Floods of April-June 1957
in Oklahoma and Western Arkansas

By D.L. Weiss and C.W. Sullivan

Prepared in cooperation with the States of Oklahoma and Arkansas, municipal corporations, and agencies of the Federal Government.

PREFACE

This report on the floods of April-June 1957 in Oklahoma and western Arkansas was prepared in the Geological Survey, Water Resources Division, Luna B. Leopold, chief hydraulic engineer, under the general direction of E.L. Hendricks, chief, Surface Water Branch. The data were assembled and the report prepared under the supervision of A.A. Fischback, Jr., district engineer.

Basic records of discharge in the area delineated by this report were collected in cooperation with the States of Oklahoma and Arkansas, municipal corporations, and agencies of the Federal Government. Acknowledgement is made to the Corps of Engineers and U.S. Weather Bureau for supplied information included in this report. The Surface Water Branch of the Geological Survey in Kansas and Missouri, the Ground Water Branch in Oklahoma, and the Bureau of Reclamation area development office in Oklahoma gave assistance for field surveys of flood flows.

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ABSTRACT

Floods of unusual magnitude in volume for the three-month period in Oklahoma and western Arkansas resulted from several heavy rains. In one storm period 20 inches of precipitation fell within 24 hours, on May 15, 16, near Hennessey, Okla., according to information obtained by a "bucket survey". Total precipitation for the three-month period at many points of observation equalled the normal yearly totals.

Ten lives are known to have been lost. Hundreds of families were evacuated from lowlands where homes were inundated for many days. The Arkansas River at Van Buren, Ark., was above flood stage for 74 days.

This report contains tabulation of peak stages and discharges for 96 gaging stations, 9 sites other than gaging stations, maximum contents of 11 reservoirs, isohyetal maps showing total precipitation by months and for the three-month period, and other data related to the floods.

INTRODUCTION

Beginning in 1951 the Great Plains suffered the most severe drouth of record with 1956 being a particularly dry year in Oklahoma. The end of this drouth came suddenly for Oklahoma and western Arkansas with widely scattered floods in April - June 1957. Beginning about April 18, and continuing through the middle of June, a succession of storms swept over the area producing damaging floods at many places. Peak flows in several streams were maximum of record and the storm period was significant also in the great volume of runoff that was produced. This extensive runoff is exemplified by Lake Texoma which was at a record low contents in March yet reached a record high contents on June 5. Damage to State and county highway systems and to rail lines was extensive while agricultural lands suffered greatly from scour of fertile soil or deposition of silt. Hundreds of families were evacuated from lowlands where homes were unundated and at least 10 lives were lost as a direct result of the floods.

The area covered in this report consists of the Arkansas River from Ralston, Okla., to Dardanelle, Ark., and its tributaries and the Red River tributaries in Oklahoma. Some stations in the North Canadian and Canadian River basins did not experience severe flooding and have been omitted. Stations in the Washita River basin above Carnegie, Okla. have been omitted for the same reason. Station on the Salt Fork Red River near Wellington, Tex. and stations on the Red River main stem from Terral, Okla. to Index, Ark., were included to provide continuity in the report. This report presents a tabulation of peak discharges at 96 gaging stations, 9 sites other than gaging stations, and maximum contents of 11 reservoirs.

The locations of these sites are shown on figure 1. Other data presented

Figure 1.--Map showing flood-determination points for floods of April-June 1957 in Oklahoma and Western Arkansas.

in this report are a description of the outstanding storms and floods.

Systematic records of streamflow are collected by the Geological Survey in a cooperative program with Federal and State agencies. The Corps of Engineers, Department of the Army, operates many gaging stations in the flood area and data for these stations are included in this report. Complete records of daily discharge at gaging stations in the flood area are published in Geological Survey Water-Supply Paper 1511 of the series "Surface Water Supply of the United States" for the water year 1957, and are not included in this report.

THE STORMS

The Great Plains had suffered the most severe drouth of record from the summer of 1951 to the spring of 1957, with 1956 being extremely dry for Oklahoma and western Arkansas when large portions of the area received less than 50 percent of the average annual precipitation. Precipitation in the first three months of 1957 was about average for the period with the precipitation becoming heavier the last week in March. Precipitation in the months of April - June was outstanding in total amount and also in some isolated heavy 24 hour amounts. Many rainfall reporting stations accumulated a total amount equal to the average annual precipitation during these three months. The heavy rains of the April-June period were the results of large scale and persistent abnormalities in the general circulation of the atmosphere over the western section of the Northern Hemisphere. This circulation brought an abundance of moisture northward from the Carribbean and the Gulf of Mexico over the South-Central States where it was released as precipitation by various circulatory and convergince mechanisms which persisted within the region. Figure 2 is

Figure 2.--Isohyetal map showing total precipitation for three months April-June 1957.

an isohyetal map of the accumulated total precipitation for the three-months period. The map also indicates the long-time average annual precipitation for Oklahoma and western Arkansas.

Storms of April

Heavy rains in April occurred in western Arkansas and eastern Oklahoma, principally in the periods April 3-4 and 18-23. The thunderstorms in April were accompanied by tornados and hail. Figure 3 shows an isohyetal map for April.

Figure 3.--Isohyetal map showing total precipitation during April 1957

Storms of May

A distinguishing feature of the May storms is the unusual recurrence of flood-producing precipitation over a 2-week period. Precipitation fell almost every day over much of Oklahoma and western Arkansas during this period.

The storm of May 15-16 occurred over an extensive area in western and central Oklahoma, generally north of the Cimarron River. The largest amount of precipitation reported at a Weather Bureau station was 13.07 inches at Hennessey. The maximum amount of precipitation found in a "bucket" survey for the storm was 20 inches, 5 miles southwest of Hennessey, and occurred in the 11 hour period from 7 p.m. to 6 a.m. Three miles northeast of this observation, 19.9 inches was measured in a large stock tank. Comparative depth-area data for the principal storm near Hennessey in relation to the storms of 1940 and 1948 are as follows:

Rainfall depth (in)	Area (sq mi)		
	1940	1948	1957
5 inches or more for	2,800	885	2,460
10 inches or more for	1,320	395	778
15 inches or more for	300	145	128
20 inches or more for	7	35	8

More storms occurred during the remainder of the month. The storm of May 17 occurred in the basins of the Washita River and Salt Fork Red River. A second storm in the lower portion of the Cimarron River basin occurred on May 20. The storm of May 22-24 was along a line from south-central Oklahoma to northwestern Arkansas. The storm of May 29 centered along the Kansas-Oklahoma border north of Buffalo.

In both western Arkansas and Oklahoma monthly precipitation for May exceeded the long-term means with many rainfall reporting stations receiving more than twice the mean. Precipitation at Hennessey was 5½ times the long-term monthly mean. In general, this month was the wettest May of record at many stations. Figure 4 shows an isohyetal map for May.

Figure 4.--Isohyetal map showing total precipitation during May 1957.

Storms of June

The general storm activity moved into northern and eastern Oklahoma and western Arkansas, during the month of June. The storms during this month were numerous, intense, and of relatively small area occurring in waves of four or five day intervals. The noteworthy storms occurred during the periods June 9-15 and 22-24. An isolated heavy rain storm on the evening of June 22 caused flooding on the North Canadian River and its tributaries in northwest Oklahoma. The Wolf Creek tributary basin drained the area of this storm which centered on the Oklahoma-Texas border. Overnight rainfall amounts up to 10-inches were obtained from a "bucket" survey in the area of the storm center.

Figure 5 shows an isohyetal map for June.

Figure 5.--Isohyetal map showing total precipitation during June 1957.

The meteorology of these storms has been described in detail in Technical Paper No. 33, "Rainfall and Floods of April, May, and June 1957 in the South-Central States" published by the Weather Bureau, Department of Commerce.

THE FLOODS

General

The floods of April-June 1957 were caused by a series of intense storms over Oklahoma and western Arkansas. Above normal precipitation occurred in most areas in April to alleviate the drouth which had prevailed since the summer of 1951. Streamflow in April was above normal over much of the area and soil moisture was at a high level. Precipitation in May and June contributed directly to streamflow and floods occurred in all sections of Oklahoma and western Arkansas except the Oklahoma panhandle. The floods were record breaking in the Cimarron and Washita River basins. The floods claimed at least 10 lives, inundated hundreds of homes, caused evacuation of hundreds of families from lowlands, destroyed more than 500 county highway bridges and many bridges on main highways and railroads, and caused millions of dollars in damages. Highways were closed by water and became impassible during flood crests. Numerous towns and cities suffered flooding in residential and business sections. Agricultural lands suffered extensive damage from scour of cropland, deposition of infertile sediment, bank errosion, and destruction of growing crops.

The floods of this period were the most widespread and the most sustained major flooding of record. The flood period is characterized by the volume of runoff and the long periods when the main rivers stayed above flood stage rather than by extreme high stages. The Arkansas River from Muskogee, Okla., to Van Buren, Ark., was continually above flood stage from mid-May throughout the month of June and into the first week of July. Discharge hydrographs for selected stations are shown in Figure 6.

Figure 6.--Graphs of discharge at selected gaging stations, April-June 1957.

Arkansas River Tributary Basins in Eastern Oklahoma and Western Arkansas

The first flooding occurred on small streams, in northwest Arkansas and northeastern Oklahoma following the heavy rains of April 3 and 4. Stages rose quickly from normal and reached a peak on April 3. The principal floods occurred on the Illinois River above Tenkiller Reservoir and small tributaries of the Arkansas River in western Arkansas. Stream gaging stations on the Barren Fork and upper Illinois River in Oklahoma, and Cove, Lee, Spadra, and Piney Creeks in Arkansas, experienced new maxima for the period of record. According to local residents, the flood on upper Lee Creek was the greatest since at least 1890. Streams again reached flood stage following the heavy rains of May 22-26 with the floods extending over a wider area than those of April. Pryor and Flint Creeks in Oklahoma, Lost Creek in Missouri, and Frog Bayou at Rudy in Arkansas, experienced new maxima. Lake O'The Cherokees on the Neosho River and Wister Reservoir on the Poteau River reached new maximum contents as they held back floodwaters from the already swollen major streams. Tenkiller Ferry Reservoir

on the Illinois River reached a new maximum contents on June 5 from the heavy runoff during the latter part of May.

Heavy rains of June 12 in northeastern Oklahoma caused rapid rises in streams that were still receeding from the previous rise. Backwater from the Caney River at Bartlesville caused some flooding while Bird Creek rose rapidly after a cloudburst rain. Bird Creek at Avant reached a new maximum discharge on June 12 while the Verdigris River near Inola reached a new maximum stage on June 16 although the discharge was less than that experienced in previous floods. Contents of both Hulah Reservoir on Caney River and Fort Gibson Reservoir on the Neosho experienced new maxima as they retarded the flood flows.

Cimarron, Canadian, and Arkansas River Basins

Flooding during April was scattered with only a few stations exceeding flood stage. Rains of April 21-23 caused only minor rises on the Cimarron River below Waynoka, Okla., and on small tributaries in the Arkansas River basin between Sallisaw, Okla., and Van Buren, Ark.

Severe to record flooding in many streams followed the generally heavy thunderstorms that occurred May 15-16 over an extensive area in western and central Oklahoma and centered near Hennessey. Preacher Creek reached a new maximum stage about 11 p.m. May 15 exceeding any stage known since at least 1918. The entire population of Dover was evacuated as flood waters engulfed the city from overflow of Turkey Creek. This stream attained a new maximum discharge at gaging station near Drummond. The greatest flood of record on the Cimarron River below Mocane occurred on May 16 and 17. The crest at Waynoka during the afternoon of May 16 was about one foot higher than the previous known maximum stage of about 14 ft, which probably occurred in 1914. The newly opened state highway

bridge, on which the gage was located, was partly destroyed shortly before the crest. The flood crest reached Guthrie early in the morning of May 17, exceeding by about five and one half feet the record stage of 12.98 ft in 1949, while the rate of discharge of this flood was three times that of 1949. Water reached three feet deep along the main street of Coyle, further downstream, while several families in the area had to leave their homes. The flood reached Perkins by evening of the same day exceeding the record flood of 1926 by two and one half feet. The crest at Perkins was further swollen by the flow from Skeleton Creek, a major tributary below Guthrie, which reached a new maximum stage on the afternoon of May 16.

Flood waters of the Cimarron River combining with those of the Arkansas River from Kansas produced two crests at Tulsa. The first crest occurred on the morning of May 19, reaching a stage of 20.35 ft while the second occurred on the afternoon of May 21, at a height of 21.53 ft. This latter crest reached a new maximum discharge for the period of record although the stage was not as great as that reached in 1923, prior to the start of streamflow records. There was no serious flooding in the city of Tulsa or vicinity.

Moderate to severe flooding occurred on the Arkansas River below Tulsa. The entire population of Bixby, 19 miles downstream, was evacuated on the evening of May 18. The station near Sallisaw, Okla., reached a new maximum discharge on May 27, at a stage about three feet lower than the stage of 1943, prior to start of streamflow records. The town of Moffett, Okla., across the Arkansas River from Fort Smith, Ark., was completely evacuated May 25-31. The town area was inundated by nearly five feet of water with substantial losses in residential and commercial areas. Urban areas in Fort Smith and Van Buren, Ark. were not affected due to their levee systems.

Flooding on the Canadian River in May was not severe. A new maximum discharge was reached at Little River below Hog Creek near Norman, where the flow was almost six times the previous maximum known since the station was established in 1952. The station near Tecumseh, downstream, reached a peak of the same discharge as the previous maximum in 1949 although at a gage height of almost a foot less. Further downstream, near Sasakwa, the flood crest failed to equal the previously known maximum.

The Arkansas River at Ralston rose briefly to flood stage in the middle of June only to recede and return to flood stage again near end of month. The reach of the Arkansas River from Muskogee, Okla., to Dardanelle, Ark., was above flood stage the entire month.

Red River Basin

Flooding in the Red River basin was generally confined to the last half of May although several streams reached their annual maxima during the last half of April or the first week in May.

Record stages occurred on the Salt Fork Red River near Wellington, Tex., and at Mangum, Okla., on May 16 from heavy rains that fell over the Texas panhandle on the previous day. The North Fork Red River reached a record stage on May 17, partly destroying the U.S. Highway 66 bridge near Sayre. In the Washita River basin, new maximum discharges were reached at Pauls Valley and Durwood although stages were two to three feet lower than previously recorded floods. The towns of Lindsay, Alex, and Pauls Valley suffered inundation. Flood crests on Rush and Rock Creeks added to the already swollen Washita near Durwood.

East Cache and Little Beaver Creeks and the Little Washita River reached new maxima after the heavy rains during the night of May 24, while the lower Washita River again experienced minor flooding.

Flooding on the Red River above Lake Texoma was not serious. On the lower Red River no unusually high stages occurred although abnormally high sustained flows persisted for unusually long periods during late May through mid-June causing considerable damage to roads and levees. During the latter part of May, Lake Texoma was no longer able to contain the

tremendous volume of inflow and spilled over the uncontrolled spillway, the first time since regulated storage began in 1943.

Minor Basins

While the major flooding of April-June has been described above, there remain other areas that warrant mention. Streams in southeastern Oklahoma, tributary to the Red River, experienced no record flooding but had a series of moderate peaks throughout the period. North Boggy, Chickaseaw, and McGee Creeks attained new maxima during April but these flows were not significant since only about one year of previous record had been obtained. Other streams in the area reached their annual maxima after the flood period.

The most noteworthy flooding was that on Wolf Creek, in the North Canadian River basin, on June 23. Heavy rains during the night of June 22 gave rise to sudden flooding on Wolf Creek, which destroyed the county bridge to which the gage was attached. The peak discharge of Wolf Creek near Fargo exceeded that previously known by about three and one half times and was the greatest known since at least 1913, from information by local residents. Fort Supply Reservoir reached a new maximum contents on June 25 when the stage rose to within 1½ feet of the crest of the spillway.

DETERMINATION OF FLOOD DISCHARGE

The usual method of determining discharge at a gaging station is the development of a stage-discharge relation or rating curve. The rating curve is developed from discharge measurements made at known gage heights. To properly define the rating curve, measurements must be made over a sufficient range of stage so that the curve of relationship can be extended to maximum stage. It is not always possible to obtain a

current-meter measurement at a gaging station during a flood. The peak discharge can be determined by an indirect method such as the slope-area method, the contracted-opening method, or some other method. Descriptions of these methods, as used by the Geological Survey for previous floods, are given in Water-Supply Papers 773-E, 796-G, 798, 799, 800, 843, and 888. Travel was difficult and at times impossible in some areas during the floods and current-meter measurements for the determination of peak discharge could not be obtained at some sites. At these gaging stations and at miscellaneous ungaged sites, where the determination of peak discharge was desired, indirect methods were used.

SUMMARY OF FLOOD STAGES AND DISCHARGES

The determinations of maximum flood stages and discharges at gaging stations and other places on streams in the area covered by this report are summarized and presented in table 1. Data are shown for

Table 1.--Flood stages and discharges, in Oklahoma and Western Arkansas, April-June 1957.

the current floods, the maxima for the period of operation of gaging stations prior to April 1, 1957, and the maxima, where known, for the period prior to the collection of records. Maximum content of reservoirs is also shown.

RECORDS OF PREVIOUS FLOODS

Oklahoma and western Arkansas, being part of the southern Great Plains, are in a region where spring and summer thunderstorms are capable of delivering flood producing rains. Locally intense rains cause flooding in one small area or another almost every year. Because of the scattered nature of these storms, major flooding often occurs in only parts of the long and relatively narrow drainage basins.

Information on early floods is meager as records of streamflow are generally less than 20 years in length. A few records date from about 1925 but most date from about 1938 or later. In some cases, records collected by the Weather Bureau antedate the establishment of gaging stations by the Survey or the Corps of Engineers, and some stage records of earlier floods are available from this source. In other cases, information on historic floods has been collected from local residents, based on floodmarks or elevations known by them.

The earliest records of flood stage in the area covered by this report are those on the Arkansas River. Flood stage near Muskogee in June 1833 is known probably to be similar to that of May 21, 1943, the maximum for the period of record. At Fort Smith, Ark. the flood of 1833 was referenced to a Weather Bureau gage. Spring River, in northeast Oklahoma, reached a stage in 1943 known to be similar to that reached in December 1895. On the Neosho River, to which Spring River is tributary, the flood of 1895 is known to be one of the major floods.

In southwest Oklahoma, the North Fork Red River is known to have suffered a major flood in 1903, while on the lower Washita, in south-central Oklahoma, a major flood occurred in May 1908.

The flood of May 1914 on the Canadian River at Bridgeport, was one of the major floods, although a higher stage may have occurred during the flood of October 1904. The flood of 1904 is known to be the maximum at upstream sites in Texas and New Mexico, while this same relationship is not shown at downstream sites in Oklahoma. The maximum stage known since 1898 near Whitefield was that which occurred in May 1943.

A major flood occurred in May 1914 on the Cimarron River in the panhandle and northwest part of Oklahoma. This flood still represents the maximum known stage at the gaging station near Mocane, while near Waynoka it was approximately equaled by the flood of May 1935 and exceeded only by the current flood. No reference has been found to the flood of 1914 at downstream stations on the Cimarron River where prior to the current flood, the station near Guthrie reached a stage of 16.5 ft in May 1935 and the station at Perkins reached a stage of 17.0 ft in October 1926.

The major floods that have occurred since continuous gaging-station records have been kept in more recent years are those in May 1943 and 1951. More information became available on the floods of May 1943 than for any previous flood in Oklahoma because of a growing interest in matters pertaining to flood control, and expanded activities of the Geological Survey and the Corps of Engineers, U.S. Army, in the collecting of streamflow records.

During May 1943, eastern Oklahoma and western Arkansas were swept by two very unusual, if not unprecedented, storms that produced flood stages in many streams far in excess of any previously recorded. In fact, the stages in some streams were in excess of any previously known. All the larger streams in eastern Oklahoma reached unusually high stages following the storm of May 7-11. Streams in northeastern Oklahoma rose again to record-breaking stages at many points following the storm of May 15-20. Unusually high discharges, equalling or exceeding those of previous years, occurred in the lower reaches of all major streams in the storm area.

On the Verdigris River and its tributaries, such as Caney River and Bird Creek, stages and discharges were higher in 1943 than any previously known. These maxima have not been subsequently exceeded except for Caney River near Hulah, which was exceeded in 1944. In the Neosho River basin, new maxima were reached in 1943 at Commerce and Langley while the Elk River, a tributary to the Neosho from southwestern Missouri, did not reach a peak as high as that experienced in 1941. The maximum at Commerce was exceeded in July 1951. In 1943, new maxima were also established at stations on the Arkansas River from Ralston, Okla., to Little Rock, Ark., its smaller tributaries in eastern Oklahoma and western Arkansas, and on the lower Canadian River and its tributaries. The peak discharge of many of the small tributaries was exceeded by subsequent floods but not further exceeded in 1957. The maximum of 1943 at Ralston was exceeded the very next year while at Tulsa the maximum was not exceeded until 1957. At other stations on the main stem of the Arkansas River the flood of 1943 has not been exceeded. The floods of 1943 did not extend westward to the Cimarron River and its tributaries.

A noteworthy flood occurred in 1951 in some areas of western Oklahoma and has been reported in Geological Survey Water-Supply Paper 1227-B, "Floods of May 1951 in Western Oklahoma and Northwestern Texas". Recurrent heavy thunderstorms during the period May 13-19 resulted in floods of unusual magnitude over a wide area in western Oklahoma, northwestern Texas, and parts of Kansas and Colorado. Major flooding occurred in the upper portions of the Cimarron, North Canadian, and Canadian Rivers; and on the Red River and some tributaries above Terral, Okla. At several sites, new maxima were established in 1951 only to be exceeded by isolated floods in the following years.

Some other isolated flooding caused by small intense storms are: the Hammon storm in April 1934, causing the maximum flood on Washita River at Clinton; the Cleveland storm in September 1940, causing a dam failure at Lake Cleveland; the Hydro storm in June 1948, causing severe flooding on Deer Creek and producing the maximum of record on Canadian River at Bridgeport; and the Cheyenne storm in April 1954, causing the maximum of record on the Washita River near Cheyenne and flooding on Rush Creek.

Table .--Flood stages and discharges, in Oklahoma and Western Arkansas, April - June 1957.

No.	Permanent station number	Stream and place of determination	Drainage area (sq mi)	Maximum floods					
				Prior to April 1957		April - June 1957	Gage height (ft)	Discharge	
				Period	Year	(date)		Cfs	Ratio to Q2.33
		ARKANSAS RIVER BASIN							
1	1525	Arkansas River at Ralston, Okla.	a84,465	1923 1925-57	1923 1944	--- ---	23.8 b22.82	--- 179,000	
						May 20	21.41	120,000	
2	1530	Black Bear Creek at Pawnee, Okla.	576	1943 1944-57	1943 1945	--- ---	28.19 c28.11	17,800 17,500	
						May 18	25.26	12,200	
3	1570	Cimarron River near Mocane, Okla.	d8,070	1914 1942-57	1914 1951	--- ---	13 9.94	--- 53,400	
						May 16	5.06	9,300	
4	1575	Crooked Creek near Nye, Kans.	e1,157	1942-57	1955	--- May 15	8.01 6.24	13,600 4,220	
5		Anderson Creek near Freedom, Okla.	28.7	---	---	May 16	---	12,900	
6		Long Creek near Freedom, Okla.	42	---	---	May 16	---	17,300	
7	1580	Cimarron River near Waynoka, Okla.	f13,334	1903-05, 1937-57	1950	--- May 16	11.40 15.10	70,000 94,500	
8		Eagle Chief Creek near Carmen, Okla.	306	---	---	May 16	---	35,800	
9		Hoyle Creek at Ames, Okla.	26.4	---	---	May 16	---	g6,800	
10	1585	Preacher Creek near Dover, Okla.	14.5	1918-57 1951-57	1955 1955	--- --- May 15	4.87 4.87 c9.1	--- 512 1,420	
11		Clear Creek near Enid, Okla.	15.9	---	---	May 16	---	3,890	
12	1590	Turkey Creek near Drummond, Okla.	248	1947-57	1950	--- May 16	20.44 21.61	16,300 18,800	
13	1600	Cimarron River near Guthrie, Okla.	h12,892	1937-57	1949	--- May 17	12.98 18.58	51,500 158,000	
14		South Boggy Creek at Enid, Okla.	3.7	---	---	May 16	---	3,750	
15		Hackberry Creek near Waukomis, Okla.	31	---	---	May 16	---	16,500	
16	1605	Skeleton Creek near Lovell, Okla.	410	1949-57	1955	--- May 16	28.72 34.58	11,100 75,200	
17	1610	Cimarron River at Perkins, Okla.	h17,852	1939-57	1949	--- May 17	15.22 19.53	65,300 149,000	
18	1630	Council Creek near Stillwater, Okla.	31	1934-57	1942	--- May 20	c17.54 c17.10	18,000 16,400	
19	1645	Arkansas River at Tulsa, Okla.	174,615	1923 1925-57	1923 1943 1944	--- --- --- May 21	22.8 --- 20.00 21.53	--- 173,000 --- 235,000	

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				Prior to April 1957		April - June 1957	Gage height (ft)	Discharge	
				Period	Year	(date)		Cfs	Ratio to Q2.33
20	1650	Heyburn Reservoir near Heyburn, Okla.	123	1950-57	1954	---	766.65	j10.58	
						May 25	771.08	j23.72	
21	1655	Polecat Creek below Heyburn Reservoir, near Heyburn, Okla.	123	1940	1940	---	e,k31.5	---	
				1943-57	1948, 1949	---	---	17,000	
					1949	---	k28.53	---	
						May 25	11.08	1,880	
22	1710	Verdigris River near Lenapah, Okla.	3,639	1938-57	1943	---	e40.44	137,000	
						June 15	31.22	81,500	
23	1725	Hulah Reservoir near Hulah, Okla.	732	1950-57	1951	---	745.42	j100.3	
						June 23	764.37	j293.4	
24	1730	Caney River near Hulah, Okla.	736	---	(m)	---	e,k40.2	---	
				1937-57	1944	---	k39.45	51,000	
						June 27	33.92	9,240	
25	1740	Caney Creek near Copan, Okla.	424	1943-57	1944	---	[illegible]0.58	36,400	
						June 13	28.81	15,600	
26	1747	Caney River near Ochelata, Okla.	1,753	1956-57	1956	---	e6.35	174	
						June 13	38.82	33,800	
27	1755	Caney River near Ramona, Okla.	1,955	1935-39, 1945-57	1945	---	30.12	38,500	
						June 12	29.69	36,700	
28	1760	Verdigris River near Claremore, Okla.	6,534	1935-57	1943	---	55.05	182,000	
						June 15	46.51	68,500	
29	1765	Bird Creek at Avant Okla.	364	1943	1943	---	e29.6	---	
				1945-57	1945	---	21.66	15,600	
						June 12	29.00	25,400	
30	1770	Hominy Creek near Skiatook, Okla.	340	1943	1943	---	e35.0	---	
				1944-57	1949	---	35.06	14,200	
						May 21	34.42	13,200	
31	1775	Bird Creek near Sperry, Okla.	906	1938-57	1943	---	31.68	86,500	
						June 13	29.03	31,400	
32	1780	Verdigris River near Inola, Okla.	7,911	1943	1943	---	54.93	224,000	
				1944-57	1945	---	---	94,500	
					1948	---	52.40	---	
						June 16	52.75	85,900	
33	1850	Neosho River near Commerce, Okla.	5,876	1939-57	1951	---	---	27,000	
					1951	---	34.03	---	
						June 16	20.22	41,000	
34	1880	Spring River near Quapaw, Okla.	o2,510	1895	1895	---	p43.4	---	
				1939-57	1943	---	e43.4	190,000	
						June 11	27.00	56,000	
35	1885	Lost Creek at Seneca, Mo.	42	1945	1945	---	e11.7	---	
				1948-57	1951	---	8.05	4,600	
						May 25	8.21	5,760	
36	1890	Elk River near Tiff City, Mo.	872	1939-57	1941	---	e23.4	137,000	
						May 21	24.72	[illegible],800	
37	1900	Lake O'The Cherokees at Langley, Okla.	10,298	1940-57	1951	---	754.96	12,195	
						May 25	755.27	12,213	

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				Prior to April 1957		April - June 1957	Gage height (ft)	Discharge	
				Period	Year	(date)		Cfs	Ratio to Q2.33
38	1905	Neosho River near Langley, Okla.	10,335	1939-57	1943	---	c,k45.5	300,000	
						May 25	c37.6	180,000	
39	1910	Big Cabin Creek near Big Cabin, Okla.	466	1943	1943	---	34.96	63,000	
				1947-57	1951	---	30.76	40,700	
						May 25	27.81	25,500	
40	1920	Pryor Creek near Pryor, Okla.	229	1943	1943	---	20.4	---	
				1947-57	1948	---	18.95	11,600	
						May 25	19.41	15,700	
41	1930	Fort Gibson Reservoir near Fort Gibson, Okla.	12,492	1949-57	1951	---	582.60	j554.5	
						June 17	581.78	j1,266	
42	1935	Neosho River below Fort Gibson Reservoir near Fort Gibson, Okla.	12,495	1943	1943	---	q46.0	---	
				1950-57	1951	---	---	133,000	
					1951	---	k30.96	---	
						May 26	37.60	233,000	
43	1945	Arkansas River near Muskogee, Okla.	196,674	1833-1957	1943	---	48.20	700,000	
						May 26	39.03	366,000	
44	1950	Osage Creek near Elm Springs, Ark.	129	1950-57	1950	---	o18.7	---	
						Apr. 3	14.36	10,800	1.9
45	1955	Illinois River near Watts, Okla.	635	1955-57	1956	---	13.05	8,650	
						Apr. 3	24.73	49,000	
46	1960	Flint Creek near Kansas, Okla.	110	1955-57	1956	---	8.42	1,370	
						May 25	11.52	8,780	
47	1965	Illinois River near Tahlequah, Okla.	959	1916	1916	---	p26	---	
				1935-57	1950	---	27.94	150,000	
						Apr. 4	21.60	55,400	
48	1970	Barren Fork at Eldon, Okla.	307	1945	1945	---	23.8	---	
				1948-57	1950	---	19.51	31,000	
						Apr. 3	20.33	37,600	
49	1975	Tenkiller Ferry Reservoir near Gore, Okla.	1,610	1952-57	1955	---	631.45	j640.9	
						June 5	666.36	j1,217.6	
50	1980	Illinois River near Gore, Okla.	1,626	1924-26, 1939-57	1950	---	r30.2	180,000	
						June 9	13.70	18,100	
51	2285	Canadian River at Bridgeport, Okla.	s25,229	1914	1914	---	p19.4	---	
				1944-57	1948	---	o14.60	150,000	
						May 26	11.30	40,800	
52	2300	Little River below Hog Creek, near Norman, Okla.	257	1952-57	1955	---	13.45	6,010	
						May 25	o28.85	34,600	
53	2305	Little River near Tecumseh, Okla.	456	1932	1932	---	25.58	---	
				1943-57	1949	---	19.56	32,300	
						May 25	18.84	32,400	
54	2310	Little River near Sasakwa, Okla.	865	1942-57	1950	---	33.48	44,600	
						May 18	29.80	26,500	

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Table .--Flood stages and discharges, in Oklahoma and Western Arkansas, April - June 1957.

No.	Permanent station number	Stream and place of determination	Drainage area (sq mi)	Maximum floods					
				Prior to April 1957		April - June 1957	Gage height (ft)	Discharge	
				Period	Year	(date)		Cfs	Ratio to Q2.33
55	2315	Canadian River at Calvin, Okla.	s27,952	1905-06, 1938-42, 1944-57	1906	---	ck21.00	---	
					1950	---	---	174,000	
						May 18	14.10	134,000	
56	2320	Gaines Creek near Krebs, Okla.	588	1938	1938	---	31.9	---	
	-			1942-57	1943	---	c31.7	62,000	
						Apr. 27	---	17,400	
						Apr. 28	28.75	---	
57	2330	Wolf Creek near Fargo, Okla.	t1,624	1913-57	1951	---	---	23,500	
					1951	---	c8.19	---	
						June 23	c10.0	81,600	
58	2365	Fort Supply Reservoir near Fort Supply, Okla.	u1,735	1942-57	1950	---	2,024.86	j89.13	
						June 25	2,026.53	j97.93	
59	2370	Wolf Creek near Fort Supply, Okla.	u1,739		(m)	---	15.6	---	
				1937-57	1939	---	11.60	14,200	
						May 19	7.71	5,020	
60	2420	North Canadian River near Wetumka, Okla.	v14,290	1923	1923	---	26.9	---	
				1937-57	1945	---	26.40	66,000	
						May 25	15.00	39,400	
61	2430	Dry Creek near Kendrick, Okla.	69	1955-57	1956	---	10.18	2,330	
						May 25	13.13	4,410	
62	2435	Deep Fork near Beggs, Okla.	2,018	1938-57	1943	---	34.55	66,800	
						May 26	29.75	30,300	
63	2450	Canadian River near Whitefield, Okla.	w47,576	1898-1957	1943	---	25.5	---	
				1930-57	1943	---	25.5	281,000	
						May 18	18.25	176,000	
64	2455	Sallisaw Creek near Sallisaw, Okla.	182	1942-57	1945	---	11.25	110,000	
						Apr. 3	16.50	38,400	
65	2465	Arkansas River near Sallisaw, Okla.	x147,757	1943	1943	---	37.90	---	
				1947-57	1950	---	31.04	442,000	
						May 27	34.80	544,000	
66	2470	Poteau River at Cauthorn, Ark.	200	1935	1935	---	27.4	---	
				1938-57	1949	---	23.34	31,000	2.7
						May 23	18.73	10,300	.9
67	2475	Fourche Maline near Red Oak, Okla.	122	1935	1935	---	c25.4	---	
				1938-57	1942	---	22.34	26,300	
						Apr. 26	19.02	14,300	
68	2480	Wister Reservoir near Wister, Okla.	993	1949-57	1950	---	495.11	j278	
						May 27	505.73	j507.4	
69	2485	Poteau River near Wister, Okla.	993	1935	1935	---	y43.0	---	
				1938-57	1945	---	k37.16	78,600	
						May 27	214.41	11,300	
70	2495	Cove Creek near Lee Creek, Ark.	36.9	1950-57	1950	---	10.50	9,510	1.7
						Apr. 3	13.50	20,500	3.6
71	2496	Lee Creek at Natural Dam, Ark.	168	---	---	Apr. 3	---	51,800	3.4

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Table .--Flood stages and discharges, in Oklahoma and Western Arkansas, April - June 1957.

No.	Permanent station number	Stream and place of determination	Drainage area (sq mi)	Maximum floods					
				Prior to April 1957		April - June 1957	Gage height (ft)	Discharge	
				Period	Year	(date)		Cfs	Ratio to 22.53
72	2500	Lee Creek near Van Buren, Ark.	427	1930-37, 1950-57	1938	--- Apr. 3	n27.0 29.37	57,700 73,200	2.1 2.6
73	2505	Arkansas River at Van Buren, Ark.	x150,483	1833-1957	1945 1943	--- --- May 28	38.10 --- aa38.07	--- 350,000 510,000	3.0 1.8
74	2510	Frog Bayou near Mountainburg, Ark.	74	1936-57	1945	--- May 23	31.06 30.28	17,300 13,700	2.8 2.2
75	2515	Frog Bayou at Rudy, Ark.	217	1945 1950-57	1946 1951	--- --- May 23	18.5 11.77 18.04	39,500 14,700 36,200	3.3 1.2 3.0
76	2520	Mulberry River near Mulberry, Ark.	372	1927 1938-57	1927 1945	--- --- Apr. 3	22.0 19.70 15.70	59,000 47,800 28,800	3.5 2.8 1.7
77	2535	Spadra Creek at Clarksville, Ark.	54.8	1927 1952-57	1927 1954	--- --- Apr. 3	c14.7 c10.7 ab14.58	--- 7,600 15,300	1.0 2.1
78	2570	Piney Creek near Dover, Ark.	274	1949 1950-57	1949 1955	--- --- Apr. 3	c25.6 17.06 20.37	--- 28,900 44,000	1.4 2.1
79	2580	Arkansas River at Dardanelle, Ark.	x153,707	1886-1957	1943	--- May 30	ac33.60 ad33.42	683,000 471,000	2.5 1.7
		RED RIVER BASIN							
80	3000	Salt Fork Red River near Wellington, Tex.	ae1,222	1952-57	1954	--- May 16	16.00 19.00	95,900 146,000	
81	3005	Salt Fork Red River at Mangum, Okla.	ae1,566	1905-06, 1937-57	1938	--- May 16	14.7 14.55	60,000 72,000	
82	3015	North Fork Red River near Carter, Okla.	af2,337	1944-57	1951 1954	--- --- May 17	--- 11.24 11.95	18,300 --- 25,300	
83	3025	Lake Altus at Lugert, Okla.	af2,515	1944-57	1951	--- June 18	1,562.10 1,569.63	j167 j146.4	
84	3030	North Fork Red River below Altus Dam, near Lugert, Okla.	af2,515	1925, 1930-32, 1950-57	1928 1951	--- --- June 18	k14.5 12.70 ---	14,300 16,100 131	
85	3045	Elk Creek near Hobart, Okla.	549	1904-08, 1949-57	1955	--- May 5	c30.75 25.73	22,400 4,570	
86	3050	North Fork Red River near Headrick, Okla.	af4,244	1905-08, 1937-57 1927-57	1955 (ag)	--- --- May 4	11.50 16.1 9.36	30,700 --- 20,100	
87	3055	Otter Creek at Snyder Lake, near Mountain Park, Okla.	132	1903-08, 1951-57	1953	--- May 18	c19.50 15.73	14,200 4,240	
88	3090	East Cache Creek near Elgin, Okla.	248	1955-57	1955	--- May 25	c27.51 34.10	13,300 20,400	

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Table .--Flood stages and discharges, in Oklahoma and Western Arkansas, April - June 1957

No.	Permanent station number	Stream and place of determination	Drainage area (sq mi)	Maximum floods					
				Prior to April 1957		April - June 1957	Gage height (ft)	Discharge	
				Period	Year	(date)		Cfs	Ratio to Q2.33
89	3110	Cache Creek near Walters, Okla.	675	1938-57	1951	--- May 26	29.72 28.80	28,200 15,000	
90	3115	Deep Red Run near Randlett, Okla.	617	1908-57 1949-57	1908 1951	--- --- May 20	(ah) 27.10 23.74	--- 20,300 8,050	
91	3130	Little Beaver Creek near Duncan, Okla.	158	1948-57	1955	--- May 25	19.46 19.74	39,800 47,500	
92	3135	Beaver Creek near Waurika, Okla.	563	1951-57 1953-57	1951 1955	--- --- May 26	c22.7 22.42 21.82	65,300 32,200 22,500	
93	3155	Red River near Terral, Okla.	a128,723	1938-57	1941	--- June 4	28.12 22.72	197,000 110,000	
94		Walnut Creek near Lone Grove, Okla.	133				---	g63,000	
95	3160	Red River near Gainesville, Tex.	a130,782	1938-57	1941 1951	--- --- June 5	--- 26.53 aj25.14	168,000 --- 102,000	
96	3255	Washita River at Carnegie, Okla.	ak3,129	1903-57 1938-57	1903 1949	--- --- Apr. 24	k29 26.21 21.41	--- 50,000 12,600	
97	3260	Pond Creek near Fort Cobb, Okla.	319	1937 1939-57	1937 1949	--- --- Apr. 21	19.3 am18.72 14.08	--- 35,000 1,550	
98	3270	Sugar Creek near Gracemont, Okla.	211	1955-57	1955	--- Apr. 23 June 2	c8.2 c7.7 7.52	905 --- 620	
99	3275	Little Washita River at Ninnekah, Okla.	227	1951-57	1952 1955	--- --- May 24	17.15 --- 22.20	--- 4,860 25,200	
100		Criner Creek near Payne, Okla.	55			May 17	---	12,600	
101	3285	Washita River near Pauls Valley, Okla.	5,330	1937-57	1950	--- May 18	29.88 27.34	30,000 35,800	
102	3295	Rush Creek near Maysville, Okla.	206	1953-57	1955	--- May 18	16.12 23.62	13,700 38,500	
103	3299	Rock Creek at Dougherty, Okla.	138	1956-57	1956	--- May 17 May 18	5.80 13.76 am16.80	2,230 25,600 ---	
104	3310	Washita River near Durwood, Okla.	7,202	1928-57	1941 1943	--- --- May 19	44.37 --- c42.30	--- 91,300 98,000	
105	3315	Lake Texoma near Denison, Tex.	a139,719	1942-57	1945	--- June 5	629.07 643.18	34,255 j5,991.3	

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Table .--Flood stages and discharges, in Oklahoma and Western Arkansas, April June 1957

No.	Permanent station number	Stream and place of determination	Drainage area (sq mi)	Maximum floods					
				Prior to April 1957		April - June 1957	Gage height (ft)	Discharge	
				Period	Year	(date)		Cfs	Ratio to Q2.33
106	3320	Red River near Colbert, Okla.	a139,777	1903	1908	---	45.5	---	
				1923-57	1935	---	---	201,000	
					1942	---	32.0	---	
						June 5	2[illegible].2[illegible]	102,000	
107	3325	Blue River near Blue, Okla.	478	1936-50, 1953-57	1938	---	31.81	34,400	
						May 25	29.43	14,300	
108	3330	North Boggy Creek near Stringtown, Okla.	139	1955-57	1957	---	15.02	2,010	
						Apr. 3	17.37	7,000	
109	3325	Chickasaw Creek near Stringtown, Okla.	32.5	1955-57	1957	---	12.98	3,120	
						Apr. 26	20.18	12,300	
110	3338	McGee Creek near Stringtown, Okla.	84.5	1956-57	1957	---	8.97	3,220	
						Apr. 26	16.79	10,200	
111	3340	Muddy Boggy Creek near Farris, Okla.	1,087	1937-57	1945	---	44.94	61,900	
						Apr. 26	40.40	21,000	
112	3350	Clear Boggy Creek near Caney, Okla.	720	1938	1938	- -	2[illegible].9	---	
				1942-57	1946	---	26.77	52,800	
						May 25	24.02	19,000	
113	3355	Red River at Arthur City, Tex.	a144,531	1905-11, 1936-57	1908	---	43.2	400,000	
						June 6	28.35	136,000	
114	3360	Tenmile Creek near Miller, Okla.	68	1955-57	1957	---	12.87	1,700	
						May 25	19.03	4,150	
115	3365	Kiamichi River near Belzoni, Okla.	1,423	1915	1915	---	44.2	---	
				1925-57	1938	---	44.0	71,400	
						May 26	37.60	40,500	
116	3370	Red River at Index, Ark.	a148,030	1917-57	1938	---	34.25	2[illegible],000	2.3
						June 8	ac28.56	154,000	1.2

a 7,615 sq mi is probably noncontributing
b In gage well; 23.65 ft from outside gage.
c From floodmark
d 4,365 sq mi is probably noncontributing.
e 344 sq mi is probably noncontributing.
f 4,830 sq mi is probably noncontributing.
g Field estimate
h 4,920 sq mi is probably noncontributing.
i 12,541 sq mi is probably noncontributing.
j Contents in thousands of acre-feet.
k Former site and/or datum.
m Unknown
n From graph based on gage readings.
o Includes that of Rock Creek
p Approximately
q From high-water profile by Corps of Engineers.
r Observed at crest, site and datum then in use; 29.6 ft, present site and datum, from floodmark.
s 4,801 sq mi is probably noncontributing.
t 238 sq mi is probably noncontributing.
u 241 sq mi is probably noncontributing.
v 4,999 sq mi is probably noncontributing.
w 9,700 sq mi is probably noncontributing.

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Table .--Flood stages and discharges, in Oklahoma and Western Arkansas, April - June 1957.

No.	Permanent station number	Stream and place of determination	Drainage area (sq mi)	Maximum floods				
				Prior to			Gage height (ft)	Discharge
				Period	Year			Cfs / Ratio to Q2.33
x	22,241 sq mi is probably noncontributing.							
y	Site and datum used in 1930.							
z	Stage of backwater pool.							
aa	In gage well; 36.4 ft from outside gage.							
ab	In gage well; 15.1 ft from floodmarks.							
ac	In gage well; 34.1 ft from outside gage.							
ad	In gage well; 33.6 ft from outside gage.							
ae	209 sq mi is probably noncontributing.							
af	399 sq mi is probably noncontributing.							
ag	Date unknown; sometime prior to 1927.							
ah	Maximum stage known somewhat exceeded 27 ft.							
ai	5,936 sq mi is probably noncontributing.							
aj	Backwater from Lake Texoma.							
ak	Includes that of Running Creek.							
am	From high-water mark in gage well.							
an	Backwater from Washita River.							
ao	In gage well; 29.3 ft from outside gage.							

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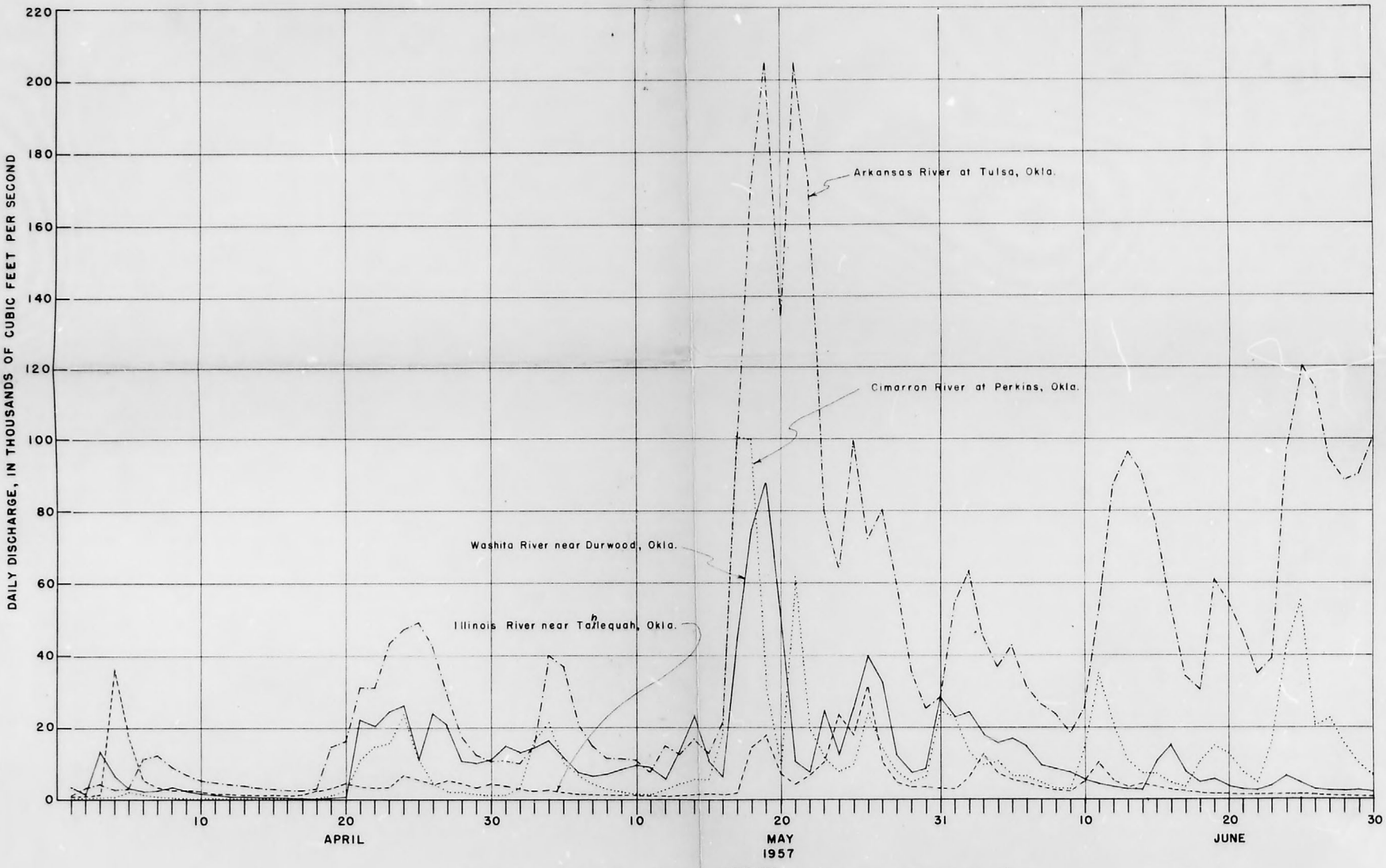

FIGURE 6 .-- GRAPHS OF DISCHARGE AT SELECTED GAGING STATIONS, APRIL-JUNE 1957