DEPARTMENT OF THE INTERIOR
ALBERT B. FALL, Secretary

UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, Director

WATER-SUPPLY PAPER 507

SURFACE WATER SUPPLY OF THE UNITED STATES

1919–1920

PART VII. LOWER MISSISSIPPI RIVER BASIN

NATHAN C. GROVER, Chief Hydraulic Engineer
ROBERT FOLLANSBEE and R. C. RICE, District Engineers

WASHINGTON
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ILLUSTRATIONS.

SURFACE WATER SUPPLY OF THE LOWER MISSISSIPPI RIVER BASIN, 1919-1920.

AUTHORIZATION AND SCOPE OF WORK.

This volume is one of a series of 14 reports presenting records of measurements of flow made on streams in the United States during the years ending September 30, 1919 and 1920.

The data presented in these reports were collected by the United States Geological Survey under the following authority contained in the organic law (20 Stat. L., p. 394):

Provided, That this officer [the Director] shall have the direction of the Geological Survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

The work was begun in 1888 in connection with special studies relating to irrigation in the arid West. Since the fiscal year ending June 30, 1895, successive sundry civil bills passed by Congress have carried the following item and appropriations:

For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

Annual appropriations for the fiscal years ending June 30, 1895–1921.

1895	$12,500.00
1896	20,000.00
1897 to 1900, inclusive	50,000.00
1901 to 1902, inclusive	100,000.00
1903 to 1906, inclusive	200,000.00
1907	150,000.00
1908 to 1910, inclusive	100,000.00
1911 to 1917, inclusive	150,000.00
1918	175,000.00
1919	148,244.10
1920	175,000.00
1921	180,000.00

In the execution of the work many private and State organizations have cooperated, either by furnishing data or by assisting in collecting data. Acknowledgments for cooperation of the first kind are made in connection with the description of each station affected; cooperation of the second kind is acknowledged on page 5.

Measurements of stream flow have been made at about 5,000 points in the United States and also at many points in Alaska and the Hawaiian Islands. In July, 1920, 1,350 gaging stations were being maintained by the Survey and the cooperating organizations. Many

miscellaneous discharge measurements are made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in water-supply papers from time to time.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups—(1) those that represent a rate of flow, as second-feet, gallons per minute, miners' inches, and discharge in second-feet per square mile, and (2) those that represent the actual quantity of water, as run-off in inches, acre-feet, and millions of cubic feet. The principal terms used in this series of reports are second-feet, second-feet per square mile, run-off in inches, and acre-feet. They may be defined as follows:

"Second-feet" is an abbreviation for "cubic feet per second." A second-foot is the rate of discharge of water flowing in a channel of rectangular cross section 1 foot wide and 1 foot deep at an average velocity of 1 foot per second. It is generally used as a fundamental unit from which others are computed.

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off in inches" is the depth to which an area would be covered if all the water flowing from it in a given period were uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

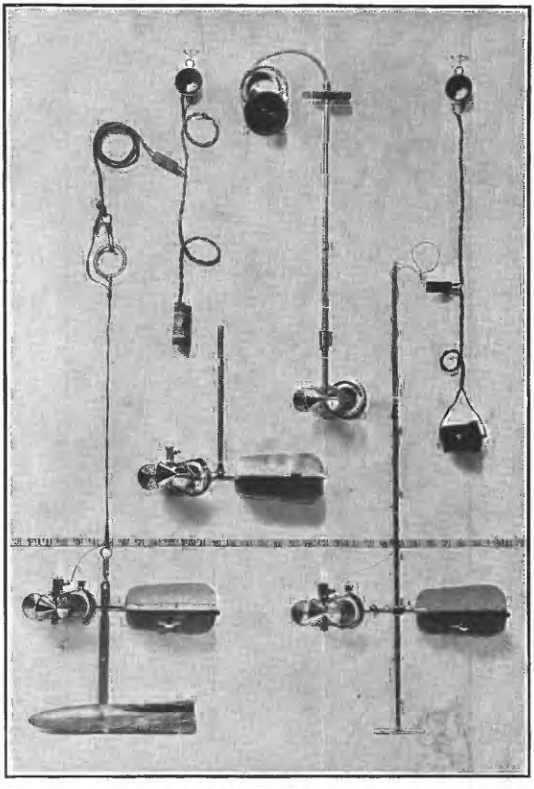
An "acre-foot," equivalent to 43,560 cubic feet, is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation.

The following terms not in common use are here defined:

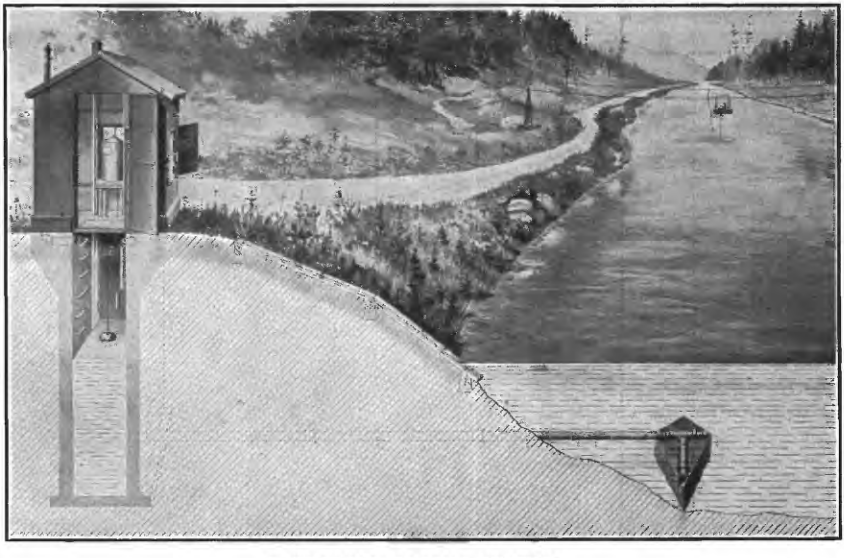
"Stage-discharge relation;" an abbreviation for the term "relation of gage height to discharge."

"Control;" a term used to designate the natural section or stretch of the channel or artificial structure below the gage that determines the stage-discharge relation at the gage. It should be noted that the control may not be the same section or sections at all stages.

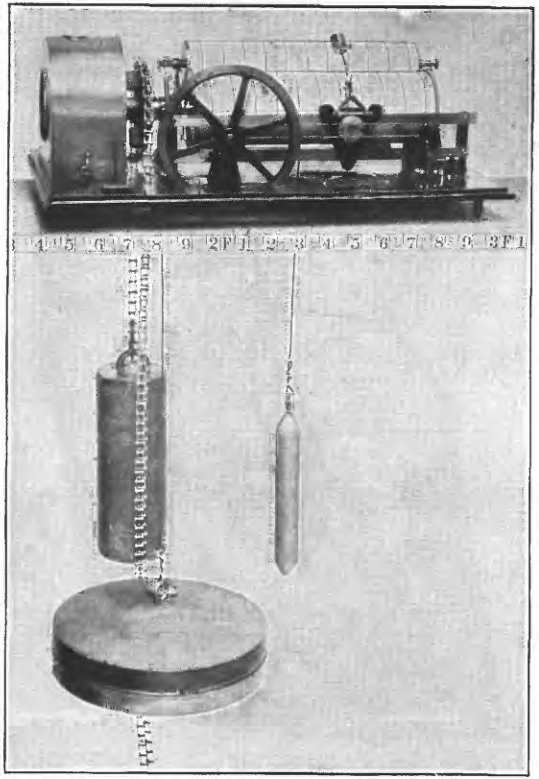
The "point of zero flow" for a given gaging station is that point on the gage—the gage height—at which water ceases to flow over the control.



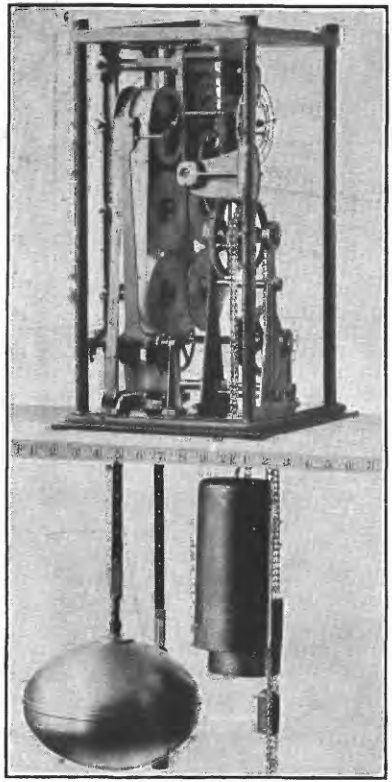
A. PRICE CURRENT METERS.



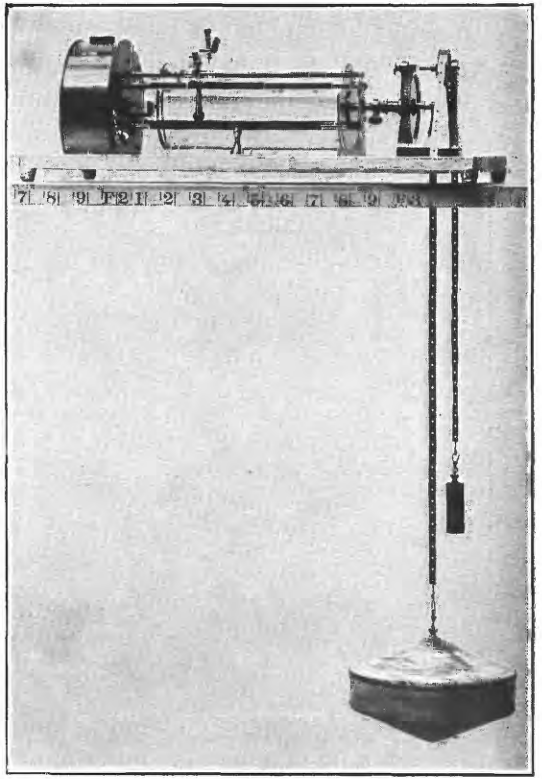
B. TYPICAL GAGING STATION.



A. STEVENS CONTINUOUS.



B. GURLEY PRINTING.



C. FRIEZ.

WATER-STAGE RECORDERS.

EXPLANATION OF DATA.

The data presented in this report cover the biennium beginning October 1, 1918, and ending September 30, 1920. At the beginning of January in most parts of the United States much of the precipitation in the preceding three months is stored as ground water, in the form of snow or ice, or in ponds, lakes, and swamps, and this stored water passes off in the streams during the spring break-up. At the end of September, on the other hand, the only stored water available for run-off is possibly a small quantity in the ground; therefore the run-off for the year beginning October 1 is practically all derived from precipitation within that year.

The base data collected at gaging stations consist of records of stage, measurements of discharge, and general information used to supplement the gage heights and discharge measurements in determining the daily flow. The records of stage are obtained either from direct readings on a staff gage or from a water-stage recorder that gives a continuous record of the fluctuations. Measurements of discharge are made with a current meter. (See Pls. I, II.) The general methods are outlined in standard textbooks on the measurement of river discharge.

From the discharge measurements rating tables are prepared that give the discharge for any stage, and these rating tables, when applied to the gage heights, give the discharge from which the daily, monthly, and yearly means of discharge are determined.

The data presented for each gaging station in the area covered by this report comprise a description of the station, a table giving records of discharge measurements, a table showing the daily discharge of the stream, and a table of monthly and yearly discharge and run-off.

If the base data are insufficient to determine the daily discharge, tables giving daily gage height and records of discharge measurements are published.

The description of the station gives, in addition to statements regarding location and equipment, information in regard to any conditions that may affect the permanence of the stage-discharge relation, covering such subjects as the occurrence of ice, the use of the stream for log driving, shifting of control, and the cause and effect of backwater; it gives also information as to diversions that decrease the flow at the gage, artificial regulation, maximum and minimum recorded stages, and the accuracy of the records.

The table of daily discharge gives, in general, the discharge in second-feet corresponding to the mean of the gage heights read each day. At stations on streams subject to sudden or rapid diurnal fluctuations the discharge obtained from the rating table and the mean

daily gage height may not be the true mean discharge for the day. If such stations are equipped with water-stage recorders the mean daily discharge may be obtained by averaging discharge at regular intervals during the day or by using the discharge integrator, an instrument operating on the principle of the planimeter and containing as an essential element the rating curve of the station.

In the table of monthly discharge the column headed "Maximum" gives the mean flow for the day when the mean gage height was highest. As the gage height is the mean for the day it does not indicate correctly the stage when the water surface was at crest height and the corresponding discharge was consequently larger than given in the maximum column. Likewise, in the column headed "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet per second during the month. On this average flow computations recorded in the remaining columns, which are defined on page 2, are based.

ACCURACY OF FIELD DATA AND COMPUTED RESULTS.

The accuracy of stream-flow data depends primarily (1) on the permanency of the stage-discharge relation and (2) on the accuracy of observation of stage, measurements of flow, and interpretation of records.

A paragraph in the description of the station gives information regarding the (1) permanence of the stage-discharge relation, (2) precision with which the discharge rating curve is defined, (3) refinement of gage readings, (4) frequency of gage readings, and (5) methods of applying daily gage height to the rating table to obtain the daily discharge.

For the rating tables "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The monthly means for any station may represent with high accuracy the quantity of water flowing past the gage, but the figures showing discharge per square mile and depth of run-off in inches may be subject to gross errors caused by the inclusion of large non-contributing districts in the measured drainage area, by lack of information concerning water diverted for irrigation or other use, or by inability to interpret the effect of artificial regulation of the flow of the river above the station. "Second-feet per square mile" and "run-off in inches" are therefore not computed if such

errors appear probable. The computations are also omitted for stations on streams draining areas in which the annual rainfall is less than 20 inches. All figures representing "second-feet per square mile" and "run-off in inches" previously published by the Survey should be used with caution because of possible inherent sources of error not known to the Survey.

Many gaging stations on streams in the irrigated sections of the United States are located above most of the diversions from those streams, and the discharge recorded does not show the water supply available for further development as prior appropriations below the stations must first be satisfied. To give an idea of the amount of prior appropriations, a paragraph on diversions is presented in each station description. The figures given can not be considered exact but represent the best information available.

The table of monthly discharge gives only a general idea of the flow at the station and should not be used for other than preliminary estimates; the tables of daily discharge allow more detailed studies of the variation in flow. It should be borne in mind, however, that the observations in each succeeding year may be expected to throw new light on data previously published.

COOPERATION.

The United States Forest Service furnished winter readings on East Fork of Arkansas River and Tennessee Fork near Leadville, Colo. It also furnished the services of a hydrographer during the winter.

In Oklahoma the United States Reclamation Service paid a part of the expense of maintaining the gaging station on Medicine Bluff Creek near Lawton. The services of a gage reader on Little Medicine Bluff Creek near Lawton were furnished by the sanitary corps of the United States Army.

The station on Neosho River near Iola, Kans., was maintained in cooperation with the Kansas Water Commission, H. A. Rice, secretary.

DIVISION OF WORK.

Data for stations in Colorado and Oklahoma were collected and prepared for publication under the direction of Robert Follansbee, assisted by P. V. Hodges, J. B. Spiegel, T. J. Watkins, and Miss Esther M. Dye.

Data for the station on Neosho River near Iola, Kans., were collected and prepared for publication under the direction of R. C. Rice, district engineer, assisted by E. L. Grant and A. K. Gowans.

GAGING-STATION RECORDS.

ARKANSAS RIVER BASIN.

EAST FORK OF ARKANSAS RIVER NEAR LEADVILLE, COLO.

LOCATION.—In sec. 16, T. 9 S., R. 80 W., at highway bridge 200 yards above junction with Tennessee Fork and 3 miles northwest of Leadville, Lake County.

DRAINAGE AREA.—52 square miles (measured on topographic map).

RECORDS AVAILABLE.—April 25 to August 31, 1890; June 18 to October 11, 1903; June 5, 1911, to September 30, 1920.

GAGE.—Vertical staff on left bridge abutment, near upstream end; read by E. J. Heaton and Fred Coquoz.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of coarse gravel and small boulders. Control 30 feet downstream from gage; shifted slightly during 1919. Banks low, subject to overflow at extreme high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 0.90 foot on June 1, 2, and 3 (discharge, 155 second-feet); minimum discharge occurred during winter.

Maximum stage recorded during year ending September 30, 1920, 1.63 feet at 9.15 a. m. May 31 (discharge, 521 second-feet); minimum discharge occurred during winter.

1911–1920: Maximum stage recorded, 1.95 feet at 8 a. m. June 12, 1918 (discharge, 680 second-feet); minimum discharge measured 5.4 second-feet on January 18, 1918.

ICE.—Stage-discharge relation seriously affected by ice.

DIVERSIONS.—The Leadville Water Co. makes a continuous diversion of 2 second-feet from East Fork above station. During the winter this diversion may be increased to 3 second-feet.

REGULATION.—None.

ACCURACY.—Stage-discharge relation shifted slightly during 1919. Rating curve used October 1, 1918, to June 30, 1919, well defined; shifting-control method used July 1 to October 31, 1919. Curve used during 1920 well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying daily mean gage height to rating table. Records fair.

Discharge measurements of East Fork of Arkansas River near Leadville, Colo., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Jan. 4	T. J. Watkins	[a]0.38	11.2	June 18	Robert Follansbee	0.92	134
Feb. 18	do	[a].47	10.1	July 22	P. V. Hodges	.54	41.4
July 22	Robert Follansbee	.49	41.0				
Nov. 1	T. J. Watkins	[a].78	26.3				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of East Fork of Arkansas River near Leadville, Colo., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.											
1	16	12	.....	.....	.....	.....	.....	138	97	84	16
2	16	12	.....	.....	.....	.....	.....	152	107	82	18
3	14	12	.....	.....	.....	.....	.....	138	127	80	20
4	14	12	11	.....	.....	.....	.....	120	134	70	19
5	13	12	.....	.....	.....	.....	.....	92	97	75	17
6	12	.....	.....	.....	.....	.....	24	92	89	58	16
7	12	.....	.....	.....	.....	.....	.....	92	84	50	16
8	12	.....	.....	.....	.....	.....	.....	92	77	44	16
9	12	.....	.....	.....	.....	.....	.....	94	72	44	16
10	12	.....	.....	.....	.....	.....	.....	80	70	39	21
11	12	.....	.....	.....	.....	.....	21	89	64	44	21
12	12	.....	.....	.....	16	21	.....	92	64	44	26
13	12	.....	.....	.....	.....	.....	.....	89	64	29	30
14	12	.....	.....	.....	.....	.....	.....	92	60	29	34
15	12	.....	.....	.....	.....	.....	.....	99	52	29	34
16	12	.....	.....	.....	.....	.....	34	110	48	29	31
17	12	.....	.....	.....	.....	21	.....	115	87	29	31
18	13	.....	.....	10	16	.....	.....	115	72	29	29
19	13	.....	.....	.....	.....	.....	.....	110	60	29	30
20	12	.....	.....	.....	.....	.....	.....	104	48	29	31
21	12	.....	.....	.....	.....	16	.....	104	42	22	31
22	12	.....	.....	.....	12	.....	.....	102	40	17	29
23	12	.....	.....	.....	.....	.....	.....	99	39	17	29
24	12	.....	.....	.....	.....	.....	.....	94	42	17	26
25	12	.....	.....	.....	.....	.....	.....	110	40	16	25
26	12	.....	.....	.....	.....	.....	.....	94	42	16	24
27	12	.....	.....	.....	12	.....	.....	104	39	16	25
28	12	.....	.....	.....	.....	9	.....	102	40	12	22
29	12	.....	.....	.....	.....	.....	.....	99	48	12	24
30	12	.....	.....	.....	.....	.....	.....	94	82	12	21
31	12	.....	.....	.....	14	.....	.....	.....	68	12	.....
1919–20.											
1	21	26	.....	.....	.....	.....	16	245	64	49	35
2	20	.....	.....	.....	.....	.....	.....	328	60	46	30
3	20	.....	.....	.....	.....	.....	.....	328	64	39	25
4	20	.....	.....	.....	.....	.....	.....	272	68	60	25
5	20	.....	.....	.....	.....	.....	.....	328	71	39	14
6	18	.....	.....	.....	.....	.....	.....	299	64	44	17
7	18	.....	.....	.....	.....	.....	.....	272	60	35	12
8	20	.....	.....	.....	.....	.....	.....	328	40	27	16
9	19	.....	.....	.....	.....	.....	.....	245	55	57	17
10	18	.....	.....	.....	.....	.....	.....	231	60	49	22
11	18	.....	.....	.....	.....	.....	.....	231	64	28	20
12	17	.....	.....	.....	.....	.....	.....	272	55	35	18
13	16	.....	.....	.....	.....	.....	.....	282	64	42	20
14	18	.....	.....	.....	.....	.....	.....	282	44	25	27
15	17	.....	.....	.....	.....	.....	26	217	49	25	25
16	15	.....	.....	.....	.....	.....	.....	199	44	25	32
17	15	.....	.....	.....	.....	.....	.....	170	55	27	27
18	18	.....	.....	.....	.....	.....	.....	141	44	28	16
19	18	.....	.....	.....	.....	.....	.....	115	49	22	16
20	17	.....	.....	.....	.....	.....	.....	106	44	31	14
21	15	.....	.....	.....	.....	.....	.....	95	40	46	16
22	15	.....	.....	.....	.....	.....	.....	103	73	39	16
23	15	.....	.....	.....	.....	.....	.....	92	95	32	17
24	16	.....	.....	.....	.....	.....	.....	88	71	25	16
25	16	.....	.....	.....	.....	.....	272	95	57	25	25
26	18	.....	.....	.....	.....	.....	299	95	95	22	20
27	18	.....	.....	.....	.....	.....	328	88	49	39	27
28	21	.....	.....	.....	.....	.....	221	82	39	28	20
29	20	.....	.....	.....	.....	.....	272	82	39	39	16
30	18	.....	.....	.....	.....	.....	328	71	49	25	16
31	18	.....	.....	.....	.....	.....	383	.....	40	42	.....

Monthly discharge of East Fork of Arkansas River near Leadville, Colo., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	16	12	12.5	769
November 1–5	12	12	12.0	119
June	152	80	104	6,190
July	134	39	67.6	4,160
August	84	12	36.0	2,210
September	34	16	24.3	1,450
1919–20.				
October	21	15	17.8	1,090
May 25–31	383	221	300	4,160
June	328	71	193	11,500
July	95	39	56.9	3,500
August	60	22	35.3	2,170
September	35	12	20.6	1,230

ARKANSAS RIVER AT GRANITE, COLO.

LOCATION.—In sec. 31, T. 11 S., R. 79 W., at Granite, Lake County, below mouth of Lake Creek and above Lost Canyon and Clear creeks.

DRAINAGE AREA.—425 square miles.

RECORDS AVAILABLE.—May 1, 1897, to September 10, 1899; April 6, 1910, to September 30, 1920.

GAGE.—Bristol float gage on right bank 200 feet below highway bridge at Granite. Prior to October 26, 1917, inclined gage located at left bank half a mile upstream. Relation between gages not determined.

DISCHARGE MEASUREMENTS.—Made from highway bridge near railroad station or by wading.

CHANNEL AND CONTROL.—Bed composed of coarse gravel and small boulders. Control shifting. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 3.44 feet at 7 a. m. June 30 (discharge, 1,230 second-feet); minimum discharge occurred during winter.

Maximum stage recorded during year ending September 30, 1920, 4.1 feet from 7 to 9 a. m. June 10 (discharge, 1,770 second-feet); minimum discharge, 54 second-feet on January 8.

1910–1920: Maximum stage, 4.7 feet June 11, 1918 (discharge, 2,630 second-feet); minimum discharge recorded, 11 second-feet on March 15, 1918.

ICE.—Stage-discharge relation not seriously affected by ice.

DIVERSIONS.—Court decrees for diversions of 90 second-feet from Arkansas River between this station and junction of Tennessee and East forks.

REGULATION.—Discharge affected by operation of Twin Lakes reservoir, which has a storage decree for 54,450 acre-feet.

COOPERATION.—Complete records furnished by State engineer.

Discharge measurements of Arkansas River at Granite, Colo., during the years ending Sept. 30, 1919 and 1920.

[Made by G. C. Price.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1919.	*Feet.*	*Sec.-ft.*	1920—Continued.	*Feet.*	*Sec.-*
May 14	1.74	29.2	Mar. 26	1.00	78
Dec. 17	1.32	97	Apr. 21	1.16	140
1920.			June 11	3.40	1,220
Feb. 10		65	July 28	2.51	639

Daily discharge, in second-feet, of Arkansas River at Granite, Colo., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	182	232	48	.....	.....	.....	.....	275	940	970	510	205
2	174	232	48	.....	.....	.....	.....	295	910	1,050	476	247
3	216	237	62	.....	.....	.....	.....	275	928	1,160	525	240
4	256	232	48	.....	.....	.....	.....	205	1,100	1,030	476	233
5	160	237	57	.....	.....	.....	.....	205	1,100	1,030	417	205
6	168	229	66	.....	.....	.....	.....	240	1,050	970	375	205
7	174	221	76	.....	.....	.....	.....	240	970	970	355	175
8	170	190	48	.....	.....	.....	.....	258	880	940	347	140
9	170	203	62	.....	.....	.....	100	258	910	940	315	125
10	174	216	48	.....	.....	.....	132	268	868	940	315	151
11	180	242	48	.....	.....	.....	100	258	820	850	268	205
12	174	190	36	.....	.....	.....	100	258	880	645	247	190
13	174	190	26	.....	.....	.....	100	258	940	700	233	247
14	174	150	36	.....	.....	.....	130	295	940	760	247	355
15	166	110	36	.....	.....	.....	116	395	970	672	138	355
16	160	110	36	.....	.....	.....	110	395	1,000	672	618	307
17	166	110	48	.....	.....	.....	169	462	1,100	510	645	283
18	172	110	48	.....	.....	.....	205	562	1,100	440	645	268
19	172	92	48	.....	.....	.....	240	634	1,100	510	645	268
20	172	31	36	.....	.....	.....	258	730	1,130	395	645	250
21	190	62	62	.....	.....	.....	250	730	1,160	375	618	233
22	182	92	55	.....	.....	.....	295	820	1,130	315	562	190
23	174	31	48	.....	.....	.....	387	880	1,130	222	535	151
24	174	31	62	.....	.....	.....	404	910	1,100	205	485	151
25	190	36	62	.....	.....	.....	395	940	1,100	258	476	199
26	216	48	48	.....	.....	.....	379	1,000	1,060	375	418	222
27	211	62	48	.....	.....	.....	335	1,030	970	440	375	212
28	242	48	48	.....	.....	.....	347	1,060	970	440	347	199
29	242	48	48	.....	.....	.....	335	1,130	940	375	323	199
30	229	48	48	.....	.....	.....	307	1,160	940	485	307	175
31	216	.....	48	.....	.....	.....	.....	1,070	.....	485	258	.....
1919–20.												
1	140	175	132	90	74	65	78	247	1,260	1,450	688	195
2	128	145	120	57	74	74	78	266	1,180	1,490	603	229
3	233	145	125	81	74	78	78	304	1,330	1,490	576	229
4	275	145	132	90	65	78	90	304	1,290	1,650	576	195
5	275	145	136	90	65	78	90	344	1,370	1,610	576	195
6	132	120	136	73	65	90	84	344	1,450	1,570	550	229
7	175	124	136	57	65	78	101	430	1,490	1,410	525	229
8	175	124	120	54	74	90	124	550	1,570	1,260	476	229
9	175	134	90	65	65	90	150	603	1,690	1,150	476	229
10	205	134	100	60	65	90	136	630	1,490	1,080	430	229
11	175	134	100	60	65	90	124	576	1,260	1,010	386	195
12	175	124	120	65	57	90	101	500	1,450	1,010	386	163
13	175	120	100	74	57	90	112	500	1,690	975	386	195
14	175	120	90	74	57	112	112	453	1,610	908	344	163
15	175	120	90	74	57	101	124	386	1,610	908	344	163
16	175	120	90	74	57	101	136	386	1,690	940	688	163
17	175	120	97	74	57	101	212	408	1,610	975	688	163
18	175	120	98	74	65	101	344	476	1,530	842	688	163
19	175	128	98	74	74	90	344	603	1,450	810	688	163
20	169	128	98	74	74	112	195	718	1,450	659	688	163
21	145	128	98	65	74	124	112	748	1,450	718	386	195
22	145	128	98	65	74	136	112	875	1,490	718	344	195
23	145	128	98	74	65	124	124	875	1,530	748	688	195
24	175	128	98	57	57	101	136	940	1,490	748	688	163
25	175	128	98	65	57	90	136	1,010	1,490	908	630	163
26	175	100	95	74	57	78	136	1,180	1,490	1,040	630	163
27	145	95	80	74	57	78	136	1,120	1,490	875	630	163
28	145	100	80	74	57	84	136	1,040	1,490	630	576	163
29	145	125	80	74	57	84	150	1,150	1,490	630	525	163
30	145	132	90	74	.....	84	179	1,220	1,450	630	476	163
31	145	.....	95	74	.....	84	.....	1,290	.....	630	229	.....

NOTE.—Stage-discharge relation affected by ice Dec. 27–31, 1918; discharge estimated.

Monthly discharge of Arkansas River at Granite, Colo., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	256	160	188	11,600
November	242	31	136	8,090
December	76	26	49.6	3,050
April 9–30	404	100	236	10,300
May	1,160	205	564	34,700
June	1,160	820	1,000	59,500
July	1,160	205	649	39,900
August	645	138	424	26,100
September	355	125	220	13,100
1919–20.				
October	275	128	172	10,600
November	175	95	127	7,560
December	136	80	104	6,400
January	90	54	71.1	4,370
February	74	57	64.2	3,690
March	136	65	92.5	5,690
April	344	78	139	8,270
May	1,290	247	661	40,600
June	1,690	1,180	1,480	88,100
July	1,650	630	1,020	62,700
August	688	229	534	32,800
September	229	163	187	11,100
The year	1,690	54	388	282,000

ARKANSAS RIVER AT SALIDA, COLO.

LOCATION.—In sec. 32, T. 50 N., R. 9 E., at Salida, Chaffee County, above mouth of South Fork of Arkansas River, nearest important tributary.

DRAINAGE AREA.—1,160 square miles.

RECORDS AVAILABLE.—April 11, 1895, to October 31, 1903; November 3, 1909, to September 30, 1920.

GAGE.—Bristol water-stage recorder on right bank in City Park 400 feet below highway bridge.

DISCHARGE MEASUREMENTS.—Made from highway bridge.

CHANNEL AND CONTROL.—Bed composed of coarse gravel; shifts at intervals. No well-defined control. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 3.9 feet May 29 and 30 (discharge, 2,460 second-feet); minimum stage probably occurred during winter.

Maximum stage during year ending September 30, 1920, 4.7 feet from 6 to 11 a. m. June 9 (discharge, 3,430 second feet); minimum discharge, 170 second-feet several days during year.

1909–1920: Maximum stage, 6.2 feet June 13, 14, and 17, 1918 (discharge, 4,840 second-feet); minimum stage, 0.10 foot, January 28, 1915 (discharge, 155 second-feet).

ICE.—Stage-discharge relation not affected by ice, as river is kept open by springs.

DIVERSIONS.—Court decrees for diversions of 154 second-feet from Arkansas River between this station and Granite.

REGULATION.—Flow at station regulated to some extent by Twin Lakes and Clear Creek reservoirs, which have storage decrees for 54,450 and 11,500 acre-feet, respectively.

COOPERATION.—Complete records furnished by State engineer.

Discharge measurements of Arkansas River at Salida, Colo., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Feb. 21	H. D. Amsley	0.39	239	Feb. 9	G. C. Price	0.40	234
Apr. 10	G. C. Price	.47	241	Mar. 25	do	.30	198
19	do	.73	397	Apr. 22	do	.42	255
May 15	do	1.44	666	June 12	do	3.96	2,620
June 5	do	2.76	1,509	July 27	do	2.80	1,430
July 20	do	1.90	913				
Oct. 28	H. D. Amsley	.73	333				
Dec. 15	G. C. Price	.42	264				

Daily discharge, in second-feet, of Arkansas River at Salida, Colo., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	390	335	266					550	1,940	1,540	1,000	450
2	390	350	266					500	1,780	1,820	850	450
3	390	390	266					500	1,660	2,280	970	450
4	470	350	266					500	1,620	2,100	970	450
5	410	350	266					450	1,500	2,000	910	450
6	430	390	266					450	1,460	1,860	800	425
7	430	370	292					450	1,460	1,700	775	380
8	430	370	292					500	1,420	1,700	850	360
9	430	370	266					500	1,320	1,580	750	352
10	390	390	266				241	500	1,390	1,540	725	500
11	390	390	242				264	500	1,390	1,440	675	640
12	430	390	242				288	450	1,460	1,320	640	575
13	320	292	242				258	500	1,660	1,180	550	600
14	320	292	220				258	550	1,700	1,100	550	640
15	320	320	220				258	650	1,860	1,180	550	88
16	320	292	220				258	725	1,780	1,180	710	735
17	350	292	220				320	750	1,940	1,140	910	675
18	350	266	220				320	910	1,980	1,100	850	600
19	350	279	220				340	1,110	1,940	970	910	640
20	320	279	220				360	1,500	1,980	910	850	600
21	320	266	220		239		380	1,700	1,980	850	850	590
22	320	266	220				450	1,900	1,940	825	840	560
23	320	254	220				500	1,860	1,860	700	800	500
24	320	247	220				625	1,780	1,780	650	750	450
25	350	242	220				650	1,860	1,740	650	700	475
26	370	242	220				675	2,020	1,700	700	650	540
27	350	220	220				650	2,190	1,620	775	650	550
28	335	220	220				600	2,280	1,580	800	600	525
29	320	220	220				575	2,460	1,540	825	550	450
30	320	242	220				550	2,460	1,520	910	540	450
31	335		220					2,100		1,110	525	

Daily discharge, in second-feet, of Arkansas River at Salida, Colo., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	400	360	376	287	270	236	170	322	2,610	2,610	1,450	648
2	392	380	384	297	270	253	170	359	2,310	2,560	1,200	550
3	400	360	364	236	270	253	202	367	2,560	2,560	921	550
4	450	360	368	287	270	236	170	359	2,610	2,610	1,100	550
5	500	360	388	304	253	236	170	439	2,720	2,610	1,240	550
6	500	360	388	304	253	236	202	439	2,770	2,460	1,170	550
7	400	360	372	270	253	219	202	482	2,940	2,310	980	550
8	450	450	352	236	253	219	236	574	3,160	2,060	950	550
9	400	400	282	229	270	236	270	700	3,210	1,840	921	550
10	400	400	317	253	253	253	322	807	3,040	1,700	1,010	550
11	450	380	317	243	253	253	253	780	2,310	1,790	950	527
12	400	400	356	243	253	236	236	700	2,460	1,700	863	527
13	450	380	304	253	236	236	236	623	2,720	1,570	950	504
14	450	360	301	270	236	253	236	623	2,820	1,530	863	482
15	450	360	288	270	236	236	236	574	2,820	1,490	835	460
16	450	364	288	270	236	219	287	527	2,940	1,490	1,100	460
17	450	364	304	270	236	236	270	527	2,770	1,610	1,200	460
18	400	364	320	270	236	236	359	574	2,560	1,610	1,240	460
19	340	368	320	270	253	236	418	700	2,560	1,200	1,240	418
20	360	368	320	270	270	236	378	921	2,410	1,570	1,310	418
21	360	368	320	270	270	243	270	1,100	2,510	1,380	1,340	439
22	360	372	320	253	270	287	236	1,310	2,510	1,380	980	418
23	360	372	320	253	270	297	253	1,340	2,560	1,380	863	418
24	360	372	320	270	253	253	253	1,420	2,610	1,530	1,200	418
25	360	376	320	236	236	219	287	1,530	2,560	1,450	1,100	418
26	360	368	320	253	236	236	236	1,740	2,560	1,660	1,040	439
27	360	328	288	270	236	202	253	1,530	2,720	1,490	1,200	439
28	340	298	288	270	236	186	253	1,530	3,040	1,380	1,100	439
29	360	372	288	270	236	170	270	1,740	2,880	1,490	1,040	439
30	380	360	304	270	.....	186	287	2,110	2,720	1,530	921	398
31	360	.....	314	270	.....	186	.....	2,560	.....	1,450	863	.....

Monthly discharge of Arkansas River at Salida, Colo., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	470	320	364	22,400
November	390	220	306	18,200
December	292	220	239	14,700
April 10–30	675	241	420	17,500
May	2,460	450	1,130	69,500
June	1,980	1,320	1,680	100,000
July	2,280	650	1,240	76,200
August	1,000	525	750	46,100
September	800	352	529	31,500
1919–20.				
October	500	340	402	24,700
November	450	298	369	22,000
December	388	282	326	20,000
January	304	229	265	16,300
February	270	236	252	14,500
March	297	170	233	14,300
April	418	170	254	15,100
May	2,560	322	945	58,100
June	3,210	2,310	2,700	161,000
July	2,610	1,200	1,770	109,000
August	1,450	835	1,070	65,800
September	648	398	486	28,900
The year	3,210	170	757	550,000

ARKANSAS RIVER AT CANON CITY, COLO.

LOCATION.—Just below Hot Springs Hotel, at mouth of canyon, 1 mile above Canon City, Fremont County. Nearest important tributary, Grape Creek, enters some distance above.

DRAINAGE AREA.—3,060 square miles.

RECORDS AVAILABLE.—May 1, 1888, to September 30, 1920.

GAGE.—Bristol float-type water-stage recorder.

DISCHARGE MEASUREMENTS.—Made from cable.

CHANNELS AND CONTROL.—Bed composed of gravel; very shifting. No well defined control.

EXTREMES OF DISCHARGE.—1888–1920: Maximum daily mean discharge recorded, 5,400 second-feet on August 18, 1909; minimum discharge, 108 second-feet on April 10, 1897.

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—Court decrees for diversions of 176 second-feet from Arkansas River between this station and Salida.

REGULATION.—Flow regulated to slight extent by operation of reservoirs on head waters.

COOPERATION.—Complete records furnished by State engineer.

Daily discharge, in second-feet, of Arkansas River at Canon City, Colo., for the years ending, Sept. 30, 1914–1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913–14												
1	410	335	335	380	330	342	330	428	2,760	2,330	2,460	755
2	500	335	335	380	330	355	330	428	3,320	2,330	4,800	728
3	442	365	365	380	330	368	330	462	3,210	2,280	2,140	620
4	425	425	380	355	330	368	342	542	3,010	2,510	2,050	595
5	425	410	395	355	330	342	355	395	2,810	2,700	1,820	595
6	425	410	365	355	355	355	355	355	2,520	2,600	1,600	572
7	410	365	335	355	330	355	380	355	2,150	2,560	1,430	510
8	395	335	365	355	310	355	355	355	1,710	2,200	1,310	470
9	395	335	365	355	380	355	355	368	1,510	2,100	1,350	490
10	395	335	335	355	355	355	342	542	1,430	1,970	1,230	490
11	380	335	310	330	380	355	355	710	1,920	1,920	1,190	470
12	380	335	310	330	380	355	355	765	2,240	2,200	1,150	450
13	395	350	310	330	380	355	368	710	2,520	2,060	1,010	450
14	395	335	365	330	380	355	355	710	2,810	2,200	1,010	470
15	395	335	395	330	355	355	355	950	3,930	2,200	940	470
16	365	335	395	355	380	380	355	1,050	4,410	2,200	908	470
17	365	335	395	355	355	368	380	1,050	3,640	2,420	845	450
18	365	335	395	355	355	410	355	982	3,480	2,650	815	430
19	335	395	335	355	355	380	330	1,050	3,480	3,050	875	430
20	335	365	395	380	355	355	330	1,120	3,370	2,940	1,010	400
21	335	335	310	380	330	355	342	1,550	3,370	2,700	1,010	400
22	335	365	310	380	330	355	355	1,970	3,100	3,210	1,040	430
23	335	335	335	355	330	342	355	2,020	2,800	2,840	940	430
24	335	335	335	355	355	355	355	2,150	3,000	2,510	1,040	415
25	335	335	335	355	330	355	330	2,100	3,000	2,330	1,120	415
26	335	365	310	355	330	355	330	1,920	2,740	2,280	1,120	370
27	335	365	425	355	355	342	342	1,920	2,460	2,460	1,010	370
28	335	365	425	355	330	330	330	2,020	2,280	3,100	975	370
29	335	365	365	380	.....	330	330	1,880	2,200	3,260	940	370
30	335	335	335	310	.....	330	355	1,840	2,200	2,840	908	415
31	335	.....	335	330	.....	330	.....	2,200	.....	2,740	755	.....

Daily discharge, in second-feet, of Arkansas River at Canon City, Colo., for the years ending Sept. 30, 1914–1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914–15												
1	430	470	.....	480	385	340	385	725	1,220	1,880	830	460
2	430	470	.....	480	385	385	385	595	1,940	1,720	725	460
3	430	450	.....	480	385	340	408	480	2,000	1,720	725	460
4	415	430	.....	480	385	340	430	430	1,880	1,620	628	465
5	430	450	.....	480	310	340	455	430	1,560	1,620	565	520
6	430	430	.....	430	280	310	480	480	1,510	1,620	535	525
7	430	470	.....	385	280	340	660	480	1,460	1,560	565	500
8	430	470	.....	385	340	340	692	535	1,320	1,410	692	465
9	430	400	.....	385	340	340	535	480	1,320	1,320	1,170	468
10	430	400	.....	430	385	340	628	430	1,410	1,270	1,120	435
11	430	400	.....	430	340	340	535	430	1,880	1,220	870	405
12	430	400	.....	385	340	340	480	455	2,530	1,220	770	440
13	430	400	.....	385	310	340	480	480	2,470	1,220	775	480
14	450	400	.....	385	310	340	480	870	2,000	1,220	745	450
15	370	400	.....	385	310	340	508	1,120	1,780	1,170	750	465
16	385	400	.....	385	310	340	692	1,080	1,720	1,120	685	410
17	400	430	.....	340	310	340	660	1,220	1,940	1,080	690	380
18	415	430	.....	340	340	340	910	1,320	2,060	910	760	360
19	400	450	.....	340	385	430	692	1,360	2,230	760	1,000	475
20	400	400	.....	385	385	362	565	1,270	2,530	910	730	450
21	400	415	.....	385	385	325	535	1,220	2,660	1,080	580	450
22	450	400	.....	385	385	340	535	1,040	2,780	1,040	525	450
23	490	385	.....	310	385	340	595	795	2,910	910	590	405
24	550	385	.....	295	385	408	595	725	2,980	1,080	620	315
25	550	370	.....	280	340	508	535	725	2,910	1,270	685	340
26	572	370	.....	280	340	480	508	832	2,840	1,360	600	525
27	595	370	.....	385	340	455	480	910	2,590	1,880	540	525
28	550	370	.....	310	340	430	480	760	2,350	1,940	545	450
29	530	370	.....	340	.....	430	480	725	2,110	1,510	520	400
30	490	400	.....	430	.....	430	628	725	2,000	1,220	555	460
31	470	.....	.....	385	.....	385	.....	795	.....	910	560	.....
1915–16.												
1	445	385	390	442	230	354	397	780	1,380	2,480	2,410	630
2	400	370	340	354	260	312	442	845	1,460	2,410	2,540	572
3	400	370	320	442	333	312	420	845	1,460	2,480	2,220	545
4	385	330	340	397	420	312	490	845	1,660	2,340	2,100	518
5	400	330	360	397	397	397	572	845	1,930	2,340	1,930	518
6	400	310	370	397	397	420	490	910	1,980	2,100	1,820	518
7	400	340	360	397	420	333	442	945	1,980	2,100	1,710	545
8	420	340	320	354	397	375	420	1,130	1,880	2,100	1,560	466
9	445	340	340	354	397	420	420	1,380	2,100	2,160	1,560	442
10	445	340	340	397	354	466	376	1,460	2,220	2,540	1,420	442
11	420	365	320	354	354	518	354	1,610	2,610	2,410	1,370	545
12	445	335	320	354	354	750	466	1,760	2,680	2,410	1,130	600
13	420	335	340	246	354	780	442	1,880	2,900	2,280	1,380	600
14	420	355	355	312	333	750	466	1,820	3,050	2,220	1,660	600
15	440	385	355	354	333	690	490	1,660	2,900	2,040	1,660	572
16	440	405	355	397	354	660	490	1,460	2,900	2,100	1,510	545
17	440	405	355	354	354	660	630	1,170	2,900	1,760	1,420	545
18	420	405	355	354	354	690	660	1,060	2,900	1,660	1,380	518
19	420	430	355	397	333	720	490	1,020	2,980	1,460	1,250	518
20	420	430	315	397	354	720	442	945	2,980	1,380	1,090	518
21	390	430	355	354	354	750	490	910	2,750	1,290	1,060	490
22	370	425	400	354	333	750	572	910	2,610	1,250	945	466
23	390	420	425	354	333	690	545	878	2,280	1,200	910	442
24	390	400	400	397	333	660	545	812	2,220	1,130	845	442
25	390	400	335	397	312	660	600	750	2,040	1,020	810	442
26	390	360	355	354	312	660	660	720	1,980	945	780	442
27	385	420	355	354	333	518	690	750	2,100	910	810	442
28	385	355	315	312	354	397	780	750	2,220	910	780	442
29	370	355	425	354	354	420	720	845	2,280	945	720	442
30	385	390	450	312	.....	420	780	945	2,410	1,710	690	442
31	385	.....	425	312	.....	397	.....	1,130	.....	2,340	690	.....

Daily discharge, in second-feet, of Arkansas River at Canon City, Colo., for the years ending Sept. 30, 1914–1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1916–17.												
1	397	490	466	550	343	280	435	458	900	3,430	1,560	736
2	375	490	490	550	343	343	389	527	980	3,430	1,460	705
3	397	490	490	527	435	343	366	550	860	3,110	1,260	674
4	397	518	490	527	435	366	320	550	829	2,970	1,020	643
5	397	442	490	527	458	412	343	550	940	2,900	980	612
6	397	442	518	504	435	435	389	458	1,020	2,760	860	643
7	442	466	466	504	412	366	343	435	1,020	2,550	980	674
8	466	490	397	504	412	366	366	481	1,060	2,690	1,100	612
9	466	490	397	504	412	366	412	643	1,360	3,270	1,100	481
10	490	490	442	504	458	366	412	674	1,830	3,590	1,100	458
11	490	466	420	504	481	389	412	643	2,760	3,040	1,180	444
12	466	545	442	458	504	389	412	627	2,900	2,760	1,260	426
13	518	490	466	343	458	360	435	481	3,040	2,550	1,260	421
14	518	442	490	300	389	389	481	481	3,430	2,350	1,140	463
15	490	442	466	300	389	343	481	643	3,830	2,020	980	536
16	490	490	466	300	389	343	458	900	4,170	2,150	940	527
17	490	572	442	366	366	360	435	1,140	4,340	2,020	829	513
18	490	572	466	435	366	389	366	1,310	4,510	1,960	798	481
19	490	545	466	504	366	412	343	1,460	4,760	1,960	940	375
20	466	572	466	527	389	435	320	1,460	4,760	2,020	860	366
21	490	572	442	435	389	435	300	1,410	4,340	1,890	829	366
22	518	545	518	343	435	435	343	1,310	4,250	1,660	767	375
23	545	572	518	389	435	412	412	1,260	4,340	1,960	674	375
24	545	572	490	458	435	412	412	1,220	4,250	1,890	643	371
25	570	545	490	458	435	389	412	1,140	4,250	2,090	581	366
26	545	518	420	481	412	389	458	980	4,250	2,150	550	348
27	570	545	333	481	366	389	389	798	3,830	1,410	527	348
28	518	518	354	435	366	389	366	767	3,510	2,090	550	329
29	518	490	420	458	.....	458	366	705	3,590	1,890	674	329
30	490	466	490	458	.....	527	389	705	3,590	1,760	736	329
31	490	.....	518	458	.....	527	.....	705	.....	1,710	736	.....
1917–18.												
1	312	244	320	300	550	280	366	320	1,560	1,890	930	670
2	308	343	300	304	610	300	320	320	1,410	1,660	860	730
3	300	352	300	308	458	320	280	343	1,510	1,510	860	700
4	304	366	292	312	610	343	240	343	1,710	1,510	1,010	670
5	296	366	280	316	640	366	260	366	2,020	1,560	1,050	700
6	288	343	288	320	730	389	260	435	2,410	1,560	1,050	700
7	280	320	343	280	527	435	320	610	2,690	1,310	860	700
8	292	329	361	300	504	435	280	670	2,830	1,560	790	700
9	312	329	329	320	412	412	320	730	3,110	1,890	860	640
10	308	329	375	280	366	366	320	790	3,590	1,820	860	700
11	312	343	371	320	366	343	366	760	4,080	1,890	1,010	700
12	320	343	375	320	366	343	366	730	4,420	2,020	1,170	700
13	312	338	375	366	389	343	389	640	4,590	1,890	1,170	700
14	296	308	394	280	366	343	412	580	4,950	1,610	1,130	670
15	284	338	398	280	366	343	435	550	4,950	1,560	1,090	580
16	272	366	384	240	300	343	366	550	4,860	1,460	1,090	700
17	264	343	357	260	343	320	343	760	4,760	1,890	1,090	730
18	252	300	366	343	366	320	300	970	4,950	1,760	895	670
19	256	288	389	343	343	343	280	1,090	4,680	1,660	760	504
20	236	312	371	343	300	320	300	1,260	4,160	1,220	790	580
21	224	334	366	366	320	343	300	1,460	3,910	1,010	700	580
22	240	320	361	412	366	343	320	1,360	3,910	1,090	550	412
23	272	312	329	366	412	320	366	1,410	4,760	1,170	550	240
24	272	308	325	435	366	343	366	1,610	3,590	1,010	458	160
25	264	300	329	412	343	435	366	1,820	3,430	860	389	366
26	272	308	325	280	320	412	366	1,890	3,110	790	366	120
27	284	320	320	300	320	412	389	1,710	2,550	790	366	200
28	288	300	320	320	280	412	412	1,610	2,410	730	366	220
29	312	288	320	366	.....	412	343	1,660	2,080	730	366	343
30	320	288	308	366	.....	389	320	1,710	1,960	700	527	412
31	348	.....	300	435	.....	366	.....	1,660	.....	860	580	.....

Daily discharge, in second-feet, of Arkansas River at Canon City, Colo., for the years ending Sept. 30, 1914–1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	435	550	412	318	398	350	1,140	1,140	2,360	1,650	1,380	400
2	504	458	412	310	398	358	1,040	1,010	2,120	1,830	1,600	360
3	458	527	412	390	390	370	1,080	925	1,900	2,420	1,380	380
4	366	670	412	440	358	382	925	880	1,650	2,850	1,250	689
5	458	550	412	490	358	350	1,030	864	1,350	2,530	1,130	425
6	458	458	412	490	410	350	1,100	840	1,480	2,160	995	360
7	369	412	412	440	382	318	692	880	1,370	2,200	844	352
8	280	412	412	490	422	342	545	898	1,420	1,900	1,830	340
9	320	412	412	530	422	330	492	952	1,370	1,730	905	340
10	320	366	412	490	455	310	650	898	1,370	1,610	796	640
11	366	412	412	555	480	318	531	864	1,350	1,500	745	675
12	366	458	366	530	430	330	629	786	1,390	1,320	654	745
13	389	389	412	610	390	358	650	786	1,460	1,060	626	626
14	435	389	366	580	370	342	552	800	1,650	1,140	570	780
15	458	412	412	480	310	318	685	816	1,830	1,320	510	820
16	435	366	412	530	330	310	594	1,020	1,900	1,240	498	820
17	389	389	458	580	370	310	566	1,060	1,960	1,320	796	796
18	458	389	412	565	390	342	636	1,320	1,830	1,110	745	745
19	389	389	412	570	430	410	952	1,390	2,120	1,040	654	654
20	389	412	412	520	358	480	970	1,820	2,090	1,100	640	640
21	481	435	412	480	370	555	898	2,570	2,020	1,070	605	605
22	458	412	412	455	350	530	840	2,710	2,060	887	654	654
23	412	435	366	440	350	520	880	2,640	2,020	773	640	640
24	366	400	366	470	342	470	988	2,500	1,900	661	605	605
25	412	366	366	430	350	422	1,060	2,390	1,030	591	510	510
26	481	458	320	410	350	406	988	2,710	2,020	682	540	540
27	412	435	320	422	390	390	970	2,810	1,770	796	510	510
28	389	435	320	370	350	455	1,060	2,950	1,690	968	522	522
29	458	412	320	358	.....	505	1,040	3,030	1,630	766	510	510
30	504	412	320	370	.....	580	1,390	2,850	1,590	1,010	450	450
31	481	.....	320	370	.....	854	.....	2,850	.....	1,230	450	.....
1919–20												
1	440	425	570	370	380	435	195	328	3,080	2,790	1,740	800
2	392	425	605	380	380	435	223	391	2,640	2,560	1,570	640
3	392	440	584	380	380	446	209	408	2,820	2,480	1,260	598
4	450	440	605	408	370	424	195	462	2,900	2,560	1,460	580
5	510	410	584	424	338	391	223	479	2,990	2,640	1,500	550
6	498	425	558	424	328	338	242	479	2,990	2,430	1,300	550
7	440	400	498	391	328	318	242	490	3,350	2,250	1,180	562
8	450	450	450	354	328	338	242	574	3,500	2,020	1,080	640
9	450	540	450	280	380	380	304	658	3,640	1,830	1,070	640
10	450	510	440	328	380	338	318	748	3,930	1,660	1,150	610
11	450	522	558	354	391	354	338	787	3,130	1,610	1,260	610
12	440	540	570	338	338	328	280	768	2,900	1,600	1,010	622
13	462	510	450	370	338	328	290	683	3,080	1,460	1,020	610
14	450	522	392	370	318	408	424	787	3,260	1,460	1,020	598
15	480	462	440	391	338	538	354	814	3,210	1,460	954	598
16	498	462	480	435	338	435	338	814	3,130	1,400	975	562
17	450	462	462	435	328	424	338	748	3,080	1,380	1,160	580
18	440	462	480	424	338	424	354	670	3,030	1,860	1,300	562
19	410	510	498	424	338	424	435	735	2,590	1,690	1,150	562
20	410	440	462	408	370	424	435	940	2,480	1,300	1,300	520
21	410	462	498	380	391	462	408	1,180	2,430	1,080	1,420	490
22	400	462	480	370	424	538	304	1,380	2,430	1,320	1,260	490
23	410	462	480	354	435	462	290	1,640	2,530	1,400	1,020	490
24	410	440	450	354	479	354	290	1,800	2,640	1,360	1,010	380
25	425	510	425	354	462	290	328	1,870	2,530	1,690	1,080	380
26	410	498	462	338	424	270	318	2,040	2,560	1,800	1,150	408
27	425	522	450	354	391	280	304	2,240	2,590	1,690	2,290	424
28	400	498	480	354	391	256	338	1,960	3,440	1,400	1,180	424
29	410	400	498	338	408	232	318	1,800	3,210	1,340	1,020	380
30	425	558	510	338	.....	223	318	2,210	2,960	1,380	996	380
31	450	.....	510	338	.....	223	.....	2,900	.....	1,400	940	.....

Monthly discharge of Arkansas River at Canon City, Colo., for the years ending Sept. 30, 1914–1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1913–14.				
October	500	335	375	23,100
November	425	335	354	21,100
December	425	310	355	21,800
January	380	310	354	21,800
February	380	310	348	19,300
March	410	330	355	21,800
April	380	330	348	20,700
May	2,200	355	1,130	69,500
June	4,410	1,430	2,780	165,000
July	3,260	1,920	2,510	154,000
August	4,800	755	1,320	81,200
September	620	370	477	28,400
The year	4,800	310	891	648,000
1914–15.				
October	595	370	453	27,900
November	470	370	413	24,600
January	480	280	386	23,700
February	385	280	347	19,300
March	508	310	370	22,800
April	910	385	548	32,600
May	1,360	430	772	47,500
June	2,980	1,220	2,100	125,000
July	1,940	760	1,320	81,200
August	1,170	520	698	42,900
September	525	315	446	26,500
1915–16.				
October	445	370	408	25,100
November	430	310	375	22,300
December	450	315	360	22,100
January	442	246	365	22,400
February	420	230	348	20,000
March	780	312	547	33,600
April	780	354	526	31,300
May	1,880	720	1,090	67,000
June	3,050	1,380	2,320	138,000
July	2,540	910	1,820	112,000
August	2,540	690	1,360	83,600
September	630	442	508	30,200
The year	3,050	230	836	608,000
1916–17.				
October	570	375	482	29,600
November	572	442	509	30,300
December	518	333	459	28,200
January	500	300	455	28,000
February	504	343	411	22,800
March	527	280	394	24,200
April	481	300	392	23,300
May	1,460	435	822	50,500
June	4,760	829	2,980	177,000
July	3,590	1,410	2,390	147,000
August	1,560	527	931	57,200
September	736	329	478	28,400
The year	4,760	280	892	646,000
1917–18.				
October	320	224	287	17,100
November	366	244	323	19,200
December	398	280	341	21,000
January	435	240	329	20,200
February	730	280	416	23,100
March	435	280	361	22,200
April	435	240	336	20,000
May	1,890	320	991	60,900
June	4,950	1,410	3,360	200,000
July	2,020	700	1,390	85,500
August	1,170	366	792	48,700
September	730	120	550	32,700
The year	4,950	120	790	571,000

Monthly discharge of Arkansas River at Canon City, Colo., for the years ending Sept. 30, 1914–1920—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	504	280	416	25,600
November	670	366	431	25,600
December	458	300	386	23,700
January	610	310	467	28,700
February	455	310	369	20,500
March	854	310	409	25,100
April	1,390	492	852	50,700
May	3,030	786	1,610	99,000
June	2,360	1,350	1,760	105,000
July	2,850	591	1,370	84,200
August	1,600	450	792	48,700
September	820	340	571	34,000
The year	3,030	280	789	571,000
1919–20.				
October	510	392	437	26,900
November	558	400	472	28,100
December	605	392	496	30,500
January	435	280	373	22,900
February	479	318	374	21,500
March	538	223	372	22,900
April	435	195	306	18,200
May	2,900	328	1,090	67,000
June	3,930	2,430	2,970	177,000
July	2,790	1,080	1,750	108,000
August	2,290	940	1,220	75,000
September	800	380	541	32,200
The year	3,930	195	867	630,000

ARKANSAS RIVER AT PUEBLO, COLO.

LOCATION.—150 feet below Main Street Bridge in Pueblo, Pueblo County. Nearest tributary, Fountain Creek, enters 2 miles below.

DRAINAGE AREA.—4,600 square miles.

RECORDS AVAILABLE.—May 1, 1885, to September 30, 1886; September 19, 1894, to September 30, 1920. From June 1 to September 30, 1887, and May 1 to August 31, 1889, station maintained at point 9 miles above Pueblo.

GAGE.—Bristol float-type water-stage recorder on right bank.

DISCHARGE MEASUREMENTS.—Made from Main Street Bridge.

CHANNEL AND CONTROL.—Bed composed of gravel and sand; shifting. No well defined control.

EXTREMES OF DISCHARGE.—1894–1920: Maximum daily mean discharge, 8,320 second-feet, on August 5, 1902; minimum discharge, 25 second-feet, on September 11, 1908.

ICE.—Stage-discharge relation slightly affected by ice.

DIVERSIONS.—Court decrees for diversion of 648 second-feet from Arkansas River between Pueblo and Canon City.

COOPERATION.—Complete records furnished by State engineer.

Daily discharge, in second-feet, of Arkansas River at Pueblo, Colo., for the years ending Sept. 30, 1914–1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept
1913–14.												
1	350	280	300	395	345	375	360	1,590	3,440	1,640	5,300	720
2	428	225	325	395	345	390	345	1,300	3,960	1,930	3,740	790
3	428	350	400	395	345	390	360	980	4,200	2,120	6,720	720
4	428	428	428	395	345	390	408	895	3,900	2,480	4,610	625
5	375	428	455	395	345	390	408	718	3,500	2,870	3,740	595
6	400	400	455	395	360	390	465	625	3,020	2,480	2,810	595
7	350	400	455	395	330	375	465	565	2,720	3,220	2,480	655
8	325	400	455	378	330	390	490	565	2,110	2,120	2,240	568
9	400	400	455	360	360	390	465	595	1,950	1,930	2,030	595
10	350	325	400	360	360	390	425	685	1,690	1,640	2,100	595
11	325	300	350	330	360	390	425	895	1,860	1,640	1,770	490
12	400	300	350	300	360	375	465	1,160	2,790	2,060	1,480	440
13	375	242	400	300	360	375	490	980	2,870	2,400	1,480	440
14	375	280	350	300	355	375	515	858	3,220	4,700	1,260	540
15	400	300	350	320	355	375	490	895	4,000	2,330	990	515
16	375	300	375	320	360	390	465	1,250	6,060	2,120	870	490
17	375	300	428	320	350	390	465	1,250	4,860	3,480	830	490
18	350	300	455	340	350	408	515	1,390	4,260	3,220	720	490
19	375	260	485	340	340	425	515	1,250	3,920	3,830	625	440
20	350	300	485	360	340	408	490	1,250	3,660	3,830	720	440
21	350	280	428	330	335	390	445	1,440	3,660	3,390	720	440
22	350	300	350	315	395	375	465	2,060	3,390	3,390	790	395
23	350	300	350	330	395	360	490	2,270	3,040	4,610	950	440
24	350	280	400	345	335	375	465	2,320	2,710	3,220	910	440
25	375	280	350	330	350	390	465	2,490	3,040	2,790	1,030	395
26	350	300	350	330	330	390	408	2,110	2,870	2,870	1,030	395
27	350	300	325	345	355	375	465	1,950	2,400	3,040	1,080	395
28	300	300	325	345	355	375	465	2,380	2,260	5,130	1,030	378
29	260	280	300	360	.....	375	465	2,380	1,860	4,700	950	360
30	300	300	300	330	.....	375	895	1,950	1,750	4,180	910	395
31	260	.....	300	315	.....	390	.....	2,220	.....	6,470	870	.....
1914–15.												
1	395	528	.....	590	402	358	425	955	1,170	1,820	875	398
2	395	450	.....	590	402	380	402	955	1,980	1,820	730	330
3	418	450	.....	590	425	380	402	838	2,260	1,600	595	295
4	418	450	.....	590	380	402	402	660	2,080	1,600	628	420
5	440	450	.....	590	402	380	450	695	1,860	1,490	695	420
6	465	428	.....	590	358	335	475	875	1,760	1,490	628	420
7	465	405	.....	530	358	335	590	875	1,650	1,440	800	420
8	490	385	.....	560	380	380	655	998	1,450	1,290	765	415
9	418	365	.....	530	425	402	790	955	1,310	1,150	1,040	380
10	440	385	.....	530	380	380	655	800	1,310	1,230	1,040	395
11	540	475	.....	530	380	380	530	695	1,500	1,230	875	340
12	515	450	.....	530	402	380	530	595	2,490	1,130	1,080	330
13	490	450	.....	530	425	380	530	628	3,020	1,130	765	325
14	540	450	.....	475	380	335	530	838	2,140	1,210	660	348
15	540	450	.....	475	335	335	530	1,120	1,810	1,790	595	348
16	470	450	.....	475	335	335	755	1,120	1,650	1,150	628	370
17	470	450	.....	425	335	335	1,150	1,120	1,650	1,150	2,430	370
18	470	450	.....	425	335	335	1,620	1,220	1,920	1,050	1,760	302
19	520	500	.....	402	358	358	1,220	1,360	2,030	1,000	1,550	348
20	520	450	.....	335	335	425	915	1,310	2,370	920	1,220	420
21	550	450	.....	530	335	335	800	1,260	2,620	1,080	890	395
22	550	450	.....	530	380	295	838	1,080	2,750	990	720	395
23	690	450	.....	475	358	335	1,120	915	3,240	860	960	370
24	760	428	.....	425	295	402	1,220	800	3,370	1,380	1,050	348
25	660	428	.....	450	358	590	1,120	800	3,190	1,150	890	1,080
26	750	385	.....	425	335	622	915	800	3,110	1,600	785	670
27	790	365	.....	475	335	655	730	875	2,970	1,400	682	650
28	660	405	.....	530	335	590	800	838	2,510	2,950	530	530
29	620	385	.....	450	.....	622	730	765	2,260	1,760	470	510
30	620	365	.....	502	.....	560	875	730	2,040	1,120	445	520
31	555	.....	.....	425	.....	475	.....	875	.....	955	420	.....

Daily discharge, in second-feet, of Arkansas River at Pueblo, Colo., for the years ending Sept. 30, 1914–1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915–16.												
1	560	345	450	465	170	220	360	1,070	1,300	2,130	2,120	310
2	530	342	400	430	272	245	360	1,070	1,490	2,220	2,120	310
3	530	340	425	465	430	195	395	980	1,540	2,270	2,060	250
4	470	337	425	500	465	245	430	1,120	1,740	2,210	1,920	250
5	515	330	440	500	465	300	430	1,200	1,790	2,100	1,980	225
6	515	332	430	500	465	360	465	1,200	1,790	1,940	1,830	200
7	485	335	430	500	465	330	430	1,200	1,840	1,830	1,760	178
8	510	350	390	465	500	300	395	1,120	1,890	1,980	1,670	200
9	530	355	360	465	465	330	360	1,200	1,940	2,080	1,560	370
10	530	360	360	500	465	330	330	1,440	2,140	2,340	1,410	340
11	495	337	358	465	360	395	300	1,590	2,250	2,390	1,140	340
12	490	337	328	360	360	465	300	1,590	2,520	2,240	1,190	462
13	490	340	330	300	330	735	330	1,690	2,640	2,100	1,550	430
14	550	340	332	360	300	815	395	1,790	2,640	2,200	1,460	430
15	570	430	370	430	300	735	430	1,640	2,640	1,990	1,690	462
16	570	430	368	395	300	655	395	1,490	2,520	1,830	1,460	462
17	535	490	419	395	330	655	430	1,200	2,640	1,630	1,280	430
18	535	463	420	430	360	655	535	1,120	2,640	1,620	1,100	430
19	538	490	417	465	300	695	430	1,120	2,640	1,480	1,010	430
20	540	530	415	430	300	695	430	1,070	2,580	1,280	890	400
21	542	530	413	430	272	735	395	1,020	2,520	1,230	850	370
22	478	505	410	395	272	735	395	980	2,270	1,230	810	370
23	480	420	490	330	272	695	430	980	2,170	1,230	560	370
24	482	420	438	330	272	695	465	855	2,010	1,100	595	370
25	460	420	435	330	195	655	500	735	1,850	925	560	370
26	440	395	432	330	195	655	615	695	1,800	840	665	370
27	442	370	460	330	220	615	615	655	1,790	800	735	340
28	390	370	380	330	195	395	695	695	1,880	840	528	340
29	392	370	405	300	220	300	895	775	1,930	840	430	340
30	395	410	458	330	.....	330	1,070	855	2,020	1,070	370	370
31	370	.....	455	330	.....	395	.....	938	.....	2,120	340	.....
1916–17.												
1	370	495	.....	478	340	265	340	315	1,180	3,020	1,690	671
2	310	495	.....	478	315	265	315	360	1,280	2,940	1,470	638
3	280	495	.....	450	395	240	265	450	1,280	2,620	1,320	612
4	280	462	.....	423	395	265	240	423	1,100	2,330	1,130	671
5	310	430	.....	450	368	265	240	340	1,180	2,190	1,080	612
6	310	400	.....	423	395	240	240	368	1,230	2,090	1,210	632
7	280	430	.....	423	368	240	265	368	1,180	1,940	897	657
8	310	400	.....	368	395	217	217	395	1,180	2,000	946	618
9	430	400	.....	368	423	265	240	450	1,280	2,920	946	472
10	495	400	.....	423	368	265	290	592	1,780	4,080	960	423
11	495	400	.....	450	340	240	340	625	2,410	3,100	1,050	395
12	495	430	.....	450	340	240	423	533	2,480	2,610	1,150	340
13	495	560	.....	368	368	240	450	450	2,550	2,350	1,250	315
14	495	528	.....	265	340	240	450	423	3,000	1,980	1,180	395
15	495	495	.....	217	368	240	450	450	3,320	1,840	987	483
16	528	495	.....	128	395	240	423	533	3,570	1,780	890	362
17	430	528	.....	217	368	217	290	690	4,120	1,890	996	362
18	430	460	.....	395	315	217	217	925	4,400	1,770	1,310	357
19	430	528	.....	505	315	265	217	1,230	4,690	1,760	946	260
20	430	560	.....	505	315	290	217	1,280	4,600	1,850	960	461
21	430	560	.....	450	315	290	172	1,140	4,400	1,830	827	434
22	462	528	.....	340	315	315	150	1,100	3,930	1,560	742	423
23	528	495	.....	315	315	368	195	1,050	3,840	1,470	625	401
24	595	528	.....	340	315	315	315	1,000	3,840	1,830	586	379
25	595	495	.....	395	368	290	290	1,100	3,740	1,770	527	320
26	560	462	.....	450	423	265	265	1,000	3,840	1,840	483	395
27	560	430	.....	478	315	240	265	855	3,320	2,550	472	401
28	528	400	.....	450	265	217	240	820	3,240	1,940	516	401
29	495	400	.....	423	.....	315	265	750	3,100	1,880	544	357
30	528	370	.....	423	.....	450	290	750	2,950	1,910	632	325
31	528	.....	.....	368	.....	368	.....	925	.....	1,920	657	.....

Daily discharge, in second-feet, of Arkansas River at Pueblo, Colo., for the years ending Sept. 30, 1914–1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Spet.
1917–18.												
1	335	401	245	196	140	190	330	270	1,300	1,440	270	300
2	305	406	320	218	240	240	270	215	1,360	1,240	270	240
3	305	434	305	240	215	240	125	240	1,370	1,090	270	240
4	305	406	270	223	360	190	125	240	1,380	1,090	480	270
5	280	384	245	206	450	190	125	270	1,600	1,340	700	550
6	255	373	235	190	420	240	190	390	1,760	1,440	585	620
7	235	390	222	190	480	190	165	480	2,530	1,340	480	450
8	362	346	315	190	330	240	165	620	2,350	1,440	480	330
9	390	384	320	190	215	165	190	550	2,420	1,340	550	360
10	351	295	325	190	190	100	125	550	2,690	1,650	450	270
11	330	260	333	190	190	100	165	550	3,260	2,520	450	420
12	340	295	338	190	165	90	190	660	3,520	1,760	480	620
13	330	305	345	190	140	90	190	620	4,320	1,240	450	585
14	320	315	350	330	90	90	300	450	4,500	1,140	860	480
15	357	280	355	480	64	190	390	420	4,320	1,140	620	420
16	325	300	362	300	42	190	270	390	3,960	950	550	420
17	320	384	310	300	72	215	190	420	4,320	1,240	550	420
18	315	335	275	420	165	165	125	636	4,320	995	420	390
19	346	305	275	480	90	190	100	788	4,050	1,040	300	360
20	325	280	260	330	90	140	140	852	3,600	905	190	360
21	315	275	231	360	190	140	165	1,160	3,430	905	140	360
22	335	260	235	240	240	190	140	1,140	4,320	950	125	300
23	346	280	209	300	190	215	190	1,180	6,380	860	110	270
24	270	260	150	480	165	190	215	1,310	3,600	860	110	215
25	270	255	141	620	90	240	300	1,390	3,100	585	100	215
26	290	275	164	480	90	330	300	1,490	2,660	550	90	215
27	290	300	200	300	56	300	330	1,620	2,180	480	81	240
28	290	325	132	190	140	215	390	1,420	2,000	480	49	240
29	395	295	128	300	.....	300	360	1,380	1,760	360	56	190
30	411	270	177	190	.....	300	300	1,330	1,540	420	140	165
31	373	.....	173	110	.....	215	.....	1,340	.....	360	300	.....
1918–19.												
1	190	270	215	198	279	244	1,150	1,440	2,250	1,530	1,230	314
2	190	240	270	200	286	272	1,080	1,280	1,980	1,320	1,430	179
3	190	270	215	200	286	286	1,110	1,170	1,850	1,320	1,430	78
4	190	240	200	250	300	300	1,210	1,150	1,710	1,930	1,470	1,620
5	240	240	200	300	251	300	1,280	1,040	1,550	2,250	1,130	258
6	270	215	200	300	230	300	1,330	914	1,410	2,430	1,060	258
7	140	240	200	300	272	230	860	1,910	1,470	1,830	950	204
8	125	270	190	325	286	230	286	950	1,530	1,670	1,930	223
9	125	240	190	350	272	244	610	941	1,590	1,650	1,880	160
10	110	240	230	375	314	230	578	905	1,550	1,630	730	410
11	125	300	200	400	356	179	474	869	1,310	1,550	682	941
12	110	300	190	425	363	179	506	754	1,210	1,490	690	714
13	110	300	200	450	300	198	674	706	1,270	1,210	570	634
14	190	270	230	475	265	198	815	706	1,410	1,250	450	932
15	190	270	190	500	244	198	754	754	1,540	1,450	418	1,460
16	165	270	230	514	230	166	514	842	1,610	1,230	418	842
17	165	215	230	546	244	142	426	914	1,730	1,410	426	754
18	215	240	252	514	265	130	426	1,060	1,810	1,280	666	842
19	240	230	230	482	363	148	530	1,370	1,850	1,180	674	674
20	240	240	200	570	363	265	626	1,630	1,880	1,210	714	650
21	240	140	240	514	293	410	674	1,770	1,850	1,160	714	586
22	240	165	230	466	286	490	642	2,050	1,850	1,080	642	586
23	240	190	215	498	286	402	610	2,140	1,750	1,000	602	626
24	215	240	240	498	328	418	779	2,050	1,750	878	602	546
25	240	252	190	418	328	349	1,080	2,140	1,750	815	530	466
26	240	252	150	370	286	307	1,230	2,250	2,010	1,130	466	426
27	270	240	140	370	272	286	1,300	2,420	2,370	995	410	450
28	300	240	140	370	244	314	1,300	2,490	1,710	1,640	386	498
29	240	270	140	342	.....	230	1,220	2,780	1,530	1,230	378	450
30	240	240	140	314	.....	349	1,380	2,820	1,430	1,090	321	418
31	240	.....	140	286	.....	833	.....	2,550	.....	1,430	307	.....

Daily discharge, in second-feet, of Arkansas River at Pueblo, Colo., for the years ending Sept. 30, 1914–1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	394	356	498	325	315	184	184	219	2,510	2,330	1,990	814
2	363	356	442	336	315	184	193	275	2,690	2,250	3,080	690
3	342	474	418	300	285	165	206	300	2,270	2,150	1,170	464
4	363	434	522	325	285	165	154	285	2,670	2,150	1,700	493
5	458	434	514	325	275	154	146	315	2,590	2,250	1,500	389
6	458	434	554	336	275	165	176	325	2,670	2,090	1,150	434
7	458	434	514	336	285	167	193	434	2,720	1,890	931	726
8	458	426	328	352	285	169	193	464	2,980	1,650	853	726
9	458	506	179	336	285	172	165	505	3,110	1,450	822	690
10	378	586	410	378	315	174	146	726	3,240	1,280	762	635
11	450	626	418	367	300	176	285	726	2,820	1,190	979	656
12	450	506	706	378	285	165	300	656	2,330	1,220	995	656
13	335	586	272	352	252	165	252	621	2,470	1,080	1,100	608
14	370	506	211	367	228	266	176	656	2,820	1,260	1,030	588
15	370	458	328	352	266	406	300	690	2,690	1,430	1,050	555
16	490	498	450	336	252	367	228	726	2,690	1,370	1,100	524
17	530	482	426	336	219	300	252	726	2,920	1,320	1,150	524
18	450	498	570	378	219	300	237	588	2,950	2,640	1,170	524
19	450	498	610	352	266	325	252	588	2,570	1,610	1,190	524
20	370	498	586	315	184	300	352	762	2,150	845	2,690	493
21	363	498	538	300	165	378	378	1,080	2,090	621	2,110	423
22	363	356	586	300	206	389	206	1,300	2,090	1,120	1,260	423
23	328	300	530	315	228	446	193	1,550	2,210	1,170	915	406
24	363	300	514	275	237	315	176	1,600	2,210	1,450	995	367
25	402	355	538	336	237	275	193	1,550	2,210	1,650	1,150	352
26	402	410	482	300	219	237	285	1,740	2,400	1,450	1,040	378
27	402	474	482	300	193	219	275	2,150	2,150	1,170	1,070	378
28	442	335	482	315	184	206	275	2,040	2,510	1,170	1,120	378
29	402	135	482	300	206	184	285	1,700	2,820	1,010	1,060	378
30	363	530	522	300	.....	154	228	1,890	2,490	995	995	378
31	328	.....	498	275	.....	154	.....	2,210	.....	1,150	876	.....

Monthly discharge of Arkansas River at Pueblo, Colo., for the years ending Sept. 30, 1914–1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1913–14.				
October	428	260	359	22,100
November	428	225	315	18,700
December	485	300	385	23,700
January	395	300	347	21,300
February	395	330	352	19,500
March	425	360	386	23,700
April	895	345	468	27,800
May	2,490	565	1,400	86,100
June	6,060	1,690	3,170	189,000
July	6,470	1,640	3,090	190,000
August	6,720	625	1,830	113,000
September	790	360	509	30,300
The year	6,720	225	1,050	765,000
1914–15.				
October	790	395	536	33,000
November	528	365	418	24,900
January	590	335	500	30,700
February	425	295	367	20.400
March	655	295	413	25,400
April	1,620	402	757	45,000
May	1,360	595	915	56,300
June	3,370	1,170	2,180	130,000
July	2,950	860	1,350	83,000
August	2,430	420	877	53,900
September	1,080	302	429	25,500

Monthly discharge of Arkansas River at Pueblo, Colo., for the years ending Sept. 30, 1914–1920—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1915–16.				
October	570	370	499	30,700
November	530	330	394	23,400
December	490	328	408	25,100
January	500	330	406	25,000
February	500	170	328	18,900
March	815	195	502	30,900
April	1,070	300	467	27,800
May	1,790	655	1,130	69,500
June	2,640	1,300	2,110	126,000
July	2,390	800	1,680	103,000
August	2,120	340	1,210	74,400
September	462	178	351	20,900
The year	2,640	170	790	576,000
1916–17.				
October	595	280	449	27,600
November	560	370	469	27,900
January	505	128	394	24,200
February	423	265	352	19,600
March	450	217	271	16,700
April	450	150	286	17,000
May	1,280	315	700	43,000
June	4,690	1,100	2,790	166,000
July	4,080	1,470	2,180	134,000
August	1,690	472	931	57,200
September	671	261	452	26,900
1917–18.				
October	411	235	323	19,900
November	434	255	322	19,200
December	362	128	256	15,700
January	620	110	284	17,500
February	480	42	190	10,600
March	330	90	196	12,100
April	390	100	219	13,000
May	1,620	215	786	48,300
June	6,380	1,300	3,000	179,000
July	2,520	360	1,070	65,800
August	860	49	345	21,200
September	620	165	350	20,800
The year	6,380	42	612	443,000
1918–19.				
October	270	110	201	12,400
November	300	140	244	14,500
December	270	140	201	12,400
January	570	198	391	24,000
February	363	230	289	16,000
March	833	130	285	17,500
April	1,380	286	848	50,500
May	2,820	706	1,510	92,800
June	2,250	1,210	1,680	100,000
July	2,430	815	1,400	86,100
August	1,930	307	784	48,200
September	1,620	78	573	35,200
The year	2,820	78	702	510,000
1919–20.				
October	530	328	405	24,900
November	626	136	430	25,600
December	610	179	472	29,000
January	378	275	329	20,200
February	315	165	251	14,400
March	446	154	240	14,800
April	378	146	229	13,600
May	2,210	219	948	58,300
June	3,240	2,090	2,570	153,000
July	2,640	621	1,500	92,200
August	3,080	762	1,260	77,500
September	814	352	519	30,900
The year	3,240	136	763	554,000

TENNESSEE FORK NEAR LEADVILLE, COLO.

LOCATION.—In sec. 16, T. 9 S., R. 80 W., at highway bridge a few hundred yards above junction with East Fork and 3 miles northwest of Leadville, Lake County.

DRAINAGE AREA.—45 square miles (measured on topographic map).

RECORDS AVAILABLE.—May 10 to October 31, 1890; June 18 to October 16, 1903; February 8, 1911, to September 30, 1920.

GAGE.—Vertical staff on downstream side of left bridge abutment: read by Fred Coquoz during summer and by forest ranger during winter. Datum lowered 0.40 foot October 6, 1911. Relation between present gage and gages used in 1890 and 1903 not known.

DISCHARGE MEASUREMENTS.—Made by wading or from bridge.

CHANNEL AND CONTROL.—Bed rough and composed of small boulders. Control a short distance below gage at rapids, which shifts slightly at long intervals. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 1.10 feet August 1 (discharge, 149 second-feet); no record during period of highest discharge; minimum stage, 0.25 foot March 27 (discharge, 4 second-feet).

Maximum stage recorded during year ending September 30, 1920, 2.0 feet at 10 a. m. May 26 and 27 (discharge, 430 second-feet); minimum discharge occurred during winter.

1911-1920: Maximum discharge recorded, 448 second-feet at 8 a. m. May 24, 1914; minimum discharge measured 1.3 second-feet on January 14, 1915.

ICE.—Stage-discharge relation seriously affected by ice.

DIVERSIONS.—Court decrees for diversions of 8 second-feet above the station; also a decree for diversions of 18.5 second-feet from the basin of Eagle River through Ewing ditch to that of Tennessee Fork above station. During 1919, 1,830 acre-feet, and during 1920, 2,000 acre-feet were diverted.

ACCURACY.—Stage-discharge relation shifted slightly. Rating curve well defined between 8 and 250 second-feet; applied indirectly for shifting control from July 1, 1919, to August 15, 1920. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Tennessee Fork near Leadville, Colo., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Jan. 4	T. J. Watkins	0.35	8.8	June 18	Robert Follansbee	1.12	124
Feb. 18	do	[a].42	8.8	July 22	P. V. Hodges	.75	47.6
July 22	Robert Follansbee	.43	17.0				
Nov. 1	T. J. Watkins	.58	21.8				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Tennessee Fork near Leadville, Colo., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	11	15							88	60	149	11
2	11	15							100	81	135	13
3	11	15							100	90	117	10
4	11	15		9					66	73	102	13
5	6.2	15							62	50	66	11
6	9.8	14						100	62	50	50	10
7	8.6	14							54	46	38	10
8	8.0	14							58	41	36	10
9	8.0	14		11					70	36	36	10
10	8.0	14							84	33	27	15
11	6.2	14						88	100	52	23	17
12	6.2	14				8	8		86	43	23	21
13	6.2	12							79	38	23	21
14	6.2	12							77	35	23	18
15	6.2	12							84	32	18	17
16	6.2	12						112	77	29	14	16
17	8.0	10					24		79	58	14	16
18	8.0	10			9	5			75	56	14	18
19	9.8	10							70	35	14	17
20	9.8	10							66	29	14	16
21	11	9					100		66	22	14	16
22	11	9							62	18	14	14
23	11	9							56	16	14	14
24	11	9				8			48	14	13	13
25	11	9							56	14	11	11
26	11	8							50	17	10	10
27	11	8				4			46	18	10	10
28	11	8					66		50	19	10	9
29	11	8							46	27	10	10
30	11	8							46	56	10	10
31	11					5				41	10	
1919–20.												
1	9	22						19	318	100	41	14
2	10								266	98	44	12
3	10								283	95	43	15
4	10								250	90	52	19
5	13								250	81	35	11
6	14								250	77	44	13
7	14								266	72	38	14
8	13								250	60	26	18
9	13							120	218	73	32	22
10	14								203	58	41	13
11	14								218	60	35	17
12	13								266	64	28	19
13	11								250	54	23	18
14	10								234	46	20	17
15	13							117	218	41	13	11
16	13								188	52	21	18
17	13								188	48	14	14
18	14								115	46	19	13
19	14								107	52	22	16
20	14								110	50	26	15
21	13								105	52	50	17
22	13								105	36	35	24
23	14								102	27	27	15
24	13								95	43	19	17
25	13							370	93	84	14	15
26	14							370	100	160	19	12
27	23							370	95	68	27	14
28	23							266	84	41	19	10
29	23							300	79	43	35	16
30	14							300	73	36	21	19
31	14							283		29	11	

NOTE.—Stage-discharge relation affected by ice Nov. 5–30, 1918; discharge determined from temperature and gage-height records.

Monthly discharge of Tennessee Fork near Leadville, Colo., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	11	6.2	9.24	568
November	15	8	11.5	684
June	100	46	68.8	4,090
July	90	14	39.6	2,430
August	149	10	34.3	2,110
September	21	9	13.6	809
1919–20.				
October	23	9	13.7	842
June	318	73	179	10,700
July	160	27	62.5	3,840
August	52	11	28.8	1,770
September	24	10	15.6	928

COTTONWOOD CREEK BELOW HOT SPRINGS, NEAR BUENA VISTA, COLO.

LOCATION.—In sec. 22, T. 14 S., R. 79 W., half a mile below old Hot Springs Hotel and 6 miles west of Buena Vista, Chaffee County.

DRAINAGE AREA.—69 square miles (measured on Hayden atlas).

RECORDS AVAILABLE.—April 7, 1911, to September 30, 1920. From September 23, 1910, to September 13, 1911, a station was maintained in sec. 21, 1 mile above present site. Flow at two sites comparable.

GAGE.—Vertical staff; read by E. D. Masters. On February 19, 1915, gage was moved from side of left abutment to downstream end and reset to same datum. In present position water does not pile up on gage, especially during high water, and therefore for same discharge gage height will be less.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of boulders; very rough. Control short distance below gage; shifts at long intervals. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 1.65 feet at 6 a. m., May 27, 28, 29, and 30 (discharge, 240 second-feet); minimum stage recorded, 0.30 foot at 6 a. m. April 10 (discharge, 20 second-feet).

Maximum stage recorded during year ending September 30, 1920, 1.9 feet at 6 a. m. June 12 (discharge, 342 second-feet); minimum stage, 0.25 foot, April 21 and 22 (discharge, 19 second-feet).

1911–1920: Maximum stage recorded, 2.2 feet at 6 a. m. June 18, 1917 (discharge, 467 second-feet); minimum discharge, 10 second-feet April 9 and 19, 1914.

ICE.—Stage-discharge relation not affected by ice; hot springs keep creek open.

DIVERSIONS.—Court decrees for diversions of 148 second-feet from Cottonwood Creek, of which 28 second-feet are above gaging station.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Cottonwood Creek below Hot Springs, near Buena Vista, Colo., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Jan. 5	T. J. Watkins	0.48	25.2	July 23	P. V. Hodges	1.15	102
May 26	J. B. Spiegel	1.50	193				
Nov. 2	T. J. Watkins	.50	26.5				

Daily discharge, in second-feet, of Cottonwood Creek below Hot Springs, near Buena Vista, Colo., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	38	32	26	26	22	22	22	36	122	134	60	34
2	36	31	27	26	23	22	21	37	100	156	60	31
3	35	31	27	26	23	22	21	31	89	207	60	31
4	34	31	26	26	23	22	22	32	89	177	56	31
5	34	31	27	24	22	22	22	34	89	140	51	31
6	34	31	27	24	22	21	22	39	89	122	47	38
7	35	31	26	24	22	21	21	42	122	129	44	32
8	35	28	26	24	22	22	21	42	115	106	49	32
9	34	31	26	24	22	22	22	42	110	106	49	32
10	36	31	26	24	22	21	21	42	122	86	49	38
11	35	31	25	24	22	22	21	39	148	76	48	34
12	34	31	25	25	22	22	22	39	177	73	45	35
13	34	31	26	24	22	22	22	39	177	73	44	36
14	34	30	25	24	22	22	22	51	177	81	41	44
15	32	30	26	24	21	22	21	63	186	73	39	51
16	32	27	26	24	22	22	21	63	192	73	38	42
17	32	27	27	25	22	22	21	76	207	66	38	38
18	37	27	27	25	22	22	23	89	207	63	38	36
19	37	27	26	25	22	22	25	115	207	63	36	36
20	34	27	26	25	22	22	26	177	207	60	36	36
21	34	27	26	24	22	22	27	198	192	60	35	35
22	34	27	26	23	22	22	34	198	162	60	34	32
23	32	27	26	24	22	21	37	156	162	56	33	32
24	32	28	26	24	22	22	42	129	162	53	32	32
25	32	27	25	24	22	21	42	148	140	53	35	31
26	31	27	25	24	22	21	38	207	140	49	34	31
27	28	27	25	24	22	21	38	216	140	50	34	31
28	31	27	26	24	22	21	32	222	162	49	34	31
29	32	27	26	24	.....	21	31	216	148	60	33	31
30	31	27	26	24	.....	21	34	222	148	60	31	30
31	31	.....	26	23	.....	22	.....	207	.....	60	31	.....
1919-20.												
1	30	30	27	24	23	22	20	22	222	229	73	52
2	28	26	27	24	23	22	20	22	192	229	73	52
3	30	26	27	24	22	22	20	24	192	216	73	54
4	30	26	26	24	22	22	21	24	198	216	72	54
5	31	28	26	24	22	22	21	26	207	207	70	54
6	31	27	27	24	22	22	21	26	198	198	68	52
7	32	27	27	24	22	22	21	28	257	186	63	49
8	32	27	26	24	22	22	21	32	320	186	60	47
9	31	26	26	24	22	22	21	40	320	168	60	45
10	31	25	27	24	22	22	21	41	297	168	58	44
11	30	26	26	24	22	22	21	37	277	168	57	40
12	31	26	26	24	22	22	21	33	277	168	54	40
13	31	26	26	24	22	22	21	36	257	156	52	40
14	32	26	27	24	22	22	21	34	257	145	50	38
15	32	26	26	24	22	20	21	31	257	148	49	38
16	32	27	26	23	22	22	21	29	250	148	49	37
17	32	27	26	24	22	22	20	32	277	148	51	35
18	32	27	26	24	22	22	20	44	240	124	51	34
19	32	27	25	24	22	21	20	70	222	115	49	34
20	30	27	25	23	22	22	20	89	216	110	52	34
21	31	27	26	23	22	22	19	106	222	110	58	36
22	31	26	26	23	22	22	19	115	240	106	60	36
23	30	26	26	23	22	22	21	89	257	93	60	36
24	30	27	25	23	22	21	21	115	250	106	58	36
25	30	27	25	23	22	21	21	168	250	100	57	36
26	30	28	25	23	22	21	20	148	216	134	57	38
27	31	26	25	23	22	21	20	110	257	106	56	38
28	25	28	25	23	22	21	20	122	297	97	54	37
29	29	26	25	23	22	21	20	140	277	97	54	37
30	31	26	24	23	.....	21	21	186	257	93	54	36
31	29	.....	24	23	.....	21	.....	216	.....	89	52	.....

Monthly discharge of Cottonwood Creek below Hot Springs, near Buena Vista, Colo., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	38	28	33.5	2,060
November	32	27	28.9	1,720
December	27	25	26.0	1,600
January	26	23	24.4	1,500
February	23	21	22.1	1,230
March	22	21	21.7	1,330
April	42	21	26.5	1,580
May	222	31	105	6,460
June	207	89	150	8,930
July	207	49	86.3	5,310
August	60	31	41.7	2,560
September	51	30	34.5	2,050
The year	222	21	50.1	36,300
1919–20.				
October	32	25	30.5	1,880
November	30	25	26.7	1,590
December	27	24	25.8	1,590
January	24	23	23.6	1,450
February	23	22	22.1	1,270
March	22	20	21.6	1,330
April	21	19	20.5	1,220
May	216	22	72.1	4,430
June	320	192	249	14,800
July	229	89	147	9,040
August	73	49	58.2	3,580
September	54	34	41.3	2,460
The year	320	19	61.5	44,600

CHALK CREEK (UPPER STATION) NEAR ST. ELMO, COLO.

LOCATION.—In sec. 27, T. 15 S., R. 80 W., a quarter of a mile below power plant of Tin Cup Gold Dredging Co. and 1¼ miles below St. Elmo, Chaffee County. Nearest tributary, Coal Creek, enters a quarter of a mile below.

DRAINAGE AREA.—48 square miles (measured on Forest Service atlas).

RECORDS AVAILABLE.—November 15, 1913, to September 30, 1919, when station was discontinued.

GAGE.—Friez water-stage recorder on left bank.

DISCHARGE MEASUREMENTS.—Made from footbridge near gage or by wading.

CHANNEL AND CONTROL.—Bed composed of coarse gravel. Banks not subject to overflow. Control at small rapids a short distance below gage; permanent during 1919.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 2.65 feet at 8 p. m. May 29 (discharge, 350 second-feet); minimum stage, 0.85 foot February 14 and March 6–11 (discharge, 8.5 second-feet).

ICE.—Stage-discharge relation not seriously affected by ice except for occasional short periods.

DIVERSIONS.—There are no court decrees for diversions of water that is not returned to the stream above the station. Below there are decrees for diversions of 133 second-feet from Chalk Creek.

REGULATION.—Low-water flow regulated to a certain extent by a small reservoir at St. Elmo, formed by the diversion dam for the Tin Cup Gold Dredging Co.'s power house (not used during 1919).

ACCURACY.—Stage-discharge relation permanent, except as affected by ice November 26–29, and December 26 to January 11. Rating curve well defined between 10 and 300 second-feet. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph. Records good.

The following discharge measurement was made by T. J. Watkins:

January 6, 1919: Gage height, 0.98 foot; discharge, 12.0 second-feet (stage-discharge relation affected by ice).

Daily discharge, in second-feet, of Chalk Creek (upper station) near St. Elmo, Colo., for the year ending Sept. 30, 1919.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	28	20	17	10	9.4	8.8	11	40	120	106	98	21
2	28	21	16	10	9.4	8.8	12	40	102	164	123	22
3	27	20	16	11	9.4	8.8	15	37	98	185	116	21
4	26	20	16	11	9.4	8.8	11	40	100	150	90	21
5	25	19	16	12	9.4	8.8	11	46	100	130	75	24
6	24	19	16	12	9.4	8.5	12	52	118	113	65	25
7	24	20	14	12	9.4	8.5	14	57	142	100	65	26
8	24	20	13	11	9.4	8.5	12	60	135	90	65	24
9	27	20	13	10	9.4	8.5	12	61	130	81	58	24
10	28	17	13	10	9.1	8.5	13	53	150	72	54	25
11	27	17	13	10	9.1	8.5	11	50	158	67	47	27
12	25	16	13	9.4	8.8	9.4	10	54	179	64	43	25
13	23	16	12	9.4	8.8	9.7	9	68	188	81	40	29
14	23	16	13	9.4	8.5	13	9	94	209	81	37	41
15	22	16	13	9.7	8.8	10	12	111	200	68	34	33
16	23	17	12	9.7	9.1	14	13	120	200	65	33	28
17	25	19	12	10	9.1	14	13	145	194	65	31	27
18	26	16	12	10	9.1	31	14	164	185	65	31	28
19	26	16	12	10	9.1	31	19	206	179	72	31	28
20	26	16	12	9.4	9.1	19	23	233	161	65	30	26
21	26	15	12	9.1	9.1	18	30	251	140	57	29	24
22	25	14	12	9.1	9.1	16	33	227	130	52	27	23
23	24	16	12	9.1	9.1	15	38	179	123	47	26	23
24	24	17	13	9.1	9.1	14	36	161	118	46	26	22
25	26	18	13	9.4	9.1	14	31	212	113	53	33	21
26	23	15	11	9.1	9.1	14	29	254	111	47	28	21
27	25	12	10	9.1	8.8	13	31	272	111	48	31	21
28	22	13	10	9.1	8.8	12	28	275	111	52	27	21
29	21	15	10	9.4	.....	12	30	278	113	68	24	21
30	21	16	10	9.4	.....	13	36	242	106	104	24	20
31	20	.....	9	9.4	.....	12	.....	176	.....	104	22	.....

NOTE.—Stage-discharge relation affected by ice Nov. 26–29 and Dec. 26 to Jan. 11; discharge based on one discharge measurement, temperature and gage-height records, and observer's notes.

Monthly discharge of Chalk Creek (upper station) near St. Elmo, Colo., for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	28	20	24.6	1,510
November	21	12	17.1	1,020
December	17	9	12.8	787
January	12	9.1	9.91	609
February	9.4	8.5	9.12	506
March	31	8.5	12.9	793
April	38	9	19.3	1,150
May	278	37	137	8,420
June	209	98	141	8,390
July	185	46	82.6	5,080
August	123	22	47.2	2,900
September	41	20	24.7	1,470
The year	278	8.5	45.1	32,600

96508—22WSP 507——3

WEST BEAVER CREEK NEAR VICTOR, COLO.

LOCATION.—In sec. 30, T. 16 S., R. 68 W., at Skaguay power station of Arkansas Valley Railway, Light & Power Co., 7 miles southeast of Victor, Fremont County.

DRAINAGE AREA.—70 square miles.

RECORDS AVAILABLE.—January 1, 1905, to September 30, 1920.

DETERMINATION OF DISCHARGE.—Water used through power house is brought by pipe line from reservoir 3½ miles upstream; quantity measured hourly by weir, and a quantity representing the gain or loss in the reservoir during the period is added or subtracted. To determine the natural flow of the stream the seepage through the dam is measured by weir and added to the total quantity thus obtained. This method takes no account of evaporation from the surface of the reservoir.

DIVERSIONS.—Above the power reservoir are three reservoirs from which the town of Victor obtains its municipal supply. In the upper basin are four reservoirs from which water is diverted through St. John tunnel into Lake Moraine, and thence by natural channels to Colorado Springs, where it is used as municipal supply. During 1919, 1,840 acre-feet were diverted through St. John tunnel and during 1920, 2,180 acre-feet. Below the power plant adjudicated decrees for diversions of 126 second-feet from Beaver Creek, which is formed by East and West Beaver creeks. In addition, there is an irrigation reservoir in operation which has a filing for 4,760 acre-feet.

COOPERATION.—Records are furnished through courtesy of Arkansas Valley Railway, Light & Power Co.

Monthly discharge of West Beaver Creek near Victor, Colo., for the years ending Sept. 30, 1919 and 1920.

Month.	1918–19		1919–20	
	Mean discharge in second-feet.	Run-off in acre-feet.	Mean discharge in second-feet.	Run-off in acre-feet.
October	12.4	762	8.81	542
November	7.48	445	6.74	401
December	6.60	406	5.50	338
January	5.49	338	6.36	391
February	4.87	270	8.25	475
March	6.72	413	8.22	505
April	51.4	3,060	12.5	744
May	80.9	4,970	23.6	1,450
June	35.9	2,140	19.9	1,180
July	46.6	2,870	13.8	848
August	22.0	1,350	38.1	2,340
September	12.6	750	27.1	1,610
The year	24.6	17,800	14.9	10,900

BOEHMER CREEK NEAR PIKES PEAK, COLO.

LOCATION.—In NW. ¼ sec. 32, T. 14 S., R. 68 W., 3½ miles south of Pikes Peak, El Paso County, above Little Beaver and Sackett creeks. Elevation of station, 11,000 feet.

DRAINAGE AREA.—7.2 square miles (measured on topographic map). About 75 per cent of this area is above timber line. To the natural drainage has been added that of West Beaver Creek above intake of Strickler tunnel.

RECORDS AVAILABLE.—October 1, 1909, to September 30, 1920.

DETERMINATION OF DISCHARGE.—Flow measured by sharp-crested weir, 60 inches long, with complete end contraction. A stake is driven into bed of stream in pool above weir, so that its head is level with crest of weir; depth of water over stake is measured by steel scale. Discharge is computed by Francis formula.

REGULATION.—Flow regulated by series of three reservoirs having an aggregate capacity of 1,400 acre-feet; reservoirs operated by Colorado Springs water department.

DIVERSIONS.—Water diverted above weir for use in Victor is measured and added to flow over Boehmer Creek weir to show total run-off.

COOPERATION.—Monthly discharge computed from records furnished by Colorado Springs water department.

Monthly discharge of Boehmer Creek near Pikes Peak, Colo., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 7.2 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
1918–19.						
October	4.47	2.07	3.44	0.478	0.55	212
November	2.61	2.07	2.30	.319	.36	137
December	2.61	1.13	1.87	.260	.30	115
January	1.13	.73	.99	.138	.16	60.9
February	1.35	.64	.91	.126	.13	50.5
March	1.58	.92	1.09	.151	.17	67.0
April	8.21	1.13	2.63	.365	.41	156
May	33.0	7.80	20.5	2.85	3.29	1,260
June	23.6	17.3	19.3	2.68	2.99	1,150
July	19.5	11.9	15.8	2.19	2.52	972
August	13.3	6.9	10.0	1.39	1.60	615
September	5.51	3.01	3.82	.531	.59	227
The year	33.0	.64	6.93	.963	13.07	5,020
1919–20.						
October	3.20	2.61	2.83	.393	.45	174
November	5.15	1.95	3.44	.478	.53	205
December	1.95	.92	1.34	.186	.21	82.4
January	1.13	1.02	1.08	.150	.17	66.4
February	7.72	1.13	5.12	.711	.77	295
March	5.87	.82	2.73	.379	.44	168
April	1.35	.82	.98	.136	.15	58.3
May	11.7	1.35	5.32	.739	.85	327
June	7.40	4.47	5.53	.768	.86	329
July	6.00	4.10	5.00	.695	.80	307
August	23.6	5.50	12.5	1.74	2.01	769
September	18.0	5.15	9.07	1.26	1.41	540
The year	23.6	.82	4.57	.636	8.65	3,320

LITTLE BEAVER CREEK NEAR PIKES PEAK, COLO.

LOCATION.—In NW. ¼ NW. ¼ sec. 32, T. 14 S., R. 68 W., just above mouth of creek and 3½ miles south of Pikes Peak, El Paso County. Little Beaver Creek enters Boehmer Creek from west 0.3 mile above reservoir No. 4. Elevation of station, 11,000 feet.

DRAINAGE AREA.—1.00 square mile (measured on topographic map). About 25 per cent of area above timber line; remainder sparsely timbered.

RECORDS AVAILABLE.—October 1, 1909, to September 30, 1920.

DETERMINATION OF DISCHARGE.—Flow measured by sharp-crested weir, 24 inches long, with complete end contraction. A stake is driven into bed of stream in pool above weir, so that its head is level with crest of weir; depth of water over stake is measured by steel scale. Discharge is computed by Francis formula.

DIVERSIONS.—None.

REGULATIONS.—None.

COOPERATION.—Monthly discharge computed from records furnished by Colorado Springs water department.

Monthly discharge of Little Beaver Creek near Pikes Peak, Colo., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 1.00 square mile.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
1918–19.						
October	0.45	0.16	0.32	0.32	0.37	19.7
November	.29	.16	.21	.21	.23	12.5
December	.29	.16	.19	.19	.22	11.7
January	.16	.16	.16	.16	.18	9.84
February	.10	0	.05	.05	.05	2.78
March	0	0	0	0	0	0
April	1.04	.10	.28	.28	.31	16.7
May	5.05	.45	2.23	2.23	2.57	137
June	2.73	1.14	1.55	1.55	1.73	92.2
July	1.93	1.00	1.39	1.39	1.60	85.5
August	1.04	.54	.77	.77	.89	47.3
September	.54	.36	.46	.46	.51	27.4
The year	5.05	.00	.64	.64	8.66	463
1919–20.						
October	.36	.16	.24	.240	.28	14.8
November	.16	.10	.11	.110	.12	6.6
December	.12	.05	.08	.080	.09	4.9
January	.18	.16	.16	.160	.18	9.8
February	.16	.05	.11	.110	.12	6.3
March	.05	.03	.04	.040	.05	2.5
April	.16	.03	.09	.090	.10	5.4
May	1.53	.16	.69	.690	.80	42.4
June	1.28	.72	.94	.940	1.05	55.9
July	.82	.54	.68	.680	.78	41.8
August	2.34	.63	1.27	1.27	1.46	78.1
September	1.78	.82	1.20	1.20	1.34	71.4
The year	2.34	.03	.47	.47	6.37	340

SACKETT CREEK NEAR PIKES PEAK, COLO.

LOCATION.—In SE. ¼ NW. ¼ sec. 32, T. 14 S., R. 68 W., just above mouth of creek and 4 miles southeast of Pikes Peak, El Paso County. Sackett Creek enters Boehmer Creek from north a short distance above reservoir No. 4. Elevation of station, 11,000 feet.

DRAINAGE AREA.—0.65 square mile (measured on topographic map). About 30 per cent of area above timber line; remainder sparsely timbered.

RECORDS AVAILABLE.—October 1, 1909, to September 30, 1920.

DETERMINATION OF DISCHARGE.—Flow measured by sharp-crested weir 24 inches long with complete end contraction. A stake is driven into bed of stream in pool above weir so that its head is level with crest of weir; depth of water over stake is measured by steel scale. Discharge is computed by Francis formula.

DIVERSIONS.—None.

REGULATION.—None.

COOPERATION.—Monthly discharge computed from records furnished by Colorado Springs water department.

Monthly discharge of Sackett Creek near Pikes Peak, Colo., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 0.65 square mile.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
1918-19						
October	0.22	0.05	0.16	0.246	0.28	9.84
November	.05	0	.02	.031	.03	1.19
December	0	0	0	0	0	0
January	0	0	0	0	0	0
February	0	0	0	0	0	0
March	0	0	0	0	0	0
April	.45	0	.08	.123	.14	4.76
May	6.64	.16	2.19	3.37	3.88	135
June	1.34	.36	.73	1.12	1.25	43.4
July	.63	.10	.46	.708	.82	28.3
August	.36	.10	.21	.323	.37	12.9
September	.16	.10	.11	.169	.19	6.55
The year	6.64	0	.33	.512	6.96	242
1919-20.						
October	.05	.02	.03	.046	.05	1.8
November	0	0	0	0	0	0
December	0	0	0	0	0	0
January	0	0	0	0	0	0
February	0	0	0	0	0	0
March	0	0	0	0	0	0
April	0	0	0	0	0	0
May	1.04	.02	.42	.647	.75	25.8
June	.63	.22	.45	.692	.77	26.8
July	.45	.16	.31	.478	.55	19.1
August	2.96	.36	1.24	1.91	2.20	76.2
September	1 40	.45	.85	1.31	1.46	50.6
The year	2.96	0	.28	.430	5.78	200

LION CREEK NEAR HALFWAY, COLO.

LOCATION.—In NW. ¼ sec. 15, T. 14 S., R. 68 W., at mouth of creek, half a mile southwest of Halfway, El Paso County. Lion Creek enters Ruxton Creek from west. Elevation of station, 9,250 feet.

DRAINAGE AREA.—2.00 square miles (measured on topographic map). Includes all area above the Crater apparently tributary to Sheep Creek. About 30 per cent of area above timber line; remainder sparsely timbered.

RECORDS AVAILABLE.—April 1, 1908, to September 30, 1920.

DETERMINATION OF DISCHARGE.—Flow measured by sharp-crested weir 30 inches long with complete end contraction. A stake is driven into bed of stream in pool above weir, so that its head is level with crest of weir; depth of water over stake is measured by steel scale. Discharge is computed by Francis formula.

DIVERSIONS.—None.

REGULATIONS.—None.

COOPERATION.—Monthly discharge computed from records furnished by Colorado Springs water department.

Monthly discharge of Lion Creek near Halfway, Colo., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 2.00 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
1918–19.						
October	1.46	1.10	1.26	0.630	0.73	77.5
November	1.17	.79	.99	.500	.56	58.9
December	.86	.67	.73	.365	.42	44.9
January	.73	.56	.63	.315	.36	38.7
February	.56	.51	.53	.265	.28	29.4
March	.61	.46	.52	.260	.30	32.0
April	1.98	.51	1.08	.540	.60	64.3
May	2.75	1.03	1.76	.880	1.01	108
June	2.78	.91	1.19	.595	.66	70.8
July	1.63	.91	1.24	.620	.72	76.2
August	1.63	1.30	1.43	.715	.82	87.9
September	1.52	.97	1.18	.590	.66	70.2
The year	2.78	.46	1.05	.523	7.12	759
1919–20.						
October	1.10	.91	1.00	.500	.58	61.5
November	.91	.79	.86	.430	.48	51.2
December	.79	.67	.70	.350	.40	43.0
January	.67	.56	.60	.300	.35	36.9
February	.67	.61	.62	.310	.33	35.7
March	.67	.56	.61	.305	.35	37.5
April	.91	.27	.64	.320	.36	38.1
May	.97	.73	.82	.410	.47	50.4
June	.97	.46	.60	.300	.33	35.7
July	.97	.41	.53	.265	.31	32.6
August	.91	.67	.76	.380	.44	46.7
September	2.75	.79	1.41	.705	.79	83.9
The year	2.75	.27	.76	.380	5.19	553

SHEEP CREEK NEAR HALFWAY, COLO.

LOCATION.—In SW. ¼ sec. 11, T. 14 S., R. 68 W., a quarter of a mile west of Halfway, El Paso County. No tributary between station and mouth, a short distance below. Sheep Creek enters Ruxton Creek from west a short distance above Halfway. Elevation of station, 9,100 feet.

DRAINAGE AREA.—0.73 square mile (measured on topographic map). Does not include any area above the Crater as this is most probably tributary to Lion Creek. Practically all below timber line, but sparsely timbered.

RECORDS AVAILABLE.—April 1, 1908, to September 30, 1920.

DETERMINATION OF DISCHARGE.—Flow measured by sharp-crested weir 30 inches long with complete end contraction. A stake is driven into bed of stream in pool above weir, so that its head is level with crest of weir; depth of water over stake is measured by steel scale. Discharge is computed by Francis formula.

DIVERSIONS.—None.

REGULATION.—None.

COOPERATION.—Monthly discharge computed from records furnished by Colorado Springs water department.

Monthly discharge of Sheep Creek near Halfway, Colo., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 0.73 square mile.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
1918–19.						
October	0.46	0.36	0.42	0.575	0.66	25.8
November	.41	.32	.37	.507	.57	22.0
December	.36	.27	.32	.438	.50	19.7
January	.27	.27	.27	.370	.43	16.6
February	.27	.20	.22	.301	.31	12.2
March	.20	.16	.19	.260	.30	11.7
April	2.07	.23	.74	1.01	1.13	44.0
May	2.75	.91	1.77	2.42	2.79	109
June	.91	.46	.62	.849	.95	36.9
July	.97	.46	.74	1.01	1.16	45.5
August	.91	.46	.63	.863	1.00	38.7
September	.73	.36	.48	.658	.73	28.6
The year	2.75	.16	.57	.773	10.53	411
1919–20.						
October	.41	.32	.35	.480	.55	21.5
November	.46	.23	.28	.384	.43	16.7
December	.27	.23	.23	.316	.36	14.1
January	.27	.23	.23	.316	.36	14.1
February	.23	.23	.23	.316	.34	13.2
March	.27	.20	.23	.316	.36	14.1
April	.32	.13	.25	.343	.38	14.9
May	.79	.41	.55	.753	.87	33.8
June	.61	.23	.38	.522	.58	22.6
July	.41	.20	.28	.384	.44	17.2
August	2.07	.36	1.17	1.60	1.84	71.9
September	1.17	.56	.86	1.18	1.32	51.2
The year	2.07	.13	.42	.575	7.83	305

SOUTH RUXTON CREEK AT HALFWAY, COLO.

LOCATION.—In SW. sec. 11, T. 14 S., R. 68 W., just above hydroelectric intake at Halfway, El Paso County. No tributary between station and mouth, a short distance below. South Ruxton Creek enters Ruxton Creek from south at Halfway. Elevation of station, 9,000 feet.

DRAINAGE AREA.—3.95 square miles (measured on topographic map). Practically all below timber line and heavily timbered.

RECORDS AVAILABLE.—June 1, 1906, to September 30, 1920.

DETERMINATION OF DISCHARGE.—Flow measured by two sharp-crested weirs, with complete end contraction. Discharge is computed by Francis formula. The main weir is one-third mile above mouth of creek and a short distance above hydroelectric intake which has a capacity of 4.63 second-feet. The second weir is half way between main weir and mouth of the creek and measures the inflow chiefly from springs below intake and a small amount of seepage. At all times except during high water, the capacity of intake is sufficient to take entire flow passing main weir, and flow at the two weirs is combined to give the total run-off from the basin. During high water the excess passing intake and recorded at lower weir does not represent increased flow between weirs, and is discarded. In its place is used a constant quantity based on inflow and seepage at other times.

DIVERSIONS.—None.

REGULATION.—None.

COOPERATION.—Monthly discharge computed from records furnished by Colorado Springs water department.

Monthly discharge of South Ruxton Creek at Halfway, Colo., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 3.95 square miles].

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
1918–19.						
October	2.10	1.60	1.87	0.473	0.55	115
November	1.75	1.30	1.51	.382	.43	89.8
December	1.38	1.17	1.23	.312	.36	75.6
January	1.17	.97	1.08	.273	.31	66.4
February	.97	.85	.92	.233	.24	51.1
March	1.03	.79	.90	.228	.26	55.3
April	5.28	.91	2.38	.603	.67	142
May	8.83	4.10	7.45	1.89	2.18	458
June	8.57	4.41	5.30	1.34	1.50	315
July	5.40	4.00	4.50	1.14	1.31	277
August	4.00	2.40	3.14	.795	.92	193
September	2.57	2.07	2.30	.582	.65	137
The year	8.83	.79	2.73	.691	9.38	1,980
1919–20.						
October	2.10	1.52	1.84	.466	.54	113
November	1.52	1.24	1.37	.347	.39	81.5
December	1.24	1.10	1.15	.291	.34	70.7
January	1.10	.97	1.03	.261	.30	63.3
February	.97	.91	.94	.238	.26	54.1
March	1.10	.91	.96	.243	.28	59.0
April	1.30	.85	1.03	.261	.29	61.3
May	3.41	1.17	1.97	.499	.58	121
June	2.84	1.90	2.24	.567	.63	133
July	2.75	1.52	1.85	.468	.54	114
August	8.40	1.98	5.90	1.49	1.72	363
September	5.17	2.23	3.58	.903	1.01	213
The year	8.40	.85	1.99	.504	6.87	1,450

CABIN CREEK NEAR HALFWAY, COLO.

LOCATION.—In SW. ¼ NW. ¼ sec. 11, T. 14 S., R. 68 W., just above hydroelectric intake, about three-eighths mile north of Halfway, El Paso County. Cabin Creek enters Ruxton Creek half a mile below Halfway. Elevation of station, about 9,000 feet.

DRAINAGE AREA.—2.4 square miles (measured on topographic map). About 15 per cent of area above timber line; remainder sparsely timbered.

RECORDS AVAILABLE.—October 1, 1906, to September 30, 1920.

DETERMINATION OF DISCHARGE.—Flow measured by two sharp-crested weirs with complete end contraction. Discharge computed by Francis formula. The main weir is about one-third of a mile above mouth of creek and just above the hydroelectric intake. The second weir is 50 feet above mouth of creek and measures flow from springs and small tributaries entering below intake. Except during high water the measured flow at weirs is combined to give total run-off from basin. During high water, record from the lower weir is discarded and inflow estimated. (See South Ruxton Creek at Halfway, Colo.)

DIVERSIONS.—None.

REGULATIONS.—None.

COOPERATION.—Monthly discharge computed from records furnished by Colorado Springs water department.

Monthly discharge of Cabin Creek near Halfway, Colo., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 2.4 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
1918–19.						
October	1.83	1.24	1.50	0.625	0.72	92.2
November	1.24	.85	1.05	.437	.49	62.5
December	.85	.73	.75	.312	.36	46.1
January	.67	.46	.57	.238	.27	35.0
February	.46	.41	.43	.179	.19	23.9
March	.51	.36	.44	.183	.21	27.1
April	3.70	.56	1.71	.712	.79	102
May	5.74	3.31	4.38	1.82	2.10	269
June	3.50	1.75	2.29	.954	1.06	136
July	3.31	1.63	2.66	1.11	1.28	164
August	2.49	1.45	1.80	.750	.86	111
September	1.65	1.03	1.25	.521	.58	74.4
The year	5.74	.36	1.58	.656	8.91	1,140
1919–20.						
October	1.10	.91	.99	.413	.48	60.9
November	.91	.73	.81	.338	.38	48.2
December	.73	.56	.63	.263	.30	38.7
January	.56	.46	.49	.204	.24	30.1
February	.46	.36	.44	.183	.20	25.3
March	.51	.36	.41	.171	.20	25.2
April	.79	.27	.53	.221	.25	31.5
May	2.67	1.03	1.63	.680	.78	100
June	2.10	1.10	1.55	.647	.72	92.2
July	1.24	.85	1.04	.433	.50	64.0
August	5.28	1.10	3.19	1.33	1.53	196
September	4.52	1.90	2.85	1.19	1.33	170
The year	5.28	.27	1.22	.508	6.91	882

SUTHERLAND CREEK NEAR MANITOU, COLO.

LOCATION.—In SW. ¼ sec. 9, T. 14 S., R. 67 W., 1½ miles southeast of Manitou, El Paso County. No large tributary between station and mouth, 1 mile below. Elevation of station, 6,600 feet.

DRAINAGE AREA.—4.4 square miles (measured on topographic map). Practically all below timber line.

RECORDS AVAILABLE.—January 1, 1918, to September 30, 1920.

DETERMINATION OF DISCHARGE.—Flow measured by sharp-crested weir, 30 inches long, with complete end contraction. A stake is driven into bed of stream in pool above weir, so that its head is level with crest of weir, depth of water over stake is measured by steel scale. Discharge is computed by Francis formula.

DIVERSIONS.—None.

REGULATION.—None.

COOPERATION.—Monthly discharge computed from records furnished by Colorado Springs water department.

Monthly discharge of Sutherland Creek near Manitou, Colo., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 4.4 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
1918–19.						
October	1.17	0.79	0.86	0.195	0.22	52.9
November	.97	.79	.84	.191	.21	50.0
December	.85	.79	.79	.180	.21	48.6
January	1.17	.56	.69	.157	.18	42.4
February	.79	.46	.66	.150	.16	36.7
March	1.03	.67	.78	.177	.20	48.0
April	4.52	1.03	1.91	.434	.48	114
May	6.32	3.70	4.86	1.10	1.27	299
June	3.70	1.60	2.49	.566	.63	148
July	2.23	1.30	1.59	.361	.42	97.8
August	1.90	.79	1.09	.248	.29	67.0
September	1.75	.79	1.05	.239	.27	62.5
The year	6.32	.46	1.47	.334	4.54	1,070
1919–20.						
October	1.03	.79	.86	.195	.22	52.9
November	.91	.67	.79	.180	.20	47.0
December	.79	.67	.74	.168	.19	45.5
January	.79	.67	.74	.168	.19	45.5
February	.79	.67	.69	.157	.17	39.7
March	1.03	.67	.70	.159	.18	43.0
April	1.03	.79	.87	.198	.22	51.8
May	1.90	1.03	1.44	.327	.38	88.5
June	1.60	.91	1.20	.273	.30	71.4
July	.91	.56	.77	.175	.20	47.3
August	2.93	.79	1.78	.405	.47	109
September	1.90	.79	1.27	.289	.32	75.6
The year	2.93	.56	.99	.224	3.04	717

BEAR CREEK NEAR COLORADO SPRINGS, COLO.

LOCATION.—In NE. ¼ sec. 21, T. 14 S., R. 67 W., 3½ miles west of Colorado Springs, El Paso County. Nearest tributary, Hunters Run, enters a short distance above. Elevation of station, 6,615 feet.

DRAINAGE AREA.—6.9 square miles (measured on topographic map). Practically all below timber line.

RECORDS AVAILABLE.—March 1, 1918, to September 30, 1920.

DETERMINATION OF DISCHARGE.—Flow measured by sharp-crested weir, 30 inches long, with complete end contraction. A stake is driven into bed of stream in pool above weir, so that its head is level with crest of weir; depth of water over stake is measured by steel scale. Discharge is computed by Francis formula.

DIVERSIONS.—None.

REGULATION.—None.

COOPERATION.—Monthly discharge computed from records furnished by Colorado Springs water department.

Monthly discharge of Bear Creek near Colorado Springs, Colo., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 6.9 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
1918–19.						
October	2.57	1.90	2.14	0.310	0.36	132
November	2.07	1.17	1.86	.270	.30	111
December	2.07	1.30	1.62	.235	.27	99.6
January	1.45	1.30	1.39	.202	.23	85.5
February	1.90	1.24	1.34	.194	.20	74.4
March	3.31	1.30	1.78	.258	.30	109
April	10.2	3.06	4.62	.670	.75	275
May	11.8	5.40	8.27	1.20	1.38	508
June	5.28	2.93	3.89	.564	.63	231
July	3.50	1.90	2.50	.362	.42	154
August	2.67	1.24	1.78	.258	.30	109
September	6.68	1.30	2.21	.320	.36	132
The year	11.8	1.17	2.80	.404	5.50	2,020
1919–20.						
October	2.07	1.75	1.86	.270	.31	114
November	2.07	1.17	1.75	.254	.28	104
December	1.63	1.30	1.55	.225	.26	95.3
January	1.63	1.03	1.41	.204	.24	86.7
February	2.10	1.60	1.76	.255	.28	101
March	2.57	1.45	1.90	.275	.32	117
April	2.49	1.30	1.91	.277	.31	114
May	3.06	2.07	2.36	.342	.39	145
June	2.60	1.45	1.94	.281	.31	115
July	1.63	1.03	1.35	.196	.23	83.0
August	8.05	1.30	3.31	.480	.55	204
September	3.22	1.98	2.50	.362	.40	149
The year	8.05	1.03	1.97	.286	3.88	1,430

NEOSHO RIVER NEAR IOLA, KANS.

LOCATION.—In NE. ¼ sec. 9, T. 25 S., R. 18 E., 2½ miles south and 1½ miles west of Iola, Allen County. Elm Creek enters from east 1 mile upstream, and Owl Creek enters from west 8 miles downstream.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 12, 1917, to September 30, 1920. August 1, 1895, to November 30, 1903, a gaging station was maintained about 4 miles upstream, 1 mile west of Iola, at city water and power house dam. The United States Weather Bureau staff gage is a short distance upstream from this dam.

GAGE.—Stevens continuous water-stage recorder on left bank. Staff gage at this location is in two sections; lower inclined, upper vertical and fastened to downstream side of concrete gage well. During periods when recorder was not operating satisfactorily staff gage was read by Ruth Conger until March 14, 1920, and by Esther Teats thereafter.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading above pipe-line ford about three-fourths of a mile downstream from gage.

CHANNEL AND CONTROL.—Control is long shale riffle, half a mile downstream from gage, terminating at pipe-line ford, where a 16-inch gas pipe line, anchored by concrete blocks in channel, crosses the stream bed; probably permanent. At low water, pooled section at gage. Bed composed of gravel. Left bank is high and well-defined ledge of limestone confines the flood channel on the left bank near the gage. Right bank is lower but is overflowed only for about three fourths of a mile at extreme high stages. On account of the high banks this section of the river is less subject to overflow than elsewhere along the Neosho Valley, in this vicinity. Channel is straight for a long distance upstream and bends slightly downstream from gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 19.4 feet at 4 a. m. March 21 (discharge, 23,700 second-feet); minimum stage, 2.55 feet, October 3 to 5 (discharge, 8 second-feet).

Maximum stage recorded during year ending September 30, 1920, 13.1 feet at 11 a. m. September 9 (discharge, 11,300 second-feet); minimum stage 1.9 feet June 23 (discharge, 1 second-foot).

1917–1920: Maximum stage recorded, same as given above for March 21, 1919; minimum stage that of June 23, 1920.

1895–1903: United States Geological Survey record: Maximum stage recorded, 22.0 feet, June 3, 1904 (discharge, 39,100 second-feet); higher discharge given for 20.1 feet, May 24, 1896 (discharge, 45,600 second-feet). 1904: Maximum stage, 24.0 feet, July 10, 1904, determined from high-water marks (discharge, estimated as 74,600 second-feet). Minimum discharge, zero, several days in September and October, 1897.

ICE.—Stage-discharge relation affected by ice; flow estimated from observer's notes, and records of precipitation and temperature. No winter discharge measurements made.

DIVERSIONS.—Water is taken from river by cities upstream for domestic water supply.

REGULATION.—Low-water flow is regulated by dams upstream.

ACCURACY.—Stage-discharge relation fairly permanent. Rating curve, used October 1, 1918, to May 20, 1919, well defined below 10,000 second-feet; extended to cover high stages by area-velocity curve study; curve used May 21, 1919 to September 30, 1920, well defined between 40 and 10,000 second-feet. Water-stage recorder checked weekly by observer's reading of outside staff gage to quarter-tenths. No record from water-stage recorder: October 6–12, 23–25, 30, November 8–14, 1918, October 25, 26, October 31 to November 12, December 9–12, 1919, March 7–14, June 7–9, July 16, July 29 to August 4, 1920; approximate gage heights for purposes of estimating discharge were determined from gage relation between United States Weather Bureau gage above dam at Iola (see "Location," "Records available") and United States Geological Survey water-stage recorder, using United States Weather Bureau gage record. March 26 to August 1, 1919, intake pipe was partially clogged and recorder was not always recording same as outside staff gage. During this period observer made daily readings on staff gage which enabled the graph to be corrected to outside gage datum. Well and intake were cleaned, August 2, 1919. March 30, 1920, recorder started to read higher than outside gage; intake and well partially clogged. This condition occurred irregularly with the stage of the river. August 29, 1920, the well was cleaned out thoroughly, but a rapid rise in river prevented cleaning intake pipe until October 1, 1920. During these periods observer made some extra readings and graph was corrected to outside gage datum. Daily discharge ascertained by applying mean daily gage height to rating table, except for periods, December 29, 1918, to January 18, 1919, and December 12–28, 1919, when stage-discharge relation was affected by ice; flow estimated for these periods from observer's notes and records of precipitation and temperature. Records good for low and medium stages, fair for high stages on account of intake clogging and uncertainty in gage record during these periods, for year ending September 30, 1919; good for year ending September 30, 1920.

Discharge measurements of Neosho River near Iola, Kans., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 26	R. C. Rice	5.57	1,380	Aug. 3	E. L. Grant	3.04	96
May 22	do	10.28	6,780	1920.			
23	do	9.46	5,850	Mar. 19	A. K. Gowans	2.82	50
				Aug. 26	do	6.42	2,260

Daily gage height, in feet, of Neosho River near Iola, Kans., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	2.6	4.7	3.55	4.35	4.45	4.25	5.0	11.95	4.85	6.6	3.1	2.75
2	2.6	4.25	3.55	4.4	4.4	4.15	4.95	14.6	4.65	5.8	3.05	2.75
3	2.55	3.95	3.55	4.55	4.3	4.15	4.9	16.0	4.65	5.1	3.05	2.8
4	2.55	3.8	3.5	4.2	4.3	4.55	4.75	11.65	5.05	4.7	3.1	2.8
5	2.55	3.7	3.45	4.15	4.6	5.2	4.7	6.85	6.05	4.45	3.1	2.8
6	.....	3.6	3.4	4.1	5.0	4.85	4.55	6.35	6.0	4.8	3.6	2.8
7	.....	4.85	3.5	4.0	4.8	4.65	4.65	6.0	5.55	4.45	3.6	2.8
8	.....	.....	3.6	4.0	4.5	4.45	5.7	5.7	5.0	4.1	3.2	2.8
9	.....	.....	3.6	4.0	4.35	4.35	8.4	5.45	4.7	3.95	3.1	2.8
10	.....	.....	3.55	4.0	4.2	4.25	11.35	5.2	6.8	3.9	3.0	2.8
11	.....	.....	3.55	4.0	4.15	4.2	12.15	4.95	6.9	3.8	3.0	2.8
12	.....	.....	3.5	4.2	4.1	4.15	11.25	4.95	6.5	3.65	2.9	2.8
13	4.35	.....	3.5	4.85	4.15	4.1	8.4	5.55	5.5	3.55	3.0	2.95
14	4.0	.....	3.7	5.15	4.25	4.1	6.7	5.6	6.5	3.45	3.0	2.9
15	3.75	4.45	4.35	5.9	4.25	4.1	5.7	5.1	6.4	3.75	3.0	2.9
16	3.55	4.25	5.4	6.9	4.25	5.7	5.4	5.95	6.3	3.7	2.95	2.9
17	3.45	4.2	5.55	7.35	4.15	12.45	5.15	5.6	5.65	3.35	2.95	2.8
18	3.4	4.05	4.9	7.75	4.05	15.6	5.0	5.6	5.3	3.25	2.9	2.8
19	3.25	4.0	4.5	9.1	4.0	17.65	4.85	13.0	5.65	3.3	2.9	2.75
20	3.15	3.9	4.8	9.95	4.05	19.0	4.75	14.9	5.9	3.2	2.85	2.75
21	3.0	3.8	5.25	10.4	4.1	18.65	4.65	10.65	5.6	3.2	2.85	2.7
22	3.0	3.7	4.95	9.25	4.55	9.7	4.55	10.4	6.05	3.2	2.8	2.7
23	.....	3.6	5.05	7.6	5.3	6.4	4.55	9.1	8.5	3.25	2.8	2.7
24	.....	3.55	4.95	6.5	5.65	5.9	4.45	6.25	9.05	3.2	2.8	2.7
25	.....	3.5	4.65	5.9	5.35	5.65	4.4	5.25	7.55	3.1	2.85	2.65
26	3.15	3.45	4.4	5.55	4.85	5.55	4.4	5.15	5.3	3.1	2.85	2.7
27	3.3	3.45	4.15	5.3	4.5	5.45	4.4	5.0	5.15	3.2	2.85	2.75
28	4.9	3.55	4.05	5.1	4.4	5.35	4.85	4.95	4.8	3.1	3.05	2.75
29	7.75	3.6	4.2	4.9	.....	5.2	4.95	5.05	4.25	3.0	3.0	2.75
30	.....	3.55	4.35	4.7	.....	5.1	7.05	5.05	6.7	3.1	2.85	2.75
31	5.45	.....	4.5	4.55	.....	5.1	.....	4.95	.....	3.05	2.8	.....
1919–20.												
1	2.75	.....	3.05	3.0	2.85	2.8	3.75	3.25	3.8	2.15	.....	8.1
2	2.7	.....	3.0	3.05	2.85	2.8	3.85	3.2	6.25	8.7	.....	8.2
3	2.75	.....	2.9	3.05	2.85	2.8	3.55	3.25	5.15	8.4	.....	6.55
4	2.75	.....	2.85	2.95	2.85	2.85	3.55	3.5	4.85	5.2	3.5	8.25
5	2.75	.....	2.8	2.95	2.85	2.9	3.6	3.55	5.75	3.9	3.3	7.75
6	2.75	.....	2.8	2.95	2.85	2.9	3.85	3.5	4.55	3.45	3.1	6.4
7	2.75	2.9	2.8	3.0	2.85	.....	3.8	3.45	.....	3.1	3.0	6.0
8	2.75	.....	2.85	2.95	2.9	.....	3.6	3.4	.....	2.85	2.95	10.45
9	2.8	2.85	2.95	2.95	2.9	.....	3.5	3.3	.....	2.75	3.95	12.75
10	2.95	.....	.....	2.95	2.95	.....	3.45	3.25	3.35	2.7	4.15	9.25
11	2.95	.....	.....	3.0	2.9	.....	3.45	3.2	2.8	2.6	3.5	5.75
12	2.85	2.9	2.9	2.95	2.9	.....	3.7	3.25	2.4	2.55	3.55	4.75
13	2.8	2.85	2.95	2.9	2.9	.....	4.75	3.2	2.35	2.65	3.45	4.35
14	2.8	2.8	2.95	2.85	2.9	2.75	4.85	3.2	2.3	3.15	3.25	4.65
15	2.8	2.75	2.95	2.85	2.9	2.9	4.85	3.25	2.3	3.0	3.15	4.35
16	2.85	2.8	2.9	2.85	2.9	3.0	4.85	3.2	2.3	.....	2.95	4.4
17	2.8	2.85	2.8	2.9	2.9	3.0	3.9	3.2	2.25	4.85	2.85	4.45
18	2.85	2.9	2.8	3.0	2.9	2.9	4.4	.....	2.15	5.6	2.75	3.85
19	2.95	3.1	2.9	3.05	2.85	2.85	4.65	.....	2.1	5.6	2.7	3.6
20	2.95	3.05	2.95	3.0	2.9	2.8	4.15	.....	2.1	4.45	2.8	3.5
21	2.9	3.05	2.9	2.95	2.9	2.8	4.05	3.35	2.05	3.95	3.25	3.45
22	2.85	3.0	2.9	2.95	2.9	2.8	3.6	3.25	1.95	3.65	3.45	3.4
23	2.8	2.95	2.85	2.95	2.85	2.8	3.45	3.25	1.9	3.4	3.15	3.3
24	2.85	2.95	2.8	2.9	2.85	3.2	3.35	3.8	1.95	3.25	2.95	3.2
25	.....	2.95	3.35	2.85	2.8	6.55	3.3	3.95	1.95	3.2	3.05	3.15
26	.....	2.85	3.35	2.85	2.75	8.8	3.3	4.1	1.95	3.25	5.8	3.1
27	2.95	2.8	3.25	2.85	2.7	5.5	3.35	4.55	1.95	3.2	4.4	3.1
28	2.9	2.9	3.15	2.85	2.75	4.55	3.35	6.1	1.95	3.05	3.5	3.05
29	2.85	3.15	3.05	2.9	2.75	5.0	3.25	4.7	1.95	.....	3.8	3.05
30	2.8	3.15	3.05	2.95	.....	4.25	3.25	4.4	2.0	.....	8.05	3.0
31	.....	.....	3.05	2.9	.....	3.8	.....	4.05	.....	.....	7.15	.....

NOTE.—Stage-discharge relation affected by ice Dec. 29, 1918, to Jan. 18, 1919, and Dec. 12–28, 1919.

Daily discharge, in second-feet, of Neosho River near Iola, Kans., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	10	844	258		699	592	1,020	9,400	930	2,260	109	42
2	10	592	258		670	540	989	13,900	810	1,600	96	42
3	8	436	258		618	540	960	16,600	810	1,080	96	48
4	8	365	238		618	757	873	8,920	1,050	840	109	48
5	8	320	216		786	1,150	844	2,520	1,820	698	109	48
6	8	276	196	400	1,020	931	757	2,020	1,780	900	280	48
7	8	931	238		902	815	815	1,720	1,400	698	280	48
8	8	b1,560	276		728	699	1,490	1,490	1,020	510	139	48
9	8	b10,900	276		644	644	4,330	1,320	840	435	109	48
10	b 8	b12,500	258		566	592	8,460	1,150	2,470	410	84	48
11	b2,160	b11,400	258		540	566	9,720	989	2,580	365	84	48
12	b2,070	b2,260	238	a 450	514	540	8,300	989	2,160	300	64	48
13	644	b1,020	238	a 600	540	514	4,330	1,380	1,360	260	84	74
14	462	b 844	320	a 800	592	514	2,360	1,420	2,160	222	84	64
15	342	699	644	a1,500	592	514	1,490	1,080	2,160	342	84	64
16	258	592	1,280	a2,500	592	1,490	1,280	1,680	2,060	320	74	64
17	216	566	1,380	a2,800	540	10,200	1,110	1,420	1,480	188	74	48
18	196	488	960	a3,600	488	15,800	1,020	1,420	1,220	154	64	48
19	143	462	728	5,240	462	20,000	931	11,100	1,480	170	64	42
20	110	410	902	6,430	488	22,800	873	14,500	1,690	139	56	42
21	68	365	1,180	7,060	514	22,100	815	7,410	1,440	139	56	36
22	68	320	989	5,450	757	6,080	757	7,060	1,820	139	48	36
23	78	276	1,050	3,370	1,210	2,070	757	5,240	4,460	154	48	36
24	89	258	989	2,160	1,460	1,640	699	2,010	5,180	139	48	36
25	100	238	815	1,640	1,240	1,460	670	1,180	3,310	109	56	31
26	110	216	670	1,380	931	1,380	670	1,120	1,220	109	56	36
27	160	216	540	1,210	728	1,320	670	1,020	1,120	139	56	42
28	960	258	488	1,080	670	1,240	931	990	900	109	96	42
29	3,550	276		960	.....	1,150	989	1,050	588	84	84	42
30	b2,580	258	400	844	.....	1,080	2,740	1,050	2,360	109	56	42
31	1,320	.....		757	.....	1,080	.....	990	.....	96	48	.....
1919-20.												
1	24	b 30	82	68	38	30	342	143	365	5	b 84	3,970
2	18	b 30	68	82	38	30	388	126	1,960	4,720	b 109	4,090
3	24	b 30	46	82	38	30	258	143	1,120	4,330	b 170	2,240
4	24	b 38	38	57	38	38	258	238	930	1,150	240	4,150
5	24	b 38	30	57	38	46	276	258	1,560	410	170	3,550
6	24	b 38	30	57	38	46	388	238	752	222	109	2,100
7	24	46	30	68	38	44	365	216	b 410	109	84	1,760
8	24	b 46	38	57	46	41	276	196	b 280	56	74	7,130
9	30	38	57	57	46	38	238	160	b 205	42	435	10,700
10	57	b 38	b 46	57	57	35	216	143	b 188	36	535	5,450
11	57	b 38	b 46	68	46	32	216	126	48	26	240	1,560
12	38	46		57	46	29	320	143	12	22	260	870
13	30	38		46	46	26	873	126	10	31	222	642
14	30	30		38	46	24	931	126	8	124	154	810
15	30	24		38	46	46	931	143	8	84	124	642
16	38	30		38	46	68	931	126	8	b 320	74	670
17	30	38		46	46	68	410	126	7	930	56	698
18	38	46		68	46	46	670	b 126	5	1,440	42	388
19	57	96		82	38	38	815	b 126	4	1,440	36	280
20	57	82	40	68	46	30	540	b 238	4	698	48	240
21	46	82		57	46	30	488	188	3	435	154	222
22	38	68		57	46	30	276	154	1.5	300	222	205
23	30	57		57	38	30	216	154	1.0	205	124	170
24	38	57		46	38	126	180	365	1.5	154	74	139
25	b 38	57		38	30	2,210	160	435	1.5	139	96	124
26	b 38	38		38	24	4,850	160	510	1.5	154	1,600	109
27	57	30		38	18	1,350	180	752	1.5	139	670	109
28	46	46		38	24	757	180	1,840	1.5	96	240	96
29	38	110	82	46	24	1,020	143	840	1.5	b 84	365	96
30	30	110	82	57	.....	592	143	670	2.0	b 84	3,910	84
31	b 30	.....	82	46	.....	365	.....	485	.....	b 64	2,860	.....

a Estimated because of ice.
b Estimated by comparison with gage-height record of United States Weather Bureau gage at Iola.
NOTE.—Braced figures show mean discharge for periods indicated.

Monthly discharge of Neosho River near Iola, Kans., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	3,550	8	509	31,300
November	12,500	216	1,670	99,400
December	1,380	196	559	34,400
January	7,060	.....	1,750	108,000
February	1,460	462	718	39,900
March	22,800	514	3,900	240,000
April	9,720	670	2,060	123,000
May	16,600	989	4,000	246,000
June	5,180	588	1,790	107,000
July	2,260	84	426	26,200
August	280	48	90.2	5,550
September	74	31	46.3	2,760
The year	22,800	8	1,470	1,060,000
1919–20.				
October	57	18	35.7	2,200
November	110	24	49.8	2,960
December	82	.....	46.4	2,850
January	82	38	55.1	3,390
February	57	18	39.8	2,290
March	4,850	24	392	24,100
April	931	143	392	23,300
May	1,840	126	312	19,200
June	1,960	1.0	263	15,600
July	4,720	5	582	35,800
August	3,910	36	438	26,900
September	10,700	84	1,780	106,000
The year	10,700	1.0	364	265,000

RED RIVER BASIN.

MEDICINE BLUFF CREEK NEAR LAWTON, OKLA.

LOCATION.—In sec. 18, T. 3 N., R. 12 W., at Medicine Park, 12 miles northwest of Lawton, Comanche County. Nearest tributary, Little Medicine Bluff Creek, enters half a mile above.

DRAINAGE AREA.—About 110 square miles.

RECORDS AVAILABLE.—November 26, 1912, to September 30, 1919, when station was discontinued.

GAGE.—Stevens water-stage recorder installed February 16, 1915, on left bank one-third mile below Medicine Park Hotel. Original gage was vertical staff on left bank a short distance below hotel, and set to datum 0.68 foot higher than that of the present gage; fall between the two points, 0.18 foot. On February 19, 1917, dam was completed 200 feet downstream, which turned section of the creek into a pool and changed control completely. Datum of water-stage recorder raised. No definite relations between gage heights before and after completion of dam.

DISCHARGE MEASUREMENTS.—Made from cable 100 yards above gage or by wading.

CHANNEL AND CONTROL.—Control is crest of concrete dam.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 3.54 feet November 7 (discharge, 1,250 second-feet); minimum stage recorded, 1.63 feet January 14 (discharge, 1.7 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Lawton waterworks diverts about 1.6 second-feet from Lawton reservoir on Medicine Bluff Creek.

REGULATION.—Flow controlled to a great extent by Lawton reservoir, which is situated 1⅓ miles upstream; capacity, 14,000 acre-feet.

ACCURACY.—Stage-discharge relation practically permanent: not affected by ice. Rating curve fairly well defined. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records fair, except for periods of missing gage heights, for which they are roughly approximate.

Daily discharge, in second-feet, of Medicine Bluff Creek near Lawton, Okla., for the year ending Sept. 30, 1919.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	8	2.6	220	2.6	51	145	18	20	34	34	12
2	10	2.6	228	2.6	28	290	18	50	51	34	12
3	15	2.6	160	3.8	5	440	18	100	51	34	12
4	18	3.6	88	5.0	12	400	26	200	34	18	12
5	21	4.1	18	5.0	18	375	34	200	18	18	12
6	48	7.6	16	5.0	15	345	42	228	18	18	12
7	1,250	3.6	13	3.8	12	315	51	200	18	12	12
8	461	3.1	10	2.6	12	360	51	315	34	12	12
9	233	3.1	5.0	2.6	12	408	51	910	12	12	12
10	130	2.6	3.8	2.6	12	390	51	1,100	5	12	12
11	86	2.6	2.6	2.6	23	375	51	440	5	18	12
12	51	3.1	2.6	2.6	34	280	51	315	12	18	12
13	60	3.1	2.6	3.8	50	200	42	228	5	12	12
14	51	3.1	1.7	5.0	100	214	34	255	5	12	12
15	44	3.1	5.0	4.2	200	228	20	228	12	12	12
16	95	6.3	3.8	3.4	51	214	5	200	12	12	12
17	135	4.5	2.6	2.6	32	200	50	95	18	12	12
18	120	3.1	100	3.8	12	170	95	95	34	12	18
19	140	21	375	5.0	9	145	120	73	200	12	18
20	200	211	100	5.0	5	130	145	73	255	12	34
21	200	261	40	5.0	5	120	98	34	200	18	18
22	145	238	20	102	5	110	51	18	145	18	18
23	34	333	5.0	200	102	95	35	34	95	12	12
24	17	297	5.0	214	200	73	18	34	51	12	12
25	5	255	5.0	228	106	51	18	18	51	12	12
26	5	228	5.0	214	12	62	18	20	34	5	12
27	5	216	5.0	200	9	73	18	23	34	5	12
28	9	211	3.8	126	5	73	18	26	34	5	12
29	4	211	2.6	.....	50	73	18	29	34	5	12
30	3	211	2.6	.....	95	45	18	32	34	5	12
31	.....	211	2.6	.....	120	.....	18	.....	34	12	.....

NOTE.—No gage-height record Nov. 1–4, Jan. 1, 3–4, 6–8, 10, 12, 16, 18, 20–26, 28, 30, Feb. 1, 3, 5, 7, 9, 11, 13, 15–16, 18, 20, 22, 24, 26, 28, Mar. 2, 4, 6, 8–9, 11, 13–14, 17, 19, 21, 23, 25, 27, 29, 31, Apr. 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, May 2, 4, 6, 8–11, 13, 15, 17, 19, 21, 23, 25, 27 to June 3, 26–30; discharge interpolated.

Monthly discharge of Medicine Bluff Creek near Lawton, Okla., for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
November	1,250	3	120	7,140
December 29	333	2.6	95.8	5,890
January	375	1.7	46.9	2,880
February	228	2.6	48.7	2,700
March	200	5.0	45.2	2,780
April	440	45	213	12,700
May	145	5	42	2,580
June	1,100	18	186	11,100
July	255	5	50.9	3,130
August	34	5	14.4	885
September	34	12	13.5	803
The period	.....	.....	.....	52,600

LITTLE MEDICINE BLUFF CREEK NEAR LAWTON, OKLA.

LOCATION.—150 feet below west line of sec. 18, T. 3 N., R. 12 W., half a mile above mouth of creek, and 12½ miles northwest of Lawton, Comanche County.

DRAINAGE AREA.—About 10 square miles.

RECORDS AVAILABLE.—November 26, 1912, to September 30, 1919, when station was discontinued.

GAGE.—Vertical staff on left bank half a mile above mouth of creek; read by Sergeant W. E. Kidd, United States Army. Upstream 200 feet is a gage referred to same datum, which is read by observer during flood to determine slope between it and regular gage.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Bed composed of ledge rock overlain with sand. Control is rock ledge just below gage. Between station and crest of small dam on Medicine Bluff Creek just below Little Medicine Bluff Creek there is a fall of about 8 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.85 feet at noon October 26 (discharge, 200 second-feet). No flow November 10–13.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent; not affected by ice. Rating curve well defined. Gage read to tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records roughly approximate because the accuracy of the gage heights is uncertain.

Daily discharge, in second-feet, of Little Medicine Bluff Creek near Lawton, Okla., for the year ending Sept. 30, 1919.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.5	0.4	0.1	2.7	0	2.3	3.0	1.3	3.0	5.5	3.0	0.4
2	.5	.3	.1	3.5	11	2.2	3.0	1.3	3.0	5.5	3.0	.4
3	.5	.2	.1	3.0	3.5	1.6	3.0	1.3	3.0	5.5	3.0	.4
4	.5	.1	.1	2.8	2.0	1.3	5.5	1.3	3.0	5.5	3.0	.4
5	.5	.1	.1	2.7	1.3	1.3	9.0	1.3	3.0	5.5	3.0	.4
6	.5	.1	.1	2.3	.9	.8	9.0	1.3	3.0	5.5	3.0	.4
7	.5	17	.1	2.3	.6	.8	5.5	1.3	3.0	5.5	3.0	.4
8	1.0	4.2	.1	1.8	.3	1.3	7.2	3.0	3.0	5.5	3.0	.4
9	15	.1	.1	1.2	.1	1.6	9.0	3.0	3.0	5.5	3.0	.4
10	19	0	.1	1.1	.1	1.3	15	3.0	5.5	5.5	3.0	.4
11	1.0	0	.1	.8	.1	.8	15	3.0	5.5	5.5	1.3	.4
12	.5	0	.1	.5	.1	1.5	15	3.0	5.5	5.5	1.3	.4
13	.5	0	.1	.3	.1	1.6	9.0	3.0	5.5	3.0	1.3	.4
14	.5	.1	.1	2.0	.1	4.2	9.0	3.0	5.5	3.0	1.3	.4
15	.5	.1	.1	3.0	.1	3.0	9.0	3.0	5.5	3.0	1.3	.4
16	.5	.1	.1	2.2	.1	3.0	9.0	3.0	5.5	3.0	1.3	.4
17	.5	.1	.1	1.1	.1	2.7	5.5	3.0	5.5	4.2	1.3	.4
18	.5	.1	.3	.9	.1	2.2	3.0	3.0	5.5	5.5	1.3	.4
19	.5	.1	14	.8	.1	1.3	3.0	3.0	5.5	5.5	1.3	.4
20	.5	.1	1.6	.7	7.6	1.3	3.0	3.0	5.5	5.5	.4	.4
21	.5	.1	.4	.4	1.3	1.3	3.0	3.0	5.5	5.5	.4	.4
22	40	.1	.2	.4	21	1.3	1.3	3.0	5.5	5.5	.4	.4
23	6.2	.1	17	.3	8.3	1.3	1.3	3.0	5.5	5.5	.4	.4
24	1.0	.1	10	.2	3.0	1.6	1.3	3.0	5.5	5.5	.4	.4
25	1.0	.1	6.2	.2	2.0	3.0	1.3	3.0	5.5	5.5	.4	.4
26	153	.1	5.2	.1	4.2	3.0	1.3	3.0	5.5	5.5	.4	.4
27	45	.1	3.5	.9	3.0	2.3	1.3	3.0	5.5	5.5	.4	.4
28	4.8	.1	2.8	.3	2.7	1.3	1.3	3.0	5.5	5.5	.4	.4
29	1.0	.1	2.8	.1	.....	1.3	1.3	3.0	5.5	5.5	.4	.4
30	.5	.1	2.7	.1	.....	3.0	1.3	3.0	5.5	5.5	.4	.4
31	.5	.....	3.8	.1	.....	3.0	.....	3.0	.....	5.5	.4	.....

NOTE.—No gage-height record Oct. 1–8, 11–21, 24–25, 29 to Nov. 6, Nov. 10 to Dec. 17, Feb. 11–19, Sept. 29–30; discharge estimated.

Monthly discharge of Little Medicine Bluff Creek near Lawton, Okla., for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	153	0.5	9.60	590
November	17	0	.81	48
December	17	.1	2.33	143
January	3.5	.1	1.25	77
February	21	.0	2.64	147
March	4.2	.8	1.89	116
April	15	1.3	5.48	326
May	3	1.3	2.62	161
June	5.5	3.0	4.75	283
July	5.5	3.0	5.14	316
August	3.0	.4	1.50	92
September	.4	.4	.40	24
The year	153	0	3.21	2,320

MISCELLANEOUS DISCHARGE MEASUREMENTS.

Miscellaneous measurements in Red River drainage basin during the year ending Sept. 30, 1919.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Aug. 8..	Red River.....	Mississippi River.....	Highway bridge ½ mile below Missouri, Kansas & Texas Ry. bridge and U. S. Weather Bureau gage, 5 miles north of Denison, Tex.	3.4	1,300

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