Floods of June 1965 in Arkansas River Basin, Colorado, Kansas, and New Mexico

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1850–D

Prepared in cooperation with the States of Colorado, Kansas, and New Mexico and with agencies of the Federal Government
Floods of June 1965 in Arkansas River Basin, Colorado, Kansas, and New Mexico

By R. J. SNIPES and others

FLOODS OF 1965 IN THE UNITED STATES

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FLOODS OF 1965 IN THE UNITED STATES

FLOODS OF JUNE 1965 IN ARKANSAS RIVER BASIN, COLORADO, KANSAS, AND NEW MEXICO

By R. J. Snipes and others

ABSTRACT

Maximum discharges during the floods of June 1965 in the Arkansas River basin in Colorado, Kansas, and New Mexico were greater than those previously known at 49 of the 137 locations where flood information was obtained. Property damage exceeded $60 million, and 16 lives were lost. At many sites, peak discharges exceeded by severalfold the discharges that may be expected, on the average, once in 50 years; yet, the 1965 discharges could be exceeded in the near future.

Heavy rainfall of more than 12 inches in several areas and more than 18 inches near Two Buttes, Colo., caused severe flooding in the Arkansas River basin in Colorado and Kansas and the Canadian River basin in New Mexico. Snowmelt runoff added only token amounts to the flood peaks. The 1965 peak discharges along the main stem of the Arkansas River in Colorado were less than those in 1921, but tributary peaks were probably greater at many sites. In New Mexico the peak discharges exceeded those for the destructive floods of 1904 at some locations, by manfold at some sites.

Descriptions of the storms and floods, detailed streamflow records, and information on damages and flood frequency are included in this report. Comparisons of the magnitude of the floods are made, and all indicate that an outstanding hydrologic event occurred.

INTRODUCTION

DESTRUCTIVE FORCES AT WORK

The floods of June 1965 in the Arkansas River basin in Colorado, Kansas, and New Mexico resulted in vast destruction and personal loss at many locations. Many individuals' reactions to their terrifying experiences were typical of those resulting from similar flood disasters which occur periodically in areas prone to unusually heavy storms. One such experience was related in the Chronicle News, Trinidad, Colo., June 18, 1965, following the outstanding flood on Raton Creek, a tributary to the Purgatoire River in Colorado.

Thursday [June 17, 1965] the water was running about normal, or maybe a bit higher. I had started to read the Chronicle News. *** I got curious about the Creek [Raton Creek at Starkville, Colo.], it was raining you know. I had pulled the blinds down and then I got up to look out the front door, and there it was coming up as fast as everything. By then it was already
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around the house. It started coming in under the door and I knew it was going to be bad, but by then it was too late to get out.

I tried to call the sheriff and I talked to someone who couldn’t understand who I was, but I told him * * * that I needed some help to get out. * * * When I placed the phone back on the stand, I was in water almost up to my waist. * * * My little dog was in the bedroom and I saw him swimming trying to reach me. Right then with the water pouring in and the noise and everything, I really thought I was a goner.

I put my dog on the bed and I got up there too. I held tight on the head of the bed and it started jumping around, floating here and there. The water just kept coming in and filling things up. I was afraid it would get so high I would drown. Then a big wardrobe fell over right on the bed. * * * I put the dog on top of it and crawled up there to get higher, but I kept a tight hold on the bed end.

Just about then, when I thought the water was going to fill the whole house, a part of the wall right in the bedroom broke, and then water was running out as fast as it ran in. I could hear windows breaking and doors were crashing and furniture was swimming around. When the wall broke out I thought maybe I can still save myself after all. * * * I began to get awful cold and was shivering wet. So was my little dog. It smelled awful, that mud and dirt in the water.

I saw four men on the railroad tracks watching the house and I saw a car stop. Pretty soon a crowd began to gather. * * * There was a big white scarf on the chiffonier * * *. I yelled to them, whoever is out there you’re trying to help me out, but don’t try ’til the water goes down, I’m all right * * *.

I used a stick to help myself walk to the back door as the water was going down. I saw Freddy Gonzales coming in that maintainer and I thought oh, God bless them, I’m saved now * * *.

When we got over to the road and up to the store, it looked like a funeral with all of those cars, and I guess it could have been mine.

Experiences such as this one, which was related by a 75-year old resident of Starkville, Colo., were common in June 1965. Some ended tragically with loss of life in addition to great material loss.

Streamflows are termed “floods” under varying circumstances, and they need not necessarily be great in terms of discharge. According to “Webster’s New International Dictionary,” second edition, unabridged, a flood is “a great flow of water; a body of moving water; the flowing stream, as of a river; esp., a body of water rising, swelling, and overflowing land; a deluge; a freshet.” Langbein and Iseri (1960) quoted three definitions:

“An overflow or inundation that comes from a river or other body of water and causes or threatens damage.”

“A relatively high streamflow overtopping the natural or artificial banks in any reach of a stream.”

“A relatively high flow as measured by either gage height or discharge quantity.”

The floods of June 1965 in the Arkansas River basin in Colorado, Kansas, and New Mexico met most of the definitions quoted above. Adjectives such as incredible, devastating, and catastrophic were used justifiably. However, one adjective, unprecedented, may have been overused. Follansbee and Sawyer (1948) gave accounts of outstanding floods in the Arkansas River basin in Colorado. Their descriptions, based on “fourth-hand” information or even Indian legend, depict floods which “covered the bottom lands near the present town of Las Animas to a depth of about 15 feet” in
1826, and in 1844 "a high-water mark of this flood at Pueblo was reputedly 12 feet higher than the high-water mark of the flood of 1921, the greatest flood of record there." Even allowing for the vagueness of some information concerning the earlier floods, evidence is strong that incredible, devastating, and catastrophic floods have occurred in the past. They will occur again, perhaps next year, perhaps centuries hence.

Authorities agree that no one measure will solve the problem of flood damage, but they disagree on the effectiveness of the various schemes to reduce flood damage. Big dams, small dams, channel improvements, watershed management, warning systems, and selective flood-plain use all have their proponents. Each measure has its advantages and disadvantages, which have been discussed many times by many authors. Some combination of measures, rather than any one alone, will most likely give optimum results. A comprehensive flood-control or damage-alleviation plan requires participation by many individuals and agencies and is almost never foolproof. However, the single measure that possibly is the most efficacious - selective use of the flood plain - can be employed by a single individual. Complete evacuation of flood plains may be too drastic; planned use, recognizing inherent risks, is feasible. Flood-plain management for reducing flood damage has received increasing attention and deserves more. The June 1965 flood in the Arkansas River valley below John Martin Dam illustrates the limitations of a single "flood-control" structure. Although all flood water from the upstream area was stored in the reservoir, serious flooding began less than 3 miles downstream and increased in severity to what was aptly described as "devastation" in the towns of Granada and Holly, about 34 and 45 miles, respectively, downstream from the reservoir. Even the most enthusiastic proponent of flood-control structures, channel improvements, or watershed management hardly would advocate construction of all the facilities that would have been required to control the flows of the many tributary streams. The "head-for-the-hills" technique may be the only effective measure to deal with such floods.

Planned use of the flood plains, based on all available flood data, including those in this report, will help prevent unexpected financial losses and danger to lives by making new development in endangered areas compatible with the degree of flooding that may occur. Lessons learned by residents of the areas flooded, including normally "dry" creek flood plains, may soon be forgotten, but properly documented evidence of flood stages, discharges, and areas inundated and related data can be of great value to administrators, planners, and engineers concerned with formulating zoning regulations and setting design criteria to minimize future flood losses.

Unusually large floods occurred on the Arkansas River from Pueblo, Colo., to Great Bend, Kans., on the north-bank tributaries from Pueblo to Avondale, Colo., on the south-bank tributaries from Swink, Colo., to the State line, and on the Canadian River and its tributaries above Conchas
Reservoir. Peak discharges several times greater than those with a frequency of 50 years occurred at many sites. Along the Canadian River in New Mexico above Conchas Dam, peak discharges were greater than those that occurred in the outstanding flood of 1904.

Flood damage in the tristate area exceeded $60 million, and 16 lives were lost. Many gaging stations were destroyed or damaged in Colorado and New Mexico. Floods during the same period in the South Platte River basin (Matthai, 1969) resulted in over $500 million in damage and the loss of eight lives.

FLOODS AND FLOOD AREAS

The floods of June 1965 in the Arkansas River basin occurred principally in five areas: north of Pueblo, Colo.; Purgatoire River and its tributaries below Alfalfa, Colo.; south of the Arkansas River from Las Animas, Colo., to the State line; the Arkansas River from Pueblo, Colo., to Great Bend, Kans.; and the Canadian River and its tributaries in New Mexico above Conchas Reservoir (pl. 1).

The floods began on June 14 in the Fountain Creek basin near Colorado Springs, Colo., from moderately intense rainfall. The next day outstanding floods occurred in the Mora River basin in New Mexico from intense rainfall. This was only the prelude of what was to come. Immense storm centers formed on the 16th and 17th in the upper Fountain Creek basin and in the southeast corner of Colorado and in northeastern New Mexico near Raton (pl. 2). Rainfall was extremely intense, as much as 15.5 inches in 14 hours, and caused record-breaking floods in the areas listed above.

ACKNOWLEDGMENTS

The data in this report were collected as part of the cooperative programs between the U.S. Geological Survey and other Federal, State, county, and municipal agencies. They were collected and compiled under the supervision of J. W. Odell, E. J. Kennedy, and W. L. Heckler, district engineers for the Colorado, Kansas, and New Mexico districts, respectively. The field surveys and some computations were coordinated by H. F. Matthai, regional hydraulic specialist. Office computations were directed by C. T. Jenkins and R. J. Snipes, Denver, Colo., and personnel in the States of Kansas and New Mexico. Experienced men from four other districts assisted in the field surveys. Owen J. Larimer provided valuable technical data concerning flood information for New Mexico. E. J. Tripp, C. T. Jenkins, and D. D. Gonzalez materially assisted in the preparation of this report. The U.S. Army Corps of Engineers, the U.S. Bureau of Reclamation, and the U.S. Weather Bureau furnished meteorological information, precipitation and flood-damage data, and the precipitation map. Their cooperation is gratefully acknowledged.

Gratitude is also extended to the many farmers, ranchers, and other individuals who provided valuable information on times of flood peaks and
storm characteristics, provided other related data, and granted access to private property for indirect measurements of peak flow.

RELATIVE MAGNITUDE OF THE FLOODS

The relative magnitudes of the floods described in this report are evaluated by comparison with maximum floods known and by frequency relations.

COMPARISON WITH MAXIMUM FLOODS KNOWN

Hoyt and Langbein (1955, fig. 20, p. 60) plotted maximum known discharges in the United States against drainage area for the period prior to 1950 and drew an enveloping curve. They compared it with a similar curve for the known floods prior to 1890 (Creager and others, 1945, p. 126). Hoyt and Langbein (1955, p. 59) stated "The upper curve is about five times the lower curve. This is no evidence that flood conditions are changing. The upward shift of the curve in Fig. 20 is due entirely to an increased number of gaging stations and increased period of record." Though they called their curve an enveloping curve, it is only nominally so, as they chose to draw it below six discharges shown on their graph. Matthai (1969) drew a higher curve based on the data used by Hoyt and Langbein and data for five additional floods. Two of these occurred prior to 1950, but presumably the data were not available to Hoyt and Langbein. Matthai's curve is additional evidence that, to paraphrase Hoyt and Langbein, it is our knowledge of floods that increases, not the size of the floods.

The enveloping curves are based on the known top discharge figures for sites in the United States, but the potential floods for some areas of the country are less than for other areas because of differences in potential storm rainfall intensities. Hoyt and Langbein (1955, fig. 24, p. 75) outlined in a rough way the regional variations in flood-discharge potentials. They showed that the potential floods in eastern Colorado and New Mexico are less than one-half those shown by their enveloping curve. Their conclusion is based on admittedly risky generalizations, but it can be used for comparison.

The June 1965 floods on several streams in the Arkansas River basin approached or exceeded the potential floods for eastern Colorado and New Mexico and were outstanding events. The most outstanding event was on Jimmy Camp Creek, where the peak discharge was 2.5 times the potential flood, and its ratio to discharge from Hoyt and Langbein's enveloping curve is 1.24. The floods on Rule Creek, Big Sandy Creek, and Clay Creek also exceeded the potential floods, having ratios to discharge from Hoyt and Langbein's curve of 0.82, 0.66, and 0.65, respectively. The higher discharges in relation to drainage area for the June 1965 floods in the Arkansas River basin and the three enveloping curves mentioned above are shown in figure 1.
Regional flood-frequency relations cannot be used directly to compare the relative magnitude of extremely outstanding floods (those with recurrence intervals greater than 50 yr) in the Arkansas River basin because the relations have been defined only up to the 50-year recurrence interval (Patterson, 1964). Also, the relations have not been defined for small drainage basins because of insufficient peak-flow data. The continuing collection of peak-flow data will eventually provide information to extend the relations to greater recurrence intervals and to define the relations for small drainage basins.

Regardless of the inadequacies in the present flood-frequency relations, they must be used in some manner by planners in protective design. One such manner is by comparison with the 50-year flood from frequency relations. The 1965 floods in the Arkansas River basin equalled or exceeded the 50-year flood at many sites; at some, by many times. For example, the peak discharges of Clay Creek near Lamar, Colo., Jimmy Camp Creek near Fountain, Colo., and Chase Canyon near Cimarron, N. Mex., were 30, 30, and 20 times those of the 50-year floods, respectively. Of the 131 sites where peak discharges were determined, at least 47 had discharges equal to, or greater than, that of the 50-year flood. At 40 sites on small drainage basins the flood-frequency relations are not defined, but the 1965 flood
probably exceeded the 50-year flood at many of these sites. By this comparison, the 1965 floods were obviously outstanding.

CAUSES

Flooding is often caused by a single event; the ensuing damage, by the downstream progression of the flood wave. For the June 1965 floods, especially on the main river courses, a series of flood waves caused progressive flooding.

Colorado, in general, received fairly heavy rain on June 14; hail damaged some areas, particularly around Colorado Springs. Rainfall was light on June 15, torrential on June 16, and of tremendous proportions on June 17. New Mexico received intense rainfall in the Mora River basin on June 15 and in the upper Canadian River basin on June 17. The June 16 and 17 storms covered practically all areas in southeastern Colorado and northeastern New Mexico, with greatest concentration of rainfall near Holly, Lamar, and Two Buttes, Colo.

ANTECEDENT CONDITIONS

General rains began in the Arkansas River basin in Colorado on May 22, and as much as 2.68 inches of rain was reported for a single day. June 4 and 5 were also days of relatively high precipitation, and the stage was set for "rivers to roll" beginning June 14. General rains in New Mexico June 9–12 set the stage for the beginning of high runoff in the Canadian River basin.

PRECIPITATION

The U.S. Weather Bureau (1961) has developed maps showing relations between rainfall, intensity, and frequency. These relations are only general and do not reflect the orographic effect of relatively isolated topographic features. The orographic effects of the divide between Colorado Springs and Limon, Colo., and the divide extending from a point between Trinidad, Colo., and Raton, N. Mex., generally eastward to the Panhandle of Oklahoma, were quite pronounced during the storms of June 16 and 17. Thus, a direct comparison between regional rainfall relations and some of the observations of point rainfall could be misleading. However, if the anomalies are considered, the comparison should provide some perspective for an evaluation of the rainfall that did occur.

From the regional relations, the 100-year 6-hour rainfall in the vicinity of Fountain, Colo., is 3.3 inches; the observed 6-hour rainfall at Fountain on June 17 between 1100 and 1700 hours (astronomical time) was 4.70 inches.

The 100-year 24-hour rainfall in the vicinity of Holly, Colo., is 5.2 inches; the observed 24-hour rainfall at Holly on June 17 was 11.08 inches. The U.S. Army Corps of Engineers (1966) reported that in the 14 hours before 1400 hours June 16, 15.5 inches of rain was observed 28 miles southeast of Lamar, Colo. This is about three times the 100-year 12-hour rainfall.
The 100-year 1-hour rainfall in the vicinity of Raton, N. Mex., is 2.3 inches. Between 1900 and 2000 hours on June 17, 2.32 inches of rain fell. The precipitation of 5.60 inches recorded on June 17 was a new record for that station and was about 1.2 times the expected 100-year 24-hour rainfall. Thus, the very heavy and intense rainfalls were extremely rare events.

To illustrate graphically the intensity of rainfall in June 1965 at some points, cumulative values were plotted for June 14–18 for 12 reporting stations in Colorado and three in New Mexico. The graphs are shown in figures 2 through 5; weather stations are shown on plate 2.

**Figure 2.** Cumulative precipitation at selected weather stations (pl. 2) in Arkansas River basin above John Martin Reservoir, Colo.

**Figure 3.** Cumulative precipitation at selected weather stations (pl. 2) in Purgatoire River basin, Colorado.
Figure 4. — Cumulative precipitation at selected weather stations (pl. 2) in Arkansas River basin below John Martin Reservoir, Colo.
Rainfall at reporting stations in the Arkansas River basin in Colorado for June 14–15 was less than 1.7 inches except at the Colorado Springs airport, where 2.74 inches was reported. Three weather stations north and west of Lamar (pl. 2) reported about 1.6 inches. In New Mexico, flood-producing rains fell over the Mora River basin and the area north and northeast of Las Vegas. At Roy, 2.50 inches fell on June 14, most of it in 2 hours; and at Valmora, 4.73 inches was reported on June 15. There were many unofficial reports of 4 inches or more during the 2-day period.

Rainfall at reporting stations in the Arkansas River basin in Colorado for June 14–15 was less than 1.7 inches except at the Colorado Springs airport, where 2.74 inches was reported. Three weather stations north and west of Lamar (pl. 2) reported about 1.6 inches. In New Mexico, flood-producing rains fell over the Mora River basin and the area north and northeast of Las Vegas. At Roy, 2.50 inches fell on June 14, most of it in 2 hours; and at Valmora, 4.73 inches was reported on June 15. There were many unofficial reports of 4 inches or more during the 2-day period.

Rainfall on June 16

Intense rainfall began on June 16; major flooding occurred the next several days. There were 15.5 inches of rain reported 28 miles southeast of Lamar, Colo., and 3.34 inches at Black Lake, N. Mex. The description given by Matthai (1969) sums up conditions in the Arkansas River basin as well as in the South Platte River basin. He stated:
Rainfall in the amounts and intensities that occurred on June 16 usually requires some persistence of several conditions. There must be (1) large amounts of low-level moisture and a strong influx of this moisture to supply the rain-producing mechanism continuously, (2) unstable atmospheric conditions, particularly at upper levels, and (3) one or more mechanisms to lift the air. All of these conditions were present on June 16 (U.S. Weather Bureau, written commun., 1966).

The air movement near the surface was one of the contributing factors. There were moderate winds from the southeast June 14–18 bringing moist air from the Gulf of Mexico, and surface dewpoints were in the low 60's and upper 50's (°F), which are unusually high for eastern Colorado. The influx of moisture was rapid, and the moist air was in a rather deep layer. The low-level southeasterly flow was particularly strong on June 16; wind speeds of over 40 knots near 2,000 feet above the ground were reported at Amarillo, Tex., and Dodge City, Kans. The surface wind at Amarillo began gusting during the afternoon of June 16. The low-level flow had the characteristics of the low-level jet in this region, but the relatively high winds at the ground produced the unusual condition of a low-level jet in depth.

A trough over the Western United States was retarded and intensified at the 500 mb (millibar) level at approximately 18,000 feet, or 5,500 meters. By June 16, a quasi-stationary cold low had been created at 500 mb over southern Nevada. This situation brought in cold air aloft which reduced the atmospheric stability to moderately low levels.

The air circulation about the low produced some lifting. This was not a prime factor in causing rain, but it was significant.

The general upslope from east to west of the High Plains caused a major uplift because the low-level wind had an easterly, or upslope, component. The orographic effect of small-scale features caused shower activity early in the storm.

Showers and thunderstorms started to develop over the area east of the mountains during the morning of June 16. By early afternoon the storms were located along a north-south line roughly from Denver to Pueblo. The upper level steering winds had only a slight westerly component; therefore the thunderstorms were not carried away from the mountains, as generally happens, but remained over the high-rainfall areas for more than an hour.

More than 14 inches of rain fell near Palmer Lake and near Larkspur in about 4 hours. By 1800 hours the westerly component of the upper level steering winds increased and moved the storm line eastward.

RAINFALL ON JUNE 17

Activity increased in southeastern Colorado and northeastern New Mexico on June 17. The U.S. Weather Bureau at Amarillo, Tex., reported moderate thunderstorms with tops at 30,000 or 40,000 feet over northeastern New Mexico and the Texas and Oklahoma Panhandles; one cell near Dalhart, Tex., had a top at 50,000 feet. Steering-level winds were from the southwest, so there was a more westerly component than on June 16.

The storm cells that developed on the afternoon of June 17 caused heavy rains in some areas for the second consecutive day. Already swollen rivers were pushed to destructive stages, and more long-term rainfall and discharge records were exceeded.

Rainfall amounts occurred which had never before been recorded in some areas. Fourteen inches of rain fell June 17 northeast of Colorado Springs, Colo. The 2-day total rainfall of more than 10 inches on June 16–17 at weather station Two Buttes 1NW (pl. 2) exceeded the maximum recorded for any month since recordkeeping began in 1890, and the monthly total for June exceeded the previous monthly record by more than 5 inches; 7.86
inches fell in 4 hours during the early morning of June 17. Holly, Colo., reported 11.08 inches. At the airport in Raton, N. Mex., 5.52 inches of rainfall was recorded between 1700 and 2200 hours, and 2.32 inches of this fell between 1900 and 2000 hours. New monthly records for June were set at Cimarron, Grenville, Raton Airport, Lake Maloya, and Roy, N. Mex. (pl. 2).

RAINFALL ON JUNE 18–19

Heavy rains continued on June 18 at some points in Colorado and on June 18–19 in New Mexico. Although the rains did not increase flooding substantially, they did contribute significantly to storm-period totals. Some 2-day rainfall amounts were 4.95 inches at Grenville and 3.68 inches at Raton, N. Mex., and 4.09 inches at Holly and 2.59 inches at Lamar, Colo.

DESCRIPTION OF THE FLOODS

The Arkansas River heads in the mountainous regions of Colorado near Leadville. It flows generally southward through a valley region to Salida, then eastward through canyon areas to Canon City and Pueblo. From Pueblo the river flows eastward across the plains of Colorado and into Kansas. The June 1965 floods were generated by storms over the eastern slopes of the mountains and on the eastern plains and affected the Arkansas River tributaries downstream from Pueblo. The Arkansas River above Pueblo contributed only minor flows to the flood area although the flow, largely from snowmelt, was above normal.

The Canadian River heads in the mountainous regions of New Mexico near Raton, just south of Colorado, and for the most part flows in a narrow valley until it is joined by Chicorica Creek south of Hebron (pl. 1). From this point to the Canadian River gorge, a distance of about 26 miles, the valley is fairly broad, but the river is entrenched between high cutbanks. The head of the Canadian River gorge is about 2 miles downstream from Cimarron Creek, near Taylor Springs, and from this point the river flows in a deep nearly continuous chasm, out of New Mexico. All the major western tributaries upstream from Conchas Reservoir rise in the Sangre de Cristo Mountains and are characterized by steep-channel slopes and small low-water channels.

The floods originated principally in four general areas: near Colorado Springs, Colo.; south of the Arkansas River in Colorado from Las Animas to the Colorado-Kansas State line; near Raton, N. Mex., in both Colorado and New Mexico; and in the Mora River basin in New Mexico. The Mora River basin sustained its greatest flooding from heavy rainfall on June 14 and 15. High runoff in most other areas was caused by the storms of June 16 and 17. The irregular distribution of the intense rainfall was such that some tributaries contributed little runoff to the flood. Some of those tributaries were on the south side of the Arkansas River in Colorado from Pueblo to Fowler and on the north side from Boone to Rocky Ford. Flooding in Kansas resulted from residual runoff from Colorado.
ARKANSAS RIVER ABOVE JOHN MARTIN DAM

The area above John Martin Dam has been affected by flooding or many occasions. Floods have been generated in the headwaters of tributaries such as the Purgatoire River, Fountain Creek, and the St. Charles River. At other times, 1921 for example, flooding occurred as a result of storms on and adjacent to the main stem of the Arkansas River. In 1965 the major flooding was between Fountain Creek and La Junta.

FOUNTAIN CREEK BASIN

The upper Fountain Creek area was first hit by intense rain and hail on June 14. Fountain Creek peaked at 2,890 cfs (cubic feet per second) at the Security gaging station (pl. 1) and then receded until the storms of June 16. Because of inflow from tributaries downstream from Security, the peak flow at Pueblo was increased to 11,000 cfs on June 15. Sand Creek also overflowed on June 14, causing heavy damage to roads and bridges.

On June 16 the intense rain on Monument Creek north of Colorado Springs (as much as 14 in. near Palmer Lake) caused a second and higher peak flow of 8,260 cfs at Security late that night. This peak decreased to 3,990 cfs at Pueblo because the rain was concentrated in the upper part of the basin. However, the major flooding down the full length of Fountain Creek was caused by the greater storms of June 17 north and east of Colorado Springs. The peak flows on June 17 were 21,500 cfs at Security and 47,000 cfs at Pueblo. Jimmy Camp Creek, which enters Fountain Creek 5.5 miles downstream from Security, had a peak flow of 124,000 cfs on this day. Fortunately this peak occurred a few hours before the peak flow at Security. Had the two peaks coincided, the effects downstream at Pueblo could have been disastrous. The peak discharge on Fountain Creek at Pueblo (47,000 cfs) exceeded the record floods of 1921 and 1935 and destroyed the gaging station. Reduction of the peak flow from at least 124,000 cfs below Jimmy Camp Creek to 47,000 cfs at Pueblo can be explained only by attenuation resulting from flow through miles of wooded flood plains and meandering channels.

ARKANSAS RIVER—FOUNTAIN CREEK TO LAS ANIMAS

Timing of the flood crests down the Arkansas River from Pueblo to Las Animas is shown by the discharge hydrographs at gaging stations (fig. 6). Records for the station near Nepesta are not available because the station was destroyed by the flood. The peak discharge of 50,000 cfs on June 18 at the gaging station on the Arkansas River near Avondale resulted mainly from the flood crest from Fountain Creek. No other high flows of consequence were recorded there during the flood period.

The highest peak discharge determined on the main stem of the Arkansas River above John Martin Reservoir was 104,000 cfs at a site 1.2 miles downstream from Chico Creek. This peak flow resulted from nearly coincidental timing of the flood crest moving down the Arkansas River and the
peak discharge of 52,200 cfs from Chico Creek. Peak discharges attenuated greatly on Chico Creek below Black Squirrel Creek, the major tributary which enters about 12 miles upstream from the mouth, and also on Black Squirrel Creek. Black Squirrel Creek had a peak discharge of 141,000 cfs about 20 miles upstream from its mouth from a drainage area of only 353 square miles.

As flooding proceeded down the Arkansas River from Avondale, other large tributary inflows increased the main-stem discharges significantly. Coincidental timing of the flood crests would have increased the main-stem discharges even more. The tributaries between Avondale and Nepesta added only nominal flows, probably less than 3,000 cfs from the Huerfano River, the major tributary. The peak discharge of the Arkansas River attenuated from the 104,000 cfs below Chico Creek to 43,100 cfs at the station near Nepesta. Attenuation was offset by tributary inflow below Nepesta, and the peak discharge at Catlin Dam was 43,200 cfs on June 18. The tributaries probably peaked on the previous day, as shown by the Apishapa River, which peaked at 11,400 cfs on June 17. The Apishapa River was contributing less than 200 cfs at the time of the peak flow on the Arkansas River (June 18). The peak flow from the Apishapa River contributed to a secondary peak of 23,400 cfs at Catlin Dam on June 17.

Between Catlin Dam and La Junta, Timpas Creek and Crooked Arroyo enter the river. These two tributaries peaked on the morning of June 17,
causing a peak of 28,300 cfs on the Arkansas River at La Junta, only 3,400 cfs less than the maximum of 31,700 cfs which occurred on June 19. North La Junta was severely damaged by floodwaters June 17–19 (fig. 7), but damage would have been increased manyfold had the Timpas Creek and Crooked Arroyo flood crests coincided with the one moving down the Arkansas River.

Horse Creek and Adobe Creek enter the Arkansas River from the north between La Junta and Las Animas. They had peak discharges of over 5,000 and 8,000 cfs, respectively, but since these occurred on June 18, they did not contribute significantly to the maximum discharge of 22,100 cfs on the Arkansas River at Las Animas on June 19. However, the flow from these streams was a significant cause of the peak discharge of 19,800 cfs at Las Animas on June 18. Observations by H. F. Matthai on July 13, 1965 (written commun.), showed that the tributaries of Horse Creek between Yoder and Hall Station had little or no flow during the flood period and that the peak flow of Horse Creek near Hall Station had been about 500 cfs.

**ARKANSAS RIVER—LAS ANIMAS TO JOHN MARTIN DAM**

Between Las Animas and John Martin Dam, flows entering John Martin Reservoir consisted mainly of runoff from the Arkansas River main stem, the Purgatoire River, and Rule Creek. During the flood period June 17–21, the contents of John Martin Reservoir increased 271,300 acre-feet; 87,000 acre-feet came from the Arkansas River, 140,800 acre-feet came from the Purgatoire River, and most of the remaining 43,500 acre-feet probably came from Rule Creek, which had a peak discharge of 276,000 cfs at a site about 20 miles upstream from the reservoir. The peak inflow to the reservoir was computed by the U.S. Army Corps of Engineers (1966, p. 17) as about 163,000 cfs at 1530 hours on June 18.

The Purgatoire River is aptly named because of its wild and frequent flooding. The succession of flooding during the period June 14–19 can be followed by referring to figure 8, which shows hydrographs of available main-stem gaging-station records from Hoehne to the mouth. No hydrograph is shown for the Purgatoire River at Ninemile Dam near Higbee, because the gage was destroyed and the record was lost.

At Trinidad, flooding on the Purgatoire River began on June 16 as a result of severe storms on the tributaries upstream. More storms on June 17, however, caused the peak discharge, 15,700 cfs, to be somewhat higher than the peaks that occurred the previous day. The gaging station was inundated, and no continuous records were obtained after 1900 hours on June 16. The gaging station near Hoehne reflected the high flows at Trinidad, but the peak discharge on June 17 was 1,400 cfs less than that on June 16. The peak discharge at the next downstream gaging station, near Alfalfa, was 27,300 cfs on June 18. Inflow from San Francisco and Frijole Creeks had contributed to this peak somewhat, but due to the timing of the peaks on
These creeks, the peak discharge near Alfalfa was not as high as it might have been.

Between the gaging station near Alfalfa and a miscellaneous site near Thatcher on the Purgatoire River, the peak discharge increased about 20,000 cfs from an intervening area of 615 square miles. Two measured tributaries with combined drainage areas of 164 square miles contributed peak flows of about 7,000 cfs of this increase. At the gaging station at Ninemile Dam near Higbee, the peak discharge was an estimated 105,000 cfs, representing an increase of 57,300 cfs from 965 square miles of drainage area between the miscellaneous site and Ninemile Dam. Chacuaco Creek, with a peak flow of 38,900 cfs, was evidently the greatest contributor to the increase in this reach.

Three significant peaks of the Purgatoire River occurred at the station near Las Animas during the flood period. The first peak on June 14 also occurred at the station near Higbee but not at the Alfalfa station. A local storm of considerable magnitude must have occurred in the area upstream from Higbee, possibly in Chacuaco Creek basin, where there are no precipitation stations. Two outstanding peaks occurred on June 18; both, however, were considerably less than the peak discharges that occurred upstream. The first peak, 59,900 cfs, was caused mainly by the flood water
from Smith Canyon, which had a peak discharge of 84,000 cfs at a site 4.5 miles upstream from its mouth. The second peak, 62,500 cfs, was from the flood crest moving down the Purgatoire River, but there had been considerable attenuation from the peak discharge of 105,000 cfs at the Higbee station. Had the flood crest from Smith Canyon been coincidental with the crest moving down the river, the flood at Las Animas would have been much more devastating.

ARKANSAS RIVER—JOHN MARTIN DAM, COLORADO, TO GREAT BEND, KANSAS

The gates in John Martin Dam were closed at 0730 hours on June 17, and nearly the entire volume of flood runoff was contained in the reservoir. However, another flood was generated on the Arkansas River in the reach between the mouth of Caddoa Creek and Lamar, Colo., from the tributaries on the south side of the river. The sum of the peak discharges on Caddoa, Mud, and Dry Creeks was almost 120,000 cfs during the early hours of June 18. Channel storage and differences in timing reduced these combined peak inflows to a peak discharge of 73,800 cfs at Lamar at 0800 hours on June 18 (fig. 9). Even with this reduction, the gaging station was inundated and extensive flooding occurred in the north half of Lamar. Willow Creek, a tributary entering Lamar from the south, spread havoc in the southern and eastern parts of town.

High runoff from Clay Creek, a south-bank tributary east of Lamar, added to the floodflows on the Arkansas River. The peak discharge on Clay Creek upstream from Clay Creek Reservoir was 158,000 cfs on June 18. Clay Creek Reservoir filled to capacity from inflow due to rains on June 17, and the dam failed because of the high inflow on June 18. Between Clay Creek Reservoir and the Arkansas River, highway bridges and railroads were extensively damaged (fig. 10).

Big Sandy Creek enters the Arkansas River from the north between Lamar and Granada, Colo. It heads near Calhan in the area northeast of Colorado Springs, flows northeast toward Limon, and then turns southeast to the Arkansas River. The peak discharge near Calhan (60,700 cfs at 1700 hr on June 17) was caused by the storms of June 17 near Colorado Springs. The peak flow was reduced significantly by Ramah Reservoir, 9 miles downstream, and little of this flow reached the Arkansas River. Supplemental information along Big Sandy Creek was obtained by H. F. Matthai on July 13, 1965 (written commun.). Peak discharges estimated at 2,500 to 3,000 cfs occurred at Matheson, Limon, and Hugo, and one of about 8,000 cfs occurred at Kit Carson. The peak discharge near the mouth of only 3,600 cfs occurred at 0900 hours on June 17 and resulted from local rains.

Other north-bank tributaries between Lamar and the State line also had only minor flood peaks except for Wild Horse Creek, which had a peak flow of 10,600 cfs at Holly on June 17.
Outstanding floods occurred on June 17 on the south-bank tributaries (Smith Arroyo and Wolf, Granada, and Two Butte Creeks) between Clay Creek and the State line. Wolf Creek had a peak discharge of 35,300 cfs and flooded the town of Granada. Triggered by rains of over 9 inches at Two Buttes and 11 inches near Holly on June 17, the floodwaters of Two Butte Creek reached a peak discharge of 82,600 cfs above Two Buttes Reservoir and increased to 182,000 cfs at the mouth, overtopping the reservoir enroute.

The peak discharges measured on June 17 on the tributaries between Clay Creek and the State line totaled nearly 255,000 cfs. The peak flow of the Arkansas River at Holly, Colo., was probably less than this amount because of attenuation and because of differences in distances traveled, but it must
FLOODS OF 1965 IN THE UNITED STATES

Figure 10. — Photographs showing damage to highway (upper) and railroad (lower) over Clay Creek east of Lamar, Colo. Photographs by D. R. Beardsley, La Junta, Colo.
have exceeded the peak flow of Two Butte Creek. The floodwaters inundated the town of Holly and were the cause of the flooding that extended to Great Bend, Kans. The flood crest on the Arkansas River from above Lamar, Colo., and from Clay Creek did not reach Holly until late the next day. It caused high secondary peaks and high sustained runoff.

Flooding occurred downstream from Holly, Colo., through Syracuse, Garden City, Dodge City, Kinsley, and Great Bend, Kans., with accompanying attenuation (fig. 11). Timing was fortunate because coincident flood crests from the tributaries and on the Arkansas River would have been destructive beyond imagination. Even so, damage was extensive in Kansas. The flood front approaching Dodge City is dramatically illustrated by two aerial photographs (fig. 12).

Peak discharges exceeded those of the 50-year frequency and those previously known at all gaging stations on the Arkansas River from Coolidge to Great Bend, Kans.

![Graph showing discharge hydrographs from selected gaging stations on Arkansas River, Garden City to Great Bend, Kans.](image)

**Figure 11.** Discharge hydrographs from selected gaging stations on Arkansas River, Garden City to Great Bend, Kans. Number in parentheses is site number (pl. 1).
Rainfall from afternoon and evening thunderstorms over the mountainous parts of the Canadian River watershed during the period June 13–20, 1965, totaled as much as 13 inches. Two separate flood peaks occurred above Conchas Reservoir. Flood-producing rains began the evening of June 14 over the Mora River basin and in the area east of Las Vegas. These rains caused high flood peaks in the Mora River basin and on the Canadian River downstream from the Mora River. The peak discharge at the gaging stations on the Canadian River on June 15 increased from 14,800 cfs near Roy to 126,000 cfs near Sanchez. The ungaged contributing area between the stations is 720 square miles. Since the peak flow of the Mora River near Shoemaker was only 14,800 cfs, the peak flow increase from the ungaged area, 288 square miles in the Mora River basin below the Shoemaker station and 432 square miles in the Canyon Largo and Vermejo Creek basins, was at least 111,000 cfs.

Severe flooding began the evening of June 17 in the upper reaches of the Canadian River and its tributaries. By late evening on June 18 the flood crest had reached Conchas Reservoir, and streams were again generally within their banks. Storms and runoff were such that tributary peak discharges nearly coincided with the main floodwave as it progressed downstream. All four gaging stations on the Canadian River were destroyed by the floods.

The peak discharge on the Canadian River near Hebron was 62,400 cfs on June 17. It was the greatest discharge in the 19-year period of record and probably exceeded that of the 1942 flood, when the river reached a stage of about 26 feet. The gaging station near Taylor Springs is at the head of the Canadian River gorge, which is 300 feet wide and over 60 feet deep at this point. The flood barely topped the canyon walls, and the constriction created a temporary lake 2 miles long and over half a mile wide. Near Roy the peak of 172,000 cfs washed out the gage and overtopped the bridge and roadway downstream. The Mora River probably contributed less than 2,000 cfs to the flood peak of 145,000 cfs on the Canadian River near Sanchez on June 18. The flood peaks of June 17 and 18 on the Canadian River exceeded those of June 15 and also exceeded those of the outstanding flood of September 1904.

Conchas Reservoir stored the entire runoff during the flood periods. Contents increased from 109,000 acre-feet on June 13 to 323,000 acre-feet on June 20 and to 352,000 acre-feet at spillway level by June 29. Maximum inflow rates were 110,000 cfs at 1000 hours on June 15 and 124,000 cfs at 1800 hours on June 18. No flooding occurred along the Canadian River downstream from Conchas Dam.
Outstanding peak flows occurred on the Canadian River tributaries from the intense storms of June 15 or 17. The peak flow of the Vermejo River near Dawson of 12,600 cfs on June 17 was the greatest discharge since 1927 and was probably higher than that during the flood of 1921.

Peak flow into Eagle Nest Lake on Cimarron Creek was about 550 cfs on June 17, and outflow was less than 1 cfs. Measured tributary contributions to Cimarron Creek for the first 10 miles downstream from the dam totaled only 171 cfs. Flooding on the creek began less than 8 miles upstream from the gaging station near Cimarron. The peak discharge of 15,500 cfs, therefore, was generated in an area of about 30 square miles. Turkey Creek Canyon, which drains 5.25 square miles, contributed over 40 percent of the peak flow. The peak discharge on Cimarron Creek at Springer increased to 29,500 cfs. The Philmont Scout Ranch, about 10 miles southeast of Cimarron, sustained heavy damage, and about 25 city blocks in Springer were partially flooded.

Other tributaries to Cimarron Creek also had outstanding peak flows. The peak discharge of 5,630 cfs on Ponil Creek near Cimarron, which destroyed the gaging station, was the greatest since 1915. Flooding in the valley downstream from Chase Canyon, which enters half a mile downstream from the gaging station on Ponil Creek, was the greatest in at least 80 years, according to a longtime resident. Rayado Creek at Srubel Ranch near Cimarron had a peak flow of 9,000 cfs on June 17. This was nearly five times the maximum discharge for the 54 years of record prior to June 1965 and almost nine times the peak discharge of the 50-year flood.

Flooding in the Mora River basin occurred June 15–17. Peak discharges at some stations on the main stem and on some of the tributaries approached or exceeded those of a 50-year frequency.

Flooding occurred in some areas in extreme northeastern New Mexico near Clayton and Guy on tributaries to the Canadian, Cimarron, and North Canadian Rivers. Travesser Creek near Guy had a peak discharge of 12,500 cfs, or twice that of the 50-year flood. Cieneguilla Creek near Clayton had a peak discharge of 9,580 cfs, or 1.2 times that of the 50-year flood. Clayton Lake on Cieneguilla Creek was filled for the first time since its completion in 1958.

In Colorado the entire flood runoff upstream from John Mart'n Dam was stored in the reservoir. This was fortunate indeed for communities downstream because of the high peak flows from the tributaries below the dam. Two tributaries entering the Arkansas River within 6 miles downstream were contributing over 90,000 cfs in the early morning of June 18. At 0630 hours on June 18 the instantaneous inflow to the reservoir was about
100,000 cfs (U.S. Army Corps of Engineers, 1966, pl. 10). According to the U.S. Army Corps of Engineers, the peak discharge at Lamar without regulation by the reservoir would have been 208,000 cfs instead of the actual 73,800 cfs. John Martin Reservoir was the only reservoir of significant size affecting the floodflows in Colorado and Kansas.

In New Mexico, floodwaters were completely controlled by Conchas and Ute Reservoirs on the Canadian River, and no flooding occurred downstream.

**COMPARISON WITH PREVIOUS FLOODS**

Detailed descriptions of the record floods of June 3–5, 1921, in Colorado are published in the report by Follansbee and Jones (1922). A report published privately by the Rocky Mountain Railroad Club (Ridgway, 1956) contains a vivid description of the 1921 flood as it progressed through Pueblo. Other reports prepared for notable floods that occurred in the Arkansas River basin in Colorado and New Mexico are those by Murphy and others (1905), Freeman, Lamb, and Bolster (1910), Follansbee and Hodges (1925), Dalrymple and others (1939), Follansbee and Sawyer (1948), and Vaudrey (1960).

At some sites the June 1965 floods exceeded the record floods of 1921 in Colorado and those of 1904 in New Mexico (table 1). Previously known maximum discharges at 31 active or discontinued gaging stations, three crest-stage stations, and 15 miscellaneous sites were exceeded in 1965.

<table>
<thead>
<tr>
<th>Stream and location</th>
<th>Contributing drainage area (sq mi)</th>
<th>Peak discharge (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1904</td>
<td>1921</td>
</tr>
<tr>
<td>Arkansas River near Pueblo, Colo</td>
<td>4,686</td>
<td>8,500</td>
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<tr>
<td>Fountain Creek at Pueblo, Colo</td>
<td>926</td>
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<tr>
<td>Chico Creek near North Avondale, Colo</td>
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<td>Arkansas River near Nepesta, Colo</td>
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<td>Arkansas River at La Junta, Colo</td>
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<td>Purgatoire River at Trinidad, Colo</td>
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<td>45,400</td>
</tr>
<tr>
<td>Arkansas River at Lamar, Colo</td>
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<td>---</td>
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<tr>
<td>Arkansas River at Great Bend, Kans</td>
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</tr>
<tr>
<td>Vermillion River near Dawson, N. Mex</td>
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<tr>
<td>Cimarron Creek at Springer, N. Mex</td>
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<td>(1)</td>
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<tr>
<td>Canadian River near Taylor Springs, N. Mex</td>
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<td>Mora River near Shoremaker, N. Mex</td>
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<td>(1)</td>
</tr>
<tr>
<td>Canadian River near Sanchez, N. Mex</td>
<td>5,712</td>
<td>(1)</td>
</tr>
</tbody>
</table>

1 Stage 1.4 ft lower than in 1965; discharge not determined. 2 Probably exceeded 10,000 cfs. 3 Probably exceeded 10,000 cfs, but probably less than in 1965.

**ARKANSAS RIVER BASIN, COLORADO AND KANSAS**

The earliest known flood in the Arkansas River valley in Colorado occurred in 1826, long before permanent settlement. Historical information indicates that many other notable floods occurred in the valley (Follansbee and Sawyer, 1948). The maximum flood since 1856 on the Arkansas River
from Pueblo to Lamar, Colo., occurred in 1921. The flood of 1864 was almost as great as the 1921 flood (103,000 cfs) in Pueblo. A major flood in 1894 was higher than the 1921 flood in the valley upstream from Pueblo but was considerably lower in Pueblo and downstream. The 1908 flood on the Arkansas River exceeded the 1921 flood at Holly, Colo., and downstream into Kansas. The floods of May 1955 in the Arkansas River basin in southeastern Colorado and northeastern New Mexico were generally the greatest floods since 1921 on the Arkansas River above the mouth of the Purgatoire River (Vaudrey, 1960).

The peak discharges of the 1965 flood on the Arkansas River from Pueblo to Lamar, Colo., were considerably lower than those in 1921 and also lower than the 1955 peak discharges from La Junta, Colo., to John Martin Reservoir. They exceeded the 1955 peak discharges in a reach downstream from Fountain Creek, especially downstream from Chico Creek. The 1965 peak discharges on the Arkansas River at Holly, Colo., and downstream into Kansas were the greatest known. The peak discharge was not determined at Holly, Colo., but probably exceeded the peak flow of 182,000 cfs from Two Butte Creek, which enters the river just upstream. On October 20, 1908, the peak flow at Holly was 110,000 cfs. At the Syracuse, Kans., station the peak discharge in 1965 was 174,000 cfs, compared with 87,000 cfs in 1908.

The 1965 peak discharge of 47,000 cfs on Fountain Creek at Pueblo, Colo., was the greatest of record. Peak discharges on June 4, 1921, and May 30, 1935, were 34,000 and 35,000 cfs, respectively. On the Purgatoire River the peak flows in 1965 generally were less than in 1955. One exception was at the station near Higbee, where the peak flow was estimated as 105,000 cfs in 1965, compared with 80,000 cfs in 1955. Peak flows much greater than in 1955 occurred on some of Purgatoire River tributaries.

Extremely high peak flows occurred in 1965 on the south-bank tributaries of the Arkansas River from John Martin Reservoir to the State line, but they cannot be compared with historical flows because records are not available. On Two Butte Creek at Holly the 1965 peak flow was more than five times the estimated peak flow of 1908.

The total runoff in the Arkansas River basin in Colorado from the June 1965 storms exceeded that of any previous flood for which there are records. John Martin Reservoir stored 320,000 acre-feet during June 14–26, and an additional 485,000 acre-feet of inflow downstream from the dam flowed past the station near Coolidge, Kans., during June 17–27. Thus, the total June 1965 storm runoff at the State line, adjusted for storage in the reservoir, would be 805,000 acre-feet. Records are not available at the Coolidge station, but at Holly, only 6 miles upstream, the total storm runoff in 1908 and 1921 was only 285,000 and 410,000 acre-feet, respectively. The large difference between 1965 and 1921 was because of the high runoff downstream from Lamar. At Lamar the total storm runoff in 1921 was
about 450,000 acre-feet, compared with 400,000 acre-feet (adjusted for storage in John Martin Reservoir) in 1965.

CANADIAN RIVER BASIN, NEW MEXICO

Streamflow records have been collected in the Canadian River basin in New Mexico since 1903. The longest continuous record collected in the 1965 flood area is on the Mora River near Shoemaker, where records date back to 1914.

The greatest floods known prior to 1965 at most sites in the Canadian River basin occurred in September 1904. Other notable floods occurred in 1913 and in 1937 (Dalrymple and others, 1939). Extensive flooding occurred on Cimarron Creek and the Mora River in 1913 and 1942, and floods occurred on Ute Creek in 1941 (Vaudrey, 1960).

The 1965 peak discharges on the Canadian River from station near Hebron to Conchas Reservoir exceeded all previously known peak discharges. At the station near Hebron the Peak discharge of 62,400 cfs on June 17, 1965, probably exceeded the 1942 peak, which was slightly lower in stage. The 1965 peak discharge of 162,000 cfs on the Canadian River near Taylor Springs was nearly twice that which occurred in 1904. The same is true for the station near Roy (peak discharge, 172,000 cfs in 1965). The Canadian River near Sanchez peaked at 145,000 cfs in June 1965. Lifelong residents state that the 1904 flood was higher in stage, but the channel was smaller, and therefore the peak discharge in 1904 was probably less than that in 1965.

The peak discharge of 29,500 cfs on Cimarron Creek at Springe in 1965 is believed to have been greater than that in 1904. Longtime residents state that although the 1904 flood was about 2 feet higher than the 1965 flood, the Santa Fe Railroad bridge opening was smaller and caused greater backwater. The flood on Ponil Creek near Cimarron (peak discharge, 5,630 cfs in 1965) was the greatest since 1915. The peak discharge on Chase Canyon near Cimarron was 10,800 cfs in June 1965. Flooding in the valley downstream from Chase Canyon was the greatest in at least 80 years, according to nearby residents.

FLOOD DAMAGE

Fourteen persons were drowned, and at least two other deaths were attributed to the storms and activities related to the 1965 floods. Damage amounted to more than $60 million in the tristate area — about $55 million in Colorado and Kansas, and the remainder in New Mexico.

Estimates of flood damage by type and location compiled by the U.S. Army Corps of Engineers (1966) are summarized in table 2.

Heavy rain and hail in the Fountain-Colorado Springs area on June 14 caused considerable damage to urban areas and road bridges. Major flooding affecting areas along the Arkansas River and its tributaries between Pueblo and John Martin Dam caused heavy damage on June
<table>
<thead>
<tr>
<th>Stream basin, reach, or tributary</th>
<th>Agricultural</th>
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<tbody>
<tr>
<td></td>
<td>Rural</td>
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<tr>
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<td>Transporta-</td>
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</tr>
<tr>
<td>Arkansas River, Colo.</td>
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<tr>
<td>Arkansas River above John Martin Dam</td>
<td>3,380</td>
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<tr>
<td>Beaver Creek</td>
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<td>Fountain Creek</td>
<td>666</td>
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<tr>
<td>Chico Creek</td>
<td>1,310</td>
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<tr>
<td>Timpas Creek</td>
<td>520</td>
</tr>
<tr>
<td>Adobe Creek</td>
<td>716</td>
</tr>
<tr>
<td>Rule Creek</td>
<td>440</td>
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<td>Mud Creek</td>
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<tr>
<td>Dry Creek</td>
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<tr>
<td>Big Sandy Creek</td>
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<td>Arkansas River, Granada to</td>
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<tr>
<td>Colorado State line</td>
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<td>Wolf Creek</td>
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<td>Two Butte Creek</td>
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<td>State line to Lakin</td>
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<td>Lakin to Cimarron</td>
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<td>Cimarron to Mulberry Creek</td>
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<td>Canadian River, N. Mex.</td>
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<td>Cimarron Creek</td>
<td>965</td>
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**Total**     31,318          11,137          1,163        43,618          14,196          2,075          481          60,370
Agricultural losses and damage to transportation and urban facilities amounted to about $15 million. Eighty-five percent of the urban damage above John Martin Dam occurred in the Pueblo area. About 90 percent of the $170,000 damage in the vicinity of La Junta occurred in north La Junta, across the river from the main town. At Trinidad, flooding of the Purgatoire River caused about $8,000 in damage; at Starkville, Raton Creek destroyed or severely damaged 26 residences. About 5 miles of railroad near John Martin Reservoir were washed out by Rule Creek.

Between John Martin Dam, Colo., and Great Bend, Kans., the loss was over $11 million, about $3 million of which occurred in Lamar, Colo. Damage to Dodge City and the suburban community of Wilroads Gardens, Kans., amounted to almost $4 million, and over $1 million in damage occurred at Garden City, Kans. About $1 million was spent in floodfighting and related miscellaneous activities. Holly, Colo., was inundated to depths of about 8 feet by water from Two Butte Creek and the Arkansas River (fig. 13). Granada, Colo., sustained heavy damage from Wolf Creek. Damage to many highways, bridges, flood dikes, and railroad beds was extensive below John Martin Dam.

A small dam on Clay Creek southeast of Lamar was completely destroyed. The dam on Muddy Creek and the spillway on Two Buttes Dam were damaged.

In the Canadian River basin in New Mexico, damage along tributaries
was extensive. Highways were blocked by slides, irrigation systems sustained heavy damage, and many diversion dams were destroyed. The U.S. Bureau of Reclamation (oral commun., 1966) estimated damage in the Vermejo Conservancy District at $593,000 and damage in the Antelope Valley Irrigation District at $194,000. In Mora County, irrigation systems suffered $106,000 in damage, and in Colfax County 25 bridges and culverts were destroyed. All but two bridges over the Canadian River upstream from Conchas Dam were destroyed. The U.S. Army Corps of Engineers (1966) estimated damage of about $4 million in the Canadian River basin above Conchas Dam. Major damage occurred in the towns of Cimarron, Raton, and Springer.

The U.S. Army Corps of Engineers (1966, table 7) estimated that about 330,000 acres of rural, urban, waste, and wooded lands were flooded in the tristate area. Over two-thirds of the inundated areas were between John Martin Dam, Colo., and Great Bend, Kans.; 55,000 acres were in the Canadian River basin in New Mexico, and the remaining 45,000 acres were along the Arkansas River and its tributaries above John Martin Reservoir.

One disastrous result of cropland flooding is the deposition of sediment. For example, almost 2,000 acres in an area along Clay Creek were covered by several feet of silt and sand; also, on the Cain Ranch upstream from Two Buttes Reservoir, south of Lamar, Colo., deposition of sand and cottonwood-tree debris covered hundreds of acres and rendered the land useless for most practical purposes.

Flood damage is always assessed in dollar amounts following disastrous floods, but the dollar figures reflect only a part of the true costs of man's efforts in cleanup activities. Who can determine, for example, what additional millions of dollars are spent in pure "shovel work," removing the muck and mire accumulated in homes, commercial buildings, and other establishments? The assessed $60 million loss may be only one-half of the true cost resulting from the Arkansas River floods of 1965.

**FLOOD FREQUENCY**

The flood-frequency report (Patterson, 1964) contains curves for two regions and seven hydrologic areas that cover the 1965 flood area and also frequency curves for the main stems of the Arkansas and Canadian Rivers. The flood-frequency relations are limited because they are defined only to a recurrence interval of 50 years. Also, relations for small areas are not defined for any recurrence interval because of insufficient data on peak flows.

Throughout the flood area the 1965 peak flows exceeded the 50-year flood by as much as 30 times. The true frequency of most of these peak flows cannot be determined from the present records, which are relatively short.

In the Arkansas River basin, peak flows exceeded the 50-year flood by 30 times on Jimmy Camp and Clay Creeks, 16 times on Rule and Two Butte
Creeks, 11 times on Black Squirrel Creek, 5.8 times on Smith Canyon, and lesser amounts on many other tributaries. These high tributary flows resulted in peak flows greater than the 50-year flood on the Arkansas River near North Avondale, near Nepesta, and at Lamar, Colo., and at all main stream stations in Kansas.

In the Canadian River basin in New Mexico, the 1965 peak flows exceeded the 50-year flood by 20 times on Chase Canyon, 8.9 times on Rayado Creek, 7.4 times on Crow Creek, and lesser amounts on many other tributaries and on the Canadian, Mora, and Cimarron Rivers.

The 1965 flood peaks on the Arkansas and Canadian Rivers and the 25- and 50-year floods (Patterson, 1964) are plotted against miles upstream from the mouth in figures 14 and 15.

![Figure 14](image-url)

**Figure 14.** — Relation of peak discharge and selected flood frequencies to miles upstream from mouth, Arkansas River. Number in parentheses is site number (pl. 1).
DETERMINATION OF FLOOD DISCHARGES

The discharge at a stream-gaging station is computed from a stage-discharge relation. Discharge measurements at known stages are used to compute the stage-discharge relation, from which discharge may be calculated for any given stage. The discharge generally is measured by current meter, but indirect methods sometimes are used. The stage is obtained from a water-stage recorder designed to provide a continuous record of stage. If the water-stage recorder malfunctions or is damaged by the flood, high-water marks and direct readings on a nonrecording gage are used.

Short extensions of the stage-discharge relation above the highest current-meter measurement were made by using the results of slope-conveyance studies, by using other measurable hydraulic factors, or by logarithmic plotting. Long extensions of the stage-discharge relation were defined by indirect measurements of peak flow by the slope-area method, computations of flow through contractions such as bridges and culverts,
flow over dams and road embankments, critical-depth computations, or a combination of these methods. At miscellaneous sites where high runoFF occurred, the peak discharges were determined by indirect measurements. A total of 89 indirect measurements were made for the floods of June 1965—28 at active or discontinued gaging stations and 61 at miscellaneous sites.

**STREAMFLOW DATA**

**EXPLANATION OF DATA**

Detailed flood information, in addition to that in the regular annual reports of the Geological Survey, is compiled here for use in future hydraulic and hydrologic studies. Records of stage and discharge at 52 gaging stations, elevations and contents of four reservoirs, and peak discharges at 10 crest-stage stations and 71 miscellaneous sites are given. The sites are numbered in downstream order, and these numbers identify the locations in plate 1. The permanent station numbers for the gaging stations and crest-stage stations correspond to the numbers in the annual reports.

**SUMMARY OF FLOOD STAGES AND DISCHARGES**

Maximum stages and discharges at gaging stations and miscellaneous sites within the flood area are summarized in table 3. The numbers in the first column correspond to those in plate 1 to facilitate identification of the sites for which flood data are tabulated.

The first column under "Maximum flood previously known" shows the period of known floods before June 1965. This period is often longer than the period of continuous records of discharge because records of historical floods have been obtained.

The last column, "Recurrence interval" contains two sets of numbers. If the number is not footnoted, it is the recurrence interval, in years, of the June 1965 peak discharge; if the recurrence interval is more than 50 years, the number is footnoted, and it is the ratio of the June 1965 peak discharge to the discharge of the 50-year flood. For some sites the June 1965 flood peaks were lower than the mean annual flood or their recurrence intervals were not defined; they are footnoted accordingly.

**DATA FOR INDIVIDUAL SITES**

The data tabulated for each site where floodflows were determined may include a station description, a short table of daily mean discharges for the days comprising the flood period, and a list of stages and discharges at indicated times during the rise to and the recession from the flood peak. For crest-stage sites, sites of former gaging stations, and miscellaneous sites, only the station description is presented.

The station description contains information concerning the location, datum, type of gage, and drainage area. The method used to determine the stage during the flood period, the definition of the stage-discharge relation,
### TABLE 3. — Summary of flood stage and discharges, Arkansas River basin

<table>
<thead>
<tr>
<th>Site No. (pl. 1)</th>
<th>Permanent station</th>
<th>Stream and place of determination</th>
<th>Contributing drainage area (sq mi)</th>
<th>Period</th>
<th>Year</th>
<th>Gage height (ft)</th>
<th>Recurrence interval (yr)</th>
<th>Day</th>
<th>Time (hr)</th>
<th>Gage height (ft)</th>
<th>Cubic feet per second</th>
<th>Recurrence interval (yr)</th>
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<tbody>
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<td>1</td>
<td>07099500</td>
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<td>34.1</td>
<td>17</td>
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<td>6.31</td>
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<td>1964</td>
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<td>1958</td>
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**Notes:**
- Discharge values are in cubic feet per second (cfs).
- Recurrence interval values are in years (yr).
- Maximum flood previously known prior to June 1965.
- Maximum June 1965.
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See footnotes at end of table, p. D38.
Table 3. — Summary of flood stages and discharges, Arkansas River basin — Continued

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<th>Year</th>
<th>Gage height (ft)</th>
<th>Recurrence interval (yr)</th>
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<td>Sandy Arroyo near Clayton, N. Mex</td>
<td>112</td>
<td>1941,1953</td>
<td>1941</td>
<td>*24,000</td>
<td>17</td>
<td>9.580</td>
<td>1.2</td>
</tr>
</tbody>
</table>

*Site and datum then in use, see station description.

*Ratio to discharge of 50-year flood.

*Not defined.

*Less than mean annual flood.

*Flood of July 2, 1965, reached a stage 1 to 1.5 feet lower.

*At different site, see station description.

*Major flood(s) occurred in prior year(s); see station description.

*Contents in acre-feet.

*Daily discharge.

*Backwater from Caddoa Creek.
and the conditions that might have affected that relation are explained. The maximum stage and (or) discharge are given for the flood period in June 1965, for the indicated period of discharge record, and for floods prior to the period of record. Remarks on regulation and diversions and other pertinent information are included where applicable.

Tables of stages and discharges at indicated times are included so that these data and the daily mean discharges before and after the detailed period can be used to define both stage and discharge hydrographs. The discharges at indicated times should be used only for this purpose and not to compute mean daily discharge, because additional data were used to compute these figures in many cases.

**STATION DATA**

**ARKANSAS RIVER BASIN**

(1) 07099500  **ARKANSAS RIVER NEAR PUEBLO, COLO.**

*Location.* — Lat 38°16'02", long 104°39'26", in SE4 NW4 sec. 34, T. 20 S., R. 65 W., on right bank at intake of south-side waterworks, 1.6 miles upstream from Dry Creek and 2.5 miles west of city hall in Pueblo.

*Drainage area.* — 4,686 sq mi.

*Gage-height record.* — Water-stage recorder graph. Datum of gage is 4,689.74 ft above mean sea level.

*Discharge record.* — Stage-discharge relation defined by current-meter measurements below 4,600 cfs and by contracted-opening measurement of 23,500 cfs for peak flow on Aug. 22, 1965.

*Maxima.* — June 1965: Discharge, 9,260 cfs 2130 hours June 17 (gage height, 6 31 ft).

1965 to May 1965: Discharge, 103,000 cfs June 3, 1921 (gage height, 24.66 ft, site and datum then in use), from rating curve extended above 6,800 cfs on basis of float measurement at gage height 11.2 ft and slope-area measurement of peak flow.

*Remarks.* — Figures of daily mean discharge include water diverted above the station into the intake of the north-side waterworks for municipal supply of Pueblo. Discharges at indicated times and extremes do not include the diverted water (daily mean discharge, approximately 26 cfs). Records do not represent storm runoff but inflow to flood area.

**Mean discharge, in cubic feet per second, 1965**

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge (cfs)</th>
<th>Day</th>
<th>Discharge (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 14</td>
<td>2,480</td>
<td>June 18</td>
<td>5,020</td>
</tr>
<tr>
<td>15</td>
<td>2,090</td>
<td>19</td>
<td>4,120</td>
</tr>
<tr>
<td>16</td>
<td>2,700</td>
<td>20</td>
<td>3,950</td>
</tr>
<tr>
<td>17</td>
<td>5,460</td>
<td>21</td>
<td>3,980</td>
</tr>
</tbody>
</table>

**Gage height and discharge at indicated time, 1965**

<table>
<thead>
<tr>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 15</td>
<td>3.78</td>
<td>1,940</td>
</tr>
<tr>
<td>0800</td>
<td>3.77</td>
<td>1,920</td>
</tr>
<tr>
<td>0900</td>
<td>3.80</td>
<td>1,970</td>
</tr>
<tr>
<td>1000</td>
<td>3.77</td>
<td>1,920</td>
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<tr>
<td>1200</td>
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<td>2,340</td>
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<tr>
<td>1500</td>
<td>4.14</td>
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<td>1800</td>
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<td>2,900</td>
</tr>
<tr>
<td>2400</td>
<td>4.85</td>
<td>4,090</td>
</tr>
<tr>
<td>June 16</td>
<td>5.18</td>
<td>5,080</td>
</tr>
</tbody>
</table>

**June 17—Con.**

<table>
<thead>
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<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
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<tbody>
<tr>
<td>0500</td>
<td>5.34</td>
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<tr>
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<td>4.90</td>
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<td>4,780</td>
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<td>1900</td>
<td>5.58</td>
<td>6,340</td>
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<td>9,140</td>
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<tr>
<td>2300</td>
<td>5.83</td>
<td>7,340</td>
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<table>
<thead>
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<th>Discharge (cfs)</th>
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</thead>
<tbody>
<tr>
<td>0300</td>
<td>5.18</td>
<td>5,080</td>
</tr>
<tr>
<td>2400</td>
<td>5.28</td>
<td>5,470</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 18</td>
<td>4.94</td>
<td>4,510</td>
</tr>
<tr>
<td>0700</td>
<td>4.81</td>
<td>4,130</td>
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<tr>
<td>0900</td>
<td>5.00</td>
<td>4,690</td>
</tr>
<tr>
<td>0900</td>
<td>5.40</td>
<td>5,890</td>
</tr>
<tr>
<td>0930</td>
<td>5.67</td>
<td>6,900</td>
</tr>
<tr>
<td>1100</td>
<td>5.60</td>
<td>6,620</td>
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<tr>
<td>1200</td>
<td>5.25</td>
<td>5,440</td>
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<tr>
<td>1700</td>
<td>5.00</td>
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<td>2000</td>
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<td>4,600</td>
</tr>
<tr>
<td>2400</td>
<td>4.93</td>
<td>4,480</td>
</tr>
</tbody>
</table>
(2) 07103700 Fountain Creek near Colorado Springs, Co'lo.

Location. — Lat 38°51'17", long 104°52'39", in SE\(\frac{1}{4}\)SW\(\frac{3}{4}\) sec. 3, T. 14 S., R. 67 W., on left bank 200 ft upstream from diversion to city of Colorado Springs, 0.5 mile east of bridge on U.S. Highway 24 near west city limits of Colorado Springs, and 1 mile downstream from Sutherland Creek.

Drainage area. — 102 sq mi.

Gage-height record. — Water-stage recorder graph. Altitude of gage is 6,110 ft (from topographic map).

Discharge record. — Stage-discharge relation defined by current-meter measurements below 190 cfs and by slope-area measurements of 410, 660, and 2,630 cfs.

Maxima. — June 1965: Discharge, 359 cfs 1700 hours June 17 (gage height, 3.82 ft).


<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
<th>Day</th>
<th>Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 14</td>
<td>29</td>
<td>June 18</td>
<td>2400</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td></td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td></td>
<td>21</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gage height and discharge at indicated time, 1965</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hour</td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>June 15</td>
</tr>
<tr>
<td>June 16</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

(3) 07103900 West Monument Creek near Pikeview, Colo.

Location. — Lat 38°58'17", long 104°53'56", in SW\(\frac{1}{4}\) sec. 28, T. 12 S., R. 67 W., on right bank in Air Force Academy Reservation, 4 miles upstream from mouth and 5.6 miles northwest of Pikeview.

Drainage area. — 15.4 sq mi.

Gage-height record. — Water-stage record graph except June 17–21. Datum of gauge is 7,080.78 ft (city of Colorado Springs bench mark).

Discharge record. — Stage-discharge relation defined by current-meter measurements below 23 cfs. Peak discharge estimated from slope-area measurement 1.6 miles downstream. Discharge June 17–21 estimated on basis of peak discharge and typical recession.

Maxima. — June 1965: Discharge, about 400 cfs about 1500 hours June 17 (gage height, 4.80 ft, from flood mark).

1957 to May 1965: Discharge, 27 cfs about May 14, 1958 (gage height, 1.59 ft).

<table>
<thead>
<tr>
<th>Mean discharge, in cubic feet per second, 1965</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>June 14</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mean discharge, in cubic feet per second, 1965</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>June 14</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
Gage height and discharge at indicated time, 1965

<table>
<thead>
<tr>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 13</td>
<td>2400</td>
<td>0.54</td>
<td>4.7</td>
<td>June 14</td>
<td>Con.</td>
<td>1500</td>
<td>0.57</td>
<td>5.1</td>
</tr>
<tr>
<td></td>
<td>0000</td>
<td>0.75</td>
<td>7.8</td>
<td>2400</td>
<td>0.54</td>
<td>4.7</td>
<td>1400</td>
<td>0.87</td>
</tr>
<tr>
<td>June 15</td>
<td>2400</td>
<td>0.68</td>
<td>6.7</td>
<td>1800</td>
<td>2.10</td>
<td>39</td>
<td>2400</td>
<td>2.16</td>
</tr>
</tbody>
</table>

(4) WEST MONUMENT CREEK BELOW STANLEY CANYON, NEAR PIKEVIEW, COLO. (Miscellaneous site)
Location. — Lat 38°58'25", long 104°52'37", in SE1/4 sec. 27, T. 12 S., R. 67 W., 0.7 mile downstream from Stanley Canyon, 1.6 miles downstream from gaging station West Monument Creek near Pikeview (07103900), and 5 miles northwest of Pikeview.
Drainage area. — 20.7 sq mi.
Maximum. — June 1965: Discharge, 515 cfs June 17, by slope-area measurement of peak flow.

(5) 07104500 TEMPLETON GAP FLOODWAY AT COLORADO SPRINGS, COLO.
Location. — Lat 38°53'17", long 104°49'01", in SE1/4 sec. 30, T. 13 S., R. 66 W., on left bank 75 ft upstream from head of concrete flume, 400 ft upstream from bridge on U.S. Highways 85 and 87, and 0.8 mile north of Colorado Springs.
Drainage area. — 8.46 sq mi.
Gage-height record. — Water-stage recorder graph. Altitude of gage is 6,200 ft (from topographic map).
Discharge record. — Stage-discharge relation based on computation of flow at critical depth at gage heights 1.3, 1.4, 1.8, and 3.0 ft.

Mean discharge, in cubic feet per second, 1965

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
<th>Day</th>
<th>Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 14</td>
<td>0</td>
<td>June 18</td>
<td>12</td>
</tr>
<tr>
<td>15</td>
<td>0</td>
<td>19</td>
<td>0</td>
</tr>
<tr>
<td>16</td>
<td>0</td>
<td>20</td>
<td>0</td>
</tr>
<tr>
<td>17</td>
<td>103</td>
<td>21</td>
<td>0</td>
</tr>
</tbody>
</table>

Gage height and discharge at indicated time, 1965

<table>
<thead>
<tr>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 16</td>
<td>2400</td>
<td>---</td>
<td>0</td>
<td>June 17—Con.</td>
<td>1600</td>
<td>2.84</td>
<td>572</td>
<td>June 18</td>
</tr>
<tr>
<td>June 17</td>
<td>1630</td>
<td>2.63</td>
<td>440</td>
<td>1600</td>
<td>2.84</td>
<td>572</td>
<td>0600</td>
<td>1.53</td>
</tr>
<tr>
<td>1700</td>
<td>2.48</td>
<td>358</td>
<td>1800</td>
<td>2.23</td>
<td>232</td>
<td>0900</td>
<td>1.37</td>
<td>3.9</td>
</tr>
<tr>
<td>1770</td>
<td>1.77</td>
<td>68</td>
<td>2000</td>
<td>1.96</td>
<td>123</td>
<td>1200</td>
<td>1.32</td>
<td>3</td>
</tr>
<tr>
<td>1430</td>
<td>1.92</td>
<td>109</td>
<td>2200</td>
<td>1.90</td>
<td>103</td>
<td>1500</td>
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<tr>
<td>1500</td>
<td>2.63</td>
<td>440</td>
<td>2400</td>
<td>1.77</td>
<td>68</td>
<td>2400</td>
<td>---</td>
<td>0</td>
</tr>
</tbody>
</table>

(6) 07105800 FOUNTAIN CREEK AT SECURITY, COLO.
Location. — Lat 38°43'46", long 104°44'00", in SW1/4 sec. 24, T. 15 S., R. 66 W., on right bank 60 ft upstream from Carson Road bridge, 0.5 mile southwest of south end of Security, 3.5 miles northeast of Fountain, and 5.5 miles upstream from Jimmy Camp Creek.
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FLOODS OF 1965 IN THE UNITED STATES

Drainage area. — 488 sq mi.

Gage-height record. — Water-stage recorder graph. Altitude of gage is 5,640 ft (from topographic map).

Discharge record. — Stage-discharge relation defined by current-meter measurements below 2,900 cfs and by slope-area measurement of 25,000 cfs for peak flow on July 24, 1965.

Maxima. — June 1965: Discharge, 21,500 cfs 1630 hours June 17 (gage height, 10.37 ft).
1964 to May 1965: Discharge, 914 cfs 0330 hours May 22, 1965 (gage height, 4.58 ft).

Mean discharge, in cubic feet per second, 1965

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 14</td>
<td>578</td>
</tr>
<tr>
<td>15</td>
<td>340</td>
</tr>
<tr>
<td>16</td>
<td>676</td>
</tr>
<tr>
<td>17</td>
<td>5,650</td>
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<tr>
<td>June 18</td>
<td>1,610</td>
</tr>
<tr>
<td>June 19</td>
<td>874</td>
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<tr>
<td>June 20</td>
<td>571</td>
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</tbody>
</table>

Gage height and discharge at indicated time, 1965

<table>
<thead>
<tr>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 13</td>
<td>3.80</td>
<td>382</td>
</tr>
<tr>
<td>June 14</td>
<td>3.50</td>
<td>247</td>
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<td>June 15</td>
<td>3.41</td>
<td>208</td>
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<tr>
<td>June 16</td>
<td>3.25</td>
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<td>3.17</td>
<td>105</td>
</tr>
<tr>
<td>June 18</td>
<td>3.31</td>
<td>95</td>
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<tr>
<td>June 19</td>
<td>3.10</td>
<td>75</td>
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<tr>
<td>June 20</td>
<td>2.62</td>
<td>200</td>
</tr>
<tr>
<td>June 21</td>
<td>2.89</td>
<td>500</td>
</tr>
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</table>

(7) JIMMY CAMP CREEK NEAR FOUNTAIN, COLO.

(Miscellaneous site)

Location. — Lat 38°43'20", long 104°38'45", in sec. 22, T. 15 S., R. 65 W., 4 miles northeast of Fountain and 4.5 miles upstream from mouth.

Drainage area. — 54.3 sq mi.

Maximum. — June 1965: Discharge, 124,000 cfs 1330 hours June 17, by slope-area measurement of peak flow.

(8) 07106500 FOUNTAIN CREEK AT PUEBLO, COLO.

Location. — Lat 38°16'33", long 104°39'09", in SW\(^2\)SW\(^2\) sec. 30, T. 20 S., R. 64 W., on right bank about 800 ft upstream from Eighth Street Bridge in Pueblo and 1.8 miles upstream from mouth.

Drainage area. — 926 sq mi.

Gage-height record. — Water-stage recorder graph except 1945 hours June 17 to June 21. Graph drawn for 1945 to 2400 hours June 17 on basis of peak stage, near suggesting typical recession. Peak stage determined from floodmark. Datum of gage is 4,668.45 ft above mean sea level.

Discharge record. — Stage-discharge relation defined by current-meter measurements below 400 cfs and by contracted-opening measurement at 47,000 cfs. Discharge June 18—21
estimated on basis of weather records and records for Arkansas River near Pueblo and Arkansas River near Avondale.

Maxima. — June 1965: Discharge, 47,000 cfs 2100 hours June 17 (gage height, 15.0 ft, from floodmark).

1903 to May 1965: Discharge, 35,000 cfs May 30, 1935, by slope-area measurement of peak flow.

Flood of June 4, 1921: Discharge, 34,000 cfs, by slope-area measurement of peak flow.

**Mean discharge, in cubic feet per second, 1965**

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
<th>Day</th>
<th>Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 14</td>
<td>2,990</td>
<td>June 18</td>
<td>2,500</td>
</tr>
<tr>
<td>15</td>
<td>4,080</td>
<td>19</td>
<td>6,740</td>
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<td>16</td>
<td>3,150</td>
<td>20</td>
<td>4,590</td>
</tr>
<tr>
<td>17</td>
<td>6,640</td>
<td>21</td>
<td>4,870</td>
</tr>
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**Gage height and discharge at indicated time, 1965**

<table>
<thead>
<tr>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
</tr>
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<tr>
<td>June 14</td>
<td>2.87</td>
<td>58</td>
<td>June 15</td>
<td>3.11</td>
<td>570</td>
</tr>
<tr>
<td>2400</td>
<td>1315</td>
<td>1380</td>
<td>0200</td>
<td>3.12</td>
<td>578</td>
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<tr>
<td>0500</td>
<td>2.80</td>
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<td>3.00</td>
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<tr>
<td>0530</td>
<td>4.70</td>
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<td>3.15</td>
<td>620</td>
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<td>499</td>
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(9) 07109500 ARKANSAS RIVER NEAR AVONDALE, COLO.

**Location.** — Lat 38°14'53"N, long 104°23'55"W, in NE¼SW¼ sec. 1, T. 21 S., R. 63 W., on right bank 15 ft downstream from bridge on Sixmile Road, 0.3 mile upstream from Sixmile Creek, and 2.6 miles west of Avondale.

**Drainage area.** — 6,327 sq mi.

**Gage-height record.** — Water-stage recorder graph. Datum of gage is 4,509.53 ft at ove mean sea level.

**Discharge record.** — Stage-discharge relation defined by current-meter measurements below 7,700 cfs and extended above on basis of peak flow computed from records for station near Pueblo and indirect measurements of peak flows of Fountain Creek at Pueblo, Chico Creek near North Avondale, and Arkansas River near North Avondale.

**Maxima.** — June 1965: Discharge 50,000 cfs 0220 hours June 18 (gage height, 9.77 ft).

1939—51, February to May 1965: Discharge, 13,900 cfs April 24, 1942, from rating curve extended above 7,000 cfs; gage height, 8.83 ft June 13, 1948, at site 550 ft downstream at datum 1.37 ft lower.

**Mean discharge, in cubic feet per second, 1965**

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
<th>Day</th>
<th>Discharge</th>
</tr>
</thead>
<tbody>
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FLOODS OF 1965 IN THE UNITED STATES

Gage height and discharge at indicated time, 1965

<table>
<thead>
<tr>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 14</td>
<td></td>
<td></td>
<td>June 16—Con.</td>
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<td>June 18—Con.</td>
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<tr>
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<td>1400</td>
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<td>2300</td>
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<td>7,300</td>
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<td></td>
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<td>4,920</td>
</tr>
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</table>

(10) **BLACK SQUIRREL CREEK NEAR PEYTON, COLO.**

(Miscellaneous Site)

Location. — Lat 39°01'05", long 104°32'00", at bridge on State Highway 217, 3 miles west of Peyton, El Paso County.

Drainage area. — 16.3 sq mi.

Maximum. — June 1965: Discharge, 10,400 cfs 1600 hours June 17, by contracted-opening measurement of peak flow.

Remarks. — Another flood July 2, 1965 (discharge unknown) reached a stage 1 to 1.5 ft lower than flood of June 17, 1965.

(11) **BLACK SQUIRREL CREEK NEAR ELICOTT, COLO.**

(Miscellaneous site)

Location. — Lat 38°42'25", long 104°23'25", in sec. 36, T. 15 S., R. 63 W., about 3 miles downstream from West Fork and 10 miles south of Ellicott.

Drainage area. — 353 sq mi.

Maximum. — June 1965: Discharge, 141,000 cfs 2300 hours June 17, by slope-area measurement of peak flow.

(12) **07110500 CHICO CREEK NEAR NORTH AVONDALE, COLO.**

(Gaging station, discontinued in 1946)

Location. — Lat 38°15'50", long 104°22'30", in SE¼ sec. 31, T. 20 S., R. 62 W., 1 mile upstream from mouth and 1.5 miles west of North Avondale.

Drainage area. — 864 sq mi.

Maximum. — June 1965: Discharge, 52,200 cfs 0400 hours June 18 (gage height, 15.5 ft, from floodmarks), by indirect measurement of peak flow.

1921 to May 1965: Discharge, 28,600 cfs June 4, 1921, by slope-area measurement of peak flow.

Remarks. — Flood came principally from Black Squirrel Creek.

(13) **ARKANSAS RIVER NEAR NORTH AVONDALE, COLO.**

(Miscellaneous site)

Location. — Lat 38°14'42", long 104°20'36", in SW¼ sec. 4, T. 21 S., R. 62 W., at U.S. Highway 50 bypass 0.6 mile northeast of Avondale, 1.2 miles southeast of North Avondale, and 1.2 miles downstream from Chico Creek.
Drainage area. — 7,157 sq mi.

Maximum. — June 1965: Discharge 104,000 cfs 0400 hours June 18, by indirect measurement of peak flow.

(14) 07116000 HUERFANO RIVER BELOW HUERFANO VALLEY DAM, 
NEAR UNDERCLIFFE, COLO.

Location. — Lat 38°00', long 104°28', in S/2 sec. 32, T. 23 S., R. 63 W., at left end of diversion dam for Huerfano Valley ditch and 8 miles southwest of Undercliffe.

Drainage area. — 1,673 sq mi.

Gage-height record. — Water-stage recorder graph. Datum of gage is 4,886.29 ft above mean sea level.

Discharge record. — Stage-discharge relation defined by current-meter measurements below 380 cfs and by computation of flows over dam of 11,300 and 16,800 cfs.

Maxima. — June 1965: Discharge, 3,220 cfs 2210 hours June 13 (gage height, 5.18 ft).

1900 to May 1965: Discharge, 16,800 cfs July 5, 1958 (gage height, 14.5 ft), from rating curve extended above 380 cfs on basis of computation of flow over dam at gage heights 11.04 and 14.5 ft.

Remarks. — Figures of daily mean discharge include water diverted by Huerfano Valley ditch. Discharges at indicated times and extremes do not include the diverted water (daily mean discharge, 17 cfs or less).

Mean discharge, in cubic feet per second, 1965

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<td>June 16</td>
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<td>June 17</td>
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<td>June 18</td>
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Gage height and discharge at indicated time, 1965

<table>
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<tr>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
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</thead>
<tbody>
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<td></td>
<td></td>
</tr>
<tr>
<td>2400</td>
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<td>0</td>
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<tr>
<td>1630</td>
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<td>0</td>
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<tr>
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<td>330</td>
</tr>
<tr>
<td>June 16</td>
<td></td>
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<tr>
<td>1645</td>
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<tr>
<td>1700</td>
<td>---</td>
<td>330</td>
</tr>
<tr>
<td>1745</td>
<td>---</td>
<td>649</td>
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<tr>
<td>June 17</td>
<td></td>
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<td>1800</td>
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<td>635</td>
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<tr>
<td>2030</td>
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<tr>
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(15) 07117000 ARKANSAS RIVER NEAR NEPESTA, COLO.

Location. — Lat 38°10'54", long 104°09'40", in NW1/4 sec. 31, T. 21 S., R. 60 W., on right bank 185 ft downstream from diversion dam of Oxford Farmers Co. canal, 1.3 miles northwest of Nepesta, and 7.3 miles downstream from Huerfano River.

Drainage area. — 9,345 sq mi, of which 54 sq mi is probably noncontributing.

Gage-height record. — Water-stage recorder graph except 0600 hours June 18 to June 21. Gage destroyed by flood. Peak stage determined from floodmarks. Datum of river gage is 4,378.68 ft above mean sea level.

Discharge record. — Stage-discharge relation defined by current-meter measurements below 8,600 cfs and by indirect measurement of 43,100 cfs. Discharge June 18—21 estimated.
FLOODS OF 1965 IN THE UNITED STATES

Maxima. — June 1965: Discharge, 43,100 cfs 1130 hours June 18 (gage height, 9.80 ft, from floodmarks).

1897 to May 1965: Discharge, 180,000 cfs June 4, 1921 (gage-height not determined), by slope-area measurement of peak flow 9 miles upstream.

Remarks. — Figures of daily mean discharge include water diverted above station into Oxford Farmers Co. canal. Discharge at indicated times and extremes do not include the diverted water (daily mean discharge, approximately 130 cfs).

### Mean discharge, in cubic feet per second, 1965

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
</tr>
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<tbody>
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<td>2,640</td>
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<tr>
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<td>2,060</td>
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<tr>
<td>17</td>
<td>4,570</td>
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</table>

### Gage height and discharge at indicated time, 1965

<table>
<thead>
<tr>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
</tr>
</thead>
<tbody>
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<td>June 13</td>
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<td>1,590</td>
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(16) 07119500  Apishapa River near Fowler, Colo.

Location. — Lat 38°05'28", long 103°58'52", in SE4NW4 sec. 35, T. 22 S., R. 59 W., near right bank on downstream side of county highway bridge, 4 miles southeast of Fowler and 5.4 miles upstream from mouth.

Drainage area. — 1,125 sq mi.

Gage-height record. — Water-stage recorder graph except June 14 to 1230 hours June 15 for which graph was reconstructed on basis of 1 gage reading, partial gage-height record, and typical recession. Datum of gage is 4,317.05 ft above mean sea level.

Discharge record. — Stage-discharge relation prior to 1230 hours June 15 defined by current-meter measurements below 270 cfs, slope-area measurement at 8.48 ft, and contracted-opening measurement at 16.45 ft. Stage-discharge relation after 1230 hours June 15 defined by current-meter measurements below 3,400 cfs.

Maxima. — June 1965: Discharge, 11,400 cfs 0230 hours June 17 (gage height, 16.45 ft).

1922 to May 1965: Discharge, 83,000 cfs Aug. 22, 1923, by slope-area measurement 2 miles upstream, caused by failure of Apishapa Dam 31 miles upstream.
## Mean discharge, in cubic feet per second, 1965

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
<th>Day</th>
<th>Discharge</th>
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</tr>
<tr>
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<td>10,100</td>
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<tr>
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## Gage height and discharge at indicated time, 1965

<table>
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<tr>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
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(17) 07119700 Arkansas River at Catlin Dam, near Fowler, Colo.

**Location.** — Lat 38°07'35", long 103°56'40", in NE4NW4 sec. 19, T. 22 S., R. 58 W., on right bank at diversion dam for Catlin Canal, 1,470 ft downstream from Apishapa River and 4 miles east of Fowler.

**Drainage area.** — 10,901 sq mi, of which 54 sq mi is probably noncontributing.

**Gage-height record.** — Water-stage recorder graph. Datum of gage is 4,270.00 ft above mean sea level.

**Discharge record.** — Stage-discharge relation defined by current-meter measurements below 13,000 cfs.

**Maxima.** — June 1965: Discharge, 43,200 cfs 1600 hours June 18 (gage height, 7.95 ft).

1964 to May 1965: Discharge, about 2,650 cfs May 24, 1965 (gage height, about 2.15 ft).

**Remarks.** — Figures of daily mean discharge include water diverted into the intake of Catlin Canal. Discharges at indicated times and extremes do not include the diverted water (daily mean discharge, approximately 130 cfs).

## Mean discharge, in cubic feet per second, 1965

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### FLOODS OF 1965 IN THE UNITED STATES

#### Gage height and discharge at indicated time, 1965

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<th>Discharge (cfs)</th>
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(18) 07121500 TIMPAS CREEK AT MOUTH, NEAR SWINK, COLO.

(Gaging station, discontinued in 1925)

**Location.** — Lat 38°00'40", long 103°38'30", in sec. 26, T. 23 S., R. 56 W., 1 mile west of Swink and 1.5 miles upstream from mouth.

**Drainage area.** — 496 sq mi.

**Maxima.** — June 1965: Discharge, 21,400 cfs 0400 hours June 17 (gage height, 20.95 ft), by indirect measurement of peak flow at site 1 mile downstream.

1922-25: Discharge and gage height unknown, probably occurred June 8, 1923 (discharge at station "near Rocky Ford," 6 miles upstream, 11,200 cfs by slope-area measurement of peak flow). Maximum discharge recorded, 10,700 cfs Aug. 1 and 2, 1922.

(19) 07122500 CROOKED ARROYO NEAR LA JUNTA, COLO.

(Gaging station, discontinued in 1925)

**Location.** — Lat 38°00', long 103°35', in sec. 32, T. 23 S., R. 55 W., 300 ft upstream from bridge, 0.5 mile upstream from mouth, and 3 miles west of La Junta.

**Drainage area.** — 108 sq mi.

**Maxima.** — June 1965: Discharge, 5,610 cfs 0800 hours June 17, by contracted-opening measurement of peak flow.

1922-25, 1953: Discharge, 24,000 cfs July 12, 1953, by indirect measurement of peak flow at site 1 mile upstream.

(20) 07123000 ARKANSAS RIVER AT LA JUNTA, COLO.

**Location.** — Lat 37°59', long 103°32', in NE1/4 sec. 2, T. 24 S., R. 55 W., on downstream side of bridge on State Highway 109 in La Junta, and 500 ft upstream from King Arroyo.

**Drainage area.** — 12,210 sq mi, of which 115 sq mi is probably noncontributing.

**Gage-height record.** — Water-stage recorder graph except June 15, 21-25. Twice-daily chain-gage readings used June 15, 21, 23-25. Graph reconstructed for June 22 on basis of partial good record and 1 chain-gage reading. Datum of gage is 4,039.60 ft above mean sea level.

**Discharge record.** — Stage-discharge relation defined by current-meter measurements below 15,000 cfs and by contracted-opening measurement of 31,700 cfs.

**Maxima.** — June 1965: Discharge, 31,700 cfs 0530 hours June 19 (gage height, 12.90 ft).

1889 to May 1965: Discharge, 200,000 cfs June 4, 1921 (gage height, 18.4 ft, at present location).
Mean discharge, in cubic feet per second, 1965

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Mean discharge, in cubic feet per second, 1965

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Gage height and discharge at indicated time, 1965

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<tr>
<td></td>
<td>7.10</td>
<td>3,980</td>
</tr>
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(21) HORSE CREEK NEAR LA JUNTA, COLO.  
(Miscellaneous site)

Location. — Lat 38°05'04", long 103°21'10", in SE¼SW¼ sec. 33, T. 22 S., R. 53 W., at State Highway 194 and 12 miles northeast of La Junta.  
Drainage area. — 1,300 sq mi.  
Maxima. — June 1965: Discharge, 5,070 cfs June 18, by indirect measurement of peak flow.  
1941: Discharge, 5,400 cfs Oct. 23, 1941, at station “near Sugar City,” 15 miles upstream (drainage area, 1,080 sq mi).

(22) ADOBE CREEK NEAR LAS ANIMAS, COLO.  
(Miscellaneous site)

Location. — Lat 38°05'23", long 103°18'44", in sec. 35, T. 22 S., R. 53 W., at railroad bridge 1 mile upstream from mouth and 6 miles west of Las Animas.  
Drainage area. — 589 sq mi.  
Maximum. — June 1965: Discharge, 8,600 cfs June 18, by contracted-opening measurement of peak flow.

(23) 07124000 ARKANSAS RIVER AT LAS ANIMAS, COLO.  
Location. — Lat 38°05'08", long 103°12'50", in SW¼ sec. 35, T. 22 S., R. 52 W., on left 0.4 mile downstream from bridge on U.S. Highway 50, 1.5 miles north of courthouse in Las
D50

FLOODS OF 1965 IN THE UNITED STATES

Animas, and 3.5 miles upstream from Purgatoire River.

Drainage area. — 14,417 sq mi, of which 441 sq mi is probably noncontributing.

Gage-height record. — Water-stage recorder graph. Datum of gage is 3,874.97 ft above mean sea level.

Discharge record. — Stage-discharge relation defined by current-meter measurements below 13,000 cfs and by contracted-opening measurement of 22,100 cfs.

Maxima. — June 1965: Discharge, 22,100 cfs 1630 hours June 19 (gage height, 14.72 ft).

1939 to May 1965: Discharge, 44,000 cfs May 20, 1955 (gage height, 15.03 ft), from rating curve extended above 24,000 cfs on basis of slope-area measurement of peak flow.

Mean discharge, in cubic feet per second, 1965

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
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<tbody>
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<td>14</td>
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June 19

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Gage height and discharge at indicated time, 1965

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<td>740</td>
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<td>9.20</td>
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<td>9.85</td>
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<td>June 21</td>
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<table>
<thead>
<tr>
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<th>Discharge</th>
</tr>
</thead>
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<tr>
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<td>8,360</td>
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(24) NORTH FORK PURGATOIRE RIVER AT WESTON, COLO.

Location. — Lat 37°08', long 104°51', in sec. 35, T. 33 S., R. 67 W., at Weston, 0.1 mile downstream from Wet Canyon and 0.1 mile upstream from confluence with South Fork.

Drainage area. — 216 sq mi.

Maximum. — June 1965: Discharge, 1,920 cfs 1800 hours June 16, by slope-area measurement of peak flow.

(25) SOUTH FORK PURGATOIRE RIVER AT WESTON, COLO.

Location. — Lat 37°08', long 104°51', in sec. 35, T. 33 S., R. 67 W., at railroad bridge at
Weston just upstream from confluence with North Fork.

Drainage area. — 101 sq mi.

Maximum. — June 1965: Discharge, 1,340 cfs 1800 hours June 16, by contracted-opening measurement of peak flow.

(26) PURGATOIRE RIVER ABOVE LORENCITO CANYON, NEAR WESTON, COLO.

(Miscellaneous site)

Location. — Lat 37°06'10", long 104°45'48", in S⅓ sec. 33, T. 33 S., R. 66 W., 1 mile upstream from Lorencito Canyon, 4 miles east of Weston, and 15 miles west of Trinidad.

Drainage area. — 381 sq mi.

Maxima. — June 1965: Discharge, 3,000 cfs June 17, by indirect measurement of peak flow. 1955: Discharge, 1,790 cfs May 19, by computation of peak flow over dam.

(27) ZARCILLO CANYON NEAR SEGUNDO, COLO.

(Miscellaneous site)

Location. — Lat 37°07'25", long 104°45'25", in sec. 34, T. 33 S., R. 66 W., just upstream from bridge on State Highway 12 and 2 miles west of Segundo.

Drainage area. — 36.4 sq mi.

Maxima. — June 1965: Discharge, 1,630 cfs 1800 hours June 17, by slope-area measurement of peak flow. 1955: Discharge, 1,460 cfs May 19, 1955, by slope-area measurement of peak flow.

(28) PURGATOIRE RIVER AT DIVERSION DAM, AT VALDEZ, COLO.

(Miscellaneous site)

Location. — Lat 37°07'32", long 104°45'50", in SWK sec. 32, T. 33 S., R. 65 W., 0.2 mile northeast of Valdez and 1 mile upstream from Valdez Canyon.

Drainage area. — 485 sq mi.

Maxima. — June 1965: Discharge, 8,500 cfs 2000 hours June 16, by contracted-opening measurement of peak flow. 1955: Discharge, 4,400 cfs May 19, by computation of peak flow over dam.

(29) BURRO CANYON AT MADRID, COLO.

(Miscellaneous site)

Location. — Lat 37°07'30", long 104°38'20", in SEW sec. 34, T. 33 S., R. 65 W., 0.2 mile upstream from State Highway 12 and 0.5 mile west of Madrid.

Drainage area. — 28.3 sq mi.


(30) REILLY CANYON AT COKE DALE, COLO.

(Miscellaneous site)

Location. — Lat 37°07'56", long 104°36'34", in NW⅔ sec. 31, T. 33 S., R. 64 W., 350 ft upstream from State Highway 12, 0.4 mile upstream from mouth, 0.5 mile west of Viola, and 1 mile southeast of Cokedale.

Drainage area. — 36.7 sq mi.

Maxima. — June 1965: Discharge, 3,410 cfs June 16, by slope-area measurement of peak flow. 1955: Discharge, 2,800 cfs May 19, by slope-area measurement of peak flow.
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FLOODES OF 1965 IN THE UNITED STATES

(31) LONG CANYON NEAR SOPRIS, COLO.

(Miscellaneous site)

Location. — Lat 37°07'20", long 104°35'20", in SE¼ sec. 31, T. 33 S., R. 64 W., 1 mile upstream from mouth and 2.5 miles southwest of Sopris.

Drainage area. — 104 sq mi.

Maxima. — June 1965: Discharge, 4,480 cfs June 17, by slope-area measurement of peak flow.

1955: Discharge, 9,650 cfs May 19, by slope-area measurement of peak flow.

(32) RATON CREEK NEAR MORLEY, COLO.

(Miscellaneous site)

Location. — Lat 37°00'30", long 104°26'50", in sec. 9, T. 35 S., R. 63 W., at upper U.S. Highways 85 and 87 crossing, 4 miles southeast of Morley, and 1.5 miles north of New Mexico-Colorado State line.

Drainage area. — 5.27 sq mi.

Maxima. — June 1965: Discharge, 4,660 cfs June 16, by slope-area measurement of peak flow.

1955: Discharge, 402 cfs May 19, by computation of peak flow through culvert.

(33) JOE CREEK NEAR MORLEY, COLO.

(Miscellaneous site)

Location. — Lat 37°01'00", long 104°28'45", in sec. 6, T. 35 S., R. 63 W., at old U.S. Highways 85 and 87 crossing 3 miles southeast of Morley.

Drainage area. — 4.54 sq mi.

Maxima. — June 1965: Discharge, 760 cfs June 17, by computation of peak flow through culvert.

1955: Discharge, 642 cfs May 19, by computation of peak flow through culvert.

(34) CLEAR CREEK NEAR STARKVILLE, COLO.

(Miscellaneous site)

Location. — Lat 37°05'38", long 104°31'19", in SW¼NW¼ sec. 13, T. 34 S., R. 64 W., 600 ft upstream from mouth and 3.7 miles south of Port-of-Entry south of Trinidad.

Drainage area. — 8.1 sq mi.

Maxima. — June 1965: Discharge, 1,660 cfs 1900 hours June 17, by computation of peak flow through culverts.

(35) RATON CREEK AT STARKVILLE, COLO.

(Miscellaneous site)

Location. — Lat 37°06'53", long 104°31'18", in NW¼ sec. 1, T. 34 S., R. 64 W., at U.S. Highways 85 and 87 crossing in Starkville.

Drainage area. — 60.5 sq mi.

Maxima. — June 1965: Discharge, 12,900 cfs June 17, by contracted-opening measurement of peak flow.

1942, 1955: Discharge, 9,400 cfs May 19, 1955, by slope-area measurement of peak flow.

(36) GRASMACK ARROYO NEAR TRINIDAD, COLO.

(Miscellaneous site)

Location. — Lat 37°09'04", long 104°30'45", in N½ sec. 25, T. 33 S., R. 64 W., at bridge on old U.S. Highways 85 and 87 1.5 miles south of city hall in Trinidad.

Drainage area. — 3.6 sq mi.

Maxima. — June 1965: Discharge, 1,090 cfs June 17, by contracted-opening measurement of peak flow.

1955: Discharge, 820 cfs May 19, by slope-area measurement of peak flow.
ARKANSAS RIVER BASIN, COLORADO, KANSAS, NEW MEXICO

(37) 07124500 Purgatoire River at Trinidad, Colo.

Location. — Lat 37°10'15", long 104°30'31", in SW¼SE¼ sec. 13, T. 33 S., R. 64 W., on left bank 90 ft downstream from railroad bridge and 680 ft downstream from Animas Street Bridge in Trinidad.

Drainage area. — 795 sq mi.

Gage-height record. — Water-stage recorder graph except 1900 hours June 16 to June 22. Gage destroyed by flood. Datum of gage is 5,979.76 ft above mean sea level.

Discharge record. — Stage-discharge relation defined by current-meter measurements below 1,200 cfs and by slope-area measurement of 15,700 cfs. Discharge June 16-22 estimated on basis of 1 discharge measurement, weather records, and records for station near Hoehne.

Maxima. — June 1965: Discharge 15,700 cfs 2000 hours June 17 (gage height, 13.35 ft, from floodmark).

1859 to May 1965: Discharge, 45,400 cfs Sept. 30, 1904 (gage height, 16.6 ft, at site 680 ft upstream at datum 1.7 ft higher), by slope-area measurement of peak flow.

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 14</td>
<td>227</td>
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<tr>
<td></td>
<td>277</td>
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<tr>
<td>June 15</td>
<td>2,700</td>
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<td>5,000</td>
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<tr>
<td>June 16</td>
<td>2,500</td>
</tr>
</tbody>
</table>

Mean discharge, in cubic feet per second, 1965

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 19</td>
<td>1,000</td>
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<tr>
<td></td>
<td>720</td>
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<td>600</td>
</tr>
<tr>
<td></td>
<td>500</td>
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Gage height and discharge at indicated time, 1965

<table>
<thead>
<tr>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 15 2400</td>
<td>3.00</td>
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</tr>
<tr>
<td>June 16 0900</td>
<td>3.18</td>
<td>620</td>
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<tr>
<td>1200</td>
<td>3.13</td>
<td>580</td>
</tr>
<tr>
<td>1500</td>
<td>3.15</td>
<td>596</td>
</tr>
</tbody>
</table>

(38) Grey Creek near Trinidad, Colo.

(Miscellaneous site)

Location. — Lat 37°12'15", long 104°27'10", in NW¼ sec. 4, T. 33 S., R. 63 W., 0.5 mile upstream from mouth and 3 miles northeast of Trinidad.

Drainage area. — 16.0 sq mi.

Maxima. — June 1965: Discharge, 3,540 cfs 1830 hours June 17, by slope-area measurement of peak flow.

1955: Discharge, 1,960 cfs May 19, by slope-area measurement of peak flow.

(39) 0712500 Purgatoire River near Hoehne, Colo.

Location. — Lat 37°14'50", long 104°23'50", in sec. 13, T. 32 S., R. 63 W., on left bank 5 ft downstream from bridge on county road, 40 ft upstream from diversion dam for Hoehne ditch, 2.5 miles southwest of Hoehne, and 8 miles northeast of city hall in Trinidad.

Drainage area. — 857 sq mi.

Gage-height record. — Water-stage recorder graph except 2000 hours June 16 to 1015 hours June 17, 1900 hours June 17 to 1000 hours June 18 (for which graph was drawn on basis of graph for supplemental water-stage recorder on right bank), and June 20-22. Datum of gage is 5,740.99 ft above mean sea level.

Discharge record. — Stage-discharge relation defined by current-meter measurements below 1,100 cfs and extended above on basis of peak flow estimated from contracted-opening measurement of peak flow at U.S. Highway 350, 5.5 miles downstream. Discharge June 20-22 estimated on basis of typical recession.
FLOODS OF 1965 IN THE UNITED STATES

Maxima. — June 1965: Discharge, 20,000 cfs 2300 hours June 16 (gage height, 11.65 ft, from floodmark).
1954 to May 1965: Discharge, 35,000 cfs May 19, 1955 (gage height, 13.97 ft), from rating curve extended above 180 cfs on basis of flow-over-dam computations at gage heights 3.2, 4.5, and 7.34 ft.
Greatest flood since at least 1859 occurred Sept. 30, 1904.

Mean discharge, in cubic feet per second, 1965

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
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<tr>
<td>June 14</td>
<td>15 ______</td>
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<td>15 ______</td>
<td>38</td>
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<tr>
<td>16 ______</td>
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<tr>
<td>17 ______</td>
<td>3,310</td>
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<tr>
<td>18 ______</td>
<td>1,310</td>
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Gage height and discharge at indicated time, 1965

<table>
<thead>
<tr>
<th>Hour</th>
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<th>Discharge (cfs)</th>
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<td>June 15</td>
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<tr>
<td>2400</td>
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<td>3.05</td>
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<tr>
<td>0330</td>
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(40) PURGAITOIRE RIVER AT U.S. HIGHWAY 350, NEAR HOEHNE, COLO.
(Miscellaneous site)

Location. — Lat 37°17'12", long 104°18'42", in NW½ sec. 2, T. 32 S., R. 62 W., at bridge on U.S. Highway 350, 1 mile downstream from Chicosa Creek and 3 miles east of Hoehne.
Drainage area. — 1,015 sq mi.
1955: Discharge, 37,900 cfs May 19, by indirect measurement of peak flow.

(41) 07125100 FRIJOLE CREEK NEAR ALFALFA, COLO.

Location. — Lat 37°12'00", long 104°11'40", in NW¼ sec. 2, T. 33 S., R. 61 W., on right bank at downstream side of bridge on U.S. Highway 160, 1 mile upstream from mouth, 4 miles west of AlfaIa, and 16 miles east of city limits of Trinidad.
Drainage area. — 80 sq mi.
Gage-height record. — Water-stage recorder graph except 0400 to 1100 hours June 18 and 1100 to 2400 hours June 20 (for which graph was drawn on basis of 1 gage reading and typical recession) and June 21, 22. Altitude of gage is 5,400 ft (from topographic map).
Discharge record. — Stage-discharge relation defined by current-meter measurements below 1,300 cfs and by slope-area measurement of 2,310 cfs and contracted-opening measurement of 10,600 cfs. Discharge June 21, 22 estimated on basis of typical recession.
Maxima. — June 1965: Discharge, 10,600 cfs 2030 hours June 17 (gage height. 17.25 ft)
1954 to May 1965: Discharge, 13,500 cfs June 22, 1954 (gage height, 17.23 f. from floodmarks), by contracted-opening measurement of peak flow.
Mean discharge, in cubic feet per second, 1965

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
<th>Day</th>
<th>Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>June</td>
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<td>June</td>
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</tr>
<tr>
<td>15</td>
<td>2.1</td>
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</tr>
<tr>
<td>18</td>
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<td>29</td>
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Gage height and discharge at indicated time, 1965

<table>
<thead>
<tr>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 14</td>
<td></td>
<td></td>
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(42) SAN ISIDRO CREEK NEAR TRINCHERA, COLO.

(Miscellaneous site)

Location. — Lat 37°01', long 104°12', in sec. 25, T. 34 S., R. 61 W., 8 miles west of Trinchera and 20 miles southeast of Trinidad.

Drainage area. — 32.1 sq mi.

Maximum. — June 1965: Discharge, 7,960 cfs 2100 hours June 17, by slope-area measurement of peak flow.

(43) 07125500 SAN FRANCISCO CREEK NEAR ALFALFA, COLO.

Location. — Lat 37°11'10", long 104°07'50", in sec. 8, T. 33 S., R. 60 W., on downstream side of bridge on U.S. Highway 160, 0.5 mile upstream from mouth, 1.5 miles south of Alfalfa, and 20 miles east of Trinidad.

Drainage area. — 160 sq mi.

Gage-height record. — Water-stage recorder graph June 14—19, except 1230 to 2230 hours June 16, 0200 to 0430 hours June 17, and 1930 hours June 17 to 0500 hours June 18 (for which graph was drawn on basis of highwater mark in gage well, 1 gage reading, and typical stage pattern), and June 20—22. Altitude of gage is 5,320 ft (from topographic map).

Discharge record. — Stage-discharge relation defined by current-meter measurements below 430 cfs and by slope-area measurements of 2,860 and 6,680 cfs. Discharge June 20—22 estimated on basis of typical recession.

Maxima. — June 1965: Discharge, about 14,000 cfs 0030 hours June 18 (gage height, 13.24 ft, from floodmark).

1954 to May 1965: Discharge, 15,500 cfs May 19, 1955 (gage height, 13.00 ft), from rating curve extended above 250 cfs on basis of slope-area measurement of peak flow.

Flood of July 22, 1954, reached a stage of 14.40 ft, from floodmarks (discharge, 26,300 cfs, by contracted-opening measurement of peak flow).
FLOODS OF 1965 IN THE UNITED STATES

**Mean discharge, in cubic feet per second, 1965**

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
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</thead>
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<tr>
<td>16</td>
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<tr>
<td>17</td>
<td>7,620</td>
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<tr>
<td>18</td>
<td>5,320</td>
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<tr>
<td>June 19</td>
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<td>833</td>
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**Gage height and discharge at indicated time, 1965**

<table>
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<tr>
<th>Hour</th>
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<th>Discharge (cfs)</th>
<th>Hour</th>
<th>Gage height (feet)</th>
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**Location.** — Lat 37°11'30", long 104°07’30", in NW¼ sec. 9, T. 33 S., R. 60 W., on right bank 700 ft downstream from San Francisco Creek, 1.5 miles southeast of Alfa, and 20 miles east of Trinidad.

**Drainage area.** — 1,320 sq mi.

**Gage-height record.** — Water-stage recorder graph. Altitude of gage is 5,20 ft (from topographic map).

**Discharge record.** — Stage-discharge relation defined by current-meter measurements below 2,700 cfs and by slope-area measurements of 3,440, 6,230, 8,740, 27,300, 37,800, and 41,900 cfs.

**Maxima.** — June 1965: Discharge, 27,300 cfs 0015 hours June 18 (gage height, 27.30 ft).

1905–7, 1924 to May 1965: Discharge, 41,900 cfs May 19, 1955 (gage height, 31.9 ft, from floodmarks, present site and datum), from rating curve extended above 2,700 cfs on basis of slope-area measurements at gage heights 9.79, 13.35, 15.75, 27.30, 30.60, and 31.9 ft.

**Mean discharge, in cubic feet per second, 1965**

<table>
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<tr>
<th>Day</th>
<th>Discharge</th>
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<td>June 14</td>
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<td>16</td>
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**Gage height and discharge at indicated time, 1965**

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<th>Hour</th>
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(45) **Trincher Creek near Trincher, Colo.**  
(Miscellaneous site)

Location. — Lat 37°07'45", long 104°00'50", in sec. 33, T. 33 S., R. 59 W., at U.S. Highway 160, 6 miles northeast of Trincher.

Drainage area. — 129 sq mi.

Maxima. — June 1965: Discharge, 4,500 cfs June 17, by critical-depth measurement of peak flow.


(46) **Alkali Arroyo near Trincher, Colo.**  
(Miscellaneous site)

Location. — Lat 37°10'00", long 103°56'13", in sec. 18, T. 33 S., R. 58 W., at bridge on U.S. Highway 160, 10 miles northeast of Trincher.

Drainage area. — 34.5 sq mi.

Maxima. — June 1965: Discharge, 2,600 cfs June 17, by slope-area measurement of peak flow.

(47) 07126300 Purgatoire River (at Canyon Crossing) near Thatcher, Colo.

(Gaging station, established July 1966)

Location. — Lat 37°21'30", long 103°53'40", in sec. 10, T. 31 S., R. 58 W., at gas line crossing and county road bridge, 1.2 miles downstream from Van Bremer Arroyo, 18 miles southeast of Thatcher, and 36 miles northeast of Trinidad.

Drainage area. — 1,935 sq mi.

Maxima. — June 1965: Discharge, 47,700 cfs June 18, by contracted-opening measurement of peak flow.

1954–55: Floods of July 22, 1954 and May 19, 1955 reached stages (from floodmarks) 3.2 and 1.7 ft higher, respectively, than the June 1965 stage.

(48) Chacuaco Creek near La Junta, Colo.

(Miscellaneous site)

Location. — Lat 37°32'11", long 103°36'06", in sec. 12, T. 29 S., R. 56 W., 2 miles upstream from mouth and 32 miles south of La Junta.

Drainage area. — 387 sq mi.

Maxima. — June 1965: Discharge, 38,900 cfs June 17, by slope-area measurement of peak flow.

1955: Discharge, 3,170 cfs May 19, by slope-area measurement of peak flow.

(49) 07126500 Purgatoire River at Ninemile Dam, near Higbee, Colo.

Location. — Lat 37°44'06", long 103°29'45", in NW 1/4 sec. 7, T. 27 S., R. 54 W., on left bank 850 ft upstream from Ninemile Dam, 4 miles southwest of Higbee, and 5.5 miles upstream from Smith Canyon.

Drainage area. — 2,900 sq mi.


Discharge record. — Stage-discharge relation defined by current-meter measurements below 2,500 cfs and by computation of peak flow over dam at 80,000 cfs. Discharge June 14, 18–23 estimated on basis of 1 discharge measurement, observer’s estimates, and records for station near Alfalfa.

Maxima. — June 1965: Discharge, 105,000 cfs (estimated), June 18 (gage height, 19.6 ft, from floodmarks).

1924 to May 1965: Discharge, 80,000 cfs May 19, 1955 (gage height, 17.7 ft), from rating curve extended above 21,000 cfs on basis of computation of peak flow over dam.

Mean discharge, in cubic feet per second, 1965

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<th>Discharge</th>
<th>Day</th>
<th>Discharge</th>
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<td>June 20</td>
<td>1,800</td>
</tr>
<tr>
<td>14</td>
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</tr>
<tr>
<td>19</td>
<td>4,500</td>
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(50) Smith Canyon near Ninview, Colo.

(Miscellaneous site)

Location. — Lat 37°42'25", long 103°24'20", in NE 1/4 sec. 14, T. 27 S., R. 54 W., at concrete ford on county road, 4.5 miles upstream from mouth, 5 miles southeast of Higbee, and 11 miles northwest of Ninview.
Drainage area. — 291 sq mi.

Maxima. — June 1965: Discharge, 84,000 cfs 0200 hours June 18, by slope-area measurement of peak flow.
1955: Discharge, 5,660 cfs May 19, by slope-area measurement of peak flow.

(51) 07128500 PURGATOIRE RIVER NEAR LAS ANIMAS, COLO.

Location. — Lat 38°02'02", long 103°12'00", in sec. 23, T. 23 S., R. 52 W., near left bank on downstream side of bridge on State Highway 101, 2.3 miles southwest of courthouse in Las Animas and 4.5 miles upstream from mouth.

Drainage area. — 3,503 sq mi.

Gage-height record. — Recording gage destroyed by flood. Hourly remote radio-gage readings June 13 to 0430 hours June 18. Hourly staff-gage readings 0530 to 2400 hours June 18. Datum of gage is 3,877.94 ft above mean sea level.

Discharge record. — Stage-discharge relation defined by current-meter measurements below 14,000 cfs. Discharge June 19-25 estimated on basis of weather records and records for nearby stations.

Maxima. — June 1965: Discharge, 62,500 cfs 1730 hours June 18 (gage height, 15.94 ft, from floodmark).
1889, 1922 to May 1965: Discharge, 70,000 cfs May 20, 1955 (gage height, 17.00 ft, present datum), from rating curve extended above 38,000 cfs.

Greatest flood since at least 1860 occurred Oct. 1, 1904.

Cooperation. — 18 staff-gage readings furnished by Corps of Engineers.

Mean discharge, in cubic feet per second, 1965

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
<th>Day</th>
<th>Discharge</th>
</tr>
</thead>
<tbody>
<tr>
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<td>3400</td>
<td>June  16</td>
<td>10,600</td>
</tr>
<tr>
<td>0430</td>
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<td>0830</td>
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<tr>
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<tr>
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<td>1830</td>
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<tr>
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<tr>
<td>2430</td>
<td>0.80</td>
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Gage height and discharge at indicated time, 1965

<table>
<thead>
<tr>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
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<tbody>
<tr>
<td>June 13</td>
<td></td>
<td></td>
<td>June 16</td>
<td></td>
<td></td>
<td>June 17</td>
<td></td>
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<tr>
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<tr>
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</tr>
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<td>85</td>
<td>0830</td>
<td>7.99</td>
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<td>0830</td>
<td>8.30</td>
<td>14,400</td>
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<td>8.30</td>
<td>11,400</td>
<td>1330</td>
<td>8.30</td>
<td>14,400</td>
</tr>
</tbody>
</table>

(52) RULE CREEK NEAR TOONERVILLE, COLO.

Location. — Lat 37°49', long 103°11', in sec. 6, T. 26 S., R. 51 W., just downstream from Muddy Creek, 3.5 miles north of Toonerville.
FLOODS OF 1965 IN THE UNITED STATES

Drainage area. — 363 sq mi.

Maxima. — June 1965: Discharge, 276,000 cfs June 18, by slope-area measurement at peak flow.

1941-46, 1949, 1955: Discharge, 11,600 cfs about June 5, 1949 (gage height, 20.05 ft, from floodmarks), at site of former gaging station "near Caddoa," 9 miles downstream (drainage area, 435 sq mi).

Remarks. — Peak June 17, 1965, may have been affected by failure of dam on Muddy Creek.

(53) 07130000 JOHN MARTIN RESERVOIR AT CADD OA, COLO.

Location. — Lat 38°04’05’’, long 102°56’13’, in NE¼NW¼ sec. 8, T. 23 S., R. 49 W., at dam on Arkansas River at Caddoa, 3.2 miles southeast of Hasty and 58 miles upstream from Colorado-Kansas State line.

Drainage area. — 18,915 sq mi, of which 785 sq mi is probably noncontributing.

Gage-height record. — Water-stage recorder graph 0700 hours June 15 to 0900 hours June 19.

8 gage readings June 13, 14, 19-21. Datum of gage is at mean sea level (Corp of Engineers bench mark).


Remarks. — Reservoir stored practically all inflow during flood period.

Cooperation. — Gage-height record furnished by Corps of Engineers.

Elevation and contents at indicated time, 1965

| Hour | Elevation (feet) | Contents (acre-feet) | | Hour | Elevation (feet) | Contents (acre-feet) |
|------|------------------|---------------------|---|------------------|---------------------|
| June 14 | 0800 | 3,782.80 | 1,060 | June 18—Con. | 1200 | 3,814.72 | 79,120 |
| 2400 | 0000 | 3,782.80 | 0 | 1500 | 3,820.10 | 105,100 |
| June 15 | 0700 | 3,785.10 | 2,590 | 1800 | 3,825.75 | 138,100 |
| 1200 | 0900 | 3,785.89 | 3,250 | 2100 | 3,829.28 | 161,800 |
| 1800 | 1200 | 3,787.80 | 5,540 | 2400 | 3,831.70 | 179,400 |
| 2100 | 1500 | 3,788.29 | 6,180 | June 19 | 0300 | 3,833.71 | 194,900 |
| 2400 | 1800 | 3,788.43 | 6,370 | 0600 | 3,833.71 | 194,900 |
| June 16 | 0200 | 3,788.51 | 6,480 | 2400 | 3,833.71 | 223,000 |
| 0800 | 0300 | 3,788.42 | 6,250 | June 20 | 2400 | 3,841.23 | 259,900 |
| 1200 | 0600 | 3,788.15 | 5,990 | June 21 | 2400 | 3,843.05 | 277,600 |
| 1800 | 0900 | 3,788.38 | 6,300 | June 22 | 2400 | 3,843.85 | 285,600 |
| 2400 | 1200 | 3,788.75 | 6,800 | June 23 | 2400 | 3,844.80 | 295,300 |
| June 17 | 0600 | 3,789.64 | 8,110 | June 24 | 2400 | 3,846.00 | 307,900 |
| 1200 | 0900 | 3,790.92 | 10,160 | June 25 | 2400 | 3,846.50 | 313,300 |
| 1800 | 1200 | 3,793.68 | 15,340 | | 1500 | 3,846.50 | 313,300 |
| 2400 | 1800 | 3,795.50 | 19,200 | | 2100 | 3,846.50 | 313,300 |

1938 to May 1965: Discharge, 40,000 cfs Apr. 24, 1942 (gage height, 10.46 ft at site 700 ft upstream at datum 3.64 ft higher), from rating curve extended above 12,000 cfs on basis of flow-over-dam and critical-depth measurement of peak flow.

Remarks. — Flow completely regulated by John Martin Reservoir. (See station 07130000.)

Mean discharge, in cubic feet per second, 1965

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
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<tbody>
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<td>June 13</td>
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</tr>
<tr>
<td>14</td>
<td>438</td>
</tr>
<tr>
<td>15</td>
<td>678</td>
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<td>16</td>
<td>900</td>
</tr>
<tr>
<td>17</td>
<td>307</td>
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</table>

(55) 07131000 CADD OA CREEK AT CADD OA, COLO.  
(Gaging station, discontinued in 1946)

Location. — Lat 38°03'40", long 102°55'05", in sec. 9, T. 23 S., R. 49 W., 0.3 mile east of Caddoa, 1 mile east of John Martin Dam, and 2 miles upstream from mouth.

Drainage area. — 131 sq mi.

Maxima. — June 1965: Discharge, 37,600 cfs 0500 hours June 18 (gage height, 14.1 ft, from floodmarks), by contracted-opening measurement of peak flow.

1941—46, 1949, 1956: Discharge, 11,800 cfs Aug. 19, 1956 (gage height not determined), by indirect measurement of peak flow.

(56) 07131500 MUD CREEK NEAR CADD OA, COLO.  
(Gaging station, discontinued in 1943)

Location. — Lat 38°01'40", long 102°52'05", in SW/4 sec. 24, T. 23 S., R. 49 W., 4 miles southeast of Caddoa and 6 miles upstream from mouth.

Drainage area. — 186 sq mi.

Maxima. — June 1965: Discharge, 53,400 cfs 0200 hours June 18, by contracted-opening measurement of peak flow.

1941—43, 1949: Discharge, 38,400 cfs during June 1949 (gage height, 23.36 ft, from floodmarks), by contracted-opening measurement of peak flow.

(57) DRY CREEK NEAR LAMAR, COLO.  
(Miscellaneous site)

Location. — Lat 38°03'23", long 104°42'00", in NW\1/4 sec. 16, T. 23 S., R. 47 W., 1 mile southwest of Lamar municipal airport and 2.5 miles upstream from mouth.

Drainage area. — 73.0 sq mi.

Maximum. — June 1965: Discharge, 28,200 cfs 0200 hours June 18, by slope-area measurement of peak flow.

(58) WILLOW CREEK NEAR LAMAR, COLO.  
(Miscellaneous site)

Location. — Lat 38°01'56", long 102°37'07", in sec. 19, T. 23 S., R. 46 W., 2,000 ft upstream from U.S. Highway 287 and 3.5 miles south of Lamar.

Drainage area. — 40.5 sq mi.

Maximum. — June 1965: Discharge, 24,300 cfs 0200 hours June 18, by slope-area measurement of peak flow.
D62

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(59) 07133000 ARKANSAS RIVER AT LAMAR, COLO.

Location. — Lat 38°06'15'', long 102°37'08'', in SE 1/4 sec. 30, T. 22 S., R. 46 W., on right bank 450 ft upstream from bridge on U.S. Highways 50 and 287 and 1.2 miles north of city hall in Lamar.

Drainage area. — 19,780 sq mi, of which 950 sq mi is probably noncontributing.

Gage-height record. — Water-stage recorder graph except 0600 hours June 18 to 0730 hours June 20. Datum of gage is 3,599.81 ft above mean sea level.

Discharge record. — Stage-discharge relation defined by current-meter measurements. Discharge June 18 and 19 estimated on basis of 1 discharge measurement, floodmark, and typical recession.

Maxima. — June 1965: Discharge, 73,800 cfs June 18 (gage height, 18.90 ft, from floodmark).

1887 to May 1965: Discharge, 130,000 cfs June 5, 1921 (gage height, 17.0 ft present datum), from rating curve extended above 10,000 cfs.

Remarks. — Flow regulated by John Martin Reservoir. (See station 07130000.) Flood runoff came from drainage area below John Martin Reservoir.

Mean discharge, in cubic feet per second, 1965

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
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<tr>
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Gage height and discharge at indicated time, 1965

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<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
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</thead>
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<td>0500</td>
<td>5.78 658</td>
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<td>0800</td>
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<td>1000</td>
<td>5.60 595</td>
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<td>5.85 612</td>
</tr>
<tr>
<td></td>
<td>2000</td>
<td>4.92 366</td>
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(60) CLAY CREEK NEAR LAMAR, COLO.

(Miscellaneous site)

Location. — Lat 38°00'44'', long 102°34'26'', in sec. 27, T. 23 S., R. 46 W., upstream from Clay Creek Reservoir, 6 miles southeast of Lamar, and 6.5 miles upstream from mouth.

Drainage area. — 213 sq mi.

Maxima. — June 1965: Discharge, 158,000 cfs June 18 by slope-area measurement of peak flow.

1903, 1951—52, 1956, 1964: Discharge, 27,500 cfs May 15, 1951, by indirect measurement of peak flow at site about 6 miles downstream (drainage area, 230 sq mi).

(61) BIG SANDY CREEK NEAR CALHAN, COLO.

(Miscellaneous site)

Location. — Lat 39°05', long 104°17', in sec. 13, T. 11 S., R. 62 W., just downstream from unnamed tributary, 1 mile downstream from bridge on county road and 4 miles north of Calhan.

Drainage area. — 49.0 sq mi.
ARKANSAS RIVER BASIN, COLORADO, KANSAS, NEW MEXICO D63

Maxima. — June 1965: Discharge, 60,700 cfs 1700 hours June 17, by slope-area measurement of peak flow.
1954: Discharge, 44,600 cfs Aug. 5, by indirect measurement of peak flow at Ramah, about 9 miles downstream.

(62) SOUTH RUSH CREEK NEAR KARVAL, COLO.
(Miscellaneous site)
Location. — Lat 38°51', long 103°32', in sec. 3, T. 14 S., R. 55 W., just upstream from State Highway 94 and 8 miles north of Karval.
Drainage area. — 188 sq mi.
Maximum. — June 1965: Discharge, 3,710 cfs June 17, by slope-area measurement of peak flow.

(63) BIG SANDY CREEK NEAR LAMAR, COLO.
(Miscellaneous site)
Location. — Lat 38°07'15", long 102°28'50", in sec. 21, T. 22 S., R. 45 W., 0.5 mile upstream from State Highway 196, 0.7 mile upstream from mouth, and 8 miles northeast of Lamar.
Drainage area. — 3,248 sq mi.
Maximum. — June 1965: Discharge, 3,600 cfs 0900 hours June 17, by slope-area measurement of peak flow.

(64) SMITH ARROYO NEAR GRANADA, COLO.
(Miscellaneous site)
Location. — Lat 38°04'25", long 102°26'25", in sec. 2, T. 23 S., R. 45 W., 1.5 miles upstream from mouth and 7 miles northwest of Granada.
Drainage area. — 29.1 sq mi.
Maximum. — June 1965: Discharge, 10,600 cfs June 17, by slope-area measurement of peak flow.

(65) WOLF CREEK ABOVE GRANADA, COLO.
(Miscellaneous site)
Location. — Lat 37°57'05", long 102°26'05", in NE 1/4 sec. 23, T. 24 S., R. 45 W., 2.1 miles upstream from State Highway 117 and 10 miles southwest of Granada.
Drainage area. — 62.5 sq mi.
Maximum. — June 1965: Discharge, 35,300 cfs 0900 hours June 17, by slope-area measurement of peak flow.

(66) GRANADA CREEK NEAR GRANADA, COLO.
(Miscellaneous site)
Location. — Lat 37°59'20", long 102°16'50", in SW 1/4 sec. 5, T. 24 S., R. 43 W., 5.2 miles southeast of Granada.
Drainage area. — 36.0 sq mi.
Maximum. — June 1965: Discharge, 12,600 cfs 0800 hours June 17, by slope-area measurement of peak flow.

(67) TWO BUTTE CREEK NEAR SPRINGFIELD, COLO.
(Miscellaneous site)
Location. — Lat 37°38', long 102°37'; in NE 1/4 sec. 6, T. 28 S., R. 46 W., at U.S. Highways 287 and 385, 7 miles upstream from Two Buttes Dam and 16 miles north of Springfield.
Drainage area. — 453 sq mi.
Maximum. — June 1965: Discharge, 82,600 cfs 0700 hours June 17, by indirect measurement of peak flow.

(68) 07134845 Two Buttes Reservoir near Holly, Colo.
Location. — Lat 37°38', long 102°32', in sec. 1, T. 28 S., R. 46 W., at dam on Two Butte Creek, 16 miles north of Springfield.
Drainage area. — 472 sq mi.
Gage-height record. — Reference point read once daily except June 14–20. Peak stage determined from levels to floodmarks on face of dam (levels by Geological Survey).
Maxima. — June 1965: Contents not determined, occurred June 17 (gage height, 74.8 ft).
1918 to May 1965: Contents observed, 40,000 acre-feet August 1936 (gage height, 63.0 ft).
No records available some years.
Cooperation. — Records furnished by Water Commissioner, District 67, Division 2, State of Colorado.

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<tr>
<th>Date</th>
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<th>Content (acre-feet)</th>
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<tr>
<td>21</td>
<td>63.0</td>
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(69) 07135000 Two Butte Creek near Holly, Colo.
(Gaging station, discontinued in 1946)
Location. — Lat 38°01'40", long 102°08'20", in SE¼ sec. 21, T. 23 S., R. 42 W., 1 mile upstream from mouth and 2 miles southwest of Holly.
Drainage area. — 817 sq mi.
Maxima. — June 1965: Discharge, 182,000 cfs 0900 hours June 17, by slope-area measurement of peak flow.
1908, 1942–46: Discharge, 35,000 cfs October 1908, estimated from a high-water cross section.

(70) 07136000 Wild Horse Creek at Holly, Colo.
(Gaging station, discontinued in 1950)
Location. — Lat 38°02'45", long 102°07'05", in sec. 14, T. 23 S., R. 42 W., at bridge on State Highway 89, 0.2 mile southeast of Holly and 0.5 mile upstream from mouth.
Drainage area. — 272 sq mi.
Gage-height record. — Floodmarks only. Gage and reference marks have been destroyed by channel improvements.
Maxima. — June 1965: Discharge, 10,600 cfs June 17, by slope-area measurement of peak flow 0.3 mile downstream from head of new levied channel 1.5 miles upstream.
1922–50: Discharge observed at station, 1,690 cfs June 5, 1949 (flood flows bypass station); discharge above bypass, 8,340 cfs by contracted-opening measurement of peak flow at site 2 miles upstream.
Flood of Aug. 28, 1935, at site 11 miles upstream, reached a discharge of 22,000 cfs, by slope-area measurement of peak flow (discharge at station or above bypass channels unknown).

(71) 07137500 ARKANSAS RIVER NEAR COOLIDGE, KANS.

Location. — Lat 38°01'33", long 102°01'00", in NW¼ sec. 26, T. 23 S., R. 43 W., on right bank 1,560 ft upstream from highway bridge, 1 mile south of Coolidge, and 1.5 miles downstream from Colorado-Kansas State line.

Drainage area. — 25,410 sq mi, of which 1,708 sq mi is probably noncontributing.


Discharge record. — Stage-discharge relation defined by current-meter measurements below 13,000 cfs. Discharge June 17-21 estimated on basis of records for nearby stations and slope-area measurement of peak flow.

1903, 1950 to May 1965: Discharge, 60,000 cfs May 15, 1951 (gage height, 10.67 ft), from rating curve extended above 11,000 cfs.

Greatest flood prior to 1965 since at least 1887 occurred Oct. 20, 1908; discharge, 110,000 cfs at station “at Holly, Colo.,” 6 miles upstream.

Remarks. — Flow regulated by John Martin Reservoir. (See station 07130000.) Flood runoff came from drainage area below John Martin Reservoir.

Mean discharge, in cubic feet per second, 1965

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
<th>Day</th>
<th>Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 15</td>
<td>50</td>
<td>June 19</td>
<td>50,000</td>
</tr>
<tr>
<td>16</td>
<td>142</td>
<td>20</td>
<td>9,000</td>
</tr>
<tr>
<td>17</td>
<td>65,000</td>
<td>21</td>
<td>2,000</td>
</tr>
<tr>
<td>18</td>
<td>101,000</td>
<td>22</td>
<td>1,500</td>
</tr>
</tbody>
</table>

(72) 07138000 ARKANSAS RIVER AT SYRACUSE, KANS.

Location. — Lat 37°57'58", long 101°45'23", in SW¼ sec. 18, T. 24 S., R. 40 W., near center of stream on downstream side of bridge on U.S. Highway 270, 0.5 mile south of Syracuse and at mile 1,080.9.

Drainage area. — 25,763 sq mi, of which 1,857 sq mi is probably noncontributing.

Gage-height record. — Water-stage recorder graph prior to June 20. One or more daily wire-weight gage readings June 20-22. Datum of gage is 3,209.32 ft above mean sea level.

Discharge record. — Stage-discharge relation defined by current-meter measurements below 62,000 cfs and extended above on basis of indirect measurements of peak flow.

Maxima. — June 1965: Discharge, 174,000 cfs 2000 hours June 17; gage height, 21.80 ft 1900 hours June 17.

1887 to May 1965: Discharge, 87,000 cfs October 1908 (gage height, 11.7 ft).

Remarks. — Flow regulated by John Martin Reservoir. (See station 07130000.) Flood runoff came principally from drainage area in Colorado below John Martin Reservoir.

Mean discharge, in cubic feet per second, 1965

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
<th>Day</th>
<th>Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 16</td>
<td>121</td>
<td>June 20</td>
<td>13,100</td>
</tr>
<tr>
<td>17</td>
<td>38,900</td>
<td>21</td>
<td>2,820</td>
</tr>
<tr>
<td>18</td>
<td>109,000</td>
<td>22</td>
<td>1,910</td>
</tr>
<tr>
<td>19</td>
<td>61,600</td>
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<td>1,710</td>
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## Floods of 1965 in the United States

### Gage Height and Discharge at Indicated Time, 1965

<table>
<thead>
<tr>
<th>Hour</th>
<th>Gage Height (feet)</th>
<th>Discharge (cfs)</th>
<th>Hour</th>
<th>Gage Height (feet)</th>
<th>Discharge (cfs)</th>
<th>Hour</th>
<th>Gage Height (feet)</th>
<th>Discharge (cfs)</th>
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<td>3.41</td>
<td>82</td>
<td>0600</td>
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<td>155</td>
<td>0800</td>
<td>5.80</td>
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<td>121</td>
<td>1000</td>
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<td>1600</td>
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<tr>
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<td>136</td>
<td>2100</td>
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<td>2400</td>
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<td>104,000</td>
<td>0100</td>
<td>15.20</td>
<td>73,000</td>
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### Floods of 1965 in the United States

(73) 07139000 Arkansas River at Garden City, Kans.

**Location.** Lat 37°57'21", long 100°52'37", in NW ¼ sec. 19, T. 24 S., R. 32 W., near left bank on downstream side of bridge on U.S. Highway 83, 0.5 mile south of Garden City and at mile 1,024.2.

**Drainage Area.** 27,071 sq mi, of which about 2,368 sq mi is probably noncontributing.

**Gage-Height Record.** Water-stage recorder graph. Datum of gage is 2,821.43 ft above mean sea level.

**Discharge Record.** Stage-discharge relation defined by current-meter measurements below 40,000 cfs and by indirect measurement of 130,000 cfs.

**Maxima.** June 1965: Discharge, 130,000 cfs 0300 hours June 19; gage height, 16.58 ft 2300 hours June 18.

1922 to May 1965: Discharge, 33,500 cfs May 16, 1951 (gage height, 9.57 ft, at site 60 ft downstream at same datum).

**Remarks.** Flow regulated by John Martin Reservoir. (See station 07130000.) Flood runoff came principally from drainage area in Colorado below John Martin Reservoir.

### Mean Discharge, in Cubic Feet per Second, 1965

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
<th>Day</th>
<th>Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>11,300</td>
<td>19</td>
<td>104,000</td>
</tr>
<tr>
<td>18</td>
<td>3,280</td>
<td>20</td>
<td>46,700</td>
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### Gage Height and Discharge at Indicated Time, 1965

<table>
<thead>
<tr>
<th>Hour</th>
<th>Gage Height (feet)</th>
<th>Discharge (cfs)</th>
<th>Hour</th>
<th>Gage Height (feet)</th>
<th>Discharge (cfs)</th>
<th>Hour</th>
<th>Gage Height (feet)</th>
<th>Discharge (cfs)</th>
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<tbody>
<tr>
<td>June 18</td>
<td>1200</td>
<td>3.28</td>
<td>7</td>
<td>0600</td>
<td>15.00</td>
<td>360</td>
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<td>2100</td>
<td>16.00</td>
<td>50,000</td>
<td>2200</td>
<td>16.23</td>
<td>65,000</td>
</tr>
<tr>
<td>2400</td>
<td>15.45</td>
<td>93,500</td>
<td>0100</td>
<td>16.00</td>
<td>115,000</td>
<td>0200</td>
<td>16.25</td>
<td>128,000</td>
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| June 19—Con. | 0400 | 16.20 | 125,000 | 0800 | 15.90 | 111,000 |
| 1200 | 16.10 | 225,000 | 1600 | 15.85 | 170,000 |
| 2000 | 16.40 | 240,000 | 2400 | 15.55 | 97,000 |
| 0100 | 15.63 | 100,000 |

| June 20 | 0400 | 14.43 | 65,800 |
| 0800 | 13.98 | 54,600 |
| 1200 | 13.36 | 42,500 |
| 1600 | 12.93 | 35,600 |
| 2000 | 12.93 | 35,600 |
| 2400 | 12.00 | 24,600 |
| 0800 | 11.24 | 18,700 |
| 1600 | 10.36 | 13,800 |
| 2400 | 9.33 | 9,780 |

| June 22 | 0400 | 8.23 | 6,180 |
| 1600 | 7.22 | 3,820 |
| 2400 | 6.71 | 2,950 |
ARKANSAS RIVER BASIN, COLORADO, KANSAS, NEW MEXICO

(74) 07139500 ARKANSAS RIVER AT DODGE CITY, KANS.

Location. — Lat 37°44'51"N, long 100°01'08"W, in NE¼ sec. 35, T. 26 S., R. 25 W., near center of stream on downstream side of Second Street Bridge in Dodge City, at mile 970.2.

Drainage area. — 30,600 sq mi, of which 5,583 sq mi is probably noncontributing.

Gage-height record. — Water-stage recorder graph. Datum of gage is 2,467.71 ft above mean sea level.

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

Maxima. — June 1965: Discharge, 82,000 cfs 2400 hours June 19 (gage height, 15.68 ft).

1902-6, 1944 to May 1965: Discharge, 19,700 cfs May 18, 1951; gage height, 13.29 ft June 8, 1949.

Remarks. — Flow regulated by John Martin Reservoir. (See station 07130000.) Flood runoff came principally from drainage area in Colorado below John Martin Reservoir.

Mean discharge, in cubic feet per second, 1965

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
<th>Day</th>
<th>Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 18</td>
<td>107</td>
<td>June 19</td>
<td>25</td>
</tr>
<tr>
<td>June 19</td>
<td>103</td>
<td>June 20</td>
<td>26</td>
</tr>
<tr>
<td>June 20</td>
<td>99</td>
<td>June 21</td>
<td>27</td>
</tr>
<tr>
<td>June 21</td>
<td>16,000</td>
<td>June 22</td>
<td>28</td>
</tr>
<tr>
<td>June 22</td>
<td>16,200</td>
<td>June 23</td>
<td>29</td>
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</table>

Gage height and discharge at indicated time, 1965

<table>
<thead>
<tr>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 20—Con.</td>
<td></td>
<td></td>
<td>June 21—Con.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0600</td>
<td>15.46</td>
<td>76,500</td>
<td>2400</td>
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<tr>
<td>1200</td>
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<td>2400</td>
<td>10.56</td>
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<tr>
<td>1800</td>
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<td>67,000</td>
<td>2400</td>
<td>9.54</td>
<td>12,000</td>
</tr>
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<td>2400</td>
<td>14.05</td>
<td>50,700</td>
<td>2400</td>
<td>8.62</td>
<td>8,860</td>
</tr>
</tbody>
</table>

(75) 07140000 ARKANSAS RIVER NEAR KINSLEY, KANS.

Location. — Lat 37°55'33"N, long 99°22'31"W, in SW¼SE¼ sec. 26, T. 24 S., R. 19 W., near center of stream on downstream side of bridge on U.S. Highway 50, 2 miles east of Kinsley and at mile 920.3.

Drainage area. — 31,066 sq mi, of which 5,660 sq mi is probably noncontributing.

Gage-height record. — Graph based on one or more daily wire-weight gage readings.

Discharge record. — Stage-discharge relation defined by current-meter measurements. Datum of gage is 2,144.64 ft above mean sea level.

Maxima. — June 1965: Discharge, 49,800 cfs 1000 hours June 21 (gage height, 14.60 ft).

1944 to May 1965: Discharge, 11,700 cfs May 19, 1951 (gage height, 11.20 ft).

Remarks. — Flow regulated by John Martin Reservoir. (See station 07130000.) Flood runoff came principally from drainage area in Colorado below John Martin Reservoir.

Mean discharge, in cubic feet per second, 1965

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
<th>Day</th>
<th>Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 18</td>
<td>107</td>
<td>June 24</td>
<td>10,500</td>
</tr>
<tr>
<td>June 19</td>
<td>103</td>
<td>June 25</td>
<td>1000</td>
</tr>
<tr>
<td>June 20</td>
<td>99</td>
<td>June 26</td>
<td>2,890</td>
</tr>
<tr>
<td>June 21</td>
<td>16,000</td>
<td>June 27</td>
<td>2,700</td>
</tr>
<tr>
<td>June 22</td>
<td>30,000</td>
<td>June 28</td>
<td>2,700</td>
</tr>
<tr>
<td>June 23</td>
<td>16,200</td>
<td>June 29</td>
<td>2,700</td>
</tr>
</tbody>
</table>
FLOODS OF 1965 IN THE UNITED STATES

Gage height and discharge at indicated time, 1965

<table>
<thead>
<tr>
<th>Hour</th>
<th>June 20</th>
<th></th>
<th></th>
<th>June 21—Con.</th>
<th></th>
<th>June 22—Con.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gage height (feet)</td>
<td>Discharge (cfs)</td>
<td>Gage height (feet)</td>
<td>Discharge (cfs)</td>
<td>Gage height (feet)</td>
<td>Discharge (cfs)</td>
<td></td>
</tr>
<tr>
<td>2400</td>
<td>3.14</td>
<td>102</td>
<td>1600</td>
<td>14.19</td>
<td>43.700</td>
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</tr>
<tr>
<td>0200</td>
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<td>2000</td>
<td>14.30</td>
<td>45.200</td>
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<tr>
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<td>14.40</td>
<td>46.600</td>
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<td>1000</td>
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<td>45.600</td>
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<td>12.67</td>
<td>23.800</td>
<td>2400</td>
<td>9.97</td>
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</table>

(76) 07141300  ARKANSAS RIVER AT GREAT BEND, KANS.

Location.—Lat 38°21'11'', long 98°45'50'', in SE 1/4 sec. 33, T. 19 S., R. 13 W., near left bank on downstream side of bridge on U.S. Highway 281, 0.5 mile south of Great Bend, 4.5 miles upstream from Walnut Creek, and at mile 873.2.

Drainage area.—34,356 sq mi, of which 6,002 sq mi is probably noncontributing.

Gage-height record.—Water-stage recorder graph. Datum of gage is 1,839.82 ft above mean sea level (levels by Corps of Engineers).

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

Maxima.—June 1965: Discharge, 27,800 cfs June 23; gage height, 13.5 ft June 23.

1940 to May 1965: Discharge, 20,200 cfs May 1, 1942 (gage height, 10.34 ft).

Maximum stage prior to 1965 since at least 1895, 11.7 ft in June 1921 (discharge not determined) from reports of U.S. Weather Bureau. Discharge of June 23, 1965, is maximum since at least 1895.

Remarks.—Flow regulated by John Martin Reservoir. (See station 07130000.) Flood runoff came principally from drainage area in Colorado below John Martin Reservoir.

Mean discharge, in cubic feet per second, 1965

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge (cfs)</th>
<th>Day</th>
<th>Discharge (cfs)</th>
<th>Day</th>
<th>Discharge (cfs)</th>
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<tbody>
<tr>
<td>18</td>
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<td>13,300</td>
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<td>20</td>
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Gage height and discharge at indicated time, 1965

<table>
<thead>
<tr>
<th>Hour</th>
<th>June 22</th>
<th></th>
<th></th>
<th>June 23</th>
<th></th>
<th></th>
<th>June 24</th>
<th></th>
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<tbody>
<tr>
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<td>Gage height (feet)</td>
<td>Discharge (cfs)</td>
<td>Gage height (feet)</td>
<td>Discharge (cfs)</td>
<td>Gage height (feet)</td>
<td>Discharge (cfs)</td>
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<td>11.60</td>
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<td>7.54</td>
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<td>2000</td>
<td>12.38</td>
<td>22,300</td>
<td>2400</td>
<td>6.54</td>
<td>10,000</td>
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</tbody>
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(77) 07153500  CIMARRON RIVER NEAR GUY, N. M. EX.

Location.—Lat 36°59'15'', long 103°25'25'', in SE 1/4 sec. 21, T. 32 N., R. 33 E., on right bank, 1.5 miles upstream from Baker damsite, 1.7 miles northwest of Valley, 3 miles upstream from Travesser Creek, 12 miles north of Guy, and 27 miles northwest of Kenton, Okla.
Drainage area. — 545 sq mi.

Gage-height record. — Water-stage recorder graph except 1200 hours June 17 to June 19 when float tape came off drive wheel. Graph drawn for 1200 to 2400 hours June 17 on basis of highwater marks and fragmentary gage-height trace. Altitude of gage is 4,900 ft (from topographic map).

Discharge record. — Stage-discharge relation defined by current-meter measurements below 3,000 cfs and by slope-area measurement of 5,310 cfs and a slope-area measurement of 46,100 cfs for the peak of Aug. 21, 1965. Discharge for June 18, 19 estimated on basis of 1 discharge measurement and records for nearby stations.

Maxima. — June 1965: Discharge, 5,750 cfs 1300 hours June 17 (gage height, 16.5 ft, from floodmarks).

1942 to May 1965: Discharge, 8,500 cfs Oct. 5, 1954 (gage height, 20.5 ft), from rating curve extended above 3,000 cfs on basis of velocity-area study.

Mean discharge, in cubic feet per second, 1965

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
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<tbody>
<tr>
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<td>15</td>
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</tr>
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<td>16</td>
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Gage height and discharge at indicated time, 1965

<table>
<thead>
<tr>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
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<tr>
<td>June 17</td>
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(78) TRAVESSER CREEK NEAR GUY, N. MEX.

(Miscellaneous site)

Location. — Lat 36°54'00", long 103°26'50", in SW1/4 sec. 20, T. 31 N., R. 33 E., 6 miles north of Guy and approximately 8 miles upstream from mouth.

Drainage area. — 74.7 sq mi.

Maximum. — June 1965: Discharge, 12,500 cfs during late evening of June 16, by slope-area measurement of peak flow.

(79) 07154400 CARRIZOZO CREEK NEAR KENTON, OKLA.

(Crest-stage station)

Location. — Lat 36°52'55", long 103°01'05", in NE1/4 sec. 31, T. 31 N., R. 37 E., under bridge on New Mexico State Highway 18, 1.5 miles upstream from mouth and 4 miles southwest of Kenton.

Drainage area. — 111 sq mi.

Gage-height record. — Crest stages only.

Discharge record. — Stage-discharge relation defined by point of zero flow, current-meter measurement of 44 cfs, slope-area measurements of 649, 5,950, and 6,230 cfs, and by critical-depth measurement of 15,600 cfs.

Maxima. — June 1965: Discharge, 5,950 cfs probably June 17 (gage height not determined).

1953 to May 1965: Discharge, 15,600 cfs July 6, 1958 (gage height, 12.22 ft).
FLOODS OF 1965 IN THE UNITED STATES

(80) LONE ROCK DRAW NEAR SPRINGFIELD, COLO. (Miscellaneous site)
Location. — Lat 37°19', long 102°36', in sec. 28, T. 31 S., R. 46 W., just upstream from Atchison, Topeka, and Santa Fe Railroad bridge 5 miles south of Springfield.
Drainage area. — 106 sq mi.
Maximum. — June 1965: Discharge, 7,330 cfs June 17, by slope-area measurement of peak flow.

(81) BEAR CREEK NEAR SPRINGFIELD, COLO. (Miscellaneous site)
Drainage area. — 113 sq mi.
Maximum. — June 1965: Discharge, 13,200 cfs June 17, by contracted-opening measurement of peak flow.

(82) BEAR CREEK NEAR JOHNSON, KANS. (Miscellaneous site)
Location. — Lat 37°36', long 101°48', in NW¼NW¼ sec. 22, T. 28 S., R. 41 W., 3 miles northwest of Johnson and 16.8 miles upstream from Little Bear Creek.
Drainage area. — 890 sq mi.
Maxima. — June 1965: Discharge, 74,000 cfs June 17 (stage 2 ft lower than in 1951), by slope-area measurement of peak flow.
1951: Discharge, 134,000 cfs May 1951, by slope-area measurement of peak flow.

(83) 07199000 CANADIAN RIVER NEAR HEBRON, N. MEX.
Location. — Lat 36°47'10", long 104°27'45", in Maxwell Grant, near right bank at downstream side of bridge on U.S. Highways 64 and 85, 3.2 miles north of Hebron, Colfax County, 5 miles upstream from Chicorica Creek, and 8 miles south of Raton.
Drainage area. — 229 sq mi.
Gage-height record. — Water-stage recorder graph except 2045 to 2115 hours June 16 and 1945 to 2015 hours June 17 when graph was drawn based on floodmarks. Altitude of gage is 6,248 ft (from topographic map).
Discharge record. — Stage-discharge relation defined by current-meter measurements below 116 cfs and extended on basis of shape of curves at former site 200 ft upstream and by slope-area measurement of 62,400 cfs.
Maxima. — June 1965: Discharge, 62,400 cfs 2000 hours June 17 (gage height, 26.2 ft, from floodmarks).
1946 to May 1965: Discharge, 6,860 cfs May 19, 1955; gage height, 11.6 ft Aug. 24, 1951 (backwater from temporary dam).
Flood of 1942 reached a stage of about 26 ft at site 150 ft upstream.

Mean discharge, in cubic feet per second, 1965

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### ARKANSAS RIVER BASIN, COLORADO, KANSAS, NEW MEXICO

**Gage height and discharge at indicated time, 1965**

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<th>Discharge (cfs)</th>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
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(84) **CANADIAN RIVER TRIBUTARY NEAR HEBRON, N. MEX.**

(Miscellaneous site)

**Location.** — Lat 36°45'55", long 104°29'30", in Maxwell Grant, 500 ft upstream from U.S. Highways 64 and 85, 2.5 miles upstream from mouth, and 2.5 miles northwest of Hebron, Colfax County.

**Drainage area.** — 2.01 sq mi.

**Maximum.** — June 1965: Discharge, 2,130 cfs June 17, by contracted-opening measurement of peak flow.

(85) **CHICORICA CREEK NEAR YANKEE, N. MEX.**

(Miscellaneous site)

**Location.** — Lat 36°56'00", long 104°22'30", in Maxwell Grant, 1 mile upstream from East Fork and 2 miles west of Yankee, Colfax County.

**Drainage area.** — 36.3 sq mi.

**Maxima.** — June 1965: Discharge, 2,230 cfs June 17, by slope-area measurement of peak flow.

1955: Discharge, 2,230 cfs May 18 at outlet of Lake Maloya 4 miles upstream (drainage area, 26 sq mi).

**Remarks.** — Flow regulated by Lake Maloya (capacity, 4,000 acre-ft).

(86) **EAST FORK CHICORICA CREEK AT YANKEE, N. MEX.**

(Miscellaneous site)

**Location.** — Lat 36°55'40", long 104°21'35", in NE¼ sec. 14, T. 31 N., R. 24 E., 0.8 mile southwest of Yankee, 1 mile upstream from mouth, and 5.5 miles northeast of Paton.

**Drainage area.** — 22.7 sq mi.

**Maximum.** — June 1965: Discharge, 13,500 cfs June 17, by slope-area measurement of peak flow.

(87) **CHICORICA CREEK AT U.S. HIGHWAYS 64, 87, NEAR RATON, N. MEX.**

(Miscellaneous site)

**Location.** — Lat 36°52'05", long 104°22'50", in NW¼ sec. 3, T. 30 N., R. 24 E. (projected),
500 ft upstream from U.S. Highways 64 and 87, 3 miles downstream from East Fork, and 3.2 miles east of Raton.

**Drainage area.** — 78.8 sq mi.

**Maximum.** — June 1965: Discharge, 12,800 cfs June 17, by slope-area measurement of peak flow.

**Remarks.** — Flow partly regulated by Lake Maloya (capacity, 4,000 acre-ft).

(88) **CHICORICA CREEK TRIBUTARY AT U.S. HIGHWAYS 64, 87, NEAR RATON, N. MEX.**

(Miscellaneous site)

**Location.** — Lat 36°51'00", long 104°21'25", in NE¼ sec. 11, T. 30 N., R. 24 E., at U.S. Highways 64 and 87, 1.5 miles upstream from mouth and 4.8 miles east of Raton.

**Drainage area.** — 1.33 sq mi.

**Maximum.** — June 1965: Discharge, 1,810 cfs June 17, by indirect measurement of peak flow.

(89) **07201000 RATON CREEK AT RATON, N. MEX.**

(Crest-stage station)

**Location.** — Lat 36°54', long 104°26', on left bank at Raton, Colfax County, 60 ft upstream from bridge on State Highway 72.

**Drainage area.** — 14.4 sq mi.

**Gage-height record.** — Crest stages only.

**Discharge record.** — Stage-discharge relation defined by point of zero flow, current-meter measurement of 24 cfs, and slope-area measurements of 116, 817, 1,850, and 4,140 cfs.

**Maxima.** — June 1965: Discharge, 4,140 cfs June 17 (gage height, 14.8 ft, from high-water profile).

1953 to May 1965: Discharge, 1,850 cfs Aug. 19, 1956 (gage height, 6.5 ft, from high-water profile).

(90) **CROW CREEK NEAR KOEHLER, N. MEX.**

(Miscellaneous site)

**Location.** — Lat 36°46'45", long 104°37'40", in Maxwell Grant, between Capr and Antlers Canyons, 3.2 miles north of Koehler, Colfax County.

**Drainage area.** — 29.0 sq mi.

**Maximum** — June 1965: Discharge, 10,600 cfs June 17, by slope-area measurement of peak flow.

(91) **CROW CREEK BELOW WALDRON CANYON, NEAR KOEHLER, N. MEX.**

(Miscellaneous site)

**Location.** — Lat 36°42'05", long 104°35'35", in Maxwell Grant, immediately downstream from Waldron Canyon, 1.5 miles upstream from U.S. Highway 64 and 3.2 miles southeast of Koehler, Colfax County.

**Drainage area.** — 59.8 sq mi.

**Maximum.** — June 1965: Discharge, 30,400 cfs June 17, by slope-area measurement of peak flow.

(92) **SPRINGER ARROYO NEAR COLFAK, N. MEX.**

(Miscellaneous site)

**Location.** — Lat 36°42'20", long 104°33'00", in Maxwell Grant, at U.S. Highway 64, 0.7 mile southwest of Hoxie Junction, 5 miles upstream from mouth, and 12 miles northeast of Colfax, Colfax County.

**Drainage area.** — 3.00 sq mi.

**Maximum.** — June 1965: Discharge, 2,280 cfs June 17, by indirect measurement of peak flow.
(93) **CROW CREEK NEAR MAXWELL, N. MEX.**

(Miscellaneous site)

**Location.** — Lat 36°37'55", long 104°32'25", in Maxwell Grant, 500 ft upstream from U.S. Highway 85, 3 miles upstream from mouth, and 6 miles north of Maxwell, Colfax County.

**Drainage area.** — 78.4 sq mi.

**Maximum.** — June 1965: Discharge, 13,100 cfs June 17, by slope-area measurement of peak flow.

(94) **VERMEJO RIVER NEAR DAWSON, N. MEX.**

**Location.** — Lat 36°40'50", long 104°47'05", T. 28 N., R. 20 E., in Maxwell Grant, on left bank, 1.5 miles north of Dawson, Colfax County, and 2 miles upstream from Rail Canyon.

**Drainage area.** — 301 sq mi.

**Gage-height record.** — Water-stage recorder graph except 1300 hours June 18 to June 20. Datum of gage is 6,383 ft above mean sea level.

**Discharge record.** — Stage-discharge relation defined by current-meter measurements below 400 cfs and by slope-area measurements of 3,200, 5,000, and 12,600 cfs. Discharge estimated 1300 hours June 18 to June 20.

**Maxima.** — June 1965: Discharge, 12,600 cfs June 17 (gage height, 15.25 ft).

1927 to May 1965: Discharge, about 9,000 cfs Aug. 6, 1950 (gage height, 11.8? ft, from floodmarks, at site about 0.8 mile upstream at different datum).

A major flood occurred Aug. 2, 1921, discharge probably exceeded 10,000 cfs.

### Mean discharge, in cubic feet per second, 1965

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
<th>Day</th>
<th>Discharge</th>
</tr>
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<td>June 16</td>
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<tr>
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### Gage height and discharge at indicated time, 1965

<table>
<thead>
<tr>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
<th>Hour</th>
<th>Gage height (feet)</th>
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(95) **CIMARRON CREEK BELOW EAGLE NEST DAM, N. MEX.**

**Location.** — Lat 36°32'05", long 105°13'55", about sec. 26, T. 27 N., R. 16 E. (projected), in Maxwell Grant, on left bank 300 ft downstream from Eagle Nest Dam, 2 miles southeast of Eagle Nest, and 6.2 miles west of Ute Park.

**Drainage area.** — 167 sq mi.

**Gage-height record.** — Water-stage recorder graph except June 17—20. Altitude of gage is 8,000 ft (from topographic map).
FLOODS OF 1965 IN THE UNITED STATES

Discharge record. — Stage-discharge relation defined by current-meter measurements. Discharge June 17–20 estimated on basis of weather records and records of releases at Eagle Nest Dam.


1950 to May 1965: Discharge, 205 cfs June 14, 1955 (gage height, 2.79 ft).

Remarks. — Flow regulated by Eagle Nest Reservoir (capacity, 79,120 acre-ft).

### Mean discharge, in cubic feet per second, 1965

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
</tr>
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<tbody>
<tr>
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<tr>
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<td>13</td>
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<tr>
<td>June 17</td>
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(96) 07206200 McEvoy Creek near Eagle Nest, N. Mex.

Location. — Lat 36°33'00", long 105°13'30", in Maxwell Grant, on left bank 1.4 miles north of Eagle Nest Dam and 2 miles east of Eagle Nest, Colfax County.

Drainage area. — 1.95 sq mi.

Gage-height record. — Water-stage recorder graph. Altitude of gage is 8,600 ft (from topographic map).

Discharge record. — Stage-discharge relation defined by theoretical rating for 90° V-notch weir and current-meter measurements.

Maxima. — June 1965: Discharge, 0.94 cfs 1700 hours June 16 (gage height, 0.65 ft).

1961 to May 1965: Discharge, 1.64 cfs May 21, 1965 (gage height, 0.82 ft).

Remarks. — Records do not represent storm runoff but inflow to flood area.

### Mean discharge, in cubic feet per second, 1965

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
</tr>
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<tbody>
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(97) 07206300 Tolby Creek near Eagle Nest, N. Mex.

Location. — Lat 36°31'20", long 105°13'30", in Maxwell Grant, on right bank 1 mile upstream from mouth and 2.5 miles southeast of Eagle Nest, Colfax County.

Drainage area. — 8.5 sq mi.

Gage-height record. — Water-stage recorder graph. Altitude of gage is 8,400 ft (from topographic map).

Discharge record. — Stage-discharge relation defined by theoretical rating for 90° V-notch weir and current-meter measurements.

Maxima. — June 1965: Discharge, 18.7 cfs 1930 hours June 16 (gage height, 1.68 ft).

1961 to May 1965: Discharge, 32.9 cfs Apr. 20, 1962 (gage height, 2.04 ft).

### Mean discharge, in cubic feet per second, 1965

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(98) 07206400 Clear Creek near Ute Park, N. Mex.

Location. — Lat 36°31'35", long 105°10'30", in Maxwell Grant, on right bank 0.2 mile upstream from mouth and 4 miles southwest of Ute Park, Colfax County.
ARKANSAS RIVER BASIN, COLORADO, KANSAS, NEW MEXICO  D75

Drainage area. — 7.44 sq mi.


Discharge record. — Stage-discharge relation defined by theoretical rating for 120° V-notch weir and current-meter measurements. Discharge June 17–21 estimated on basis of 1 discharge measurement and records for nearby stations.

Maxima. — June 1965: Discharge, 151 cfs 0700 hours June 18 (gage height, 3.05 ft, backwater from debris).

1961 to May 1965: Discharge, 60.3 cfs May 24, 1965 (gage height, 2.29 ft).

Mean discharge, in cubic feet per second, 1965

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Gage height and discharge at indicated time, 1965

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<th>Discharge (cfs)</th>
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</tr>
<tr>
<td>1600</td>
<td>1.48</td>
<td>13.2</td>
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<td>1600</td>
<td>2.25</td>
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(99) TURKEY CREEK CANYON NEAR CIMARRON, N. MEX.

(Miscellaneous site)

Location. — Lat 36°31'25", long 104°58'55", in Maxwell Grant at Philmont Scout Ranch, 1,000 ft upstream from mouth and 4 miles west of Cimarron, Colfax County.

Drainage area. — 5.25 sq mi.

Maximum. — June 1965: Discharge, 6,660 cfs June 17, by slope-area measurement of peak flow.

(100) 07207000 CIMARRON CREEK NEAR CIMARRON, N. MEX.

Location. — Lat 36°31'00", long 104°58'35", about sec. 6, T. 26 N., R. 19 E. (projected), in Maxwell Grant, on right bank 3.8 miles west of Cimarron.

Drainage area. — 294 sq mi.

Gage-height record. — Water-stage recorder graph except 2030 hours June 17 to June 20 for which graph was drawn on basis of high-water marks and outside gage readings. Datum of gage is 6,599.58 ft above mean sea level.

Discharge record. — Stage-discharge relation defined by current-meter measurements below 800 cfs and by slope-area measurements of 1,160 and 15,500 cfs.

Maxima. — June 1965: Discharge, 15,500 cfs 2030 hours June 17 (gage height, 12.42 ft, from floodmarks).


Mean discharge, in cubic feet per second, 1965

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### Floods of 1965 in the United States

#### Gage height and discharge at indicated time, 1965

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(101) 07207500 PONIL CREEK NEAR CIMARRON, N. MEX.

**Location.** — Lat 36°34'35", long 104°56'55", about sec. 8, T. 27 N., R. 19 E. (projected), on left bank 1.5 miles downstream from confluence of North and South Ponil Creeks and 5 miles northwest of Cimarron.

**Drainage area.** — 171 sq mi.

**Gage-height record.** — Water-stage recorder graph to 2100 hours June 17 when gage was destroyed by flood. Datum of gage is 6,630 ft above mean sea level.

**Discharge record.** — Stage-discharge relation defined by current-meter measurements below 120 cfs and by slope-area measurements of 391, 540, 1,160, 2,040, and 5,630 cfs. Discharge 2100 hours June 17 to June 20 estimated on basis of weather records and records for Vermejo River near Dawson and other nearby stations.

**Maxima.** — June 1965: Discharge, 5,630 cfs 2100 hours June 17 (gage height, 11.13 ft, from floodmarks).


**Mean discharge, in cubic feet per second, 1965**

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
<th>Day</th>
<th>Discharge</th>
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Gage height and discharge at indicated time, 1965

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<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
<th>Hour</th>
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<th>Discharge (cfs)</th>
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<tr>
<td>0900</td>
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<td>89</td>
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<td>3.02</td>
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<tr>
<td>1100</td>
<td>2.00</td>
<td>57</td>
<td>1000</td>
<td>2.88</td>
<td>142</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(102) CHASE CANYON NEAR CIMARRON, N. MEX.  
(Miscellaneous site)

Location. — Lat 36°34'30", long 104°56'25", in Maxwell Grant, 1,500 ft upstream from mouth and 5 miles north of Cimarron, Colfax County.

Drainage area. — 23.0 sq mi.

Maximum. — June 1965: Discharge, 10,800 cfs June 17, by slope-area measurement of peak flow.

(103) 07208500 RAYADO CREEK AT SAUBLE RANCH, NEAR CIMARRON, N. MEX.

Location. — Lat 36°22'20", long 104°58'10", in sec. 30, T. 25 N., R. 19 E. (projected), in Maxwell Grant, on left bank at Sauble Ranch, 10 miles southwest of Cimarron and 16 miles upstream from mouth.

Drainage area. — 65 sq mi.

Gage-height record. — Water-stage recorder graph to 0200 hours June 16 when station was destroyed by flood. Altitude of gage is 6,720 ft (from topographic map).

Discharge record. — Stage-discharge relation defined by current-meter measurements below 110 cfs, a slope-area measurement of 323 cfs, and a field estimate of 9,000 cfs. Discharge 0300 hours June 16 to June 22 estimated on basis of weather records and records for Ponil Creek near Cimarron and Cimarron Creek near Cimarron.

Maxima. — June 1965: Discharge, 9,000 cfs 2400 hours June 17 (gage height, 11.5 ft from floodmarks at site 270 ft upstream at datum 2.79 ft higher, used subsequent to June 16, 1965).
FLOODS OF 1965 IN THE UNITED STATES

1909-12, 1914 to May 1965: Discharge, 1,900 cfs May 23, 1965 (gage height, 6.20 ft).

The major flood of June 10, 1913, destroyed the gage (stage and discharge not determined). Another major flood probably occurred Sept. 29 or 30, 1904.

Mean discharge, in cubic feet per second, 1965

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 14</td>
<td>13</td>
</tr>
<tr>
<td>15</td>
<td>54</td>
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<tr>
<td>16</td>
<td>400</td>
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<tr>
<td>17</td>
<td>1,300</td>
</tr>
<tr>
<td>18</td>
<td>2,000</td>
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<table>
<thead>
<tr>
<th>Day</th>
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<tr>
<td>June 19</td>
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</tr>
<tr>
<td>21</td>
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<td>22</td>
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Gage height and discharge at indicated time, 1965

<table>
<thead>
<tr>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
</tr>
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<tbody>
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<td>June 15</td>
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<tr>
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<td>4.60</td>
<td>640</td>
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<tr>
<td>0200</td>
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(104) 07211000 CIMARRON CREEK AT SPRINGER, N. MEX.

Location. — Lat 36°21'30", long 104°35'50", in southeast corner of Maxwell Grant, on left bank at Springer, Colfax County, 270 ft downstream from bridge on State Highway 199, 6 miles downstream from Rayado Creek, and 6 miles upstream from mouth.

Drainage area. — 1,032 sq mi.

Gage-height record. — Water-stage recorder graph after 1430 hours June 19. Several staff-gage readings available June 17-19. Altitude of gage is 5,770 ft (from nearby level line).

Discharge record. — Stage-discharge relation defined by current-meter measurements below 1,800 cfs and by slope-area measurement of 6,250 cfs and contracted-opening measurement of 29,500 cfs. Discharge June 14-18 estimated on basis of 4 discharge measurements, staff gage readings, and records for nearby stations.

Maxima. — June 1965: Discharge, 29,500 cfs 0200 hours June 18 (gage height, 19.96 ft, from high-water profile).

1930 to May 1965: Discharge, 6,250 cfs June 6, 1958 (gage height, 10.55 ft) by slope-area measurement of peak flow.

Flood of Sept. 29, 1904, reached a stage of about 22 ft (backwater from det-ris on railroad bridge). Another major flood occurred June 11, 1913. Discharges of these floods probably exceeded 10,000 cfs but probably were less than that of June 18, 1965.

Mean discharge, in cubic feet per second, 1965

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
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<tbody>
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<td>5</td>
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<tr>
<td>15</td>
<td>50</td>
</tr>
<tr>
<td>16</td>
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<tr>
<td>17</td>
<td>1,600</td>
</tr>
<tr>
<td>18</td>
<td>10,500</td>
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<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
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</thead>
<tbody>
<tr>
<td>June 19</td>
<td>20</td>
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<tr>
<td>21</td>
<td>1,120</td>
</tr>
<tr>
<td>22</td>
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Gage height and discharge at indicated time, 1965

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<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
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<tbody>
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<tr>
<td>0930</td>
<td>7.51</td>
<td>1,670</td>
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<tr>
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<td>1,690</td>
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<tr>
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<td>7.57</td>
<td>1,730</td>
</tr>
<tr>
<td>1130</td>
<td>7.59</td>
<td>1,750</td>
</tr>
<tr>
<td>June 18</td>
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<td></td>
</tr>
<tr>
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<td>19.96</td>
<td>29,500</td>
</tr>
<tr>
<td>1300</td>
<td>10.40</td>
<td>7,420</td>
</tr>
<tr>
<td>June 19</td>
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<td></td>
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<tr>
<td>1130</td>
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<tr>
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<td>1600</td>
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<td>1,780</td>
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<tr>
<td>2400</td>
<td>6.00</td>
<td>1,320</td>
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ARKANSAS RIVER BASIN, COLORADO, KANSAS, NEW MEXICO

(105) 07211500 CANADIAN RIVER NEAR TAYLOR SPRINGS, N. MEX.

Location. — Lat 36°17'45", long 104°29'35", in NW¼SE¼ sec. 21, T. 24 N., R. 23 E., on left bank at head of gorge, 2.1 miles downstream from Cimarron Creek, 2.1 miles south of Taylor Springs, and 2.2 miles upstream from Chico Creek.

Drainage area. — 2,850 sq mi.

Gage-height record. — Water-stage recorder graph except 1700 hours June 16 to 1700 hours June 22, gage was destroyed by flood. Staff-gage readings on June 17, 20, and 21. Datum of gage is 5,636 ft above mean sea level.

Discharge record. — Stage-discharge relation defined by current-meter measurements below 7,000 cfs and by slope-area measurement of 162,000 cfs. Discharge June 16–21 estimated on basis of 4 discharge measurements, staff-gage readings, weather records, and records for nearby stations.

Maxima. — June 1965: Discharge, 162,000 cfs about 0600 hours June 18 (gage height, 47.4 ft, from floodmark).

1904 to May 1965: Discharge, 91,100 cfs Sept. 29, 1904.

Mean discharge, in cubic feet per second, 1965

<table>
<thead>
<tr>
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<th>Discharge</th>
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</thead>
<tbody>
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<td>5.0</td>
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<tr>
<td>16</td>
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<tr>
<td>17</td>
<td>4,800</td>
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<tr>
<td>18</td>
<td>43,000</td>
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Gage height and discharge at indicated time, 1965

<table>
<thead>
<tr>
<th>Hour</th>
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<th>Discharge (cfs)</th>
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<tbody>
<tr>
<td>June 16</td>
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<tr>
<td>0200</td>
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<td>2.00</td>
<td>97</td>
</tr>
<tr>
<td>0400</td>
<td>1.91</td>
<td>80</td>
</tr>
<tr>
<td>0500</td>
<td>5.00</td>
<td>2,810</td>
</tr>
<tr>
<td>0600</td>
<td>8.00</td>
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<td>12,200</td>
</tr>
<tr>
<td>1400</td>
<td>8.35</td>
<td>9,760</td>
</tr>
</tbody>
</table>

(106) 07213700 CANADIAN RIVER TRIBUTARY NEAR MILLS, N. MEX.

(Crest-stage station)

Location. — Lat 36°10'00", long 104°15'45", in NE¼ sec. 3, T. 22 N., R. 25 E., on downstream side of bridge abutment on State Highway 39, 6 miles north of Mills.

Drainage area. — 4.2 sq mi, approximately.

Gage-height record. — Crest stages only.

Discharge record. — Stage-discharge relation defined by point of zero flow, current-meter measurement of 3 cfs, and slope-area measurements of 190 and 918 cfs.

Maxima. — June 1965: Discharge, 1,100 cfs June 19 (gage height, 4.25 ft).


(107) 07214000 CANADIAN RIVER NEAR ROY, N. MEX.

Location. — Lat 35°55'10", long 104°21'10", in E½ sec. 35, T. 20 N., R. 24 E., on right bank 1,080 ft upstream from bridge on State Highway 120 and 9 miles west of Roy.

Drainage area. — 4,066 sq mi, of which 107 sq mi is probably noncontributing.
FLOODS OF 1965 IN THE UNITED STATES

Gage-height record. — Station destroyed by flood. Periodic gage readings June 16, 17, 19, and 20, from discharge measurement notes. Peak stage of June 18 from floodmarks. Datum of gage is 4,892.55 ft above mean sea level (levels by Corps of Engineers).

Discharge record. — Stage-discharge relation defined by current-meter measurements below 20,000 cfs and by slope-area measurement of 172,000 cfs. Discharge June 14—23 estimated on basis of partially reconstructed recorder graph, 8 discharge measurements, and records for stations "near Taylor Springs" and "near Sanchez."

Maxima. — June 1965: Discharge, 172,000 cfs 0800 hours June 18 (gage height, 34.5 ft, from high-water profile).

1936 to May 1965: Discharge, 63,800 cfs Apr. 23, 1942 (gage height, 14.22 ft at site 1,080 ft downstream at datum 0.39 ft higher).

Flood of Sept. 29 or 30, 1904 (discharge unknown) was the greatest for the period 1904 to May 1965.

Mean discharge, in cubic feet per second, 1965

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
</tr>
</thead>
<tbody>
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<td>June 14</td>
<td>120</td>
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<tr>
<td>15</td>
<td>5,700</td>
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<tr>
<td>16</td>
<td>8,800</td>
</tr>
<tr>
<td>17</td>
<td>7,800</td>
</tr>
<tr>
<td>18</td>
<td>48,000</td>
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</tbody>
</table>

Gage height and discharge at indicated time, 1965

<table>
<thead>
<tr>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 16</td>
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</tr>
<tr>
<td>1300</td>
<td>13.85</td>
<td>21,200</td>
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<td>1330</td>
<td>13.65</td>
<td>20,300</td>
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<tr>
<td>1630</td>
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<td>16,700</td>
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<tr>
<td>1100</td>
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<td>20,600</td>
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<td>June 17—Con.</td>
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<tr>
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<tr>
<td>0800</td>
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Mean discharge, in cubic feet per second, 1965

<table>
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<th>Day</th>
<th>Discharge</th>
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<tbody>
<tr>
<td>June 14</td>
<td>19</td>
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<tr>
<td>15</td>
<td>28</td>
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<tr>
<td>16</td>
<td>332</td>
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<tr>
<td>17</td>
<td>254</td>
</tr>
<tr>
<td>18</td>
<td>323</td>
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(108) 07214500 MORA RIVER NEAR HOLMAN, N. MEX.
(Formerly published as Rio Agua Negra near Holman, N. Mex.)

Location. — Lat 36°07'00", long 105°22'35", on right bank 150 ft upstream from bridge, 2.5 miles south of Chacon, 4.5 miles downstream from confluence of Luna and Lujan Creeks, 5.0 miles north of Holman, and 8.5 miles southwest of Gaudalupita, Mora County.

Drainage area. — 57 sq mi.

Gage-height record. — Water-stage recorder graph. Altitude of gage is 7,876 ft (by barometer).

Discharge record. — Stage-discharge relation defined by current-meter measurements below 300 cfs and by slope-area measurement of 4,700 cfs.

Maxima. — June 1965: Discharge, 1,550 cfs 1600 hours June 16 (gage height, 4.50 ft).

1953 to May 1965: Discharge, 4,700 cfs July 22, 1954 (gage height, 6.10 ft), by slope-area measurement of peak flow.
**Gage height and discharge at indicated time, 1965**

<table>
<thead>
<tr>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 15</td>
<td></td>
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<td>June 16</td>
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<td>June 18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1200</td>
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<td>18</td>
<td>1800</td>
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<td>1200</td>
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<td>2.56</td>
<td>218</td>
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</tbody>
</table>

(109) 07214600 **VIGIL CANYON NEAR HOLMAN, N. MEX.**

(Gaging station, discontinued in 1963)

**Location.** — Lat 36°02'50", long 105°24'10", in Mora Grant, on right bank 1.5 miles northwest of Holman, Mora County.

**Drainage area.** — 2.8 sq mi.

**Gage-height record.** — High-water marks. Altitude of gage is 7,840 ft (by barometer).

**Discharge record.** — Stage-discharge relation defined by current-meter measurements below 20 cfs.

**Maxima.** — June 1965: Discharge, 50 cfs probably June 15 (gage height, 3.08 ft inside well, 3.20 ft, from floodmarks).

1956–63: Discharge, 87 cfs June 6, 1958 (gage height, 3.43 ft), from rating curve extended above 13 cfs.

(110) 07214700 **AGUA FRIA CREEK NEAR HOLMAN, N. MEX.**

(Gaging station, discontinued in 1963)

**Location.** — Lat 36°01'25", long 105°24'35", in Mora Grant, on left bank 1.8 miles southwest of Holman, Mora County.

**Drainage area.** — 9.2 sq mi.

**Gage-height record.** — High-water mark in gage well. Altitude of gage is 7,850 ft (from topographic map).

**Discharge record.** — Stage-discharge relation defined by current-meter measurements below 30 cfs.

**Maxima.** — June 1965: Discharge, 250 cfs probably June 15 (gage height, 2.50 ft, from high-water mark in gage well).


(111) 07214800 **RIO LA CASA NEAR CLEVELAND, N. MEX.**

(Formerly published as Rio De La Casa near Cleveland, N. Mex.)

**Location.** — Lat 35°58'30", long 105°23'20", in Mora Grant, on left bank 1.5 miles southwest of Cleveland, Mora County.

**Drainage area.** — 23.0 sq mi.
FLOODS OF 1965 IN THE UNITED STATES

Gage-height record. — Water-stage recorder graph. Altitude of gage is 7,625 ft (by barometer).

Discharge record. — Stage-discharge relation defined by current-meter measurements below 200 cfs and by slope-area measurement of 2,260 cfs.

Maxima. — June 1965: Discharge, 395 cfs 0300 hours June 19 (gage height, 3.75 ft).

1956 to May 1965: Discharge, 2,260 cfs Aug. 6, 1959 (gage height, 6.0 ft), by slope-area measurement of peak flow.

Mean discharge, in cubic feet per second, 1965

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 13</td>
<td>63</td>
</tr>
<tr>
<td>June 14</td>
<td>73</td>
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<tr>
<td>June 15</td>
<td>99</td>
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<tr>
<td>June 16</td>
<td>161</td>
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<td>June 17</td>
<td>186</td>
</tr>
<tr>
<td>June 18</td>
<td>176</td>
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</table>

(112) 07215500 MORA RIVER AT LA CUEVA, N. MEX.

Location. — Lat 35°56'20", long 105°14'55", in Mora Grant, on right bank 600 ft downstream from bridge on State Highway 3, 0.2 mile southeast of La Cueva, Mora County, and 0.5 mile downstream from La Cueva damsite.

Drainage area. — 173 sq mi.

Gage-height record. — Water-stage recorder graph. Datum of gage is 6,998.7 ft above mean sea level.

Discharge record. — Stage-discharge relation defined by current-meter measurements below 500 cfs and by slope-area measurement of 1,000 cfs.

Maxima. — June 1965: Discharge, 989 cfs 0330 hours June 17 (gage height, 8.22 ft).

1931 to May 1965: Discharge, 1,530 cfs Sept. 23, 1941 (gage height, 7.58 ft, at site 600 ft upstream at datum 2 ft higher), from rating curve extended above 400 cfs; gage height, 8.55 ft July 23, 1961.

Flood of Sept. 29, 1904, may have exceeded 20,000 cfs; another major flood occurred June 11, 1913, but is believed less than that of 1904.

Mean discharge, in cubic feet per second, 1965

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 13</td>
<td>63</td>
</tr>
<tr>
<td>June 14</td>
<td>99</td>
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<tr>
<td>June 15</td>
<td>130</td>
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<td>June 16</td>
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<td>June 17</td>
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<tr>
<td>June 18</td>
<td>548</td>
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Gage height and discharge at indicated time, 1965

<table>
<thead>
<tr>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
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</thead>
<tbody>
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<td>54</td>
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<tr>
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<td>3.97</td>
<td>181</td>
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Gage height and discharge at indicated time, 1965

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<thead>
<tr>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
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<tr>
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<td>8.15</td>
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<tr>
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<td>582</td>
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(113) 07215600 RIO CEBOLLA NEAR GOLONDRINAS, N. MEX.
(Formerly published as Cebolla River near Golondrinas, N. Mex.;
gaging station discontinued in 1963)

Location. — Lat 35°53'15", long 105°13'45", in Mora Grant, on right bank 50 ft downstream
from bridge on State Highway 160 and 2.2 miles west of Golondrinas, Mora County.

Drainage area. — 64 sq mi.

Gage-height record. — High-water mark at gage site. Datum of gage is 6,890 ft above mean
sea level.

Discharge record. — Stage-discharge relation defined by current-meter measurements below
130 cfs, by slope-area measurement of 1,050 cfs, and by contracted-opening measurement of
1,270 cfs.

Maxima. — June 1965: Discharge, 490 cfs probably June 15 (gage height, 5.3 ft, from flood-
mark).

1956-63: Discharge, 1,390 cfs Oct. 19, 1957 (gage height, 5.25 ft); gage height*, 6.35 ft

A major flood occurred probably in August 1952; discharge, about 9,300 cfs (gage height,
about 11.8 ft, from old floodmark), by slope-area measurement of peak flow, mad° in June
1956.

(114) 07216500 MORA RIVER NEAR GOLONDRINAS, N. MEX.

Location. — Lat 35°53'45", long 105°09'12", in Mora Grant, at downstream end of left abut­
ment of bridge on State Highway 160 1.2 miles upstream from Coyote Creek, 1.9 miles east
of Golondrinas, Mora County, and 5.4 miles downstream from Cebolla River.

Drainage area. — 267 sq mi.

Gage-height record. — Water-stage recorder graph. Altitude of gage is 6,735 ft (from
topographic map).

Discharge record. — Stage-discharge relation defined by current-meter measurements below
700 cfs and by slope-area measurement of 14,000 cfs.

Maxima. — June 1965: Discharge, 2,240 cfs 0300 hours June 15 (gage height, 7.85 ft).

1915 to May 1965: Discharge, 14,000 cfs Aug. 22, 1952 (gage height, 14.4 ft), by slope-
area measurement of peak flow.

Floods of Sept. 29, 1904, and June 11, 1913, probably exceeded 25,000 cfs.

Mean discharge, in cubic feet per second, 1965

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
<th>Day</th>
<th>Discharge</th>
</tr>
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<tbody>
<tr>
<td>June 13</td>
<td>54</td>
<td>June 19</td>
<td>981</td>
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<tr>
<td>14</td>
<td>66</td>
<td>20</td>
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<td>15</td>
<td>602</td>
<td>21</td>
<td>574</td>
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<td>16</td>
<td>431</td>
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<td>458</td>
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<td>365</td>
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<tr>
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Gage height and discharge at indicated time, 1965

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<tr>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
</tr>
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<tbody>
<tr>
<td>June 13</td>
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<td>184</td>
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<tr>
<th>Hour</th>
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<th>Discharge (cfs)</th>
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<table>
<thead>
<tr>
<th>Hour</th>
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<th>Discharge (cfs)</th>
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**FLOODS OF 1965 IN THE UNITED STATES**

**COYOTE CREEK BELOW BLACK LAKE, N. MEX.**

- **Location:** Lat 36°16'20", long 105°14'50", in NW 4 sec. 33, T. 14 N., R. 16 E., on right bank 150 ft downstream from road crossing, 0.2 mile downstream from Black Lake, 2 miles south of Black Lake Village, and 12 miles south of Agua Fria.
- **Drainage area:** 48 sq mi.
- **Gage-height record:** High-water mark in gage well. Altitude of gage is 8,450 ft (from topographic map).
- **Discharge record:** Stage-discharge relation defined by current-meter measurements below 110 cfs and by slope-area measurement of 913 cfs.
- **Maxima:**
  - June 1965: Discharge, 740 cfs, probably June 15 (gage height, 4.60 ft, from flood-marks).
  - 1953-63: Discharge, 913 cfs June 6, 1958 (gage height, 4.60 ft, from flood-marks).

**COYOTE CREEK ABOVE GUADALUPIITA, N. MEX.**

- **Location:** Lat 36°09'51", long 105°13'49", in Mora Grant, on right bank 1.8 miles north of Guadalupita, Mora County.
- **Drainage area:** 71 sq mi.
- **Gage-height record:** Water-stage recorder graph. Altitude of gage is 7,700 ft (from topographic map).
- **Discharge record:** Stage-discharge relation defined by current-meter measurements below 150 cfs and by slope-area measurement of 1,820 cfs.
- **Maxima:**
  - June 1965: Discharge, 1,820 cfs 2400 hours June 17 (gage height, 6.70 ft).
  - 1956 to May 1965: Discharge, 1,390 cfs June 6, 1958 (gage height, 6.08 ft), from rating curve extended above 150 cfs.

**Mean discharge, in cubic feet per second, 1965**

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
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<tbody>
<tr>
<td>June 13</td>
<td>8.3</td>
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<td>1.7</td>
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<td>June 15</td>
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<td>June 16</td>
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<tr>
<td>June 17</td>
<td>556</td>
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<tr>
<td>June 18</td>
<td>599</td>
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**Gage height and discharge at indicated time, 1965**

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Location. — Lat 35°55'00", long 105°09'49", in Mora Grant, on left bank 0.5 mile downstream from Coyote Creek damsite, 2.3 miles northeast of Golondrinas, Mora County, and 2.7 miles upstream from mouth.

Drainage area. — 215 sq mi.

Gage-height record. — Water-stage recorder graph. Altitude of gage is 6,785 ft (from topographic map).

Discharge record. — Stage-discharge relation defined by current-meter measurement below 300 cfs and by slope-area measurements of 990, 2,320, and 4,050 cfs.

Maxima. — June 1965: Discharge, 2,500 cfs June 16, (gage height, 7.90 ft).

1928 to May 1965: Discharge, 4,050 cfs Aug. 17, 1961; gage height, 10.1 ft Aug. 30, 1936 (at site 0.4 mile downstream at different datum).

Remarks. — Diversions (including off-channel storage) for irrigation of about 4,000 acres above station affect some flood flows.

Mean discharge, in cubic feet per second, 1965

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Gage height and discharge at indicated time, 1965

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<th>Discharge (cfs)</th>
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(118) 07218100 MORA RIVER NEAR WATROUS, N. MEX.

(Gaging station, discontinued in 1963)

Location. — Lat 35°50'05", long 105°02'22", in Mora Grant, on right bank 4.5 miles northwest of Watrous, Mora County, and 5 miles upstream from Sapello River.

Drainage area. — 521 sq mi.

Gage-height record. — High-water mark in gage well. Altitude of gage is 6,480 ft (from topographic map).

Discharge record. — Stage-discharge relation defined by current-meter measurements below 600 cfs, by computation of peak flow over dam of 2,340 cfs, and by slope-area measurements of 2,980 and 7,050 cfs.

Maxima. — June 1965: Discharge, 6,080 cfs, probably June 15 (gage height, 9.43 ft. from floodmark).
1956–63: Discharge, 7,050 cfs July 8, 1962 (gage height, 9.98 ft), by slope-area measurement of peak flow.
Floods of Sept. 29, 1904, and June 11, 1913, probably exceeded 25,000 cfs.

(119) 07218700 MANUELITAS CREEK NEAR ROCIA. N. MEX.
(Gaging station, discontinued in 1963)

Location. — Lat 35°49'30", long 105°23'55", in Mora Grant, on right brnk about 300 ft downstream from road crossing and 1.5 miles southeast of Rociada, San Miguel County.
Drainage area. — 52 sq mi.
Gage-height record. — High-water mark in gage well. Altitude of gage is 7,350 ft (from topographic map).
Discharge record. — Stage-discharge relation defined by current-meter measurements below 250 cfs and by slope-area measurement of 1,410 cfs.
1956–63: Discharge, 1,410 cfs Aug. 23, 1957 (gage height, 7.48 ft), by slope-area measurement of peak flow.

(120) 07220000 SAPELLO RIVER AT SAPELLO, N. MEX.

Location. — Lat 35°46'11", long 105°15'05", in Mora Grant, near left bnd at downstream side of bridge on State Highway 3, in Sapello, San Miguel County, and 0.5 mile downstream from Manuelitas Creek.
Drainage area. — 132 sq mi.
Gage-height record. — Water-stage recorder graph. Altitude of gage is 6,910 ft (by barometer).
Discharge record. — Stage-discharge relation defined by current-meter measurements below 330 cfs and by computation of flow over dam of 6,160 cfs.
Maxima. — June 1965: Discharge, 860 cfs 2400 hours June 18 (gage height, 4.10 ft).
A major flood occurred June 11, 1913; discharge about 11,400 cfs, at site 3 miles downstream and 6 miles upstream from Los Alamos, San Miguel County. For discussion of this flood, see U.S. Geological Survey (1915).
Remarks. — Diversions above station for irrigation of about 4,200 acres. No appreciable flow in Sapello Canal, which bypasses station.

Mean discharge, in cubic feet per second, 1965

<table>
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<tr>
<th>Day</th>
<th>Discharge</th>
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### Gage height and discharge at indicated time, 1963

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(121) **07220600 SAPELLO RIVER NEAR WATROUS, N. MEX.**

**Gaging station, discontinued in 1963**

**Location.** — Lat 35°46'05", long 105°02'28", on line between Mora and Las Vegas Grants, on right bank 4 miles southwest of Watrous, Mora County, and 6 miles upstream from mouth.

**Drainage area.** — 213 sq mi.

**Gage-height record.** — High-water mark at gage site. Altitude of gage is 6,500 ft. (from topographic map).

**Discharge record.** — Stage-discharge relation defined by current-meter measurement below 500 cfs and by slope-area measurement of 5,860 cfs.

**Maxima.** — June 1965: Discharge, 4,240 cfs probably June 15 (gage height, 11.3 ft, from floodmark).

1956–63: Discharge, 5,860 cfs Aug. 5, 1957 (gage height, 13.02 ft, from floodmark), by slope-area measurement of peak flow.

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(122) **07220900 DOG CREEK NEAR SHOEMAKER, N. MEX.**

**Crest-stage station**

**Location.** — Lat 35°49'32", long 104°53'28", 0.5 mile upstream from Valmora-Showemaker road and 1.8 miles northwest of Shoemaker, San Miguel County.

**Drainage area.** — 18.4 sq mi.

**Gage-height record.** — Crest stages only.

**Discharge record.** — Stage-discharge relation defined by point of zero flow, current-meter measurements below 75 cfs, and slope-area measurements of 320, 720, 730, 1,530, and 1,930 cfs.
FLOODS OF 1965 IN THE UNITED STATES


(123) 07221000 MORA RIVER NEAR SHOEMAKER, N. ME
Location. — Lat 35°48'01", long 104°46'58", in S\(\frac{1}{4}\) sec. 11, T. 18 N., R. 20 E. (projected), in Mora Grant, on left bank 5.5 miles east of Shoemaker and 12.3 miles upstream from Pedroso Creek.
Drainage area. — 1,104 sq mi, of which 71 sq mi is probably noncontributing.
Gage-height record. — Water-stage recorder graph. Altitude of gage is 6,170 ft (from topographic map).
Discharge record. — Stage-discharge relation defined by current-meter measurements below 2,300 cfs and by slope-area measurements of 8,200 and 15,200 cfs.
Maxima. — June 1965: Discharge, 14,800 cfs 0200 hours June 15 (gage height, 12.65 ft).
1914 to May 1965: Discharge, 15,200 cfs June 3, 1948 (gage height, 12.79 ft), by slope-area measurement of peak flow.
Floods of Sept. 29, 1904, and June 11, 1913, probably exceeded 30,000 cfs.

Mean discharge, in cubic feet per second, 1965

<table>
<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
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<td>17</td>
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<tr>
<td></td>
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<tr>
<td>June 19</td>
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Gage height and discharge at indicated time, 1965

<table>
<thead>
<tr>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
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<td>2400</td>
<td>9.50</td>
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<td>5.73</td>
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<tr>
<td></td>
<td>0800</td>
<td>4.73</td>
</tr>
<tr>
<td>June 17—Con.</td>
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</tr>
<tr>
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<td>1500</td>
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<td>5.32</td>
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<td>1200</td>
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<td>1400</td>
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<td>2000</td>
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(124) 07221500 CANADIAN RIVER NEAR SANchez, N. ME
Location. — Lat 35°39'15", long 104°22'30", in S\(\frac{1}{4}\) sec. 34, T. 17 N., R. 24 E., at downstream side of bridge on State Highway 65, 1 mile upstream from Lagartija Creek, 3 miles northeast of Sanchez, 10 miles downstream from Mora River, and 24 miles southwest of Mosquero.
Drainage area. — 6,015 sq mi, of which 303 sq mi is probably noncontributing.
Gage-height record. — Station destroyed by flood. A few gage heights available from observations and discharge measurements during flood period. Altitude of gage is 4,500 ft (from topographic map).
Discharge record. — Stage-discharge relation defined by current-meter measurements below 90,000 cfs and by slope-area measurement of 145,000 cfs. Discharge June 14—22 estimated on basis of 6 discharge measurements, weather records, inflow records for Conchas Reservoir, and records for nearby stations.
Maxima. — June 1965: Discharge, 145,000 cfs 1300 hours June 18 (gage height, 31.5 ft, from floodmarks).


The flood of Sept. 29 or 30, 1904, probably exceeded 100,000 cfs but is believed to have been less than the flood of June 18, 1965.

Mean discharge, in cubic feet per second, 1965

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<thead>
<tr>
<th>Day</th>
<th>Discharge</th>
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<tr>
<td>June 16</td>
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<td>22</td>
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<tr>
<td>June 18</td>
<td>23</td>
</tr>
</tbody>
</table>

Gage height and discharge at indicated time, 1965

<table>
<thead>
<tr>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
</tr>
</thead>
<tbody>
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<td>June 16</td>
<td>23.1</td>
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<td>June 18</td>
<td>15.0</td>
<td>41,000</td>
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(125) 07222300 TREMENTINA CREEK AT TREMENTINA, N. MEX.
(Crest-stage station)

Location. — Lat 35°28', long 104°25', in NW/4 sec. 8, T. 14 N., R. 24 E., at bridge on State Highway 65 at Trementina, about 14 miles west of Conchas Dam.

Drainage area. — 65 sq mi, approximately.

Gage-height record. — Crest stages only.

Discharge record. — Stage-discharge relation defined by current-meter measurements below 15 cfs and by slope-area measurements of 2,350, 2,770, and 14,100 cfs (peak flow on Sept. 11, 1965).

Maxima. — June 1965: Discharge, 5,600 cfs, probably June 16 (gage height, 8.76 ft).

1959 to May 1965: Discharge, 4,400 cfs July 6, 1962 (gage height, 8.00 ft, from floodmark).

(126) 07222500 CONCHAS RIVER AT VARIADERO, N. MEX.

Location. — Lat 35°24'10", long 104°26'35", in NE¼NE¼ sec. 36, T. 14 N., R. 23 E., on left bank 1.5 miles northeast of Variadero and 15 miles west of Conchas Dam.

Drainage area. — 523 sq mi, of which 130 sq mi is probably noncontributing.

Gage-height record. — Water-stage recorder graph except 0030 to 1700 hours June 17 for which graph was drawn on basis of high-water mark in well and typical recession curve. Altitude of gage is 4,430 ft (from topographic map).

Discharge record. — Stage-discharge relation defined by current-meter measurement: below 760 cfs and by slope-area measurements of 8,300 and 44,000 cfs.

Maxima. — June 1965: Discharge, 8,880 cfs about 0100 hours June 17 (gage height, 10.40 ft, from floodmarks).

1936 to May 1965: Discharge, 44,000 cfs Sept. 1, 1942 (gage height, 19.96 ft, present datum), by slope-area measurement of peak flow.
Mean discharge, in cubic feet per second, 1965

<table>
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<tr>
<th>Day</th>
<th>Discharge</th>
<th>Day</th>
<th>Discharge</th>
</tr>
</thead>
<tbody>
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<td>June 23</td>
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Gage height and discharge at indicated time, 1965

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<th>Discharge (cfs)</th>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
<th>Hour</th>
<th>Gage height (feet)</th>
<th>Discharge (cfs)</th>
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<td>June 17—Con.</td>
<td>0300</td>
<td>5.6</td>
<td>2,600</td>
<td>June 19—Con.</td>
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<td></td>
<td>0800</td>
<td>3.1</td>
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<td>60</td>
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<td>2100</td>
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(127) 07223500 Conchas Reservoir near Conchas Dam, 1° M. Mex.

Location. — Lat 35°24'10"N, long 104°11'25"W, in Pablo Montoya Grant, stilling well within concrete part of Conchas Dam on Canadian River, 1.8 miles northwest of Conchas Dam Post Office and 24 miles north of Newkirk.

Drainage area. — 7,409 sq mi, of which 433 sq mi is probably noncontributing.

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

Maxima. — June 13-24, 1965: Contents, 336,000 acre-ft at 2400 hours June 24 (elevation, 4,199.28 ft).

1938 to May 1965: Contents, 479,600 acre-ft Apr. 24, 1942 (elevation, 4,208.41 ft).

Remarks. — Reservoir stored practically all inflow during flood period.

Cooperation. — Elevations and capacity table furnished by Corps of Engineers.

Elevation and contents at indicated time, 1965

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<tr>
<th>Hour</th>
<th>Elevation (feet)</th>
<th>Contents (acre-feet)</th>
<th>Hour</th>
<th>Elevation (feet)</th>
<th>Contents (acre-feet)</th>
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(128) 07225500  Ute Creek near Gladstone, N. Mex.
(Crest-stage station)

Location. — Lat 36°18', long 103°56', on line between secs. 14 and 23, T. 24 N., R. 28 E., on bridge on U.S. Highway 56 3 miles east of Gladstone.
Drainage area. — 256 sq mi, approximately.
Gage-height record. — Crest stages only.
Discharge record. — Stage-discharge relation defined by current-meter measurements below 30 cfs and by slope-area measurements at 4,200, 6,190, and 10,600 cfs.
Maxima. — June 1965: Discharge, peak stage did not reach bottom of gage.
Remarks. — No significant runoff during flood period.

(129) 07226200  Bueyeros Creek at Bueyeros, N. Mex.
(Crest-stage station)

Location. — Lat 35°58'10", long 103°41'05", in E'/i sec. 7, T. 20 N., R. 31 E., on downstream end of right abutment of bridge on State Highway 102 at Bueyeros.
Drainage area. — 34 sq mi, approximately.
Gage-height record. — Crest stages only.
Discharge record. — Stage-discharge relation defined by point of zero flow and slope-area measurements of 3,400 and 5,240 cfs.
Maxima. — June 1965: Discharge, 2,460 cfs June 19 (gage height, 5.21 ft).
1957 to May 1965: Discharge, 5,240 cfs July 21, 1961 (gage height, 7.43 ft), by slope-area measurement of peak flow.

(130) 07226300  Carrizo Creek near Roy, N. Mex.
(Crest-stage station)

Location. — Lat 36°03'00", long 103°57'50", in NW'/4SE'/4 sec. 16, T. 21 N., R. 28 E., 800 ft downstream from State Highway 120 and 15 miles northeast of Roy.
Drainage area. — 68 sq mi, approximately.
Gage-height record. — Crest stages only.
Discharge record. — Stage-discharge relation defined by point of zero flow and slope-area measurements of 586 and 1,100 cfs.
Maxima. — June 1965: Discharge, 1,380 cfs, probably June 16 (gage height, 6.43 ft).
1954 to May 1965: Discharge, 1,100 cfs May 14, 1958 (gage height, 5.97 ft), by slope-area measurement of peak flow.

(131) 07226500  Ute Creek near Logan, N. Mex.

Location. — Lat 35°26'18", long 103°31'31", in NW'/4SE'/4 sec. 15, T. 14 N., R. 32 E., on right bank 1.9 miles downstream from Alamosa Creek, 4.5 miles upstream from State Road 155, 4.7 miles upstream from high-water line of Ute Reservoir, 8.2 miles northwest of Logan, and 10.2 miles upstream from mouth.
Drainage area. — 2,060 sq mi, of which 617 sq mi is probably noncontributing.
Gage-height record. — Water-stage recorder graph. Altitude of gage is 3,840 ft (from topographic map).
Discharge record. — Stage-discharge relation defined by current-meter measurements below 1,800 cfs and extended above by logarithmic plotting and computed discharge at former site.
Maxima. — June 1965: Discharge, 11,700 cfs 1430 hours June 19 (gage height, 6.80 ft).
1942 to May 1965: Discharge, 24,500 cfs May 28, 1946, July 12, 1951 (gage height, 8.4 ft at site 4.8 miles downstream at datum of 3,758.50 ft), from rating curve extended above 7,700 cfs on basis of slope-area measurements at gage heights 5.2 and 7.2 ft.
Flood of May 1, 1914, reached a stage of 22.95 ft, at site 4.2 miles downstream at different
FLOODS OF 1965 IN THE UNITED STATES

datum. Another major flood reached a stage of 16.0 ft (site and datum used 1942-55) sometime in 1941, from information by Bureau of Reclamation (discharge, about 70,000 cfs).

**Mean discharge, in cubic feet per second, 1965**

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<th>Day</th>
<th>Discharge</th>
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<td>113</td>
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<tr>
<td>17</td>
<td>7</td>
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<td>18</td>
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**Gage height and discharge at indicated time, 1965**

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<th>Hour</th>
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<th>Discharge (cfs)</th>
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<tr>
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<td>2400</td>
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<td>1.48</td>
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(132) 07226800 UTE RESERVOIR NEAR LOGAN, N. MEX.

Location. — Lat 35°20'35", long 103°26'37", in NW¼ sec. 21, T. 13 N., R. 33 E., on face of Ute Dam on Canadian River, 2.5 miles southwest of Logan and 3.5 miles downstream from Ute Creek.

Drainage area. — 11,140 sq mi, of which 1,110 sq mi is probably noncontributing.

Gage-height record. — Inclined cable gage read once daily at 0800 hours. Datum of gage is at mean sea level (levels by N. Mex. Interstate Stream Commission).


1963 to May 1965: Contents, 33,780 acre-ft June 1-4, 1965 (elevation, 3,733.8 ft).

Remarks. — Reservoir stored all inflow during flood period.

Cooperation. — Records furnished by New Mexico Interstate Stream Commission.

**Elevation and contents at 0800 hours, 1965**

<table>
<thead>
<tr>
<th>Date</th>
<th>Elevation (feet)</th>
<th>Contents (acre-feet)</th>
<th>Date</th>
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<td>49,870</td>
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(133) 07227200 TRAMPEROS CREEK NEAR STEAD, N. MEX.

(Gaging station, established in June 1966)

Location. — Lat 36°04'15", long 103°12'10", in NW¼NW¼ sec. 10, T. 21 N., R. 35 E., on left bank 10 ft upstream from bridge on State Highway 18, 2 miles south of Stead, and 26 miles south of Clayton.

Drainage area. — 556 sq mi, approximately.

Maxima. — June 1965: Discharge, 6,600 cfs, probably June 17, by slope-area measurement of peak flow.
The 1904 flood reached a stage of about 29 ft (discharge, about 45,500 cfs) with single span bridge, and the 1937 flood reached a stage of about 22 ft, (discharge, about 31,600 cfs) with present (1968) bridge (information from State Highway Department).

(134) **Carrizo Creek near Clayton, N. Mex.**

(Miscellaneous site)

**Location.** Lat 36°21'00", long 103°28'10", in SE¼ sec. 36, T. 25 N., R. 32 E., 1,070 ft upstream from U.S. Highway 56, 0.8 mile downstream from nearest tributary (unnamed), and 17.5 miles southwest of Clayton.

**Drainage area.** — 477 sq mi.

**Maxima.** — June 1965: Discharge, 9,270 cfs, probably June 17, by slope-area measurement of peak flow.

1957: Discharge, 29,500 cfs May 28, by slope-area measurement of peak flow at site 15 miles downstream.

(135) **07227295 Sandy Arroyo tributary near Clayton, N. Mex.**

(Crest-stage station)

**Location.** Lat 36°23'20", long 103°19'05", in NWW sec. 21, T. 25 N., R. 34 E., 15 ft upstream from culvert entrance on U.S. Highway 56 and 8 miles southwest of Clayton.

**Drainage area.** — 1.25 sq mi, approximately.

**Gage-height record.** — Crest stages only.

**Discharge record.** — Stage-discharge relation defined by point of zero flow, flow through culvert measurement of 92 cfs, and slope-area measurement of 388 cfs.

**Maxima.** — June 1965: Discharge, 172 cfs June 17 (gage height, 4.22 ft).


(136) **07227300 Sandy Arroyo near Clayton, N. Mex.**

(Crest-stage station)

**Location.** Lat 36°20'30", long 103°11'00", in W 1/2 sec. 2, T. 24 N., R. 35 E., on downstream side of bridge on State Highway 18, 7.5 miles south of Clayton.

**Drainage area.** — 42 sq mi, approximately.

**Gage-height record.** — Crest stages only.

**Discharge record.** — Stage-discharge relation not defined. Slope-area measurements of 392 and 10,300 cfs.

**Maxima.** — June 1965: Discharge, not determined, probably June 17 (gage height, 4.17 ft).

1953 to May 1965: Discharge, 10,300 cfs June 1953 (gage height, 8.85 ft, from high-water profile).

Flood of June 1953 was the highest in at least 20 years, from information by local residents.

(137) **Cieneguilla Creek near Clayton, N. Mex.**

(Miscellaneous site)

**Location.** Lat 36°36'10", long 103°22'10", in S¼ sec. 1, T. 27 N., R. 33 E., 3.5 miles upstream from Clayton Lake and 15 miles northwest of Clayton.

**Drainage area.** — 112 sq mi.

**Maxima.** — June 1965: Discharge, 9,580 cfs, probably June 17, by slope-area measurement of peak flow.

1941: Discharge, 24,000 cfs, date unknown, by slope-area measurement of peak flow at site 15 miles downstream.

1955: Discharge, 1,600 cfs May 18, by slope-area measurement of peak flow at site 5 miles downstream.
SELECTED REFERENCES


Dalrymple, Tate, and others, 1939, Floods in the Canadian and Pecos River basins in New Mexico, May and June 1937, with summary of flood discharges in New Mexico: U.S. Geol. Survey Water-Supply Paper 842, 68 p.


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