by F. A. Johnson and Harlowe Stafford, U. S. Geol. Survey, Feb. 28, 1951.

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