DEPARTMENT OF THE INTERIOR
ALBERT B. FALL, Secretary.

UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, Director

WATER-SUPPLY PAPER 479

SURFACE WATER SUPPLY OF THE UNITED STATES

1918

PART IX. COLORADO RIVER BASIN

NATHAN C. GROVER, Chief Hydraulic Engineer
ROBERT FOLLANSBEE, C. C. JACOB, A. B. PURTON, and C. E. ELLSWORTH
District Engineers

Prepared in cooperation with
THE STATES OF ARIZONA, COLORADO, UTAH, AND WYOMING

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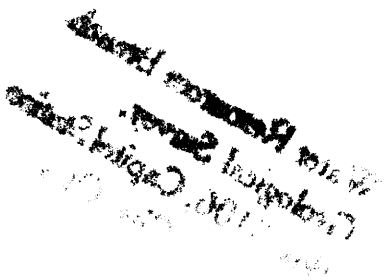

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SURFACE WATER SUPPLY OF COLORADO RIVER BASIN, 1918.

AUTHORIZATION AND SCOPE OF WORK.

This volume is one of a series of 14 reports presenting results of measurements of flow made on streams in the United States during the year ending September 30, 1918.

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

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

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

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

Annual appropriations for the fiscal years ending June 30, 1895–1919.

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

In the execution of the work many private and State organizations have cooperated, either by furnishing data or by assisting in collecting data. Acknowledgments for cooperation of the first kind are made in connection with the description of each station affected; cooperation of the second kind is acknowledged on pages 5 and 6.

Measurements of stream flow have been made at about 4,510 points in the United States and also at many points in Alaska and the Hawaiian Islands. In July, 1918, 1,180 gaging stations were being

maintained by the Survey and the cooperating organizations. Many miscellaneous 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 water-supply papers from time to time.

DEFINITION OF TERMS.

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

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

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

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

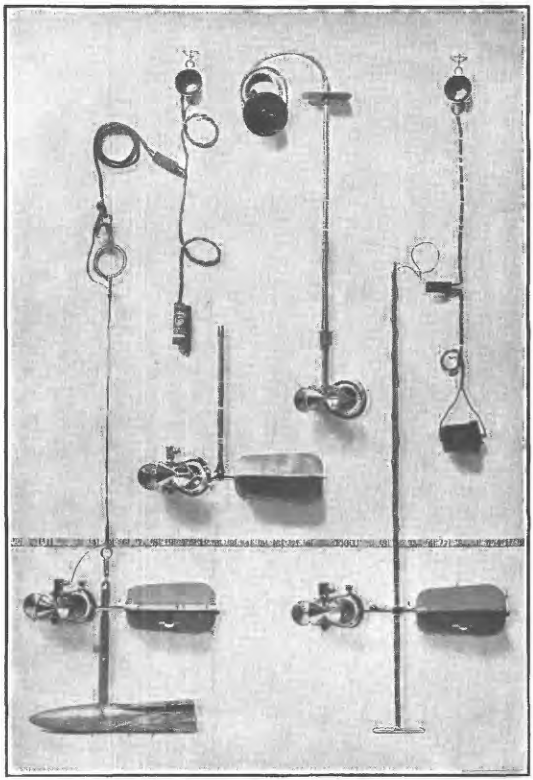
An "acre-foot," equivalent to 43,560 cubic feet, is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation.

The following terms not in common use are here defined:

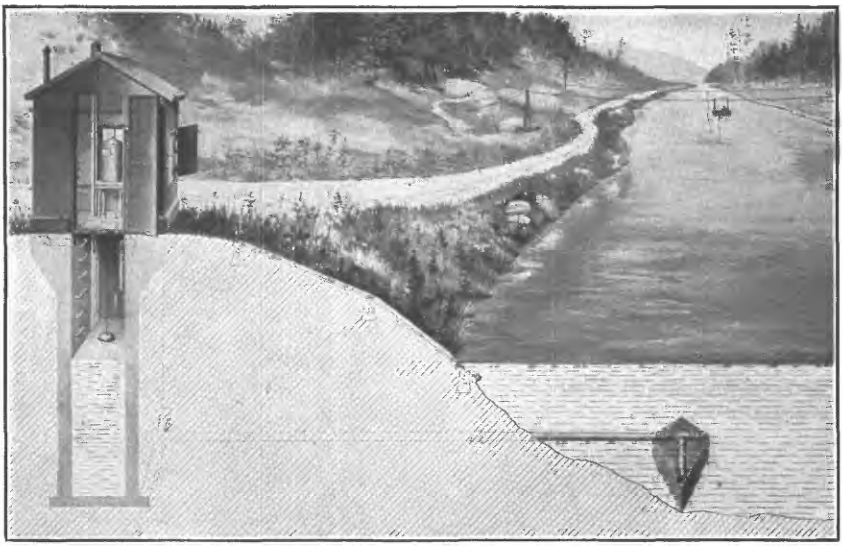
"Stage-discharge relation," an abbreviation for the term "relation of gage height to discharge."

"Control," a term used to designate the section or sections below the gage which determine the stage-discharge relation at the gage. It should be noted that the control may not be the same section or sections at all stages.

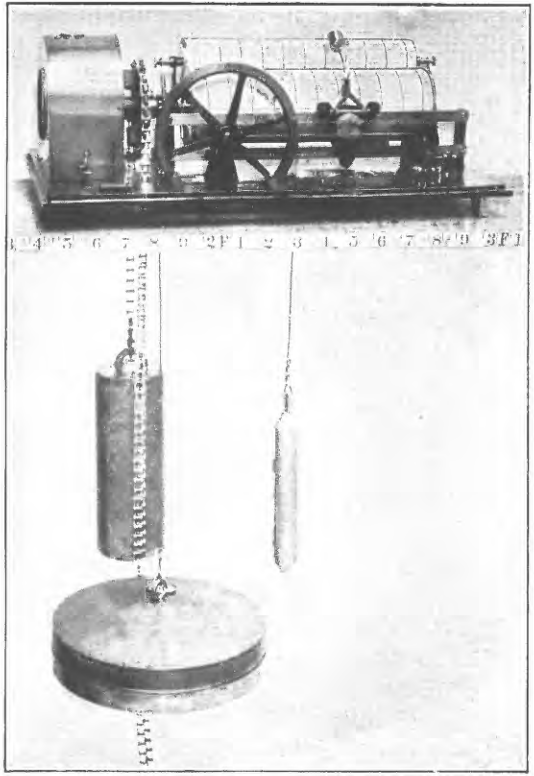
The "point of zero flow" for a gaging station is that point on the gage—the gage height—to which the water surface of the stream would fall if there were no flow.



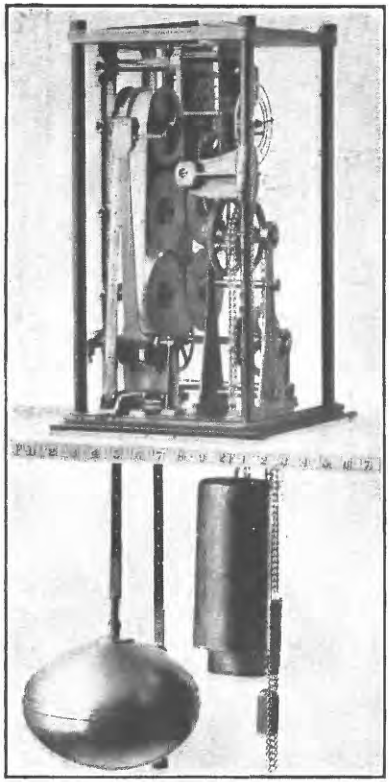
A. PRICE CURRENT METERS.



B. TYPICAL GAGING STATION.



A. STEVENS CONTINUOUS.



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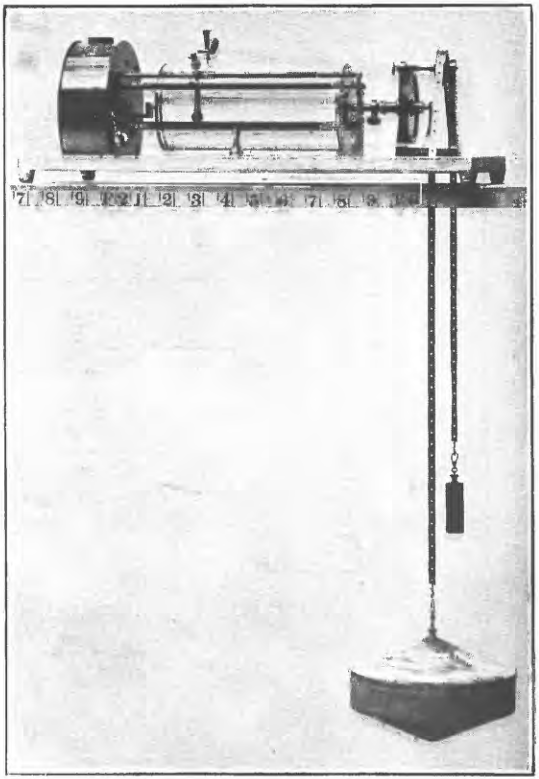

C. FRIEZ.

WATER-STAGE RECORDERS.

EXPLANATION OF DATA.

The data presented in this report cover the year beginning October 1, 1917, and ending September 30, 1918. At the beginning of January in most parts of the United States much of the precipitation in the preceding three months is stored as ground water, in the form of snow or ice, or in ponds, lakes, and swamps, and this stored water passes off in the streams during the spring break-up. At the end of September, on the other hand, the only stored water available for run-off is possibly a small quantity in the ground; therefore the run-off for the year beginning October 1 is practically all derived from precipitation within that year.

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

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

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

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

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

The table of daily discharge gives the discharge in second-feet corresponding to the mean of the gage heights read each day. At stations on streams subject to sudden or rapid diurnal fluctuations the discharge obtained from the rating table and the mean daily gage height may not be the true mean discharge for the day. If

such stations are equipped with water-stage recorders, the mean daily discharge may be obtained by averaging discharge at regular intervals during the day, or by using the discharge integrator, an instrument operating on the principle of the planimeter and containing as an essential element the rating curve of the station.

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

ACCURACY OF FIELD DATA AND COMPUTED RESULTS.

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

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

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

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

[1] For a more detailed discussion of the accuracy of stream-flow data see Grover, N. C., and Hoyt, J. C. Accuracy of stream-flow data: U. S. Geol. Survey Water-Supply Paper 400, pp. 53-59, 1916.

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

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

COOPERATION.

The work in Arizona, Utah, and Wyoming was carried on under cooperative agreement between the United States Geological Survey and the States, and special acknowledgments are due to the cooperating State officials, R. H. Forbes, director, and G. E. P. Smith, irrigation engineer, of the Arizona State Agricultural Experiment Station; G. F. McGonagle, State engineer of Utah; and J. B. True, State engineer of Wyoming.

The State engineer of Colorado, A. J. McCune, furnished complete records for the stations on Little Snake River near Dixon, Wyo., Savery Creek near Savery, Wyo., Muddy Creek near Baggs, Wyo., and paid the observer's salary and furnished other assistance for nine stations in Colorado.

In Wyoming the United States Forest Service furnished gage heights for Pine Creek at Fremont Lake outlet and at Pinedale; the United States Weather Bureau furnished gage heights for Green River at Green River.

In Utah financial assistance was rendered by the Office of Indian Affairs and the Vernal Milling & Light Co.

In Colorado the United States Forest Service furnished all or a part of the gage heights for 15 stations and the services of a hydrographer for part of the winter. The United States Reclamation Service furnished complete records for the stations on Grand River near Palisade and on Uncompahgre River near Colona, Montrose, and Delta; the United States Weather Bureau furnished gage heights for Grand River near Fruita; the city of Grand Junction furnished gage heights for the station on Kannah Creek near Whitewater and financial assistance in installing the station; the Colorado Power Co. furnished the water-stage recorder used on Grand River at Glenwood Springs; the Redlands Irrigation & Power Co. furnished the gage heights and most of the discharge measurements for the stations on Gunnison River near Grand Junction; the Fruitland Irrigation Co.

paid the observer on Crystal Creek near Maher and furnished transportation to the station; Mr. H. C. Getty, State division irrigation engineer, furnished assistance in maintaining stations near Montrose.

In Arizona the United States Reclamation Service furnished complete records for the station on Colorado River at Yuma. The Salt River Valley Water Users' Association furnished daily discharge records for the stations on Verde River near McDowell, Salt River near Roosevelt, and Tonto Creek near Roosevelt. The Office of Indian Affairs furnished complete records for Zuni River at Black Rock and assistance in maintaining gaging stations in the eastern part of the State; the United States Army furnished gage heights for White River and the East Fork of White River at Fort Apache; the University of Arizona furnished complete records for Santa Cruz River and Rillito Creek near Tucson.

DIVISION OF WORK.

Data for stations in Arizona were collected under the direction of C. E. Ellsworth, district engineer, who was assisted by W. E. Dickinson, J. B. Spiegel, and H. D. Empie. The records were compiled and prepared for publication under the direction of C. E. Ellsworth and H. D. McGlashan, district engineers, who were assisted by J. F. Kunesh, William Kessler, and Mrs. Carol H. Shrigley.

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

Data for stations in Utah were collected and prepared for publication by C. C. Jacob and A. B. Purton, district engineers, assisted by L. W. Jordan, J. J. Sanford, W. E. Dickinson, J. W. Bones, C. W. Bennett, and Miss Ruby Christensen.

GAGING-STATION RECORDS.

GREEN RIVER AND THE MAIN COLORADO.

GREEN RIVER NEAR KENDALL, WYO.

LOCATION.—In sec. 23, T. 38 N., R. 110 W., at Kendall ranger station, 6 miles north of Kendall post office, Fremont County. Nearest tributary, Gypsum Creek, enters a short distance below.

DRAINAGE AREA.—271 square miles (measured on topographic map).

RECORDS AVAILABLE.—August 3, 1910, to June 30, 1912; May 15 to October 17, 1918, when station was discontinued.

GAGE.—Chain gage at left bank 1,000 feet below ranger station; read by Walter D. Rickert, forest ranger.

DISCHARGE MEASUREMENTS.—Made from highway bridge below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel. Control short distance below gage; shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.85 feet at 8 a. m. June 15 (discharge, 5,180 second-feet).

ICE.—Stage-discharge relation seriously affected by ice; observations discontinued.

DIVERSIONS.—Prior to December 31, 1916, no adjudicated diversions from Green River above station.

REGULATION.—Flow regulated naturally to limited extent by Green River lakes on headwaters.

ACCURACY.—Stage-discharge relation not permanent; gravel bar formed below gage during latter part of year. Rating curves used May 15 to July 23, fairly well defined; shifting-control method during remainder of year. Gage read to quarter-tenths twice daily, except as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair.

COOPERATION.—Gage heights furnished by United States Forest Service.

Discharge measurements of Green River near Kendall, Wyo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 21	S. B. Soulé	6.30	4,140
Sept. 27	P. V. Hodges	2.55	246

Daily discharge, in second-feet, of Green River near Kendall, Wyo., for the period May 15 to Oct. 17, 1918.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	May.	June.	July.	Aug.	Sept.	Oct.
1	.....	503	1,100	566	320	.....	16	461	5,000	1,200	395	270	215
2	.....	550	1,020	670	310	.....	17	405	4,610	990	385	260	220
3	.....	710	1,020	650	290	.....	18	377	4,560	894	375	250	.....
4	.....	1,000	1,070	620	280	.....	19	338	4,450	804	365	240	.....
5	.....	1,300	1,020	600	260	.....	20	331	4,300	804	360	250	.....
6	.....	1,550	1,010	580	250	.....	21	419	4,100	795	360	250	.....
7	.....	1,800	1,110	558	245	.....	22	419	3,690	726	357	260	.....
8	.....	2,070	1,120	489	260	305	23	468	3,560	710	357	260	.....
9	.....	2,380	1,130	412	287	370	24	510	3,740	690	293	260	.....
10	.....	2,850	1,400	405	205	370	25	534	3,300	670	295	260	.....
11	.....	3,420	1,420	398	287	305	26	489	2,770	650	300	250	.....
12	.....	3,900	1,420	398	280	263	27	489	2,300	620	320	245	.....
13	.....	4,300	1,470	398	280	232	28	468	1,830	580	335	220	.....
14	.....	4,620	1,550	412	280	220	29	405	1,500	560	350	305	.....
15	475	5,030	1,470	400	270	220	30	468	1,180	550	350	370	.....
							31	475	.....	550	340	.....	.....

NOTE.—No gage heights June 4–6, 12, 13, 18–20, 25, 27, July 1, 2, 8, 10–14, 24–29, Aug. 3–6, 15–21, 25–28, 31, Sept. 1–6, 8, and 12–26, Oct. 1–7, 13; discharge determined by comparison with record obtained at station near Daniel. Indirect method for shifting control used July 30 to Sept. 30 and Oct. 8–17.

Monthly discharge of Green River near Kendall, Wyo., for the period May 15 to Oct. 17, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 15–31	534	331	443	14,900
June	5,030	503	2,900	173,000
July	1,550	550	972	59,800
August	670	293	422	25,900
September	370	205	268	15,900
October 8–17	370	215	272	5,400

GREEN RIVER NEAR DANIEL, WYO.

LOCATION.—Near line between Tps. 32 and 33 N., R. 110 W., at highway bridge 6 miles southwest of Daniel, Fremont County. No important tributary within several miles.

DRAINAGE AREA.—932 square miles (measured on map of United States Geological Survey; scale, 1:500,000).

RECORDS AVAILABLE.—April 1, 1915, to September 3 , 1918. State engineer maintained station at this point during 1913 and 1914.

GAGE.—Chain on downstream side of bridge; read by Mrs. A. P. Sommers.

DISCHARGE MEASUREMENTS.—Made from two-span bridge or by wading.

CHANNEL AND CONTROL.—Channel composed of coarse gravel and small boulders. Control 100 feet downstream at small rapids which shifted slightly during 1918. Banks are high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7 feet at 10 a. m. June 16 (discharge, 8,750 second-feet); minimum discharge probably occurred during winter.

ICE.—Stage-discharge relation seriously affected by ice; observations discontinued during winter.

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 212 second-feet from Green River between stations near Kendall and Daniel.

REGULATION.—None, except natural regulation of Green River lakes.

ACCURACY.—Stage-discharge relation shifted slightly during year. Rating curve used October 1 to November 30, well defined; curve used from March 28 to September 30, well defined between 350 and 8,000 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Green River near Daniel, Wyo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 7	S. B. Soulé	3.98	1,920
June 19	.....do	6.39	7,120
Sept. 26	P. V. Hodges	2.47	399

Daily discharge, in second-feet, of Green River near Daniel, Wyo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	394	245	.....	930	1,370	1,310	2,980	882	454
2	382	245	.....	835	1,500	1,310	2,620	835	443
3	376	245	.....	750	1,440	1,370	2,360	835	432
4	370	245	.....	600	1,720	1,570	2,110	930	432
5	370	245	.....	600	1,870	2,110	1,870	882	421
6	370	245	.....	565	1,950	2,450	1,500	882	410
7	365	245	.....	565	2,030	2,980	1,250	835	410
8	360	245	.....	530	1,950	3,170	1,370	835	400
9	354	245	.....	530	1,790	3,550	1,500	670	390
10	349	245	.....	530	1,640	3,950	1,640	670	380
11	318	245	.....	498	1,440	4,580	1,950	635	370
12	314	245	.....	530	1,250	5,520	1,950	635	360
13	309	245	.....	530	1,310	6,050	1,870	600	350
14	300	245	.....	565	1,370	6,320	1,950	600	330
15	291	245	.....	600	1,440	7,130	2,280	600	338
16	283	245	.....	600	1,500	8,210	2,110	600	347
17	274	245	.....	635	1,640	7,670	1,950	600	356
18	274	245	.....	600	1,370	7,670	1,640	565	365
19	274	245	.....	600	1,250	6,860	1,500	565	373
20	274	245	.....	600	1,140	6,590	1,440	530	382
21	267	245	.....	600	1,080	6,320	1,310	565	391
22	260	245	.....	600	1,140	6,320	1,250	530	400
23	252	245	.....	635	1,140	6,050	1,190	530	400
24	245	245	.....	635	1,370	6,050	1,140	530	395
25	245	245	.....	635	1,370	6,050	1,080	530	395
26	245	245	.....	670	1,440	5,520	1,030	498	395
27	245	245	.....	750	1,500	4,580	1,030	465	390
28	245	245	1,640	835	1,440	3,950	980	465	390
29	245	245	1,500	980	1,440	3,550	930	454	390
30	245	245	1,440	1,140	1,250	3,360	930	454	390
31	245	.....	1,140	.....	1,310	.....	930	454	.....

NOTE.—Gage not read Sept. 15-25 and 27-30; discharge determined by interpolation.

Monthly discharge of Green River near Daniel, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	394	245	301	18,500
November	245	245	245	14,600
March 28-31	1,640	1,140	1,430	11,400
April	1,140	498	656	39,000
May	2,030	1,080	1,470	90,400
June	8,210	1,310	4,740	282,000
July	2,980	930	1,600	98,400
August	930	454	634	39,000
September	454	330	389	23,100

GREEN RIVER AT GREEN RIVER, WYO.

LOCATION.—In sec. 22, T. 18 N., R. 107 W., at highway bridge a quarter of a mile south of railroad station at Green River, Sweetwater County. No tributary within several miles.

DRAINAGE AREA.—7,670 square miles (measured on United States Geological Survey map; scale, 1: 500,000.

RECORDS AVAILABLE.—May 2, 1895, to October 31, 1906; March 1, 1915, to September 30, 1918.

GAGE.—Chain on upstream side of left span; read by William Hutton, jr. Vertical staff, attached to submerged cribbing on the east bank of the river near pump house one-third mile above present location, used from 1895 to 1906. No determined relation between gages.

DISCHARGE MEASUREMENTS.—Made from two-span bridge.

CHANNEL AND CONTROL.—Channel composed of compact gravel and small boulders with sand bar on one side; practically permanent during 1918. No well-defined control. Banks are high and not subject to overflow at stages less than 10.5 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.3 feet at 5 p. m. June 19 (discharge, 22,200 second-feet); minimum discharge occurs during winter.

ICE.—Stage-discharge relation seriously affected by ice; records discontinued.

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 208 second-feet from Green River between station near Daniel and Green River station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent; affected by ice December 1 to March 19. Rating curve used during October and November fairly well defined; curve used March 20 to September 30, well defined. Gage read to tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent except for November for which interpolated discharge makes records fair.

COOPERATION.—United States Weather Bureau furnished gage-height record October 1 to November 30, and March 1 to September 30.

Discharge measurements of Green River at Green River, Wyo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 1	S. B. Soulé	4.62	1,700	June 24	S. B. Soulé	11.54	19,300
10	do	6.26	3,810	Sept. 21	P. V. Hodges	3.78	797

Daily discharge, in second-feet, of Green River at Green River, Wyo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,120	795	725	.....	1,900	1,660	3,020	7,770	2,260	1,000
2	1,120	795	.....	.....	1,780	1,920	3,160	6,450	2,140	1,050
3	1,120	795	.....	.....	1,900	2,240	3,160	5,510	2,140	1,160
4	1,030	795	.....	.....	1,900	2,180	3,160	5,300	2,140	1,000
5	1,030	795	.....	.....	1,900	2,630	3,880	5,100	2,140	1,000
6	1,030	795	.....	.....	1,780	3,020	4,720	4,720	2,020	910
7	1,030	795	.....	.....	1,430	3,300	5,960	4,540	2,140	1,000
8	1,030	795	.....	.....	1,320	3,440	8,050	4,370	2,140	1,000
9	1,030	795	.....	.....	1,430	3,730	9,490	4,200	2,140	1,000
10	1,030	795	.....	.....	1,660	3,880	11,000	4,370	1,900	910
11	990	795	.....	.....	1,900	3,730	12,300	4,720	1,900	910
12	950	795	.....	.....	2,260	3,730	13,700	4,540	1,780	910
13	950	795	.....	.....	2,630	3,440	15,800	4,720	1,710	825
14	950	795	.....	.....	2,890	3,160	16,500	5,300	1,650	825
15	950	795	.....	.....	2,630	3,020	18,000	5,510	1,580	910
16	910	795	.....	.....	2,630	3,020	19,100	5,100	1,520	910
17	870	795	.....	.....	2,140	3,160	20,700	4,720	1,450	910
18	870	725	.....	.....	1,900	3,440	21,800	4,540	1,380	910
19	870	505	.....	.....	1,900	3,300	21,800	4,370	1,320	825
20	870	475	.....	825	1,660	3,150	21,800	4,040	1,320	825
21	870	760	.....	825	1,430	3,000	21,000	3,850	1,260	825
22	870	795	.....	825	1,430	2,900	19,900	3,600	1,210	825
23	870	832	.....	1,050	1,430	2,760	19,500	3,440	1,210	825
24	870	870	.....	1,210	1,430	2,630	19,500	3,160	1,160	825
25	832	1,030	.....	1,210	1,430	2,630	18,700	3,020	1,100	825
26	795	950	.....	1,660	1,450	2,890	17,600	2,890	1,050	825
27	795	950	.....	1,660	1,450	3,160	15,800	2,760	1,000	825
28	795	910	.....	1,780	1,460	3,440	13,400	2,760	1,000	825
29	795	725	.....	1,780	1,480	3,440	11,000	2,630	1,000	825
30	795	660	.....	1,780	1,500	3,440	9,490	2,380	1,000	825
31	795	.....	.....	1,780	.....	3,160	.....	2,260	1,000	.....

NOTE.—Gage not read Nov. 1-16, Apr. 24-30, May 2-4, 20-22, July 21, 22, Aug. 13-18, Sept. 20, and 22-30; discharge determined by comparison with record at station near Daniel.

Monthly discharge of Green River at Green River, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1,120	795	930	57,200
November	1,030	475	790	47,000
March 20-31	1,780	825	1,370	32,600
April	2,890	1,320	1,800	107,000
May	3,880	1,660	3,050	188,000
June	21,800	3,020	13,400	797,000
July	7,770	2,260	4,280	263,000
August	2,260	1,000	1,570	96,500
September	1,160	825	901	53,600

GREEN RIVER AT LITTLE VALLEY, NEAR GREEN RIVER, UTAH.

LOCATION.—In sec. 4, T. 22 S., R. 16 E., 1 mile above old Little Valley ferry and 6 miles downstream from Green River, Emery County.

DRAINAGE AREA.—41,000 square miles.

RECORDS AVAILABLE.—December 18, 1910, to September 30, 1918. Records obtained at Green River (known also as Elgin or Blake) from 1894 to 1899 and 1905 to 1911 give practically the same flow.

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GAGE.—Stevens continuous water-stage recorder replaced a Friez water-stage recorder on left bank about a mile above old ferry cable on December 16, 1917; inspected by R. C. Wheeler. Various gages at cable were in use from December 18, 1910, to November 6, 1914, when Friez recorder was installed. The records at Green River were obtained from chain gage at Denver & Rio Grande Railroad bridge until December 2, 1910, when gage was moved 200 feet upstream to new highway bridge.

DISCHARGE MEASUREMENTS.—Made from car on ferry cable.

CHANNEL AND CONTROL.—Bed composed of gravel and sand. Principal control probably about two-thirds of a mile below the gage; apparently fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 10.47 feet at 3 a. m. June 26 (discharge, 43,700 second-feet); minimum stage, from water-stage recorder, −0.03 foot at noon January 14 (discharge, 1,100 second-feet).

1894–1899, 1905–1918: Maximum discharge recorded, 68,800 second-feet, May 29, 1897; minimum stage recorded, −0.35 foot at 8 a. m. December 21, 1915 (discharge, 875 second-feet).

ICE.—Stage-discharge relation affected by ice nearly every winter.

DIVERSIONS.—Station is below practically all diversions from Green River.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent; probably not affected by ice during year. Rating curve well defined between 800 and 70,000 second-feet. Operation of water-stage recorder satisfactory except as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph. Records excellent, except for period December to February, for which they are good. At times during these three months there is a possibility of slight backwater from ice.

COOPERATION.—Since December 16, 1917, station has been maintained by Utah Power & Light Co., which made all discharge measurements during year.

Discharge measurements of Green River at Little Valley, near Green River, Utah, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 16[a]	R. P. Flagel[b]	0.84	2,140	May 9	H. L. Stoner[b]	4.90	13,600
Mar. 3	do	1.48	3,010	Aug. 5	do	1.85	3,700

[a] Measurement made from Denver & Rio Grande Railroad Co.'s bridge at Green River. Gage at highway bridge read 6.50 feet.
[b] Engineer, Utah Power & Light Co.

Daily discharge, in second-feet, of Green River at Little Valley, near Green River, Utah, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3,710	2,970	3,330	3,240	2,400	3,150	5,600	6,240	15,900	23,600	4,880	1,870
2	3,710	3,060	3,330	3,240	2,350	2,970	5,860	6,380	15,400	20,400	4,540	1,860
3	3,810	3,060	3,330	3,330	2,300	3,060	6,110	6,380	14,900	17,900	4,320	1,830
4	3,710	3,060	3,240	3,330	2,220	3,060	6,110	6,110	14,500	15,900	4,110	1,880
5	3,710	3,060	3,240	3,330	2,150	2,970	6,240	5,980	14,000	14,500	3,810	2,880
6	3,710	3,060	3,150	3,330	2,090	3,060	6,380	6,380	13,500	13,100	3,910	2,270
7	3,520	2,970	3,060	3,150	2,110	3,150	6,650	7,690	14,900	12,200	3,710	2,020
8	3,520	3,060	2,800	2,970	2,120	3,240	6,790	10,500	15,900	10,500	3,620	2,300
9	3,420	3,150	2,630	2,800	2,160	3,330	6,240	13,500	17,900	9,760	3,420	2,380
10	3,420	3,240	2,460	3,060	2,300	3,620	5,730	15,900	20,400	10,500	3,420	2,460
11	3,420	3,240	2,260	2,460	2,380	3,620	5,360	17,900	24,600	12,200	3,710	2,460
12	3,330	3,240	2,050	1,820	2,460	4,220	5,240	18,400	27,900	13,100	3,520	2,630
13	3,240	3,240	1,940	1,300	2,460	4,220	5,480	18,400	30,100	12,200	3,330	2,540
14	3,150	3,240	1,800	1,200	2,540	4,010	5,980	16,900	31,800	14,000	3,620	2,380
15	3,330	3,240	1,910	1,500	2,540	4,880	6,650	15,400	33,500	14,500	4,320	2,300
16	3,060	3,240	2,090	1,480	2,460	5,730	7,540	13,500	35,200	14,500	3,620	2,140
17	3,060	3,240	2,300	1,420	2,460	5,360	8,680	12,600	36,300	12,600	3,910	2,050
18	3,060	3,240	2,460	1,480	2,540	5,120	9,210	13,100	37,500	11,800	3,520	2,000
19	2,970	3,150	2,630	1,880	2,460	5,000	9,390	14,900	37,500	10,900	3,240	1,970
20	2,970	3,060	2,630	2,040	2,460	4,540	8,860	16,400	38,100	10,500	3,060	1,960
21	2,970	3,060	2,720	2,300	2,380	4,320	8,010	16,900	38,600	10,100	2,880	1,930
22	2,970	3,060	2,720	2,630	2,460	4,220	7,230	17,400	39,200	9,390	2,720	1,940
23	3,060	3,060	2,720	2,460	2,540	4,110	6,510	16,900	40,400	8,680	2,630	3,240
24	3,060	3,060	2,800	2,300	2,720	4,010	5,980	16,400	42,100	8,180	2,540	3,420
25	3,060	2,970	2,800	2,280	2,880	4,010	5,600	15,900	43,300	7,540	2,460	4,010
26	2,970	2,880	2,630	2,270	2,800	4,010	5,360	15,900	43,300	7,230	2,380	4,430
27	2,970	2,800	2,880	2,100	2,800	4,220	5,120	16,900	40,400	6,790	2,270	3,620
28	2,970	2,880	3,060	1,950	3,060	4,430	5,240	17,400	35,800	6,510	2,150	3,910
29	2,970	3,060	2,970	1,950	.....	4,660	5,360	17,400	31,200	6,110	2,050	3,420
30	3,060	3,240	3,240	2,000	.....	5,000	5,730	16,900	27,300	5,480	1,970	3,060
31	3,060	.....	3,240	2,300	.....	5,240	.....	16,400	.....	5,240	1,920	.....

NOTE.—Discharge estimated from weather records and range of stage Jan. 27 to Feb. 2; interpolated Jan. 25 and July 5.

Monthly discharge of Green River at Little Valley, near Green River, Utah, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	3,810	2,970	3,260	200,000
November	3,240	2,800	3,100	184,000
December	3,330	1,800	2,720	167,000
January	3,330	1,200	2,350	144,000
February	3,060	2,090	2,450	136,000
March	5,730	2,970	4,080	251,000
April	9,390	5,120	6,470	385,000
May	18,400	5,980	13,800	848,000
June	43,300	13,500	29,000	1,730,000
July	23,600	5,240	11,500	707,000
August	4,880	1,920	3,280	202,000
September	4,430	1,830	2,570	153,000
The year	43,300	1,200	7,050	5,110,000

COLORADO RIVER NEAR TOPOCK, ARIZ.

LOCATION.—In E. ½ sec. 16, T. 7 N., R. 24 E., at head of canyon 1¾ miles below Atchison, Topeka & Santa Fe Railway bridge at Topock, Mohave County, and 16 miles (by main channel of river) below Needles, Calif.

DRAINAGE AREA.—171,000 square miles (169,000 square miles at Hardyville, Ariz., plus about 2,000 square miles between Hardyville and gaging station).

RECORDS AVAILABLE.—February 1, 1917, to September 30, 1918.

GAGE.—Stevens water-stage recorder on right bank just above point where river rapidly narrows and enters rock canyon; inspected by G. M. Bobst.

DISCHARGE MEASUREMENTS.—Made from cable just below gage.

CHANNEL AND CONTROL.—Above gage, channel is wide and bed, composed of loose sand, is constantly shifting. At low stages large sand bars form numerous islands between Topock and the gage. Below gage, river enters steep-walled rock canyon and channel rapidly narrows from about 800 to 400 feet. Bed in canyon shifts during floods. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 15.5 feet at 4 a. m. June 30 (discharge, 99,000 second-feet); minimum stage, 1.2 feet September 12 (discharge, 4,900 second-feet).

1917–18: Maximum stage recorded, 27 feet about July 1, 1917, determined from flood marks on gage (discharge determined from extension of rating curve, about 156,000 second-feet); minimum stage recorded during 1918.

DIVERSIONS.—Water is diverted for irrigation and the development of power from main river and tributaries above the station.

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve fairly well defined below 90,000 second-feet, applicable direct February 1 to June 20; indirect method for shifting control used June 21 to September 30. Operation of water-stage recorder satisfactory. Mean daily gage height determined by inspecting recorder graph. Daily discharge ascertained by applying mean daily gage height to rating table except for period for which the shifting-control method was used. Records fair.

Discharge measurements of Colorado River near Topock, Ariz., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 12	Asplind and Bobst	5.00	7,180	June 18	C. E. Ellsworth	18.10	92,100
Apr. 14	J. B. Spiegel	7.13	16,900	20	do	18.30	87,400
14	do	7.13	16,700	July 6	do	7.00	50,800
May 24	C. E. Ellsworth	12.50	53,900	7	do	6.80	46,800
25	do	12.82	52,400	Aug. 30	do	2.40	7,850
26	do	12.90	51,900	Sept. 13	do	3.08	8,010
June 17	do	17.20	81,900				

Daily discharge, in second-feet, of Colorado River near Topock, Ariz., for the year ending Sept. 30, 1918.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	6,800	10,500	11,000	14,100	51,600	87,500	24,000	7,000
2	6,400	10,000	11,000	14,600	49,600	77,500	23,500	7,000
3	6,400	11,000	12,300	17,500	46,200	68,500	22,300	7,000
4	6,400	11,800	13,600	19,000	44,800	63,500	19,200	7,400
5	6,800	15,000	15,500	20,000	40,800	58,500	17,600	7,200
6	7,200	14,100	14,100	19,500	35,500	50,000	17,400	7,600
7	7,200	13,200	14,600	19,500	34,200	45,700	17,200	6,800
8	8,800	12,300	15,000	21,600	32,200	41,500	17,600	6,000
9	8,400	13,200	16,000	23,300	34,200	42,300	17,600	6,410
10	8,000	17,000	17,500	26,800	40,800	41,800	17,200	6,820
11	7,600	14,600	17,000	34,200	46,200	42,500	15,800	7,230
12	7,200	12,800	17,000	40,100	52,300	42,300	16,300	7,640
13	7,200	19,000	17,000	44,200	58,500	44,900	17,000	8,050
14	7,200	40,100	17,000	46,900	63,400	46,900	19,000	7,800
15	7,200	26,200	16,000	49,600	67,500	47,500	16,500	6,900
16	8,000	25,600	16,000	51,600	73,800	50,500	15,500	6,300
17	8,800	31,000	15,000	46,900	82,200	54,500	14,800	7,200
18	8,800	19,000	15,000	42,800	87,800	53,300	15,200	11,000
19	8,800	17,000	15,500	42,100	92,000	49,300	15,200	11,500
20	9,200	17,000	19,000	40,800	90,600	47,300	15,200	11,500
21	9,600	16,500	20,600	44,800	91,700	42,800	15,200	12,200
22	8,800	13,600	22,800	48,900	89,000	40,000	14,500	11,800
23	8,400	13,200	23,300	49,600	88,000	37,000	15,300	11,500
24	8,400	13,600	23,300	50,300	85,000	34,200	14,000	12,500
25	10,500	13,600	23,300	50,300	82,500	30,000	13,100	13,500
26	11,800	13,600	21,600	51,600	78,500	29,000	12,200	11,500
27	11,400	13,600	20,000	48,200	82,000	28,500	11,300	10,000
28	11,000	13,600	19,000	48,900	87,000	27,200	10,400	9,500
29	.....	13,600	16,000	52,300	89,000	25,500	9,500	8,400
30	.....	12,300	14,600	55,100	91,500	25,200	7,850	7,800
31	.....	11,400	.....	50,300	.....	24,000	7,000	.....

NOTE.—Gage not operating satisfactorily Aug. 6, 25–28, and Sept. 9–12; discharge interpolated. Insufficient discharge measurements obtained to define changes in stage-discharge relation Oct. 1 to Jan. 31; mean discharge estimated in second-feet by comparison with flow of Colorado River at Yuma, as follows: October, 9,570; November, 9,100; December, 8,830; January, 8,590.

Monthly discharge of Colorado River near Topock, Ariz., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	.....	.....	9,570	588,000
November	.....	.....	9,100	541,000
December	.....	.....	8,830	543,000
January	.....	.....	8,590	528,000
February	11,800	6,400	8,300	461,000
March	40,100	10,000	16,100	990,000
April	23,300	11,000	17,000	1,010,000
May	55,100	14,100	38,200	2,350,000
June	92,000	32,200	66,300	3,950,000
July	87,500	24,000	45,100	2,770,000
August	24,000	7,000	15,600	957,000
September	13,500	6,000	8,770	522,000
The year	92,000	.....	21,000	15,210,000

NOTE.—See footnote to daily-discharge table.

COLORADO RIVER AT YUMA, ARIZ.

LOCATION.—In sec. 35, T. 16 S., R. 22 E., at Southern Pacific Co.'s railroad bridge at Yuma, Yuma County, 1½ miles below mouth of Gila River.

DRAINAGE AREA.—242,000 square miles (measured on map compiled from best available maps of the Colorado River basin).

RECORDS AVAILABLE.—April 1, 1878, to September 30, 1918.

GAGE.—Vertical staff in two sections at bridge; zero of gage is 102.79 feet above sea level.

DISCHARGE MEASUREMENTS.—Made from cable 600 feet below gage.

CHANNEL AND CONTROL.—Bed composed of shifting sand. No well-defined control.

EXTREMES OF DISCHARGE.—1902–1918: Maximum mean daily discharge, 240,000 second-feet, January 22, 1916; minimum mean daily discharge, 2,600 second-feet, January 20, 1913.

DIVERSIONS.—Water is diverted for irrigation and power from main river and tributaries above station.

REGULATION.—None.

ACCURACY.—Discharge measurements are made frequently; discharge determined by shifting-control method. Records good.

COOPERATION.—Results of current-meter measurements and record of daily discharge furnished by United States Reclamation Service.

Discharge measurements of Colorado River at Yuma, Ariz., during the year ending Sept. 30, 1918.

[Made by United States Reclamation Service.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 1	14.30	8,100	Feb. 6	14.70	5,300	June 7	20.40	46,500
3	14.30	8,700	8	14.60	5,700	10	19.30	39,300
5	14.60	8,600	11	14.40	5,200	12	19.60	41,400
8	14.60	8,200	13	14.50	4,900	14	20.40	48,100
12	14.50	8,100	15	14.20	4,900	17	21.05	52,600
17	14.40	7,700	18	14.40	5,100	19	22.00	61,600
19	14.40	7,200	20	15.00	5,500	21	23.10	72,100
22	14.20	7,100	22	15.20	6,800	24	24.20	85,500
24	14.20	6,800	25	15.30	6,600	26	24.65	90,700
26	14.40	6,700	27	15.20	6,900	28	24.15	92,000
29	14.20	5,600	Mar. 2	15.60	7,600	July 1	23.55	92,300
31	14.40	5,900	4	15.40	7,000	3	23.65	94,300
Nov. 2	14.60	7,400	6	15.40	7,200	5	22.70	88,600
5	14.40	5,900	8	15.95	8,400	8	18.55	50,000
7	14.60	6,500	11	17.40	21,800	10	17.10	37,400
9	14.90	7,600	13	16.70	14,200	12	16.60	33,200
12	14.60	6,800	15	20.60	40,000	15	16.50	33,100
14	14.70	6,600	16	22.05	49,300	17	17.15	35,300
16	14.80	7,500	18	18.25	27,200	19	18.05	40,500
19	14.50	6,400	20	17.40	23,000	22	16.95	32,000
21	14.60	7,200	22	16.60	19,600	24	15.90	26,500
23	14.90	7,300	25	15.45	14,300	26	15.20	22,400
26	14.60	6,800	27	15.60	12,800	29	14.40	18,100
28	14.70	7,000	29	15.10	11,700	31	14.05	16,400
30	14.90	7,300	Apr. 1	14.60	10,000	Aug. 2	13.80	15,200
Dec. 3	14.50	6,800	3	14.50	9,400	5	13.70	13,700
5	14.70	6,400	6	14.80	10,300	7	13.60	11,800
7	14.90	7,200	8	15.10	10,500	9	13.65	10,800
10	14.80	7,300	10	15.20	10,600	11	15.80	19,600
12	15.00	7,200	12	15.70	12,800	12	15.00	14,700
14	15.20	7,700	15	15.70	13,100	14	14.75	12,100
17	14.80	7,000	17	15.60	13,500	16	15.10	12,400
19	14.60	6,000	19	15.50	11,300	19	14.50	9,600
21	14.50	6,200	22	15.90	14,100	21	14.70	8,800
24	14.40	6,200	24	16.45	17,800	23	14.50	9,100
26	14.50	6,600	26	16.50	17,000	26	15.05	9,400
28	14.70	6,200	29	16.40	15,700	28	14.55	8,600
31	14.45	6,300	May 1	15.80	12,200	30	14.20	7,100
Jan. 2	14.70	6,700	3	15.70	11,100	Sept. 3	13.70	5,200
4	14.80	7,000	6	16.10	14,900	4	14.50	7,200
7	15.10	7,700	8	16.45	15,600	6	14.00	5,500
9	15.20	7,400	10	16.40	15,500	9	14.20	5,100
11	15.30	7,300	13	17.85	23,000	11	14.50	5,300
14	14.90	7,200	15	19.20	30,500	13	13.50	4,100
16	15.00	7,000	17	19.90	34,300	16	13.70	5,900
18	15.00	6,900	20	19.70	31,000	18	14.60	5,700
21	15.00	7,100	22	19.50	35,100	20	14.70	6,200
23	14.30	5,500	24	20.10	38,600	23	15.60	9,800
25	14.10	5,300	27	20.70	47,900	25	15.05	8,200
28	14.05	5,000	29	21.00	47,000	27	15.80	10,000
30	14.10	5,000	31	21.10	48,800	30	14.85	6,400
Feb. 1	14.50	5,400	June 3	21.05	49,600			
4	15.30	7,000	5	21.00	49,800			

Daily discharge, in second-feet, of Colorado River at Yuma, Ariz., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	8,100	8,200	7,600	6,500	5,400	6,700	10,000	12,200	49,900	92,300	16,100	6,000
2	8,300	7,400	7,500	6,700	5,800	7,600	9,800	11,600	50,000	93,000	15,200	5,400
3	8,700	8,000	6,800	6,700	6,300	7,300	9,400	11,100	49,600	94,300	14,700	5,200
4	8,500	7,600	6,600	7,000	7,000	7,000	9,800	11,500	49,900	92,000	14,200	7,200
5	8,600	5,900	6,400	7,200	6,100	7,300	10,300	14,000	49,800	88,600	13,700	5,200
6	8,500	6,200	7,000	7,600	5,300	7,200	11,200	14,900	48,200	75,800	12,800	5,500
7	8,300	6,500	7,200	7,700	5,500	7,100	11,200	15,400	46,500	62,800	11,800	5,800
8	8,200	6,700	7,300	7,500	5,700	8,400	10,500	15,600	45,000	50,000	11,200	6,100
9	8,200	7,600	7,300	7,400	5,800	8,400	10,500	15,400	41,400	43,000	10,800	5,100
10	8,200	7,900	7,300	7,500	5,900	8,300	10,600	15,500	39,300	37,400	11,800	5,600
11	8,100	7,000	7,100	7,300	5,200	21,800	11,000	16,100	40,300	34,300	19,600	5,300
12	8,100	6,800	7,200	7,300	5,000	24,300	12,800	18,700	41,400	33,200	14,700	4,500
13	8,300	6,700	7,500	7,300	4,900	14,200	13,700	23,000	46,200	33,100	18,500	4,100
14	8,300	6,600	7,700	7,200	4,900	16,800	13,300	27,600	48,100	33,000	12,100	4,600
15	8,300	7,200	7,700	7,100	4,900	40,000	13,100	30,500	50,400	33,100	12,200	5,000
16	7,700	7,500	7,500	7,000	4,900	49,300	13,700	32,800	52,000	34,200	12,400	5,900
17	7,700	7,500	7,000	6,900	4,900	28,900	13,500	34,300	52,600	35,300	11,500	6,800
18	7,500	7,400	6,600	6,900	5,100	27,200	13,000	34,700	57,600	38,900	11,000	5,700
19	7,200	6,400	6,000	7,500	5,200	23,300	11,300	34,500	61,600	40,500	9,600	5,800
20	7,300	6,800	6,100	7,400	5,500	23,000	11,600	34,000	67,300	37,000	10,000	6,200
21	7,200	7,200	6,200	7,100	6,200	21,100	12,800	34,400	72,100	32,300	8,800	14,000
22	7,100	7,200	6,700	6,500	6,800	19,600	14,100	35,100	79,300	32,000	9,000	12,000
23	6,900	7,300	6,200	5,500	6,900	17,500	15,100	35,800	82,300	29,300	9,100	9,800
24	6,800	7,200	6,200	5,400	6,700	16,500	17,800	38,600	85,500	23,500	9,200	8,300
25	6,800	7,000	6,600	5,300	6,600	14,300	17,400	45,900	88,100	24,500	9,300	8,200
26	6,700	6,800	6,600	5,200	6,700	13,000	17,000	47,900	90,700	22,400	9,400	9,100
27	6,900	6,900	6,400	5,600	6,900	12,800	17,000	47,900	91,300	20,900	9,200	10,000
28	6,800	7,000	6,200	5,000	6,600	12,000	16,200	47,100	92,000	19,500	8,600	8,200
29	5,600	7,100	6,400	4,700	.....	11,700	15,700	47,000	92,100	18,100	7,500	7,800
30	5,800	7,300	6,400	5,000	.....	11,500	13,100	47,900	92,200	17,300	7,100	6,400
31	5,900	.....	6,300	5,400	.....	11,200	.....	48,800	.....	16,400	7,000	.....

Monthly discharge of Colorado River at Yuma, Ariz., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	8,700	5,600	7,570	465,000
November	8,200	5,900	7,100	422,000
December	7,700	6,000	6,830	420,000
January	7,700	4,700	6,590	405,000
February	7,000	4,900	5,810	323,000
March	49,300	6,700	16,400	1,010,000
April	17,800	9,400	12,900	768,000
May	48,800	11,100	29,100	1,790,000
June	92,200	39,300	61,800	3,680,000
July	94,300	16,400	43,300	2,660,000
August	19,600	7,000	11,600	713,000
September	14,000	4,100	6,830	406,000
The year	94,300	4,100	18,000	13,100,000

HORSE CREEK BASIN.

HORSE CREEK AT DANIEL, WYO.

LOCATION.—About sec. 2, T. 33 N., R. 111 W., at highway bridge three-fourths mile south of Daniel, Lincoln County. No tributary between station and mouth.

DRAINAGE AREA.—193 square miles (measured on map of United States Geological Survey; scale, 1:500,000).

RECORDS AVAILABLE.—April 1, 1915, to November 18, 1918, when station was discontinued. State engineer maintained station at this point during 1913 and 1914.

GAGE.—Vertical staff on upstream side of left abutment; read by Mrs. S. R. Hill and W. D. Blackman.

DISCHARGE MEASUREMENTS.—Made from single-span bridge or by wading near by.

CHANNEL AND CONTROL.—Channel composed of gravel; control is 100 feet below gage at small rapids; shifted slightly during 1918.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.7 feet at 10 a. m. June 16 (discharge, 1,530 second-feet). Minimum discharge probably occurs during winter.

ICE.—Stage-discharge relation seriously affected by ice; observations discontinued during winter.

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 161 second-feet from Horse Creek, all above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation slightly shifting. Rating curve used October 1 to November 19, well defined; curve used April 22 to November 18, fairly well defined between 15 and 1,200 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Owing to uncertainty in gage heights, records can not be considered better than fair.

Discharge measurements of Horse Creek at Daniel, Wyo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 7	S. B. Soulé	2.57	330
June 18	do	4.99	1,240
Sept. 26	P. V. Hodges	1.01	15.2

Daily discharge, in second-feet, of Horse Creek at Daniel, Wyo., for the period Oct. 1, 1917, to Nov. 18, 1918.

Day.	Oct.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	16	37	.....	114	215	260	38	22	14	22
2	17	39	.....	116	185	245	36	21	15	22
3	17	49	.....	154	200	200	38	21	18	22
4	16	49	.....	260	322	200	38	20	19	22
5	15	51	.....	260	515	185	37	20	21	24
6	16	51	.....	275	515	185	39	18	22	25
7	15	51	.....	322	730	140	38	18	21	27
8	15	51	.....	322	770	136	38	18	19	28
9	15	51	.....	322	810	116	37	21	18	30
10	15	51	.....	310	810	96	37	19	18	30
11	16	51	.....	340	970	96	37	18	16	29
12	15	51	.....	275	1,130	100	38	21	15	28
13	15	51	.....	275	1,250	104	38	19	15	28
14	16	51	.....	275	1,290	156	37	21	15	27
15	15	51	.....	305	1,330	136	36	19	24	24
16	16	51	.....	322	1,250	134	34	20	25	24
17	16	51	.....	305	1,330	130	33	17	27	23
18	15	51	.....	275	1,210	126	35	18	38	22
19	11	51	.....	230	1,050	76	34	20	30	.....
20	17	.....	.....	215	890	76	33	21	22	.....
21	19	.....	.....	245	850	76	32	23	21	.....
22	19	.....	132	215	1,010	76	31	23	19	.....
23	17	.....	120	260	1,130	72	31	23	18	.....
24	19	.....	116	275	930	60	30	23	19	.....
25	19	.....	116	305	730	60	31	23	21	.....
26	21	.....	112	358	655	49	30	23	22	.....
27	19	.....	108	305	550	47	30	21	22	.....
28	33	.....	108	290	445	41	28	18	22	.....
29	33	.....	112	260	445	39	26	15	22	.....
30	33	.....	116	230	275	41	25	14	22	.....
31	31	.....	.....	215	.....	39	24	.....	22	.....

NOTE.—Gage not read Nov. 6–17, 1917; discharge interpolated.

Monthly discharge of Horse Creek at Daniel, Wyo., for the period Oct. 1, 1917, to Nov. 18, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	33	11	18.5	1,140
November 1-19	51	37	49.4	1,860
April 22-30	132	108	116	2,070
May	358	114	267	16,400
June	1,330	185	794	47,200
July	260	39	113	6,950
August	39	24	33.8	2,080
September	23	14	19.9	1,180
October	38	14	20.7	1,270
November 1-18	30	22	25.4	907

COTTONWOOD CREEK BASIN.

COTTONWOOD CREEK NEAR BIG PINEY, WYO.

LOCATION.—About sec. 21, T. 32 N., R. 111 W., at highway bridge near Hayden's ranch, 16 miles north of Big Piney, Lincoln County.

DRAINAGE AREA.—241 square miles (measured on United States Geological Survey map; scale, 1:500,000).

RECORDS AVAILABLE.—April 25, 1916, to September 30, 1918.

GAGE.—Creek flows in two channels 1 mile apart; vertical staff on north channel, and Stevens water-stage recorder on south channel, installed May 7, 1918, at datum of vertical staff used previously; both gages read by Mrs. J. G. Hayden.

DISCHARGE MEASUREMENTS.—Made from bridge on each channel or by wading.

CHANNEL AND CONTROL.—North channel: Channel composed of coarse gravel; control shifted during 1918, owing to backwater from drift lodged on fence near control.

South channel: Channel composed of sand and gravel; control shifted after high water of 1918.

EXTREMES OF DISCHARGE.—North channel: Maximum stage recorded during year, 4.2 feet at 8 p. m. June 16, affected by backwater (discharge, 586 second-feet); minimum stage possibly occurred during winter, when records were discontinued.

South channel: Maximum stage recorded during year, 5.0 feet from 8 a. m. to 2 p. m. June 17 (discharge, 355 second-feet); minimum stage recorded, 1.8 feet November 15, 1917 (discharge, practically zero).

ICE.—No data.

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 38 second-feet from Cottonwood Creek above station and 55 second-feet below.

REGULATION.—Diversion works at head of south channel control flow through south channel during low stages.

ACCURACY.—North channel: Stage-discharge relation fairly permanent except for period June 6 to 30, when drift caused backwater. Rating curve fairly well defined. Gage read to hundredths twice daily during high water and once daily during August and September. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair.

South channel: Stage-discharge relation shifted after high water. Rating curve fairly well defined; applied indirectly July 1 to September 30. Gage read to hundredths once daily from October 1 to May 6. Beginning May 7 gage heights taken from water-stage recorder which operated satisfactorily. Records good.

Discharge measurements of Cottonwood Creek (north channel) near Big Piney, Wyo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 7	S. B. Soulé	2.35	184
June 17	....do	3.98	497
Sept. 25	P. V. Hodges	1.34	26.9

Daily discharge, in second-feet, of Cottonwood Creek (north channel) near Big Piney, Wyo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.	Sept.
1	20	16	40	.....	106	75	118	46	20
2	20	16	.....	.....	123	67	109	46	20
3	18	18	.....	.....	132	67	100	46	20
4	18	20	.....	.....	142	54	100	35	23
5	18	20	.....	.....	163	97	97	35	23
6	18	20	.....	.....	192	123	84	35	23
7	18	20	.....	75	220	152	81	30	27
8	18	20	.....	89	220	208	77	30	27
9	18	20	.....	89	185	244	84	26	27
10	18	20	.....	106	174	270	97	26	27
11	20	22	.....	106	174	312	100	26	27
12	20	24	.....	142	152	388	114	26	26
13	20	24	.....	142	132	421	136	26	26
14	20	24	.....	123	114	487	156	26	26
15	20	24	.....	97	132	535	146	35	26
16	20	24	.....	81	132	586	109	35	26
17	20	28	.....	74	123	487	77	26	26
18	20	30	.....	68	106	487	70	26	23
19	20	30	.....	63	81	454	57	26	23
20	20	32	.....	53	67	421	54	26	23
21	18	35	.....	52	67	454	70	26	23
22	18	35	.....	59	54	454	54	23	23
23	18	37	.....	66	42	520	44	23	23
24	18	40	.....	77	54	487	44	19	23
25	18	40	.....	89	67	388	44	19	24
26	16	40	.....	89	81	297	44	19	24
27	16	40	.....	81	67	257	44	19	24
28	16	40	.....	75	67	185	39	19	23
29	16	40	.....	89	67	152	39	19	23
30	16	40	.....	97	75	111	39	19	24
31	16	.....	.....	.....	75	.....	39	19	.....

NOTE.—Drift lodged on fence just below gage caused backwater June 6–30; maximum effect 0.55 foot as determined from discharge measurement. Discharge interpolated May 6 and Sept. 24; gage not read.

Monthly discharge of Cottonwood Creek (north channel) near Big Piney, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre feet.
	Maximum.	Minimum.	Mean.	
October	20	16	18.4	1,130
November	40	16	28.0	1,670
April 7–30	142	52	86.8	4,130
May	220	42	116	7,130
June	586	54	309	18,400
July	156	39	79.5	4,890
August	46	19	27.6	1,700
September	27	20	24.1	1,430

Discharge measurements of Cottonwood Creek (south channel) near Big Piney, Wyo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 6	S. B. Soulé	3.05	100
June 17	....do	5.00	354
Sept. 25	P. V. Hodges	2.23	18

Daily discharge, in second-feet, of Cottonwood Creek (south channel) near Big Piney, Wyo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.	Sept.
1	12	13	4	.....	56	51	87	21	16
2	12	13	.....	.....	75	47	71	23	18
3	12	7	.....	.....	85	46	73	23	19
4	13	7	.....	.....	95	54	73	20	18
5	13	7	.....	.....	106	68	62	20	16
6	13	6	.....	.....	99	77	58	19	16
7	14	6	.....	8	88	107	56	19	16
8	14	6	.....	12	88	118	42	18	16
9	14	6	.....	12	87	130	45	18	16
10	14	6	.....	17	83	160	50	18	16
11	14	6	.....	17	83	188	45	16	14
12	14	6	.....	28	79	214	41	16	14
13	14	6	.....	28	67	239	45	16	15
14	14	6	.....	62	69	263	55	16	14
15	14	6	.....	53	70	294	67	19	13
16	14	6	.....	47	68	330	57	22	15
17	14	6	.....	40	64	354	45	18	17
18	14	6	.....	37	60	338	38	16	17
19	14	6	.....	35	54	325	33	16	16
20	14	6	.....	34	50	314	33	16	16
21	14	6	.....	34	49	310	40	16	16
22	14	6	.....	37	50	283	35	16	16
23	14	5	.....	40	49	286	30	16	19
24	14	5	.....	41	53	295	28	16	20
25	14	5	.....	44	54	227	25	17	18
26	14	4	.....	45	59	176	24	18	18
27	14	4	.....	48	61	154	23	18	18
28	13	4	.....	48	63	130	22	17	18
29	13	4	.....	51	65	108	21	18	16
30	13	4	.....	54	60	96	21	17	16
31	13	.....	.....	.....	57	.....	20	17	.....

Monthly discharge of Cottonwood Creek (south channel) near Big Piney, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	14	12	13.6	836
November	13	4	6.1	363
April 7–30	54	8	36.3	1,730
May	106	49	69.2	4,250
June	354	46	193	11,500
July	87	20	44.0	2,710
August	23	16	17.9	1,100
September	20	13	16.4	976

EAST FORK BASIN.

EAST FORK AT NEWFORK, WYO.

LOCATION.—About sec. 33, T. 32 N., R. 108 W., at highway bridge a quarter of a mile south of Newfork, Fremont County. No tributary between station and mouth 1 mile below.

DRAINAGE AREA.—348 square miles (measured on map of United States Geological Survey; scale, 1:500,000).

RECORDS AVAILABLE.—April 1, 1905, to October 31, 1906; May 11, 1915, to September 30, 1918.

GAGE.—Vertical staff on downstream side of left abutment; read by Mrs. Pearl Eppelman, John Tarkelson, and Gus Eppleman. Gage a quarter of a mile upstream used during 1905; gage for 1906 located at bridge and referred to datum 0.27 foot higher than present gage.

DISCHARGE MEASUREMENTS.—Made from two-span highway bridge or by wading.

CHANNEL AND CONTROL.—Channel composed of sand and gravel. Control 100 feet downstream at gravel bar; affected by backwater from New Fork during high water of 1918. Banks are overflowed at stage of 6 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.8 feet at 6 a. m. June 11 (discharge, 3,020 second-feet); minimum discharge probably occurs during winter.

ICE.—Stage-discharge relation seriously affected by ice; observations discontinued.

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 119 second-feet from East Fork, all above station.

REGULATION.—Flow of East Fork regulated to minor extent by many small lakes at headwaters.

ACCURACY.—Stage-discharge relation fairly permanent except when affected by backwater. Rating curve used October 1 to November 30, fairly well defined; curve used April 4 to September 30, well defined throughout. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent except for June and August, for which they are fair.

Discharge measurements of East Fork at Newfork, Wyo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 8	S. B. Soulé	2.49	322
June 20	....do	4.59	1,100
Sept. 29	P. V. Hodges	1.20	55

Daily discharge, in second-feet, of East Fork at Newfork, Wyo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.
1	68	77	.....	100	478	174	68	60
2	68	74	.....	108	522	149	67	59
3	68	72	.....	128	745	149	67	59
4	68	71	79	174	1,560	138	64	59
5	66	69	79	216	1,960	121	64	57
6	66	68	74	262	2,170	114	64	57
7	66	69	75	262	2,170	112	64	57
8	66	68	81	312	2,170	101	64	57
9	66	68	95	350	2,310	100	64	57
10	66	68	119	330	2,380	119	64	57
11	65	67	138	295	2,540	115	63	55
12	64	67	123	278	2,540	114	63	55
13	63	66	123	262	2,380	106	63	54
14	64	68	108	330	2,540	128	63	54
15	64	68	101	370	2,340	124	63	60
16	62	69	94	432	2,000	110	62	59
17	62	69	88	410	1,720	98	62	57
18	62	68	82	390	1,590	94	62	55
19	62	66	80	350	1,340	91	62	55
20	63	67	80	312	1,100	87	62	55
21	64	68	77	278	1,260	87	61	55
22	65	69	82	262	1,820	83	61	54
23	66	70	85	312	1,500	79	61	59
24	65	71	88	350	1,380	75	61	59
25	64	71	87	390	1,020	73	61	58
26	68	69	92	410	745	73	60	58
27	68	68	85	410	595	70	60	56
28	66	68	88	370	432	69	60	56
29	59	72	88	330	312	69	60	55
30	64	71	91	350	231	68	60	58
31	73	.....	.....	410	.....	68	60	.....

NOTE.—Gage not read Nov. 20–23, August 5–31; discharge interpolated. Backwater from New Fork June 5–25 with maximum effect of 0.55 foot as determined from discharge measurement.

Monthly discharge of East Fork at Newfork, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	73	59	65.2	4,010
November	77	66	69.2	4,120
April 4–30	138	74	91.9	4,920
May	432	100	308	18,900
June	2,540	231	1,530	91,000
July	174	68	102	6,270
August	68	60	62.6	3,850
September	60	54	56.9	3,390

NEW FORK NEAR BOULDER, WYO.

LOCATION.—About sec. 8, T. 32 N., R. 108 W., at highway bridge 1 mile west of Boulder, Fremont County. Nearest tributary, Boulder Creek, enters one-eighth mile below.

DRAINAGE AREA.—578 square miles (measured on map of United States Geological Survey; scale, 1:500,000).

RECORDS AVAILABLE.—May 11, 1915, to September 30, 1918.

GAGE.—Vertical staff on downstream side of left abutment; read by J. O. Orcutt.

DISCHARGE MEASUREMENTS.—Made from two-span bridge or by wading near by.

CHANNEL AND CONTROL.—Channel is composed of sand and gravel underlain by slate; somewhat shifting. No well-defined control. At high water there are two overflow channels, one around right end of bridge, and the other from New Fork to Boulder Creek.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.7 feet at 6 a. m. June 17 (discharge, 12,300 second-feet). Minimum discharge occurs during winter.

ICE.—Stage-discharge relation seriously affected by ice; observations discontinued.

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 199 second-feet from New Fork above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent but shifted during high water. Rating curve used October 1 to December 1, well defined; curve used March 29 to June 26, well defined below 6,000 second-feet, but somewhat uncertain above. Rating curve applied indirectly June 27 to September 30. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except during extremely high water and latter part of year, for which they are fair.

Discharge measurements of New Fork near Boulder, Wyo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 8	S. B. Soulé	2.59	414
June 20	do	7.00	5,640
Sept. 29	P. V. Hodges	2.05	132

Daily discharge, in second-feet, of New Fork near Boulder, Wyo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	296	188	142	.....	273	291	461	2,000	461	150
2	300	180	.....	.....	310	255	461	1,720	461	150
3	296	188	.....	.....	220	238	461	1,640	438	176
4	284	180	.....	.....	205	273	486	1,560	438	163
5	284	174	.....	.....	176	255	561	1,390	370	163
6	280	165	.....	.....	205	329	810	1,320	414	150
7	276	165	.....	.....	205	370	1,100	1,320	392	150
8	276	168	.....	.....	205	392	1,470	1,160	392	150
9	276	168	.....	.....	220	461	2,000	1,320	392	163
10	276	168	.....	.....	350	536	2,560	1,240	350	150
11	268	165	.....	.....	486	588	3,400	1,320	329	150
12	256	159	.....	.....	588	588	4,130	1,240	329	150
13	244	159	.....	.....	536	510	5,090	1,240	392	138
14	244	165	.....	.....	536	486	6,250	1,390	350	131
15	236	165	.....	.....	438	461	9,200	1,390	310	138
16	228	156	.....	.....	350	461	10,500	1,320	291	140
17	228	156	.....	.....	310	461	11,800	1,160	291	140
18	220	188	.....	.....	273	486	8,390	1,470	291	136
19	220	208	.....	.....	273	486	7,620	1,030	255	131
20	208	256	.....	.....	255	461	6,570	965	238	128
21	204	196	.....	.....	255	438	5,640	965	238	126
22	200	177	.....	.....	291	414	5,360	900	220	128
23	196	171	.....	.....	310	370	5,090	840	205	128
24	188	150	.....	.....	291	370	4,830	698	190	133
25	184	142	.....	.....	291	414	4,350	698	176	143
26	180	145	.....	.....	291	486	3,730	698	176	140
27	188	140	.....	.....	273	536	3,400	642	176	136
28	192	156	.....	.....	273	561	3,250	642	163	133
29	248	208	.....	255	255	510	2,440	561	163	131
30	256	156	.....	255	255	486	2,200	536	163	138
31	177	.....	.....	273	.....	461	.....	506	163	.....

Monthly discharge of New Fork near Boulder, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	300	177	239	14,700
November	256	140	172	10,200
April	588	176	307	18,300
May	588	238	433	26,600
June	11,800	461	4,120	245,000
July	2,000	506	1,130	69,500
August	461	163	297	18,300
September	176	126	143	8,510

PINE CREEK AT FREMONT LAKE OUTLET, WYO.

LOCATION.—In sec. 22, T. 34 N., R. 109 W., at old Indian ford one-third mile below outlet of Fremont Lake, Fremont County.

DRAINAGE AREA.—114 square miles (measured on United States Geological Survey map; scale, 1:500,000).

RECORDS AVAILABLE.—July 22, 1910, to June 30, 1912; October 11, 1915, to September 30, 1918. From April 2, 1905, to October 31, 1906, a station was maintained half a mile downstream. Records at two points not comparable, as two ditches divert water between.

GAGE.—Chain on cantilever arm on left bank; read by forest ranger.

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

CHANNEL AND CONTROL.—Bed composed of small boulders; permanent. No well-defined control. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Data too few.

ICE.—Stage-discharge relation seriously affected by ice; observations discontinued.

DIVERSIONS.—Fremont canal diverts water between station and outlet of lake. During 1918 about 3 second-feet diverted from May 15 to September 30.

REGULATION.—Flow regulated naturally by Fremont Lake, which has an area of about 8 square miles.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 50 and 2,500 second-feet. Gage read to hundredths at irregular intervals. Daily discharge ascertained by applying daily gage height to rating table. Records fair.

COOPERATION.—Gage heights furnished by United States Forest Service.

Discharge measurements of Pine Creek at Fremont Lake outlet, Wyo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 22	S. B. Soulé	4.70	2,090
Sept. 27	P. V. Hodges	1.53	57

Daily discharge, in second-feet, of Pine Creek at Fremont Lake outlet, Wyo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	May.	June.	July.	Aug.	Sept.
1	112	38	31	.....	135	.....	.....	.....
2	109	38	30	.....	140	940	232	.....
3	106	38	30	.....	152	888	215	66
4	103	38	30	.....	168	.....	.....	62
5	100	38	30	43	190	.....	215	62
6	100	38	30	47	220	.....	.....	66
7	98	38	30	50	250	.....	207	66
8	95	38	30	60	380	.....	.....	.....
9	85	38	30	80	510	.....	183	.....
10	80	38	32	87	750	.....	.....	.....
11	80	38	32	97	1,000	.....	.....	.....
12	80	38	32	108	1,200	.....	.....	.....
13	75	34	32	110	1,450	.....	.....	.....
14	70	34	32	105	1,690	660	.....	.....
15	65	34	32	102	2,010	636	.....	.....
16	63	34	32	106	2,170	624	.....	.....
17	62	34	36	110	2,330	576	.....	.....
18	60	34	50	112	2,330	564	.....	.....
19	59	34	50	112	2,220	528	.....	.....
20	59	34	35	113	2,170	.....	.....	.....
21	55	34	35	113	2,100	.....	.....	48
22	52	33	34	113	1,930	442	.....	.....
23	50	33	35	114	1,880	420	.....	.....
24	50	33	36	117	1,830	390	.....	.....
25	49	33	35	123	1,720	360	.....	.....
26	48	33	35	129	1,620	341	.....	.....
27	46	33	35	135	1,580	331	.....	57
28	44	32	36	140	1,500	321	87	.....
29	43	32	38	135	1,360	273	.....	.....
30	40	31	38	132	1,200	.....	.....	.....
31	38	.....	38	130	.....	246	.....	.....

NOTE.—Gage read Oct. 1, 5, 6, 8, 9, 16, 19, 20, 22, 25, 29, 31, Nov. 3, 21, 28, Dec. 3–5, 10, 14, 22, 24, 29, 31, Jan. 2, 3, May 5–7, 10, 11, 15, 22, 25, 26, June 4, 7, 9, 14, 15, 17, 20, 22; discharge for other days determined from comparison with flow at Pinedale. Beginning July 1, discharge for missing days not determined.

Monthly discharge of Pine Creek at Fremont Lake outlet, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	112	38	70.2	4,320
November	38	31	35.2	2,090
December	50	30	34.2	2,100
May 5–31	140	43	105	5,620
June	2,330	135	1,270	75,600

PINE CREEK AT PINEDALE, WYO.

LOCATION.—In sec. 4, T. 33 N., R. 109 W., at highway bridge at Pinedale, Fremont County. No important tributary between station and mouth, 3 miles below.

DRAINAGE AREA.—128 square miles (measured on United States Geological Survey map; scale, 1:500,000).

RECORDS AVAILABLE.—May 8, 1915, to September 30, 1918.

GAGE.—Vertical staff on downstream side of bridge pier; read by United States Forest Service. Prior to August 17, 1917, vertical staff located a quarter of a mile downstream at left bank. No determined relation between gages.

DISCHARGE MEASUREMENTS.—Made from two-span bridge or by wading a short distance above.

CHANNEL AND CONTROL.—Channel and control shifted after high water of 1918. Banks are not overflowed except at extremely high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.0 feet at 8 a. m. and 5 p. m. June 17 (discharge, 2,310 second-feet); minimum discharge occurred during winter.

ICE.—Stage-discharge relation somewhat affected by ice; no estimates.

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 78 second-feet from Pine Creek between stations at Fremont Lake outlet and Pinedale, and 4 second-feet below Pinedale.

REGULATION.—Flow naturally regulated by Fremont Lake, which has an area of about 8 square miles and drains 110 square miles.

ACCURACY.—Stage-discharge relation permanent until high water, after which a shift occurred. Rating curve for bridge gage, used from October 1 to December 1 and May 9 to July 16, well defined below 2,000 second-feet; curve used March 27 to May 8 well defined; curve used July 17 to September 30, fairly well defined. Gage read to hundredths twice daily during high water and once daily for remainder of year. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

COOPERATION.—Gage heights furnished by United States Forest Service.

Discharge measurements of Pine Creek at Pinedale, Wyo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 9	S. B. Soulé	1.34	61
June 22	....do	4.60	2,000
Sept. 27	P. V. Hodges	.87	48.0

Daily discharge, in second-feet, of Pine Creek at Pinedale, Wyo., for the year ending Sept 30, 1918.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	95	42	28	.....	28	33	100	1,200	301	82
2	95	40	.....	.....	28	36	105	1,120	289	81
3	93	40	.....	.....	30	38	110	1,060	285	81
4	93	39	.....	.....	38	38	125	945	285	78
5	90	39	.....	.....	36	39	125	910	285	76
6	88	38	.....	.....	33	40	162	854	273	76
7	86	38	.....	.....	34	42	210	840	265	74
8	81	39	.....	.....	34	45	275	805	258	73
9	90	38	.....	.....	36	71	435	805	237	71
10	86	38	.....	.....	38	85	560	805	230	62
11	83	38	.....	.....	38	93	770	784	215	61
12	76	38	.....	.....	36	95	1,120	805	197	61
13	76	33	.....	.....	36	85	1,330	798	185	60
14	74	32	.....	.....	36	75	1,680	770	182	59
15	72	33	.....	.....	36	75	1,960	770	170	59
16	72	33	.....	.....	36	85	2,030	770	165	58
17	68	33	.....	.....	40	90	2,170	757	157	58
18	68	33	.....	.....	40	90	2,170	738	147	56
19	68	34	.....	.....	38	92	2,100	698	139	52
20	64	29	.....	.....	38	95	2,100	653	132	52
21	60	26	.....	.....	39	95	2,030	640	121	50
22	56	26	.....	.....	40	90	2,030	569	113	50
23	54	26	.....	.....	38	95	2,030	545	112	50
24	53	26	.....	.....	39	95	2,030	515	110	49
25	53	26	.....	.....	40	90	1,820	515	102	49
26	53	26	.....	.....	39	97	1,610	491	100	49
27	51	26	.....	28	38	105	1,610	467	99	50
28	51	26	.....	30	40	112	1,610	411	96	49
29	50	26	.....	31	40	100	1,540	380	92	49
30	46	28	.....	28	38	100	1,260	350	86	50
31	43	.....	.....	28	.....	100	.....	314	83	.....

NOTE.—Gage not read Nov. 4, 9, 11, Mar. 28, 31, Apr. 7, 9, 21, 24, 26, May 5, 19, 26, 27, June 23; discharge interpolated. Stage-discharge relation affected by ice Dec. 2 to Mar. 26; discharge not computed.

Monthly discharge of Pine Creek at Pinedale, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	95	43	70.6	4,340
November	42	26	33.0	1,960
March 27–31	31	28	29.0	288
April	40	28	36.7	2,180
May	112	33	78.1	4,800
June	2,170	100	1,240	73,800
July	1,200	314	712	43,800
August	301	83	178	10,900
September	82	49	60.8	3,620

BOULDER CREEK NEAR BOULDER, WYO.

LOCATION.—In sec. 4, T. 32 N., R. 108 W., at Sandlin's ranch, 2 miles northwest of Boulder, Fremont County. No tributary between station and mouth, 2 miles below.

DRAINAGE AREA.—112 square miles (measured on United States Geological Survey map; scale, 1:500,000).

RECORDS AVAILABLE.—April 23, 1904, to October 31, 1906; May 10, 1915, to September 30, 1918.

GAGE.—Vertical staff on left bank 60 feet northwest of ranch house; read by Mrs. M. M. Sandlin. Gage used 1904–1906 was a short distance upstream. No comparison between the two gages, as high water cut new channel and changed control.

DISCHARGE MEASUREMENTS.—Made by wading or from bridge $1\frac{3}{4}$ miles downstream during high water.

CHANNEL AND CONTROL.—Channel composed of gravel. Deep pool at gage. Control 150 feet downstream at rapids which were practically permanent until high water of 1918. Banks are high and not subject to overflow. Stage of zero flow, 0.3 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.8 feet at 7 a. m. June 14 (discharge, 3,240 second-feet); minimum stage occurred during winter.

ICE.—Stage-discharge relation seriously affected by ice; records discontinued.

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 47 second-feet from Boulder Creek, all above station.

REGULATION.—None, except natural regulation of Boulder Lake.

ACCURACY.—Stage-discharge relation shifted after high water. Rating curve fairly well defined below 2,200 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table; indirect method for shifting control used August 1 to September 30. Records good except for August and September for which they are fair.

Discharge measurements of Boulder Creek near Boulder, Wyo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 8	S. B. Soulé	1.53	98
June 20	....do	5.40	2,090
Sept. 28	P. V. Hodges	.60	7.3

Daily discharge, in second-feet, of Boulder Creek near Boulder, Wyo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	47	23	29	.....	57	18	178	450	34	7
2	43	14	.....	.....	55	15	202	410	35	7
3	41	14	.....	.....	57	14	230	350	31	7
4	38	31	.....	.....	57	20	450	350	31	7
5	36	31	.....	.....	50	53	750	310	29	7
6	33	29	.....	.....	42	75	1,040	260	27	7
7	29	26	.....	.....	51	80	1,220	245	25	7
8	23	25	.....	.....	54	95	1,490	245	24	7
9	20	27	.....	.....	54	102	2,040	245	21	6
10	16	25	.....	.....	59	140	2,440	245	19	6
11	13	25	.....	.....	63	135	2,840	245	16	6
12	10	26	.....	.....	63	122	3,080	245	18	6
13	7	24	.....	.....	61	118	3,080	260	16	6
14	7	23	.....	.....	61	117	3,160	310	15	6
15	6	23	.....	.....	64	133	3,080	310	15	7
16	5	25	.....	.....	66	140	2,760	292	14	6
17	5	29	.....	.....	66	156	2,440	275	13	6
18	5	31	.....	.....	64	156	2,360	245	11	6
19	5	31	.....	.....	62	156	2,120	202	11	6
20	5	31	.....	.....	59	131	1,960	167	11	6
21	4	30	.....	.....	63	127	2,120	156	11	6
22	4	28	.....	.....	59	127	2,120	133	10	6
23	5	25	.....	.....	59	133	1,960	113	10	7
24	4	25	.....	54	36	142	2,040	98	9	7
25	4	25	.....	57	14	167	1,640	88	9	6
26	4	25	.....	51	12	190	1,290	78	9	7
27	3	31	.....	57	12	215	1,040	74	9	7
28	4	29	.....	55	12	190	860	62	7	7
29	5	24	.....	54	12	190	650	54	7	7
30	5	25	.....	55	16	178	510	49	7	8
31	25	.....	.....	55	.....	167	.....	43	7	.....

Monthly discharge of Boulder Creek near Boulder, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	47	3	14.9	916
November	31	14	26.0	1,550
March 24–31	57	51	54.8	870
April	66	12	48.7	2,900
May	215	14	123	7,560
June	3,160	178	1,700	101,000
July	450	43	213	13,100
August	35	7	16.5	1,010
September	8	6	6.6	393

PINEY CREEK BASIN.

MIDDLE PINEY CREEK NEAR BIG PINEY, WYO.

LOCATION.—In sec. 30, T. 30 N., R. 113 W., at Black's ranch, 15 miles west of Big Piney, Lincoln County. No important tributary within several miles.

DRAINAGE AREA.—46 square miles (measured on special map in Bulletin 543).

RECORDS AVAILABLE.—April 1, 1915, to November 22, 1918, when station was discontinued. State engineer maintained station at Budd's ranch during 1914.

GAGE.—Vertical staff on left bank 200 feet below house; read by Mrs. Orlin Black. Prior to 1916 gage was 1 mile downstream at C. P. Budd's ranch. Datum lowered 0.50 foot May 17, 1917.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Channel composed of gravel. Control 50 feet below gage at small rapids, which are permanent. Banks are not overflowed except during extremely high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.65 feet at 6 a. m. June 16, 17, and 18 (discharge, 282 second-feet); minimum discharge occurred during winter.

ICE.—Stage-discharge relation seriously affected by ice; records discontinued.

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 34 second-feet from Middle Piney Creek above the station and 72 second-feet below.

REGULATION.—None.

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

The following discharge measurement was made by S. B. Soulé:
May 4, 1918: Gage height, 1.11 feet; discharge, 31.9 second-feet.

Daily discharge, in second-feet, of Middle Piney Creek near Big Piney, Wyo., for the period Oct. 1, 1917, to Nov. 23, 1918.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	16	11	.....	13	23	19	82	47	16	10	10
2	16	11	.....	12	25	19	74	44	16	10	10
3	15	10	.....	12	31	19	67	42	16	11	10
4	15	12	.....	11	35	20	68	38	17	12	10
5	15	10	.....	9	32	23	66	35	17	12	10
6	14	8	.....	7	31	30	62	35	16	12	8
7	14	9	.....	9	33	39	64	32	16	12	8
8	14	6	.....	10	24	47	62	32	16	12	5
9	14	7	.....	13	23	65	61	31	16	11	5
10	14	7	.....	16	23	87	64	30	16	11	5
11	13	8	.....	16	23	108	66	30	15	11	7
12	13	7	.....	24	23	130	60	30	14	11	6
13	13	8	.....	23	25	170	60	29	14	10	6
14	13	8	.....	22	24	220	58	28	15	10	7
15	12	9	.....	23	26	270	53	27	16	10	7
16	12	8	.....	19	27	282	52	28	15	10	7
17	12	7	.....	18	23	270	48	29	14	9	6
18	9	7	.....	16	23	270	44	29	14	12	5
19	11	8	.....	18	23	270	42	28	14	11	5
20	12	6	.....	16	23	258	43	26	12	11	4
21	12	7	.....	16	23	245	54	24	12	10	5
22	11	7	.....	16	23	200	56	23	12	10	7
23	11	7	.....	18	22	200	54	22	12	11	7
24	11	7	8	19	20	180	52	22	12	10	.....
25	11	7	7	19	16	180	51	21	11	10	.....
26	10	7	8	22	16	160	51	19	11	9	.....
27	10	7	10	21	16	140	51	19	11	9	.....
28	8	7	10	18	18	120	49	18	10	12	.....
29	9	7	11	18	19	108	47	17	11	12	.....
30	12	5	12	22	18	94	45	16	10	11	.....
31	11	.....	14	.....	18	.....	42	16	.....	11	.....

NOTE.—Gage not read Nov. 14, 1917, May 20, July 10, Aug. 11, 25, Sept. 14, and Nov. 21, 1918; discharge interpolated.

Monthly discharge of Middle Piney Creek near Big Piney, Wyo., for the period Oct. 1, 1917, to Nov. 23, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	16	8	12.4	762
November	12	5	7.8	464
March 24–31	14	7	10.0	158
April	24	7	16.5	982
May	35	16	23.5	1,440
June	282	19	141.0	8,390
July	82	42	56.4	3,470
August	47	16	28.0	1,720
September	17	10	13.9	827
October	12	9	10.7	658
November 1–23	10	4	7.0	319

FONTENELLE CREEK BASIN.

FONTENELLE CREEK NEAR FONTENELLE, WYO.

LOCATION.—About sec. 3, T. 24 N., R. 113 W., at bridge at Holden's ranch, on stage road from Opal to Big Piney, 5 miles west of Fontenelle, Lincoln County. No important tributary between station and mouth.

DRAINAGE AREA.—224 square miles (measured on map in Bulletin 543).

RECORDS AVAILABLE.—May 16, 1915, to September 30, 1918. State engineer maintained station at this point during 1914.

GAGE.—Vertical staff on downstream end of right abutment; read by Mrs. Howard Holden.

DISCHARGE MEASUREMENTS.—Made from single span bridge or by wading below bridge.

CHANNEL AND CONTROL.—Channel composed of coarse gravel. Control is small rapids 100 feet below gage; shifts occasionally. Banks subject to overflow during extremely high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.8 feet on May 12, 24, 27, June 13 and 14 (discharge, 496 second-feet); minimum discharge probably occurs during winter.

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 78 second-feet from Fontenelle Creek; percentage above station not known.

ICE.—Stage-discharge relation seriously affected by ice; observations discontinued during winter.

REGULATION.—None.

ACCURACY.—Stage-discharge relation shifted slightly during winter period. Rating curves fairly well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good except during high water when diurnal fluctuation in stage may cause considerable error.

Discharge measurements of Fontenelle Creek near Fontenelle, Wyo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 3	S. B. Soulé	1.29	311
June 16	....do	1.74	461
Sept. 24	P. V. Hodges	.38	53

Daily discharge, in second-feet, of Fontenelle Creek near Fontenelle, Wyo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	40	23	.....	108	208	189	122	70	40
2	40	36	.....	127	273	195	117	70	40
3	40	40	.....	78	290	202	122	70	51
4	36	36	.....	78	290	208	117	70	47
5	36	27	.....	58	324	256	113	66	47
6	32	36	.....	54	324	290	99	66	47
7	32	27	.....	54	324	341	99	62	47
8	32	27	.....	70	341	376	99	62	44
9	32	27	.....	82	307	376	108	62	47
10	32	40	.....	135	307	416	117	62	40
11	27	19	.....	208	273	456	143	58	40
12	27	23	.....	234	496	456	127	58	40
13	32	32	.....	240	416	496	122	58	40
14	32	27	.....	208	256	496	117	62	40
15	32	36	.....	173	256	456	113	66	40
16	32	36	.....	127	256	476	113	58	44
17	32	.....	.....	113	256	416	99	58	40
18	32	.....	.....	99	256	376	91	54	37
19	23	.....	.....	95	256	358	86	54	37
20	32	.....	.....	86	240	341	82	51	37
21	32	.....	.....	97	416	290	95	51	37
22	27	.....	.....	140	416	273	91	51	37
23	27	.....	.....	176	341	234	82	51	44
24	27	.....	.....	195	496	221	82	47	54
25	32	.....	.....	208	240	208	70	47	44
26	36	.....	.....	234	416	195	66	47	40
27	36	.....	74	195	496	176	66	44	40
28	40	.....	86	165	240	165	66	44	37
29	23	.....	97	195	214	148	62	40	40
30	49	.....	99	182	195	143	70	40	40
31	36	.....	110	.....	176	.....	70	40	.....

Monthly discharge of Fontenelle Creek near Fontenelle, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	49	23	32.8	2,020
November 1–16	40	19	30.8	977
March 27–31	110	74	93.2	924
April	240	54	140	8,330
May	496	176	319	19,600
June	496	143	308	18,300
July	143	62	97.6	6,000
August	70	40	56.1	3,450
September	54	37	41.9	2,490

BLACKS FORK BASIN.

BLACKS FORK NEAR URIE, WYO.

LOCATION.—In sec. 23, T. 16 N., R. 115 W., at highway bridge 4 miles northwest of Urie, Uinta County. No tributary within 10 miles.

DRAINAGE AREA.—261 square miles (measured on United States Geological Survey map; scale, 1:500,000).

RECORDS AVAILABLE.—August 21, 1913, to September 30, 1918.

GAGE.—Vertical staff on downstream side of center pier; read by Mary Anderson. Datum lowered 0.50 foot August 19, 1915, to avoid negative readings.

DISCHARGE MEASUREMENTS.—Made from two-span bridge or by wading 100 feet downstream.

CHANNEL AND CONTROL.—Channel composed of well-compacted gravel. Control is small rapids just below the bridge and remained practically permanent during 1918. Right bank high and not subject to overflow; left bank subject to overflow at stage of about 3 feet. Stage of zero flow, 0.3 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.0 feet at 6.30 p. m. June 19 (discharge, 1,890 second-feet); minimum stage, 0.25 foot August 3–8 (discharge, 2 second-feet).

ICE.—Stage-discharge relation seriously affected by ice; observations discontinued during winter.

DIVERSIONS.—Below all diversions. Prior to December 31, 1916, adjudicated diversions of 599 second-feet from Blacks Fork.

REGULATION.—None.

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

The following discharge measurement was made by S. B. Soulé:

June 14, 1918: Gage height, 3.56 feet; discharge, 1,380 second-feet.

Daily discharge, in second-feet, of Blacks Fork near Urie, Wyo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4	20	.....	46	25	176	10	4	3
2	4	20	.....	50	44	206	16	3	3
3	5	20	.....	21	88	312	19	2	4
4	5	20	.....	32	190	354	20	2	4
5	4	10	.....	26	238	444	20	2	4
6	4	8	.....	80	312	492	11	2	4
7	4	9	.....	88	332	710	8	2	4
8	4	10	.....	63	354	680	10	3	4
9	4	10	.....	70	255	803	12	4	4
10	4	10	.....	80	221	1,090	29	4	4
11	4	10	.....	80	206	1,260	70	4	4
12	4	10	.....	57	206	1,170	37	4	4
13	4	10	.....	61	190	1,090	31	4	4
14	4	10	.....	52	190	1,360	42	8	4
15	4	10	.....	38	375	1,260	25	4	4
16	5	10	.....	29	492	467	20	4	4
17	5	14	61	25	354	940	14	4	4
18	5	10	70	22	398	569	13	4	4
19	5	10	48	29	332	1,260	13	4	4
20	5	11	52	21	354	940	13	3	4
21	5	14	72	31	467	836	13	3	4
22	5	15	68	31	444	836	13	3	4
23	5	11	70	32	398	740	14	3	6
24	5	11	78	42	517	543	13	3	6
25	5	10	68	33	420	398	9	3	8
26	5	10	70	20	398	292	4	3	8
27	5	12	72	20	375	176	4	3	8
28	5	14	78	19	332	149	4	3	8
29	3	13	70	19	292	22	4	3	7
30	4	15	61	20	255	13	4	3	8
31	8	.....	61	.....	238	.....	4	3	.....

Monthly discharge of Blacks Fork near Urie, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	8	3	4.6	283
November	20	8	12.2	726
March 17–31	78	48	66.6	1,980
April	88	19	41.2	2,450
May	517	25	300	18,400
June	1,360	13	653	38,900
July	70	4	16.7	1,030
August	8	2	3.4	209
September	8	3	4.8	286

HAMS FORK AT KEMMERER, WYO.

LOCATION.—In SW. ¼ sec. 13, T. 21 N., R. 116 W., at highway bridge in Kemmerer, Lincoln County. No important tributary within many miles.

DRAINAGE AREA.—383 square miles (measured on United States Geological Survey map; scale, 1:500,000).

RECORDS AVAILABLE.—May 1 to September 30, 1918.

GAGE.—Chain attached to upstream side of bridge; read by W. A. Sommers.

DISCHARGE MEASUREMENTS.—Made from railroad bridge half a mile downstream or by wading just below gage.

CHANNEL AND CONTROL.—Channel composed of gravel. Control at loose rock dam just below bridge; dam raised August 31, changing control.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 5.4 feet at 6 p. m. May 9 (discharge, 1,700 second-feet); minimum stage, 1.24 feet on August 30 and 31 (discharge, 24 second-feet).

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

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 37 second-feet from Hams Fork above station and 119 second-feet below.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent until August 31 when it was changed artificially. Rating curve fairly well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table; shifting-control method was used for September. Records good except for September, for which they are fair.

Discharge measurements of Hams Fork at Kemmerer, Wyo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 2	S. B. Soulé	3.67	827	Aug. 20	Robert Follansbee	1.28	30.0
June 15	do	3.74	878	Sept. 23	P. V. Hodges	1.77	34.5
July 12	do	2.02	190				

Daily discharge, in second-feet, of Hams Fork at Kemmerer, Wyo., for the year ending Sept. 30, 1918.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	830	670	200	64	27	16	1,100	850	169	57	27
2	850	670	183	68	27	17	1,040	760	148	48	31
3	895	625	183	62	27	18	995	670	130	42	31
4	1,100	715	180	61	27	19	1,040	625	122	40	29
5	1,140	760	178	59	32	20	895	580	118	34	26
6	1,210	805	169	57	42	21	895	580	127	32	31
7	1,240	895	161	53	32	22	895	500	113	29	31
8	1,240	895	150	53	32	23	945	440	101	27	35
9	1,500	895	153	53	32	24	995	440	95	28	35
10	1,040	895	215	50	31	25	895	400	99	34	34
11	895	895	245	46	29	26	895	328	90	28	33
12	805	895	200	42	27	27	945	275	84	27	33
13	805	895	200	42	26	28	850	260	82	27	32
14	895	850	200	42	26	29	670	230	78	27	32
15	995	805	186	52	27	30	715	215	72	24	31
						31	670	.....	70	24	.....

NOTE.—Gage not read May 1 and Sept. 24–30; discharge estimated.

Monthly discharge of Hams Fork at Kemmerer, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May	1,500	670	965	59,300
June	895	215	644	38,300
July	245	70	145	8,920
August	68	24	43.0	2,640
September	42	26	30.5	1,810
The period	.....	.....	.....	111,000

YAMPA RIVER BASIN.

LITTLE SNAKE RIVER NEAR DIXON, WYO.

LOCATION.—In sec. 6, T. 12 N., R. 90 W., at highway bridge 1 mile west of Dixon, Carbon County. No important tributary within several miles.

DRAINAGE AREA.—1,060 square miles (measured on map of United States Geological Survey; scale, 1:500,000).

RECORDS AVAILABLE.—May 27, 1910, to September 30, 1918 (records, 1914–1916, published in reports of State engineer of Colorado).

GAGE.—Chain gage on bridge; read by Miss Edith Madsen.

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 131 second-feet from Little Snake River in Wyoming; amount above station not known.

COOPERATION.—Complete records furnished by State engineer of Colorado.

Discharge measurements of Little Snake River near Dixon, Wyo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 5	B. T. Chase	2.00	336	July 28	B. T. Chase	1.15	68
May 5	.....do	5.50	3,560	Aug. 12	.....do	.64	7.2
June 28	.....do	2.35	657				

Daily discharge, in second-feet, of Little Snake River near Dixon, Wyo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	85	140	140	.....	585	1,110	2,150	315	21.0	9.1
2	70	140	.....	.....	611	1,550	1,930	275	17.0	9.1
3	85	120	.....	.....	575	2,020	2,150	243	15.0	11
4	100	120	.....	.....	475	2,570	2,340	283	8.7	14
5	100	140	.....	.....	381	3,260	2,700	255	7.8	17
6	70	140	.....	.....	345	3,500	2,930	215	6.5	17
7	70	140	.....	.....	367	3,950	3,170	223	7.8	21
8	85	140	.....	.....	381	3,670	3,300	191	7.8	21
9	100	140	.....	.....	451	3,780	3,230	170	8.7	21
10	85	100	.....	.....	654	3,230	3,230	263	8.7	26
11	100	120	.....	.....	795	2,570	3,370	315	7.8	21
12	100	140	.....	.....	986	2,120	3,170	358	7.8	23
13	100	120	.....	.....	1,130	1,910	3,130	323	5.7	21
14	100	140	.....	.....	1,320	2,440	2,900	263	8.7	26
15	100	188	.....	.....	1,070	2,830	2,640	191	10.0	23
16	100	140	.....	.....	709	3,500	2,600	161	13.0	19
17	100	140	.....	295	681	3,030	2,210	170	10.0	19
18	85	100	.....	335	575	3,230	2,020	161	7.8	19
19	100	100	.....	358	500	2,660	1,720	131	8.7	29
20	100	120	.....	345	451	2,900	1,720	105	7.8	23
21	100	140	.....	315	485	2,700	1,570	100	6.5	21
22	100	140	.....	358	550	2,540	1,700	94	7.8	23
23	100	100	.....	413	585	2,900	1,450	84	7.8	26
24	100	164	.....	475	575	3,170	1,410	80	10.0	40
25	120	188	.....	535	766	3,260	1,230	70	8.7	100
26	100	164	.....	550	778	3,100	930	80	10.0	125
27	100	140	.....	638	808	2,800	737	64	10.0	100
28	100	140	.....	638	692	2,770	575	64	8.7	90
29	100	140	.....	255	611	2,510	413	64	7.8	70
30	70	140	.....	475	709	2,640	358	40	10.0	60
31	140	.....	.....	575	.....	2,440	.....	18	8.7	.....

Monthly discharge of Little Snake River near Dixon, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	140	70	95.6	5,880
November	188	100	136	8,090
March 17-31	638	255	437	13,000
April	1,320	345	653	38,900
May	3,950	1,110	2,790	172,000
June	3,370	358	2,100	125,000
July	358	18	173	10,600
August	21	5.7	9.4	578
September	125	9.1	34.8	2,070

SAVERY CREEK AT SAVERY, WYO.

LOCATION.—About sec. 8, T. 12 N., R. 89 W., half a mile east of Savery, Carbon County. No tributary between station and mouth, 1½ miles below.

DRAINAGE AREA.—354 square miles (measured on map of United States Geological Survey; scale, 1:500,000).

RECORDS AVAILABLE.—May 1, 1915, to September 30, 1916; April 5 to September 30, 1918.

GAGE.—Vertical staff at highway bridge; read by Marie Kilgore.

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 63 second-feet from Savery Creek.

REGULATION.—None.

COOPERATION.—Complete records furnished by State engineer of Colorado.

Discharge measurements of Savery Creek at Savery, Wyo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 5	B. T. Chase	1.70	92	July 28	B. T. Chase	0.75	5.7
May 5	do	3.10	477	Aug. 13	do	.29	1.0
June 29	do	.95	15.5				

Daily discharge, in second-feet, of Savery Creek at Savery, Wyo., for the year ending Sept. 30, 1918.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	202	260	18	0.6	0.0	16	290	445	162	44	0.0	1.2
2	.....	202	230	18	.6	.0	17	188	321	188	39	.0	1.2
3	.....	463	216	18	.6	.0	18	150	321	150	39	.0	2
4	.....	260	202	31	.2	.0	19	150	321	141	39	.0	3
5	56	230	230	18	.0	.0	20	113	260	95	39	.0	9
6	87	477	202	18	.0	.0	21	113	260	141	35	.0	9
7	104	509	275	9	.2	.0	22	122	290	150	31	.0	9
8	95	509	260	9	.2	.0	23	150	321	150	31	.0	18
9	113	509	230	9	.0	.0	24	150	260	95	28	.0	35
10	131	321	230	24	.0	.0	25	216	260	71	24	.0	39
11	202	260	230	131	.0	.0	26	230	260	87	21	.0	56
12	260	260	230	113	.0	.0	27	245	245	49	18	.0	63
13	260	260	216	95	.0	.0	28	202	245	31	18	.0	35
14	321	260	188	56	.0	.0	29	150	230	18	9	.0	39
15	321	321	162	44	.0	1.2	30	202	260	18	3.5	.0	39
							31	.....	260	.....	.6	.0	.....

Monthly discharge of Savery Creek at Savery, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 5-30	321	56	178	7,300
May	509	202	319	19,600
June	275	18	164	9,760
July	131	.6	339	2,080
August	.6	0	.08	4.9
September	63	0	12.0	714
The period	.....	.....	.....	39,500

MUDDY CREEK NEAR BAGGS, WYO.

LOCATION.—About sec. 33, T. 13 N., R. 91 W., at highway bridge 1¼ miles northeast of Baggs, Carbon County. No tributary between station and mouth, 1 mile below.

DRAINAGE AREA.—904 square miles.

RECORDS AVAILABLE.—May 4, 1915, to August 10, 1916; April 6 to August 31, 1918.

GAGE.—Chain gage on upstream side of single-span bridge; read by Bayard Bailey.

DIVERSIONS.—Prior to December 31, 1916, adjudicated diversions of 3 second-feet from Muddy Creek above station.

COOPERATION.—Complete records furnished by State engineer of Colorado.

Discharge measurements of Muddy Creek near Baggs, Wyo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 6	B. T. Chase	0.20	24.8	July 28	B. T. Chase	0.50	16.0
May 7	do	1.30	39.2	Aug. 13	do	.29	*a* 6
June 28	do	.62	22.0	Sept. 10	do	2.48	78.0

a Estimated.

Daily discharge, in second-feet, of Muddy Creek near Baggs, Wyo., for the year ending Sept. 30, 1918.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	16	22	8	43	0	16	49	30	17	33	0	0
2	.....	16	8	10	19	0	17	28	30	14	16	0	0
3	.....	13	9	9	12	0	18	25	30	22	16	5	0
4	.....	12	7	10	8	0	19	30	33	24	13	43	0
5	.....	24	10	9	22	0	20	30	16	28	8	51	0
6	15	33	6	9	10	0	21	33	22	240	30	78	0
7	16	30	6	15	11	0	22	33	16	100	16	31	0
8	30	33	6	12	12	0	23	34	18	445	22	158	0
9	43	39	7	9	9	0	24	33	15	290	33	153	5
10	42	34	8	16	8	0	25	39	12	100	36	15	28
11	22	25	6	100	7	0	26	43	18	36	34	6	78
12	134	30	7	142	6	0	27	12	13	33	80	0	342
13	52	33	6	215	6	0	28	13	14	19	190	0	392
14	58	39	6	108	0	0	29	12	16	19	240	0	288
15	45	21	16	62	0	0	30	14	18	16	166	0	252
							31	.....	21	.....	80	0	.....

Monthly discharge of Muddy Creek near Baggs, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 6–30	134	12	35.4	1,760
May	39	12	23.2	1,430
June	445	6	51.1	3,040
July	240	8	56.4	3,470
August	158	0	23.0	1,410
September	392	0	46.2	2,750
The period	.....	.....	.....	13,900

ASHLEY CREEK BASIN.

ASHLEY CREEK NEAR VERNAL, UTAH.

LOCATION.—In sec. 12, T. 3 S., R. 20 E., three-quarters of a mile above heading of power canal of Vernal Milling & Light Co., 4 miles above mouth of Dry Fork, and 12 miles northwest of Vernal, Uinta County.

DRAINAGE AREA.—101 square miles (measured on topographic maps).

RECORDS AVAILABLE.—June 6, 1914, to September 30, 1918. From October 8, 1911, to June 5, 1914, fragmentary records were obtained at power plant, the total flow of the creek being determined by including the discharge from the tailrace. Records are also available for a point below the mouth of Dry Fork from March 15, 1900, to December 31, 1904.

GAGE.—Gurley water-stage recorder on left bank three-quarters of a mile above heading of power canal, installed November 14, 1917; inspected by William Mort. Staff gage on right bank 850 yards above heading of power canal, July 12 to November 13, 1917. Lietz water-stage recorder on right bank about 400 yards above heading of power canal, April 15, 1915, to June 17, 1917, at same location as vertical staff gage from which fragmentary records had been obtained since June 6, 1914. Description of gages used previous to that date published in Water-Supply Paper 459.

DISCHARGE MEASUREMENTS.—Prior to June 17, 1917, made from cable about 75 feet above gage or by wading; after that date, by wading.

CHANNEL AND CONTROL.—Bed steep and rough; subject to change during high water. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.50 feet at 12.30 p. m. May 25 (discharge, 324 second-feet); minimum discharge, 35 second-feet at 3 p. m. February 15. As gage was read once each week, it is probable that the preceding determinations do not represent the extreme stages reached.

1911–1918: Maximum discharge recorded, 1,350 second-feet, May 23, 1914 (probably exceeded by high water in June, 1917); minimum stage recorded, 1.34 feet April 8, 1917 (discharge, 28 second-feet).

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

DIVERSIONS.—Above all diversions.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed when gage was moved November 14, 1917; not affected by ice. Rating curve used October 1 to November 13, fairly well defined; curve used November 14 to September 30, fairly well defined between 30 and 250 second-feet. Operation of water-stage recorder not satisfactory. Weekly readings by observer used except November 17–30 and February 2–7. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph or by applying weekly gage height to rating table. Monthly discharge not computed. Records fair.

Discharge measurements of Ashley Creek near Vernal, Utah, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 14	E. S. Borgquist	3.56	70	June 17	A. B. Purton	4.06	200
Feb. 15	J. J. Sanford	3.44	34.7	Aug. 4	J. W. Bones	3.66	98
Apr. 21	R. P. Flagel	3.46	35.9				

Daily discharge, in second-feet, of Ashley Creek near Vernal, Utah, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1			72						249			
2					42	37						
3					42						91	
4		85			42			177			91	
5				46	42							
6					42		42					
7	87				42							65
8			55						249			
9					42	37						
10											85	
11								177				
12				46			50					
13							50			101		
14	88	70										60
15			65		37				237			
16					37	37						
17		75							198		80	
18		75						278				
19		75		42								
20		75					46			101		
21	86	75					42					60
22		75	50						187			
23		75			37	37						
24		75									75	
25		75						324				
26		75		42								
27	86	75					50			96		
28		75									75	65
29		75	46						26			
30		72				42						
31						42					70	

DUCHESNE RIVER BASIN.

DUCHESNE RIVER AT DUCHESNE, UTAH.

LOCATION.—In SE. ¼ sec. 1, T. 4 S., R. 5 W., half a mile north of post office at Duchesne, Duchesne County, at bridge on road from Duchesne to Tabiona, a quarter of a mile above mouth of Strawberry River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 3, 1917, to September 30, 1918.

GAGE.—Chain gage on downstream handrail of bridge near right bank; read by E. S. Winslow.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel. At extremely low water probably no flow under gage, but a pool remains as backwater from stream at control. Control formed by gravel riffle a short distance below gage; permanent. Banks are subject to erosion but not to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.4 feet at 8 a. m. June 10 (discharge, 2,740 second-feet); minimum stage recorded, 3.80 feet at 8 p. m. August 28 (discharge, 96 second-feet).

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—Below all diversions above mouth of Strawberry River; numerous diversions below station.

REGULATION.—None except by diversion.

ACCURACY.—Stage-discharge relation permanent except as affected by ice. Rating curve fairly well defined. Gage read to half-tenths twice a day except from December 8 to March 2, when it was read once a day. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Duchesne River at Duchesne, Utah, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 10	J. J. Sanford	[a]4.25	155	June 19	A. B. Purton	6.69	1,940
Apr. 9	R. P. Flagel	4.16	196	July 30	Bones and Purton	4.16	170

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Duchesne River at Duchesne, Utah, for the year ending Sept. 30, 1918.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	178		192	229	248	705	610	160	122
2	.....	192		207	198	284	774	579	145	152
3	207	192		198	216	351	1,000	550	135	152
4	[a]194	178		207	178	418	1,180	522	122	468
5	[a]180	192		229	198	468	1,540	522	117	372
6	[a]167	178		207	192	522	1,740	522	140	262
7	[a]153	178		229	192	522	2,060	468	152	229
8	140	207		198	192	522	2,060	418	140	238
9	178	207		216	192	550	2,500	550	145	238
10	222	178		187	198	522	2,740	640	140	262
11	178	106		198	229	495	2,620	522	140	248
12	207			216	238	418	2,500	579	140	229
13	192			187	222	418	2,390	610	145	238
14	238			165	207	443	2,390	774	170	222
15	222		140	160	192	579	2,280	672	248	198
16	192			170	187	705	2,280	522	192	198
17	207			187	187	705	2,170	522	187	192
18	200			187	178	705	2,060	443	165	187
19	192			178	178	705	1,840	418	160	178
20	197			187	187	705	1,740	395	152	170
21	202	120		178	178	740	1,640	330	152	165
22	207			187	178	705	1,450	351	160	165
23	238			187	187	774	1,450	330	145	291
24	238			187	198	847	1,270	310	145	310
25	222			198	207	924	1,180	291	122	262
26	207			198	198	924	1,000	291	117	248
27	192			207	216	847	886	284	113	238
28	192			198	216	740	810	229	100	222
29	192		.....	192	216	705	705	222	113	216
30	192		.....	198	229	705	640	192	140	207
31	178		.....	216	.....	705	.....	178	140	.....

[a] Gage not read; discharge interpolated.

NOTE.—Stage-discharge relation affected by ice Dec. 18, 20, 21, and Jan. 12 to Mar. 1. Discharge interpolated Dec. 18, 20, and 21; estimated Jan. 12 to Mar. 1, by means of gage heights, one discharge measurement, observer's notes, and weather records. Braced figures show mean discharge for periods indicated.

Monthly discharge of Duchesne River at Duchesne, Utah, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
December 3–31	238	140	197	11,300
January	207	.....	141	8,670
February	.....	.....	140	7,780
March	229	160	195	12,000
April	238	178	200	11,900
May	924	248	610	37,500
June	2,740	640	1,650	98,200
July	774	178	447	27,500
August	248	100	147	9,040
September	468	122	229	13,600
The period	.....	.....	.....	237,000

DUCHESNE RIVER AT MYTON, UTAH.

LOCATION.—In NW. ¼ sec. 25, T. 3 S., R. 2 W., at highway bridge at Myton, Duchesne County, 3 miles below mouth of Lake Fork and 15 miles above mouth of Uinta River.

DRAINAGE AREA.—2,750 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 26, 1899, to November 30, 1910; July 26, 1911, to September 30, 1918.

GAGE.—Chain gage near left end of bridge, installed August 6, 1910; readings about 2.7 feet lower than those on previous gage; read by Abe Smith. From October 26, 1899, to June 6, 1909, chain gage at old wooden bridge half a mile below present site. June 6, 1909, river cut new channel and chain gage was installed July 9, 1909, about a quarter of a mile upstream and at different datum; moved 100 feet downstream 1 month later; datum unchanged.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading 100 feet below.

CHANNEL AND CONTROL.—Bed composed of coarse gravel. Principal control probably a gravel bar at the ford 100 or 200 feet below the gage; shifting at long intervals. Banks comparatively low, but not subject to overflow, although subject to erosion during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.7 feet at 5.35 p. m. June 10 (discharge, 4,790 second-feet); minimum stage recorded, 1.0 foot September 1 and 2 (discharge, 56 second-feet).

1899–1918: Maximum stage recorded, 7.4 feet June 20, 22, and 23, 1917 (discharge, 9,690 second-feet); minimum stage recorded in 1918.

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

DIVERSIONS.—Much of low-water flow of river and its tributaries is diverted for irrigation above station.

REGULATION.—Annual run-off is affected by storage in United States Reclamation Service reservoir on Strawberry River, one of the main tributaries.

ACCURACY.—Stage-discharge relation changed during winter; affected by ice December 18 to February 28. Rating curve used October 1 to December 17, well defined; curve used March 1 to September 30, well defined. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except for period of ice effect. Records good.

Discharge measurements of Duchesne River at Myton, Utah, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 1	E. S. Borgquist	2.05	528	June 14	A. B. Purton	5.40	4,220
Feb. 10	J. J. Sanford	2.05	378	Aug. 5	J. W. Bones	1.09	77
Apr. 11	R. P. Flagel	1.92	401				

Daily discharge, in second-feet, of Duchesne River at Myton, Utah, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	567	454	502			403	341	317	844	887	136	56
2	534	454	502			437	331	382	930	844	121	56
3	502	454	490			403	331	437	1,240	844	121	56
4	502	534	502			448	341	448	1,610	722	93	56
5	490	502	442			392	284	508	2,220	722	80	350
6	472	442	442	325		403	270	646	2,700	684	170	293
7	502	442	490			437	270	844	2,970	647	121	248
8	502	472	414			448	284	887	3,410	610	93	248
9	502	502	567			478	293	973	4,220	706	106	248
10	490	534	638			448	351	1,060	4,590	802	106	270
11	472	534	567			448	420	1,020	4,590	1,190	100	270
12	442	502	472			508	448	973	4,400	887	93	270
13	454	534	534			478	508	887	4,400	1,710	106	228
14	431	567	567			420	508	762	4,220	1,330	106	228
15	442	502	534		390	382	478	684	4,050	1,060	200	228
16	431	490	534			392	392	646	3,880	1,020	250	221
17	442	454	454			392	366	646	3,560	973		214
18	442	472				382	293	646	2,970	802		207
19	442	490				392	293	722	2,830	646		207
20	454	472				403	293	722	2,970	610	175	192
21	502	502		335		351	303	802	2,830	508		188
22	502	502				382	341	887	2,830	448		170
23	490	472				382	331	973	2,450	407	136	1,020
24	454	490				341	303	1,060	2,450	366	121	684
25	442	502	415			341	293	1,190	2,110	341	121	448
26	472	567				366	303	1,330	1,810	341	121	415
27	502	567				382	341	1,420	1,330	248	106	382
28	490	490				351	331	1,060	1,330	207	98	350
29	454	454			.....	341	293	973	1,330	188	89	317
30	442	567			.....	293	293	930	973	170	80	293
31	454	.....			.....	317	.....	887	.....	170	68	.....

NOTE.—Discharge interpolated Nov. 1, 2, May 11, July 7, 9, 16, 23, 29, Aug. 11, 28, 29, Sept. 8, 9, 16, 17, 26–28; estimated Aug. 15–22, Sept. 3–5, and 20. Braced figures show mean discharge for periods indicated; estimated from discharge measurements, weather records, and observer's notes.

Monthly discharge of Duchesne River at Myton, Utah, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	567	431	475	29,200
November	567	442	497	29,600
December	638	.....	466	28,700
January	.....	.....	331	20,400
February	.....	.....	390	21,700
March	508	293	398	24,500
April	508	270	341	20,300
May	1,420	317	830	51,000
June	4,590	844	2,730	162,000
July	1,710	170	680	41,800
August	250	68	129	7,930
September	1,020	56	280	16,700
The year	4,590	56	628	454,000

STRAWBERRY RIVER AT DUCHESNE, UTAH.

LOCATION.—In sec. 2, T. 4 S., R. 5 W., at Winslow's ranch, 1 mile west of post office at Duchesne, Duchesne County, half a mile above mouth of Indian Canyon, a small tributary entering from south, and 1½ miles above confluence of Strawberry River with Duchesne River.

DRAINAGE AREA.—1,040 square miles (measured on topographic maps).

RECORDS AVAILABLE.—June 10, 1908, to November 30, 1910; March 16, 1914, to September 30, 1918.

GAGE.—Vertical staff installed July 30, 1918, on downstream side of right abutment of footbridge. Inclined staff on right bank, about 30 feet below present footbridge used April 12, 1914, to July 29, 1918. Gage read by E. S. Winslow. Gage datum lowered 1 foot November 5, 1915, and 1 foot July 30, 1918. Chain gage at approximately same site, but different datum was used 1908–1910. A staff gage at the county bridge about 1 mile below was used from March 16 to April 11, 1914.

DISCHARGE MEASUREMENTS.—Made from cable just below footbridge or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and gravel; probably shifting. Control at gravel bar a short distance downstream; fairly permanent. Left bank subject to overflow at extremely high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.8 feet at 7 p. m. June 23 (discharge, 613 second-feet); minimum stage, 1.65 feet August 10 and 11 (discharge, 42 second-feet).

1908–1918: Maximum discharge recorded, 1,860 second-feet, April 22, 1910; minimum discharge, 30 second-feet, November 20, 1914. Records obtained prior to 1914 incomplete.

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—Water stored in Strawberry Valley reservoir (capacity, 250,000 acre-feet) about 40 miles above station is diverted by means of tunnel to the Spanish Fork drainage basin. Some water is also diverted from upper end of Strawberry Valley to the basin of Provo River.

REGULATION.—Since 1912 flow of river has been affected by operation of Strawberry Valley reservoir.

ACCURACY.—Stage-discharge relation permanent during year except as affected by ice from January 9 to March 2. Rating curve well defined between 40 and 350 second-feet; fairly well defined above 350 second-feet. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except for period when stage-discharge relation was affected by ice. Records good.

Discharge measurements of Strawberry River at Duchesne, Utah, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 10	J. J. Sanford	[a] 1.25	91	June 19	A. B. Purton	1.43	189
Apr. 9	R. P. Flagel	1.18	129	July 30	Purton and Bones	.75	53

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Strawberry River at Duchesne, Utah, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	145	135	135	135		135	137	183	213	148	62	48
2	152	135	135	135		140	148	196	213	137	55	78
3	156	135	135	125		152	141	196	201	183	55	62
4	152	135	135	125		152	148	213	201	201	48	156
5	156	135	135	115		160	119	238	201	148	62	70
6	156	135	135	106		152	121	278	190	141	48	55
7	156	135	135	96		167	137	292	190	137	48	48
8	152	135	135	78		160	137	292	196	127	55	96
9	152	135	135			178	127	292	196	115	48	78
10	156	135	135			139	148	292	201	196	42	70
11	156	135	135			133	183	264	196	201	42	62
12	156	135	135			123	196	251	196	148	78	55
13	156	135	135			117	201	251	190	225	87	48
14	156	135	156			127	183	251	178	238	156	48
15	145	135	152		95	121	167	264	238	167	106	55
16	145	135	145			119	156	278	251	148	106	62
17	145	135	135			121	148	278	213	137	96	70
18	145	135	135			119	148	264	201	127	78	62
19	145	135	135			121	141	251	183	119	78	55
20	145	135	135	55		121	137	238	213	121	70	55
21	145	135	135			119	148	251	292	115	70	48
22	145	135	135			121	148	251	238	119	62	87
23	139	135	135			121	156	238	384	100	55	225
24	135	135	135			127	156	251	352	96	48	146
25	135	135	135			127	167	251	213	91	48	115
26	135	125	135			121	167	225	183	83	48	106
27	135	135	135			119	167	238	167	80	42	96
28	135	135	135			121	178	225	154	67	48	87
29	135	135	135		.....	119	178	238	148	59	42	78
30	135	135	135		.....	121	190	225	141	55	42	78
31	135	.....	135		.....	133	.....	225	.....	62	42	.....

NOTE.—Braced figures show mean discharge for periods indicated; estimated because of ice from one discharge measurement, weather records, and observer's notes.

Monthly discharge of Strawberry River at Duchesne, Utah, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	156	135	146	8,980
November	135	135	135	8,030
December	156	135	137	8,420
January	135	.....	70.3	4,320
February	.....	.....	95.0	5,280
March	178	117	132	8,120
April	201	119	156	9,280
May	292	183	248	15,200
June	384	141	211	12,600
July	238	55	132	8,120
August	156	42	63.5	3,900
September	225	48	79.9	4,750
The year	384	42	134	97,000

RED CREEK NEAR FRUITLAND, UTAH.

LOCATION.—In sec. 28, T. 3 S., R. 8 W., Uinta special base and meridian, 400 feet above State highway crossing at D. S. Murdock's ranch, and 4 miles southeast of Fruitland, Duchesne County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 23, 1917, to September 30, 1918.

GAGE.—Vertical staff on left bank 200 feet east of ranch house and 400 feet upstream from road bridge; read by Mrs. A. S. Murdock.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed composed of silt and sand; somewhat shifting. No well-defined control. One channel at all stages. Banks subject to overflow at extremely high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 6.5 feet on January 24, when there was backwater from ice. Maximum stage of unobstructed flow, 4.55 feet at 4 p. m. September 23 (discharge, 27 second-feet); minimum stage recorded, 3.31 feet at 3.30 p. m. August 5 (discharge, 0.1 second-foot).

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—Below all diversions from Red Creek.

REGULATION.—None except by diversion.

ACCURACY.—Stage-discharge relation changed during winter; affected by ice December 2–15 and December 23 to March 8. Rating curves fairly well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Red Creek near Fruitland, Utah, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 23	E. S. Borgquist	4.34	15.1	June 19	A. B. Purton	3.85	7.6
Feb. 9	J. J. Sanford	a 5.70	10.4	July 29	J. W. Bones	3.35	.2
Apr. 9	R. P. Flagel	4.15	13.7				

a Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Red Creek near Fruitland, Utah, for the year ending Sept. 30, 1918.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		14				16	14	12	3.4	0.2	3.4
2						16	16	12	3.1	.2	3.4
3						17	15	12	3.2	.2	3.4
4						15	16	14	4.7	.2	5.0
5					12	a 15	18	15	4.2	.1	6.6
6						a 15	19	12	4.0	.2	5.0
7						a 14	17	14	3.9	.2	4.7
8						13	16	14	3.4	.2	9.7
9		12			14	15	15	10	4.0	.2	9.7
10					14	16	14	10	2.6	.2	9.3
11					13	17	15	11	2.8	.2	9.0
12					12	19	15	10	3.2	10	8.3
13					12	21	14	10	4.2	7.4	5.0
14					10	20	15	8.3	4.5	7.4	4.7
15				10	9.7	21	18	8.3	4.4	7.6	4.7
16		12	11		11	20	19	7.6	4.0	7.8	5.0
17		13			12	19	20	7.6	3.9	6.6	5.0
18		14			12	20	21	8.3	4.7	5.8	5.0
19		12			10	24	20	7.4	4.8	5.0	5.0
20		13			11	25	19	7.4	4.7	3.4	5.0
21		12			11	24	18	7.6	5.0	3.4	4.7
22		11			10	23	17	7.6	4.7	3.4	25
23	15				10	21	16	8.1	5.2	3.4	27
24	14				12	20	16	7.4	5.0	3.4	8.3
25	15				12	23	15	8.3	3.1	3.2	7.3
26	14	11			14	24	16	6.6	1.9	3.2	6.6
27	17				11	25	17	6.6	1.6	3.1	7.4
28	23				12	21	12	3.4	.7	3.1	8.3
29	16			.....	14	20	12	3.2	.5	3.1	8.3
30	14			.....	15	15	12	3.2	.2	3.1	8.3
31	.....			.....	15	.....	12	.....	.2	3.1	.....

a Interpolated.

NOTE.—Braced figures show mean discharge for periods indicated when stage-discharge relation was affected by ice; estimated from one discharge measurement, weather records, and observer's notes.

Monthly discharge of Red Creek near Fruitland, Utah, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
November 23–30	23	14	16.0	254
December	.....	.....	11.9	732
January	.....	.....	11.0	676
February	.....	.....	10.0	555
March	15	9.7	12.0	738
April	25	13	19.1	1,140
May	21	12	16.1	990
June	15	3.2	9.10	541
July	5.2	.2	3.41	210
August	10	.1	3.18	196
September	27	3.4	7.60	452
The period	.....	.....	.....	6,480

ANTELOPE CREEK NEAR MYTON, UTAH.

LOCATION.—In NW. ¼ sec. 10, T. 4 S., R. 3 W., at crossing of Gray Mountain canal over creek, a quarter of a mile above mouth, and 10 miles west of Myton, Duchesne County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 1, 1917, to September 30, 1918.

GAGE.—Vertical staff on right bank fastened to column of flume of Gray Mountain canal; read by Anthon Tucker.

DISCHARGE MEASUREMENTS.—Made by wading. High water can be measured from highway bridge, 25 feet upstream.

CHANNEL AND CONTROL.—Bed composed of hard clay; apparently permanent. No well-defined control. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.85 feet on June 22 (discharge not determined); minimum discharge zero at various times during year.

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—Station is below all diversions.

REGULATION.—None except that caused by numerous small diversions above.

ACCURACY.—Stage-discharge relation permanent during year except as affected by ice January 10–17 and January 23 to February 25. Rating curve well defined below 15 second-feet; no measurements of discharge have yet been made at higher stages. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Antelope Creek near Myton, Utah, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 25	E. S. Borgquist	7.56	11.6	June 19	A. B. Purton	6.55	a 0.2
Feb. 10	J. J. Sanford	7.55	8.2	July 31	J. W. Bones	6.65	a 0.2
Apr. 10	R. P. Flagel	.....	0				

a Estimated.

Daily discharge, in second-feet, of Antelope Creek near Myton, Utah, for the year ending Sept. 30, 1918.

Day.	Dec.	Jan.	Feb.	Mar.	June.	July.	Aug.	Sept.
1	11	8.0		5.9	.....	1.9	0.4	0.0
2	11	9.0		6.2	.....	1.9	.0	.0
3	11	9.0		4.8	.....	6.2	.0	.0
4	7.8	9.0		3.8	.....	.....	.0	.0
5	7.8	9.2		3.3	.....	4.8	.0	1.7
6	8.0	8.8		2.5		3.5	.4	2.5
7	8.8	8.4		1.7	.....	2.5	.4	1.0
8	a8.0	8.6		1.0	.....	2.5	.4	.0
9	7.1	7.1		a1.0	.....	.....	.4	.0
10	8.4			a1.0	.....	7.5	.4	.0
11	7.5			1.0	.....	.....	.4	.8
12	8.8			2.3	.....	7.5	.4	.8
13	9.0			5.1	.....	.....	.4	.8
14	9.0	7.6	7.0	3.8	.....	5.5	.4	.8
15	8.8			3.5	.....	4.4	.4	.1
16	8.6			3.4	.....	4.4	.4	.1
17	9.2			3.5	.....	4.4	.4	.1
18	12	8.6		3.8	.....	4.2	.4	.1
19	11	8.0		3.5	0.2	3.5	.4	.1
20	11	7.8		3.4	.1	3.0	.0	.1
21	11	7.1		3.5	.1	2.5	.0	.1
22	11	6.6		3.3	.....	2.5	.2	.8
23	9.0			3.5	.....	1.7	.2	.8
24	10			2.1	5.5	1.0	.2	.5
25	11			1.9	2.7	1.0	.2	.5
26	9.6	7.0	6.1	1.4	2.0	1.0	.2	.8
27	9.2		5.8	1.4	1.8	1.0	.0	.8
28	9.6		5.5	10.	1.7	1.0	.0	.8
29	9.0		.....	a.6	1.7	1.0	.0	.0
30	9.0		.....	a.4	1.7	1.0	.0	.0
31	9.4		.....	a.2	.....	.4	.0	.....

a Interpolated.

NOTE.—Braced figures show mean discharge for periods indicated when stage-discharge relation was affected by ice; estimated from one discharge measurement, weather records, and observer's notes. Creek practically dry April 1 to June 18. For days of missing discharge June 22 to July 13 stage was above limits of rating table as at present determined; water also overtopped gage July 4, 9, and 13.

Monthly discharge of Antelope Creek near Myton, Utah, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
December	12.	7.1	9.41	579
January	9.2	.....	7.71	474
February	.....	.....	6.87	381
March	6.2	.2	2.70	166
August	.4	.0	.23	14
September	2.5	.0	.47	28

NOTE.—See footnote to table of daily discharge.

LAKE FORK NEAR ALTONAH, UTAH.

LOCATION.—In S. ½ sec. 32, T. 1 N., R. 4 W., a quarter of a mile below heading of United States Lake Fork canal and 4½ miles northwest of Altonah, Duchesne County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 15, 1917, to September 30, 1918. June 4 to September 18, 1917, station maintained three-eighths mile upstream; records not directly comparable, as United States Lake Fork canal diverts water between stations.

GAGE.—Stevens continuous water-stage recorder on right bank; installed October 15, 1917; inspected by Warren Foote and W. R. Preece.

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

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

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 4.24 feet at 4.30 a. m. June 11 (discharge, 2,000 second-feet); minimum discharge not determined.

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—Above all diversions except Farnsworth canal, Payne canal, and United States Lake Fork canal. Records of these canals for the irrigation season accompany records for this station.

REGULATION.—A number of small lakes on the headwaters have been developed to store about 5,000 acre-feet.

ACCURACY.—Stage-discharge relation not permanent; shifted October 15 to December 4, and June 2. Rating curves poorly defined. Operation of water-stage recorder unsatisfactory as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height determined from inspection of recorder graph; shifting-control method used October 15 to December 4. Records fair.

Records of discharge of Farnsworth, Payne, and United States Lake Fork canals for the irrigation season are published herewith to supplement the records of flow at this station, as these are the only diversions in the Lake Fork basin above this station. The records of daily discharge of these canals were furnished by C. C. Jacob, Federal court water commissioner. Following these records is a table of combined flow showing total run-off of Lake Fork including diversions.

Discharge measurements of Lake Fork near Altonah, Utah, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 15	E. S. Borgquist	1.28	132	May 29	C. C. Jacob	1.63	194
Nov. 30	do	1.35	152	June 18	Purton and Jacob	3.00	859
Feb. 11	J. J. Sanford	[a] 1.70	90	July 8	C. C. Jacob	1.52	193
May 14	C. C. Jacob	1.40	145	Aug. 1	Jacob and Bones	1.22	132

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Lake Fork near Altonah, Utah, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	143	154				96	95	250	205	134	116
2	.....	139	156				96	100	280	191	135	118
3	.....	135	156				96	102	475	189	136	120
4	.....	135	150				93	104	640	181	136	122
5	.....	134					82	155	828	172	137	124
6	.....	132					87	192	1,000	185	138	127
7	.....	137					92	196	1,080	196	139	130
8	.....	135					96	218	1,190	194	139	132
9	.....	132					96	244	1,420	217	139	134
10	.....	134					96	224	1,580	278	139	127
11	.....	141					96	204	1,580	315	139	120
12	.....	148					96	184	1,380	251	139	113
13	.....	154					96	165	1,300	284	139	112
14	.....	156					96	145	1,230	358	139	112
15	132	154			90		95	165	1,150	282	139	112
16	132	148		110		95	95	205	1,110	257	139	114
17	130	150					95	203	1,080	248	130	115
18	134	150	145				95	201	930	227	126	123
19	148	150					93	198	1,000	210	124	124
20	150	150					82	210	700	194	122	125
21	150	152					82	264	640	185	120	126
22	148	152					82	246	550	178	118	127
23	146	156					82	250	500	176	117	128
24	146	156					93	348	450	170	116	129
25	143	158					119	348	410	165	115	130
26	148	156					114	330	350	160	114	130
27	144	150					111	280	298	154	113	125
28	144	154					105	235	260	148	112	123
29	143	152			.....		99	198	243	139	110	123
30	146	154			.....		95	222	220	130	112	122
31	144	.....			.....		.....	222	.....	130	114	.....

NOTE.—Braced figures show mean discharge for periods indicated when stage-discharge relation was affected by ice. No gage-height record, discharge interpolated, Apr. 6, 7, May 10–13, 17, 18, July 24, 25, 27, 29, Aug. 2–6, 8, 10–15, 18, 19, 21–28, 30, 31, Sept. 1–3, 5–8, 10, 11, 13, 14, 16, and 19–25.

Monthly discharge of Lake Fork near Altonah, Utah, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October 15–31	150	130	143	4,820
November	158	132	147	8,750
December	.....	.....	146	8,980
January	.....	.....	110	6,760
February	.....	.....	90.0	5,000
March	.....	.....	95.0	5,840
April	119	82	95.0	5,650
May	348	95	208	12,800
June	1,580	220	804	47,800
July	358	130	205	12,600
August	139	110	128	7,870
September	134	112	123	7,320
The period	.....	.....	.....	134,000

Daily discharge, in second-feet, of Farnsworth canal for the irrigation season 1918.

Day.	May.	June.	Aug.	Sept.	Day.	May.	June.	Aug.	Sept.
1	47	0	.....	34	16	37	110	.....	33
2	48	55	.....	40	17	46	110	.....	30
3	49	110	.....	43	18	56	110	.....	28
4	23	110	.....	43	19	54	.....	.....	16
5	2	110	.....	43	20	26	.....	.....	16
6	2	110	.....	43	21	11	.....	.....	.....
7	2	110	.....	43	22	26	.....	.....	.....
8	2	110	.....	44	23	28	.....	.....	.....
9	18	110	.....	45	24	30	.....	.....	.....
10	37	110	.....	45	25	59	.....	12	.....
11	37	110	.....	43	26	61	.....	14	.....
12	37	110	.....	41	27	63	.....	23	.....
13	37	110	.....	40	28	66	.....	32	.....
14	37	110	.....	38	29	47	.....	32	.....
15	37	110	.....	36	30	30	.....	32	.....
					31	0	.....	32	.....

NOTE.—Canal dry June 19 to Aug. 24.

Monthly discharge of Farnsworth canal for the irrigation season 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May	66	0	34.0	2,090
June	110	0	60.5	3,600
July	0	0	0	0
August	32	0	5.71	351
September 1–20	45	16	37.2	1,480
The period	110	0	26.5	7,520

Daily discharge, in second-feet, of Payne canal for the irrigation season 1918.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	5	29	38	11	8	16	31	60	50	24	.....
2	2	31	38	10	8	17	36	67	47	24	.....
3	2	47	37	11	7	18	42	61	35	24	.....
4	4	62	36	11	10	19	41	70	34	24	.....
5	4	69	36	11	13	20	41	67	32	24	.....
6	7	72	34	11	13	21	38	41	30	24	.....
7	24	75	25	11	13	22	35	41	29	24	.....
8	21	75	21	11	13	23	39	41	32	24	.....
9	18	75	21	11	12	24	42	41	25	18	.....
10	28	75	21	11	12	25	47	44	18	13	.....
11	34	0	32	11	11	26	46	47	18	15	.....
12	34	0	46	23	10	27	45	41	18	12	.....
13	34	0	48	24	10	28	41	41	19	12	.....
14	31	53	50	24	9	29	38	41	17	10	.....
15	29	60	53	24	8	30	35	41	13	8	.....
						31	32	.....	14	8	.....

Monthly discharge of Payne canal for the irrigation season 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May	47	2	29.2	1,800
June	75	0	48.9	2,910
July	53	13	31.2	1,920
August	24	8	16.2	996
September 1–15	13	7	10.5	311
The period	75	0	29.0	7,940

Daily discharge, in second-feet, of United States Lake Fork canal for the irrigation season 1918.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	19	84	106	75	42	16	84	140	112	60	.....
2	26	90	118	76	44	17	90	135	106	57	.....
3	33	106	126	76	47	18	92	130	84	55	.....
4	40	124	134	76	50	19	85	130	92	53	.....
5	52	146	143	76	50	20	78	130	100	51	.....
6	64	156	124	76	50	21	94	129	110	49	.....
7	60	156	95	76	51	22	106	127	100	47	.....
8	57	155	99	76	51	23	104	125	84	45	.....
9	42	154	104	76	52	24	105	124	78	43	.....
10	86	154	108	74	52	25	112	118	73	42	.....
11	82	153	106	72	30	26	116	143	73	40	.....
12	78	153	108	70	30	27	112	143	72	39	.....
13	75	152	109	68	31	28	108	136	71	38	.....
14	82	150	110	66	32	29	95	127	76	37	.....
15	74	145	112	64	32	30	84	118	81	38	.....
						31	84	.....	75	39	.....

Monthly discharge of United States Lake Fork canal for the irrigation season 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May	116	19	78.0	4,800
June	156	84	134	7,970
July	143	71	99.6	6,120
August	76	37	59.0	3,630
September 1–15	52	30	42.9	1,280
The period	156	19	87.1	23,800

Total monthly discharge of Lake Fork (including diversions) near Altonah, Utah, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	150	130	143	8,790
November	158	132	147	8,750
December	.....	.....	146	8,980
January	.....	.....	110	6,760
February	.....	.....	90.0	5,000
March	.....	.....	95.0	5,840
April	119	82	95.0	5,650
May	566	166	349	21,500
June	1,920	363	1,050	62,500
July	518	219	336	20,700
August	232	177	209	12,900
September	243	122	174	10,400
The year	1,920	.....	240	178,000

LAKE FORK NEAR MYTON, UTAH.

LOCATION.—In sec. 21, T. 3 S., R. 2 W., Uinta special base and meridian, 100 yards below highway bridge, half a mile above confluence of Lake Fork with Duchesne River, and 3½ miles northwest of Myton, Duchesne County. From 1900 to 1903 this station was known as "Lake Creek at mouth."

DRAINAGE AREA.—468 square miles (measured on topographic maps).

RECORDS AVAILABLE.—July 3, 1900, to December 31, 1903; June 13, 1907, to November 30, 1910; July 26, 1911, to September 30, 1918.

GAGE.—Inclined staff installed September 13, 1912, on left bank at cable; read by Taylor Beasley and Anton Verholz. Description of gages used prior to 1912 given in Water-Supply Paper 459.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Banks perpendicular and comparatively high. Bed composed of gravel; somewhat shifting. Control permanent during year. Stage of zero flow, about 0.9 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.05 feet at 7 a. m. June 11 (discharge, 1,740 second-feet); minimum stage recorded, 1.35 feet August 31 (discharge, 2 second-feet).

1900–1903; 1907–1918: Maximum stage recorded, 9.4 feet June 22 and 23, 1917 (discharge, 4,350 second-feet); minimum discharge July 24, 1916, probably zero.

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

DIVERSIONS.—No diversions below station; several canals of the United States Indian Office and some privately owned canals divert water above for irrigation.

REGULATION.—Flow affected by irrigation diversions above.

ACCURACY.—Stage-discharge relation permanent during year except as affected by ice December 7 to March 5. Rating curve well defined between 5 and 1,300 second-feet. Gage read to hundredths once daily except November 18–25. Daily discharge ascertained by applying daily gage height to rating table except for period when gage was not read and period of ice effect. Records good except for periods estimated, for which they are fair.

Discharge measurements of Lake Fork near Myton, Utah, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 26	E. S. Borgquist	2.37	88	June 15	A. B. Purton	5.02	1,180
Feb. 10	J. J. Sanford	[a]2.92	117	Aug. 5	J. W. Bones	1.35	2.5

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Lake Fork near Myton, Utah, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	42	61	95				17	3	20	42	5	4
2	42	61	103				20	5	14	48	7	5
3	42	68	99			65	14	7	28	42	5	4
4	32	68	73				17	7	54	54	7	5
5	32	68	83				20	14	84	32	3	452
6	24	68	73			76	20	68	148	28	4	412
7	24	68				83	20	48	284	24	5	174
8	24	76				124	17	76	598	20	7	664
9	24	76				76	32	113	804	24	9	42
10	24	61				68	37	32	1,260	113	7	32
11	24	68				76	54	61	1,740	32	12	28
12	24	68				124	48	14	1,500	234	17	12
13	24	76				88	54	9	1,680	203	14	9
14	20	76				53	32	7	1,260	188	17	12
15	20	76	75	50	80	20	28	7	1,130	174	24	14
16	28	76				66	24	9	1,000	148	20	12
17	24	76				66	28	7	902	124	24	14
18	24					61	37	12	877	113	17	24
19	24					66	24	5	664	103	20	32
20	24					44	17	5	852	76	17	28
21	32	84				32	20	42	710	61	14	28
22	37					42	17	7	337	42	12	28
23	32					37	14	5	492	28	9	579
24	24					48	9	17	412	24	12	234
25	24					24	14	93	337	32	9	42
26	24	91				20	12	37	284	28	7	37
27	24	88				17	14	32	188	24	5	32
28	28	90				12	9	24	103	14	5	24
29	42	124				20	7	14	42	12	4	24
30	61	99				17	24	9	48	7	3	28
31	61					17		24		9	2	

NOTE.—Braced figures show mean discharge for periods indicated; estimated from discharge measurements, weather records, and observer's notes.

Monthly discharge of Lake Fork near Myton, Utah, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	61	20	30.2	1,860
November	124	61	78.5	4,670
December			77.4	4,760
January			50.0	3,070
February			80.0	4,440
March	124	12	54.9	3,380
April	54	7	23.3	1,390
May	113	3	26.2	1,610
June	1,740	14	595	35,400
July	234	7	67.8	4,170
August	24	2	10.4	640
September	664	4	101	6,010
The year	1,740	2	98.6	71,400

UINTA RIVER NEAR WHITEROCKS, UTAH.

LOCATION.—In SE. ¼ sec. 31, T. 2 N., R. 1 W., Uinta special base and meridian, 200 feet below Pole Creek bridge on road to government sawmill, in Duchesne County, 10 miles northeast of Whiterocks, Uinta County. Pole Creek enters on left a short distance above station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 5, 1917, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on right bank; installed November 5, 1917; inspected by Mrs. W. H. Koehler.

DISCHARGE MEASUREMENTS.—Made by wading or from highway bridge.

CHANNEL AND CONTROL.—Bed composed of boulders and gravel; apparently fairly permanent. No well-defined control. Banks low but probably not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.92 feet at 2 a. m. June 11 (discharge, 1,150 second-feet); minimum stage recorded, 3.86 feet at 11.30 a. m. April 19 (discharge, 54 second-feet).

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—Above all diversions except Cedar View canal, which diverts from right a quarter of a mile above station. Records of discharge of this canal for the irrigation season accompany records for this station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during winter; affected by ice December 21 to March 6. Rating curves fairly well defined between 60 and 600 second-feet. Operation of water-stage recorder satisfactory except December 21 to April 24, during which period weekly staff gage readings were obtained. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph. Records fair.

Records of discharge of Cedar View canal for the irrigation season are published with this station to supplement the records of flow at the station, as this is the only diversion in the Uinta River basin above this station. The records of daily discharge of this canal were furnished by C. C. Jacob, Federal court water commissioner. Following these records is a monthly table giving combined flow of Uinta River and canal, which is total flow of river.

Discharge measurements of Uinta River near Whiterocks, Utah, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 27	E. S. Borgquist	4.00	100	Aug. 2	J. W. Bones	4.46	270
Feb. 13	J. J. Sanford	[a] 3.96	69	27	C. C. Jacob [b]	4.22	143
Apr. 15	R. P. Flagel	3.92	64				

[a] Stage-discharge relation affected by ice.
[b] Water commissioner.

Daily discharge, in second-feet, of Uinta River near Whiterocks, Utah, for the year ending Sept. 30, 1918.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		108				67	90	399	299	247	128
2		108				69	100	470	299	252	128
3		112				72	115	581	337	237	138
4		100			60	74	138	659	337	232	146
5	131	118				76	158	778	315	247	162
6	131	102				76	170	824	304	262	154
7	131	115			60	76	178	890	310	237	138
8	128	118			61	76	213	890	299	237	138
9	118	113			62	76	213	956	343	262	158
10	128	108			64	76	213	988	458	232	135
11	128	105			65	76	204	956	488	222	125
12	122	102			66	76	200	923	452	252	122
13	131	102			68	76	200	824	550	250	118
14	128	100			69	78	254	824	738	248	115
15	131	100		68	70	64	308	824	581	247	115
16	122	98	70		70	62	362	758	531	213	131
17	125	98			70	59	417	824	500	191	122
18	122	100			69	56	428	646	446	182	115
19	122	95			69	54	382	679	411	174	112
20	122	95			68	58	428	679	388	159	108
21	122				68	63	464	679	476	166	105
22	122				68	67	464	600	482	158	122
23	115				67	71	464	692	428	150	299
24	115				66	76	562	626	354	146	222
25	115				65	80	562	519	348	142	187
26	115	90			64	80	531	470	304	142	162
27	102				62	80	470	428	283	146	150
28	112				61	80	382	399	262	142	142
29	115			.....	60	80	332	354	247	135	138
30	112			.....	62	85	337	304	242	128	138
31	.....			.....	64	.....	337	.....	242	125	.....

NOTE.—Braced figures show mean discharge for periods indicated; estimated from one discharge measurement, weather records, and observer's notes. From Mar. 7 to Apr. 24 gage was read Mar. 7, 15, 22, 29, Apr. 5, 12–15, 19; discharge interpolated for intervening periods. Discharge interpolated Dec. 9, May 14–16, Aug. 13 and 14.

Monthly discharge of Uinta River near Whiterocks, Utah, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
November 5–30	131	112	122	6,290
December	118	.....	99.6	6,120
January	.....	.....	70.0	4,300
February	.....	.....	68.0	3,780
March	70	.....	64.5	3,970
April	85	54	72.0	4,280
May	562	90	312	19,200
June	988	304	681	40,500
July	738	242	389	23,900
August	262	125	199	12,200
September	299	105	142	8,450
The period	.....	.....	.....	133,000

Daily discharge, in second-feet, of Cedar View canal for the irrigation season 1918.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	2	15	22	5	5	16	.....	3	29	21	4	.....
2	.....	2	17	8	5	5	17	.....	8	30	20	4	.....
3	.....	2	22	8	5	5	18	.....	16	29	20	3	.....
4	.....	2	31	8	5	5	19	.....	18	29	20	3	.....
5	.....	2	32	8	5	5	20	11	18	29	20	3	.....
6	.....	12	3	8	5	5	21	11	22	29	20	3	.....
7	.....	13	2	6	5	5	22	11	22	33	20	3	.....
8	.....	13	2	6	4	5	23	11	22	39	20	3	.....
9	.....	3	2	6	4	5	24	11	23	38	20	4	.....
10	.....	3	2	13	4	5	25	11	24	36	20	5	.....
11	.....	3	2	21	4	5	26	3	24	34	20	5	.....
12	.....	3	11	20	4	5	27	3	24	33	20	5	.....
13	.....	3	31	21	4	6	28	2	23	32	19	5	.....
14	.....	3	31	23	4	6	29	2	22	28	19	5	.....
15	.....	3	31	21	4	6	30	2	17	23	19	5	.....
							31	.....	12	.....	12	5	.....

Monthly discharge of Cedar View canal for the irrigation season 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 20–30	11	2	7.09	155
May	24	2	11.8	726
June	39	2	23.5	1,400
July	23	6	16.4	1,010
August	5	3	4.26	262
September 1–15	6	5	5.20	155
The period	39	2	12.5	3,710

Combined monthly discharge of Uinta River and Cedar View canal near Whiterocks, Utah, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
November 5–30	131	102	122	6,290
December	118	.....	99.6	6,120
January	.....	.....	70.0	4,300
February	.....	.....	68.0	3,780
March	70	.....	64.5	3,970
April	91	54	74.6	4,440
May	586	92	324	19,900
June	990	327	705	42,000
July	761	254	405	24,900
August	267	130	203	12,500
September	299	105	145	8,630
The period	.....	.....	.....	137,000

WHITEROCKS CREEK NEAR WHITEROCKS, UTAH.

LOCATION.—In SE. ¼ sec. 19, T. 2 N., R. 1 E., Uinta special base and meridian, 6 miles north of Whiterocks, Uinta County. United States Whiterocks canal diverts from left side a quarter of a mile above, and Farm Creek canal from right side about 600 feet below station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 8, 1917, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on right bank; installed November 8, 1917; inspected by Mrs. W. H. Koehler.

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

CHANNEL AND CONTROL.—Bed composed of boulders and gravel; shifting during high water. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 5.45 feet at 11 p. m. June 4 (discharge, 535 second-feet); minimum stage recorded, 3.55 feet March 29 and April 5 (discharge, 28 second-feet).

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—Above all diversions except United States Whiterocks canal, which diverts from left bank just above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during winter; affected by ice December 9 to March 14. Rating curves well defined between 30 and 150 second-feet, and fairly well defined up to 350 second-feet. Operation of water-stage recorder satisfactory except as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height determined from inspection of recorder graph. Records good.

Records of discharge of the United States Whiterocks canal for the irrigation season are published with this station, as this is the only diversion in the Whiterocks Creek basin above this station. The records of daily discharge of this canal were furnished by C. C. Jacob, Federal court water commissioner. Following these is a monthly table giving combined flow of creek and canal which is total flow of Whiterocks Creek.

Discharge measurements of Whiterocks Creek near Whiterocks, Utah, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 28	E. S. Borgquist	3.67	40.8	Apr. 16	R. P. Flagel	3.64	31.3
Feb. 13	J. J. Sanford	[a] 3.65	33.5	Aug. 3	J. W. Bones	4.14	104

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Whiterocks Creek near Whiterocks, Utah, for the year ending Sept. 30, 1918.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	41				28	34	325	106	106	47
2	.....	39				28	33	399	100	104	48
3	.....	41				28	37	453	130	93	54
4	.....	33				28	47	471	136	93	62
5	.....	41				28	65	435	123	106	69
6	.....	37				29	74	382	118	106	66
7	.....	40			34	29	82	399	199	100	59
8	53	38				30	89	382	214	97	57
9	49					30	87	382	a 210	104	62
10	53					31	78	417	a 206	89	54
11	53					31	74	417	a 202	89	50
12	50					32	62	382	199	97	49
13	52					32	60	364	364	87	48
14	50					33	78	329	453	93	47
15	50	38			32	31	126	319	360	102	48
16	47		32	34	32	30	170	336	302	82	56
17	48				31	31	205	312	272	71	48
18	44				31	29	218	262	443	64	44
19	48				30	29	199	249	205	60	44
20	47				30	29	246	249	196	56	44
21	48				29	29	278	288	272	53	43
22	48				29	29	246	252	262	57	45
23	47				29	30	278	295	205	57	170
24	45				29	30	399	329	182	53	143
25	44				29	30	399	233	182	48	106
26	45	36			28	30	346	187	167	40	84
27	42				28	30	262	165	143	a 41	72
28	42				28	30	205	143	130	a 42	66
29	41			.....	28	29	156	126	128	a 43	62
30	42			.....	28	30	182	118	118	43	60
31	.....			.....	28	.....	278	.....	111	44	.....

a Interpolated.

NOTE.—Braced figures show mean discharge for period indicated; estimated because of ice, from one meter measurement, weather records, and observer's notes. Gage not read Mar. 16–21, 23–28, 30, 31, Apr. 1–4, 6–11, July 9–11, Aug. 27–29; discharge interpolated.

Monthly discharge of Whiterocks Creek near Whiterocks, Utah, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
November 8–30	53	41	47.3	2,160
December	.....	.....	37.5	2,310
January	.....	.....	32.0	1,970
February	.....	.....	34.0	1,890
March	.....	.....	31.5	1,940
April	33	28	29.8	1,770
May	399	33	164	10,100
June	471	118	313	18,600
July	453	100	208	12,800
August	106	40	74.8	4,600
September	170	43	63.6	3,780
The period	.....	.....	.....	61,900

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Daily discharge, in second-feet, of United States Whiterocks canal for the irrigation season 1918.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	6	11	33	25	23	14	16	6	28	42	16	20	.....
2		11	32	24	18	14	17		28	43	16	20	.....
3		12	31	23	18	14	18	6	29	45	15	20	.....
4		13	34	23	18	14	19	6	29	44	15	20	.....
5		14	38	23	18	14	20	6	30	45	15	20	.....
6		15	41	24	18	14	21	6	33	46	15	20	.....
7		17	41	24	19	14	22	6	36	45	16	20	.....
8		18	41	24	19	14	23	6	38	44	21	19	.....
9	6	19	41	23	19	14	24	6	30	44	22	19	.....
10		20	42	26	19	13	25	6	22	43	23	19	.....
11		21	42	25	18	15	26	10	23	41	23	16	.....
12		22	45	24	19	16	27	10	24	39	23	14	.....
13		23	44	21	19	16	28	10	25	34	23	14	.....
14		24	44	18	19	17	29	10	25	31	22	14	.....
15		26	42	16	19	17	30	10	26	29	22	14	.....
							31	.....	30	.....	22	14	.....

Monthly discharge of United States Whiterocks canal for the irrigation season 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April	10	.....	6.67	397
May	38	11	23.3	1,430
June	46	29	40.2	2,390
July	26	15	21.0	1,290
August	23	14	18.3	1,130
September 1–15	17	13	14.7	436
The period	46	.....	21.2	7,070

Combined monthly discharge of Whiterocks Creek and United States Whiterocks canal near Whiterocks, Utah, for the year ending Sept. 30, 1918.

Month	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
November 8–30	53	41	47.3	2,160
December	.....	.....	37.5	2,310
January	.....	.....	32.0	1,970
February	.....	.....	34.0	1,890
March	.....	.....	31.5	1,940
April	40	34	36.4	2,170
May	429	44	188	11,600
June	505	147	354	21,100
July	471	124	229	14,100
August	129	55	93.1	5,720
September	170	43	70.9	4,220
The period	.....	.....	.....	69,200

PRICE RIVER BASIN.

PRICE RIVER NEAR HELPER, UTAH.

LOCATION.—In sec. 36, T. 13 S., R. 9 E., at ford 300 feet west of Denver & Rio Grande Western Railroad main line at settlement locally known as Spring Glenn, 2 miles south of Helper, Carbon County, 1 mile above diversion dam of Price River Irrigation Co., and 4 miles below White Creek.

DRAINAGE AREA.—530 square miles (measured on topographic maps).

RECORDS AVAILABLE.—February 21, 1904, to September 30, 1918.

GAGE.—Vertical staff on left bank; installed July 16, 1907, to replace old chain gage washed out April 11, 1907; read by D. S. Rowley. A temporary gage was read June 23 to July 15, 1907. All gage heights beginning June 23, 1907, are referred to datum 0.7 foot above that of original chain gage.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Bed of the stream composed of gravel and fine sand. Control is a riffle immediately below ford; shifts occasionally during floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.60 feet at 9 p. m. September 22 (discharge, 1,700 second-feet); minimum stage recorded, 2.08 feet on August 24, 25, 31, and September 3 (discharge, 14 second-feet).

1904–1918: Maximum stage recorded, 8.43 feet at 9 p. m. June 25, 1917, determined by leveling from hub set at high-water mark (discharge determined from extension of rating curve, 8,500 second-feet); minimum stage recorded, 3.1 feet (old chain gage) during December, 1905, and January, 1906 (discharge, 4 second-feet).

ICE.—Stage-discharge relation affected by ice for short periods.

DIVERSIONS.—Main diversions from Price River are below station.

REGULATION.—Flow of river was affected by storage at Mammoth reservoir (capacity, about 10,000 acre-feet) of Price River Irrigation Co. on Gooseberry Fork, 40 miles above station, until after June 24, 1917, when dam broke.

ACCURACY.—Stage-discharge relation changed July 9, and also during the winter; affected by ice for one or two-day periods December to February. Rating curves well defined. Shifting-control method used November 21 to March 1 and July 9. Gage read to hundredths usually once a day, occasionally twice a day. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Price River near Helper, Utah, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 20	Sanford and Jordan....	2.14	33.8	May 24	W. B. Maughan.....	3.01	353
Feb. 19	J. J. Sanford.....	2.14	44.4	June 12	A. B. Purton.....	2.42	110
Apr. 30	R. P. Flagel.....	2.57	151	July 6	W. B. Maughan.....	2.16	47.7

Daily discharge, in second-feet, of Price River near Helper, Utah, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	46	43	41	45	40	40	175	147	231	37	23	29
2	50	40	41	45	41	38	160	194	201	35	26	19
3	50	40	41	38	40	45	140	205	194	53	29	14
4	46	40	28	45	36	59	109	222	182	55	21	24
5	46	40	33	45	38	73	103	291	171	64	24	46
6	46	40	37	43	40	68	90	296	167	50	21	22
7	50	40	37	32	40	59	93	317	153	48	24	24
8	50	40	29	46	43	136	87	338	153	38	24	235
9	46	40	37	43	35	64	87	327	147	350	24	39
10	46	37	50	30	34	59	112	301	147	76	22	33
11	46	37	42	24	40	64	140	286	121	57	69	26
12	46	37	40	32	46	98	147	218	115	69	49	22
13	46	37	45	41	43	64	150	214	124	966	24	21
14	50	37	46	40	40	52	147	248	121	136	81	21
15	46	37	46	38	40	64	127	239	109	118	57	21
16	46	34	40	40	45	64	109	268	112	74	43	21
17	46	29	38	40	50	55	93	296	106	67	29	21
18	43	32	41	40	43	62	87	338	98	57	24	21
19	43	29	40	40	45	68	82	338	98	53	22	19
20	43	32	40	43	42	93	77	338	109	65	21	18
21	46	33	45	40	48	82	80	348	182	61	19	18
22	46	35	35	40	41	87	82	348	98	65	15	430
23	46	38	41	41	41	87	98	348	109	65	15	272
24	46	38	45	41	40	93	109	348	100	53	14	79
25	50	38	50	40	39	103	121	348	93	33	14	49
26	46	43	48	45	38	140	127	338	74	31	18	33
27	46	41	45	40	52	167	127	338	55	29	16	31
28	43	30	45	41	45	153	127	306	52	26	18	31
29	43	38	45	43	.....	127	127	258	45	23	16	29
30	43	48	45	45	.....	133	147	239	38	22	15	29
31	43	.....	45	42	.....	160	.....	222	.....	23	14	.....

NOTE.—Stage-discharge relation affected by ice; discharge estimated: Dec. 11, 17, Jan. 10, 14, 15, 21, 22, 25, 27, 31, Feb. 1, 3, 4, 9, 14, 15, 20, 25, and 28. Gage not read; discharge interpolated Jan. 29, Feb. 16, 24, Mar. 18, Apr. 21, May 16, and June 26.

Monthly discharge of Price River near Helper, Utah, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	50	43	46.1	2,830
November	48	29	37.4	2,230
December	50	28	41.3	2,540
January	46	24	40.3	2,480
February	52	34	41.6	2,310
March	167	38	85.7	5,270
April	175	77	115	6,840
May	348	147	286	17,600
June	231	38	124	7,380
July	966	22	93.5	5,750
August	69	14	26.8	1,650
September	430	14	56.6	3,370
The year	966	14	83.2	60,200

FISH CREEK NEAR SCOFIELD, UTAH.

LOCATION.—In sec. 10, T. 12 S., R. 7 E., three-quarters of a mile above railroad siding at Hale and about 5 miles northeast of Scofield, Carbon County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 17, 1917, to September 30, 1918.

GAGE.—Stevens eight-day water-stage recorder on left bank 85 feet below railroad bridge; installed November 17, 1917; inspected by W. S. Jensen.

DISCHARGE MEASUREMENTS.—Made by wading or from railroad bridge near gage or from road bridge 1 mile upstream.

CHANNEL AND CONTROL.—Bed composed of sand and gravel. Riffle a short distance below gage forms control; shifting during high water. Banks not subject to any considerable overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 7.45 feet at 8 a. m. May 24 (discharge, 345 second-feet); minimum discharge not determined as it occurred during period of ice.

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—No information. Probably some small diversions for irrigation above station.

REGULATION.—None since failure on June 24, 1917, of the Mammoth reservoir dam on Gooseberry Fork, a tributary of Fish Creek. This reservoir had a capacity of about 10,000 acre-feet and was used by Price River Irrigation Co. to store water for irrigation near Price, Utah.

ACCURACY.—Stage-discharge relation for low stages changed during high water about June 1; affected by ice December 5 to March 28. Rating curves well defined. Operation of water-stage recorder satisfactory except for short periods as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table the mean daily gage height determined from recorder graph by inspection. Records good.

Discharge measurements of Fish Creek near Scofield, Utah, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 17	Sanford and Jordan	5.32	28.8	May 24	W. B. Maughan	7.43	341
20	L. W. Jordan	5.04	14.7	June 12	A. B. Purton	6.14	117
Feb. 20	J. J. Sanford	[a] 5.60	22.1	July 6	W. B. Maughan	5.40	35.3
May 3	R. P. Flagel	6.57	189				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Fish Creek near Scofield, Utah, for the year ending Sept. 30, 1918.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		23				83	150	230	34	22	21
2		24				80	169	207	32	24	23
3		18				62	188	202	38	21	25
4		16				48	243	197	34	20	27
5			14			41	261	192	34	19	28
6						41	270	183	35	19	23
7						51	279	175	32	19	20
8					20	48	297	163	34	20	20
9						60	279	134	43	20	21
10						78	243	138	69	20	19
11						90	238	127	99	21	17
12						83	232	116	54	21	17
13						78	226	106	62	21	17
14						75	220	101	78	26	17
15				15		58	261	99	47	29	17
16						52	288	102	39	22	17
17	29	16				47	288	96	34	19	17
18	26					38	306	88	31	19	16
19	24					37	306	98	30	19	15
20	22					42	326	105	35	19	16
21	22		6			48	326	96	39	18	16
22	24				40	60	326	74	37	18	16
23	23					72	335	72	35	17	60
24	28					80	335	71	30	17	34
25	28					94	326	58	28	17	24
26	29					95	316	52	26	17	20
27	20					92	297	46	24	16	
28	18					94	261	42	21	17	20
29	28			.....	79	113	245	39	20	16	
30	28			.....	82	132	234	35	20	17	
31	.....			.....	85	.....	223	.....	20	19	.....

NOTE.—Braced figures show mean discharge for periods indicated; estimated from one discharge measurement, weather records, and observer's notes. No gage-height record, discharge interpolated, Nov. 18, 19, Mar. 30, Apr. 29 to May 2, May 11–13, June 11, Aug. 6–12, Aug. 30 to Sept. 4, Sept. 27–30.

Monthly discharge of Fish Creek near Scofield, Utah, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
November 17–30	29	18	24.9	692
December	24	.....	16.5	1,010
January	.....	.....	8.58	528
February	.....	.....	15.0	833
March	85	.....	34.4	2,120
April	132	37	69.1	4,110
May	335	150	268	16,500
June	230	35	115	6,840
July	99	20	38.5	2,370
August	29	16	19.6	1,200
September	60	15	21.4	1,270
The period	.....	.....	.....	37,500

SAN RAFAEL RIVER BASIN.

HUNTINGTON CREEK NEAR HUNTINGTON, UTAH.

LOCATION.—In sec. 6, T. 17 S., R. 8 E., at Cunha ranch, 7 miles northwest of Huntington, Emery County. Below all main tributaries except Fish Creek.

DRAINAGE AREA.—158 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 3, 1909, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on right bank, installed September 11, 1917; inspected by J. P. Brockbank. Original gage, vertical staff on right bank at same site as present gage but at independent datum, used May 3, 1909, to October 6, 1912. Inclined staff gage at same site and datum, October 7, 1912, to April 29, 1913. Stevens continuous water-stage recorder on left bank, 100 feet upstream, used April 30, 1913, to September 9, 1917.

DISCHARGE MEASUREMENTS.—Made by wading or from cable.

CHANNEL AND CONTROL.—Bed composed of coarse gravel; shifts occasionally during high stages. No well-defined control.

EXTREMES OF DISCHARGE.—Extremes for year ending September 30, 1918, uncertain. See Accuracy.

1909–1918: Maximum stage from water-stage recorder, 6.1 feet from 8 to 10 p. m. May 23, 1914 (discharge, 1,200 second-feet); minimum discharge, 12 second-feet, March 20–23, 1912.

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

DIVERSIONS.—Several small ditches divert from tributaries above station.

REGULATION.—A small storage reservoir on Huntington Creek above the station controls flow to slight extent.

ACCURACY.—Operation of water-stage recorder not satisfactory owing to excessive clogging of inlet pipe and filling of stilling well with mud. Discharge not ascertained, as gage-height record is not an index of discharge.

Discharge measurements of Huntington Creek near Huntington, Utah, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 21	Jordan and Sanford	2.61	36.8	May 25	W. B. Maughan	4.05	304
Feb. 19	J. J. Sanford	2.75	46.6	June 12	A. B. Purton	4.23	379
May 2	R. P. Flagel	3.48	140	July 12	W. B. Maughan	3.21	118

HUNTINGTON CREEK NEAR CASTLEDALE, UTAH.

LOCATION.—In sec. 33, T. 18 S., R. 9 E., half a mile below bridge on road to Green River, 5 miles above mouth of Cottonwood Creek, and 6 miles east of Castledale, Emery County.

DRAINAGE AREA.—325 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 12, 1911, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on right bank; installed May 2, 1913, at same datum as vertical staff gage which it replaced; inspected by Rex Petersen.

DISCHARGE MEASUREMENTS.—Made by wading or from cable just below gage.

CHANNEL AND CONTROL.—Bed composed of sand and gravel; somewhat shifting. No well-defined control. Banks subject to erosion but not to overflow.

EXTREMES OF DISCHARGE.—Not determined for current year.

1911–1918: Maximum stage recorded, 11.3 feet September 8, 1913, when dam above station broke (discharge estimated, 1,750 second-feet); minimum stage, 0.95 foot September 10, 1915 (discharge, 2.5 second-feet).

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

DIVERSIONS.—The station is below all diversions in Castle Valley.

REGULATION.—Flow affected by irrigation in Huntington district.

ACCURACY.—Stage-discharge relation permanent during year except as affected by ice from about December 15 to March 17. Rating curve fairly well defined between 6 and 300 second-feet. Operation of water-stage recorder not satisfactory, owing to silting up of stilling well except October 1 to November 21; hook gage read to hundredths once weekly. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph or by applying hook-gage readings. Discharge not determined for days of no gage-height record. Records fair.

Discharge measurements of Huntington Creek near Castledale, Utah, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 21	J. J. Sanford	1.94	35.4	May 25	W. B. Maughan	2.69	92
Feb. 19	....do	[a]3.60	51	June 13	A. B. Purton	2.34	64
May 2	R. P. Flagel	1.38	8.8	July 12	W. B. Maughan	2.11	41.6

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Huntington Creek near Castledale, Utah, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	36	25	24				38			17
2	33	26	24			8.4			9	
3	32	26	22					57		
4	30	27				30				
5	30	27								
6	30	28						23		
7	29	26			9.0					
8	29	26								24
9	30	25					89			
10	29	25						155		
11	27	26				32				12
12	24	26						51		
13	23	29					58			
14	23	32			17					
15	22	31					44			
16	22	30						75		
17	22	28							24	15
18	22	28								
19	21	26				51				
20	22	28			11					
21	22	30								
22	22	30								
23	22	30		22			170			35
24	22	30		22			170			
25	23	30		23		84				
26	23	29		21		64			11	20
27	22	28		18	15					
28	20	27		17						
29	20	26		18						
30	20	25		20			22			18
31	24									

Monthly discharge of Huntington Creek near Castledale, Utah, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	36	20	25.0	1,540
November	32	25	27.7	1,650

SAN RAFAEL RIVER NEAR GREEN RIVER, UTAH.

LOCATION.—In sec. 27, T. 22 S., R. 14 E., at county bridge near Tomlinson ranch, on road from Green River to Hanksville, 16 miles southwest of Green River, Emery County.

DRAINAGE AREA.—1,690 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 5, 1909, to September 30, 1918.

GAGE.—Vertical staff on downstream side of right bridge abutment; read by Louis Presset.

DISCHARGE MEASUREMENTS.—Made from highway bridge at gage or by wading.

CHANNEL AND CONTROL.—Bed composed of mud and quicksand; shifting. Control not well defined. Banks fairly high but left bank subject to overflow at extreme floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.0 feet July 12 (discharge, 3,200 second-feet); minimum stage recorded, 1.9 feet September 1–3 and 18–21 (discharge, 20 second-feet).

1909–1918: Maximum stage recorded, 12.6 feet October 8, 1916 (discharge, 7,300 second-feet). Water standing in pools during August and September, 1910, and August 13 to September 8, 1915.

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

DIVERSIONS.—Below practically all diversions from San Rafael River. Main diversions in basin are made from tributaries, for irrigation in Castle Valley.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed in June and July; affected by ice January 14 to February 23. Rating curves fairly well defined between 20 and 1,750 second-feet. Gage read to tenths once daily, except October 1–4. Daily discharge ascertained by applying daily gage height to rating table except for period when stage-discharge relation was affected by ice. Records good.

Discharge measurements of San Rafael River near Green River, Utah, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 17	J. J. Sanford	[a] 3.26	74.9	Mar. 27	W. B. Maughan	4.38	540
Apr. 29	R. P. Flagel	2.22	35.5	July 11	....do	6.00	1,300

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of San Rafael River near Green River, Utah, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	98	54	77	65		152	27	35	119	152	77	20
2	96	65	77	77		119	35	35	77	190	77	20
3	94	65	90	54		90	44	35	104	152	65	20
4	92	77	90	77	28	152	44	27	152	712	44	27
5	90	77	77	77		152	77	35	190	152	27	27
6	90	90	77	65		152	44	35	258	135	152	402
7	90	77	65	77		152	54	170	258	119	258	152
8	65	77	54	77		135	44	190	402	589	234	135
9	65	65	54	90		119	44	190	712	402	152	119
10	65	65	54	65		152	54	190	1,190	436	152	90
11	54	77	44	77	44	135	1,440	152	1,090	2,270	135	77
12	54	77	44	77		119	234	152	1,040	3,200	258	54
13	54	77	35	65		152	190	104	1,040	629	592	44
14	54	77	35			119	152	135	940	2,850	152	35
15	54	77	35			104	190	119	940	1,290	135	27
16	44	90	35			104	77	135	1,090	799	152	27
17	44	90	44		75	119	35	119	799	190	190	27
18	54	77	44			104	35	135	629	436	152	20
19	54	77	65			90	27	152	549	402	135	20
20	54	77	54			90	44	152	510	370	135	20
21	54	77	54		90	77	27	119	589	284	104	20
22	54	77	65	44		104	27	104	670	234	90	27
23	54	90	65			119	35	90	712	190	65	1,440
24	44	90	90		152	104	27	90	1,290	152	65	402
25	44	90	104		190	90	35	77	670	135	54	152
26	54	90	90		211	104	35	402	549	135	54	152
27	65	90	77		152	104	44	472	402	119	49	135
28	90	90	65		135	90	35	311	284	119	44	135
29	65	90	65		.....	27	35	152	234	104	35	27
30	54	77	65		.....	27	27	135	152	90	27	27
31	65	.....	90		.....	27	.....	119	.....	90	27	.....

NOTE.—Braced figures show mean discharge for periods indicated; estimated, because of ice, from one discharge measurement, weather records, and observer's notes. Discharge interpolated Oct. 1–4.

Monthly discharge of San Rafael River near Green River, Utah, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	98	44	64.8	3,980
November	90	54	79.0	4,700
December	104	35	63.9	3,930
January	77	.....	56.0	3,440
February	211	.....	73.7	4,090
March	152	27	109	6,700
April	1,440	27	107	6,370
May	472	27	141	8,670
June	1,290	77	588	35,000
July	3,200	90	552	33,900
August	592	27	125	7,690
September	1,440	20	129	7,680
The year	3,200	20	174	126,000

COTTONWOOD CREEK NEAR ORANGEVILLE, UTAH.

LOCATION.—In sec. 9 or 10, T. 18 S., R. 7 E., at Robert Johnson's ranch, about 5 miles northwest of Orangeville, Emery County.

DRAINAGE AREA.—240 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 1, 1909, to September 30, 1918.

GAGE.—Inclined staff on left bank just below corral at ranch house and 300 feet above cable; used March 22, 1910, to November 23, 1913, and May 24, 1914, to September 30, 1918; read by Robert Johnson. Datum raised 1.0 foot July 14, 1918. For description of previous gages see Water-Supply Paper 459.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Bed rough; shifting. No well-defined control. Banks fairly high but have been overflowed by the sudden floods, to which the stream is subject.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.5 feet June 12 and 14 (discharge, 770 second-feet); minimum discharge probably occurred during winter.

1909–1918: Maximum discharge recorded, 1,980 second-feet, September 7, 1913; minimum discharge recorded, 5 second-feet, September 21, 1910.

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—Two or three small ditches divert water above station, but main diversions are below.

REGULATION.—None.

ACCURACY.—Stage-discharge relation affected by ice November 30 to March 6. One rating curve used prior to change in datum of gage on July 14; another used thereafter; both fairly well defined. Gage read to tenths four to six times weekly. Daily discharge ascertained by applying daily gage height to rating table and by interpolation for days when gage was not read. Records fair.

Discharge measurements of Cottonwood Creek near Orangeville, Utah, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 22	Jordan and Sanford	5.05	24.5	May 26	W. B. Maughan	6.83	415
Feb. 18	J. J. Sanford	[a] 5.70	21.8	June 13	A. B. Purton	7.20	592
May 1	R. P. Flagel	5.84	101	July 14[b]	W. B. Maughan	4.98	140

[a] Stage-discharge relation affected by ice.
[b] Datum of gage raised 1.00 foot.

Daily discharge, in second-feet, of Cottonwood Creek near Orangeville, Utah, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	45	23					38	97	288	166	60	30
2	38	23					32	166	323	166	58	29
3	32	23					38	193	359	157	56	29
4	32	23				25	32	193	400	149	56	35
5	32	23					27	193	400	141	56	43
6	32	23					32	193	594	141	94	35
7	32	23				27	30	286	594	141	70	29
8	32	23				27	27	253	541	141	47	29
9	32	21				27	32	222	625	141	47	29
10	32	19				30	45	208	709	166	48	40
11	32	19				32	54	193	709	193	50	50
12	32	19				32	50	180	770	257	51	60
13	32	19				30	45	166	594	321	148	60
14	32	23				27	45	166	770	140	245	60
15	32	22			20	25	45	166	594	121	51	60
16	32	20	20	18		23	42	253	519	121	47	
17	32	19				24	38	222	444	102	47	60
18	32	21				26	32	222	444	102	45	60
19	27	23				27	32	254	382	102	43	48
20	27	23				38	38	286	321	102	39	36
21	27	23				35	40	304	359	102	39	25
22	27	25				32	42	321	359	102	39	42
23	27	23				27	45	406	356	86	39	60
24	27	23				30	54	491	253	79	39	60
25	27	23				32	97	491	238	72	39	51
26	27	23				35	79	413	222	72	39	42
27	27	19				38	79	400	222	72	37	34
28	23	16				35	79	400	166	66	35	25
29	19	18			.....	32	79	400	166	60	35	60
30	23	19			.....	32	79	286	166	60	34	60
31	23	.....			.....	35	.....	253	.....	60	32	.....

NOTE.—Braced figures show mean discharge for periods indicated; estimated, because of ice, from one discharge measurement, weather records, and observer's notes.

Monthly discharge of Cottonwood Creek near Orangeville, Utah, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	45	19	29.9	1,840
November	25	16	21.5	1,280
December	.....	.....	20	1,230
January	.....	.....	18	1,110
February	.....	.....	20	1,110
March	38	.....	29.3	1,800
April	97	27	47.6	2,830
May	491	97	267	16,400
June	770	166	430	25,600
July	321	60	126	7,750
August	245	32	56.9	3,500
September	60	25	44.7	2,660
The year	770	.....	92.6	67,100

FERRON CREEK (UPPER STATION) NEAR FERRON, UTAH.

LOCATION.—In sec. 1, T. 20 S., R. 6 E., a quarter of a mile below house at Peterson ranch, 1½ miles above grist mill, and 5 miles northwest of Ferron, Emery County.

DRAINAGE AREA.—150 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 6, 1911, to September 30, 1918.

GAGE.—Inclined staff on right bank; installed September 13, 1911, to replace the original vertical staff 165 feet upstream; read by Charles Carlson and Joseph Peterson.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 15 feet upstream from gage.

CHANNEL AND CONTROL.—Bed composed of sand and gravel; shifting. No well-defined control. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.0 feet at 6 p. m. September 22 (discharge from extension of rating curve, 700 second-feet); minimum stage recorded, 0.18 foot at 9 a. m. April 6 (discharge, 6 second-feet).

1911–1918: Maximum stage recorded, 5.50 feet at 4 p. m. June 1, 1914 (discharge, 1,100 second-feet); minimum discharge recorded, 1 second-foot, March 22 and 23, 1912.

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

DIVERSIONS.—Above all diversions except small ditch for Peterson ranch.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during high water September 22; affected by ice December 1 to March 8. Rating curve used until September 21, well defined between 12 and 400 second-feet; curve used after September 21, fairly well defined. Gage read to hundredths once daily except October 22 to March 14 when it was read twice weekly. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Ferron Creek (upper station) near Ferron, Utah, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 22	J. J. Sanford	0.32	11.2	May 26	W. B. Maughan	2.39	211
Feb. 18	do	*a*.90	9.7	June 13	A. B. Purton	2.90	314
May 1	R. P. Flagel	1.05	54	July 14	W. B. Maughan	1.46	83

a Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Ferron Creek (upper station) near Ferron, Utah, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	21	13					17	52	194	73	50	32
2	20	14					16	58	205	71	48	29
3	20	14					15	229	281	73	48	31
4	20	13					20	87	326	70	48	308
5	20	13					13	153	411	64	47	32
						15						
6	20	13					6	153	407	64	47	32
7	19	13					24	140	354	64	47	32
8	18	13					26	154	510	58	44	31
9	18	13					19	140	440	56	41	31
10	17	13					36	127	317	67	47	30
11	17	14				23	54	87	330	48	41	29
12	17	14				24	28	87	313	52	90	29
13	16	13				20	31	140	299	48	41	29
14	16	13				15	28	140	308	71	205	29
15	15	13				25	26	154	263	80	44	28
16	15	13	12	11	10	35	19	174	263	153	38	27
17	15	15				22	19	182	246	64	38	26
18	15	17				25	18	197	234	68	38	25
19	14	20				23	18	202	210	67	37	24
20	14	19				30	18	213	205	64	37	24
21	14	18				31	19	234	197	60	38	24
22	14	12				23	18	272	167	246	34	236
23	14	12				24	56	382	167	56	34	40
24	13	12				20	41	263	140	58	35	19
25	13	12				17	38	272	127	56	35	17
26	13	12				21	41	210	121	54	34	17
27	13	12				18	41	197	115	48	34	16
28	13	12				18	35	182	92	48	34	13
29	13	12			.....	18	48	167	78	52	32	13
30	13	12			.....	17	44	160	85	50	30	13
31	13	.....			.....	17	.....	167	.....	48	35	.....

NOTE.—Braced figures show mean discharge for periods indicated; estimated Nov. 27 to Mar. 10, because of ice, from one discharge measurement, weather records, and observer's notes. Discharge interpolated because gage was not read, Oct. 22, 25, 26, 29, 31, Nov. 2, 5, 6, 9, 12, 15, 17, 18, 20, 23–25, 27–30, Mar. 13, 15, 29, Apr. 2, 5, 10, 14, 17, 18, and 20.

Monthly discharge of Ferron Creek (upper station) near Ferron, Utah, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	21	13	15.9	978
November	20	12	13.6	809
December	.....	.....	12	738
January	.....	.....	11	676
February	.....	.....	10	555
March	35	.....	19.9	1,220
April	56	6	27.7	1,650
May	382	52	173	10,600
June	510	78	247	14,700
July	246	48	69.4	4,270
August	205	30	46.8	2,880
September	308	13	42.2	2,510
The year	510	.....	57.4	41,600

GRAND RIVER BASIN.[1]

NORTH FORK OF GRAND RIVER NEAR GRAND LAKE, COLO.

LOCATION.—In sec. 13, T. 3 N., R. 76 W., at old highway bridge 200 feet downstream from bridge on stage road to Grand Lake, Grand County. Nearest tributary, Grand Lake outlet, enters some distance below; no tributaries for several miles above.

DRAINAGE AREA.—101 square miles (measured on topographic map).

RECORDS AVAILABLE.—July 29, 1904, to September 30, 1909; September 20, 1910, to September 30, 1918, when station was discontinued.

GAGE.—Vertical staff on downstream side of right bridge abutment; read by Mrs. Ethel M. Curry.

DISCHARGE MEASUREMENTS.—Made from old highway bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of boulders; shifting slightly from year to year. No well-defined control. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.0 feet at 6 p. m. June 15 and 16 (discharge, 1,840 second-feet); minimum discharge recorded, 11 second-feet, February 28.

ICE.—Stage-discharge relation only slightly affected by ice, as springs keep river open.

DIVERSIONS.—Court decrees for the diversion of 699 second-feet from the headwaters above the station. Of this amount 525 second-feet is for diversion across divide into headwaters of Cache la Poudre River. Under this decree 14,371 acre-feet was diverted in 1918 between May 19 and August 19.

REGULATION.—Diurnal fluctuation in spring from alternate melting and freezing of mountain snow. No artificial regulation.

ACCURACY.—Stage-discharge relation considered permanent, except during winter when affected by ice. Rating curve well defined. Gage read to hundredths once daily except December 1 to March 31, when it was read every other day. Daily discharge ascertained by applying daily gage height to rating table and interpolating for days of missing gage heights except for periods of ice effect. Records good at ordinary stages, but fair during high water and winter period.

[1] By act of Congress the name of Grand River was changed to Colorado River July 25, 1921.

Discharge measurements of North Fork of Grand River near Grand Lake, Colo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 26	S. B. Soulé	[a] 3.46	17.9
Mar. 9	do	[a] 3.46	14.9

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of North Fork of Grand River near Grand Lake, Colo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	48	38	36	30	15	12	43	100	620	210	81	71
2	60	36	35	28	15	14	45	120	440	250	79	84
3	56	36	33	28	15	14	46	145	555	290	71	71
4	50	39	32	28	15	14	45	290	620	250	71	60
5	48	41	30	27	15	14	43	250	685	210	84	64
6	48	52	27	27	15	14	43	335	820	175	100	50
7	45	50	27	25	14	14	43	385	960	145	94	48
8	43	43	26	24	14	14	45	385	1,030	175	84	41
9	41	41	26	21	14	15	48	440	1,100	182	71	45
10	41	41	26	20	14	14	52	290	1,240	250	69	48
11	39	41	27	18	14	14	67	290	1,320	145	71	45
12	39	41	27	17	14	14	74	210	1,100	218	60	43
13	38	39	28	16	14	13	87	290	1,470	290	84	41
14	38	37	28	16	14	12	87	175	1,620	210	71	41
15	39	36	30	16	12	12	84	210	1,840	196	71	46
16	38	38	32	16	12	12	84	335	1,840	242	60	46
17	39	36	32	16	12	12	71	385	1,470	175	60	50
18	39	39	31	16	12	13	71	385	1,470	145	60	48
19	39	41	31	16	13	14	71	385	890	157	60	46
20	39	41	32	16	12	16	67	385	890	210	60	33
21	39	45	33	16	12	20	62	440	960	203	58	46
22	39	45	41	16	13	24	58	440	890	175	56	48
23	39	41	49	16	14	31	58	495	820	163	60	50
24	38	39	38	16	14	32	58	652	820	120	60	50
25	38	39	28	16	14	34	58	685	718	112	50	46
26	38	38	30	18	12	36	60	620	555	116	50	50
27	38	35	32	18	12	38	67	620	495	120	60	50
28	37	35	33	17	11	40	71	685	440	120	48	50
29	36	36	33	16	.....	43	68	685	335	100	41	46
30	37	38	33	16	.....	43	81	750	290	94	39	50
31	38	.....	33	15	.....	43	.....	750	.....	84	41	.....

NOTE.—Stage-discharge relation affected by ice Oct. 28-30, Nov. 9-14, Dec. 2-15, Jan. 3 to Mar. 22; discharge determined from frequent gage heights, 2 discharge measurements, and temperature records. Discharge interpolated Dec. 17, 19, 22, 24, 26, 28, 30, Jan. 1, Mar. 1, 3, 5, 7, 10, 12, 14, 16, 18, 20, 22, 25, 28, and 30.

Monthly discharge of North Fork of Grand River near Grand Lake, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	60	36	41.4	2,550
November	52	35	39.9	2,370
December	49	26	31.6	1,940
January	30	15	19.4	1,190
February	15	11	13.5	750
March	43	12	21.1	1,300
April	87	43	61.9	3,680
May	750	100	407	25,000
June	1,840	290	943	56,100
July	290	84	178	10,900
August	100	39	65.3	4,020
September	84	33	50.2	2,990
The year	1,840	11	156	113,000

GRAND RIVER AT HOT SULPHUR SPRINGS, COLO.

LOCATION.—In sec. 2, T. 1 N., R. 78 W., at highway bridge in Hot Sulphur Springs, Grand County.

DRAINAGE AREA.—946 square miles (measured on Hayden's atlas).

RECORDS AVAILABLE.—July 22, 1904, to September 30, 1909; September 23, 1910, to September 30, 1918.

GAGE.—Chain on downstream side of bridge; read by United States Forest Service. Prior to April 16, 1906, a staff gage 1,000 feet downstream, set to a datum 6.07 feet lower, was used.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Channel composed of well-compacted gravel. Control 150 feet downstream; shifted slightly during 1918. Banks are not overflowed.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.5 feet at noon June 14 (discharge, 8,770 second-feet); minimum discharge occurs during winter (estimated at 98 second-feet).

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

DIVERSIONS.—Court decrees for diversion of 96 second-feet from Grand River between this station and mouth of North Fork.

REGULATION.—Diurnal fluctuation during spring of year from alternate melting and freezing of mountain snow. No artificial regulation.

ACCURACY.—Stage-discharge relation shifted slightly. Rating curve well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Shifting-control method from May 1 to September 30. Records good except during winter, for which they are fair.

COOPERATION.—Gage heights furnished by United States Forest Service.

Discharge measurements of Grand River at Hot Sulphur Springs, Colo., during the year ending Sept. 30, 1918.

[Made by S. B. Soulé.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 14	1.77	167	Jan. 24	[a] 2.73	109	Mar. 4	[a] 2.98	108
Dec. 17	[a] 3.52	130	24	[a] 2.76	119	July 8	4.01	1,540

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Grand River at Hot Sulphur Springs, Colo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.	Sept.
1	200	155	163	141	424	3,310	2,400	472	221
2	227	156	153	146	578	2,880	2,260	497	230
3	234	160	155	153	665	2,880	2,260	534	263
4	205	148	150	162	1,020	2,880	2,260	472	317
5	202	168	146	170	1,530	3,310	2,010	578	290
6	190	162	141	190	1,760	3,910	1,640	635	263
7	186	163	125	210	2,010	4,520	1,760	605	337
8	186	155	121	215	2,260	4,870	1,530	497	298
9	182	160	123	280	2,670	5,230	1,420	447	280
10	176	158	125	337	2,140	5,770	1,640	472	298
11	168	146	132	317	1,760	7,060	1,640	424	280
12	170	150	132	447	1,310	7,250	1,530	378	280
13	168	150	132	550	1,110	7,440	2,010	400	263
14	167	163	132	665	1,310	8,580	1,760	378	218
15	165	172	132	550	1,640	7,820	1,420	400	210
16	167	163	132	447	2,330	6,680	1,420	357	246
17	163	162	130	378	2,460	6,310	1,420	337	298
18	155	147	132	337	2,600	6,310	1,310	317	263
19	148	138	138	280	2,600	5,950	1,210	298	246
20	172	138	141	215	2,600	5,950	1,020	280	246
21	167	147	144	280	2,460	5,950	1,110	298	227
22	178	153	144	317	2,460	6,130	1,210	280	215
23	165	162	138	317	2,600	5,770	890	280	243
24	167	162	135	337	3,020	5,410	890	263	280
25	174	156	125	378	3,610	4,870	850	246	298
26	178	148	125	497	3,610	4,360	810	246	298
27	162	141	128	550	3,310	4,060	700	230	298
28	184	138	130	400	3,610	3,310	635	246	280
29	180	141	128	357	3,910	2,880	635	227	298
30	175	153	125	357	3,610	2,600	578	210	337
31	170	.....	125	.....	4,060	.....	550	200	.....

NOTE.—Stage-discharge relation affected by ice Oct. 29, 30, Nov. 18 to Apr. 6. Daily discharge during November, December, and April estimated from discharge measurements, temperature records, and observer's notes. Monthly estimates only are given for January, February, and March.

Monthly discharge of Grand River at Hot Sulphur Springs, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	234	148	178	10,900
November	172	138	154	9,160
December	163	121	135	8,300
January	.....	.....	[a]115	7,070
February	.....	.....	[a]115	6,390
March	.....	.....	[a]114	7,010
April	665	141	333	19,800
May	4,060	424	2,290	141,000
June	8,580	2,600	5,140	306,000
July	2,400	550	1,380	84,800
August	635	200	371	22,800
September	337	210	271	16,100
The year	8,580	.....	883	639,000

[a] See footnote to daily-discharge table.

GRAND RIVER NEAR KREMMLING, COLO.

LOCATION.—In sec. 23, T. 1 N., R. 81 W., at entrance to Gore Canyon, 3 miles southwest of Kremmling, Grand County. Nearest tributary, Blue River, enters 1 mile below Kremmling.

DRAINAGE AREA.—2,380 square miles.

RECORDS AVAILABLE.—July 24, 1904, to September 30, 1918, when station was discontinued.

GAGE.—Friez water-stage recorder on right bank 200 feet above wagon bridge, used since October 15, 1915; inspected by C. H. Yust. Original gage, a chain on left bank, 100 feet above present location, installed July 24, 1904, and used until October 17, 1906; datum 0.80 foot lower than present. Inclined staff directly opposite chain gage, at present gage datum, used October 18, 1906, to July 27, 1910. Friez water-stage recorder installed near staff gage and at same datum used July 28, 1910, to October 14, 1915, except during winter when staff gage was used.

DISCHARGE MEASUREMENTS.—Made from cable just above gage. Winter measurements made from bridge at head of rapids.

CHANNEL AND CONTROL.—Bed composed of sand, silt, and scattered boulders. Control is head of rapids 250 feet downstream; slightly shifting, as silt is deposited and later scoured out by high water. Banks high and are not overflowed.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 19.0 feet at noon June 15 (discharge, 16,800 second-feet); minimum discharge occurred during winter when stage-discharge relation was affected by ice.

ICE.—Stage-discharge relation affected by ice during most of winter.

DIVERSIONS.—Court decrees for diversion of 35 second-feet from Grand River between this station and Hot Sulphur Springs.

STORAGE.—Station is located at proposed Kremmling reservoir site. A dam built 230 feet above the river bed at the mouth of Gore Canyon will impound nearly 2,200,000 acre-feet.

REGULATION.—Diurnal fluctuation during spring, caused by alternate melting and freezing of mountain snow.

ACCURACY.—Stage-discharge relation slightly shifting. Standard rating curve well defined. Operation of water-stage recorder satisfactory except for brief periods given in footnote to table of daily discharge. Mean daily gage height obtained by inspection of recorder graph. Daily discharge ascertained by indirect method for shifting control. Records good except during winter, when they are fair.

Discharge measurements of Grand River near Kremmling, Colo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 16	S. B. Soulé	1.64	482	Mar. 6	S. B. Soulé	[a]1.93	406
Jan. 22	do	[a]1.58	384	Oct. 13	P. V. Hodges	2.81	896

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Grand River near Kremmling, Colo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	625	500	576	.....	1,010	1,250	7,720	5,360	1,490	730
2	650	525	546	.....	1,090	1,580	6,540	4,860	1,450	730
3	670	550	486	.....	1,090	1,930	6,430	4,760	1,450	800
4	635	576	456	.....	1,090	2,610	7,000	4,860	1,490	835
5	600	576	411	.....	975	3,570	7,950	4,490	1,580	975
6	585	576	426	.....	870	4,400	8,800	4,130	1,680	1,050
7	550	576	320	.....	835	4,860	9,700	3,890	1,680	1,010
8	450	576	235	.....	800	5,060	10,600	3,650	1,580	940
9	540	561	.....	.....	835	5,560	11,400	3,570	1,410	940
10	560	531	.....	.....	1,010	5,360	13,800	3,570	1,370	1,010
11	560	501	.....	.....	1,050	4,580	14,200	3,810	1,330	1,050
12	540	501	.....	.....	1,170	3,810	15,400	3,570	1,290	1,010
13	489	501	.....	.....	1,450	3,410	16,000	3,970	1,290	940
14	535	531	.....	.....	1,730	3,810	16,500	3,970	1,250	870
15	510	546	.....	.....	1,780	4,310	16,500	3,410	1,250	835
16	483	561	.....	.....	1,450	5,660	15,800	3,270	1,250	835
17	495	516	.....	.....	1,250	6,210	14,900	3,340	1,170	905
18	516	441	.....	.....	1,130	6,430	14,500	3,060	1,090	905
19	471	370	.....	.....	1,050	6,430	14,000	2,850	1,090	835
20	516	426	.....	.....	905	6,320	13,200	2,670	1,050	800
21	546	486	.....	.....	940	6,320	13,500	2,730	1,010	765
22	516	516	.....	.....	975	6,320	13,500	2,610	975	730
23	531	516	.....	.....	1,010	6,820	13,300	2,550	940	730
24	516	486	.....	.....	1,050	7,650	13,000	2,310	905	765
25	546	546	.....	.....	1,210	8,560	12,400	2,310	870	835
26	561	531	.....	.....	1,330	8,680	10,900	2,190	835	905
27	546	516	.....	.....	1,580	8,200	9,570	1,980	800	940
28	576	456	.....	.....	1,490	8,200	8,320	1,830	765	940
29	456	396	.....	905	1,290	8,200	7,120	1,780	765	905
30	460	546	.....	870	1,210	8,000	6,210	1,680	730	870
31	475	.....	.....	1,010	.....	7,750	.....	1,580	730	.....

NOTE.—No gage heights Oct. 1–5, 7–12, 14, 15, 17, May 23, 24, 30, 31, June 5–7, 9–11, 13, 14; discharge determined by comparison with record obtained at Glenwood Springs. No gage heights Dec. 9 to Mar. 28; daily discharge not computed.

Monthly discharge of Grand River near Kremmling, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	670	450	539	33,100
November	576	370	515	30,600
December	.....	.....	412	25,300
January	.....	.....	374	23,000
February	.....	.....	375	20,800
March	.....	.....	510	31,400
April	1,780	800	1,160	69,000
May	8,680	1,250	5,540	341,000
June	16,500	6,210	11,600	690,000
July	5,360	1,580	3,250	200,000
August	1,680	730	1,180	72,600
September	1,050	730	880	52,400
The year	16,500	.....	2,200	1,590,000

NOTE.—Monthly means for December, January, February, and March determined from discharge measurements and comparison with record obtained at Glenwood Springs.

GRAND RIVER AT GLENWOOD SPRINGS COLO.

LOCATION.—In sec. 9, T. 6 S., R. 89 W., at Glenwood Springs, Garfield County. No Name Creek enters Grand River 2 miles above station and Roaring Fork half a mile below.

DRAINAGE AREA.—4,520 square miles (measured on Nell's map of Colorado).

RECORDS AVAILABLE.—January 1, 1900, to September 30, 1918; also May 12 to July 17, 1899, at point just above Roaring Fork.

GAGE.—Friez water-stage recorder on right bank in front of power house; installed May 17, 1910. See Water-Supply Paper 175 for history of early gages and gage used in 1905 which was also used until May 17, 1910.

DISCHARGE MEASUREMENTS.—Made from cable beneath State Street bridge, one-third mile below gage.

CHANNEL AND CONTROL.—Bed composed of well-compacted gravel, on which silt is deposited. Control is riffle 300 feet downstream; slightly shifting. Banks are not overflowed except at extremely high water.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 12.55 feet at noon June 14 and 15 (discharge, 30,100 second-feet); minimum stage, 1.9 feet at 3 p. m. March 17 (discharge, 155 second-feet).

ICE.—Stage-discharge relation not affected by ice. Hot water from springs keeps river open.

DIVERSIONS.—Court decrees for diversion of 13 second-feet from Grand River between this station and the one near Kremmling for irrigation, and 1,250 second-feet for power. Water diverted for power is returned to river above Glenwood Springs.

REGULATION.—Shoshone power plant of Colorado Power Co., 7 miles upstream controls flow during the day at low water, but has insufficient pondage to control it for more than a few hours.

ACCURACY.—Stage-discharge relation changed gradually during October, November, and December. Standard rating curve used October 1 to December 31, well defined; curve used January 1 to September 30, well defined. Operation of water-stage recorder satisfactory except for short periods as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph, except for period October 1 to December 31 for which the shifting-control method was used and except as indicated in footnote to daily-discharge table. Records excellent.

COOPERATION.—Gage heights furnished by United States Forest Service.

Discharge measurements of Grand River at Glenwood Springs, Colo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 24	H. W. Fear	3.87	1,210
Jan. 21	T. J. Watkins	3.31	754

Daily discharge, in second-feet, of Grand River at Glenwood Springs, Colo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,220	1,140	1,060	850	779	920	1,920	2,240	11,600	8,720	2,560	1,190
2	1,220	1,190	1,020	915	737	800	1,920	2,450	10,800	8,060	2,430	1,260
3	1,290	1,260	1,050	864	751	737	1,980	2,930	10,800	7,420	2,310	1,330
4	1,360	1,230	1,180	869	824	937	2,050	3,710	11,900	7,740	2,240	1,440
5	1,350	1,250	1,120	901	920	744	1,920	5,360	13,100	7,420	2,310	1,680
6	1,260	1,240	992	870	848	1,040	1,800	6,800	13,900	6,800	2,450	1,980
7	1,240	1,200	840	836	896	1,130	1,620	8,060	16,100	6,500	2,600	1,920
8	1,190	1,190	880	879	960	1,180	1,560	8,390	17,800	6,200	2,450	1,860
9	1,080	1,190	760	935	864	1,260	1,500	8,720	19,500	6,200	2,310	1,810
10	1,180	1,210	754	774	870	1,210	1,680	9,060	21,700	6,200	2,310	1,950
11	1,220	1,140	850	606	876	1,190	1,980	8,060	24,300	6,200	2,210	2,180
12	1,220	1,200	838	606	882	1,370	2,180	7,110	27,300	6,200	2,110	2,130
13	1,230	1,210	988	681	888	1,760	2,450	6,200	28,600	5,910	2,010	1,980
14	1,110	1,150	1,090	758	895	1,540	2,840	6,200	29,400	6,200	1,910	1,820
15	1,150	1,190	1,120	861	901	1,330	3,110	7,110	29,400	5,910	1,820	1,740
16	1,220	1,210	965	952	907	1,140	2,840	8,390	28,600	5,230	1,720	1,620
17	1,190	1,220	918	832	913	945	2,450	10,100	26,800	5,230	1,620	1,680
18	1,190	1,110	898	786	920	1,070	2,240	10,800	25,100	5,100	1,680	1,740
19	1,130	1,030	892	880	896	1,080	2,050	11,200	23,400	4,730	1,560	1,620
20	1,110	956	987	739	800	1,050	1,920	11,200	21,700	4,490	1,500	1,500
21	1,030	1,020	992	702	848	1,040	1,740	10,800	21,700	4,370	1,440	1,380
22	1,150	1,090	983	667	1,010	1,110	1,800	10,800	21,700	4,370	1,440	1,440
23	1,130	1,160	992	800	824	1,560	1,860	11,600	22,100	4,030	1,440	1,380
24	1,130	1,230	1,030	880	816	1,620	1,920	12,700	22,100	3,820	1,380	1,560
25	1,180	1,140	872	944	996	1,620	2,050	14,400	20,400	3,710	1,380	1,620
26	1,200	1,200	1,080	896	1,100	1,620	2,240	14,400	17,800	3,600	1,300	1,680
27	1,200	1,150	965	919	896	1,740	2,520	14,400	15,700	3,400	1,210	1,740
28	1,150	1,200	965	823	880	1,920	2,760	13,500	13,100	3,110	1,210	1,740
29	1,140	1,000	965	858	.....	1,800	2,520	13,500	11,600	2,930	1,180	1,740
30	1,150	1,020	947	892	.....	1,680	2,310	13,100	10,100	2,810	1,190	1,680
31	1,070	.....	929	822	.....	1,680	.....	12,300	.....	2,680	1,190	.....

NOTE.—Daily discharge obtained by averaging bi-hourly discharge: Dec. 10–13, 17–20, 24, 26, Jan. 1–10, 15, 20, 26–31, Feb. 22, Mar. 4 and 17. No gage heights Nov. 21–23, Feb. 10–17, July 10, 11, 30, 31, Aug. 1, 2, 11–16; discharge determined by comparison with records near Kremmling.

Monthly discharge of Grand River at Glenwood Springs, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1,360	1,030	1,180	72,600
November	1,260	956	1,160	69,000
December	1,180	754	965	59,300
January	952	606	826	50,800
February	1,100	737	882	49,000
March	1,920	737	1,280	78,700
April	3,110	1,500	2,120	126,000
May	14,400	2,240	9,210	566,000
June	29,400	10,100	19,600	1,170,000
July	8,720	2,680	5,330	328,000
August	2,600	1,180	1,820	112,000
September	2,180	1,190	1,680	100,000
The year	29,400	606	3,840	2,780,000

GRAND RIVER NEAR PALISADE, COLO.

LOCATION.—In sec. 2, T. 11 S., R. 98 W., at State bridge 2 miles above Palisade, Mesa County. Nearest important tributary, Plateau Creek, enters 6 miles above.

DRAINAGE AREA.—8,550 square miles (measured on Hayden's atlas).

RECORDS AVAILABLE.—April 9, 1902, to September 30, 1918.

GAGE.—Chain on downstream side of bridge near midspan; read by Mrs. Inez Nelson.

DISCHARGE MEASUREMENTS.—Made from new bridge, 2 miles below gage.

CHANNEL AND CONTROL.—No data, as only computed records are furnished.

EXTREMES OF DISCHARGE.—No data.

ICE.—Stage-discharge relation affected by ice. Data insufficient to warrant daily-discharge determinations.

DIVERSIONS.—Court decrees for diversion of 1,828 second-feet from Grand River between Palisade and Glenwood Springs station, 628 second-feet for irrigation, and 1,200 second-feet for pumping. The high-line canal of the United States Reclamation Service diverts 700 second-feet 5 miles above Palisade station.

REGULATION.—None.

COOPERATION.—Complete records furnished by United States Reclamation Service.

Discharge measurements of Grand River near Palisade, Colo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Dec. 22	Robertson and Owens	12.7	1,780
May 15	Robertson and Blackmer	16.8	11,200
Sept. 21	Page and Blackmer	13.05	2,050

Daily discharge, in second-feet, of Grand River near Palisade, Colo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,320	2,060	1,880	1,530	2,940	4,180	17,000	15,800	3,300	1,530
2	2,540	2,120	1,760	1,580	3,680	4,500	16,400	14,100	3,120	1,530
3	2,390	2,250	1,640	1,530	3,480	5,140	16,800	13,200	2,860	1,530
4	2,460	2,180	1,530	1,580	3,580	6,340	18,600	13,400	2,940	1,820
5	2,460	2,180	1,700	1,820	3,480	8,640	20,800	13,400	2,940	2,120
6	2,390	2,180	1,580	2,620	3,120	11,200	22,300	12,400	3,480	2,540
7	2,390	2,120	1,530	2,860	2,780	12,900	24,500	11,500	3,480	2,700
8	2,320	2,120	1,530	3,680	2,700	13,600	27,400	10,400	3,780	2,460
9	2,250	2,120	1,480	2,940	2,540	13,900	30,100	10,400	3,480	2,620
10	2,250	2,120	1,480	2,390	2,620	14,300	33,400	10,400	2,860	2,700
11	2,180	2,120	1,420	2,320	3,120	13,400	38,200	10,100	2,860	3,480
12	2,180	1,880	1,530	2,700	3,780	11,200	42,600	9,900	2,700	3,680
13	2,320	1,880	1,530	5,030	4,500	10,200	45,400	9,580	2,540	3,480
14	2,250	2,000	1,640	3,480	5,030	9,900	48,000	9,740	2,700	3,120
15	2,000	2,000	1,760	2,540	5,360	11,400	47,700	9,420	2,780	2,780
16	2,120	2,000	1,760	2,250	5,030	13,900	46,200	8,480	2,540	2,540
17	2,180	2,120	1,530	2,120	4,500	16,200	44,400	8,030	2,390	2,540
18	2,180	2,120	1,530	2,060	3,980	18,000	41,200	7,880	2,320	2,540
19	2,180	1,940	1,420	2,120	3,480	18,600	37,600	7,160	2,180	2,540
20	2,180	1,880	1,480	2,120	3,120	18,600	35,500	7,020	2,060	2,320
21	2,120	2,000	1,880	2,120	2,940	18,000	34,600	6,470	1,940	2,250
22	2,060	1,940	1,820	2,180	2,460	18,600	35,200	6,210	1,880	2,000
23	2,120	1,940	1,700	2,180	2,940	19,200	34,600	6,080	1,820	2,180
24	2,120	1,940	1,760	2,460	3,120	20,800	36,100	5,720	1,760	2,700
25	2,120	2,000	1,760	2,700	3,480	22,100	33,100	5,720	1,700	2,390
26	2,180	2,000	1,640	2,780	3,880	22,100	29,000	5,250	1,580	2,390
27	2,180	2,120	1,940	2,540	4,500	22,100	25,500	4,810	1,580	2,460
28	2,180	2,120	1,700	3,030	4,810	21,200	22,800	4,500	1,480	2,460
29	2,060	2,120	1,700	3,210	4,500	20,500	20,100	4,080	1,480	2,180
30	2,000	2,120	1,760	2,940	3,980	19,500	17,400	3,780	1,480	2,390
31	2,060	.....	1,700	2,940	.....	18,000	.....	3,680	1,530	.....

NOTE.—Quantities changed slightly to conform to rules of computation used by U. S. Geol. Survey. Stage-discharge relation affected by ice during January and February.

Monthly discharge of Grand River near Palisade, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	2,540	2,000	2,220	136,000
November	2,250	1,880	2,060	123,000
December	1,940	1,420	1,650	101,000
March	5,030	1,530	2,530	156,000
April	5,360	2,460	3,650	217,000
May	22,100	4,180	14,800	910,000
June	48,000	16,400	31,400	1,870,000
July	15,800	3,680	8,660	532,000
August	3,780	1,480	2,440	150,000
September	3,680	1,530	2,470	147,000

NOTE.—See footnote to table of daily discharge.

GRAND RIVER NEAR FRUITA, COLO.

LOCATION.—In sec. 20, T. 1 N., R. 2 W. New Mexico principal meridian, at highway bridge 1½ miles south of Fruita, Mesa County. Nearest important tributary, Little Salt Wash, enters 1 mile below station; Gunnison River enters at Grand Junction, 12 miles above.

DRAINAGE AREA.—16,800 square miles (measured on Hayden's atlas).

RECORDS AVAILABLE.—Flood records during 1908, 1909, and 1910; continuous records April 1, 1911, to September 30, 1918.

GAGE.—Chain on downstream side of left span; read by L. C. Jones. Prior to May 3, 1911, gage was vertical staff attached to center pier; datum 0.05 foot lower.

DISCHARGE MEASUREMENTS.—Made from three-span highway bridge.

CHANNEL AND CONTROL.—Bed composed of silt and gravel which will shift during high water, scouring out at high stages and filling in afterwards. Control is riffle 600 feet downstream; somewhat shifting. Banks are high and are not overflowed, except at stages above 14 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 13.9 feet at 5 p. m. June 14, and 8 a. m. June 15 (discharge, 57,000 second-feet); minimum stage occurs during winter.

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

DIVERSIONS.—Court decrees for diversion of 788 second-feet from Grand River between Palisade station and Fruita.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent except during high water when channel and control scour and fill. Rating curve well defined below 20,000 second-feet, but uncertain above, owing to the scour and fill. Gage read to tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except during high water when they may be 10 to 15 per cent too small, as indicated by comparison with flow of Grand River near Palisade and Gunnison River near Grand Junction.

COOPERATION.—Gage heights furnished by Weather Bureau.

Discharge measurements of Grand River near Fruita, Colo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 17	H. W. Fear	3.35	2,870	May 30	Robert Follansbee	9.86	25,600
Dec. 2	Robert Follansbee	3.44	2,870	July 14	do	7.01	11,600

Daily discharge, in second-feet, of Grand River near Fruita, Colo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3,040	2,880	2,880	.....	3,200	5,170	8,510	22,800	18,700	3,540	1,800
2	3,200	2,880	2,880	.....	2,580	5,640	9,600	21,700	16,700	3,540	1,800
3	3,200	2,880	2,880	.....	2,730	5,880	10,200	20,200	14,200	3,540	1,800
4	3,040	3,040	2,880	.....	2,730	5,880	12.200	22,700	15,000	3,540	2,580
5	3,040	3,040	2,880	.....	2.880	5,880	14,600	25,200	14,600	3,370	2,580
6	3,040	3,200	2,580	.....	3,370	5,400	17,200	27,800	14,200	4,720	2,730
7	3,040	3,040	2,580	.....	4,510	4,940	18,700	30,600	12,600	3,910	2,880
8	2,880	3,040	2,580	.....	4,300	4,720	20,700	34,400	13,400	4,100	3,200
9	2,730	3,040	2,580	.....	4,720	4,720	20,700	39,000	12,600	3,910	3,040
10	2,730	3,040	2,580	.....	4,100	4,720	20,700	42,200	11,800	3,720	4,300
11	2,730	2.880	2,580	.....	3,910	5,400	18,700	46,200	12,200	3,720	6,630
12	2,730	2,880	.....	.....	3,720	6,130	16,200	51,100	12,600	3,540	6,880
13	2,880	2,880	.....	.....	7,140	7,670	14,600	54,500	12,600	3,540	6,130
14	2,730	2,880	.....	.....	6,130	8,510	15,000	55,400	12,200	3,910	5,170
15	2,580	2,880	.....	.....	4,510	9,100	17,700	56,200	11.800	4,300	4,940
16	2,580	3,040	.....	.....	3,910	8,800	20,200	53,600	10,500	4,300	4,300
17	2,580	3,040	.....	.....	3,540	7,940	24,600	51,100	9,900	4,300	4,100
18	2,730	2,880	.....	.....	3,540	6,880	26,500	47,800	9,400	3,370	4,100
19	2,730	2,730	.....	.....	3,540	5,880	28,500	46.200	8,800	2,880	3,910
20	2,730	2,730	.....	3,370	3,370	5,400	27,200	41,400	8,220	2,580	3,720
21	2,730	2,730	.....	2,880	3,370	5,170	28,500	40,600	7,940	2,440	3,540
22	2,880	2,730	.....	2,730	3,540	4,510	25,800	39,800	7,670	2,300	3,540
23	2,880	2,730	.....	2,880	3,540	4,720	26,500	41,400	7,140	2,300	3,200
24	3,040	3,040	.....	3,370	3,540	5,400	32,100	39,800	7.400	2,300	3,910
25	2,880	3,040	.....	3,370	3,910	6,380	31,600	38,200	7,140	2,170	3,910
26	2,880	3,040	.....	3,200	4,510	7,670	31,100	32,800	6,130	2,170	3,720
27	3,040	3,040	.....	3,040	4,720	9,100	30,600	29,200	5,640	2,040	3,540
28	3,200	3,040	.....	2,880	5,170	9,100	28,500	26,500	5,400	1,800	3,720
29	3,040	3,040	.....	.....	5.400	8,220	27,200	23,400	5,170	1,690	3,540
30	2,880	2,880	.....	.....	4,940	7,670	25,800	19,700	4,510	1,800	3,540
31	2,880	.....	.....	.....	4,940	.....	24,600	.....	4,100	1,800	.....

NOTE.—Discharge interpolated May 25, 26, and June 4; gage not read.

Monthly discharge of Grand River near Fruita, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	3,200	2,580	2,880	177,000
November	3,200	2,730	2,940	175,000
December	.....	.....	2,630	162,000
January	.....	.....	2,390	147,000
February	.....	.....	2,710	151,000
March	7,140	2,580	4,060	250,000
April	9,100	4,510	6,420	382,000
May	32,100	8,510	21,800	1,340,000
June	56,200	19,700	37,400	2,230,000
July	18,700	4,100	10,300	633,000
August	4,720	1,690	3,130	192,000
September	6,880	1,800	3,760	224,000
The year	56,200	.....	8,370	6,060,000

NOTE.—Monthly means for December, January, and February, determined by comparison with record at Glenwood Springs.

FRASER RIVER NEAR ARROW, COLO.

LOCATION.—In sec. 4, T. 2 S., R. 75 W., a quarter of a mile from Vasquez siding on Denver & Salt Lake Railroad, in Arapahoe National Forest, and 1½ miles southwest of Arrow, Grand County. Nearest tributary enters half a mile above.

DRAINAGE AREA.—29 square miles, revised (measured on special map).

RECORDS AVAILABLE.—September 23, 1910, to September 30, 1918.

GAGE.—Friez water-stage recorder on left bank about 1 mile below bridge on road to Arrow. Vertical staff on railroad bridge 200 yards below original gage site, installed December 15, 1917, and used during winter. Forest ranger acts as observer. Prior to June 3, 1916, and from December 12, 1916, to May 26, 1917, vertical staff attached to downstream side of bridge on road to Arrow was used.

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

CHANNEL AND CONTROL.—Bed composed of boulders and coarse gravel; shifting during high water. No well-defined control. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 2.9 feet at 9 p. m. June 13 (discharge, 820 second-feet); minimum discharge, 6 second-feet during greater part of winter.

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—Court decrees for diversion of 53 second-feet across divide from headwaters of Fraser River to headwaters of Clear Creek. During 1918 about 950 acre-feet were diverted under this decree, all between June 1 and August 22. Below station, court decrees for 74 second-feet for irrigation and 61 second-feet for placer and power.

REGULATION.—Diurnal fluctuation during spring, caused by alternate melting and freezing of mountain snow.

ACCURACY.—Stage-discharge relation shifted during high water; affected by ice October 25 to March 16. Rating curve used October 1–24, well defined; curve for winter gage used March 17 to May 18, well defined. Standard rating curve used May 19 to September 30, well defined; applied indirectly May 19 to June 27. Operation of water-stage recorder satisfactory October 1–24 and May 19 to September 30; gage heights December 15 to May 18 from winter staff gage which was read once daily. Daily discharge ascertained by applying to rating table the daily staff gage reading or the mean daily gage height obtained by inspecting the recorder graph, except for period May 19 to June 27, and except as indicated in footnote to table of daily discharge. Records good except for period of ice effect, for which they are fair.

COOPERATION.—Gage heights furnished by United States Forest Service.

Discharge measurements of Fraser River near Arrow, Colo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 15	S. B. Soulé	[a] 1.06	8.2	June 21	Robert Follansbee	2.14	409
Mar. 7	do	[a] 1.08	6.8	July 8	S. B. Soulé	1.14	111
June 6	Robert Follansbee	1.26	190	9	do	1.10	103

[a] Made at winter station established Dec. 15. Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Fraser River near Arrow, Colo., for the year ending Sept. 30, 1918.

Day.	Oct.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	15	.....	10	6	6	27	41	171	161	45	24
2	14	.....	9	6	6	28	46	151	151	46	26
3	14	.....	8	6	6	27	54	156	144	46	28
4	14	.....	8	6	6	26	58	171	137	47	28
5	14	.....	7	6	6	27	58	185	133	50	27
6	14	.....	6	6	6	28	66	226	131	45	27
7	14	.....	6	6	7	28	71	272	120	40	25
8	13	.....	6	6	6	29	62	339	111	37	23
9	13	.....	6	6	6	31	61	339	105	37	23
10	13	.....	6	6	6	31	68	411	105	37	23
11	13	.....	6	6	6	33	74	491	103	37	24
12	13	.....	6	6	6	33	80	555	94	36	24
13	12	.....	6	6	6	33	86	600	96	36	25
14	12	.....	6	6	6	33	93	622	96	36	25
15	12	8	6	6	6	31	127	534	96	36	26
16	12	8	6	6	11	31	139	511	103	35	27
17	13	9	6	6	20	30	152	534	107	35	26
18	13	10	6	6	20	30	159	491	94	35	24
19	13	10	6	6	20	29	129	450	89	35	22
20	13	11	6	6	20	29	131	450	84	34	20
21	13	10	6	6	22	29	140	450	84	32	18
22	13	10	6	6	22	30	146	411	84	31	18
23	13	9	6	6	23	29	179	374	78	30	15
24	13	9	6	6	23	30	196	339	73	29	19
25	.....	8	6	6	22	28	199	305	70	29	23
26	.....	8	6	6	22	28	199	272	66	28	22
27	.....	8	6	6	22	29	199	232	62	27	22
28	.....	8	6	6	22	35	199	208	54	28	21
29	.....	9	6	.....	21	37	193	192	52	26	20
30	.....	10	6	.....	22	39	193	176	50	25	19
31	.....	10	6	.....	20	.....	176	.....	48	24	.....

NOTE.—Stage-discharge relation affected by ice Oct. 25 to Mar. 16. Discharge Dec. 15 to Mar. 16 determined from daily gage heights, discharge measurements, and temperature records. Discharge not determined Oct. 25 to Dec. 14. No gage heights June 29, 30, July 14, and Aug. 9–18; discharge interpolated.

Monthly discharge of Fraser River near Arrow, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October 1–24	15	12	13.2	628
December 15–31	11	8	9.1	307
January	10	6	6.4	394
February	6	6	6.0	333
March	23	6	13.6	836
April	39	26	30.3	1,800
May	199	41	122	7,500
June	622	151	354	21,100
July	161	48	96.2	5,920
August	50	24	35.3	2,170
September	28	15	23.1	1,370

WILLIAMS FORK NEAR PARSHALL, COLO.

LOCATION.—About sec. 36, T. 1 N., R. 79 W., at private bridge at Field's ranch, 4 miles above mouth of river and 4 miles south of Parshall, Grand County. Nearest tributary, Battle Creek, enters from west 2 miles below station.

DRAINAGE AREA.—185 square miles (measured on Forest atlas).

RECORDS AVAILABLE.—July 25, 1904, to September 30, 1918.

GAGE.—Vertical staff on downstream side of bridge pier; read by F. A. Field.

DISCHARGE MEASUREMENTS.—Made from two-span bridge or by wading near by.

CHANNEL AND CONTROL.—Bed composed of coarse gravel and small boulders; shifts. Control is gravel bar 50 feet downstream; practically permanent during 1918. At stage of 4.1 feet water begins to flow through small overflow channels.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.0 feet at 9:45 a. m. June 14 (discharge, 2,520 second-feet); gage was destroyed on June 15 and river was probably higher. Minimum discharge of 25 second-feet occurred January 11.

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—Court decrees for diversion of 1,416 second-feet from Williams Fork, all above station. Of this amount, 700 second-feet is to be diverted to the eastern slope, but this diversion has not been made.

REGULATION.—Diurnal fluctuation during spring, caused by alternate melting and freezing of mountain snow.

ACCURACY.—Stage-discharge relation practically permanent except as affected by ice. Rating curve well defined below 1,500 second-feet but uncertain above. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent except for period of ice effect for which they are fair.

Discharge measurements of Williams Fork near Parshall, Colo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 15	S. B. Soulé	2.69	70	Mar. 4	S. B. Soulé	[a] 2.73	45.6
Dec. 18	do	[a] 2.77	57	June 5	Robert Follansbee	4.25	728
Jan. 23	do	[a] 2.70	47.6	July 7	S. B. Soulé	3.92	477

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Williams Fork near Parshall, Colo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	76	78	65	57	45	45	81	112	690	712	148	86
2	80	92	57	64	45	45	86	117	540	674	151	88
3	80	100	57	60	45	45	90	139	610	674	146	86
4	78	100	45	57	45	45	98	203	690	706	146	96
5	73	96	45	57	45	44	90	291	690	642	153	108
6	70	86	45	57	45	44	85	388	770	582	156	85
7	73	78	45	57	51	45	81	382	905	540	148	85
8	71	71	51	57	52	45	92	356	1,050	494	142	85
9	67	68	57	51	51	55	92	393	1,150	508	128	94
10	70	60	57	45	51	57	81	427	1,050	421	126	102
11	73	68	57	25	51	56	78	315	1,300	398	126	104
12	67	76	57	35	45	47	100	238	1,360	393	123	102
13	68	71	57	45	45	45	117	216	950	346	119	96
14	70	68	57	45	45	45	135	320	2,520	338	115	92
15	68	73	57	45	45	45	108	275	2,600	328	110	98
16	73	70	57	45	45	45	94	371	2,600	324	108	104
17	74	70	57	51	45	45	85	488	2,600	328	108	94
18	80	86	57	45	45	45	90	488	2,520	320	115	90
19	78	80	57	45	45	46	81	482	1,300	303	102	86
20	74	85	57	45	45	55	102	488	1,360	268	98	86
21	74	85	57	51	45	93	85	488	1,300	253	92	85
22	74	80	57	51	45	56	74	494	1,580	242	88	86
23	74	64	57	45	45	56	83	540	1,360	238	86	106
24	81	68	57	45	46	60	80	650	1,420	228	85	110
25	85	78	57	51	55	61	80	730	1,420	225	83	121
26	86	70	57	51	45	67	85	730	1,470	216	81	112
27	81	71	57	51	44	96	128	690	1,250	200	81	121
28	90	85	57	51	45	88	92	730	1,150	189	81	119
29	98	74	57	51	.....	85	100	690	950	178	80	110
30	80	68	57	45	.....	88	86	730	860	170	83	112
31	92	.....	57	35	.....	74	.....	730	.....	158	81	.....

NOTE.—Stage-discharge relation affected by ice Dec. 2–29, Jan. 5–7, 9–31, Feb. 1–6, 9–20, 28, Mar. 1–4, 13–18; discharge determined from daily gage height and temperature records, and discharge measurements. Gage washed out June 15–17; discharge determined from comparison with record obtained at station on Grand River at Hot Sulphur Springs.

Monthly discharge of Williams Fork near Parshall, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	98	67	76.7	4,720
November	100	64	77.3	4,600
December	65	45	55.5	3,410
January	64	25	48.9	3,010
February	55	44	46.5	2,580
March	96	44	57.0	3,500
April	135	74	92.0	5,470
May	730	112	442	27,200
June	2,600	540	1,330	79,100
July	712	158	374	23,000
August	156	80	113	6,950
September	121	85	98.3	5,850
The year	2,600	25	234	169,000

BLUE RIVER AT DILLON, COLO.

LOCATION.—In sec. 18, T. 5 S., R. 77 W., at highway bridge on edge of Dillon, Summit County. Nearest tributaries, Snake River and Tenmile Creek, enter a short distance below.

DRAINAGE AREA.—110 square miles (measured on Forest atlas).

RECORDS AVAILABLE.—October 15, 1910, to September 30, 1918.

GAGE.—Vertical staff on right abutment of bridge facing channel; read by E. Cooke, M. D. Pierce, and Frank Sopir.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of compact gravel upon which lodges detritus from hydraulic dredges near Breckenridge. Control is riffle 50 feet downstream, which shifted during high water of 1918. Banks high and not overflowed. Point of zero flow, 0.4 foot (±.1).

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.7 feet at 7 p. m. June 16 (discharge, 900 second-feet); minimum discharge of 20 second-feet occurred February 28 and March 1.

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—Court decrees for diversion of 2.3 second-feet for irrigation from Blue River above station and 63 second-feet below; also placer decrees for diversion of 118 second-feet near Breckenridge. Unadjudicated diversion from the headwaters of Blue River across Boreas Pass to Tarryall Creek.

REGULATION.—Diurnal fluctuation during spring, caused by alternate melting and freezing of mountain snow.

ACCURACY.—Stage-discharge relation not permanent, but shifted slightly after high water; affected by ice. Standard rating curve well defined below 700 second-feet. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except for period of ice effect. Indirect method for shifting control June 1 to August 31. Records good except during winter, for which they are fair.

Discharge measurements of Blue River at Dillon, Colo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 22	S. B. Soulé	1.43	47.9	Mar. 12	S. B. Soulé	[a] 3.00	22.6
Dec. 21	do	[a] 1.39	32.5	Aug. 1	J. B. Spiegel	2.07	165
Jan. 20	do	[a] 1.89	25.9				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Blue River at Dillon, Colo., for the year ending Sept. 30, 1918.

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	53	46	34	30	24	20	34	170	578	442	158	60
2	51	46	32	30	24	21	34	200	625	420	158	60
3	49	44	32	30	25	21	34	217	625	375	158	63
4	49	44	31	30	27	21	33	217	675	355	158	70
5	49	43	30	30	28	22	32	217	675	355	158	73
6	49	42	28	30	29	22	34	236	750	355	150	73
7	49	37	28	30	29	22	42	255	800	355	145	73
8	49	36	28	30	30	22	43	236	750	355	132	73
9	49	36	28	30	30	22	46	217	750	375	132	73
10	49	36	28	27	30	22	52	236	800	355	132	70
11	49	36	28	24	29	22	55	236	850	355	132	66
12	49	36	28	24	28	22	60	255	850	355	132	66
13	49	36	28	24	28	22	63	335	850	355	132	66
14	49	36	29	24	28	22	60	335	850	355	132	66
15	49	35	30	24	28	21	58	375	850	335	121	66
16	49	34	30	24	28	21	60	420	900	315	121	66
17	49	34	30	25	27	22	55	420	850	315	121	66
18	49	33	31	25	27	22	50	465	850	295	117	66
19	46	32	32	25	27	24	44	465	750	275	110	60
20	45	34	32	26	26	26	46	510	800	275	97	60
21	46	35	32	26	26	26	46	578	850	255	89	60
22	46	36	32	26	25	25	52	555	800	236	89	60
23	46	36	31	26	24	24	50	600	800	221	79	60
24	46	36	30	27	24	25	58	600	800	210	72	60
25	46	35	29	28	23	26	63	600	750	204	70	60
26	46	34	30	28	22	27	60	600	650	178	66	60
27	46	32	30	26	21	28	60	555	600	172	63	60
28	46	32	30	26	20	30	81	578	532	172	63	60
29	46	33	30	25	.....	31	108	600	488	172	61	60
30	46	34	30	24	.....	32	142	600	488	172	61	60
31	46	.....	30	24	.....	34	.....	600	.....	172	60	.....

NOTE.—Stage-discharge relation affected by ice Oct. 24 to Apr. 6; discharge determined from daily gage-height records, discharge measurements, and temperature records.

Monthly discharge of Blue River at Dillon, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	53	45	47.9	2,950
November	46	32	36.6	2,180
December	34	28	30.0	1,840
January	30	24	26.7	1,640
February	30	20	26.3	1,460
March	34	20	24.1	1,480
April	142	32	55.2	3,280
May	600	170	403	24,800
June	900	488	740	44,000
July	442	172	295	18,100
August	158	60	112	6,890
September	73	60	64.5	3,840
The year	900	20	155	112,000

SNAKE RIVER AT DILLON, COLO.

LOCATION.—In. sec. 18, T. 5 S., R. 77 W., at highway bridge 100 yards above mouth of river, at Dillon, Summit County. Nearest tributary, a small stream, enters from north 1 mile above station.

DRAINAGE AREA.—92 square miles (measured on Forest atlas).

RECORDS AVAILABLE.—October 15, 1910, to September 30, 1918.

GAGE.—Vertical staff on downstream side of right bridge abutment; read by Frank Sopir. Prior to April 26, 1913, gage was 2 feet farther upstream, and although referred to same datum, water piled up on gage during high water, giving a higher reading for same discharge.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading just below gage.

CHANNEL AND CONTROL.—Bed composed of small boulders, rough, but permanent. Control 50 feet downstream; shifted during 1918. Banks are not overflowed.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.1 feet at 7 a. m. and 7 p. m. June 15 (discharge, 1,170 second-feet); minimum discharge 8 second-feet for several days during winter.

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

DIVERSIONS.—Snake River ditch of Summit County Power Co. diverts about 30 second-feet from Snake River above Dillon. Irrigation decree for 4.5 second-feet above Dillon.

REGULATION.—Operation of power canal affects low-water flow.

ACCURACY.—Stage-discharge relation not permanent; affected by ice. Rating curve used from October 1 to May 31, well defined below 600 second-feet. Curve used from June 15 to September 30, fairly well defined. Shifting-control method used June 1-14. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except for period for which shifting-control method was used and except as indicated in footnote to daily-discharge table. Records good except for winter, for which they are fair.

Discharge measurements of Snake River at Dillon, Colo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 22	S. B. Soulé	0.66	15.1	Mar. 11	S. B. Soulé	0.53	9.3
Dec. 21	do	.85	15.5	Aug. 1	J. B. Spiegel	1.7	100
Jan. 20	do	.68	9.8				

Discharge measurements of Snake River ditch at Dillon, Colo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 22	S. B. Soulé	1.26	18.2
Dec. 21	do	2.3	10.2
Aug. 1	J. B. Spiegel	1.47	27.1

Daily discharge, in second-feet, of Snake River at Dillon, Colo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	13	14	10	13	9	8	12	47	196	355	92	58
2	13	14	10	13	9	9	12	47	265	307	92	54
3	13	14	10	13	9	10	12	51	330	280	92	51
4	13	14	10	13	10	11	11	57	440	233	92	49
5	13	14	9	13	10	11	12	60	530	240	92	45
6	13	20	8	12	10	11	12	72	602	233	92	39
7	13	23	8	12	11	11	12	64	674	226	86	39
8	13	29	8	11	11	11	13	72	686	216	83	39
9	13	23	8	10	10	11	17	76	728	233	79	37
10	13	25	8	10	10	10	18	81	830	252	74	33
11	13	25	9	9	12	11	23	81	1,000	233	74	33
12	13	23	10	9	10	11	23	86	1,040	240	74	33
13	13	22	10	10	11	11	26	94	1,090	252	69	33
14	13	21	12	10	10	11	12	124	1,100	252	66	33
15	13	13	13	10	10	12	13	131	1,170	233	66	33
16	13	16	14	10	10	12	16	142	1,140	216	66	30
17	13	20	15	10	10	13	17	159	1,110	199	66	28
18	12	33	16	10	11	14	14	159	1,080	175	66	28
19	14	28	16	10	10	13	14	165	990	165	69	24
20	16	28	16	10	10	12	16	182	860	158	74	24
21	14	52	16	10	13	12	16	220	990	158	74	24
22	14	30	14	10	10	12	18	240	800	146	74	24
23	14	26	13	10	10	11	21	276	740	135	74	24
24	14	27	13	10	11	11	19	262	680	135	74	24
25	14	14	13	9	11	12	21	262	620	124	74	24
26	14	13	13	8	11	12	21	249	530	113	69	26
27	14	13	13	8	11	11	21	232	475	113	66	28
28	14	10	13	8	11	12	28	220	425	106	66	28
29	14	10	13	8	.....	12	31	249	375	102	63	28
30	14	10	13	8	.....	12	43	240	375	92	58	28
31	14	.....	13	8	.....	12	.....	208	.....	92	58	.....

NOTE.—Stage-discharge relation affected by ice Nov. 28 to Feb. 3, Feb. 26 to Mar. 13; discharge estimated from discharge measurements, observer's notes, and records of gage height and temperature.

Monthly discharge of Snake River at Dillon, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	16	12	13.5	830
November	52	10	20.8	1,240
December	16	8	11.8	726
January	13	8	10.2	627
February	13	9	10.4	578
March	14	8	11.4	701
April	43	11	18.1	1,080
May	276	47	149	9,160
June	1,170	196	729	43,400
July	355	92	194	11,900
August	92	58	74.6	4,590
September	58	24	33.4	1,990
The year	1,170	8	106	76,800

TENMILE CREEK AT DILLON, COLO.

LOCATION.—In sec. 18, T. 5 S., R. 77 W., at highway bridge 300 yards above mouth of creek, in Dillon, Summit County. Nearest tributary, Canon Creek, enters from west 4 miles above.

DRAINAGE AREA.—113 square miles (measured on Forest atlas).

RECORDS AVAILABLE.—October 15, 1910, to September 30, 1918.

GAGE.—Vertical staff on downstream side of center pier; read by Frank Sopir and E. Cooke. Prior to June 10, 1914, gage was at side of pier where during high stages the water piled up on the gage, giving a higher reading for the same discharge, although referred to the same datum.

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

CHANNEL AND CONTROL.—Bed composed of small boulders; rough but permanent. Control 30 feet downstream; shifted during 1918. Banks high and are not overflowed.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.25 feet at 8 a. m. June 11 (discharge, 1,600 second-feet); minimum discharge of 2 second-feet occurred February 15, 16, 17, and 20.

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

DIVERSIONS.—Court decrees for diversion of 11 second-feet from Tenmile Creek above station.

REGULATION.—Diurnal fluctuation during spring, caused by alternate melting and freezing of mountain snow.

ACCURACY.—Stage-discharge relation not permanent, but shifted during high water; affected by ice. Standard rating curve well defined below 1,000 second-feet. Shifting-control method used June 9 to September 30. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except for period for which shifting-control method was used and except for period of ice effect. Records good except for winter, for which they are fair.

Discharge measurements of Tenmile Creek at Dillon, Colo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 22	S. B. Soulé	1.66	30.6	Mar. 12	S. B. Soulé	[a] 1.59	23.0
Dec. 21	do	[a] 1.88	22.6	July 31	J. B. Spiegel	2.08	123
Jan. 20	do	[a] 1.70	19.1				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Tenmile Creek at Dillon, Colo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	40	30	29	23	14	18	42	138	525	442	110	44
2	40	31	27	23	14	22	40	174	610	410	98	48
3	40	31	25	23	14	23	46	203	761	378	98	50
4	40	30	24	23	13	23	40	203	921	348	98	52
5	40	30	22	22	12	24	37	203	1,060	319	98	56
6	40	30	21	22	12	25	37	181	1,190	302	98	64
7	40	30	21	20	10	26	40	174	1,250	302	87	64
8	40	31	21	20	10	25	40	216	1,300	265	87	64
9	40	33	21	19	10	24	44	216	1,360	292	77	56
10	40	32	22	18	9	24	50	216	1,530	280	77	56
11	40	33	22	18	8	24	56	225	1,530	302	75	56
12	40	33	22	18	8	23	59	235	1,480	348	75	56
13	40	34	22	18	6	23	68	319	1,480	336	73	56
14	40	35	22	18	4	23	71	342	1,480	319	73	56
15	40	39	22	18	2	22	68	378	1,480	280	71	56
16	40	34	22	18	2	21	59	390	1,480	265	71	56
17	40	32	22	18	2	21	50	442	1,400	240	70	56
18	40	30	22	19	4	21	44	490	1,400	230	70	56
19	35	29	22	19	4	22	46	539	1,320	216	68	56
20	35	29	22	19	2	24	54	632	1,320	194	68	56
21	34	31	23	19	4	23	59	730	1,190	194	59	56
22	34	32	23	18	6	23	59	809	1,190	174	59	56
23	34	32	23	18	11	23	68	865	1,060	155	54	56
24	34	32	22	17	12	25	59	889	985	138	51	56
25	34	32	22	16	13	27	64	921	785	124	50	56
26	34	29	23	16	14	29	59	889	595	118	50	60
27	34	29	23	18	15	31	56	825	560	110	50	64
28	34	29	23	17	16	33	68	785	595	110	44	64
29	32	29	24	16	.....	32	96	632	560	110	44	64
30	29	29	24	16	.....	34	115	610	525	110	44	64
31	30	.....	24	15	.....	40	.....	560	.....	110	44	.....

NOTE.—Stage-discharge relation affected by ice Oct. 29 to Nov. 7, Nov. 17 to Mar. 26; discharge determined from daily gage-height records, discharge measurements, and temperature records.

Monthly discharge of Tenmile Creek at Dillon, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	40	29	37.2	2,290
November	39	29	31.3	1,860
December	29	21	22.8	1,400
January	23	15	18.8	1,160
February	16	2	9.0	500
March	40	18	25.1	1,540
April	115	37	56.5	3,360
May	921	138	466	28,700
June	1,530	525	1,100	65,500
July	442	110	243	14,900
August	110	44	70.7	4,350
September	64	44	57.0	3,390
The year	1,530	2	178	129,000

EAGLE RIVER AT REDCLIFF, COLO.

LOCATION.—In sec. 29, T. 6 S., R. 80 W., at footbridge in Redcliff, Eagle County. Nearest tributary, Turkey Creek, enters 100 yards below station; Homestake Creek enters 1 mile below.

DRAINAGE AREA.—74 square miles (measured on topographic map).

RECORDS AVAILABLE.—January 8, 1911, to September 30, 1918.

GAGE.—Chain on downstream side of footbridge; read by forest ranger. Staff gage in same section and referred to same datum, read during high water.

DISCHARGE MEASUREMENTS.—Made from highway bridge 800 feet above station or by wading.

CHANNEL AND CONTROL.—Bed composed of boulders and is very rough. Control short distance below gage; shifts between narrow limits. Banks are high and are not overflowed.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.5 feet at 7.30 a. m. June 10, 11, and 12 (discharge, 685 second-feet); minimum stage, 0.01 foot at 7 a. m. October 15 (discharge, 1 second-foot).

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

DIVERSIONS.—Court decrees for diversion of 6 second-feet from Eagle River above station, and also a decree for diversion to the Arkansas basin of 18.5 second-feet from Piney Creek, a tributary. During 1918, 2,210 acre-feet diverted under this decree.

REGULATION.—Diurnal fluctuation during spring, caused by alternate melting and freezing of mountain snow. Filling of Pando ice pond in fall reduces flow for a few days.

ACCURACY.—Stage-discharge relation not permanent but shifted slightly; unaffected by ice. Rating curve used from October 1 to May 22 well defined below 500 second-feet; curve used May 27 to September 30 well defined below 700 second-feet. Indirect method for shifting control used January 3 to March 5, and May 23–25. Gage read to hundredths usually twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except for periods for which the shifting-control method was used. Records good.

COOPERATION.—Gage heights furnished by United States Forest Service.

Discharge measurements of Eagle River at Redcliff, Colo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 19	S. B. Soulé	0.69	12.8	June 12	Robert Follansbee	3.22	589
Jan. 26	T. J. Watkins	.67	17.0	Aug. 2	J. B. Spiegel	1.07	35.6
Feb. 25	....do	.58	9.3				

Daily discharge, in second-feet, of Eagle River at Redcliff, Colo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	15	12	10	11	15	11	43	81	319	186	38	26
2	17	12	12	13	16	12	52	94	326	162	34	27
3	15	13	15	12	15	14	52	94	334	162	34	28
4	15	16	11	14	14	16	55	196	434	162	34	31
5	16	16	11	14	14	17	36	221	478	151	35	34
6	15	16	15	14	14	16	26	246	454	140	37	34
7	15	16	14	13	15	16	26	201	501	131	34	32
8	15	16	14	15	12	16	27	211	535	122	32	35
9	15	15	15	15	11	15	40	238	583	129	32	38
10	14	14	15	15	12	15	58	243	631	118	32	41
11	14	14	16	16	12	14	63	211	597	129	32	35
12	13	14	16	17	11	14	94	190	597	122	32	31
13	13	15	10	18	11	15	80	168	590	136	29	28
14	5	14	11	18	11	16	76	203	566	122	28	26
15	1	14	13	18	11	13	73	232	508	108	30	28
16	1	14	14	18	11	13	65	324	470	114	27	29
17	2	14	14	19	10	13	50	386	421	114	27	28
18	5	11	13	19	10	13	45	450	383	94	26	26
19	13	8	13	19	10	17	42	447	352	70	26	26
20	7	12	13	20	10	17	31	444	337	65	26	24
21	8	10	13	20	11	15	33	437	328	64	26	25
22	10	11	14	20	12	15	36	427	346	62	26	24
23	10	11	14	17	12	16	36	488	342	56	26	24
24	10	12	14	17	11	18	37	638	337	52	26	29
25	10	14	14	17	10	21	41	677	280	52	26	31
26	12	15	13	17	10	27	52	635	260	47	26	30
27	9	15	13	16	10	35	58	593	244	40	26	26
28	9	9	14	16	10	31	55	583	217	42	26	24
29	10	12	14	16	.....	28	52	539	207	44	26	24
30	14	15	12	16	.....	35	59	457	196	44	28	24
31	13	.....	9	16	.....	38	.....	368	.....	38	24	.....

NOTE.—Gage not read on Sundays and holidays, and on a few other days; discharge interpolated. Low flow Oct. 14–18, due to filling Pando ice pond.

Monthly discharge of Eagle River at Redcliff, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	17	1	11.0	676
November	16	8	13.3	791
December	16	9	13.2	812
January	20	11	16.3	1,000
February	16	10	11.8	655
March	35	11	18.5	1,140
April	94	26	49.8	2,960
May	677	81	346	21,300
June	631	196	406	24,200
July	186	38	99.3	6,110
August	38	24	29.4	1,810
September	41	24	28.9	1,720
The year	677	1	87.1	63,200

EAGLE RIVER AT EAGLE, COLO.

LOCATION.—In sec. 33, T. 4 S., R. 84 W., at highway bridge at Eagle, Eagle County. Nearest tributary, Brush Creek, enters three-fourths mile below station.

DRAINAGE AREA.—630 square miles (measured on Forest atlas).

RECORDS AVAILABLE.—January 17, 1911, to September 30, 1918. March 12, 1905, to February 10, 1907, station was maintained short distance below mouth of Brush Creek.

GAGE.—Chain on downstream side of bridge; read by D. L. Wedmore. Prior to August, 1915, vertical staff fastened to right abutment was used. This gage was referred to same datum as present gage.

DISCHARGE MEASUREMENTS.—Made from single-span bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of boulders and is very rough; shifted somewhat during 1918. No well-defined control. Banks are high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.0 feet at 8 a. m. June 12 and 14 (discharge, 6,300 second-feet); minimum discharge occurred during winter when record was discontinued.

ICE.—Stage-discharge relation seriously affected by ice; observations discontinued during winter.

DIVERSIONS.—Court decrees for diversion of 80 second-feet from Eagle River between Eagle and station at Redcliff and 22 second-feet from Eagle River below Eagle.

REGULATION.—Diurnal fluctuation during spring, caused by alternate melting and freezing of mountain snow.

ACCURACY.—Stage-discharge relation not permanent but shifted slightly. Rating curve well defined below 6,000 second-feet. Gage read to hundredths once daily. This does not give true daily mean during spring. Daily discharge ascertained by applying daily gage height to rating table; indirect method for shifting control used July 7 to September 30. Records fair.

Discharge measurements of Eagle River at Eagle, Colo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 17	S. B. Soulé	0.44	167
July 10	Robert Follansbee	2.11	1,120

Daily discharge, in second-feet, of Eagle River at Eagle, Colo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	221	175	.....	314	455	2,220	2,800	375	165
2	221	180	.....	336	575	1,980	2,580	350	165
3	221	182	.....	360	640	2,590	2,360	332	161
4	190	182	.....	370	710	3,110	2,140	341	161
5	190	182	.....	281	1,410	3,240	1,930	375	161
6	190	180	.....	268	1,510	3,370	1,720	400	165
7	190	180	.....	255	1,620	4,060	1,510	400	165
8	190	178	.....	242	1,740	4,340	1,310	400	195
9	190	178	.....	273	1,980	4,760	1,210	375	265
10	165	175	.....	350	1,740	5,040	1,210	341	400
11	165	175	.....	370	1,410	5,880	1,210	332	455
12	165	172	.....	485	1,510	6,300	1,210	314	455
13	165	170	.....	608	1,860	6,160	1,210	305	428
14	165	168	.....	575	1,980	6,300	1,120	289	400
15	165	165	.....	575	1,980	6,160	1,030	281	400
16	165	165	.....	455	2,220	5,600	988	273	428
17	165	161	143	390	2,340	5,460	945	227	341
18	165	161	161	360	2,590	5,040	905	221	305
19	163	161	170	350	2,460	4,760	785	214	273
20	165	158	192	242	2,460	4,620	748	208	242
21	163	158	175	227	2,460	5,040	710	208	214
22	163	158	175	250	2,590	5,180	608	201	208
23	163	156	182	297	2,850	5,040	575	190	195
24	165	156	195	341	3,240	5,040	575	180	201
25	165	156	208	360	3,370	4,900	545	180	265
26	165	156	231	455	3,240	4,620	515	175	235
27	163	154	277	575	3,110	4,200	515	175	221
28	165	154	269	485	3,240	3,920	455	175	195
29	168	152	235	455	2,980	3,240	428	170	201
30	170	152	265	400	2,720	3,020	400	170	208
31	172	.....	281	.....	2,460	.....	375	165	.....

NOTE.—Gage not read Apr. 6, 7, and June 30 to July 6: discharge determined by comparison with record at Redcliff.

Monthly discharge of Eagle River at Eagle, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	221	163	175	10,800
November	182	152	167	9,940
March 17-31	281	143	211	6,280
April	608	227	377	22,400
May	3,370	455	2,110	130,000
June	6,300	1,980	4,510	268,000
July	2,800	375	1,120	68,900
August	400	165	269	16,500
September	455	161	262	15,600

TURKEY CREEK AT REDCLIFF, COLO.

LOCATION.—In sec. 19, T. 6 S., R. 80 W., at highway bridge in Redcliff, Eagle County, 800 feet above mouth of creek.

DRAINAGE AREA.—27 square miles (measured on Forest atlas).

RECORDS AVAILABLE.—June 30, 1913, to September 30, 1918.

GAGE.—Chain attached to guard rail of bridge. Prior to November 9, 1915, vertical staff on downstream side of left abutment referred to same datum.

DISCHARGE MEASUREMENTS.—Made from single-span bridge or by wading near by.

CHANNEL AND CONTROL.—Bed composed of coarse gravel and small boulders; shifts. No well-defined control. Banks are high and are not overflowed.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.7 feet at 7.15 p. m. June 13 (discharge, 670 second-feet); minimum stage, 0.82 foot at 5 p. m. December 14 (discharge, 4 second-feet); minimum discharge, 3 second-feet August 17–26.

ICE.—Stage-discharge relation not affected by ice, except for a few days.

DIVERSIONS.—Court decrees for diversion of 5.5 second-feet from Turkey Creek.

REGULATION.—Diurnal fluctuation during spring, caused by alternate melting and freezing of mountain snow.

ACCURACY.—Stage-discharge relation not permanent; shifted considerably during high water. Rating curve used before high water fairly well defined; applied indirectly October 1 to March 31. Rating curve used June 20 to September 30 well defined below 250 second-feet; applied indirectly June 13–19. Gage read to hundredths usually twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except for periods for which the shifting-control method was used. Records fair.

COOPERATION.—Gage heights furnished by United States Forest Service.

Discharge measurements of Turkey Creek at Redcliff, Colo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 19	S. B. Soulé	0.95	6.3	June 12	Robert Follansbee	4.24	532
Jan. 26	T. J. Watkins	.87	5.0	Aug. 2	J. B. Spiegel	1.86	23.8
Feb. 25	do	.90	3.6				

Daily discharge, in second-feet, of Turkey Creek at Redcliff, Colo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4.6	4.4	4.0	4.4	4.0	4.6	12	16	155	104	28	6
2	4.6	4.5	4.1	4.4	4.2	4.6	16	18	152	91	28	7
3	4.0	4.6	4.2	4.4	4.2	4.6	16	22	148	91	23	7
4	4.2	4.7	4.0	4.2	4.2	4.6	16	42	155	67	22	8
5	4.2	4.8	4.0	4.4	4.2	4.6	13	57	169	66	20	9
6	4.0	7.0	4.0	4.4	4.2	4.6	14	72	197	61	22	9
7	4.0	6.5	4.0	4.4	4.4	5.0	14	65	225	59	22	7
8	4.0	6.0	4.0	4.2	4.4	5.0	13	68	325	57	20	7
9	3.9	6.4	4.0	4.2	4.2	4.9	12	68	292	54	18	7
10	3.9	7.2	4.0	4.0	4.2	4.9	14	68	260	53	16	8
11	4.0	6.8	4.0	4.2	4.2	4.8	14	64	375	46	16	6
12	4.2	4.8	4.0	4.4	4.2	4.8	18	64	455	45	16	4
13	4.0	5.2	4.2	4.3	4.2	6.0	20	64	485	43	15	4
14	4.0	5.2	3.8	4.2	4.2	7.2	18	52	400	43	9	4
15	3.9	5.2	4.4	4.2	4.2	5.0	16	62	425	43	5	4
16	4.3	4.4	4.3	4.2	4.2	4.6	14	90	362	41	9	5
17	4.7	4.0	4.2	4.4	4.2	5.0	14	97	300	42	3	5
18	5.0	4.0	4.0	4.4	4.2	5.4	13	116	280	36	3	5
19	5.4	4.1	4.0	4.4	4.6	5.4	12	119	280	37	3	5
20	3.9	4.2	4.0	4.3	4.4	4.6	12	122	311	32	3	5
21	3.9	4.0	3.9	4.2	4.2	7.0	11	136	270	32	3	5
22	3.9	4.0	4.0	4.2	5.0	5.6	10	122	232	33	3	5
23	4.2	4.0	4.2	4.2	5.0	6.6	10	148	242	35	3	5
24	3.9	4.0	4.4	4.2	5.0	7.0	10	190	251	34	3	6
25	4.0	4.3	4.4	4.2	5.0	7.4	11	197	214	32	3	6
26	3.9	4.6	4.4	4.2	4.2	8.9	13	190	180	32	3	6
27	3.9	4.2	4.4	4.2	4.2	8.9	14	183	164	28	5	5
28	4.0	4.2	4.4	4.2	4.2	7.6	13	169	118	28	6	5
29	4.1	4.3	4.4	3.9	.....	8.3	12	155	133	27	8	5
30	4.2	4.4	4.4	4.2	.....	9.5	12	142	120	27	7	5
31	4.4	.....	4.4	4.2	.....	10.0	.....	148	.....	26	6	.....

NOTE.—Gage not read Sundays and holidays; discharge estimated.

Monthly discharge of Turkey Creek at Redcliff, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	5.4	3.9	4.17	256
November	7.2	4.0	4.87	290
December	4.4	3.8	4.15	255
January	4.4	3.9	4.25	261
February	5.0	4.0	4.34	241
March	10	4.6	6.03	371
April	20	10	13.6	809
May	197	16	101	6,210
June	485	118	256	15,200
July	104	26	46.6	2,870
August	28	3	11.3	695
September	9	4	5.8	345
The year	485	3	38.4	27,800

HOMESTAKE CREEK NEAR REDCLIFF, COLO.

LOCATION.—In sec. 30, T. 6 S., R. 80 W., a quarter of a mile above mouth of creek, at first Forest Service bridge, 1 mile from Redcliff, Eagle County; below all tributaries.

DRAINAGE AREA.—64 square miles (measured on topographic map).

RECORDS AVAILABLE.—January 8, 1911, to September 30, 1918.

GAGE.—Vertical staff attached to center pier of bridge used since October 18, 1917; at practically same location as gage used January 8, 1911, to August 16, 1914. August 17, 1914, to October 17, 1917, gage was a quarter of a mile upstream. Read by forest ranger.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading near by.

CHANNEL AND CONTROL.—Bed composed of well-compacted gravel. Control is located 50 feet downstream at small rapids; apparently permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.2 feet at 9 a. m. June 24 (discharge, 1,300 second-feet); minimum discharge probably occurred during winter when stage-discharge relation was affected by ice.

ICE.—Stage-discharge relation seriously affected by ice; observations discontinued.

DIVERSIONS.—Court decrees for diversion of 1.2 second-feet from tributary of Homestake Creek.

REGULATION.—Diurnal fluctuation during spring from alternate melting and freezing of mountain snow.

ACCURACY.—Stage-discharge relation apparently permanent. Rating curve used prior to October 18, when gage location was changed, well defined below 650 second-feet; curve used after that date not well defined. Gage read at irregular intervals. Daily discharge ascertained by applying daily gage height to rating table and estimating for days of no gage height. One reading does not represent mean daily gage height during spring. Records poor during high water and fair for remainder of year.

COOPERATION.—Gage heights furnished by United States Forest service.

Discharge measurements of Homestake Creek near Redcliff, Colo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 18	S. B. Soulé	0.36	6.5	Feb. 25	T. J. Watkins	[a] 1.62	5.6
19	do	1.46	7.9	June 12	Robert Follansbee	5.60	1,060
Jan. 26	T. J. Watkins	[a] 1.7	8.5	Aug. 2	J. B. Spiegel	2.14	48.1

[a] Stage-discharge relation affected by ice.

NOTE.—Measurements made on and after Oct. 19 were referred to the present gage.

Daily discharge, in second-feet, of Homestake Creek near Redcliff, Colo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	14	16	.....	45	65	190	320	50	16
2	13	16	.....	50	75	190	300	48	17
3	13	18	.....	54	85	360	280	70	17
4	12	20	.....	56	90	542	260	80	18
5	12	22	.....	54	100	600	240	70	20
6	12	19	.....	52	224	650	220	64	25
7	11	20	.....	50	240	700	200	62	50
8	11	22	.....	45	250	750	180	62	75
9	10	22	.....	50	200	780	161	61	86
10	10	24	.....	60	190	850	161	61	90
11	10	22	.....	70	144	900	156	50	100
12	10	20	.....	80	148	900	152	38	80
13	10	18	.....	87	150	900	148	35	66
14	10	15	.....	75	152	900	144	32	61
15	10	15	.....	70	200	850	140	30	56
16	10	15	.....	65	250	820	136	30	51
17	9	14	.....	60	290	800	128	30	48
18	9	14	.....	55	320	790	120	30	44
19	8	14	.....	50	350	780	112	30	40
20	11	14	.....	40	380	770	104	22	36
21	11	14	.....	36	415	800	96	20	32
22	10	13	.....	38	445	1,000	90	20	28
23	10	13	.....	40	475	1,200	86	17	23
24	9	13	.....	42	510	1,300	82	16	50
25	9	13	.....	44	542	740	78	16	75
26	8	12	.....	50	500	580	74	16	66
27	8	12	.....	65	450	500	70	15	46
28	9	12	.....	60	400	400	66	15	40
29	10	10	.....	60	350	363	64	16	40
30	12	10	36	60	300	340	61	16	42
31	14	.....	38	.....	250	.....	55	16	.....

NOTE.—Gage read Oct. 5, 10, 18–20, Nov. 5, 6, 10, 14, 20, 24, 30, Mar. 30, Apr. 9, 13, 25, May 6, 11, 14, 17, 25, June 1, 4, 9, 11, 12, 19, 24–26, 29, July 9, 10, 16, 19, 21, 30, Aug. 2, 6, 7, 10, 12, 15, 19, 20, 23, 27, Sept. 3, 9, 13, 16, 23, 26, 27; discharge for missing days determined by comparison with record obtained at station on Eagle River at Redcliff.

Monthly discharge of Homestake Creek near Redcliff, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	14	8	10.5	646
November	24	10	16.1	958
April	87	36	55.4	3,300
May	542	65	275	16,900
June	1,300	190	708	42,100
July	320	55	145	8,920
August	80	15	36.7	2,260
September	100	16	47.9	2,850

ROARING FORK AT ASPEN, COLO.

LOCATION.—In sec. 7, T. 10 S., R. 84 W., at bridge near old power plant at Aspen, Pitkin County. Castle, Maroon, and Hunter creeks all enter below.

DRAINAGE AREA.—109 square miles (measured on topographic map).

RECORDS AVAILABLE.—February 25, 1915, to September 30, 1918. From January 1, 1911, to February 24, 1915, station was maintained just below Cooper Avenue bridge, three-quarters of a mile upstream.

GAGE.—Vertical staff at downstream end of right bridge abutment; read by H. W. Wood and Francis McDonnell. Gage used at original section was a vertical staff fastened to old crib abutment on right bank, 25 feet below Cooper Avenue bridge; no determined relation between two gages.

DISCHARGE MEASUREMENTS.—Made from single-span bridge or by wading near by.

CHANNEL AND CONTROL.—Bed composed of small boulders and is fairly smooth. Control not well defined; shifts occasionally. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.8 feet at 8 a. m. June 13 (discharge, 2,380 second-feet); minimum stage, 1.06 feet at 9 a. m. November 28 (discharge, 28 second-feet).

ICE.—Stage-discharge relation practically unaffected by ice during winter.

DIVERSIONS.—Salvation ditch, which has a decree for 58 second-feet, diverts water above station from middle of May to middle of September. It was not used during 1918. The mines at Aspen pump into the river about 6 second-feet, which enters above the station.

REGULATION.—Diurnal fluctuation during spring caused by alternate melting and freezing of mountain snow.

ACCURACY.—Stage-discharge relation not permanent, but shifted during high water. Rating curve used from October 1 to May 23 well defined below 2,000 second-feet; curve used June 5 to September 30 well defined; shifting-control method used May 24 to June 5. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except for period for which shifting-control method was used. Records good.

Discharge measurements of Roaring Fork at Aspen, Colo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 24	T. J. Watkins	1.18	42.5
June 9	Robert Follansbee	4.39	1,400

Daily discharge, in second-feet, of Roaring Fork at Aspen, Colo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	55	60	50	34	36	41	54	82	485	690	114	47
2	62	56	49	38	42	42	61	94	650	690	116	49
3	49	56	51	41	40	44	63	100	700	640	122	51
4	56	54	43	40	38	42	56	142	802	640	117	54
5	54	55	53	39	41	39	36	175	1,030	595	117	72
6	54	54	54	38	39	45	47	200	1,470	550	183	81
7	56	54	49	41	40	34	47	255	1,470	528	136	73
8	56	54	47	38	43	41	49	272	1,470	485	114	59
9	54	49	51	38	47	36	53	255	1,540	505	100	108
10	50	49	50	38	43	35	65	240	1,820	528	89	193
11	47	45	47	31	42	38	71	212	1,960	485	103	162
12	45	49	47	39	40	36	83	188	2,170	445	96	125
13	45	47	43	42	40	33	83	164	2,170	425	93	114
14	44	54	47	42	38	35	86	212	2,100	385	100	113
15	44	50	49	43	35	36	79	255	1,890	368	88	96
16	45	54	40	40	41	45	68	360	1,750	385	86	94
17	48	54	44	41	44	44	66	440	1,820	350	82	85
18	40	54	42	38	38	43	63	462	1,680	315	79	85
19	44	54	47	40	33	40	61	508	1,540	280	75	85
20	48	56	44	38	35	41	63	530	1,610	265	72	82
21	45	53	40	40	35	41	55	552	1,540	250	68	77
22	48	49	40	42	36	41	62	552	1,540	235	65	67
23	44	51	44	41	38	42	61	625	1,610	235	61	74
24	48	49	43	36	43	42	62	802	1,540	220	58	85
25	50	49	39	41	39	41	72	750	1,400	195	54	85
26	47	49	41	42	40	42	74	650	1,270	183	47	89
27	50	47	38	43	38	47	79	600	1,140	164	37	84
28	59	39	39	41	39	41	75	625	1,020	158	42	81
29	54	50	39	38	.....	42	61	575	900	145	41	76
30	57	49	38	41	.....	45	65	530	790	134	42	71
31	55	.....	35	40	.....	54	.....	485	.....	120	45	.....

NOTE.—Discharge estimated Aug. 16-24, Sept. 2, 3, on account of missing gage heights.

Monthly discharge of Roaring Fork at Aspen, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	62	40	50.1	3,080
November	60	39	51.4	3,060
December	54	35	44.6	2,740
January	43	31	39.5	2,430
February	47	33	39.4	2,190
March	54	33	40.9	2,510
April	86	36	64.0	3,810
May	802	82	384	23,600
June	2,170	485	1,430	85,100
July	690	120	374	23,000
August	183	37	85.2	5,240
September	193	47	87.2	5,190
The year	2,170	31	224	162,000

ROARING FORK BELOW ASPEN, COLO.

LOCATION.—In sec. 1, T. 10 S., R. 85 W., at first highway bridge 2 miles below Aspen, Pitkin County. Nearest tributary above is Castle Creek; nearest below, Maroon Creek.

DRAINAGE AREA.—223 square miles (measured on topographic map).

RECORDS AVAILABLE.—October 18, 1913, to June 30, 1918, when station was discontinued.

GAGE.—Vertical staff on left abutment of bridge, facing channel; read at irregular intervals by forest ranger.

DISCHARGE MEASUREMENTS.—Made from two-span bridge.

CHANNEL AND CONTROL.—Bed composed of gravel and small boulders; slightly shifting. No well-defined control. Banks are high and not subject to overflow.

EXTREMES OF DISCHARGE.—Data too few.

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

DIVERSIONS.—Between this station and the one at Aspen there are a number of small diversions, some of which return the water to the river above the station. Roaring Fork Light & Power Co. diverts water from Maroon Creek into Castle Creek and thence into Roaring Fork above station.

REGULATION.—Diurnal fluctuation during spring from alternate melting and freezing of mountain snow.

ACCURACY.—Stage-discharge relation shifted between narrow limits. Standard rating curve well defined below 3,000 second-feet. Gage read to hundredths semiweekly. Daily discharge ascertained by applying daily gage height to rating table and estimating for days when gage was not read. During spring, one reading does not represent mean for day. Records poor.

COOPERATION.—Gage heights furnished by United States Forest Service.

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

January 24, 1918: Gage height, 0.15 foot; discharge, 125 second-feet.

Daily discharge, in second-feet, of Roaring Fork below Aspen, Colo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	414	194	145	135	106	115	141	217	785
2	350	193	140	141	114	116	177	230	800
3	300	192	132	139	117	117	180	320	1,100
4	250	184	131	137	120	119	170	408	1,400
5	200	177	130	135	123	123	160	450	1,700
6	220	180	128	138	126	120	154	490	2,000
7	240	183	127	141	128	118	156	550	2,280
8	260	186	126	138	120	116	158	581	2,930
9	287	189	136	133	114	114	161	550	3,000
10	250	192	146	130	114	114	180	519	4,000
11	220	192	158	125	114	114	198	480	4,500
12	190	192	151	123	114	114	216	450	5,000
13	161	192	151	130	114	114	217	408	5,000
14	169	192	151	141	114	120	210	500	4,800
15	165	174	151	141	114	130	205	600	4,500
16	162	154	151	141	114	135	200	700	4,170
17	159	155	151	141	120	135	190	800	4,200
18	156	156	151	141	125	136	180	937	4,000
19	152	158	151	141	128	137	175	980	3,500
20	148	161	148	130	128	138	177	1,020	3,450
21	150	162	144	123	128	139	165	1,100	3,350
22	155	164	138	124	130	140	169	1,200	3,270
23	155	166	138	126	135	141	172	1,400	2,800
24	158	169	138	128	130	141	185	1,500	2,590
25	161	166	138	116	120	141	198	1,500	2,540
26	165	164	138	106	114	148	212	1,350	2,490
27	169	161	138	96	114	154	234	1,240	2,440
28	172	150	138	86	114	152	230	1,100	2,390
29	184	155	138	76	.....	150	226	1,000	2,330
30	196	154	130	86	.....	148	222	900	2,280
31	195	.....	126	96	.....	143	.....	800	.....

NOTE.—Gage read semiweekly; discharge for missing days determined by comparison with record obtained at station near Aspen.

Monthly discharge of Roaring Fork below Aspen, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	414	148	204	12,500
November	194	154	174	10,400
December	158	126	141	8,670
January	141	76	125	7,690
February	135	106	120	6,660
March	154	114	130	7,990
April	234	141	187	11,100
May	1,500	217	783	48,100
June	5,000	785	2,990	178,000
The period	.....	.....	.....	291,000

ROARING FORK AT GLENWOOD SPRINGS, COLO.

LOCATION.—In sec. 9, T. 6. S., R. 89 W., 1,500 feet above mouth of river, at Glenwood Springs, Garfield County.

DRAINAGE AREA.—1,450 square miles (measured on Nell's map of Colorado).

RECORDS AVAILABLE.—April 6, 1906, to September 30, 1909; September 21, 1910, to September 30, 1918.

GAGE.—Gurley water-stage recorder installed October 27, 1917, and referred to inclined staff on left bank 800 feet above highway bridge, used since November 20, 1915; inspected by United States Forest Service. Chain gage on downstream side of highway bridge previously used; relation between gages not determined.

DISCHARGE MEASUREMENTS.—Made from single-span highway bridge.

CHANNEL AND CONTROL.—Bed composed of boulders and coarse gravel, practically permanent during 1918. No well-defined control. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 8.45 feet at 8 a. m. June 14 (discharge, 17,600 second-feet); minimum stage, 0.64 foot at 4 p. m. February 16 (discharge, 340 second-feet).

ICE.—Stage-discharge relation not seriously affected by ice, as river seldom freezes over, and only occasionally does slush or anchor ice form.

DIVERSIONS.—There are court decrees for diversions of 164 second-feet from Roaring Fork between Glenwood Springs and station below Aspen.

REGULATION.—Diurnal fluctuation during spring, caused by alternate melting and freezing of mountain snow.

ACCURACY.—Stage-discharge relation permanent; not affected by ice. Rating curve well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean gage height obtained by inspecting gage-height graph. Records excellent except during winter, when possibility of slight ice effect makes them good.

COOPERATION.—Gage heights furnished by United States Forest Service.

Discharge measurements of Roaring Fork at Glenwood Springs, Colo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 24	H. W. Fear	1.20	714	June 11	Robert Follansbee	7.75	15,000
Jan. 21	T. J. Watkins	.72	372	July 12	do	3.08	2,990

Daily discharge, in second-feet, of Roaring Fork at Glenwood Springs, Colo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	860	762	568	475	433	410	860	1,280	3,210	4,590	1,260	685
2	910	770	575	482	439	427	910	1,420	3,210	4,380	1,260	728
3	910	770	589	482	482	451	860	1,590	4,380	4,180	1,260	728
4	910	753	547	482	463	433	860	2,040	5,700	4,380	1,210	815
5	815	719	561	482	469	451	815	2,540	6,690	4,180	1,210	960
6	815	702	540	501	463	514	728	3,030	7,460	3,780	1,260	1,060
7	815	678	561	439	463	514	728	3,210	8,520	3,590	1,260	1,010
8	815	648	508	508	451	554	685	3,030	8,800	3,400	1,210	960
9	815	625	520	514	380	582	728	3,030	9,920	3,400	1,160	1,110
10	770	603	554	482	400	568	860	2,700	11,400	3,210	1,110	1,590
11	792	596	520	380	421	625	960	2,390	13,600	3,400	1,110	1,780
12	815	596	540	385	433	662	1,160	2,100	14,200	3,030	1,110	1,480
13	728	589	520	482	445	920	1,240	2,100	14,900	3,030	1,110	1,370
14	728	610	554	501	410	662	1,360	2,700	15,200	2,860	1,060	1,260
15	728	610	534	508	427	603	1,220	3,400	14,200	2,700	1,110	1,210
16	685	610	475	501	390	540	1,080	4,380	13,900	2,540	1,060	1,160
17	728	603	475	475	439	540	980	4,800	13,300	2,390	1,010	1,110
18	728	589	508	494	482	540	910	4,590	13,000	2,390	960	1,060
19	728	561	508	514	451	575	842	4,380	11,100	2,240	910	1,010
20	728	582	501	494	439	540	770	4,800	11,100	2,100	860	1,010
21	728	582	494	415	439	540	788	4,590	11,100	2,100	860	960
22	728	589	494	410	433	575	797	4,800	11,400	1,970	815	910
23	728	582	520	463	457	575	860	5,460	11,400	1,840	770	910
24	685	575	508	501	501	610	1,010	6,190	10,800	1,840	770	1,060
25	696	582	501	514	482	648	1,160	5,940	9,360	1,710	770	1,060
26	708	589	494	527	390	685	1,260	5,700	8,520	1,710	770	1,010
27	719	589	494	520	457	770	1,420	5,010	7,720	1,590	728	1,010
28	728	540	488	488	433	770	1,240	5,010	6,440	1,480	728	960
29	685	568	475	469	.....	728	1,120	4,590	5,940	1,420	728	910
30	685	568	475	488	.....	728	1,140	3,980	5,280	1,420	685	910
31	744	.....	475	494	.....	815	.....	3,590	.....	1,320	685	.....

NOTE.—Gage not read Oct. 7, 11, 14, 21, 25, 26, and Dec. 31; discharge interpolated.

Monthly discharge of Roaring Fork at Glenwood Springs, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	910	685	763	46,900
November	770	540	625	37,200
December	589	475	519	31,900
January	527	380	480	29,500
February	501	380	442	24,500
March	920	410	599	36,800
April	1,420	685	978	58,200
May	6,190	1,280	3,690	227,000
June	15,200	3,210	9,720	578,000
July	4,590	1,320	2,720	167,000
August	1,260	685	994	61,100
September	1,780	685	1,060	63,100
The year	15,200	380	1,880	1,360,000

CASTLE CREEK NEAR ASPEN, COLO.

LOCATION.—In sec. 35, T. 10 S., R. 85 W., 75 feet below highway bridge, 4½ miles above Aspen, Pitkin County. No inflow below, except spring run-off from small gulches; nearest tributary above, Conundrum Creek, enters 1 mile upstream.

DRAINAGE AREA.—62[1] square miles (measured on topographic map).

RECORDS AVAILABLE.—February 16, 1911, to September 30, 1918.

GAGE.—Gurley water-stage recorder on left bank, 75 feet below bridge; inspected by forest ranger. Staff on opposite bank at datum 1.0 foot higher than present gage, used February 16, 1911, to February 28, 1912. Vertical staff on right abutment of bridge at present datum used February 29, 1912, to April 11, 1915, but owing to slope of stream, gage readings were somewhat higher.

DISCHARGE MEASUREMENTS.—Made from two-span bridge or by wading near by.

CHANNEL AND CONTROL.—Bed composed of coarse gravel; shifts during high water. Control is small rapids just below cable; shifting at intervals. Left bank is high and not subject to overflow; right bank subject to overflow a distance of 75 feet at gage height 4.3 feet.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 3.9 feet at 7 p. m. June 15 (discharge, 1,090 second-feet): minimum stage, 0.68 foot at 5 a. m. February 26 (discharge, 24 second-feet).

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—No water diverted above station except possibly for a small amount of meadow irrigation. Court decrees for diversion of 160 second-feet below station.

REGULATION.—Diurnal fluctuation during spring caused by alternate melting and freezing of mountain snow.

ACCURACY.—Stage-discharge relation not permanent; shifted at beginning of high water. Rating curve used October 1 to June 3 fairly well defined; curve used June 8 to September 30 well defined. Operation of water-stage recorder satisfactory except for periods indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspection of gage-height graph, except for period of ice effect; shifting-control method used April 1 to June 3. Records excellent except for period January 1 to June 8, for which they are fair.

COOPERATION.—Gage heights furnished by United States Forest Service.

[1] Revised since 1916 report.

Discharge measurements of Castle Creek near Aspen, Colo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 24	T. J. Watkins	[a] 0.96	31.2	June 27	Robert Follansbee	2.18	446
June 10	Robert Follansbee	2.75	627	July 11	do	1.69	272

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Castle Creek near Aspen, Colo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	69	52	44	40	26	32	37	54	194	362	118	77
2	70	50	44	40	28	33	39	59	199	351	122	81
3	64	50	45	39	31	33	37	69	234	340	127	85
4	64	50	42	39	31	34	37	79	320	334	132	89
5	62	49	45	39	34	35	37	90	420	328	136	87
6	62	49	45	37	34	36	34	100	520	322	149	78
7	62	49	42	36	34	36	34	120	520	316	138	76
8	62	49	41	34	34	36	35	140	540	310	129	82
9	61	48	44	32	34	34	37	130	558	304	121	127
10	60	48	45	31	31	34	39	120	650	298	121	158
11	60	48	44	26	31	34	41	109	750	292	129	143
12	59	48	45	28	31	36	45	105	810	286	123	121
13	58	48	44	28	31	35	46	113	890	280	117	119
14	58	48	43	28	31	33	48	134	890	260	132	110
15	56	48	42	30	28	33	42	164	970	232	129	117
16	56	48	41	30	28	38	41	192	770	222	119	102
17	56	48	42	30	30	33	40	197	710	210	112	94
18	56	48	42	31	31	33	38	181	630	200	104	89
19	56	48	43	31	31	33	35	197	610	190	98	83
20	58	46	42	30	31	33	36	210	610	180	93	80
21	58	48	41	30	32	33	37	205	575	176	93	76
22	56	46	42	30	32	32	37	221	558	165	89	76
23	55	45	41	31	34	33	41	250	540	174	85	78
24	56	44	41	31	34	34	41	280	522	167	83	76
25	58	44	41	31	27	35	45	290	505	160	80	73
26	58	44	41	31	35	37	49	268	505	156	78	70
27	55	44	41	32	35	38	49	248	470	149	80	65
28	54	43	41	31	34	37	45	248	396	147	76	62
29	50	44	40	30	.....	36	45	227	365	138	75	62
30	53	44	41	28	.....	36	47	210	382	132	73	62
31	52	.....	40	28	.....	36	.....	201	.....	114	73	.....

NOTE.—No gage heights Nov. 18–23, Mar. 23–29, May 5–10, June 4–7, July 4–12, 18, 19, Aug. 1–4, Sept. 1–3, 29, 30; discharge interpolated or estimated. Stage-discharge relation affected by ice Jan. 8 to Feb. 4, Feb. 9–22, discharge determined from daily gage-height records, discharge measurements, and temperature records.

Monthly discharge of Castle Creek near Aspen, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	70	50	58.5	3,600
November	52	43	47.3	2,810
December	45	40	42.4	2,610
January	40	26	32.0	1,970
February	35	26	31.5	1,750
March	38	32	34.5	2,120
April	49	34	40.5	2,410
May	290	54	168	10,300
June	970	194	554	33,000
July	362	114	235	14,400
August	149	73	108	6,640
September	158	62	89.9	5,350
The year	970	26	120	87,000

FRYINGPAN CREEK AT THOMASVILLE, COLO.

LOCATION.—In sec. 7, T. 8 S., R. 83 W., at private bridge 1,000 feet southwest of railroad station at Thomasville, Pitkin County. Nearest tributary, Deadman Gulch, enters a quarter of a mile below.

DRAINAGE AREA.—175 square miles (measured on Forest atlas and topographic map).

RECORDS AVAILABLE.—February 26, 1915, to September 30, 1918. From January 2, 1911, to February 25, 1915, station was maintained 1 mile downstream, where drainage area was 190 square miles.

GAGE.—Stevens water-stage recorder installed May 11, 1918, and referred to vertical staff on upstream side of right bridge abutment. This vertical staff was used prior to installation of recording gage. Observers, J. H. Swineford and J. A. Cox.

DISCHARGE MEASUREMENTS.—Made from single-span bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of large boulders practically permanent during 1918. No well-defined control. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—High-water records missing. Minimum stage recorded, 1.10 feet at 7.30 a. m. November 19 (discharge, 26 second-feet).

ICE.—Stage-discharge relation practically unaffected by ice.

DIVERSIONS.—No court decrees for diversion of water above station.

REGULATION.—Diurnal fluctuation during spring, caused by alternate melting and freezing of mountain snow.

ACCURACY.—Stage-discharge relation changed slightly about January 2. Rating curve used October 1 to January 1 well defined; curve used after that date fairly well defined below 1,500 second-feet. Gage read to half-tenths twice daily October 1 to May 10. Beginning May 11 gage heights from water-stage recorder, whose operation was satisfactory. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair until May and good for remainder of year.

Discharge measurements of Fryingpan Creek at Thomasville, Colo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 26	H. W. Fear	1.44	64	May 1	T. J. Watkins	2.10	209
Jan. 23	T. J. Watkins	[a] 2.10	60	June 26	Robert Follansbee	4.08	1,230
Feb. 23	do	1.20	39	July 12	do	2.85	510

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Fryingpan Creek at Thomasville, Colo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	69	44	44	44	44	43	145	152	.....	805	183	79
2	69	44	44	44	44	49	130	194	.....	750	178	85
3	69	50	44	44	41	51	124	168	.....	695	180	79
4	69	50	44	44	45	53	134	208	.....	695	180	98
5	69	50	56	44	49	58	112	194	.....	640	178	119
6	69	44	44	39	39	54	119	350	.....	575	205	134
7	66	44	39	44	41	58	119	485	.....	570	194	130
8	69	56	44	47	44	54	134	485	.....	570	175	123
9	62	44	44	44	39	51	152	585	.....	560	168	208
10	62	50	44	44	39	51	152	640	.....	535	161	338
11	62	50	39	44	41	51	145	440	.....	535	168	303
12	62	44	44	44	44	50	156	418	.....	510	166	224
13	56	44	44	44	44	58	134	418	.....	535	154	170
14	56	34	44	44	41	63	145	440	.....	422	145	145
15	56	39	39	47	39	74	130	510	.....	438	138	134
16	62	39	44	44	39	83	134	668	.....	395	127	141
17	62	39	44	44	39	88	168	695	.....	395	119	130
18	56	44	44	44	39	92	141	750	.....	372	112	119
19	56	30	44	44	39	87	145	.....	.....	350	108	108
20	56	44	44	39	41	92	145	.....	.....	330	104	104
21	56	44	44	39	44	94	141	.....	.....	330	98	100
22	56	44	44	44	44	88	123	.....	.....	310	94	92
23	62	44	44	39	40	88	123	.....	.....	310	90	92
24	56	46	44	39	43	92	145	.....	.....	292	85	116
25	44	44	44	39	44	94	152	.....	.....	274	81	130
26	44	44	42	39	49	83	145	.....	1,240	257	79	143
27	50	44	44	39	44	92	163	.....	1,240	240	79	136
28	44	44	44	38	44	88	134	.....	1,050	234	78	134
29	44	39	44	39	.....	112	141	.....	985	208	78	125
30	44	39	44	44	.....	123	152	.....	925	208	76	112
31	50	.....	44	44	.....	134	.....	.....	.....	194	76	.....

NOTE.—No record May 19 to June 26, as observer was away.

Monthly discharge of Fryingpan Creek at Thomasville, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	69	44	58.3	3,580
November	56	30	43.8	2,610
December	56	39	43.8	2,690
January	47	38	42.6	2,620
February	49	39	42.2	2,340
March	134	43	75.7	4,650
April	168	112	140	8,330
May 1–18	750	152	433	15,500
July	805	194	436	26,800
August	205	76	131	8,060
September	338	79	138	8,210

TAYLOR RIVER AT ALMONT, COLO.

LOCATION.—In sec. 2, T. 51 N., R. 1 E. New Mexico principal meridian, at highway bridge at Almont, Gunnison County, 300 feet above junction of Taylor and East rivers.

DRAINAGE AREA.—413 square miles (measured on Forest atlas).

RECORDS AVAILABLE.—July 27, 1910, to September 30, 1918.

GAGE.—Vertical staff on downstream side of center pier; read by J. W. Brittain.

DISCHARGE MEASUREMENTS.—Made from two-span bridge.

CHANNEL AND CONTROL.—Bed composed of small boulders and coarse gravel. Control shifts between narrow limits. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—No data, as only mean daily gage heights are furnished.

ICE.—Stage-discharge relation affected by ice during winter.

DIVERSIONS.—No court decrees for diversion from Taylor River.

REGULATION.—Diurnal fluctuation during spring caused by alternate melting and freezing of mountain snow.

ACCURACY.—Stage-discharge relation practically permanent except as affected by ice. Rating curve well defined between 150 and 2,000 second-feet. Gage read to tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except for winter, for which they are fair.

COOPERATION.—Gage heights furnished by United States Reclamation Service except during winter when they were furnished by United States Forest Service.

Discharge measurements of Taylor River at Almont, Colo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 7	H. W. Fear	2.02	196	Mar. 2	T. J. Watkins	[a] 2.16	119
Dec. 17	T. J. Watkins	[a] 1.90	120	May 23	Robert Follansbee	3.30	1,210
Jan. 16	S. B. Soulé	[a] 2.00	127				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Taylor River at Almont, Colo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	190	190	160	115	115	115	160	298	1,050	935	325	225
2	190	190	160	115	115	115	160	355	1,050	935	325	225
3	190	190	160	115	100	148	160	385	1,240	832	325	225
4	190	190	160	115	115	135	160	570	1,700	785	325	270
5	190	190	160	115	160	135	160	740	1,780	740	325	270
6	190	160	135	115	115	135	148	935	2,100	740	355	298
7	190	160	135	115	135	115	135	990	2,260	740	325	270
8	190	160	115	115	125	135	160	935	2,420	785	325	270
9	190	160	115	115	115	160	135	832	2,500	880	325	325
10	190	160	115	115	160	175	160	740	2,660	785	325	652
11	190	160	115	115	160	148	148	455	2,980	785	355	652
12	190	160	115	115	160	135	190	530	3,140	740	355	492
13	190	160	115	135	160	148	190	652	3,220	740	325	455
14	190	160	115	135	125	135	225	832	3,220	785	325	355
15	190	160	115	135	160	135	190	935	2,740	785	325	325
16	190	160	115	135	160	135	190	1,180	2,580	695	325	298
17	190	160	115	160	160	135	175	1,110	2,660	610	325	270
18	190	160	115	125	208	148	160	1,110	2,420	570	325	270
19	190	160	115	125	190	135	160	1,110	2,420	530	325	270
20	190	160	115	135	160	135	148	1,240	2,420	530	325	248
21	190	160	115	135	175	148	160	1,110	2,420	455	270	248
22	190	160	115	125	148	135	160	1,110	2,420	455	270	248
23	190	160	115	115	190	135	175	1,380	2,420	455	270	248
24	190	160	115	115	135	135	225	1,540	2,020	455	270	248
25	190	160	115	115	115	135	248	1,460	1,700	455	270	248
26	190	160	115	115	125	135	225	1,310	1,380	420	225	248
27	190	160	115	115	135	135	325	1,180	1,460	385	225	248
28	190	160	115	115	135	135	225	1,310	1,310	325	225	225
29	190	160	115	115	.....	135	225	1,240	1,180	325	225	225
30	190	160	115	135	.....	135	248	1,180	1,110	325	225	225
31	190	.....	115	135	.....	160	.....	1,180	.....	325	225	.....

NOTE.—Stage-discharge relation affected by ice December 6 to March 14; discharge estimated from discharge measurements, observer's notes, and records of daily gage-height and temperature.

Monthly discharge of Taylor River at Almont, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	190	190	190	11,700
November	190	160	165	9,820
December	160	115	124	7,620
January	160	115	123	7,560
February	208	100	145	8,050
March	175	115	138	8,480
April	325	135	184	10,900
May	1,540	298	966	59,400
June	3,220	1,050	2,130	127,000
July	935	325	623	38,300
August	355	225	300	18,400
September	652	225	303	18,000
The year	3,220	100	449	325,000

GUNNISON RIVER NEAR GUNNISON, COLO.

LOCATION.—In sec. 3, T. 49 N., R. 1 W. New Mexico principal meridian, at highway bridge 2 miles west of Gunnison, Gunnison County. Nearest tributary, Tomichi Creek, enters 1 mile below.

DRAINAGE AREA.—1,010 square miles (measured on Hayden's atlas).

RECORDS AVAILABLE.—November 27, 1910, to November 30, 1914; April 27, 1916, to September 30, 1918.

GAGE.—Bristol water-stage recorder on downstream side of right abutment, referred to chain gage in center of bridge. Chain gage used subsequent to June 19, 1918; read by C. W. Chinery. April 27 to September 30, 1916, gage referred to vertical staff at right abutment having datum 0.15 foot higher.

DISCHARGE MEASUREMENTS.—Made from single-span bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of coarse gravel and small boulders; shifting during high water. Control at well-defined rapids below bridge; shifted during high water of 1918. Banks not subject to overflow except during extremely high water.

EXTREMES OF DISCHARGE.—Maximum stage from water-stage recorder, 4.05 feet at 8 a. m. June 13 (discharge estimated at 11,400 second-feet); minimum discharge of 180 second-feet occurred on several days during December and January.

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

DIVERSIONS.—Court decrees for diversion of 276 second-feet from Gunnison River between this station and the forks at Almont.

REGULATION.—None.

ACCURACY.—Stage-discharge relation shifted during and subsequent to the high water of June; affected by ice. Standard rating curve well defined below 6,000 second-feet; was used direct prior to June 2. During the period June 2–21 there was considerable overflow and two overflow curves were used based upon available information and a comparison with flow at Almont. From June 22, when overflow was practically stopped by filling in with broken rock, to September 30, the shifting-control method was used based upon a discharge measurement made in October, 1918, and upon comparison with flow at Almont. Operation of water-stage recorder satisfactory prior to June 18; thereafter chain gage was read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except for periods of ice effect and periods for which the shifting-control method was used. Records fair.

Discharge measurements of Gunnison River near Gunnison, Colo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 6	H. W. Fear	0.10	347	Mar. 1	T. J. Watkins	[c]0.58	308
Dec. 18	T. J. Watkins	— 38	185	May 24	Robert Follansbee	2.91	3,800
Jan. 16	S. B. Soulé	[c]—.02	195				

[c] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Gunnison River near Gunnison, Colo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	353	353	285	184	215	305	335	1,000	2,900	2,530	695	345
2	353	333	285	184	206	305	335	1,400	2,900	2,220	695	385
3	345	345	285	180	215	305	335	1,690	3,400	2,370	695	435
4	345	361	248	180	230	305	345	1,920	3,550	2,290	695	435
5	345	353	230	180	248	305	345	2,290	4,100	2,370	695	490
6	345	321	200	180	248	305	345	2,610	4,230	2,140	835	520
7	345	333	190	180	248	305	345	2,690	6,200	2,060	695	462
8	345	337	190	180	265	305	365	2,530	8,100	1,990	679	462
9	345	325	190	190	265	305	365	2,450	8,600	1,920	679	615
10	345	305	190	190	265	305	435	2,370	10,300	1,920	679	1,470
11	345	325	190	190	265	305	490	2,060	11,400	1,840	615	1,840
12	345	305	190	190	265	305	582	1,920	11,400	1,760	615	2,290
13	330	285	190	195	265	305	655	1,990	11,400	1,690	550	1,000
14	320	325	190	195	265	305	695	2,530	10,300	1,690	550	655
15	305	321	190	195	265	305	655	2,690	9,200	1,620	582	615
16	309	317	180	195	265	305	582	2,930	8,000	1,540	550	582
17	313	313	180	195	265	305	520	3,090	8,000	1,470	538	550
18	321	305	184	195	265	305	435	3,170	7,200	1,400	490	520
19	313	305	180	190	265	285	410	3,170	5,200	1,330	479	490
20	337	265	180	190	265	285	365	3,250	5,200	1,330	462	435
21	353	305	180	190	265	248	365	3,170	5,200	1,260	446	435
22	353	345	180	190	265	224	385	3,170	5,000	1,260	435	385
23	361	313	180	196	265	230	435	3,330	5,000	1,120	435	385
24	353	265	180	190	265	285	615	3,740	4,590	1,120	462	385
25	349	258	190	190	265	285	655	3,660	4,250	1,060	435	377
26	305	258	190	190	265	305	835	3,740	4,080	942	435	365
27	333	251	190	200	265	325	942	3,250	3,570	942	435	365
28	321	248	196	215	265	325	785	3,330	3,250	885	425	365
29	349	265	196	196	.....	325	740	3,090	3,010	885	385	365
30	345	265	190	200	.....	335	835	3,090	2,690	785	385	365
31	349	.....	190	215	.....	335	.....	3,010	.....	785	385	.....

NOTE.—Stage-discharge relation affected by ice Dec. 5–11, Feb. 3–8, Feb. 11 to Mar. 17; discharge determined from daily gage height and temperature records, and discharge measurements. No gage heights Oct. 13–14, Nov. 15, 16, Dec. 12–15, 17, 19–22, Jan. 6–15, 17–19, Mar. 28 to Apr. 6; discharge interpolated.

Monthly discharge of Gunnison River near Gunnison, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	361	305	338	20,800
November	361	248	307	18,300
December	285	180	200	12,300
January	215	180	191	11,700
February	265	206	256	14,200
March	335	224	299	18,400
April	942	335	518	30,800
May	3,740	1,000	2,720	167,000
June	11,400	2,690	6,070	361,000
July	2,530	785	1,570	96,500
August	835	385	553	34,000
September	2,290	345	613	36,500
The year	11,400	180	1,140	822,000

GUNNISON RIVER NEAR GRAND JUNCTION, COLO.

LOCATION.—In NW. ¼ sec. 35, T. 1 S., R. 1 W., a quarter of a mile below Redlands Irrigation & Power Co.'s canal and 1½ miles above mouth of Gunnison River in Grand Junction, Mesa County, below all tributaries.

DRAINAGE AREA.—7,920 square miles (measured on map of Colorado Geological Survey; scale, 1 : 500,000).

RECORDS AVAILABLE.—April 1, 1917, to September 30, 1918. From October 19, 1894, to December 21, 1895, and May 2, 1897, to September 30, 1899, station maintained nearer mouth.

GAGE.—Vertical staff at left bank a quarter of a mile below canal intake; read by employee of Redlands Irrigation & Power Co. Original gage vertical staff attached to wall of Denver & Rio Grande Railroad Co.'s pump house some distance below present site. Moved July 5, 1895, to highway bridge 1 mile below present gage. Relation between different gages not determined.

DISCHARGE MEASUREMENTS.—Made from car and cable at gage section.

CHANNEL AND CONTROL.—Bed composed of well-compacted gravel; permanent. Control at rapids 500 feet downstream; practically permanent. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.1 feet at 6.45 p. m. June 14 (discharge, 17,600 second-feet); minimum stage, 1.35 feet at 8 a. m. August 5 (discharge, 190 second-feet).

ICE.—Stage-discharge relation affected by ice for short periods.

DIVERSIONS.—Below all diversions from Gunnison River. Most of water diverted through Redlands canal is used for pumping and is returned to Grand River below the Gunnison.

COMBINED FLOW.—Combined flow of Gunnison River and Redlands power canal represents flow of Gunnison River which enters Grand River less about 25 second-feet which is used during irrigation season.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent except for winter period, for which they are good.

COOPERATION.—Daily gage heights furnished by Redlands Irrigation & Power Co.

Discharge measurements of Gunnison River near Grand Junction, Colo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 16	Fear and Oliver	2.00	530	May 15	H. R. Oliver	6.99	7,910
Jan. 18	Watkins and Oliver	2.58	909	May 19	Oliver and Tener	8.00	11,100
Feb. 22	do	2.59	863	Aug. 23	H. R. Oliver	1.85	409

Daily discharge, in second-feet, of Gunnison River near Grand Junction, Colo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	830	760	1,040	910	795	1,080	1,910	4,100	6,540	3,930	300	300
2	830	700	990	910	760	990	2,000	4,470	5,680	3,280	230	290
3	910	700	990	830	795	990	2,080	5,260	6,100	2,800	218	290
4	910	700	990	830	910	1,040	2,080	5,890	7,430	3,120	210	460
5	910	760	990	830	950	1,080	2,080	7,900	8,150	3,120	350	640
6	830	760	830	870	990	1,280	2,080	9,180	9,440	2,500	950	670
7	830	730	795	830	1,040	1,490	1,950	9,960	10,200	2,350	950	700
8	830	730	730	795	1,060	1,490	1,830	9,960	12,700	2,500	910	640
9	460	730	760	760	1,080	1,490	1,710	9,440	12,400	2,650	580	730
10	550	730	730	760	1,080	1,280	1,830	8,920	13,300	2,800	490	1,490
11	520	670	730	760	1,080	1,180	2,650	7,430	14,500	3,120	580	3,760
12	520	700	830	810	1,080	1,230	3,120	6,100	15,800	3,760	1,280	4,100
13	550	700	910	860	1,040	1,280	3,600	5,680	16,200	3,440	1,230	2,800
14	490	700	1,040	910	1,180	1,280	3,930	6,540	16,500	3,120	1,280	1,950
15	520	760	1,080	910	1,180	1,280	3,760	8,920	16,500	3,120	1,710	1,950
16	520	700	1,080	1,080	1,180	1,180	3,440	10,500	14,800	2,800	2,210	1,830
17	610	1,040	990	990	1,080	1,040	3,120	11,600	13,600	2,650	1,380	1,710
18	640	990	910	870	1,080	1,180	2,650	11,600	12,400	2,500	870	1,490
19	640	990	910	990	1,080	1,180	2,080	11,000	12,100	2,080	730	1,380
20	640	910	830	1,040	1,080	1,180	2,500	11,000	10,800	1,710	550	1,280
21	670	760	830	990	910	1,230	1,600	10,800	11,000	1,380	490	1,230
22	760	910	830	1,080	990	1,280	1,490	9,700	10,500	1,280	490	1,080
23	700	950	910	950	1,130	1,230	1,710	9,700	11,300	1,180	460	1,080
24	730	1,040	830	910	1,180	1,420	2,210	10,800	11,600	1,180	490	1,040
25	700	1,040	910	910	1,230	1,600	2,800	11,300	9,960	1,130	460	1,080
26	640	1,040	910	910	1,130	1,710	3,760	10,500	8,400	1,080	460	1,130
27	640	990	910	930	1,080	1,830	4,280	9,440	7,900	910	400	1,080
28	670	1,040	990	950	1,080	2,210	4,100	8,150	6,540	550	400	1,080
29	700	990	990	870	.....	2,080	3,760	8,660	5,680	610	325	1,040
30	700	700	910	910	.....	1,600	3,600	7,900	5,260	490	275	950
31	550	.....	795	910	.....	1,830	.....	7,430	.....	275	275	.....

NOTE.—Gage not read Jan. 12, 13, 27, Feb. 8, 11, 24, Mar. 6, 21, 24, Apr. 1, 2, 4-9; discharge interpolated. Stage-discharge relation affected by ice Jan. 26 to Feb. 10, Mar. 13-15; discharge determined from daily gage height and temperature records.

Monthly discharge of Gunnison River near Grand Junction, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	910	460	677	41,600
November	1,040	670	831	49,400
December	1,080	730	902	55,500
January	1,080	760	899	55,300
February	1,230	760	1,040	57,800
March	2,210	990	1,360	83,600
April	4,280	1,490	2,660	158,000
May	11,600	4,100	8,700	535,000
June	16,500	5,260	10,800	643,000
July	3,930	275	2,170	133,000
August	2,210	210	695	42,700
September	4,100	290	1,310	78,000
The year	16,500	210	2,670	1,930,000

Combined monthly discharge of Gunnison River and Redlands canal near Grand Junction, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1,100	705	909	55,900
November	1,360	760	1,040	61,900
December	1,080	730	902	55,500
January	1,080	760	899	55,300
February	1,230	760	1,040	57,800
March	2,210	990	1,360	83,600
April	4,480	1,690	2,730	162,000
May	12,000	4,370	9,030	555,000
June	16,900	5,670	11,100	660,000
July	4,340	685	2,430	149,000
August	2,210	275	760	46,700
September	4,100	290	1,310	78,000
The year	16,900	275	2,800	2,020,000

EAST RIVER AT ALMONT, COLO.

LOCATION.—In sec. 22, T. 51 N., R. 1 E., at highway bridge at Almont, Gunnison County, 100 feet above junction of East and Taylor rivers.

DRAINAGE AREA.—295 square miles (measured on Forest atlas).

RECORDS AVAILABLE.—July 27, 1910, to September 30, 1918. From April 15 to October 8, 1905, a station was maintained at this point, gage being referred to different datum.

GAGE.—Vertical staff on downstream side of right abutment; read by J. W. Brittain.

DISCHARGE MEASUREMENTS.—Made from two-span bridge.

CHANNEL AND CONTROL.—Bed composed of small boulders and coarse gravel. Control practically permanent during 1918.

EXTREMES OF DISCHARGE.—No data.

ICE.—Stage-discharge relation affected by ice during winter.

DIVERSIONS.—There are court decrees for diversions of 78 second-feet from East River.

REGULATION.—Diurnal fluctuation during spring caused by alternate melting and freezing of mountain snow.

ACCURACY.—Stage-discharge relation practically permanent except as affected by ice. Rating curve well defined below 2,000 second-feet, but somewhat uncertain above, owing to overflow. Gage read to tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except for period of ice effect. Records for medium stages good; for high and low stages fair.

COOPERATION.—Gage heights furnished by United States Reclamation Service.

Discharge measurements of East River at Almont, Colo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 7	H. W. Fear	0.96	114	Mar. 2	T. J. Watkins	0.82	74
Dec. 17	T. J. Watkins	*a* .84	63	May 23	Robert Follansbee	2.90	1,710
Jan. 16	S. B. Soulé	*a* 1.52	68				

a Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of East River at Almont, Colo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	120	100	100	65	56	70	100	450	1,140	962	255	145
2	120	100	100	65	65	70	100	565	1,140	905	255	145
3	120	100	100	65	65	70	110	650	1,360	850	285	145
4	120	100	100	65	65	70	120	905	1,650	795	255	160
5	120	100	100	65	65	75	120	1,190	1,710	795	255	175
6	120	100	75	65	65	75	120	1,480	1,820	745	285	192
7	120	100	65	65	65	75	110	1,540	2,520	745	232	175
8	120	100	65	65	65	75	120	1,540	3,000	745	232	175
9	120	100	56	65	65	75	120	1,360	3,250	695	232	210
10	120	100	56	56	65	65	145	1,140	3,700	650	232	525
11	120	100	65	47	65	70	175	850	4,800	650	232	450
12	120	100	65	56	65	75	210	795	5,000	565	232	380
13	120	100	65	65	65	75	232	850	5,000	605	232	315
14	120	100	65	65	70	80	255	1,310	5,000	650	232	285
15	110	100	65	65	70	80	255	1,480	3,700	605	232	255
16	100	100	65	65	70	80	255	1,650	3,250	565	210	232
17	100	100	65	65	70	80	210	1,600	3,250	525	210	210
18	100	100	70	65	70	80	175	1,600	3,000	488	210	210
19	100	100	70	65	70	75	192	1,600	2,640	450	210	192
20	100	100	70	65	70	75	145	1,710	2,640	450	210	175
21	100	100	70	65	70	75	175	1,600	2,640	415	192	175
22	100	100	70	65	75	75	175	1,650	2,520	415	175	160
23	100	100	70	70	75	75	192	1,770	2,520	415	175	160
24	100	100	70	75	75	80	255	1,770	2,060	380	145	160
25	100	100	65	80	75	80	285	1,710	1,820	380	145	160
26	110	100	65	85	75	80	348	1,710	1,710	348	145	160
27	100	100	65	80	80	80	415	1,540	1,540	315	145	160
28	100	100	65	70	80	80	348	1,540	1,310	255	145	145
29	100	100	65	70	.....	85	348	1,480	1,080	285	145	145
30	100	100	65	65	.....	85	415	1,360	1,080	255	145	145
31	100	.....	65	65	.....	92	.....	1,190	.....	255	145	.....

NOTE.—Stage-discharge relation affected by ice Dec. 6 to Mar. 2; discharge determined from daily gage-height record, discharge measurements, and temperature records.

Monthly discharge of East River at Almont, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	120	100	110	6,760
November	100	100	100	5,950
December	100	56	71.5	4,400
January	85	47	66.3	4,080
February	80	56	69.0	3,830
March	92	65	76.8	4,720
April	415	100	208	12,400
May	1,770	450	1,340	82,400
June	5,000	1,080	2,600	155,000
July	962	255	553	34,000
August	285	145	207	12,700
September	520	145	211	12,600
The year	5,000	47	467	339,000

TOMICHI CREEK AT SARGENTS, COLO.

LOCATION.—In NW. ¼ sec. 28, T. 48 N., R. 5 E., at railroad bridge three-quarters of a mile west of Sargents, Saguache County. Nearest tributary, Marshall Creek, enters a quarter of a mile above.

DRAINAGE AREA.—165 square miles (revised) (measured on Hayden's atlas).

RECORDS AVAILABLE.—May 12, 1917, to September 30, 1918.

GAGE.—Lallie water-stage recorder installed October 5, 1917, and referred to former vertical staff attached to downstream piling of railroad bridge; read by W. S. Cole.

DISCHARGE MEASUREMENTS.—Made by wading or from pile bent bridge.

CHANNEL AND CONTROL.—Bed composed of gravel; shifting. Control 30 feet down stream at small rapids of compact gravel; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 3.4 feet during forenoon of May 29 (discharge, 410 second-feet); minimum discharge probably occurs during winter.

ICE.—Stage-discharge relation seriously affected by ice; observations discontinued.

DIVERSIONS.—A few small ditches divert water for irrigation above Sargents.

REGULATION.—Diurnal fluctuation during spring, caused by alternate melting and freezing of mountain snow.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting gage-height graph. Wide control at high water makes station nonsensitive, and for that reason records for high water are good and for other stages excellent.

Discharge measurements of Tomichi Creek at Sargents, Colo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 3	H. W. Fear	1.72	30.5	May 24	J. H. Baily	3.22	337
Feb. 28	T. J. Watkins	2.98	[a]32.0	Sept. 15	H. D. Amsley	1.82	40.3
May 22	Robert Follansbee	3.00	267				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Tomichi Creek at Sargents, Colo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.
1	33	39	.....	92	306	89	40	26
2	33	31	.....	95	278	90	39	26
3	32	30	.....	116	292	90	45	34
4	31	39	.....	134	281	95	47	39
5	31	36	.....	134	295	96	41	54
6	31	37	.....	154	302	92	41	48
7	30	29	.....	168	309	86	39	37
8	30	32	.....	170	302	81	38	30
9	30	29	.....	192	302	81	39	44
10	30	30	.....	182	302	81	35	78
11	30	30	.....	160	302	80	41	70
12	29	28	.....	140	302	77	40	54
13	29	27	.....	138	312	82	40	49
14	29	26	.....	154	284	77	52	45
15	29	29	.....	160	260	81	49	41
16	29	28	.....	185	213	89	36	40
17	29	30	.....	232	195	76	29	40
18	29	31	.....	281	210	70	26	39
19	34	32	.....	274	192	64	26	38
20	40	33	46	302	168	59	28	35
21	45	34	36	278	168	52	44	30
22	38	35	46	292	204	52	35	32
23	35	36	51	326	185	54	30	32
24	37	37	61	362	160	54	29	39
25	37	.....	61	378	136	58	26	37
26	37	.....	72	374	128	51	26	35
27	34	.....	77	370	117	47	26	34
28	34	.....	71	370	110	44	27	30
29	37	.....	70	382	106	48	27	34
30	45	.....	78	362	95	48	26	34
31	44	.....	.....	350	.....	44	23	.....

NOTE.—No gage heights Oct. 1, 2, 4–6, 14–20, Nov. 18–23; discharge interpolated.

Monthly discharge of Tomichi Creek at Sargents, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	45	29	33.6	2,070
November 1–24	39	26	32.0	1,520
April 20–30	78	36	60.8	1,330
May	382	92	236	14,500
June	312	95	227	13,500
July	96	44	70.6	4,340
August	52	23	35.2	2,160
September	78	26	40.1	2,390

CRYSTAL CREEK NEAR MAHER, COLO.

LOCATION.—In sec. 35, T. 50 N., R. 6 W., at old Kruemling ranch, 300 feet above headgate of Fruitland Irrigation Co.'s ditch, 8 miles southeast of Maher, Montrose County. Nearest important tributary, North Fork, enters 1 mile above.

DRAINAGE AREA.—26 square miles (measured on Forest atlas).

RECORDS AVAILABLE.—April 6, 1917, to September 30, 1918.

GAGE.—Vertical staff attached to downstream left abutment of highway bridge; read by C. B. Wray and V. G. Meek.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of compact gravel; slightly shifting. Control at small rapids of compact gravel, 40 feet downstream; slightly shifting during 1918. Banks subject to overflow at stage of 4.0 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 1.9 feet at 6 p. m. April 28 and 29, and 6 a. m. April 30 and May 11 (discharge, 179 second-feet); stream practically dry during part of August.

ICE.—Stage-discharge relation seriously affected by ice; observations discontinued.

DIVERSIONS.—Above station, Cedar Canyon and Iron Springs ditch has adjudicated decree for 50 second-feet. Below, Fruitland Irrigation Co.'s ditch diverts water into Onion Valley reservoir.

ACCURACY.—Stage-discharge relation changed during high water of later part of April. Rating curve used prior to May 1, well defined below 400 second-feet; curve used after that date fairly well defined. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except during low stages, for which they are fair.

The following discharge measurement was made by Robert Follansbee:
May 26, 1918: Gage height, 1.49 feet; discharge, 107 second-feet.

Daily discharge, in second-feet, of Crystal Creek near Maher, Colo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	15	8	.....	46	132	105	2	2	4
2	15	7	.....	63	116	100	2	1	4
3	15	7	12	76	100	108	2	1	49
4	15	6	15	76	86	111	2	2	11
5	15	5	15	84	72	121	2	2	7
6	15	5	18	84	72	108	6	2	6
7	14	5	19	84	108	100	10	2	6
8	14	5	18	70	140	82	8	2	6
9	14	5	22	57	157	76	8	2	5
10	14	5	22	51	157	56	8	0	5
11	14	5	12	51	157	69	6	0	5
12	14	5	5	35	134	64	6	0	4
13	14	5	7	40	137	60	6	0	4
14	13	5	5	46	116	60	6	0	5
15	12	5	12	51	111	69	6	0	4
16	12	5	22	70	127	96	5	1	4
17	12	5	22	84	124	76	5	0	4
18	12	5	26	99	121	54	5	0	4
19	12	5	35	99	111	37	4	0	4
20	12	5	51	91	100	30	4	0	4
21	12	5	51	84	111	26	4	0	4
22	12	5	46	99	108	18	4	0	4
23	12	5	35	139	96	14	3	0	5
24	12	5	51	139	76	5	3	0	6
25	11	5	51	139	56	2	2	2	6
26	10	5	63	147	66	2	1	3	6
27	9	5	70	163	86	2	1	3	7
28	9	5	63	171	90	2	2	3	7
29	9	5	63	171	96	2	2	4	7
30	8	5	51	163	93	2	2	4	7
31	8	.....	40	.....	96	.....	2	4	.....

NOTE.—Gage read three times weekly during October and November; discharge interpolated for days of missing gage heights.

Monthly discharge of Crystal Creek near Maher, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	15	8	12.4	762
November	8	5	5.3	315
March 3–31	70	5	31.8	1,830
April	171	35	92.4	5,500
May	157	56	108	6,640
June	121	2	55.2	3,280
July	10	1	4.2	258
August	4	0	1.3	80
September	49	4	6.8	405

LAKE FORK AT LAKE CITY, COLO.

LOCATION.—In sec. 34, T. 44 N., R. 4 W., at private bridge one-third mile above Henson Creek, in Lake City, Hinsdale County.

DRAINAGE AREA.—126 square miles (measured on topographic map).

RECORDS AVAILABLE.—April 21 to September 30, 1918.

GAGE.—Vertical staff fastened to downstream side of right bridge abutment; read by Eugene Otis.

DISCHARGE MEASUREMENTS.—Made by wading or from bridge.

CHANNEL AND CONTROL.—Bed composed of coarse gravel well compacted; permanent. Control at small rapids 250 feet downstream; apparently permanent. Banks not subject to overflow except during extremely high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 2.57 feet at 8 a. m. June 14 (discharge, 980 second-feet); minimum discharge occurs during winter.

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

DIVERSIONS.—Practically none which do not return to stream above station. Court decrees for diversions of 22 second-feet from Lake Fork below station.

REGULATION.—Flow naturally regulated by Lake San Cristobal, 4 miles upstream; area 1 square mile. During low water operation of power plant, 1 mile upstream, may influence discharge slightly.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Width of control at high water makes station nonsensitive, and for that reason records for that period are good, and for other periods, excellent.

Discharge measurements of Lake Fork at Lake City, Colo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 21	Robert Follansbee	0.83	32.7
May 24	....do	1.90	334
June 17	H. C. Getty	2.38	625

Daily discharge, in second-feet, of Lake Fork at Lake City, Colo., for the year ending Sept. 30, 1918.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	65	191	207	55	50	16	.....	228	780	163	94	125
2	.....	72	188	194	69	50	17	.....	242	722	152	86	110
3	.....	84	261	194	74	50	18	.....	261	612	141	76	98
4	.....	92	432	204	72	50	19	.....	280	612	130	69	88
5	.....	101	560	197	72	55	20	.....	305	560	130	69	78
6	.....	123	612	188	76	54	21	35	305	515	110	84	76
7	.....	138	665	188	76	50	22	35	261	470	106	80	69
8	.....	136	722	169	72	48	23	35	261	470	101	78	72
9	.....	123	722	163	74	96	24	36	330	470	92	71	65
10	.....	128	840	178	72	178	25	18	330	432	92	63	63
11	.....	118	900	178	88	181	26	43	362	395	84	60	57
12	.....	103	900	175	84	178	27	47	305	362	74	57	55
13	.....	106	900	175	80	169	28	52	305	330	72	54	54
14	.....	136	960	172	92	155	29	51	305	280	71	55	51
15	.....	188	900	169	96	141	30	57	261	242	65	55	50
							31	.....	228	.....	62	52	.....

Monthly discharge of Lake Fork at Lake City, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 21–30	57	18	40.9	811
May	362	65	203	12,500
June	960	188	567	33,700
July	207	62	142	8,730
August	96	52	72.7	4,470
September	181	48	87.2	5,190
The period	.....	.....	.....	65,400

HENSON CREEK AT LAKE CITY, COLO.

LOCATION.—In sec. 34, T. 44 N., R. 4 W., at first highway bridge above mouth in Lake City, Hinsdale County. No tributary between station and mouth, a quarter of a mile below.

DRAINAGE AREA.—83 square miles (measured on topographic map).

RECORDS AVAILABLE.—April 21 to September 30, 1918.

GAGE.—Vertical staff fastened to downstream side of right pile abutment; read by S. W. Williams.

DISCHARGE MEASUREMENTS.—Made by wading or from single-span bridge.

CHANNEL AND CONTROL.—Bed composed of coarse gravel overlain with silt tailings from mills upstream; shifting. Control at rapids 75 feet downstream, which will shift during high water. Banks not subject to overflow at bridge.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.78 feet at 6 p. m. June 11 (discharge, 1,180 second-feet); minimum discharge occurs during winter.

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

DIVERSIONS.—Practically no diversions which do not return water to creek above station.

REGULATION.—Operation of power plant of Hidden Treasure mine above station causes considerable variation in flow during low water. Storage capacity of dam, about 735 acre-feet.

ACCURACY.—Stage-discharge relation shifted during high water. Standard rating curve not well defined. Gage read to hundredths twice daily. Daily discharge obtained by applying mean daily gage height to rating table. Shifting-control method used April 21 to June 10. Records fair.

Discharge measurements of Henson Creek at Lake City, Colo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 21	Robert Follansbee	0.52	57
May 25	....do	1.36	366
June 17	H. C. Getty	1.60	508

Daily discharge, in second-feet, of Henson Creek at Lake City, Colo., for the year ending Sept. 30, 1918.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	94	230	202	80	43	16	.....	293	660	149	98	80
2	.....	100	305	173	96	36	17	.....	311	575	149	84	80
3	.....	94	406	221	108	46	18	.....	336	526	130	80	76
4	.....	127	462	213	125	59	19	.....	314	575	125	76	59
5	.....	152	530	196	130	54	20	.....	362	542	120	78	56
6	.....	165	640	183	110	62	21	54	311	406	125	73	54
7	.....	186	655	186	96	30	22	26	321	410	116	69	62
8	.....	165	735	186	96	49	23	24	366	438	110	66	36
9	.....	162	848	180	125	116	24	26	394	446	98	71	52
10	.....	175	824	183	100	186	25	32	358	394	98	68	52
11	.....	167	896	180	100	139	26	45	366	336	96	64	48
12	.....	147	872	167	98	84	27	78	374	302	98	42	48
13	.....	165	860	162	102	116	28	64	350	278	88	56	59
14	.....	224	812	167	118	120	29	52	339	257	98	59	50
15	.....	299	740	149	104	110	30	69	290	202	76	36	50
							31	.....	254	.....	78	120	.....

Monthly discharge of Henson Creek at Lake City, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 21-30	78	24	47.0	932
May	394	94	250	15,400
June	896	202	539	32,100
July	221	76	145	8,920
August	130	36	88.0	5,410
September	186	30	70.4	4,190
The period				67,000

LEROUX CREEK NEAR LAZEAR, COLO.

LOCATION.—In sec. 33, T. 13 S., R. 93 W., at highway bridge 8 miles north of Lazear, Delta County. No important tributary within several miles.

DRAINAGE AREA.—52 square miles (measured on Forest atlas).

RECORDS AVAILABLE.—May 15, 1917, to September 30, 1918.

GAGE.—Lallie water-stage recorder installed April 23, 1918, and referred to vertical staff fastened to face of left bridge abutment; inspected by G. H. Henderson and W. F. Stewart. Datum lowered 0.40 foot July 20, 1917, and 0.45 foot October 11, 1917. All gage heights referred to latter datum.

DISCHARGE MEASUREMENTS.—Made from single-span bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders; very rough. Control 50 feet downstream; somewhat shifting during 1918.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 3.5 feet at 9 p. m. May 16 and 11 p. m. May 17 (discharge, 840 second-feet); minimum discharge occurs during winter.

ICE.—No data; flow very small.

DIVERSIONS.—Court decrees for diversion of 55 second-feet from Leroux Creek above station, of which 33 second-feet is for diversion out of the drainage basin. Below, decrees for 290 second-feet.

REGULATION.—Diurnal fluctuation during spring, caused by alternate melting and freezing of mountain snow. Flow in nonirrigating season stored in reservoirs on headwaters. Decrees for such storage amount to 606 acre-feet.

ACCURACY.—Stage-discharge relation not permanent; shifted during high water. Rating curve well defined below 500 second-feet. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting gage-height graph. Indirect method for shifting control used May 18 to June 24. Records good.

Discharge measurements of Leroux Creek near Lazear, Colo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 11	H. W. Fear	0.50	3.0	May 28	Robert Follansbee	2.24	186
Apr. 23	Robert Follansbee	1.05	27.2	June 20	H. C. Getty	2.15	220
May 17	J. H. Baily	2.50	356				

Daily discharge, in second-feet, of Leroux Creek near Lazear, Colo., for the year ending Sept. 30, 1918.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1		112	134	26	14	2.9	16		665	85	31	20	2.7
2		96	176	27	14	3.9	17		550	75	34	16	2.6
3		79	233	33	13	4.8	18		352	77	26	8.8	2.6
4		158	260	51	14	9.6	19		438	125	28	10	2.6
5		236	187	32	20	11	20		266	134	30	12	2.6
6		284	169	31	18	7.0	21		291	119	32	14	2.6
7		316	158	41	15	3.4	22		316	110	36	12	2.6
8		277	164	26	10	3.4	23	42	305	128	34	8.4	2.6
9		205	169	24	10	5.6	24	50	277	154	35	5.6	4.2
10		163	174	35	12	39	25	72	260	85	34	4.2	3.8
11		105	171	31	11	18	26	74	224	67	23	4.0	3.0
12		110	154	27	10	5.9	27	70	224	52	20	3.6	2.8
13		115	136	28	9.6	4.4	28	88	243	39	12	3.2	2.9
14		246	119	27	16	2.9	29	85	249	31	12	2.9	2.9
15		565	110	30	19	2.6	30	117	176	28	12	2.8	2.8
							31		128		14	2.8	

Monthly discharge of Leroux Creek near Lazear, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 23-30	117	42	74.8	1,190
May	665	79	259	15,900
June	260	28	127	7,560
July	51	12	28.5	1,750
August	20	2.8	10.8	664
September	39	2.6	5.59	333
The period				27,400

SURFACE CREEK AT CEDAREDGE, COLO.

LOCATION.—About sec. 29, T. 13 S., R. 94 W., at Cedaredge, Delta County. Nearest tributary, Mill Creek, enters 4 miles above.

DRAINAGE AREA.—43 square miles (measured on Forest atlas).

RECORDS AVAILABLE.—May 16, 1917, to September 2, 1918.

GAGE.—Lallie water-stage recorder referred to vertical staff fastened to right concrete abutment of footbridge, 400 feet upstream from highway bridge in Cedaredge.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage section.

CHANNEL AND CONTROL.—Bed composed of small boulders filled in behind control which is old concrete weir filled up flush with boulders and gravel, located 12 feet downstream. Control permanent. Above stage 0.7 foot water flows through an overflow channel which may shift somewhat.

EXTREMES OF DISCHARGE.—Maximum stage during year, 1.5 feet at 10 p. m. May 14 (discharge, 330 second-feet); minimum discharge occurs during winter.

ICE.—No data. Flow very small as most of it is stored during winter.

DIVERSIONS.—Court decrees for diversion of 142 second-feet from Surface Creek above station, of which 67 second-feet is for diversion out of drainage basin. Below, court decrees for 272 second-feet.

REGULATION.—Alternate melting and freezing of snow in mountains caused diurnal fluctuation during spring. Court decrees for storage of 8,140 acre-feet on headwaters of Surface Creek. The release of this flow during irrigation season changes natural flow.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Operation of water-stage recorder satisfactory except for short periods, as shown in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspection of recorder graph. Owing to wide control station is nonsensitive, and records can be considered only good.

Discharge measurements of Surface Creek at Cedaredge, Colo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Dec. 15	T. J. Watkins	0.14	3.2
May 15	J. H. Baily	1.09	124
27	Robert Follansbee	.83	72

Daily discharge, in second-feet, of Surface Creek at Cedaredge, Colo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.0	2.9	5.0	75	68	40	31	7.4
2	1.6	2.9	5.4	64	84	40	26	9.0
3	1.6	3.2	4.4	77	84	40	27	.....
4	1.6	3.5	3.5	132	84	42	27	.....
5	1.6	3.5	3.2	141	88	44	23	.....
6	1.6	3.2	2.9	141	82	45	19	.....
7	1.6	3.2	3.8	141	82	61	19	.....
8	1.6	2.9	5.4	128	71	45	17	.....
9	1.8	3.2	11	110	59	44	15	.....
10	2.0	3.2	9.8	106	48	69	13	.....
11	2.3	3.2	22	98	62	71	11	.....
12	2.6	.....	20	98	80	66	8.6	.....
13	3.2	.....	23	141	86	62	8.2	.....
14	3.2	.....	18	165	86	52	11	.....
15	3.2	.....	15	183	80	45	7.4	.....
16	3.2	.....	17	190	78	39	5.8	.....
17	3.2	.....	12	155	84	51	8.6	.....
18	3.2	.....	11	135	88	39	9	.....
19	3.2	.....	11	140	88	35	9.8	.....
20	3.5	.....	9	115	86	38	11	.....
21	3.5	.....	20	130	80	37	11	.....
22	3.5	.....	35	140	75	34	11	.....
23	3.2	.....	51	130	82	24	12	.....
24	2.6	.....	57	115	75	17	12	.....
25	2.6	.....	61	100	62	19	13	.....
26	2.6	.....	46	95	57	26	13	.....
27	3.2	.....	32	90	45	31	9.8	.....
28	3.2	.....	28	94	42	25	7.8	.....
29	3.2	.....	42	96	40	23	7.4	.....
30	3.2	.....	57	75	42	30	8.6	.....
31	3.2	.....	.....	66	.....	38	5	.....

NOTE.—No gage heights Apr. 21, May 16–26, July 30, Aug 8–11, 22–25; discharge for period May 16–26 determined from comparison with flow of Leroux Creek near Lazear; discharge for other periods interpolated.

Monthly discharge of Surface Creek at Cedaredge, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	3.5	1.6	2.64	162
November 1–11	3.5	2.9	3.17	69
April	61	2.9	21.4	1,270
May	190	64	118	7,260
June	88	40	72.3	4,300
July	71	17	41.0	2,520
August	31	5.0	13.5	830

UNCOMPAHGRE RIVER AT OURAY, COLO.

LOCATION.—River: In sec. 31, T. 44 N., R. 7 W., in box canyon a short distance upstream from highway bridge half a mile south of Ouray, Ouray County. Nearest tributary, Canyon Creek, enters 150 feet below; nearest tributary above is Bear Creek.

Power-house flume: In tailrace of power house flume in Ouray about 100 feet upstream from entrance to river. Water diverted from Uncompahgre River above river station.

DRAINAGE AREA.—44 square miles (measured on topographic map).

RECORDS AVAILABLE.—January 25, 1911, to September 30, 1918, for river station and February 25, 1916, to September 30, 1918, for power-house flume. Beginning October 1, 1917, only combined daily flow for river and flume are given, as intermittent operation of latter causes low-water flow in river to fluctuate to such an extent that one daily gage height does not represent essentially the mean daily stage. From January 7 to March 17, 1908, records were kept at dam of Ouray Electric Light & Power Co., 1 mile south of present station, and were furnished through courtesy of Wheeler & Whinnerah.

GAGE.—River: Vertical staff attached to rock cliff at left side of stream 150 feet above mouth of Canyon Creek.

Power-house flume: Vertical staff fastened to side of wooden flume just below power house. Both gages read by T. J. Watkins, forest ranger.

DISCHARGE MEASUREMENTS.—River: Made by wading or from footbridge at gage.

Flume: Made from footbridge just below gage.

CHANNEL AND CONTROL.—River: Bed composed of small boulders and is rough and shifting. Control short distance downstream; slightly shifting during 1918. Station is in box canyon with high vertical walls.

Flume: Control is plank nailed across bottom of flume at lower end; permanent elevation of crest, 0.9 foot gage height.

EXTREMES OF DISCHARGE.—River: Maximum stage recorded during year, 4.4 feet at 8 p. m. June 13 (discharge, 1,180 second-feet). Data insufficient for determining minimum discharge.

ICE.—Stage-discharge relation not affected by ice, as warm springs keep stream open.

DIVERSIONS.—No diversion above station other than pipe line, whose flow is included in these records.

REGULATION.—Diurnal fluctuation during spring, from alternate melting and freezing of mountain snow.

ACCURACY.—Stage-discharge relation shifted slightly after high water. Rating curve well defined below 700 second-feet. Gage read to hundredths once daily except period May 13 to June 17, when it was read twice daily. Daily discharge ascertained by applying mean daily gage height to rating table; shifting-control method used August 1 to September 30. Records good.

COOPERATION.—Gage heights furnished by United States Forest Service.

Discharge measurements of Uncompahgre River at Ouray, Colo., during the year ending Sept. 30, 1918.

[Made by T. J. Watkins.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Jan. 14	0.52	3.9	June 13	3.48	538
May 24	2.37	287	Sept. 5	.98	16.1

Discharge measurements of power-house flume at Ouray, Colo., during the year ending Sept. 30, 1918.

[Made by T. J. Watkins.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Jan. 14	1.25	10.5
Sept. 5	1.85	27.8

Daily discharge, in second-feet, of Uncompahgre River and power-house flume at Ouray, Colo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	32	17	13	15	17	16	25	72	152	154	38	31
2	33	17	10	13	15	16	24	119	163	131	46	31
3	31	17	9.2	15	12	16	23	119	253	147	45	32
4	29	17	9.2	15	12	16	24	144	429	163	41	33
5	27	17	9.2	12	12	16	24	142	606	141	40	44
6	27	17	9.2	13	12	20	26	178	606	152	37	33
7	26	16	9.2	13	11	17	31	203	604	163	36	31
8	26	15	10	16	12	14	31	173	694	149	35	30
9	25	14	12	14	15	13	37	155	746	135	69	59
10	25	14	17	12	16	13	50	132	796	121	51	244
11	24	14	14	11	17	13	48	128	696	112	46	97
12	22	16	14	14	17	17	44	122	746	112	39	74
13	22	17	16	14	17	17	41	178	896	114	39	65
14	22	16	16	14	17	12	37	229	946	94	65	60
15	22	16	17	15	15	10	36	298	996	85	51	57
16	21	15	12	15	15	10	35	324	606	77	51	51
17	21	15	13	14	17	10	29	354	606	71	46	51
18	21	9.8	11	18	15	17	20	340	340	69	39	50
19	20	8.9	13	16	16	17	18	354	324	63	31	45
20	20	9.8	13	16	14	10	18	354	294	63	31	43
21	19	9.2	12	18	15	10	20	282	266	62	29	41
22	19	17	9.5	18	17	10	21	296	280	70	29	36
23	19	18	9.2	21	17	18	23	340	280	67	28	35
24	19	17	9.2	14	17	20	52	340	280	58	25	34
25	19	18	14	19	16	21	50	310	280	59	25	33
26	19	12	16	15	16	22	59	310	238	46	23	33
27	19	14	10	16	16	24	62	310	226	44	23	33
28	18	14	9.2	17	16	26	44	310	201	39	25	33
29	17	14	9.2	15	.....	26	52	268	175	41	26	33
30	17	18	11	15	.....	25	76	240	164	46	25	33
31	17	.....	9.5	15	.....	27	.....	187	.....	39	31	.....

Monthly discharge of Uncompahgre River and power-house flume at Ouray, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	33	17	22.5	1,380
November	18	8.9	15.0	893
December	17	9.2	11.8	726
January	21	11	15.1	928
February	17	11	15.1	839
March	27	10	16.7	1,030
April	76	18	36	2,140
May	354	72	236	14,500
June	996	152	463	27,600
July	163	39	93.1	5,720
August	69	23	37.6	2,310
September	244	30	50.2	2,990
The year	996	8.9	84.3	61,100

UNCOMPAHGRE RIVER BELOW OURAY, COLO.

LOCATION.—In sec. 30, T. 44 N., R. 7 W. New Mexico principal meridian, near lowest bridge in Ouray, Ouray County, a third of a mile below railroad station; below all tributaries in Ouray.

DRAINAGE AREA.—76 square miles (measured on topographic map).

RECORDS AVAILABLE.—May 12, 1913, to September 30, 1918.

GAGE.—Gurley water-stage recorder installed March 28, 1917, referred to vertical staff attached to rock cliff, 500 feet above bridge used since March 22, 1916; inspected by T. J. Watkins, forest ranger. Original gage, vertical staff attached to downstream side of right bridge abutment, was used prior to March 22, 1916.

DISCHARGE MEASUREMENTS.—Made by wading or from single-span bridge.

CHANNEL AND CONTROL.—Bed composed of coarse gravel and small boulders; somewhat shifting during 1918. No well-defined control. Banks not subject to overflow except above extremely high stage of 6.5 feet.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 5.5 feet at 1 a. m. June 14 (discharge, 2,530 second-feet); minimum stage, 0.6 foot at 11 p. m. February 8 (discharge, 17 second-feet).

ICE.—Stage-discharge relation not affected by ice, as warm springs keep the river from freezing.

DIVERSIONS.—All diversions returned to river above station except one of 5.2 second-feet from Oak Creek.

REGULATION.—Diurnal fluctuation during spring, caused by alternate melting and freezing of mountain snow.

ACCURACY.—Stage-discharge relation not permanent, but shifted after high water. Rating curve well defined below 800 second-feet. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting gage-height graph; indirect method for shifting control used August 21 to September 30. Records good.

Discharge measurements of Uncompahgre River below Ouray, Colo., during the year ending Sept. 30, 1918.

[Made by T. J. Watkins.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Jan. 14	1.00	27.7
May 24	3.32	477
Sept. 5	1.78	89

Daily discharge, in second-feet, of Uncompahgre River below Ouray, Colo, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	66	36	33	28	25	26	53	158	270	238	80	57
2	60	35	33	28	28	32	50	167	350	228	85	54
3	57	33	32	29	26	35	50	176	492	315	77	64
4	54	35	30	29	27	36	47	255	610	368	79	74
5	52	34	28	26	28	32	42	270	685	273	93	85
6	53	33	27	26	28	32	36	294	785	270	115	73
7	51	34	25	27	28	30	45	291	910	238	93	67
8	50	34	26	27	23	32	50	255	835	230	82	73
9	48	33	29	31	25	27	80	255	1,050	255	137	152
10	47	32	32	27	29	31	86	238	1,160	276	115	361
11	46	33	30	26	31	33	84	178	1,180	242	104	258
12	45	32	31	26	30	38	86	167	1,050	222	94	167
13	44	32	29	27	28	34	77	208	1,080	232	92	141
14	43	32	31	28	26	29	77	315	1,270	198	136	126
15	42	33	31	27	28	29	69	425	1,160	173	120	115
16	43	32	30	27	24	28	60	448	993	158	105	106
17	43	30	30	26	26	33	52	470	885	145	96	97
18	37	29	30	28	26	36	46	492	885	131	94	87
19	36	31	31	28	25	35	44	515	785	122	90	84
20	39	34	31	28	26	34	41	515	735	116	84	78
21	37	34	29	26	26	33	46	405	760	115	78	71
22	37	33	28	27	27	31	54	405	710	109	65	66
23	37	33	29	28	29	34	54	515	735	103	57	68
24	37	33	29	28	29	44	77	538	560	104	53	72
25	37	33	28	29	27	42	93	515	585	102	57	65
26	37	31	28	28	27	43	102	515	470	96	65	64
27	36	32	28	28	28	45	110	470	448	91	73	62
28	34	27	28	27	27	40	98	470	368	86	73	59
29	33	33	27	28	.....	47	100	448	315	84	69	57
30	36	33	28	28	.....	54	123	385	264	79	70	54
31	35	.....	29	28	.....	60	.....	312	.....	78	59	.....

Monthly discharge of Uncompahgre River below Ouray, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	66	33	43 6	2,680
November	36	27	32 6	1,940
December	33	25	29 4	1,810
January	31	26	27 5	1,690
February	31	23	27 0	1,500
March	60	26	36 0	2,210
April	123	36	67.7	4,030
May	538	158	357	22,000
June	1,270	264	746	44,400
July	368	78	177	10,900
August	137	53	86 8	5,340
September	361	54	98.6	5,870
The year	1,270	23	144	104,000

UNCOMPAHGRE RIVER AT COLONA, COLO.

LOCATION.—In sec. 17, T. 47 N., R. 8 W., half a mile east of Colona, Ouray County. No important tributary within several miles.

DRAINAGE AREA.—475 square miles approximately (measured by United States Reclamation Service.)

RECORDS AVAILABLE.—April 6, 1917, to September 30, 1918.

GAGE.—Vertical staff, read by J. M. Stakebake.

DISCHARGE MEASUREMENTS.—Made from suspension footbridge near gage.

CHANNEL AND CONTROL.—Somewhat shifting.
EXTREMES OF DISCHARGE.—No data.
ICE.—No data as station is discontinued during winter.
DIVERSIONS.—Only a few small diversions above station.
COOPERATION.—Daily-discharge record furnished by United States Reclamation Service.

Daily discharge, in second-feet, of Uncompahgre River at Colona, Colo., for the year ending Sept. 30, 1918.

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1	110	.....	260	400	325	166	23
2	110	.....	282	377	400	175	20
3	110	.....	260	560	450	176	16
4	110	.....	355	690	520	158	20
5	110	.....	425	835	520	140	55
6	110	.....	425	875	500	122	87
7	93	.....	477	1,000	475	102	56
8	93	.....	425	835	450	86	88
9	93	.....	400	957	550	74	120
10	93	.....	450	1,250	760	116	260
11	93	.....	330	1,580	700	107	365
12	93	.....	260	1,480	300	98	260
13	61	.....	282	1,870	585	108	245
14	61	.....	355	2,270	550	126	221
15	61	.....	505	2,040	515	144	217
16	53	.....	590	1,800	505	122	214
17	45	.....	620	1,600	475	117	211
18	45	.....	725	1,460	444	103	195
19	45	110	725	1,180	396	89	180
20	45	95	794	1,260	390	89	167
21	45	95	620	1,000	385	74	150
22	45	110	532	1,540	370	74	142
23	45	127	655	1,280	355	61	135
24	45	145	760	1,040	340	52	142
25	45	180	690	925	321	52	140
26	45	200	725	875	282	52	135
27	45	240	620	810	256	38	135
28	45	180	655	476	236	30	135
29	45	200	590	475	218	30	135
30	45	220	532	400	170	26	135
31	45	.....	450	.....	172	26	.....

NOTE.—June 10 to July 15 discharge obtained by adding to the discharge at Montrose all diversions between Montrose and Colona.

Monthly discharge of Uncompahgre River at Colona, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	110	45	68.7	4,220
April 19–30	240	95	158	3,760
May	794	260	509	31,300
June	2,270	377	1,100	65,500
July	760	170	417	25,600
August	176	26	94.6	5,820
September	365	16	147	8,750

UNCOMPAHGRE RIVER AT MONTROSE, COLO.

LOCATION.—In sec. 31, T. 49 N., R. 9 W. New Mexico principal meridian, at highway bridge a quarter of a mile west of Montrose, Montrose County. Nearest important tributary, Happy Canyon Creek, enters 2 miles below.

DRAINAGE AREA.—565 square miles.

RECORDS AVAILABLE.—April 22, 1903, to September 30, 1918.

GAGE.—Vertical staff attached to bridge; read by L. R. Allen.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Bed composed of sand and gravel; shifts occasionally.

EXTREMES OF DISCHARGE.—No data.

ICE.—Although ice forms along the banks during winter, river is not frozen over. Observations, however, are discontinued.

DIVERSIONS.—Uncompahgre River is so overappropriated that the United States Reclamation Service has constructed a tunnel and canal to divert 1,300 second-feet from Gunnison River into the Uncompahgre above Uncompahgre.

COOPERATION.—Daily-discharge record furnished by United States Reclamation Service.

Daily discharge, in second-feet, of Uncompahgre River at Montrose, Colo., for the year ending Sept. 30, 1918.

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1	300	.....	360	235	395	360	285
2	300	.....	360	340	360	360	275
3	321	.....	380	560	432	340	285
4	345	.....	515	680	432	360	340
5	377	.....	515	735	475	380	395
6	395	.....	635	760	540	415	380
7	395	.....	495	1,050	475	450	360
8	395	.....	495	820	475	380	360
9	330	.....	395	820	475	360	380
10	300	.....	395	1,120	560	380	432
11	223	.....	295	1,180	515	415	322
12	43	.....	270	990	360	415	100
13	56	.....	270	955	360	395	360
14	56	.....	360	1,340	415	495	360
15	63	.....	495	1,300	450	285	322
16	56	.....	545	1,120	432	35	270
17	49	28	560	955	415	380	180
18	32	0	660	955	432	360	*163*
19	22	0	660	820	395	360	163
20	5	0	742	820	360	360	138
21	5	322	540	680	360	360	115
22	0	360	360	900	395	395	110
23	0	360	495	845	360	380	100
24	0	360	680	845	360	360	90
25	0	415	560	610	360	360	90
26	0	360	635	560	380	360	80
27	0	415	560	495	360	360	70
28	0	360	495	415	322	340	80
29	0	360	495	415	322	322	80
30	0	360	495	432	322	300	70
31	0	....	300	.....	340	275	.....

Monthly discharge of Uncompahgre River at Montrose, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	395	0	131	8,060
April 17-30	415	0	264	7,330
May	742	270	484	29,800
June	1,340	235	792	47,100
July	560	322	408	25,100
August	495	35	358	22,000
September	432	70	225	13,400

UNCOMPAHGRE RIVER NEAR DELTA, COLO.

LOCATION.—In T. 15 S., on line between Rs. 95 and 96 W., at highway bridge 2 miles south of Delta, Delta County. No tributaries below station and none for several miles above.

DRAINAGE AREA.—1,130 square miles.

RECORDS AVAILABLE.—April 29, 1903, to September 30, 1918.

GAGE.—Vertical staff read by Miss Eva Helmick. Original gage located at a highway bridge a quarter of a mile above Denver & Rio Grande Railroad bridge; moved to latter bridge November 17, 1903; replaced by an inclined gage installed near bridge April 21, 1904, which was used until November, 1906, when a staff gage was placed at present site. April 16, 1910, a new gage was installed at slightly different datum. No determined relation between gages at the various sites.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Bed composed of silt and gravel. Control shifts at intervals Banks are not subject to overflow.

EXTREMES OF DISCHARGE.—No data.

ICE.—Although ice forms along banks and slush ice frequently occurs, the stage-discharge relation is probably not materially affected thereby; observations, however, are discontinued during winter.

DIVERSIONS.—Ditches above station divert normal flow during irrigation season; records represent largely return seepage water.

REGULATION.—None.

COOPERATION.—Daily-discharge record furnished by United States Reclamation Service which maintains the station.

Daily discharge, in second-feet, of Uncompahgre River near Delta, Colo., for the year ending Sept. 30, 1918.

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1	384	.....	69	99	59	85	95
2	393	.....	52	67	58	74	90
3	375	.....	37	116	87	76	95
4	411	.....	150	140	102	85	90
5	379	.....	140	215	150	77	120
6	416	.....	163	202	92	87	100
7	435	.....	190	335	103	97	70
8	420	.....	138	315	140	99	77
9	375	.....	115	230	170	109	100
10	277	.....	100	277	185	107	337
11	180	.....	85	575	152	308	440
12	215	.....	93	357	335	187	535
13	47	.....	75	485	78	166	400
14	100	.....	67	910	126	335	315
15	90	.....	69	855	125	125	290
16	114	.....	109	705	100	66	288
17	98	.....	95	540	100	38	250
18	94	.....	150	345	88	59	203
19	91	.....	87	315	85	67	171
20	96	.....	50	425	97	85	172
21	83	.....	90	460	121	100	176
22	93	177	58	505	100	93	174
23	95	123	123	1,100	100	59	172
24	94	15	140	625	67	40	170
25	102	100	88	475	77	66	171
26	94	75	125	420	85	37	176
27	84	70	87	300	75	10	170
28	100	70	132	245	72	68	170
29	102	67	87	176	77	95	170
30	93	75	75	150	75	88	171
31	91	.....	130	.....	76	85	.....

Monthly discharge of Uncompahgre River near Delta, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre feet.
	Maximum.	Minimum.	Mean.	
October	435	47	194	11,900
April 22-30	177	15	85.8	1,530
May	190	37	102	6,270
June	1,100	67	399	23,700
July	335	58	108	6,640
August	335	10	99.1	6,090
September	535	70	199	11,800

KANNAH CREEK NEAR WHITEWATER, COLO.

LOCATION.—In sec. 34, T. 12 S., R. 97 W., a quarter of a mile below intake for water supply of Grand Junction and 17 miles southwest of Whitewater, Mesa County. Nearest tributary, Coal Creek, enters short distance above station.

DRAINAGE AREA.—38 square miles (measured on Forest atlas).

RECORDS AVAILABLE.—October 15, 1917, to September 30, 1918.

GAGE.—Vertical staff at right bank 300 feet above footbridge; read by James Woods.

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

CHANNEL AND CONTROL.—Bed composed of gravel and small boulders; probably permanent. Control at riffle of small boulders 75 feet downstream; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.74 feet at 6 p. m. May 23 (discharge, 449 second-feet); minimum stage recorded, 0.16 foot at 8 a. m. December 7 and 8 (discharge, 0.8 second-foot).

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

DIVERSIONS.—City of Grand Junction diverts an average of 5 second-feet above station for domestic use; maximum diversion, 7.8 second-feet. Flow measured over Cippoletti weir.

REGULATION.—Diurnal fluctuation in spring from alternate melting and freezing of mountain snow. No artificial regulation.

COMBINED FLOW.—Flow diverted by city intake measured by weir and flow added to that at gaging station to show total flow of creek.

ACCURACY.—Stage-discharge relation permanent except as affected by ice. Rating curve well defined below 200 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Kannah Creek near Whitewater, Colo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 15	H. W. Fear	0.52	6.9	May 29	Robert Follansbee	1.90	184
Dec. 14	T. J. Watkins	.54	9.2	June 20	H. C. Getty	1.14	48.2
Jan. 19	....do	.50	7.5	July 13	Robert Follansbee	.98	27.8
Apr. 29	Follansbee and Getty	.74	17.8				

Daily discharge, in second-feet, of Kannah Creek near Whitewater, Colo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	8.2	7.4	6.7	6.4	7.0	11	18	165	50	21	18
2	.....	8.2	6.4	6.7	6.4	7.0	12	23	162	43	21	16
3	.....	8.2	7.0	7.0	6.4	7.0	13	28	153	38	19	16
4	.....	6.4	4.0	7.0	6.4	7.0	13	31	137	36	18	28
5	.....	6.4	4.6	7.0	6.4	7.0	13	35	137	33	18	34
6	.....	6.4	3.8	7.0	6.4	7.0	13	37	129	30	18	40
7	.....	6.7	1.6	6.7	6.4	7.0	13	38	126	34	18	25
8	.....	6.1	1.4	6.7	6.4	6.7	13	81	105	34	17	20
9	.....	4.6	2.0	6.4	6.4	7.0	14	124	101	32	18	16
10	.....	4.6	3.0	6.1	6.4	7.0	14	167	92	32	18	16
11	.....	4.6	3.2	5.0	6.4	7.0	13	210	82	34	16	16
12	.....	5.2	5.8	4.0	6.4	5.5	14	252	80	34	15	16
13	.....	4.3	6.4	3.0	6.4	4.6	16	255	75	34	15	15
14	.....	4.3	5.8	2.7	6.4	5.8	16	252	67	31	16	14
15	.....	5.2	5.8	2.4	6.4	6.7	17	252	61	31	18	14
16	.....	4.9	5.8	2.5	6.4	7.0	17	252	63	31	16	14
17	.....	4.9	5.8	2.8	6.4	6.7	15	249	47	31	15	14
18	.....	4.9	5.8	3.0	6.4	7.4	11	288	41	31	11	13
19	.....	4.9	5.8	4.0	6.4	7.8	7.4	219	40	31	11	13
20	.....	4.9	6.4	5.0	6.4	7.8	8.6	202	61	31	11	13
21	8.6	4.9	6.4	6.4	6.4	7.8	13	231	74	31	11	13
22	8.6	4.9	6.4	6.4	6.4	7.8	13	294	80	31	11	12
23	8.6	4.9	6.4	6.7	6.4	7.8	15	336	80	31	10	12
24	8.6	4.3	6.4	7.0	6.4	8.2	16	288	77	31	10	12
25	8.6	4.0	6.4	6.7	6.4	8.2	17	255	72	31	11	11
26	8.6	5.5	6.1	7.0	6.4	8.6	18	252	66	31	12	11
27	8.6	6.7	6.4	6.7	6.4	9.4	19	231	64	31	16	11
28	7.8	6.4	6.7	6.4	7.0	9.4	13	213	60	27	21	10
29	3.6	7.4	7.0	6.4	.....	10	16	210	56	25	22	10
30	4.9	7.0	6.7	6.4	.....	11	17	202	52	22	22	10
31	6.4	.....	6.7	6.4	.....	12	.....	190	.....	22	20	.....

NOTE.—Stage-discharge relation affected by ice Dec. 9, 10, Jan. 11-20; discharge determined from daily gage height and temperature records. May 8-11 gage heights apparently in error; discharge interpolated.

Monthly discharge of Kannah Creek near Whitewater, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October 21-31	8.6	3.6	7.54	165
November	8.2	4.0	5 66	337
December	7.4	1.4	5.46	336
January	7.0	2.4	5.62	346
February	7.0	6.4	6.42	357
March	12	4.6	7.62	469
April	19	7.4	14.0	833
May	336	18	184	11,300
June	165	40	86.9	5,170
July	50	22	32.1	1,970
August	22	10	16.0	984
September	40	10	16.1	958
The period	.....	.....	.....	23,200

Combined monthly discharge of Kannah Creek and weir near Whitewater, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October 21-31	14	8.4	11.9	260
November	13	7.5	9.93	591
December	12	5.3	9.78	601
January	12	6.7	9.70	596
February	11	8.5	10.2	566
March	17	8.5	11.7	719
April	24	12	18.9	1,120
May	343	24	191	11,700
June	172	44	92.6	5,510
July	57	29	38.9	2,390
August	29	17	22.5	1,380
September	42	14	22.1	1,320
The period				26,800

DOLORES RIVER AT BEDROCK, COLO.

LOCATION.—In sec. 17, T. 47 N., R. 18 W., at highway bridge at Bedrock, Montrose County. Nearest perennial tributary, West Paradox Creek, enters below station

DRAINAGE AREA.—1,910 square miles (measured on map of Colorado Geological Survey; scale, 1:500,000).

RECORDS AVAILABLE.—April 26 to September 30, 1918.

GAGE.—Chain attached to upstream side of bridge; read by Henry Dockery.

DISCHARGE MEASUREMENTS.—Made from single-span bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of compact sand and silt, which was apparently permanent during 1918. No well-defined control.

ICE.—Ice forms complete cover.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.45 feet at 7 a. m. May 18 and 19 (discharge, 1,690 second-feet); minimum stage, −0.3 foot from September 27 to 30 (discharge, 6 second-feet).

DIVERSIONS.—No decrees for diversion from Dolores River, although irrigation is practiced to a considerable extent on headwaters.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 1,000 second-feet. Gage read to tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Dolores River at Bedrock, Colo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 26	Robert Follansbee	1.6	342	June 29	H. C. Getty	1.20	258
May 28	Baily and Getty	3.0	913	Sept. 9	J. H. Baily	−.08	17.1

Daily discharge, in second-feet, of Dolores River at Bedrock, Colo., for the year ending Sept. 30, 1918.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	560	560	197	25	25	16	.....	1,190	1,090	241	25	67
2	.....	580	410	154	25	25	17	.....	1,430	890	176	25	44
3	.....	560	365	144	25	25	18	.....	1,460	730	134	25	31
4	.....	600	600	124	31	208	19	.....	1,460	620	104	25	25
5	.....	600	890	104	134	59	20	.....	1,350	500	124	25	20
6	.....	820	1,380	325	59	25	21	.....	1,400	462	94	25	16
7	.....	990	1,320	197	44	31	22	.....	1,020	752	59	25	16
8	.....	1,060	1,290	144	25	25	23	.....	842	730	51	25	10
9	.....	775	990	208	31	20	24	.....	1,060	1,460	51	25	10
10	.....	730	1,090	275	25	16	25	.....	1,260	1,040	51	25	10
11	.....	940	1,290	300	94	20	26	395	1,060	708	51	25	10
12	.....	820	1,430	600	59	20	27	462	1,040	462	44	25	6
13	.....	640	1,350	865	37	230	28	480	965	325	31	25	6
14	.....	462	1,220	410	25	154	29	445	915	252	25	25	
15	.....	580	1,240	365	31	94	30	445	842	208	25	25	6
							31	.....	708	.....	25	25	.....

Monthly discharge of Dolores River at Bedrock, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 26–30	480	395	445	4,410
May	1,460	462	926	56,900
June	1,460	208	855	50,900
July	865	25	184	11,300
August	134	25	34.5	2,120
September	230	6	42.0	2,500
The period	.....	.....	.....	128,000

SAN MIGUEL RIVER AT NATURITA, COLO.

LOCATION.—On line between Rs. 15 and 16 W., T. 46 N., at high bridge in Naturita, Montrose County. Nearest tributary, Basin Creek, enters half a mile downstream.

DRAINAGE AREA.—1,090 square miles (measured on map of Colorado Geological Survey; scale, 1:500,000.)

RECORDS AVAILABLE.—April 26 to September 30, 1918.

GAGE.—Chain fastened to upstream side of bridge; read by Flora Cooper, and Mrs. A. R. Payson.

DISCHARGE MEASUREMENTS.—Made from single-span bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of coarse gravel and small boulders and is rough. Control at rapids 300 feet downstream; will shift during high water.

ICE.—Stage-discharge relation affected by ice.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.8 feet at 8 a. m. June 23 (discharge, 2,200 second-feet); minimum stage probably occurs during winter.

DIVERSIONS.—Court decrees for diversion of 102 second-feet from San Miguel River, of which about 84 second-feet is above station.

REGULATION.—Diurnal fluctuation during spring from alternate melting and freezing of mountain snow.

ACCURACY.—Stage-discharge relation not permanent; shifted during high water. Rating curve used July 16 to September 30, fairly well defined below 1,200 second-feet, but poorly defined above. Shifting-control method used April 26 to July 15. Gage read to quarter-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair.

Discharge measurements of San Miguel River at Naturita, Colo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 26	Robert Follansbee	1.33	370
May 28	Baily and Getty	2.00	598
June 29	H. C. Getty	1.80	407

Daily discharge, in second-feet, of San Miguel River at Naturita, Colo., for the year ending Sept. 30, 1918.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	339	360	318	76	40	16	.....	627	1,260	278	145	101
2	.....	384	360	272	87	46	17	.....	627	1,050	220	164	89
3	.....	354	414	315	89	66	18	.....	711	950	217	152	89
4	.....	478	560	525	79	58	19	.....	711	760	176	134	84
5	.....	525	920	390	101	70	20	.....	746	746	160	112	82
6	.....	478	900	449	117	66	21	.....	641	746	152	112	75
7	.....	525	970	400	114	59	22	.....	501	1,460	140	93	66
8	.....	437	950	339	107	53	23	.....	608	1,980	164	65	57
9	.....	418	950	453	97	1,150	24	.....	711	1,050	127	54	66
10	.....	465	1,260	920	178	354	25	.....	641	690	156	47	64
11	.....	384	1,320	461	158	306	26	369	614	488	112	46	59
12	.....	348	1,370	718	112	234	27	363	506	488	101	42	54
13	.....	330	1,540	492	110	208	28	333	510	425	90	43	52
14	.....	384	1,640	375	200	138	29	333	492	384	87	47	53
15	.....	478	1,480	330	227	107	30	339	470	330	101	39	52
							31	.....	449	.....	76	38	.....

Monthly discharge of San Miguel River at Naturita, Colo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 26–30	369	333	347	3,440
May	746	330	513	31,500
June	1,980	330	927	55,200
July	920	76	294	18,100
August	227	38	103	6,330
September	1,150	40	133	7,910
The period	.....	.....	.....	122,000

MILL CREEK NEAR MOAB, UTAH.

LOCATION.—In sec. 8, T. 26 S., R. 22 E., a quarter of a mile above dam, three-quarters of a mile above power plant of Moab Light & Power Co., half a mile below mouth of Dry Fork, 1½ miles above confluence with Pack (Deep) Creek, and 2 miles southeast of Moab, Grand County.

DRAINAGE AREA.—76 square miles.

RECORDS AVAILABLE.—October 24, 1914, to July 9, 1918 (fragmentary).

GAGE.—Vertical staff on left bank bolted to rock ledge; installed October 25, 1914. Friez water-stage recorder installed April 28, 1918, on right bank directly opposite staff gage; destroyed by flood June 22, 1918. Stevens eight-day water-stage recorder was installed at same site on July 18, 1918, but at a datum 3.5 feet lower. Recorders inspected by Frank Peterson.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Bed composed of boulders. Control is a rock ledge a few feet downstream from gage; shifting at extremely high water.

EXTREMES OF DISCHARGE.—Not determined.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent until flood on June 22 which changed conditions by scouring channel considerably wider though no deeper. Rating curve used before high water, well defined. Only reliable gage-height record obtained during year was that from Friez recorder, May 5–26, and staff gage readings on April 28, June 2 and 9, and July 9. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph. Records good.

Discharge measurements of Mill Creek near Moab, Utah, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 28	R. P. Flagel	0 62	11.2
July 9	W. B. Maughan	.70	23.2

Daily discharge, in second-feet, of Mill Creek near Moab, Utah, for the year ending Sept. 30, 1918.

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

LITTLE COLORADO RIVER BASIN.

LITTLE COLORADO RIVER NEAR WOODRUFF, ARIZ.

LOCATION.—In T. 16 N., R. 22 E., at highway bridge 1½ miles below Woodruff, Navajo County, and 4 miles below Silver Creek.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 5, 1915, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on right bank just below highway bridge.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading near bridge.

CHANNEL AND CONTROL.—Bed consists of bedrock covered with thin deposit of sand and silt; shifts considerably because of large quantities of silt that are constantly being deposited at low stages and scoured out at each rise. No well-defined control. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 2.24 feet at 1 p. m. March 14 (discharge, 337 second-feet); minimum stage probably occurred during period of no record.

1915–1918: Maximum stage, 12.7 feet January 19, 1916 (discharge not determined). Stream dry for about 2 weeks during June and July, 1916.

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

DIVERSIONS.—Much of the low-water flow is diverted for irrigation in vicinity of St. Johns and Snowflake; amount unknown.

REGULATION.—There are several small reservoirs on headwaters of this stream and on Silver Creek which regulate the flow to some extent.

ACCURACY.—Stage-discharge relation changed considerably during floods and slightly at low stages. Standard rating curve fairly well defined below 400 second-feet and poorly defined above. Operation of water-stage recorder unsatisfactory. Daily discharge determined by shifting-control method. Records fair.

Discharge measurements of Little Colorado River near Woodruff, Ariz., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 11	W. E. Dickinson	0.56	11.7	Mar. 12	C. E. Ellsworth	1.89	203
11	do	.58	12.4	July 22	do	.63	10.7
Feb. 6	Frank Asplind	.66	11.6	Aug. 27	do	.57	1.2

Daily discharge, in second-feet, of Little Colorado River near Woodruff, Ariz., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1	13			9	10	68	16	16		13	8	8	129
2	32			9	10	79	17	16		13	9	8	97
3	26			9	10	58	18	16		13	9	8	78
4	20			9	11	49	19	16		13	9	8	61
5	19			9	11	40	20			12	9	8	49
			13										
6	17			9	11	29	21			12	9	8	47
7	16			9	10	26	22			12	9	8	
8	15	14		8	9	24	23		14	11	8	8	
9	14			8	8	22	24			11	8	8	
10	14			8	8	81	25			11	8	8	
								14					
11	14		13	8	8	164	26			10	8		30
12	14		13	8	8	175	27			10	8	200	
13	14		13	8	8	103	28			10	8		
14	14		13	8	8	267	29			10	9	.....	
15	15		13	8	8	194	30			10	9	.....	
							31		.....	10	9	.....	

NOTE.—Braced figures show estimated mean discharge for periods indicated when recorder failed to operate; Dec. 11 to Feb. 25 staff gage read weekly and discharge interpolated for intervening days. No record Apr. 1 to Sept. 30.

Monthly discharge of Little Colorado River near Woodruff, Ariz., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	.....	.....	15.8	972
November	.....	.....	14.0	833
December	.....	10	12.1	744
January	9	8	8.5	523
February	.....	8	29.2	1,620
March	267	.....	69.0	4,240
The period	.....	.....	.....	8,930

ZUNI RIVER AT BLACK ROCK, N. MEX.

LOCATION.—At reservoir of Zuni Indian Reservation at Black Rock, McKinley County. Rio de Los Nutrias, nearest large tributary, enters from north about 4 miles above.

DRAINAGE AREA.—About 660 square miles.

RECORDS AVAILABLE.—Yearly flow July 1, 1903, to June 30, 1905; July 1, 1908, to June 30, 1910. Monthly flow October 1, 1910, to September 30, 1918. Record since July 1, 1908, shows inflow into reservoir.

METHOD OF COLLECTING DATA.—From July 1, 1903, to June 30, 1905, records were obtained by the ordinary stream-gaging methods. Reservoir completed in 1908. Record beginning July 1, 1908, obtained by means of gage in reservoir and capacity curve for reservoir, quantity of water released from the reservoir during the periods of inflow being taken into consideration.

FLOODS.—Channel dry greater part of the year below point where it leaves mountains, but stream is subject to sudden floods of considerable volume and usually of short duration.

DIVERSIONS.—Reservoir at Ramah, about 18 miles above station, capacity of which is given as 4,240 acre-feet, is used to irrigate about 1,150 acres in T. 11 N., R. 16 W. There are other small ponds or reservoirs in drainage area.

COOPERATION.—Record furnished by the United States Indian Service, through H. F. Robinson, supervising engineer, Albuquerque, N. Mex.

Monthly run-off of Zuni River at Black Rock, N. Mex., for the year ending Sept. 30, 1918.

Month.	Run-off in acre-feet.	Month.	Run-off in acre-feet.
October	102	May	28
November	0	June	558
December	0	July	890
January	40	August	790
February	880	September	335
March	1,240		
April	0	The year	4,860

CHEVELON FORK NEAR WINSLOW, ARIZ.

LOCATION.—In T. 18 N., R. 17 E., 300 yards below highway bridge, 1 mile above concrete diversion dam, 1½ miles above junction with Little Colorado River, and 14 miles southeast of Winslow, Navajo County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 18, 1905, to December 12, 1908; December 18, 1915, to September 30, 1918.

GAGE.—Stevens water-stage recorder attached to rock ledge on right bank 300 yards below highway bridge.

DISCHARGE MEASUREMENTS.—Made from cable 300 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed consists of sand and gravel; shifting during floods. No well-defined control. Station in box canyon which ends just above cable.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 4.82 feet at 8 p. m. February 27 (discharge, from extension of rating curve, about 1,100 second-feet); stream practically dry about midnight July 31.

1916–1918: Maximum stage, 13.2 feet at 9 a. m. January 19, 1916 (discharge not determined); minimum discharge in 1918.

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

DIVERSIONS.—No data.

ACCURACY.—Stage-discharge relation changed during March. Rating curve used before change fairly well defined below 500 second-feet; curve used after change fairly well defined between 2 and 15 second-feet. Operation of water-stage recorder satisfactory except as shown in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting gage-height graph. Records fair except for extremely low and high stages, and for periods estimated, for which they are poor.

Discharge measurements of Chevelon Fork near Winslow, Ariz., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 12	W. E. Dickinson	0.95	3.7	June 22	C. E. Ellsworth	2.15	12.6
Feb. 5	Frank Asplind	.98	4.9	July 21	.....do	.80	3.1
Mar. 11	C. E. Ellsworth	3.09	460	Aug. 26	.....do	1.77	3.9
June 22	.....do	2.16	12.8				

Daily discharge, in second-feet, of Chevelon Fork near Winslow, Ariz., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	7.0	5.5	5.0	5.5	6.5	315		3.0	5.0	3 8	0.7	3.5
2	7.0	5.5	4.5	5.5	6.0	204		3.2	5.0	3.8	3.2	3.5
3	6.5	6.0	4.8	5.5	6.0	152		3.2	5.0	4	3.7	3.5
4	6.5	6.0	4.8	5.5	5.5	122		3.2	5.0	4.3	3.5	3.8
5	6.5	6.0	4.8	5.5	5.5	120		3.2	5.0	4.3	2	3.8
6	5.5	5.0	3.9	5.5	5.5	128		3.2	5.0	4.3	3.5	3.7
7	6.0	4.2	4.2	4.5	3.9	138		3.2	5.0	4.3	4	3.7
8	6.0	5.0	4.5	4.2	3.3	662		3.2	5.0	4.1	3	3.3
9	6.0	5.5	4.5	5.0	4.5	794		3.0	5.0	4.1	1.9	3.3
10	6.0	5.5	3.3	5.5	5.0	710		3.0	5.0	5	1.8	3.3
11	5.5	5.5	3.6	5.5	5.5	554		3.2	5.0	6	3	3.4
12	5.5	5.5	4.8	5.5	4.8	471		3.0	5.0	5	3.3	3.4
13	5.5	4.8	4.8	5.5	4.2			3.0	5.5	5	3.5	3.4
14	5.5	4.5	4.8	5.5	3.9		5.0	3.0	6.5	11	3.7	3.2
15	5.0	5.0	4.8	6.0	5.0			3.0	7.5	5.5	3.7	3.2
16	4.5	5.5	4.8	6.0	6.5			3.0	8.0	4.6	3.8	3.2
17	2.7	5.5	4.8	6.0	7.5			3.0	9	4.5	3.8	3.2
18	2.9	5.5	4.8	5.5	5.5			3.2	10	4.1	3.8	3.2
19	3.1	6.0	4.8	6.0	5.5			3.2	11	4.1	3.7	3.3
20	3.3	6.0	4.8	6.0	7.5			3.2	12	4	3.7	3.2
21	3.5	6.5	4.8	6.0	8.0	100		3.2	13	3.8	3.7	3.0
22	3.8	6.5	4.8	6.0	8.0			3.3	13	3.8	3.4	2.9
23	4.0	7.0	4.5	6.0	7.0			3.3	10	4	3.4	2.5
24	4.2	6.0	4.2	6.0	5.5			3.3	5	4.3	3.4	2.8
25	4.4	5.5	4.5	6.0	5.5			3.4	4.6	4.1	3.4	3.2
26	4.6	6.5	4.5	5.5	561.0		3.0	3.5	4.5	4	3.4	3.3
27	4.8	7.0	4.5	5.5	948		3.0	3.7	4.3	4	3.4	3.2
28	5.0	7.5	4.5	5.5	672		3.0	3.8	4.5	3.7	3.5	3.3
29	5.0	5.5	5.5	5.5	.....		3.0	4.3	4.3	4	3.5	3.3
30	5.5	5.5	5.5	6.0	.....		3.0	4.6	4.1	3	3.5	3.3
31	5.5	.....	5.5	6.5	.....		.....	4.8	.....	0.8	3.4	.....

NOTE.—Braced figures show estimated mean discharge for periods indicated. No record Oct. 9–13, 18–30, June 15–21; discharge interpolated.

Monthly discharge of Chevelon Fork near Winslow, Ariz., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	7.0	2.7	5.06	311
November	7.5	4.2	5.72	340
December	5.5	3.3	4.64	285
January	6.5	4.2	5.62	346
February	948	3.3	82.9	4,600
March			202	12,400
April		3.0	4.67	278
May	4.8	3.0	3.34	205
June	13	4.1	6.56	390
July	11	.8	4.36	268
August	4.0	.7	3.27	201
September	3.8	2.5	3.30	196
The year	948	0.7	27.4	19,800

VIRGIN RIVER BASIN.

VIRGIN RIVER AT VIRGIN, UTAH.

LOCATION.—In NW. ¼ sec. 27 or NE. ¼ sec. 28, T. 41 S., R. 12 W., a few hundred feet above point where river enters steep, narrow gorge, and three-quarters of a mile west of Virgin, Washington County. Station replaces one maintained prior to February, 1915, half a mile above Virgin and gives practically same record of flow.

DRAINAGE AREA.—1,010 square miles.

RECORDS AVAILABLE.—April 18, 1909, to September 30, 1918.

GAGE.—Chain gage on right bank near lower end of sandstone bluff. Installed February 1, 1915; read by Lawrence Earl. For description of gages at original section see Water-Supply Paper 459.

DISCHARGE MEASUREMENTS.—Made by wading below gage except during high water when old cable above Virgin must be used.

CHANNEL AND CONTROL.—Bed consists of sand and gravel. Principal control is a gravel bar a short distance below the gage; shifts slightly. Left bank subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.3 feet at 2.30 p. m. March 12 (discharge estimated from extension of rating curve, 5,100 second-feet); minimum stage recorded, 1.62 feet at 7 p. m. July 3 (discharge, 42 second-feet).

1909–1918: Maximum stage recorded, 11.6 feet at upper station October 27, 1912 (discharge estimated, 12,000 second-feet). The flood of August 31, 1909, probably equalled or exceeded this flow. Minimum discharge, 24 second-feet, July 1, 2, 4, and 5, 1909.

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

DIVERSIONS.—Above all important diversions.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during floods. Standard rating curve fairly well defined except for peaks of sharp floods. Gage read to hundredths once daily about five or six times a week. Daily discharge determined by applying daily gage height to rating table and interpolating for days when gage was not read, except for floods, which are roughly estimated. Records poor.

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Discharge measurements of Virgin River at Virgin, Utah, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 12	W. E. Dickinson	2.05	113
Apr. 27	J. J. Sanford	2.58	411
Aug. 9	L. W. Jordan	2.01	123

Daily discharge, in second-feet, of Virgin River at Virgin, Utah, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	172	142	154	150	98	110	374	351	297	56	95	101
2	122	136	152	153	98	110	278	374	222	49	88	132
3	116	136	150	156	98	110	254	491	212	42	80	150
4	110	139	150	142	98	110	231	608	201	53	70	698
5	112	142	150	142	92	955	209	735	190	74	80	500
6	114	150	157	142	101	1,800	278	692	180	45	85	303
7	115	157	164	144	110	213	273	650	196	74	90	287
8	116	164	156	147	98	3,080	268	608	128	104	95	271
9	110	136	156	150	100	1,000	258	593	142	700	122	254
10	110	140	156	146	102	700	372	572	142	1,310	244	238
11	110	145	160	142	104	572	485	551	142	142	222	222
12	110	150	164	142	102	3,690	430	544	128	110	199	206
13	104	146	150	139	100	1,690	374	537	113	1,710	176	190
14	122	142	161	136	98	974	308	530	98	200	368	174
15	122	156	172	128	88	258	278	524	116	156	257	158
16	116	142	156	116	90	240	249	504	122	113	146	141
17	122	150	156	116	92	222	236	484	128	104	139	125
18	122	152	153	116	88	204	222	498	108	95	126	107
19	124	154	150	122	98	357	258	409	88	76	113	94
20	126	156	156	119	98	510	331	380	99	58	110	80
21	127	150	153	116	98	204	404	351	110	58	107	107
22	128	150	150	116	156	204	477	342	104	58	107	403
23	128	146	152	116	231	204	550	334	88	64	96	835
24	125	142	153	116	164	196	622	326	86	70	85	150
25	122	144	155	107	150	202	351	318	84	66	96	150
26	125	145	156	98	136	207	362	293	82	66	107	146
27	128	148	156	101	122	213	397	268	80	58	88	146
28	128	150	150	104	116	222	386	268	78	50	70	148
29	128	150	152	101	.....	249	374	268	64	48	70	150
30	128	156	154	98	.....	291	362	282	60	47	70	153
31	135	.....	156	98	.....	333	.....	297	.....	71	70	.....

Monthly discharge of Virgin River at Virgin, Utah, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	172	110	122	7,500
November	164	136	147	8,750
December	172	150	155	9,530
January	156	98	126	7,750
February	231	88	112	6,220
March	3,690	110	627	38,600
April	622	209	342	20,400
May	735	268	451	27,700
June	297	60	130	7,740
July	1,710	42	191	11,700
August	368	70	125	7,690
September	835	80	227	13,500
The year	3,690	42	231	167,000

LEEDS (QUAIL) CREEK NEAR LEEDS, UTAH.

LOCATION.—In N. ½ sec. 36, T. 40 S., R. 14 W., just above head of R. C. Savage's canal, a quarter of a mile above head of Leeds canal, three-quarters of a mile north of abandoned mining camp of Silver Reef, and 2½ miles north of Leeds, Washington County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 31, 1915, to September 30, 1918.

GAGE.—Vertical staff on left bank 60 feet above head of Savage ditch; read by R. C. Savage.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed consists of gravel and boulders; probably shifts at each flood.

EXTREMES OF DISCHARGE.—Not determined for current year.

1915–1917: Maximum stage recorded, 5.0 feet August 3, 1916 (discharge not estimated); minimum stage, 1.98 feet January 31, 1915 (discharge, 3.9 second-feet).

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

DIVERSIONS.—Above all diversions. R. C. Savage diverts water about 60 feet below the station for irrigation and domestic uses. Measurements of ditch have shown from 1 to 4 second-feet. Measurements of Leeds canal which diverts a quarter of a mile below have shown maximum discharge of 18.5 second-feet.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed several times during year. Rating doubtful. Gage-height record fragmentary. Discharge not determined.

Discharge measurements of Leeds (Quail) Creek near Leeds, Utah, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 13	W. E. Dickinson	2.16	4.8
Apr. 27	J. J. Sanford	2.05	8.5
Aug. 10	L. W. Jordan	1.92	7.1

Daily gage height, in feet, of Leeds (Quail) Creek near Leeds, Utah, for the year ending Sept. 30, 1918.

Day.	Oct.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1				2.14			2.05	2.07	2.05	1.86
2				2.14	2.12			2.07		
3						2.11			2.03	1.87
4							2.05			
5		2.15		2.14	4.0		2.06			
6						2.09			2.01	2.12
7			2.14		2.30	2.09		2.07	1.99	1.90
8		2.15						2.07		
9				2.14	2.28			2.07		
10			2.14	2.14		2.09	2.07			2.91
11					7.0		2.07	2.07		2.02
12			2.14							1.98
13	2.16				2.30	2.09			1.95	
14						2.07	2.05		1.95	
15								2.09		
16			2.14	2.14	2.29			2.09		
17				2.14	2.28	2.07				1.95
18		2.16			2.36		2.05			1.91
19			2.14		2.38		2.06	2.09		
20		2.16				2.05			1.93	
21						2.05			1.91	
22		2.15						2.09		
23				2.14	2.15					
24		2.16		2.14	2.15	2.05				1.90
25			2.18				2.05	2.07		
26		2.15	2.18		2.13				1.90	
27			2.16			2.05	2.07		1.91	
28				2.12		2.06				
29		2.16						2.07	1.87	
30					2.13		2.08			
31					2.12					

SANTA CLARA CREEK NEAR CENTRAL, UTAH.

LOCATION.—In sec. 11, T. 39 S., R. 16 W., just above ford at R. H. Hunt's ranch about a mile southeast of Central, Washington County, on road to Pine Valley. Hunt's spring, which has fairly constant discharge of about 3 second-feet, enters 10 feet below gage.

DRAINAGE AREA.—84 square miles.

RECORDS AVAILABLE.—April 21, 1909, to September 30, 1918.

GAGE.—Vertical staff fastened to cottonwood tree on left bank about 20 feet above ford; read by R. H. Hunt. Datum of gage was raised 0.45 foot on January 20, 1910, 2.00 feet on February 22, 1916, and lowered 1.00 foot on August 12, 1918.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge.

CHANNEL AND CONTROL.—Bed consists of gravel and sand. Control is at a riffle formed by small boulders just below ford; shifts at intervals. Banks subject to overflow at extremely high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.04 feet at 2 p. m. March 12 (discharge, 832 second-feet); minimum stage recorded, 0.12 foot February 27 (discharge, 6 second-feet).

1909–1918: Maximum stage recorded, 5.00 feet at 11 a. m. October 6, 1916 (discharge from extension of rating curve, 1,450 second-feet); minimum discharge, 5 second-feet February 6–8 and September 10–17, 1914.

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

DIVERSIONS.—New Castle Reclamation Co. has constructed reservoir on Grass Valley Creek with capacity of 23,000 acre-feet. Water is diverted into the reservoir from Santa Clara Creek above town of Pine Valley and released into tunnel through rim of the Great Basin for irrigation of lands outside the Colorado River basin. Central canal diverts water about 2 miles above station for irrigation of lands near Central. This canal has been measured when it was carrying 16 second-feet.

REGULATION.—Flow affected by diversions noted above.

ACCURACY.—Stage-discharge relation changed by sudden flood on March 12. Rating curves fairly well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Santa Clara Creek near Central, Utah, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 15	W. E. Dickinson	0.33	13.0	Aug. 11	L. W. Jordan	0.02	11.0
Apr. 26	J. J. Sanford	.10	15.6	12	do	[a] 1.02	10.7

[a] Datum lowered 1.00 foot.

Daily discharge, in second-feet, of Santa Clara Creek near Central, Utah, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	13	11	9	9	8	6	29	25	16	12	13	13
2	13	11	8	9	7	6	27	29	16	15	12	13
3	13	11	9	9	7	6	26	39	16	14	12	13
4	12	11	12	9	8	6	24	52	16	13	13	130
5	12	11	11	9	8	6	24	52	16	12	13	24
6	12	11	11	9	8	13	24	43	15	12	14	14
7	12	11	10	9	8	8	24	39	16	39	14	12
8	12	10	9	8	7	251	24	33	15	14	14	11
9	12	10	10	8	8	31	24	31	14	14	14	12
10	13	10	8	8	8	28	24	29	14	19	14	13
11	13	10	11	8	7	26	27	27	14	18	17	13
12	13	10	10	8	8	663	29	26	14	19	11	14
13	13	10	8	8	8	149	29	26	15	35	13	14
14	13	10	8	7	8	88	29	26	15	26	13	13
15	13	9	9	7	9	60	27	29	22	21	12	13
16	13	9	9	8	8	50	26	31	22	18	12	13
17	13	9	9	8	8	43	22	29	21	14	11	13
18	13	9	9	8	7	39	22	27	18	14	11	13
19	13	9	9	7	8	37	16	27	19	21	11	14
20	13	9	9	7	8	37	16	27	19	21	11	14
21	13	9	8	7	8	36	16	26	16	15	11	14
22	13	9	9	7	11	36	15	26	14	14	12	29
23	13	9	10	8	12	35	14	27	13	14	12	19
24	13	9	9	8	8	35	13	26	11	14	12	13
25	13	9	10	8	7	33	13	24	12	12	12	12
26	12	9	10	8	6	31	16	22	11	12	13	11
27	13	9	10	8	6	29	12	22	12	11	13	11
28	12	8	9	7	6	29	11	21	11	11	13	11
29	12	8	9	7	.....	27	18	21	11	11	13	12
30	12	10	9	7	.....	27	22	18	13	12	13	12
31	12	.....	9	8	.....	29	.....	18	.....	13	13	.....

NOTE.—Discharge interpolated for occasional days when gage was not read.

Monthly discharge of Santa Clara Creek near Central, Utah, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	13	12	12.6	775
November	11	8	9.67	575
December	12	8	9.35	575
January	9	7	7.94	488
February	12	6	7.86	437
March	663	6	61.3	3,770
April	29	11	21.4	1,270
May	52	18	29.0	1,780
June	22	11	15.2	904
July	39	11	16.5	1,010
August	17	11	12.6	775
September	130	11	17.8	1,060
The year	663	6	18.6	13,400

GILA RIVER BASIN.

GILA RIVER AT GUTHRIE, ARIZ.

LOCATION.—In sec. 3, T. 6 S., R. 30 E., 1,500 feet above Arizona & New Mexico Railroad bridge at Guthrie, Greenlee County, and 8 miles above junction of Gila and San Francisco rivers.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 6, 1910, to July 11, 1918, when station was discontinued.

GAGE.—Stevens water-stage recorder on left bank, installed May 16, 1914, at datum different from that of inclined staff gage on right bank about 500 feet above railroad bridge, which was used prior to that date; inspected by A. O. Baker, Howard Sprouse, and Willard Marshall.

DISCHARGE MEASUREMENTS.—Made from cable 1,000 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and gravel; shifts slightly at low stages and considerably at high stages. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 5.7 feet 12.30 p. m. July 1 (discharge, 2,280 second-feet); minimum discharge, 24 second-feet, May 13, 15, and 26.

1910–1918: Maximum stage recorded, 14.7 feet morning of October 15, 1916 (discharge not determined); minimum discharge, 18 second-feet, May 21, 1914.

DIVERSIONS.—Sufficient water to irrigate about 7,000 acres of land is diverted from stream above station.

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve fairly well defined below 500 second-feet, poorly defined from 500 to 2,400 second-feet, and extended above 2,400 second-feet. Shifting-control method used during year. Operation of water-stage recorder satisfactory. Records fair.

Discharge measurements of Gila River at Guthrie, Ariz., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 24	J. B. Spiegel	1.50	42.5	Mar. 2	J. B. Spiegel	2.09	190
24	do	1.50	43.3	2	do	2.09	183
Nov. 27	do	1.70	73	May 1	do	1.28	24.2
27	do	1.70	70	1	do	1.28	25.4
Dec. 18	Ellsworth and Spiegel	1.75	91	24	do	1.28	26.5
18	do	1.75	91	24	do	1.28	25.5
Jan. 9	J. B. Spiegel	1.72	87	June 20	do	1.26	28.5
9	do	1.72	89	20	do	1.26	28.5
Feb. 6	do	1.76	102	July 11	do	1.61	25.4
6	do	1.76	99	11	do	1.61	25.6

Daily discharge, in second-feet, of Gila River at Guthrie, Ariz., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	50	48	76	81	110	94	94	25	28	480
2	50	48	76	81	108	185	90	25	27	315
3	50	50	78	84	102	225	80	27	27	122
4	48	49	78	83	104	225	74	28	27	80
5	42	50	78	81	104	219	67	27	26	61
6	42	53	76	81	100	237	67	28	31	48
7	41	53	73	83	100	246	64	27	28	37
8	38	54	76	83	90	240	60	26	28	49
9	41	56	74	87	89	228	54	27	29	31
10	41	56	76	94	97	231	50	27	29	31
11	40	60	78	94	100	225	45	27	28	26
12	41	62	80	95	102	216	42	25	28	.....
13	40	66	81	97	102	202	40	24	29	.....
14	36	69	81	102	97	188	34	26	28	.....
15	36	69	84	102	94	185	31	24	28	.....
16	40	71	84	98	90	182	30	25	28	.....
17	35	74	87	102	87	188	28	25	29	.....
18	32	74	90	102	89	195	30	27	28	.....
19	33	76	90	98	86	188	30	27	31	.....
20	38	74	87	102	81	168	31	27	30	.....
21	40	74	90	100	81	165	29	27	30	.....
22	44	77	87	97	77	160	31	28	30	.....
23	44	78	84	95	71	158	31	27	30	.....
24	44	73	87	92	69	154	31	25	31	.....
25	44	70	87	95	67	148	30	25	30	.....
26	43	71	86	94	69	138	29	24	30	.....
27	42	71	83	98	67	128	29	26	30	.....
28	43	72	83	98	70	116	29	27	30	.....
29	45	73	83	108	.....	100	25	27	30	.....
30	45	74	83	114	.....	94	25	27	35	.....
31	45	.....	81	114	.....	87	.....	29	.....	.....

Monthly discharge of Gila River at Guthrie, Ariz., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	50	32	41.7	2,560
November	78	48	64.8	3,860
December	90	73	81.8	5,030
January	114	81	94.7	5,820
February	110	67	89.4	4,960
March	246	87	178	10,900
April	94	25	44.3	2,640
May	29	24	26.3	1,620
June	35	26	29.1	1,730
July 1–11	480	26	116	2,530
The period	.....	.....	.....	41,600

GILA RIVER NEAR SOLOMONSVILLE, ARIZ.

LOCATION.—In NE. ¼ sec. 31, T. 6 S., R. 28 E., 1 mile below intake of Brown canal and 10 miles above Solomonsville, Graham County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 21, 1914, to September 30, 1918.

GAGE.—Stevens water-stage recorder on left bank, directly opposite J. W. Earven's ranch.

DISCHARGE MEASUREMENTS.—Made from cable just below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel, sand, and slit; shifts slightly at low stages and considerably at high stages. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 3.1 feet at 2.30 a. m. July 1 (discharge, 9,020 second-feet); minimum discharge, 75 second-feet, September 16–18, 29, and 30.

1914–1918: Maximum stage, determined from flood marks on gage, 14.0 feet January 19, 1916 (discharge, from extension of rating curve, about 100,000 second-feet); minimum discharge, 64 second-feet, June 29, 1914.

DIVERSIONS.—Brown canal, which irrigates a few hundred acres on north side of river, heads 1 mile above this station and below station near Guthrie; maximum capacity of canal about 35 second-feet.

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve fairly well defined below 10,000 second-feet and poorly defined above. Shifting-control method used during year. Operation of water-stage recorder fairly satisfactory, except for periods indicated in footnote to daily-discharge table. Records fair.

Discharge measurements of Gila River near Solomonsville, Ariz., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 2	J. B. Spiegel	1.01	118	Mar. 19	J. B. Spiegel	1.55	344
2	do	1.01	121	Apr. 25	do	1.03	134
Dec. 6	do	1.14	170	25	do	1.03	132
6	do	1.15	173	June 10	H. D. Empie	.86	86
19	Ellsworth and Spiegel	1.17	174	10	J. B. Spiegel	.86	84
28	J. B. Spiegel	1.14	167	July 6	do	.90	114
Jan. 31	do	1.32	256	6	do	.90	110
31	do	1.32	235	Aug. 2	H. D. Empie	.98	131
Feb. 21	do	1.16	175	2	do	.96	129
21	do	1.16	178	Sept. 1	do	.90	99
Mar. 19	do	1.55	352				

Daily discharge, in second-feet, of Gila River near Solomonsville, Ariz., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	126	117	161	174	245	427	228	122	89	1,110	132	101
2	126	119	161	174	234	436	234	119	88	211	122	106
3	122	122	166	174	228	490	222	117	86	146	122	106
4	119	122	166	178	222	418	222	143	86	140	104	99
5	117	126	166	174	217	392	211	150	84	146	93	94
6	112	126	166	174	217	368	200	143	82	114	454	91
7	112	126	161	174	211	392	200	140	88	206	664	88
8	112	126	161	166	200	409	196	132	86	183	490	82
9	109	126	161	166	196	400	191	126	88	170	}	82
10	109	129	166	191	200	532	174	119	86	150	}	84
11	106	129	161	187	200	553	170	112	82	136	} 400	88
12	106	132	161	187	206	472	170	112	79	126	}	84
13	106	132	161	196	200	400	166	109	78	146	}	78
14	104	136	161	211	196	392	161	106	77	126	}	77
15	101	136	166	211	187	445	161	104	78	119	}	76
16	99	140	170	200	178	376	157	94	81	122	150	75
17	101	140	174	191	183	376	150	94	84	119	}	75
18	101	143	178	196	187	352	146	94	81	117	}	75
19	101	143	178	200	187	336	143	96	81	117	}	77
20	96	146	178	196	178	328	143	96	99	114	}	101
21	112	146	178	183	170	328	140	96	99	143	}	84
22	112	150	178	183	170	320	136	94	187	143	}	114
23	114	150	183	174	161	307	146	93	222	150	}	94
24	114	150	187	166	150	294	140	93	166	146	} 120	86
25	114	154	191	183	150	281	132	89	120	143	}	81
26	114	154	183	196	150	275	132	89	100	143	}	78
27	112	157	174	250	170	256	126	91	95	140	}	78
28	112	157	170	281	250	239	122	93	95	146	}	77
29	112	157	174	262	.....	239	122	91	94	336	}	75
30	114	161	174	250	.....	239	122	89	106	256	}	75
31	117	.....	174	245	.....	228	.....	91	.....	234	}	.....

NOTE.—Braced figures show mean discharge for periods indicated; estimated from comparison with flow at other stations in basin. No record Nov. 7 to Dec. 5; discharge interpolated. Discharge estimated June 25–28.

Monthly discharge of Gila River near Solomonsville, Ariz., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	126	96	111	6,830
November	161	117	138	8,210
December	191	161	171	10,500
January	281	166	197	12,100
February	250	150	194	10,800
March	490	228	365	22,400
April	234	122	165	9,820
May	150	89	108	6,640
June	222	77	98.9	5,880
July	1,110	114	187	11,500
August	664	.....	224	13,800
September	114	75	86.0	5,120
The year	1,110	75	171	124,000

GILA RIVER NEAR SAN CARLOS, ARIZ.

LOCATION.—One mile above dam site in box canyon on San Carlos Indian Reservation and 6 miles below San Carlos Indian Agency, Gila County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 29, 1914, to September 30, 1918, at present site; July 11, 1899, to Nov. 27, 1905, at point half a mile south of Indian Agency at San Carlos and below San Carlos River; August 17, 1910, to February 5, 1911, at point just below Arizona Eastern Railroad bridge and half a mile above San Carlos River.

GAGE.—Stevens water-stage recorder on left bank 1 mile above dam site.

DISCHARGE MEASUREMENTS.—Made from cable 1 mile above gage or by wading near gage.

CHANNEL AND CONTROL.—Bed consists of sand, gravel, and boulders; shifting. Control afforded by rapids over heavy boulders just below gage; shifts somewhat because of sand filling in and washing out between boulders.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water stage recorder, 8.84 feet at 9 p. m. August 6 (discharge, 8,630 second-feet); minimum stage, from water-stage recorder, 0.26 foot June 12–14 (discharge, 3 second-feet).

1914–1918: Maximum stage, 25.5 feet January 20, 1916 (discharge, from extension of rating curve, about 92,000 second-feet); minimum stage, 0.15 foot July 1, 1914 (discharge, 1 second-foot).

DIVERSIONS.—Water for irrigating about 30,000 acres is diverted from river in valley just above station. About 7,000 acres is irrigated from this stream above station at Guthrie.

ACCURACY.—Stage-discharge relation continually changing. Standard rating curve fairly well defined below 14,000 second-feet and poorly defined above. Shifting-control method used during year. Operation of water-stage recorder reasonably satisfactory except as indicated in footnote to daily-discharge table. Records fair.

Discharge measurements of Gila River near San Carlos, Ariz., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 19	J. B. Spiegel	0.60	26.8	Mar. 29	J. B. Spiegel	1.38	87
19	do	.60	28.2	29	do	1.38	86
Nov. 13	do	.93	53	Apr. 19	do	.84	32.9
13	do	.93	50	19	do	.84	34.0
Dec. 14	Ellsworth and Spiegel	1.17	81	June 4	do	.30	5.9
14	do	1.18	90	4	do	.30	6.7
Jan. 29	J. B. Spiegel	2.11	301	25	do	1.08	40.2
29	do	2.12	296	25	do	1.08	39.5
Feb. 19	do	1.62	185	July 9	do	1.10	22.1
19	do	1.62	173	9	do	1.10	22.4
Mar. 15	do	2.47	324	27	C. E. Ellsworth	1.67	27.2
15	do	2.46	316	27	do	1.67	26.7

Daily discharge, in second-feet, of Gila River near San Carlos, Ariz., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	24	38	53	154	295	425	66	22	6	3	22	
2	24	38	60	154	290	277	62	18	6	9	18	
3	25	37	65	148	290	277	57	17	6	386	14	
4	25	37	72	152	279	316	52	20	6	259	13	
5	27	38	70	148	272	311	49	20	5	135	12	
6	24	42	69	143	261	272	47	20	4	86	1,040	
7	24	46	61	140	237	256	46	20	4	104	1,540	
8	24	50	62	154	225	285	45	19	4	103	860	
9	24	50	71	161	208	878	45	17	4	19	890	
10	24	49	82	161	204	482	42	18	4	9	650	
11	27	51	90	150	197	345	42	18	4	10	342	
12	27	50	89	154	208	322	40	19	3	104	282	
13	27	51	87	181	214	631	39	20	3	154	482	
14	27	52	87	193	204	514	38	18	3	112	436	
15	27	53	94	193	185	330	38	16	6	103	436	
16	28	55	97	193	165	232	38	15	94	91		25
17	28	48	96	183	152	210	36	14	24	84		
18	28	43	105	183	145	187	34	13	14	73		
19	28	44	112	185	179	181	34	13	10	65		
20	28	44	108	187	189	277	32	13	10	58		
21	32	44	108	197	183	232	31	12	12	52		
22	33	45	110	197	169	202	30	13	67	46		
23	32	47	112	193	150	169	28	13	463	41		
24	29	46	111	204	143	147	27	12	90	37	200	
25	29	45	122	228	150	130	26	11	42	33		
26	30	48	133	259	171	120	24	10	26	30		
27	29	51	142	295	314	108	24	10	16	27		
28	30	49	143	282	593	100	23	10	9	27		
29	30	46	142	292	.....	86	23	10	5	26		
30	31	48	138	316	.....	77	24	8	3	25		
31	36	.....	143	308	.....	70	.....	6	.....	24		.....

NOTE.—Braced figures show mean discharge for periods indicated, for which no records are available estimated from comparison with flow at other stations in basin.

Monthly discharge of Gila River near San Carlos, Ariz., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	36	24	27.8	1,710
November	55	37	46.2	2,750
December	143	53	97.9	6,020
January	316	140	196	12,100
February	593	143	224	12,400
March	878	70	273	16,800
April	66	23	38.1	2,270
May	22	6	15.0	922
June	463	3	31.8	1,890
July	386	3	75.3	4,630
August	1,540	.....	330	20,300
September	.....	.....	25	1,490
The year	1,540	.....	115	83,300

GILA RIVER AT WINKELMAN, ARIZ.

LOCATION.—In NE. ¼ sec. 24, T. 5 S., R. 15 E., at highway bridge at Winkelman, Gila County, 1 mile above San Pedro River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 10, 1917, to June 27, 1918, when station was discontinued.

GAGE.—Chain gage attached to upstream side of bridge; read by S. H. Snider.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading near bridge.

CHANNEL AND CONTROL.—Bed composed of silt, sand and gravel; shifts frequently. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum discharge during year 527 second-feet March 10; minimum stage recorded, 2.86 feet at 9 a. m. June 16 (discharge, 10 second-feet).

DIVERSIONS.—About 30,000 acres is irrigated from this stream between this station and the station at Guthrie, and about 7,000 acres above Guthrie.

ACCURACY.—Stage-discharge relation changed frequently during period covered by records. Rating curves fairly well defined below 600 second-feet. Gage read to hundredths once daily. Daily discharge determined by applying daily gage height to rating table. Records fair.

Discharge measurements of Gila River at Winkelman, Ariz., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 14	C. E. Ellsworth	3.38	62	Apr. 18	J. B. Spiegel	3.44	61
14	do	3.38	59	18	do	3.44	53
Dec. 7	do	3.38	80	29	C. E. Ellsworth	3.34	38.4
Jan. 18	J. B. Spiegel	3.82	205	29	do	3.34	36.0
18	do	3.80	192	May 22	do	3.03	18.0
Feb. 28	Frank Asplind	4.44	435	June 27	Ellsworth and Slonaker	3.21	38.6
Mar. 30	J. B. Spiegel	3.67	110	27	do	3.23	40.8
30	do	3.69	105				

Daily discharge, in second-feet, of Gila River at Winkelman, Ariz., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	30	48	56	140	318	417	127	40	22
2	42	51	58	157	307	384	94	42	22
3	30	51	53	140	307	326	97	43	22
4	30	48	58	148	307	364	97	43	21
5	30	48	82	140	318	380	85	43	21
6	30	51	84	134	299	356	89	43	20
7	30	51	72	134	262	353	87	43	19
8	30	54	72	134	227	337	79	43	18
9	30	54	70	140	238	405	76	43	18
10	29	54	89	169	227	527	68	36	18
11	28	56	93	148	210	417	85	28	18
12	30	78	102	140	227	413	57		18
13	30	61	89	169	224	426	85		18
14	32	61	89	201	194	460	64		15
15	31	61	89	210	191	376	66	30	12
16	34	59	107	217	178	307	57		10
17	34	59	102	194	183	299	66		100
18	32	59	93	210	188	460	57		48
19	32	51	112	204	191	292	59	34	30
20	34	50	112	210	214	288	48	29	28
21	37	50	107	217	224	277	50	24	24
22	34	51	107	227	227	234	48	20	80
23	40	50	102	227	191	214	48	22	505
24	41	51	107	227	182	160	64	24	496
25	37	51	107	252	182	151	57	24	64
26	37	53	118	280	210	143	55	23	42
27	34	58	129	409	280	131	57	23	37
28	40	61	140	326	280	123	57	23	.....
29	41	58	140	310	.....	123	42	23	.....
30	41	59	134	307	.....	116	41	22	.....
31	45	.....	134	329	.....	114	.....	22	.....

NOTE.—Braced figure shows mean discharge for period indicated; estimated from comparison with flow at other stations in basin. No gage height, Nov. 17, 20, Feb. 17, May 2, 4, 6, 8, 10, 20, 21, 23, 25, 27–31, June 1, 3, 4, 6–8, 10–12, 14, 15, 17, and 22; discharge estimated or interpolated.

Monthly discharge of Gila River at Winkelman, Ariz., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	45	28	34.0	2,090
November	78	48	54.9	3,270
December	140	53	97.0	5,960
January	409	134	208	12,800
February	318	178	235	13,100
March	527	114	302	18,600
April	127	41	68.7	4,090
May	43	20	31.3	1,920
June 1–27	505	10	64.7	3,460
The period	.....	.....	.....	65,300

GILA RIVER AT KELVIN, ARIZ.

LOCATION.—In sec. 12, T. 4 S., R. 13 E., half a mile below mouth of Mineral Creek, 1 mile below Kelvin,[1] Pinal County, and 25 miles above Florence.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 26, 1911, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder installed June 15, 1914, on left bank half a mile above original gage and referred to new datum. Original gage, an inclined staff fastened to basalt ledge on right bank opposite observer's house. For description of various gages used see Water-Supply Paper 459.

DISCHARGE MEASUREMENTS.—Made from suspension footbridge 1½ miles above gage or by wading near gage.

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

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 7.9 feet at 11 p. m. August 6 (discharge, 15,100 second-feet); minimum stage, from water-stage recorder, 1.77 feet at 2 p. m. September 18 (discharge, 3.5 second-feet).

1911–1918: Maximum stage, 19.5 feet about noon January 20, 1916, determined from flood marks (discharge, from extension of rating curve, about 93,000 second-feet); no flow June 29 to July 11, 1913.

DIVERSIONS.—About 30,000 acres is irrigated from this stream between this station and Guthrie, and about 7,000 acres above Guthrie.

ACCURACY.—Stage-discharge relation continually changing. Standard rating curve fairly well defined below 30,000 second-feet; poorly defined above. High-water discharge measurements subject to considerable error due to impossibility of obtaining accurate soundings. Shifting-control method used during year. Operation of water-stage recorder satisfactory except during March when staff gage was used. Records fair.

Discharge measurements of Gila River at Kelvin, Ariz., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 2	L. N. Morscher	1.86	43.5	Apr. 1	J. B. Spiegel	2.18	118
27	do	1.87	45.1	1	do	2.18	114
Nov. 3	do	1.98	54	17	do	2.05	66
3	do	1.98	58	17	do	2.05	68
13	C. E. Ellsworth	2.08	59	29	C. E. Ellsworth	1.99	40.5
13	do	2.08	66	May 21	do	1.91	18.6
Dec. 6	do	2.20	88	22	do	1.91	19.6
6	do	2.20	88	June 27	Ellsworth and Slonaker	1.89	39.7
Jan. 12	J. B. Spiegel	2.42	175	27	do	1.88	36.7
12	do	2.41	170	July 10	C. E. Ellsworth	2.12	81
27	C. E. Ellsworth	3.10	870	Aug. 8	do	3.49	1,200
28	do	2.80	544	9	do	3.18	882
Feb. 27	Frank Asplind	2.68	477	Sept. 26	do	1.89	8.5

[1] Ray Junction on Arizona & Eastern Railroad.

Daily discharge, in second-feet, of Gila River at Kelvin, Ariz., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	38	39	58	150	300	2,020	110	48	35	12	14	106
2	39	38	60	174	293	1,220	106	48	34	12	10	80
3	39	44	74	186	286	825	106	48	32	343	9	174
4	38	52	76	178	279	605	102	48	30	343	15	102
5	39	42	80	170	272	825	99	48	27	160	194	106
6	39	46	86	166	272	950	96	48	23	102	4,340	52
7	40	48	80	166	265	825	89	48	23	116	5,340	35
8	40	56	72	170	259	710	92	45	20	116	1,580	30
9	38	56	80	178	254	2,200	92	43	19	152	950	18
10	37	62	89	194	254	2,020	92	43	18	120	1,190	13
11	37	68	107	182	248	950	82	41	15	82	535	8
12	39	70	110	174	248	1,080	77	41	13	78	351	6
13	44	66	114	235	214	1,080	74	41	14	170	433	5
14	48	56	107	294	208	2,020	74	41	14	110	469	5
15	50	56	107	272	203	1,480	74	41	14	63	515	4
16	52	58	114	254	198	950	72	41	113	52	585	4
17	54	60	122	231	198	605	69	41	124	41	535	4
18	54	58	118	236	198	510	69	41	85	23	433	4
19	50	52	126	248	214	415	69	41	72	13	359	15
20	48	48	134	248	248	415	63	41	63	9	272	27
21	44	48	130	248	293	485	58	35	61	6	225	15
22	42	52	126	265	343	555	58	35	92	5	189	8
23	40	56	122	300	343	415	58	35	383	4	214	8
24	40	62	118	307	314	335	58	34	170	6	328	7
25	44	66	114	383	335	265	54	34	77	16	184	8
26	42	66	134	689	424	335	54	37	52	32	144	9
27	42	66	150	976	545	208	48	37	41	41	113	8
28	44	70	166	505	814	160	45	37	20	23	99	7
29	42	70	166	343	.....	160	43	37	16	13	74	8
30	40	60	150	314	.....	160	43	35	14	10	61	9
31	40	.....	146	314	.....	160	.....	35	.....	12	56	.....

NOTE.—Discharge estimated or interpolated Mar. 15, 18, 21, 30, June 29, 30, July 1, and 2.

Monthly discharge of Gila River at Kelvin, Ariz., for the year ending Sept. 30. 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	54	37	42.7	2,630
November	70	38	56.4	3,360
December	166	58	111	6,830
January	976	150	282	17,300
February	814	198	297	16,500
March	2,200	160	805	49,500
April	110	43	74.2	4,420
May	48	34	40.9	2,510
June	383	13	57.1	3,400
July	343	4	73.7	4,530
August	5,340	9	639	39,300
September	174	4	29.5	1,760
The year	5,340	4	210	152,000

SAN FRANCISCO RIVER AT CLIFTON, ARIZ.

LOCATION.—In sec. 30, T. 4 S., R. 30 E., between highway bridge and railroad bridge at Clifton, Greenlee County, 1½ miles below diversion dam of Arizona Copper Co., and 5 miles above junction with Gila River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 24, 1910, to January 14, 1911; January 24 to March 31, 1912; August 5, 1912, to July 12, 1918, when station was discontinued.

GAGE.—Stevens continuous water-stage recorder with inclined well on right bank about 1,000 feet below highway bridge, installed June 11, 1916, at datum different from previous gages. For description of previous gages see Water-Supply Paper 459.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—Banks high and steep and not subject to overflow except at extreme floods. Bed composed of sand and gravel; fairly permanent except during high water. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage during year not determined; minimum stage recorded, 2.7 feet June 14 and 16 (discharge, 33 second-feet).

1910–1918: Maximum stage recorded, 19.7 feet October 14, 1916 (discharge not determined); minimum stage recorded, 2.2 feet June 29, 1917 (discharge, about 2 second-feet).

DIVERSIONS.—Small amount of water is used for irrigation above station.

ACCURACY.—Stage-discharge relation not changed during year. Rating curve well defined. Operation of water-stage recorder fairly satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting gage-height graph. Records good, except for estimated periods.

Discharge measurements of San Francisco River at Clifton, Ariz., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 23	J. B. Spiegel	2.90	55	Feb. 5	J. B. Spiegel	3.09	80
23	do	2.89	52	Mar. 1	do	3.70	258
Nov. 26	do	2.95	66	1	do	3.70	253
26	do	2.95	67	Apr. 30	do	2.90	55
Dec. 17	Ellsworth and Spiegel	2.98	66	30	do	2.90	59
17	do	2.98	76	May 21	do	2.80	43.5
Jan. 8	J. B. Spiegel	3.00	71	21	do	2.80	44.3
8	do	3.00	74	July 12	do	3.10	87
Feb. 5	do	3.09	87	12	do	3.08	82

Daily discharge, in second-feet, of San Francisco River at Clifton, Ariz., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	74	50	68	72	90	238	94	57	a 44	b 400
2	74	50	68	a 72	90	238	90	57	a 44	b 150
3	74	57	72	72	90	188	90	72	a 44	b 100
4	74	64	a 66	72	90	174	90	90	a 44	72
5	72	64	60	72	88	160	90	90	a 44	a 81
6	a 63	68	68	a 72	90	147	90	90	44	a 91
7	a 54	68	a 68	72	90	147	90	81	a 44	a 100
8	44	68	a 68	72	90	152	90	70	44	110
9	44	64	a 68	72	90	160	90	66	a 44	90
10	44	64	68	72	90	147	88	66	a 44	90
11	44	64	68	72	90	139	86	58	a 44	a 89
12	a 44	64	a 68	72	90	134	85	57	44	88
13	a 44	68	a 68	72	90	134	83	56	a 38	.....
14	44	64	a 68	72	90	122	85	53	33	.....
15	44	57	a 69	72	90	122	81	50	a 33	.....
16	44	62	a 69	70	90	134	77	44	33	.....
17	a 44	64	69	70	90	110	77	44	a 67	.....
18	44	64	69	69	90	110	76	44	a 100	.....
19	44	57	70	69	90	110	74	44	134	.....
20	44	57	68	69	90	110	72	44	134	.....
21	44	a 57	69	70	90	110	69	44	86	.....
22	53	57	a 70	72	90	110	69	44	134	.....
23	50	62	72	72	90	110	68	a 44	a 112	.....
24	a 50	64	72	72	90	106	66	a 44	90	.....
25	50	a 64	a 71	74	90	100	64	a 44	a 90	.....
26	50	64	70	79	90	100	63	44	90	.....
27	50	68	a 71	83	90	100	62	44	b 80	.....
28	50	68	72	110	160	100	58	44	b 70	.....
29	50	a 68	72	b 100	.....	100	57	44	b 60	.....
30	53	68	72	b 100	.....	100	57	44	b 70	.....
31	53	.....	a 72	90	.....	100	.....	44	.....	.....

a Interpolated.
b Estimated from flow of Gila River at Guthrie and Solomonsville.

Monthly discharge of San Francisco River at Clifton, Ariz., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	74	44	51.9	3,190
November	68	50	62.6	3,720
December	72	60	69.1	4,250
January	110	69	75.8	4,660
February	160	88	92.4	5,130
March	238	100	133	8,180
April	94	57	77.7	4,620
May	90	44	55.4	3,410
June	134	33	66.1	3,930
July 1–12	400	72	122	2,900
The period				44,000

SAN PEDRO RIVER NEAR FAIRBANK, ARIZ.

LOCATION.—Opposite Boquillas Land & Cattle Co.'s ranch house, 1½ miles southeast of Fairbank, Cochise County, 3 miles below old Charleston mill.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 28, 1912, to September 30, 1918. January 27, 1904, to August 31, 1906, and October 18, 1910, to November 15, 1911, for station at Charleston; November 15, 1911, to September 28, 1912, for station at diversion dam of Boquillas Land & Cattle Co.

GAGE.—Vertical and inclined staff on right bank; read by J. M. Barnes. Original gage, a vertical staff on right bank about 800 feet below present gage, was destroyed by flood on August 17, 1914, and replaced at same datum August 24, 1914; second gage was washed out on December 23, 1914, and replaced by present gage on January 21, 1915, at different datum.

DISCHARGE MEASUREMENTS.—Made from cable 600 feet below gage or by wading near gage.

CHANNEL AND CONTROL.—Bed composed of sand, gravel, and clay; shifts slightly during low stages and considerably at high stages.

EXTREMES OF DISCHARGE.—Maximum stage during year, 4.15 feet during night of June 20, determined from flood marks on gage (discharge, 3,610 second-feet); minimum discharge, 1 second-foot, June 13–14 and September 26–28.

1912–1918: Maximum stage recorded, 16.0 feet at 5 p. m. December 22, 1915 (discharge not determined); minimum discharge occurred in 1918.

DIVERSIONS.—Boquillas Land & Cattle Co. divert water at various points above station for irrigation. Total area irrigated not known.

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve fairly well defined below 1,800 second-feet. Gage read to half-tenths once daily, except during flood periods, when it was read oftener. Daily discharge ascertained by shifting-control method. Records good.

Discharge measurements of San Pedro River near Fairbank, Ariz., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 22	J. B. Spiegel	0.33	13.1	Jan. 23	J. B. Spiegel	0.30	12.9
22	do	.33	12.2	Apr. 27	C. E. Ellsworth	.07	2.5
Jan. 23	do	.30	13.0				

Daily discharge, in second-feet, of San Pedro River near Fairbank, Ariz., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	12	7	12	12	16	a15	7	2	2	920	16	10
2	10	7	12	12	12	20	7	2	2	920	10	10
3	10	7	12	12	12	20	7	3	2	164	5	12
4	10	7	12	12	12	16	7	3	2	133	372	2
5	10	7	12	12	12	16	7	3	2	73	105	2
6	10	12	12	12	10	16	7	3	2	133	356	2
7	10	12	12	12	10	12	7	3	2	92	64	105
8	7	12	12	16	10	12	7	3	2	82	239	36
9	7	10	12	16	10	10	7	3	2	383	133	2
10	5	10	12	16	10	10	5	3	2	64	36	2
11	5	10	12	16	10	10	5	3	2	48	10	2
12	5	12	12	16	a15	10	5	3	2	48	48	2
13	5	12	12	16	12	10	7	3	1	105	36	2
14	5	12	12	16	12	10	10	3	1	56	10	2
15	5	12	12	16	10	a10	2	3	270	48	7	2
16	5	12	12	20	10	7	2	2	22	36	7	2
17	5	12	12	12	10	7	2	2	7	25	5	2
18	5	12	12	12	7	7	2	2	8	20	7	2
19	7	12	12	12	7	7	2	2	8	20	8	2
20	7	12	12	12	7	7	2	2	118	20	10	2
21	10	12	12	12	7	7	2	2	188	16	452	2
22	10	12	12	12	7	7	2	2	48	12	260	2
23	10	12	12	12	a7	7	2	2	164	10	10	2
24	7	12	12	12	a7	7	2	2	105	10	383	2
25	7	12	12	12	7	7	2	2	64	7	28	2
26	7	12	12	12	7	7	2	2	36	7	6	1
27	7	12	12	16	a10	7	2	2	25	7	5	1
28	7	12	12	16	a10	7	2	2	25	40	10	1
29	7	12	12	20	.....	7	3	2	177	25	10	2
30	7	12	12	20	.....	7	3	2	331	20	10	2
31	7	.....	12	16	.....	7	.....	2	.....	16	10	.....

a No record; discharge estimated from flow of adjacent streams.

Monthly discharge of San Pedro River near Fairbank, Ariz., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	12	5	7.5	461
November	12	7	11.0	655
December	12	12	12.0	738
January	20	12	14.2	873
February	16	7	9.9	550
March	20	7	10.0	615
April	10	2	4.3	256
May	3	2	2.4	149
June	331	1	54.1	3,220
July	920	7	115	7,070
August	452	5	86.1	5,290
September	105	1	7.3	434
The year	920	1	28.0	20,300

QUEEN CREEK NEAR SUPERIOR, ARIZ.

LOCATION.—One mile below dam site near Whitlow's ranch and 12 miles below Superior, Pinal County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—February 14, 1915, to September 30, 1918. A station was operated at Whitlow's ranch during 1896 and fragmentary records of stage and flood occurrence kept during 1897 to 1899. Total run-off, January, 1896, to August 11, 1899, published in Twenty-first Annual Report, Part IV.

GAGE.—Inclined staff on left bank 1 mile below dam site, installed September 15, 1916; read by W. C. Mullins and Hart Mullins. Original gage was vertical staff painted on rock ledge on right bank at lower end of box canyon about 500 feet above Whitlow's ranch house, installed February 14, 1915. For description of succeeding gages, see Water-Supply Paper 459.

DISCHARGE MEASUREMENTS.—Made from cable at dam site or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and gravel which is constantly shifting. No well-defined control. Left bank subject to overflow at extremely high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.0 feet at 10.30 a. m. August 6 (discharge, about 5,000 second-feet); channel dry for long periods during year. Floods with considerable greater discharge have occurred during previous years, but no reliable record is available showing maximum stage or discharge. Channel at present gage is dry for considerable period each year; at dam site 1 mile above gage, discharge seldom, if ever, is less than about 1 second-foot.

DIVERSIONS.—Water diverted above gage to irrigate a few acres; amount unknown.

ACCURACY.—Stage-discharge relation not permanent. Rating curve poorly defined. Gage read to half-tenths or hundredths twice daily. Daily discharge not accurate enough to publish. Monthly estimates poor but show the deficiency of water.

Discharge measurements of Queen Creek near Superior, Ariz., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Aug. 7	C. E. Ellsworth	0.50	0.5	Aug. 9	C. E. Ellsworth	0.98	10.7
8	Hart Mullins	1.0	14.5				

Monthly discharge of Queen Creek near Superior, Ariz., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet (mean).	Run-off in acre-feet.	Month.	Discharge in second-feet (mean).	Run-off in acre-feet.
October	0	0	May	0	0
November	0	0	June	0	0
December	0	0	July	0	0
January	.6	36.9	August	24.7	1,520
February	1.1	61.1	September	0	0
March	5.5	338			
April	1.6	95.2	The year	2.84	2,050

SANTA CRUZ RIVER NEAR NOGALES, ARIZ.

LOCATION.—In SW. ¼ sec. 36, T. 23 S., R. 14 E., just below proposed dam site at Yerba Buena ranch, half a mile above city pumping plant, and 7 miles northeast of Nogales, Pima County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 22 to November 30, 1907, and April 1, 1909, to September 30, 1918 (incomplete).

GAGE.—Richard Frères' water-stage recorder on left bank about half a mile above city pumping plant installed January 3, 1916; inspected by W. W. Coons. Original gage, a vertical staff on right bank about 500 feet below the intake of a small irrigation ditch and about one-fourth mile above the present gage. For description of succeeding gages, see Water-Supply Paper 459.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed composed of sand and gravel, which is constantly shifting. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 2.1 feet from noon to 4 p. m. August 7 (discharge, 142 second-feet). No reliable records of maximum floods during previous years. Channel is generally dry during part of each year.

DIVERSIONS.—Water is diverted above station for irrigation of about 140 acres.

ACCURACY.—Stage-discharge relation continually changing. Standard rating curve defined by 19 discharge measurements made during year from which the changes in stage-discharge relation were determined with fair accuracy for low stages. Changes during high stages not well defined. Water-stage recorder was not sensitive and gage heights are subject to errors as great as 0.05 foot at any time. Daily discharge ascertained by shifting-control method. Records fair for low stages and poor for high stages.

Discharge measurements of Santa Cruz River near Nogales, Ariz., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 21	W. W. Coons	1.31	5.8	Jan. 31	W. W. Coons	1.48	29.0
22	.....do	1.35	6.4	Feb. 15	.....do	1.45	10.6
31	.....do	1.36	8.3	23	.....do	1.45	10.9
Nov. 9	.....do	1.38	10.4	28	.....do	1.50	31.4
19	.....do	1.40	12.8	Mar. 8	.....do	1.45	8.0
30	.....do	1.38	11.9	22	.....do	1.43	2.5
Dec. 7	.....do	1.35	11.6	29	.....do	1.40	1.2
21	.....do	1.35	6.6	Apr. 5	.....do	1.40	2.4
Jan. 4	.....do	1.35	5.0	19	.....do	1.40	1.4
18	.....do	1.37	9.0	25	C. E. Ellsworth	1.29	.5

Daily discharge, in second-feet, of Santa Cruz River near Nogales, Ariz., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Aug.
1	a 15	6	12	5	30	28	2	1	.....
2	a 13	7	11	5	28	25	2	.....	.....
3	a 11	8	11	5	25	23	2	.....	.....
4	a 10	9	11	5	24	19	2	.....	.....
5	9	11	12	5	22	16	2	.....	.....
6	8	11	11	5	20	13	2	.....	.....
7	8	11	11	6	18	11	2	.....	40
8	7	10	11	7	17	8	2	.....	31
9	7	10	11	7	16	8	2	.....	21
10	7	10	10	8	15	8	3	.....	11
11	6	10	10	9	14	7	2	.....	9
12	6	10	10	10	14	7	2	.....	a9
13	7	11	9	10	13	6	2	.....	a9
14	8	11	9	10	12	6	2	.....	a9
15	7	11	9	10	11	5	2	.....	a9
16	7	11	8	11	11	4	2	.....	9
17	7	11	8	10	11	4	2	.....	8
18	6	11	8	9	11	4	2	.....	8
19	5	11	7	9	11	3	1	.....	8
20	5	12	7	10	10	3	1	.....	8
21	6	13	7	10	10	2	1	.....	8
22	6	13	7	10	9	2	2	.....	7
23	6	13	7	11	9	2	1	.....	7
24	6	13	6	11	11	2	.8	.....	7
25	7	13	6	11	14	2	1	.....	7
26	6	13	6	12	18	2	2	.....	5
27	5	13	5	35	21	2	2	.....	4
28	5	13	5	60	29	1	2	.....	2
29	5	13	5	43	.....	1	2	.....	2
30	6	12	5	32	.....	1	2	.....	1
31	6	.....	5	31	.....	2	.....	.....	.7

a Interpolated.

NOTE.—No record May 2-9; mean discharge estimated as 0.2 second-foot. No flow May 10 to Aug. 6 and Sept. 1-30.

Monthly discharge of Santa Cruz River near Nogales, Ariz., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	15	5	7.2	443
November	13	6	11.0	655
December	12	5	8.4	516
January	60	5	13.6	836
February	30	9	16.2	900
March	28	1	7.3	449
April	3	.8	1.83	109
May	1	0	.084	5.2
June	0	0	0	0
July	0	0	0	0
August	40	0	7.73	475
September	0	0	0	0
The year	60	0	6.07	4,390

SANTA CRUZ RIVER AT TUCSON, ARIZ.

LOCATION.—In sec. 13, T. 14 S., R. 13 E., at Congress Street Bridge in Tucson, Pima County.

RECORDS AVAILABLE.—October 15, 1905, to September 30, 1918 (incomplete).

DRAINAGE AREA.—Not measured.

GAGE.—Staff on bridge pier installed September 7, 1916. Original gage painted on bridge pier on left bank. For description of succeeding gages see Water-Supply Paper 459.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of sand which is constantly shifting.

EXTREMES OF DISCHARGE.—1905–1918: Maximum stage recorded, 9.8 feet December 24, 1914 (discharge, about 9,000 second-feet). No flow part of each year.

DIVERSIONS.—Flood water is diverted above station for irrigation; amount unknown.

ACCURACY.—Stage-discharge relation constantly changing. Gage read to half-tenths several times daily during periods of flow. Daily discharge computed by shifting-control method.

COOPERATION.—Daily-discharge record furnished by University of Arizona through G. E. P. Smith, irrigation engineer.

Discharge measurements of Santa Cruz River at Tucson, Ariz., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 28	F. C. Kelton	4.5	40	Aug. 7	A. L. Sionaker	5.1	295
Mar. 1	do	3.95	8.3	7	do	4.72	112
July 9	A. L. Sionaker	4.45	215	8	do	5.82	1,040
9	do	4.1	51.0	8	do	5.25	385
10	do	3.8	9.41	9	do	4.4	2.23
Aug. 7	do	5.85	1,060	13	do	4.35	1.2

Daily discharge, in second-feet, of Santa Cruz River at Tucson, Ariz., for the year ending Sept. 30, 1918.

Day.	Feb.	Mar.	June.	July.	Aug.	Day.	Feb.	Mar.	June.	July.	Aug.
1		7.0				16					
2						17					
3					1.9	18					
					1.2	19					
5						20					
6				2.2	.6	21					
7					788	22					
8					1,490	23				2.2	
9				104	9.4	24				.4	
10				3.9		25					6.5
11						26					14
12						27					
13					1.0	28	16				
14						29					
15						30			39		
						31					

NOTE.—No flow except where discharge is given.

Monthly discharge of Santa Cruz River at Tucson, Ariz., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	0	0	0	0
November	0	0	0	0
December	0	0	0	0
January	0	0	0	0
February	16	0	.6	33 3
March	7	0	.2	12 3
April	0	0	0	0
May	0	0	0	0
June	39	0	1.3	77.4
July	104	0	3 64	224
August	1,490	0	74.6	4,590
September	0	0	0	0
The year	1,490	0	6.81	4,940

RILLITO CREEK NEAR TUCSON, ARIZ.

LOCATION.—In sec. 23, T. 13 S., R. 13 E., at highway bridge on Oracle Road, 4 miles north of Tucson, Pima County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 12, 1911, to September 30, 1918 (incomplete).

GAGE.—Staff painted on bridge pier. A Richard Frères' water-stage recorder attached to right abutment of bridge was used part of the time prior to July 21, 1916, when it was destroyed.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of sand, which is constantly shifting.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge during year, 2,130 second-feet.

1911–1918: Maximum mean daily discharge, about 16,000 second-feet on December 23, 1914 (no record of discharge at peak of flood). Stream dry greater part of each year.

DIVERSIONS.—Flood water is diverted for irrigation above station, amount unknown

COOPERATION.—Daily-discharge record furnished by University of Arizona through G. E. P. Smith, irrigation engineer.

Discharge measurements of Rillito River near Tucson, Ariz., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 28	F. C. Kelton	3.26	21.9	Aug. 7	A. L. Slonaker	3.4	2.49
28	do	3.03	3.0	7	do	3.45	5.52
July 7	A. L. Slonaker	3.8	115	7	do	3.3	.71
9	do	3.55	30.2	13	do	3.35	1.13

Daily discharge, in second-feet, of Rillito Creek near Tucson, Ariz., for the year ending Sept. 30, 1918.

Day.	Feb.	Mar.	May.	June.	July.	Aug.	Day.	Feb.	Mar.	May.	June.	July.	Aug.
1		1,640					16				4.7		
2		543					17						
3		415					18						
4		161	2,130				19						
5		15	6				20						
6		3.6					21						
7					39	2.9	22				8		
8					11	.1	23						
9		1,130			22		24						
10		4.7					25						
11							26						
12							27						
13						.4	28	3.5					
14					.1		29						
15				231	.6		30						
							31						

NOTE.—No flow except where discharge is given.

Monthly discharge of Rillito Creek near Tucson, Ariz., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	0	0	0	0
November	0	0	0	0
December	0	0	0	0
January	0	0	0	0
February	3.5	0	.12	6.7
March	1,640	0	126	7,750
April	0	0	0	0
May	2,130	0	68.9	4,240
June	231	0	8.12	483
July	39	0	2.35	144
August	2.9	0	.11	6.8
September	0	0	0	0
The year	2,130	0	17.5	12,600

BLACK RIVER NEAR FORT APACHE, ARIZ.

LOCATION.—Three-quarters of a mile above bridge on road from Rice to Fort Apache, 2½ miles above junction with White River, and 18 miles west of Fort Apache, Gila County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 24, 1912, to July 25, 1918, when station was discontinued.

GAGE.—Stevens continuous water-stage recorder on left bank three-fourths mile above bridge; installed December 10, 1917. November 24, 1912, to October 16, 1913, and May 12, 1916, to December 6, 1916, vertical staff on right bank about 400 feet above bridge. October 16, 1913, to December 19, 1914, Gurley printing water-stage recorder half a mile below bridge. January 20, 1915, to January 8, 1916, staff gage on recorder well below bridge. December 7, 1916, to December 9, 1917, record is from Gurley printing water-stage recorder at same site as present gage. Independent datum at each location.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and gravel. Control is solid rock; permanent.

EXTREMES OF DISCHARGE.—1912–1918: Maximum stage recorded, 15.9 feet, determined from flood marks, December 20, 1914 (discharge, determined from extension of rating curve, about 18,000 second-feet); minimum discharge recorded, 30 second-feet at 4 a. m. January 14, 1918.

DIVERSIONS.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined from 40 to 150 second-feet. Operation of water-stage recorder satisfactory, but no observer was available to attend it after Feb. 19. Mean daily gage height determined by inspecting graph from water-stage recorder. Daily discharge below 300 second-feet ascertained by applying mean daily gage height to rating table; above 300 second feet, discharge not determined. Daily gage heights for entire period, published. Records good.

Discharge measurements of Black River near Fort Apache, Ariz., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 12	J. B. Spiegel	0.99	50	Dec. 12	J. B. Spiegel	1.01	58
12	do	.99	47.4	12	do	1.01	58
Dec. 9	Ellsworth and Spiegel	.94	49.9	July 25	C. E. Ellsworth	1.63	126

Daily gage height, in feet, of Black River near Fort Apache, Ariz. for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.
1	.....	1.01	0.93	1.02	1.13	3.96	2.50	1.33
2	.....	1.01	.94	.98	1.12	3.30	2.46	1.32
3	.....	1.00	.94	1.00	1.08	2.99	2.39	.....
4	.....	.99	.94	1.00	1.09	2.92	2.29	.....
5	.....	.99	.95	1.01	1.15	2.86	2.22	.....
6	.....	.99	.97	1.01	1.17	2.81	2.14	.....
7	.....	.97	.94	1.00	1.17	2.68	2.09	.....
8	.....	.96	.94	.95	1.16	2.97	2.04	.....
9	.....	.96	.94	.99	1.14	5.26	2.02	.....
10	0.99	.96	.92	.....	1.13	4.05	1.98	.....
11	.99	.96	.90	1.02	1.11	3.60	1.97	.....
12	.99	.97	1.00	.98	1.08	3.56	1.99	.....
13	.99	.96	1.00	.88	1.07	5.21	1.98	.....
14	.99	.96	1.00	.97	1.06	6.20	1.97	.....
15	.99	.96	.99	1.06	1.07	5.06	1.96	.....
16	.99	.96	1.04	1.08	1.08	4.47	1.96	.....
17	1.00	.96	1.03	1.01	1.09	3.99	1.95	.....
18	1.00	.96	1.01	.98	1.12	3.60	1.82	.....
19	1.00	.96	1.02	1.02	1.17	3.38	1.73	.....
20	1.00	.96	1.00	1.07	1.13	3.21	1.67	.....
21	1.00	.95	1.01	1.00	1.08	3.10	1.62	.....
22	1.00	.94	1.04	.99	1.10	3.03	1.57	.....
23	1.00	.94	1.03	.90	1.22	2.84	1.53	.....
24	1.00	.95	1.02	.95	1.27	2.86	1.49	.....
25	1.00	.95	1.02	1.20	1.99	2.77	1.46	.....
26	1.00	.96	1.04	1.36	3.18	2.71	1.41	.....
27	1.00	.96	1.03	1.35	4.84	2.72	1.38	.....
28	1.00	.96	1.03	1.28	4.90	2.72	1.36	.....
29	1.00	.95	1.05	1.15	.....	2.70	1.34	.....
30	1.01	.94	1.04	1.02	.....	2.65	1.33	.....
31	1.01	.....	1.03	1.10	.....	2.56	.....	.....

NOTE.—No record obtained Oct. 1-9 and May 3 to July 24.

Daily discharge, in second-feet, of Black River near Fort Apache, Ariz., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Apr.	May.	July.
1	.....	54	47	55	65	298	85	.....
2	.....	54	48	51	64	287	84	.....
3	.....	53	48	53	60	268	.....	.....
4	.....	52	48	53	61	244	.....	.....
5	.....	52	48	54	67	228	.....	.....
6	.....	52	50	54	69	210	.....	.....
7	.....	50	48	53	69	200	.....	.....
8	.....	49	48	48	68	190	.....	.....
9	.....	49	48	52	66	186	.....	.....
10	52	49	46	54	65	178	.....	.....
11	52	49	44	55	63	177	.....	.....
12	52	50	53	51	60	180	.....	.....
13	52	49	53	42	59	178	.....	.....
14	52	49	53	50	58	177	.....	.....
15	52	49	52	58	59	175	.....	.....
16	52	49	57	60	60	175	.....	.....
17	53	49	56	54	61	173	.....	.....
18	53	49	54	51	64	151	.....	.....
19	53	49	55	55	69	137	.....	.....
20	53	49	53	59	65	128	.....	.....
21	53	48	54	53	60	121	.....	.....
22	53	48	57	52	62	114	.....	.....
23	53	48	56	44	74	109	.....	.....
24	53	48	55	48	79	104	.....	.....
25	53	48	55	72	180	100	.....	122
26	53	49	57	89	.....	94	.....	.....
27	53	49	56	88	.....	91	.....	.....
28	53	49	56	80	.....	89	.....	.....
29	53	48	58	67	.....	86	.....	.....
30	54	48	57	55	.....	85	.....	.....
31	54	.....	56	62	.....	.....	.....	.....

NOTE.—Discharge Jan. 10, interpolated. Daily discharge Feb. 26 to Mar. 31 not determined, rating curve not developed above 300 second-feet.

Monthly discharge of Black River near Fort Apache, Ariz., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October 10–31	54	52	52.3	2,280
November	54	48	49.6	2,950
December	58	44	52.4	3,220
January	89	42	57.2	3,520
February 1–25	180	58	69.1	3,430
April	298	85	164.4	9,780

SALT RIVER NEAR ROOSEVELT, ARIZ.

LOCATION.—At diversion dam for power canal, 10 miles above upper end of Roosevelt reservoir and 20 miles east of Roosevelt, Gila County.

DRAINAGE AREA.—4,222 square miles (measured by United States Reclamation Service.)

RECORDS AVAILABLE.—October 1, 1913, to September 30, 1918 (including all water diverted for the development of power but not flow of Tonto Creek); February 7, 1901, to December 9, 1907, at site of Roosevelt dam (including flow of Tonto Creek); 1910–1913, discharge at Roosevelt dam computed from records of flow into and out of the reservoir (representing natural flow of Salt River, including Tonto Creek and water diverted for the development of power).

GAGE.—Principal gage is a vertical staff on left bank, bolted to concrete wall at head of canal. Temporary gages are used from time to time on account of the channel shifting away from the main gage.

DISCHARGE MEASUREMENTS.—Made from cable at dam site or by wading near dam site. Prior to January 19, 1916, when the dam was destroyed by flood, low-water measurements were made by wading below the dam. Above wading stage, discharge was determined from elevation of water surface in reservoir, taking into account known outflow and computed inflow from other sources besides Salt River.

CHANNEL AND CONTROL.—Shifting sand and gravel. Prior to its destruction by flood on January 19, 1916, the dam formed a permanent control.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge during year, 6,120 second-feet, March 10; minimum discharge, 152 second-feet, September 25.

1913–1918: Maximum mean daily discharge 79,200 second-feet, January 15, 1916; minimum discharge, 152 second-feet, September 25, 1918.

DIVERSIONS.—None.

ACCURACY.—Discharge measurements are made nearly every day when discharge is less than about 3,000 second-feet, and results should be excellent. For flow greater than 3,000 second-feet there are no facilities for making discharge measurements. Discharge determined from extension of rating curve and study of reservoir contents, and results are subject to considerable error.

COOPERATION.—Daily-discharge records furnished by Salt River Valley Water Users' Association.

Daily discharge, in second-feet, of Salt River near Roosevelt, Ariz., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	277	245	250	240	334	3,770	1,090	470	260	263	270	226
2	277	235	250	240	284	2,210	1,060	460	260	255	524	220
3	228	239	250	235	262	1,670	1,040	460	270	310	346	228
4	228	239	250	235	260	1,330	970	432	270	370	322	367
5	228	239	250	235	267	1,260	906	420	270	430	541	335
6	228	239	250	235	265	1,130	842	454	270	303	601	385
7	228	239	250	245	275	1,130	780	458	265	690	521	266
8	228	239	250	235	314	955	770	460	258	420	1,110	263
9	247	239	250	235	300	1,020	675	513	260	410	1,330	207
10	238	239	245	240	300	6,120	690	478	270	480	1,230	210
11	218	239	245	240	300	2,440	635	448	270	435	867	192
12	210	253	245	250	290	1,900	625	428	270	390	601	192
13	210	253	240	250	290	1,760	615	433	255	396	564	192
14	208	253	235	255	270	5,120	620	405	255	425	482	183
15	215	253	235	268	269	4,380	683	375	290	390	560	180
16	230	253	235	248	269	4,060	665	368	270	393	444	183
17	230	253	235	258	262	2,420	652	368	270	338	418	180
18	230	253	235	250	251	1,970	665	353	270	325	359	176
19	230	253	235	250	291	1,620	651	348	265	375	337	158
20	234	253	235	250	324	1,670	612	348	338	374	304	158
21	230	253	240	250	315	1,740	548	352	346	339	305	160
22	234	253	240	250	311	1,510	505	325	315	337	303	157
23	230	253	240	250	296	1,860	513	318	405	390	300	157
24	230	250	240	237	349	1,570	505	288	392	407	248	166
25	230	250	240	237	545	1,320	526	285	362	405	290	152
26	230	250	240	265	1,260	1,300	488	275	360	360	300	158
27	234	250	240	368	1,050	1,220	486	265	325	378	267	159
28	234	250	240	491	2,720	1,120	484	265	300	355	299	169
29	234	250	240	510	.....	1,100	472	265	300	294	280	169
30	234	250	240	429	.....	1,080	475	260	277	274	264	169
31	234	.....	240	337	.....	1,180	.....	265	.....	310	233	.....

Monthly discharge of Salt River near Roosevelt, Ariz., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	277	208	231	14,200
November	253	235	247	14,700
December	250	235	242	14,900
January	510	235	275	16,900
February	2,720	251	447	24,800
March	6,120	955	2,030	125,000
April	1,090	472	675	40,200
May	513	260	376	23,100
June	405	255	293	17,400
July	690	255	375	23,100
August	1,330	233	478	29,400
September	385	152	204	12,100
The year	6,120	152	491	356,000

NORTH FORK OF WHITE RIVER AT WHITERIVER, ARIZ.

LOCATION.—At power plant half a mile from Fort Apache Indian School at Whiteriver, Navajo County, three-quarters of a mile above highway bridge, and 4 miles northeast of Fort Apache.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1916, to September 30, 1918.

GAGE.—Vertical staff on right bank just below tailrace of power plant; read by Chester Gatewood.

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

CHANNEL AND CONTROL.—Bed composed of sand and gravel; shifts during floods. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.65 feet at 7 a. m. March 13 (discharge, from extension or rating curve, about 1,820 second-feet); minimum stage recorded, 1.61 feet December 9 (discharge, 24 second-feet).

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

DIVERSIONS.—Water diverted for power development and returned to river above gage.

REGULATION.—Slight fluctuation may occasionally be caused by operation of power plant just above gage.

ACCURACY.—Stage-discharge relation changed March 13. Rating curve used from October 1 to March 13, well defined from 35 to 150 second-feet. Curve used from March 14 to September 30, fairly well defined. Gage read twice daily to hundredths. Daily discharge ascertained by applying mean daily gage height to rating table. Records good from October 1 to February 13; fair for remainder of year.

COOPERATION.—Gage-height record furnished by Office of Indian Affairs.

Discharge measurements of North Fork of White River at Whiteriver, Ariz., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 11	J. B. Spiegel	1.78	42.0	Dec. 11	Ellsworth and Spiegel	1.75	36.9
11	do	1.78	43.1	July 24	Ellsworth and Beardsley.	1.16	108
Dec. 11	Ellsworth and Spiegel	1.73	37.6				

Daily discharge, in second-feet, of North Fork of White River at Whiteriver, Ariz., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	35	45	45	40	38	290	286	147	72	71	67	50
2	37	45	48	41	32	262	263	141	75	94	70	48
3	40	46	48	45	35	219	245	134	68	123	65	60
4	43	46	46	40	46	223	229	136	70	103	64	59
5	43	45	44	43	46	228	209	136	71	105	67	52
6	43	43	41	43	45	223	195	134	75	126	241	49
7	40	45	44	28	48	200	202	134	75	109	156	47
8	40	43	30	31	49	376	192	134	75	126	114	46
9	40	48	24	41	45	316	199	128	78	105	490	44
10	41	46	29	40	46	348	209	126	78	83	186	42
11	40	48	28	25	46	429	217	123	75	98	150	40
12	40	46	29	30	44	498	217	116	74	111	118	39
13	40	43	31	41	44	1,420	217	109	68	107	123	38
14	40	45	38	30	44	1,140	209	105	64	91	121	36
15	40	43	37	35	44	825	221	100	67	105	103	35
16	40	44	34	32	38	615	205	100	70	109	85	35
17	40	43	37	35	44	462	183	100	70	107	77	35
18	40	44	34	35	48	410	170	96	70	105	77	35
19	44	46	34	40	45	390	158	96	72	103	68	35
20	43	43	37	35	38	370	147	98	72	94	62	35
21	40	48	37	30	46	345	136	96	72	94	59	35
22	40	48	39	31	48	272	150	96	94	100	77	35
23	40	52	39	31	55	365	139	87	92	87	80	35
24	40	50	38	35	58	350	136	85	85	85	67	32
25	40	49	40	54	133	304	134	85	78	82	62	32
26	40	49	45	61	327	304	141	87	77	75	60	32
27	41	48	43	53	735	299	150	85	70	70	67	32
28	41	38	45	43	365	304	150	83	67	64	57	35
29	43	37	44	32	.....	304	150	82	70	63	56	35
30	43	44	45	37	.....	290	150	80	70	64	49	35
31	46	.....	43	38	.....	286	.....	78	.....	77	48	.....

NOTE.—No gage-height record Sept. 8-14; discharge interpolated.

Monthly discharge of North Fork of White River at Whiteriver, Ariz., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	46	35	40.7	2,500
November	52	37	45.3	2,700
December	48	24	38.6	2,370
January	61	25	37.9	2,330
February	735	32	94.0	5,220
March	1,420	200	409	25,100
April	286	134	187	11,100
May	147	78	108	6,640
June	94	64	73.8	4,390
July	126	63	94.7	5,820
August	490	48	103	6,330
September	60	32	39.9	2,370
The year	1,420	24	106	76,900

WHITE RIVER AT FORT APACHE, ARIZ.

LOCATION.—At highway bridge on Fort Apache Military Reservation, just below junction of North and East forks, at Fort Apache, Navajo County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 23, 1912, to September 30, 1918 (incomplete).

GAGE.—Vertical staff fastened to downstream end of left abutment of bridge; read by Larzelere, Meyers, and Ator. Datum of gage raised 4.40 feet January 20, 1915, and lowered 0.64 foot December 5, 1916.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and gravel; may shift during floods. No well-defined control. Left bank subject to overflow during extreme floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.54 feet at 8.35 a. m. February 27 (discharge, 1,610 second-feet); river reached higher stage March 13, when mean discharge for day was estimated at 2,500 second-feet. Minimum stage, 0.60 foot September 26, 27, and 30 (discharge, 39 second-feet).

1912–1918: Maximum stage and discharge not determined; minimum discharge, 25 second-feet, November 3 and 4, 1915.

DIVERSIONS.—Small quantity of water diverted for irrigation by the Indians several miles above station; amount not known.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined between 30 and 2,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table, except as indicated in footnote to daily-discharge table. Records good.

COOPERATION.—Gage-height record furnished by United States Army.

Discharge measurements of White River at Fort Apache, Ariz., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 11	J. B. Spiegel	0.15	53	Dec. 10	Ellsworth and Spiegel..	0.07	38.6
11	.....do	.15	52	July 24	C. E. Ellsworth	.60	131
Dec. 10	Ellsworth and Spiegel..	.07	36.8				

Daily discharge, in second-feet, of White River at Fort Apache, Ariz., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	a 58	55	60	a 55	65	a 500	360	200			96	65
2	58	52	58	55	a 65	360	338	200			96	a 60
3	76	52	62	56	a 65	a 338	338	207			105	76
4	55	a 52	58	56	65	315	315	207			a 96	76
5	55	52	54	58	69	a 350	295	a 202		110	88	78
6	52	55	54	a 50	69	a 400	275	197			360	71
7	52	55	52	49	65	410	a 275	204	120		210	58
8	52	58	49	49	69	520	275	200			176	a 56
9	52	58	a 46	58	65	460	275	207			410	54
10	52	52	43	56	a 68	a 500	315	200		128	275	52
11	52	58	41	a 48	71	580	315	194		159	a 232	49
12	52	58	46	41	65	a1,000	315	a 182		170	188	46
13	52	58	46	a 50	72	a2,500	295	170		170	a 173	49
14	52	55	46	58	65	1,540	a 295	165	107	a 156	a 158	a 47
15	50	55	a 47	58	69	920	295	159	109	143	143	a 45
16	52	56	a 48	42	65	650	295	165	a 122	176	133	43
17	52	58	49	58	a 67	a 600	275	165	136	151	123	43
18	55	58	46	52	a 67	520	275	165	114	143	a 112	41
19	55	58	46	55	69	520	259	a 162	243	138	100	41
20	52	55	50	a 50	65	460	243	159	116	143	92	41
21	55	58	52	46	69	435	a 236	159	133	a 140	88	43
22	58	62	55	54	69	385	228	a 153	133	a 138	100	a 42
23	55	65	a 52	56	72	a 385	188	143	a 136	136	138	41
24	55	69	49	56	96	a 385	191	a 143	138	143	105	41
25	55	65	49	65	159	385	a 194	a 143	143	120	a 102	40
26	55	62	54	a 65	410	385	a 197	a 143	138	105	100	39
27	55	a 60	55	65	1,270	385	a 201	143	105	96	88	39
28	a 56	a 58	55	67	a 700	435	a 204	148	96	a 90	84	41
29	56	a 56	58	76	.....	435	207	a 148	88	84	80	a 40
30	58	54	a 56	55	.....	385	200	a 148	a 88	80	72	39
31	55	.....	55	69	.....	a 372	.....	a 148	.....	116	67	.....

a Discharge estimated or interpolated.

NOTE.—Braced figures show mean discharge for periods indicated; estimated from comparison with flow at other stations in basin.

Monthly discharge of White River at Fort Apache, Ariz., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	76	50	54.8	3,370
November	69	52	57.3	3,410
December	62	41	51.3	3,150
January	76	41	55.7	3,420
February	1,270	65	149	8,280
March	2,500	315	575	35,400
April	360	188	266	15,800
May	207	143	172	10,600
June	.....	.....	88	124	7,380
July	.....	.....	80	126	7,750
August	410	67	142	8,730
September	78	39	49.9	2,970
The year	2,500	39	152	110,000

WHITE RIVER AT WANSLEE'S RANCH, NEAR FORT APACHE, ARIZ.

LOCATION.—At highway bridge 8 miles above Black River and 14 miles southwest of Fort Apache, Navajo County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1917, to August 31, 1918, when station was discontinued.

GAGE.—Vertical staff in two sections on left bank; first section is on tree 60 feet below bridge, second section is painted on boulder 50 feet southeast of first section; read by Mrs. Tom Wanslee.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading at gage.

CHANNEL AND CONTROL.—Bed composed of boulders and coarse gravel; permanent. No well-defined control. Left bank subject to overflow at medium flood stage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.5 feet at 6 p. m. March 13 (discharge, 3,110 second-feet); minimum stage recorded, 0.84 foot part of November, December, and January (discharge, 49 second-feet).

DIVERSIONS.—Small quantity of water diverted above the station; amount not known.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 1,500 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

Discharge measurements of White River at Wanslee's ranch, near Fort Apache, Ariz., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 11	J. B. Spiegel	0.88	53	Dec. 10	J. B. Spiegel	0.85	44.1
12	.....do	.86	49.5	July 25	C. E. Ellsworth	1.28	115
Dec. 10	.....do	.84	46.6	25	.....do	1.28	112

Daily discharge, in second-feet, of White River at Wanslee's ranch, near Fort Apache, Ariz., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1		53	49	49	64	960	335	170	110	110	79
2		52	49	50	62	525	320	180	106	88	79
3		52	49	50	58	502	290	170	102	90	76
4		53	49	50	53	502	290	170	106	94	152
5		54	49	49	52	480	260	170	103	94	460
	52										
6		51	49	50	52	460	260	180	100	98	1,080
7		51	49	50	53	460	245	170	102	92	232
8		53	49	50	58	440	232	170	100	94	138
9		53	49	50	61	440	260	170	112	96	370
10		52	49	50	64	422	260	140	108	97	210
11	53	53	49	50	67	810	260	132	108	94	160
12	51	53	49	50	70	1,760	260	138	114	97	160
13		52	50	51	70	2,850	260	128	116	97	160
14		51	50	51	70	1,340	260	128	100	96	160
15		51	50	51	72	1,340	260	128	94	92	144
16		51		53	73	752	260	130	90	92	127
17		51		53	70	595	260	132	91	94	125
18		52		53	70	525	210	133	100	91	123
19		52		54	70	480	200	132	104	96	121
20		51	50	54	73	422	180	136	104	104	110
21		51		54	74	370	170	152	106	100	78
22	52	50		64	76	352	170	145	109	110	115
23		50	49	67	70	335	152	160	126	112	128
24		50	49	67	72	352	160	160	130	133	118
25		51	50	73	73	352	180	122	126	109	103
26		50	50	73	1,340	335	152	128	124	92	84
27		50	50	67	1,760	320	170	132	127	92	66
28		51	50	67	2,530	335	190	128	128	80	51
29		50	50	67	.....	352	170	126	122	66	50
30		49	50	67	.....	352	190	118	116	64	50
31		.....	50	64	.....	335	.....	115	.....	82	51

NOTE.—Braced figures show mean discharge for periods indicated; estimated by comparison with flow at other stations in basin. No record Aug. 17 and 18; discharge interpolated.

Monthly discharge of White River at Wanslee's ranch, near Fort Apache, Ariz., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	.....	.....	52.0	3,200
November	54	49	51.4	3,060
December	50	49	49.5	3,040
January	73	49	56.4	3,470
February	2,530	52	260	14,400
March	2,850	320	640	39,400
April	335	152	229	13,600
May	180	115	145	8,920
June	128	90	109	6,490
July	133	64	95.0	5,840
August	1,080	50	166	10,200
The period	.....	.....	.....	112,000

EAST FORK OF WHITE RIVER AT FORT APACHE, ARIZ.

LOCATION.—On Fort Apache Military Reservation at Fort Apache, Navajo County, half a mile above junction with North Fork of White River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 8, 1912, to September 30, 1918 (incomplete).

GAGE.—Vertical staff fastened to ash tree on left bank opposite officers' quarters; read by Larzelere, Myers, and Ator. Datum raised 5.00 feet June 27, 1915; lowered 0.40 foot August 5, 1917.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.1 feet at 8 a. m. March 13 (discharge, 640 second-feet); minimum stage recorded, 0.08 foot September 23–25 and 27–30 (discharge, 2 second-feet).

1912–1918: Maximum stage and discharge not recorded; minimum discharge occurred in 1918.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined below 400 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table, except as indicated in footnote to daily-discharge table. Records good.

COOPERATION.—Gage-height record furnished by United States Army.

Discharge measurements of East Fork of White River at Fort Apache, Ariz., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 11	J. B. Spiegel	0.28	7.3	Dec. 10	Ellsworth and Spiegel	0.28	8.2
11	do	.28	8.5	July 24	C. E. Ellsworth	.46	25.1
Dec. 10	Ellsworth and Spiegel	.28	8.3	24	do	.46	26.4

Daily discharge, in second-feet, of East Fork of White River at Fort Apache, Ariz., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	a 12	11	11	11	13	b 100	67	39			13	7
2	12	11	11	11	a 13	b 100	57	41			14	a 7
3	12	11	11	11	a 13	b 100	57	41			11	a 7
4	11	a 11	11	11	13	b 90	59	41			a 11	7
5	10	11	11	11	14	b 80	57	a 46		20	11	7
6	10	11	10	a 10	14	67	54	50			54	7
7	10	12	10	10	14	77	a 54	54	30		34	7
8	10	12	10	10	15	83	54	54			29	a 6
9	10	11	a 10	11	14	75	57	57			66	4
10	10	a 11	10	11	a 14	b 100	57	54		27	50	4
11	10	11	9	11	15	108	62	52		37	a 42	4
12	10	11	9	11	14	b 400	67	a 48		33	35	4
13	10	11	9	a 11	15	640	59	43		35	a 32	4
14	10	11	9	11	13	301	a 58	43	19	a 33	a 29	a 3
15	10	11	a 9	11	14	190	57	43	21	a 31	26	a 3
16	10	11	a 10	10	13	b 150	54	45	a 32	29	22	2
17	10	11	10	11	a 13	b 100	54	50	44	33	21	2
18	10	11	9	12	a 13	94	50	47	22	35	a 18	2
19	12	11	9	13	13	80	45	a 46	200	a 28	14	2
20	12	10	10	a 12	13	67	43	45	26	22	10	2
21	12	11	a 10	10	14	80	a 41	43	26	a 22	10	a 2
22	11	11	10	9	15	62	39	a 42	28	a 22	94	a 2
23	11	12	a 10	11	15	b 60	41	41	a 30	23	20	2
24	11	12	10	12	a 20	b 60	39	a 41	32	21	14	2
25	11	12	10	13	24	59	a 39	41	37	16	b 14	2
26	11	12	11	a 13	67	57	a 40	a 41	28	13	b 10	2
27	11	a 12	11	13	274	59	a 40	41	22	12	10	2
28	a 11	a 11	11	14	b 200	80	a 41	41	16	a 10	9	2
29	12	a 10	11	14	.....	77	41	b 41	14	8	10	a 2
30	12	10	a 11	11	.....	70	39	b 41	b 14	6	8	2
31	11	.....	11	13	.....	68	.....	b 41	.....	22	7	.....

a No record, discharge interpolated.
b No record, discharge estimated from flow of North Fork of White River and of White River.

NOTE.—Braced figures show estimated mean discharge for periods indicated.

Monthly discharge of East Fork of White River at Fort Apache, Ariz., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	12	10	10.8	664
November	12	10	11.1	660
December	11	9	10.1	621
January	14	9	11.4	701
February	274	13	32.2	1,790
March	640	57	120	7,380
April	67	39	50.7	3,020
May	57	39	44.9	2,760
June	200	.....	33.4	1,990
July	.....	6	22.5	1,380
August	94	7	24.1	1,480
September	7	2	3.7	220
The year	640	2	31.4	22,700

TONTO CREEK NEAR ROOSEVELT, ARIZ.

LOCATION.—In sec. 14, T. 6 N., R. 10 E., 6 miles above upper end of Roosevelt reservoir and 15 miles northwest of Roosevelt, Gila County.

DRAINAGE AREA.—1,004 square miles (measured by United States Reclamation Service).

RECORDS AVAILABLE.—October 1, 1913, to September 30, 1918.

GAGE.—Vertical staff on right bank. Site of gage is changed from time to time owing to shifting control.

DISCHARGE MEASUREMENTS.—Made by wading at low stages and by slope method at high stages.

CHANNEL AND CONTROL.—Bed composed of boulders and gravel; shifts at high stages. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge during year, 1,010 second-feet, February 26; minimum discharge, 1 second-foot, September 1–3.

1913–1918: Maximum mean daily discharge, 15,800 second-feet, January 19, 1916; minimum discharge, 1 second-foot, September 1–3, 1918.

DIVERSIONS.—There are no diversions near this station. The entire flow is discharged into Roosevelt reservoir.

ACCURACY.—Discharge measurements made as often as appears necessary to determine changes in stage-discharge relation. Records fair for low and medium stages. Records for high stages poor; based on extension of rating curve and study of reservoir contents.

COOPERATION.—Record of daily discharge furnished by Salt River Valley Water Users' Association.

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Daily discharge, in second-feet, of Tonto Creek near Roosevelt, Ariz., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	11	18	27	31	76	350	205	10	5	5	20	1
2	11	17	27	30	68	330	170	10	5	5	24	1
3	12	15	24	28	76	340	165	10	5	5	24	1
4	11	15	24	25	76	215	150	10	5	5	24	107
5	13	18	25	20	76	208	132	8	5	5	11	42
6	12	20	25	20	44	185	125	8	5	36	235	31
7	12	17	24	20	38	185	120	8	5	40	153	16
8	12	18	24	20	30	152	112	10	5	44	83	8
9	16	17	24	20	30	220	112	8	5	25	700	8
10	16	17	24	20	28	760	110	8	5	270	475	8
11	13	16	25	20	36	390	128	8	5	32	187	6
12	13	15	27	20	30	132	106	8	5	44	100	6
13	13	15	30	20	30	310	105	8	5	320	70	6
14	14	18	28	20	24	610	35	8	5	44	70	5
15	14	15	28	20	30	420	36	8	5	64	100	5
16	14	20	30	20	30	350	35	8	5	47	54	5
17	14	19	27	20	30	340	33	8	5	44	45	5
18	13	20	28	20	30	350	32	8	5	9	32	2
19	11	24	27	20	44	240	31	8	5	9	27	2
20	11	24	27	20	51	195	32	8	5	9	14	2
21	14	22	28	20	38	447	29	12	5	9	15	2
22	14	24	27	20	44	440	30	10	5	9	13	2
23	16	24	27	20	78	430	32	8	5	45	10	2
24	16	17	27	20	68	450	30	8	5	45	10	2
25	16	18	28	20	158	360	31	5	5	45	10	2
26	16	27	28	26	1,010	320	28	5	5	12	10	2
27	14	27	28	130	680	252	26	5	5	12	10	2
28	14	26	28	490	390	220	24	5	5	10	10	2
29	15	26	28	33	.....	230	12	5	5	10	10	2
30	17	26	30	105	.....	220	10	5	5	10	10	2
31	17	.....	31	76	.....	205	.....	5	.....	10	10	.....

Monthly discharge of Tonto Creek near Roosevelt, Ariz., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	17	11	13.7	842
November	27	15	19.8	1,180
December	31	24	26.9	1,650
January	490	20	45.0	2,770
February	1,010	24	119	6,610
March	760	132	319	19,600
April	205	10	74.2	4,420
May	12	5	7.8	480
June	5	5	5.0	298
July	320	5	41.3	2,540
August	700	10	82.8	5,090
September	107	1	9.6	571
The year	1,010	1	63.6	46,100

VERDE RIVER NEAR CLARKDALE, ARIZ.

LOCATION.—In T. 17 N., R. 3 E., 4 miles below mouth of Sycamore Creek and 5 miles above Clarkdale, Yavapai County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 18, 1915, to September 30, 1918 (incomplete).

GAGE.—Stevens continuous water-stage recorder installed on left bank June 18, 1915; referred to vertical staff 30 feet upstream; datum lowered 0.65 foot December 8, 1917. Inspected by engineers of United Verde Copper Co.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Bed composed of sand, gravel, and boulders; shifting during high water. No well-defined control. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 16.45 feet at 1 p. m. March 8 (discharge, from extension of rating curve, about 35,500 second-feet); minimum stage, from water-stage recorder, 1.59 feet July 1 (discharge, 76 second-feet).

1915–1918: Maximum stage recorded in 1918; minimum discharge, 70 second-feet, on August 4, 11, and 15, 1915.

DIVERSIONS.—Water is diverted above and below station for irrigating a few small ranches; amount not known.

ACCURACY.—Stage-discharge relation changed during year. Rating curve used from March 9 to September 30, fairly well defined below 3,000 second-feet, but poorly defined above; applied indirectly from December 8 to March 8. Operation of water-stage recorder fairly satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting gage-height graph. Records fair.

COOPERATION.—Station established and maintained in cooperation with United Verde Copper Co.

Discharge measurements of Verde River near Clarkdale, Ariz., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 8	W. E. Dickinson	1.46	82	June 9	Ellsworth, Coston, and Bundy.	1.62	77
Feb. 15	Coston and Larson	1.50	81				
Mar. 8	Ellsworth and Coston	16.2	34,400	July 15	C. E. Ellsworth	1.68	88
June 9	Ellsworth, Coston, and Bundy.	1.62	78				

Daily discharge, in second-feet, of Verde River near Clarkdale, Ariz., for year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1				88	82	83	92	84	82	76		
2				88	82	86	92	84	83	78		
3				88	82	129	90	84	83	80		
4			82	88	82	114	90	84	83	82		
5			82	88	82	104	89	86	82	83		
6				86	82	90	89	88	82	84		
7				86	83	860	89	88	82	86		
8			82	88	82	14,600	88	88	82	88	150	
9				88	82	1,700	89	88	80	89		90
10				89	82	495	88	86	82	88		
11				86	82	920	86	84	82	87		
12				90	83	8,900	86	84	80	86		
13				92	82	8,870	86	84	82	85		
14				90	83	1,280	86	84	84	84		
15				90	80	465	86	84	86	83		
16	85	85		88	83	282	86	84	84	83	92	
17				89	84	187	86	84	86	83		80
18				89	83	138	88	84	83	83		80
19			85	88	84	133	88	83	121	83		80
20				86	80	131	86	83	129	82		80
21				86	80	138	86	83	88	82		80
22				86	83	530	86	82	82	81		
23				86	84	590	86	82	82	81		
24				86	83	270	84	82	80	80	90	
25				89	240	165	84	82	77	80		
26				100	137	117	84	82	77	80		80
27				96	106	98	84	82	77	80		
28				89	90	95	84	83	77	80		
29			89	86	.....	92	84	83	77	80		
30			90	86	.....	92	84	82	77	80		
31		.....	89	83	.....	92	.....	82	.....	80		.....

NOTE.—Braced figures show estimated mean discharge for periods indicated, during which recorder was not operating. No record obtained July 6–8, 10–14, 18–24, 26–31; discharge interpolated.

Monthly discharge of Verde River near Clarkdale, Ariz., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October			85.0	5,230
November			85.0	5,060
December			84.6	5,200
January	100	83	88.3	5,430
February	240	80	91.0	5,050
March	14,600	83	1,350	83,000
April	92	84	86.9	5,170
May	88	82	84.0	5,160
June	129	77	84.4	5,020
July	89	76	82.5	5,070
August			119	7,320
September			85.3	5,080
The year	14,600	76	196	142,000

VERDE RIVER AT CAMP VERDE, ARIZ.

LOCATION.—In sec. 30, T. 14 N., R. 5 E., at steel highway bridge just above town of Camp Verde, Yavapai County, and above mouth of Beaver Creek.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 5, 1912, to September 30, 1918.

GAGE.—Chain gage on downstream side of bridge, installed November 12, 1915, at datum 1.8 feet above original gage; read by Nicholas A. Vyne. Original gage was a vertical staff painted on east bridge pier.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of clay and sand; shifting during high water. No well-defined control. Banks not subject to overflow except at extremely high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 14.5 feet at 6 p. m. March 8; probably some backwater from Beaver Creek, discharge not determined. Minimum stage recorded, 0.45 foot June 8–10 (discharge, 38 second-feet).

1912–1918: Maximum stage recorded, 17.0 feet on night of January 18, 1916 (discharge not determined); minimum discharge, 31 second-feet, June 28 and 29, 1914.

ACCURACY.—Stage-discharge relation practically permanent during year, except for periods in February and March, when it was affected by backwater from Beaver Creek. Rating curve well defined below 3,000 second-feet. Curve used above 3,000 second-feet based on logarithmic extension and is subject to considerable error. Gage read to half-tenths once daily; during high water oftener. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair for low stages and poor for high stages.

Discharge measurements of Verde River at Camp Verde, Ariz., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 6	W. E. Dickinson	0.74	133	June 8	C. E. Ellsworth	.45	38.9
7	do	.74	135	July 16	Ellsworth and Vyne	.75	121
Mar. 9	C. E. Ellsworth	4.23	4,550	16	do	.75	111
10	do	2.50	1,660	Aug. 20	N. A. Vyne	.90	107
June 8	Ellsworth and Vyne	.45	37.9	Sept. 18	do	.74	66
8	do	.45	35.3				

Daily discharge, in second-feet, of Verde River at Camp Verde, Ariz., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	100	80	90	90	100		150	70	45	45	180	60
2	90	80	90	90	100		125	70	45	45	165	70
3	90	80	90	90	90		112	70	45	45	180	80
4	90	80	90	90	90		112	70	45	60	150	130
5	90	80	90	90	90		112	60	45	60	180	412
6	90	80	90	90	90		100	60	45	45	156	180
7	90	80	88	90	90		100	60	45	45	236	150
8	80	80	90	90	90		100	60	38	60	375	125
9	80	90	90	90	90		100	52	38	60	292	112
10	80	80	90	90	90	3,000	90	52	38	80	280	112
11	80	90	90	90	90		90	52	45	100	260	112
12	80	90	90	90	90		90	52	45	112	252	100
13	90	90	90	90	90		90	52	45	112	200	100
14	80	90	90	90	90		90	52	45	112	360	100
15	80	90	90	90	90		90	52	45	100	300	90
16	90	90	90	90	90		90	52	45	112	240	90
17	90	90	90	90	90		90	52	45	112	165	84
18	90	90	90	90	90		90	52	45	90	138	80
19	90	90	90	90	90	150	90	52	45	90	125	80
20	90	90	90	90	90	138	90	52	252	90	125	80
21	90	90	90	90	112	125	80	52	180	125	112	80
22	90	90	90	90	112	125	80	52	125	138	112	80
23	90	90	90	90	112	112	80	52	125	125	112	80
24	90	90	90	100	125	112	90	52	125	112	112	80
25	90	90	90	100		112	80	52	125	100	100	80
26	90	90	90	138	400	100	80	52	60	80	90	80
27	90	90	90	130		100	80	52	60	80	90	80
28	90	90	90	112		100	70	52	45	70	80	70
29	80	90	90	112	.....	100	70	52	45	70	80	70
30	80	90	90	105	.....	100	70	45	45	60	60	70
31	80	.....	90	100	.....	90	.....	45	.....	52	60	.....

NOTE.—Braced figures show mean discharge for periods indicated, when gage heights were affected by backwater from Beaver Creek; estimated from comparison with flow at Clarkdale.

Monthly discharge of Verde River at Camp Verde, Ariz., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	100	80	87.1	5,360
November	90	80	87.0	5,180
December	90	88	89.9	5,530
January	138	90	95.7	5,880
February	.....	90	139	7,720
March	.....	90	1,790	110,000
April	150	70	92.7	5,520
May	70	45	54.9	3,380
June	252	38	67.4	4,010
July	138	45	83.5	5,130
August	375	60	173	10,600
September	412	60	104	6,190
The year	.....	38	241	174,000

VERDE RIVER NEAR McDOWELL, ARIZ.

LOCATION.—At dam site on Salt River Indian Reservation, three-fourths mile above junction with Salt River and 5½ miles below McDowell, Maricopa County.

DRAINAGE AREA.—6,000 square miles (furnished by United States Reclamation Service).

RECORDS AVAILABLE.—August 14 to September 30, 1889; April 20, 1897, to November 11, 1899; January 1, 1901, to April 19, 1902; July 23–26, 1902; January 1, 1903, to September 30, 1918.

GAGE.—Painted on granite rocks on right bank.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading. Since November, 1913, measurements have been made regularly 3 or 4 times a week by a man stationed at gage.

CHANNEL AND CONTROL.—Sand; shifts.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge during year, 54,300 second-feet March 14; minimum discharge, 112 second-feet, June 13. (Maximum or minimum gage heights not available.)

1897–1918: Maximum mean daily gage height, 17.0 feet November 27, 1905 (discharge, 61,500 second-feet); minimum mean daily discharge, 32 second-feet, July 19 and 20, 1904.

DIVERSIONS.—See Verde River at Camp Verde. Water is also diverted 5 miles above station for use on Indian reservation.

COÖPERATION.—Daily-discharge record furnished by Salt River Valley Water Users' Association.

Daily discharge, in second-feet, of Verde River near McDowell, Ariz., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	284	246	250	290	528	1,880	475	220	120	140	140	177
2	268	234	250	280	455	1,550	540	200	120	120	140	170
3	267	246	250	280	437	1,250	500	200	120	140	132	177
4	264	246	264	280	400	1,160	450	200	130	140	137	344
5	255	255	257	285	402	1,120	460	200	130	140	164	166
6	260	250	257	280	385	950	470	190	155	152	482	154
7	260	222	250	280	345	930	460	190	140	152	465	418
8	260	234	257	300	335	6,660	450	180	146	152	435	310
9	255	250	250	305	335	29,800	425	180	130	200	935	250
10	258	255	226	300	335	13,100	425	175	130	190	960	230
11	258	255	265	290	338	3,000	410	175	120	180	2,780	210
12	249	250	275	275	330	2,750	410	170	115	210	1,320	222
13	235	246	275	275	315	22,200	375	165	112	220	975	222
14	235	234	265	290	302	54,300	355	158	120	228	910	219
15	226	234	265	275	286	8,800	340	155	126	303	790	210
16	235	240	265	287	320	3,270	340	155	126	318	880	190
17	235	234	265	287	320	2,360	330	155	126	266	760	186
18	260	234	265	287	300	1,800	330	152	120	235	660	165
19	260	234	265	285	321	1,060	295	150	132	215	505	158
20	244	246	262	285	341	1,080	280	145	148	192	432	165
21	247	246	270	280	370	1,150	275	145	139	168	392	144
22	226	238	270	274	353	1,360	270	145	137	165	350	135
23	232	238	270	270	334	1,800	269	145	170	220	320	128
24	232	244	270	274	671	1,850	269	135	175	265	252	128
25	232	236	270	285	668	2,220	250	135	168	228	261	130
26	232	250	270	308	8,950	1,420	245	135	170	208	240	130
27	232	250	285	1,500	4,100	1,120	245	130	163	170	231	143
28	232	250	290	1,290	2,750	900	245	120	148	165	225	143
29	246	250	290	780	.....	775	245	120	143	160	200	143
30	239	246	290	605	.....	662	224	115	140	144	208	143
31	239	.....	290	630	.....	712	.....	115	.....	138	200	.....

Monthly discharge of Verde River near McDowell, Ariz., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	284	226	247	15,200
November	255	222	243	14,500
December	290	226	266	16,400
January	1,500	270	394	24,200
February	8,950	286	904	50,200
March	54,300	662	5,580	343,000
April	540	224	355	21,100
May	220	115	160	9,840
June	175	112	137	8,150
July	318	120	191	11,700
August	2,780	132	545	33,500
September	418	128	190	11,300
The year	54,300	112	773	559,000

BEAVER CREEK AT CAMP VERDE, ARIZ.

LOCATION.—In sec. 30, T. 14 N., R. 5 E., a quarter of a mile above junction with Verde River and 1 mile northeast of Camp Verde, Yavapai County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 1, 1912, to September 30, 1918.

GAGE.—Inclined and vertical staff on right bank, installed August 14, 1916, at same datum and at practically same location as original gage which was washed out January 21, 1916; read by Nicholas A. Vyne. From January 22 to August 13, 1916, temporary gage at datum 1.46 feet above original gage was used. All readings on temporary gage reduced to datum of original gage.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Bed composed of sand, clay, and solid rock; shifts slightly at low stages and considerably at high stages. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 14.2 feet at noon March 8 (discharge not determined); minimum discharge, 7 second-feet during parts of April, July, and September.

1912–1918: Maximum stage occurred in 1918; minimum discharge, 1.5 second-feet, April 26–30, 1913.

DIVERSIONS.—Water is diverted for irrigation at several points above station; quantity unknown. A small amount of water is discharged into creek above gage at times by an irrigation ditch which diverts from Verde River above the mouth of Beaver Creek.

ACCURACY.—Stage-discharge relation probably affected by backwater from Verde River, during the periods February 25–28 and March 8–13; otherwise practically permanent. Rating curve well defined below 50 second-feet and extended above. Gage read to half-tenths once daily; during high water oftener. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair for low stages and poor for high stages.

Discharge measurements of Beaver Creek at Camp Verde, Ariz., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 7	W. E. Dickinson	3.99	10.3	June 8	C. E. Ellsworth	3.85	6.7
7	do	3.99	14.8	July 16	Ellsworth and Vyne	3.84	9.0
Mar. 9	C. E. Ellsworth	5.65	1,270	Aug. 19	N. A. Vyne	4.00	18.3
9	do	5.15	746	Sept. 17	do	3.81	7.8

Daily discharge, in second-feet, of Beaver Creek at Camp Verde, Ariz., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	16	8.5	13	13	20	231	20	8.5	8.5	10	13	8.5
2	16	8.5	13	13	20	171	16	8.5	8.5	13	10	8.5
3	16	8.5	13	13	25	156	16	8.5	8.5	13	10	8.5
4	13	13	13	13	25	128	13	8.5	8.5	13	37	87
5	13	13	13	13	25	91	13	8.5	8.5	13	280	52
6	10	13	14	13	25	52	13	13	8.5	13	91	18
7	13	13	15	13	25	585	10	13	8.5	13	52	13
8	10	13	16	13	25	}	10	13	8.5	10	31	10
9	10	13	16	13	25	}	10	8.5	8.5	31	20	10
10	10	13	13	13	31	}	10	8.5	8.5	25	44	8.5
11	10	10	16	13	31	500	8.5	8.5	10	20	142	8.5
12	10	10	16	13	31	}	8.5	8.5	8.5	25	44	8.5
13	10	10	16	13	31	}	8.5	8.5	8.5	25	31	7
14	8.5	13	16	13	31	302	7	8.5	8.5	16	52	7
15	8.5	13	16	16	31	80	7	8.5	13	10	31	7
16	8.5	13	16	16	37	61	7	8.5	10	9	31	7
17	8.5	13	16	16	31	40	7	8.5	8.5	10	20	7
18	10	13	16	20	31	31	7	8.5	13	8.5	16	7
19	10	13	16	20	31	25	8.5	8.5	13	8.5	16	7
20	10	13	16	20	31	25	8.5	8.5	13	7	13	7
21	8.5	13	16	25	31	20	8.5	8.5	10	10	10	7
22	8.5	13	16	25	31	16	8.5	8.5	10	13	10	7
23	13	13	13	25	37	16	8.5	8.5	10	10	10	7
24	13	13	13	25	91	16	8.5	8.5	10	8.5	8.5	7
25	13	13	13	25	}	16	8.5	8.5	10	8.5	8.5	7
26	8.5	13	13	25	} 300	13	8.5	8.5	10	7	8.5	7
27	8.5	13	13	25	}	13	8.5	8.5	10	7	16	7
28	8.5	13	13	25	}	13	8.5	8.5	13	10	10	7
29	8.5	13	16	20	.....	13	8.5	8.5	13	13	8.5	7
30	8.5	13	16	20	.....	13	8.5	8.5	8.5	8.5	8.5	7
31	8.5	.....	16	20	.....	10	.....	8.5	.....	7	8.5	.....

NOTE.—Braced figures show mean discharge for periods indicated, when gage was affected by backwater from Verde River; estimated from comparison with flow of Verde River near Clarkdale.

Monthly discharge of Beaver Creek at Camp Verde, Ariz., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	16	8.5	10.6	652
November	13	8.5	12.2	726
December	16	13	14.7	904
January	25	13	17.8	1,090
February	.....	20	69.7	3,870
March	.....	10	166	10,200
April	20	7.0	9.78	582
May	13	8.5	8.94	550
June	13	8.5	9.85	586
July	31	7.0	12.8	787
August	280	8.5	35.2	2,160
September	87	7.0	12.2	726
The year	.....	7.0	31.6	22,800

AGUA FRIA RIVER NEAR GLENDALE, ARIZ.

LOCATION.—In sec. 28, T. 6 N., R. 1 E., at uncompleted masonry diversion dam of Beardsley irrigation project, at Camp Dyer, 4 miles below mouth of Castle Creek and 22 miles northwest of Glendale, Maricopa County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 10, 1910, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on right bank, installed October 2, 1913; destroyed by flood on January 27, 1916, and replaced March 21, 1916; during the interval staff-gage readings were made by R. Jones. From August 28, 1913, to October 2, 1913, Richard Frérés (Paris, France) water-stage recorder was used. Prior to August 28, 1913, gages were vertical staffs, either painted on or attached to masonry diversion dam, with datum 20 feet lower than that used for water-stage recorders.

DISCHARGE MEASUREMENTS.—Made from cable about one-third of a mile below gage or by wading near gage.

CHANNEL AND CONTROL.—Bed above and below the dam consists of shifting sand and gravel. Principal control is formed by the unfinished portion of the diversion dam and ledge on which dam is built. At low and medium stages entire stream flows through the larger opening in the dam near the right bank. At high stages the stream divides and part flows through the opening near the left bank and through a scour gate opening in the dam. At extreme high stages the stream flows over the entire crest of the dam. This control shifted considerably because of the crevices in dam filling in with sand and washing out during high stages. On October 18, 1914, an artificial control was completed across the right opening or gap in dam but was partly destroyed by flood of January 29, 1915. It was repaired October 28, 1915, but was again partly destroyed during floods of January, 1916, and April, 1917.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 16.5 feet at 11 a. m. August 6 (discharge, from extension of rating curve, about 39,600 second-feet); minimum discharge during year, 2 second-feet, parts of June to September.

1910–1918: Maximum stage on record, 30 feet January 27, 1916, determined from flood marks (discharge from extension of rating curve, about 105,000 second-feet); minimum discharge, 2 second-feet, has occurred at numerous times during the period of record.

DIVERSIONS.—Water is diverted above gage for irrigating two or three small ranches; amount not known.

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve fairly well defined below 4,000 second-feet. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by the shifting-control method. Mean daily gage height determined by inspecting gage graph or, on days of considerable fluctuation, by averaging hourly gage heights. Records fair for low and medium stages; poor for high stages.

Discharge measurements of Agua Fria River near Glendale, Ariz., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 7	C. E. Ellsworth	3.24	7.0	Mar. 9	Frank Asplind	6.35	1,020
7	do	3.24	6.0	24	C. E. Ellsworth	4.37	114
26	Ellsworth and Dickinson	3.29	9.8	Apr. 7	do	3.82	24.8
26	do	3.29	9.2	21	do	3.65	9.0
Dec. 27	do	3.21	11.0	May 14	do	3.55	2.7
27	C. E. Ellsworth	3.21	11.6	14	do	3.55	3.7
Jan. 18	Ellsworth and Asplind.	3.14	13.5	June 2	do	3.47	2.4
18	do	3.14	14.2	2	do	3.47	1.9
27	Frank Asplind	4.68	360	24	do	3.57	2.7
28	do	4.05	160	July 11	do	3.59	3.1
29	do	3.75	78	Aug. 3	do	3.52	1.5
Feb. 21	do	2.94	20.1	10	do	7.6	3,350
22	do	2.96	20.6	11	do	5.48	618
Mar. 7	do	3.02	31.4	16	do	3.80	38.3
8	do	7.9	2,980	Sept. 18	do	3.41	2.3
				28	do	3.42	2.0

Daily discharge, in second-feet, of Agua Fria River near Glendale, Ariz., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	12	8	10	13	18	108	58	6	2	12	2	37
2	10	8	10	13	15	90	52	6	2	24	2	64
3	10	8	10	14	15	63	48	6	2	37	2	57
4	10	8	10	14	15	52	41	5	2	50	2	26
5	10	7	10	14	12	44	36	5	2	64	2	17
6	10	7	10	13	10	37	30	5	2	19	1,030	9
7	10	7	10	14	10	32	25	5	2	4	390	6
8	10	7	10	13	10	800	25	5	2	59	570	5
9	9	7	10	14	10	875	24	4	2	8	70	4
10	9	8	10	13	10	385	22	4	2	6	1,500	4
11	9	8	10	13	10	231	22	4	2	4	570	4
12	9	8	10	13	11	158	21	4	2	4	255	3
13	8	8	10	13	11	1,290	20	3	2	40	156	3
14	8	8	10	13	11	444	20	3	2	16	158	3
15	8	8	10	13	10	261	18	3	267	8	102	3
16	8	9	10	13	9	199	16	3	63	8	45	3
17	7	9	10	14	10	156	16	3	10	9	38	3
18	6	9	11	14	11	129	15	3	5	9	38	3
19	6	10	11	15	14	114	15	3	4	8	36	3
20	5	10	11	15	16	108	12	3	3	7	35	3
21	5	10	11	15	20	170	9	3	3	6	32	3
22	6	10	12	15	22	160	8	3	3	6	31	3
23	6	10	12	16	22	149	8	3	3	8	31	3
24	6	10	12	16	25	116	8	3	3	4	28	3
25	6	10	12	20	35	112	8	3	3	3	21	2
26	6	10	12	800	65	110	8	3	3	3	19	2
27	6	10	12	399	96	100	8	3	3	3	19	2
28	6	10	13	153	142	87	8	2	3	2	15	2
29	7	10	14	78	.....	78	7	2	3	2	12	2
30	7	10	13	42	.....	73	7	2	3	2	9	2
31	8	.....	14	20	.....	68	.....	2	.....	2	6	.....

NOTE.—Recorder not operating Oct. 23 to Nov. 6, Dec. 26, Jan. 27 to Feb. 20, June 23 to Aug. 2, Aug. 9, Aug. 28 to Sept. 17; discharge based on frequent staff gage readings.

Monthly discharge of Agua Fria River near Glendale, Ariz., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	12	5	7.84	482
November	10	7	8.73	519
December	14	10	11.0	676
January	800	13	59.5	3,660
February	142	9	23.8	1,320
March	1,290	32	219	13,500
April	58	7	20.5	1,220
May	6	2	3.6	221
June	267	2	13.7	815
July	64	2	14.1	867
August	1,500	2	169	10,400
September	64	2	9.47	564
The year	1,500	2	47.2	34,200

HASSAYAMPA RIVER NEAR WAGONER, ARIZ.

LOCATION.—Near line between secs. 23 and 26, T. 11 N., R. 3 W., at road crossing opposite Shride's ranch, 2½ miles above mouth of Milk Creek, 4½ miles above Wagoner, Yavapai County, 6 miles above Walnut Grove dam site, and 25 miles northeast of Wickenburg.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 21, 1912, to June 13, 1918, when station was discontinued.

GAGE.—Vertical staff on right bank; read by E. W. Shride. On December 10, 1916, an auxiliary gage was installed on left bank about 300 feet below regular gage for use when stream shifts away from regular gage. This gage was used from October 1 to April 15.

DISCHARGE. MEASUREMENTS.—Made by wading or from cable.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.90 feet (temporary gage) at 7.30 a. m. March 8 (discharge, 560 second-feet); minimum discharge, about 1 second-foot, part of October, January, May, and June. The stream is dry at the gage during periods nearly every year.

DIVERSIONS.—Nearly entire low-water flow is diverted for irrigation above the station.

ACCURACY.—Stage-discharge relation continually changing. Rating curves poorly defined. Gage read to hundredths twice daily. Records poor.

Discharge measurements of Hassayampa River near Wagoner, Ariz., during the year ending Sept. 30, 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 7	E. W. Shride	0.20	1.2	Feb. 8	Ellsworth and Shride	0.24	2.9
Nov. 5	do	.24	5.4	25	E. W. Shride	.40	15.3
Dec. 16	do	.26	3.2	Mar. 9	do	.34	8.3
Jan. 21	do	.10	4.5	12	do	1.29	255
Feb. 7	C. E. Ellsworth	.23	2.4	May 14	do	5.20	1.5

NOTE.—All measurements except that of May 14 were referred to auxiliary gage.

Daily discharge, in second-feet, of Hassayampa River near Wagoner, Ariz., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	1	5	3	3	3	5	15	1	1
2	1	5	3	2	3	5	15	1	1
3	1	5	3	1	3	5	15	1	1
4	1	5	3	1	3	5	15	1	1
5	1	5	3	1	2	5	15	1	1
6	1	5	3	2	2	5	15	1	1
7	1	5	3	3	3	20	7	1	1
8	1	5	3	3	3	500	5	1.5	1
9	1	5	3	3	3	8	7	5	1
10	1	5	3	3	3	8	7	5	1
11	1	5	3	3	3	8	7	5	1
12	1	5	3	3	3	255	7	5	1
13	1	5	3	3	5	60	7	1.5	1
14	1	5	3	4	5	40	7	1.5	.....
15	8	5	3	4	5	35	4	1.5	.....
16	7	4	3	4	5	35	4	1.5	.....
17	7	4	3	4	5	10	4	1.5	.....
18	7	4	3	4	5	10	4	1.5	.....
19	7	4	3	4	5	10	4	1.5	.....
20	7	4	3	4	5	15	4	1.5	.....
21	7	4	3	4	5	15	3	1.5	.....
22	7	4	3	5	5	15	3	1.5	.....
23	7	4	3	5	5	15	3	1.5	.....
24	7	4	3	5	5	20	3	1.5	.....
25	7	4	3	5	15	17	3	1.5	.....
26	7	4	3	20	7	15	2	1.5	.....
27	7	4	3	10	5	15	2	1.5	.....
28	7	4	3	3	5	15	2	1.5	.....
29	5	4	3	3	.....	15	2	1.5	.....
30	5	4	3	3	.....	15	2	1	.....
31	5	.....	3	3	.....	15	.....	1	.....

Monthly discharge of Hassayampa River near Wagoner, Ariz., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	8	1	4.1	252
November	5	4	4.5	268
December	3	3	3.0	184
January	20	1	4.0	246
February	15	2	4.5	250
March	500	5	39.2	2,410
April	15	2	6.4	381
May	5	1	1.8	111
June 1–13	1	1	1.0	25.8
The period	.....	.....	.....	4,130

WHITEWATER BASIN.

WHITEWATER DRAW NEAR DOUGLAS, ARIZ.

LOCATION.—In sec. 10, T. 24 S., R. 27 E., opposite city pumping plant, a quarter of a mile above highway bridge, a quarter of a mile above El Paso & Southwestern Railroad bridge, 1 mile above electric railway bridge, and about 1¼ miles west of Douglas, Cochise County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 24 to October 10, 1911, at electric railway bridge; July 21, 1912, to February 15, 1916, at highway bridge; and February 16, 1916, to September 30, 1918, at present location.

GAGE.—Vertical and inclined staff on right bank opposite city pumping plant; read by Mrs. L. E. King and Mrs. Joseph Harris. Original gage installed in August, 1911, at electric railway bridge was read until October 10, 1911. On July 21, 1912, station was moved three-quarters of a mile upstream to highway bridge. Datum was raised 3.00 feet January 20, 1915. February 16, 1916, station was moved a quarter of a mile upstream to its present location and gage set at an independent datum.

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

CHANNEL AND CONTROL.—Bed composed of sand and gravel; shifts frequently. Slag dumped into the channel below the gage causes backwater at the gage and scours out at high water.

EXTREMES OF DISCHARGE.—Maximum stage during year, 8.0 feet July 15 (discharge, from extension of rating curve, about 1,050 second-feet); minimum discharge about 0.2 second-foot between floods.

1911–1918: maximum stage recorded, 13.6 feet at 9 a. m. December 23, 1914 (discharge, from extension of rating curve, about 3,000 second-feet). Stream dry or carries less than 0.5 second-foot the greater part of each year.

DIVERSIONS.—Some flood water is diverted above station for irrigation, quantity unknown.

ACCURACY.—Stage-discharge relation changes frequently. Rating curve defined by measurements made during 1919 was used. On days when discharge was greater than ordinary seepage flow (about 0.2 second-foot) gage was read twice daily to half-tenths and during rapidly fluctuating stages, oftener. On account of the extremely flashy character of the flow the assumption that the average of the observed gage heights was the mean for the day may cause considerable error. Daily discharge determined by applying mean daily gage height to rating table. Records fair.

Discharge measurement of Whitewater Draw near Douglas, Ariz., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Nov 21	J. B. Spiegel	3.33	0.2
Jan. 22	do	4.5	.1
Apr. 26	C. E. Ellsworth	3.45	.5

Daily discharge, in second-feet, of Whitewater Draw near Douglas, Ariz., for the year ending Sept. 30, 1918.

Day.	Nov.	Jan.	Feb.	Mar.	Apr.	June.	July.	Aug.	Sept.
1				0.3			4.0	a 0.4	a 0.3
2							184	a .4	a .3
3							90	a .4	a .3
4							18	a .4	a .3
5							2.0	a .4	a .3
6							.5	64	a .3
7							a .4	26	a .3
8							a .4	83	a .3
9							175	18	a .3
10							45	4.0	a .3
11							45	a .4	a .3
12							2.0	a .4	a .3
13							.4	a .4	a .3
14							.3	a .4	a .3
15							550	a .4	a .3
16							57	a .4	a .3
17							7	a .4	a .3
18							2.0	a .4	70
19							.4	a .4	2.0
20							.3	a .4	.4
21	0.2						83	a .4	a .3
22		0.2				26	7	a .4	a .3
23						4.0	.6	43	a .3
24						a .4	26	37	a .3
25						a .4	127	16	a .3
26					0.2	a .4	35	.6	a .3
27						a .4	104	.3	a .3
28			1.0			a .4	97	a .3	a .3
29						a .4	a 62	a .3	a .3
30						a .4	26	a .3	a .3
31							4.0	a .3	

a Gage not read, discharge estimated.

NOTE.—No gage readings made except during floods; flow for days when no discharge is given is about 0.2 second-foot.

Monthly discharge of Whitewater Draw near Douglas, Ariz., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October			a 0.2	12.3
November			a .2	11.9
December			a .2	12.3
January			a .2	12.3
February			b .23	12.8
March			a .3	18.4
April			a .2	11.9
May			a .2	12.3
June	26		b 1.23	73.2
July	550	0.3	56.6	3,480
August	83	.3	9.67	595
September	70	.3	2.68	159
The year	550		6.10	4,410

a Estimated. b Partly estimated.

MISCELLANEOUS MEASUREMENTS.

In addition to the records of flow obtained at the gaging stations, and reported in the preceding pages, many measurements were made at other points, as shown by the following table:

Miscellaneous discharge measurements in Colorado River drainage basin during the year ending Sept. 30, 1918.

Date.	Stream.	Tributary to or diverting from—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
June 17	Vernal Milling & Light Co.'s power canal.	Ashley Creek	Sec. 18, T. 3 S., R. 21 E., above penstock of Vernal Milling & Light Co.'s power house near Vernal, Utah.		30
Feb. 13	Vernal Milling & Light Co.'s tailrace.	do	Sec. 18, T. 3 S., R. 21 E., at Vernal Milling & Light Co.'s power house, at former gaging station, "Vernal Milling & Light Co.'s tailrace near Vernal, Utah."	1.18	24
Apr. 21	do	do	do	.90	15
June 17	do	do	do	.98	17
Aug. 4	do	do	do	.45	2.8
6	Rock Creek	Duchesne River	Sec. 1, T. 2 S., R. 6 W., at gaging station maintained by Knight Investment Co., on south edge of Uinta National Forest, 12 miles southeast of Mountain Home, Utah.	1.52	140
Nov. 23	Currant Creek	Strawberry River	Sec. 22, T. 3 S., R. 9 W., half a mile below Deep Creek, near Fruitland, Utah.	4.43	45
Feb. 9	do	do	do	4.28	31
Apr. 8	do	do	do	4.42	43
June 20	do	do	do	4.76	89
July 29	do	do	do	4.20	33
Nov. 25	Cottonwood Creek	Duchesne River	Sec. 2, T. 4 S., R. 4 W., below all diversions; 5 miles east of Duchesne, Utah.	6.17	.2
Feb. 10	do	do	do	Ice.	1.0
Apr. 10	do	do	do	6.10	.4
June 19	do	do	do	5.98	.1
July 31	do	do	do	5.67	.1
Nov. 15	Uinta River	Duchesne River	Sec. 35, T. 2 S., R. 1 E., 100 feet below diversion of Henry Jim canal, and 2 miles south of Fort Duchesne, Utah. At former gaging station, "Uinta River at Fort Duchesne, Utah."	4.46	110
Feb. 14	do	do	do	Ice.	64
Apr. 18	do	do	do	3.86	20
June 15	do	do	do	5.24	446
Aug. 3	do	do	do	3.40	2
Nov. 27	Farm Creek	Uinta River	SE. ¼ sec. 2, T. 1 N., R. 1 W., 3 miles above mouth, 5 miles northwest of Whiterocks, Utah.	7.45	2.6
Feb. 12	do	do	do	7.35	1.6
Apr. 15	do	do	do	8.49	3.2
Nov. 11	do	do	do	7.62	2.5
Apr. 24	Pack Creek	Mill Creek	Half a mile above mouth, at Moab, Utah. Below all diversions.		1.1
July 9	do	do	do		1.6
Apr. 27	Ash Creek	Virgin River	SW. ¼ sec. 2, T. 41 S., R. 13 W., at Toquerville, Utah.		1.5
27	La Verkin Creek	Ash Creek	State road crossing near La Verkin, Utah.		20
Aug. 10	Leeds Creek	Virgin River	N. ½ sec. 36, T. 40 S., R. 14 W., below Leeds canal diversion near Leeds, Utah.		.2
10	Savage canal	Leeds Creek	N. ½ sec. 36, T. 40 S., R. 14 W., at head, near Leeds, Utah.		.2
Apr. 27	Leeds canal	do	do		8.1
Aug. 10	do	do	do		5.4
Oct. 14	Santa Clara Creek	Virgin River	Sec. 16, T. 42 S., R. 16 W., at former gaging station, "Santa Clara Creek at Santa Clara, Utah."	1.56	11
Apr. 26	do	do	do		4.6
Aug. 12	Hunt's Spring	Santa Clara Creek	Sec. 11, T. 39 S., R. 16 W.; enters Santa Clara Creek 10 feet below gaging station, "Santa Clara Creek near Central, Utah."		2.1
Apr. 26	Central canal	do	Central, Utah		8.3

Miscellaneous discharge measurements in Colorado River drainage basin during the year ending Sept. 30, 1918—Continued.

Date.	Stream.	Tributary to or diverting from—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Apr. 26	South canal	Santa Clara Creek	Santa Clara, Utah		2.0
26	North canal	do	do		2.2
Nov. 14	Muddy River	Virgin River	SE. ¼ sec. 15, T. 14 S., R. 65 E., at former gaging station, "Muddy River near Moapa, Nev."	1.20	48
Jan. 28	do	do	do	1.24	49
July 29	do	do	do	1.00	34
Sept. 10	do	do	do	1.23	46
Jan. 29	do	do	SW. ¼ sec. 26, T. 14 S., R. 65 E., at former gaging station, "Muddy River above Indian Reservation, near Moapa, Nev."	2.48	50
July 30	do	do	do	1.96	34
Aug. 8	do	do	do	2.16	41
Jan. 23	do	do	Sec. 5, T. 15 S., R. 66 E., at former gaging station, "Muddy River at railroad pumping plant, near Moapa, Nev."	.72	45
Oct. 4	do	do	NE. ¼ sec. 2, T. 15 S., R. 66 E., at former gaging station, "Muddy River at Weiser ranch, near Moapa, Nev."	.62	37
Jan. 31	do	do	do	.51	46
Aug. 16	do	do	do	.38	37
Oct. 5	do	do	Sec. 13, T. 17 S., R. 68 E., at former gaging station, "Muddy River near St. Thomas, Nev."	1.70	5.0
Nov. 3	do	do	do	1.85	11
Dec. 2	do	do	do	2.01	18
Jan. 9	do	do	do	1.96	24
Feb. 3	do	do	do	1.86	23
Mar. 3	do	do	do	2.00	33
July 17	do	do	do	1.43	6.3
Aug. 3	do	do	do	1.21	.5
Sept. 19	do	do	do	.78	4.8
Oct. 25	Gila River	Colorado River	Near Duncan, Ariz	2.13	55
25	do	do	do	2.13	57
Jan. 3	do	do	do	2.30	85
3	do	do	do	2.30	82
May 2	do	do	do	2.38	45
2	do	do	do	2.38	42
21	do	do	Above Florence canal intake near Florence, Ariz.		16
Aug. 21	do	do	Enterprise canal dam near Arlington, Ariz.		330
21	do	do	Above Arlington canal intake near Buckeye, Ariz.		285
21	do	do	Below Buckeye canal near Liberty, Ariz.		229
Nov. 15	San Pedro River	Gila River	Mouth, near Winkelman, Ariz.		9
Jan. 19	do	do	do		29
19	do	do	do		30
Mar. 1	do	do	do		84
30	do	do	do		6
30	do	do	do		6
Apr. 18	do	do	do		3
28	do	do	do		5
May 22	do	do	do		3.7
June 27	do	do	do		.5
Apr. 27	Boquillas Land & Cattle Co.'s West Side ditch.	Diverts from San Pedro River.	Near Fairbank, Ariz		2.8
27	Boquillas Land & Cattle Co.'s East Side ditch.	do	do		3.6
Feb. 22	Queen Creek	Gila River	Dam site near Superior, Ariz.		1.2
May 5	do	do	do		3
22	do	do	do		.7
Apr. 25	Camberos ditch	Diverts from Santa Cruz River.	Near Nogales, Ariz		1.8
June 8	Beaver Creek	Verde River	½ mile above gage at Camp Verde, Ariz.		.8
Feb. 7	Hassayampa River	Gila River	Walnut Grove dam site	3.12	6
Aug. 21	Buckeye canal	Diverts from Gila River.	Intake, near Liberty, Ariz		61

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