

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*



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By R. J. SNIPES *and others*

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UNITED STATES DEPARTMENT OF THE INTERIOR

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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 manyfold 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

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 I know you're trying to help me out, but don't try 'til the water goes down, I'm allright * * *

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 fool-proof. 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 loss 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.

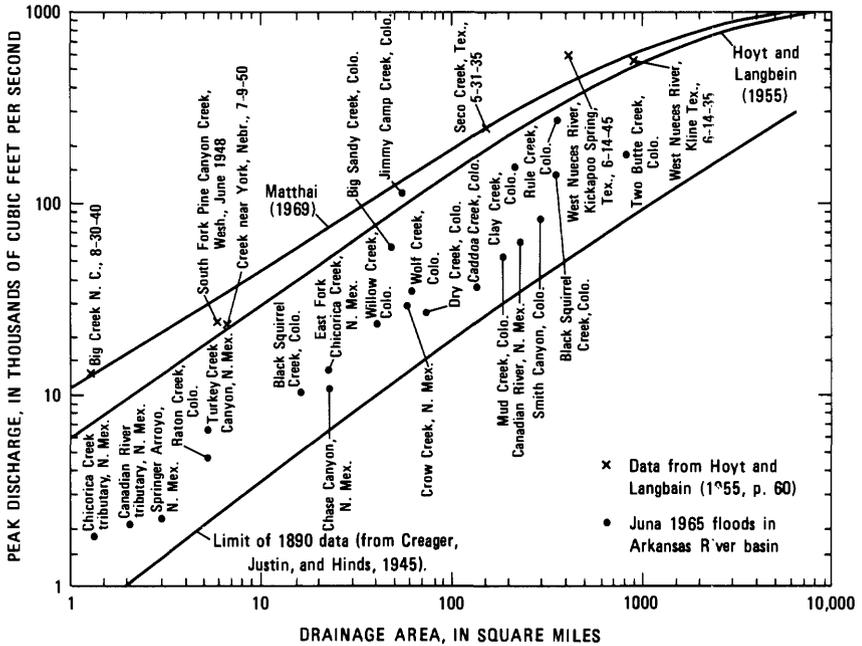


FIGURE 1. — Maximum discharges in relation to drainage area.

COMPARISON BY FREQUENCY RELATIONS

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 the 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 south-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.

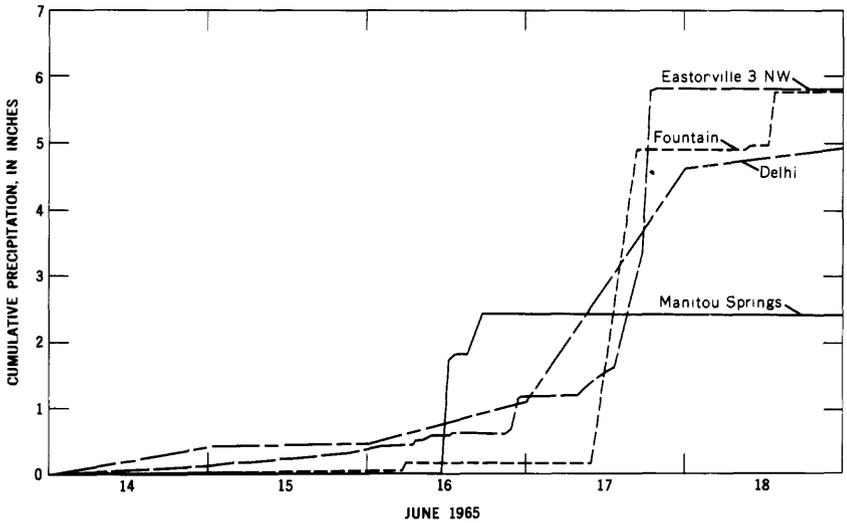


FIGURE 2. — Cumulative precipitation at selected weather stations (pl. 2) in Arkansas River basin above John Martin Reservoir, Colo.

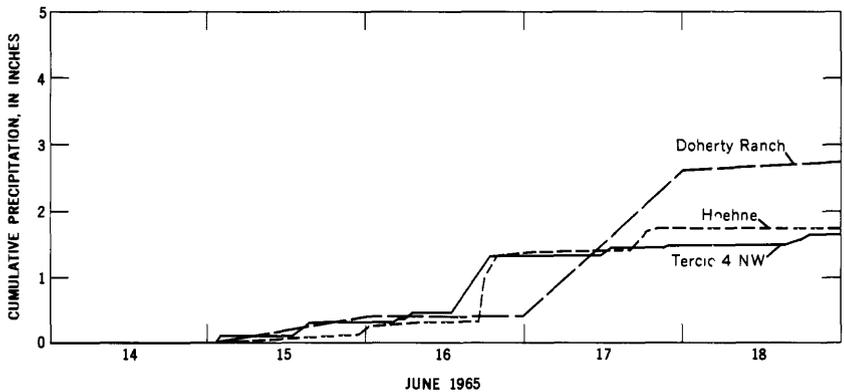


FIGURE 3. — Cumulative precipitation at selected weather stations (pl. 2) in Purgatoire River basin, Colorado.

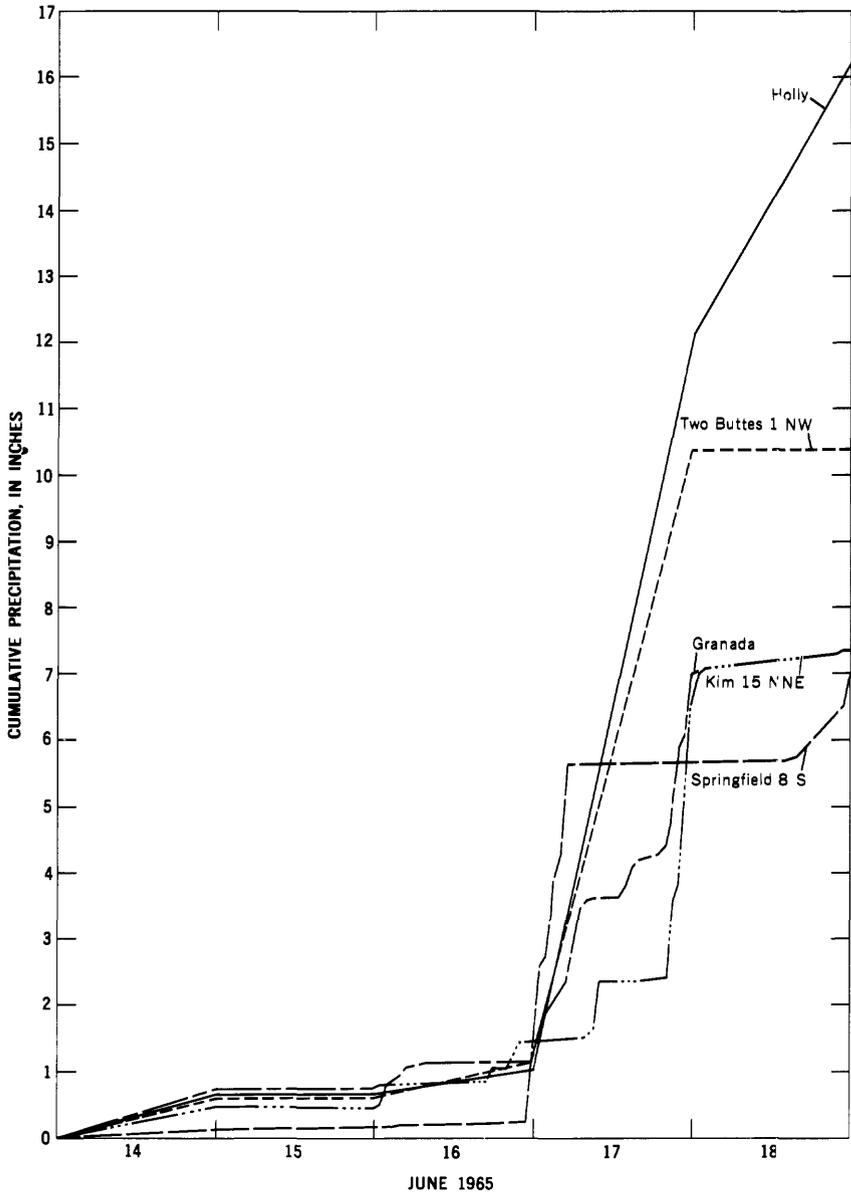


FIGURE 4. — Cumulative precipitation at selected weather stations (pl. 2) in Arkansas River basin below John Martin Reservoir, Colo.

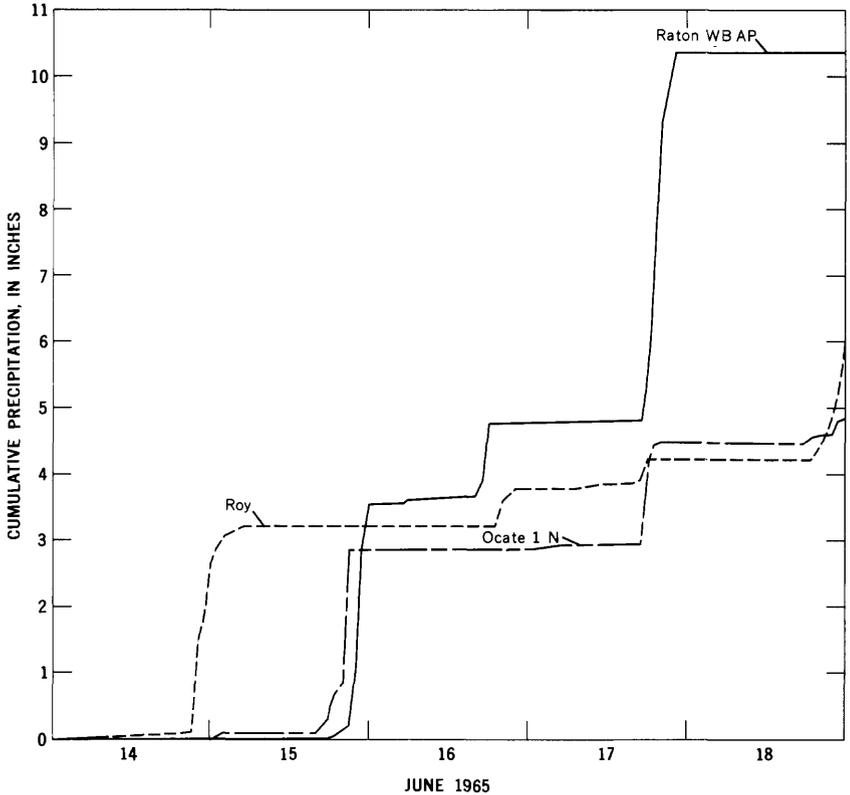


FIGURE 5. — Cumulative precipitation at selected weather stations (pl. 2) in Canadian River basin, New Mexico.

RAINFALL ON JUNE 14–15

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 south-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 these 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 on 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.

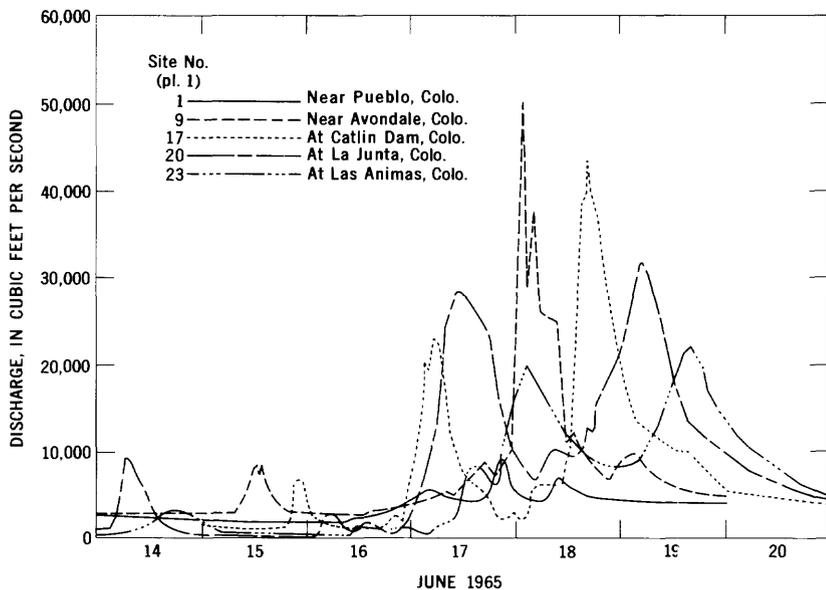


FIGURE 6. — Discharge hydrographs from selected gaging stations on Arkansas River, Pueblo to Las Animas, Colo.

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

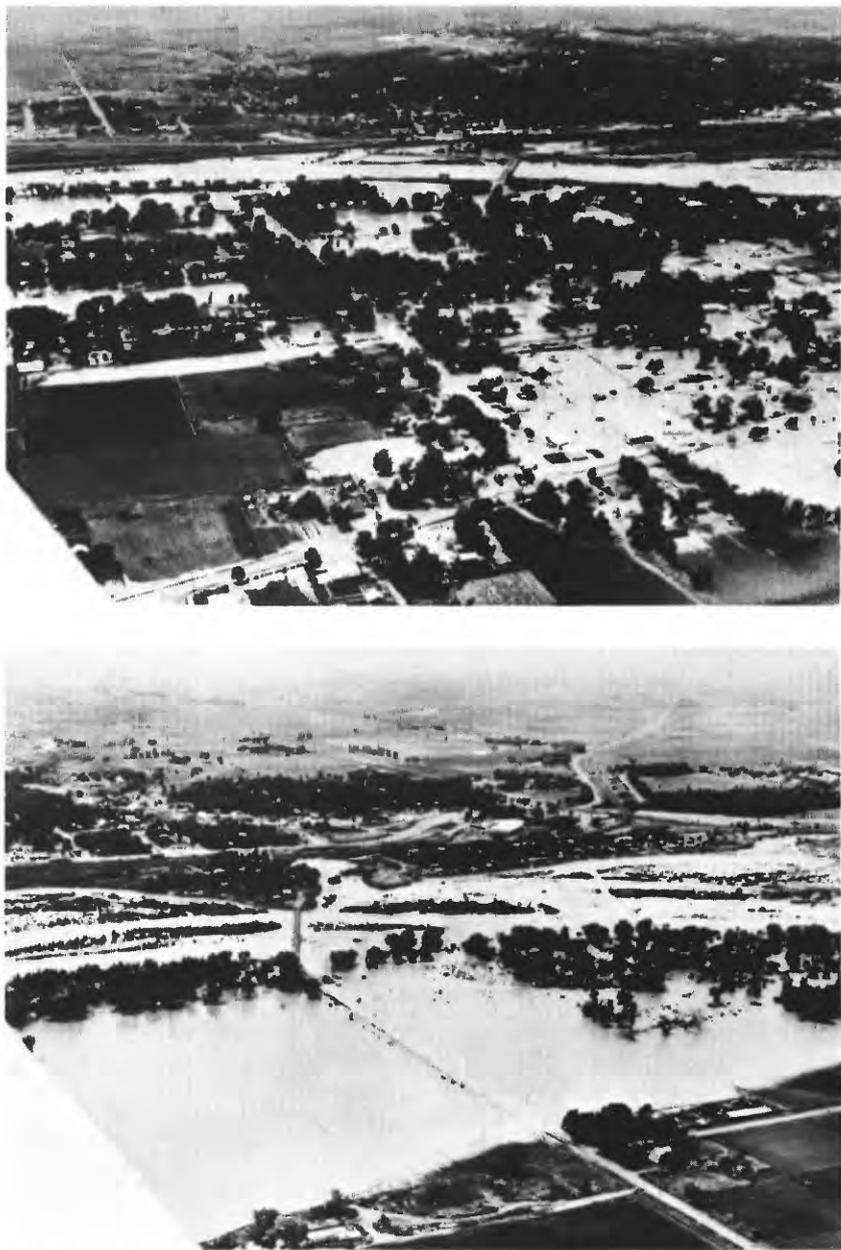


FIGURE 7. — Aerial views near La Junta, Colo., during afternoon of June 17, 1965, looking south. *Upper*, North La Junta. *Lower*, West La Junta. Photographs by the Pueblo Star Journal-Chieftain.

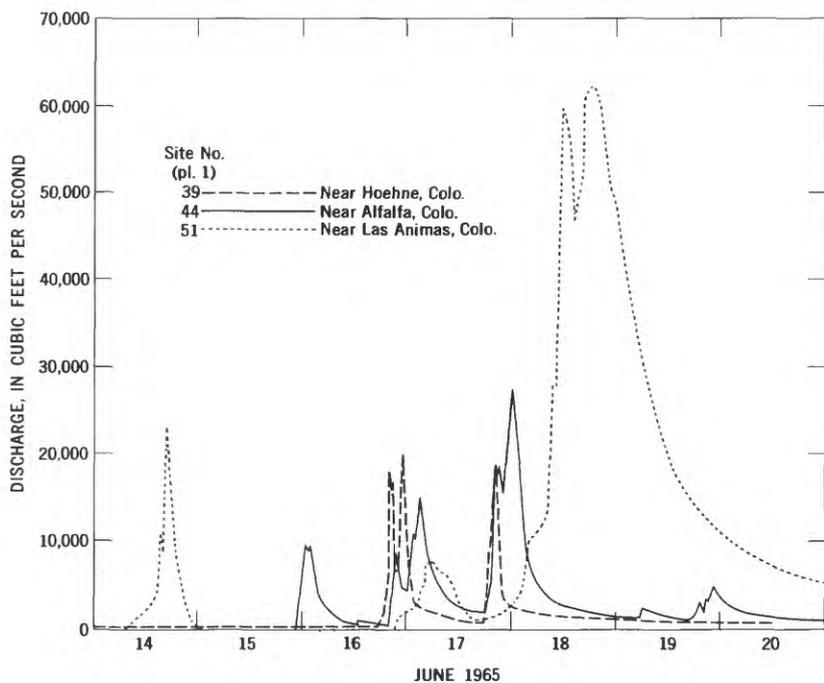


FIGURE 8. — Discharge hydrographs from selected gaging stations on Purgatoire River, Hoehne to Las Animas, Colo.

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.

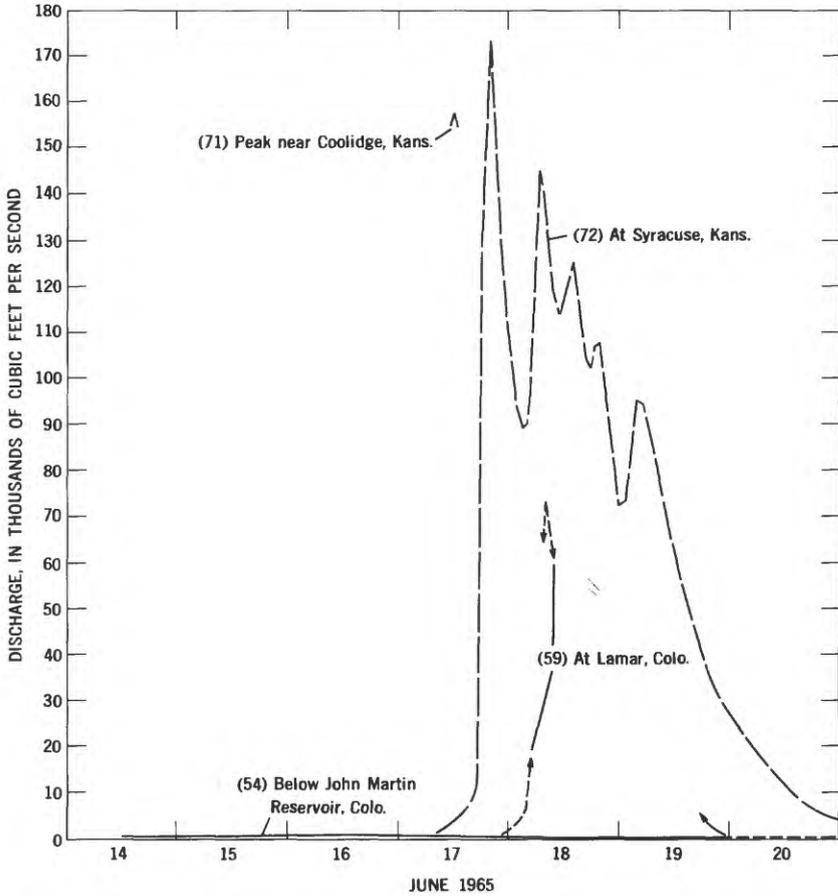


FIGURE 9. — Discharge hydrographs from selected gaging stations on Arkansas River, John Martin Reservoir, Colo., to Syracuse, Kans. Number in parentheses is site number (pl. 1).

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



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.

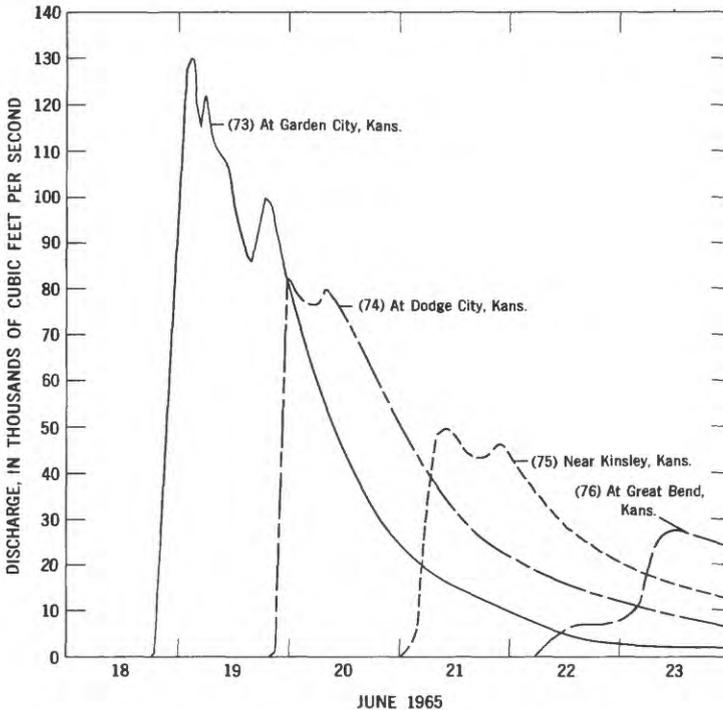


FIGURE 11. — Discharge hydrographs from selected gaging stations on Arkansas River, Garden City to Great Bend, Kans. Number in parentheses is site number (pl. 1).

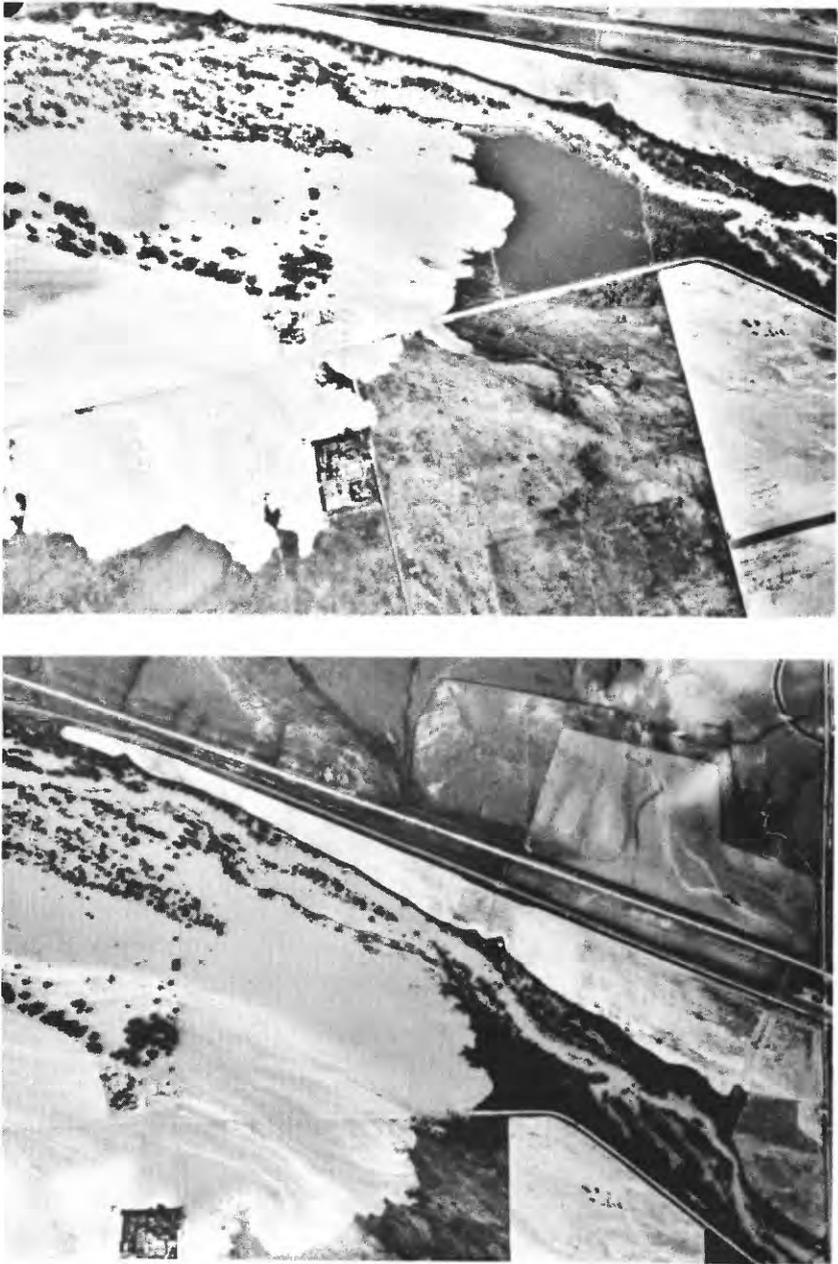


FIGURE 12. — Aerial views of flood front 8 miles west of Dodge City, Kans., June 19, 1965. *Upper*, At 1629 hours. *Lower*, At 1635 hours. Kansas State Highway Commission photographs by William H. Weber.

CANADIAN RIVER BASIN, NEW MEXICO

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.

CANADIAN RIVER ABOVE CONCHAS RESERVOIR

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.

CANADIAN RIVER TRIBUTARIES

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 Seuble 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.

NORTHEASTERN NEW MEXICO

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.

EFFECTS OF STORAGE

In Colorado the entire flood runoff upstream from John Martin 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 1. — Comparison of peak discharges for floods in 1904, 1921, and 1965

Stream and location	Contributing drainage area (sq mi)	Peak discharge (cfs)		
		1904	1921	1965
Arkansas River near Pueblo, Colo	4,686	8,500	103,000	9,260
Fountain Creek at Pueblo, Colo	926	---	34,000	47,000
Chico Creek near North Avondale, Colo	864	---	28,600	52,200
Arkansas River near Nepesta, Colo	9,291	---	180,000	43,100
Arkansas River at La Junta, Colo	12,095	---	200,000	31,700
Purgatoire River at Trinidad, Colo	795	45,400	---	15,700
Arkansas River at Lamar, Colo	18,830	---	130,000	73,800
Arkansas River at Great Bend, Kans	28,354	---	(¹)	27,800
Vermejo River near Dawson, N. Mex	301	---	(²)	12,600
Cimarron Creek at Springer, N. Mex	1,032	(³)	---	29,500
Canadian River near Taylor Springs, N. Mex	2,850	91,100	---	162,000
Mora River at La Cueva, N. Mex	173	(⁴)	---	989
Mora River near Goldondrinan, N. Mex	267	(⁴)	---	2,240
Mora River near Watrous, N. Mex	521	(⁴)	---	6,080
Mora River near Shoemaker, N. Mex	1,033	(⁴)	11,000	14,800
Canadian River near Sanchez, N. Mex	5,712	(⁵)	---	145,000

¹Stage 1.4 ft lower than in 1965; discharge not determined.

²Probably exceeded 10,000 cfs.

³Probably exceeded 10,000 cfs, but probably less than in 1965.

⁴May have exceeded 20,000 cfs.

⁵Probably exceeded 25,000 cfs.

⁶Probably exceeded 30,000 cfs.

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 Springer 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 2. — Summary of flood damage, in thousands of dollars, in Arkansas River basin, June 1965

[Adapted from U.S. Army Corps of Engineers data, 1966]

Stream basin, reach, or tributary	Rural			Subtotal	Urban facilities	Business and financial	Existing flood- control works	Total loss
	Agricul- tural	Transpor- tation facilities	Utilities and communication facilities					
Arkansas River, Colo.:								
Arkansas River above John Martin Dam	3,380	490	4	3,874	170	175	30	4,249
Beaver Creek	103	898	500	2,955	60	2	20	980
Fountain Creek	666	2,415	287	3,368	2,240	137	70	5,815
Chico Creek	1,310	2,145	104	3,559	---	60	39	3,658
Timpas Creek	520	20	4	544	---	11	5	560
Adobe Creek	5	15	---	20	---	---	---	20
Purgatoire River	716	700	3	1,419	60	50	10	1,539
Rule Creek	440	240	5	685	---	15	50	750
Arkansas River, John Martin Dam To granada	5,141	238	21	5,400	1,333	540	10	7,283
Caddoa Creek	---	10	---	10	---	---	---	10
Mud Creek	40	60	---	100	---	---	---	100
Dry Creek	110	60	---	170	---	---	---	170
Willow Creek	86	224	---	310	2,049	180	6	2,565
Clay Creek	504	576	---	1,080	---	---	---	1,080
Big Stinky Creek	---	---	---	---	---	---	33	33
Arkansas River, Granada to Colorado State line	3,907	578	20	4,505	---	192	16	4,713
Wolf Creek	315	104	---	479	337	5	6	827
Wild Horse Creek	---	196	---	196	---	---	---	196
Two Butte Creek	1,071	218	6	1,295	1,301	115	8	2,714
Arkansas River, Kans.:								
State line to Lakin	2,768	490	6	3,264	240	182	63	4,027
Lakin to Cimarron	4,414	290	---	4,704	1,598	106	6	6,414
Cimarron to Mulberry Creek	1,052	207	---	1,259	3,936	227	75	5,497
Mulberry Creek to Pawnee River	1,560	390	---	1,950	482	50	1	2,483
Pawnee River to Walnut Creek	911	89	---	1,000	---	9	18	1,027
Canadian River, N. Mex.:								
Canadian River above Conchas Dam	390	367	---	757	5	---	---	762
Mora River	139	150	---	289	16	---	---	305
Vernejo River	500	310	---	810	---	---	---	810
Raton Creek	56	20	---	76	154	5	10	245
Chocoma Creek	249	---	3	252	---	---	---	252
Cimarron Creek	965	336	200	1,501	215	14	2	1,732
Total	31,318	11,137	1,163	43,618	14,196	2,075	481	60,370

16-17. 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



FIGURE 13. — Aerial view of flooding in Holly, Colo., on June 19, 1965. Photograph by Pueblo Star Journal-Chieftain.

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.

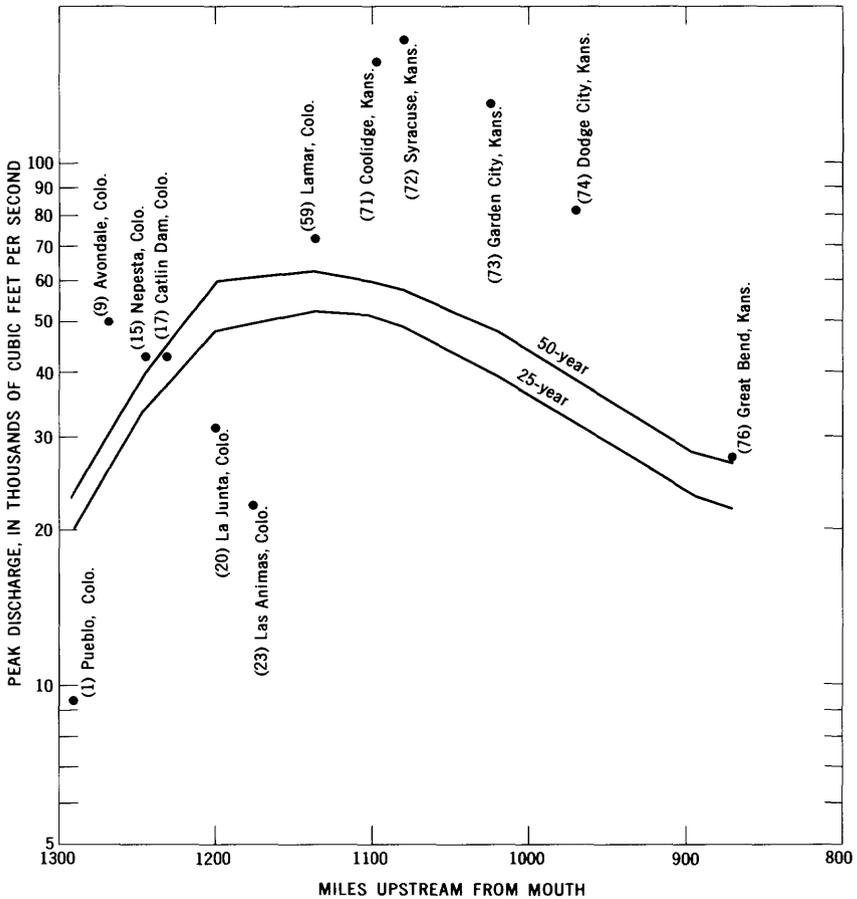


FIGURE 14. — Relation of peak discharge and selected flood frequencies to miles upstream from mouth, Arkansas River. Number in parentheses is site number (pl. 1).

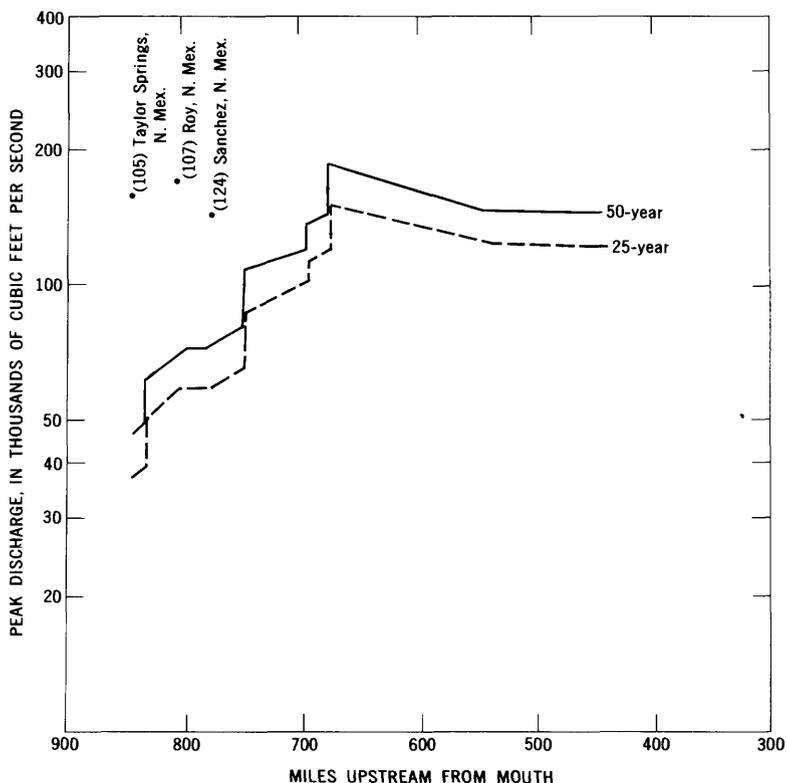


FIGURE 15. — Relation of peak discharge and selected flood frequencies to miles upstream from mouth, Canadian River. Number in parentheses is site number (pl. 1).

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 stages and discharges, Arkansas River basin

Site No. (pt. 1)	Perma- nent station	Stream and place of determination	Contributing drainage area (sq mi)	Maximum flood previously known prior to June 1965				Maximum June 1965					
				Period	Year	Gage height (ft)	Discharge Cubic feet per second	Recur- rence interval (yr)	Day	Time (hr)	Gage height (ft)	Discharge Cubic feet per second	Recur- rence interval (yr)
1	07099500	Arkansas River near Pueblo, Colo	4,686	1865-1965	1921	24.66	103,000	4.1	17	2130	6.31	9,260	3
2	07103700	Spring Creek near Colorado Springs, Colo	102	1958-65	1964	5.27	2,630	8	17	1700	3.82	359	1
3	07103900	West Monument Creek near Pikeview, Colo	15.4	1957-65	1958	1.59	27	(*)	17	1500	4.80	400	(*)
4	---	West Monument Creek below Stanley Canyon, near Pikeview, Colo	20.7	---	---	---	---	---	17	---	---	515	(*)
5	07104500	Templeton Gap Floodway at Colorado Springs, Colo	8.46	1951-65	1956	2.63	458	(*)	17	1600	2.84	572	(*)
6	07105800	Fountain Creek at Security, Colo	488	1964-65	1965	4.58	914	(*)	17	1630	10.37	21,500	1.6
7	07106500	Jimmy Camp Creek near Fountain, Colo	54.3	1903-65	1921	---	34,000	1.4	17	1330	---	124,000	30
8	07106500	Fountain Creek at Pueblo, Colo	926	1935	1935	---	35,000	1.4	17	2100	19.0	47,000	1.9
9	07109500	Arkansas River near Avondale, Colo	6,327	1939-51, 1965	1942	7.79	13,900	4	18	0220	9.77	50,000	1.8
10	---	Black Squirrel Creek near Peyton, Colo	16.3	---	---	---	---	---	17	1600	---	10,400	6.8
11	---	Black Squirrel Creek near Ellicott, Colo	353	---	---	---	---	---	17	2300	---	141,000	11
12	07110500	Chico Creek near North Avondale, Colo	864	1921-65	1921	---	28,600	50	18	0400	15.5	52,200	1.8
13	---	Arkansas River near North Avondale, Colo	7,157	---	---	---	---	---	18	0400	---	104,000	10
14	07116000	Huerfano River below Huerfano Valley Dam, near Undercliffe, Colo	1,673	1900-65	1958	14.5	16,800	13	13	2210	5.18	3,220	(*)
15	07117000	Arkansas River near Nepesita, Colo	9,291	1897-1965	1921	---	*180,000	4.5	18	1130	9.80	43,100	1.1
16	07119500	Apishapa River near Fowler, Colo	1,125	1922-65	1923	---	*83,000	2.4	17	0230	16.45	11,400	4
17	07119700	Arkansas River at Catlin Dam, near Fowler, Colo	10,847	1964-65	1965	2.15	2,650	(*)	18	1600	7.95	43,200	45
18	07121500	Timpas Creek at mouth, near Swink, Colo	496	1922-25	1923	---	*11,200	13	17	0400	20.95	21,400	50
19	07122500	Crooked Arroyo near La Junta, Colo	108	1922-25, 1953	1953	---	24,000	2.9	17	0800	---	5,610	18
20	0712300	Arkansas River at La Junta, Colo	12,095	1889-1965,	1921	18.4	200,000	3.3	19	0530	12.90	31,700	8
21	---	Horse Creek near La Junta, Colo	1,300	1941	1941	---	*5,400	5	18	---	---	5,070	4
22	---	Adobe Creek near Las Animas, Colo	589	---	---	---	---	---	18	---	---	8,600	34
23	07124000	Arkansas River at Las Animas, Colo	13,976	1939-65	1955	15.03	44,000	14	19	1630	14.72	22,100	4
24	---	North Fork Purgatoire River at Weston, Colo	216	---	---	---	---	---	16	1800	---	1,920	2

25	South Fork Purgatoire River at Weston, Colo	101								16	1800					1,340		2
26	Purgatoire River above Lorencito Canyon, near Weston, Colo.	381	1955						1,790	(¹)						3,000		2
27	Zarcillo Canyon near Segundo, Colo	36.4	1955						1,460	(¹)						1,630		(¹)
28	Purgatoire River at diversion dam, at Valdez, Colo	485	1955						4,400	2	2000					8,500		4
29	Burro Canyon at Madrid, Colo	28.3	1925, 1955						23,600	(¹)						3,120		(¹)
30	Reilly Canyon at Cokedale, Colo	36.7	1955						2,800	(¹)						3,410		16
31	Long Canyon near Sopris, Colo	104	1955						9,650	50	17					4,480		8
32	Raton Creek near Morley, Colo	5.27	1955						402	(¹)						4,660		(¹)
33	Joe Creek near Morley, Colo	4.54	1955						642	(¹)						760		(¹)
34	Clear Creek near Starkville, Colo	8.1	1942, 1955						9,400	(¹)	1900					1,660		(¹)
35	Raton Creek at Starkville, Colo	60.5	1955						820	(¹)						12,900		(¹)
36	Grasmack Arroyo near Trinidad, Colo	3.6	1955						16.6	(¹)						1,090		(¹)
37	Purgatoire River at Trinidad, Colo	795	1859-1965						45,400	1.2	2000					15,700		6
38	Grey Creek near Trinidad, Colo	16.0	1955						1,960	(¹)	1830					3,540		(¹)
39	Purgatoire River near Hoehne, Colo	857	1954-65						13.97	33	2300					20,000		8
40	Purgatoire River at U.S. Highway 350, near Hoehne, Colo	1,015	1955						37,900	28						20,900		7
41	Frijole Creek near Allalfa, Colo	80	1954-65						17.23	(¹)	2050					17,25		(¹)
42	San Isidro Creek near Trinchera, Colo	32.1	1905-7						13,500		2100					7,960		(¹)
43	San Francisco Creek near Allalfa, Colo	1,320	1954-65						41,900	20	0015					14,000		44
44	Purgatoire River near Allalfa, Colo	160	1954-65						26,300	1.8	18					27,300		8
45	Trinchera Creek near Trinchera, Colo	129	1924-65						25,100	2.1	17					4,500		5
46	Alkali Arroyo near Trinchera, Colo	34.5	1954-55						15,500	(¹)						2,600		(¹)
47	Purgatoire River near Thatcher, Colo	1,935	1954-55						29.2	2	18					47,700		15
48	Chacuaco Creek near La Junta, Colo	387	1955						3,170	2	17					38,900		2.3
49	Purgatoire River at Ninemite Dam, near Higbee, Colo	2,900	1924-65						17.7	11.2	18					105,000		11.6
50	Smith Canyon near Ninaview, Colo	291	1955						5,660	5	0200					84,000		5.8
51	Purgatoire River near Las Animas, Colo	3,503	1889, 1922-65						70,000	37	1750					62,500		28
52	Rule Creek near Toonerville, Colo	363	1941-46, 1949, 1953						20.05	3	18					276,000		16
53	John Martin Reservoir at Caddoa, Colo	18,130	1943-65						3,850.44		30					3,848.50		1330
54	Arkansas River below John Martin Reservoir, Colo	18,132	1938-65						40,000		16					900		---
55	Caddoa Creek at Caddoa, Colo	131	1941-46, 1949, 1956						110.46	1.3	18					110.62		---
56	Mud Creek near Caddoa, Colo	186	1941-43, 1949						23.36	3.3	18					37,600		4.2
57	Dry Creek near Lamar, Colo	73.0	1887-1965						17.0	2.0	18					53,400		4.6
58	Willow Creek near Lamar, Colo	40.5	1903, 1951-52, 1956, 1964							5.2	18					28,200		(¹)
59	Arkansas River at Lamar, Colo	18,830	1954						444,600	(¹)	17					24,300		(¹)
60	Clay Creek near Lamar, Colo	213	1954						130,000	2.0	18					73,900		(¹)
61	Big Sandy Creek near Cathlam, Colo	49.0	1954						27,500	5.2	18					19,000		3.1
62	South Rush Creek near Karval, Colo	188	1954						444,600	(¹)	17					158,000		30
											1700					60,700		(¹)
																3,710		28

See footnotes at end of table, p. D38

ARKANSAS RIVER BASIN, COLORADO, KANSAS, NEW MEXICO D37

92	07203000	Springer Arroyo near Colfax, N. Mex.	3.00	1940	11.88	9,000	17	---	---	2,280	(¹)
93	07203000	Crow Creek near Maxwell, N. Mex.	78.4	1940	11.88	9,000	17	---	---	13,100	27.7
94	07206000	Vermijo River near Dawson, N. Mex.	301	1927-65	---	---	30	---	---	12,600	11.2
95	07206000	Cimarron Creek below Eagle Nest Dam, N. Mex.	167	1955	2.79	205	---	---	---	*9.51	---
96	07206200	McEvoy Creek near Eagle Nest, N. Mex.	1.95	1961-65	0.82	1.64	14	---	---	0.65	0.94
97	07206300	Tolby Creek near Eagle Nest, N. Mex.	8.5	1962	2.04	32.9	16	(¹)	---	1.68	18.7
98	07206400	Clear Creek near Ute Park, N. Mex.	7.44	1965	2.29	60.3	18	(¹)	---	3.05	151
99	07207000	Turkey Creek Canyon near Cimarron, N. Mex.	5.25	1965	4.88	1,160	17	---	---	6,860	(¹)
100	07207000	Cimarron Creek near Cimarron, N. Mex.	284	1950-65	---	---	6	---	---	12.42	15,500
101	07207500	Pomil Creek near Cimarron, N. Mex.	171	1915-29, 1950-65	---	5,200	22	---	---	11.13	5,630
102	07208500	Chase Canyon near Cimarron, N. Mex.	23.0	1965	6.20	*1,900	17	---	---	10,800	20
103	07211000	Rayado Creek at Saddle Ranch, near Cimarron, N. Mex.	65	1909-12, 1914-65	10.55	*6,250	31	---	---	*11.5	9,000
104	07211000	Cimarron Creek at Springer, N. Mex.	1,032	1930-65	---	---	18	---	---	19.96	29,500
105	07211500	Canadian River near Taylor Springs, N. Mex.	2,850	1904-65	---	91,100	19	---	---	47.4	162,000
106	07213700	Canadian River tributary near Mills, N. Mex.	4.2	1957	3.99	918	18	---	---	4.25	1,100
107	07214000	Canadian River near Roy, N. Mex.	3,959	1942	14.22	*63,800	4	---	---	34.5	172,000
108	07214500	Mora River near Holman, N. Mex.	57	1954	6.10	4,700	16	---	---	4.50	1,550
109	07214600	Vigil Canyon near Holman, N. Mex.	2.8	1958	3.43	87	15	---	---	3.08	50
110	07214700	Agua Fria Creek near Holman, N. Mex.	9.2	1959	1.70	138	15	---	---	2.50	250
111	07214800	Rio la Casa near Cleveland, N. Mex.	23.0	1956-65	6.0	2,260	19	(¹)	---	3.75	395
112	07215500	Mora River at La Cueva, N. Mex.	173	1941	7.58	*1,530	5	---	---	8.22	989
113	07215600	Rio Cebolla near Golondrinas, N. Mex.	64	1952, 1956-63	11.8	9,300	5.2	---	---	5.3	490
114	07216500	Mora River near Golondrinas, N. Mex.	267	1952	14.4	*14,000	2.6	---	---	7.85	2,240
115	07217000	Coyote Creek below Black Lake, N. Mex.	48	1953-63	4.70	913	33	---	---	4.60	740
116	07217100	Coyote Creek above Guadalupe, N. Mex.	71	1956-63	6.08	1,390	34	---	---	6.70	1,820
117	07218000	Coyote Creek near Golondrinas, N. Mex.	215	1928-63	10.0	3,020	17	---	---	0.530	7,900
118	07218100	Mora River near Waitrous, N. Mex.	521	1961	9.60	4,050	34	---	---	9.43	6,080
119	07218700	Mamulitas Creek near Rosciada, N. Mex.	52	1956-63	7.48	*7,050	24	---	---	4.20	430
120	07220000	Sapello River at Sapello, N. Mex.	132	1956-65	7.40	*6,160	50	---	---	4.10	860
121	07220600	Sapello River near Waitrous, N. Mex.	213	1957	13.02	5,860	21.1	---	---	11.3	4,240
122	07220900	Dog Creek near Shoemaker, N. Mex.	18.4	1954-65	9.91	2,150	15	---	---	9.88	2,050
123	07221000	Mora River near Shoemaker, N. Mex.	1,033	1948	12.79	*15,200	37	---	---	0.200	14,800
124	07221500	Canadian River near Sanchez, N. Mex.	5,712	1912-14, 1942	21.3	*87,800	1.2	---	---	31.5	145,000
125	07222300	Tremetina Creek at Tremetina, N. Mex.	65	1962	8.00	4,400	16	(¹)	---	8.76	5,600
126	07222500	Conchas River at Variadero, N. Mex.	393	1936-65	19.96	44,000	1.5	---	---	10.40	8,880
127	07223500	Conchas Reservoir near Conchas Dam, N. Mex.	6,976	1942	4,208.41	*479,600	14	---	---	4,199.28	*336,000
128	07225500	Ute Creek near Gladstone, N. Mex.	256	1963	6.85	10,700	19	---	---	---	(¹)
129	07226200	Bueyeros Creek at Bueyeros, N. Mex.	34	1961	7.43	5,240	---	---	---	5.21	2,460

See footnotes at end of table, p. D38.

TABLE 3.—*Summary of flood stages and discharges, Arkansas River basin—Continued*

Site No. (pl. 1)	Perma-nent station	Stream and place of determination	Contributing drainage area (sq mi)	Maximum flood previously known prior to June 1965					Maximum June 1965				
				Period	Year	Gage height (ft)	Cubic feet per second	Recur-rence interval (yr)	Day	Time (hr)	Gage height (ft)	Cubic feet per second	Recur-rence interval (yr)
130	07226300	Carrizo Creek near Roy, N. Mex.	68	1954-65	1958	5.97	1,100	(^c)	16	---	6.43	1,380	(^c)
131	07226500	Ute Creek near Logan, N. Mex.	1,443	1942-65	1946, 1951	8.4	24,500	4	19	1430	6.80	11,700	2
132	07226800	Ute Reservoir near Logan, N. Mex.	10,030	1963-65	1965	3,733.8	33,780	---	22,23	---	3,741.6	49,870	4
133	07227200	Trampas Creek near Sneed, N. Mex.	556	---	---	---	(^c)	---	17	---	---	6,600	4
134	---	Carrizo Creek near Clayton, N. Mex.	477	1957	1957	---	29,500	---	17	---	---	9,270	7
135	07227295	Sandy Arroyo tributary near Clayton, N. Mex.	---	1952-65	1956	7.33	388	(^c)	17	---	4.22	172	(^c)
136	07227300	Sandy Arroyo near Clayton, N. Mex.	1.25	1933-65	1953	8.85	10,300	(^c)	17	---	4.17	---	(^c)
137	---	Cieneguilla Creek near Clayton, N. Mex.	112	1941, 1955	1941	---	24,000	---	17	---	---	9,580	11.2

^aSite and datum then in use, see station description.

^bRatio to discharge of 50-year flood.

^cNot defined.

^dLess than mean annual flood.

^aFlood of July 2, 1965, reached a stage 1 to 1.5 feet lower.

^bAt different site, see station description.

^cAt site 2 miles upstream, caused by Apishapa Dam failure.

^dMajor flood(s) occurred in prior year(s); see station description.

^eContents in acre-feet.

^fDaily discharge.

^gBack water 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 SE¼NW¼ 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).

1865 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

<i>Day</i>	<i>Discharge</i>	<i>Day</i>	<i>Discharge</i>
June 14 -----	2,480	June 18 -----	5,020
15 -----	2,090	19 -----	4,120
16 -----	2,700	20 -----	3,950
17 -----	5,460	21 -----	3,980

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
<i>June 15</i>			<i>June 17—Con.</i>			<i>June 18</i>		
2400 -----	3.78	1,940	0500 -----	5.34	5,560	0300 -----	4.94	4,510
<i>June 16</i>			0800 -----	5.12	4,900	0700 -----	4.81	4,120
0800 -----	3.77	1,920	1200 -----	4.96	4,420	0800 -----	5.00	4,690
0900 -----	3.80	1,970	1600 -----	4.90	4,240	0900 -----	5.40	5,890
1000 -----	3.77	1,920	1800 -----	5.08	4,780	1030 -----	5.67	6,900
1200 -----	4.00	2,340	1900 -----	5.58	6,340	1100 -----	5.60	6,620
1500 -----	4.14	2,620	2000 -----	6.00	8,020	1500 -----	5.25	5,440
1800 -----	4.28	2,900	2130 -----	6.31	9,260	1700 -----	5.00	4,690
2400 -----	4.85	4,090	2200 -----	6.28	9,140	2000 -----	4.97	4,600
<i>June 17</i>			2300 -----	5.83	7,340	2400 -----	4.93	4,480
0300 -----	5.18	5,080	2400 -----	5.28	5,470			

(2) 07103700 FOUNTAIN CREEK NEAR COLORADO SPRINGS, COLO.

Location. — Lat 38°51'17", long 104°52'39", in SE¼SW¼ 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). 1958 to May 1965: Discharge, 2,630 cfs Aug. 4, 1964 (gage height, 5.27 ft).

Mean discharge, in cubic feet per second, 1965

Day	Discharge	Day	Discharge
June 14	29	June 18	168
15	26	19	152
16	94	20	131
17	233	21	118

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
<i>June 15</i>			<i>June 16—Con.</i>			<i>June 17—Con.</i>		
2400	1.63	26	2200	3.38	220	1700	3.82	359
<i>June 16</i>			2400	3.37	218	2000	3.40	226
0800	1.64	26	<i>June 17</i>			2400	3.28	195
1200	1.84	31	1200	3.20	175	<i>June 18</i>		
1400	2.82	112	1400	3.72	324	1200	3.24	165
1800	3.09	170	1500	3.81	356	2400	3.22	160
1930	3.16	188	1600	3.72	324			

(3) 07103900 WEST MONUMENT CREEK NEAR PIKEVIEW, COLO.

Location. — Lat 38°58'17", long 104°53'56", in SW¼ 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).

Mean discharge, in cubic feet per second, 1965

Day	Discharge	Day	Discharge
June 14	6.1	June 18	90
15	4.4	19	50
16	16	20	28
17	130	21	25

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
<i>June 13</i>			<i>June 14—Con.</i>			<i>June 16</i>		
2400-----	0.54	4.7	1500-----	0.57	5.1	1200-----	0.55	4.8
<i>June 14</i>			2400-----	.54	4.7	1400-----	.80	8.6
0500-----	.75	7.8	<i>June 15</i>			1600-----	1.41	21
1300-----	.68	6.7	2400-----	.52	4.4	1800-----	2.10	39
						2400-----	2.16	40

(4) WEST MONUMENT CREEK BELOW STANLEY CANYON, NEAR PIKEVIEW, COLO.
(Miscellaneous site)

Location. — Lat 38°58'25", long 104°52'37", in SE¼ 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 SE¼ 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.

Maxima. — June 1965: Discharge, 572 cfs 1600 hours June 17 (gage height, 2.84 ft).

1951 to May 1965: Discharge, 458 cfs July 2, 1956 (gage height, 2.63).

Mean discharge, in cubic feet per second, 1965

Day	Discharge	Day	Discharge
June 14-----	0	June 18-----	12
15-----	0	19-----	0
16-----	0	20-----	0
17-----	103	21-----	0

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
<i>June 16</i>			<i>June 17—Con.</i>			<i>June 18</i>		
2400-----	---	0	1600-----	2.84	572	0300-----	1.65	43
<i>June 17</i>			1630-----	2.63	440	0600-----	1.50	18
1000-----	---	0	1700-----	2.48	358	0900-----	1.30	3.9
1100-----	1.77	68	1800-----	2.23	232	1200-----	1.32	.3
1430-----	1.92	109	2000-----	1.96	123	1500-----	1.20	0
1500-----	2.63	440	2200-----	1.90	103	2400-----	---	0
1530-----	2.73	500	2400-----	1.77	68			

(6) 07105800 FOUNTAIN CREEK AT SECURITY, COLO.

Location. — Lat 38°43'46", long 104°44'00", in SW¼ 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.

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

Day	Discharge	Day	Discharge
June 14	578	June 18	1,610
15	340	19	874
16	676	20	645
17	5,650	21	571

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
<i>June 13</i>			<i>June 15—Con.</i>			<i>June 17—Con.</i>		
2400	3.80	382	1400	3.43	324	1500	6.97	4,390
<i>June 14</i>			1900	3.33	278	1530	6.33	3,110
0200	3.50	247	2400	3.27	252	1600	7.37	5,510
0500	3.41	208	<i>June 16</i>			1630	10.37	21,500
1100	3.25	152	0600	3.17	252	1700	9.47	15,600
1600	3.05	74	1200	3.21	314	1800	8.37	9,500
1700	3.22	140	1800	3.40	422	1900	8.57	10,600
1800	4.02	490	2100	3.86	660	2000	7.87	7,580
1900	5.17	1,110	2230	3.90	695	2200	6.87	4,570
2000	6.90	2,620	2330	8.50	8,260	2300	7.16	5,420
2030	7.08	2,890	2400	8.00	6,520	2400	6.77	4,650
2100	6.75	2,490	<i>June 17</i>			<i>June 18</i>		
2200	5.99	1,780	0400	6.87	3,560	0100	5.92	3,170
2300	5.41	1,310	0900	6.12	2,400	0600	4.29	1,440
2400	4.75	908	1000	5.82	2,210	0700	5.48	2,600
<i>June 15</i>			1100	6.37	2,930	0800	3.93	1,250
0300	3.81	468	1200	6.42	3,100	0900	3.93	1,270
0600	3.47	314	1300	7.81	6,660	1200	3.86	1,230
0900	3.37	283	1345	8.57	9,830	2400	3.72	1,140
1300	3.34	283	1400	7.87	6,970			

(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 SW¼SW¼ 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 streamflow record, and 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

ARKANSAS RIVER BASIN, COLORADO, KANSAS, NEW MEXICO D43

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 (gauge height, 19.0 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

Day	Discharge	Day	Discharge
June 14	92	June 18	10,000
15	1,500	19	2,500
16	448	20	600
17	7,330	21	900

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
<i>June 14</i>			<i>June 15—Con.</i>			<i>June 17—Con.</i>		
2400	2.87	58	1315	3.11	570	1015	5.00	3,480
<i>June 15</i>			1800	3.00	483	1115	5.22	3,920
0500	2.80	43	2400	2.78	344	1230	4.50	2,480
0530	4.70	1,450	<i>June 16</i>			1300	3.70	1,150
0600	5.25	2,600	0200	3.12	578	1345	4.19	1,920
0700	6.50	6,030	0400	3.18	626	1445	3.90	1,440
0730	7.67	9,840	0600	3.02	498	1515	4.07	1,710
0745	7.30	8,980	1200	2.92	427	1645	3.70	1,150
0800	7.83	11,000	2400	2.90	414	1900	4.00	1,590
0830	7.30	9,430	<i>June 17</i>			1930	4.20	1,930
0930	6.40	6,690	0300	2.87	396	1945	8.55	13,600
1000	4.00	1,510	0700	3.15	602	2000	10.00	18,500
1030	3.00	462	0730	3.60	1,030	2100	19.00	47,000
1100	2.47	182	0800	4.15	1,850	2200	16.50	38,200
1215	3.20	642	0900	4.65	2,780	2300	15.00	33,400
1300	2.92	427	0945	5.25	3,990	2400	12.50	25,000

(9) 07109500 ARKANSAS RIVER NEAR AVONDALE, COLO.

Location. — Lat 38°14'53", long 104°23'55", 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 6,700 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

Day	Discharge	Day	Discharge
June 14	2,990	June 18	18,500
15	4,080	19	6,740
16	3,150	20	4,590
17	6,640	21	4,870

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
<i>June 14</i>			<i>June 16—Con.</i>			<i>June 18—Con.</i>		
2400-----	5.16	2,800	1400-----	5.16	2,850	0220-----	9.77	50,000
<i>June 15</i>			1600-----	5.44	3,290	0230-----	9.56	43,700
0800-----	5.17	2,820	1800-----	5.54	3,470	0330-----	8.96	29,200
0900-----	5.75	3,800	2400-----	5.81	3,970	0430-----	9.33	37,600
1000-----	6.30	5,000	<i>June 17</i>			0600-----	8.86	26,100
1100-----	6.70	6,200	0600-----	6.26	4,950	1000-----	8.84	25,000
1200-----	7.00	7,450	0830-----	6.45	5,450	1200-----	7.76	11,200
1300-----	7.16	8,340	1000-----	6.27	4,970	1330-----	7.84	12,000
1330-----	7.00	7,450	1200-----	6.58	5,860	1500-----	7.66	10,300
1345-----	7.20	8,580	1500-----	7.01	7,600	1800-----	7.36	8,220
1400-----	7.00	7,450	1700-----	7.22	8,820	2200-----	7.09	6,800
1500-----	6.50	5,570	1900-----	6.90	7,050	2400-----	7.41	8,520
1800-----	5.60	3,580	2100-----	7.10	8,100	<i>June 19</i>		
2200-----	5.27	3,020	2300-----	7.46	10,600	0400-----	7.61	9,860
2400-----	5.22	2,940	2400-----	8.21	18,800	0800-----	7.19	7,300
<i>June 16</i>			<i>June 18</i>			1200-----	6.86	6,000
0400-----	5.21	2,930	0100-----	8.61	24,200	1800-----	6.61	5,230
1200-----	5.13	2,800	0200-----	9.66	46,600	2400-----	6.49	4,920

(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 ELLICOTT, 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.

Maxima. — 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 S½ 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.

Maximum. — 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

<i>Day</i>	<i>Discharge</i>	<i>Day</i>	<i>Discharge</i>
June 12	1.7	June 18	3
13	130	19	3
14	2.7	20	3
15	0	21	5.9
16	66	22	0
17	63		

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
June 12			June 15			June 16—Con.		
2400	---	0	2400	---	0	2030	---	1.47
June 13			June 16			2200	---	1.10
2140	---	0	1630	---	0	2315	---	0
2200	4.60	2,600	1645	1.80	330	2400	---	0
2210	5.18	3,220	1700	2.27	649	June 17		
2220	4.30	2,300	1745	1.71	276	0015	---	0
2230	3.50	1,560	1800	2.25	635	0045	---	2.10
2300	2.38	726	1830	1.85	362	0100	---	1.95
June 14			1900	1.63	228	0300	---	1.70
0115	---	0	2000	1.45	120	0500	---	1.35
2400	---	0	2015	1.31	47	0700	---	1.08
						0730	---	0
						2400	---	0

(15) 07117000 ARKANSAS RIVER NEAR NEPESTA, COLO.

Location. — Lat 38°10'54", long 104°09'40", in NW¼ 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.

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

1897 to May 1965: Discharge, 180,000 cfs June 4, 1921 (gauge-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

Day	Discharge	Day	Discharge
June 14	2,410	June 18	18,700
15	2,640	19	11,900
16	2,060	20	5,200
17	4,570	21	6,270

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
<i>June 13</i>			<i>June 15—Con.</i>			<i>June 17—Con.</i>		
2400	5.61	1,840	1700	6.72	4,170	0600	6.45	3,940
<i>June 14</i>			1800	7.30	6,760	0800	6.35	3,620
0600	5.86	2,330	2000	7.00	5,120	1100	6.62	4,530
0700	6.45	3,620	2200	6.03	2,490	1400	6.55	4,280
0800	6.84	4,610	2400	5.55	1,680	1630	6.39	3,740
1000	6.28	2,850	<i>June 16</i>			1800	6.52	4,170
1200	5.96	2,120	0200	5.42	1,520	2000	6.72	4,940
1800	5.72	1,860	1200	5.64	1,890	2200	6.88	5,700
2400	5.46	1,590	2000	5.72	2,040	2400	6.95	6,100
<i>June 15</i>			2200	6.13	2,980	<i>June 18</i>		
0600	5.43	1,540	2400	6.45	3,940	0100	6.86	5,600
1200	5.64	1,890	<i>June 17</i>			0300	6.87	5,650
1500	5.79	2,180	0300	7.20	7,700	0600	7.32	8,560
						1130	9.80	43,100

(16) 07119500 APISHAPA RIVER NEAR FOWLER, COLO.

Location. — Lat 38°05'28", long 103°58'52", in SE¼NW¼ 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

Day	Discharge	Day	Discharge
June 14	580	June 18	140
15	168	19	37
16	470	20	37
17	5,100	21	21

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
<i>June 13</i>			<i>June 15—Con.</i>			<i>June 17—Con.</i>		
2400	1.84	44	0800	2.98	224	0230	16.45	11,400
<i>June 14</i>			1500	3.02	236	0300	16.43	11,400
0130	1.84	44	1800	2.95	215	0500	15.90	10,700
0200	5.00	1,000	2000	2.58	156	0700	14.70	9,700
0300	6.35	1,640	2400	2.45	140	0800	12.20	7,820
0400	5.65	1,300	<i>June 16</i>			0900	10.00	6,170
0500	5.00	1,000	1300	2.32	124	1100	8.00	4,670
0600	4.32	694	1500	2.36	132	1200	7.00	3,870
0700	6.10	1,520	1800	2.36	132	1400	5.80	2,860
0730	6.52	1,730	1900	3.05	260	1600	4.70	1,920
0800	6.30	1,620	2000	3.80	500	1800	4.00	1,320
1000	4.75	888	2100	5.00	1,000	2100	3.25	710
1200	4.05	580	2200	6.90	1,920	2400	2.87	442
1400	3.20	260	2300	7.80	2,370	<i>June 18</i>		
1800	2.50	110	2330	10.00	3,700	0600	2.33	179
2200	2.13	71	2400	13.00	6,200	1000	2.08	97
2400	2.00	64	<i>June 17</i>			1300	1.90	57
<i>June 15</i>			0030	15.00	8,700	1930	1.80	40
0600	1.86	46	0100	15.40	9,340	2230	2.15	117
0630	3.15	278	0200	16.15	10,700	2400	2.08	97

(17) 07119700 ARKANSAS RIVER AT CATLIN DAM,

NEAR FOWLER, COLO.

Location. — Lat 38°07'35", long 103°56'40", in NE¼NW¼ 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 at 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

Day	Discharge	Day	Discharge
June 14	2,680	June 18	18,300
15	2,250	19	11,300
16	2,320	20	4,940
17	10,100	21	4,620

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
<i>June 14</i>			<i>June 17—Con.</i>			<i>June 18—Con.</i>		
2400-----	1.74	1,530	0300-----	5.41	20,400	1300-----	4.45	16,800
<i>June 15</i>			0330-----	5.31	19,800	1400-----	5.65	25,600
0645-----	1.60	1,210	0400-----	5.51	21,100	1500-----	7.40	39,000
0800-----	1.68	1,390	0500-----	5.85	23,400	1600-----	7.95	43,200
1200-----	1.52	1,060	0700-----	5.35	20,000	1700-----	7.50	39,700
1800-----	1.65	1,320	0900-----	4.12	12,200	1900-----	7.02	36,300
1930-----	1.80	1,670	1200-----	3.25	7,240	2100-----	6.04	29,400
2100-----	3.10	6,490	1600-----	2.90	5,530	2400-----	4.83	20,900
2200-----	3.18	6,890	1830-----	2.55	4,040	<i>June 19</i>		
2400-----	2.62	4,320	1930-----	2.10	2,500	0200-----	4.15	16,500
<i>June 16</i>			2100-----	2.02	2,270	0500-----	3.60	13,100
0200-----	2.02	2,270	2300-----	2.35	3,300	1000-----	3.30	11,300
0800-----	1.66	1,340	2400-----	2.10	2,500	1200-----	3.13	10,200
1500-----	1.65	1,320	<i>June 18</i>			1600-----	3.10	10,100
1800-----	1.75	1,550	0100-----	2.07	2,410	1630-----	3.70	9,700
2000-----	2.12	2,560	0230-----	2.17	2,710	1800-----	3.53	8,760
2100-----	2.12	2,560	0300-----	2.90	5,530	2100-----	3.27	7,350
2130-----	2.00	2,210	0500-----	3.05	6,240	2400-----	3.00	6,000
2300-----	2.95	5,760	0700-----	3.04	6,200	<i>June 20</i>		
2400-----	3.35	7,780	0800-----	2.84	6,200	0600-----	2.80	5,080
<i>June 17</i>			0900-----	2.80	6,200	1200-----	2.70	4,650
0200-----	4.60	15,200	1100-----	3.08	7,940	1800-----	2.62	4,320
						2400-----	2.55	4,040

(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 NE¼ 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

site, datum then in use), from rating curve extended above 15,000 cfs on basis of slope-area measurement of peak flow.

Mean discharge, in cubic feet per second, 1965

Day	Discharge	Day	Discharge
June 13	671	June 20	6,650
14	3,140	21	3,980
15	255	22	4,580
16	1,310	23	2,250
17	18,400	24	2,090
18	11,100	25	1,800
19	20,000		

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Dis-charge (cfs)	Hour	Gage height (feet)	Dis-charge (cfs)	Hour	Gage height (feet)	Dis-charge (cfs)
<i>June 13</i>			<i>June 16—Con.</i>			<i>June 18—Con.</i>		
2400	5.46	1,050	1430	6.10	1,940	1700	9.45	12,600
<i>June 14</i>			1700	5.50	1,230	1800	9.40	12,400
0230	5.47	1,060	2000	4.67	539	1900	10.00	15,100
0300	6.48	2,470	2100	4.80	630	2100	10.50	17,600
0500	7.27	4,490	2200	5.50	1,230	2400	11.15	21,100
0600	8.35	8,060	2400	6.45	2,510	<i>June 19</i>		
0630	8.67	9,260	<i>June 17</i>			0200	11.85	25,300
0800	8.48	8,530	0300	8.07	7,060	0400	12.55	29,600
1000	7.95	6,650	0600	9.60	13,300	0530	12.90	31,700
1200	7.17	4,190	0800	11.55	23,500	0700	12.60	29,900
1500	5.95	1,740	1000	12.15	27,100	0900	12.05	26,500
1900	4.77	609	1100	12.35	28,300	1100	11.40	22,600
2400	4.67	539	1300	12.23	27,600	1300	10.50	17,600
<i>June 15</i>			1700	11.75	24,700	1600	9.65	13,500
0600	4.20	255	1900	11.20	21,400	1900	9.30	11,900
1800	4.20	255	2100	10.00	15,100	2400	8.87	10,100
2400	4.20	255	2400	8.98	10,500	<i>June 20</i>		
<i>June 16</i>			<i>June 18</i>			0600	8.27	7,770
0300	4.20	255	0300	8.25	7,700	1200	7.87	6,380
0400	6.00	1,800	0500	7.95	6,650	1800	7.55	5,360
0600	6.60	2,800	0700	8.50	8,600	2400	7.25	4,430
0900	5.40	1,130	0900	8.95	10,400	<i>June 21</i>		
1200	5.03	804	1230	8.72	9,460	0600	7.08	3,920
1500	5.92	1,700	1600	9.00	10,600	1600	6.94	3,560
						2400	7.10	3,980

(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.

Maxima. — 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

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

Day	Discharge	Day	Discharge
June 13	529	June 20	8,360
14	1,720	21	3,240
15	595	22	2,900
16	758	23	1,880
17	4,990	24	1,780
18	12,200	25	1,690
19	15,100		

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
<i>June 13</i>			<i>June 16—Con.</i>			<i>June 19</i>		
2400	8.16	463	1900	8.73	896	0300	12.20	8,600
<i>June 14</i>			2100	9.02	1,090	0500	12.38	9,320
0800	8.65	740	2300	9.20	1,220	0700	12.85	11,300
1000	9.20	1,090	2400	9.15	1,180	0900	13.20	13,000
1200	9.85	1,650	<i>June 17</i>			1200	13.95	17,200
1400	10.37	2,270	0400	8.35	425	1300	14.20	18,700
1600	10.64	2,870	0600	9.04	1,060	1400	14.40	20,000
1800	10.75	3,100	1000	10.00	2,300	1500	14.62	21,400
2000	10.68	3,000	1100	10.30	2,860	1630	14.72	22,100
2200	10.50	2,760	1200	11.30	5,270	1730	14.62	21,400
2400	10.00	2,140	1300	11.85	6,990	1900	14.40	20,000
<i>June 15</i>			1500	12.24	8,360	2100	14.05	17,800
0400	8.53	878	1900	11.65	6,320	2200	13.80	16,300
0800	8.13	639	2100	11.70	6,470	2400	13.50	14,600
1200	7.90	512	2200	12.17	8,110	<i>June 20</i>		
1800	7.61	360	2300	13.00	11,400	0300	13.02	12,100
2400	7.53	320	2400	13.47	13,900	0600	12.70	10,600
<i>June 16</i>			2400	13.80	15,700	1200	12.12	8,320
0900	7.47	290	<i>June 18</i>			1800	11.53	6,290
1030	7.47	290	0300	14.37	19,800	2400	11.03	4,820
1130	8.86	992	0600	14.00	17,500	<i>June 21</i>		
1300	9.05	1,110	1200	13.00	12,000	0600	10.55	3,620
1500	9.25	1,260	1800	12.30	9,000	1200	10.30	3,080
1700	9.04	1,100	2400	12.05	8,080	1800	10.22	2,920
						2400	10.08	2,650

(24) NORTH FORK PURGATOIRE RIVER AT WESTON, COLO.

(Miscellaneous site)

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.

(Miscellaneous site)

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 S½ 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°41'50", in SW¼ 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 SE¼ 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.

Maxima. — June 1965: Discharge, 3,120 cfs June 17, by indirect measurement of peak flow. 1925, 1955: Discharge, 23,600 cfs July 22, 1925, by slope-area measurement of peak flow.

(30) REILLY CANYON AT COKEDALE, COLO.
(Miscellaneous site)

Location. — Lat 37°07'56", long 104°36'34", in NW¼ 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.

(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.

Maximum. — 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.

(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.

Mean discharge, in cubic feet per second, 1965

Day	Discharge	Day	Discharge
June 14	227	June 19	1,000
15	227	20	720
16	2,700	21	600
17	5,000	22	500
18	2,500		

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
June 15			June 16—Con.			June 16—Con.		
2400	3.00	476	0600	3.42	812	1730	3.17	612
June 16			0900	3.18	620	1800	3.60	963
0300	3.03	500	1200	3.13	580	1830	4.20	1,540
0400	3.50	876	1500	3.15	596	1900	6.40	4,120

(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.

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

Day	Discharge	Day	Discharge
June 14	15	June 19	873
15	18	20	700
16	2,440	21	330
17	3,310	22	230
18	1,310		

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
<i>June 15</i>			<i>June 16—Con.</i>			<i>June 17—Con.</i>		
2400	3.03	42	2015	11.15	18,100	0100	6.60	5,260
<i>June 16</i>			2030	10.10	14,500	0200	5.35	2,960
0330	3.05	47	2045	10.80	16,900	0400	4.95	2,320
0400	3.24	146	2100	8.80	10,600	0700	4.45	1,580
0500	3.22	133	2145	7.10	6,300	1000	4.15	1,140
0600	3.46	311	2200	7.35	6,850	1400	4.02	958
0800	3.44	273	2215	7.10	6,300	1800	3.92	818
1200	3.30	152	2230	8.35	9,320	1900	6.00	4,090
1400	3.30	152	2300	11.65	20,000	2000	10.80	16,900
1600	3.34	185	2330	11.05	17,800	2030	11.30	18,600
1800	3.54	370	2400	9.00	11,100	2100	9.75	13,400
1900	4.50	1,650	<i>June 17</i>			2200	5.90	3,910
2000	7.25	6,630	0030	7.45	7,080	2300	5.40	3,040
						2400	5.00	2,400

(40) PURGATOIRE RIVER AT U.S. HIGHWAY 350,
NEAR HOEHNE, COLO.
(Miscellaneous site)

Location. — Lat 37°17'12", long 104°18'42", in NW¼ 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.

Maxima. — June 1965: Discharge, 20,900 cfs June 16, by contracted-opening measurement of peak flow.

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 Alfalfa, 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 ft, from floodmarks), by contracted-opening measurement of peak flow.

Mean discharge, in cubic feet per second, 1965

Day	Discharge	Day	Discharge
June 14	0	June 19	264
15	2.1	20	130
16	748	21	32
17	1,440	22	29
18	418		

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
<i>June 14</i>			<i>June 16—Con.</i>			<i>June 18—Con.</i>		
2400	---	0	2400	6.15	615	1100	4.70	116
<i>June 15</i>			<i>June 17</i>			<i>June 19</i>		
2230	---	0	0230	5.04	212	1400	4.42	61
2300	3.95	7.5	0700	4.40	58	2400	4.35	52
2330	4.35	42	1800	4.25	42	<i>June 19</i>		
2400	4.68	100	1815	7.00	1,050	1730	4.13	31
<i>June 16</i>			1830	13.00	5,700	1800	5.50	360
0130	6.45	765	1900	15.10	7,920	1830	6.70	890
0300	5.60	395	2000	17.20	10,500	2000	5.50	510
0600	4.50	74	2030	17.25	10,600	2030	5.67	420
1200	4.02	23	2045	16.70	9,880	2100	5.74	446
1830	3.98	21	2100	15.50	8,400	2130	7.00	1,050
1900	6.00	550	2115	11.50	4,380	2145	8.00	1,700
1915	8.00	1,700	2200	9.50	2,780	2200	8.54	2,080
1930	12.00	4,800	2300	8.25	1,880	2230	7.80	1,560
1945	13.00	5,700	2400	8.45	2,020	2300	7.15	1,140
2000	13.98	6,680	<i>June 18</i>			2400	6.30	690
2030	13.00	5,700	0045	8.82	2,270	<i>June 20</i>		
2130	10.00	3,150	0200	7.90	1,630	0300	5.18	254
2200	8.50	2,050	0300	6.90	990	0600	4.83	150
2300	7.15	1,140	0600	5.95	530	1200	4.58	89
						2400	4.17	35

 (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).

Mean discharge, in cubic feet per second, 1965

Day	Discharge	Day	Discharge
June 14	0	June 19	94
15	130	20	50
16	1,110	21	20
17	993	22	10
18	2,200		

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
<i>June 14</i>			<i>June 16—Con.</i>			<i>June 17—Con.</i>		
2400		0	2300	2.50	505	2200	7.00	3,600
<i>June 15</i>			2315	3.20	820	2300	9.15	6,480
2200		0	2400	2.80	640	2400	11.60	10,700
2230	1.50	115	<i>June 17</i>			<i>June 18</i>		
2300	4.00	1,230	0200	1.90	250	0030	13.24	14,000
2330	6.35	2,950	0430	1.10	43	0100	12.80	13,100
2400	7.25	3,860	1215	.59	3	0200	11.45	10,500
<i>June 16</i>			1230	2.12	338	0300	10.00	7,900
0100	9.50	7,040	1330	2.07	318	0400	7.20	3,800
0115	9.90	7,720	1345	2.27	402	0500	4.90	1,740
0200	9.00	6,250	1430	2.07	318	0600	4.35	1,420
0300	7.10	3,700	1730	1.60	140	0800	3.40	910
0500	4.30	1,400	1800	2.35	438	1000	2.90	685
0700	2.75	618	1900	4.70	1,620	1200	2.47	492
0930	1.97	278	1930	5.20	1,930	1800	1.93	262
1230	1.00	32	2000	4.68	1,610	2400	1.64	152
2230	.52	1.5	2100	5.00	1,800			

(44) 07126000 PURGATOIRE RIVER NEAR ALFALFA, COLO.

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 Alfalfa, and 20 miles east of Trinidad.

Drainage area. — 1,320 sq mi.

Gage-height record. — Water-stage recorder graph. Altitude of gage is 5,2°0 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

Day	Discharge	Day	Discharge
June 14	27	June 19	1,820
15	203	20	1,580
16	2,900	21	833
17	7,620	22	548
18	5,320		

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Dis-charge (cfs)	Hour	Gage height (feet)	Dis-charge (cfs)	Hour	Gage height (feet)	Dis-charge (cfs)
<i>June 14</i>			<i>June 16—Con.</i>			<i>June 18—Con.</i>		
2400	2.09	26	2300	11.40	4,820	0400	14.00	7,050
<i>June 15</i>			2400	10.84	4,370	0800	9.85	3,580
0800	2.05	24	<i>June 17</i>			1200	8.50	2,600
1400	2.06	24	0030	12.10	5,380	1800	7.20	1,820
2230	2.10	27	0100	15.90	8,900	2400	6.30	1,350
2245	3.00	143	0130	17.75	10,900	<i>June 19</i>		
2300	5.00	805	0145	17.35	10,400	0515	5.65	1,060
2315	8.00	2,300	0200	17.75	10,900	0600	7.94	2,260
2330	11.00	4,500	0300	20.70	15,000	0800	7.10	1,760
2400	14.00	7,050	0400	18.45	11,800	1200	6.05	1,230
<i>June 16</i>			0500	15.00	8,000	1730	5.85	1,140
0100	16.54	9,540	0800	10.25	3,900	1900	8.00	2,300
0130	15.65	8,650	1200	8.30	2,480	1930	5.00	2,930
0200	16.30	9,300	1730	7.15	1,790	2030	8.75	2,760
0300	13.50	6,600	1900	12.25	5,500	2100	5.60	3,380
0400	10.00	3,700	2000	20.75	15,000	2115	5.12	3,010
0600	7.75	2,150	2115	23.12	18,900	2145	16.00	3,700
1000	4.50	605	2215	20.92	15,300	2215	11.60	4,980
1245	3.76	326	2300	23.00	18,700	2300	16.80	4,340
1300	4.70	685	2400	27.00	26,600	2400	9.65	3,420
2000	3.80	340	<i>June 18</i>			<i>June 20</i>		
2015	10.00	3,700	0015	27.30	27,300	0200	8.60	2,660
2100	13.50	6,600	0130	25.25	22,900	0600	7.20	1,820
2130	15.75	8,750	0200	22.50	17,800	1200	6.38	1,390
2200	15.00	8,000	0300	18.30	11,600	1800	5.75	1,100
						2400	5.45	985

(45) TRINCHERA CREEK NEAR TRINCHERA, 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 Trinchera.

Drainage area. — 129 sq mi.

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

1954-55: Discharge, 25,100 cfs July 22, 1954, by indirect measurement of peak flow.

(46) ALKALI ARROYO NEAR TRINCHERA, 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 Trinchera.

Drainage area. — 34.5 sq mi.

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

1954-55: Discharge, 15,500 cfs July 22, 1954, by computation of peak flow through culvert.

(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 NW¼ 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.

Gage-height record. — Recording gage destroyed by flood. Twice daily chain-gage readings June 13, 15–17. Datum of gage is 4,240.59 ft above mean sea level.

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

<i>Day</i>	<i>Discharge</i>	<i>Day</i>	<i>Discharge</i>
June 13 -----	52	June 20 -----	1,800
14 -----	3,000	21 -----	1,100
15 -----	72	22 -----	600
16 -----	47	23 -----	600
17 -----	920	24 -----	500
18 -----	18,000	25 -----	400
19 -----	4,500		

(50) SMITH CANYON NEAR NINAVIEW, COLO.

(Miscellaneous site)

Location. — Lat 37°42'25", long 103°24'20", in NE¼ 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 Ninaview.

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

Day	Discharge	Day	Discharge
June 13	11	June 20	7,000
14	3,400	21	5,000
15	196	22	3,500
16	166	23	2,000
17	3,280	24	600
18	35,700	25	200
19	20,000		

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
June 13			June 16			June 17—Con.		
2400	0.49	11	0430	1.07	79	2400	4.48	2,210
June 14			0830	1.16	98	June 18		
0430	.54	14	1230	.84	39	0130	5.32	3,440
0830	.71	31	1630	.73	25	0230	6.14	5,000
0930	2.89	854	2030	.59	12	0330	7.33	8,090
1130	4.06	1,780	2130	.60	13	0430	7.59	10,300
1330	4.80	2,620	2230	3.40	1,200	0630	8.30	11,400
1430	5.56	3,830	2330	3.77	1,510	0830	9.65	14,400
1530	8.10	10,600	2400	3.94	1,670	0930	11.50	27,800
1545	7.49	8,570	June 17			1030	11.50	27,800
1630	10.69	22,900	0130	4.49	2,220	1130	15.66	59,900
1700	9.05	14,400	0230	4.88	2,740	1230	15.40	57,600
1800	8.70	13,000	0330	5.93	4,560	1430	14.20	47,100
1830	7.89	9,920	0430	6.68	6,300	1530	14.70	51,300
1930	7.10	7,410	0630	7.12	7,470	1630	15.72	60,500
2030	5.99	4,680	0730	6.84	6,700	1730	15.54	62,500
2130	4.44	2,160	0930	6.50	5,850	1830	15.74	62,300
2230	2.81	786	1230	4.91	2,790	2030	15.00	58,500
2330	2.35	525	1630	3.24	1,080	2200	13.50	51,900
2400	2.24	470	1830	3.26	1,090	2300	13.00	49,900
June 15			2030	3.61	1,370	2400	12.50	47,500
2400	1.22	112	2230	3.99	1,710			

(52) RULE CREEK NEAR TOONERVILLE, COLO.

(Miscellaneous site)

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.

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 CADDOA, 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 (Corps of Engineers bench mark).

Maxima. — June 14-25, 1965: Contents, 313,300 acre-feet 2400 hours June 25 (elevation, 3,846.50 ft).

1943 to May 1965: Contents, 360,300 acre-feet July 27, 1958 (elevation, 3,850.44 ft).

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)
<i>June 14</i>			<i>June 18—Con.</i>		
0800 -----	-----	0	1200 -----	3,814.72	79,120
2400 -----	3,782.80	1,060	1500 -----	3,820.10	105,100
<i>June 15</i>			1800 -----	3,825.75	138,100
0700 -----	3,785.10	2,590	2100 -----	3,829.28	161,800
1200 -----	3,785.89	3,350	2400 -----	3,831.70	179,400
1800 -----	3,787.80	5,540	<i>June 19</i>		
2100 -----	3,788.29	6,180	0300 -----	3,833.24	191,200
2400 -----	3,788.43	6,370	0600 -----	3,833.71	194,900
<i>June 16</i>			2400 -----	3,837.13	223,000
0200 -----	3,788.51	6,480	<i>June 20</i>		
0800 -----	3,788.42	6,350	2400 -----	3,841.23	259,900
1800 -----	3,788.15	5,990	<i>June 21</i>		
2400 -----	3,788.38	6,300	2400 -----	3,843.05	277,600
<i>June 17</i>			<i>June 22</i>		
0600 -----	3,788.75	6,800	2400 -----	3,843.85	285,600
1200 -----	3,789.64	8,110	<i>June 23</i>		
1800 -----	3,790.92	10,160	2400 -----	3,844.80	295,300
2400 -----	3,793.68	15,340	<i>June 24</i>		
<i>June 18</i>			2400 -----	3,846.00	307,900
0300 -----	3,795.50	19,200	<i>June 25</i>		
0600 -----	3,799.20	27,900	2400 -----	3,846.50	313,300
0900 -----	3,809.30	58,090			

(54) 07130500 ARKANSAS RIVER BELOW JOHN MARTIN RESERVOIR, COLO.

Location. — Lat 38°05'02", long 102°55'10", in NW¼NW¼ sec. 4, T. 23 S., R. 49 W., on left bank 1.1 miles upstream from Caddoa Creek, 1.7 miles downstream from John Martin Dam, and 2.9 miles southeast of Hasty.

Drainage area. — 18,917 sq mi, of which 785 sq mi is probably noncontributing.

Gage-height record. — Water-stage recorder graph; backwater from Caddoa Creek 0245 hours June 18 to 2400 hours June 20. Datum of gage is 3,737.40 ft above mean sea level (Corps of Engineers bench mark).

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

Discharge June 18–20 estimated on basis of gate openings at dam and flow on June 21.

Maxima. — June 1965: Daily discharge, 900 cfs June 16; gage height, 10.62 ft 0545 hours June 18 (backwater from Caddoa Creek).

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

Day	Discharge	Day	Discharge
June 13	660	June 18	17
14	438	19	17
15	678	20	16
16	900	21	17
17	307		

(55) 07131000 CADDOA CREEK AT CADDOA, 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 CADDOA, COLO.

(Gaging station, discontinued in 1943)

Location. — Lat 38°01'40", long 102°52'05", in SW¼ 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 NW¼NW¼ 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.

(59) 07133000 ARKANSAS RIVER AT LAMAR, COLO.

Location. — Lat 38°06'15", long 102°37'08", in SE¼ 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 0800 hours 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

Day	Discharge	Day	Discharge
June 13	34	June 18	25,000
14	215	19	5,990
15	63	20	383
16	381	21	220
17	598		

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
June 16			June 17—Con.			June 19		
2400	5.02	396	2200	4.84	342	2400	4.97	580
June 17			2300	6.05	850	June 20		
0400	5.03	399	2400	7.20	1,860	0600	4.72	464
0500	5.78	658	June 18			1200	4.51	379
0800	6.04	756	0100	7.70	2,580	1800	4.31	304
1000	5.60	595	0200	8.20	3,420	2400	4.18	259
1200	5.84	679	0300	8.80	4,590	June 21		
1400	6.08	772	0400	9.60	6,480	0600	4.13	244
1500	6.09	776	0500	11.00	10,800	1200	4.04	217
1700	5.65	612	0600	12.50	17,100	1800	3.97	198
2000	4.92	366	0800	18.90	73,800	2400	3.91	182

(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.

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 NE¼ 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 SW¼ 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 NE¼ 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.

Elevation and contents, 1965

Date	Elevation (feet)	Contents (acre-feet)
June 13	15.2	9C1
17	74.8	Not determined
21	63.0	40,000

(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.

Gage-height record. — Floodmarks only. Gage and reference marks destroyed by flood May 15, 1951.

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.

Gage-height record. — Water-stage recorder graph except June 17–21. Gage destroyed by flood. Peak stage from floodmarks. Datum of gage is 3,333.84 ft above mean sea level.

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

Day	Discharge	Day	Discharge
June 15 -----	50	June 19 -----	50,000
16 -----	142	20 -----	8,000
17 -----	65,000	21 -----	2,000
18 -----	101,000	22 -----	1,500

(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

Day	Discharge	Day	Discharge
June 16 -----	121	June 20 -----	13,100
17 -----	38,900	21 -----	2,820
18 -----	109,000	22 -----	1,930
19 -----	61,600	23 -----	1,710

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Dis-charge (cfs)	Hour	Gage height (feet)	Dis-charge (cfs)	Hour	Gage height (feet)	Dis-charge (cfs)
<i>June 16</i>			<i>June 18</i>			<i>June 19—Con.</i>		
0400	3.41	82	0200	16.23	92,600	0300	16.00	88,000
0800	3.65	121	0300	16.06	89,200	0400	16.37	95,400
1600	3.77	144	0400	16.10	90,000	0500	16.33	94,600
2000	3.73	136	0500	17.10	110,000	0600	16.20	92,000
2400	3.80	150	0600	18.15	134,000	0800	15.70	82,000
<i>June 17</i>			0700	18.60	145,000	1000	15.05	70,300
0400	3.78	146	0800	18.30	138,000	1200	14.60	63,000
0600	3.82	155	0900	17.80	125,000	1600	13.48	46,700
0800	5.80	960	1100	17.30	114,000	2000	12.50	34,600
1000	7.35	2,210	1300	17.67	122,000	2400	11.77	27,300
1200	8.15	3,210	1400	17.85	126,000	<i>June 20</i>		
1400	9.20	5,040	1500	17.55	119,000	0800	10.38	16,300
1600	10.20	7,500	1700	16.80	104,000	1600	8.73	7,920
1700	11.00	10,400	1800	16.70	102,000	2400	7.57	4,380
1800	20.10	119,000	1900	16.94	107,000	<i>June 21</i>		
1900	21.80	152,000	2000	16.98	108,000	0800	6.95	2,920
2000	19.75	174,000	2200	16.00	88,000	1600	6.64	2,380
2100	18.60	145,000	2400	15.15	72,100	2400	6.47	2,120
2300	17.35	115,000	<i>June 19</i>			<i>June 22</i>		
2400	16.80	104,000	0100	15.20	73,000	1200	6.33	1,920
			0200	15.55	79,300	2400	6.23	1,780

(73) 07139000 ARKANSAS RIVER AT GARDEN CITY, KANS.

Location. — Lat 37°57'21", long 100°52'37", in NW¼ 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

Day	Discharge	Day	Discharge
June 17	8	June 21	16,400
18	11,300	22	5,300
19	104,000	23	2,360
20	46,700	24	1,940

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Dis-charge (cfs)	Hour	Gage height (feet)	Dis-charge (cfs)	Hour	Gage height (feet)	Dis-charge (cfs)
<i>June 18</i>			<i>June 19—Con.</i>			<i>June 20</i>		
1200	3.28	7	0400	16.20	125,000	0400	14.43	65,800
1800	3.33	9	0500	16.00	115,000	0800	13.98	54,600
1900	5.00	260	0600	16.15	122,000	1200	13.36	42,500
2000	15.00	30,000	0800	15.90	111,000	1600	12.93	35,600
2100	16.00	50,000	1000	15.85	109,000	2400	12.00	24,600
2200	16.23	65,000	1200	15.60	99,000	<i>June 21</i>		
2300	16.58	80,000	1600	15.20	86,000	0800	11.24	18,700
2400	15.45	93,500	1800	15.55	97,000	1600	10.36	13,800
<i>June 19</i>			1900	15.63	100,000	2400	9.33	9,760
0100	16.00	115,000	2000	15.58	99,200	<i>June 22</i>		
0200	16.25	128,000	2200	15.30	89,000	0800	8.23	6,180
0300	16.30	130,000	2400	14.98	79,500	1600	7.22	3,820
						2400	6.71	2,900

ARKANSAS RIVER BASIN, COLORADO, KANSAS, NEW MEXICO D67

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

Location. — Lat 37°44'51", long 100°01'08", 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 at 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

Day	Discharge	Day	Discharge
June 18	92	June 24	5,080
19	5,940	25	2,890
20	70,300	26	2,750
21	33,600	27	3,120
22	16,700	28	3,640
23	9,000		

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
<i>June 19</i>			<i>June 20—Con.</i>			<i>June 21—Con.</i>		
1200	3.10	90	0600	15.46	76,500	2400	11.58	22,300
2000	3.09	88	0800	15.60	80,000	<i>June 22</i>		
2100	3.80	212	1200	15.35	74,000	1200	10.56	16,600
2200	13.40	29,400	1600	15.00	67,000	2400	9.54	12,000
2300	15.45	70,000	2000	14.54	58,500	<i>June 23</i>		
2400	15.68	82,000	2400	14.05	50,700	1200	8.62	8,860
<i>June 20</i>			<i>June 21</i>			2400	7.77	6,740
0200	15.55	78,800	0800	13.05	37,200			
0400	15.47	76,800	1600	12.25	27,900			

(75) 07140000 ARKANSAS RIVER NEAR KINSLEY, KANS.

Location. — Lat 37°55'33", long 99°22'31", 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

Day	Discharge	Day	Discharge
June 18	107	June 24	10,500
19	103	25	7,080
20	99	26	4,740
21	36,000	27	2,890
22	30,000	28	2,700
23	16,200		

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
<i>June 20</i>			<i>June 21—Con.</i>			<i>June 22—Con.</i>		
2400-----	3.14	102	1600-----	14.19	43,700	2400-----	12.40	20,600
<i>June 21</i>			1800-----	14.15	43,100	<i>June 23</i>		
0200-----	6.90	1,540	2000-----	14.30	45,200	1200-----	11.90	15,800
0400-----	10.00	5,900	2200-----	14.40	46,600	2400-----	11.48	12,700
0600-----	13.50	34,000	2400-----	14.20	43,800	<i>June 24</i>		
0800-----	14.40	46,600	<i>June 22</i>			1200-----	11.08	10,400
1000-----	14.60	49,800	0600-----	13.62	35,700	2400-----	10.72	8,600
1200-----	14.50	48,200	1200-----	13.06	28,500	<i>June 25</i>		
1400-----	14.33	45,600	1800-----	12.67	23,800	1200-----	10.35	7,000
						2400-----	9.97	5,810

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

Location. — Lat 38°21'11", long 98°45'50", in SE¼ 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 1200 hours June 23; gage height, 13.18 ft 1000 hours 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

Day	Discharge	Day	Discharge
June 18-----	282	June 24-----	19,300
19-----	684	25-----	13,300
20-----	877	26-----	10,700
21-----	370	27-----	9,890
22-----	4,300	28-----	7,930
23-----	21,800	29-----	5,790

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
<i>June 22</i>			<i>June 23</i>			<i>June 24</i>		
0200-----	2.65	290	0200-----	8.75	8,650	0600-----	11.69	21,200
0400-----	2.62	278	0400-----	10.00	11,400	1200-----	11.60	19,100
0600-----	2.88	390	0600-----	11.75	17,400	1800-----	11.20	17,200
0800-----	4.75	2,200	0800-----	12.85	24,000	2400-----	10.79	15,700
1000-----	6.35	46,800	1000-----	13.18	26,300	<i>June 25</i>		
1200-----	7.05	5,800	1200-----	13.10	27,800	1200-----	9.98	13,200
1400-----	7.38	6,330	1400-----	12.93	27,600	2400-----	9.23	11,300
1800-----	7.64	6,740	1600-----	12.80	26,700	<i>June 26</i>		
2200-----	7.93	7,210	2000-----	12.58	25,200	0400-----	9.10	11,000
2400-----	8.30	7,840	2400-----	12.38	23,800	0800-----	9.18	11,200
						1600-----	8.83	10,500
						2400-----	8.54	10,000

(77) 07153500 CIMARRON RIVER NEAR GUY, N. MEX.

Location. — Lat 36°59'15", long 103°25'25", in SE¼ 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

Day	Discharge	Day	Discharge
June 13	0.6	June 17	1,670
14	.4	18	150
15	.4	19	50
16	264	20	21

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
<i>June 16</i>			<i>June 17—Con.</i>			<i>June 17—Con.</i>		
1600	0.90	0.5	0230	7.20	1,520	1230	14.9 ⁵	4,980
1700	1.40	7.1	0300	7.60	1,680	1300	16.50	5,750
1900	1.12	2.0	0400	6.30	1,180	1330	14.4 ⁵	4,720
2100	1.07	1.7	0500	5.00	723	1430	12.80	3,950
2130	1.40	7.1	0700	3.75	344	1500	13.15	4,110
2200	2.50	90	0900	3.30	227	1600	10.00	2,690
2230	10.00	2,690	0930	4.00	416	1700	7.00	1,440
2300	13.65	4,310	1000	8.60	2,080	1800	5.50	895
2400	11.50	3,360	1030	10.45	2,890	2000	4.60	597
<i>June 17</i>			1100	8.85	2,180	2200	4.10	445
0100	9.00	2,240	1200	10.95	3,120	2400	3.80	358

(78) TRAVESSER CREEK NEAR GUY, N. MEX.

(Miscellaneous site)

Location. — Lat 36°54'00", long 103°26'50", in SW¼ 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 CARRIZO CREEK NEAR KENTON, OKLA.

(Crest-stage station)

Location. — Lat 36°52'55", long 103°01'05", in NE¼ 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).

(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)

Location. — Lat 37°26', long 102°37', sec. 17, T. 30 S., R. 64 W., at bridge on U.S. Highway 287 and 2 miles north of Springfield.

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

<i>Day</i>	<i>Discharge</i>	<i>Day</i>	<i>Discharge</i>
June 14 -----	0.1	June 18 -----	2,160
15 -----	447	19 -----	132
16 -----	2,160	20 -----	46
17 -----	7,800		

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Dis-charge (cfs)	Hour	Gage height (feet)	Dis-charge (cfs)	Hour	Gage height (feet)	Dis-charge (cfs)
<i>June 15</i>			<i>June 16—Con.</i>			<i>June 17—Con.</i>		
2000-----	1.07	0.1	1900-----	5.50	2,950	2200-----	12.20	22,900
2100-----	1.75	95	1930-----	9.30	7,900	2300-----	8.70	14,300
2200-----	4.50	1,650	2030-----	7.60	5,380	2400-----	12.70	24,200
2300-----	8.00	5,510	2100-----	12.00	12,600	<i>June 18</i>		
2330-----	8.60	6,500	2200-----	8.00	5,920	0100-----	7.20	11,000
2400-----	8.45	6,420	2300-----	6.75	4,350	0200-----	4.70	6,080
<i>June 16</i>			2400-----	5.70	3,150	0400-----	2.90	3,030
0100-----	8.10	5,990	<i>June 17</i>			0600-----	2.20	1,980
0200-----	4.70	2,180	0100-----	4.30	1,820	0800-----	1.65	1,260
0300-----	2.50	610	0230-----	6.00	3,470	0900-----	1.40	960
0400-----	1.90	330	0400-----	4.80	2,270	1130-----	1.25	798
0600-----	1.42	161	0600-----	3.10	960	1200-----	1.30	851
0800-----	1.14	79	0800-----	2.35	535	1600-----	.90	452
1100-----	.93	31	1200-----	1.75	272	1900-----	.67	261
1530-----	.73	6	1730-----	1.43	164	2400-----	.46	118
1630-----	1.10	68	1800-----	5.00	2,450			
1700-----	2.80	780	1900-----	10.00	15,000			
1800-----	7.00	4,650	2000-----	26.20	62,400			
			2100-----	18.70	40,300			

(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 Carp 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 COLFAX, 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) 07203000 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 2130 hours June 17 (gage height, 15.25 ft).

1927 to May 1965: Discharge, about 9,000 cfs Aug. 6, 1950 (gage height, 11.88 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

Day	Discharge	Day	Discharge
June 14	37	June 18	392
15	44	19	90
16	1,280	20	75
17	2,260		

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
<i>June 15</i>			<i>June 16—Con.</i>			<i>June 17—Con.</i>		
0200	2.21	28	2030	12.10	6,860	2000	8.30	2,940
0400	2.29	34	2100	12.35	7,210	2030	7.70	2,460
2100	2.37	42	2200	10.00	4,450	2100	10.00	4,450
2400	3.06	147	2230	10.20	4,650	2130	15.25	12,600
<i>June 16</i>			2300	9.85	4,300	2200	12.50	7,430
0100	2.80	99	2400	8.70	3,260	2300	12.60	7,500
0400	2.88	113	<i>June 17</i>			2400	8.60	3,180
0500	3.88	364	0100	7.35	2,200	<i>June 18</i>		
0700	3.45	242	0200	7.80	2,540	0100	7.35	2,200
1030	3.00	135	0300	6.30	1,490	0200	5.60	1,100
1100	3.25	192	0400	5.60	1,100	0400	4.20	470
1200	3.30	205	0600	4.80	710	0500	3.90	370
1730	2.85	108	0900	4.17	458	0700	3.55	268
1800	3.80	340	1630	3.65	295	1000	3.20	180
1900	3.67	283	1700	5.00	800	1200	3.03	141
1930	12.80	7,880	1800	12.60	7,580	1500	---	126
2000	12.70	7,730	1900	10.50	4,950	2400	---	104

(95) 07206000 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).

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.

Maxima. — June 1965: Daily discharge, 51 cfs June 14.

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

Day	Discharge	Day	Discharge
June 14	51	June 18	0.2
15	40	19	.1
16	13	20	0
17	.3		

(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

Day	Discharge	Day	Discharge
June 14	0.27	June 18	0.32
15	.27	19	.33
16	.41	20	.30
17	.34		

(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

Day	Discharge	Day	Discharge
June 14	1.68	June 18	13.1
15	1.66	19	15.3
16	7.59	20	13.3
17	14.20		

(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.

Drainage area. — 7.44 sq mi.

Gage-height record. — Water-stage recorder graph. Backwater from debris June 17–20.

Altitude of gage is 7,860 ft (from topographic map).

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

Day	Discharge	Day	Discharge
June 14	9.20	June 18	121
15	9.18	19	83.8
16	38.6	20	51.5
17	121	21	34.0

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
June 15			June 16—Con.			June 16—Con.		
1600	1.29	8.34	0400	1.43	12.1	1800	2.32	67.1
2400	1.46	12.7	0800	1.52	14.1	2400	2.53	118
June 16			1430	1.48	13.2			
0100	1.56	15.0	1600	2.25	55.9			

(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).

1950 to May 1965: Discharge, 1,160 cfs May 23, 1965 (gage height, 4.88 ft, from floodmarks).

Mean discharge, in cubic feet per second, 1965

Day	Discharge	Day	Discharge
June 14	64	June 18	632
15	97	19	178
16	412	20	80
17	1,240	21	77

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
<i>June 15</i>			<i>June 16—Con.</i>			<i>June 17—Con.</i>		
0800	1.95	66	1400	2.32	120	1830	5.01	1,330
1800	1.85	55	1600	2.27	111	1930	3.92	680
1900	2.07	80	1630	3.50	480	2000	5.00	1,320
2000	1.94	64	1700	4.20	820	2030	12.42	15,500
2200	1.92	62	1730	4.45	960	2100	9.55	7,510
2300	3.65	548	1800	4.28	860	2200	6.55	2,830
2330	3.85	646	1900	3.90	670	2300	5.55	1,660
2400	3.73	585	2000	3.42	448	2400	4.90	1,390
<i>June 16</i>			<i>June 17</i>			<i>June 18</i>		
0030	5.01	1,330	2100	3.19	356	0600	3.90	795
0100	6.28	2,440	2230	2.98	287	1200	3.37	534
0130	3.90	670	2300	3.16	366	1800	2.92	372
0200	3.45	460	2400	3.42	448	2400	2.57	261
0300	3.02	297	<i>June 18</i>			<i>June 19</i>		
0400	2.78	226	0100	3.54	494	1200	2.08	167
0500	3.08	318	0300	3.23	372	2400	1.80	117
0600	3.52	489	0500	3.03	300			
0700	3.15	362	0700	3.09	342			
0800	2.88	254	1500	2.73	212			
1000	2.63	186	1600	3.85	640			
1200	2.44	143	1630	5.01	1,330			
			1730	6.12	2,260			

(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).

1915–29, 1950 to May 1965: Discharge, about 5,200 cfs (estimated by State Engineer) Aug. 8, 1929.

Mean discharge, in cubic feet per second, 1965

Day	Discharge	Day	Discharge
June 14	18	June 18	700
15	19	19	180
16	296	20	60
17	819	21	26

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
<i>June 15</i>			<i>June 16—Con.</i>			<i>June 17—Con.</i>		
1900-----	1.36	16	1300-----	1.90	48	1100-----	2.54	87
2000-----	1.47	21	1630-----	1.82	42	1500-----	2.31	59
2100-----	1.47	21	1730-----	6.90	1,870	1530-----	2.50	82
2200-----	1.52	24	1900-----	5.00	760	1600-----	5.7-	1,130
2300-----	1.75	39	2000-----	4.10	420	1700-----	4.20	460
2400-----	2.07	67	2100-----	3.58	286	1930-----	3.27	202
<i>June 16</i>			2230-----	3.25	222	2000-----	5.00	770
0030-----	5.55	1,040	2300-----	3.42	254	2100-----	11.13	5,630
0200-----	3.20	240	2400-----	3.32	235	2200-----	---	4,500
0300-----	2.35	96	<i>June 17</i>			2300-----	---	3,500
0400-----	2.10	67	0030-----	3.85	377	2400-----	---	2,500
0500-----	2.10	67	0200-----	3.30	230			
0600-----	2.50	118	0400-----	2.94	153			
0700-----	3.05	213	0600-----	2.77	122			
0800-----	2.50	118	0830-----	2.61	97			
0900-----	2.29	89	0930-----	3.02	168			
1100-----	2.00	57	1000-----	2.88	142			

(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).

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

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

Mean discharge, in cubic feet per second, 1965

Day	Discharge	Day	Discharge
June 14	13	June 19	800
15	54	20	400
16	400	21	330
17	1,300	22	234
18	2,000		

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
<i>June 15</i>			<i>June 15—Con.</i>			<i>June 16</i>		
1900	2.13	15	2130	4.30	495	0030	4.80	750
2000	2.23	20	2200	3.85	316	0100	4.10	410
2100	2.70	61	2300	3.15	134	0130	5.25	975
			2400	4.60	640	0200	4.50	590

(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 debris 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

Day	Discharge	Day	Discharge
June 14	5	June 19	1,850
15	50	20	1,120
16	800	21	820
17	1,600	22	600
18	10,500		

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
<i>June 17</i>			<i>June 17—Con.</i>			<i>June 19</i>		
0930	7.51	1,670	1730	7.32	1,500	1130	6.55	1,850
1000	7.53	1,690	2200	7.00	1,260	1430	6.30	1,600
1100	7.57	1,730	2300	8.60	2,900	1530	6.25	1,550
1130	7.59	1,750	<i>June 18</i>			1600	6.48	1,780
1600	7.41	1,580	0200	19.96	29,500	2400	6.00	1,320
			1300	10.40	7,420			

(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

Day	Discharge	Day	Discharge
June 14	4.5	June 19	4,000
15	5.0	20	1,770
16	8,000	21	1,160
17	4,800	22	840
18	43,000	23	650

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
<i>June 16</i>			<i>June 16—Con.</i>			<i>June 20</i>		
0200	1.24	7	1500	7.85	8,540	1100	4.32	1,820
0300	2.00	97	1600	7.40	7,490	1300	4.30	1,790
0400	1.91	80	1700	6.95	6,480	<i>June 21</i>		
0500	5.00	2,810	<i>June 17</i>			1100	3.64	1,140
0600	8.00	8,900	1000	8.60	10,400	1400	3.64	1,140
0700	9.25	12,100	1200	7.75	8,300	1700	3.58	1,080
0800	10.20	14,700	1300	7.30	7,260			
0900	12.00	20,100	1500	6.63	5,790			
0930	13.30	24,500	1600	6.39	5,300			
1100	12.25	20,900	<i>June 18</i>					
1200	10.75	16,300	0600	47.40	162,000			
1300	9.30	12,200						
1400	8.35	9,760						

(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).

1954 to May 1965: Discharge, 918 cfs Aug. 18, 1957 (gage height, 3.99 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.

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

Day	Discharge	Day	Discharge
June 14	120	June 19	6,500
15	5,700	20	3,100
16	8,800	21	1,800
17	7,800	22	1,100
18	48,000	23	800

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
<i>June 16</i>			<i>June 17—Con.</i>			<i>June 19</i>		
1300	13.85	21,200	1330	11.94	15,700	1300	7.95	4,700
1330	13.65	20,300	1600	10.50	10,500	1530	7.58	4,300
1630	12.80	16,700	1730	9.80	8,500	1730	7.23	3,900
<i>June 17</i>			<i>June 18</i>			<i>June 20</i>		
1100	13.22	20,600	0800	34.50	172,000	0830	7.15	3,800
						1000	6.91	3,500

(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.

Mean discharge, in cubic feet per second, 1965

Day	Discharge	Day	Discharge
June 14	19	June 19	355
15	28	20	265
16	332	21	188
17	254	22	142
18	323	23	110

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Dis-charge (cfs)	Hour	Gage height (feet)	Dis-charge (cfs)	Hour	Gage height (feet)	Dis-charge (cfs)
<i>June 15</i>			<i>June 16—Con.</i>			<i>June 18—Con.</i>		
1200	1.31	18	1800	3.80	860	1000	2.82	302
1600	1.28	16	2000	3.35	552	1200	2.80	295
1900	1.32	18	2200	3.06	414	1800	2.73	270
2000	1.78	55	2400	2.88	337	2000	2.73	270
2030	1.63	40	<i>June 17</i>			2100	2.78	288
2100	1.95	78	0300	2.66	248	2200	3.05	396
2230	1.82	62	0600	2.48	196	2300	3.60	689
2300	2.13	108	1300	2.30	150	2330	3.80	838
2400	2.02	89	1400	2.40	174	2400	3.70	762
<i>June 16</i>			1500	2.63	238	<i>June 19</i>		
0030	1.93	76	1600	2.60	228	0100	3.38	552
0100	2.04	92	1700	3.28	501	0200	3.17	405
0200	1.90	72	1800	3.23	477	0400	2.95	353
0400	1.79	58	1900	2.97	362	0600	2.89	329
1400	1.56	34	2000	2.82	302	1200	2.90	333
1430	3.00	387	2100	2.75	277	2200	2.83	306
1500	4.30	1,320	2300	2.80	295	2300	3.01	379
1530	4.08	1,100	2400	2.78	288	2400	2.93	345
1600	4.50	1,550	<i>June 18</i>			<i>June 20</i>		
1700	4.10	1,120	0600	2.81	299	0300	2.85	314
						1200	2.70	260
						2400	2.56	218

(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).

1956-63: Discharge, 138 cfs Aug. 6, 1959; gage height, 1.87 ft Aug. 18, 1961.

(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.

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

Day	Discharge	Day	Discharge
June 13	63	June 19	270
14	73	20	232
15	99	21	198
16	161	22	159
17	186	23	129
18	176		

(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

Day	Discharge	Day	Discharge
June 13	63	June 19	672
14	99	20	522
15	130	21	391
16	308	22	313
17	516	23	261
18	548		

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
<i>June 13</i>			<i>June 16—Con.</i>			<i>June 18—Con.</i>		
2400	2.65	54	1100	4.52	260	1800	5.75	476
<i>June 14</i>			1730	4.28	227	1830	6.30	594
0600	2.77	63	1900	4.60	271	1930	6.08	550
1200	2.84	68	2100	5.13	351	2200	6.35	604
2000	2.73	59	2400	5.70	448	2300	6.70	674
2100	2.82	67	<i>June 17</i>			2400	7.09	752
2200	4.75	286	0200	6.00	504	<i>June 19</i>		
2300	6.51	596	0230	7.40	794	0200	6.55	644
2400	4.58	261	0300	8.15	972	0600	6.65	664
<i>June 15</i>			0330	8.22	989	0700	6.95	724
0100	3.68	148	0400	8.07	952	0800	7.37	808
0300	3.48	127	0600	6.80	674	1030	7.58	854
1200	3.30	109	0800	5.95	504	1200	7.30	794
2030	3.23	102	1300	5.13	359	1400	6.75	688
2100	4.15	204	1500	5.06	348	1800	6.20	584
2130	4.63	268	1800	5.22	373	<i>June 20</i>		
2300	3.97	181	1900	5.62	443	0200	5.96	547
2400	4.22	213	2100	6.00	514	0800	6.08	568
<i>June 16</i>			2230	6.34	582	1000	6.00	554
0100	4.95	316	2400	6.20	554	1200	5.98	550
0200	5.37	382	<i>June 18</i>			1800	5.60	485
0330	5.63	426	0230	6.12	538	2400	5.30	435
0500	5.40	396	0600	6.50	624			
0700	4.81	302	1200	5.83	492			

ARKANSAS RIVER BASIN, COLORADO, KANSAS, NEW MEXICO D83

(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 Aug. 18, 1961.

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, made 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 abutment 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

Day	Discharge	Day	Discharge
June 13	54	June 19	981
14	66	20	754
15	602	21	574
16	431	22	458
17	649	23	365
18	734		

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
June 13			June 16			June 17—Con.		
2400	2.36	45	0100	4.86	503	2300	5.95	935
June 14			0300	4.55	410	2400	5.84	886
2000	2.52	58	0500	5.28	662	June 18		
2300	3.20	134	0800	4.97	570	0100	5.61	794
2400	4.52	401	1000	4.74	467	0600	5.50	750
June 15			1400	4.42	371	1000	5.55	770
0100	6.70	1,380	1700	4.23	318	1300	5.40	710
0300	7.85	2,240	2100	4.14	295	2000	5.26	654
0400	6.77	1,420	2400	4.51	398	2200	5.34	686
0500	5.54	766	June 17			2400	5.77	858
0700	4.70	455	0300	4.81	488	June 19		
1000	4.08	280	0600	5.09	586	0500	6.35	1,170
1700	3.57	184	0800	6.03	978	1000	5.97	945
1900	3.60	189	1200	5.43	722	1400	6.17	1,060
2030	5.57	778	1500	5.06	574	1900	5.88	902
2200	4.90	515	2000	4.92	522	2400	5.63	802
2400	4.78	479	2100	5.08	582			

(115) 07217000 COYOTE CREEK BELOW BLACK LAKE, N. MEX.

(Gaging station, discontinued in 1963)

Location. — Lat 36°16'20", long 105°14'50", in NW¼ 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, 4.70 ft), by slope-area measurement of peak flow.

(116) 07217100 COYOTE CREEK ABOVE GUADALUPITA, 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

Day	Discharge	Day	Discharge
June 13	8.3	June 19	324
14	7.6	20	182
15	28	21	126
16	179	22	100
17	556	23	82
18	599		

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
<i>June 15</i>			<i>June 17—Con.</i>			<i>June 19</i>		
2000	1.65	7.6	1400	3.66	247	0300	4.12	362
2100	1.70	9.4	1500	3.66	247	0500	4.10	356
2200	3.50	215	1600	3.98	529	0800	4.30	424
2230	3.68	251	1630	5.27	855	1200	4.07	347
2300	3.42	199	1930	4.21	404	1800	3.74	258
2400	3.22	161	2100	5.00	720	2100	3.61	231
<i>June 16</i>			2200	5.72	1,090	2300	3.63	235
0200	2.78	98	2300	6.32	1,500	2400	3.62	233
0700	2.74	93	2400	6.70	1,820	<i>June 20</i>		
1200	2.82	102	<i>June 18</i>			1200	3.32	173
2100	3.16	150	0200	6.25	1,440	2400	3.18	148
2130	3.66	247	0400	5.70	1,080			
2200	4.75	600	0600	5.00	705			
2230	4.93	685	1000	4.35	442			
2400	4.90	670	1800	3.80	272			
<i>June 17</i>			2100	3.70	249			
0600	4.30	435	2200	3.77	265			
0800	4.08	359	2400	4.12	365			

ARKANSAS RIVER BASIN, COLORADO, KANSAS, NEW MEXICO D85

(117) 07218000 COYOTE CREEK NEAR GOLONDRINAS, N. MEX.

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 0330 hours 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

Day	Discharge	Day	Discharge
June 13	1.8	June 19	521
14	18	20	242
15	138	21	143
16	627	22	104
17	642	23	84
18	826		

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
<i>June 14</i>			<i>June 16—Con.</i>			<i>June 17—Con.</i>		
2100	1.58	1.4	0200	5.25	825	2300	5.05	850
2200	2.06	10	0230	7.35	2,100	2400	5.54	1,070
2300	3.40	137	0330	7.90	2,500	<i>June 18</i>		
2400	4.60	505	0500	6.76	1,750	0200	5.40	1,050
<i>June 15</i>			0700	5.02	810	0400	4.88	840
0100	4.80	600	0900	4.08	407	0700	5.54	1,130
0300	3.95	265	1400	3.34	216	0800	6.20	1,470
0600	3.06	86	2000	3.03	162	1500	4.50	650
1200	2.40	25	2400	3.15	188	1900	3.94	433
1700	2.19	15	<i>June 17</i>			2400	3.75	358
1800	2.40	25	0100	3.25	212	<i>June 19</i>		
2000	2.86	62	0300	4.77	785	0200	4.10	505
2230	3.08	88	0500	4.06	442	0500	4.20	550
2300	4.02	286	0600	4.84	820	0630	4.80	800
2400	5.27	835	0730	4.90	850	1200	4.16	532
<i>June 16</i>			1200	4.64	720	1700	4.07	492
0030	5.45	925	1900	3.96	399	2400	3.62	316
0100	5.25	825	2100	4.64	720			

(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 f. 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 ROCIADA, N. MEX.

(Gaging station, discontinued in 1963)

Location. — Lat 35°49'30", long 105°23'55", in Mora Grant, on right bank 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.

Maxima. — June 1965: Discharge, 430 cfs, probably June 15 (gage height, 4.20 ft, from flood-marks).

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 bank 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).

1956 to May 1965: Discharge, 6,160 cfs Aug. 4, 1957 (gage height, 7.40 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

<i>Day</i>	<i>Discharge</i>	<i>Day</i>	<i>Discharge</i>
June 13 -----	9.8	June 19 -----	173
14 -----	47	20 -----	60
15 -----	133	21 -----	49
16 -----	58	22 -----	41
17 -----	79	23 -----	37
18 -----	86		

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
<i>June 14</i>			<i>June 15—Con.</i>			<i>June 17—Con.</i>		
1500-----	1.19	7.1	0830-----	2.16	96	1730-----	2.22	106
1600-----	1.34	13	1100-----	1.97	68	1800-----	2.03	76
1630-----	2.04	70	1600-----	1.61	33	1830-----	3.06	322
1730-----	1.70	35	1700-----	1.73	43	2000-----	2.41	142
1900-----	2.56	164	1800-----	2.23	107	2200-----	2.08	83
2000-----	2.24	100	1830-----	2.70	212	2400-----	2.01	73
2030-----	2.46	144	1900-----	3.80	664	<i>June 18</i>		
2100-----	2.35	122	2000-----	2.90	270	0100-----	2.14	92
2130-----	2.70	204	2200-----	2.25	111	0700-----	1.95	66
2200-----	2.38	132	2400-----	2.03	76	2030-----	1.72	42
2230-----	2.65	196	<i>June 16</i>			2100-----	2.15	94
2330-----	2.15	92	0030-----	2.15	94	2200-----	2.02	75
2400-----	3.17	362	0430-----	1.85	54	2300-----	2.90	270
<i>June 15</i>			0700-----	2.14	92	2400-----	4.10	860
0030-----	3.95	758	1500-----	1.76	45	<i>June 19</i>		
0100-----	3.37	443	2300-----	1.67	38	0100-----	3.55	527
0130-----	2.90	270	2400-----	1.72	42	0200-----	3.16	358
0200-----	2.56	176	<i>June 17</i>			0400-----	2.72	218
0300-----	2.14	92	0300-----	1.98	70	1000-----	2.43	147
0730-----	1.61	33	1500-----	1.77	46	1600-----	2.16	96
			1700-----	1.90	60	2400-----	1.98	70

(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 f' (from topographic map).

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

(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-Shoemaker 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.

Maxima. — June 1965: Discharge, 2,050 cfs June 15 (gage height, 9.88 ft).

1954 to May 1965: Discharge, 2,150 cfs July 25, 1962 (gage height, 9.51 ft).

(123) 07221000 MORA RIVER NEAR SHOEMAKER, N. MEX.

Location. — Lat 35°48'01", long 104°46'58", in S½ 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

Day	Discharge	Day	Discharge
June 13	16	June 19	1,610
14	713	20	1,190
15	6,320	21	840
16	1,700	22	640
17	1,070	23	523
18	1,630		

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
<i>June 14</i>			<i>June 15—Con.</i>			<i>June 17—Con.</i>		
1900	0.76	12	2300	5.73	2,170	1500	5.14	1,680
2000	1.80	144	2400	5.64	2,090	2000	4.66	1,330
2100	2.60	390	<i>June 16</i>			2400	4.28	1,080
2200	8.10	5,550	0100	4.73	1,380	<i>June 18</i>		
2400	9.50	8,000	0400	5.48	1,950	0300	4.15	1,000
<i>June 15</i>			0700	4.98	1,560	0700	5.30	1,810
0100	11.00	11,000	0900	5.40	1,890	0900	5.32	1,830
0200	12.65	14,800	1100	6.70	3,170	1200	5.08	1,630
0300	12.05	13,200	1200	6.86	3,350	1400	5.27	1,790
0400	12.25	13,800	1300	6.45	2,900	1600	5.78	2,210
0500	11.15	10,900	1500	5.05	1,610	2000	5.23	1,750
0600	12.63	14,700	1800	4.23	1,050	2400	4.72	1,370
0800	10.65	9,730	2400	3.61	730	<i>June 19</i>		
0900	11.25	11,200	<i>June 17</i>			0200	4.62	1,300
1000	10.10	8,520	0600	3.38	627	0800	4.94	1,530
1200	7.60	4,290	0900	3.62	734	1400	5.50	1,970
1400	5.55	2,010	1100	4.42	1,160	1600	5.26	1,780
1800	4.00	920	1200	4.30	1,090	2400	4.95	1,540
2200	3.54	698	1400	4.93	1,520			

(124) 07221500 CANADIAN RIVER NEAR SANCHEZ, N. MEX.

Location. — Lat 35°39'15", long 104°22'30", in S½ 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).

1912–14, 1935 to May 1965: Discharge, 87,800 cfs Sept. 2, 1942 (gage height, 21.3 ft, from floodmarks), by slope-area measurement of peak flow.

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

Day	Discharge	Day	Discharge
June 14 -----	80	June 19 -----	13,900
15 -----	27,000	20 -----	4,400
16 -----	9,300	21 -----	2,800
17 -----	13,200	22 -----	2,000
18 -----	44,000	23 -----	1,350

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
June 15			June 18—Con.			June 19		
-----	28.56	126,000	1545 -----	23.1	89,600	1400 -----	8.9	10,900
June 16			1600 -----	21.8	81,800	1540 -----	8.3	9,050
0950 -----	---	1,760	1615 -----	20.5	74,000	June 21		
June 18			1655 -----	18.4	61,400	1115 -----	5.58	2,980
1300 -----	31.5	145,000	1745 -----	16.5	50,000	1230 -----	5.57	2,960
1350 -----	29.7	134,000	1805 -----	15.8	45,800	June 22		
1420 -----	28.4	125,000	1830 -----	15.0	41,000	0830 -----	4.68	1,740
1520 -----	24.6	98,600	1855 -----	14.3	46,800	1510 -----	4.50	1,530

(125) 07222300 TREMENTINA CREEK AT TREMENTINA, N. MEX.

(Crest-stage station)

Location. — Lat 35°28', long 104°25', in NW¼ 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

Day	Discharge	Day	Discharge
June 14	1.8	June 19	613
15	79	20	78
16	145	21	28
17	1,230	22	15
18	65	23	10

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
<i>June 15</i>			<i>June 17—Con.</i>			<i>June 19—Con.</i>		
0800	0.64	1.4	0300	5.6	2,600	0400	2.45	234
0830	2.19	202	0400	5.0	2,000	0630	2.12	118
1600	1.88	107	0600	4.1	1,240	0700	5.00	2,000
2400	1.63	60	0800	3.6	890	0730	5.25	2,250
<i>June 16</i>			1100	3.1	570	1000	4.20	1,310
1200	1.29	23	1400	2.7	350	1200	3.45	288
1900	1.12	13	1700	2.40	213	1300	3.25	660
2100	1.80	93	2000	2.25	158	1500	3.08	559
2130	2.50	336	2400	2.10	112	1700	2.79	395
2200	2.40	288	<i>June 18</i>			2100	2.45	234
2230	2.08	161	0600	1.95	78	2400	2.28	168
2400	7.40	4,580	1800	1.77	48	<i>June 20</i>		
<i>June 17</i>			<i>June 19</i>			0400	2.11	115
0100	10.40	8,880	0100	1.71	40	1200	1.89	66
0200	6.8	3,890	0200	3.35	722	2400	1.70	39

(127) 07223500 CONCHAS RESERVOIR NEAR CONCHAS DAM, 1^r. MEX.

Location. — Lat 35°24'10", long 104°11'25", 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 mean 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

Hour	Elevation (feet)	Contents (acre-feet)	Hour	Elevation (feet)	Contents (acre-feet)
<i>June 13</i>			<i>June 18—Con.</i>		
2400	4,163.56	109,000	1500	4,185.20	222,200
<i>June 14</i>			1600	4,186.60	231,900
2400	4,163.60	109,200	1700	4,187.95	241,200
<i>June 15</i>			1800	4,189.30	251,600
0700	4,163.70	109,600	1900	4,190.60	261,500
0800	4,165.20	115,500	2000	4,191.50	268,500
0900	4,167.00	123,000	2100	4,192.10	273,300
1000	4,169.10	132,200	2200	4,192.45	276,100
1200	4,171.10	141,400	2400	4,192.96	280,300
1400	4,172.60	148,700	<i>June 19</i>		
1600	4,173.40	152,700	0100	4,193.16	282,000
1800	4,173.90	155,300	0200	4,193.50	284,800
2400	4,174.90	160,400	0300	4,193.90	288,100
<i>June 16</i>			0800	4,195.25	299,600
2200	4,176.00	166,300	1600	4,196.33	309,000
2300	4,176.40	168,500	2400	4,196.87	313,800
2400	4,176.80	170,700	<i>June 20</i>		
<i>June 17</i>			1200	4,197.46	319,200
0100	4,177.40	174,000	2400	4,197.92	323,300
0400	4,178.60	180,800	<i>June 21</i>		
0800	4,179.68	187,100	2400	4,198.51	328,800
1200	4,180.22	190,300	<i>June 22</i>		
1700	4,180.58	192,500	2400	4,198.90	332,400
2400	4,182.12	202,000	<i>June 23</i>		
<i>June 18</i>			2400	4,199.12	334,500
1300	4,183.40	210,200	<i>June 24</i>		
1400	4,184.00	214,200	2400	4,199.28	336,000

(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.

1953 to May 1965: Discharge, 10,700 cfs Sept. 1, 1963 (gage height, 6.85 ft, from floodmarks).

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 E½ 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 NW¼SE¼ 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 NW¼SE¼ 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

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

Day	Discharge	Day	Discharge
June 14	2	June 19	2,350
15	1,200	20	341
16	113	21	10
17	7	22	5
18	189	23	3

Gage height and discharge at indicated time, 1965

Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)	Hour	Gage height (feet)	Discharge (cfs)
<i>June 15</i>			<i>June 16—Con.</i>			<i>June 19—Con.</i>		
1030	---	0	1800	1.32	12	1100	2.93	965
1100	5.70	7,450	2400	1.25	10	1400	2.50	425
1200	5.00	5,260	<i>June 17</i>			1430	6.80	11,700
1400	4.10	2,930	2400	1.02	3	1700	5.70	7,450
1600	3.55	1,820	<i>June 18</i>			1900	4.80	4,660
1800	3.15	1,180	0430	1.02	3	2100	3.95	2,590
2000	2.90	836	0500	2.65	590	2400	3.28	1,370
2200	2.68	578	1200	2.20	212	<i>June 20</i>		
2400	2.54	461	2400	1.70	50	0600	2.52	446
<i>June 16</i>			<i>June 19</i>			1200	2.12	170
0600	2.07	150	0200	1.62	40	1800	1.70	50
1200	1.70	50	0800	1.93	104	2400	1.48	24

(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).

Maxima. — June 13-24, 1965: Contents 49,870 acre-ft June 22-24 (elevation, 3,741.6 ft). 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

Date	Elevation (feet)	Contents (acre-feet)	Date	Elevation (feet)	Contents (acre-feet)
June 13	3733.6	33,420	June 19	3736.7	39,230
14	3733.6	33,420	20	3740.0	46,190
15	3733.6	33,420	21	3741.2	48,690
16	3734.3	34,320	22	3741.6	49,870
17	3734.9	35,780	23	3741.6	49,870
18	3736.2	38,250	24	3741.6	49,870

(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 NW¼ 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).

1952 to May 1965: Discharge, 388 cfs July 16, 1956 (gage height, 7.33 ft, from flood-marks).

(136) 07227300 SANDY ARROYO NEAR CLAYTON, N. MEX.

(Crest-stage station)

Location. — Lat 36°20'30", long 103°11'00", in W½ 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 S½ 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.

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