

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

WATER-SUPPLY PAPER 327

SURFACE WATER SUPPLY OF THE UNITED STATES

1912

PART VII. LOWER MISSISSIPPI RIVER BASIN

BY

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WASHINGTON
GOVERNMENT PRINTING OFFICE
1914

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SURFACE WATER SUPPLY OF THE LOWER MISSISSIPPI RIVER BASIN, 1912.

By ROBERT FOLLANSBEE.

AUTHORIZATION AND SCOPE OF WORK.

This volume is one of a series of 12 reports presenting results of measurements of flow made on streams in the United States during the calendar year 1912.

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

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 of water supply for irrigation. 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 year ending June 30—

1895.....	\$12,500
1896.....	20,000
1897 to 1900, inclusive.....	50,000
1901 to 1902, inclusive.....	100,000
1903 to 1906, inclusive.....	200,000
1907.....	150,000
1908 to 1910, inclusive.....	100,000
1911 to 1914, inclusive.....	150,000

In the execution of the work many private and State organizations have cooperated, either by furnishing data or by assisting financially in collecting the data. Acknowledgments for cooperation of the first kind are made in connection with the description of each station affected and of the second kind on page 14.

Measurements of stream flow have been made at about 2,000 points in the United States and also at many points in small areas in Seward Peninsula and the Yukon-Tanana region, Alaska, and in the Hawaiian Islands. During 1912 gaging stations were maintained by the Survey

and the cooperating organizations at about 4,500 points, and many discharge measurements were 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 the regular water-supply papers from time to time.

PUBLICATIONS.

A report for each calendar year has been prepared embodying the stream-flow data collected during that year. An index to the reports containing stream-flow measurements prior to 1904 has been published as Water-Supply Paper 119. Circulars are also available giving complete lists of the gaging stations maintained by the Survey to date and a list of the reports relating to the water supply of the country.

Prior to 1902 gage heights and discharge measurements were published in water-supply papers or bulletins and estimates of monthly discharge in annual reports; since 1902 both classes of data have been published in water-supply papers, and they are now being published in 12 parts, as shown in the following table:

Papers on surface water supply of the United States, 1912.

Part. ^a	No.	Title.
I	321	North Atlantic coast.
II	322	South Atlantic coast and eastern Gulf of Mexico.
III	323	Ohio River basin.
IV	324	St. Lawrence River basin.
V	325	Upper Mississippi River and Hudson Bay basins.
VI	326	Missouri River basin.
VII	327	Lower Mississippi River basin.
VIII	328	Western Gulf of Mexico.
IX	329	Colorado River basin.
X	330	Great Basin.
XI	331	Pacific coast in California.
XII	332	North Pacific coast.

^a For the purpose of uniformity in the presentation of reports, a general plan has been agreed upon by the United States Reclamation Service, the United States Forest Service, the United States Weather Bureau, and the United States Geological Survey, according to which the area of the United States has been divided into 12 parts, whose boundaries coincide with natural drainage lines, indicated by the parts of the report.

A list of reports containing stream-flow data is presented in the following table:

Stream-flow data in reports of the United States Geological Survey.

[A=Annual Report; B=Bulletin; WS=Water-Supply Paper.]

Report.	Character of data.	Year.
10th A, pt. 2.....	Descriptive information only.....	
11th A, pt. 2.....	Monthly discharge.....	1834 to Sept., 1890.
12th A, pt. 2.....	.....do.....	1834 to June 30, 1891.
13th A, pt. 3.....	Mean discharge in second-feet.....	1834 to Dec. 31, 1892.
14th A, pt. 2.....	Monthly discharge (long-time records, 1871 to 1893).....	1833 to Dec. 31, 1893.

Stream-flow data in reports of the United States Geological Survey—Continued.

Report.	Character of data.	Year.
B 131.....	Descriptions, measurements, gage heights, and ratings.....	1893 and 1894.
16th A, pt. 2.....	Descriptive information only.....	
B 140.....	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
WS 11.....	Gage heights (also gage heights for earlier years).....	1896.
18th A, pt. 4.....	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).	1895 and 1896.
WS 15.....	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
WS 16.....	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A, pt. 4.....	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
WS 27.....	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
WS 28.....	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.
20th A, pt. 4.....	Monthly discharge (also for many earlier years).....	1898.
WS 35 to 39.....	Descriptions, measurements, gage heights, and ratings.....	1899.
21st A, pt. 4.....	Monthly discharge.....	1899.
WS 47 to 52.....	Descriptions, measurements, gage heights, and ratings.....	1900.
22d A, pt. 4.....	Monthly discharge.....	1900.
WS 65, 66.....	Descriptions, measurements, gage heights, and ratings.....	1901.
WS 75.....	Monthly discharge.....	1901.
WS 82 to 85.....	Complete data.....	1902.
WS 97 to 100.....	do.....	1903.
WS 124 to 135.....	do.....	1904.
WS 165 to 178.....	do.....	1905.
WS 201 to 214.....	Complete data, except descriptions.....	1906.
WS 241 to 252.....	Complete data.....	1907-8.
WS 261 to 272.....	do.....	1909.
WS 281 to 292.....	do.....	1910.
WS 301 to 312.....	do.....	1911.
WS 321 to 332.....	do.....	1912.

NOTE.—No data regarding stream flow are given in the 15th and 17th annual reports.

The following table gives, by years and drainage basins, the numbers of the papers on surface water supply published from 1899 to 1912. The data for any particular station will be found in the reports covering the years during which the station was maintained. For example, data for any station in the area covered by Part I are published in Water-Supply Papers 97, 124, 165, 201, 241, 261, 281, 301, and 321, which contain records for the New England streams from 1903 to 1912. The year covered by the report is indicated at the head of the column in which the paper is listed.

Numbers of water-supply papers containing results of stream measurements, 1899-1912.

	1899 <i>a</i>	1900 <i>b</i>	1901	1902	1903	1904	1905	1906	1907-8	1910	1911	1912
North Atlantic coast (St. John River to York River).....	35	47, <i>c</i> 48	65, 75	82	97	<i>d</i> 124, <i>e</i> 125, <i>f</i> 126	<i>d</i> 165, <i>e</i> 166, <i>f</i> 167	<i>d</i> 201, <i>e</i> 202, <i>f</i> 203	241	281	301	321
South Atlantic coast and eastern Gulf of Mexico (James River to the Mississippi).....	<i>g</i> 35, 36	48	65, 75	<i>g</i> 82, 83	<i>g</i> 97, 98	<i>f</i> 126, 127	<i>f</i> 167, 168	<i>f</i> 203, 204	242	282	302	322
Ohio River basin.....	36	48, <i>h</i> 49	65, 75	83	98	128	169	205	243	283	303	323
St. Lawrence River and Great Lakes.....	36	49	65, 75	<i>i</i> 82, 83	97	129	170	206	244	284	304	324
Hudson Bay and upper Mississippi River.....	36	49	<i>j</i> 65, 66, 75	<i>f</i> 83, 85	<i>j</i> 98, 99, <i>k</i> 100	<i>f</i> 128, 130	171	207	245	285	305	325
Missouri River.....	<i>l</i> 36, 37	49, <i>m</i> 50	66, 75	84	99	130, <i>n</i> 131	172	208	246	286	306	326
Lower Mississippi River.....	37	50	<i>j</i> 65, 66, 75	<i>f</i> 83, 84	<i>f</i> 98, 99	<i>f</i> 128, 131	<i>f</i> 169, 173	<i>f</i> 205, 209	247	287	307	327
Western Gulf of Mexico.....	37	50	66, 75	84	99	132	174	210	248	288	308	328
Colorado River.....	<i>o</i> 37, 38	50	66, 75	85	100	133	175, <i>p</i> 177	211	249	289	309	329
Great Basin.....	38, <i>q</i> 39	51	66, 75	85	100	133, <i>r</i> 134	176, <i>r</i> 177	212, <i>r</i> 213	250, <i>r</i> 251	290	310	330
Pacific coast in California.....	38, <i>s</i> 39	51	66, 75	85	100	134	177	213	251	291	311	331
North Pacific coast.....	38	51	66, 75	85	100	135	<i>t</i> 177, 178	214	252	292	312	332

a Rating tables and index to Water-Supply Papers 35-39 contained in Water-Supply Paper 39. Estimates for 1899 in Twenty-first Annual Report, part 4.
b Rating tables and index to Water-Supply Papers 47-52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52.
c New England rivers only.
d New England rivers only.
e Hudson River to Delaware River, inclusive.
f Susquehanna River to York River, inclusive.
g James River only.
h Colorado River.
i Lake Ontario and tributaries to St. Lawrence River proper.
j Tributaries of Mississippi from east.
k Hudson Bay only.
l Hudson Bay only.
m Hudson Bay only.
n Gulf and Plate rivers near Columbus, Nebr., and all tributaries below junction with Platte.
o Platte and Kansas rivers.
p Green and Gunnison rivers.
q Green and Gunnison rivers and Grand River above junction with Gunnison.
r Below junction with Gila.
s Mohave River only.
t Great Basin in California, excepting Truckee and Carson drainage basins.
u Kings and Kern rivers and south Pacific coast drainage basins.
v Rogue, Umpqua, and Siletz rivers only.

Estimates

Water-supply papers and other publications of the United States Geological Survey containing data in regard to the water resources of the United States may be obtained or consulted as indicated below.

1. Copies may be obtained free of charge by applying to the Director of the Geological Survey, Washington, D. C. The edition printed for free distribution is, however, small and is soon exhausted.

2. Copies may be purchased at nominal cost from the Superintendent of Documents, Government Printing Office, Washington, D. C., who will on application furnish lists giving prices.

3. Sets of the reports may be consulted in the libraries of the principal cities in the United States.

4. Complete sets are available for consultation in the local offices of the water-resources branch of the Geological Survey, as follows:

Albany, N. Y., Room 18, Federal Building.
Atlanta, Ga., Post Office Building.
Newport, Ky., Federal Building.
St. Paul, Minn., Old Capitol Building.
Helena, Mont., Montana National Bank Building.
Denver, Colo., 302 Chamber of Commerce Building.
Salt Lake City, Utah, Federal Building.
Boise, Idaho, 615 Idaho Building.
Portland, Oreg., 416 Couch Building.
Tacoma, Wash., Federal Building.
San Francisco, Cal., 505 Custom House.
Los Angeles, Cal., Federal Building.
Santa Fe, N. Mex., Capitol Building.
Honolulu, Hawaii, Kapiolani Building.

A list of the Geological Survey's publications will be sent on application to the Director of the United States Geological Survey, Washington, D. C.

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 which represent a rate of flow, as second-feet, gallons per minute, miner's inches, and discharge in second-feet per square mile; and (2) those which represent the actual quantity of water, as run-off in depth in inches and acre-feet. The units 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-foot” is an abbreviation for cubic foot per second and is the unit for the rate of discharge of water flowing in a stream 1 foot wide, 1 foot deep, at a rate of 1 foot per second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the following table of equivalents:

“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 (depth in inches)" is the depth to which the drainage area would be covered if all the water flowing from it in a given period were conserved and 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" is equivalent to 43,560 cubic feet and 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 work.

CONVENIENT EQUIVALENTS.

The following is a list of convenient equivalents for use in hydraulic computations:

Table for converting discharge in second-feet per square mile into run-off in depth in inches over the area.

Discharge in second- feet per square mile.	Run-off in inches.				
	1 day.	28 days.	29 days.	30 days.	31 days.
1.....	0.03719	1.041	1.079	1.116	1.153
2.....	.07438	2.083	2.157	2.231	2.306
3.....	.11157	3.124	3.236	3.347	3.459
4.....	.14876	4.165	4.314	4.463	4.612
5.....	.18595	5.207	5.393	5.578	5.764
6.....	.22314	6.248	6.471	6.694	6.917
7.....	.26033	7.289	7.550	7.810	8.070
8.....	.29752	8.331	8.628	8.926	9.223
9.....	.33471	9.372	9.707	10.041	10.376

NOTE.—For partial month multiply the values for one day by the number of days.

Table for converting discharge in second-feet into run-off in acre-feet.

Discharge in second- feet.	Run-off in acre-feet.				
	1 day.	28 days.	29 days.	30 days.	31 days.
1.....	1.983	55.54	57.52	59.50	61.49
2.....	3.967	111.1	115.0	119.0	123.0
3.....	5.950	166.6	172.6	178.5	184.5
4.....	7.934	222.1	230.1	238.0	246.0
5.....	9.917	277.7	287.6	297.5	307.4
6.....	11.90	333.2	345.1	357.0	368.9
7.....	13.88	388.8	402.6	416.5	430.4
8.....	15.87	444.3	460.2	476.0	491.9
9.....	17.85	499.8	517.7	535.5	553.4

NOTE.—For partial month multiply values for one day by the number of days.

1 second-foot equals 40 California miner's inches (law of Mar. 23, 1901).

1 second-foot equals 38.4 Colorado miner's inches.

1 second-foot equals 40 Arizona miner's inches.

1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,317 gallons for one day.

1 second-foot for one year covers 1 square mile 1.131 feet or 13.572 inches deep.

- 1 second-foot for one year equals 31,536,000 cubic feet.
 1 second-foot equals about 1 acre-inch per hour.
 1 second-foot for one day equals 86,400 cubic feet.
 1,000,000,000 (1 United States billion) cubic feet equals 11,570 second-feet for one day.
 1,000,000,000 cubic feet equals 414 second-feet for one 28-day month.
 1,000,000,000 cubic feet equals 399 second-feet for one 29-day month.
 1,000,000,000 cubic feet equals 386 second-feet for one 30-day month.
 1,000,000,000 cubic feet equals 373 second-feet for one 31-day month.
 100 California miner's inches equals 18.7 United States gallons per second.
 100 California miner's inches for one day equals 4.96 acre-feet.
 100 Colorado miner's inches equals 2.60 second-feet.
 100 Colorado miner's inches equals 19.5 United States gallons per second.
 100 Colorado miner's inches for one day equals 5.17 acre-feet.
 100 United States gallons per minute equals 0.223 second-feet.
 100 United States gallons per minute for one day equals 0.442 acre-foot.
 1,000,000 United States gallons per day equals 1.55 second-feet.
 1,000,000 United States gallons equals 3.07 acre-feet.
 1,000,000 cubic feet equals 22.95 acre-feet.
 1 acre-foot equals 325,850 gallons.
 1 inch deep on 1 square mile equals 2,323,200 cubic feet.
 1 inch deep on 1 square mile equals 0.0737 second-foot per year.
 1 foot equals 0.3048 meter.
 1 mile equals 1.60935 kilometers.
 1 mile equals 5,280 feet.
 1 acre equals 0.4047 hectare.
 1 acre equals 43,560 square feet.
 1 acre equals 209 feet square, nearly
 1 square mile equals 2.59 square kilometers.
 1 cubic foot equals 0.0283 cubic meter.
 1 cubic foot of water weighs 62.5 pounds.
 1 cubic meter per minute equals 0.5886 second-foot.
 1 horsepower equals 550 foot-pounds per second.
 1 horsepower equals 76.0 kilogram-meters per second.
 1 horsepower equals 746 watts.
 1 horsepower equals 1 second-foot falling 8.80 feet.
 1½ horsepower equals about 1 kilowatt.

To calculate water power quickly:
$$\frac{\text{Sec.-ft.} \times \text{fall in feet}}{11} = \text{net horsepower on water wheel realizing 80 per cent of theoretical power.}$$

EXPLANATION OF DATA.

For each regular current-meter gaging station the following data are given: Description of the station, list of discharge measurements, table of daily gage heights, table of daily discharges, table of monthly and yearly discharges and run-off. For stations located at weirs or dams the gage-height table is omitted.

In addition to statements regarding the location and installation of current-meter stations, the descriptions give information in regard to any conditions which may affect the constancy of the relation of gage height to discharge, covering such points as ice, logging, shifting

channels, and backwater; also information regarding diversions which decrease the total flow at the measuring section. Statements are also made regarding the accuracy and reliability of the data.

The table of daily gage heights records the daily fluctuations of the surface of the river as found from the mean of the gage readings taken each day, usually in the morning and in the evening. The gage height given in the table represents the elevation of the surface of the water above the zero of the gage. All gage heights affected by the presence of ice in the streams or by backwater from obstructions are published as recorded, with suitable footnotes. The rating table is not applicable for such periods unless the proper corrections to the gage heights are known and applied. Attention is called to the fact that the zero of the gage is placed at an arbitrary datum and has no relation to zero flow or the bottom of the river. In general, the zero is located somewhat below the lowest known flow, so that negative readings shall not occur.

The discharge measurements and gage heights are the base data from which rating tables, daily discharge tables, and monthly discharge tables are computed.

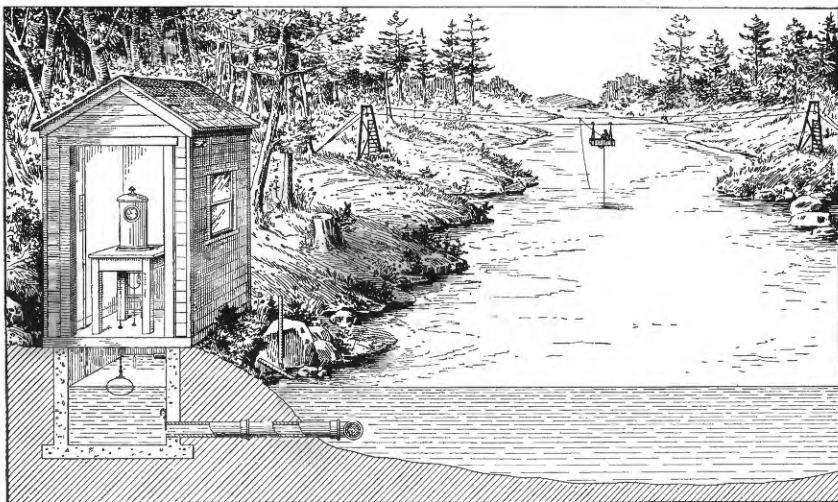
The rating table gives, either directly or by interpolation, the discharge in second-feet corresponding to every stage of the river recorded during the period for which it is applicable. It is not published in this report, but can be determined from the tables of daily gage heights and daily discharge by plotting gage heights in feet as ordinates and discharge in second-feet as abscissas.

The table of daily discharges gives the discharges in second-feet corresponding to the observed gage heights as determined from the rating tables.

In the table of monthly discharge the column headed "Maximum" gives the mean flow, as determined from the rating table, 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 of "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 for each second during the month. On this the computations for the remaining columns, which are defined on pages 9-10, are based.

The base data presented in this report, unless otherwise stated in description of station, have been collected by the methods commonly used at current-meter gaging stations and described in standard textbooks.

Plate I shows typical gaging stations. Plate II shows the current meter used in the work.

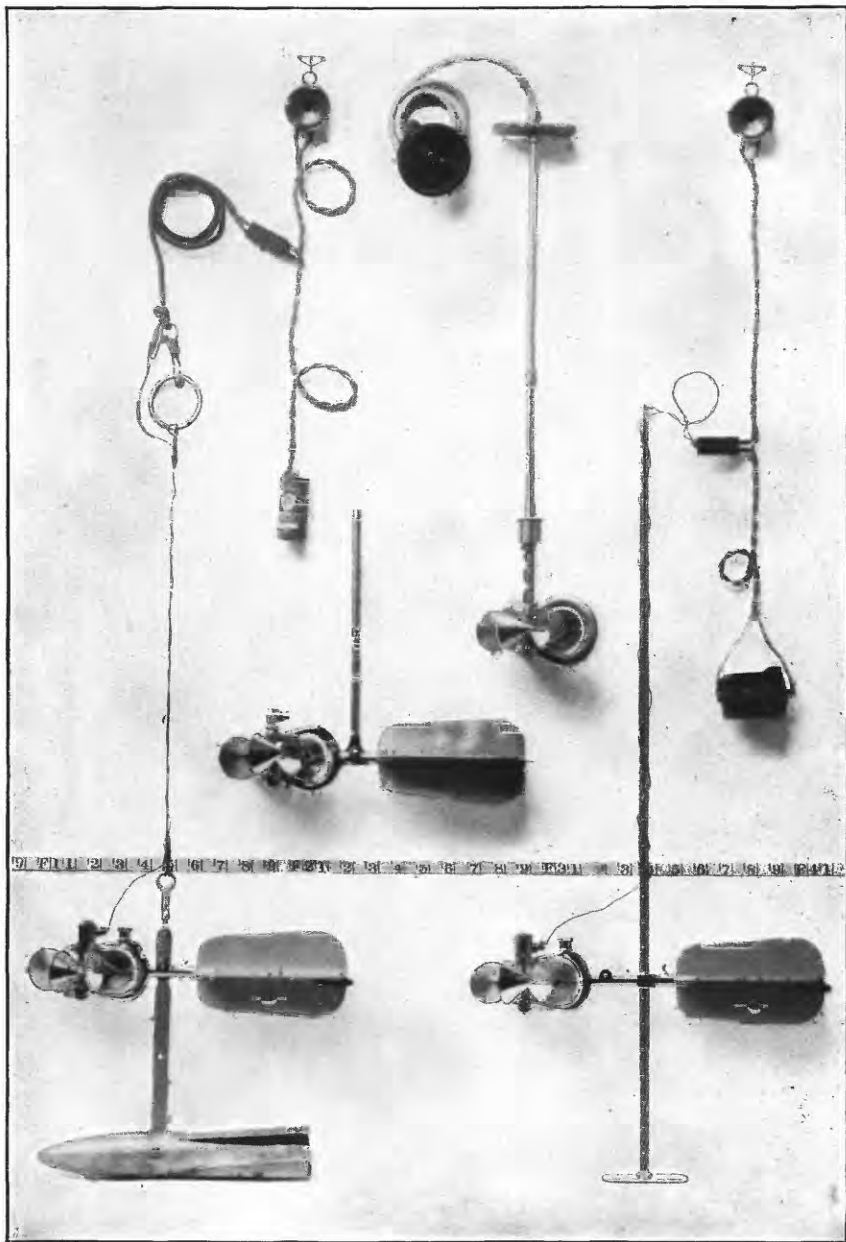


A. CABLE STATION WITH AUTOMATIC GAGE.



B. STATION FOR BRIDGE MEASUREMENT.

TYPICAL GAGING STATIONS.



PRICE CURRENT METERS.

ACCURACY AND RELIABILITY OF FIELD DATA AND COMPARATIVE RESULTS.

The accuracy of stream-flow data depends primarily on the natural conditions at the gaging station and on the methods and care with which the data are collected. Errors of the first group depend on the degree of permanency of channel and of permanency of the relation between discharge and stage.

Errors of the second class are due, first, to errors in observation of stage; second, to errors in measurements of flow; and, third, to errors due to misinterpretation of stage and flow data.

In order to give engineers and others information regarding the probable accuracy of the computed results, footnotes are added to the daily discharge tables, stating the probable accuracy of the rating tables used, and an accuracy column is inserted in the monthly discharge table. 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" or "approximate" 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 accuracy column in the monthly discharge table does not apply to the maximum or minimum nor to any individual day, but to the monthly mean. It is based on the accuracy of the rating, the probable reliability of the observer, and knowledge of local conditions. In this column, A indicates that the mean monthly flow is probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

Even though the monthly means for any station may represent with a high degree of accuracy the quantity of water flowing past the gage, the figures showing discharge per square mile and depth of runoff in inches may be subject to gross errors which result from including in the measured drainage area large noncontributing districts or omitting estimates of water diverted for irrigation or other use, and they should, therefore, be considered as only approximate, particularly for periods of irrigation or of low water. For these errors it is as a rule not feasible to make adequate correction.

In general, the base data collected each year by the Survey engineers are published, not only to comply with the law, but also to afford any engineer the means of examining and adjusting to his own needs the results of the computations. The table of monthly discharge is so arranged as to give only a general idea of the flow at the station and should not be used for other than preliminary estimates. The determinations of daily discharge allow more detailed studies of

the variation in flow by which the period of deficiency may be determined.

It should be borne in mind that the observations in each succeeding year may be expected to throw new light on data already collected and published, and the engineer who makes use of the figures presented in these papers should verify all ratings and make such adjustments for earlier years as may seem necessary.

COOPERATION.

The work in New Mexico was carried on in cooperation with J. A. French, State engineer, and was supervised from a suboffice established at Santa Fe. Other cooperative work in the lower Mississippi River basin is duly acknowledged in connection with the descriptions of the stations affected.

DIVISION OF WORK.

The field data for the Arkansas River drainage basin in Colorado were collected under the direction of Robert Follansbee, district engineer, assisted by G. A. Gray, Raymond Richards, R. H. Fletcher, H. B. Waha, and J. L. Mathias.

The work in New Mexico was under the general supervision of Robert Follansbee. After August 1, the work was in direct charge of G. A. Gray, assistant engineer, who was assisted by R. L. Cooper, J. E. Powers, and C. J. Emerson.

The ratings, special estimates, and computations for stations in Colorado were made and the completed data prepared for publication under the direction of Robert Follansbee by Raymond Richards, assisted by R. H. Fletcher.

The ratings, special estimates, and computations for stations in New Mexico were made by G. A. Gray and H. J. Dean.

The ratings and computations in the Yazoo River basin were made by Warren E. Hall and J. G. Mathers.

The report was edited by Mrs. B. D. Wood.

STATION RECORDS.

ARKANSAS RIVER BASIN.

EAST FORK OF ARKANSAS RIVER NEAR LEADVILLE, COLO.

Location.—At highway bridge in sec. 16, T. 9 S., R. 80 W., about 300 yards above mouth of Tennessee Fork, 3 miles northwest of Leadville.

Records available.—April to August 31, 1890; June 18 to September 29, 1903; June 5, 1911, to November 14, 1912.

Drainage area.—52 square miles (measured on topographic sheet).

Gage.—Vertical staff.

Channel.—Somewhat shifting.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—There is a court decree for a diversion of 2 second-feet from the East Fork above the station, but none below.

Accuracy.—Owing to the high altitude of the drainage basin, it is probable that the stage is subject to considerable diurnal fluctuation at certain seasons, due to the alternate melting and freezing. Mean daily gage heights based on one reading per day are therefore liable to considerable error. Estimates have only been made for the days on which the gage was read, and can only be considered fair.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of East Fork of Arkansas River near Leadville, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
Feb. 22 ^a	H. B. Waha.....		8.3
Apr. 11 ^a	J. L. Mathias.....		15.3
May 31	.....do.....	1.12	20.8
Sept. 20	R. H. Fletcher.....	.27	15.9

^a Ice present. Discharge obtained by subtracting discharge of Tennessee Fork from discharge of Arkansas River below the confluence with Tennessee Fork.

Daily gage height, in feet, of East Fork of Arkansas River near Leadville, Colo., for 1912.

[M. F. Frey, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....			1.0				
2.....							0.85
3.....		1.00					
4.....							
5.....							
6.....					0.25		
7.....		1.30					
8.....							.15
9.....				0.45			
10.....							
11.....							
12.....		1.10				0.15	
13.....							
14.....					.2		.8
15.....				.5			
16.....						.17	
17.....			.8		.25		
18.....		.90		.4		.16	
19.....	0.60			.4			
20.....	.55				.27		
21.....							
22.....							
23.....			.7		.23	.22	
24.....	.90		.75				
25.....							
26.....							
27.....							
28.....	.90						
29.....							
30.....							
31.....	1.12		.7	.15			

NOTE.—Gage heights Dec. 2 and 14 affected by ice.

Daily discharge, in second-feet, of East Fork of Arkansas River near Leadville, Colo., for 1912.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....			178				
2.....							
3.....		178					
4.....							
5.....							
6.....					14		
7.....		263					
8.....							6
9.....				47			
10.....							
11.....							
12.....		205				6	
13.....							
14.....					8		
15.....				57			
16.....						7	
17.....			125		14		
18.....		151		38		6	
19.....	78			38			
20.....	67				17		
21.....							
22.....							
23.....							
24.....	151		100		12	11	
25.....			112				
26.....							
27.....							
28.....							
29.....	151						
30.....							
31.....	211		100	6			

NOTE.—Daily discharge determined from a rating curve not well defined.

ARKANSAS RIVER AT GRANITE, COLO.

Location.—At Granite, in sec. 31, T. 11 S., R. 79 W., below the mouth of Lake Creek and above Lost Canyon and Clear creeks.

Records available.—May 1, 1897, to September 10, 1899; April 6, 1910, to November 30, 1912.

Drainage area.—425 square miles.

Gage.—Automatic recording gage established in 1910; datum of recording gage bears no determined relation to that of the vertical staff gage which was used from 1897 to 1899 and which was located at the highway bridge near the railroad station.

Channel.—Practically permanent.

Discharge measurements.—Made from car and cable.

Winter flow.—Ice causes backwater during the winter months and the records are discontinued.

Artificial control.—The discharge is affected by the operation of the Twin Lakes reservoir and by a flume used to carry water from Lake Creek to a point below the station.

Diversions.—There are court decrees for diversions of 76 second-feet from the Arkansas between this station and the junction of Tennessee and East forks, and diversions of 22 second-feet from the intervening tributaries.

Cooperation.—Since 1910 this station has been maintained and records have been furnished by the State engineer of Colorado.

Discharge measurements of Arkansas River at Granite, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Feb. 3 ^a	C. C. Hezmalhalch	1.70	44	June 25	Thos. Grieve, jr.	3.22	1,060
Mar. 12 ^a	Thos. Grieve, jr.	1.58	62	July 23	B. S. Clayton	3.52	1,360
Apr. 8	C. C. Hezmalhalch	3.51	117	Sept. 3	do.	1.80	197
May 29	do.	4.10	1,300	Oct. 15	do.	1.62	149
June 7	A. A. Weiland	2.68	2,030	Nov. 21	Thos. Grieve, jr.	1.45	100
21	Thos. Grieve, jr.		590	Dec. 23 ^a	B. S. Clayton		52

^a Relation of gage height to discharge affected by ice.

Daily gage height, in feet, of Arkansas River at Granite, Colo., for 1912.

[George Morrison, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.		1.4	1.95	3.65	3.3	2.55	1.85	1.6	1.55
2.		1.4	2.0	3.55	3.2	2.45	1.8	1.6	1.6
3.		1.55	2.0	3.6	3.2	2.35	1.8	1.6	1.55
4.		1.7	1.9	3.75	3.2	2.3	1.75	1.55	1.5
5.		1.75	1.8	3.9	3.15	2.15	1.75	1.55	1.5
6.		1.7	1.75	4.1	3.05	2.15	1.75	1.55	1.5
7.		1.6	2.0	4.1	3.1	2.1	1.75	1.55	1.55
8.		1.65	2.6	4.0	3.3	2.2	1.7	1.55	1.55
9.		1.7	2.6	4.1	3.35	2.2	1.7	1.55	1.55
10.		1.7	2.65	3.7	3.4	2.15	1.7	1.55	1.55
11.		1.6	2.75	3.9	3.2	2.1	1.7	1.55	1.5
12.		1.6	2.7	3.8	3.25	2.05	1.6	1.6	1.5
13.		1.5	2.65	3.7	3.25	2.05	1.6	1.55	1.45
14.		1.5	2.3	4.0	3.35	2.1	1.6	1.55	1.45
15.		1.5	1.95	3.5	3.15	2.25	1.65	1.6	1.5
16.		1.55	1.9	3.3	2.9	2.35	1.7	1.65	1.5
17.		1.6	2.0	3.0	2.9	2.4	1.7	1.7	1.45
18.	1.35	1.6	2.15	2.9	2.95	2.25	1.7	1.75	1.4
19.	1.35	1.6	2.25	2.9	2.9	2.05	1.65	1.6	1.4
20.	1.4	1.6	2.45	2.7	2.9	2.3	1.7	1.55	1.4
21.	1.4	1.5	2.9	2.7	3.1	2.5	1.8	1.5	1.45
22.	1.4	1.45	3.25	3.1	3.4	2.5	1.9	1.5	1.45
23.	1.35	1.5	3.4	3.3	3.6	2.6	1.7	1.5	1.45
24.	1.35	1.55	3.4	3.4	3.4	2.6	1.7	1.5	1.35
25.	1.4	1.7	3.5	3.2	3.4	2.55	1.65	1.5	1.3
26.	1.5	1.65	3.6	3.1	3.4	2.55	1.7	1.5	1.35
27.	1.5	1.65	3.55	3.2	3.4	2.55	1.6	1.5	1.4
28.	1.55	1.7	3.45	3.25	3.4	2.5	1.6	1.5	1.5
29.	1.5	1.75	3.5	3.35	3.4	2.4	1.55	1.5	1.55
30.	1.55	1.85	3.7	3.4	3.35	1.95	1.55	1.55	1.45
31.	1.4		3.8		2.85	1.9		1.55	

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to Mar. 17.

Daily discharge, in second-feet, of Arkansas River at Granite, Colo., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.	45	44	55	80	235	1,505	1,140	530	210	140	130
2.	45	44	55	80	255	1,395	1,040	470	195	140	140
3.	48	44	55	110	255	1,450	1,040	415	195	140	130
4.	43	44	62	150	215	1,615	1,040	390	180	130	120
5.	48	44	62	165	180	1,790	995	318	180	130	120
6.	46	44	62	150	165	2,030	905	318	180	130	120
7.	50	44	62	120	255	2,030	950	295	180	130	130
8.	45	44	62	135	560	1,910	1,140	340	165	130	130
9.	46	44	62	150	560	2,030	1,190	340	165	130	130
10.	46	44	62	150	595	1,560	1,240	318	165	130	130

Daily discharge, in second-feet, of Arkansas River at Granite, Colo., for 1912—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
11.....	46	44	62	120	665	1,790	1,040	295	165	130	120
12.....	44	44	62	120	630	1,670	1,090	275	140	140	120
13.....	43	50	62	100	595	1,560	1,090	275	140	130	112
14.....	44	50	62	100	390	1,910	1,190	295	140	130	112
15.....	44	50	65	100	235	1,340	995	365	152	140	120
16.....	46	50	65	110	215	1,140	780	415	165	152	120
17.....	48	50	72	120	255	860	780	440	165	165	112
18.....	48	50	72	120	318	780	820	365	165	180	105
19.....	45	50	72	120	365	780	780	275	152	140	105
20.....	44	50	80	120	470	630	780	390	165	130	105
21.....	48	50	80	100	780	630	950	500	195	120	112
22.....	45	50	80	90	1,090	950	1,240	500	225	120	112
23.....	44	50	72	100	1,240	1,140	1,450	560	165	120	112
24.....	43	55	72	110	1,240	1,240	1,240	560	165	120	98
25.....	45	55	80	150	1,340	1,040	1,240	530	152	120	90
26.....	48	55	100	135	1,450	950	1,240	530	165	120	98
27.....	46	55	100	135	1,395	1,040	1,240	530	140	120	105
28.....	45	55	110	150	1,290	1,090	1,240	500	140	120	120
29.....	45	55	100	165	1,340	1,190	1,240	440	130	120	130
30.....	45	.....	110	198	1,560	1,240	1,190	240	130	130	112
31.....	45	.....	80	.....	1,670	.....	740	225	.....	130	.....

NOTE.—Discharge Jan. 1 to Mar. 17 estimated.

Monthly discharge of Arkansas River at Granite, Colo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January.....	50	43	45.6	2,800
February.....	55	44	48.5	2,790
March.....	110	55	72.8	4,480
April.....	198	80	125	7,440
May.....	1,670	165	703	43,200
June.....	2,030	630	1,340	79,700
July.....	1,450	780	1,070	65,800
August.....	560	225	395	24,300
September.....	225	130	166	9,880
October.....	180	120	132	8,120
November.....	140	90	117	6,960
The period.....	.....	.....	.....	255,000

NOTE.—Values in the above table have been changed slightly from the State engineer's records to conform with the standard computation rules of the Geological Survey.

ARKANSAS RIVER AT SALIDA, COLO.

Location.—At Salida, Colorado, some distance above the mouth of the South Fork of Arkansas River, the nearest tributary of importance.

Records available.—April 11, 1895, to October 31, 1903; November 3, 1909, to December 31, 1912.

Drainage area.—1,160 square miles.

Gage.—Automatic recording gage; no determined relation between automatic gage and the gage used from 1895 to 1903.

Channel.—Slightly shifting.

Winter flow.—Springs keep the river open during the winter months.

Diversions.—There are court decrees for diversions of 148 second-feet from the Arkansas between this station and Granite, and diversions of 380 second-feet from intervening tributaries.

Cooperation.—Since 1909 this station has been maintained and records have been furnished by the State engineer of Colorado.

Discharge measurements of Arkansas River at Salida, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Jan. 17	C. C. Hezmalhalch.....	0.60	225	July 24	B. S. Clayton.....	3.59	1,810
Feb. 5	.....do.....	.52	200	Sept. 14	.....do.....	1.23	480
Mar. 12	Thos. Grieve, jr.....	.50	210	Oct. 16	.....do.....	.99	360
Apr. 11	C. C. Hezmalhalch.....	.85	287	Dec. 29	.....do.....	.42	201
June 20	Thos. Grieve, jr.....	2.72	1,160				

Daily gage height, in feet, of Arkansas River at Salida, Colo., for 1912.

[H. Snedden, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	0.5	0.5	0.55	0.45	0.9	4.15	4.2	2.65	1.4	1.05	1.0	0.75
2.....	.5	.55	.55	.45	1.05	4.25	3.95	2.45	1.3	1.05	.95	.7
3.....	.5	.6	.5	.55	1.0	4.45	3.9	2.2	1.3	1.0	.95	.7
4.....	.5	.5	.4	.7	.85	4.75	3.8	2.1	1.25	1.0	1.1	.65
5.....	.55	.55	.45	.75	.8	4.95	3.45	1.9	1.2	1.05	1.15	.7
6.....	.6	.5	.5	.8	.85	5.05	3.25	1.75	1.2	1.05	1.1	.6
7.....	.65	.5	.55	.7	.9	5.1	3.3	1.7	1.2	1.05	1.15	.6
8.....	.55	.6	.5	.75	1.45	5.1	3.5	1.65	1.2	1.05	1.2	.6
9.....	.55	.55	.5	.85	1.85	4.95	3.8	2.35	1.15	1.0	1.15	.55
10.....	.55	.6	.55	.9	1.8	4.45	3.9	2.1	1.15	1.0	1.15	.55
11.....	.4	.65	.55	.75	1.85	3.9	3.35	1.55	1.15	1.1	1.1	.55
12.....	.4	.55	.5	.8	1.85	3.85	3.65	1.5	1.1	1.05	.95	.55
13.....	.55	.45	.55	.65	1.7	3.9	3.75	1.4	1.0	1.05	.9	.6
14.....	.6	.5	.5	.55	1.7	4.0	4.05	1.45	1.05	1.05	.9	.65
15.....	.6	.5	.5	.55	1.35	3.95	3.95	1.7	1.15	1.05	.9	.6
16.....	.65	.45	.5	.55	1.2	3.45	3.05	2.3	1.2	1.0	.95	.6
17.....	.6	.45	.5	.65	1.25	3.1	2.85	2.35	1.2	1.0	.9	.6
18.....	.55	.45	.45	.65	1.5	2.8	3.35	2.35	1.2	1.0	.85	.5
19.....	.55	.40	.5	.7	1.65	2.9	3.55	2.1	1.2	1.0	.85	.55
20.....	.55	.35	.55	.7	1.95	2.75	3.5	1.5	1.2	.95	.85	.5
21.....	.5	.35	.45	.55	2.4	2.9	3.45	1.95	1.2	.95	.85	.5
22.....	.5	.4	.5	.5	3.15	3.2	3.9	2.05	1.3	.9	.85	.45
23.....	.5	.5	.5	.5	3.35	3.65	4.1	2.15	1.3	.9	.85	.45
24.....	.5	.5	.5	.6	3.45	4.0	3.7	2.15	1.25	.9	.8	.45
25.....	.6	.4	.5	.75	3.5	3.75	3.7	2.1	1.2	.9	.8	.5
26.....	.6	.4	.5	.75	4.0	3.8	3.7	2.1	1.2	.95	.75	.45
27.....	.6	.45	.55	.75	3.8	3.7	3.8	2.1	1.15	.9	.7	.5
28.....	.55	.5	.6	.75	3.85	4.2	3.95	2.05	1.1	.9	.75	.5
29.....	.5	.4	.65	.8	3.85	4.3	4.05	2.05	1.1	.9	.75	.5
30.....	.5		.7	.85	4.25	4.4	4.1	1.75	1.05	.95	.75	.5
31.....	.5		.55		4.3		3.5	1.45		1.05		.5

Daily discharge, in second-feet, of Arkansas River at Salida, Colo., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	200	200	210	192	295	2,320	2,370	1,120	510	390	370	285
2.....	200	210	210	192	335	2,420	2,125	1,000	470	390	350	270
3.....	200	220	200	210	320	2,628	2,080	860	470	370	350	270
4.....	200	200	185	245	282	2,950	1,990	810	455	370	410	255
5.....	210	210	192	258	270	3,172	1,682	700	435	390	430	270
6.....	220	200	200	270	282	3,288	1,520	630	435	390	410	240
7.....	232	200	210	245	295	3,345	1,560	610	435	390	430	240
8.....	210	220	200	258	480	3,345	1,725	590	435	390	450	240
9.....	178	210	200	282	658	3,172	1,990	950	420	370	430	228
10.....	210	220	210	295	635	2,628	2,080	815	420	370	430	228

Daily discharge, in second-feet, of Arkansas River at Salida, Colo., for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11.....	185	232	210	258	658	2,080	1,600	545	420	410	410	228
12.....	185	210	200	270	658	2,085	1,855	525	405	390	350	228
13.....	210	192	210	232	585	2,080	1,945	485	370	390	330	240
14.....	220	200	200	210	585	2,170	2,220	505	390	390	330	255
15.....	220	200	200	210	440	2,125	2,125	620	430	390	330	240
16.....	232	192	200	210	385	1,682	1,370	935	450	370	350	240
17.....	220	192	200	232	402	1,405	1,232	970	450	370	330	240
18.....	210	192	192	232	500	1,200	1,600	970	450	370	315	215
19.....	210	185	200	245	562	1,265	1,768	830	450	370	315	228
20.....	210	178	210	245	705	1,168	1,725	540	450	350	315	215
21.....	200	178	192	210	950	1,265	1,682	750	450	350	315	215
22.....	200	185	200	200	1,442	1,480	2,080	805	495	330	315	205
23.....	200	200	200	200	1,600	1,855	2,270	865	495	330	315	205
24.....	200	200	200	220	1,682	2,170	1,900	865	472	330	300	205
25.....	220	185	200	258	1,725	1,945	1,900	840	450	330	300	215
26.....	220	185	200	258	2,270	1,990	1,900	840	450	350	285	205
27.....	220	192	210	258	2,170	1,900	2,000	840	430	330	270	215
28.....	210	200	220	258	1,990	2,370	2,140	820	410	330	285	215
29.....	200	185	232	270	2,035	2,470	2,220	820	410	330	285	215
30.....	200	.....	245	282	2,420	2,575	2,290	665	390	350	285	215
31.....	200	.....	210	.....	2,470	.....	1,750	530	.....	390	.....	215

Monthly discharge of Arkansas River at Salida, Colo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January.....	232	178	207	12,700
February.....	232	178	199	11,400
March.....	245	185	205	12,600
April.....	295	192	240	14,300
May.....	2,470	270	971	59,700
June.....	3,349	1,170	2,220	132,000
July.....	2,370	1,230	1,890	116,000
August.....	1,120	485	763	46,900
September.....	510	370	440	26,200
October.....	410	330	367	22,600
November.....	450	270	346	20,600
December.....	285	205	232	14,300
The year.....	3,340	178	674	489,000

NOTE.—Values in the above table have been changed slightly from the State engineer's records to conform with the standard computation rules of the Geological Survey.

ARKANSAS RIVER AT CANON CITY, COLO.

Location.—Just below the suspension bridge at Hot Springs Hotel, at the mouth of the canyon, and $1\frac{1}{2}$ miles above Canon City. Nearest important tributary is Grape Creek, which enters above.

Records available.—May 1, 1888, to November 30, 1912.

Drainage area.—3,060 square miles.

Gage.—Automatic recording gage established by the State engineer in September, 1909. The river shifted away from this gage early in 1912, and a chain gage reading to the same datum was placed on the opposite side of the river and used during the year. The original Geological Survey gage was established April 17, 1889. On October 4, 1895, a new staff gage was established on the left bank about 100 feet below the original gage and referred to the same datum. At low stages it read 0.4 foot lower than the original gage, but at high stages the readings were the same. On August 26, 1902, a gage was established on the right bank near the first gage and referred to the same datum. The datum of the recording gage now used is 2.00 feet higher than that of the last gage.

Channel.—The channel shifts to such an extent during high water that at times it is necessary to move the gage in order to read the gage heights.

Discharge measurements.—Made from car and cable.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—There are court decrees for diversions of 131 second-feet from the Arkansas between the stations at Canon City and Salida, and diversions of 2,286 second-feet from intervening tributaries.

Cooperation.—During 1912 this station was maintained and records were furnished by the State engineer of Colorado.

Discharge measurements of Arkansas River at Canon City, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Jan. 18 ^a	C. C. Hezmalhalch.....	4.92	351	June 20	Thos. Grieve, jr.....	6.55	2,020
Feb. 6 ^a	.....do.....	4.95	381	July 27	B. S. Clayton.....	6.55	2,190
Mar. 13	Thos. Grieve, jr.....	5.06	388	Sept. 6	.....do.....	4.30	380
Apr. 10	C. C. Hezmalhalch.....	5.50	602	Oct. 11	.....do.....	4.30	370
24	Thos. Grieve, jr.....	4.72	279	Nov. 14	.....do.....	4.14	306
May 22	C. L. Patterson.....	7.35	1,720	20	Thos. Grieve, jr.....	4.14	346
28	C. C. Hezmalhalch.....	8.17	2,860	Dec. 20	B. S. Clayton.....	4.04	320

^a Relation of gage height to discharge affected by ice.

Daily gage height, in feet, of Arkansas River at Canon City, Colo., for 1912.

[S. R. McKissick, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	4.7	4.7	4.6	5.1	5.0	7.9	7.3	6.2	4.75	4.3	4.25
2.....	4.7	4.8	4.85	5.0	5.2	7.6	7.15	5.8	4.5	4.3	4.2
3.....	4.7	4.8	4.9	5.25	5.35	7.85	7.0	5.55	4.4	4.3	4.2
4.....	4.7	4.55	4.8	5.45	5.2	8.1	6.85	5.45	4.3	4.3	4.15
5.....	4.7	4.8	4.8	5.65	5.05	8.3	6.8	5.35	4.3	4.3	4.3
6.....	4.7	4.85	4.95	5.7	4.9	8.55	6.35	5.15	4.3	4.3	4.4
7.....	4.7	4.85	4.9	5.6	4.85	8.5	6.3	5.05	4.3	4.3	4.4
8.....	4.7	4.9	4.85	5.45	4.9	8.3	6.4	5.0	4.3	4.3	4.4
9.....	4.7	4.95	4.7	5.45	5.9	8.35	6.5	5.25	4.3	4.3	4.4
10.....	4.8	4.9	5.0	5.5	5.95	7.8	6.7	5.35	4.2	4.3	4.35
11.....	4.9	4.9	5.15	5.5	5.95	7.35	6.3	5.05	4.2	4.3	4.3
12.....	4.8	4.9	5.2	5.3	6.05	7.05	6.35	4.65	4.3	4.3	4.3
13.....	4.8	4.85	5.05	5.2	6.2	7.05	6.5	4.7	4.2	4.3	4.2
14.....	4.8	4.75	4.85	4.95	6.3	7.15	6.5	4.85	4.15	4.3	4.15
15.....	4.8	4.85	4.7	4.9	6.2	7.2	6.9	5.25	4.3	4.3	4.2
16.....	4.8	4.8	4.7	4.85	6.05	7.05	6.4	5.25	4.35	4.3	4.2
17.....	4.9	4.85	4.7	4.9	5.6	6.95	6.05	5.5	4.35	4.3	4.15
18.....	4.9	4.9	4.8	4.95	5.5	6.9	6.1	5.5	4.3	4.3	4.1
19.....	4.9	4.85	5.7	5.25	5.75	6.7	6.9	5.4	4.3	4.3	4.1
20.....	4.9	4.75	5.45	5.45	6.15	6.45	6.6	5.3	4.3	4.25	4.2
21.....	4.85	4.55	5.3	5.05	6.5	6.45	6.5	5.1	4.3	4.3	4.1
22.....	4.85	4.5	5.1	4.85	7.0	6.65	6.65	5.25	4.3	4.3	4.1
23.....	4.85	4.6	5.05	4.75	7.75	6.85	6.85	5.35	4.45	4.3	4.1
24.....	4.8	4.85	5.0	4.7	7.7	7.2	6.7	5.4	4.4	4.3	4.15
25.....	4.9	4.7	5.05	4.75	8.0	7.2	6.7	5.35	4.4	4.2	4.1
26.....	4.9	4.7	5.15	4.8	8.35	7.1	6.65	5.3	4.4	4.2	4.1
27.....	4.9	4.8	5.1	4.8	8.4	7.0	6.6	5.2	4.35	4.2	4.1
28.....	4.9	4.8	5.1	4.9	8.15	7.2	6.65	5.2	4.3	4.25	4.1
29.....	4.95	4.75	5.2	4.9	7.95	7.35	6.75	5.2	4.3	4.1	4.1
30.....	4.8	.....	5.25	4.95	8.1	7.4	6.8	5.2	4.3	4.15	4.1
31.....	4.8	.....	5.25	.....	8.1	.....	6.75	4.8	.....	4.3	.....

Daily discharge, in second-feet, of Arkansas River at Canon City, Colo., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	340	260	230	455	415	2,750	3,140	1,780	555	370	352
2.....	340	295	310	415	500	2,420	2,940	1,350	445	370	335
3.....	340	295	330	522	568	2,800	2,740	1,115	405	370	335
4.....	340	210	290	612	500	3,200	2,575	1,028	370	370	320
5.....	340	290	290	710	435	3,560	2,510	945	370	370	370
6.....	310	310	350	735	375	4,000	1,960	795	370	370	405
7.....	310	310	330	685	355	4,000	1,900	728	370	370	405
8.....	310	330	310	612	375	3,740	2,020	695	370	370	405
9.....	310	350	260	612	845	3,880	2,140	868	370	370	405
10.....	310	330	370	635	872	3,260	2,380	945	335	370	388
11.....	350	330	430	635	872	2,560	1,900	728	335	370	370
12.....	350	330	450	545	928	2,240	1,960	508	370	370	370
13.....	350	310	390	500	1,010	2,290	2,140	530	335	370	335
14.....	350	280	310	395	1,070	2,460	2,140	608	320	370	320
15.....	350	310	260	375	1,010	2,570	2,640	868	370	370	335
16.....	350	295	260	355	928	2,440	2,020	868	388	370	335
17.....	350	310	260	375	685	2,370	1,615	1,070	388	370	320
18.....	350	330	295	395	635	2,350	1,670	1,070	370	370	305
19.....	350	310	700	522	762	2,140	2,640	985	370	370	305
20.....	350	280	595	612	982	1,900	2,260	905	370	352	335
21.....	310	210	545	435	1,190	1,920	2,140	760	370	370	305
22.....	310	200	455	355	1,490	2,180	2,320	868	370	370	305
23.....	310	230	435	318	2,070	2,430	2,575	945	425	370	305
24.....	295	310	415	300	2,140	2,920	2,380	985	405	370	320
25.....	330	260	435	318	2,420	2,930	2,380	945	405	335	305
26.....	330	260	478	335	2,790	2,800	2,320	905	405	335	305
27.....	330	295	455	335	2,930	2,670	2,260	830	388	335	305
28.....	330	295	455	375	2,860	2,960	2,320	830	370	352	305
29.....	350	280	500	375	2,640	3,180	2,445	830	370	305	305
30.....	295	522	395	2,900	3,270	2,510	830	370	320	305	305
31.....	295	522	2,980	2,980	2,445	580	370	370	370	370	370

Monthly discharge of Arkansas River at Canon City, Colo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January.....	350	295	330	20,300
February.....	350	200	290	16,700
March.....	700	230	395	24,300
April.....	735	300	475	28,300
May.....	2,980	355	1,310	80,500
June.....	4,000	1,900	2,810	167,000
July.....	3,140	1,620	2,300	141,000
August.....	1,780	508	893	54,900
September.....	555	320	382	22,700
October.....	370	305	362	22,300
November.....	405	305	337	20,100
The period.....				598,000

NOTE.—Values in the above table have been changed slightly from the State engineer's records to conform with the standard computation rules of the Geological Survey.

ARKANSAS RIVER AT PUEBLO, COLO.

Location.—At Main Street Bridge in Pueblo, 2 miles above the mouth of Fountain Creek, the nearest tributary.

Records available.—September 19, 1894, to December 31, 1912. From May 1, 1885, to September 30, 1886, a station was maintained at Pueblo by the State engineer; from June 1, 1887, to September 30, 1887, a station was maintained at a point 9 miles above Pueblo; from May 1, 1889, to August 31, 1889, the Geological Survey maintained the station 9 miles above Pueblo.

Drainage area.—4,600 square miles.

Gage.—An automatic gage located 150 feet below Main Street Bridge has been used since March 22, 1911. It is referred to the same datum as the chain gage on the Main Street Bridge, which was installed July 7, 1905, but the slope of the river between the two points causes differences in readings. A vertical staff placed at the Santa Fe Avenue Bridge on September 19, 1894, was used until July 10, 1898, when a second gage was placed at Main Street Bridge, and used until March 3, 1900. From that date until July 14, 1902, a vertical staff near the Union Avenue Bridge was used. From that date until July 7, 1905, when the present gage was placed in position, a staff gage referred to a different datum was used.

Channel.—The channel shifts to such an extent during high water that it has been necessary to move the gage in order to read the gage heights.

Discharge measurements.—Made from Main Street Bridge.

Winter flow.—Ice causes some slight backwater during the winter months.

Diversions.—There are court decrees for diversions of 637 second-feet from Arkansas River, between the station at Canon City and Pueblo, and diversions of 372 second-feet from intervening tributaries.

Cooperation.—From 1894 to 1908 this station was maintained by the United States Geological Survey. At present the station is maintained and records are furnished by the State engineer of Colorado.

Discharge measurements of Arkansas River at Pueblo, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Jan. 19 ^a	C. C. Hezmalhaleh.....	3.35	304	May 23	A. A. Weiland.....	3.70	1,500
Feb. 7	.....do.....	2.35	272	24	C. L. Patterson.....	4.01	2,150
Mar. 18	Thos. Grieve.....	2.50	341	June 6	B. S. Clayton.....	5.49	3,720
Apr. 2	C. L. Patterson.....	2.05	150	July 30	.....do.....	4.58	2,460
12	C. C. Hezmalhaleh.....	2.70	429	Sept. 7	.....do.....	2.05	292
23	Thos. Grieve.....	2.28	276	Oct. 14	Clayton and Chew...	2.35	504
May 10	A. A. Weiland.....	2.75	614	Nov. 15	B. S. Clayton.....	2.28	430
18	C. L. Patterson.....	2.63	554	Dec. 12	.....do.....	2.12	359

^a Slight ice effect.

Daily gage height, in feet, of Arkansas River at Pueblo, Colo., for 1912.

[A. A. Weiland, Observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	5.7	3.1	2.3	2.1	2.2	4.9	4.75	5.55	2.3	2.2	4.2	.....
2.....	5.7	2.9	2.4	2.0	2.2	4.6	4.6	3.85	2.3	2.2	3.55	.....
3.....	5.7	2.6	2.4	1.95	2.3	4.55	4.4	3.65	2.15	2.15	2.6	.....
4.....	5.7	2.6	2.4	2.2	2.3	4.8	4.1	3.45	2.2	2.2	2.9	.....
5.....	5.7	2.6	2.4	2.4	2.3	5.2	4.15	3.1	2.0	2.2	3.55	.....
6.....	5.7	2.4	2.4	2.75	2.3	5.45	3.7	2.9	2.05	2.25	4.2	.....
7.....	5.7	2.4	2.4	2.75	2.2	5.6	3.65	2.8	2.0	2.4	4.4	.....
8.....	5.6	2.4	2.4	2.75	2.1	5.6	3.6	2.65	2.1	2.3	3.85	2.1
9.....	5.6	2.5	2.4	2.5	2.4	5.8	3.8	2.6	2.1	2.3	4.55	2.15
10.....	5.6	2.45	2.5	2.5	2.8	5.7	4.1	2.95	2.0	2.3	2.25	2.1
11.....	5.6	2.4	2.5	2.6	2.8	4.95	3.9	2.95	2.05	2.3	2.4	2.05
12.....	5.5	2.4	2.55	2.6	3.0	4.75	3.6	2.6	2.05	2.35	2.3	2.0
13.....	5.5	2.4	2.6	2.5	3.1	4.4	3.9	2.5	2.35	2.3	2.3	2.05
14.....	5.4	2.4	2.5	2.45	3.2	4.4	4.0	2.4	2.1	2.35	2.2	2.1
15.....	5.4	2.35	2.4	2.3	3.2	4.45	5.05	2.75	2.2	2.35	2.3	2.1
16.....	5.4	2.4	2.4	2.3	2.9	4.5	4.85	2.75	2.3	2.3	2.25	2.1
17.....	5.4	2.3	2.4	2.3	2.9	4.3	3.75	2.9	2.3	2.3	2.2	2.1
18.....	5.4	2.35	2.4	2.4	2.8	4.5	3.45	3.0	2.25	2.3	2.25	2.1
19.....	5.3	2.35	2.5	2.45	2.75	4.2	4.6	3.0	2.2	2.2	2.15	2.1
20.....	5.3	2.3	2.55	2.65	2.9	4.05	3.95	3.0	2.2	2.3	2.2	2.1

Daily gage height, in feet, of Arkansas River at Pueblo, Colo., for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21.....	5.25	2.3	2.6	2.6	3.0	4.1	4.5	2.5	2.25	2.3	2.05	2.05
22.....	5.25	2.4	2.45	2.4	3.35	4.2	4.05	2.7	2.25	2.4	2.05	.....
23.....	5.2	2.2	2.4	2.3	3.9	4.4	4.15	2.8	2.3	2.3	2.1	.....
24.....	5.15	2.3	2.4	2.2	4.0	4.65	4.3	2.8	2.3	2.3	2.0	.....
25.....	4.05	2.4	2.4	2.2	4.15	4.85	4.2	2.8	2.3	2.3	2.0	.....
26.....	3.65	2.4	2.3	2.2	4.5	4.7	4.1	2.75	2.35	2.2	1.95	.....
27.....	3.4	2.4	2.2	2.2	4.75	4.5	4.1	2.65	2.3	3.85	2.2	.....
28.....	3.35	2.3	2.1	2.2	4.6	4.45	4.2	2.6	2.3	3.85	2.2	.....
29.....	3.0	2.4	2.0	2.2	4.35	4.85	4.9	2.65	2.2	4.2	2.1	2.0
30.....	2.8	.....	2.1	2.2	4.6	4.9	5.4	2.8	2.2	3.35	2.0	2.0
31.....	3.2	.....	2.1	.....	4.8	.....	5.8	2.4	.....	3.5	.....	2.0

NOTE.—Gage heights affected by ice Jan. 1 to Feb. 5.

Daily discharge, in second-feet, of Arkansas River at Pueblo, Colo., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	350	270	245	170	240	3,095	2,930	3,518	460	390	2,270	268
2.....	340	270	290	140	240	2,770	2,770	1,670	460	390	1,570	276
3.....	340	270	290	125	300	2,718	2,560	1,510	358	358	685	284
4.....	340	270	290	205	300	2,985	2,245	1,320	393	390	940	292
5.....	340	270	290	290	300	3,415	2,298	1,075	263	390	1,570	300
6.....	330	290	290	460	300	3,678	1,825	940	292	425	2,270	308
7.....	330	290	290	460	240	3,835	1,775	850	290	535	2,490	316
8.....	330	290	290	460	190	3,835	1,725	725	325	460	1,885	325
9.....	330	335	290	335	365	4,045	1,930	685	325	460	2,655	358
10.....	330	312	335	335	670	3,940	2,245	988	230	460	425	325
11.....	330	290	335	380	670	3,148	2,035	988	292	460	535	292
12.....	320	290	358	350	835	2,930	1,725	685	292	498	460	260
13.....	320	290	380	325	925	2,560	2,035	610	498	460	460	292
14.....	310	290	335	390	1,020	2,560	2,140	535	325	498	390	325
15.....	310	268	290	225	1,020	2,612	2,975	808	390	498	460	325
16.....	310	290	290	225	750	2,665	2,762	808	460	460	425	325
17.....	310	245	290	225	750	2,455	1,562	940	460	400	390	325
18.....	310	268	290	310	670	2,665	1,200	1,035	425	460	425	325
19.....	305	268	335	350	630	2,350	2,495	1,035	390	390	358	325
20.....	305	245	358	510	750	2,192	1,780	1,035	390	460	390	325
21.....	300	245	380	490	835	2,245	2,385	610	425	460	292	292
22.....	300	290	312	360	1,162	2,350	1,890	765	425	535	292	288
23.....	290	205	290	300	1,730	2,560	2,000	850	460	460	325	284
24.....	285	245	290	240	2,140	2,822	2,105	850	460	460	260	280
25.....	280	290	290	240	2,298	3,040	2,055	850	460	460	260	276
26.....	280	290	245	240	2,665	2,875	1,945	808	498	390	230	272
27.....	280	290	205	240	2,930	2,665	1,945	725	460	1,885	390	268
28.....	280	245	170	240	2,770	2,612	2,055	685	460	1,885	390	264
29.....	280	290	140	240	2,508	8,040	2,815	725	390	2,270	325	280
30.....	270	.....	170	240	2,770	3,095	3,360	850	390	1,370	260	260
31.....	270	.....	170	.....	2,985	.....	3,785	535	.....	1,520	.....	260

NOTE.—Discharge interpolated for days for which gage heights are missing and on which they were affected by ice.

Monthly discharge of Arkansas River at Pueblo, Colo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January.....	350	270	310	19,100
February.....	335	205	276	15,900
March.....	380	140	285	17,500
April.....	510	125	301	17,900
May.....	2,980	190	1,160	71,300
June.....	4,040	2,190	2,920	174,000
July.....	3,780	1,260	2,240	138,000
August.....	3,520	535	968	59,500
September.....	498	260	391	23,300
October.....	2,270	358	664	40,800
November.....	2,660	230	803	47,800
December.....	358	260	296	18,200
The year.....	4,040	125	886	643,000

NOTE.—Values in the above table have been changed slightly from the State engineer's records to conform with the standard computation rules of the Geological Survey.

ARKANSAS RIVER NEAR NEPESTA, COLO.

Location.—At the dam of the Oxford Farmers' Canal Co., in sec. 31, T. 21 S., R. 60 W. $1\frac{1}{2}$ miles above Nepesta; about 6 miles below the mouth of Huerfano River, the nearest important tributary.

Records available.—September 8, 1897, to October 31, 1903; July 14, 1909, to November 30, 1912.

Drainage area.—9,130 square miles.

Gage.—An automatic recording gage with its zero coinciding with the lowest point of the diversion dam has been in use since 1910. There is no known relation between the present gage and that used in 1903.

Channel.—The diversion dam is the control point, and as the results show shifting conditions it is evident that the dam is not permanent.

Discharge measurements.—Made from the bridge at Nepesta except during low water, when measurements are made by wading. Between the gage and the measuring section is a wasteway from the canal. The flow at this point is subtracted from the flow at the bridge in order to show the amount of water flowing over the dam.

Winter flow.—Ice causes backwater during a portion of the winter months.

Diversions.—There are court decrees for diversions of 1,552 second-feet from the Arkansas between Pueblo and Nepesta, and approximately 1,600 second-feet from intervening tributaries. The discharge records given in this report do not include the flow of the canal.

Cooperation.—Since 1909 this station has been maintained and records have been furnished by the State engineer of Colorado.

Discharge measurements of Arkansas River near Nepesta, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Feb. 7 ^a	C. C. Hezmalhalch.....	0.80	271	May 30	B. S. Clayton.....	2.00	1,950
Mar. 12	Thos. Grleve, jr.....	.85	255	June 7	do.....	2.78	3,340
Apr. 12	C. C. Hezmalhalch.....	.78	302	July 3	do.....	1.65	1,960
29	C. L. Patterson.....	.70	270	15	do.....	2.90	3,710
May 20	do.....	1.20	1,060	Sept. 9	do.....	.60	255
21	do.....	1.40	1,290	Oct. 18	do.....	.85	425
24	B. S. Clayton.....	2.10	2,210	Dec. 11	do.....	.72	393
27	C. L. Patterson.....	2.21	2,380				

^a Relation gage height to discharge affected by ice.

Daily gage height, in feet, of Arkansas River near Nepesta, Colo., for 1912.

[C. W. Cummings, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		0.85	0.60	2.35	1.90	3.80	1.00	0.50	0.70
2.....		1.00	.70	2.20	1.70	2.75	.95	.50	.80
3.....		.70	.70	1.90	1.55	1.70	.90	.70	.50
4.....		.45	.75	2.30	1.45	2.35	.80	.60	.40
5.....		.55	.80	-----	1.30	1.50	.75	.70	.40
6.....		.60	.75	-----	1.45	1.50	.75	.70	.60
7.....		.75	.65	2.60	1.35	1.10	.70	.80	.50
8.....		.65	.60	2.50	1.25	.95	.60	.90	.60
9.....		.55	.45	-----	1.30	1.00	.60	.90	.70
10.....		.60	.60	2.80	1.65	1.25	.60	.95	.85
11.....		.70	.60	2.50	1.85	1.35	.50	.85	.80
12.....		.80	.60	1.85	1.55	1.25	.45	.90	.80
13.....		.90	.90	1.95	1.55	1.10	.70	.85	.45
14.....		.85	1.10	2.05	1.60	1.00	.85	.90	.50
15.....		.50	1.10	2.40	2.65	1.40	.80	.90	.45
16.....		.35	1.10	2.20	2.00	1.55	.80	.95	.50
17.....		.45	1.15	2.70	1.15	1.15	.85	.90	.50
18.....	0.65	.70	.80	2.70	1.35	1.30	.80	.95	.55
19.....	.85	.85	.95	2.10	1.70	1.20	.80	.95	.55
20.....	.75	.80	1.25	1.95	1.60	1.20	.80	.90	.70
21.....	.60	.55	1.30	1.70	1.70	2.05	.80	.80	.50
22.....	.80	.85	1.55	1.80	1.55	.85	.75	.90	.40
23.....	.95	.70	1.90	1.70	1.65	.95	.90	.90	.50
24.....	.80	.70	2.40	2.00	1.65	.90	.90	.80	.40
25.....	.75	.70	2.15	2.15	1.60	.85	.90	.70	.50
26.....	.75	.60	2.05	2.10	1.55	.80	.90	.70	.40
27.....	.80	.70	2.05	2.10	1.65	.80	.85	.60	.40
28.....	.85	.70	2.10	2.00	1.60	.80	.85	-----	.50
29.....	.65	.70	2.35	2.15	1.60	.80	.70	-----	.75
30.....	.90	.70	2.35	2.10	1.95	.80	.70	.90	.55
31.....	.85	-----	2.55	-----	3.80	1.40	-----	.85	-----

Daily discharge, in second-feet, of Arkansas River near Nepesta, Colo., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		330	225	2,600	2,310	5,240	540	200	320
2.....		415	325	2,360	2,030	3,280	500	200	330
3.....		270	350	1,920	1,830	1,640	460	320	200
4.....		225	400	2,520	1,720	2,600	390	255	150
5.....		210	460	2,690	1,560	1,375	355	320	150
6.....		230	430	2,850	1,720	1,375	355	320	255
7.....		290	360	3,020	1,620	900	320	390	200
8.....		250	340	2,860	1,520	750	255	460	255
9.....		210	230	3,150	1,560	790	255	460	320
10.....		230	365	3,440	1,950	1,068	255	500	425
11.....		270	375	2,930	2,190	1,188	190	425	390
12.....		310	380	1,950	1,830	1,068	165	460	390
13.....		350	675	2,100	1,830	900	320	425	175
14.....		330	900	2,260	1,890	790	425	460	200
15.....		190	900	2,850	3,320	1,250	390	460	175
16.....		135	900	2,550	2,320	1,438	390	500	200
17.....		170	955	3,400	1,420	945	425	460	200
18.....	250	270	600	3,430	1,620	1,125	390	500	228
19.....	330	330	750	2,450	2,010	1,010	390	500	228
20.....	290	310	1,068	2,220	1,890	1,010	390	460	320
21.....	230	210	1,125	1,870	2,010	2,135	390	390	200
22.....	310	330	1,438	2,030	1,830	425	355	460	150
23.....	370	270	1,920	1,900	1,950	500	460	460	200
24.....	310	270	2,680	2,370	1,950	460	460	390	150
25.....	290	270	2,285	2,620	1,890	425	460	320	200
26.....	290	230	2,135	2,560	1,830	390	460	320	150
27.....	310	270	2,135	2,570	1,950	390	425	255	150
28.....	330	270	2,210	2,420	1,890	390	425	325	200
29.....	250	270	2,600	2,680	1,890	390	320	390	355
30.....	350	270	2,600	2,610	2,320	390	320	460	228
31.....	330	-----	2,935	-----	5,240	880	-----	425	-----

Monthly discharge of Arkansas River near Nepesta, Colo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
Mar. 18-31.....	370	250	303	8,400
April.....	415	135	266	15,800
May.....	2,940	225	1,130	69,500
June.....	3,440	1,870	2,570	153,000
July.....	5,240	1,420	1,970	121,000
August.....	5,240	390	1,180	72,600
September.....	540	165	374	22,300
October.....	500	200	395	24,300
November.....	425	150	238	14,200
The period.....				501,000

NOTE.—Values in the above table have been changed slightly from the State engineer's records to conform with the standard computation rules of the Geological Survey.

ARKANSAS RIVER AT LA JUNTA, COLO.

Location.—Half a mile below the east bridge at La Junta; no important tributary within several miles.

Records available.—April 11, 1912, to December 7, 1912. From December 5, 1893, to December 31, 1895, a station was maintained near the city pumping plant. During 1899 and 1901 a station was maintained at the head of the Fort Lyon Canal by the Great Plains Water Co. From April 7, 1903, to October 31, 1903, a station was maintained 1 mile east of La Junta and a number of discharge measurements were made during 1904. From August 27, 1908, to November 30, 1908, a station was maintained half a mile northwest of La Junta, just below the mouth of Crooked Arroyo.

Drainage area.—Not measured.

Gage.—Automatic recording gage.

Channel.—Fairly permanent during 1912.

Discharge measurements.—Made from the bridge during high water and by wading at ordinary stages.

Winter flow.—No data.

Diversions.—There are court decrees for diversions of 2,735 second-feet from the Arkansas between Nepesta and La Junta, and 511 second-feet from intervening tributaries.

Cooperation.—Station maintained by the State engineer in cooperation with the Arkansas Valley Ditch Association.

Discharge measurements of Arkansas River at La Junta, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 11	C. L. Patterson.....	0.95	87	June 10	B. S. Clayton.....	2.18	807
15	.....do.....	.80	83	July 2	.....do.....	1.10	138
20	.....do.....	1.50	310	17	.....do.....	1.13	138
25	C. C. Hezmalhalch.....	.70	40	Aug. 30	.....do.....	.40	22
May 21	C. L. Patterson.....	1.95	491	Oct. 17	.....do.....	1.14	116
30	B. S. Clayton.....	1.90	554	Dec. 16	.....do.....	1.61	236

Daily gage height, in feet, of Arkansas River at La Junta, Colo., for 1912.

[Bristol auto-gage, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....		0.65	1.8	1.0	5.55	1.25	1.0	1.9	1.5
2.....		.80	2.05	1.05	.35	.65	.90	1.85	1.8
3.....		.80	1.8	1.25	1.65	.70	.90	1.85	1.6
4.....		.85	1.95	1.15	1.65	.85	1.0	1.85	1.85
5.....		.90	2.0	1.2	1.3	.75	1.05	1.6	1.4
6.....		.85	1.85	1.8	1.3	.55	1.25	1.35	1.3
7.....		.80	1.95	1.8	.80	.70	1.4	1.3	1.2
8.....		.80	1.85	1.85	.70	.50	1.85	1.2	-----
9.....		.75	2.05	1.9	1.0	.95	1.9	1.2	-----
10.....		.80	2.15	2.0	1.0	.85	1.6	1.2	-----
11.....	0.95	.80	1.9	2.0	1.5	.85	1.45	1.35	-----
12.....	.90	.80	1.3	1.95	1.8	.75	1.05	1.25	-----
13.....	.85	.85	1.9	1.85	1.6	.60	1.05	1.3	-----
14.....	.85	.95	2.0	2.1	1.3	.80	1.05	1.55	-----
15.....	.85	1.35	1.8	2.3	1.0	.75	1.1	1.35	-----
16.....	.75	1.60	1.75	2.2	1.2	.70	1.05	1.3	-----
17.....	.65	1.50	1.85	1.35	.90	.60	1.05	1.1	-----
18.....	.70	1.40	3.35	1.0	.75	.80	1.1	1.5	-----
19.....	.65	1.30	1.75	1.35	1.0	1.2	1.05	1.4	-----
20.....	.55	1.50	1.1	1.9	1.4	1.2	1.2	1.4	-----
21.....	.80	1.95	1.15	2.0	1.55	1.25	1.35	1.5	-----
22.....	1.45	2.0	1.45	2.05	1.3	1.2	1.1	1.45	-----
23.....	1.50	1.9	1.55	2.15	.95	1.3	1.25	1.3	-----
24.....	1.10	1.65	1.55	1.9	.75	1.45	1.25	1.75	-----
25.....	.75	1.75	1.5	2.1	.55	1.6	1.2	1.3	-----
26.....	.65	1.8	1.7	1.9	.65	1.4	1.55	1.4	-----
27.....	.65	1.9	1.4	1.9	.60	1.5	1.6	1.45	-----
28.....	.60	1.9	1.25	2.1	.45	1.45	1.5	1.55	-----
29.....	.60	1.6	.65	1.8	.45	1.25	1.7	1.80	-----
30.....	.60	1.85	1.0	1.95	.40	1.0	1.85	1.75	-----
31.....		2.1	-----	4.25	.85	-----	1.85	-----	-----

Daily discharge, in second-feet, of Arkansas River at La Junta, Colo., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		40	480	105	8,500	190	105	555
2.....		60	685	120	2,600	40	80	518
3.....		60	480	190	385	45	80	518
4.....		70	598	152	385	70	105	518
5.....		80	640	170	210	52	120	355
6.....		70	518	480	210	32	190	232
7.....		60	598	480	60	45	255	210
8.....		60	518	518	45	30	518	170
9.....		52	685	555	105	92	555	170
10.....		60	778	640	105	70	355	170
11.....	92	60	555	640	305	70	280	232
12.....	80	60	210	598	480	52	120	190
13.....	70	70	555	518	355	35	120	210
14.....	70	92	640	730	210	60	120	330
15.....	70	220	480	930	105	52	135	232
16.....	52	340	448	825	170	45	120	210
17.....	40	275	518	232	80	35	120	135
18.....	45	220	2,360	105	52	60	135	305
19.....	40	170	448	232	105	170	120	255
20.....	32	250	135	555	255	170	170	255
21.....	60	495	152	640	330	190	232	305
22.....	280	540	280	685	210	170	135	280
23.....	305	480	330	778	92	210	190	210
24.....	135	330	330	555	52	280	190	448
25.....	52	400	305	730	32	355	170	210
26.....	40	440	415	555	40	255	330	255
27.....	40	520	255	555	35	305	355	280
28.....	35	530	190	730	28	280	305	330
29.....	35	350	40	480	28	190	415	480
30.....	35	518	105	598	25	105	518	448
31.....		730	-----	4,250	70	-----	518	-----

Monthly discharge of Arkansas River at La Junta, Colo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
April 11-30.....	305	32	80.4	3,190
May.....	730	40	248	15,200
June.....	2,360	40	491	29,200
July.....	4,250	105	624	38,400
August.....	8,500	25	505	31,100
September.....	355	30	125	7,440
October.....	555	80	231	14,200
November.....	555	135	301	17,900
The period.....				157,000

NOTE.—Values in the above table have been changed slightly from the State engineer's records to conform with the standard computation rules of the Geological Survey.

ARKANSAS RIVER AT HOLLY, COLO.

Location.—At highway bridge half a mile southeast of Holly, on line between secs. 14 and 15, T. 23 S., R. 42 W., 1 mile below the mouth of Wild Horse Creek, an intermittent stream.

Records available.—October 15, 1907, to December 31, 1912.

Drainage area.—Approximately 25,000 square miles.

Gage.—A number of gages have been used at the station, but all readings have all been referred to the same datum except those from October 25 to December 31, 1911, when a different datum was used.

Channel.—Very shifting.

Discharge measurements.—Made from bridge during high water and by wading at low stages.

Winter flow.—Ice causes backwater during a portion of the winter months.

Diversions.—There are court decrees for diversions of 1,072 second-feet from Arkansas River between the stations at La Junta and Holly, and diversions of 1,253 second-feet from intervening tributaries. There are many diversions from Arkansas River below Holly, in Kansas.

Cooperation.—Station maintained and records furnished by the State engineer of Colorado.

Discharge measurements of Arkansas River at Holly, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Feb. 9 ^a	O. C. Hezmalhalch.....	3.45	424	June 30	C. L. Patterson.....	2.60	313
Mar. 15 ^a	Thos. Grieve, jr.....	2.96	390	July 1	B. S. Clayton.....	2.48	250
28	C. L. Patterson.....	2.36	237	3	C. L. Patterson.....	2.35	148
Apr. 12	H. C. Ogden.....	2.38	232	5	do.....	2.05	61
13	do.....	2.30	222	18	B. S. Clayton.....	3.00	850
20	C. L. Patterson.....	2.10	109	20	do.....	2.12	129
20	do.....	2.15	163	Aug. 1	do.....	5.20	7,360
25	do.....	1.90	46	5	do.....	2.97	857
June 10	do.....	2.57	455	8	do.....	2.70	529
12	B. S. Clayton.....	2.00	64	10	do.....	2.41	247
18	do.....	3.58	2,200	12	do.....	2.12	115
19	do.....	4.20	3,600	17	do.....	2.59	434
21	do.....	2.96	871	18	C. L. Patterson.....	2.47	297
23	H. C. Ogden.....	2.63	412	Sept. 12	do.....	4.43	4,300
24	B. S. Clayton.....	3.77	2,470	14	H. C. Ogden.....	2.78	644
27	do.....	3.10	1,020	15	do.....	2.46	323
28	do.....	2.92	716	16	B. S. Clayton.....	2.40	190
29	do.....	2.69	458	Dec. 19	do.....	2.46	220

^a Relation of gage height to discharge affected by ice.

Daily gage height, in feet, of Arkansas River at Holly, Colo., for 1912.

[H. C. Ogden, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	3.9	2.6	2.2	2.0	1.5	2.55	5.3	1.9	2.4	2.8	2.2
2.....	3.9	2.8	2.15	1.75	1.5	2.5	5.15	1.85	2.45	2.9	2.3
3.....	3.9	3.1	2.2	1.7	1.5	2.4	4.5	1.75	2.35	2.35	2.65
4.....	3.9	3.2	2.1	1.7	1.5	2.35	4.05	1.75	2.35	2.3	2.2
5.....	3.85	2.95	2.25	1.75	1.5	2.2	3.2	1.75	2.25	2.35	3.05
6.....	3.7	2.7	2.3	1.8	1.5	1.95	3.1	1.8	2.15	2.45	2.45
7.....	3.65	2.7	2.2	1.8	1.5	1.8	2.9	1.8	2.15	2.1	2.2
8.....	3.15	2.55	2.4	1.7	1.5	1.65	2.8	1.7	2.15	2.1	2.55
9.....	3.35	2.55	2.5	1.7	1.6	1.6	2.45	1.7	2.0	2.1	2.5
10.....	3.25	2.4	2.4	1.6	2.4	1.65	2.4	1.55	2.0	2.1	2.45
11.....	3.25	2.6	2.4	1.65	2.1	1.6	2.2	1.55	2.35	2.1	2.3
12.....	3.2	2.55	2.4	1.7	2.05	1.6	2.15	3.85	2.15	2.05	2.4
13.....	3.15	2.5	2.35	1.8	2.05	1.65	2.05	3.35	2.1	2.1	2.4
14.....	2.95	2.5	2.35	1.8	2.0	1.6	2.2	2.7	2.05	2.1	2.5
15.....	2.8	2.9	2.2	1.8	2.1	1.55	3.95	2.45	2.0	2.15	2.5
16.....	2.6	2.65	2.1	1.8	2.3	1.55	3.3	2.45	2.0	2.2	2.4
17.....	2.7	2.5	2.0	1.7	2.5	2.6	2.8	2.3	2.0	2.2	2.4
18.....	2.7	2.5	2.0	1.7	3.8	2.9	2.5	2.35	2.0	2.2	2.4
19.....	2.45	2.6	2.1	1.7	4.3	2.7	2.25	2.3	2.0	2.6	2.4
20.....	2.4	2.6	2.05	1.6	3.65	2.2	2.15	2.2	2.0	2.65	2.4
21.....	2.3	2.7	2.0	1.6	3.15	1.9	2.1	2.3	2.0	2.0	2.4
22.....	2.3	2.5	1.9	1.55	2.95	1.8	2.05	2.3	2.15	2.6	2.45
23.....	2.3	2.6	1.9	1.55	2.65	1.7	2.0	2.2	2.2	2.3	2.5
24.....	2.2	2.6	1.9	1.55	3.7	1.65	2.0	2.1	2.2	2.65	2.65
25.....	2.3	2.5	1.9	1.55	3.1	1.65	2.0	2.2	2.2	2.7	2.7
26.....	2.45	2.45	1.85	1.5	2.85	1.8	2.0	2.2	2.15	2.2	2.75
27.....	2.4	2.4	1.8	1.5	2.95	1.7	2.0	2.3	2.1	2.25	2.8
28.....	2.4	2.35	1.8	1.5	2.95	1.65	1.9	2.35	2.1	2.25	2.8
29.....	2.6	2.2	1.8	1.5	2.7	1.65	1.85	2.2	2.1	2.3	2.8
30.....	.....	2.2	2.0	1.5	2.55	1.75	1.9	2.3	2.15	2.2	2.8
31.....	.....	2.15	.....	1.5	.....	2.25	1.8	.....	2.2	.....	2.8

NOTE.—Gage heights probably affected by ice during December.

Daily discharge, in second-feet, of Arkansas River at Holly, Colo., for 1912.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	400	435	145	80	5	315	7,790	a 5	205	550
2.....	400	650	125	22	5	275	7,110	a 5	240	670
3.....	400	700	145	15	5	205	4,590	a 5	178	178
4.....	400	800	105	15	5	178	3,195	a 5	178	150
5.....	400	855	172	22	5	110	1,280	a 5	130	178
6.....	420	540	200	30	5	42	1,100	a 5	95	240
7.....	420	540	145	30	5	15	785	a 5	95	80
8.....	420	390	265	15	5	6	655	a 5	95	80
9.....	420	390	345	15	10	5	305	a 5	55	80
10.....	420	265	265	10	310	6	265	a 6	55	80
11.....	420	435	265	12	105	5	145	a 6	178	80
12.....	400	390	265	15	90	5	125	2,665	95	68
13.....	420	345	270	30	90	6	90	1,570	80	80
14.....	430	345	270	30	75	5	145	540	68	80
15.....	435	390	170	30	105	4	2,925	305	55	95
16.....	435	390	120	30	200	4	1,470	240	55	110
17.....	540	345	80	15	345	355	655	150	55	110
18.....	540	345	80	15	2,700	670	345	178	55	110
19.....	305	435	120	15	3,930	540	172	150	55	355
20.....	265	435	100	10	2,130	145	125	110	55	402
21.....	200	540	80	10	1,090	45	105	150	55	55
22.....	200	345	50	8	745	20	90	150	95	355
23.....	200	435	50	8	402	8	75	110	110	150
24.....	145	435	50	8	2,250	6	75	80	110	402
25.....	200	345	50	8	1,000	6	75	110	110	450
26.....	305	305	40	5	610	20	75	110	95	110
27.....	265	265	30	5	745	8	75	150	80	130
28.....	265	232	30	5	745	6	45	178	80	130
29.....	435	145	30	5	450	6	32	110	80	150
30.....	.....	145	80	5	315	10	a 5	150	95	110
31.....	.....	125	.....	5	.....	172	a 5	.....	110	.....

a Estimated.

Monthly discharge of Arkansas River at Holly, Colo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
February.....	540	145	362	20,800
March.....	855	125	411	25,300
April.....	345	30	138	8,210
May.....	80	5	17	1,050
June.....	3,930	5	616	36,700
July.....	670	4	103	6,330
August.....	7,790	5	1,090	67,000
September.....	2,660	5	242	14,400
October.....	240	55	100	6,150
November.....	670	68	194	11,500
The period.....				197,000

NOTE.—Values in the above table have been changed slightly from the State engineer's records to conform with the standard computation rules of the Geological Survey.

TENNESSEE FORK NEAR LEADVILLE, COLO.

Location.—At highway bridge in sec. 16, T. 9 S., R. 80 W., a few hundred yards above the mouth of the stream and about 3 miles northwest of Leadville.

Records available.—February 8, 1911, to November 20, 1912.

Drainage area.—45 square miles (measured on topographic sheet).

Gage.—Vertical staff.

Channel.—Data too meager to determine.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—There are court decrees for diversions of 24 second-feet above the station. There is also a decree for diversion of 18.5 second-feet from the headwaters of Eagle River to Tennessee Fork above the station.

Accuracy.—As the station has not been completely rated, no estimates of daily discharge have been made.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Tennessee Fork near Leadville, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
Feb. 22 ^a	H. B. Waha.....	0.37	11.4
Apr. 11 ^a	J. L. Mathias.....	.34	25.6
May 31	do.....	1.65	285
Sept. 20	R. H. Fletcher.....	.00	12

^a Relation of gage height to discharge affected by ice.

Daily gage height, in feet, of Tennessee Fork near Leadville, Colo., for 1912.

[Merl F. Frey, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		0.0					0.7				
2				0.05							0.2
3					0.60	1.10					
4				.08							
5			0.20								
6		.05							0.05		
7						1.35					
8											-.1
9								0.40			
10				.20	.60						
11				.30							
12			.15			1.00				0.0	
13											
14					.40				.05		.05
15								.50			
16										.0	
17		.05					.45		.0		
18						1.00		.25		-.03	
19			.20		.85			.20			
20				.30	.80				.0		.1
21											
22		.37									
23							.45		.05	.0	
24				.15	1.30		.45				
25											
26	0.10										
27											
28					1.20						
29		.28	.10	.15							
30											
31							.55	.05			

NOTE.—Gage heights affected by ice January, February, and March.

HALF MOON CREEK NEAR LEADVILLE, COLO.

Location.—In sec. 6, T. 10 S., R. 80 W., 1 mile above mouth of stream and 6 miles southwest of Leadville; no tributaries below the station.

Records available.—April 10, 1911, to November 16, 1912.

Drainage area.—30 square miles (measured on topographic sheet).

Gage.—Vertical staff.

Channel.—Shifting.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes backwater during the winter months and records are discontinued.

Diversions.—There are court decrees for diversions of 12 second-feet above the station.

Accuracy.—Owing to the high altitude of the drainage basin, the stage is likely to show considerable diurnal fluctuations at certain seasons of the year, due to alternate melting and freezing, and the mean daily gage height based on one reading for day may be considerably in error. For this reason the estimates can not be considered better than fair.

Cooperation.—This station is maintained in cooperation with the United States Forest Service.

Discharge measurements of Half Moon Creek near Leadville, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.
May 31	J. L. Mathias.....	<i>Feet.</i> 0.73	<i>Sec.-ft.</i> 73.1
Sept. 20	R. H. Fletcher.....	.40	14.9

Daily gage height, in feet, of Half Moon Creek near Leadville, Colo., for 1912.

[Merle F. Frey, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		0.6			0.6	0.4	0.15	16.....			1.1	0.65	0.4	0.4	0.72
2.....		.8				.4	.1	17.....			1.1		.4	.32	
3.....		.8				.4	.15	18.....			1.1	.6	.4		
4.....		1.0				.4	.65	19.....	0.4		1.0	.6	.4	.29	
5.....		1.1		0.65		.4		20.....	.4			.6	.4		
6.....		1.2			.5	.4		21.....	.4		1.0	.6	.4		
7.....		1.2	1.05			.4		22.....	.5			.6	.4		
8.....		1.2	1.05		.45	.4		23.....	.5	1.0		.6	.4		
9.....		1.0	1.05			.4		24.....	.6	1.0		.6	.4	.18	
10.....		1.0	1.05			.4		25.....	.6	1.1	.9	.6	.4		
11.....	0.2	1.0	1.05			.4		26.....	.6	1.1	.9	.6	.4		
12.....		1.0	1.05			.4		27.....	.6	1.0		.6	.4	.2	
13.....		.9	1.05	.7	.4	.4		28.....	.65	1.0		.6	.42	.2	
14.....		.9	1.05	.7	.4	.4		29.....	.65	1.0		.6		.2	
15.....		.85	1.1	.7	.4	.4	.3	30.....	.6			.6		.2	
								31.....	.7			.6		.2	

NOTE.—Gage heights during November affected by ice.

Daily discharge, in second-feet, of Half Moon Creek near Leadville, Colo., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1911.								
1.....	4.5	8.0	60	90	39	26	14	18
2.....	4.5	8.0	52	130	39	26	10	18
3.....	4.5	8.0	45	145	39	26	10	16
4.....	4.5	12	75	145	39	20	14	14
5.....	4.5	15	104	145	39	14	14	13
6.....	4.5	25	98	160	23	14	26	12
7.....	4.5	35	91	145	23	14	26	11
8.....	4.5	45	84	160	23	14	26	10
9.....	4.5	36	77	145	23	14	26	9
10.....	4.5	28	70	115	23	14	26	9
11.....	4.9	24	63	90	39	14	26	10
12.....	5.3	21	56	90	33	14	14	11
13.....	5.7	18	71	90	32	14	14	12
14.....	6.1	15	86	90	30	14	14	13
15.....	6.5	15	101	90	28	14	14	14
16.....	6.9	18	116	90	26	14	14	15
17.....	7.3	21	131	102	24	14	14	16
18.....	7.7	24	146	115	22	14	14	18
19.....	8.0	27	161	90	20	14	26	16
20.....	7.3	30	176	90	18	14	26	16
21.....	6.6	33	191	67	33	14	26	15
22.....	5.9	36	205	78	64	14	26	15
23.....	5.2	39	190	90	64	14	26	15
24.....	4.5	42	190	67	64	14	26	15
25.....	5.6	45	160	67	42	14	26	15
26.....	6.8	48	160	60	42	14	20	10
27.....	8.0	51	115	60	33	14	14	10
28.....	8.0	54	145	60	33	14	14	10
29.....	8.0	56	130	60	26	14	14	10
30.....	8.0	62	90	60	26	14	14	10
31.....		67		50	26		14	

Daily discharge, in second-feet, of Half Moon Creek near Leadville, Colo., for 1912.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	May.	June.	July.	Aug.	Sept.	Oct.
1912.							1912.						
1.....	5.0	45	148	80	45	15	16.....	11	108	175	56	15	15
2.....	5.0	90	150	74	42	15	17.....	12	114	175	50	15	9.0
3.....	5.0	90	152	68	39	15	18.....	14	120	175	45	15	8.0
4.....	5.0	145	154	62	36	15	19.....	15	125	145	45	15	8.0
5.....	5.0	175	156	56	32	15	20.....	15	130	145	45	15	8.0
6.....	5.0	205	158	58	28	15	21.....	15	135	145	45	15	7.0
7.....	5.0	205	160	60	25	15	22.....	28	140	138	45	15	6.0
8.....	5.0	205	160	62	22	15	23.....	28	145	130	45	15	5.0
9.....	5.0	145	160	63	20	15	24.....	45	145	122	45	15	4.0
10.....	5.0	145	160	64	18	15	25.....	45	175	115	45	15	4.2
11.....	4.5	145	160	65	17	15	26.....	45	175	115	45	15	4.4
12.....	6.0	145	160	66	16	15	27.....	45	145	110	45	15	4.5
13.....	7.5	115	160	67	15	15	28.....	56	145	104	45	18	4.5
14.....	9.0	115	160	67	15	15	29.....	56	145	98	45	17	4.5
15.....	10	102	175	67	15	15	30.....	45	146	92	45	16	4.5
							31.....	67		86	45		4.5

NOTE.—Discharge determined as follows: Apr. 1 to July 25, 1911, from a fairly well-defined rating curve. Apr. 26 to Nov. 30, 1911, by the indirect method for shifting channels. Discharge June 5, 1911, is the mean determined from the hydrographs and observer's gage heights. Discharge for 1912 determined from a fairly well-defined rating curve. Discharge interpolated or estimated for days on which gage heights are missing.

Monthly discharge of Half Moon Creek near Leadville, Colo., for 1911-12.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
1911.					
April.....	8.0	4.5	5.91	352	B.
May.....	67	8	31.2	1,920	B.
June.....	205	45	115	6,840	C.
July.....	160	50	97.9	6,020	B.
August.....	64	18	33.4	2,050	B.
September.....	26	14	15.4	915	B.
October.....	26	10	19	1,170	B.
November.....	18	9	13.2	786	C.
The period.....				20,100	
1912.					
May.....	67	4.5	20.3	1,250	B.
June.....	205	45	139	8,270	B.
July.....	175	86	140	8,610	B.
August.....	80	45	55.3	3,400	B.
September.....	45	15	20.5	1,220	B.
October.....	15	4	10.5	646	B.
The period.....				23,400	

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

Location.—In the Leadville National Forest, at bridge in sec. 22, T. 14 S., R. 79 W., half a mile below Hot Springs Hotel and 6 miles west of Buena Vista; 2 miles below mouth of South Fork, the nearest tributary.

Records available.—April 9, 1911, to December 31, 1912. From September 25, 1910, to September 13, 1911, a station was maintained in section 21, 1 mile above the present station.

Drainage area.—72 square miles (measured on forest atlas).

Gage.—Vertical staff.

Channel.—Probably permanent, although the rough section makes the results erratic.

Discharge measurements.—Made from bridge or by wading.

Winter flow.—The river is open during the winter months on account of hot springs above.

Diversions.—There are court decrees for diversions of 133 second-feet from Cottonwood Creek, of which 28 second-feet are above the station.

Accuracy.—Owing to the very rough condition of the stream bed, the estimates can not be considered other than fair or possibly good.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Cottonwood Creek below Hot Springs, near Buena Vista, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
Mar. 12	J. L. Mathias.....	<i>Feet.</i> 0.62	<i>Sec.-ft.</i> 21.8
Apr. 23	.....do.....	.60	18.9
June 4	.....do.....	2.15	272
22	H. B. Waba.....	2.00	201
Sept. 27	Raymond Richards.....	.90	59

Daily gage height, in feet, of Cottonwood Creek below Hot Springs, near Buena Vista, Colo., for 1912.

[E. D. Masters, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....		0.7		0.6	0.7	2.1	1.75	0.95	0.9			0.63
2.....						2.1	2.0	1.75	.9			.63
3.....		.8		.6	.8	2.3	2.0	1.7	.9	.85	0.7	.63
4.....			0.6			2.3	1.9	1.6	.85	.85	.7	.63
5.....				.6		2.3	1.85	1.55	.85	.85	.7	.65
6.....	0.7	.6	.6		.6	2.2	1.85	1.5	.8	.8	.7	.65
7.....						2.2	1.8	1.45	.8	.8	.7	.65
8.....		.6	.6	.61	.75	2.1	1.8	1.4	.8	.8	.7	.65
9.....						2.2	1.8	1.35	.8	.8	.7	.65
10.....		.6		.63	.85	2.1	1.8	1.3	.8	.8	.7	.63
11.....			.6			2.1	1.75	1.25	.8	.75	.7	.63
12.....			.62	.6	.85	2.0	1.75	1.2	.8	.75	.65	.6
13.....	.7	.6	.62		.83	2.0	1.75	1.1	.8	.75	.65	.6
14.....					.8	1.9	1.75	1.0	.8	.75	.65	.6
15.....		.6	.65	.6	.8	1.95	1.75	1.2	.8	.75	.65	.6
16.....					.8	1.9	1.75	1.25	.8	.75	.65	.6
17.....		.6		.6	.9	1.9	1.75	1.25	.85	.75	.65	.6
18.....			.62			1.8	1.75	1.25	.85	.75	.65	.6
19.....	.7	.6		.6	1.1	1.8	1.75	1.2	.9	.75	.65	.6
20.....			.64		1.2	1.85	1.75	1.15	.8	.75	.65	.6
21.....		.6			1.3	2.0	1.7	1.15	.8	.75	.65	.6
22.....			.65	.58	1.5	2.0	1.6	1.1	.85	.75	.65	.6
23.....		.6		.6	1.7	2.1	1.65	1.1	.85	.7	.65	.6
24.....				.6	1.8	2.2	1.6	1.0	.85	.7	.65	.6
25.....		.6	.61		1.9	2.1	1.6	1.0	.9	.7	.65	.6
26.....	.65			.6	2.0	2.2	1.6	1.0	.9	.7	.65	.6
27.....		.6	.6		2.0	2.2	1.6	1.0	.9	.7	.65	.6
28.....					1.7	2.1	1.6	1.0	.9	.7	.63	.6
29.....		.6	.6	.65	1.8	2.1	1.6	1.0	.9	.7	.63	.6
30.....	.65				2.2		1.8	1.0	.9	.7	.63	.6
31.....					2.2		1.8	.95		.7		.6

Daily discharge in second-feet, of Cottonwood Creek below Hot Springs, near Buena Vista, Colo., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....		22	19	19	30	270	260	190	61	55	30	22
2.....		22	19	19	36	260	240	190	55	55	30	22
3.....		22	19	19	42	300	240	181	55	48	30	22
4.....		21	19	19	35	300	220	162	48	48	30	22
5.....		20	19	19	25	300	210	153	48	48	30	24
6.....	30	19	19	19	19	280	210	144	42	42	30	24
7.....		19	19	20	27	280	200	135	42	42	30	24
8.....		19	19	20	36	260	200	127	42	42	30	24
9.....		19	19	21	42	280	200	119	42	42	30	24
10.....		19	19	22	48	260	200	111	42	42	30	22
11.....		19	19	20	48	260	190	103	42	36	30	22
12.....		19	21	19	48	240	190	96	42	36	24	19
13.....	30	19	21	19	46	240	190	82	42	36	24	19
14.....		19	22	19	42	220	190	68	42	36	24	19
15.....		19	24	19	42	230	190	96	42	36	24	19
16.....		19	23	19	42	220	190	103	42	36	24	19
17.....		19	22	19	55	220	190	103	48	36	24	19
18.....		19	21	19	68	200	190	103	48	36	24	19
19.....	30	19	22	19	82	200	190	96	55	36	24	19
20.....		19	23	19	96	210	190	89	42	36	24	19
21.....		19	24	19	111	240	181	89	42	36	24	19
22.....		19	24	18	144	240	162	82	48	36	24	19
23.....		19	23	19	181	260	171	82	48	30	24	19
24.....		19	21	19	200	280	162	68	48	30	24	19
25.....		19	20	19	220	260	162	68	55	30	24	19
26.....	24	19	20	19	240	280	162	68	55	30	24	19
27.....		19	19	20	240	280	162	68	55	30	24	19
28.....		19	19	22	181	260	162	68	55	30	22	19
29.....		19	19	24	200	260	162	68	55	30	22	19
30.....	24		19	27	280	260	200	68	55	30	22	19
31.....			19		280		200	61		30		19

NOTE.—Daily discharge determined from a curve not well defined above 70 second-feet. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Cottonwood Creek below Hot Springs, near Buena Vista, Colo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
January.....			28.0	1,720	C.
February.....	22	19	19.4	1,120	B.
March.....	24	19	20.5	1,260	B.
April.....	27	18	19.8	1,180	B.
May.....	280	19	103	6,330	C.
June.....	300	200	255	15,200	C.
July.....	260	162	192	11,800	C.
August.....	190	61	105	6,460	C.
September.....	61	42	47.9	2,550	B.
October.....	55	30	37.6	2,310	B.
November.....	30	22	26.0	1,550	B.
December.....	24	19	20.4	1,250	B.
The year.....	300		72.9	53,000	

NORTH COTTONWOOD CREEK NEAR BUENA VISTA, COLO.

Location.—At highway bridge in sec. 10, T. 14 S., R. 79 W., 6 miles northwest of Buena Vista, just below a small stream entering from the west, and $1\frac{1}{2}$ miles below mouth of Silver Creek.

Records available.—October 5, 1911, to November 30, 1912.

Drainage area.—50 square miles (measured on forest atlas).

Gage.—Vertical staff.

Channel.—Permanent.

Discharge measurements.—Made from the bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes some backwater effect during the winter months.

Diversions.—There are court decrees for diversions of 32 second-feet from North Cottonwood Creek.

Accuracy.—Owing to the high altitude of the drainage basin, it is probable that the river stage is subject to considerable diurnal fluctuations at certain seasons, due to the alternate melting and freezing. Therefore the mean daily gage height as determined from one reading per day may be considerably in error. This uncertainty in mean gage height and the many interpolated discharges make the estimates only fair.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of North Cottonwood Creek near Buena Vista, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Mar. 12 ^a	J. L. Mathias.....	3.78	4.5	June 22	H. B. Waha.....	5.20	71.7
Apr. 23	.....do.....	3.86	5.1	Sept. 27	Raymond Richards....	4.09	13.4
June 4	.....do.....	6.10	170				

^a Some ice present.

Daily gage height, in feet, of North Cottonwood Creek near Buena Vista, Colo., for 1912.

[C. A. Mack, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1			3.9								
2									4.5		
3	3.9							4.8			
4				3.95		5.5					4.0
5			3.9	3.95							4.0
6	3.9	3.95				5.2				4.05	
7											
8							5.25				
9	3.9									4.05	4.0
10									4.4		
11					4.0					4.05	
12	3.9		3.8				5.4				
13				3.95							4.0
14				3.9							
15		3.9									
16	3.9							4.6	4.4		
17		3.9			4.05						
18									4.4		4.02
19										4.0	
20							5.25				
21			3.81								
22						5.2					
23			3.84								4.0
24											
25							5.3				
26	3.95							4.5		4.0	
27					4.7		5.25		4.1		4.0
28					4.9	5.15					
29			3.81								
30								4.5	4.1	4.0	
31	4.0						4.85				

NOTE.—Gage heights affected by ice Jan. 1 to Mar. 12.

Daily discharge, in second-feet, of North Cottonwood Creek near Buena Vista, Colo., for 1911-12.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1911.				1911.				1911.			
1.....	23	23	15	11.....	30	26	11	21.....	26	19	9
2.....	23	21	14	12.....	29	26	11	22.....	26	19	8.5
3.....	23	19	14	13.....	28	25	11	23.....	26	19	8.5
4.....	23	20	14	14.....	24	24	11	24.....	27	19	8.5
5.....	28	21	13	15.....	19	23	11	25.....	28	19	8.5
6.....	33	21	13	16.....	19	22	11	26.....	28	19	8.5
7.....	38	21	13	17.....	19	22	11	27.....	28	19	8.5
8.....	36	21	13	18.....	21	21	11	28.....	28	18	8.5
9.....	34	22	13	19.....	23	20	10	29.....	27	17	8.5
10.....	32	24	12	20.....	26	19	10	30.....	26	16	8.5
								31.....	24	.....	8.5

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1912.									
1.....	4.5	7.4	9.0	83	74	51	33	15	11
2.....	4.5	8.1	9.0	90	75	50	33	14	11
3.....	4.5	8.8	9.0	96	76	49	33	14	11
4.....	4.5	9.5	9.0	102	77	49	32	14	11
5.....	4.5	9.5	9.0	89	78	48	32	13	11
6.....	4.5	9.5	10	76	79	47	31	13	11
7.....	4.5	9.5	10	76	80	46	30	13	11
8.....	4.5	9.5	10	76	80	45	29	13	11
9.....	4.5	9.5	10	76	83	44	28	13	11
10.....	4.5	9.5	10	76	86	43	28	13	11
11.....	4.5	9.5	11	76	90	42	28	13	11
12.....	4.5	9.5	11	76	93	41	28	13	11
13.....	4.6	9.5	12	76	91	40	28	13	11
14.....	4.7	8.8	12	76	89	39	28	12	11
15.....	4.8	8.0	12	76	87	38	28	12	11
16.....	4.9	8.0	13	76	85	38	28	12	12
17.....	5.0	8.0	13	76	84	38	28	11	12
18.....	5.1	8.0	16	76	83	37	28	11	12
19.....	5.1	8.0	19	76	82	37	26	11	12
20.....	5.2	8.0	22	76	80	36	25	11	12
21.....	5.3	8.0	25	76	80	36	24	11	11
22.....	5.8	8.0	27	76	81	35	22	11	11
23.....	6.2	8.0	30	75	82	35	21	11	11
24.....	6.0	8.0	33	74	83	34	19	11	11
25.....	5.9	8.0	36	73	84	34	18	11	11
26.....	5.7	9.0	40	73	82	33	16	11	11
27.....	5.6	9.0	43	72	80	33	15	11	11
28.....	5.4	9.0	55	72	73	33	15	11	11
29.....	5.3	9.0	62	72	66	33	15	11	11
30.....	6.0	9.0	69	73	59	33	15	11	11
31.....	6.7	.....	76	.....	52	33	.....	11	.....

NOTE.—Daily discharge determined from a rating curve well defined below 35 second-feet and fairly well defined above. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of North Cottonwood Creek near Buena Vista, Colo., for 1911-12.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
1911.					
October.....	38	19	26.6	1,640	C.
November.....	26	16	20.8	1,240	C.
December.....	15	8.5	10.8	644	C.
1912.					
January.....			a 7.0	430	D.
February.....			a 6.0	345	D.
March.....	6.7	4.5	5.07	312	C.
April.....	9.5	7.4	8.70	518	C.
May.....	76	9.0	23.6	1,450	C.
June.....	102	72	77.9	4,640	C.
July.....	93	52	79.8	4,910	C.
August.....	51	33	39.7	2,440	C.
September.....	33	15	25.5	1,520	C.
October.....	15	11	12.1	744	C.
November.....	12	11	11.2	666	C.
The period.....				18,000	

a Estimated.

CHALK CREEK NEAR ST. ELMO, COLO.

Location.—In the Leadville National Forest at highway bridge in sec. 28, T. 15 S., R. 79 W., just below the cascades of Chalk Creek and 6 miles east of St. Elmo.

Nearest tributary is a small intermittent stream entering from the north just below.

Records available.—March 10, 1911, to December 31, 1912. From September 6 to December 28, 1910, a station was maintained in sec. 24, T. 15 S., R. 79 W.

Drainage area.—75 square miles (measured on forest atlas).

Gage.—Vertical staff.

Channel.—Somewhat shifting.

Discharge measurements.—Made from the bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes only slight backwater.

Diversions.—There are no court decrees for diversions from Chalk Creek above the station, but below there are decrees for 132 second-feet.

Accuracy.—Owing to the high altitude of the drainage basin, it is probable that there is considerable diurnal fluctuation of stage at certain seasons, due to the alternate melting and freezing, and that the mean daily gage height as based on one reading per day may be considerably in error. The uncertain gage height and the many interpolated discharges can make the estimates only fair.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Chalk Creek near St. Elmo, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Dis- charge.	Date.	Hydrographer.	Gage height.	Dis- charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Mar. 13 ^a	J. L. Mathias.....	0.75	9.7	June 5	J. L. Mathias.....	2.08	459
Apr. 24	do.....	.86	13.8	21	H. B. Waha.....	1.90	252
24	do.....	.86	15.0	Sept. 27	Raymond Richards....	1.21	41

a Ice present.

Daily gage height, in feet, of Chalk Creek near St. Elmo, Colo., for 1912.

[A. J. Smith, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.						1.95		1.70				
2.			0.75					1.62	1.25	1.15	1.05	
3.		0.90								1.2	1.0	
4.					1.10				1.25	1.15	1.0	
5.		.90		0.80		2.10				1.2	1.05	
6.						2.20						
7.			.85			2.28						
8.	0.95						1.80			1.2	1.05	
9.			.75				1.80		1.15		1.0	
10.							1.85		1.20	1.15	1.0	0.95
11.											1.05	.95
12.										1.05	1.05	.93
13.		.85	.75	.85	1.10						.95	.93
14.								1.55		1.0	.95	.90
15.										1.0	.95	.88
16.			.80								.95	.88
17.								1.50		1.0	1.0	
18.						1.90				.95	1.0	
19.								1.45		1.0	1.0	
20.	.95			.90	1.40	1.95	1.80		1.30	1.05	.95	
21.						1.90				1.05	1.0	
22.					1.65		1.70			1.0	1.05	
23.			.75		1.70		1.80			.95	1.1	
24.				.86			1.85			1.0	.95	
25.					1.30					.95	1.0	
26.							1.70			1.0	.95	
27.	.95			.90					1.16	.95	.95	
28.					1.95	1.85				.95	.95	.81
29.					2.00		1.70	1.35		.95	.95	
30.			.75							.95	.95	
31.					2.00		1.60			1.0		.79

NOTE.—Gage heights affected by ice during January, February, and March.

Daily discharge, in second-feet, of Chalk Creek near St. Elmo, Colo., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.				11	25	392	324	235	58	38	25	20
2.			9	11	25	420	320	191	52	37	27	20
3.		14		11	30	445	316	188	52	43	23	20
4.				11	31	470	312	185	52	37	23	20
5.		14		12	31	495	308	183	49	43	27	20
6.				12	31	565	304	180	46	43	25	20
7.		12		12	31	621	300	177	43	43	23	20
8.	17			13	31	620	295	174	40	43	27	20
9.			9	13	31	600	295	171	37	40	23	20
10.				13	31	600	327	168	43	37	23	20
11.				14	31	570	335	165	43	32	27	20
12.				14	31	540	330	162	43	27	27	19
13.		12	9	14	31	510	330	159	45	25	20	19
14.				15	34	480	325	156	45	23	20	17
15.				15	35	450	320	148	45	23	20	16
16.			11	15	40	420	315	140	50	23	20	16
17.				16	50	390	310	132	50	23	23	16
18.				16	70	360	305	121	55	20	23	15
19.				17	85	376	300	110	55	23	23	15
20.	17			17	89	392	295	107	61	27	20	15
21.				16	140	360	265	103	60	27	23	14
22.				16	207	355	235	99	55	23	27	14
23.			10	15	235	355	295	96	50	20	31	14
24.				15	200	350	327	92	45	23	20	13
25.				16	61	370	286	89	40	20	23	13
26.				16	250	360	235	85	40	23	20	13
27.	17			17	350	340	235	82	38	20	20	13
28.				18	392	327	235	78	38	20	20	12
29.				19	425	333	235	75	38	20	20	12
30.			10	20	425	328	205	70	38	20	20	12
31.		10			425		180	64		23		12

NOTE.—Daily discharge determined from a well-defined rating curve. Discharge interpolated for days on which gage heights are missing, except Jan.-Mar.

Monthly discharge of Chalk Creek near St. Elmo, Colo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
January.....			a 17	1,040	D.
February.....			a 12	690	C.
March.....			a 10	615	C.
April.....	20	11	14.7	875	C.
May.....	425	25	126	7,750	C.
June.....	621	327	440	26,200	C.
July.....	330	180	290	17,800	C.
August.....	235	64	135	8,300	C.
September.....	61	37	46.9	2,790	B.
October.....	43	20	28.7	1,760	B.
November.....	31	20	23.1	1,370	B.
December.....	20	12	16.5	1,010	C.
The year.....	621		96.7	70,200	

a Estimated.

SOUTH FORK OF ARKANSAS RIVER AT PONCHA, COLO.

Location.—At highway bridge about half a mile from Poncha, in sec. 10, T. 49 N., R. 8 E. Nearest tributary, Poncha Creek, enters one-fourth mile below.

Records available.—January 14, 1911, to December 31, 1912.

Drainage area.—140 square miles (measured from Forest atlas).

Gage.—Vertical staff.

Channel.—Permanent prior to the highwater of 1912, when it shifted.

Discharge measurements.—Made from bridge during highwater and by wading at ordinary stages.

Winter flow.—Springs keep this stream open during the winter months.

Diversions.—There are court decrees for diversions of 113 second-feet from the South Fork above the station, and 66 second-feet below. There are also decrees for diversions of 76 second-feet from the North Fork which enters above.

Accuracy.—The high altitude of the drainage basin causes diurnal fluctuations of stage during certain seasons, due to alternate melting and freezing. The mean daily gage height is based on three readings per day, the maximum stage, which occurs during the night, and readings at 6 a. m. and 6 p. m. The mean stage as determined in this manner may be somewhat in error, and therefore the estimates can not be considered better than good.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of South Fork of Arkansas River at Poncha, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Mar. 14	J. L. Mathias.....	0.31	26.5	June 8	H. B. Waha.....	2.30	447
Apr. 16	H. B. Waha.....	.12	17.4	Oct. 24	do.....	1.60	264
25	J. L. Mathias.....	.09	17.8	Oct. 3	R. H. Fletcher.....	.17	24.0
June 6	do.....	2.05	362				

Daily gage height, in feet, of South Fork of Arkansas River at Poncha, Colo., for 1912.

[J. M. Cuenin, observer.]

Day.	Feb.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.			0.35	1.50	1.5	0.50	-0.10	0.08	0.20	0.30
2.			.25	2.15	1.45	.40	-.05	.20	.20	.45
3.			.20	2.45	1.30	.25	-.15	.10	.35	.30
4.			-.03	2.5	1.15	.20	-.05	.20	.40	.40
5.		0.40	-.05	2.6	1.00	.20	-.20	.10	.35	.30
6.			.30	2.6	.80	-.08	-.05	.20	.45	.38
7.			.30	2.5	.80	-.20	-.15	.10	.35	.30
8.			.30	2.7	.75	-.40	-.05	.20	.40	.40
9.			.30	2.4	α 2.4	-.45	-.10	.10	.30	.35
10.		.35	-.20	2.3	.30	-.45	.10	.20	.40	.40
11.	0.35	.25	-.23	2.1	.30	-.55	-.05	.20	.30	.30
12.	.35	.20	-.16	1.75	.30	-.55	.00	.25	.32	.42
13.	.45	.15	-.13	1.8	.60	-.15	-.12	.12	.32	.35
14.	.4	.15	.22	1.6	.45	.20	.00	.22	.40	.40
15.	.35	.15	.23	1.75	.65	.30	.00	.10	.30	.25
16.	.3	.10	.25	1.55	.60	.02	.22	.20	.35	.45
17.	.3	.10	.20	1.30	.55	.00	.08	.10	.15	.25
18.	.3	.10	.40	1.5	.55	.00	.20	.20	.20	.42
19.	.3	.10	.70	1.6	.70	-.08	.08	.10	.35	.30
20.	.3	.10	.70	1.65	.70	-.02	.20	.20	.45	.35
21.	.3	.00	1.15	1.65	.55	-.10	.12	.10	.45	.25
22.		.00	1.15	1.65	.55	-.10	.22	.12	.50	.30
23.		.05	1.30	1.6	.70	-.10	.12	.00	.25	.20
24.		.08	1.45	1.7	.85	-.15	.22	.10	.35	.30
25.		.08	1.65	2.15	1.05	-.02	.18	.00	.35	.25
26.		.05	2.10	1.8	.65	-.15	.28	.10	.45	.28
27.		.05	1.95	1.7	.80	-.10	.15	.02	.45	.12
28.		.02	1.65	1.6	.70	-.10	.22	.02	.40	.22
29.		.10	1.85	1.6	.70	-.10	.12	-.15	.28	.22
30.		.30	1.95	1.7	.60	-.02	.18	.05	.40	.10
31.			1.75		.65	-.00		.15		.20

α Maximum for year, 3.2 feet.

Daily discharge, in second-feet, of South Fork of Arkansas River at Poncha, Colo., for 1911-12.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.												
1.	30	27	27	15	18	167	222	72	12	94	54	79
2.	30	20	31	15	24	199	272	60	13	188	44	54
3.	30	27	35	20	16	188	222	40	8.0	138	49	49
4.	30	27	35	16	13	210	272	24	7.4	199	49	49
5.	30	35	27	11	7.0	272	632	24	4.8	178	66	49
6.	30	20	27	8.0	20	260	510	19	7.4	178	94	49
7.	30	20	35	6.0	49	330	375	14	6.0	102	86	49
8.	30	15	27	5.0	72	272	272	8.0	8.0	102	86	49
9.	30	20	27	6.0	86	422	248	6.0	10.0	86	72	49
10.	30	44	35	6.4	94	315	178	5.4	13	94	60	44
11.	30	44	35	7.0	40	272	157	7.4	10.0	72	60	49
12.	30	35	27	5.6	20	272	167	10.0	7.4	72	66	49
13.	30	35	27	5.0	18	188	188	12.0	10.0	49	60	49
14.	35	20	20	6.0	18	235	178	12.0	8.0	54	66	40
15.	35	20	20	4.0	31	422	178	6.8	11	60	66	44
16.	27	27	15	4.0	31	345	199	6.8	12	54	66	40
17.	35	27	11	9.5	44	300	199	6.8	11	60	66	31
18.	27	27	11	6.0	66	272	235	11	15	54	86	35
19.	35	27	15	5.0	157	285	248	7.4	15	49	72	27
20.	35	27	15	5.0	66	300	210	7.4	31	49	72	27
21.	35	27	13	20	49	300	199	10.0	24	40	66	40
22.	35	27	15	20	40	272	188	138	27	49	60	35
23.	27	27	18	27	31	260	235	120	20	49	102	27
24.	27	27	13	27	54	210	199	49	16	60	79	40
25.	35	27	13	21	60	222	157	40	20	54	72	31
26.	27	27	11	27	72	147	178	31	31	60	72	31
27.	27	27	11	24	86	111	178	18	18	54	72	31
28.	27	35	13	20	102	79	138	24	18	49	94	35
29.	35		15	31	138	79	167	24	13	40	111	40
30.	35		13	27	138	157	157	54	20	44	94	31
31.	35		15		147		102	40		60		35

Daily discharge, in second-feet, of South Fork of Arkansas River at Poncha, Colo., for 1911-12—Continued.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1912.											
1.			30	31	210	230	50	12	20	26	33
2.			30	24	390	218	41	14	26	26	46
3.			30	20	492	183	30	11	20	37	33
4.			30	10.0	510	152	26	14	26	41	41
5.			35	9.5	545	122	26	10	20	37	33
6.			27	8.0	545	88	13	14	26	46	39
7.			27	7.6	510	88	10.0	11	20	37	33
8.			27	8.6	580	81	7.0	14	26	41	41
9.			27	4.0	480	57	6.5	12	20	33	37
10.			31	6.0	450	33	6.5	20	26	41	41
11.	31		24	5.4	390	33	5.5	14	26	33	33
12.	31		20	6.8	292	33	5.5	16	30	35	43
13.	40		18	7.4	305	61	11	12	22	35	37
14.	35	26	18	21	255	46	26	16	27	41	41
15.	31		18	22	292	68	33	16	20	33	30
16.	27		15	24	242	61	17	27	26	37	46
17.	27		15	20	183	56	16	20	20	23	30
18.	27		15	35	230	56	16	26	26	26	43
19.	27		15	66	255	74	13	20	20	37	33
20.	27		15	66	268	74	15	26	26	46	37
21.	27		11	138	268	56	12	22	20	46	30
22.			11	138	268	56	12	27	22	50	33
23.			13	167	255	74	12	22	16	30	26
24.			14	199	280	96	11	27	20	37	33
25.			14	248	405	132	15	25	16	37	30
26.			13	375	305	68	11	32	20	46	32
27.			13	330	280	88	12	23	17	46	22
28.			12	248	255	74	12	27	17	41	27
29.			15	300	255	74	12	22	11	32	27
30.			27	330	280	61	15	25	13	41	26
31.				272		68	16		18		20

NOTE.—Daily discharge determined from two well-defined rating curves applicable Jan. 13, 1911, to June 8, 1912, and June 9 to Dec. 31, 1912, respectively. Discharge Jan. 1-13, 1911, and Apr. 1-4, 1912, estimated.

Monthly discharge of South Fork of Arkansas River at Poncha, Colo., for 1911-12.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
1911.					
January	35	27	31.1	1,910	B.
February	44	15	27.4	1,520	A.
March	35	11	21.0	1,280	A.
April	31	4.0	13.6	809	A.
May	157	7.0	58.3	3,580	B.
June	422	79	245	14,600	B.
July	632	102	228	14,000	B.
August	138	5.4	29.3	1,800	A.
September	31	4.8	14.2	845	A.
October	199	40	80.4	4,940	B.
November	111	44	72.1	4,280	B.
December	79	27	41.5	2,550	B.
The year	632	4.0	71.8	52,100	
1912.					
January			a 30.0	1,840	C.
February			a 28.0	1,610	C.
March			a 26.0	1,600	C.
April	35	11	20.3	1,210	B.
May	375	4.0	102	6,270	B.
June	545	183	342	20,400	B.
July	230	33	85.8	5,280	B.
August	33	5.5	16.6	1,020	A.
September	32	11	19.2	1,140	A.
October	30	11	21.4	1,320	A.
November	50	26	37.2	2,210	A.
December	46	20	34.1	2,100	A.
The year	545		63.6	46,000	

a Estimated.

PONCHA CREEK AT PONCHA, COLO.

Location.—At highway bridge in sec. 10, T. 49 N., R. 8 E., near Poncha, about one-fourth mile above the mouth of creek.

Records available.—January 14, 1911, to December 31, 1912.

Drainage area.—89 square miles (measured on Forest Atlas).

Gage.—Vertical staff.

Channel.—Shifting.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Springs prevent the creek from freezing to any considerable extent.

Diversions.—There are court decrees for diversions of 7 second-feet above the station, but none below.

Accuracy.—Owing to the high altitude of this drainage basin, the stage is subject to considerable diurnal fluctuations at certain seasons of the year due to alternate melting and freezing, and the mean daily gage height based on morning and evening readings and the maximum stage for 24 hours may be somewhat in error. The uncertain mean gage height and the shifting conditions make the estimates of daily discharge only fair.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Poncha Creek at Poncha, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Mar. 14	J. L. Mathias	0.50	6.6	June 8	H. B. Waha	1.80	142
Apr. 16	H. B. Waha	.55	14.3	Oct. 24	do.	1.20	84.0
Apr. 25	J. L. Mathias	.60	17.0	Oct. 3	R. H. Fletcher	.40	9.74
June 6	do.	1.80	128				

Daily gage height, in feet, of Poncha Creek at Poncha, Colo., for 1912.

[J. M. Cuenin, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1				1.05		1.1	0.55	0.3	0.38	0.15	0.1
2				1.16		1.02	.55	.25	.35	.0	.2
3				1.15		1.05	.5	.15	.35	.35	.2
4				1.06		.98	.5	.25	.25	.28	.2
5			0.75	.86		.85	.55	.25	.4	.32	.2
6			.7	.96	1.9	.88	.5	.2	.35	.35	.2
7			.72	1.0		.85	.5	.2	.35	.3	.3
8			.7	1.03	1.9	.8	.5	.2	.35	.3	.28
9			.65	1.06	2.0		.5	.25	.35	.3	.35
10			.65	1.2	1.8	.6	.4	.28	.3	.38	.25
11	0.4		.65	1.16	1.7	.55	.4	.25	.35	.3	.22
12	.5		.6	1.13	1.62	.5	.4	.3	.32	.3	.28
13	.6		.5	1.1	1.7	.68	.45	.28	.32	.45	.2
14	.45	0.5	.55	1.06	1.63	.65	.55	.28	.32	.35	.2
15	.55		.55	1.13	1.36	.6	.55	.32	.32	.5	.2
16	.5		.6	1.1	1.4	.68	.6	.32	.32	.4	.15
17	.4		.55	1.16	1.18	.5	.52	.28	.32	.3	.20
18	.5		.55	1.38	1.3	.6	.58	.28	.32	.25	.20
19	.55		.55	1.53	1.15	.6	.48	.35	.32	.35	.25
20	.58		.55	1.63	1.1	.55	.45	.4	.32	.3	.2
21	.7		.45	1.86	1.12	.55	.4	.32	.32	.35	.15
22			.5	2.3	1.2	.62	.4	.32	.22	.45	.15
23			.52	2.56	1.2	.62	.4	.3	.28	.35	.15
24			.55	2.5	1.22	.85	.38	.32	.3	.3	.15
25			.6	2.67	1.32	.72	.4	.35	.28	.3	.2
26			.6	2.56	1.15	.6	.32	.38	.3	.3	.1
27			.58	3.0	1.1	.6	.35	.38	.32	.35	.1
28			.65		1.1	.6	.25	.32	.3	.3	.1
29			.65		1.1	.6	.3	.32	.35	.15	.1
30			.75		1.1	.55	.3	.32	.25	.0	.1
31						.6	.3		.3		.12

^b Maximum gage height, 3.2 feet.

Daily discharge, in second-feet, of Poncha Creek at Poncha, Colo., for 1911-12.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.												
1.....	7.0	3.0	11.0	7.0	51	158	102	46	29	36	11	7.0
2.....	7.0	1.0	11.0	7.0	50	140	128	46	30	42	7.0	13
3.....	7.0	4.5	11.0	20	42	146	110	46	35	25	6.0	10
4.....	7.0	4.5	11.0	20	60	133	128	40	38	28	4.0	10
5.....	7.0	9.0	11.0	16	70	137	116	42	30	33	17	10
6.....	7.0	4.5	11.0	16	67	137	96	52	20	38	27	10
7.....	7.0	2.0	19.0	16	120	104	92	40	22	38	22	10
8.....	7.0	4.5	11.0	13	133	124	107	35	22	30	27	10
9.....	7.0	4.5	11	16	146	112	85	29	20	33	24	9.0
10.....	7.0	15	19	16	149	124	74	43	22	38	22	9.0
11.....	7.0	9.0	19	18	120	120	52	26	20	33	24	10
12.....	7.0	9.0	6.0	14	116	100	55	35	20	30	22	10
13.....	7.0	9.0	6.0	13	100	112	55	35	20	33	17	9.0
14.....	7.2	4.5	4.0	13	116	89	76	35	22	36	22	6.0
15.....	7.2	4.5	7.0	16	137	116	81	21	20	30	22	15
16.....	7.2	9.0	16	16	124	92	55	21	17	36	22	7.0
17.....	7.2	9.0	20	16	140	78	99	40	22	38	24	6.0
18.....	7.2	9.0	20	27	166	81	96	37	20	28	13	6.0
19.....	7.2	9.0	7.0	31	184	92	116	40	22	20	16	6.0
20.....	7.2	9.0	20	27	140	74	108	40	17	25	20	6.0
21.....	7.2	9.0	13	51	120	74	104	37	22	15	16	6.0
22.....	7.2	9.0	20	54	124	70	116	56	22	17	10	6.0
23.....	7.2	11.0	16	54	108	56	128	56	20	26	20	6.0
24.....	7.2	11.0	13	54	124	56	120	53	22	22	20	6.0
25.....	7.2	11.0	13	54	137	56	104	46	20	22	16	6.0
26.....	7.2	8.5	2.5	64	133	74	120	37	25	24	16	6.0
27.....	7.2	8.5	1.5	64	149	70	85	35	18	17	17	6.0
28.....	7.2	11.0	2.5	64	140	63	76	37	13	15	9.0	6.0
29.....	7.2	-----	7.0	64	153	66	70	40	18	11	10	6.0
30.....	7.2	-----	7.0	78	149	66	108	35	28	11	20	6.0
31.....	7.2	-----	7.0	-----	153	-----	74	31	-----	13	-----	6.0

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1912.											
1.....			20	52	200	70	20	5.5	8.7	2.5	1.5
2.....			20	63	200	61	20	4.5	7.5	5	3.5
3.....			20	62	200	64	16	2.5	7.5	7.5	3.5
4.....			20	53	200	57	16	4.5	4.5	5.1	3.5
5.....			29	35	200	44	20	4.5	9.5	6.3	3.5
6.....			25	44	140	47	16	3.5	7.5	7.5	3.5
7.....			27	47	147	44	16	3.5	7.5	5.5	5.5
8.....			25	50	154	40	16	3.5	7.5	5.5	5.1
9.....			21	53	166	32	16	4.5	7.5	5.5	7.5
10.....			21	64	142	23	9.5	5.1	5.5	8.7	4.5
11.....	3.0		21	60	130	20	9.5	4.5	7.5	5.5	3.9
12.....	7.0		18	57	119	16	9.5	5.5	6.3	5.5	5.1
13.....	15		11	54	133	29	13	5.1	6.3	13	3.5
14.....	5.0	6.6	15	49	125	27	20	5.1	6.3	7.5	3.5
15.....	10		15	57	92	23	20	6.3	6.3	16	3.5
16.....	7.0		18	54	100	29	23	6.3	6.3	9.5	2.5
17.....	3.0		15	60	76	16	17	5.1	6.3	5.5	3.5
18.....	7.0		15	84	89	23	22	5.1	6.3	4.5	3.5
19.....	10		15	100	72	23	15	7.5	6.3	7.5	4.5
20.....	12		15	112	70	20	13	9.5	6.3	5.5	3.5
21.....	20		8.0	140	72	20	9.5	6.3	6.3	7.5	2.5
22.....			11	194	81	25	9.5	6.3	3.9	13	2.5
23.....			13	226	81	25	9.5	5.5	5.1	7.5	2.5
24.....			15	216	84	44	8.7	6.3	5.5	5.5	2.5
25.....			18	238	94	33	9.5	7.5	5.1	5.5	3.5
26.....			15	224	76	23	6.3	8.7	5.5	5.5	1.5
27.....			14	281	70	23	7.5	8.7	6.3	7.5	1.5
28.....			18	250	70	23	4.5	6.3	5.5	5.5	1.5
29.....			18	250	70	23	5.5	6.3	7.5	2.5	1.5
30.....			26	250	70	20	5.5	6.3	4.5	.5	1.5
31.....			-----	250	-----	23	5.5	-----	5.5	-----	1.9

NOTE.—Daily discharge to June 24, 1912, determined by the indirect method for shifting channels. Discharge Jan. 1 to 13, Dec. 17 to 31, 1911, and May 28 to June 5, 1912, estimated. Discharge June 25 to Dec. 31, 1912, determined from a poorly-defined rating curve.

Monthly discharge of Poncha Creek at Poncha, Colo., for 1911-12.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
1911.					
January	7.2	7.0	7.12	438	D.
February.....	15	1.0	7.59	422	D.
March.....	20	1.5	11.4	701	D.
April.....	78	7.0	31.3	1,860	D.
May.....	184	42	120	7,380	D.
June.....	158	56	97.3	5,790	D.
July.....	128	52	94.7	5,820	D.
August.....	56	21	39.1	2,400	D.
September.....	38	13	22.5	1,340	D.
October.....	42	11	27.2	1,670	D.
November.....	27	4.0	17.4	1,040	D.
December.....	15	6.0	7.9	486	D.
The year.....	184	1.0	40.2	29,300	
1912.					
January			a 4.5	277	D.
February.....			a 7.5	431	D.
March.....			a 10.0	615	D.
April.....	29	8.0	18.1	1,080	D.
May.....	281	35	120	7,380	D.
June.....	200	70	117	6,960	D.
July.....	70	16	31.9	1,960	C.
August.....	23	4.5	13.2	812	C.
September.....	9.5	2.5	5.66	337	C.
October.....	9.5	3.9	6.39	393	C.
November.....	16	.5	6.50	387	C.
December.....	7.5	1.5	3.28	202	C.
The year.....	281	.5	28.7	20,800	

a Estimated.

WEST BEAVER CREEK NEAR VICTOR, COLO.

Location.—At the Skagway power station of the Arkansas Valley Railway, Light & Power Co., in sec. 30, T. 16 S., R. 68 W., about 7 miles southeast of Victor.

Records available.—January 1, 1905, to December 31, 1912.

Drainage area.—70 square miles.

Method of compiling records.—The water used through the power house, which is brought by pipe line from the reservoir $3\frac{1}{2}$ miles upstream, is measured hourly by weir. To this amount is added or subtracted a quantity representing the gain or loss in the reservoir during the period. The seepage through the reservoir is measured by weir and added to the above to obtain the final result. The record therefore represents the flow of the stream (less evaporation from the stored water) as if there were no reservoir.

Diversions.—Above the power reservoir the town of Victor has three reservoirs from which water is diverted for municipal purposes. Colorado Springs receives its water supply from four reservoirs in the upper basin. There are filings (which have not yet been adjudicated) for diversions from the basin of 52 second-feet by ditch and 5 second-feet by pipe line. This water is diverted into Lake Moraine and thence by natural channels to Colorado Springs. The town of Altman, for municipal supply, has filed on five reservoir sites in the upper basin, having a combined capacity of 2,300 acre-feet. Below the power plant there are adjudicated decrees for diversions of 57 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., which states that records are probably correct within 5 per cent.

Monthly discharge of West Beaver Creek near Victor, Colo., for 1912.

Month.	Mean discharge in second-feet.	Run-off (total in acre-feet).	Month.	Mean discharge in second-feet.	Run-off (total in acre-feet).
January.....	2.92	180	August.....	24.6	1,510
February.....	3.20	184	September.....	11.7	696
March.....	4.75	292	October.....	10.8	664
April.....	11.6	690	November.....	5.88	350
May.....	25.7	1,580	December.....	4.16	256
June.....	23.6	1,400			
July.....	29.0	1,780	The year.....	13.2	9,580

NOTE.—Values represent the actual flow of the stream if no water was consumed and were determined by adding the amount drawn from the reservoir plus the reservoir loss or gain plus the flow over the spillway to the amount used in the turbines.

HUERFANO RIVER AT BADITO, COLO.

Location.—At the concrete bridge at Badito in sec. 4, T. 27 S., R. 68 W. The nearest tributary, Yellowstone Creek, enters a short distance above.

Records available.—August 28, 1912, to December 20, 1912.

Drainage area.—Not measured.

Gage.—Chain gage located at the bridge.

Channel.—Shifting.

Discharge measurements.—Made from the bridge at high stages and by wading at ordinary and low stages.

Winter flow.—No data.

Diversions.—Water is diverted from the Huerfano above and below the station, but the exact amount is indeterminable, owing to conflicting court decrees.

Cooperation.—Station maintained and records furnished by the State engineer of Colorado.

Discharge measurements of Huerfano River at Badito, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
Aug. 28	B. S. Clayton.....	<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 1	do.....	1.01	8.4
Nov. 12	do.....	.52	2.6
	do.....	.54	1.9

Daily discharge, in second-feet, of Purgatory River at Trinidad, Colo., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	7	14	28	75	111	297	370	265	85	38	30
2.....	7	14	33	52	111	297	332	265	65	79	30
3.....	7	14	33	75	131	297	297	450	65	57	30
4.....	7	14	33	93	131	297	297	430	65	48	30
5.....	7	14	39	93	121	297	265	390	65	153	30
6.....	7	14	39	93	111	370	235	370	50	68	30
7.....	7	14	39	75	102	584	205	215	50	48	30
8.....	7	14	39	75	102	332	205	205	50	48	30
9.....	9	14	39	75	111	538	179	205	40	48	30
10.....	9	14	40	75	131	332	155	140	40	48	38
11.....	9	14	40	75	111	584	155	300	125	48	38
12.....	9	14	40	75	192	332	220	310	85	48	38
13.....	9	14	40	75	155	314	155	320	75	48	38
14.....	9	14	45	75	131	297	155	210	75	48	38
15.....	9	14	45	75	220	281	632	225	80	38	38
16.....	9	14	45	67	220	297	390	165	70	38	38
17.....	9	14	59	59	192	430	332	160	70	38	48
18.....	9	18	59	59	220	370	281	150	70	38	38
19.....	9	18	102	52	281	584	351	140	70	38	38
20.....	9	20	235	45	297	297	297	130	55	38	38
21.....	12	23	102	45	297	492	297	585	55	38	38
22.....	12	28	75	45	332	370	265	185	55	38	38
23.....	12	33	75	45	297	450	265	155	55	38	38
24.....	12	33	45	45	281	450	265	115	55	38	57
25.....	12	33	45	59	281	450	410	95	55	38	38
26.....	12	38	45	67	281	430	370	90	55	38	38
27.....	12	38	33	67	314	430	265	85	55	38	38
28.....	12	23	52	167	297	410	265	70	48	38	38
29.....	12	23	67	111	314	430	351	260	48	48	38
30.....	12	.....	84	131	332	410	332	110	48	48	38
31.....	12	.....	59	.....	332	.....	332	.....	.....	48	.....

NOTE.—Daily discharge Jan. 1 to Feb. 14 estimated.

Monthly discharge of Purgatory River at Trinidad, Colo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January.....	12	7	9.55	587
February.....	38	14	18.1	1,040
March.....	235	28	56.6	3,480
April.....	167	45	74.0	4,400
May.....	332	102	211	13,000
June.....	584	281	392	23,300
July.....	632	155	288	17,700
August.....	585	70	222	13,600
September.....	125	40	62.0	3,690
October.....	153	38	48.5	2,980
November.....	57	30	36.6	2,180
December.....	.....	.....	.....	.....
The year.....	.....	.....	.....	86,000

NOTE.—Values in the above table have been changed slightly from the State engineer's records to conform with the standard computation rules of the Geological Survey.

BIG SANDY CREEK AT HUGO, COLO.

Location.—At highway bridge in sec. 32, T. 10 S., R. 54 W., one-half mile south of Hugo. No important tributaries within several miles of the station.

Records available.—April 10, 1910, to June 30, 1912.

Drainage area.—Approximately 555 square miles.

Gage.—Friez automatic gage referred to same datum as the original staff gage.

Channel.—Very shifting.

Discharge measurements.—Made from the bridge during high water and by wading at ordinary stages.

Winter flow.—The bed of the stream is usually dry during the winter months.

Diversions.—There are no court decrees for diversions from Big Sandy Creek.

Accuracy.—Owing to a lack of measurements, the estimates can only be considered fair.

Cooperation.—Station is maintained in cooperation with the Central Land & Irrigation Co.

The following measurement was made by R. H. Fletcher:

June 17, 1912: Gage height, 2.80 feet; discharge, 31.7 second-feet.

Daily gage height, in feet, of Big Sandy Creek at Hugo, Colo., for 1912.

[George Leonard, observer.]

Day.	March.	April.	May.	June.	Day.	March.	April.	May.	June.
1.....		2.3	2.3	2.4	16.....		2.3	2.3	2.55
2.....		2.3	2.3	2.3	17.....		2.3	2.75	2.85
3.....		2.3	2.3	2.3	18.....		2.3	2.35	2.7
4.....		2.3	2.35	2.3	19.....		2.35	2.3	2.5
5.....		2.3	2.55	2.3	20.....		2.45	2.3	2.3
6.....		2.3	2.35	2.3	21.....		2.45	2.3	2.3
7.....		2.3	2.3	2.3	22.....		2.4	2.3	2.3
8.....		2.3	2.3	2.3	23.....		2.3	2.3	2.3
9.....		2.3	2.3	2.3	24.....	2.5	2.3	2.3	2.3
10.....		2.3	2.35	2.3	25.....	2.5	2.3	2.4	2.3
11.....		2.3	2.35	2.3	26.....	2.5	2.3	2.3	2.3
12.....		2.3	2.3	2.3	27.....	2.5	2.3	2.3	2.3
13.....		2.5	2.3	2.3	28.....	2.4	2.5	2.3	2.3
14.....		2.4	2.3	2.3	29.....	2.4	2.4	2.3	2.3
15.....		2.35	2.3	2.4	30.....	2.4	2.3	2.3	2.3
					31.....	2.4		2.55	

Daily discharge, in second-feet, of Big Sandy Creek at Hugo, Colo., for 1911-12.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1911.							
1.....		9.0	0.2	0.2	0.2	0.0	0.2
2.....		.2	.2	.2	.2	.0	.2
3.....		.2	.2	9.0	.2	45.	.2
4.....		.2	.2	.2	.2	.2	.2
5.....		2.5	.2	9.0	.2	.2	.2
6.....		.2	.2	.2	.2	.2	.2
7.....		.2	.2	.2	.2	.2	.2
8.....		.2	.2	.2	.2	.2	.2
9.....		.2	.2	.2	.2	.2	.2
10.....		.2	.2	.2	.2	.2	.2
11.....		.2	.2	.2	.2	.2	.2
12.....		.2	.2	9.0	.2	.2	.2
13.....		.2	.2	.2	.2	.2	.2
14.....		.2	.2	32.	.2	.2	.2
15.....		.2	5.0	.2	.2	.2	.2
16.....		.2	.2	.2	.2	.2	.2
17.....		.2	5.0	.2	.2	.2	.2
18.....		.2	.2	.2	.2	.2	.2
19.....		.2	.2	.2	.2	.2	.2
20.....		.2	.2	.2	.0	.2	.2
21.....	0.2	.2	.2	.2	.0	.2	11.
22.....	.2	.2	.2	.2	.0	.2	2.5
23.....	9	.2	.2	.2	.0	.2	.2
24.....	9	.2	.2	.2	.0	.2	.2
25.....	5	.2	.2	.2	.0	.2	.2
26.....	2.5	.2	.2	.2	.0	.2	.2
27.....	.2	.2	.2	.2	.0	.2	.2
28.....	.2	2.5	.2	.2	.0	.2	.2
29.....	0	20.	.2	.2	.0	.2	.2
30.....	32.	.2	.2	.2	.0	11.0	.2
31.....		.2		.2	.0		.2

Daily discharge, in second-feet, of Big Sandy Creek at Hugo, Colo., for 1911-12—Con.

Day.	Mar.	Apr.	May.	June.	Day.	Mar.	Apr.	May.	June.
1912.					16.		.2	.2	11
1.		0.2	0.2	4.0	17.		.2	27.0	40
2.		.2	.2	.2	18.		.2	1.5	22
3.		.2	.2	.2	19.		1.5	.2	8.0
4.		.2	1.5	.2	20.		6.0	.2	.2
5.		.2	11	.2	21.		6.0	.2	.2
6.		.2	1.5	.2	22.		4.0	.2	.2
7.		.2	.2	.2	23.		.2	.2	.2
8.		.2	.2	.2	24.	8.0	.2	.2	.2
9.		.2	.2	.2	25.	8.0	.2	4.0	.2
10.		.2	1.5	.2	26.	8.0	.2	.2	.2
11.		.2	1.5	.2	27.	8.0	.2	.2	.2
12.		.2	.2	.2	28.	4.0	8.0	.2	.2
13.		8.0	.2	.2	29.	4.0	4.0	.2	.2
14.		4.0	.2	.2	30.	4.0	.2	.2	.2
15.		1.5	.2	4.0	31.	4.0		11	

NOTE.—Daily discharge determined from a rating curve not well defined. Stream probably dry before Apr. 20, 1911, and Oct. 31, 1911, to some time in March, 1912.

Monthly discharge of Big Sandy Creek at Hugo, Colo., for 1911-12.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
1911.					
April 21-30.	32	0.0	5.83	116	C.
May.	20	.2	1.27	78	C.
June.	5	.2	.52	31	C.
July.	32	.2	2.08	128	C.
August.	2	.0	.12	7.4	C.
September.	45	.2	2.04	121	C.
October.	11	.2	.62	38	C.
The period.				519	
1912.					
March 24-31.	8.0	4.0	6.0	95	C.
April.	8.0	.2	1.57	93	C.
May.	27	.2	2.09	129	C.
June.	40	.2	3.13	186	C.

BIG SANDY CREEK NEAR KIT CARSON, COLO.

Location.—At highway bridge in sec. 8, T. 15 S., R. 48 W., 1 mile west of Kit Carson; 1 mile above mouth of Wild Horse Creek, the nearest tributary.

Records available.—April 15, 1910, to December 31, 1912.

Drainage area.—Approximately 1,100 square miles.

Gage.—Vertical staff; datum unchanged; also Friez automatic recording.

Channel.—Shifting; dry during the greater portion of the time.

Discharge measurements.—Made from the bridge during high water and by wading at ordinary stages.

Winter flow.—Bed of the stream usually dry during the winter months.

Diversions.—There are no court decrees for diversions from Big Sandy Creek.

Accuracy.—Owing to insufficient discharge measurements, no estimates of daily discharge have been made.

Cooperation.—Station maintained in cooperation with the Central Land & Irrigation Co.

The following discharge measurement was made by R. H. Fletcher:

June 18, 1912: Gage height, 2.00 feet; discharge, 400 second-feet.

Daily gage height, in feet, of Big Sandy Creek near Kit Carson, Colo., for 1912.

[Automatic gage, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1.....				0.50	1.61	1.34	16.....			.....	0.40	1.68	0.29
2.....					2.51	1.27	17.....			2.00		1.49	.24
3.....					1.98	1.19	18.....			1.92		1.42	.23
4.....					1.63	1.10	19.....			1.50		1.33	.21
5.....					1.48	.94	20.....			1.28		1.26	.18
6.....					1.68	.48	21.....			1.14		1.19	
7.....					1.69	.00	22.....			.75		1.13	
8.....					1.60	.00	23.....					1.10	
9.....					1.52	.03	24.....					1.04	
10.....					1.38	.03	25.....		0.69		.44	1.01	
11.....					1.31	.16	26.....				1.27	.97	
12.....					1.32	.13	27.....				1.62	.94	
13.....					1.39	.04	28.....	1.44			1.38	.89	
14.....				.30	1.54	.34	29.....	1.15			1.12	.88	
15.....				.65	1.39	.33	30.....	.85			1.01	1.03	
							31.....				.92	1.38	

NOTE.—No flow during days for which no gage heights are given.

BIG SPRING CREEK NEAR ARENA, COLO.

Location.—In sec. 6, T 15 S., R. 47 W., $1\frac{1}{2}$ miles southwest of Arena. There is no tributary between the station and the mouth, 2 miles below.

Records available.—April 11, 1910, to June 30, 1912.

Drainage area.—Approximately 295 square miles.

Gage.—Vertical staff; datum unchanged.

Channel.—Data too meager to determine.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes backwater during the winter months and the records are discontinued.

Diversions.—There are no court decrees for diversions from Big Spring Creek.

Accuracy.—Owing to the meager data no estimates of discharge have been made.

Cooperation.—Station maintained in cooperation with the Central Land & Irrigation Co.

The following discharge measurement was made by R. H. Fletcher:

June 18, 1912: Gage height, 1.40 feet; discharge, estimated 0.3 second-foot.

Daily gage height, in feet, of Big Spring Creek near Arena, Colo., for 1912.

Day.	Mar.	Apr.	May.	June.	Day.	Mar.	Apr.	May.	June.
1.....		1.65	1.55	.....	16.....				1.6
2.....		1.65	1.65	.....	17.....				1.55
3.....		1.65	1.65	.....	18.....				1.55
4.....		1.55	1.75	.....	19.....				
5.....		1.55	1.7	.....	20.....				
6.....		1.55	1.65	1.55	21.....				
7.....		1.55	1.75	1.55	22.....				
8.....		1.55	1.75	.....	23.....				
9.....		1.55	1.65	.....	24.....	1.55			
10.....		1.55	1.65	1.55	25.....	1.55		1.65	
11.....		1.55	1.6	1.65	26.....	1.55	1.55	1.55	
12.....			1.55	1.75	27.....	1.55	1.55		
13.....			1.55	1.75	28.....	1.55	1.55		
14.....			1.55	1.65	29.....	1.55	1.55		
15.....			1.75	30.....	1.55	1.55		
					31.....	1.55			

NOTE.—Stream dry Apr. 12 to 25 and May 15 to 24; May 27 to June 5, June 8 and 9, and June 19 to 30.

CANADIAN RIVER NEAR SANCHEZ, N. MEX.

Location.—In sec. 8, T. 17 N., R. 24 E., 1 mile below the old Sanchez ruins, 2 miles north of Sanchez post office, 30 miles northwest of Bell Ranch post office, about 5 miles south of mouth of Mora River, $1\frac{1}{2}$ miles below mouth of Canyon Largo.

Records available.—May 15, 1912, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Automatic recording and staff; referred to the same datum.

Channel.—Shifting.

Discharge measurements.—By wading at low stages and from cable at medium stages at high stages the discharge can only be determined by means of the slope and Kutter's formula.

Winter flow.—Slightly affected by ice.

Diversions.—A large portion of the flow is diverted for irrigation above this station.

Accuracy.—The daily discharge estimates made in 1912 can be considered good.

Cooperation.—Maintained in cooperation with the Red River Valley Co., Bell ranch, N. Mex.

Discharge measurements of Canadian River near Sanchez, N. Mex., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 12	R. H. Fletcher.....	3.04	443
Sept. 6	Robert Cooper.....	1.20	18.6
Oct. 18	J. E. Powers.....	1.40	27.9
Nov. 12	Emerson and Powers.....	1.48	37.4

Daily gage height, in feet, of Canadian River near Sanchez, N. Mex., for 1912.

[Luther Hamilton, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....		3.4		1.7	1.4	1.2	1.4	1.35
2.....		2.8		1.6	1.35	1.2	1.4	1.45
3.....		2.8		2.0	1.35	1.2	1.4	1.5
4.....		2.4		1.7	1.25	1.25	1.4	1.5
5.....		2.4		2.0	1.2	1.3	1.4	1.5
6.....		3.6		2.9	1.2	1.35	1.5	1.5
7.....		2.6		2.0	1.3	1.4	1.5	1.4
8.....		2.6		1.7	1.4	1.45	1.5	1.4
9.....		2.6			1.3	1.5	1.5	1.35
10.....		5.2			1.3	1.5	1.5	1.2
11.....		4.6			1.3	1.5	1.5	1.15
12.....		3.1			1.2	1.5	1.5	1.3
13.....		3.0			1.3	1.5	1.5	1.3
14.....		2.8	2.3		1.4	1.45	1.5	1.3
15.....	5.3	2.6	2.2	1.0	1.5	1.45	1.5	1.2
16.....	5.3	2.5	2.2	1.0	1.6	1.45	1.5	1.2
17.....	4.4		2.0	1.0	1.65	1.4	1.5	1.3
18.....	5.5	4.2	2.0	1.0	1.6	1.4	1.5	1.3
19.....	4.4	3.5	1.9	1.0	1.6	1.4	1.5	1.35
20.....	4.4	2.9	1.8	1.05	1.6	1.4	1.5	1.3
21.....	5.2	2.8	1.8	2.1	1.5	1.4	1.5	1.5
22.....	4.4		1.6	2.0	1.5	1.4	1.55	1.5
23.....	4.4	2.6	1.4	1.7	1.4		1.55	1.5
24.....	4.2		1.4	1.6	1.4		1.5	1.7
25.....	4.2	2.6	1.4	1.55	1.3	1.3	1.5	1.6
26.....	4.2	4.6	1.3	1.45	1.3	1.35	1.5	1.6
27.....	3.9	3.6	1.3	1.4	1.3	1.35	1.4	1.65
28.....	3.9	3.2	1.6	1.4	1.25	1.35	1.35	1.6
29.....	3.6	2.6	1.6	1.4	1.25	1.3	1.35	1.65
30.....			1.55	1.4	1.25	1.3	1.3	1.7
31.....			1.4	1.4		1.3		1.7

NOTE.—Gage heights May 15 to June 29 taken from a staff gage; those for remainder of the year from an automatic gage. Gage heights slightly affected by ice Dec. 24 to 31.

Daily discharge, in second-feet, of Canadian River near Sanchez, N. Mex., for 1912.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.		608	269	72	35	14	28	22
2.		350	263	59	30	14	28	30
3.		350	257	122	30	14	28	35
4.		221	251	72	22	17	28	35
5.		221	245	122	18	21	28	35
6.		715	239	386	18	24	38	35
7.		281	233	122	25	29	38	26
8.		281	227	72	34	33	38	26
9.		281	221	62	25	38	38	22
10.		2,240	215	52	25	38	38	11
11.		1,540	209	42	24	37	39	8
12.		467	203	33	17	37	39	18
13.		425	198	24	24	37	39	18
14.		350	194	15	33	32	39	18
15.	2,380	281	167	6	44	32	39	11
16.	2,380	251	167	6	55	31	38	10
17.	1,330	695	122	6	62	27	38	17
18.	2,670	1,140	122	6	55	27	38	17
19.	1,330	660	104	6	55	27	38	20
20.	1,330	386	87	8	55	27	38	17
21.	2,240	350	87	143	42	27	37	33
22.	1,330	316	59	122	42	27	43	33
23.	1,330	281	35	72	31	25	43	33
24.	1,140	281	35	59	31	22	37	33
25.	1,140	281	35	52	23	19	37	33
26.	1,140	1,540	26	40	22	24	35	33
27.	910	715	26	35	22	24	26	33
28.	910	512	59	35	18	24	22	33
29.	715	281	59	35	18	20	22	33
30.	680	275	52	35	18	20	18	33
31.	644		35	35		20		33

NOTE.—Daily discharge determined as follows: May 15 to Sept. 6, from well-defined curves; Sept. 7 to Dec. 23, by indirect method for shifting channels; Dec. 24 to 31, estimated on account of slight effect of ice; discharge interpolated for days for which gage heights are missing.

Monthly discharge of Canadian River near Sanchez, N. Mex., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
May 15-31.	2,670	644	1,390	46,900
June.	2,240	221	552	32,800
July.	269	26	145	8,920
August.	386	6	63.1	3,880
September.	62	17	31.8	1,890
October.	38	14	26.1	1,600
November.	43	18	34.5	2,050
December.	35	8	25.6	1,570
The period.				99,600

CANADIAN RIVER AT LOGAN, N. MEX.

Location.—Three-fourths of a mile above the railroad bridge in sec. 15, T. 13 N., R. 33 E., 1 mile south of Logan, 5 miles below mouth of Ute Creek, and about 5 miles above mouth of Arroyo Largo or Tucumcari Creek.

Records available.—June 29, 1904, to February 26, 1905; December 22, 1908, to December 31, 1912.

Drainage area.—Approximately 12,000 square miles.

Gage.—Automatic recording gage was installed August 5, 1910, at a point three-quarters mile above bridge and referred to a datum different from that of gage previously used. The original gage was a staff. On the reestablishment of the station in 1908, a gage was painted on one of the bridge piers, but referred to a new datum. This gage was used until August 5, 1910, when the present gage was placed in position.

Channel.—Very shifting.

Discharge measurements.—Flood measurements are made by floats, owing to the great amount of drift carried in the stream. Measurements at ordinary stage are made from a car and cable, and at low water by wading.

Winter flow.—Ice causes slight backwater during a portion of the winter months.

Diversions.—Some water is diverted from the headwater streams, as irrigation is carried on quite actively, but there are no diversions in the vicinity of this station.

Accuracy.—The estimates of discharge made in 1912 can be rated as fair.

Discharge measurements of Canadian River at Logan, N. Mex., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 15	R. H. Fletcher	6.25	421	Oct. 18	Gray and Emerson	4.35	0.2
July 11	S. S. Carroll	5.55	76.8	Nov. 16	C. J. Emerson	4.70	6.4
Sept. 2	R. L. Cooper	5.02	22.2				

^a Estimated.

Daily gage height, in feet, of Canadian River at Logan, N. Mex., for 1912.

[Samuel Ruff, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	5.25		5.65			6.35		4.85	5.2	4.5		4.8
2.....	5.35				6.45		5.95	4.9	5.1	4.5		4.8
3.....	5.4	5.35	5.95					5.1	5.0	4.5		4.8
4.....	5.5			7.00			7.05	6.0	4.95	4.5		4.8
5.....	5.65		5.85					6.4	4.9	4.45		4.8
6.....	5.8	5.35						6.3	4.9	4.3		4.8
7.....	5.75		5.75					6.6	4.85	4.3		4.8
8.....	5.55							6.6	4.8	4.4		4.8
9.....	5.45			6.45	6.35		5.55	6.2	4.8			4.8
10.....	5.4		6.75			8.0		6.0	4.5			4.8
11.....	5.4			6.35		^a 6.75	5.55	5.85	5.35			4.8
12.....	5.35		5.95		6.45			5.75	6.3			4.8
13.....	5.3	5.35	6.05				5.25	5.6	5.9		4.55	4.8
14.....	5.25		5.85	6.05				5.8	5.5		4.6	4.85
15.....	5.35			6.25				7.0	5.3		4.65	4.85
16.....	5.45				7.35			7.4	5.25		4.7	4.8
17.....	5.45			6.25		7.5		6.2	5.1		4.7	4.8
18.....	5.5		5.85			6.75		5.7	5.1		4.7	4.8
19.....	5.55	5.35						5.1	5.1		4.7	4.8
20.....	5.65				7.05		5.05	6.4	5.0		4.7	4.75
21.....	5.55		5.55	6.15		6.15		^b 9.0	5.0		4.7	4.7
22.....	5.35	5.45		6.15				7.0	4.9		4.7	4.7
23.....	5.35						5.65	6.1	5.0		4.7	4.7
24.....	5.35					6.35	5.55	5.9	5.0		4.7	4.75
25.....	5.35		6.85	6.55	6.85		5.5	5.9	4.9		4.7	4.8
26.....	5.35		6.15		6.35		5.45	5.8	4.85		4.7	4.8
27.....							5.55	5.6	4.8		4.7	4.7
28.....		5.45	5.85				5.4	5.5	4.7		4.7	4.7
29.....	5.35					6.15	5.3	5.4	4.7		4.8	4.7
30.....							5.0	5.3	4.7		4.8	4.7
31.....			5.35				4.9	5.3				4.7

^a Maximum gage height 10 feet.

^b Maximum gage height 11 feet.

NOTE.—Gage heights affected by ice Jan. 1–5, 1912. Gage heights Jan. 27 to July 22 were read from a staff gage at the same datum as the automatic gage.

Daily discharge, in second-feet, of Canadian River at Logan, N. Mex., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	30	73	140	70	640	512	222	12	35	1	0.0	10
2.....	30	73	196	80	620	520	188	15	27	1	.0	10
3.....	40	73	252	100	605	520	200	27	20	1	.0	10
4.....	50	73	231	1,920	590	520	2,080	210	18	1	.0	10
5.....	80	73	210	1,610	575	520	200	490	15	.5	.0	10
6.....	190	73	191	900	560	520	150	390	15	.2	.0	10
7.....	172	73	172	700	544	550	100	780	12	.2	.0	10
8.....	172	73	200	620	528	600	80	780	10	.4	.5	10
9.....	90	73	200	620	512	1,000	76	320	10	.0	.5	10
10.....	80	73	1,220	570	548	7,500	76	210	1	.0	.5	10
11.....	80	73	400	512	584	1,160	76	149	49	.0	.5	10
12.....	73	73	252	440	620	1,100	58	120	390	.0	.5	10
13.....	66	73	302	370	650	1,100	40	84	166	.0	2	10
14.....	60	73	210	302	700	1,100	38	132	67	.0	3	12
15.....	73	73	210	428	3,200	1,200	36	1,900	44	.0	4	12
16.....	90	73	210	428	3,280	2,000	33	3,500	40	.2	6	10
17.....	90	73	210	428	2,980	4,000	30	320	27	.2	6	10
18.....	100	73	210	411	2,690	1,160	28	107	27	.2	6	10
19.....	112	73	180	394	2,400	600	26	27	27	.0	6	10
20.....	112	78	145	376	2,100	300	24	490	20	.0	6	8
21.....	112	84	112	359	2,000	290	41	16,000	20	.0	6	6
22.....	73	90	115	359	2,000	340	79	1,900	15	.0	6	6
23.....	73	90	115	580	2,000	390	96	260	20	.0	6	6
24.....	73	90	115	800	3,000	440	76	166	20	.0	6	8
25.....	73	90	1,480	765	1,480	410	67	166	15	.0	6	10
26.....	73	90	359	740	512	380	60	132	12	.0	6	10
27.....	73	90	284	720	512	350	76	84	10	.0	6	6
28.....	73	90	210	700	512	320	54	67	6	.0	6	6
29.....	73	115	160	680	512	290	44	54	6	.0	10	6
30.....	73	-----	115	660	512	256	20	44	6	.0	10	6
31.....	73	-----	73	-----	512	-----	15	44	-----	.0	-----	6

NOTE.—Daily discharge during 1912 determined as follows: Jan. 1-5, estimated, on account of ice; Jan. 6 to June 10, from a curve not well defined; June 11 to Dec. 31, from a well-defined curve. Discharge on days for which gage heights are missing estimated from observer's notes or interpolated.

Monthly discharge of Canadian River at Logan, N. Mex., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet.)	Accu- racy.
	Maximum.	Minimum.	Mean.		
January.....	190	30	84.9	5,220	C.
February.....	115	73	79.1	4,550	C.
March.....	1,480	73	274	16,800	C.
April.....	1,920	70	538	35,000	C.
May.....	3,280	512	1,240	76,200	C.
June.....	7,500	256	998	59,400	C.
July.....	2,080	15	142	8,730	C.
August.....	16,000	12	935	57,500	B.
September.....	390	1	38.3	2,280	B.
October.....	1	0	.10	12	B.
November.....	10	0	3.65	217	B.
December.....	12	6	9.0	553	B.
The year.....	16,000	0	367	266,000	

CHICO RICO CREEK NEAR RATON, N. MEX.

Location.—At St. Louis, Rocky Mountain & Pacific Railway bridge, in sec. 21, T. 30 N., R. 24 E., and 10 miles southeast of Raton, above Raton and Una del Gato creeks.

Records available.—July 29, 1910, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Automatic recording; datum unchanged.

Channel.—Shifting.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months.

Divisions.—The greater part of the normal flow is diverted above the station for irrigation.

Accuracy.—Owing to lack of measurements, no estimates of discharge have been made.

Discharge measurements of Chico Rico Creek near Raton, N. Mex., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
Apr. 5	R. H. Fletcher	Feet. 2.50	Sec.-ft. 209
Aug. 27	Gray and Cooper	1.48	(a) 1.0
Oct. 21	Gray and Powers	1.40	b 1.5
Nov. 16	J. E. Powers		

^a Dry. Zero flow occurred at gage height of about 1.40 feet.

^b Estimated.

Daily gage height, in feet, of Chico Rico Creek near Raton, N. Mex., for 1912.

[J. L. Tuyman, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.	1.1	1.4	1.40	1.95	2.44	1.80	2.50	2.00	.....	1.50	1.40
2.	1.1	1.4	1.60	2.05	2.48	1.80	2.50	2.00	.....	1.50	.....
3.	1.1	1.4	1.72	2.23	2.28	1.78	2.50	2.00	.....	1.50	.....
4.	1.1	1.4	1.63	2.57	2.15	1.75	2.50	1.95	.....	1.50	.....
5.	1.1	1.4	1.50	2.95	2.08	1.90	2.40	1.80	.....	1.62	.....
6.	1.1	1.4	1.48	2.76	2.00	1.78	2.40	1.70	.....	1.60	.....
7.	1.2	1.4	1.53	2.44	2.00	1.65	2.40	.....	.....	1.57	.....
8.	1.3	1.4	1.60	2.33	1.98	1.60	2.30	.....	.....	1.68	.....
9.	1.35	1.4	1.50	2.32	1.98	1.65	2.35	.....	.....	1.55	.....
10.	1.35	1.4	1.50	2.47	1.98	1.65	2.40	.....	.....	1.52	1.40
11.	1.35	1.4	1.50	2.43	2.00	1.65	2.40	.....	2.00	1.50	1.40
12.	1.35	1.4	1.50	2.28	2.13	1.55	2.30	.....	2.35	1.50	1.40
13.	1.25	1.4	1.55	2.14	2.35	1.50	2.30	.....	2.35	1.50	1.40
14.	1.3	1.4	1.67	2.09	2.32	1.45	2.30	.....	2.35	1.50	1.40
15.	1.35	1.4	1.69	2.03	2.58	1.50	2.25	1.63	2.30	1.50	1.40
16.	1.35	1.4	1.68	1.98	2.54	2.16	2.20	1.50	2.30	1.50	1.40
17.	1.35	1.4	1.93	1.94	2.40	2.41	2.15	1.50	2.25	1.50	1.40
18.	1.35	1.4	2.03	1.95	2.35	2.75	2.15	1.50	2.25	1.50	1.40
19.	1.4	1.4	2.34	1.95	2.30	2.65	2.15	1.50	2.30	1.50	1.45
20.	1.3	1.4	2.71	1.98	2.22	2.15	1.90	1.50	2.30	1.48	1.45
21.	1.3	1.4	2.52	1.90	2.18	2.40	1.75	1.50	2.30	1.48	1.45
22.	1.3	1.4	2.25	1.93	2.10	2.60	1.70	1.50	2.30	1.48	1.45
23.	1.3	1.4	2.10	1.95	2.05	2.63	1.55	1.50	2.20	1.48	1.40
24.	1.3	1.4	2.08	1.98	2.02	2.70	1.60	.....	2.15	1.48	1.45
25.	1.35	1.4	2.05	2.00	2.00	2.65	2.10	.....	2.00	1.48	1.45
26.	1.4	1.4	2.02	2.00	2.00	2.50	1.80	.....	1.85	1.48	1.48
27.	1.4	1.4	2.05	2.00	1.96	2.50	1.60	.....	1.65	1.40	1.48
28.	1.4	1.4	2.08	2.11	1.80	2.50	1.70	.....	1.50	1.40	.....
29.	1.4	.....	2.12	2.32	1.76	2.50	1.75	.....	1.50	1.40	.....
30.	1.4	.....	2.22	2.46	1.74	2.50	1.70	.....	1.50	1.40	.....
31.	1.4	.....	2.15	.....	1.82	.....	1.90	.....	.....	1.40	.....

NOTE.—Gage heights estimated Jan. 1-12. Ice about 0.4 foot thick during January and 0.3 foot during February. Creek frozen to bottom Nov. 28 to Dec. 31. Creek dry Aug. 7-14, Aug. 24 to Sept. 10, and Nov. 2-9, 1912.

UNA DEL GATO CREEK NEAR RATON, N. MEX.

Location.—In sec. 13, T. 30 N., R. 25 E., about 2 miles northeast of Meloche's ranch, 18 miles southeast of Raton, N. Mex. No important tributary enters within several miles.

Records available.—May 3, 1910, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Automatic recording.

Channel.—Probably permanent.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes backwater during a portion of the winter months.

Artificial control.—A short distance above the station is a reservoir designed to hold the flood water for use in irrigation farther down the valley.

Accuracy.—The estimates in 1912 can be considered good.

Cooperation.—Gage heights furnished by Mr. A. J. Meloche, Raton, N. Mex.

Discharge measurements of Una del Gato Creek near Raton, N. Mex., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 5	R. H. Fletcher.....	1.80	122	Oct. 21	Gray and Powers	0.35	60.2
July 9	S. S. Carroll.....	.50	.9	Nov. 16	J. E. Powers .....	.40	6.2
Aug. 27	Gray and Cooper.....		(a)				

a Dry. Zero flow occurred at about gage height, 0.30 foot.

b Estimated.

Daily gage height, in feet, of Una del Gato Creek near Raton, N. Mex., for 1912.

[A. J. Meloche, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		1.35	1.35	0.55	0.40	0.68	0.32	0.38	0.32
2.....		1.40	1.55	.50	.40	.59	.32		.32
3.....		1.55	1.55	.50	.40	.46	.38		
4.....		1.70	1.35	.50	.40	.40	.44		
5.....		1.80	1.20	.50	.40	.40	.47		
6.....		2.00	.58	.50	.44	.78	.48		
7.....		1.75	.35	.52	.42	.76			
8.....		1.70	.35	.60	.42	.54			
9.....		1.65			.42	.52			
10.....		1.60			.46	.55			
11.....		1.65			.43	.50			
12.....		1.70	.40		.47	.50			
13.....		1.00	1.63		.50	.50			
14.....			1.65		.53	.69	.40		
15.....			1.39	.50	.57	.44	.40		
16.....			1.70	.73	.61	.44	.40		.40
17.....		1.40	1.75	.90	.60	.41	.40		.40
18.....		1.35	1.70	.48	.50	.40	.40	.32	.40
19.....		1.20	1.30	.42	.62	.40	.40	.35	.40
20.....		.80	.70	.40	.66	.40	.40	.35	.40
21.....		.60	.42	.50	.60	.39	.40	.35	.40
22.....		.70	.45	.50	.60	.39	.40	.35	.40
23.....		.65	.35	.50	.60	.40	.40	.35	.40
24.....		.55	.35	.50	.60		.40	.35	.40
25.....		.35	.50	.50	.60		.40	.38	.40
26.....	1.25	.38	.45	.50	.60		.40	.40	.40
27.....	1.20	.60	.45	.50	.50		.40	.35	.40
28.....	1.25	1.55	.56	.50	.50	.32	.40	.35	.40
29.....	1.20	1.10	.48	.50	.81	.32	.47	.32	.40
30.....	1.20	1.10	.58	.40	.80	.32	.41	.32	.40
31.....	1.30		.59		.69	.32		.32	

NOTE.—Gage heights affected by ice Jan. 1 to Mar. 25, and Dec. 1-31.

Daily discharge, in second-feet, of Una del Gato Creek near Raton, N. Mex., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.		57	57	1.7	0.3	4.9	0.1	0.2	0.1
2.		62	80	.9	.3	2.3	.1	.0	.1
3.		80	80	.9	.3	.7	.2	.0	.0
4.		98	57	.9	.3	.3	.5	.0	.0
5.		110	42	.9	.3	.3	.7	.0	.0
6.		140	2.2	.9	.5	9.1	.8	.0	.0
7.		104	.2	1.2	.4	8.2	.7	.0	.0
8.		98	.2	2.5	.4	1.5	.6	.0	.0
9.		92	.0	2.3	.4	1.2	.5	.0	.0
10.		86	.0	2.1	.7	1.7	.4	.0	.0
11.		92	.0	1.9	.5	.9	.3	.0	.0
12.		98	.3	1.6	.7	.9	.3	.0	.0
13.		24	90	1.3	.9	.9	.3	.0	.0
14.		34	92	1.1	1.4	5.2	.3	.0	.0
15.		43	61	.9	2.0	.5	.3	.0	.0
16.		52	98	6.8	2.8	.5	.3	.0	.3
17.		62	104	16	2.5	.4	.3	.0	.3
18.		57	98	.8	.9	.3	.3	.1	.3
19.		42	52	.4	3.1	.3	.3	.2	.3
20.		10	5.5	.3	4.3	.3	.3	.2	.3
21.		2.5	.4	.9	2.5	.3	.3	.2	.3
22.		5.5	.6	.9	2.5	.3	.3	.2	.3
23.		4.0	.2	.9	2.5	.3	.3	.2	.3
24.		1.7	.2	.9	2.5	.0	.3	.2	.3
25.		.2	.9	.9	2.5	.0	.3	.2	.3
26.	47	.2	.6	.9	2.5	.0	.3	.3	.3
27.	42	2.5	.6	.9	.9	.0	.3	.2	.3
28.	47	80	1.9	.9	.9	.1	.3	.2	.3
29.	42	32	.8	.9	11	.1	.7	.1	.3
30.	42	32	2.2	.3	10	.1	.4	.1	.3
31.	42		2.3		5.2	.1		.1	

NOTE.—Daily discharge Mar. 26 to Nov. 30 determined from a curve well defined below 150 second-feet. Stream dry May 9-11, Aug. 24-27, Oct. 2-17, Nov. 3-15, and Dec. 1-31. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Una del Gato Creek near Raton, N. Mex., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
March 26-31.....	47	42	43.7	520	B.
April.....	140	.2	53.4	3,180	B.
May.....	104	.0	30.0	1,840	B.
June.....	16	.3	1.79	107	B.
July.....	11	.3	2.13	131	B.
August.....	9.1	.0	1.35	83	B.
September.....	.8	.1	.37	22	B.
October.....	.3	.0	.09	6	B.
November.....	.3	.0	.16	10	B.
December.....	.0	.0	.00	0	
The period.....				5,900	

CIMARRON RIVER AT UTE PARK, N. MEX.

Location.—At highway bridge in Ute Park, in sec. 19, T. 27 N., R. 18 E., half a mile below mouth of Ute Creek.

Records available.—July 14, 1907, to December 31, 1912.

Drainage area.—235 square miles (measured on Land Office map).

Gage.—Automatic recording gage installed in September, 1909; referred to the same datum as the staff gage previously used.

Channel.—Fairly permanent but rough.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Backwater from ice during the winter months.

Diversions.—Little water is diverted above the station, but most of the normal flow is diverted below.

Accuracy.—Conditions are favorable for accurate results and the estimates of flow should be reliable.

Discharge measurements of Cimarron River at Ute Park, N. Mex., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.ft.</i>			<i>Feet.</i>	<i>Sec.ft.</i>
Apr. 3	R. H. Fletcher.....	0.78	70.8	Oct. 23	J. E. Powers.....	.35	12.5
July 6	S. S. Carroll.....	.45	23.6	Nov. 27	.....do.....	a.35	6.5
Aug. 29	Gray and Cooper.....	.33	12.8				

a Gage height affected by ice.

Daily gage height, in feet, of Cimarron River at Ute Park, N. Mex., for 1912.

[J. H. Robinson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	0.43	0.51	0.38	1.00	1.23	1.30	0.66	0.55	0.38	0.38	0.35	0.42
2.....	.45	.45	.35	.75	1.50	1.32	.64	.42	.36	.38	.35	.43
3.....	.43	.40	.40	.93	1.68	1.25	.62	.42	.34	.38	.38	.41
4.....	.44	.45	.39	1.08	1.45	1.20	.61	.40	.33	.37	.34	.42
5.....	.42	.45	.45	1.18	1.34	1.15	.58	.40	.33	.55	.32	.42
6.....	.40	.42	.42	1.15	1.33	1.00	.40	.35	.32	.45	.30	.41
7.....	.38	.42	.44	1.05	1.28	1.00	.38	.35	.35	.40	.30	.42
8.....	.40	.38	.48	1.08	1.30	1.00	.35	.35	.33	.35	.30	.40
9.....	.38	.35	.55	1.00	1.35	.96	.33	.30	.32	.35	.30	.40
10.....	.38	.38	.67	1.10	1.28	.97	.33	.30	.32	.35	.30	.35
11.....	.39	.42	.77	1.08	1.20	.92	.37	.28	.34	.35	.30	.35
12.....	.47	.38	.57	1.06	1.20	.93	.36	.28	.38	.35	.31	.40
13.....	.37	.47	.50	1.05	1.28	.89	.35	.30	.36	.36	.32	.30
14.....	.37	.40	.43	1.05	1.22	.95	.35	.35	.34	.34	.33	.30
15.....	.37	.42	.45	.95	1.35	.90	.42	.40	.30	.33	.34	.30
16.....	.38	.47	.45	.90	1.50	.89	.45	.35	.26	.34	.35	.30
17.....	.38	.42	.48	.90	1.60	.85	.42	.30	.24	.33	.....	.40
18.....	.36	.40	.57	.87	1.70	.85	.40	.34	.22	.32	.....	.30
19.....	.36	.42	.98	.85	1.72	.85	.35	.33	.22	.33	.....	.60
20.....	.42	.42	1.82	.85	1.73	.87	.38	.35	.22	.33	.....	.35
21.....	.42	.43	1.35	.75	1.85	.83	.45	.53	.24	.33	.....	.40
22.....	.39	.45	1.20	.75	1.83	.70	.45	.48	.23	.33	.....	.40
23.....	.40	.47	.80	.78	1.78	.93	.50	.40	.25	.33	.....	.40
24.....	.38	.45	.80	.93	1.70	.85	.45	.38	.26	.33	.35	.45
25.....	.37	.40	.76	1.07	1.68	.76	.48	.47	.27	.33	.34	.40
26.....	.40	.40	.68	1.02	1.55	.73	.45	.45	.27	.35	.35	.40
27.....	.38	.38	.70	1.02	1.48	.72	.50	.44	.27	.35	.35	.35
28.....	.35	.37	.62	1.12	1.48	.73	.45	.38	.30	.35	.33	.40
29.....	.53	.39	.72	1.25	1.38	.71	.46	.33	.31	.34	.33	.....
30.....	.53	.....	.70	1.20	1.33	.68	.45	.35	.38	.35	.34	.....
31.....	.53	.....	.80	.....	1.30	.....	.45	.35	.....	.35	.....	.....

NOTE.—Gage height affected by ice Nov. 24 to Dec. 31.

Daily discharge, in second-feet, of Cimarron River at Ute Park, N. Mex., for 1912.

. Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	19	29	15	141	205	225	58	39	17	17	13	10
2.....	22	22	13	76	281	231	55	21	16	17	13	10
3.....	19	16	16	121	331	211	51	21	14	17	15	10
4.....	20	22	15	163	267	197	49	18	13	16	12	10
5.....	18	22	22	191	236	183	44	18	13	36	11	10
6.....	16	18	18	183	233	141	18	15	12	22	10	10
7.....	15	18	20	155	219	141	17	15	15	16	10	10
8.....	16	15	25	163	225	141	15	15	13	13	10	10
9.....	15	13	36	141	239	130	13	11	12	13	10	10
10.....	15	15	58	169	219	133	13	11	12	13	10	8
11.....	16	18	80	163	197	119	16	10	14	13	10	8
12.....	24	15	39	158	197	122	16	10	17	13	10	9
13.....	14	24	27	155	219	112	15	11	16	13	11	5
14.....	14	16	19	155	203	128	15	15	14	12	11	5
15.....	14	18	22	127	239	114	21	18	11	11	12	5
16.....	15	24	22	113	281	112	24	15	10	12	13	5
17.....	15	18	25	113	309	102	21	11	9	11	13	10
18.....	13	16	39	105	337	102	18	14	8	11	13	12
19.....	13	18	135	100	343	102	15	13	8	11	13	15
20.....	18	18	371	100	345	106	17	15	8	11	13	7
21.....	18	19	239	76	379	96	24	35	9	11	13	5
22.....	15	22	197	76	373	66	24	28	9	11	13	5
23.....	16	24	87	82	359	122	30	18	9	11	12	5
24.....	15	22	87	121	337	102	24	17	10	11	11	6
25.....	14	16	78	160	331	80	28	27	10	11	9	7
26.....	16	16	60	147	295	73	24	24	10	13	8	
27.....	15	15	64	147	275	71	30	23	10	13	7	7
28.....	13	14	48	175	275	73	24	17	11	13	5	8
29.....	32	15	69	211	247	68	26	13	12	12	5	7
30.....	32	.....	64	197	233	64	24	15	17	13	6	7
31.....	32	.....	87	.....	225	.....	24	15	.....	13	.....	7

NOTE.—Daily discharge determined as follows: Jan. 1 to May 20 and Oct. 5 to Nov. 16, from a curve well defined between 5 and 200 second-feet; May 21 to Oct. 4, from a fairly well defined curve; Nov. 17-23 interpolated; Nov. 24 to Dec. 31, estimated, taking into consideration discharge measurements and United States Weather Bureau reports.

Monthly discharge of Cimarron River at Ute Park, N. Mex., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
January.....	32	13	17.7	1,090	A.
February.....	29	13	18.6	1,070	A.
March.....	371	13	67.6	4,160	A.
April.....	211	76	139	8,270	A.
May.....	379	197	273	16,800	A.
June.....	231	64	122	7,260	A.
July.....	58	13	25.6	1,570	A.
August.....	39	10	17.7	1,090	A.
September.....	17	8	12.0	714	A.
October.....	36	11	13.9	855	A.
November.....	15	5	10.7	637	B.
December.....	15	5	8.1	498	C.
The year.....	379	5	60.6	44,000	

RAYADO RIVER ABOVE ABREU'S RANCH, NEAR CIMARRON, N. MEX.

Location.—Six miles above Abreu's ranch house, at the mouth of the box canyon, 15 miles southwest of Cimarron, near sec. 29, T. 25 N., R. 18 E.

Records available.—May 4, 1911, to December 31, 1912.

Drainage area.—56 square miles; from private surveys made for George H. Webster, of Cimarron, N. Mex.

Gage.—Automatic recording gage, installed May 5, 1911. A staff gage, located three-fourths of a mile above Abreu's ranch house, was read from January 1, 1909, until May 5, 1911, when the station was moved to its present site. No determined relation between the two gages. No streams enter between the two points, but it is possible that some of the flow is lost by sinking into the sand.

Channel.—Slightly shifting.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes some backwater during the winter months.

Diversions.—No water is diverted above the station and the records represent the natural run-off.

Accuracy.—Estimates of discharge can be considered good.

Discharge measurements of Rayado River above Abreu's ranch, near Cimarron, N. Mex., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 1	R. H. Fletcher.....	1.20	18.9	Oct. 24	J. E. Powers.....	0.80	4.2
July 5	S. S. Carroll.....	1.18	16.8	Nov. 26	.....do.....	.92	6.2
Aug. 30	Gray and Cooper.....	.85	5.4				

Daily gage height, in feet, of Rayado River above Abreu's ranch, near Cimarron, N. Mex., for 1912.

[A. J. Senseman, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....		0.75	0.74	1.05	^a 2.15	1.75	1.27	0.97	0.87	0.81	0.80	0.70
2.....		.75	.72	1.10	2.25	1.70	1.26	.94	.84	.80	.80	.65
3.....		.75	.73	1.17	2.15	.....	1.23	.92	.83	.78	.80	.70
4.....		.78	.73	1.35	1.98	.....	1.22	.90	.83	.77	.75	.70
5.....		.80	.74	1.48	1.90	.....	1.20	.92	.81	.98	.72	.70
6.....		.80	.78	1.45	1.90	.....	1.15	.89	.81	.90	.71	.70
7.....		.77	.78	1.48	1.92	.....	1.14	.87	.80	.85	.74	.70
8.....		.77	.78	1.50	1.90	1.55	1.12	.86	.80	.83	.77	.70
9.....		.77	.78	1.50	1.92	1.50	1.10	.86	.80	.82	.80	.70
10.....		.75	.79	1.58	1.88	1.48	1.10	.84	.83	.80	.79	.70
11.....		.76	.78	1.62	1.90	.....	1.11	.85	.97	.78	.79	.70
12.....		.76	.78	1.65	1.93	.....	1.08	.85	.89	.80	.69	.70
13.....		.76	.80	1.55	1.92	.....	1.06	.86	.87	.80	.62	.70
14.....		.75	.82	1.55	1.82	.....	1.04	1.07	.85	.80	.60	.70
15.....	0.74	.73	.85	1.42	1.98	.....	1.07	1.02	.83	.80	.70	.70
16.....	.74	.72	.85	1.37	1.95	1.28	1.08	.90	.82	.80	.75	.70
17.....	.74	.73	.82	1.32	1.91	1.25	1.05	.91	.81	.79	.75	.70
18.....	.74	.75	.85	1.32	1.95	1.25	1.02	.93	.79	.80	.75	.70
19.....	.74	.78	1.03	1.30	2.05	1.25	1.00	.88	.79	.80	.75	.70
20.....	.74	.80	1.18	1.25	2.08	1.25	1.00	.95	.79	.80	.70	.70
21.....	.74	.79	1.08	1.22	2.18	1.25	1.06	1.01	.79	.80	.68	.70
22.....	.74	.79	1.05	1.22	2.22	1.25	.98	.99	.78	.78	.75	.65
23.....	.73	.75	1.00	1.30	2.18	.....	1.00	.90	.78	.81	.75	.65
24.....	.73	.73	1.00	1.55	2.16	.....	1.04	.90	.78	.81	.80	.60
25.....	.73	.73	.98	1.65	2.10	.....	1.10	.88	.78	.81	.80	.60
26.....	.73	.74	1.02	1.55	2.08	.....	1.07	.87	.78	.80	.85	.60
27.....	.73	.74	1.00	1.60	2.04	.....	1.04	.84	.77	.81	.85	.60
28.....	.73	.74	1.00	1.70	2.00	.....	.99	.84	.77	.81	.90	.60
29.....	.74	.74	1.00	1.75	1.93	.....	.98	.87	.78	.80	.85	.60
30.....	.75	.....	1.10	1.82	1.88	1.28	.97	.90	.74	.80	.70	.60
31.....	.75	.....	1.10	.....	1.82	.....	.99	.93	.....	.80	.....	.60

^a Maximum gage height, 2.60 feet.

NOTE.—Stream covered with ice Jan. 1-14 and Dec. 3-31. Thickness of ice varied from 0.5 to 0.8 of a foot during December.

Daily discharge, in second-feet, of Rayado River above Abreu's ranch, near Cimarron, N. Mex., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	2.0	3.3	3.1	11	108	62	22	8.5	5.8	4.4	4.2	2.4
2.....	2.0	3.3	2.8	13	122	57	22	7.6	5.1	4.2	4.2	2.0
3.....	2.0	3.3	2.9	16	108	55	20	7.1	4.9	3.8	4.2	2.0
4.....	2.0	3.8	2.9	27	88	47	19	6.5	4.9	3.7	3.3	2.0
5.....	2.0	4.2	3.1	36	78	47	18	7.1	4.4	8.7	2.8	2.0
6.....	2.0	4.2	3.8	34	78	45	16	6.3	4.4	6.5	2.6	2.0
7.....	2.0	3.7	3.8	36	80	42	15	5.8	4.2	5.4	3.1	2.0
8.....	2.0	3.7	3.8	38	78	42	14	5.6	4.2	4.9	3.7	2.0
9.....	2.0	3.7	3.8	38	80	38	13	5.6	4.2	4.7	4.2	2.0
10.....	2.0	3.3	4.0	45	76	36	13	5.1	4.9	4.2	4.0	2.0
11.....	2.0	3.5	3.8	49	78	34	14	5.4	8.5	3.8	4.0	2.0
12.....	2.0	3.5	3.8	52	82	30	12	5.4	6.3	4.2	2.3	2.0
13.....	2.0	3.5	4.2	42	80	30	12	5.6	5.8	4.2	1.7	2.0
14.....	2.0	3.3	4.7	42	69	29	11	12	5.4	4.2	1.5	2.0
15.....	3.1	2.9	5.4	32	88	24	12	10	4.9	4.2	2.4	2.0
16.....	3.1	2.8	5.4	28	84	23	12	6.5	4.7	4.2	3.3	2.0
17.....	3.1	2.9	4.7	25	79	21	11	6.8	4.4	4.0	3.3	2.0
18.....	3.1	3.3	5.4	25	84	21	10	7.3	4.0	4.2	3.3	2.0
19.....	3.1	3.8	10	24	96	21	9.3	6.0	4.0	4.2	3.3	2.0
20.....	3.1	4.2	17	21	100	21	9.3	7.9	4.0	4.2	2.4	2.0
21.....	3.1	4.0	12	19	112	21	12	9.7	4.0	4.2	2.2	2.0
22.....	3.1	4.0	11	19	118	21	8.7	9.0	3.8	3.8	3.3	1.0
23.....	2.9	3.3	9.3	24	112	21	9.3	6.5	3.8	4.4	3.3	1.0
24.....	2.9	2.9	9.3	42	110	21	11	6.5	3.8	4.4	4.2	1.0
25.....	2.9	2.9	8.7	52	102	21	13	6.0	3.8	4.4	4.2	1.0
26.....	2.9	3.1	10	42	100	23	12	5.8	3.8	4.2	5.6	1.0
27.....	2.9	3.1	9.3	47	95	24	11	5.1	3.7	4.4	5.6	1.0
28.....	2.9	3.1	9.3	57	90	24	9.0	5.1	3.7	4.4	6.5	1.0
29.....	3.1	3.1	9.3	62	82	24	8.7	5.8	3.8	4.2	5.6	1.0
30.....	3.3	.....	13	69	76	23	8.5	6.5	3.1	4.2	2.4	1.0
31.....	3.3	.....	13	.....	69	.....	9.0	7.3	.....	4.2	.....	1.0

NOTE.—Daily discharge determined as follows: Jan. 1-14, estimated on account of ice; Jan. 15 to Dec. 2, from a curve well defined between 2 and 50 second-feet; Dec. 3-31 estimated on account of ice. June 3-7, 11-15, and 23-29 estimated.

Monthly discharge of Rayado River above Abreu's ranch, above Cimarron, N. Mex., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
January.....	3.3	2.0	2.58	159	C.
February.....	4.2	2.8	3.44	198	B.
March.....	17	2.8	6.86	422	A.
April.....	69	11	35.6	2,120	A.
May.....	122	60	90.4	5,560	A.
June.....	62	21	31.6	1,880	A.
July.....	22	8.5	12.8	787	A.
August.....	12	5.1	6.82	419	A.
September.....	8.5	3.1	4.54	270	A.
October.....	8.7	3.7	4.47	275	A.
November.....	6.5	1.5	3.56	212	B.
December.....	2.4	1.0	1.69	104	C.
The year.....	122	1.0	17.1	12,400	

RAYADO RIVER BELOW ABREU'S RANCH, NEAR CIMARRON, N. MEX.

Location.—Twelve miles south of Cimarron, one-half mile east of Abreu's ranch house, one-fourth mile above the headgate of the ditch of the Farmers' Development Co., in sec. 28, T. 25 N., R. 19 E.

Records available.—September 10, 1912, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Automatic recording.

Channel.—Shifting.

Discharge measurements.—Wading.

Winter flow.—Backwater effect during the winter months.

Diversions.—Water is diverted above this station for irrigation.

Accuracy.—The daily discharge estimates for 1912 can be considered only fair.

Cooperation.—Maintained in cooperation with the Rayado Colonization Co., Cimarron, N. Mex.

Discharge measurements of Rayado River below Abreu's ranch, near Cimarron, N. Mex., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
Sept. 10	R. L. Cooper	<i>Fect.</i> 1.00	<i>Sec.-ft.</i> 0.5
Oct. 24	J. E. Powers	1.35	3.5
Nov. 26	do.	1.10	.7

^a Estimated.

Daily gage height, in feet, and discharge, in second-feet, of Rayado River below Abreu's ranch, near Cimarron, N. Mex., for 1912.

Day.	September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1.	1.2	1.7	1.4	4.1	1.0	0.4
2.	1.15	1.2	1.55	6.1	.95	.3
3.	1.15	1.2	1.4	4.1	.95	.3
4.	1.2	1.7	1.5	5.4	1.0	.4
5.	1.2	1.7	1.3	2.8	1.0	.4
6.	1.15	1.2	1.1	.7	1.0	.4
7.	1.1	.7	1.3	2.8	1.45	.....
8.	1.2	1.7	1.4	4.1	1.45	.....
9.	1.25	2.2	.....	4.1	1.4	.....
10.	0.95	0.5	1.3	2.8	1.4	4.1	1.4	.....
11.	.8	.1	1.3	2.8	1.4	4.1	1.45	.....
12.	.85	.2	1.3	2.8	1.35	3.4	1.4	.....
13.	.85	.2	1.2	1.7	1.45	4.8	1.45	.....
14.	.9	.2	1.05	.6	.....	3.8	1.45	.....
15.5	1.1	.7	.....	2.8	1.45	.....
16.9	1.1	.7	.....	1.8	1.4	.....
17.	1.2	1.1	.7	1.1	.7	1.4	.....
18.	1.4	1.15	1.2	1.1	.7	1.4	.....
19.	1.7	1.25	2.2	1.1	.7	1.4	.....
20.	2.0	1.25	2.2	1.05	.6	1.45	.....
21.	1.25	2.2	1.2	1.7	1.05	.6	1.4
22.	1.2	1.7	1.35	3.4	1.15	1.2	1.5
23.	1.2	1.7	1.25	2.2	1.15	1.2	1.6
24.	1.15	1.2	1.3	2.8	.....	1.0	1.7
25.	1.2	1.7	1.3	2.8	.....	.9	1.7
26.	1.3	2.8	1.25	2.2	1.1	.7	1.65
27.	1.3	2.8	1.3	2.8	1.05	.6	1.6
28.	1.3	2.8	1.4	4.1	1.05	.6	1.5
29.	1.2	1.7	1.35	3.4	1.0	.4	1.5
30.	1.2	1.7	1.4	4.1	1.1	.7	1.45
31.	1.4	4.1	.....	.....	1.5	.....

NOTE.—Gage heights affected by ice Dec. 7-31. Daily discharge determined as follows: Sept. 10 to Dec. 6 from a fairly well-defined curve. Discharge interpolated for days for which gage heights are missing.

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Monthly discharge of Rayado River below Abreu's ranch near Cimarron, N. Mex., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
Sept. 10-30.....	2.8	0.1	1.39	58	C.
October.....	4.1	.6	2.11	130	B.
November.....	6.1	.4	2.32	138	B.
December.....			^a 1.00	61	D.

^a Estimated on account of ice.

URRACA CREEK NEAR CIMARRON, N. MEX.

Location.—Eight miles southwest of Cimarron, 5 miles upstream from Urraca ranch, at proposed reservoir site, near sec. 35, T. 26 N., R. 18 E.

Records available.—November 25, 1912, to December 31, 1912.

Drainage area.—6.3 square miles; from private surveys made for George H. Webster, of Cimarron, N. Mex.

Gage.—Automatic recording.

Channel.—Fairly permanent.

Discharge measurements.—Made by wading.

Winter flow.—Backwater from ice during the winter months.

Diversions.—No diversions above this point.

Accuracy.—Because of meager data caused by short period of records no daily estimates of the discharge were made in 1912. As soon as sufficient data have been collected daily estimates of the discharge will be made, which should be rated as good.

Cooperation.—Maintained in cooperation with George H. Webster, jr., Cimarron, N. Mex.

The following discharge measurement was made by J. E. Powers:

November 25, 1912: Gage height, 0.80 foot; discharge, 0.9 second-foot.

Daily gage height, in feet, of Urraca Creek near Cimarron, N. Mex., for 1912.

[B. C. Sturges, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1.....		0.92	11.....		0.86	21.....		1.00
2.....		.80	12.....		.87	22.....		1.00
3.....		.82	13.....		.89	23.....		1.60
4.....		.95	14.....		.90	24.....		1.00
5.....		.92	15.....		.90	25.....	0.80	1.00
6.....		.80	16.....		.90	26.....	.89	1.00
7.....		.80	17.....		.92	27.....	.86	1.00
8.....		.80	18.....		.97	28.....	.80	1.00
9.....		.81	19.....		1.00	29.....	.85	1.00
10.....		.84	20.....		1.00	30.....	.90	1.00
						31.....		1.00

NOTE.—Gage heights affected by ice Dec. 4, 5, and 10 to 31, 1912.

Daily discharge, in second-feet, of Urraca Creek near Cimarron, N. Mex., for 1912.

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1.....		1.4	11.....		0.8	21.....		0.5
2.....		.9	12.....		.7	22.....		.5
3.....		1.0	13.....		.7	23.....		.5
4.....		.9	14.....		.7	24.....		.5
5.....		.9	15.....		.7	25.....	0.9	.6
6.....		.9	16.....		.7	26.....	1.3	.6
7.....		.9	17.....		.7	27.....	1.1	.6
8.....		.9	18.....		.7	28.....	.9	.6
9.....		.9	19.....		.7	29.....	1.1	.6
10.....		.8	20.....		.7	30.....	1.3	.6
						31.....		.5

NOTE.—Daily discharge determined by means of discharge measurements made in 1912 and 1913, climatological data, and information furnished by the observer.

Monthly discharge of Urraca Creek near Cimarron, N. Mex., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
November 25-30.....	1.3	0.9	1.10	13
December.....	1.4	.5	.73	45

PAJARITO CREEK NEAR HANLEY, N. MEX.

Location.—In sec. 26, T. 11 N., R. 28 E., 2 miles north of Hanley; one-fourth mile above mouth of Vigil Creek, the nearest tributary.

Records available.—August 30, 1911, to May 20, 1912, when the station was discontinued.

Drainage area.—310 square miles.

Gage.—Automatic recording gage.

Channel.—Data too meager to determine.

Discharge measurements.—Made by floats during high water and by wading at ordinary stages.

Winter flow.—No data.

Diversions.—No water is diverted above the station, and therefore the records represent the natural run-off.

Accuracy.—Owing to the possibility of shift and the fact that the upper portion of the rating curve is determined by floats and slope measurements, no estimates of discharge have been made.

Cooperation.—Gage heights are furnished through the courtesy of Mr. V. W. Moore, Tucumcari, N. Mex.

Discharge measurements of Pajarito Creek near Hanley, N. Mex., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
Jan. 26	W. B. Freeman.....	<i>Feet.</i>	<i>Sec.-ft.</i>	Mar. 6	H. C. Hanson.....	<i>Feet.</i>	<i>Sec.-ft.</i>
29	.....do.....		Dry.	9	W. B. Freeman.....	1.28	4.2
Feb. 11	.....do.....		Dry.	9	Freeman and Hanson..	1.00	a. 7
Mar. 4	H. C. Hanson.....	1.75	33.5	17	W. B. Freeman.....	1.18	2.8
5	.....do.....	1.40	6.1				Dry.

a Estimated.

Daily gage height, in feet, of Pajarito Creek near Hanley, N. Mex., for 1912.

Date.	Gage height.	Date.	Gage height.	Date.	Gage height.
Mar. 1.....	1.18	Mar. 6.....	1.27	Mar. 11.....	0.95
2.....	1.85	7.....	1.30	12.....	1.00
3.....	1.82	8.....	1.27	13.....	.90
4.....	1.66	9.....	1.13	May 14.....	1.20
5.....	1.39	10.....	1.04	15.....	1.50

NOTE.—There are no flow on days for which gage heights are not given, Jan. 1 to May 20, except May 16 and 17, when there was a small discharge.

**PAJARITO CREEK BELOW MOUTH OF VIGIL CREEK, NEAR HANLEY,
N. MEX.**

Location.—In sec. 21, T. 11 N., R. 29 E., 2 miles below the mouth of Vigil Creek, about a mile above the mouth of Alamo Draw, 9 miles west of Tucumcari, and 3 miles northeast of Hanley, the nearest post office.

Records available.—May 21, 1912, to December 31, 1912.

Drainage area.—About 350 square miles.

Gage.—Automatic recording. This gage bears no determined relation to the gage installed above Vigil Creek.

Channel.—Shifting.

Discharge measurements.—Made from cable during high water and by wading at ordinary stages.

Winter flow.—No data.

Diversions.—Very little water is diverted above the station.

Accuracy.—On account of the erratic flow of the stream, sufficient data have not been collected to allow discharge estimates to be made.

Cooperation.—Gage heights are furnished by Mr. V. W. Moore, Tucumcari, N. Mex.

Discharge measurements of Pajarito Creek below Vigil Creek, near Hanley, N. Mex., in 1912.

Date.	Hydrographer.	Dis-charge.
Sept. 2	W. B. Freeman.....	Sec.-ft.
3	R. L. Cooper.....	Dry.
Oct. 17	Gray and Emerson.....	Dry.
Nov. 15	C. J. Emerson.....	Dry.

NOTE.—Point of zero flow about gage height of 2.4 feet.

Daily gage height, in feet, of Pajarito Creek below Vigil Creek, near Hanley, N. Mex., for 1912.

[Teo D. Martinez, observer.]

Day.	June.	July.	Aug.	Day.	June.	July.	Aug.	Day.	June.	July.	Aug.
1.....				11.....	4.25			21.....		2.6	3.0
2.....				12.....	^a 4.80			22.....			3.3
3.....				13.....	3.60			23.....			2.8
4.....			3.0	14.....	2.00		3.3	24.....			2.7
5.....			2.3	15.....		3.3	4.0	25.....		3.3	2.5
6.....			3.0	16.....		2.5	3.2	26.....			
7.....			2.2	17.....		2.4	2.7	27.....			2.7
8.....				18.....		2.2	2.2	28.....			2.7
9.....				19.....		2.1	2.0	29.....			2.6
10.....	3.80			20.....		^b 6.5	2.0	30.....			2.5
								31.....			2.4

^a Maximum gage height 7.6 feet.

^b Maximum gage height 13.2 feet.

NOTE.—No flow on days for which gage heights are not given from May 21 to Dec. 31, 1912, except Sept. 10, when there was a small discharge.

UTE CREEK NEAR LOGAN, N. MEX.

Location.—Four miles above the mouth of Ute Creek, in the northeastern corner of T. 13 N., R. 32 E. No important tributaries enter within several miles of this station.

Records available.—August 12, 1904, to June 30, 1906; April 13, 1909, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Automatic recording gage installed August 1, 1911, to replace original staff gage used since 1904. Datum of recording gage different from that of staff gage.

Channel.—Very shifting.

Discharge measurements.—Made by wading at low stages and from cable at ordinary stages. Estimates of flood discharge are made by slope measurements and the use of Kutter's formula.

Winter flow.—Little backwater from ice during the winter months.

Diversions.—A small amount of water is diverted above the station for irrigation.

Accuracy.—Because of meager data no estimates of discharge could be made in 1912.

Discharge measurements of Ute Creek near Logan, N. Mex., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
Apr. 14	R. H. Fletcher.....	<i>Feet.</i>	<i>Sec.-ft.</i>	Oct. 18	Gray and Emerson.....	<i>Feet.</i>	<i>Sec.-ft.</i>
July 11	S. S. Carroll.....	0.70	0	Nov. 16	C. J. Emerson.....		Dry.
Sept. 2	R. L. Cooper.....		^a Dry.				Dry.

^a Zero flow occurred at gage height of 0.40 foot.

Daily gage height, in feet, of Ute Creek near Logan, N. Mex., for 1912.

[Samuel Ruff, observer.]

Day.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.70			0.80		0.68		
2	.70	1.10		.75		1.68		
3	.70	2.40		.70		2.50	0.92	
4	.70	1.90				.79	1.37	
5	.75	1.20			1.16	.79	1.04	
6	.80	1.30				.72	1.09	
7	.85	1.35				.58	.83	
8		1.40				.58	.68	
9		1.40		.70		.58	.60	
10					b 2.90	.58		
11		1.30			2.11	.52		
12		1.28			1.56			0.95
13		1.26		1.60	1.28			.87
14		1.24			1.10			.65
15		1.24		1.60	1.10			.57
16		1.22		1.52	1.10			.57
17		1.16		1.48	2.12			.51
18		1.12		1.42	2.42			.54
19		1.10		1.28	1.73			.53
20		1.08		1.21	1.52	.77	.72	.53
21		1.04		1.00	1.52	c 4.25	d 2.30	.50
22		1.00		.80	1.52	1.69	1.05	.52
23		.98		.80	1.95	.72	.95	.53
24		.92		.80	1.86	.60	.90	
25		.90	a 2.32		1.30	.48	.50	
26		.90	2.02		1.10	.47	.50	
27		.90	1.62		.90	.48		
28		.90	1.20		.74			
29		.90	.96		.70			
30		.90	.92		.69			
31								

a Maximum gage height 4.30 feet.

b Maximum gage height 7.35 feet.

c Maximum gage height 6 feet.

d Maximum gage height 9 feet.

NOTE.—No water flowing in the creek Jan. 8 to Mar. 1, 1912, Mar. 31 to Apr. 24, May 25 to June 4, June 6-9, July 12-19, July 28 to Aug. 2, Aug. 10-19, Aug. 27 to Sept. 11, and Sept. 24 to Dec. 31. Automatic gage out of order May 4-8, 10-12 and 14, 1912.

YAZOO RIVER BASIN.

TALLAHATCHIE RIVER AT BATESVILLE, MISS.

Location.—At the county highway bridge 1 mile west of Batesville and about 2 miles below the crossing of the Illinois Central Railroad.

Records available.—June 15, 1906, to December 31, 1912, except from August 1 to September 19, 1906.

Gage.—Standard chain gage attached to the bridge; datum unchanged.

Channel.—Bed is soft and liable to change.

Discharge measurements.—Made from the downstream side of the wagon bridge.

Floods.—The flood of April 20, 1911, reached a height of 18.9 feet above the gage zero.

Winter flow.—Ice does not affect the flow.

Accuracy.—Good. Discharge rating curve has remained fairly constant.

Cooperation.—Station maintained until February 29, 1912, in cooperation with the Tallahatchie Drainage Commission.

Daily gage height, in feet, of Tallahatchie River at Batesville, Miss., for 1912.

[J. S. Goff, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.	18.1	11.2	12.5	16.8	16.4	4.5	6.2	3.1	3.4	3.7	3.2	2.7
2.	17.4	11.4	12.7	16.8	17.1	4.3	6.6	3.0	3.1	3.2	3.4	7.2
3.	17.1	12.0	13.4	17.5	17.2	4.1	9.4	3.0	3.0	3.1	3.3	6.6
4.	17.1	12.5	13.6	17.6	16.9	4.2	9.2	2.9	3.0	3.0	3.2	6.1
5.	17.2	12.8	13.1	17.2	16.4	4.2	8.4	3.2	3.0	3.0	3.4	6.2
6.	16.7	12.7	14.6	16.7	15.8	4.5	7.6	7.0	2.8	2.8	3.6	8.2
7.	16.1	12.5	14.4	16.8	15.4	4.4	7.6	12.8	2.8	2.8	3.6	8.0
8.	15.4	11.8	15.5	16.8	14.5	4.1	7.0	8.0	2.8	2.8	3.5	8.2
9.	14.5	11.6	16.1	16.4	13.2	4.2	7.0	10.8	2.7	2.7	3.3	8.5
10.	13.6	9.0	16.6	15.8	11.5	4.2	7.1	11.3	2.8	2.8	3.2	9.0
11.	12.4	5.4	16.1	15.1	12.9	3.9	8.1	9.3	2.9	2.7	3.1	9.3
12.	12.1	5.7	17.0	14.6	12.4	3.7	8.1	9.0	2.7	2.6	3.1	9.8
13.	11.0	5.7	17.5	14.4	11.9	3.7	7.9	8.7	2.6	2.6	3.1	10.6
14.	10.1	6.1	17.0	14.1	11.6	3.7	7.1	8.7	2.6	2.5	3.1	11.1
15.	9.9	6.2	17.1	13.8	11.3	3.7	6.8	9.1	2.7	2.6	3.2	11.0
16.	9.6	6.1	16.7	13.3	10.7	3.5	4.4	8.6	6.6	2.5	3.0	11.1
17.	9.3	6.1	15.7	13.6	10.1	3.4	3.0	8.9	4.2	2.5	3.0	10.6
18.	9.1	5.7	15.8	14.2	9.2	3.3	4.0	8.6	5.0	2.6	2.9	13.6
19.	10.1	5.6	15.8	11.5	8.0	3.9	3.9	8.0	6.5	5.8	2.9	6.6
20.	9.2	5.6	15.8	10.7	7.3	4.3	3.9	7.0	6.5	5.7	3.0	6.0
21.	8.7	9.1	15.7	10.1	6.5	4.0	4.3	5.5	6.3	5.2	2.9	5.6
22.	8.3	9.5	15.5	10.6	6.0	3.8	4.9	4.7	6.6	4.3	2.9	5.5
23.	8.1	9.6	15.1	11.7	5.6	3.7	5.5	4.3	6.8	4.9	2.9	6.4
24.	8.8	9.7	16.8	11.8	5.3	3.6	5.6	4.2	6.8	4.6	2.9	9.1
25.	9.0	10.7	17.2	13.4	5.1	3.7	4.9	5.0	6.8	4.3	3.0	9.0
26.	8.8	12.6	16.5	13.0	5.8	3.6	4.5	5.3	5.7	3.8	2.9	8.8
27.	8.7	11.6	15.9	14.4	4.9	3.6	3.9	5.1	4.6	3.8	2.8	8.8
28.	8.5	13.6	17.5	16.4	5.3	4.4	3.6	4.6	4.1	3.8	2.8	9.1
29.	13.2	13.0	17.8	16.7	5.1	3.8	3.3	4.0	3.6	3.7	2.8	9.8
30.	12.3	.....	17.5	16.6	5.2	4.8	3.4	3.8	3.5	3.6	2.9	10.9
31.	11.8	.....	17.2	.....	4.8	.....	3.2	3.5	.....	3.2	.....	10.6

Daily discharge, in second-feet, of Tallahatchie River at Batesville, Miss., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.	13,000	4,750	5,820	11,000	10,400	1,140	1,820	645	747	849	679	517
2.	11,900	4,900	6,000	11,000	11,400	1,060	2,000	613	645	679	747	2,290
3.	11,400	5,390	6,640	12,000	11,600	991	3,500	613	613	645	713	2,000
4.	11,400	5,820	6,840	12,200	11,100	1,030	3,380	581	613	613	679	1,770
5.	11,609	6,090	6,360	11,600	10,400	1,030	2,920	679	613	613	747	1,820
6.	10,800	6,000	7,950	10,800	9,480	1,140	2,490	2,190	549	549	815	2,800
7.	9,910	5,820	7,720	11,000	8,930	1,100	2,490	6,090	549	549	815	2,700
8.	8,930	5,220	9,060	11,000	7,830	1,140	2,190	2,700	549	549	781	2,800
9.	7,830	5,060	9,910	10,400	6,460	1,030	2,190	4,460	517	517	713	2,970
10.	6,840	3,260	10,700	9,480	4,980	1,030	2,240	4,820	549	549	679	3,260
11.	5,730	1,480	9,910	8,550	6,180	919	2,750	3,440	581	517	645	3,440
12.	5,480	1,600	11,300	7,950	6,640	849	2,750	3,260	517	485	645	3,750
13.	4,600	1,600	12,000	7,720	5,300	849	2,650	3,080	485	485	645	4,320
14.	3,970	1,770	11,300	7,390	5,030	849	2,240	3,080	485	485	645	4,680
15.	3,830	1,820	11,400	7,060	4,820	849	2,090	3,320	517	485	679	4,800
16.	3,640	1,770	10,800	6,550	4,390	781	1,100	3,020	2,000	455	613	4,680
17.	3,440	1,770	9,340	6,840	3,970	747	613	3,200	1,030	455	613	4,320
18.	3,320	1,600	9,480	7,500	3,380	713	955	3,020	1,320	485	581	6,840
19.	3,970	1,560	9,480	4,980	2,700	919	919	2,700	1,950	1,650	581	2,000
20.	3,380	1,560	9,480	4,390	2,340	1,060	919	2,190	1,950	1,600	613	1,730
21.	3,080	3,320	9,340	3,970	1,950	955	1,060	1,520	1,860	1,400	581	1,560
22.	2,860	3,570	8,060	4,320	1,730	833	1,290	1,210	2,000	1,060	581	1,520
23.	2,750	3,640	8,550	5,140	1,560	849	1,520	1,060	2,090	1,290	581	1,910
24.	3,140	3,700	11,000	5,220	1,440	815	1,560	1,030	2,090	1,170	581	3,320
25.	3,260	4,390	11,600	6,640	1,360	849	1,290	1,320	2,090	1,060	613	3,260
26.	3,140	5,910	10,500	6,270	1,650	815	1,140	1,440	1,600	833	581	3,140
27.	3,080	5,060	9,620	7,720	1,290	815	919	1,160	1,170	833	549	3,140
28.	2,970	6,840	12,000	10,400	1,440	1,100	815	1,370	991	833	549	3,320
29.	6,460	6,270	12,500	10,800	1,360	833	713	955	815	849	549	3,760
30.	6,090	.....	12,000	10,700	1,400	1,250	747	883	781	815	581	4,530
31.	5,220	.....	11,600	.....	1,250	.....	679	781	.....	679	.....	4,320

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of Tallahatchie River at Batesville, Miss., for 1912.

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
January.....	13,000	2,750	6,030	A.
February.....	6,840	1,480	3,850	A.
March.....	12,500	5,820	9,650	A.
April.....	12,200	3,970	8,350	A.
May.....	11,600	1,250	4,960	A.
June.....	1,250	713	948	A.
July.....	3,500	613	1,740	A.
August.....	6,090	581	2,140	A.
September.....	2,090	485	1,080	A.
October.....	1,650	455	779	A.
November.....	815	549	646	A.
December.....	6,840	517	3,130	A.
The year.....	13,000	455	3,620	

TALLAHATCHIE RIVER AT PHILIPP, MISS.

Location.—At the Yazoo & Mississippi Valley Railroad bridge at Philipp, Miss.

Records available.—September 6, 1908, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Vertical timber attached to a bridge pier; datum unchanged.

Channel.—Fairly permanent and good for discharge measurements at all but high flood stages, when some water, difficult to measure, passes through distant bayous.

Discharge measurements.—Made from the railroad bridge.

Floods.—The flood of April 28, 1911, reached a height of 138.6 feet above the gage datum which is mean sea level.

Winter flow.—Ice does not affect the flow.

Accuracy.—Records fair.

Cooperation.—Station maintained until February 29, 1912, in cooperation with the Tallahatchie Drainage Commission.

Daily gage height, in feet, of Tallahatchie River at Philipp, Miss., for 1912.

[J. P. Mahoney, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	137.2	135.0	128.8	138.6	137.3	132.0	118.9	114.3	115.8	115.4	114.2	113.0
2.....	137.5	134.9	129.0	138.7	137.2	131.1	118.8	114.2	115.3	114.8	114.0	113.4
3.....	137.9	134.8	129.4	138.8	137.2	129.8	119.2	114.0	114.9	114.3	113.9	114.6
4.....	138.2	134.6	129.6	138.9	137.2	128.5	120.0	114.0	114.7	113.9	113.9	116.9
5.....	138.4	134.3	130.0	139.0	137.2	127.0	120.8	113.9	114.4	113.6	113.9	118.5
6.....	138.5	134.1	130.6	139.0	137.3	125.4	121.3	114.0	114.0	113.5	113.9	119.5
7.....	138.5	133.9	131.0	139.0	137.4	123.8	121.6	114.0	113.8	113.4	114.0	120.4
8.....	138.5	133.7	131.6	139.0	137.4	122.5	121.6	114.0	113.6	113.3	114.2	120.8
9.....	138.5	133.5	132.1	138.8	137.4	121.4	121.4	115.0	113.6	113.2	114.2	121.2
10.....	138.4	133.4	132.6	138.8	137.4	120.4	121.1	118.2	113.5	113.1	114.4	121.6
11.....	138.3	133.2	133.0	138.7	137.5	119.5	120.8	120.2	113.5	113.0	114.3	122.0
12.....	138.2	133.0	133.6	138.6	137.5	118.7	120.5	121.2	113.4	112.9	114.2	122.2
13.....	138.2	132.9	134.0	138.6	137.4	118.0	120.6	121.8	113.3	112.8	114.0	122.4
14.....	138.0	132.7	134.6	138.4	137.4	117.6	120.6	122.2	113.2	112.8	113.8	122.6
15.....	137.9	132.4	135.1	138.4	137.4	117.2	120.6	122.4	113.2	112.8	113.7	122.8
16.....	137.6	132.0	135.5	138.3	137.3	116.8	120.1	122.5	113.2	112.7	113.7	122.9
17.....	137.5	131.7	135.9	138.4	137.2	116.4	119.2	122.5	113.6	112.7	113.6	122.9
18.....	137.4	131.2	136.2	138.4	137.0	116.4	118.1	122.5	114.6	112.7	113.4	122.8
19.....	137.3	130.5	136.6	138.4	136.8	116.3	117.0	122.5	115.2	112.0	113.3	122.4
20.....	137.0	129.7	136.7	138.3	136.8	116.4	116.4	122.3	115.8	113.5	113.2	121.9
21.....	136.9	129.3	137.0	138.3	136.6	116.8	116.0	121.8	116.9	114.8	113.2	121.1
22.....	136.8	128.7	137.2	138.2	136.4	116.8	115.8	121.0	117.9	115.9	113.1	120.0
23.....	136.7	128.5	137.4	138.0	136.2	116.8	115.8	119.8	119.0	116.4	113.1	119.0
24.....	136.6	127.1	137.6	137.9	136.0	116.8	115.8	118.5	119.0	116.5	113.1	119.6
25.....	136.4	128.0	137.8	137.8	135.6	116.9	116.0	117.2	118.8	116.2	113.0	121.2
26.....	136.2	128.3	137.8	137.8	135.2	116.9	115.8	116.6	118.8	116.1	113.0	122.0
27.....	136.0	128.4	137.9	137.6	134.9	116.9	115.6	116.2	118.4	115.8	113.0	122.4
28.....	135.8	128.5	138.1	137.5	134.5	116.9	115.2	116.2	117.7	115.6	113.0	122.8
29.....	135.6	128.6	138.2	137.5	134.1	117.0	114.8	116.4	116.9	115.2	113.0	123.2
30.....	135.4	.....	138.3	137.4	133.6	119.0	114.4	116.5	116.0	115.0	113.0	123.8
31.....	135.3	.....	138.4	.....	132.8	.....	114.4	116.2	.....	114.6	.....	124.0

Daily discharge, in second-feet, of Tallahatchie River at Philipp, Miss., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	22,000	16,500	9,280	25,600	22,300	11,400	3,410	1,470	1,980	1,840	1,440	1,130
2.....	22,803	16,300	9,400	25,900	22,000	10,700	3,360	1,440	1,800	1,630	1,380	1,220
3.....	23,800	16,000	9,640	26,100	22,000	9,880	3,570	1,380	1,660	1,470	1,350	1,500
4.....	24,600	15,500	9,760	28,400	22,000	9,100	4,000	1,380	1,600	1,350	1,350	2,440
5.....	25,100	14,800	10,000	28,600	22,000	8,200	4,480	1,350	1,500	1,270	1,350	3,200
6.....	25,400	14,300	10,400	28,600	22,300	7,240	4,780	1,380	1,380	1,250	1,350	3,730
7.....	25,400	13,900	10,600	28,600	22,500	6,280	4,960	1,380	1,320	1,220	1,380	4,240
8.....	25,400	13,500	11,000	28,600	22,500	5,500	4,960	1,380	1,270	1,200	1,440	4,480
9.....	25,400	13,200	11,500	26,100	22,500	4,840	4,840	1,700	1,270	1,170	1,440	4,720
10.....	25,100	13,000	12,000	26,100	22,500	4,240	4,660	3,040	1,250	1,150	1,500	4,960
11.....	24,800	12,700	12,500	25,900	22,800	3,730	4,480	4,120	1,250	1,130	1,470	5,200
12.....	24,600	12,500	13,400	25,600	22,800	3,300	4,300	4,720	1,220	1,110	1,440	5,320
13.....	24,600	12,300	14,100	25,600	22,500	2,940	4,360	5,080	1,200	1,080	1,380	5,440
14.....	24,000	12,100	15,500	25,100	22,500	2,750	4,360	5,320	1,170	1,080	1,320	5,560
15.....	23,800	11,800	16,700	25,100	22,500	2,570	4,360	5,440	1,170	1,090	1,300	5,680
16.....	23,000	11,400	17,700	24,800	22,300	2,380	4,060	5,500	1,170	1,070	1,300	5,740
17.....	22,800	11,100	18,700	25,100	22,000	2,220	3,570	5,500	1,270	1,070	1,270	5,740
18.....	22,500	10,700	19,500	25,100	21,500	2,220	2,990	5,500	1,560	1,070	1,220	5,680
19.....	22,300	10,300	20,500	25,100	21,000	2,180	2,480	5,500	1,770	940	1,200	5,440
20.....	21,500	9,820	20,700	24,800	21,000	2,220	2,220	5,380	1,980	1,250	1,170	5,140
21.....	21,200	9,580	21,500	24,800	20,500	2,390	2,060	5,080	2,440	1,630	1,170	4,660
22.....	21,000	9,220	22,000	24,600	20,000	2,390	1,980	4,600	2,890	2,020	1,150	4,000
23.....	20,700	9,100	22,500	24,000	19,500	2,390	1,980	3,590	3,460	2,220	1,150	3,460
24.....	20,500	8,260	23,000	23,800	19,000	2,390	1,980	3,200	3,460	2,260	1,150	3,780
25.....	20,000	8,800	23,500	23,500	18,000	2,440	2,060	3,570	3,360	2,140	1,130	4,720
26.....	19,500	8,980	23,500	23,500	17,000	2,440	1,980	2,300	3,360	2,100	1,130	5,200
27.....	19,000	9,040	23,800	23,000	16,300	2,440	1,910	2,140	3,150	1,980	1,130	5,440
28.....	18,500	9,100	24,300	22,800	15,300	2,440	1,770	2,140	2,800	1,910	1,130	5,680
29.....	18,000	9,160	24,600	22,800	14,300	2,480	1,630	2,220	2,440	1,770	1,130	5,920
30.....	17,500	.....	24,800	22,500	13,400	3,460	1,500	2,260	2,060	1,700	1,130	6,280
31.....	17,200	.....	25,100	.....	12,200	.....	1,500	2,140	.....	1,500	.....	6,400

NOTE.—Daily discharge determined from a fairly well defined rating curve.

Monthly discharge of Tallahatchie River at Philipp, Miss., for 1912.

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
January.....	25,400	17,200	22,300	B.
February.....	16,500	8,260	11,800	B.
March.....	25,100	9,280	17,100	B.
April.....	28,600	22,500	25,300	B.
May.....	22,800	12,200	20,300	B.
June.....	11,400	2,180	4,310	B.
July.....	4,960	1,500	3,240	B.
August.....	5,500	1,350	3,240	B.
September.....	3,460	1,170	1,940	A.
October.....	2,260	940	1,480	A.
November.....	1,500	1,130	1,280	A.
December.....	6,400	1,130	4,590	B.
The year.....	28,600	940	9,750	

YAZOO RIVER AT GREENWOOD, MISS.

Location.—At the highway bridge in the city of Greenwood, about 1 mile below the mouth of Yalobusha River.

Records available.—January 1, 1908, to December 31, 1912. The 1908 gage heights prior to July 15, when the station was established, are from the United States Weather Bureau, whose records began November 1, 1904.

Drainage area.—Not measured.

Gage.—Standard chain gage attached to the highway bridge. The datum, which is sea level, has not been changed. The datum of the United States Weather Bureau gage is 92.5 feet above sea level.

Channel.—Excellent for measurements, and appears to be practically permanent.

Discharge measurements.—Made from the downstream side of the highway bridge.

Floods.—The flood of May 2, 1911, reached a height of 128.9 feet above the gage datum. (On Apr. 7, 1912, the height was 130.7 feet.)

Point of zero flow.—Has not been determined.

Winter flow.—Ice does not affect the flow.

Artificial control.—None.

Accuracy.—Good. Discharge rating affected by backwater from Mississippi River.

Cooperation.—Station maintained, until Feb. 29, 1912, in cooperation with the Tallahatchie Drainage Commission.

Discharge measurements of Yazoo River at Greenwood, Miss., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
Apr. 5	Warren E. Hall.....	Feet. 130.64	Sec.-ft. 39,100
Sept. 25	do.....	101.16	5,070

Daily gage height, in feet, of Yazoo River at Greenwood, Miss., for 1912.

[W. T. Davis, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	124.0	122.6	114.8	129.9	128.0	119.8	102.6	96.85	97.4	97.9	96.35	94.65
2.....	124.8	122.3	114.8	130.2	127.7	119.0	102.7	96.65	97.2	97.2	96.05	95.1
3.....	125.6	122.0	114.8	130.3	127.5	118.2	102.4	96.55	96.8	96.65	95.8	96.45
4.....	126.5	121.6	115.0	130.5	127.2	117.2	102.5	96.7	96.5	96.2	95.7	98.5
5.....	127.4	121.4	115.1	130.6	127.2	116.1	102.6	96.4	96.25	95.85	95.6	101.2
6.....	128.0	121.1	115.9	130.7	127.3	115.0	102.8	96.25	96.0	95.55	95.55	103.5
7.....	128.6	120.8	116.3	130.7	127.5	114.0	103.3	96.2	95.8	95.35	95.5	104.8
8.....	128.9	120.6	116.6	130.6	127.5	113.0	103.6	96.1	95.6	95.2	95.55	104.9
9.....	129.1	120.4	117.2	130.5	127.4	112.0	103.6	96.15	95.45	95.1	95.6	105.1
10.....	129.1	120.2	117.5	130.3	127.4	110.9	103.2	96.8	95.35	95.0	95.7	105.4
11.....	129.1	119.9	117.8	130.2	127.4	109.8	102.8	99.0	95.4	94.9	95.75	105.8
12.....	129.0	119.6	118.6	130.0	127.3	108.8	102.4	100.8	95.35	94.85	95.7	106.3
13.....	128.8	119.2	119.3	129.8	127.2	107.7	102.0	101.8	95.15	94.75	95.6	106.7
14.....	128.5	118.8	119.8	129.6	127.0	106.8	102.0	102.4	95.1	94.7	95.45	107.0
15.....	128.3	118.4	120.4	129.5	126.9	105.8	102.1	102.7	95.05	94.65	95.3	107.2
16.....	127.9	117.9	121.0	129.7	126.7	104.8	102.0	102.9	95.35	94.6	95.2	107.4
17.....	127.6	117.4	121.5	129.4	126.5	103.9	101.8	102.9	96.0	94.55	95.1	107.5
18.....	127.2	116.8	121.8	130.0	126.3	103.0	101.3	103.0	97.2	94.55	95.1	107.3
19.....	127.0	116.2	122.2	129.9	126.0	102.2	101.6	102.9	97.5	94.75	95.0	106.8
20.....	126.6	115.5	122.6	129.9	125.7	101.6	102.1	102.9	97.5	94.95	94.9	106.2
21.....	126.2	115.6	123.0	129.9	125.3	101.0	101.4	102.8	97.7	95.95	94.85	105.9
22.....	125.8	115.7	123.4	129.8	124.9	100.6	100.6	102.4	98.8	96.7	94.8	104.5
23.....	125.4	115.3	123.9	129.6	124.4	100.1	100.1	101.8	100.8	97.8	94.75	104.0
24.....	125.0	115.0	124.6	129.4	123.9	99.8	99.8	101.1	101.4	98.8	94.7	104.9
25.....	124.6	114.8	125.2	129.1	123.4	99.6	99.4	100.1	101.1	99.0	94.65	105.8
26.....	124.2	115.0	125.6	128.8	122.9	99.6	99.0	100.1	100.7	98.6	94.65	106.2
27.....	123.8	115.1	126.0	128.6	122.4	99.7	98.6	98.4	100.4	98.2	94.65	106.5
28.....	123.5	115.0	126.5	128.4	121.9	99.7	98.2	98.0	99.9	97.9	94.7	106.9
29.....	123.5	114.9	127.3	128.4	121.6	100.5	97.8	97.8	99.3	97.5	94.7	107.2
30.....	123.4	.....	127.8	128.4	121.0	101.9	97.4	97.7	98.6	97.1	94.65	107.9
31.....	123.0	.....	128.4	.....	120.4	.....	97.1	97.6	.....	96.7	.....	108.5

Daily discharge, in second-feet, of Yazoo River at Greenwood, Miss., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	29,000	27,000	17,300	37,800	35,000	23,300	6,370	2,870	3,170	3,440	2,590	1,720
2.....	30,200	26,600	17,300	38,300	34,600	22,300	6,440	2,760	3,060	3,060	2,430	1,950
3.....	31,400	26,200	17,300	38,400	34,200	21,300	6,230	2,700	2,840	2,760	2,300	2,650
4.....	32,800	25,700	17,500	38,800	33,800	20,000	6,300	2,780	2,680	2,510	2,250	3,800
5.....	34,100	25,400	17,600	38,900	33,800	18,700	6,370	2,620	2,540	2,320	2,200	5,430
6.....	35,000	25,000	18,500	39,000	34,000	17,500	6,510	2,540	2,400	2,180	2,180	7,000
7.....	35,900	24,600	19,000	39,000	34,200	16,400	6,860	2,510	2,300	2,080	2,150	7,950
8.....	36,400	24,400	19,300	38,900	34,200	15,300	7,070	2,460	2,200	2,000	2,180	8,020
9.....	36,600	24,100	20,000	38,800	34,100	14,300	7,070	2,480	2,120	1,950	2,200	8,180
10.....	36,600	23,900	20,400	38,400	34,100	13,200	6,790	2,480	2,080	1,900	2,250	8,420
11.....	36,600	23,500	20,800	38,300	34,100	12,100	6,510	4,100	2,100	1,850	2,280	8,740
12.....	36,500	23,100	21,800	38,000	34,000	11,200	6,230	5,180	2,080	1,820	2,250	9,140
13.....	36,200	22,600	22,700	37,700	33,800	10,300	5,950	5,820	1,980	1,780	2,200	9,460
14.....	35,800	22,000	23,300	37,400	33,500	9,540	5,950	6,230	1,950	1,750	2,120	9,700
15.....	35,400	21,500	24,100	37,400	33,400	8,740	6,020	6,440	1,920	1,720	2,050	9,860
16.....	34,800	20,900	24,900	37,600	33,000	7,950	5,950	6,580	2,080	1,700	2,000	10,000
17.....	34,400	20,300	25,600	38,600	32,800	7,280	5,820	6,580	2,400	1,680	1,950	10,100
18.....	33,800	19,600	25,900	38,000	32,400	6,650	5,500	6,650	3,060	1,680	1,950	9,940
19.....	33,500	18,800	26,500	37,800	32,000	6,090	5,690	6,580	3,220	1,780	1,900	9,540
20.....	32,900	18,000	27,000	37,800	31,600	5,690	5,020	6,580	3,220	1,880	1,850	9,060
21.....	32,300	18,200	27,600	37,800	31,000	5,300	5,560	6,510	3,340	2,380	1,820	8,420
22.....	31,700	18,300	28,200	37,700	30,400	5,060	5,060	6,230	3,980	2,780	1,800	7,720
23.....	31,100	17,800	28,900	37,400	29,600	4,760	4,760	5,820	5,180	3,390	1,780	7,350
24.....	30,500	17,500	29,900	37,100	28,900	4,580	4,580	5,360	5,560	3,980	1,750	8,020
25.....	29,900	17,300	30,800	36,600	28,200	4,460	4,340	4,760	5,360	4,100	1,720	8,740
26.....	29,300	17,500	31,400	36,200	27,500	4,460	4,100	4,160	5,120	3,860	1,720	9,060
27.....	28,700	17,600	32,000	35,900	26,800	4,520	3,860	3,740	4,940	3,620	1,720	9,300
28.....	28,300	17,500	32,800	35,600	26,100	4,520	3,620	3,500	4,640	3,440	1,750	9,620
29.....	28,300	17,400	34,000	35,600	25,700	5,000	3,390	3,390	4,280	3,220	1,750	9,860
30.....	28,200	.....	34,700	35,600	24,900	5,880	3,170	3,340	3,860	3,000	1,720	10,400
31.....	27,600	.....	35,600	.....	24,100	.....	3,000	3,280	.....	2,780	.....	11,000

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of Yazoo River at Greenwood, Miss., for 1912.

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
January.....	36,600	27,600	32,700	A.
February.....	27,000	17,300	21,500	A.
March.....	35,600	17,300	24,900	A.
April.....	39,000	35,600	37,700	A.
May.....	35,000	24,100	31,500	A.
June.....	23,300	4,460	10,500	B.
July.....	7,070	3,000	5,520	A.
August.....	6,650	2,460	4,450	A.
September.....	5,560	1,920	3,190	A.
October.....	4,100	1,680	2,520	A.
November.....	2,590	1,720	2,030	A.
December.....	11,000	1,720	8,070	A.
The year.....	39,000	1,680	15,400	

COLDWATER RIVER AT SAVAGE, MISS.

Location.—At the Yazoo & Mississippi Valley Railroad bridge at Savage, Miss., about 3 miles above the mouth of Arkabutla Creek.

Records available.—October 1, 1908, to October 31, 1912.

Drainage area.—Not measured.

Gage.—Vertical timber in two sections on the left bank just below the bridge. The datum is unchanged.

Channel.—Good and practically permanent. There is some overflow water, difficult to measure, at high floods.

Discharge measurements.—Made from the railroad bridge.

Floods.—The flood of April 18, 1910, reached a height of 187.0 feet above the gage datum which is mean sea level.

Winter flow.—Ice does not affect the flow.

Accuracy.—Fair.

Cooperation.—Station maintained until February 29, 1912, in cooperation with the Tallahatchie Drainage Commission.

The following discharge measurement was made by Warren E. Hall:

September 27, 1912: Gage height, 168.70 feet; discharge, 299 second-feet.

Daily gage height, in feet, of Coldwater River at Savage, Miss., for 1912.

[David J. Hill, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1.	186.0	180.9	184.2	185.7	186.9	167.1	172.0	166.8	168.1	168.0
2.	186.1	181.3	183.9	185.9	186.6	168.0	172.2	166.8	167.4	167.6
3.	186.0	182.0	183.3	186.0	186.0	170.1	172.3	166.8	167.0	166.8
4.	185.9	182.5	183.0	186.1	185.5	169.7	172.5	166.8	166.6	166.7
5.	185.0	182.3	182.7	186.0	184.8	169.4	172.5	166.8	166.6	166.5
6.	184.5	181.4	183.1	185.7	183.2	169.3	171.0	166.8	166.5	166.5
7.	184.0	180.5	183.6	185.2	181.3	168.7	170.9	166.8	166.5	166.5
8.	183.3	178.5	184.0	184.9	181.2	168.7	172.0	168.0	166.5	166.5
9.	183.1	176.0	184.5	184.6	181.0	167.3	174.0	170.0	166.5	166.5
10.	182.6	173.4	186.2	184.4	180.9	167.0	175.0	176.3	166.4	166.5
11.	179.4	171.5	186.2	184.2	180.8	167.0	175.1	176.8	166.4	166.5
12.	179.4	170.9	186.1	184.2	181.0	166.9	174.9	177.2	166.4	166.5
13.	179.3	170.2	186.0	183.9	181.2	166.8	171.5	177.0	166.3	166.5
14.	179.0	169.8	185.4	183.4	182.4	166.8	170.0	176.3	166.2	166.5
15.	179.8	169.5	185.7	183.2	181.7	167.7	168.9	173.4	166.2	166.5
16.	179.5	169.2	186.0	182.2	181.0	167.8	168.4	170.8	166.2	166.5
17.	179.8	169.0	186.1	182.8	177.0	167.8	168.0	170.8	166.4	166.5
18.	180.0	169.0	186.0	182.9	176.4	167.9	167.5	170.7	170.4	166.5
19.	181.2	169.0	185.8	182.5	176.0	168.0	167.3	170.4	170.8	166.5
20.	181.3	168.9	185.3	182.2	175.7	170.0	167.3	170.0	171.8	166.5
21.	181.5	169.0	184.9	181.8	172.3	172.0	167.0	169.8	172.6	166.5
22.	181.9	177.2	184.3	181.3	170.7	170.3	167.0	168.4	172.0	166.8
23.	182.3	179.5	184.0	181.0	169.4	170.2	167.0	168.1	171.3	166.9
24.	182.9	181.0	184.6	180.5	169.3	170.4	167.0	167.7	171.8	166.9
25.	183.0	183.7	185.8	180.5	168.2	170.6	167.0	168.4	171.8	166.8
26.	182.4	184.4	186.7	176.8	168.0	170.7	167.0	171.8	171.8	166.6
27.	181.8	184.8	186.5	179.6	169.7	170.7	167.0	171.8	170.5	166.4
28.	180.5	184.9	186.0	182.0	170.0	170.9	167.0	170.3	170.3	166.2
29.	180.0	184.5	185.9	184.3	169.7	171.4	167.0	170.2	169.3	166.2
30.	180.0	.....	185.7	184.6	168.9	171.6	167.0	170.0	168.2	166.0
31.	180.3	.....	185.3	.....	168.2	.....	167.0	169.4	.....	166.0

Daily discharge, in second-feet, of Coldwater River at Savage, Miss., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1.....	10,400	3,480	6,410	9,420	14,500	175	685	153	257	248
2.....	10,800	3,750	6,040	10,000	13,000	248	713	153	199	215
3.....	10,400	4,250	5,390	10,400	10,400	454	727	153	167	153
4.....	10,000	4,650	5,100	10,800	8,870	410	755	153	139	146
5.....	7,700	4,490	4,830	10,400	7,330	380	755	153	139	132
6.....	6,830	3,820	5,190	9,420	5,290	370	558	153	132	132
7.....	6,180	3,240	5,700	8,120	3,750	311	546	153	132	132
8.....	5,390	2,250	6,160	7,510	3,680	311	685	248	132	132
9.....	5,190	1,430	6,830	6,990	3,540	191	1,000	443	132	132
10.....	4,740	894	11,200	6,680	3,480	167	1,200	1,510	125	132
11.....	2,650	619	11,200	6,410	3,420	167	1,220	1,650	125	132
12.....	2,650	546	10,800	6,410	3,540	160	1,180	1,770	125	132
13.....	2,600	465	10,400	6,040	3,680	153	619	1,710	118	132
14.....	2,460	421	8,600	5,490	4,570	153	443	1,510	112	132
15.....	2,850	390	9,420	5,290	4,030	223	330	894	112	132
16.....	2,690	360	10,400	4,410	3,540	231	284	534	112	132
17.....	2,850	340	10,800	4,920	1,710	231	248	534	125	132
18.....	2,950	340	10,400	5,010	1,540	239	207	522	487	132
19.....	3,680	340	9,720	4,650	1,430	248	191	487	534	132
20.....	3,750	330	8,350	4,410	1,360	443	191	443	658	132
21.....	3,890	340	7,510	4,100	727	685	167	421	770	132
22.....	4,170	1,770	6,540	3,750	522	476	167	284	685	153
23.....	4,490	2,690	6,160	3,540	380	465	167	257	504	160
24.....	5,010	3,540	6,990	3,240	370	487	167	223	658	160
25.....	5,100	5,810	9,720	2,950	266	510	167	284	658	153
26.....	4,570	6,680	13,500	1,650	248	522	167	658	658	139
27.....	4,100	7,330	12,600	2,740	410	522	167	658	498	125
28.....	3,240	7,510	10,400	4,250	443	546	167	476	476	112
29.....	2,950	6,830	10,000	6,540	410	606	167	465	370	112
30.....	2,950	.....	9,420	6,990	330	632	167	443	266	100
31.....	3,120	.....	8,350	.....	266	.....	167	380	.....	100

NOTE.—Daily discharge determined from a rating curve fairly well defined below 7,000 second-feet.

Monthly discharge of Coldwater River at Savage, Miss., for 1912.

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
January.....	10,800	2,460	4,850	B.
February.....	7,510	330	2,720	B.
March.....	13,500	4,830	8,520	B.
April.....	10,800	1,650	6,080	B.
May.....	14,500	248	3,450	B.
June.....	685	153	357	B.
July.....	1,220	167	464	B.
August.....	1,770	153	577	B.
September.....	770	112	323	B.
October.....	248	100	139	B.

YALOBUSHA RIVER AT GRENADA, MISS.

Location.—At the highway bridge in the western part of Grenada, about half a mile below the Illinois Central Railroad bridge and three-quarters of a mile below the mouth of Batawpan Bogue.

Records available.—June 14, 1906, to November 2, 1906, and July 7, 1908, to March 2, 1912.

Drainage area.—Not measured.

Gage.—Standard chain gage attached to the wagon bridge. After having been twice stolen the chain has for some time been carried to and from the station by the observer. The datum has not been changed.

Channel.—Mostly in soft rock or firm clay.

Discharge measurements.—Made from the downstream side of the wagon bridge.

Floods.—The flood of July 10, 1910, reached a height of 25.7 feet above the gage datum.

Winter flow.—Ice does not affect the flow.

Accuracy.—Fair; there has been considerable change in the discharge rating curve.

Cooperation.—Station maintained in cooperation with the Tallahatchie Drainage Commission.

Daily gage height, in feet, and discharge, in second-feet, of Yalobusha River at Grenada, Miss., for 1912.

[J. E. Caldwell, observer.]

Day.	January.		February.		March.		Day.	January.		February.		March.	
	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.		Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.
1....	24.9	16,200	8.1	1,940	12.0	3,950	16....	11.4	3,590	5.3	940	.....	.....
2....	24.6	15,800	9.0	2,300	11.8	3,830	17....	11.0	3,350	5.0	850	.....	.....
3....	24.4	15,500	11.1	3,410	.....	.....	18....	10.8	3,240	5.0	850	.....	.....
4....	23.9	14,800	12.2	4,070	.....	.....	19....	10.3	2,960	4.8	800	.....	.....
5....	23.0	13,500	11.0	3,350	.....	.....	20....	9.0	2,300	4.6	750	.....	.....
6....	21.5	11,500	9.9	2,750	.....	.....	21....	8.8	2,220	6.4	1,290	.....	.....
7....	20.1	9,910	8.8	2,220	.....	.....	22....	7.9	1,860	9.2	2,400	.....	.....
8....	19.0	8,900	8.0	1,900	.....	.....	23....	7.5	1,700	11.8	3,830	.....	.....
9....	17.9	8,020	7.4	1,660	.....	.....	24....	7.0	1,500	13.2	4,680	.....	.....
10....	15.2	6,040	7.0	1,500	.....	.....	25....	6.0	1,150	14.9	5,830	.....	.....
11....	13.8	5,070	6.7	1,400	.....	.....	26....	5.4	970	15.2	6,040	.....	.....
12....	13.3	4,740	6.4	1,290	.....	.....	27....	5.3	940	13.9	5,140	.....	.....
13....	13.0	4,550	6.0	1,150	.....	.....	28....	5.0	850	13.2	4,680	.....	.....
14....	12.4	4,190	5.8	1,090	.....	.....	29....	4.6	750	12.4	4,190	.....	.....
15....	12.0	3,950	5.6	1,030	.....	.....	30....	6.3	1,260	.....	.....	.....	.....
							31....	7.0	1,500	.....	.....	.....	.....

NOTE.—Daily discharge determined from a fairly well defined rating curve.

Monthly discharge of Yalobusha River at Grenada, Miss., for 1912.

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
January.....	16,200	750	5,570	B.
February.....	6,040	750	2,530	B.

SUNFLOWER RIVER NEAR RULEVILLE, MISS.

Location.—At the new iron wagon bridge 3 miles southwest of Ruleville; just below the point at which Dougherty Bayou connects with the river.

Records available.—January 1, 1909, to March 6, 1912.

Drainage area.—Not measured.

Gage.—Vertical timber in two sections, set at sea level datum; datum unchanged.

Channel.—Very sluggish current at low stage; surface height is greatly affected by the stage of the Mississippi River.

Discharge measurements.—Made from the wagon bridge.

Floods.—The flood of April 21, 1911, reached a height of 117.5 feet above the gage datum (mean sea level).

Winter flow.—Ice does not affect the flow.

Accuracy.—No discharge estimates have been made.

Cooperation.—Station maintained in cooperation with the Tallahatchie Drainage Commission.

Daily gage height, in feet, of Sunflower River near Ruleville, Miss., for 1912.

[W. E. McMathe, observer.]

Day.	Jan.	Feb.	Mar.	Day.	Jan.	Feb.	Mar.	Day.	Jan.	Feb.	Mar.
1.....	117.4	102.2	101.3	11.....	106.4	99.5	.....	21.....	103.6	99.2	.....
2.....	117.2	101.8	100.8	12.....	105.6	99.6	.....	22.....	104.3	99.4	.....
3.....	116.3	101.4	100.6	13.....	104.4	99.5	.....	23.....	104.2	99.4	.....
4.....	115.2	101.1	100.8	14.....	103.5	99.4	.....	24.....	103.6	99.6	.....
5.....	113.8	100.6	101.4	15.....	102.6	99.4	.....	25.....	102.9	99.8	.....
6.....	112.4	100.2	104.1	16.....	102.0	99.2	.....	26.....	102.0	100.6	.....
7.....	111.1	99.8	.....	17.....	101.8	99.1	.....	27.....	101.3	101.2	.....
8.....	109.8	99.6	.....	18.....	101.8	99.0	.....	28.....	101.4	101.5	.....
9.....	108.4	99.5	.....	19.....	101.8	99.0	.....	29.....	102.1	101.5	.....
10.....	107.4	99.4	.....	20.....	102.0	99.0	.....	30.....	102.5	.....	.....
								31.....	102.4	.....	.....

SUNFLOWER RIVER AT BAIRD, MISS.

Location.—At the Southern Railway bridge at Baird, Miss., about 4 miles below the mouth of Quiver River.

Records available.—September 3, 1908, to March 6, 1912. Also from records of United States engineers, March 15 to July 25, 1908.

Drainage area.—Not measured.

Gage.—Vertical timber set at sea level datum; datum unchanged.

Discharge measurements.—Made from the Southern Railway bridge.

Floods.—The flood of June 3, 1909, reached a height of 104.4 feet above the gage datum (mean sea level).

Winter flow.—Ice does not affect the flow.

Accuracy.—Water surface height is greatly affected by the stage of Mississippi River.

There is no fixed relation between the gage height and discharge. No discharge estimates have been made.

Cooperation.—Station maintained in cooperation with the Tallahatchie Drainage Commission.

Daily gage height, in feet, of Sunflower River at Baird, Miss., for 1912.

[H. V. Finch, observer.]

Day.	Jan.	Feb.	Mar.	Day.	Jan.	Feb.	Mar.	Day.	Jan.	Feb.	Mar.
1.....	107.5	96.9	93.2	11.....	103.0	93.0	.....	21.....	98.4	90.5	.....
2.....	107.8	96.5	92.5	12.....	102.0	92.9	.....	22.....	98.3	92.0	.....
3.....	107.7	96.2	92.0	13.....	101.5	92.6	.....	23.....	98.2	92.5	.....
4.....	107.5	95.6	91.5	14.....	101.4	92.2	.....	24.....	97.9	92.5	.....
5.....	107.0	95.3	92.0	15.....	100.0	91.9	.....	25.....	97.5	92.6	.....
6.....	105.8	95.0	93.5	16.....	99.5	91.5	.....	26.....	97.0	93.0	.....
7.....	105.5	94.5	.....	17.....	99.0	90.9	.....	27.....	96.5	93.7	.....
8.....	105.0	94.0	.....	18.....	98.5	90.4	.....	28.....	96.3	94.0	.....
9.....	104.1	93.7	.....	19.....	98.5	89.7	.....	29.....	96.4	93.8	.....
10.....	103.5	93.3	.....	20.....	98.5	89.3	.....	30.....	97.0	.....	.....
								31.....	97.0	.....	.....

RED RIVER BASIN.

MEDICINE BLUFF CREEK NEAR LAWTON, OKLA.

Location.—At Medicine Park, in sec. 18, T. 3 N., R. 12 W., 12 miles northwest of Lawton. The nearest tributary is Little Medicine Bluff Creek, which enters a few hundred yards above.

Records available.—November 26 to December 31, 1912.

Drainage area.—Approximately 110 square miles.

Gage.—Vertical staff.

Channel.—Should be practically permanent, as river bed is composed largely of rock, which is covered with some silt and gravel. The channel forms a pool a half mile or more in length, with a ledge-rock control point.

Discharge measurements.—Made from car and cable during high water and by wading at low stages.

Controlled flow.—The flow is controlled to a great extent by the reservoir of the Lawton waterworks, located a mile upstream, which has an area of 1,100 acres. The entire low-water flow is used by the waterworks.

Accuracy.—Since the establishment of the station there has been practically no flow.

Cooperation.—Station maintained in cooperation with the United States Reclamation Service.

The following estimate of flow was made on November 26, 1912:

Gage height, 0.76 foot; discharge, 0.3 second-foot.

Daily gage height, in feet, of Medicine Bluff Creek near Lawton, Okla., for 1912.

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1.....		0.85	11.....		0.78	21.....		0.75
2.....		.78	12.....		.75	22.....		.75
3.....		.78	13.....		.72	23.....		.75
4.....		.78	14.....		.72	24.....		.75
5.....		.88	15.....		.72	25.....		.75
6.....		.85	16.....		.72	26.....	0.75	.75
7.....		.75	17.....		.75	27.....	.8	.75
8.....		.75	18.....		.75	28.....	.75	.75
9.....		.72	19.....		.75	29.....	.75	.75
10.....		.72	20.....		.75	30.....	.75	.75
						31.....		.72

LITTLE MEDICINE BLUFF CREEK NEAR LAWTON, OKLA.

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

Records available.—November 26 to December 31, 1912.

Drainage area.—Approximately 10 square miles.

Gage.—Vertical staff.

Channel.—Should be permanent as there is a rock ledge control. There is a fall of about 8 feet between the station and the crest of the small dam on Medicine Bluff Creek just below the mouth.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes little or no backwater during the winter months.

Accuracy.—Since the establishment of the station there has been practically no flow.

Cooperation.—Station maintained in cooperation with the U. S. Reclamation Service.

The following measurement was made on November 26:

Gage height, 0.15 foot; discharge, 0.05 second-foot.

Daily gage height, in feet, of Little Medicine Bluff Creek near Lawton, Okla., for 1912.

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1.....		0.2	11.....		0.12	21.....		0.12
2.....		.15	12.....		.12	22.....		.12
3.....		.15	13.....		.12	23.....		.15
4.....		.15	14.....		.12	24.....		.15
5.....		.15	15.....		.12	25.....		.15
6.....		.15	16.....		.12	26.....	0.15	.15
7.....		.15	17.....		.12	27.....	.15	.15
8.....		.15	18.....		.12	28.....	.12	.15
9.....		.12	19.....		.12	29.....	.15	.15
10.....		.12	20.....		.12	30.....	.15	.15
						31.....		.15

MISCELLANEOUS MEASUREMENTS.

The following miscellaneous measurements were made on streams in the Arkansas River basin in 1912:

Miscellaneous measurements in Arkansas River drainage basin in 1912.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Dis-charge.
Feb. 22	Arkansas.....	Mississippi.....	Just below confluence with Tennessee Fork, Colo.	<i>Feet.</i>	<i>Sec.-ft.</i>
4	Raton Creek.....	Chico Rico Creek..	Raton, N. Mex.....	a 1.40	b 12.0
6	do.....	do.....	do.....		b 2.0
Apr. 2	Cimarron River....	Canadian River...	Cimarron, N. Mex.		44.8
July 7	Cimarroncito Creek	Cimarron River...	One-half mile above Cimarron reservoir.		.9

^aFrom old United States Geological Survey gage.

^bEstimated.

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