Floods of December 1966 in the Kern-Kaweah Area, Kern and Tulare Counties, California

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1870-C

Floods of December 1966 in the Kern-Kaweah Area, Kern and Tulare Counties, California

By WILLARD W. DEAN

With a section on GEOMORPHIC EFFECTS IN THE KERN RIVER BASIN

By KEVIN M. SCOTT

FLOODS OF 1966 IN THE UNITED STATES

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1870-C

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1971

UNITED STATES DEPARTMENT OF THE INTERIOR

ROGERS C. B. MORTON, *Secretary*

GEOLOGICAL SURVEY

W. A. Radlinski, *Acting Director*

Library of Congress catalog-card No. 73–610922

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402 - Price 45 cents (paper cover)

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FLOODS OF DECEMBER 1966 IN THE KERN-KAWEAH AREA, KERN AND TULARE COUNTIES, CALIFORNIA

By WILLARD W. DEAN

ABSTRACT

Past records of peak flow and 3-day storm-runoff volume in the Kern, Tule, and Kaweah River basins in California were greatly exceeded by the floods of December 1966. Streams rose rapidly following precipitation of as much as 15 inches in a 24-hour period on December 5–6 during a strong inflow of warm moist Pacific air across central California. As heavy rain continued, extremely high peak discharges occurred at most gaging stations between 2300 hours December 5 and 1800 hours December 6.

Snowmelt was not a major cause of the floods, although some snow that had accumulated during minor November and early December storms was melted. This snowmelt was offset by snowpack accumulation at high altitudes where little runoff occurred during the storm.

This report covers the area of most intense precipitation and runoff. Areas of central California to the north and west had severe floods, but these, in general, were not nearly as great as previous record floods. The terrain of the flood area described in the report ranges from the rolling foothills at the east edge of the flat Tulare Lake basin to the steep slopes of the Sierra Nevada where considerable area is above an altitude of 9,000 feet. This report includes discussions of the antecedent hydrology and the meteorology of the storm; a description of the floods, storage regulation, flood damage, comparison to previous floods, sedimentation, channel changes, and flood frequency; a summary of flood stages and discharges; and detailed information on stage, discharge, and reservoir contents for December 1966.

INTRODUCTION

On December 4–6, 1966, an intense Pacific storm brought heavy precipitation to the Kern, Tule, Kaweah, and intervening smaller river basins for 48 hours. Storm runoff increased rapidly to peak flows greater than those previously experienced at most gaging stations

upstream from storage reservoirs. The stations include one station with continuous records since 1912. Peak flows generally were 1.5 to 2 times the magnitude of the probable 50–year flood. On the Kern River near Kernville the 1966 flood stage was somewhat lower than the historic flood of December 1867. The area covered in this report of extreme flooding in the Sierra Nevada and the foothills east of the valley floor is outlined in figure 1. Severe floods that occured in central California to the west and north are not described in the report.

Damage was less than might be expected from a flood of this record-breaking magnitude because the mountain and foothill areas are sparsely populated. Three reservoirs operated by the U.S. Army Corps of Engineers controlled the floods and prevented catastrophic damage to Bakersfield, Porterville, Visalia, and other downstream

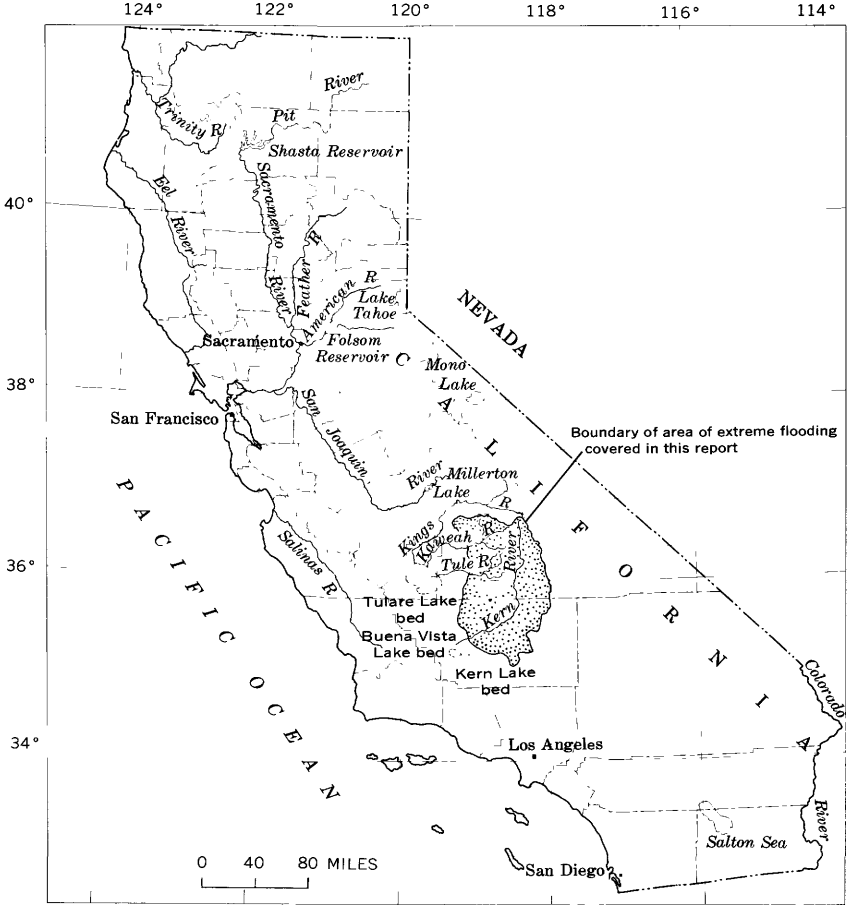


FIGURE 1.—Area of extreme flooding in December 1966.

cities. Actual damage is estimated at $13 million in mountain and foothill areas upstream from these reservoirs. This total includes $4,500,000 damage to U.S. Forest Service and National Park Service facilities. The three reservoirs are estimated to have prevented a total of $81,300,000 in potential downstream damage. Three lives were lost in the flood.

This report provides detailed hydrologic data for use in flood-control planning and in other studies involving flood hydrology. Flood stage and discharge information collected by the U.S. Geological Survey is presented for the flood area. This information includes all available data on stage and discharge for each gaging station during the period of storm runoff, a summary table of flood stages and discharges, a comparison to the maximum floods previously known, and the estimated recurrence interval. Information provided by other agencies on storm precipitation, flood damage, and storage regulation is included.

Pacific standard time on a 24-hour clock basis is used in this report. Numbers in figure 2 are assigned to all gaging sites on a downstream basis following the order used in U.S. Geological Survey publications on surface-water supply and quality. National network identification numbers are also listed in the summary table and in the station-data tabulations for all sites where data are collected on a continuing basis.

Special reports have been prepared for other notable floods in the area flooded in December 1966. The publications that contain this information are U.S. Geological Survey Water-Supply Papers 843, 1137–F, 1260–D, 1650–A and B, and 1830–A.

ACKNOWLEDGMENTS

The data in this report were collected as part of the cooperative programs between the U.S. Geological Survey and the California Department of Water Resources, the U.S. Army Corps of Engineers, the Bureau of Reclamation, and the Forest Service. Records for several stations were furnished by the Southern California Edison Co. and the Pacific Gas and Electric Co. Records for the Kern River near Bakersfield were furnished by the Kern County Land Co.

The data were collected and compiled under the supervision of R. Stanley Lord, district chief of the California district of the Water Resources Division. The field surveys and office computations were supervised by Edward J. Jones, Herman A. Ray, and Verrie F. Pearce of the Sacramento office.

The cooperation of the U.S. Army Corps of Engineers in providing information on storm precipitation, storage regulation, and flood damage is gratefully acknowledged.

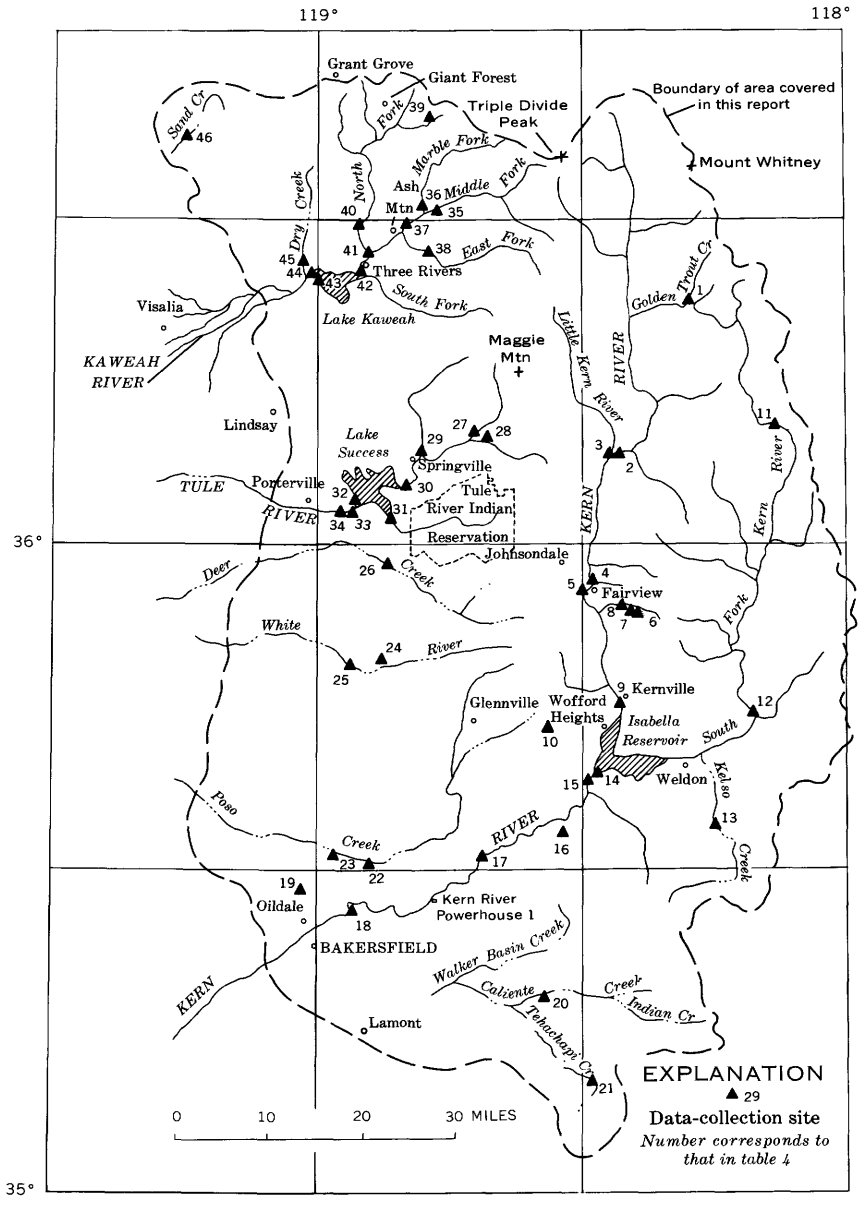


FIGURE 2.—Location of gaging stations.

PRECIPITATION

The primary cause of the floods in December 1966 was the persistent moderate to heavy rainfall that began about 1600 hours on December 4 and continued until 1800 hours on December 6. Antecedent precipitation had reduced soil-moisture deficiencies. Some melting of accumulated low-altitude snow may have augmented flood peaks slightly. The intense precipitation of up to 15 inches in 24 hours would have been sufficient to cause record floods without any antecedent precipitation or snow.

Above-normal precipitation occurred during the latter part of November from several small storms. On December 2, a moderate storm deposited 2–6 inches of precipitation at mountain stations. Late in the afternoon of December 4, an influx of warm moist Pacific air began the period of heavy precipitation and runoff that culminated in the flood peaks late on December 5 or early on December 6. Hourly precipitation at selected stations is plotted in figure 3. The precipitation intensity lessened for a few hours before noon on December 5. Very heavy precipitation resumed after noon and increased generally to its highest rates during the evening of December 5.

Daily and monthly precipitation totals are listed in table 1. More complete data for these and many additional stations are published in the December 1966 Climatological Data report of the U.S. Weather Bureau (1967). Observations of accumulated precipitation tabulated in table 1 are made at 0800 hours at many nonrecording rain gages. Thus the amounts recorded for December 7 at Johnsondale, Glennville, Giant Forest, Grant Grove, and Ash Mountain actually fell on December 6. Daily observations are made later in the day at Wofford Heights (sunset), Kern River powerhouse 1 (1700), Springville (midnight), and Three Rivers powerhouse 2 (1400). Amounts for these stations more nearly represent precipitation on the dates shown.

TABLE 1.—*Precipitation, in inches, at selected stations*

Station	Altitude (ft)	November		December								
		Total for month	Percentage of normal	1	2	3	4	5	6	7	Total for month	Percentage of normal
Johnsondale	4,680	4.58	----------	0	0.0	3.15	Trace	6.46	14.94	5.90	30.61	----------
Glennville	3,140	2.07	----------	0	.09	.92	0	1.52	4.38	1.71	8.74	----------
Wofford Heights	2,700	1.16	----------	0	.04	1.14	1.04	2.60	6.04	.14	11.03	----------
Kern River powerhouse 1	970	1.28	147	0	.02	.57	.01	.97	1.82	.07	3.54	200
Springville Ranger Station	1,050	2.38	----------	0	1.66	.02	.21	5.04	3.85	0	10.93	----------
Giant Forest	6,412	5.83	158	0	.15	5.80	.06	5.81	12.90	3.03	28.02	335
Grant Grove	6,600	5.72	----------	0	.17	4.86	.16	4.33	10.09	3.43	23.33	----------
Ash Mountain	1,708	5.83	266	0	.09	2.46	.08	2.98	7.33	2.58	15.65	316
Three Rivers powerhouse 2	950	3.72	220	0	.34	1.41	0	2.03	7.90	.17	11.99	310

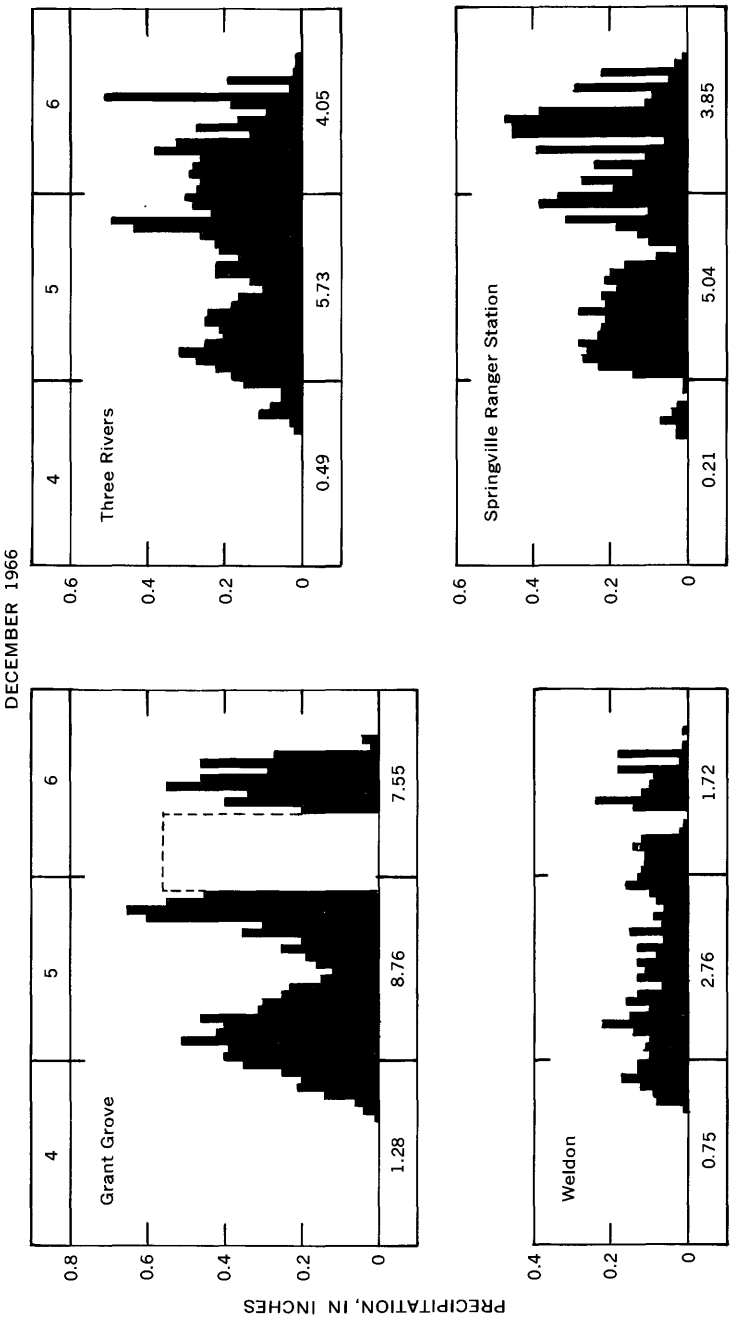
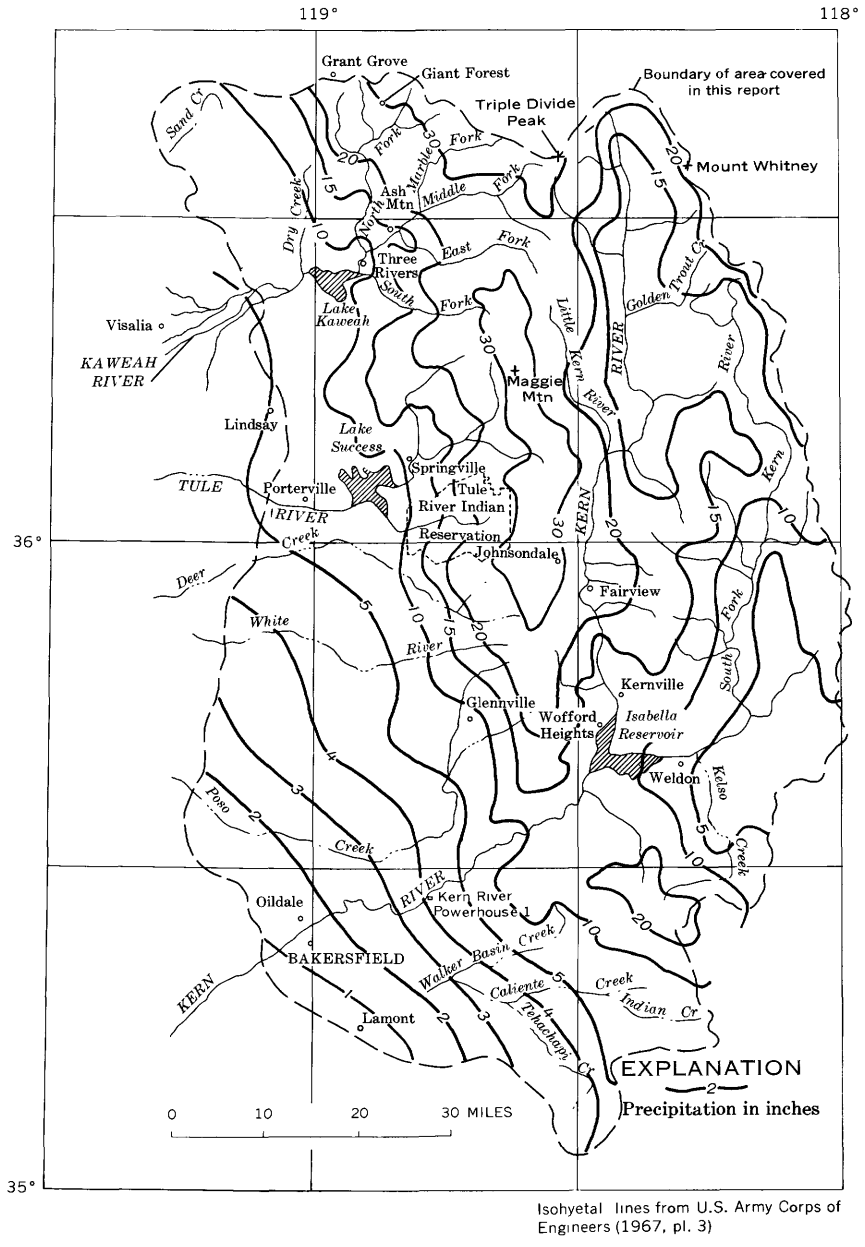


FIGURE 3.—Hourly precipitation at selected stations.

Measurements at the many high-altitude snow courses in the flood area are not made until January 1 or February 1 of each year. Therefore, there are few data on snowpack accumulation or loss during the storm. Snow depth on the ground is measured daily at Grant Grove (alt, 6,600 ft); however, no snow was reported on the ground there before the December storm, and the 4 inches reported at 0800 hours December 5 was gone December 6. During an inspection of Kern River basin gaging stations December 8 and 9, no snow was noted on the ground below 7,000 feet altitude, but thin patches of saturated snow and snow-ice were noted between 7,000 and 8,000 feet, and continuous snow cover was noted above 8,500 feet. At the Golden Trout Creek gaging station (site 1) the snow on the ground at 9,000 feet consisted of a 2-foot-deep dense frozen base which was covered with 1 foot of powder snow. Evidently rain had fallen at that altitude during part of the storm, but the snowpack absorbed most of the rain. Above 9,000 feet the storm precipitation caused little runoff in the Kern River basin.

The isohyetal map (fig. 4) adapted from data furnished by the U.S. Army Corps of Engineers (1967, pl. 3) shows the generalized total precipitation December 2–6 over the flood area. The map is based on all available precipitation data from recording gages, nonrecording daily observation gages, and high-altitude storage gages. Precipitation accumulated since September 1966 in storage gages was measured December 13 and proportioned on the basis of lower altitude daily precipitation records to estimate total December 2–6 storm precipitation for the high altitudes.

To relate precipitation to runoff in the December 1966 flood area, it is necessary to determine the altitude above which precipitation fell as snow and did not contribute to runoff. Analysis by the U.S. Corps of Engineers (1967, chart 1) indicates that the incoming warm moist air brought rain as high as 8,000 feet altitude during the evening of December 5 and up to 10,000 feet early on December 6. This rainfall melted most of the shallow residual snowpack from December 2–4 and previous storms. Observation by the Corps of Engineers of the snowpack near high-altitude precipitation gages in the Kern, Tule, and Kaweah River basins on December 13 indicated that heavy rain had fallen during the December 5–6 storm above 8,000 feet altitude. Personal observation December 9 of snowpack and stream-channel conditions at the Golden Trout Creek gaging station disclosed that little storm runoff had occurred above 9,000 feet in the Kern River basin. To the west, runoff probably occurred from all altitudes in the Tule River basin (highest alt, 10,042 ft) because practically the entire basin was bare, with only patches of snowpack being observed at highest altitudes December 8. No direct observations were made to define



Isohyetal lines from U.S. Army Corps of Engineers (1967, pl. 3)

FIGURE 4.—Isohyets of total precipitation. December 2–6, 1966.

the upper altitude boundary of the runoff-producing area in the Kaweah River basin. The altitude of the snowline in the Kaweah River basin probably was comparable to that in the Tule River basin, with little snow below 9,000–10,000 feet altitude.

The effect of the altitude of the snowline on runoff is demonstrated by use of area-altitude curves (fig. 5). Assuming that there was little direct runoff from areas above 9,000 feet altitude, about 80 percent of the Kern River drainage area above Isabella Reservoir contributed storm runoff to the peak of the December 1966 flood. Likewise, at least 90 percent of the Kaweah River drainage area above Lake Kaweah contributed runoff, and virtually 100 percent of the Tule River drainage area above Lake Success contributed.

In contrast, a colder storm with snow down to 6,000 feet altitude would cause rain and runoff over only 35 percent of the Kern River basin, 50 percent of the Kaweah River basin, and 80 percent of the Tule River basin. Such a storm occurs often over these areas during the period of December through March when Pacific airflow from the west or northwest has a temperature as much as 5° Celsius colder than the temperature during the storm period of December 5–6, 1966. Under these conditions the runoff-producing area of the Kern River basin would be less than half that during the December 1966 flood and that of the Kaweah River basin only a little more than half. Runoff from the Tule River basin is affected less by temperature differences because a much smaller part of the drainage area is higher than 6,000 feet altitude. In the Kern and Kaweah River basins, however, the precipitation during the relatively warm storm of December 1966 fell as rain over a much larger part of the drainage than usual and produced much greater runoff than usual during a winter storm.

The area-altitude curves (fig. 5) were approximated on the basis of 100 or more points selected on a uniform square grid system and were arrayed by altitude zones. The curves were smoothed after plotting cumulative percentages of points above indicated altitudes.

GENERAL DESCRIPTION OF THE FLOODS

The intense 48-hour storm on December 4–6, 1966, caused record-breaking floods in the Buena Vista Lake and Tulare Lake basins (fig. 1). Severe flooding extended over the Kern, Tule, and Kaweah River basins in a 60- by 100-mile area in the Sierra Nevada northeast of Bakersfield. Moderate flooding occurred in the Kings River basin and other basins to the north and in streams draining from the Coast Range to the west.

Hydrographs of daily mean discharge at key gaging stations on Kern, Tule, and Kaweah Rivers are shown in figure 6. The hydro-

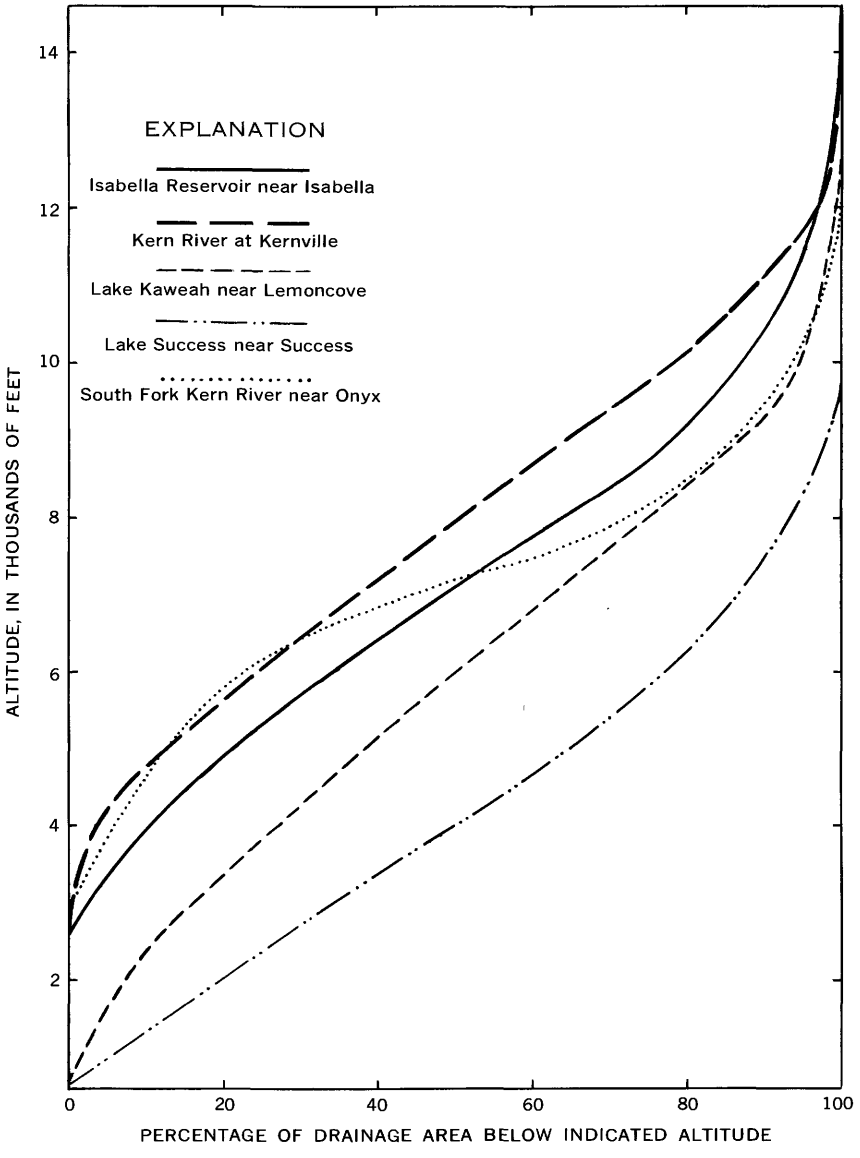


FIGURE 5.—Area-altitude relations upstream from selected gaging stations or reservoirs.

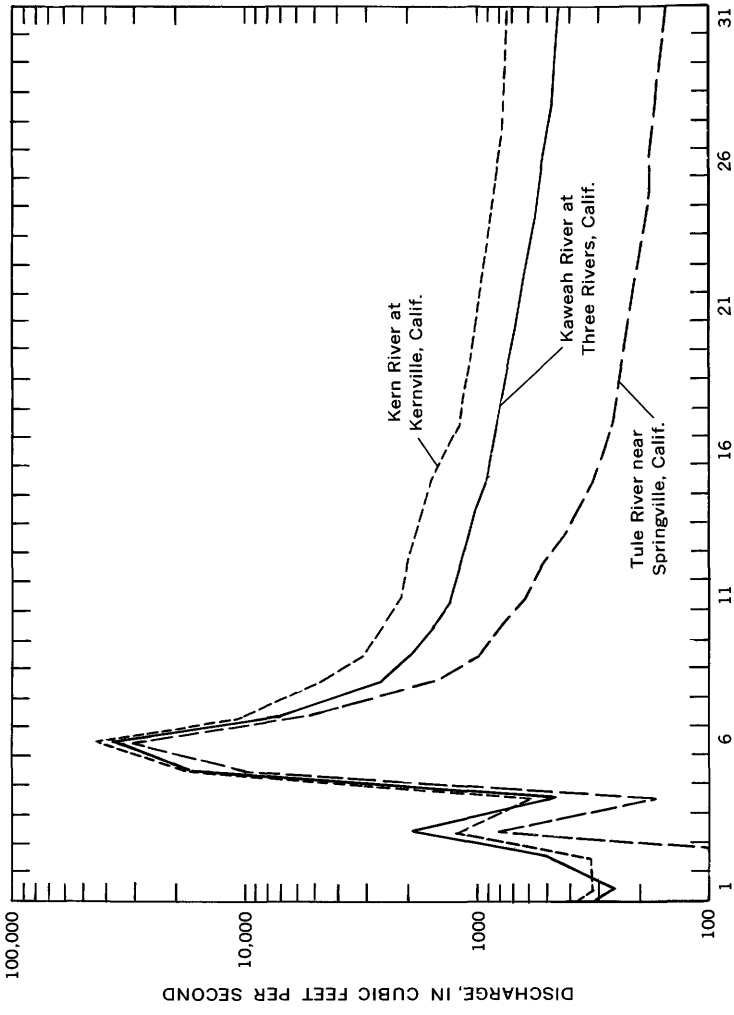


FIGURE 6.—Hydrographs showing daily mean discharge at selected gaging stations.

graph shape is remarkably similar for the three rivers. Flood peaks were the greatest of record at many gaging stations in the Kern, Tule, and Kaweah River basins. Damage was severe in all headwater areas Most highway bridges were destroyed or severely damaged. Culverts were overflowed or plugged with debris, or usually a combination of both. Sustained discharged in excess of normal channel capacity eroded streambeds and streambanks and damaged all adjacent structures. Details regarding the flood in each basin are given in the following sections.

KERN RIVER BASIN

The Kern River basin upstream from the gaging station near Bakersfield (site 18), a drainage area of 2,407 square miles, ranges in altitude from 450 feet to 14,495 feet at the summit of Mount Whitney. Runoff from 2,074 square miles, 86 percent of the area above the Bakersfield gage, is controlled in Isabella Reservoir (site 14). Records are available from 18 gaging stations in the Kern River basin to document the flood. A good sample of different hydrologic conditions is provided because runoff is measured from drainage areas with a wide range of size, altitude, and location in the basin. Eleven of the stations were installed since the November 1950 and December 1955 floods, which were the greatest previous floods of record. Continuous records are available since 1893 for Kern River near Bakersfield and since 1912 for Kern River near Kernville.

Peak flows of the December 1966 flood exceeded previous maximums at all stations except those on Golden Trout Creek, the one at South Fork Kern River near Olancha (site 11), and those below Isabella Dam (sites 15, 17, 18). The stations on Golden Trout Creek and South Fork Kern River near Olancha are at high altitudes above which December 1966 storm precipitation fell mostly as snow. Flows during December 1966 at the three stations on Kern River downstream from Isabella Dam were less than those during several floods prior to completion of the dam in 1954. Detailed hydrographs during December 4–7, 1966, at four selected Kern River stations are shown in figure 7. The hydrograph of computed inflow to Isabella Reservoir near Isabella (site 14) shows unusual fluctuations on December 4; the trend of actual inflow probably follows that of the Kern River at Kernville.

The maximum discharge of 60,000 cfs (cubic feet per second) of the Kern River near Kernville (site 5) on December 6, 1966, was more than twice the previous maximum of 27,400 cfs in November 1950 and December 1955. The maximum discharge of 28,700 cfs on the South Fork Kern River near Onyx (site 12) was eight times as great as the previous maximum of 3,460 cfs recorded in February 1963. The computed maximum bihourly inflow of 96,900 cfs to Isabella Reservoir

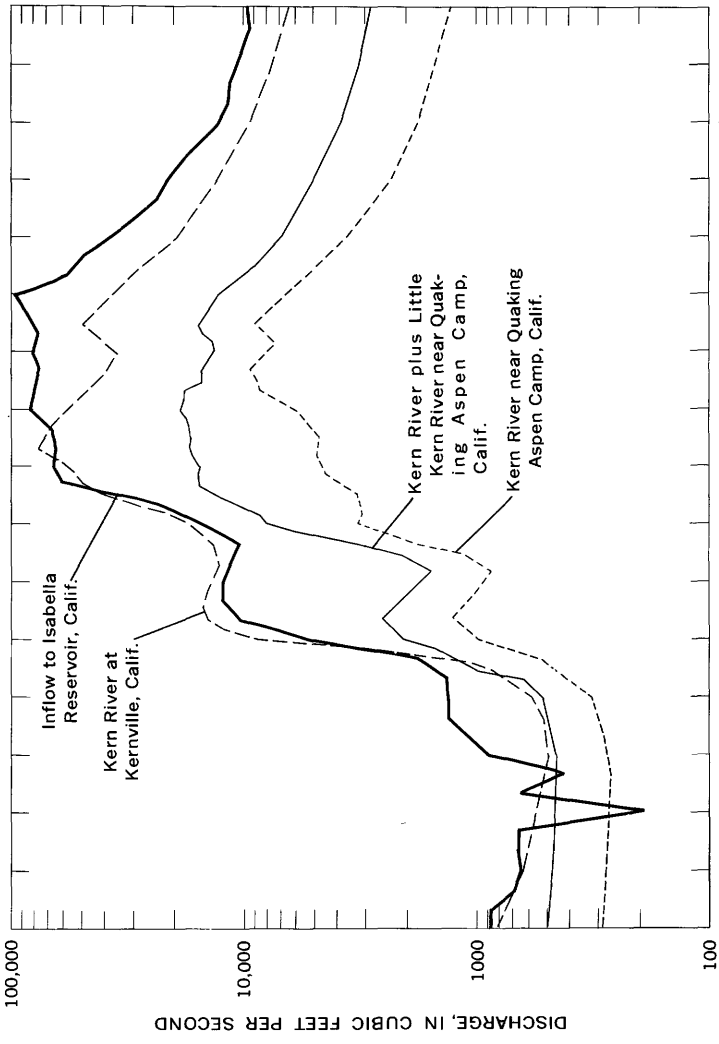


FIGURE 7.—Hydrographs showing discharge at selected gaging stations in Kern River basin.

near Isabella was 2.5 times the previous maximum flow of 39,000 cfs at the damsite in November 1950 prior to dam construction.

Little storm runoff occurred above 9,000 feet altitude where the precipitation fell during part of the storm as snow and during the remainder as rain, as the freezing level changed during the storm. When inspected on December 9, the channel of Golden Trout Creek was nearly full of ice and frozen saturated snow. There was no evidence of substantial high flow during the storm. Snow already on the ground apparently absorbed and held most of the rain that fell upstream from this gaging station.

The next highest Kern River basin gaging station is at 7,840 feet on the South Fork Kern River near Olancha. A moderate peak occurred on December 6, but the yield per square mile was low because of a substantial noncontributing area above about 9,000 feet. The relations between drainage area and altitude upstream from the gaging stations on the South Fork Kern River near Onyx and the Kern River at Kernville are shown in figure 5.

For the December 1966 flood the computed peak runoff per square mile at main Kern River gaging stations increases in a downstream direction because downstream tributaries drain more area at altitudes below 9,000 feet. The unit runoff of Kern River tributaries near Fairview and Kernville exceeded 100 cfs per square mile. The greatest known unit runoff was 490 cfs per square mile from a 1.21-square-mile area above a crest-stage gage (slope-area measurement) at Kern River tributary near Miracle Hot Springs (site 16). Heavy precipitation on December 6 caused this peak and the peak discharge of 9,290 cfs at Kern River near Bakersfield (site 18) on December 7 that was the result of storm runoff from the 333-square-mile drainage area downstream from Isabella Dam. The only release from Isabella Dam for the first 10 days during and after the flood was the 300–500 cfs released to Borel Canal for power production.

Damage was heavy along stream channels in the Kern River basin. The road from Kernville upstream to Johnsondale is close to the river at many locations. This road was obliterated at the outside bank of many river bends, and the pavement was scoured away in other locations. The modern steel girder and concrete deck bridge at Kernville was destroyed by floodflow. Bridge debris, including one 3-foot by 40-foot steel girder, was moved several hundred feet downstream. A trailer court and other buildings along the river at Kernville were badly damaged.

The flood destroyed the water-stage recorder structures and the measuring cableways on the Kern River at Kernville (site 9) and South Fork Kern River near Onyx (site 12). The series of four pictures in figure 8, taken by personnel of the U.S. Forest Service on

A. November 27, 1966

B. December 5, 1966

C. December 6, 1966

D. December 7, 1966

FIGURE 8.—Flow at gaging-station site, Kern River at Kernville, before, during, and after flood of December 1966. (Photographs courtesy of U.S. Forest Service.)

November 27 and December 5, 6, and 7, shows the gaging-station site on the Kern River at Kernville before and after the flood. The gaging station on the Little Kern River near Quaking Aspen Camp was tilted downstream when the riverbank of boulders and cobbles was scoured away, but the station remained in operation. The concrete recorder structure on the Kern River near Kernville survived the flood, although the recorder was submerged and the cableway destroyed. Later this station also had to be replaced because the low-flow channel had been scoured during the flood below the altitude of the intake pipes to the gage well. The gaging station on Kelso Creek near Weldon was put out of service permanently when a sand fill 8 feet deep plugged the channel during flow recession on December 6. The fill extends on a level plain 200 feet wide from cutbank to cutbank in the alluvial terrain. Most gages were destroyed and discharge-rated culverts were plugged at small-area crest-stage gage stations in the Kern River basin.

The flood caused the loss of two lives in the Kern River basin. One woman died from exposure after she and a companion were isolated by the flood in the Lamont Meadows area on the South Fork Kern River. One man cleaning a weir on the lower Kern River fell into the river and suffered a fatal heart attack.

TULE RIVER BASIN

The Tule River drains a fan-shaped 391-square-mile area above Lake Success east of Porterville. The drainage area extends from an altitude of 560 feet at the reservoir to 10,042 feet at the crest of Maggie Mountain on the Tule-Kern River basin drainage divide. The relation between drainage area and altitude in the Tule River basin above Lake Success is shown in figure 5. Only a very small part of the basin is above 9,000 feet altitude and was noncontributing during the 1966 flood. Steep slopes in the upper part of this basin cause rapid concentration of runoff during all major storms. The basin is heavily timbered above 5,000 feet altitude. Lower slopes are covered with brush and scrub timber. Valleys along the North Fork Tule and main Tule Rivers have large open cultivated fields.

Records for the December 1966 flood are available from eight gaging stations in the Tule River basin. Detailed hydrographs at three selected stations in the basin are shown for the period December 4–7 in figure 9. The December 1966 maximum flow of 49,600 cfs at the gaging station on the Tule River near Springville (site 30) was the greatest flood of record and more than double the previous record flow of 22,400 cfs in November 1950. Records at a former gage site inundated by Lake Success in 1961 show that the 1950 flood was the greatest during the period of record, from 1901 to 1960. The December 1955 peak

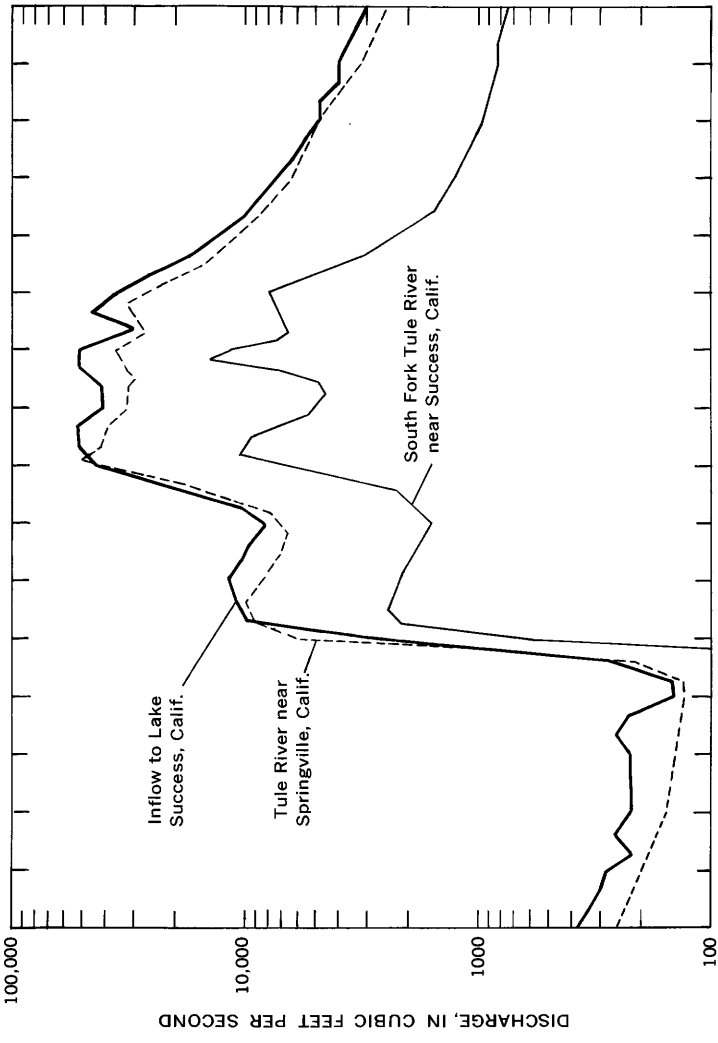


FIGURE 9.—Discharge hydrographs at selected gaging stations in the Tule River basin.

discharge was slightly less than that in 1950 and thus was the third highest recorded flood on the Tule River. The December 1966 peak discharge of 14,300 cfs on the South Fork Tule River near Success (site 31) was also more than double the previous record flow of 7,000 cfs in November 1950. The computed maximum bihourly inflow to Lake Success near Success (site 32) of 52,800 cfs on December 6 similarly was 1.7 times the peak flow of 32,000 cfs in November 1950 at a former gaging station near the damsite. The 85,400 acre-feet of nominal storage capacity in Lake Success plus 16,000 acre-feet of flood surcharge storage were utilized by the Corps of Engineers to reduce the record-high inflow of December 1966 to a peak outflow of 9,050 cfs about 18 hours later.

Peak runoff of 430 cfs per square mile from a 39.3-square-mile area on the North Fork of Middle Fork Tule River near Springville (site 27) was the highest in the Tule River basin. Unit runoff exceeded 130 cfs per square mile throughout the basin.

Damage in the Tule River basin was greatest along headwater stream channels, where all manmade structures suffered some degree of damage. The concrete bridge across North Fork Tule River at Springville and two bridges across the Tule River downstream from Springville were destroyed. Houses along the banks of the Tule River at Springville were damaged severely by flooding. Many road culverts on normally small channels were destroyed when they were plugged or overflowed by the record runoff. On the Tule River Indian Reservation a 6-year-old boy died from exposure when he was isolated after a bridge washed out. Some flooding occurred in agricultural areas downstream from Lake Success during sustained release of floodwater December 6–11.

Gaging stations were heavily damaged, including total destruction of the station on the North Fork Tule River at Springville (site 29) adjacent to the bridge that was destroyed. Downstream, the station on Tule River near Springville survived the destruction of the bridge to which it was attached, but had to be rebuilt at a different site because of channel scour. Upstream, two low-flow gaging stations belonging to the Southern California Edison Co. were badly damaged.

KAWEAH RIVER BASIN

The Kaweah River basin includes 560 square miles of forest, brush, and open areas above Lake Kaweah, the Corps of Engineers' flood-control and conservation reservoir east of Visalia. Headwater drainage extends up to an altitude of 12,634 feet at the summit of Triple Divide Peak on the Great Western Divide, which separates the Kaweah River basin from the Kern River basin to the east. Triple Divide Peak lies at the juncture with the Kings River basin to the north. The

relation between drainage area and altitude in the Kaweah River basin above Lake Kaweah is shown in figure 5.

Eleven continuous, partial-record, and crest-stage gaging stations provide flood records in the Kaweah River basin. Eight are upstream from Lake Kaweah, one is on the reservoir, and two are downstream. Detailed hydrographs for December 4–7, 1966, at four selected stations are shown in figure 10.

Adding the hydrograph of Kaweah River at Three Rivers (site 41) to that of South Fork Kaweah River at Three Rivers (site 42) gives an estimated peak discharge of 78,500 cfs on December 6, 1966, from the 505-square-mile drainage area upstream from the junction of the two streams. The December 6, 1966, peak stages at these two stations were slightly higher than the floodmarks for December 23, 1955. The maximum discharge during the period 1903–60 was 80,700 cfs December 23, 1955, at a former gaging-station site near Three Rivers. The drainage area was 520 square miles at the former site, now submerged in Lake Kaweah.

The computed maximum bihourly inflow on December 6 to Lake Kaweah near Lemoncove (site 43) was 82,700 cfs. The drainage area at Lake Kaweah is 560 square miles. The 1966 maximum flow of 23,900 cfs at North Fork Kaweah River at Kaweah (site 40) exceeded the 1955 peak discharge of 21,500 cfs. The December 1955 and December 1966 floods were of approximately equal magnitude in the vicinity of Three Rivers and Kaweah. However, upstream December 1966 peak discharges at Middle Fork Kaweah River (site 37) and Marble Fork Kaweah River near Potwisha Camp (site 36) were only about half those of 1955. The maximum discharge of 14,500 cfs on December 6, 1966, at Dry Creek near Lemoncove (site 45), tributary to the Kaweah River downstream from Lake Kaweah, was more than double the peak discharge of 6,070 cfs on December 23, 1955, at a slope-area measurement site 2 miles upstream. Thus the 1966 flood peaks in the Kaweah River basin were about half those of 1955 in upstream tributaries, equal to those of 1955 in the vicinity of Three Rivers, and twice those of 1955 on a downstream tributary.

Figure 11 is a plot of cumulative hourly precipitation at the recording gage at Grant Grove (alt, 6,000 ft) and computed cumulative hourly runoff at the gaging station on the Kaweah River at Three Rivers. Runoff is expressed in equivalent inches of depth over the 418-square-mile drainage area. The peak hourly precipitation recorded was 0.65 inches, although hourly precipitation probably was greater sometime during a 10-hour period when the only record at Grant Grove is from a nonrecording gage. A radio-reporting precipitation gage at Giant Forest indicated a total of 4.1 inches of precipitation during the period of 1600 to 2000 hours December 5.

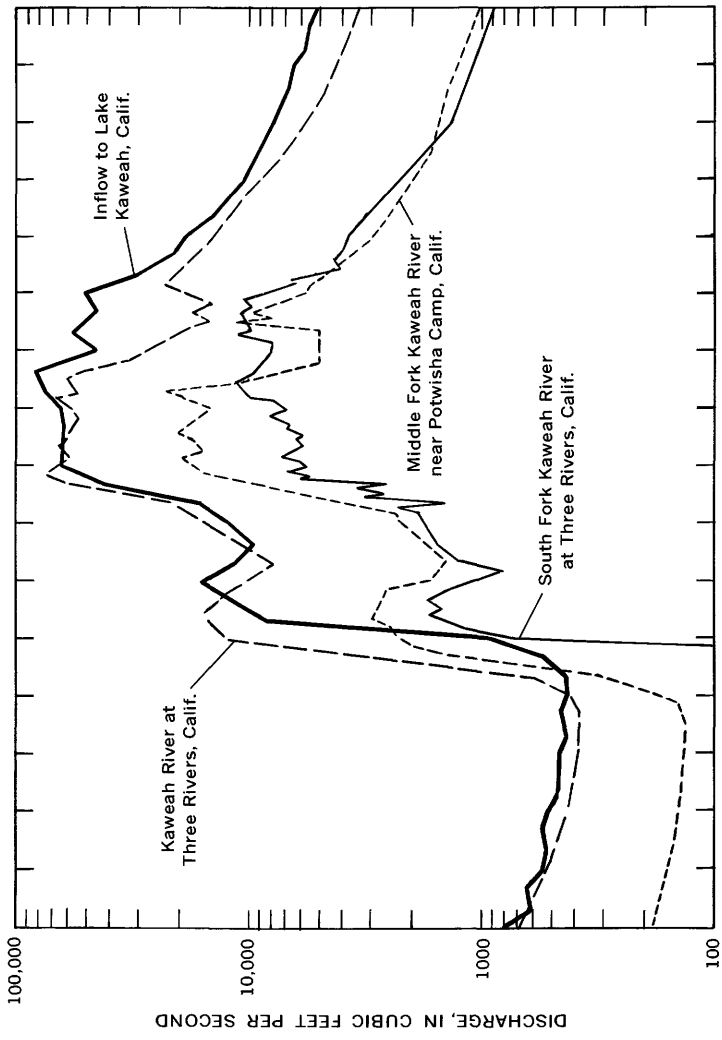


FIGURE 10.—Discharge hydrographs at selected gaging stations in the Kaweah River basin.

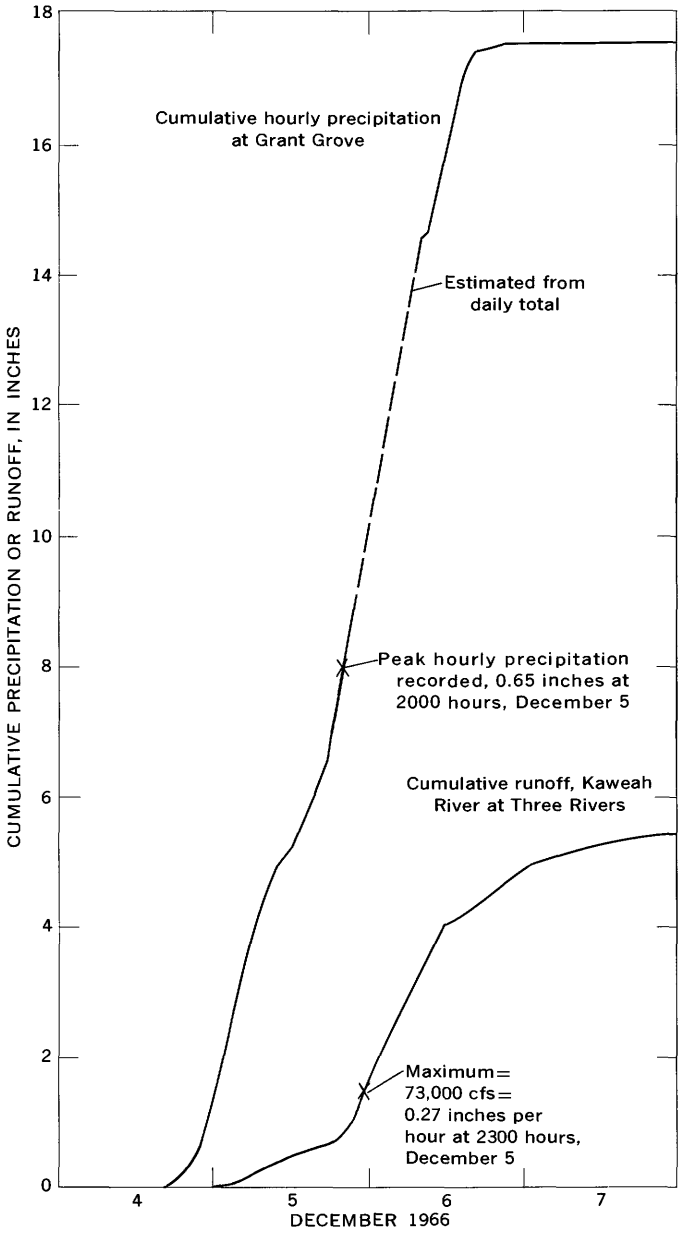


FIGURE 11.—Cumulative precipitation or runoff in the Kaweah River basin.

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The maximum runoff rate of the Kaweah River at Three Rivers was equivalent to 0.27 inches per hour at 2300 hours on December 5. Total runoff past this gaging station during December 1966 was equivalent to 7.59 inches. Total precipitation during December was 23.33 inches at Grant Grove. Assuming that Grant Grove precipitation data are somewhat representative of the basin mean, then about two-thirds of the precipitation that fell in December remained in storage in the Kaweah River basin as snow, ground water, and soil moisture. Evapotranspiration losses would be small during December.

MISCELLANEOUS BASINS

Available records indicate that the December 1966 flood was the greatest flood of record on most major streams within the Kern-Kaweah area. These include Poso Creek draining the area west of the lower Kern River basin, Deer Creek draining the area west of the Kern River and south of the Tule River, and Sand Creek draining the area west of the North Fork Kaweah River. Peak runoff was less to the south on Caliente and Tehachapi Creeks, which were close to the south boundary of the intense storm precipitation. Poso Creek and White River, which is a smaller stream in the western foothills between Poso Creek and Deer Creek, had lower peak discharges in December 1966 than the estimated maximums during the flood of March 9, 1943.

The 10,000 cfs peak discharge on December 6, 1966, on Deer Creek near Terra Bella (site 26) was particularly destructive. The main road to California Hot Springs follows Deer Creek and crosses it at several locations. All bridges were destroyed or badly damaged. Downstream irrigation diversion structures were washed out and were further damaged by deposition of coarse sediment. The damage pattern on Deer Creek was very similar to that in the Kern and Tule River headwater areas.

STORAGE REGULATION

Three reservoirs were operated by the Corps of Engineers to reduce floodflows and keep flood damage to comparatively low amounts downstream from the reservoirs. All inflow from the Kern River basin was stored in Isabella Reservoir during the critical peak runoff period. No releases were made at Isabella Dam until December 17, except to Borel Canal for power generation. A peak discharge of 9,290 cfs on December 7 on the Kern River near Bakersfield resulted from tributary inflow below Isabella Dam. In contrast, the

computed peak bihourly inflow to Isabella Reservoir was 96,900 cfs on December 6.

Lake Success filled rapidly during the record-high Tule River basin inflow December 5 and 6. Flow began over the spillway crest during the afternoon of December 6 and peaked at 8,260 cfs at 0400 hours December 7. Releases through Success Dam outlet works were manipulated to obtain 6 feet of surcharge above the ungated spillway crest. This caused 16,000 acre-feet of surcharge storage and greatly reduced the rate of discharge to the lower Tule River. The combined flow through the outlet works and over the spillway reached a peak of 9,050 cfs. The computed peak bihourly inflow was 52,800 cfs (fig. 12).

Storage in Lake Kaweah was also regulated to provide maximum flow reduction downstream. At the time of the peak bihourly inflow of 82,700 cfs on December 6, floodflow from Dry Creek entering Kaweah River downstream from the reservoir filled all available channel capacity, and there was no significant release at Terminus Dam. As local flows receded, the release was stepped up to 5,740 cfs on December 8. Approximately 99 percent of the available reservoir space was utilized, but there was no spill at Terminus Dam.

FLOOD DAMAGE

The recordbreaking floodflows of December 1966 caused severe damage in mountain and foothill areas. Parts of the communities of Kernville, Lamont, Springville, and Three Rivers adjacent to streams were damaged heavily by stream overflow, streambank erosion, and deposition of sediment and debris. Roads and bridges were hard hit, and some bridges were totally destroyed. Many smaller culverts and bridges were damaged to some degree from debris and overflows. Inundation of downstream agricultural areas caused additional damage.

Storage in Isabella Reservoir, Lake Success, and Lake Kaweah reduced record inflows to near channel capacity downstream and prevented catastrophic damage to Bakersfield, Porterville, Visalia, and smaller downstream cities. Data on the amount of flow reduction are given in the preceding section. Flood-damage prevention has been estimated by the U.S. Army Corps of Engineers (1967, p. A–24, A–16, A–12) as $51,300,000 downstream from Isabella Dam, $10,400,000 downstream from Success Dam, and $19,600,000 downstream from Terminus Dam. The benefit by operation of the three reservoirs thus was $81,300,000 in a single flood.

Actual flood damage was determined by the Corps of Engineers to have totalled $18,003,000. A detailed breakdown by type of damage is

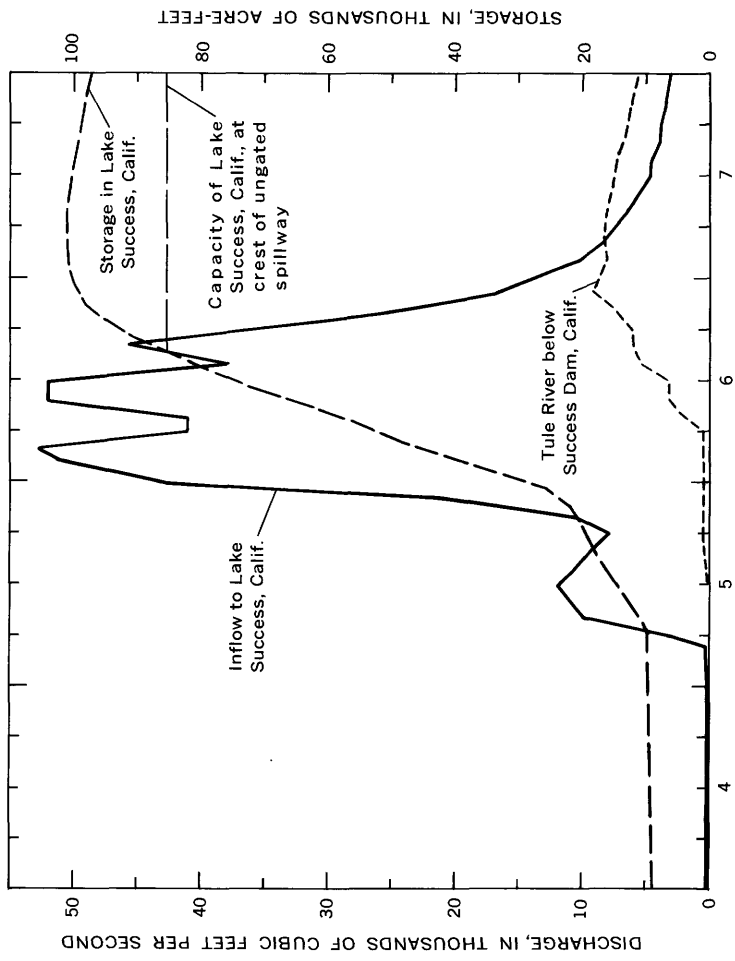

FIGURE 12.—Storage regulation and discharge in the Tule River basin.

given in a report of the U.S. Army Corps of Engineers (1967) for the Kern-Tule-Kaweah area. The damage is summarized below:

Stream basin	*Mountain and foothill area*	*Valley floor*	*Total*
Kern River	$4, 369, 000	$271, 000	$4, 640, 000
Caliente Creek	355, 000	774, 000	1, 129, 000
Poso Creek	83, 000	1, 215, 000	1, 298, 000
Tule River	4, 647, 000	1, 539, 000	6, 186, 000
Kaweah River	3, 468, 000	1, 282, 000	4, 750, 000
Total	12, 922, 000	5, 081, 000	18, 003, 000

The figure for flood damage in mountain and foothill areas include $4,457,000 damage to U.S. Forest Service and National Park Service facilities.

COMPARISON TO PREVIOUS FLOODS

Descriptions and streamflow data for floods of record in the Kern, Tule, and Kaweah River basins are found in Water-Supply Papers 843, 1137–F, 1260–D, 1650–A and B, and 1830–A. Historic floods of 1861–62, 1867, 1875, 1879, 1884, 1890, and 1893 are discussed in Water-Supply Papers 843, 1137–F, and 1650–A. No reliable estimates of flood discharge can be made for these earlier years. The information available indicates that the flood in December 1867 was the largest on all three streams, and the flood in January 1862 probably was the second highest, prior to 1900.

Streamflow records began in October 1893 on the Kern River, in May 1901 on the Tule River, and in May 1903 on the Kaweah River. Records are continuous since those dates. Gaging sites were moved upstream on the Tule River in November 1961 and on the Kaweah River in February 1962, when new reservoirs inundated former sites. The peak discharge of the Tule River near Springville has been estimated for the 1950 and 1955 floods on the basis of the ratio of the drainage area at the present site near Springville and that at the former site downstream near Porterville. The peak discharge of the Kaweah River during the 1963 and 1966 floods has been estimated at the former site near Three Rivers by the summation of flow at present gaging stations on the Kaweah River at Three Rivers (upstream from South Fork) and the South Fork Kaweah River at Three Rivers (near mouth). These estimates permit comparison of all major floods on the Tule and Kaweah Rivers since records began in 1901 and 1903, respectively.

Records indicate that the rain-produced floods of 1950, 1955, 1963, and 1966 were the greatest since streamflow records began in the Kern, Tule, and Kaweah River basins. The peak discharges during the four floods at principal long-term gaging stations on these rivers are listed in table 2. The December 1966 flood was by far the greatest in the Kern and Tule River basins. In the Kaweah River basin the December 1955

peak discharge near Three Rivers was about the same in magnitude as the estimated peak discharge in 1966. For the South Fork Kern, Tule, and Kaweah Rivers, peak discharge during several lesser floods prior to 1950 exceeded slightly the fourth highest discharge of the four floods listed in table 2.

TABLE 2.—*Peak discharge at selected stations during the floods of 1950, 1955, 1963, and 1966*

Station	Peak discharge (cfs)			
	November 1950	December 1955	February 1963	December 1966
Kern River near Kernville	27,000	27,200	24,000	60,000
South Fork Kern River near Onyx	2,180	2,050	3,460	28,700
Tule River near Springville	22,400	21,500	10,100	49,600
Kaweah River near Three Rivers	52,000	80,700	31,900	78,500

The 3-day flood runoff volume during the same floods and at the same stations is listed in table 3. The December 1966 3-day volume on the Kern and Tule Rivers was several times that during previous floods. The estimated 3-day volume in 1966 on the Kaweah River slightly exceeded that of 1955.

TABLE 3.—*Runoff at selected gaging stations for 3-day periods during the floods of 1950, 1955, 1963, and 1966*

1950		1955		1963		1966	
Period	Runoff (acre-ft)	Period	Runoff (acre-ft)	Period	Runoff (acre-ft)	Period	Runoff (acre-ft)
Kern River near Kernville							
Nov. 18	4,200	Dec. 23	31,900	Jan. 31	14,200	Dec. 5	23,800
19	25,600	24	11,100	Feb. 1	25,000	6	66,600
20	5,890	25	6,270	2	6,960	7	15,300
18–20	35,690	23–25	49,270	Jan. 31–Feb. 2	46,160	5–7	105,700
South Fork Kern River near Onyx							
Nov. 18	83	Dec. 23	1,260	Jan. 31	2,280	Dec. 5	6,900
19	2,740	24	2,960	Feb. 1	4,800	6	27,800
20	1,020	25	1,040	2	2,720	7	4,780
18–20	3,843	23–25	5,260	Jan. 31–Feb. 2	9,800	5–7	39,480
Tule River near Springville							
Nov. 18	3,020	Dec. 23	16,000	Jan. 31	8,150	Dec. 5	16,900
19	17,700	24	3,940	Feb. 1	9,780	6	59,900
20	2,450	25	2,220	2	2,240	7	10,200
18–20	23,170	23–25	22,160	Jan. 31–Feb. 2	20,170	5–7	87,000
Kaweah River near Three Rivers							
Nov. 18	15,700	Dec. 23	84,900	Jan. 31	26,500	Dec. 5	36,100
19	31,700	24	30,000	Feb. 1	37,900	6	89,000
20	8,330	25	16,300	2	8,790	7	16,800
18–20	55,730	23–25	131,200	Jan. 31–Feb. 2	73,190	5–7	141,900

Comparison of the historic flood of December 1867 with that of December 1966 is possible at two locations. At the gaging station on the Kern River near Kernville drift logs were found in 1938 that are believed to have been deposited during the peak of the flood of 1867; the logs were 13 feet above the peak stage of the flood of February 1937. The peak stage for the flood of 1966 was 10.3 feet higher than that of February 1937, but whether the peak discharge in 1867 was greater than that in 1966 is open to conjecture. In fact, the Kern River channel at the gage site was scoured considerably in 1966 and thus may have carried a greater floodflow at a given stage than in 1867; nevertheless, the peak discharges of 1867 and 1966 may have been approximately the same in the Kern River in the vicinity of Kernville.

At the former gaging station on the Kaweah River near Three Rivers the maximum stage of the December 1867 flood was about 22.7 feet, referred to the datum of the December 1955 flood, whose flood peak stage was 22.24 feet. As previously explained, the peak discharge of the December 1966 flood on the Kaweah River is estimated to have been about the same as that in December 1955, but the 3-day flood runoff was greater in 1966. Thus the 1867, 1955, and 1966 peak discharges in the Kaweah River basin were about the same; however, the 1867 peak near Three Rivers probably was slightly greater than the peaks in 1955 and 1966.

FLOOD FREQUENCY

A method for determining the probable magnitude and return frequency of floods for recurrence intervals between 1.2 and 50 years for streams in the flood area is presented by Young and Cruff (1967) in Water-Supply Paper 1686. On the basis of regional equations presented in that report, the recurrence interval for the December 1966 flood has been determined (table 4) for all gaging sites with 10 years or more of record, unregulated flow, and more than 10 square miles of drainage area. The procedure for computing flood magnitude given in Water-Supply Paper 1686 is not applicable at sites where the drainage area is less than 10 square miles.

A ratio of the 1966 peak discharge to the 50-year flood is given whenever the December 1966 flood exceeded the probable 50-year flood. Extension of calculated flood-frequency curves beyond 50 years is not recommended because of limitations of available flood records. Comparison of the peak discharge for a given flood with the probable 50-year flood provides an approximate measure of the severity of the flood. In general, gaging stations with a lower percentage of high-altitude drainage area had the larger ratios. The highest ratio determined was 3.5 for North Fork of Middle Fork Tule River near Springville (site 27).

Other methods may be used to analyze flood frequency including the uniform technique (log-Pearson type III) described in a U.S. Water Resources Council report (1967). Use of other techniques could produce different recurrence intervals for peak discharges of December 1966 from those given in this report.

GEOMORPHIC EFFECTS IN THE KERN RIVER BASIN

By Kevin M. Scott

Effects of the 1966 flood in the Kern River drainage basin were impressive, not only in channels, which were radically modified, but on sparsely vegetated hillslopes as well. Overland flow clearly occurred over much of the basin, in spite of the fact that lower hillslopes are mantled by grus, a fragmental accumulation formed by weathering from granite and having a high infiltration capacity. Much of the basin is underlain by vast expanses of bare granitic rock, the effect of which was to increase the rapidity of runoff. Local rillwash and gulleying occurred on depositional surfaces, but rangeland was not extensively eroded because of the high infiltration capacity of grus.

Press reports of numerous large landslides in the area referred in large part to relatively small failures of artificial slopes and roadcuts. Failures of natural slopes were rare because of the anisotropic nature of the bedrock and a thin soil cover rather than a lack of intensity of the storm. Small tributaries with steep gradients were locally the sites of mudflows which transported large volumes of forest debris and boulders to the main channels. The driver of a Corps of Engineers truck, attempting the first postflood traverse of the main Kern River canyon, reported that he got 2¼ miles into the canyon when a mudslide sent rocks "as big as houses" onto the road in front of his vehicle.

Small tributaries were radically affected by the storm runoff. Most striking were the changes in channel configuration in the normally dry desert washes of the southeastern part of the Kern River drainage basin. Here the effects were those of a widespread desert thunderstorm: overland flow, flashy runoff, widespread rill formation on depositional surfaces, and major changes in main channels. These effects are strikingly demonstrated in the Kelso Creek watershed, draining into the South Fork Kern River near Weldon. The main channel of Kelso Creek has been widened by lateral scour and now is bounded by nearly vertical cutbanks. The bed of the channel has undergone appreciable fill, apparently continuously along its entire length. Fill was locally at least 12 feet deep, inundating a stunted growth of willows along the previous thalweg.

Fill at the site of a former stream-gaging station was about 8 feet deep, leaving only the recorder shelter protruding above the surface.

The fill is almost entirely sand, as is the material exposed in the eroded cutbanks. A few coarse fragments are incorporated in the sand and were apparently transported during upper regime flow by progressive movement into a downstream scour pocket as described by Fahenstock and Haushild (1962). Local excavation of the fill reveals that the fill is constant in its grain size and that there is a lack of crossbedding with depth. Figure 13 shows the Kelso Creek channel at the gaging station after the flood. The small white recorder shelter is visible near the left bank of the filled channel.

The flood was equally devasting in larger tributaries, such as the South Fork Kern River. Where confined, the flood removed much vegetation and cut into but did not extensively overtop old terrace levels; however, the flood did not consistently fill or scour along its course. The flood occupied all the previous flood channel and left extensive sand berms up to a level 2 feet below the high-water mark. Peak flow was sufficiently competent to move the coarsest bed material present, as indicated by relationships of deposited boulders to vegetation. Where the South Fork debouches onto its fan, deposition was widespread, burying many fences and much vegetation.

FIGURE 13.—Kelso Creek near Weldon; downstream view; January 1967.

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Effects in the canyon of the main Kern River were similar to those in the South Fork drainage, but were of a larger scale. Flow depth was at least 25 feet over much of the flood route, and with a relatively high gradient, flow was sufficiently competent to move all material previously in the channel, including boulders 10–15 feet in intermediate diameter. The pool-and-riffle pattern was modified. Much vegetation was lost and transported to Lake Isabella; however, little timber of economic value was lost. The pool above a diversion dam on the main Kern River near Fairview was completely filled with flood detritus.

Boulder and timber "jams" were formed in both the Kern and South Fork Kern Rivers, similar in this respect to other floods of mountain rivers (Krumbein, 1942). Such deposits consist of an abrupt front composed of boulders and timber. In an upstream direction, material becomes progressively finer. The surface of the deposit has a lower gradient than that of the reach in which it occurs, and coarse material is commonly present on the surface as a lag deposit. The snouts of the jams apparently formed at channel constrictions or in areas of reduced competency and acted as dams for the finer material. The low-water channel then formed laterally to the jam. These deposits, with apparently random spacing, do not seem to be related to riffles, which show a characteristic spacing related to channel width.

No definite idea of the flood frequency can be obtained from the erosional and depositional effects relative to previous deposits. On the main Kern River, the flood locally overtopped a terrace level at 20–25 feet with mature Coulter pines. A second pronounced terrace level occurs at a level 40–45 feet above the main Kern River thalweg. Some trees in the main channel that were older than 200 years were destroyed by the flood. The relative magnitude of the flood on the South Fork Kern River was similar—the flood locally overtopped a terrace 15–18 feet above the stream thalweg.

SEDIMENTATION AND CHANNEL CHANGES

No direct measurements of fluvial sediment are available for the flood area. Hydrographers reported visibly high suspended-sediment load and very audible moving bedload at streamflow-measuring stations. Large areas of channel scour and fresh deposits of sand were evident in all streams after recession of floodflow.

Reconnaissance surveys by the U.S. Army Corps of Engineers, Sacramento District, indicate an accumulation of 2,550 acre-feet of sediment in headwater reaches of Lake Success on the Tule River between May 1961 and November 1967. Depth of sediment was as great as 12 feet on the ranges surveyed. Surveys show that 2,500 acre-feet of sediment up to 25 feet deep was deposited between June 1962 and

November 1967 in the headwater reaches of Lake Kaweah on the Kaweah River. These estimates do not include sediment deposits below the reservoir water levels at the time the surveys were made or the suspended sediment that passed through the reservoirs.

The sediment accumulation in Lake Success corresponds to an average annual rate of 1.1 acre-feet per square mile for the 1961–67 period and in Lake Kaweah to 0.9 acre-foot per square mile for 1962–67. These rates are about double the average annual sediment yields in this area, which are estimated to be less than 0.5 acre-foot per square mile. Much of the sediment in Lakes Success and Kaweah was deposited during the December 1966 flood, although part must have accumulated during the February 1963 and lesser floods.

There is little documentation of channel changes except at gaging-station cableways where stream cross sections are surveyed often during streamflow measurements. The greatest changes measured were in the Kern River basin, where the 1966 peak flows were most in excess of previously recorded maximums. Channel cross sections before and after the flood are plotted for two gaging stations in figure 14. The cross section on the Kern River at Kernville was widened considerably when sand and other small alluvial material was scoured from the left bank for a considerable distance. The section on the South Fork Kern River near Onyx was enlarged greatly in both width and depth with a maximum scour over 5 feet deep. Part of this scour was induced by the total destruction of a concrete weir. Figure 15 shows the scoured left bank and streambed and the top of the tipped concrete recorder shelter and stilling well which stood at the left end of the concrete control section before the flood. The A-frame for the former gaging cableway upstream from the recorder installation was dropped about 4 feet vertically when the left bank was eroded.

DETERMINATION OF FLOOD DISCHARGES

The operation of a streamflow-measuring station consists principally of the measurement of stage and discharge and the definition of the stage-discharge relation from which discharge can be calculated for a given stage. The development of a stage-discharge relation is based upon current-meter discharge measurements throughout the range of stage experienced, or through a sufficient part of the range that the discharge corresponding to the maximum stage can be obtained by a reasonable extension of the stage-discharge relation, or rating curve. Short extensions of a rating curve are usually made by logarithmic plotting, by velocity-area studies, or by use of other hydraulic or hydrologic principles.

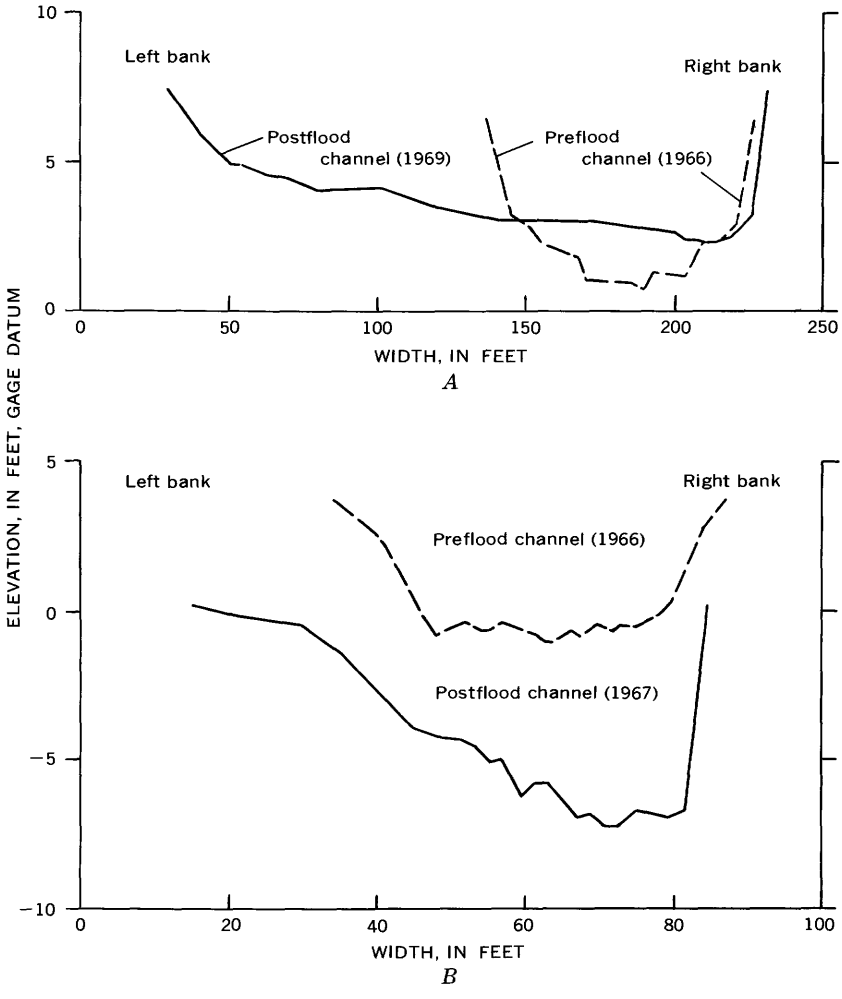

FIGURE 14.—Change in river-channel cross section of the Kern River at Kernville (*A*) and the South Fork Kern River near Onyx (*B*), 1966, 1967, and 1969.

Because of the record-breaking magnitude of the December 1966 floods, it was impossible to obtain current-meter discharge measurements at or near peak stage at most of the gaging stations. Most foothill and mountain roads were flooded, washed out, or blocked by debris during the flood crests December 6. Stream-gaging cableways at several stations were destroyed. Measurements were resumed at most Tule and Kaweah River stations December 7; Kern River stations were measured beginning December 8 by utilizing a helicopter to transport hydrographers and equipment to the stations.

For most of the gaging stations at which no extremely high-water current-meter measurements were made, peak discharges were obtained by slope-area measurements, computation of flow through culverts, contracted-opening measurements, critical-depth measurements, and other types of indirect discharge measurements. These indirect measurements are based on channel geometry and high-water profiles obtained by field survey and are computed by use of procedures and equations based on established hydraulic principles. They are indirect only in the sense that the data are collected subsequent to the passage of the peak discharge.

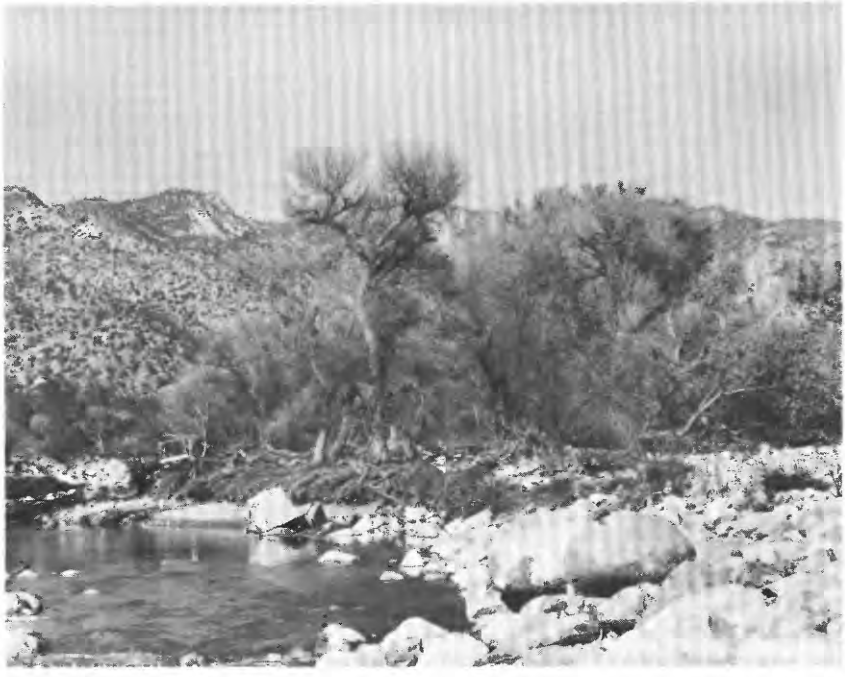

FIGURE 15.—South Fork Kern River near Onyx, upstream view, January 1967.

SUMMARY OF FLOOD STAGES AND DISCHARGES

Flood stages and discharges at 46 gaging stations, crest-stage stations, miscellaneous sites, and reservoir stations are summarized in table 4. The reference numbers in the table correspond to those on the location map (fig. 2) and aid in locating the sites at which peak discharges were determined.

TABLE 4.—*Summary of flood stages and discharges*

No.	Permanent station 11-	Stream and place determination	Drainage area (sq mi)	Maximum previously known				Maximum December 1966				
				Period of record	Year	Gage height (ft)	Discharge (cfs)	Day	Gage height (ft)	Discharge		
										Cfs	Cfs per sq mi	Recurrence interval (yr)
		Buena Vista Lake basin										
1	1853	Golden Trout Creek near Cartago, Calif.	23.6	1956–66	1958		182	6	5.65	40	1.69	1
					1959	5.24						
2	1853.5	Kern River near Quaking Aspen Camp, Calif.	530	1960–66	1963	7.98	4,060	6	10.89	9,360	17.7	10
3	1854	Little Kern River near Quaking Aspen Camp, Calif.	132	1957–66	1963	9.19	7,370	6	12.60	13,100	99.2	[1]1.4
				1955	1955	12.4	12,200					
4	1856	Packsaddle Canyon Creek near Fairview Calif.	4.05	1959–66	1963	9.91	223	6	12.0	660	163	
5	1860	Kern River near Kernville, Calif.	848	1912–66	1950, 1955	17.55	27,400	6	22.77	60,000	70.8	[1]1.5
6	1863.4	Salmon Creek tributary B near Fairview Calif.	.46	1962–66	1963	.87	3.1	5	1.93	22.1	48.0	
7	1863.6	Salmon Creek tributary C near Fairview, Calif.	.35	1962–66	1963	1.03	2.7	6	2.71	60	171	
8	1863.8	Salmon Creek tributary E near Fairview, Calif.	.20	1962–66	1965	.57	1.1	6	(2)	24	120	
9	1870	Kern River at Kernville, Calif.	1,009	1905–12, 1953–66	1955	16.2	29,400	6	22.2	74,000	73.3	[1]1.6
				1905–66	1950	18.4	38,700					
10	1872	Shirley Creek tributary near Alta Sierra, Calif.	.27	1959–66	1962, 1963	11.57	14	6	13.70	60	148	
11	1882	South Fork Kern River near Olancha, Calif.	146	1956–66	1958	5.50	1,280	6	4.98	1,010	6.92	4
12	1895	South Fork Kern River near Onyx, Calif.	530	1911–14, 1919–42	1963	6.79	3,460	6	12.0	28,700	54.2	[1]2.0
				1947–66	1914	[3]7.2						
13	1897	Kelso Creek near Weldon, Calif.	101	1958–66	1965	6.20	1,340	6	11.7	[5]5,800	57.4	[1]1.9
14	1905	Isabella Reservoir near Isabella, Calif.	2,074	1953–66	1958	[4]2,594.83	[5]455,200	21, 22	[4]2,582.32	[5]337,400		
								6		[6]96,900	4.67	[1]1.6
15	1910	Kern River below Isabella Dam, Calif.	2,074	1945–53	1950	28.6	39,000	30	10.10	[7]2,160		
				1954–66	1958	15.14	[7]4,870					
16	1918	Kern River tributary near Miracle Hot Springs, Calif.	1.21	1959–66	1962	6.80	5.0	6	13.10	593	490	
17	1925	Kern River near Democrat Springs, Calif.	2,258	1950–53	1950	30.7	40,000	6	18.55	[7]10,100		
				1954–66	1958	13.68	[7]4,370					
18	1940	Kern River near Bakersfield, Calif.	2,407	1893–1953	1950	[4]461.37	36,000	7	[4]454.94	[7]9,290		
				1954–66	1958		[7][8]3,940					
19	1940.5	Tumbleweed Creek near Oildale, Calif.	2.40	1958–66	1963	4.65	104	6	2.25	1	.42	
20	1964	Caliente Creek above Tehachapi Creek, Calif.	165	1961–66	1963	7.48	1,410	6	6.90	1,140	6.91	5
21	1964.2	Tehachapi Creek near Tehachapi, Calif.	53.2	1962–66	1963	[3]5.30	1,700	6	1.06	52	.98	

22	1978	Poso Creek near Oildale, Calif.	230	1959–66	1964	6.38	359	6	11.57	4,300	1.87	8
				1958	1958	8.6	2,750					
23	1980.5	Mon Canyon Creek near Oildale, Calif.	2.38	1958–66	1964	5.08	35	6	3.90	9	3.78	
24	1993	Coho Creek near White River, Calif.	12.9	1959–66	1960	(2)	1	6	7.72	221	17.1	
25	1995	White River near Ducor, Calif.	92.9	1942–53, 1958–66	1943	(2)	2,300	6	4.58	1,080	11.6	4
26		Deer Creek near Terra Bella, Calif.	130					6		10,000	76.9	
27	2020	North Fork of Middle Fork Tule River near Springville, Calif.	39.3	1939–66	1950	13.06		6	13.83	16,900	430	[1] 3.5
					1955	12.47	12,400					
28	2024.5	Winding Creek near Camp Nelson, Calif.	.30	1959–66	1963	11.66	19	6	12.71	48	160	
29	2031	North Fork Tule River at Springville, Calif.	97.6	1957–66	1963	10.29	4,600	5	23	24,200	248	[1] 3.1
30	2032	Tule River near Springville, Calif.	225	1950–66	1950		22,400	6	17.18	49,600	220	[1] 2.8
31	2045	South Fork Tule River near Success, Calif.	109	1930–54, 1956–66	1950	11.36	7,100	6	12.50	14,300	131	[1] 1.7
32	2047	Lake Success near Success, Calif.	391	1961–66	1965	[4] 642.74	[5] 66,100	7	[4] 658.63	[5] 101,300		
								6		[6] 52,800	135	[1] 2.2
33	2049	Tule River below Success Dam, Calif.	393	1950–61	1950	[3] 26	32,000	6		[7] 9,050		
				1962–63	1933	9.25	[7] 2,930					
34	2049.5	Tule River tributary near Success, Calif.	1.13	1959–63	1962	11.76	8	6	14.63	219	194	
35	2065	Middle Fork Kaweah River near Potwisha Camp, Calif.	102	1949–66	1955	[3] 29.0	46,800	6	17.7	23,300	228	[1] 2.1
36	2080	Marble Fork Kaweah River at Potwisha Camp, Calif.	51.4	1950–66	1955	13.4	12,500	6	11.50	6,400	125	[1] 1.0
37	2085	Middle Fork Kaweah River tributary near Hammond, Calif.	1.90	1959–66	1963	18.41	152	6	30.63	879	463	
38	2087.3	East Fork Kaweah River near Three Rivers, Calif.	85.8	1952–55, 1957–66	1963	11.00	2,850	6	21	13,000	152	[1] 1.3
39	2090	Dorst Creek near Kaweah Camp, Calif.	6.11	1959–66	1963	28.85	1,540	6	30.73	2,010	329	
40	2095	North Fork Kaweah River at Kaweah, Calif.	129	1910–66	1955	14.1	21,500	6	14.7	23,900	185	[1] 2.3
41	2099	Kaweah River at Three Rivers, Calif.	418	1958–66	1963	13.68	30,900	6	16.69	73,000	175	[1] 2.0
				1955	1955	17.9	(2)					
42	2101	South Fork Kaweah River at Three Rivers, Calif.	86.7	1958–66	1963	4.95	2,440	6	9.30	11,600	134	[1] 1.4
				1955	1955	9.5	10,000					
43	2109	Lake Kaweah near Lemoncove, Calif.	560	1961–66	1965	[4] 688.96	[5] 139,900	8	[4] 692.77	[5] 147,200		
								6		[6] 82,700	148	[1] 2.1
44	2109.5	Kaweah River below Terminus Dam, Calif.	561	1961–66	1963	8.28	[7] 5,080	8	8.62	[7] 5,740		
45	2113	Dry Creek near Lemoncove, Calif.	80.4	1959–66	1963	5.08	1,600	6	7.30	14,500	175	[1] 3.0
46	2120	Sand Creek near Orange Cove, Calif.	26.8	1944–66	1955	4.80	775	6	5.60	1,350	50.4	28
				1943	1943		1,000–1,200					

[1] Ratio of peak discharge to 50-year flood.
[2] Unknown.
[3] Site and (or) datum then in use; see station description.
[4] Altitude, in feet.
[5] Contents, in acre-feet.
[6] Two-hour average peak inflow, in cubic feet per second.
[7] Affected by storage and (or) diversions; see station description.
[8] Maximum daily mean discharge, in cubic feet per second.

The derivation of the peak data is explained in the station description for each site. The peak discharges in table 4 are those actually determined; that is, no adjustments for upstream storage have been made for stations downstream from reservoirs. For reservoir stations the peak stage, contents, and computed peak bihourly inflow are given.

Explanation of data in the 13 columns of table 4 follows:

Number.—The number by which each station is referenced in this report. The numerical order follows the Geological Survey's standard downstream order for listing stations.

Permanent station number.—The number used in the Geological Survey's Water-Supply Papers of surface-water supply in the United States and the annual surface-water basic-data reports for California.

Stream and place of determination.—The permanent name adopted for the site to which the listed data apply; each name is unique.

Drainage area.—The gross drainage area, in square miles, above the station site as determined by the topography.

The last nine columns of the table give data for all known floods at the site:

Period of record.—The period of known floods prior to December 1966.

Year.—The calendar year of the maximum discharge known prior to December 1966.

Day.—The date of the peak discharge or stage during the flood of December 1966.

Gage height and discharge.—Data in each pair of columns are associated with the year or day in the preceding column. The 1966 peak discharge is also expressed in cubic feet per second per square mile of drainage area.

Recurrence interval.—The average interval of time in which the peak discharge of December 1966 can be expected to be exceeded once. When the recurrence interval is greater than 50 years, the ratio of the peak discharge to the discharge of the 50-year flood is shown.

EXPLANATION OF STATION DATA

Detailed information on stage and discharge during the floods of December 1966 are given in the following section. Many of the data are in addition to records published in annual streamflow reports of the Geological Survey. The data consist of descriptions of the stations or sites, tables of daily discharge at gaging stations for December 1966, and tables of stages and discharges at indicated times for many of the gaging stations.

The station description gives information relative to the location of the gage, size of drainage area above the gage, nature of the gage-height record obtained during the period covered by this report, datum of gage, definition of the stage-discharge relation, peak stage and discharge during the December 1966 floods and previous maximum of record, maximum data for floods outside the period of record, effect of regulation and diversion, and other pertinent general information.

The table of daily mean discharge gives data for the month of December 1966 to show discharges during antecedent and recession periods. The monthly figures of the table show the monthly mean discharge, in cubic feet per second; the volume of monthly runoff, in acre-feet; and the volume of monthly runoff, in inches, at selected stations. Monthly figures for a few stations downstream from a reservoir have been adjusted for change in contents of the reservoir.

The table of stages and discharges at indicated times gives sufficient data so that hydrographs of stage and discharge can be drawn. The period of time covered is from prior to the start of the major rise to an arbitrary cutoff point on the recession and is not the same for all stations. The stages and associated discharges given should not be used to prepare a stage-discharge relation (rating curve) for use outside the flood period. For many stations the relation used to compute the discharge was shifted from the basic rating for various reasons, such as backwater from debris blockage or other changes in control condition.

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STATION DATA

BUENA VISTA LAKE BASIN

(1) 11-1853. Golden Trout Creek near Cartago, Calif.

Location.--Lat 36°22'20", long 118°17'15", in NW¼SW¼ sec.10, T.18 S., R.34 E., on right bank 0.5 mile upstream from Tunnel Ranger Station, and 15 miles west of Cartago.

Drainage area.--23.6 sq mi.

Gage-height record.--Water-stage recorder graph. Altitude of gage is 8,940 ft (from topographic map).

Discharge record.--Stage-discharge relation defined by current-meter measurements; affected by ice Dec. 5-11, 22-25, 27-31.

Maxima.--December 1966: Discharge, about 40 cfs 1330 hours Dec. 6 (gage height, 5.65 ft, backwater from ice).
1956 to November 1966: Discharge, 182 cfs May 31, 1958 (gage height, 4.05 ft); gage height, 5.24 ft Feb. 12, 1959 (backwater from ice).

Mean discharge, in cubic feet per second, December 1966

Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge
1.....	9.7	9.....	12	17.....	10	25.....	9.5
2.....	9.5	10.....	11	18.....	10	26.....	9.7
3.....	13	11.....	11	19.....	9.7	27.....	10
4.....	22	12.....	10	20.....	9.7	28.....	9.7
5.....	28	13.....	10	21.....	9.7	29.....	9.5
6.....	35	14.....	10	22.....	9.7	30.....	9.5
7.....	27	15.....	10	23.....	9.7	31.....	9.5
8.....	20	16.....	10	24.....	9.5		
Monthly mean discharge, in cubic feet per second.....							12.7
Runoff, in inches.....							.64
Runoff, in acre-feet.....							801

(2) 11-1853.5. Kern River near Quaking Aspen Camp, Calif.

Location.--Lat 36°08'05", long 118°24'45", in SW¼SW¼ sec.32, T.20 S., R.33 E., on right bank 0.4 mile upstream from Little Kern River, and 6.8 miles east of Quaking Aspen Camp.

Drainage area.--530 sq mi.

Gage-height record.--Water-stage recorder graph. Datum of gage is 4,693 ft above mean sea level (river-profile survey).

Discharge record.--Stage-discharge relation defined by current-meter measurements below 5,000 cfs and by slope-area measurement at 9,360 cfs.

Maxima.--December 1966: Discharge, 9,360 cfs at 1000 hours Dec. 6 (gage height, 10.89 ft, in gage well; 12.9 ft, from floodmarks).
1960 to November 1966: Discharge, 4,060 cfs June 18, 1963 (gage height, 7.98 ft).

Mean discharge, in cubic feet per second, December 1966

Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge
1.....	258	9.....	890	17.....	498	25.....	382
2.....	296	10.....	768	18.....	480	26.....	378
3.....	401	11.....	673	19.....	462	27.....	344
4.....	273	12.....	619	20.....	452	28.....	347
5.....	1,710	13.....	570	21.....	444	29.....	357
6.....	6,440	14.....	542	22.....	424	30.....	357
7.....	2,030	15.....	542	23.....	410	31.....	341
8.....	1,120	16.....	518	24.....	396		
Monthly mean discharge, in cubic feet per second.....							765
Runoff, in inches.....							1.66
Runoff, in acre-feet.....							47,050

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1966

Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge
Dec. 3	2400	2.73	277	Dec. 5	1900	6.90	3,070	Dec. 6	1800	9.58	6,580
					2100	7.05	3,240		2100	8.28	4,490
4	1600	2.68	261		2300	8.10	4,450		2400	7.57	3,560
	2000	2.73	277		2400	8.20	4,580				
	2400	2.87	322					7	0600	6.44	2,370
				6	0100	8.37	4,800		1200	5.71	1,750
5	0400	3.40	515		0300	8.30	4,710		1800	5.45	1,540
	0600	4.40	980		0600	9.08	5,790		2400	5.16	1,340
	0800	4.92	1,310		0700	9.85	7,100				
	1100	4.45	1,010		0800	10.50	8,460	8	0600	4.92	1,180
	1300	4.18	865		0900	10.57	8,610		1200	4.80	1,110
	1500	4.65	1,130		1000	10.89	9,360		1800	4.66	1,030
	1600	5.50	1,750		1300	9.92	7,240		2400	4.57	975
	1800	7.10	3,290		1500	10.68	8,860				

(3) 11-1854. Little Kern River near Quaking Aspen Camp, Calif.

Location.--Lat 36°08'05", long 118°26'10", in SE¼SE¼ sec.31, T.20 S., R.33 E., on left bank 600 ft upstream from mouth, and 5 miles east of Quaking Aspen Camp.

Drainage area.--132 sq mi.

Gage-height record.--Water-stage recorder graph. Datum of gage is 4,682 ft above mean sea level (river-profile survey).

Discharge record.--Stage-discharge relation defined by current-meter measurements below 1,200 cfs and by slope-area measurements at 7,370 and 13,100 cfs.

Maxima.--December 1966: Discharge, 13,100 cfs 0600 hours Dec. 6 (gage height, 12.60 ft, from recorder graph; 13.0 ft, from flood profile).
1957 to November 1966: Discharge, 7,370 cfs Feb. 1, 1963 (gage height, 9.19 ft, from recorder graph; 10.05 ft, from floodmarks).
Flood of Dec. 23, 1955, reached a stage of 12.4 ft, from floodmarks (discharge, 12,200 cfs).

Mean discharge, in cubic feet per second, December 1966

Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge
1.....	48	9.....	826	17.....	345	25.....	249
2.....	127	10.....	692	18.....	329	26.....	242
3.....	312	11.....	580	19.....	313	27.....	226
4.....	100	12.....	516	20.....	298	28.....	223
5.....	3,110	13.....	470	21.....	294	29.....	223
6.....	7,880	14.....	412	22.....	277	30.....	211
7.....	2,160	15.....	381	23.....	270	31.....	205
8.....	1,200	16.....	361	24.....	260		
Monthly mean discharge, in cubic feet per second.....							746
Runoff, in inches.....							6.52
Runoff, in acre-feet.....							45,900

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1966

Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge
Dec. 3	2400	2.17	126	Dec. 5	1700	6.40	2,910	Dec. 6	1200	8.84	5,730
					1800	7.62	4,560		1300	9.32	6,600
4	0800	2.03	98		2000	9.34	7,660		1400	9.74	7,370
	1400	1.99	90		2100	10.59	9,840		1630	9.58	7,060
	1800	2.00	92		2200	11.40	11,200		1800	9.12	6,240
	2100	2.02	96		2300	11.67	11,600		2100	8.02	4,350
	2400	2.08	108		2400	11.32	11,100		2400	7.32	3,270
5	0200	2.68	254	6	0100	11.73	11,700	7	0600	6.85	2,590
	0300	3.60	610		0200	12.18	12,400		1200	6.35	1,970
	0400	3.89	755		0400	12.00	12,100		1800	6.09	1,670
	0500	3.92	772		0500	12.16	12,400		2400	5.97	1,540
	0600	4.44	1,090		0600	12.60	13,100				
	0700	4.73	1,290		0700	11.60	11,000	8	0600	5.81	1,380
	0800	4.79	1,340		0800	10.90	9,600		1200	5.58	1,170
	1100	4.25	970		0900	9.34	6,630		1800	5.40	1,020
	1330	3.98	808		1000	8.82	5,700		2400	5.27	924
	1500	4.25	970		1100	8.63	5,370				

(4) 11-1856. Packsaddle Canyon Creek near Fairview, Calif.

(Crest-stage station)

Location.--Lat 35°56'40", long 118°28'30", in sec.12, T.23 S., R.32 E., at culvert on county road, Sequoia National Forest, 1.8 miles northeast of Fairview.

Drainage area.--4.05 sq mi.

Gage-height record.--Crest stages only; gage and culvert destroyed by flood. Altitude of gage is 3,600 ft (from topographic map).

Discharge record.--Peak discharge by computation at critical-depth section.

Maxima.--December 1966: Discharge, 660 cfs Dec. 6 (gage height, 12.0 ft, from floodmarks).
1959 to November 1966: Discharge, 223 cfs Jan. 31, 1963 (gage height, 9.91 ft, in gage well; 10.6 ft, from floodmarks).

(5) 11-1860. Kern River near Kernville, Calif.

Location.--Lat 35°56'00", long 118°29'10", in NE¼ sec.14, T.23 S., R.32 E., on left bank 3 miles upstream from Salmon Creek, and 15 miles north of Kernville.

Drainage area.--848 sq mi.

Gage-height record.--Water-stage recorder graph except 2300 hours Dec. 5 to 1530 hours Dec. 14. Datum of gage is 3,542.3 ft above mean sea level (river-profile survey).

Discharge record.--Stage-discharge relation defined by current-meter measurements below 6,000 cfs and by slope-area measurement at 60,000 cfs; relation indefinite Dec. 14-31. Discharge Dec. 6-31 estimated on basis of weather records and records for nearby stations.

Maxima (river only).--December 1966: Discharge, 60,000 cfs about 0200 hours Dec. 6 (gage height, 22.77 ft, from floodmarks).
1912 to November 1966: Discharge, 27,200 cfs Dec. 23, 1955 (gage height, 17.55 ft).
(river and canal).--December 1966: Discharge, 60,000 cfs about 0200 hours Dec. 6.
1912 to November 1966: Discharge, 27,400 cfs Nov. 19, 1950, Dec. 23, 1955.

Remarks.--Kern River No. 3 Canal diverts up to 630 cfs 1 mile upstream from station. Figures of mean discharge and discharge at indicated times represent the combined flow of Kern River and Kern River No. 3 Canal.

Mean discharge, in cubic feet per second, December 1966

Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge
1.....	309	9.....	2,200	17.....	1,100	25.....	750
2.....	338	10.....	1,900	18.....	1,100	26.....	748
3.....	1,040	11.....	1,600	19.....	1,000	27.....	680
4.....	438	12.....	1,500	20.....	960	28.....	660
5.....	12,000	13.....	1,400	21.....	900	29.....	660
6.....	33,600	14.....	1,300	22.....	850	30.....	650
7.....	7,700	15.....	1,250	23.....	830	31.....	640
8.....	3,540	16.....	1,150	24.....	790		
Monthly mean discharge, in cubic feet per second.....							2,696
Runoff, in inches.....							3.67
Runoff, in acre-feet.....							165,800

Discharge, in cubic feet per second, at indicated time, 1966

Date	Hour	Discharge	Date	Hour	Discharge	Date	Hour	Discharge	Date	Hour	Discharge
Dec. 1	2400	309	Dec. 3	0500	1,880	Dec. 4	1000	423	Dec. 5	0700	5,910
				0700	1,580		1700	376		0800	5,850
2	1200	317		0800	1,540		2100	404		0900	6,180
	2000	327		1000	1,290		2300	465		1400	5,570
	2200	338		1100	1,033		2400	531		1700	8,670
	2400	584		1400	733					1900	21,100
				2000	558	5	0200	1,800		2000	29,000
3	0200	1,180		2200	545		0400	3,900		2400	43,800
	0400	1,720		2400	544		0600	5,600			

(6) 11-1863.4. Salmon Creek tributary B near Fairview, Calif.

Location.--Lat 35°54'05", long 118°23'05", in SE¼NE¼ sec.26, T.23 S., R.33 E., on left bank 0.15 mile upstream from junction with Salmon Creek, 6.3 miles east of Fairview, and 10.3 miles north of Kernville.

Drainage area.--0.46 sq mi.

Gage-height record.--Water-stage recorder graph except 2400 hours Dec. 5 to 1430 hours Dec. 9. Altitude of gage is 7.360 ft (from topographic map).

Discharge record.--Stage-discharge relation defined by computation of flow over 120° V-notch weir and by slope-area measurement at 22.1 cfs. Discharge Dec. 5-9 based on partial record, slope-area measurement, weather records, and records for Salmon Creek tributaries C and E.

Maxima.--December 1966: Discharge, 22.1 cfs 2400 hours Dec. 5 (gage height, 1.93 ft, result of release of stored water from debris jam).
1962 to November 1966: Discharge, 3.1 cfs Feb. 1, 1963 (gage height, 0.87 ft).

Mean discharge, in cubic feet per second, December 1966

Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge
1.....	0.004	9.....	1.39	17.....	0.40	25.....	0.28
2.....	.03	10.....	1.04	18.....	.37	26.....	.26
3.....	.08	11.....	.82	19.....	.35	27.....	.24
4.....	.02	12.....	.67	20.....	.32	28.....	.22
5.....	2.66	13.....	.60	21.....	.30	29.....	.22
6.....	11.0	14.....	.54	22.....	.30	30.....	.22
7.....	4.40	15.....	.48	23.....	.28	31.....	.20
8.....	2.40	16.....	.42	24.....	.28		
Monthly mean discharge, in cubic feet per second.....							0.993
Runoff, in inches.....							2.49
Runoff, in acre-feet.....							61.0

(7) 11-1863.6. Salmon Creek tributary C near Fairview, Calif.

Location.--Lat 35°54'15", long 118°23'30", in NE¼NW¼ sec.26, T.23 S., R.33 E., on left bank 0.1 mile upstream from junction with Salmon Creek, 6.0 miles east of Fairview, and 10.5 miles north of Kernville.

Drainage area.--0.35 sq mi.

Gage-height record.--Water-stage recorder graph Dec. 1 to 0600 hours Dec. 6. Altitude of gage is 7,200 ft (from topographic map).

Discharge record.--Stage-discharge relation defined by computation of flow over 120° V-notch weir and by slope-area measurement at 60 cfs. Discharge Dec. 6-31 estimated on basis of records for Salmon Creek tributary B, and weather records.

Maxima.--December 1966: Discharge, 60 cfs Dec. 6 (gage height, 2.71 ft, from floodmarks).
1962 to November 1966: Discharge, 2.7 cfs Feb. 1, 1963 (gage height, 1.03 ft).

Mean discharge, in cubic feet per second, December 1966

Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge
1.....	0.02	9.....	2.20	17.....	0.39	25.....	0.26
2.....	.07	10.....	1.20	18.....	.37	26.....	.25
3.....	.09	11.....	.90	19.....	.35	27.....	.24
4.....	.05	12.....	.70	20.....	.32	28.....	.23
5.....	2.31	13.....	.60	21.....	.31	29.....	.22
6.....	18.0	14.....	.52	22.....	.29	30.....	.21
7.....	7.00	15.....	.48	23.....	.28	31.....	.20
8.....	3.70	16.....	.43	24.....	.27		
Monthly mean discharge, in cubic feet per second.....							1.370
Runoff, in inches							4.51
Runoff, in acre-feet.....							84.2

(8) 11-1863.8. Salmon Creek tributary E near Fairview, Calif.

Location.--Lat 35°54'15", long 118°23'45", in NW¼NW¼ sec.26, T.23 S., R.33 E., on left bank 0.2 mile upstream from junction with Salmon Creek, 5.7 miles east of Fairview, and 10.5 miles north of Kernville.

Drainage area.--0.20 sq mi.

Gage-height record.--Water-stage recorder graph Dec. 1 to 1000 hours Dec. 6. Altitude of gage is 7,200 ft (from topographic map).

Discharge record.--Stage-discharge relation defined by computation of flow over 120° V-notch weir and by slope-area measurement at 24 cfs. Discharge Dec. 6-31 estimated on basis of records for Salmon Creek tributary B, weather records, and slope-area measurement.

Maxima.--December 1966: Discharge, 24 cfs Dec. 6 (gage height, unknown). 1962 to November 1966: Discharge, 1.1 cfs Apr. 29, 1965 (gage height, 0.57 ft).

Mean discharge, in cubic feet per second, December 1966

Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge
1.....	0.008	9.....	1.40	17.....	0.24	25.....	0.16
2.....	.01	10.....	.72	18.....	.22	26.....	.15
3.....	.03	11.....	.51	19.....	.21	27.....	.15
4.....	.008	12.....	.42	20.....	.19	28.....	.14
5.....	.69	13.....	.36	21.....	.18	29.....	.13
6.....	10.0	14.....	.32	22.....	.17	30.....	.12
7.....	5.40	15.....	.29	23.....	.17	31.....	.12
8.....	2.50	16.....	.26	24.....	.16		
Monthly mean discharge, in cubic feet per second.....							0.821
Runoff, in inches.....							4.73
Runoff, in acre-feet.....							50.5

(9) 11-1870. Kern River at Kernville, Calif.

Location.--Lat 35°45'15", long 118°25'25", in NE¼SW¼ sec.15, T.25 S., R.33 E., on right bank 300 ft downstream from highway bridge at Kernville, 1.1 miles upstream from Caldwell Creek, 8.9 miles upstream from Isabella Dam, and 41 miles northeast of Bakersfield.

Drainage area.--1,009 sq mi.

Gage-height record.--Water-stage recorder graph Dec. 1 to 2400 hours Dec. 5; station destroyed by flood. Datum of gage is 2,621.57 ft above mean sea level (levels by Corps of Engineers).

Discharge record.--Stage-discharge relation defined by current-meter measurements below 6,400 cfs and by slope-area measurements at 28,800 and 74,000 cfs. Discharge Dec. 6-31 estimated on basis of records for Kern River and Little Kern River near Quaking Aspen Camp, South Fork Kern River near Onyx, Kern River near Kernville, and inflow into Isabella Reservoir.

Maxima.--December 1966: Discharge, 74,000 cfs Dec. 6 (gage height, 22.2 ft, from floodmarks).
1905-12, 1953 to November 1966: Discharge, 29,400 cfs Dec. 23, 1955 (gage height, 16.20 ft, in gage well; 16.8 ft, from floodmarks).
Maximum stage known prior to December 1966 since at least 1912, 18.4 ft Nov. 19, 1950 (discharge, 38,700 cfs).

Mean discharge, in cubic feet per second, December 1966

Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge
1.....	330	9.....	3,120	17.....	1,260	25.....	860
2.....	334	10.....	2,600	18.....	1,240	26.....	820
3.....	1,310	11.....	2,210	19.....	1,080	27.....	780
4.....	589	12.....	2,020	20.....	1,040	28.....	770
5.....	16,900	13.....	1,820	21.....	1,000	29.....	770
6.....	44,500	14.....	1,690	22.....	950	30.....	760
7.....	10,600	15.....	1,600	23.....	920	31.....	750
8.....	4,890	16.....	1,380	24.....	890		
Monthly mean discharge, in cubic feet per second							3,541
Runoff, in inches							4.05
Runoff, in acre-feet							217,800

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1966

Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge
Dec. 4	0600	5.25	635	Dec. 5	0500	7.90	2,900	Dec. 5	1700	13.30	14,500
	1200	5.07	552		0600	11.25	8,780		1800	14.10	17,200
	1900	4.91	480		0700	12.65	12,600		1900	15.35	22,000
	2200	4.99	516		0800	13.32	14,600		2000	17.00	30,200
	2400	5.15	588		0900	13.42	14,900		2100	18.50	39,400
					1100	13.26	14,400		2200	19.60	48,200
5	0300	5.65	850		1400	12.71	12,700		2300	20.15	52,800
	0400	6.00	1,080		1600	12.94	13,400		2400	20.65	57,500

(10) 11-1872. Shirley Creek tributary near Alta Sierra, Calif.

(Crest-stage station)

Location.--Lat 35°43'15", long 118°29'55", in SW¼ sec.25, T.25 S., R.32 E., at culvert on Evans road, Sequoia National Forest, 3 miles east of Alta Sierra.

Drainage area.--0.27 sq mi.

Gage-height record.--Crest stages only. Altitude of gage is 4,120 ft (from topographic map).

Discharge record.--Stage-discharge relation defined by computation of flow through culvert.

Maxima.--December 1966: Discharge, 60 cfs Dec. 6 (gage height, 13.70 ft).
1959 to November 1966: Discharge, 14 cfs Feb. 8, 1962 and Feb. 1, 1963; gage height, 11.57 ft Feb. 1, 1963.

(11) 11-1882. South Fork Kern River near Olancha, Calif.

Location.--Lat 36°11'00", long 118°07'40", in NW¼SW¼ sec.18, T.20 S., R.36 E., on left bank 50 ft upstream from small unnamed left bank tributary, 2.0 miles downstream from Snake Creek, and 9.7 miles southwest of Olancha.

Drainage area.--146 sq mi.

Gage-height record.--Water-stage recorder graph. Altitude of gage is 7,840 ft (from topographic map).

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

Maxima.--December 1966: Discharge, 1,010 cfs 2000 hours Dec. 6 (gage height, 4.98 ft).
1956 to November 1966: Discharge, 1,280 cfs May 10, 1958 (gage height, 5.50 ft).

Mean discharge, in cubic feet per second, December 1966

Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge
1.....	25	9.....	311	17.....	88	25.....	43
2.....	24	10.....	258	18.....	78	26.....	42
3.....	24	11.....	199	19.....	69	27.....	36
4.....	17	12.....	157	20.....	64	28.....	35
5.....	42	13.....	128	21.....	64	29.....	34
6.....	613	14.....	111	22.....	56	30.....	33
7.....	664	15.....	102	23.....	47	31.....	32
8.....	440	16.....	94	24.....	46		
Monthly mean discharge, in cubic feet per second.....							128
Runoff, in inches.....							1.01
Runoff, in acre-feet.....							7,890

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1966

Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge
Dec. 4	2400	1.07	4.6	Dec. 6	0600	3.44	317	Dec. 7	1200	4.15	570
					0900	4.10	550		1800	4.37	675
5	0600	1.45	17		1200	4.40	690		2400	4.14	566
	1600	1.82	40		1500	4.59	785				
	2000	2.29	87		1900	4.90	960	8	0600	3.95	490
	2400	2.50	115		2000	4.98	1,010		1000	3.87	460
					2400	4.79	894		1200	3.61	368
6	0200	2.55	123						1600	3.69	396
	0400	2.90	186	7	0600	4.38	680		2400	3.66	386

(12) 11-1895. South Fork Kern River near Onyx, Calif.

Location (revised).--Lat 35°44'22", long 118°10'33", T.25 S., R.35 E., (unsurveyed), on left bank 0.8 mile north of State Highway 178, 1.6 miles upstream from Canebrake Creek, and 5 miles northeast of Onyx.

Drainage area.--530 sq mi.

Gage-height record.--Water-stage recorder graph Dec. 1 to 2000 hours Dec. 5; station destroyed by flood. Altitude of gage is 2,900 ft (from topographic map).

Discharge record.--Stage-discharge relation defined by current-meter measurements below 3,000 cfs and by slope-area measurement at 28,700 cfs. Discharge Dec. 6-31 estimated on basis of records for Kern River at Kernville, Little Kern River near Quaking Aspen Camp, and inflow into Isabella Reservoir.

Maxima.--December 1966: Discharge, 28,700 cfs Dec. 6 (gage height, 12.0 ft, from floodmarks).
1911-14, 1919-42, 1947 to November 1966: Discharge, 3,460 cfs Feb. 1, 1963 (gage height, 6.79 ft) but may have been exceeded by flood of Jan. 25, 1914 (observed maximum gage height, 7.2 ft and rising, at site then in use).

Mean discharge, in cubic feet per second, December 1966

Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge
1.....	55	9.....	900	17.....	325	25.....	205
2.....	55	10.....	700	18.....	310	26.....	195
3.....	176	11.....	600	19.....	280	27.....	186
4.....	79	12.....	530	20.....	265	28.....	180
5.....	3,480	13.....	465	21.....	250	29.....	172
6.....	14,000	14.....	420	22.....	235	30.....	168
7.....	2,410	15.....	385	23.....	225	31.....	162
8.....	1,200	16.....	360	24.....	215		
Monthly mean discharge, in cubic feet per second.....							942
Runoff, in inches.....							2.05
Runoff, in acre-feet.....							57,890

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1966

Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge
Dec. 1	2400	2.07	52	Dec. 3	1800	2.62	139	Dec. 5	0800	5.00	1,390
					2400	2.44	104		0900	5.15	1,520
2	0300	2.08	53						1000	5.12	1,490
	1500	2.03	47	4	1200	2.22	70		1200	5.26	1,610
	2100	2.16	62		1500	2.20	67		1300	5.35	1,700
	2300	2.30	81		1800	2.23	71		1400	5.60	1,920
	2400	2.50	115		2200	2.25	74		1600	6.78	3,450
					2400	2.32	84		1800	7.95	5,880
3	0200	2.85	192						2000	8.52	7,460
	0500	3.15	282	5	0200	2.56	127				
	1000	2.81	182		0400	3.52	424				
	1200	2.80	180		0600	4.45	955				

(13) 11-1897. Kelso Creek near Weldon, Calif.

Location.--Lat 35°34'10", long 118°15'05", in NW¼ sec.20, T.27 S., R.35 E., on left bank 0.5 mile upstream from Woolstaff Creek, and 7 miles southeast of Weldon.

Drainage area.--101 sq mi.

Gage-height record.--Water-stage recorder graph Dec. 1-5; flood-deposited detritus destroyed station effectiveness. Altitude of gage is 3,180 ft (from topographic map).

Discharge record.--Stage-discharge relation defined by current-meter measurements and weir discharge computations below 7 cfs and by one slope-area measurement at 1,180 cfs. Maximum discharge Dec. 6 estimated on basis of field survey of site.

Maxima.--December 1966: Discharge, about 5,800 cfs Dec. 6 (gage height, 11.7 ft, from floodmarks).
1958 to November 1966: Discharge, 1,340 cfs Aug. 15, 1965 (gage height, 6.20 ft, from floodmarks).

(14) 11-1905. Isabella Reservoir near Isabella, Calif.

Location.--Lat 35°38'50", long 118°28'50", in SW¼ sec.19, T.26 S., R.33 E., in main control tower near left abutment of main dam on Kern River, 1.5 miles north of Isabella, and 2.8 miles upstream from Erskine Creek.

Drainage area.--2,074 sq mi.

Gage-height record.--Water-stage recorder graph. Datum of gage is at mean sea level (levels by Corps of Engineers).

Contents record.--Contents computed from capacity table dated June 1966.

Maxima.--December 1966: Computed bihourly inflow, 96,900 cfs 1700 to 1900 hours Dec. 6; contents, 337,400 acre-ft 2300 hours Dec. 21 to 0930 hours Dec. 22 (elevation, 2,582.32 ft).
1953 to November 1966: Contents, 455,200 acre-ft June 28, 1958 (elevation, 2,594.83 ft).

Remarks.--Reservoir is formed by earthfill dam, with sidehill spillway and auxiliary earthfill dam, completed in 1954; regulation of discharge from reservoir began Apr. 15, 1954. Usable capacity, 569,700 acre-ft between elevations 2,470.0 ft (invert of main outlet) and 2,605.5 ft (spillway crest) above mean sea level. Dead storage, 326 acre-ft. Surcharge flood control storage, 271,800 acre-ft between ungated spillway crest and elevation 2,627.0 ft (maximum spillway design flood pool). Figures given herein represent total contents. Records furnished by Corps of Engineers.

Contents, in acre-feet at 2400 hours, December 1966

Day	Contents	Day	Contents	Day	Contents	Day	Contents
1.....	82,710	9.....	311,900	17.....	336,300	25.....	331,100
2.....	83,010	10.....	317,500	18.....	336,800	26.....	328,900
3.....	84,620	11.....	322,000	19.....	336,900	27.....	326,200
4.....	85,300	12.....	325,400	20.....	337,200	28.....	322,900
5.....	116,700	13.....	328,500	21.....	337,400	29.....	319,800
6.....	260,400	14.....	330,900	22.....	336,800	30.....	316,600
7.....	292,700	15.....	333,000	23.....	335,400	31.....	313,300
8.....	304,500	16.....	334,800	24.....	333,300		
Change in contents, in acre-feet.....							+230,500

Average inflow, in cubic feet per second, for bihourly periods ending at indicated time, 1966

Date	Hour	Inflow	Date	Hour	Inflow	Date	Hour	Inflow	Date	Hour	Inflow
Dec. 4	0100	877	Dec. 5	0700	5,260	Dec. 6	1300	81,400	Dec. 7	1900	10,700
	0300	876		0900	10,900		1500	76,700		2100	10,100
	0500	664		1100	12,700		1700	86,000		2300	9,130
	0700	634		1300	12,500		1900	96,900			
	0900	651		1500	11,200		2100	57,300	8	0100	9,160
	1100	651		1700	10,400		2300	49,400		0300	8,200
	1300	191		1900	15,200					0500	7,230
	1500	650		2100	23,600	7	0100	37,300		0700	7,250
	1700	420		2300	59,900		0300	29,400		0900	7,260
	1900	874					0500	24,100		1100	6,290
	2100	1,100	6	0100	65,600		0700	22,100		1300	6,300
	2300	1,340		0300	64,300		0900	18,200		1500	4,820
				0500	67,400		1100	15,600		1700	6,320
5	0100	1,340		0700	83,000		1300	12,800		1900	5,830
	0300	1,340		0900	79,400		1500	11,900		2100	5,340
	0500	1,800		1100	75,400		1700	11,500		2300	5,340
									9	0100	5,850

(15) 11-1910. Kern River below Isabella Dam, Calif.

Location.--Lat 35°38'30", long 118°28'55", in S½NW¼ sec.30, T.26 S., R.33 E., on right bank 200 ft downstream from highway bridge, 0.6 mile downstream from Isabella Dam, and 1.6 miles southwest of Isabella.

Drainage area.--2,074 sq mi.

Gage-height record.--Digital-recorder tape punched at 15-minute intervals and auxiliary graphic water-stage recorder graph. Datum of gage is 2,435.07 ft above mean sea level (levels by Corps of Engineers).

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

Maxima.--December 1966: Discharge, 2,160 cfs 1730 hours Dec. 30 (gage height, 10.10 ft).
1945-53 (prior to regulation by Isabella Reservoir): Discharge, 39,000 cfs Nov. 19, 1950 (gage height, 28.6 ft from floodmark, present site and datum), from rating curve extended above 1,100 cfs on basis of slope-area measurement of peak flow.
1954 to November 1966: Discharge, 4,870 cfs June 28, 1958 (gage height, 15.14 ft).

Remarks.--Flow regulated by Isabella Reservoir (see station 11-1905) beginning Apr. 15, 1954. Total monthly runoff includes 29,300 acre-ft diverted from Isabella Reservoir through Borel Canal and returned to the river downstream from this station and 230,500 acre-ft stored in Isabella Reservoir.

Mean discharge, in cubic feet per second, December 1966

Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge
1.....	35	9.....	8.0	17.....	167	25.....	1,440
2.....	25	10.....	5.8	18.....	651	26.....	1,560
3.....	8.0	11.....	5.0	19.....	651	27.....	1,800
4.....	5.0	12.....	5.0	20.....	651	28.....	1,960
5.....	12	13.....	5.0	21.....	711	29.....	1,900
6.....	31	14.....	6.0	22.....	944	30.....	1,870
7.....	7.9	15.....	7.0	23.....	1,260	31.....	2,130
8.....	8.6	16.....	7.0	24.....	1,440		
Monthly mean discharge, in cubic feet per second							623
Runoff, in inches, adjusted							2.70
Runoff, in acre-feet, adjusted							298,100

(16) 11-1918. Kern River tributary near Miracle Hot Springs, Calif.

(Crest-stage station)

Location.--Lat 35°33'15", long 118°34'45", in SE¼NW¼ sec.30, T.27 S., R.32 E., at culvert on State Highway 178, Sequoia National Forest, 3.5 miles southwest of Miracle Hot Springs.

Drainage area.--1.21 sq mi.

Gage-height record.--Crest stages only; gage destroyed by flood. Datum of gage is 2,453.4 ft.

Discharge record.--Peak discharge by slope-area measurement.

Maxima.--December 1966: Discharge, 593 cfs Dec. 6 (gage height, 13.10 ft, from floodmarks).
1959 to November 1966: Discharge, 5.0 cfs Feb. 8, 1962 (gage height, 6.80 ft).

(17) 11-1925. Kern River near Democrat Springs, Calif.

Location.--Lat 35°31'20", long 118°40'40", in NE¼SE¼ sec.6, T.28 S., R.31 E., on left bank 1.0 mile southwest of Democrat Springs, and 2.1 miles upstream from Cow Creek.

Drainage area.--2,258 sq mi.

Gage-height record.--Water-stage recorder graph except Dec. 1 to 0200 hours Dec. 6 and Dec. 7-23. Altitude of gage is 1,850 ft (from topographic map).

Discharge record.--Stage-discharge relation defined by current-meter measurements. Discharge Dec. 1-5 and Dec. 7-23 estimated on basis of records for Kern River below Isabella Dam, Kern River near Bakersfield, and weather records.

Maxima (river only).--December 1966: Discharge, 10,100 cfs 1800 hours Dec. 6 (gage height, 18.55 ft).
1950-53 (prior to regulation by Isabella Reservoir): Discharge, 40,000 cfs Nov. 19, 1950 (gage height, 30.7 ft), from rating curve extended above 8,700 cfs on basis of computation of maximum flow over dam (basic data for computation furnished by Southern California Edison Co.).
1954 to November 1966: Discharge, 3,960 cfs June 12, 1958 (gage height, 13.68 ft).
(river and conduit).--December 1966: Discharge, 10,100 cfs 1800 hours Dec. 6.
1950-53 (prior to regulation by Isabella Reservoir): Discharge, 40,000 cfs Nov. 19, 1950.
1954 to November 1966: Discharge, 4,370 cfs June 12, 1958.

Remarks.--Flow regulated by Isabella Reservoir (see station 11-1905). Kern River No. 1 conduit diverts up to 420 cfs upstream from station. Figures of mean discharge and discharge at indicated times represent the combined flow of Kern River and Kern River No. 1 conduit.

Mean discharge, in cubic feet per second, December 1966

Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge
1.....	418	9.....	478	17.....	650	25.....	2,020
2.....	359	10.....	463	18.....	1,220	26.....	2,040
3.....	430	11.....	459	19.....	1,220	27.....	2,340
4.....	452	12.....	468	20.....	1,230	28.....	2,450
5.....	903	13.....	475	21.....	1,270	29.....	2,500
6.....	4,600	14.....	538	22.....	1,500	30.....	2,510
7.....	1,090	15.....	556	23.....	1,810	31.....	2,680
8.....	601	16.....	556	24.....	2,010		
Monthly mean discharge, in cubic feet per second.....							1,301
Runoff, in acre-feet.....							79,930

Discharge, in cubic feet per second, at indicated time, 1966

Date	Hour	Discharge	Date	Hour	Discharge	Date	Hour	Discharge	Date	Hour	Discharge
Dec. 5	2400	631	Dec. 6	0200	1,270	Dec. 6	0700	4,420	Dec. 6	1800	10,100
				0300	2,640		1100	2.470		2400	3,200
6	0100	738		0500	4,240		1300	2,810			

(18) 11-1940. Kern River near Bakersfield, Calif.

Location.--Lat 35°25'54", long 118°56'43", in NW¼SW¼ sec.2, T.29 S., R.28 E., on left bank 1.9 miles upstream from Sacramento Gulch, 0.8 mile northeast of Oil City, and 5.8 miles northeast of Bakersfield Post Office.

Drainage area.--2,407 sq mi.

Gage-height record.--Water-stage recorder graph. Datum of gage is at mean sea level.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 8,000 cfs.

Maxima.--December 1966: Discharge, 9,290 cfs 0100 hours Dec. 7 (elevation, 454.94 ft); daily discharge, 4,790 cfs Dec. 6.
1893-1953 (prior to regulation by Isabella Reservoir): Discharge, 36,000 cfs Nov. 19, 1950 (elevation, 461.37 ft).
1954 to November 1966: Daily discharge, 3,940 cfs June 18, 1958.

Remarks.--Flow regulated by Isabella Reservoir beginning in 1954 (see station 11-1905). Mean discharge is computed for 24-hour period from noon on date listed to noon on following day. Records furnished by Kern County Land Company.

Mean discharge, in cubic feet per second, December 1966

Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge
1.....	440	9.....	503	17.....	600	25.....	2,080
2.....	408	10.....	487	18.....	1,280	26.....	2,150
3.....	427	11.....	494	19.....	1,290	27.....	2,380
4.....	476	12.....	493	20.....	1,280	28.....	2,540
5.....	951	13.....	501	21.....	1,340	29.....	2,490
6.....	4,790	14.....	566	22.....	1,560	30.....	2,450
7.....	1,150	15.....	585	23.....	1,820	31.....	2,710
8.....	668	16.....	585	24.....	2,080		
Monthly mean discharge, in cubic feet per second.....							1,341
Runoff, in acre-feet.....							82,460

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1966

Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge
Dec. 3	2400	49.42	424	Dec. 6	0200	49.75	782	Dec. 7	1100	50.30	1,620
					0800	49.65	671		1200	50.15	1,510
4	0800	49.42	426		1100	51.67	3,330		2200	49.67	1,160
	1000	49.47	472		1200	52.25	4,320		2400	49.67	1,160
	1200	49.47	473		1300	52.42	4,540				
	2400	49.47	476		1800	51.00	2,460	8	1200	49.44	840
					2300	54.55	8,140		1700	49.35	713
5	1000	49.47	478		2400	54.80	8,850		2100	49.38	729
	1200	49.48	488						2400	49.34	707
	1230	49.49	498	7	0100	54.94	9,290				
	1800	49.49	500		0300	54.30	7,620				
	2400	49.70	725		0800	50.80	2,170				

(19) 11-1940.5. Tumbleweed Creek near Oildale, Calif.

(Crest-stage station)

Location.--Lat 35°27'55", long 119°01'30", in NW¼ sec.25, T.28 S., R.27 E., at culvert on county road 3.2 miles north of Oildale.

Drainage area.--2.40 sq mi.

Gage-height record.--Crest stages only. Altitude of gage is 765 ft (from topographic map).

Discharge record.--Peak discharge by computation of flow through culvert.

Maxima.--December 1966: Discharge, 1 cfs Dec. 6 (gage height, 2.25 ft).
1958 to November 1966: Discharge, 104 cfs Feb. 13, 1963 (gage height, 4.65 ft).

(20) 11-1964. Caliente Creek above Tehachapi Creek, near Caliente, Calif.

Location.--Lat 35°18'40", long 118°34'10", in SE¼SW¼ sec.17, T.30 S., R.32 E., on right bank 0.5 mile upstream from Harper Canyon, 1.0 mile upstream from Oiler Canyon, and 3.6 miles northeast of Caliente.

Drainage area.--165 sq mi.

Gage-height record.--Water-stage recorder graph except 1830 to 2030 hours Dec. 6. Altitude of gage is 1,575 ft (from topographic map).

Discharge record.--Stage-discharge relation defined by current-meter measurements below 61 cfs and by slope-area measurement at 1,410 cfs. Discharge 1830 to 2030 hours Dec. 6 estimated on basis of floodmarks at the station.

Maxima.--December 1966: Discharge, 1,140 cfs 2000 hours Dec. 6 (gage height, 6.90 ft, from floodmarks).
1961 to November 1966: Discharge, 1,410 cfs Aug. 8, 1963 (gage height, 7.48 ft, from floodmarks).

Mean discharge, in cubic feet per second, December 1966

Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge
1.....	0	9.....	14	17.....	1.5	25.....	1.3
2.....	0	10.....	14	18.....	1.5	26.....	1.3
3.....	0	11.....	9.9	19.....	1.5	27.....	1.2
4.....	0	12.....	7.6	20.....	1.6	28.....	1.5
5.....	.90	13.....	4.9	21.....	1.6	29.....	1.5
6.....	196	14.....	2.6	22.....	1.2	30.....	1.4
7.....	84	15.....	1.5	23.....	1.3	31.....	1.2
8.....	22	16.....	1.5	24.....	1.5		
Monthly mean discharge, in cubic feet per second							12.3
Runoff, in inches							.086
Runoff, in acre-feet							754

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1966

Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge
Dec. 5	0000	-	0	Dec. 6	0700	1.83	14	Dec. 6	1700	3.70	196
	0830	-	0		0730	2.35	42		1800	4.78	415
	0830	1.22	.7		0800	2.22	33		2000	6.90	1,140
	1100	1.33	1.7		0830	2.65	66		2200	4.52	374
	1500	1.22	.7		0900	2.75	75		2400	3.85	244
	1800	1.20	.6		0930	2.50	53				
	2000	1.25	.9		1000	2.66	66	7	0200	3.70	219
	2200	1.35	1.9		1200	2.38	44		0400	2.90	109
	2400	1.57	5.8		1400	2.30	38		0700	2.56	75
					1530	2.37	43		0900	2.40	61
6	0200	1.64	7.6		1630	3.85	221		2400	2.33	49
	0400	1.82	13								

(21) 11-1964.2. Tehachapi Creek near Tehachapi, Calif.

Location.--Lat 35°10'25", long 118°28'45", in NE¼SW¼ sec.6, T.32 S., R.33 E., on right bank 1.3 miles downstream from Brite Creek, and 3.2 miles northwest of Tehachapi.

Drainage area.--53.2 sq mi.

Gage-height record.--Water-stage recorder graph except Dec. 17-21. Datum of gage is 3,534.48 ft above mean sea level.

Discharge record.--Stage-discharge relation defined by computation of flow over weir. Discharge Dec. 17-21 estimated as no flow based on recorded range in stage.

Maxima.--December 1966: Discharge, 52 cfs 1830 hours Dec. 6 (gage height, 1.06 ft).
1962 to November 1966: Discharge, 1,700 cfs Aug. 8, 1963 (gage height, 5.30 ft, in gage well; 6.40 ft, from floodmarks, site and datum then in use), from slope-area measurement of maximum flow.

Mean discharge, in cubic feet per second, December 1966

Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge
1.....	0	9.....	0	17.....	0	25.....	0
2.....	0	10.....	0	18.....	0	26.....	0
3.....	0	11.....	0	19.....	0	27.....	0
4.....	0	12.....	0	20.....	0	28.....	0
5.....	.10	13.....	0	21.....	0	29.....	0
6.....	8.2	14.....	0	22.....	0	30.....	0
7.....	.50	15.....	0	23.....	0	31.....	0
8.....	0	16.....	0	24.....	0		
Monthly mean discharge, in cubic feet per second.....							0.28
Runoff, in inches.....							.006
Runoff, in acre-feet.....							17

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1966

Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge
Dec. 4	2400	0.32	0	Dec. 5	2300	0.38	0.20	Dec. 6	1830	1.06	52
					2400	.40	.50		1900	1.00	43
5	0300	.32	0						2100	.76	16
	0400	.36	.10	6	0500	.44	1.1		2200	.70	11
	1700	.33	0		1000	.38	.20		2400	.57	4.2
	1800	.38	.20		1400	.44	1.1				
	1900	.35	.10		1600	.52	2.7	7	0300	.45	1.3
	2000	.35	.10		1700	.84	23		0600	.38	.20
	2200	.40	.50		1800	1.04	49		0900	.36	.10
					1800	.99	42		2400	.33	0

TULARE LAKE BASIN

(22) 11-1978. Poso Creek near Oildale, Calif.

Location.--Lat 35°30'50", long 118°54'15", in SW¼SW¼ sec.6, T.28 S., R.29 E., on downstream side of highway bridge opposite mouth of Hillvale Canyon, 10 miles northeast of Oildale, and 12 miles northeast of Bakersfield.

Drainage area.--230 sq mi.

Gage-height record.--Digital-recorder tape punched at 15-minute intervals except Dec. 1 to 1400 hours Dec. 10. Altitude of gage is 700 ft (from topographic map).

Discharge record.--Stage-discharge relation defined by current-meter measurements below 300 cfs and by contracted opening measurement at 4,300 cfs. Discharge Dec. 1-10 estimated on basis of weather records and records for South Fork Tule River near Success.

Maxima.--December 1966: Discharge, 4,300 cfs Dec. 6 (gage height, 11.57 ft).
1959 to November 1966: Discharge, 359 cfs Dec. 28, 1964 (gage height, 6.38 ft).
Flood of Apr. 4, 1958, reached a stage of 8.6 ft, from floodmarks (discharge, 2,750 cfs, furnished by Kern County Land Company).

Mean discharge, in cubic feet per second, December 1966

Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge
1.....	4.0	9.....	120	17.....	30	25.....	28
2.....	4.0	10.....	76	18.....	29	26.....	29
3.....	43	11.....	56	19.....	29	27.....	29
4.....	12	12.....	42	20.....	29	28.....	28
5.....	547	13.....	37	21.....	29	29.....	28
6.....	2,130	14.....	33	22.....	28	30.....	29
7.....	750	15.....	33	23.....	28	31.....	28
8.....	200	16.....	31	24.....	28		
Monthly mean discharge, in cubic feet per second.....							147
Runoff, in inches.....							.74
Runoff, in acre-feet.....							9,020

(23) 11-1980.5. Mon Canyon Creek near Oildale, Calif.

(Crest-stage station)

Location.--Lat 35°31'45", long 118°58'25", in NW¼NW¼ sec.4, T.28 S., R.28 E., at culvert on county road, 8 miles northeast of Oildale.

Drainage area.--2.38 sq mi.

Gage-height record.--Crest stages only. Altitude of gage is 640 ft (from topographic map).

Discharge record.--Peak discharge estimated on basis of water surface profiles in culvert.

Maxima.--December 1966: Discharge, 9 cfs Dec. 6 (gage height, 3.90 ft).
1958 to November 1966: Discharge, 35 cfs Apr. 1, 1964 (gage height, 5.08 ft).

(24) 11-1993. Coho Creek near White River, Calif.

(Crest-stage station)

Location.--Lat 35°49'50", long 118°51'35", in NE¼NE¼ sec.20, T.24 S., R.29 E., at culvert on county road, 1.6 miles northwest of White River.

Drainage area.--12.9 sq mi.

Gage-height record.--Crest stages only. Altitude of gage is 1,090 ft (from topographic map).

Discharge record.--Peak discharge by computation of flow through culvert.

Maxima.--December 1966: Discharge, 221 cfs Dec. 6 (gage height, 7.72 ft).
1959 to November 1966: Discharge, 1 cfs Nov. 11, 1960 (gage height not determined).

(25) 11-1995. White River near Ducor, Calif.

Location.--Lat 35°48'54", long 118°55'47", in SE¼NE¼ sec.27, T.24 S., R.28 E., on right bank 0.2 mile downstream from Tyler Gulch, and 8.3 miles southeast of Ducor.

Drainage area.--92.9 sq mi.

Gage-height record.--Water-stage recorder graph. Altitude of gage is 685 ft (from topographic map).

Discharge record.--Stage-discharge relation defined by current-meter measurements below 660 cfs.

Maxima.--December 1966: Discharge, 1,080 cfs 1340 hours Dec. 6 (gage height, 4.58 ft).
1942-53, 1958 to November 1966: Discharge, about 2,300 cfs Mar. 9, 1943 (estimated by U.S. Bureau of Reclamation).

Remarks.--Records furnished by U.S. Bureau of Reclamation.

Mean discharge, in cubic feet per second, December 1966

Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge
1.....	-	9.....	20.0	17.....	3.5	25.....	3.3
2.....	-	10.....	12.0	18.....	3.5	26.....	3.3
3.....	-	11.....	10.0	19.....	4.2	27.....	3.3
4.....	-	12.....	8.5	20.....	4.2	28.....	3.3
5.....	16.0	13.....	7.9	21.....	3.8	29.....	3.3
6.....	622.0	14.....	6.5	22.....	3.8	30.....	3.5
7.....	119.0	15.....	5.2	23.....	3.5	31.....	3.1
8.....	36.0	16.....	4.5	24.....	3.3		
Monthly mean discharge, in cubic feet per second							29.7
Runoff, in inches							.37
Runoff, in acre-feet							1,830

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1966

Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge
Dec. 4	2400	-	0	Dec. 6	0830	3.89	496	Dec. 7	0300	3.33	233
					1000	4.08	632		0600	3.07	154
5	1800	-	0		1130	3.83	457		0900	2.87	110
	1830	2.51	54		1230	4.16	700		1200	2.74	87
	1930	2.66	72		1340	4.58	1,080		1800	2.54	60
	2400	2.56	60						2400	2.42	48
					1500	4.37	880				
6	0300	2.53	57		1600	4.20	732	8	0600	2.34	41
	0330	4.33	850		1800	4.22	748		1200	2.28	33
	0400	3.98	559		1930	4.50	990		1800	2.24	26
	0500	4.23	756		2100	4.25	772		2400	2.21	22
	0600	4.33	850		2400	3.75	410				

(26) Deer Creek near Terra Bella, Calif.

(Miscellaneous site)

Location.--Lat 35°58'42", long 118°52'26", in NE¼NE¼ sec.31, T.22 S., R.29 E., 0.3 mile upstream from county road bridge, 4 miles upstream from U.S. Bureau of Reclamation gaging station, and 9.6 miles east of Terra Bella.

Drainage area.--130 sq mi, approximately.

Discharge record.--Maximum discharge by slope-area measurement.

Maximum.--December 1966: Discharge, 10,000 cfs Dec. 6.

(27) 11-2020. North Fork of Middle Fork Tule River near Springville, Calif.

Location.--Lat 36°10'29", long 118°41'41", T.20 S., R.30 E. (unsurveyed), on right bank 1.2 miles upstream from mouth, 2.2 miles downstream from Hossack Creek, and 7.4 miles northeast of Springville.

Drainage area.--39.3 sq mi.

Gage-height record.--Digital-recorder tape punched at 15-minute intervals except 2045 hours Dec. 5 to 1900 hours Dec. 6. Altitude of gage is 2,920 ft (from topographic map).

Discharge record.--Stage-discharge relation defined by current-meter measurements below 270 cfs and by critical-depth determinations at 5,460 and 12,400 cfs. Discharge 2045 hours Dec. 5 to 1900 hours Dec. 6 estimated on basis of floodmarks, weather records, and records for nearby stations.

Maxima.--December 1966: Discharge, 16,900 cfs 0600 hours Dec. 6 (gage height, 13.83 ft, from floodmarks).
1939 to November 1966: Discharge, 12,400 cfs Dec. 23, 1955 (gage height, 12.47 ft, from floodmarks), from rating curve extended above 300 cfs on basis of critical-depth determination; gage height, 13.06 ft Nov. 19, 1950, from floodmarks.

Remarks.--Pacific Gas and Electric Co. conduit diverts part of flow 2.5 miles upstream from station. Figures given herein represent combined flow of North Fork of Middle Fork Tule River and Pacific Gas and Electric Co. conduit; diversion is minor during floods.

Mean discharge, in cubic feet per second, December 1966

Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge
1.....	23	9.....	443	17.....	120	25.....	64
2.....	72	10.....	320	18.....	109	26.....	61
3.....	183	11.....	254	19.....	101	27.....	56
4.....	54	12.....	213	20.....	94	28.....	53
5.....	3,780	13.....	185	21.....	88	29.....	50
6.....	13,300	14.....	161	22.....	80	30.....	48
7.....	3,460	15.....	144	23.....	73	31.....	47
8.....	790	16.....	129	24.....	69		
Monthly mean discharge, in cubic feet per second.....							794
Runoff, in inches.....							23.30
Runoff, in acre-feet.....							48,840

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1966

Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge
Dec. 5	0100	-	42	Dec. 5	1500	-	1,270	Dec. 7	0300	-	6,280
	0200	-	554		1700	-	2,160		0600	-	4,780
	0300	-	1,080		1800	-	4,050		0900	-	3,650
	0500	-	1,670		2000	-	11,000		1200	-	2,810
	0600	-	2,020		2100	-	11,200		1500	-	2,220
	0700	-	1,980		2400	-	13,600		1800	-	1,800
	0800	-	2,100						2100	-	1,470
	0900	-	1,860	6	0600	13.83	16,900		2400	-	1,220
	1200	-	1,300		1900	11.92	11,100				
					2400	10.61	7,940				

(28) 11-2024.5. Winding Creek near Camp Nelson, Calif.

(Crest-stage station)

Location.--Lat 36°09'35", long 118°40'30", in sec.25, T.20 S., R.30 E.,(unsurveyed), at culvert on State Highway 190, 4 miles northwest of Camp Nelson.

Drainage area.--0.30 sq mi.

Gage-height record.--Crest stages only. Altitude of gage is 3,500 ft (from topographic map).

Discharge record.--Peak discharge by computation of flow through culvert.

Maxima.--December 1966: Discharge, 48 cfs Dec. 6 (gage height, 12.71 ft).
1959 to November 1966: Discharge, 19 cfs Feb. 1, 1963 (gage height, 11.66 ft).

(29) 11-2031. North Fork Tule River at Springville, Calif.

Location.--Lat 36°08'22", long 118°48'15", in SE¼ sec.35, T.20 S., R.29 E., on left bank 0.1 mile upstream from Middle Fork Tule River, 0.8 mile northeast of Springville, and 12.9 miles northeast of Porterville.

Drainage area.--97.6 sq mi.

Gage-height record.--Digital-recorder tape punched at 15-minute intervals Dec. 1; station destroyed by flood. Altitude of gage is 1,040 ft (from topographic map).

Discharge record.--Stage-discharge relation defined by current-meter measurements below 3,900 cfs and by slope-area measurement at 24,200 cfs.

Maxima.--December 1966: Discharge, 24,200 cfs about midnight Dec. 5 (gage height, about 23 ft).
1957 to November 1966: Discharge, 4,600 cfs Jan. 31, 1963 (gage height, 10.29 ft).

Cooperation.--Records furnished by California Department of Water Resources and reviewed by Geological Survey. December 1966 record estimated by Geological Survey.

Mean discharge, in cubic feet per second, December 1966

Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge
1.....	7.3	9.....	405	17.....	107	25.....	56
2.....	5.8	10.....	310	18.....	97	26.....	53
3.....	294	11.....	230	19.....	88	27.....	50
4.....	60	12.....	185	20.....	81	28.....	48
5.....	4,230	13.....	165	21.....	75	29.....	47
6.....	14,200	14.....	145	22.....	70	30.....	45
7.....	2,090	15.....	130	23.....	65	31.....	44
8.....	734	16.....	118	24.....	60		
Monthly mean discharge, in cubic feet per second.....							784
Runoff, in inches.....							9.26
Runoff, in acre-feet.....							48,190

(30) 11-2032. Tule River near Springville, Calif.

Location.--Lat 36°05'41", long 118°50'09", in SE¼SW¼ sec.15, T.21 S., R.29 E., on left bank 15 ft upstream from highway bridge, 2 miles southwest of Springville, and 4 miles downstream from North Fork.

Drainage area.--225 sq mi.

Gage-height record.--Water-stage recorder graph. Altitude of gage is 800 ft (from topographic map).

Discharge record.--Stage-discharge relation defined by current-meter measurements below 3,500 cfs and by slope-area measurement at 49,600 cfs.

Maxima.--December 1966: Discharge, 49,600 cfs 0030 hours Dec. 6 (gage height, 17.18 ft, from recorder graph; 19.7 ft, from flood profile).
1950 to November 1966: Discharge, 22,400 cfs (revised) Nov. 19, 1950 (gage height, unknown).

Mean discharge, in cubic feet per second, December 1966

Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge
1.....	47	9.....	990	17.....	266	25.....	185
2.....	44	10.....	770	18.....	254	26.....	185
3.....	812	11.....	620	19.....	243	27.....	174
4.....	171	12.....	532	20.....	235	28.....	170
5.....	8,510	13.....	427	21.....	225	29.....	168
6.....	30,200	14.....	360	22.....	212	30.....	164
7.....	5,150	15.....	314	23.....	200	31.....	156
8.....	1,590	16.....	285	24.....	191		
Monthly mean discharge, in cubic feet per second.....							1,737
Runoff, in inches.....							8.90
Runoff, in acre-feet.....							106,800

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1966

Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge
Dec. 4	0600	3.97	194	Dec. 5	1900	9.70	7,600	Dec. 6	1000	14.02	33,100
	1200	3.86	158		2000	10.45	9,260		1200	14.59	36,000
	1800	3.80	140		2100	12.29	14,500		1300	13.57	30,900
	2400	3.75	126		2200	13.02	17,600		1400	12.37	26,100
					2300	15.00	29,000		1700	13.79	32,000
5	0200	3.76	129		2400	16.57	42,700		1900	11.42	22,300
	0400	4.03	215						2100	9.82	15,900
	0500	5.73	1,390	6	0030	17.18	49,600		2400	8.27	10,800
	0600	8.81	5,820		0230	15.79	42,000				
	0800	10.32	8,960		0400	15.14	38,700	7	0200	7.67	9,010
	1000	10.74	9,920		0600	14.05	33,200		0600	6.75	6,270
	1500	9.44	7,050		0800	13.82	32,100		1200	6.16	4,740
	1700	9.16	6,490		0900	13.07	28,900		1800	5.54	3,120
									2400	5.28	2,450

(31) 11-2045. South Fork Tule River near Success, Calif.

Location.--Lat 36°02'30", long 118°51'25", in NW¼SW¼ sec.4, T.22 S., R.29 E., on left bank 0.5 mile upstream from Crew Creek, 4 miles southeast of Success, and 5 miles upstream from mouth.

Drainage area.--109 sq mi.

Gage-height record.--Water-stage recorder graph. Altitude of gage is 770 ft (from topographic map).

Discharge record.--Stage-discharge relation defined by current-meter measurements below 3,100 cfs and by slope-area measurements at 7,100 and 14,300 cfs.

Maxima.--December 1966: Discharge, 14,300 cfs 1100 hours Dec. 6 (gage height, 12.50 ft, from recorder graph; 13.3 ft, from floodmarks).
1930-54, 1956 to November 1966: Discharge, 7,100 cfs Nov. 19, 1950 (gage height, 11.36 ft).

Mean discharge, in cubic feet per second, December 1966

Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge
1.....	9.9	9.....	377	17.....	66	25.....	58
2.....	9.4	10.....	247	18.....	51	26.....	57
3.....	137	11.....	171	19.....	43	27.....	52
4.....	36	12.....	133	20.....	51	28.....	48
5.....	1,710	13.....	114	21.....	59	29.....	48
6.....	6,660	14.....	109	22.....	60	30.....	46
7.....	1,110	15.....	95	23.....	60	31.....	45
8.....	575	16.....	77	24.....	62		
Monthly mean discharge, in cubic feet per second.....							399
Runoff, in inches.....							4.22
Runoff, in acre-feet.....							24,550

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1966

Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge
Dec. 1	2400	3.56	9.5	Dec. 5	0400	3.88	30	Dec. 6	1000	10.70	6,750
					0500	4.00	42		1100	12.50	14,300
2	1200	3.55	8.7		0600	6.00	575		1200	11.65	11,600
	1800	3.55	8.7		0800	8.15	2,140		1300	10.20	7,360
	2200	3.60	11		0930	8.46	2,450		1400	9.85	6,510
	2400	3.67	15		1300	8.06	2,050		1800	10.43	7,930
					1800	7.51	1,560		2000	9.10	4,950
3	0100	3.77	21		2100	8.15	2,140		2200	7.85	3,020
	0200	4.40	95		2200	8.80	2,820		2400	7.20	2,300
	0500	5.43	340		2300	9.90	4,680				
	0900	4.92	201		2400	10.70	6,750	7	0300	6.40	1,550
	1300	4.50	112						0600	6.03	1,240
	1800	4.25	74	6	0130	11.61	10,200		1200	5.56	944
	2400	4.10	54		0300	11.40	9,310		1630	5.40	860
					0500	10.20	5,380		1800	5.33	824
4	0900	3.97	39		0600	10.11	5,130		2000	5.32	818
	1530	3.90	32		0800	9.30	3,530		2400	5.15	740
	1600	3.84	26		0900	9.50	3,900				
	2400	3.83	25								

(32) 11-2047. Lake Success near Success, Calif.

Location.--Lat 36°03'40", long 118°55'18", in SE¼NW¼ sec.35, T.21 S., R.28 E., in control tower near right abutment of Success Dam on Tule River, 5 miles east of Porterville.

Drainage area.--391 sq mi.

Gage-height record.--Water-stage recorder graph. Datum of gage is at mean sea level, datum of 1929 (levels by Corps of Engineers).

Contents record.--Contents computed from capacity table dated June 1966.

Maxima.--December 1966: Computed bihourly inflow, 52,800 cfs 0300 to 0500 hours Dec. 6; contents, 101,300 acre-ft 0425 hours Dec. 7 (elevation, 658.63 ft).
1961 to November 1966: Contents, 66,100 acre-ft June 22-26, 1965 (elevation, 642.74 ft).

Remarks.--Lake is formed by earthfill dam and dike. Storage began November 1961. Usable capacity, 85,400 acre-ft between elevations 559.0 ft (invert of outlet structure) and 652.5 ft (spillway crest). Surcharge flood-control storage, 117,400 acre-ft between ungated spillway crest and elevation 686.8 ft (maximum spillway design flood pool). Dead storage, 720 acre-ft. Figures given herein represent usable contents. Records furnished by Corps of Engineers.

Contents, in acre-feet at 2400 hours, December 1966

Day	Contents	Day	Contents	Day	Contents	Day	Contents
1.....	7,360	9.....	88,500	17.....	70,000	25.....	61,000
2.....	7,480	10.....	83,000	18.....	67,900	26.....	60,100
3.....	9,150	11.....	76,800	19.....	66,200	27.....	59,100
4.....	9,650	12.....	73,400	20.....	65,100	28.....	58,000
5.....	28,400	13.....	74,300	21.....	64,300	29.....	56,900
6.....	100,500	15.....	74,400	22.....	63,500	30.....	55,700
7.....	97,600	15.....	73,300	23.....	62,700	31.....	54,600
8.....	93,200	16.....	71,800	24.....	61,900		
Change in contents in acre-feet.....							+47,370

Average inflow, in cubic feet per second, for bihourly periods ending at indicated time, 1966

Date	Hour	Inflow	Date	Hour	Inflow	Date	Hour	Inflow	Date	Hour	Inflow
Dec. 4	0100	370	Dec. 5	0700	2,930	Dec. 6	1300	52,000	Dec. 7	1900	3,910
	0300	334		0900	9,830		1500	37,900		2100	3,600
	0500	296		1100	11,000		1700	45,500		2300	3,290
	0700	290		1300	11,900		1900	36,300			
	0900	224		1500	10,400		2100	25,300	8	0100	2,980
	1100	260		1700	9,420		2300	16,900		0300	3,010
	1300	224		1900	8,010					0500	2,410
	1500	224		2100	10,400	7	0100	13,500		0700	2,460
	1700	224		2300	21,400		0300	10,300		0900	2,380
	1900	224					0500	8,580		1100	2,150
	2100	260	6	0100	43,100		0700	7,380		1300	1,860
	2300	230		0300	51,100		0900	6,390		1500	2,010
				0500	52,800		1100	5,660		1700	2,030
5	0100	146		0700	41,100		1300	4,700		1900	1,620
	0300	152		0900	41,200		1500	4,720		2100	1,810
	0500	266		1100	52,000		1700	3,910		2300	1,520
									9	0100	1,620

(33) 11-2049. Tule River below Success Dam, Calif.

Location.--Lat 36°03'23", long 118°55'22", in SW¼ sec.35, T.21 S., R.28 E., on right bank 1,000 ft downstream from Success Dam, and 5 miles east of Porterville.

Drainage area.--393 sq mi.

Gage-height record.--Digital-recorder tape punched at 15-minute intervals. Datum of gage is 536.00 ft above mean sea level, datum of 1929 (levels by Corps of Engineers).

Discharge record.--Stage-discharge relation at gaging station defined by current-meter measurements below 4,100 cfs. Stage-discharge relation through spillway checked by current-meter measurement at 7,330 cfs.

Maxima.--December 1966: Discharge, 9,050 cfs 2230 hours Dec. 6 (includes flow through spillway).
1950-61 (prior to regulation by Lake Success): Discharge, 32,000 cfs Nov. 19, 1950 (gage height, 26 ft, from floodmarks, at site 0.5 mile downstream at datum then in use), estimated from discharge records for upstream stations.
1961 to November 1966: Discharge, 2,980 cfs Jan. 31, 1963 (gage height, 9.25 ft).

Remarks.--Flow regulated by Lake Success (see station 11-2047) beginning Nov. 23, 1961. Discharge figures Dec. 6-10, 1966, include flow over spillway that bypassed gaging station. Monthly runoff figures include 47,370 acre-ft stored in Lake Success.

Mean discharge, in cubic feet per second, December 1966

Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge
1.....	0.50	9.....	4,040	17.....	1,320	25.....	690
2.....	.50	10.....	4,020	18.....	1,410	26.....	690
3.....	.50	11.....	4,010	19.....	1,280	27.....	754
4.....	.50	12.....	2,440	20.....	922	28.....	810
5.....	180	13.....	98	21.....	690	29.....	805
6.....	3,760	14.....	435	22.....	690	30.....	798
7.....	7,250	15.....	1,040	23.....	690	31.....	798
8.....	4,360	16.....	1,200	24.....	690		
Monthly mean discharge, in cubic feet per second							1,480
Runoff, in inches, adjusted							6.60
Runoff, in acre-feet, adjusted							138,400

Discharge, in cubic feet per second, at indicated time, 1966

Date	Hour	Discharge	Date	Hour	Discharge	Date	Hour	Discharge	Date	Hour	Discharge
Dec. 4	2400	0.50	Dec. 6	0200	423	Dec. 7	0200	8,130	Dec. 8	0200	5,280
				0400	444		0400	8,260		0400	4,990
5	0200	.50		0600	459		0600	8,220		0600	4,710
	0400	.60		0800	2,040		0800	8,060		0800	4,470
	0600	.60		1000	3,240		1000	7,820		1000	4,240
	0800	.90		1200	3,290		1200	7,560		1200	4,030
	1000	39		1400	5,470		1400	7,240		1400	4,110
	1200	217		1600	6,000		1600	6,860		1600	4,090
	1400	251		1800	6,060		1800	6,560		1800	4,010
	1600	335		2000	7,300		2000	6,240		2000	3,920
	1800	370		2200	8,850		2200	5,900		2200	3,870
	2000	375		2230	9,050		2400	5,580		2400	3,990
	2200	382		2300	7,970						
	2400	399		2400	7,700						

(34) 11-2049.5. Tule River tributary near Success, Calif.

(Crest-stage station)

Location.--Lat 36°03'27", long 118°54'48", in NE¼SE¼ sec.35, T.21 S., R.28 E., at culvert on State Highway 190, 1.8 miles south of Success.

Drainage area.--1.13 sq mi.

Gage-height record.--Crest stages only. Altitude of gage is 630 ft (from topographic map).

Discharge record.--Peak discharge by computation of flow through culvert.

Maxima.--December 1966: Discharge, 219 cfs Dec. 6 (gage height, 14.63 ft).
1959 to November 1966: Discharge, 8 cfs Mar. 6, 1962 (gage height, 11.76 ft).

(35) 11-2065. Middle Fork Kaweah River near Potwisha Camp, Calif.

Location.--Lat 36°30'45", long 118°47'25", in NW¼ sec.25, T.16 S., R.29 E., on right bank 0.7 mile southeast of Potwisha Camp, and 0.9 mile upstream from confluence with Marble Fork Kaweah River.

Drainage area.--102 sq mi.

Gage-height record.--Water-stage recorder graph. Altitude of gage is 2,100 ft (from topographic map).

Discharge record.--Stage-discharge relation defined by current-meter measurements below 1,000 cfs and by slope-area measurement at 46,800 cfs.

Maxima.--December 1966: Discharge, 23,300 cfs 0800 hours Dec. 6 (gage height, 17.7 ft).
1949 to November 1966: Discharge, 46,800 cfs Dec. 23, 1955 (gage height, 29.0 ft, from floodmarks, at datum 0.70 ft higher), by slope-area measurement of maximum flow.

Remarks.--Middle Fork Kaweah River No. 3 conduit diverts 0.5 mile upstream from station. Figures given herein represent combined flow of Middle Fork Kaweah River and Middle Fork Kaweah River No. 3 conduit; diversion is minor during floods.

Mean discharge, in cubic feet per second, December 1966

Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge
1.....	117	9.....	596	17.....	237	25.....	161
2.....	229	10.....	476	18.....	227	26.....	156
3.....	455	11.....	392	19.....	217	27.....	146
4.....	138	12.....	338	20.....	207	28.....	146
5.....	3,360	13.....	301	21.....	193	29.....	144
6.....	10,500	14.....	277	22.....	182	30.....	140
7.....	1,720	15.....	261	23.....	173	31.....	134
8.....	846	16.....	247	24.....	167		
Monthly mean discharge, in cubic feet per second.....							738
Runoff, in inches.....							8.34
Runoff, in acre-feet.....							45,390

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1966

Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge
Dec. 3	2400	-	183	Dec. 5	1800	8.88	2,220	Dec. 6	1600	12.99	9,570
					1900	9.00	2,340		1700	12.25	7,580
4	0700	-	155		2200	13.00	9,600		1800	11.42	5,760
	1100	-	145		2300	15.00	15,200		1900	11.28	5,500
	2100	-	138		2400	15.70	17,300		2300	9.88	3,330
	2300	-	149						2400	9.60	2,980
	2400	-	168	6	0100	16.45	19,600				
					0200	15.30	16,100	7	0200	9.30	2,640
5	0200	-	320		0300	15.85	17,800		0400	9.10	2,440
	0400	-	1,340		0400	16.65	20,200		0700	8.50	1,870
	0500	-	1,840		0600	14.85	14,800		0900	8.28	1,690
	0600	9.00	2,340		0800	17.70	23,300		1400	8.00	1,470
	0700	9.15	2,490		0900	13.60	11,300		2400	7.32	1,070
	0800	9.60	2,980		1100	11.00	5,000				
	1100	9.25	2,590		1400	11.02	5,040	8	0800	6.90	875
	1200	8.28	1,690		1500	13.60	11,300		1100	6.80	830
	1400	8.01	1,480		1530	12.30	7,700		1500	6.74	805
									2400	6.45	684

(36) 11-2080. Marble Fork Kaweah River at Potwisha Camp, Calif.

Location.--Lat 36°31'10", long 118°48'10", in SE¼ sec.23, T.16 S., R.29 E., on left bank 0.1 mile north of Potwisha Camp, and 0.3 mile upstream from confluence with Middle Fork Kaweah River.

Drainage area.--51.4 sq mi.

Gage-height record.--Water-stage recorder graph. Altitude of gage is 2,150 ft (from topographic map).

Discharge record.--Stage-discharge relation defined by current-meter measurements below 560 cfs, computed flow over dam at 4,000 cfs, and slope-area measurement at 12,500 cfs.

Maxima.--December 1966: Discharge, 6,400 cfs 0900 hours Dec. 6 (gage height, 11.50 ft).
1950 to November 1966: Discharge, 12,500 cfs Dec. 23, 1955 (gage height, 13.4 ft), from rating curve extended above 1,100 cfs on basis of slope-area measurement of maximum flow.

Remarks.--Marble Fork Kaweah River No. 3 conduit diverts 0.3 mile upstream from station. Figures given herein represent combined flow of Marble Fork Kaweah River and Marble Fork Kaweah River No. 3 conduit; diversion is minor during floods.

Mean discharge, in cubic feet per second, December 1966

Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge
1.....	51	9.....	322	17.....	139	25.....	98
2.....	116	10.....	255	18.....	133	26.....	97
3.....	265	11.....	223	19.....	128	27.....	89
4.....	76	12.....	199	20.....	125	28.....	90
5.....	1,700	13.....	181	21.....	120	29.....	90
6.....	4,540	14.....	163	22.....	112	30.....	88
7.....	1,100	15.....	152	23.....	109	31.....	83
8.....	522	16.....	145	24.....	104		
Monthly mean discharge, in cubic feet per second.....							375
Runoff, in inches.....							8.40
Runoff, in acre-feet.....							23,040

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1966

Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge
Dec. 3	2400	-	94	Dec. 5	1000	6.84	1,170	Dec. 6	0700	11.30	6,000
					1100	6.32	928		0900	11.50	6,400
4	0900	-	72		1300	5.81	724		1400	9.88	3,760
	1300	-	70		1400	5.88	752		1700	10.40	4,460
	1400	-	67		1500	6.20	880		1800	10.26	4,260
	2000	-	66		1600	6.60	1,050		2000	9.36	3,150
	2300	-	82		1700	7.00	1,250		2300	8.35	2,130
	2400	-	93		2000	9.52	3,320		2400	8.17	1,990
					2100	9.87	3,740				
5	0200	-	160		2200	10.56	4,700	7	0200	7.84	1,740
	0400	-	954		2300	10.86	5,180		0700	7.00	1,250
	0500	-	1,260		2400	10.98	5,370		1000	6.62	1,050
	0700	7.56	1,560						1200	6.45	968
	0800	7.57	1,560	6	0300	10.91	5,260		1900	6.00	780
					0500	10.74	4,980		2400	5.73	664

(37) 11-2085. Middle Fork Kaweah River tributary near Hammond, Calif.

(Crest-stage station)

Location.--Lat 36°29'35", long 118°49'30", in NW¼SW¼ sec.34, T.16 S., R.29 E., at culvert on State Highway 198, Sequoia National Park, 2.7 miles northeast of Hammond.

Drainage area.--1.90 sq mi.

Gage-height record.--Crest stages only; gage destroyed by flood. Altitude of gage is 1,740 ft (from topographic map).

Discharge record.--Peak discharge by computation of flow through culvert and flow over road.

Maxima.--December 1966: Discharge, 879 cfs Dec. 6 (gage height, 30.63 ft, from floodmarks).
1959 to November 1966: Discharge, 152 cfs Feb. 1, 1963 (gage height, 18.41 ft).

(38) 11-2087.3. East Fork Kaweah River near Three Rivers, Calif.

Location.--Lat 36°27'05", long 118°47'15", in NW¼ sec.14, T.17 S., R.29 E., on left bank just downstream from diversion dam, and 6.6 miles east of Three Rivers.

Drainage area.--85.8 sq mi.

Gage-height record.--Water-stage recorder graph Dec. 1-4. Altitude of gage is 2,500 ft (from topographic map).

Discharge record.--Stage-discharge relation defined by current-meter measurements below 850 cfs and by critical-depth computation at diversion dam at 13,000 cfs. Discharge Dec. 5-31 estimated on basis of weather records, records for nearby stations, and critical-depth computation.

Maxima (river only).--December 1966: Discharge, 13,000 cfs Dec. 6 (gage height, 21 ft , from flood profile).
1952-55, 1957 to November 1966: Discharge, 2,850 cfs Feb. 1, 1963 (gage height, 11.00 ft).
(river and conduit).--December 1966: Discharge, 13,000 cfs Dec. 6.
1952-55, 1957 to November 1966: Discharge, 2,850 cfs Feb. 1, 1963.

Remarks.--East Fork Kaweah River No. 1 conduit diverts up to 30 cfs upstream. Mean discharge figures are the combined flow of East Fork Kaweah River and East Fork Kaweah River No. 1 conduit. Diversion is minor during floods. Records furnished by Southern California Edison Co. and reviewed by Geological Survey. Maximum discharge computed by Geological Survey.

Mean discharge, in cubic feet per second, December 1966

Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge
1.....	37	9.....	400	17.....	225	25.....	143
2.....	218	10.....	360	18.....	201	26.....	143
3.....	199	11.....	320	19.....	201	27.....	132
4.....	91	12.....	300	20.....	176	28.....	125
5.....	3,200	13.....	291	21.....	168	29.....	122
6.....	8,000	14.....	254	22.....	157	30.....	119
7.....	1,500	15.....	249	23.....	157	31.....	85
8.....	550	16.....	225	24.....	153		
Monthly mean discharge, in cubic feet per second.....							597
Runoff, in inches.....							8.02
Runoff, in acre-feet.....							36,700

(39) 11-2090. Dorst Creek near Kaweah Camp, Calif.

(Crest-stage station)

Location.--Lat 36°38'45", long 118°48'15", in SE¼SW¼ sec.2, T.15 S., R.29 E., at culvert on Generals Highway, Sequoia National Park, 6 miles northwest of Kaweah Camp.

Drainage area.--6.11 sq mi.

Gage-height record.--Crest stages only. Altitude of gage is 6,700 ft (from topographic map).

Discharge record.--Peak discharge by computation of flow through culvert.

Maxima.--December 1966: Discharge, 2,010 cfs Dec. 6 (gage height, 30.73 ft, from flood profile).
1959 to November 1966: Discharge, 1,540 cfs Feb. 1, 1963 (gage height, 28.85 ft).

(40) 11-2095. North Fork Kaweah River at Kaweah, Calif.

(Crest-stage partial-record station)

Location.--Lat 36°29', long 118°55', in SE¼ sec.34, T.16 S., R.28 E., on left bank 1.2 miles upstream from Mannikin Creek, 1.5 miles north of Kaweah, and 3 miles upstream from mouth.

Drainage area.--129 sq mi.

Gage-height record.--Floodmarks only. Datum of gage is 1,027.7 ft above mean sea level (river-profile survey).

Discharge record.--Stage-discharge relation defined by current-meter measurements below 3,200 cfs and by slope-area measurement at 21,500 cfs.

Maxima.--December 1966: Discharge, 23,900 cfs Dec. 6 (gage height, 14.7 ft, from flood profile).
1910 to November 1966: Discharge, 21,500 cfs Dec. 23, 1955 (gage height, 14.1 ft, from flood profile).

(41) 11-2099. Kaweah River at Three Rivers, Calif.

Location.--Lat 36°26'38", long 118°54'09", in SW¼SW¼ sec.13, T.17 S., R.28 E., on right bank opposite schoolhouse in Three Rivers, 0.25 mile downstream from North Fork Kaweah River.

Drainage area.--418 sq mi.

Gage-height record.--Water-stage recorder graph. Datum of gage is 809.62 ft above mean sea level, datum of 1929.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 13,000 cfs and by slope-area measurements at 30,900 and 73,000 cfs.

Maxima.--December 1966: Discharge, 73,000 cfs 2300 hours Dec. 5 (gage height, 16.69 ft, from recorder graph; 19.0 ft, from flood profile).
1958 to November 1966: Discharge, 30,900 cfs Feb. 1, 1963 (gage height, 13.68 ft, from recorder graph; 14.80 ft, from flood profile).
Flood of Dec. 23, 1955, reached a stage of 17.9 ft, from floodmarks.

Mean discharge, in cubic feet per second, December 1966

Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge
1.....	268	9.....	1,900	17.....	815	25.....	549
2.....	494	10.....	1,560	18.....	766	26.....	531
3.....	1,910	11.....	1,360	19.....	730	27.....	505
4.....	472	12.....	1,200	20.....	695	28.....	481
5.....	16,600	13.....	1,090	21.....	665	29.....	474
6.....	37,100	14.....	1,000	22.....	624	30.....	467
7.....	7,010	15.....	920	23.....	599	31.....	458
8.....	2,650	16.....	863	24.....	571		
Monthly mean discharge, in cubic feet per second.....							2,752
Runoff, in inches.....							7.59
Runoff, in acre-feet.....							169,200

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1966

Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge
Dec. 1	2400	3.42	227	Dec. 4	2200	4.22	383	Dec. 6	0700	16.38	66,800
					2400	4.32	411		0730	15.68	54,400
2	0800	3.37	218						0900	16.06	60,400
	0900	3.21	190	5	0200	4.87	603		1000	15.40	50,200
	1100	3.40	223		0400	7.60	3,800		1100	14.00	33,200
	1300	3.35	214		0600	10.00	12,000		1200	13.10	27,600
	1800	3.50	250		0830	10.80	15,600		1400	11.50	19,100
	2000	4.94	700		1100	10.00	12,000		1500	10.68	15,100
	2200	6.17	1,550		1200	9.45	9,700		1600	11.15	17,400
	2400	7.25	3,110		1400	9.00	7,900		1700	10.60	14,700
					1800	10.00	12,000		1900	12.19	22,600
3	0200	8.13	5,120		2000	12.32	23,300		2100	11.55	19,400
	0400	7.62	3,850		2100	13.50	29,800		2400	10.75	15,400
	0700	6.67	2,180		2200	15.90	57,700				
	1200	5.87	1,250		2300	16.69	73,000	7	0400	9.67	10,600
	1800	5.42	888		2400	16.30	65,200		0800	8.97	7,800
	2400	5.05	685						1200	8.37	5,810
				6	0100	16.02	59,600		1500	8.02	4,850
4	0600	4.70	538		0200	16.23	63,800		1800	7.76	4,200
	1200	4.38	430		0500	15.63	53,600		2200	7.50	3,600
	1800	4.22	383		0600	15.95	58,400		2400	7.42	3,440

(42) 11-2101. South Fork Kaweah River at Three Rivers, Calif.

Location.--Lat 36°25'00", long 118°54'48", in SE¼ sec.26, T.17 S., R.28 E., on right bank 200 ft upstream from unnamed tributary, 0.5 mile upstream from mouth, and 1.8 miles southwest of Three Rivers.

Drainage area.--86.7 sq mi.

Gage-height record.--Water-stage recorder graph except Dec. 7 to 1500 hours Dec. 12. Datum of gage is 807.22 ft above mean sea level.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 2,000 cfs and by slope-area measurement at 11,600 cfs. Discharge Dec. 7 to 1500 hours Dec. 12 estimated on basis of discharge measurements, weather records, and record for Kaweah River at Three Rivers.

Maxima.--December 1966: Discharge, 11,600 cfs 1400 hours Dec. 6 (gage height, 9.30 ft, in gage well; 10.4 ft, from floodmarks).
1958 to November 1966: Discharge, 2,440 cfs Feb. 1, 1963 (gage height, 4.95 ft).
Flood of Dec. 23, 1955, reached a stage of 9.5 ft, from floodmarks (discharge, 10,000 cfs).

Mean discharge, in cubic feet per second, December 1966

Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge
1.....	24	9.....	400	17.....	104	25.....	66
2.....	28	10.....	260	18.....	97	26.....	66
3.....	174	11.....	200	19.....	90	27.....	58
4.....	46	12.....	172	20.....	87	28.....	58
5.....	1,610	13.....	150	21.....	82	29.....	56
6.....	7,760	14.....	136	22.....	76	30.....	55
7.....	1,480	15.....	126	23.....	72	31.....	51
8.....	600	16.....	118	24.....	69		
Monthly mean discharge, in cubic feet per second.....							464
Runoff, in inches.....							6.16
Runoff, in acre-feet.....							28,500

Gage height, in feet, and discharge, in cubic feet per second, at indicated times, 1966

Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge
Dec. 4	2400	1.93	42	Dec. 5	2100	5.02	2,600	Dec. 6	0630	7.10	7,180
					2130	5.35	3,330		0700	7.65	8,300
5	0300	2.03	54		2200	5.02	2,600		0730	8.55	10,100
	0500	2.30	95		2230	6.55	5,970		0900	9.16	11,300
	0600	3.80	690		2300	6.30	5,420		1000	8.50	10,000
	0700	4.28	1,190		2330	6.95	6,850		1200	7.65	8,300
	0800	4.62	1,760		2400	6.40	5,640		1300	7.46	7,920
	0900	4.47	1,490		2400	7.05	7,070		1400	9.30	11,600
	1000	4.61	1,740						1400	8.30	9,600
	1100	4.44	1,440	6	0100	6.60	6,080		1530	9.10	11,200
	1400	4.34	1,280		0130	6.98	6,920		1630	8.39	9,780
	1600	4.52	1,580		0230	6.55	5,970		1700	8.59	10,200
	1800	4.62	1,760		0300	6.73	6,370		1900	6.80	6,320
	1900	4.67	1,850		0330	6.50	5,860		1930	6.98	6,750
	1930	4.82	2,140		0400	6.94	6,830		2100	5.88	4,090
	2000	4.45	1,460		0430	6.87	6,670		2130	6.00	4,380
	2030	5.29	3,200		0530	7.60	8,200		2200	5.87	4,070
					0600	7.06	7,090		2400	5.78	3,850

(43) 11-2109. Lake Kaweah near Lemoncove, Calif.

Location.--Lat 36°24'53", long 119°00'07", in SE¼SW¼ sec.25, T.17 S., R.27 E., in control tower near left abutment of Terminus Dam on Kaweah River, 2.1 miles northeast of Lemoncove.

Drainage area.--560 sq mi.

Gage-height record.--Water-stage recorder graph. Datum of gage is at mean sea level, datum of 1929 (levels by Corps of Engineers).

Contents record.--Contents computed from capacity table dated June 1966.

Maxima.--December 1966: Computed bihourly inflow, 82,700 cfs 0900 to 1100 hours Dec. 6; contents, 147,200 acre-ft 0100 hours Dec. 8 (elevation, 692.77 ft). October 1961 to November 1966: Contents, 139,900 acre-ft June 14, 1965 (elevation, 688.96 ft).

Remarks.--Reservoir is formed by earthfill dam and earthfill auxiliary dam; completed and storage began in February 1962. Usable capacity, 149,400 acre-ft between elevations 520.0 ft (invert of outlet structure) and 694.0 ft (spillway crest). Dead storage, 166 acre-ft. Figures given herein represent total contents. Surcharge flood-control storage, 117,400 acre-ft between ungated spillway crest and elevation 745.1 ft (maximum spillway design flood pool). Records furnished by Corps of Engineers.

Contents, in acre-feet at 2400 hours, December 1966

Day	Contents	Day	Contents	Day	Contents	Day	Contents
1.....	7,850	9.....	142,500	17.....	102,500	25.....	71,400
2.....	8,100	10.....	140,100	18.....	96,000	26.....	69,800
3.....	10,500	11.....	136,800	19.....	89,500	27.....	67,900
4.....	8,800	12.....	131,800	20.....	82,800	28.....	66,200
5.....	35,800	13.....	126,400	21.....	78,600	29.....	64,500
6.....	139,100	14.....	120,800	22.....	76,600	30.....	62,800
7.....	147,200	15.....	114,900	23.....	74,600	31.....	60,800
8.....	144,700	16.....	108,900	24.....	73,000		
Change in contents in acre-feet.....							+52,100

Average inflow, in cubic feet per second, for bihourly periods ending at indicated time, 1966

Date	Hour	Inflow	Date	Hour	Inflow	Date	Hour	Inflow	Date	Hour	Inflow
Dec. 4	0100	797	Dec. 5	0700	879	Dec. 6	1300	45,600	Dec. 7	2100	5,810
	0300	614		0900	8,320		1500	57,800		2300	5,580
	0500	638		1100	11,500		1700	45,600			
	0700	543		1300	16,800		1900	50,900	8	0100	5,220
	0900	528		1500	11,400		2100	30,400		0300	4,990
	1100	558		1700	9,590		2300	22,000		0500	4,760
	1300	516		1900	12,100					0700	4,410
	1500	477		2100	16,300	7	0100	19,000		0900	4,180
	1700	481		2300	42,700		0300	14,500		1100	3,940
	1900	478					0500	12,300		1300	3,940
	2100	432	6	0100	63,800		0700	10,900		1500	3,520
	2300	461		0300	63,800		0900	9,630		1700	3,890
				0500	62,400		1100	8,720		1900	3,530
5	0100	415		0700	64,500		1300	8,130		2100	3,650
	0300	430		0900	76,900		1500	7,200		2300	3,540
	0500	535		1100	82,700		1700	6,860			
							1900	6,510	9	0100	3,410

(44) 11-2109.5. Kaweah River below Terminus Dam, Calif.

Location.--Lat 36°24'51", long 119°00'42", in SE¼SE¼ sec.26, T.17 S., R.27 E., on left bank 0.6 mile downstream from Terminus Dam, and 2.2 miles northeast of Lemoncove.

Drainage area.--561 sq mi.

Gage-height record.--Digital-recorder tape punched at 15-minute intervals. Datum of gage is 495.90 ft above mean sea level (levels by Corps of Engineers).

Discharge record.--Stage-discharge relation defined by current-meter measurements below 4,100 cfs.

Maxima.--December 1966: Discharge, 5,740 cfs 1445 hours Dec. 8 (gage height, 8.62 ft).
1961 to November 1966: Discharge, 5,080 cfs Jan. 31, 1963 (gage height, 8.28 ft).

Remarks.--Flow regulated by Lake Kaweah (see station 11-2109). Monthly runoff figures include 52,100 acre-ft stored in Lake Kaweah.

Mean discharge, in cubic feet per second, December 1966

Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge
1.....	651	9.....	3,590	17.....	4,180	25.....	1,410
2.....	198	10.....	3,120	18.....	4,200	26.....	1,400
3.....	877	11.....	3,200	19.....	4,200	27.....	1,460
4.....	1,300	12.....	3,870	20.....	4,210	28.....	1,410
5.....	1,310	13.....	4,010	21.....	2,950	29.....	1,370
6.....	1,150	14.....	4,000	22.....	1,650	30.....	1,400
7.....	4,920	15.....	4,010	23.....	1,700	31.....	1,420
8.....	5,320	16.....	4,020	24.....	1,420		
Monthly mean discharge, in cubic feet per second.....							2,578
Runoff, in inches, adjusted.....							7.04
Runoff, in acre-feet, adjusted.....							210,600

Gage height, in feet, and discharge, in cubic feet per second, at indicated times, 1966

Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge
Dec. 3	2400	5.32	1,360	Dec. 6	0200	2.70	263	Dec. 7	2000	8.31	5,140
					0400	1.68	110		2400	8.31	5,140
4	0400	5.31	1,360		0600	1.29	73				
	0800	5.29	1,340		1000	1.19	65	8	0400	8.31	5,140
	1200	5.30	1,350		1200	1.15	62		0800	8.32	5,160
	1600	5.28	1,340		1400	1.08	57		1200	8.31	5,140
	2000	5.27	1,330		1600	3.05	339		1400	8.59	5,680
	2400	5.25	1,320		1800	6.39	2,310		1445	8.62	5,740
					2000	7.35	3,490		1600	8.57	5,640
5	0400	5.24	1,310		2200	7.68	4,010		2000	8.56	5,620
	0800	5.32	1,360		2400	7.69	4,020		2400	8.56	5,620
	1000	5.62	1,600								
	1200	5.75	1,700	7	0200	7.70	4,040	9	0400	8.55	5,600
	1400	5.80	1,750		0400	8.06	4,690		0600	7.04	3,070
	1600	4.92	1,100		0600	8.26	5,050		1000	7.11	3,150
	1800	4.88	1,080		1000	8.30	5,120		2400	7.11	3,150
	2000	4.92	1,100		1200	8.31	5,140				
	2200	5.00	1,150		1600	8.32	5,160	10	1200	7.10	3,120
	2400	5.11	1,220						2400	7.10	3,120

(45) 11-2113. Dry Creek near Lemoncove, Calif.

Location.--Lat 36°25'30", long 119°01'20", in NW¼NW¼ sec.26, T.17 S., R.27 E., on left bank 400 ft downstream from Pogue Canyon, 1.3 miles upstream from mouth, and 2.8 miles north of Lemoncove.

Drainage area.--80.4 sq mi.

Gage-height record.--Water-stage recorder graph except Dec. 8-15. Altitude of gage is 515 ft (from topographic map).

Discharge record.--Stage-discharge relation defined by current-meter measurements below 9,400 cfs. Discharge Dec. 8-15 estimated on basis of discharge measurements, records for nearby stations, and weather records.

Maxima.--December 1966: Discharge, 14,500 cfs 0900 hours Dec. 6 (gage height, 7.30 ft, from recorder graph, 8.94 ft, from floodmarks).
1959 to November 1966: Discharge, 1,600 cfs Feb. 1, 1963 (gage height, 5.08 ft).

Mean discharge, in cubic feet per second, December 1966

Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge
1.....	0	9.....	70	17.....	16	25.....	11
2.....	0	10.....	48	18.....	14	26.....	11
3.....	.70	11.....	37	19.....	14	27.....	11
4.....	1.2	12.....	31	20.....	14	28.....	9.6
5.....	670	13.....	27	21.....	13	29.....	9.6
6.....	6,370	14.....	22	22.....	12	30.....	9.6
7.....	537	15.....	19	23.....	12	31.....	8.5
8.....	115	16.....	17	24.....	11		
Monthly mean discharge, in cubic feet per second.....							263
Runoff, in inches.....							3.77
Runoff, in acre-feet.....							16,150

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1966

Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge
Dec. 3	2400	2.38	4.7	Dec. 5	2000	4.09	574	Dec. 6	1200	5.81	8,530
					2100	4.21	658		1230	5.21	6,640
4	0600	2.34	2.3		2200	4.55	980		1230	5.53	7,620
	1200	2.26	.3		2400	6.28	6,050		1300	5.01	6,050
	1500	-	0						1300	5.33	7,080
	2400	-	0	6	0100	6.53	7,620		1400	4.92	5,720
					0200	6.53	7,620		1500	4.60	4,840
5	0900	-	0		0500	6.39	6,700		1700	4.72	5,160
	1000	2.85	72		0600	6.90	10,300		1700	4.62	4,880
	1030	4.10	580		0800	6.96	10,800		1900	3.70	2,800
	1100	4.40	820		0900	7.30	14,500		2200	2.94	1,610
	1130	4.63	1,080		1000	6.51	9,750		2400	2.58	1,220
	1230	4.41	830		1030	6.69	9,830				
	1300	4.53	956		1100	5.29	6,960	7	0600	1.92	706
	1400	4.50	920		1130	5.81	8,530		0900	1.57	532
	1830	4.10	580		1200	5.04	6,100		1200	1.27	420
									2400	.70	218

(46) 11-2120. 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., on right bank 3.8 miles east of Orange Cove.

Drainage area.--26.8 sq mi.

Gage-height record.--Water-stage recorder graph. Altitude of gage is 710 ft (from topographic map).

Discharge record.--Stage-discharge relation defined by current-meter measurements below 200 cfs.

Maxima.--December 1966: Discharge, 1,350 cfs 0840 hours Dec. 6 (gage height, 5.60 ft, from recorder graph; 6.78 ft, from floodmarks).
1944 to November 1966: Discharge, 775 cfs (revised) Dec. 23, 1955 (gage height, 4.80 ft).

Remarks.--Records furnished by U.S. Bureau of Reclamation. Discharges above 200 cfs computed by Geological Survey.

Mean discharge, in cubic feet per second, December 1966

Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge
1.....	-	9.....	3.9	17.....	0.6	25.....	0.6
2.....	-	10.....	2.1	18.....	.6	26.....	.6
3.....	-	11.....	1.5	19.....	.6	27.....	.6
4.....	-	12.....	1.1	20.....	.6	28.....	.6
5.....	-	13.....	.9	21.....	.6	29.....	.6
6.....	345	14.....	.8	22.....	.6	30.....	.6
7.....	46	15.....	.7	23.....	.6	31.....	.6
8.....	10	16.....	.6	24.....	.6		
Monthly mean discharge, in cubic feet per second							13.6
Runoff, in inches							.58
Runoff, in acre-feet							836

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1966

Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge
Dec. 5	2400	1.45	11	Dec. 6	0900	5.60	1,350	Dec. 7	0400	2.45	83
					0930	4.90	835		0800	2.22	56
6	0100	2.97	159		1000	4.38	561		1200	2.04	42
	0200	3.00	164		1100	4.22	493		1600	1.88	31
	0400	2.85	139		1400	4.35	548		2000	1.73	23
	0600	3.00	164		1600	4.01	414		2400	1.62	18
	0700	3.48	264		1800	3.72	326				
	0730	3.75	335		2100	3.15	192	8	0600	1.48	13
	0800	4.20	485		2400	2.82	134		1200	1.37	10
	0830	5.00	895						1800	1.27	7.5
									2400	1.18	5.7

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U. S. GOVERNMENT PRINTING OFFICE : 1971 O - 414-459