DEPARTMENT OF THE INTERIOR
FRANKLIN K. LANE, Secretary

UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, Director

WATER-SUPPLY PAPER 409

RFACE WATER SUPPLY OF THE UNITED STATES

1915

PART IX. COLORADO RIVER BASIN

NATHAN C. GROVER, Chief Hydraulic Engineer
OBERT FOLLANSBEE, E. A. PORTER, and C. C. JACOB, District Engineers

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

WASHINGTON
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SURFACE WATER SUPPLY OF COLORADO RIVER BASIN, 1915.

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, 1915.

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

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

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

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

Annual appropriations for the fiscal years ending June 30, 1895-1916.

1895	$12,500
1896	20,000
1897 to 1900, inclusive	50,000
1901 to 1902, inclusive	100,000
1903 to 1906, inclusive	200,000
1907	150,000
1908 to 1910, inclusive	100,000
1911 to 1916, inclusive	150,000

In the execution of the work many private and State organizations have cooperated, either by furnishing data or by assising in collecting data. Acknowledgments for cooperation of the first kind are made in connection with the description of each station affected; cooperation of the second kind is acknowledged on page 13.

Measurements of stream flow have been made at about 3,800 points in the United States and also at many points in Alaska and the Hawaiian Islands. In July, 1915, 1,350 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 the regular water-supply papers from time to time. Information in regard to publications relating to water resources is presented in the appendix to this report.

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, miner's inches, and discharge in second-feet per square mile, and (2) those that represent the actual quantity of water, as run-off in depth 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 rectangle 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 by the use of the factors given in the tables of convenient equivalents (p. 9).

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

"Run-off depth in inches" is the depth to which 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 of 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 expression "relation of gage height to discharge."

"Control," a term used to designate the section or sections of the stream 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 surface of the river would fall if there were no flow.

CONVENIENT EQUIVALENTS.

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

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

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

NOTE.—For part of month multiply run-off for 1 day by the number of days.

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

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

NOTE.—For part of a month multiply the run-off for 1 day by the number of days.

Table for converting discharge in second-feet into run-off in millions of cubic feet.

Discharge (second-feet).	Run-off (millions of cubic feet).				
	1 day.	28 days.	29 days.	30 days.	31 days.
1	0.0864	2.419	2.506	2.592	2.678
2	.1728	4.838	5.012	5.184	5.356
3	.2592	7.257	7.518	7.776	8.034
4	.3456	9.676	10.02	10.37	10.71
5	.4320	12.10	12.53	12.96	13.39
6	.5184	14.51	15.04	15.55	16.07
7	.6048	16.93	17.54	18.14	18.75
8	.6912	19.35	20.05	20.74	21.42
9	.7776	21.77	22.55	23.33	24.10

NOTE.—For part of a month multiply the run-off for 1 day by the number of days.

Table for converting discharge in second-feet into run off in millions of gallons.

Discharge (second-feet).	Run-off (millions of gallons).				
	1 day.	28 days.	29 days.	30 days.	31 days.
1	0.6463	18.10	18.74	19.39	20.04
2	1.293	36.20	37.48	38.78	40.08
3	1.939	54.30	56.22	58.17	60.12
4	2.585	72.40	74.96	77.56	80.16
5	3.232	90.50	93.70	96.95	100.2
6	3.878	108.6	112.4	116.3	120.2
7	4.524	126.7	131.2	135.7	140.3
8	5.171	144.8	149.9	155.1	160.3
9	5.817	162.9	168.7	174.5	180.4

NOTE.—For part of a month multiply the run-off for 1 day by the number of days.

Table for converting velocity in feet per second into velocity in miles per hour.

[1 foot per second=0.681818 mile per hour, or two-thirds mile per hour, very nearly; 1 mile per hour=1.4668 feet per second. In computing the table the values 0.68182 and 1.4667 were used.]

Feet per second (units).	Miles per hour for tenths of foot per second.									
	0	1	2	3	4	5	6	7	8	9
0	0.000	0.068	0.136	0.205	0.273	0.341	0.409	0.477	0.545	0.614
1	.682	.750	.818	.886	.995	1.02	1.09	1.16	1.23	1.300
2	1.36	1.43	1.50	1.57	1.64	1.70	1.77	1.84	1.91	1.98
3	2.05	2.11	2.18	2.25	2.32	2.39	2.45	2.52	2.59	2.66
4	2.73	2.80	2.86	2.93	3.00	3.07	3.14	3.20	3.27	3.34
5	3.41	3.48	3.55	3.61	3.68	3.75	3.82	3.89	3.95	4.02
6	4.09	4.16	4.23	4.30	4.36	4.43	4.50	4.57	4.64	4.70
7	4.77	4.84	4.91	4.98	5.05	5.11	5.18	5.25	5.32	5.39
8	5.45	5.52	5.59	5.66	5.73	5.80	5.86	5.93	6.00	6.07
9	6.14	6.20	6.27	6.34	6.41	6.48	6.55	6.61	6.68	6.75

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

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

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

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

1 second-foot for one year (365 days) covers 1 square mile 1.131 feet, or 13.572 inches deep.

1 second-foot for one year (365 days) equals 31,536,000 cubic feet.

1 second-foot equals about 1 acre-inch per hour.

1 second-foot for one year (365 days) equals 724 acre-feet.

1 second-foot for one day equals 86,400 cubic feet.

1,000,000,000 (1 United States billion) cubic feet equals 11,570 second-feet for one day.

1,000,000,000 cubic feet equals 414 second-feet for one 28-day month.

1,000,000,000 cubic feet equals 399 second-feet for one 29-day month.

1,000,000,000 cubic feet equals 386 second-feet for one 30-day month.

1,000,000,000 cubic feet equals 373 second-feet for one 31-day month.

100 California miner's inches equals 18.7 United States gallons per second.

100 California miner's inches for one day equals 4.96 acre-feet.

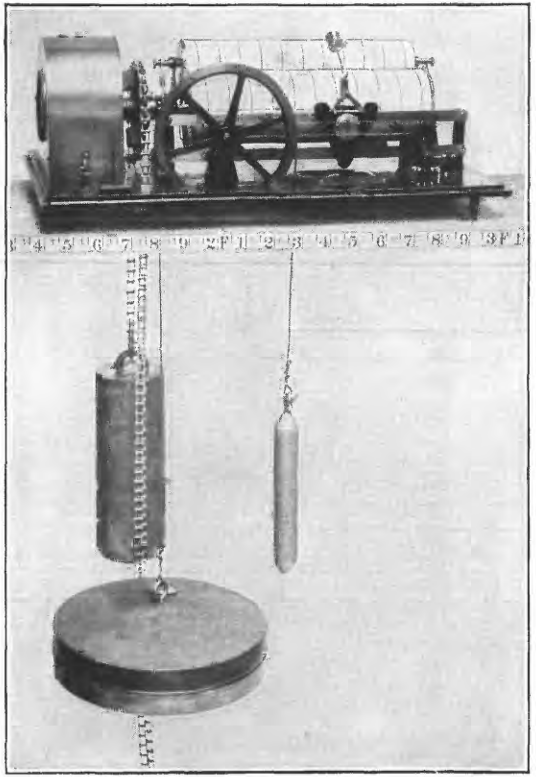
100 Colorado miner's inches equals 2.60 second-feet.

100 Colorado miner's inches equals 19.5 United States gallons per second.

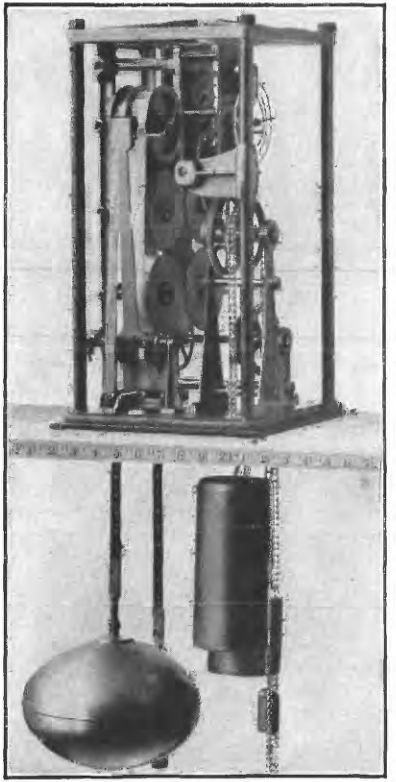
100 Colorado miner's inches for one day equals 5.17 acre-feet.

100 United States gallons per minute equals 0.223 second-foot.

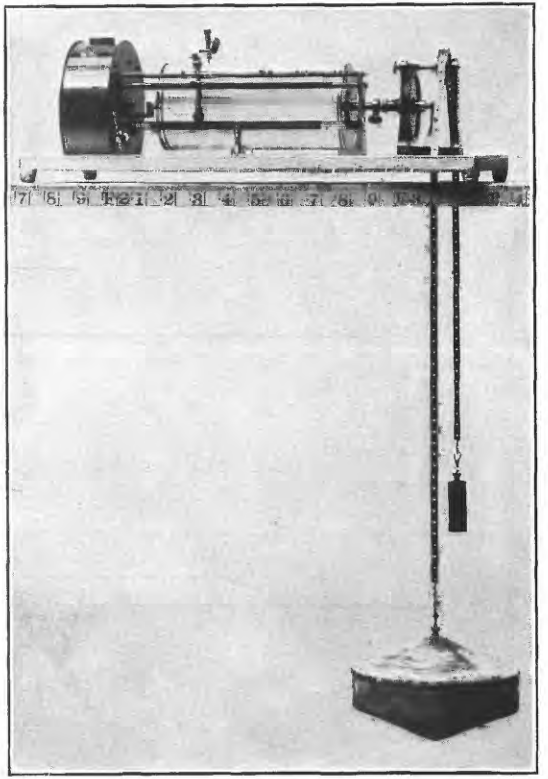
100 United States gallons per minute for one day equals 0.442 acre-foot.



A. STEVENS.

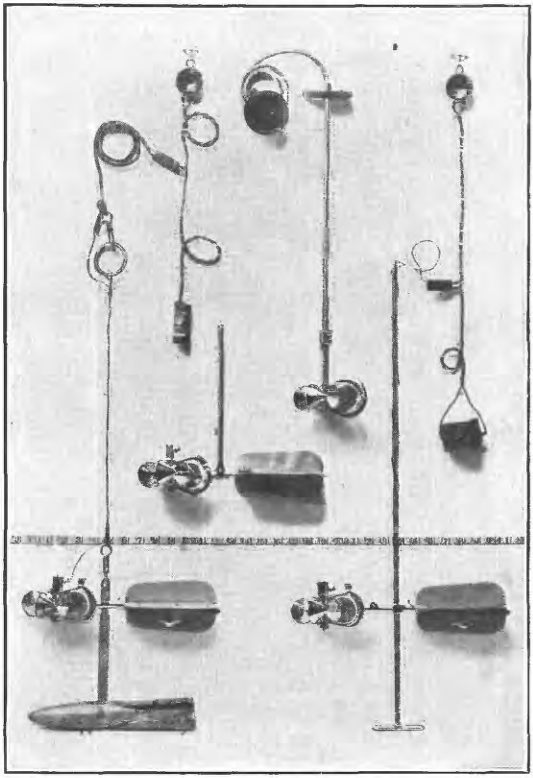


B. GURLEY PRINTING.

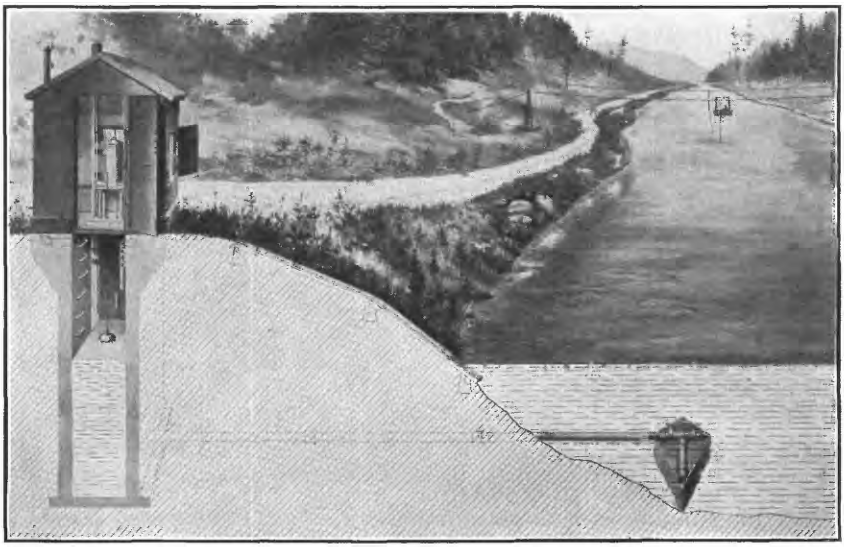


C. FRIEZ.

WATER-STAGE RECORDERS.



A. PRICE CURRENT METERS.



B. TYPICAL GAGING STATION.

1,000,000 United States gallons per day equals 1.55 second-feet.
1,000,000 United States gallons equals 3.07 acre-feet.
1,000,000 cubic feet equals 22.95 acre-feet.
1 acre-foot equals 325,850 gallons.
1 inch deep on 1 square mile equals 2,323,200 cubic feet.
1 inch deep on 1 square mile equals 0.0737 second-foot per year.
1 foot equals 0.3048 meter.
1 mile equals 1.60935 kilometers.
1 mile equals 5,280 feet.
1 acre equals 0.4047 hectare.
1 acre equals 43,560 square feet.
1 acre equals 209 feet square, nearly.
1 square mile equals 2.59 square kilometers.
1 cubic foot equals 0.0283 cubic meter.
1 cubic foot of water weighs 62.5 pounds.
1 cubic meter per minute equals 0.5886 second-foot.
1 horsepower equals 550 foot-pounds per second.
1 horsepower equals 76.0 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horsepower equals 1 second-foot falling 8.80 feet.
1½ horsepower equals about 1 kilowatt.

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

EXPLANATION OF DATA.

The data presented in this report cover the year beginning October 1, 1914, and ending September 30, 1915. At the 1st of January in most parts of the United States much of the precipitation in the preceding three months is stored as ground water, in the form of snow or ice, or in ponds, lakes, and swamps, and this stored water passes off in the streams during the spring break-up; at the end of September, on the other hand, the only stored water available for run-off is possibly a small quantity in the ground; therefore the run-off for the year beginning October 1 is practically all derived from precipitation within that year.

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

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 daily discharge from which the 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 constancy of the stage-discharge relation, covering such subjects as the occurrence of ice, the use of the stream for log driving, shifting of channel, 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 fluctuation the discharge obtained from the rating table and the mean daily gage height may not be the true mean discharge for the day. When such stations are equipped with water-stage recorders, the true mean daily discharge may be obtained by computing the mean daily gage height and applying it to the rating table, by averaging quantities of discharge for regular intervals during the day, or by means of a 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 that 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 8, are based.

ACCURACY OF FIELD DATA AND COMPUTED RESULTS.

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

Footnotes added to the daily-discharge tables give information regarding the probable accuracy of the rating tables used, and an

accuracy column is inserted in the monthly-discharge table. For the rating tables, "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined," 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 letter in the column headed "Accuracy," in the monthly-discharge table, rates the accuracy of the monthly mean and not that of the estimate of maximum or minimum discharge or the discharge for any one day. The rating is determined by considering the accuracy of the rating curve, the probable reliability of the observer, the number of gage readings per day, the range of the fluctuation in stage, and local conditions. In this column A indicates that determination of the mean monthly flow is probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

The monthly means for any station may represent with high accuracy the quantity of water flowing past the gage, but the figures showing discharge per square mile and depth of run-off in inches may be subject to gross errors caused by the inclusion of large noncontributing 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 (depth in inches)" are therefore not computed if such errors appear probable. The computations are also omitted for stations on streams draining areas in which the annual rainfall is less than 20 inches. All figures representing "second-feet per square mile" and "run-off (depth 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, Nevada, 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 State Agricultural Experiment Station; W. M. Kearney, State engineer of Nevada; W. D. Beers, State engineer of Utah; and J. B. True, State engineer of Wyoming.

The State engineer of Colorado, John E. Field, furnished records for a number of stations in the Grand River basin.

The United States Forest Service furnished gage records for many stations on streams in or near the national forests, the Reclamation Service furnished field data for a number of stations in the Grand River basin and the complete record for the station at Palisade, Colo., the Weather Bureau furnished the gage record for Grand River at Fruita, and the Office of Indian Affairs cooperated in maintaining the gaging stations on Gila River near Duncan, at Guthrie, near Solomonville, near San Carlos, and at Kelvin, on San Francisco River at Clifton, Ariz., and on San Carlos River at San Carlos, Ariz., and all canal stations in Gila River valley.

The Heber Land & Livestock Co. paid the observer on Blacks Fork near Urie, Wyo.

The Colorado Power Co. furnished the automatic gage on Grand River at Glenwood Springs.

The gaging station on Gila River near Sentinel was maintained in cooperation with the Southwestern Arizona Land & Irrigation Co.

Valuable assistance has been rendered to the States of Nevada and Utah and the United States Geological Survey by Leonard Tanner, water commissioner for Muddy River, in Nevada, and the Water Users Association of Monticello, Utah, through H. W. Sheley, consulting engineer, of Salt Lake City.

Assistance has also been furnished by C. E. Howell, S. C. Hulse, and W. M. Tait.

DIVISION OF WORK.

Data for stations in Arizona were collected and prepared for publication under the direction of C. C. Jacob and C. E. Ellsworth, district engineers, who were assisted by M. D. Anderson, J. B. Spiegel, and Wallace Adams.

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 R. H. Fletcher, W. R. King, M. N. Grant, jr., H. K. Smith, and Miss Jane Hanna.

For stations in Nevada and Utah data were collected and prepared for publication under the direction of E. A. Porter and C. C. Jacob, district engineers, who were assisted by Lynn Crandall, A. B. Purton, J. J. Sanford, L. W. Jordan, and Miss Ruby Christensen.

The records were reviewed and assembled by H. J. Dean, assistant engineer.

GAGING-STATION RECORDS.

GREEN RIVER AND THE MAIN COLORADO.

GREEN RIVER NEAR DANIEL, WYO.

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

DRAINAGE AREA.—932 square miles (measured on base map of Wyoming, scale, 1:500,000.

RECORDS AVAILABLE.—April 1 to September 30, 1915. State engineer maintained station at this point during 1913 and 1914.

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

DISCHARGE MEASUREMENTS.—Made from two-span bridge.

CHANNEL AND CONTROL.—Channel composed of coarse gravel and small boulders. Control is at small rapids 100 feet downstream. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.85 feet at 8 a. m. July 17 (discharge, 2,180 second-feet); minimum stage recorded, 2.25 feet at 8 a. m. September 23 (discharge, 272 second-feet).

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

DIVERSIONS.—Prior to December 31, 1916, there were adjudicated diversions of 212 second-feet from Green River above station.

REGULATION.—None.

ACCURACY.—Control permanent during year. Records considered excellent.

Discharge measurements of Green River, near Daniel, Wyo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 15	M. N. Grant, jr	2.68	525
June 10	R. H. Fletcher	3.11	976
July 29	Robert Follansbee	3.23	1,220

Daily discharge, in second-feet, of Green River near Daniel, Wyo., for the year ending Sept. 30, 1915.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day	Apr.	May.	June.	July.	Aug.	Sept.
1....	870	870	1,210	1,000	1,000	465	16....	695	465	810	2,180	621	286
2....	750	1,000	1,590	1,140	870	400	17....	810	400	750	1,750	621	295
3....	640	750	1,670	1,210	810	640	18....	810	505	810	1,430	592	305
4....	592	640	1,360	1,280	750	870	19....	870	640	870	1,280	564	305
5....	545	592	1,280	1,280	695	1,140	20....	870	750	870	1,140	545	320
6....	592	545	1,140	1,280	640	1,000	21....	870	640	750	1,140	529	335
7....	465	465	1,070	1,280	640	974	22....	935	481	640	1,140	505	295
8....	545	400	1,070	1,360	640	935	23....	1,000	545	870	1,140	481	272
9....	640	356	1,000	1,360	640	870	24....	935	592	1,000	1,210	465	295
10....	592	400	1,000	1,360	640	870	25....	870	640	1,140	1,280	465	400
11....	640	432	1,070	1,430	640	870	26....	750	810	1,280	1,360	465	750
12....	640	465	1,140	1,430	640	846	27....	640	695	1,280	1,430	465	870
13....	592	400	1,000	1,590	640	545	28....	640	695	1,280	1,510	545	870
14....	640	400	1,000	1,750	640	400	29....	640	695	1,140	1,280	529	846
15....	640	545	870	1,920	621	320	30....	750	1,000	1,000	1,210	505	750
							31....	.....	1,000	.....	1,140	481	.....

NOTE.—Discharge determined from rating curve well defined between 400 and 2,440 second-feet.

Monthly discharge of Green River near Daniel, Wyo., for the year ending Sept. 30, 1915

Month.	Discharge in second feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April	1,000	465	716	42,600	A.
May	1,000	356	607	37,300	A.
June	1,590	640	1,070	63,700	A.
July	2,180	1,000	1,360	83,600	A.
August	1,000	465	609	37,400	A.
September	1,140	272	611	36,400	A.
The period				301,000	

GREEN RIVER AT GREEN RIVER, WYO.

LOCATION.—At highway bridge a quarter of a mile south of railroad station at Green River, in Sweetwater County. No tributary within several miles.

DRAINAGE AREA.—7,670 square miles (measured on base map of Wyoming, scale, 1:500,000.)

RECORDS AVAILABLE.—May 2, 1895, to October 31, 1906; March 29 to September 30, 1915.

GAGE.—Chain gage on upstream side of left channel span; read twice daily by William Hutton, jr. From 1895 to 1906 a vertical staff was attached to submerged cribbing on east bank of river near pump house, a third of a mile above present location. No determined relation between gages.

DISCHARGE MEASUREMENTS.—Made from two-span bridge.

CHANNEL AND CONTROL.—Bed composed of compact gravel and small boulders with a sand bar on one side. Control shifted during the last part of 1915. Banks high and not subject to overflow at stages below 10.5 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.4 feet at 5 p. m., June 4 (discharge, 4,150 second-feet). Minimum discharge occurs during winter months.

WINTER FLOW.—Stage discharge relation seriously affected by ice.

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

REGULATION.—None.

ACCURACY.—Control permanent except for one shift in the last part of the year. Records as a whole considered excellent.

COOPERATION.—Gage-height record furnished by United States Weather Bureau.

Discharge measurements of Green River at Green River, Wyo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Sept. 20	Robert Follansbee	3.65	686	May 22	M. N. Grant, jr	4.98	1,840
Jan. 12	L. W. Jordan	[a] 5.50	329	June 4	R. H. Fletcher	6.42	4,160
Apr. 1	Robert Follansbee	4.03	1,020	14	do	5.81	3,070
May 12	R. H. Fletcher	4.31	1,260	Aug. 2	Robert Follansbee	4.72	1,590

[a] Complete ice cover.

Daily discharge, in second-feet, of Green River at Green River, Wyo., for the year ending Sept. 30, 1915.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	910	1,890	2,010	2,880	1,580	840
2	.....	1,140	2,410	2,270	2,720	1,580	805
3	.....	1,060	2,560	2,720	2,720	1,580	840
4	.....	1,140	2,410	3,960	2,720	1,480	1,060
5	.....	1,220	2,140	3,960	3,050	1,300	1,300
6	.....	1,220	1,890	3,770	3,050	1,220	2,010
7	.....	1,390	1,680	3,580	2,880	1,220	1,580
8	.....	1,480	1,580	3,220	3,050	1,300	1,300
9	.....	2,140	1,390	2,720	3,220	1,300	1,300
10	.....	1,580	1,300	2,410	3,220	1,300	1,220
11	.....	1,580	1,220	2,560	3,050	1,220	1,140
12	.....	1,480	1,220	2,720	2,880	1,220	980
13	.....	1,480	1,220	2,880	2,880	1,140	980
14	.....	1,390	1,220	3,050	2,880	1,140	945
15	.....	1,300	1,140	2,720	3,400	1,140	945
16	.....	1,220	1,220	2,560	3,770	1,060	980
17	.....	1,220	1,480	2,270	3,770	1,060	980
18	.....	1,220	1,480	2,010	3,580	1,060	910
19	.....	1,300	1,480	2,140	3,050	945	875
20	.....	1,300	1,480	2,410	2,560	875	840
21	.....	1,390	1,680	2,720	2,270	945	805
22	.....	1,390	1,780	2,560	2,010	875	805
23	.....	1,580	1,680	2,410	1,890	875	805
24	.....	1,680	1,580	2,410	1,780	875	738
25	.....	1,680	1,480	2,720	1,680	875	805
26	.....	1,680	1,480	2,720	1,580	980	2,300
27	.....	1,580	1,480	3,050	1,680	945	3,600
28	.....	1,580	1,680	3,400	1,780	910	2,580
29	945	1,580	1,580	3,580	1,680	875	2,040
30	910	1,580	1,580	3,220	2,560	840	1,810
31	805	.....	1,680	.....	1,780	840	.....

NOTE.—Discharge determined as follows: Mar. 29 to Sept. 25, from rating curve well defined throughout; Sept. 26–30 by indirect method for shifting control.

Monthly discharge of Green River at Green River, Wyo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off total (in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April	2,140	910	1,420	84,500	A.
May	2,560	1,140	1,620	99,600	A.
June	3,960	2,010	2,820	168,000	A.
July	3,770	1,580	2,650	163,000	A.
August	1,580	840	1,110	68,200	A.
September	3,600	738	1,270	75,600	B.
The period	.....	.....	.....	659,000	

GREEN RIVER AT BRIDGEPORT, UTAH.

LOCATION.—In sec. 31, T. 2 N., R. 25 E., about half a mile below Sears Creek and the ferry at Bridgeport post office, and about 40 miles northeast of Vernal.

DRAINAGE AREA.—15,700 square miles (measured on special map of Colorado River basin).

RECORDS AVAILABLE.—October 1, 1914, to September 30, 1915. Records were obtained October 12, 1911, to September 30, 1914, at station 5 miles below; flow practically the same at both points.

GAGE.—Gurley printing water-stage recorder on right bank. From October 12, 1911, to September 30, 1914, records were obtained from a staff gage at Park Livestock Co.'s ferry near the headquarters ranch, about 5 miles below the present gage.

DISCHARGE MEASUREMENTS.—Made from car on ferry cable or by wading.

CHANNEL AND CONTROL.—Bed for 300 or 400 feet above and below gage is of solid rock overlain in places with clean gravel. Current swift above and below gage; control should be fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year, 6.72 feet at 1.30 a. m. June 6 (discharge, 6,810 second-feet); minimum stage recorded, 1.35 feet February 28 (discharge, 495 second-feet). Mean flow December 5–31 estimated 465 second-feet.

1911–1914: Maximum stage recorded at old gage, 13.4 feet June 13, 14, 1912 (discharge, 16,900 second-feet); minimum stage recorded, 3.0 during January and February, 1912; stage-discharge relation affected by ice. Mean discharge for January estimated 550 second-feet. Mean flow December 5–31, 1914, estimated 465 second-feet.

WINTER FLOW.—Stage-discharge relation seriously affected by ice. Flow estimated from one current-meter measurement made in January, 1916, comparison with records at Little Valley, and a study of reports on precipitation and temperature.

DIVERSIONS.—The amount of water diverted above is not definitely known.

REGULATION.—None.

ACCURACY.—Open-water records considered good; winter records fair.

Discharge measurements of Green River at Bridgeport, Utah, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 17	Lynn Crandall	3.30	2,160	June 17	Lynn Crandall	5.30	4,750
18	do	3.77	2,780	17	do	5.23	4,560
May 24	L. W. Jordan	4.24	3,380	Aug. 13	R. C. Pierce	2.43	1,280
25	do	4.10	3,280	13	do	2.43	1,280

Daily discharge, in second-feet, of Green River at Bridgeport, Utah, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	916	1,170			500	1,640	2,880	3,200	4,420	2,320	868
2	924				500	1,600	3,010	3,900	4,100	2,200	846
3	924				550	1,580	3,130	4,420	3,810	2,060	892
4	1,140		505		550	1,630	3,200	4,620	3,640	1,970	1,000
5					545	1,640	3,200	6,030	3,640	1,890	1,240
6					540	1,640	3,070	6,330	3,780	1,810	1,820
7					538	1,750	2,880	5,960	3,900	1,800	2,220
8					550	1,940	2,630	5,430	3,810	1,600	2,580
9		1,070			570	2,070	2,410	5,290	3,900	1,480	2,160
10					594	2,090	2,260	5,220	3,900	1,450	1,880
11					600	2,100	2,140	5,010	3,740	1,500	1,640
12					600	2,160	2,150	4,880	3,550	1,420	1,520
13					600	2,180	2,300	5,010	3,370	1,320	1,500
14					643	2,020	2,600	4,940	3,240	1,260	1,460
15						1,990	2,810	4,850	3,380	1,230	1,390
16						2,240	2,880	4,750	3,680	1,210	1,400
17	1,260					2,340	3,130	4,680	3,870	1,200	1,440
18						2,640	3,490	4,420	3,780	1,150	1,450
19						2,680	3,540	4,260	3,450	1,110	1,420
20						2,530	3,500	4,230	3,070	1,090	1,360
21		520			868	2,510	3,530	4,420	2,700	1,060	1,240
22					1,100	2,580	3,500	4,620	2,420	1,020	1,100
23					1,400	2,530	3,380	4,560	2,290	996	1,040
24					1,640	2,540	3,320	4,420	2,290	980	988
25	1,220			544	1,790	2,650	3,180	4,360	2,160	964	1,100
26				530	1,640	2,690	3,160	4,420	2,040	948	1,610
27				510	1,640	2,660	3,010	4,490	2,060	948	4,230
28		769		495	1,710	2,720	2,930	4,420	2,030	1,010	5,010
29		750			1,780	2,750	3,240	4,560	2,400	988	4,360
30		750			1,850	2,970	3,280	4,680	2,700	932	2,940
31					1,640		3,100		2,340	900	

NOTE.—Discharge determined from a well-defined rating surve. Water-stage recorder out of commission Oct. 5 to Mar. 23; discharge estimated or interpolated for days between staff-gage readings and for periods in which ice affected the stage-discharge relation, largely by comparison with the record of flow obtained at Little Valley, Utah. Mean flow estimated as follows: Oct. 5–16, 1,400 second-feet; Oct. 18–24, 1,240 second-feet; Oct. 26–31, 1,200 second-feet; Nov. 2–8, 1,100 second-feet; Nov. 10–15, 950 second-feet; Nov. 16–20, 640 secon-dfeet; Nov. 22–27, 600 second-feet; Dec. 1–3, 600 second-feet; Dec. 5–31, 465 second-feet; Jan. 1–31, 480 second-feet; Feb. 1–24, 490 second-feet; Feb. 26 and 27, Mar. 1, 2, 4, 5, 6, 8, 9, 11, 12, 13, as in table; Mar. 15–20, 750 second-feet; Mar. 22 and 23, 28 and 29 and June 15 and 16, as in table.

Monthly discharge of Green River at Bridgeport, Utah, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October			1,260	77,500	C.
November			841	50,000	C.
December			479	29,500	C.
January			480	29,500	C.
February			494	27,400	C.
March	1,850	500	950	58,400	C.
April	2,970	1,580	2,240	133,000	A.
May	3,540	2,140	2,990	184,000	A.
June	6,330	3,200	4,750	283,000	A.
July	4,420	2,030	3,210	197,000	A.
August	2,320	900	1,350	83,000	A.
September	5,010	846	1,790	107,000	A.
The year	6,330		1,740	1,260,000	

NOTE.—See footnote to table of daily discharge.

GREEN RIVER AT JENSEN, UTAH.

LOCATION.—In sec. 21, T. 5 S., R. 23 E., at steel highway bridge at Jensen, about 3 miles below mouth of Brush Creek and 2½ miles above Ashley Creek.

DRAINAGE AREA.—26,100 square miles. (Measured on special map of Colorado River basin).

RECORDS AVAILABLE.—November 7, 1903 to December 24, 1904; March 13 to September 30, 1906; June 30 to October 17, 1914; August 1 to December 15, 1915, when station was discontinued.

GAGE.—Chain gage on downstream rail of highway bridge, near right bank, read twice daily by H. W. Chatwin. The gage used November 7, 1903, to September 30, 1906, was a vertical staff about 300 feet below the old Billings ferry.

DISCHARGE MEASUREMENTS.—Made from highway bridge. Conditions only fair.

CHANNEL AND CONTROL.—Stream bed of sand and mud; shifting. Right bank high; not subject to overflow; left bank is occasionally overflowed at extreme high water. Channel straight for several hundred feet above and below bridge.

EXTREMES OF DISCHARGE.—Maximum stage recorded August 1 to December 15, 5.42 feet at 7.30 a. m. September 29 (discharge 7,180 second-feet); minimum stage, 1.55 feet at 5 p. m. November 29 (discharge, 680 second-feet).

1903-1915: Maximum stage recorded, 11.80 feet May 29, 1904 (discharge, 32,100 second-feet); minimum stage recorded, 0.93 foot December 6, 1904 (discharge 36 second-feet). Gage used in 1904 was not referred to same datum as present chain gage, but must have been approximately the same.

WINTER FLOW.—Stream freezes over occasionally during winter.

DIVERSIONS.—Considerable water diverted above this station in Wyoming and Utah but amount is not definitely known.

REGULATION.—None.

ACCURACY.—Records only fair, owing to unstable conditions in channel.

Discharge measurements of Green River at Jensen, Utah, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Aug. 16	R. C. Pierce	2.07	1,420	Oct. 31	L. W. Jordan	2.52	1,400

Daily discharge, in second-feet, of Green River at Jensen, Utah, for the period Aug. 1 to Dec. 15, 1915.

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,580	1,100	4,020	1,430	966	16	1,440	1,750	1,770	973	.....
2	2,580	1,080	3,470	1,420	910	17	1,400	1,820	1,850	775	.....
3	2,260	1,080	3,000	1,390	980	18	1,390	1,880	1,900	749	.....
4	2,030	1,140	2,750	1,370	1,040	19	1,350	1,900	1,880	966	.....
5	1,970	1,210	2,630	1,340	1,090	20	1,310	1,860	1,790	1,020	.....
6	1,900	1,270	2,520	1,360	1,060	21	1,270	1,800	1,790	1,210	.....
7	1,800	1,700	2,380	1,420	1,230	22	1,200	1,750	1,670	1,430	.....
8	1,760	2,220	2,300	1,420	1,230	23	1,180	1,660	1,660	1,620	.....
9	1,950	2,940	2,170	1,440	1,230	24	1,150	1,620	1,680	1,660	.....
10	1,620	2,520	2,170	1,650	1,280	25	1,140	1,900	1,640	1,690	.....
11	1,500	2,180	2,040	1,610	1,400	26	1,160	1,760	1,600	1,420	.....
12	1,530	1,940	1,910	1,530	1,340	27	1,150	2,040	1,580	1,270	.....
13	1,600	2,040	1,790	1,480	1,170	28	1,120	4,470	1,530	924	.....
14	1,590	2,110	1,780	1,310	1,190	29	1,140	6,780	1,480	762	.....
15	1,520	1,830	1,770	1,040	1,150	30	1,180	5,080	1,440	782	.....
						31	1,150	.....	1,420	.....	.....

NOTE.—Discharge determined from two fairly well-defined rating curves, applied Aug. 1 to Sept. 29, and Oct. 13 to Dec. 15. Discharge Sept. 30 to Oct. 12 determined by indirect method for shifting control.

Monthly discharge of Green River at Jensen, Utah, for the period Aug. 1, to Dec. 15, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
August	2,580	1,120	1,550	95,300	B.
September	6,780	1,080	2,150	128,000	B.
October	4,020	1,420	2,040	125,000	B.
November	1,690	749	1,280	76,200	B.
December 1–15	1,400	910	1,150	34,200	B.
The period	.....	.....	.....	459,000	

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

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

DRAINAGE AREA.—41,000 square miles.

RECORDS AVAILABLE.—December 18, 1910, to September 30, 1915. Records obtained at Green River (known also as Elgin or Blake) from 1894 to 1899, and 1905 to 1911 give practically the same flow.

GAGE.—Friez water-stage recorder on left bank about a mile above old ferry cable. Various gages at cable were in use from December 18, 1910, to November 6, 1914, when the Friez recorder was installed. The records at Green River were obtained from a chain gage at the Denver & Rio Grande Railroad bridge until December 2, 1910, when the gage was moved to the highway bridge 200 feet above.

DISCHARGE MEASUREMENTS.—Made from a car on the ferry cable.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.13 feet at 6 a. m. June 14 (discharge, 19,300 second-feet); minimum stage determined by comparison with old slope gage at cable −0.1 foot on December 19 (discharge, 1,100 second-feet).

1894 to 1898 and 1905 to 1915: Maximum discharge recorded, 68,800 second-feet, May 29, 1897; minimum discharge recorded, 750 second-feet December 5, 1908.

WINTER FLOW.—Stage-discharge relation seriously affected by ice. Mean flow estimated during January and February and parts of December and March from current-meter measurements and a study of temperature records and observer's notes.

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

REGULATION.—None.

ACCURACY.—Open-water records good.

Discharge measurements of Green River at Little Valley, Utah, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height at Green River Bridge.	Gage height at station.	Discharge.
			Feet.	*Sec.-ft.*
Nov. 8	L. W. Jordan	6.17	1.57	3,300
Dec. 29	J. J. Sanford	6.95	*a*.50	1,290
30	.....do	5.06	*a*.82	1,480
Feb. 7	.....do	6.15	*a*2.13	1,560
Mar. 27	L. W. Jordan	.....	1.78	3,600
April 9	.....do	.....	2.63	5,610
May 13	R. C. Pierce	.....	3.18	7,000
June 1	L. W. Jordan	.....	4.45	12,000
22	Lynn Crandall	9.2	5.27	15,100
July 15	L. W. Jordan	.....	2.83	6,020
Aug. 8	R. C. Pierce	.....	1.07	2,450
Sept. 15	L. W. Jordan	.....	1.39	3,000

a Stage-discharge relation affected by ice.

NOTE.—Measurements Nov. 8 to Feb. 7 made at highway bridge at Green River.

Daily discharge, in second-feet, of Green River at Little Valley, Utah, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3,960	3,680	2,260	.....	4,690	10,400	11,800	11,100	2,680	1,460
2	2,720	3,480	2,230	.....	4,810	11,500	12,200	10,500	2,580	1,470
3	2,800	3,480	1,980	.....	4,830	13,000	13,500	10,200	3,050	1,530
4	4,540	3,480	2,030	.....	4,810	13,900	15,500	9,380	2,930	1,740
5	3,480	3,480	1,970	.....	4,880	13,200	16,200	8,800	2,740	1,780
6	3,120	3,480	2,080	.....	4,950	11,900	18,300	8,320	2,640	1,730
7	4,340	3,300	2,140	2,440	5,070	10,900	17,200	7,960	2,550	1,980
8	3,860	3,290	2,240	2,470	5,410	9,900	17,000	7,640	2,530	2,290
9	3,480	3,270	2,230	2,470	5,610	9,270	17,100	7,480	2,420	2,070
10	3,680	3,210	1,970	2,520	6,140	8,560	16,800	7,320	2,340	1,960
11	5,270	3,120	1,440	2,610	6,080	8,020	17,000	7,190	2,200	2,260
12	5,710	3,110	1,260	2,640	5,900	7,510	17,600	6,860	2,260	2,770
13	4,540	3,030	1,180	2,820	6,140	7,260	18,800	6,500	2,230	3,090
14	4,540	2,980	.....	3,030	6,480	7,480	19,200	6,360	2,080	2,880
15	4,540	2,930	.....	3,560	6,740	7,700	18,300	6,080	1,890	2,920
16	4,340	2,880	.....	4,000	7,010	8,730	17,700	5,740	1,860	2,850
17	4,150	2,820	.....	3,450	7,290	10,700	15,900	5,460	1,900	2,900
18	4,150	2,690	.....	3,230	7,380	13,000	15,400	5,190	1,900	2,720
19	3,860	2,550	1,100	3,200	8,090	14,300	15,900	4,950	1,860	2,600
20	3,860	2,420	.....	3,290	8,980	14,400	15,900	4,830	1,840	2,470
21	3,860	2,290	.....	3,230	9,710	14,700	15,200	4,950	1,780	2,470
22	3,680	2,140	.....	3,270	9,980	13,900	15,200	5,020	1,760	2,470
23	3,680	2,000	.....	3,380	9,630	12,900	14,800	4,720	1,710	2,400
24	3,680	1,850	.....	3,410	10,400	11,800	15,200	4,500	1,680	2,400
25	3,480	1,670	.....	3,320	11,000	10,900	15,000	4,200	1,640	5,000
26	3,680	1,670	1,490	3,390	11,200	10,400	14,500	3,880	1,600	6,340
27	3,680	1,660	1,400	3,600	10,600	10,700	13,800	3,540	1,560	5,360
28	3,860	1,670	1,300	3,940	9,980	10,700	13,200	3,300	1,530	4,880
29	4,150	1,880	1,290	4,040	9,670	10,900	12,300	3,270	1,540	7,960
30	4,150	2,180	1,480	4,220	9,710	10,900	11,700	2,950	1,550	8,800
31	3,860	.....	1,500	4,540	.....	11,200	.....	2,740	1,500	.....

NOTE.—Discharge determined from two well-defined rating curves, one used Oct. 1 to Nov. 7, applicable to staff-gage readings, and one Nov. 7 to Dec. 26 and Mar. 7 to Sept. 30, applicable to gage heights obtained with the water-stage recorder. Mean flow interpolated Dec. 14 to 18, 1,140 second-feet, and estimated Dec. 20–25, 1,200 second-feet, while water was below intake. River frozen Dec. 27 to Mar. 6; flow estimated from current-meter measurements made Dec. 29 and 30 and Feb. 7, from climatic data, and observer's notes, as follows: Jan. 1–31, 1,500 second-feet; Feb. 1–11, 1,560 second-feet; and Feb. 12–28, 1,900 second-feet; Mar. 1–6, 2,000 second-feet.

Monthly discharge of Green River at Little Valley, Utah, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	5,710	2,720	3,960	243,000	B.
November	3,680	1,660	2,720	162,000	B.
December	2,260	1,100	1,530	94,100	C.
January	.....	.....	a1,500	92,200	C.
February	.....	.....	a1,770	98,300	C.
March	4,540	.....	3,030	186,000	B.
April	11,200	4,690	7,440	443,000	A.
May	14,700	7,260	11,000	676,000	A.
June	19,200	11,700	15,600	928,000	A.
July	11,100	2,740	6,160	379,000	A.
August	3,050	1,500	2,080	128,000	B.
September	8,800	1,460	3,120	186,000	A.
The year	19,200	1,100	4,990	3,620,000	

a Estimated.

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, about 1½ miles below mouth of Gila River.

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

RECORDS AVAILABLE.—April 1, 1878, to September 30, 1915.

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.—Shifting sand.

EXTREMES OF DISCHARGE.—1902–1915: Maximum mean daily discharge, 149,500 second-feet, June 24, 1909 (stage, 30.75 feet); minimum mean daily discharge, 2,600 second-feet, January 20, 1913 (stage, 13.95 feet).

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

REGULATION.—None.

ACCURACY.—Frequent current-meter measurements are made; discharge determined by indirect method for shifting control. Records considered good for a station of this type.

COOPERATION.—Results of current-meter measurements and record of daily discharge furnished by United States Reclamation Service, through F. L. Sellew, project manager.

Discharge measurements of Colorado River at Yuma, Ariz., during the year ending Sept. 30, 1915.

[Made by Cornes and Pierce.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 1	15.70	6,660	Nov. 2	16.90	12,800	Dec. 4	16.30	7,270
3	16.65	9,590	4	16.75	11,900	7	16.30	8,670
6	16.30	8,900	6	16.55	12,200	9	16.00	5,800
8	15.85	6,980	9	16.45	10,800	11	16.10	6,730
10	18.55	27,100	11	16.40	11,000	14	16.50	8,280
13	18.00	21,400	13	16.50	10,200	16	16.10	5,820
15	16.80	15,900	16	16.85	11,000	18	16.40	6,820
17	17.10	18,000	18	16.85	10,700	21	16.60	8,600
20	16.60	13,600	20	16.70	9,750	22	17.00	11,200
22	16.90	12,800	23	16.50	8,600	23	17.20	13,800
24	16.75	11,700	25	16.50	7,420	24	17.45	15,600
27	16.60	11,200	27	16.40	7,750	25	18.75	22,600
29	17.50	17,000	30	16.30	6,580	26	21.20	40,800
30	17.50	16,400	Dec. 2	16.20	7,380	28	21.90	50,000

Discharge measurements of Colorado River at Yuma, Ariz., during the year ending Sept. 30, 1915.—Continued.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Jan. 30	18.15	20,600	Apr. 2	19.50	24,400	July 2	21.70	56,800
4	16.20	9,860	4	19.50	24,000	6	20.30	46,700
6	16.10	9,780	7	19.30	23,700	9	19.50	38,100
8	16.00	9,650	9	19.05	21,900	13	18.60	31,400
11	15.80	7,780	12	19.30	23,700	16	18.00	26,500
13	15.70	6,840	14	19.50	27,000	19	17.80	23,200
15	15.85	6,730	16	19.65	28,400	21	17.90	21,200
18	15.85	5,690	19	19.50	27,000	23	17.70	19,600
20	16.00	5,670	21	19.70	26,400	26	17.20	18,200
23	16.35	7,210	23	21.05	38,700	28	17.30	16,400
25	16.40	6,350	26	21.45	39,100	31	19.40	28,200
27	16.20	6,060	28	22.10	47,500	Aug. 2	20.55	34,500
29	17.20	15,700	30	21.80	44,400	4	18.45	24,800
Feb. 1	21.00	35,800	May 3	21.70	48,700	6	16.90	16,200
3	26.50	98,500	5	22.20	52,600	9	15.70	11,600
5	18.45	26,000	7	23.50	64,200	11	15.20	9,380
8	18.10	22,600	10	23.35	59,300	13	14.90	8,650
10	17.40	16,500	12	21.90	55,100	16	14.80	6,900
12	17.30	16,400	14	20.55	44,500	18	15.00	6,550
15	18.85	23,000	17	18.90	34,200	20	15.10	6,060
17	17.85	16,800	19	18.90	27,900	23	15.80	6,140
19	17.50	15,500	21	20.35	41,100	25	15.80	5,550
24	19.80	31,000	24	21.25	48,200	27	15.90	6,160
26	18.85	25,400	26	21.70	50,000	30	15.60	6,000
Mar. 1	17.75	17,900	28	21.80	51,100	Sept. 1	15.20	4,210
3	17.20	16,200	June 1	20.45	45,400	3	15.60	5,140
5	17.15	14,900	4	20.25	40,400	7	15.20	4,070
8	17.60	16,300	7	20.45	41,800	10	15.90	5,640
10	17.70	16,000	9	21.10	42,000	13	14.90	3,400
12	17.25	13,600	11	21.90	49,800	15	14.70	3,240
15	17.00	12,200	14	21.60	49,100	17	14.80	3,300
17	17.10	11,400	16	21.10	43,500	20	14.55	2,750
19	17.50	14,500	18	21.50	44,300	22	14.80	3,230
22	17.40	12,700	21	22.30	56,500	24	14.75	3,200
24	17.90	13,800	23	22.10	53,000	27	15.80	5,480
26	18.25	16,800	25	21.60	54,500	29	15.30	3,56
29	18.85	20,100	28	21.90	55,700			
31	19.05	20,300	30	21.90	58,800			

Daily discharge, in second-feet, of Colorado River at Yuma, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	6,700	13,500	7,500	13,000	36,200	17,500	25,000	42,700	45,400	57,300	30,700	4,000
2	7,600	12,800	7,400	11,000	65,000	16,600	25,000	43,300	46,800	56,800	35,200	3,800
3	7,400	11,800	7,300	10,500	90,000	16,200	25,900	50,200	43,200	53,200	31,000	4,500
4	7,900	11,900	7,300	9,900	38,500	15,700	24,000	53,500	39,900	48,000	24,000	12,500
5	8,200	12,300	8,200	9,900	27,000	14,900	24,100	53,400	41,000	48,300	18,200	9,300
6	8,900	12,200	8,700	9,800	28,000	14,500	23,300	58,700	41,400	46,700	16,200	5,100
7	8,000	12,000	8,700	9,800	26,000	15,000	23,000	64,700	41,800	44,000	15,000	3,900
8	7,000	11,700	6,800	9,700	22,200	16,300	21,500	66,200	42,000	42,500	12,400	4,000
9	10,300	11,200	5,800	9,000	19,500	16,200	21,900	62,800	42,000	38,100	11,600	8,900
10	24,800	12,500	6,300	8,400	16,500	16,000	23,000	59,300	46,300	34,000	10,100	5,400
11	30,300	11,300	7,000	7,800	18,500	15,500	23,900	57,200	49,800	32,700	9,400	5,000
12	25,500	10,700	8,200	7,200	16,400	13,600	23,200	55,100	51,000	32,100	8,800	4,000
13	21,300	10,200	8,500	7,200	24,000	14,200	25,300	48,800	51,300	31,400	8,600	3,200
14	16,500	11,200	8,000	6,800	25,200	13,600	27,200	44,000	48,000	30,200	8,800	3,200
15	15,900	10,500	7,400	6,700	24,000	12,800	30,000	39,300	44,300	28,100	7,900	3,200
16	13,500	11,000	5,800	6,200	19,300	12,200	28,400	37,500	43,500	26,500	6,600	3,200
17	16,100	11,500	6,300	5,700	16,300	11,400	28,700	34,200	42,500	25,200	6,300	3,200
18	16,600	10,700	6,800	5,700	14,800	11,400	26,400	31,000	44,300	23,700	6,600	3,800
19	13,700	10,300	7,200	5,700	18,600	11,400	27,000	28,600	49,200	22,700	6,500	4,000
20	14,000	9,700	7,800	5,700	19,200	12,700	26,400	33,500	53,700	22,700	6,100	2,700
21	15,000	9,000	8,800	5,700	15,300	13,100	27,500	41,700	56,500	20,400	6,100	3,000
22	12,500	8,800	11,200	6,200	21,300	12,700	36,800	46,500	54,400	20,000	6,100	3,200
23	12,500	8,600	13,800	7,200	30,800	12,500	38,700	47,200	52,200	19,600	6,100	3,200
24	12,000	8,200	15,700	7,500	31,000	13,500	39,200	48,200	51,900	17,500	5,800	3,500
25	11,700	7,400	26,300	6,400	25,800	15,500	39,200	49,800	54,500	18,300	5,400	3,800
26	11,500	7,800	37,800	6,000	25,400	16,800	38,200	50,000	56,200	18,200	6,100	4,200
27	11,200	7,800	38,200	6,000	23,500	21,800	43,500	51,300	56,000	15,000	6,200	5,500
28	11,300	7,500	49,200	8,500	20,300	21,700	47,500	51,100	55,300	16,400	4,700	5,200
29	17,000	7,300	29,300	19,000	.....	20,900	44,000	48,000	55,700	16,000	5,600	3,600
30	15,000	6,600	19,500	16,000	.....	21,500	44,000	42,800	57,800	22,200	6,700	4,000
31	13,500	.....	15,700	30,000	.....	21,700	.....	42,200	.....	28,200	6,700	.....

Monthly discharge of Colorado River at Yuma, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	30,300	6,700	13,700	842,000
November	13,500	6,600	10,300	613,000
December	49,200	5,800	13,300	818,000
January	30,000	5,700	9,170	564,000
February	90,000	14,800	27,100	1,510,000
March	21,800	11,400	15,500	953,000
April	47,500	21,500	30,100	1,790,000
May	66,200	28,600	47,800	2,940,000
June	57,800	39,900	48,600	2,890,000
July	57,300	15,000	30,800	1,890,000
August	35,200	4,700	11,100	682,000
September	12,500	2,700	4,540	270,000
The year	90,000	2,700	21,800	15,800,000

NOTE.—Monthly discharge computed by engineers of the U. S. Geological Survey.

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, in Lincoln County. No tributary between station and mouth.

DRAINAGE AREA.—193 square miles (measured on base map of Wyoming, scale 1:500,000.

RECORDS AVAILABLE.—April 1 to August 31, 1915. State engineer maintained station at this point during 1913 and 1914.

GAGE.—Vertical staff on upstream side of left bridge abutment; read once daily by Mrs. Sylvia Barnhart.

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

CHANNEL AND CONTROL.—Bed composed of gravel. Control 100 feet below gage at small rapids; permanent during 1915.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.42 feet at 10 a. m. June 1, 8 a. m. June 2, 11 a. m. June 3, and 9 a. m. June 4 (discharge, 281 second-feet); minimum stage recorded, 0.70 foot on August 29 and 30 (discharge, 1 second-foot).

WINTER FLOW.—No information.

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

REGULATION.—None.

ACCURACY.—One gage reading a day may not give the true daily mean stage at all times. Records considered good except for low water, for which they are fair.

Discharge measurements of Horse Creek at Daniel, Wyo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 14	M. N. Grant, jr.	2.11	197
June 10	R. H. Fletcher	2.20	217
July 26	Robert Follansbee	1.00	*a* 7

a Estimated.

Daily discharge, in second-feet, of Horse Creek at Daniel, Wyo., for the year ending Sept. 30, 1915.

Day.	Apr.	May.	June.	July.	Aug..	Day.	Apr.	May.	June.	July.	Aug.
1	25	275	275	7	7	16	82	104	100	7	2
2	25	82	275	7	7	17	82	104	100	7	2
3	37	82	275	7	7	18	100	215	100	7	2
4	50	82	275	7	7	19	142	215	100	7	2
5	65	82	275	7	15	20	165	165	100	7	2
6	65	82	275	7	15	21	165	165	15	7	2
7	82	15	275	7	15	22	190	165	15	7	2
8	82	15	190	7	15	23	190	190	15	7	2
9	82	17	215	7	15	24	190	190	15	7	2
10	82	17	215	7	15	25	142	190	15	7	2
11	82	17	190	7	2	26	142	215	15	7	2
12	82	17	190	7	2	27	142	215	7	25	2
13	65	17	82	7	2	28	190	215	7	25	2
14	65	190	100	7	2	29	190	215	7	7	1
15	82	147	100	7	2	30	275	170	7	7	1
						31	.....	215	.....	7	1

NOTE.—Discharge determined from rating curve fairly well defined between 7 and 305 second-feet. No observer available after Aug. 31.

Monthly discharge of Horse Creek at Daniel, Wyo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April	275	25	112	6,660	B.
May	275	15	132	8,120	B.
June	275	7	128	7,620	B.
July	25	7	8.2	504	C.
August	15	1	5.1	314	C.
The period	.....	.....	.....	23.200	

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, in Fremont County. No tributary between station and mouth, a mile below.

DRAINAGE AREA.—348 square miles (measured on base map of Wyoming, scale 1:500,000.

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

GAGE.—Vertical staff on downstream side of left abutment; read twice daily by Oliver Vible. Gage used during 1905 was a quarter of a mile upstream; that used in 1906 was at bridge and was referred to datum 0.27 foot higher than present gage.

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

CHANNEL AND CONTROL.—Bed composed of sand and gravel. Control 100 feet downstream from gage at gravel bar; permanent during 1915. Banks subject to overflow at stage of 6 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.08 feet at 6 p. m. June 2 (discharge, 1,060 second-feet); minimum stage recorded, 1.16 feet at 6 a. m. September 1 (discharge, 36 second-feet).

WINTER FLOW.—No data.

DIVERSIONS.—Prior to December 31, 1916, there were adjudicated diversions of 119 second-feet from East Fork.

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

ACCURACY.—Records considered good.

Discharge measurements of East Fork at Newfork, Wyo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 11	M. N. Grant, jr.	2.10	213
June 9	R. H. Fletcher.	2.73	435
July 28	Robert Follansbee.	1.48	73

Daily discharge, in second-feet, of East Fork at Newfork, Wyo., for the year ending Sept. 30, 1915.

Day.	May.	June.	July.	Aug.	ept.	Day.	May.	June.	July.	Aug.	Sept.
1		685	285	54	38	16	390	338	166	47	89
2		1,020	320	57	43	17	410	450	121	46	75
3		775	338	54	46	18	470	640	92	45	70
4		685	285	53	49	19	470	640	85	48	68
5		595	250	52	53	20	390	338	83	47	64
6		355	250	54	48	21	268	430	67	43	62
7		390	250	53	47	22	220	470	57	42	58
8		390	235	53	43	23	190	470	54	109	54
9		490	190	49	40	24	190	510	48	89	100
10		685	205	48	39	25	250	470	49	48	117
11	220	640	181	47	40	26	338	550	57	45	145
12	220	390	205	48	68	27	320	430	54	41	181
13	250	470	285	47	127	28	338	320	65	39	166
14	430	430	285	46	117	29	450	285	54	38	152
15	470	355	220	46	106	30	595	268	59	38	135
						31	595		58	38	

NOTE.—Discharge determined from rating curve well defined above 60 second-feet.

Monthly discharge of East Fork at Newfork, Wyo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May 11–31	595	190	356	14,800	A.
June	1,020	268	499	29,700	A.
July	338	48	160	9,840	B.
August	109	38	50.5	3,110	B.
September	181	38	81.3	4,840	B.
The period				62,300	

NEW FORK NEAR BOULDER, WYO.

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

DRAINAGE AREA.—578 square miles (measured on base map of Wyoming, scale, 1:500,900.

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

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

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and gravel underlain by slate; control not well defined. At high water there are two overflow channels, one around the right end of the bridge and the other from New Fork to Boulder Creek. Neither channel carried water in 1915.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.9 feet at 6 p. m. June 27, 7 a. m. and 6 p. m. June 28 (discharge, 1,100 second-feet); minimum stage recorded, 1.88 feet at 7 a. m. and 6 p. m. September 2 (discharge, 142 second-feet).

WINTER FLOW.—Stage-discharge relation seriously affected by ice.

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

REGULATION.—None.

ACCURACY.—Records considered good.

Discharge measurements of New Fork near Boulder, Wyo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 11	M. N. Grant, jr	2.20	257	July 28	Robert Follansbee	2.98	593
June 9	R. H. Fletcher	3.16	759				

Daily discharge, in second-feet, of New Fork near Boulder, Wyo., for the year ending Sept. 30, 1915.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	.....	520	1,040	486	154	16	320	715	990	261	230
2	.....	725	995	486	144	17	324	690	935	266	217
3	.....	885	1,000	464	230	18	360	700	870	252	217
4	.....	870	1,000	441	252	19	405	770	805	243	209
5	.....	935	1,040	405	288	20	450	770	750	225	209
6	.....	855	1,040	369	270	21	450	775	690	209	205
7	.....	800	1,060	374	248	22	459	775	650	209	201
8	.....	770	1,060	374	217	23	414	805	600	205	185
9	.....	755	1,070	356	217	24	405	870	525	201	178
10	.....	735	1,020	342	225	25	414	940	490	201	320
11	270	775	970	346	217	26	432	1,020	486	174	454
12	270	815	940	360	252	27	405	1,100	490	171	486
13	270	820	945	315	252	28	400	1,100	620	168	428
14	270	800	990	306	248	29	400	1,100	535	164	387
15	270	770	995	270	243	30	459	1,040	510	154	378
						31	468	.....	490	154	.....

NOTE.—Discharge determined from a fairly well defined rating curve.

Monthly discharge of New Fork near Boulder, Wyo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May 11-31	468	270	377	15,700	B.
June	1,040	520	833	49,600	B.
July	1,070	486	826	50,800	B.
August	486	154	289	17,800	B.
September	486	144	259	15,400	B.
The period	.....	.....	.....	149,000	

PINE CREEK AT PINEDALE, WYO.

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

DRAINAGE AREA.—128 square miles (measured on base map of Wyoming, scale, 1:500,000.

RECORDS AVAILABLE.—May 8 to September 30, 1915. From April 2, 1905, to October 31, 1906, a station was maintained at a point a mile below the outlet of Fremont Lake, and from July 22, 1910, to June 30, 1912, one was maintained a third of a mile below the outlet. Flow at different points not directly comparable as several ditches divert water between them.

GAGE.—Vertical staff on left bank a quarter of a mile below bridge; read twice daily by Ernest McKee, forest ranger.

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

CHANNEL AND CONTROL.—Bed composed of coarse gravel and small boulders, which may shift during highwater. Control 100 feet downstream from gage at small rapids; permanent during 1915. Banks not subject to overflow except at extreme high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.85 feet at 5.30 p.m. July 5 and 10 a.m. and 5 p. m. July 6 (discharge, 500 second-feet); minimum stage recorded, 1.40 feet at 9 a. m. May 9 and 6 p. m. May 12 (discharge, 71 second-feet).

WINTER FLOW.—No data.

DIVERSIONS.—Prior to December 31, 1916, there was adjudicated diversions of 78 second-feet from Pine Creek above station, and 4 second-feet below.

REGULATION.—Fremont Lake, by which the flow is naturally regulated, covers approximately 8 square miles and drains 114 square miles.

ACCURACY.—Records considered excellent.

Discharge measurements of Pine Creek at Pinedale, Wyo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 8	M. N. Grant, jr	1.45	80
June 9	R. H. Fletcher	2.15	231
July 27	Robert Follansbee	2.16	255

Daily discharge, in second-feet, of Pine Creek at Pinedale, Wyo., for the year ending Sept. 30, 1915.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	.....	168	460	216	74	16	86	253	460	123	104
2	.....	194	460	212	76	17	95	270	460	123	95
3	.....	208	480	194	86	18	104	270	440	114	95
4	.....	221	490	194	86	19	114	270	420	104	95
5	.....	237	500	168	104	20	114	287	380	104	86
6	.....	237	500	168	104	21	123	287	342	104	86
7	.....	221	480	156	104	22	123	305	323	95	86
8	86	221	480	150	104	23	123	323	305	86	83
9	78	237	460	144	104	24	123	342	305	95	83
10	74	237	460	144	104	25	134	380	288	86	95
11	74	253	460	144	104	26	134	420	270	86	114
12	72	270	460	144	104	27	134	440	237	86	123
13	74	270	460	134	104	28	134	460	237	82	123
14	78	270	460	123	104	29	134	460	221	79	123
15	86	270	460	123	104	30	144	460	237	76	123
						31	144	.....	221	74	.....

NOTE.—Discharge determined from rating curve fairly well defined between 60 and 300 second-feet; discharge June 27, July 4, 25, Aug. 1, 8, 15, 22, 29, interpolated, as gage was not read.

Monthly discharge of Pine Creek at Pinedale, Wyo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May 8-31	144	72	108	5,130	A.
June	460	168	291	17,300	A.
July	500	221	394	24,200	B.
August	216	74	127	7,810	A.
September	123	74	99.3	5,910	A.
The period				60,400	

BOULDER CREEK NEAR BOULDER, WYO.

LOCATION.—In sec. 4, T. 32 N., R. 108 W., at Sandlin ranch, 2 miles northwest of Boulder, in Fremont County. No tributary between station and mouth 2 miles below.

DRAINAGE AREA.—112 square miles (measured on base map of Wyoming, scale, 1:500,000.

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

GAGE.—Vertical staff on left bank 60 feet northwest of ranch house; read twice daily by Lewis 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 at different sections.

CHANNEL AND CONTROL.—Bed composed of gravel; channel at gage is deep pool. Control is 150 feet downstream, at rapids which remained permanent during 1915. Banks high and not subject to overflow. Point of zero flow, 0.3 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 3.3 feet at 7 a. m. June 3 (discharge, 810 second-feet); minimum stage recorded, 0.38 foot at 7 a. m. and 7 p. m. August 31 (discharge, 1 second-foot).

WINTER FLOW.—No data.

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

REGULATION.—None except natural regulation in Boulder Lake.

ACCURACY.—Records as a whole considered good.

Discharge measurements of Boulder Creek near Boulder, Wyo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 10	M. N. Grant, jr	1.30	85
June 9	R. H. Fletcher	2.32	399
July 28	Robert Follansbee	.96	34

Daily discharge, in second-feet, of Boulder Creek near Boulder, Wyo., for the year ending Sept. 30, 1915.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	.....	515	435	37	3	16	255	360	395	6	28
2	.....	675	455	37	3	17	262	435	286	6	20
3	.....	765	515	26	3	18	308	595	234	6	44
4	.....	675	475	26	3	19	342	595	184	6	67
5	.....	595	435	26	3	20	325	555	115	4	67
6	.....	515	435	25	3	21	272	515	74	1	67
7	.....	415	475	18	3	22	205	555	67	1	67
8	.....	360	455	18	3	23	172	635	74	6	67
9	.....	395	395	17	3	24	160	635	49	6	39
10	88	555	360	18	5	25	184	635	46	6	41
11	101	635	342	18	7	26	172	720	46	6	70
12	106	635	378	22	6	27	255	675	34	6	130
13	115	555	455	22	28	28	172	555	37	6	130
14	160	415	455	6	28	29	196	515	37	6	130
15	248	378	435	6	28	30	325	455	37	6	184
						31	378	.....	37	1	.....

NOTE.—Discharge determined from rating curve well defined between 30 and 475 second-feet.

Monthly discharge of Boulder Creek near Boulder, Wyo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May 10-31	378	88	218	9,500	A.
June	765	360	551	32,800	B.
July	515	34	266	16,400	B.
August	37	1	12.7	781	C.
September	184	3	42.6	2,530	B.
The period	.....	.....	.....	62,000	

PINEY CREEK BASIN.

NORTH PINEY CREEK NEAR MARBLETON, WYO.

LOCATION.—In sec. 19, T. 31 N., R. 113 W., 300 yards above headgate of North Piney canal, and 20 miles northwest of Marbleton in Lincoln County. No large tributary within several miles.

DRAINAGE AREA.—58 square miles (measured on special map in Bulletin 543).

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

GAGE.—Lallie water-stage recorder on left bank 300 yards above headgate of North Piney canal.

DISCHARGE MEASUREMENTS.—Made by wading 75 feet below gage.

CHANNEL AND CONTROL.—Bed composed of gravel. Control 100 feet downstream from gage at small rapids; permanent during 1915. Overflow of banks not likely. Stage of zero flow, 1.2 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.15 feet at noon June 12 (discharge, 130 second-feet); minimum stage recorded, 2.19 feet during September 19 (discharge, 28 second-feet).

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

DIVERSIONS.—Prior to July 1, 1914, there were adjudicated diversions of approximately 8 second-feet from North Piney Creek above station, and 209 second-feet below.

REGULATION.—None.

ACCURACY.—Records considered excellent.

Discharge measurements of North Piney Creek near Marbleton, Wyo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 17	M. N. Grant, jr	2.40	39
June 12	R. H. Fletcher	3.14	126
July 30	Robert Follansbee	2.54	46

Daily discharge, in second-feet, of North Piney Creek near Marbleton, Wyo., for the year ending Sept. 30, 1915.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1		103	81	43	30	16		88	46	38	30
2		120	88	42	30	17	39	94	45	37	32
3		94	80	42	38	18		112	43	36	28
4		74	73	42	41	19		103	42	36	28
5		77	66	42	40	20		96	42	34	28
6		68	64	42	36	21		96	46	34	28
7		64	63	42	34	22		103	54	34	28
8		103	62	42	34	23		103	52	34	28
9		103	55	41	34	24		112	49	34	29
10		106	52	40	32	25		120	47	36	35
11		112	49	40	30	26		120	48	35	37
12		130	46	39	33	27		103	49	34	41
13		106	48	38	32	28		92	56	33	37
14		96	50	38	32	29		88	49	32	34
15		96	48	38	30	30	61	88	44	32	34
						31			43	30	

NOTE.—Discharge determined from well-defined rating curve; discharge July 3, 4, 6, 7, 10, 15, 16, interpolated, as gage not read.

Monthly discharge of North Piney Creek near Marbleton, Wyo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
June	130	64	99.0	5,890	A.
July	88	42	54.2	3,330	A.
August	43	30	37.4	2,300	A.
September	41	28	32.8	1,950	A.
The period				13,500	

MIDDLE PINEY CREEK NEAR BIG PINEY, WYO.

LOCATION.—About sec. 24, T. 30 N., R. 114 W., at C. P. Budd's ranch, 14 miles west of Big Piney, in Lincoln County. No large tributary within several miles.

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

RECORDS AVAILABLE.—April 1 to September 30, 1915. State engineer maintained station at this point during 1914.

GAGE.—Vertical staff on left bank just above foot log 500 yards above ranch house; read morning and evening by Mrs. J. A. Wells.

DISCHARGE MEASUREMENTS.—Made from foot log or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel. Control 20 feet below gage, somewhat shifting. Banks not subject to overflow except during extreme high water. Point of zero flow, approximately 0.5 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.72 feet at 4 p. m. July 8 (discharge, 66 second-feet); minimum stage recorded, 0.70 foot May 2 to 15, inclusive (discharge, 2 second-feet).

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

DIVERSIONS.—Prior to July 1, 1914, there were adjudicated diversions of 34 second feet from Middle Piney Creek above the station and 72 second-feet below.

REGULATION.—None.

ACCURACY.—Records considered only fair.

Discharge measurements of Middle Piney Creek near Big Piney, Wyo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 16	M. N. Grant, jr	0.80	3.8
June 11	R. H. Fletcher	1.13	15
July 30	Robert Follansbee	1.14	15

Daily discharge, in second-feet, of Middle Piney Creek near Big Piney, Wyo., for the year ending Sept. 30, 1915.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	4	4	9	42	22	10	16	6	4	22	16	16	13
2	4	2	13	48	16	10	17	6	4	25	33	16	16
3	4	2	9	38	16	14	18	6	4	16	25	16	13
4	4	2	9	42	13	13	19	6	6	11	29	13	13
5	4	2	9	18	13	16	20	6	6	11	25	13	16
6	4.4	2	9	18	16	13	31	6	13	8	18	16	13
7	4.4	2	9	25	13	16	22	6	18	9	22	13	16
8	4.4	2	9	42	16	13	23	7.5	18	9	18	16	13
9	4.4	2	9	58	13	13	24	9	18	11	18	13	13
10	4.4	2	13	42	13	16	25	7.5	22	16	18	13	16
11	5.6	2	18	42	18	13	26	6	13	29	22	16	13
12	6.6	2	16	48	18	16	27	9	13	48	22	13	16
13	6	2	33	42	22	13	28	9	13	48	13	16	13
14	6	2	33	42	13	13	29	5	13	53	16	13	10
15	6	2	22	29	13	16	30	4	13	48	16	14	10
							31	.....	9	.....	18	10	.....

NOTE.—Discharge determined from rating curve not well defined.

Monthly discharge of Middle Piney Creek near Big Piney, Wyo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April	9	4	5.7	339	C.
May	22	2	7.1	436	C.
June	53	8	19.5	1,160	C.
July	58	13	29.2	1,800	C.
August	22	10	14.9	916	C.
September	16	10	13.6	809	C.
The period	.....	.....	.....	5,460	

LABARGE CREEK BASIN.

LABARGE CREEK NEAR LABARGE, WYO.

LOCATION.—In sec. 29, T. 26 N., R. 113 W. 250 feet downstream from highway bridge at Welty's ranch, 3 miles west of Labarge in Lincoln County.

No large tributary between station and mouth 6 miles below.

DRAINAGE AREA.—176 square miles (measured on special map in Bulletin 543).

RECORDS AVAILABLE.—April 1 to September 30, 1915. State engineer maintained station at this point during 1913 and 1914.

GAGE.—Vertical staff on right bank 250 feet downstream from highway bridge at Welty's ranch; read morning and evening by Samuel Welty.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel. Control 50 feet downstream at gravel bar; shifted somewhat during 1915. Right bank high and not subject to overflow; left bank is low, is covered with dense underbrush, and is overflowed during high water. Point of zero flow about 0.7 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.15 feet at 7 a. m. September 26 (discharge, 154 second-feet); minimum stage recorded, 0.65 foot at 7 p. m. July 1, 5 p. m. July 3, and July 7–14, inclusive (discharge, 3 second-feet).

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

DIVERSIONS.—Prior to December 31, 1916, there were adjudicated diversions of 185 second-feet from Labarge Creek above station and 103 second-feet below.

REGULATION.—None.

ACCURACY.—Records fair.

Discharge measurements of Labarge Creek near Labarge, Wyo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 19	M. N. Grant, jr	1.70	107
June 13	R. H. Fletcher	.90	13

Daily discharge, in second-feet, of Labarge Creek near Labarge, Wyo., for the year ending Sept. 30, 1915.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	98	.....	60	5	42	48	16	104	74	20	30	52	66
2	110	.....	62	6	42	55	17	104	74	20	22	55	66
3	110	.....	60	5	42	82	18	104	79	20	18	52	60
4	110	55	52	5	38	88	19	110	104	20	18	52	60
5	110	57	50	4	40	93	20	110	104	18	14	62	60
6	98	55	50	4	42	76	21	110	104	15	12	60	60
7	98	55	50	4	52	76	22	110	93	15	7	58	60
8	98	55	50	4	52	76	23	120	82	15	7	58	60
9	98	55	48	4	58	76	24	120	80	15	12	58	63
10	98	66	40	4	52	76	25	120	93	18	22	58	76
11	98	71	40	4	52	82	26	115	93	18	20	58	148
12	98	76	40	4	52	76	27	110	80	18	28	58	110
13	98	76	20	4	52	74	28	.....	71	9	38	52	98
14	101	71	20	4	52	68	29	.....	69	8	30	50	88
15	104	76	20	9	52	66	30	.....	66	6	32	48	88
							31	.....	63	.....	32	48	.....

NOTE.—Discharge determined from rating curve fairly well defined between 20 and 150 second-feet; discharge Apr. 14, May 29–31, July 4–6, Aug. 5 and 29, interpolated, as gage was not read.

Monthly discharge of Labarge Creek near Labarge, Wyo., for the year ending Sept. 30, 1915.

Month	Discharge in second feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April 1–27	120	98	106	5,680	C.
May 4–31	104	55	74.9	4,160	C.
June	62	6	29.9	1,780	C.
July	38	4	13.3	818	C.
August	62	38	51.6	3,170	C.
September	148	48	75.8	4,510	C.

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, and 5 miles west of Fontenelle, Lincoln County. No large tributary between station and mouth.

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

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

GAGE.—Vertical staff at down-stream end of right abutment; read once daily by Mrs. Howard Holden.

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

CHANNEL AND CONTROL.—Bed composed of coarse gravel. Control at small rapids 100 feet below gage; will probably shift at high water. Banks may be overflowed during extreme high water. Point of zero flow, approximately −0.2 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 0.63 foot at 5.30 p. m. Sept. 27 (discharge, 104 second-feet); minimum stage, recorded, −0.05 foot from June 27 to July 6, when gage was destroyed (discharge, 2 second-feet).

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

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

REGULATION.—None.

ACCURACY.—Results considered fair. One gage reading daily may not give the true mean stage at all times; control fairly permanent during 1915.

Discharge measurements of Fontenelle Creek near Fontenelle, Wyo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 21	M. N. Grant, jr	0.55	80
June 13	R. H. Fletcher	.46	56
July 31	Robert Follansbee		12

Daily discharge, in second-feet, of Fontenelle Creek near Fontenelle, Wyo., for the year ending Sept. 30, 1915.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1		52	2	15	16	16		33		26	26
2		57	2	15	19	17		21		26	26
3		65	2	15	23	18		21		26	26
4		52	2	15	46	19		21		26	26
5		57	2	15	60	20		21		23	26
6		65	2	15	60	21	80	21		23	26
7		65		15	60	22	80	16		19	26
8		57		26	35	23	80	15		19	26
9		52		23	30	24	65	12		23	26
10		46		19	30	25	65	10		23	35
11		38		19	26	26	57	8		19	89
12		38		19	46	27	57	2		19	104
13		52		19	41	28	57	2		19	74
14		46		19	30	29	38	2		19	74
15		33		19	26	30	52	2		19	60
						31	52			19	

NOTE.—Discharge determined from a rating curve not well defined; gage out July 7 to Aug 2, when bridge was being rebuilt

Monthly discharge of Fontenelle Creek near Fontenelle, Wyo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May 21-31	80	38	62.1	1,350	C
June	65	2	32.7	1,950	C
August	26	15	19.9	1,220	C
September	104	16	40.6	2,420	C

BIG SANDY CREEK BASIN.

BIG SANDY CREEK NEAR FARSON, WYO.

LOCATION.—In sec. 18, T. 27 N., R. 106 W., half a mile above headgate of Eden canal, 14 miles north of Farson, in Sweetwater County. No tributary within several miles of station.

DRAINAGE AREA.—322 square miles (measured on base map of Wyoming; scale, 1:500,000.

RECORDS AVAILABLE.—May 10 to August 7, 1915.

GAGE.—Vertical staff on left bank half a miles above headgate; read once daily by E. R. Pulley.

DISCHARGE MEASUREMENTS.—Made by wading at control.

CHANNEL AND CONTROL.—Bed composed of sand; will shift. Control 100 feet downstream from gage, fairly permanent during 1915. Banks subject to overflow at stage of 3.7 feet. Point of zero flow, 1.0 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 3.6 feet at 9:30 a. m. May 14 (discharge, 440 second-feet); minimum stage recorded, 1.55 feet at 11 a. m. July 21 (discharge, 30 second-feet).

WINTER FLOW.—No data.

DIVERSIONS.—No information.

REGULATION.—None.

ACCURACY.—Records considered good. One gage reading may not give the true daily mean stage.

Discharge measurements of Big Sandy Creek near Farson, Wyo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 6	M. N. Grant, jr	2.00	90
June 7	R. H. Fletcher	2.68	217

Daily discharge, in second-feet, of Big Sandy Creek, near Farson, Wyo., for the year ending Sept. 30, 1915.

Day.	May.	June.	July.	Aug.	Day.	May.	June.	July.	Aug.
1			290	92	16			34	
2			267	99	17			45	
3			290	200	18			34	
4			244	156	19			40	
5			222	167	20			45	
6	178		156	135	21		220	30	
7			178	116	22		267	34	
8			116		23		290	45	
9			99		24		315	57	
10	146		70		25		365	45	
11	200		84		26		365	99	
12	290		70		27		390	156	
13	267		57		28		415	84	
14	440		70		29		390	70	
15	220		45		30		290	70	
					31			57	

NOTE.—Discharge determined from fairly well defined rating curve.

Monthly discharge of Big Sandy Creek near Farson, Wyo., for the year ending Sept. 30, 1915.

Month.	Discharge in second feet.			Run-off (in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
June 21–30	415	220	330	6,550	C.
July	290	30	103	6,330	B.
August 1–7	200	92	138	1,920	B.
The period				14,800	

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, in Uinta County. No tributary within 10 miles.

DRAINAGE AREA.—261 square miles (measured on U. S. Geological Survey base map, scale 1:500,000).

RECORDS AVAILABLE.—August 21, 1913, to September 30, 1915.

GAGE.—Vertical staff on downstream side of center pier; read morning and evening by Miss Mary Anderson. August 19, 1915, datum lowered 0.50 foot.

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

CHANNEL AND CONTROL.—Bed composed of compact gravel. Control which is a small riffle just below the bridge, changed slightly during 1915, being gouged out by tie jam. Right bank high and not subject to overflow; left bank subject to overflow at stage of approximately 3 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.1 feet at 9 a. m. June 2 and 23 (discharge, 670 second-feet), minimum discharge recorded, 2.3 second-feet on August 31 and September 1.

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

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

REGULATION.—None.

ACCURACY.—Records considered excellent except for the period during which the water was below the gage. Control permanent except for one well-defined shift during high water.

Discharge measurements of Blacks Fork near Urie, Wyo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 11	R. H. Fletcher	1.30	243
June 16	do	1.70	470
Aug. 19	Robert Follansbee	*a*.45	9.0

a New datum. Gage height at old datum, — 0.05 foot.

Daily discharge, in second-feet, of Blacks Fork near Urie, Wyo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.
1	24	30	70	350	442	186	.....	2.3
2	24	30	75	224	535	200	.....	2.6
3	30	30	80	152	338	200	.....	10.
4	36	38	86	152	266	200	.....	25.
5	38	36	86	149	272	200	.....	56.
6	38	33	82	107	255	200	.....	31.
7	38	33	65	100	310	172	.....	12.
8	42	38	69	100	258	134	.....	10.
9	42	30	61	130	272	100	.....	8.0
10	54	30	47	178	378	90	.....	8.0
11	49	30	54	230	298	71	.....	19.
12	49	30	54	272	298	71	.....	39.
13	44	30	65	390	310	62	3.5	57.
14	39	30	74	478	310	26	3.5	46.
15	44	38	140	390	310	20	3.5	46.
16	44	42	122	414	350	20	3.5	40.
17	44	42	120	432	510	.....	3.5	33.
18	39	39	230	390	510	.....	3.5	22.
19	39	42	178	290	510	.....	7.4	26.
20	38	49	169	238	560	.....	7.4	26.
21	42	54	217	175	588	.....	7.4	27.
22	42	54	224	190	615	.....	6.8	19.
23	45	49	224	196	642	.....	6.8	19.
24	45	49	187	193	615	.....	5.6	19.
25	42	49	169	160	535	.....	4.4	62.
26	45	49	163	175	485	.....	2.9	159.
27	42	45	276	190	370	.....	2.9	90.
28	42	49	370	160	350	.....	2.6	80.
29	36	49	500	244	295	.....	3.5	78.
30	30	49	432	298	245	.....	2.6	62.
31	30	.....	.....	330	.....	.....	2.3	.....

NOTE.—Discharge determined as follows: Oct. 1 to June 1, from rating curve well defined throughout, June 2–15, by indirect method for shifting control; June 16 to Sept. 30, from rating curve well defined throughout: July 17–31, estimated at 5 second-feet; Aug. 1–12 estimated at 4 second-feet as no gage-height record was obtained.

Monthly discharge of Blacks Fork near Urie, Wyo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	54	24	39.9	2,450	A.
November	54	30	39.9	2,370	A.
April	500	47	156	9,280	A.
May	478	100	241	14,800	A.
June	642	245	401	23,900	A.
July	200	.....	65.4	4,020	B.
August	7.4	.....	4.25	261	C.
September	159	2.3	37.8	2,250	B.

YAMPA RIVER BASIN.

SAVERY CREEK NEAR SAVERY, WYO.

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

DRAINAGE AREA.—354 square miles.

RECORDS AVAILABLE.—May 1 to September 30, 1915.

DIVERSIONS.—Prior to July 1, 1914, there were adjudicated diversions of 55 second-feet from Savery Creek.

REGULATION.—None.

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

Discharge measurements of Savery Creek near Savery, Wyo., during the year ending Sept. 30, 1915.

[Made by C. L. Chatfield.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 3	1.20	242	Aug. 5	.....	0
June 7	1.60	359	26	.....	0
29	— .06	20			

Daily discharge, in second-feet, of Savery Creek near Savery, Wyo., for the year ending Sept. 30, 1915.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	395	207	46	0	0	16	230	144	0	0	6
2	315	412	52	0	0	17	207	97	0	0	10
3	285	345	46	0	0	18	207	97	0	0	10
4	270	285	39	0	50	19	285	124	0	0	10
5	243	300	33	0	39	20	218	115	0	0	10
6	207	448	0	0	33	21	207	97	0	0	10
7	207	315	0	0	27	22	207	88	0	0	10
8	186	285	0	0	15	23	230	80	0	0	10
9	175	256	0	0	10	24	207	72	0	0	52
10	186	270	0	0	10	25	230	58	0	0	46
11	186	285	0	0	6	26	186	58	0	0	39
12	196	230	0	0	6	27	186	58	0	0	27
13	207	207	0	0	6	28	196	52	0	0	15
14	256	196	0	0	6	29	186	52	0	0	10
15	270	164	0	0	6	30	186	46	0	0	10
						31	164	.....	0	0	.....

Monthly discharge of Savery Creek near Savery, Wyo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
May	395	164	223	13,700
June	448	46	181	10,800
July	52	0	7.0	430
August	0	0	0.0	0
September	52	0	16.4	976
The period	448	0	85.4	25,900

MUDDY CREEK NEAR BAGGS, WYO.

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

DRAINAGE AREA.—904 square miles.

RECORDS AVAILABLE.—May 1 to September 30, 1915.

GAGE.—Chain gage on upstream side of single-span bridge, read twice daily by Miss Ethel M. Shank.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and mud, will probably shift; bank subject to overflow during extreme high water. Control shifting.

WINTER FLOW.—No data; observations discontinued.

DIVERSIONS.—Prior to July 1, 1914, there were no adjudicated diversions from Muddy Creek.

REGULATION.—None.

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

Discharge measurements of Muddy Creek near Baggs, Wyo., during the year ending Sept. 30, 1915.

[Made by C. L. Chatfield.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 4	2.22	42	Aug. 4	0.30	0
June 8	3.00	77	27	0.20	0
28	0.48	3.0			

Daily discharge, in second-feet, of Muddy Creek near Baggs, Wyo., for the year ending Sept. 30, 1915.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	40	20	0.8	0.0	3.5	16	22	40	1.5	0.8	0.0
2	40	21	.8	2.2	3.8	17	18	42	2.2	.0	.0
3	40	44	.8	3.8	4.2	18	16	38	.8	.0	.0
4	39	99	.0	2.2	5.0	19	14	38	.8	.0	.0
5	40	122	.8	1.5	4.2	20	14	24	.0	.0	.0
6	38	125	2.2	.8	4.2	21	14	9	.0	.0	.0
7	28	147	2.2	.0	3.5	22	15	3.5	.0	.0	.0
8	30	90	1.5	.0	3.8	23	16	4.2	.0	.0	.0
9	24	58	3.0	.0	3.0	24	22	3.8	.0	.0	.0
10	26	48	3.5	2.2	2.2	25	17	3.5	.0	.0	.0
11	26	30	4.2	.8	1.5	26	17	3.8	.0	.0	.0
12	22	21	3.0	3.0	.0	27	20	3.8	.0	.0	.0
13	24	27	2.2	2.2	.0	28	17	3.0	.0	.0	.0
14	26	38	1.5	.8	.0	29	14	1.5	.0	.0	.0
15	26	40	.8	1.5	.8	30	15	.8	.0	.0	.0
						31	18	.....	.0	.0	.0

Monthly discharge of Muddy Creek near Baggs, Wyo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
May	40	14	23.8	1,460
June	147	.8	38.2	2,280
July	4.2	.0	1.0	65
August	3.8	.0	.7	44
September	5.0	.0	1.3	78
The period				3,930

ASHLEY CREEK BASIN.

ASHLEY CREEK NEAR VERNAL, UTAH.

LOCATION.—In sec. 1, T. 3 S., R. 20 E., about one-fourth mile above the heading of the power canal of the Vernal Light & Milling Co. 3½ miles above mouth of Dry Fork, and 12 miles northwest of Vernal.

DRAINAGE AREA.—101 square miles.

RECORDS AVAILABLE.—June 6, 1914, to September 30, 1915. From October 8, 1911, to June 5, 1914, fragmentary records were obtained at the power plant, the total flow of the creek being estimated 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.—Lietz water-stage recorder on right bank about 400 yards above diversion dam, installed April 15, 1915, at the same location as a vertical staff gage from which fragmentary records had been obtained June 6, 1914, to April 14, 1915. From October 8, 1911, to June 5, 1914, records were obtained at the power plant until June 28, 1913, from a gage below the tailrace and after June 28 from a gage above the tailrace. While the gage above the tailrace was in use supplementary readings in the tailrace were taken and the flow added to obtain the total in the creek. The gage used from March 15, 1900, to December 31, 1904, was at E. Marett's ranch about 5 miles downstream and below Dry Fork. This gage was a vertical staff on the right bank at the wagon bridge.

DISCHARGE MEASUREMENTS.—Made from cable about 75 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed steep and rough. Control apparently fairly permanent at present site.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year, 4.15 feet at 3 p. m. May 14 (discharge 1,260 second-feet); minimum stage 1.35 feet during March (discharge, 30 second-feet).

1911–1915, maximum discharge recorded, 1,350 second-feet, May 23, 1914; minimum discharge recorded, 30 second-feet March 2, 1912, first 15 days of January, 1914, and during March, 1915.

WINTER FLOW.—Stage-discharge relation apparently not seriously affected by ice.

DIVERSIONS.—Above all diversions.

REGULATION.—None.

ACCURACY.—Records fair for period for which continuous gage heights are available.

Discharge measurements of Ashley Creek, near Vernal, Utah, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 15	Lynn Crandall	1.56	61.9	May 27	L. W. Jordan	2.51	335
20	....do	2.25	215	Aug. 15	R. C. Pierce	1.68	79.8
May 22	L. W. Jordan	2.20	212	15	....do	1.68	81.3

Daily discharge, in second-feet, of Ashley Creek near Vernal, Utah, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		75						220	703	208	92	71
2								215	603	198	92	70
3				37				173	405	192	92	75
4	78						30	154	366	215	92	85
5								149	310	226	90	82
6			49					144	376	201	90	82
7					37	30		139	319	176	92	82
8		69						144	435	165	90	80
9								175	635	160	87	82
10				37				211	670	151	85	89
11	84						34	265	710	146	85	90
12								430	555	137	85	92
13			44					655	352	132	85	101
14					34	30		855	282	130	85	89
15		66					62	845	300	125	83	85
16								755	350	123	83	83
17				37				720	400	117	83	83
18	78						230	510	500	111	83	82
19							290	425	400	109	82	82
20			44				273	291	396	107	82	82
21					30	30	286	233	381	105	80	80
22		60					230	253	376	103	80	80
23							173	355	371	101	80	78
24				37			146	535	362	99	78	76
25	78						192	584	320	99	80	137
26							96	376	280	99	80	119
27			40				110	342	236	105	80	107
28					30		100	466	240	105	76	101
29		52					140	695	229	101	73	98
30						30	180	583	218	98	73	96
31				37				523		96	71	

NOTE.—Discharge determined from two well defined curves, one applicable to the staff gage used prior to Apr. 15, the other to the automatic gage used Apr. 15 to Sept. 30. Clock stopped Apr. 27 to May 1, June 15–19, 25–26, and discharge estimated by comparison with records of flow of Duchesne and Lake Fork and climatic data. Discharge Apr. 18–22, and 25, May 9, 12–19, 23, 24, and 29–31, June 1–3, 6, and 8–12, and July 4, computed as the mean of hourly discharge.

Monthly discharge of Ashley Creek near Vernal, Utah, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October			79	4,860	D.
November			65	3,870	D.
December			44	2,710	D.
January			37	2,280	D.
February			33	1,830	D.
March			30	1,840	D.
April	290		109	6,490	C.
May	855	139	401	24,700	B.
June	710	218	403	24,000	B.
July	226	96	137	8,420	B.
August	92	71	83.5	5,130	B.
September	137	70	88.0	5,240	B.
The year	855		126	91,400	

NOTE.—Mean monthly discharge October to April, estimated from weekly readings.

DUCHESNE RIVER BASIN.

DUCHESNE RIVER AT MYTON, UTAH.

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

DRAINAGE AREA.—2,750 square miles.

RECORDS AVAILABLE.—October 26, 1899, to November 30, 1910, and July 26, 1911, to September 30, 1915.

GAGE.—Chain gage on upstream rail near the left end of bridge; installed August 6, 1910, at a new datum; readings about 2.7 feet lower than those on old gage; read once daily by Abe Smith and W. Edgar. From October 26, 1899, to June 6, 1909, a chain gage was used at an old wooden bridge about half a mile below present site. June 6, 1909, the river cut a new channel, and a new chain gage was installed July 9, 1909, about a quarter of a mile upstream and at a different datum. August 9, 1909, this gage was replaced by another chain gage about 100 feet downstream on right bank but at same datum.

DISCHARGE MEASUREMETS.—Made from the highway bridge or by wading about 100 feet below bridge.

CHANNEL AND CONTROL.—Stream bed of coarse gravel; banks comparatively low but not likely to be overflowed, although they are subject to erosion during high water. Current comparatively swift and makes an angle with the bridge at low stages. Control probably a gravel bar at the ford 100 or 200 feet below gage, apparently fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year, 5.39 feet at 6.15 p. m. June 12 (discharge, 3,960 second-feet); minimum stage 1.27 feet from August 28 to September 1 (discharge, 100 second-feet).

1899–1915: Maximum discharge recorded, 9,560 second-feet July 6, 1907; minimum discharge recorded, 100 second-feet August 28 to September 1, 1915.

WINTER FLOW.—River generally frozen over from middle of December to middle of March. Determinations of mean flow are based largely on a study of climatic data and are roughly approximate.

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

REGULATION.—None.

ACCURACY.—Open-water records fair.

Discharge measurements of Duchesne River at Myton, Utah, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 3	Lynn Crandall	2.14	471	May 18	L. W. Jordan	3.78	1,940
4	do	2.51	720	29	do	3.13	1,280
Apr. 9	do	2.14	442	June 20	Lynn Crandall	4.90	3,270
10	do	2.16	448	Aug. 10	E. S. Borgquist	1.53	177

Daily discharge, in second-feet, of Duchesne River at Myton, Utah, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	442	470	315	.....	145	1,360	2,570	1,250	145	104
2	442	442	315	.....	320	1,280	3,360	1,250	164	132
3	442	442	365	.....	320	906	2,940	1,200	132	498
4	710	442	416	.....	151	822	2,390	1,050	145	498
5	560	442	390	.....	448	726	1,940	996	132	453
6	498	442	416	.....	448	623	1,910	1,070	132	325
7	470	442	442	.....	421	588	1,750	1,050	138	253
8	442	442	390	.....	448	588	1,640	790	172	210
9	498	416	340	.....	476	554	1,860	686	172	219
10	529	390	290	.....	421	554	2,690	574	154	210
11	498	390	330	.....	432	523	3,360	523	132	210
12	470	416	365	.....	476	588	3,770	481	138	411
13	442	390	365	.....	504	678	3,100	411	138	390
14	442	390	330	.....	504	888	2,570	400	115	350
15	442	350	236	.....	535	1,130	2,450	350	124	325
16	442	253	315	.....	638	1,220	2,510	340	132	300
17	442	290	281	.....	602	1,610	2,210	310	132	325
18	442	340	.....	.....	638	1,910	3,490	262	154	310
19	442	330	.....	395	548	1,940	3,180	244	138	290
20	442	330	.....	421	602	1,580	3,140	244	110	253
21	470	330	.....	370	662	1,270	2,880	210	124	253
22	498	315	.....	320	798	1,160	2,840	179	110	244
23	529	350	.....	320	758	1,070	2,880	164	132	219
24	498	340	.....	370	678	978	2,710	172	115	210
25	498	330	.....	370	678	1,160	2,450	179	138	646
26	498	380	.....	421	662	1,190	2,470	210	164	978
27	470	350	.....	395	718	1,090	1,910	219	110	806
28	442	365	.....	448	662	1,040	1,640	262	104	726
29	470	390	.....	448	838	1,180	1,360	244	110	646
30	470	365	.....	320	1,100	1,660	1,280	219	110	574
31	470	.....	.....	320	.....	2,020	.....	191	104	.....

NOTE—Discharge determined from rating curve well defined between 150 and 3,500 second-feet. Mean flow estimated, on account of ice, as follows: Dec. 18–31, 280 second-feet; Jan. 1–31, 310 second-feet; Feb. 1–28, 320 second-feet; Mar. 1–18, 340 second-feet.

Monthly discharge of Duchesne River at Myton, Utah, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	710	442	479	29,500	B.
November	470	253	379	22,600	B.
December	442	.....	317	19,500	C.
January	.....	.....	310	19,100	D.
February	.....	.....	320	17,800	D.
March	448	.....	356	21,900	C.
April	1,100	145	554	33,000	B.
May	2,020	523	1,090	67,000	B.
June	3,770	1,280	2,510	149,000	B.
July	1,250	164	507	31,200	B.
August	172	104	133	8,180	B.
September	978	104	379	22,600	B.
The year	3,770	104	610	441,000	

NOTE.—See footnote to table of daily discharge.

STRAWBERRY RIVER AT DUCHESNE,[1] UTAH.

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

DRAINAGE AREA.—1,040 square miles.

RECORDS AVAILABLE.—June 10, 1908, to November 30, 1910, and March 16, 1914, to September 30, 1915.

GAGE.—Inclined staff installed April 12, 1914, on right bank, about 50 feet below the footbridge at Winslow's house; read twice daily by E. S. Winslow. Chain gage at approximately same site but different datum was used 1908–1910. A staff gage at the county bridge about a mile below was used from March 16 to April 11, 1914.

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

CHANNEL AND CONTROL.—Banks comparatively low; covered with underbrush; left bank subject to overflow at very high stages. Control is gravel bar; apparently fairly permanent. Point of zero flow, about −1.0 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 0.95 foot at 7 p. m. May 1 (discharge, 380 second-feet); minimum stage, −0.40 foot at 8 a. m. November 20 (discharge, 30 second-feet).

1908–1915: Maximum discharge recorded, 1,860 second-feet April 22, 1910; minimum discharge, 30 second-feet November 20, 1914. Records obtained prior to 1914 only for incomplete years.

WINTER FLOW.—Discharge relation generally affected by ice from December to March Winter estimates are based on a comparison with the station on the Duchesne at Myton.

DIVERSION.—Water is stored in the Strawberry Valley Reservoir, having a capacity of 250,000 acre-feet and located about 40 miles above the station. This water is diverted by means of a tunnel to the Spanish Fork drainage basin. Some water is also diverted to the Provo River basin from the upper end of Strawberry Valley.

REGULATION.—Since 1912 the flow of the river has been affected by the Strawberry Valley Reservoir.

ACCURACY.—All except winter records good.

Discharge measurements of Strawberry River at Duchesne, Utah, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 4	Lynn Crandall	0.30	187	May 30	L. W. Jordan	.78	320
April 8	do	.21	151	June 20	Lynn Crandall	.34	201
8	do	.23	159	Aug. 22	E. S. Borgquist	−.20	66.0
May 17	L. W. Jordan	.75	323	Sept. 8	do	*a*−.12	76.8

[1] Described in report for 1910 as "Strawberry River at Theodore, Utah."
a Observer's reading; gage height not recorded at time of measurement.

Daily discharge, in second-feet, of Strawberry River at Duchesne, Utah, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	225	118	72	.....	201	367	324	130	82	57
2	195	118	94	.....	158	330	336	130	78	59
3	195	118	.....	.....	158	306	330	130	76	74
4	195	118	.....	.....	135	285	336	130	74	78
5	155	105	.....	.....	158	285	336	130	72	91
6	155	118	.....	.....	135	255	345	130	72	82
7	142	118	.....	.....	158	240	336	130	78	78
8	118	118	.....	.....	160	255	315	125	82	78
9	195	118	.....	.....	175	246	306	120	82	72
10	155	105	.....	.....	175	246	306	120	78	72
11	142	94	.....	.....	186	255	285	115	74	72
12	130	94	.....	.....	186	264	270	105	72	80
13	130	100	.....	.....	186	276	270	100	68	87
14	130	105	.....	.....	186	300	270	100	66	82
15	130	94	.....	.....	204	315	255	91	66	82
16	105	72	.....	.....	216	324	240	84	70	82
17	130	54	.....	.....	216	306	216	82	70	82
18	130	54	.....	.....	225	336	210	82	66	78
19	130	62	.....	.....	234	354	210	82	64	72
20	130	45	.....	.....	234	360	204	80	64	72
21	130	62	.....	130	255	330	180	78	62	66
22	118	105	.....	118	270	330	186	80	62	66
23	118	118	.....	118	255	324	175	82	62	64
24	118	82	.....	142	234	315	168	84	64	62
25	118	87	.....	130	234	300	160	87	64	118
26	118	82	.....	118	210	330	155	91	62	168
27	110	82	.....	118	204	330	155	91	62	130
28	105	94	.....	105	276	315	155	105	59	105
29	105	94	.....	118	324	315	142	100	59	94
30	118	72	.....	142	336	330	135	89	59	94
31	118	.....	.....	118	.....	324	.....	84	55	.....

NOTE.—Discharge determined from rating curve well defined below 400 second-feet. Mean discharge estimated, on account of ice, as follows: Dec. 3–31, 76 second-feet; Jan. 1–31, 77 second-feet; Feb. 1–28, 83 second-feet; and Mar. 1–20, 105 second-feet.

Monthly discharge of Strawberry River at Duchesne Utah, for the year ending Sept. 30, 1915.

Month.	Discharge in second feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	225	105	138	8,480	B.
November	118	45	93.5	5,560	B.
December	.....	.....	76.5	4,700	C.
January	.....	.....	77	4,730	D.
February	.....	.....	83	4,610	D.
March	142	.....	112	6,890	C.
April	336	135	209	12,400	B.
May	367	240	305	18,800	B.
June	345	135	244	14,500	B.
July	130	78	102	6,270	B.
August	82	55	68.5	4,210	B.
September	168	57	83.2	4,950	B.
The year	367	.....	133	96,100	

NOTE.—See footnote to table of daily discharge.

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 the confluence of Lake Fork with Duchesne River, and 3½ miles northwest of Myton, Utah. From 1900 to 1903 this station was known as Lake Creek at mouth.

DRAINAGE AREA.—468 square miles.

RECORDS AVAILABLE.—July 3, 1900, to December 31, 1903; June 13, 1907, to November 30, 1910; July 26, 1911, to September 30, 1915.

GAGE.—Inclined staff installed September 13, 1912, on left bank at cable; read once daily by J. R. Bywater. July 3, 1900, to June 30, 1907, records were obtained from a vertical staff gage near mouth of creek at an old bridge, which was washed out with the gage July 1, 1907. A chain gage installed August 18, 1907, on right bank about 250 feet below site of old bridge, at new datum was used until December 31, 1907; in March, 1908, it was moved upstream about a quarter of a mile and installed at new datum on right bank, just below cable. This gage was moved to the left bank and established at same datum June 22, 1909, and used until August 10, 1912, when the chain was stolen. A temporary gage was used by the observer until September 12, 1912, when the present inclined staff was installed at the same site and datum as gage stolen August 10.

DISCHARGE MEASUREMENTS.—From a cable or by wading.

CHANNEL AND CONTROL.—Banks perpendicular and comparatively high. Stream bed of gravel; control fairly permanent. Point of zero flow, about 0.8 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.0 feet at 7.30 a. m. June 2 (discharge, 1,840 second-feet); minimum stage, 1.0 foot August 19–22, 25, and 26 (discharge, 2.5 second-feet).

1900–1903, 1907–1915: Maximum discharge recorded, June 7, 1912, 3,050 second-feet; minimum discharge recorded August 20 and 21, 1911 (discharge, 1 second-foot).

WINTER FLOW.—Stream usually icebound from December to middle of March; flow determined largely by study of climatic data.

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

REGULATION.—None.

ACCURACY.—Open-water records good; winter records only fair.

Discharge measurements of Lake Fork near Myton, Utah, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 3	Lynn Crandall	1.80	81	May 29	L. W. Jordan	2.84	295
April 9	do	1.94	88	June 20	Lynn Crandall	5.20	1,310
May 18	L. W. Jordan	3.40	500	Aug. 10	E. S. Borgquist	1.11	4.6

Daily discharge, in second-feet, of Lake Fork near Myton, Utah, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	65	109	109	.....	98	165	1,010	520	6.4	5.8
2	52	109	125	.....	98	135	1,840	430	5.8	5.8
3	65	109	143	.....	115	106	755	290	4.5	7
4	143	93	143	.....	98	82	940	200	5.8	166
5	93	109	143	.....	98	56	642	108	4.5	99
6	78	109	143	.....	115	50	560	155	4.5	57
7	65	109	125	200	98	35	500	202	4.5	26
8	65	93	109	200	98	26	430	116	4.5	11
9	93	78	109	200	98	35	520	116	4.5	11
10	78	65	65	200	82	26	965	89	4.5	11
11	78	78	.....	200	68	26	1,550	62	4.5	11
12	78	78	.....	200	68	35	1,810	35	4.5	17
13	78	78	.....	226	68	30	1,190	35	4.5	70
14	78	78	.....	190	68	35	642	26	4.5	57
15	78	65	.....	154	68	106	688	17	4.5	46
16	78	52	.....	154	115	300	1,020	14	4.5	35
17	93	65	.....	135	98	500	1,580	7	4.5	26
18	93	65	.....	115	98	520	1,810	4.5	4.5	26
19	93	78	.....	98	68	540	1,460	4.5	2.5	17
20	93	65	.....	98	68	345	1,430	4.5	2.5	17
21	125	65	.....	90	62	270	1,340	4.5	2.5	11
22	125	109	.....	82	115	200	1,280	7	2.5	11
23	125	93	.....	82	98	134	1,340	4.5	5.8	11
24	125	93	.....	98	82	144	1,370	4.5	4.5	11
25	125	78	.....	98	72	176	1,280	7	2.5	230
26	125	78	.....	98	62	176	1,220	7	2.5	166
27	125	93	.....	115	62	134	755	11	4.5	125
28	125	125	.....	106	40	125	600	17	4.5	190
29	125	125	.....	98	56	240	134	11	4.5	166
30	125	109	.....	98	134	585	342	11	4.5	166
31	125	.....	.....	98	.....	788	.....	7	5.8	.....

NOTE.—Discharge determined from three fairly well defined rating curves used as follows: Oct. 1 to Dec. 10, Mar. 7 to June 1, and June 3 to Sept. 30. Discharge interpolated for a few days on which gage was not read Discharge Mar. 17 interpolated because of an ice jam at control. Discharge June 2 determined by indirect method for shifting control. Mean flow estimated because of ice as follows: Dec. 11–15, 65 second-feet; 16–31, 85 second-feet; Jan. 1–31, 100 second-feet; Feb. 1–5, 150 second-feet; 6–28, 120 second-feet; Mar. 1–6, 140 second-feet.

Monthly discharge of Lake Fork near Myton, Utah, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off Total (in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	143	52	97.2	5,980	B.
November	125	52	88.4	5,260	B.
December	143	.....	93.5	5,750	D.
January	.....	.....	100	6,150	D.
February	.....	.....	125	6,940	D.
March	226	82	138	8,480	C.
April	134	40	85.6	5,090	B.
May	788	26	198	12,200	B.
June	1,840	134	1,030.	61,300	B.
July	520	4.5	81.5	5,010	B.
August	6.4	2.5	4.34	267	C.
September	230	5.8	60.3	3,590	B.
The year	1,840	2.5	174	126,000	

NOTE —See footnote to table of daily discharge.

PRICE RIVER BASIN.

PRICE RIVER NEAR HELPER, UTAH.

LOCATION.—In sec. 36, T. 13 S., R. 9 E., at ford about 300 feet west of the Denver & Rio Grande Railroad Co.'s main-line track, at the settlement locally known as Spring Glenn, 2 miles south of Helper, 1 mile above diversion dam of Price River Irrigation Co. and 4 miles below White Creek.

DRAINAGE AREA.—530 square miles.

RECORDS AVAILABLE.—February 21, 1904, to September 30, 1915.

GAGE.—Vertical staff on left bank; installed July 16, 1907, to replace the old chain gage washed out April 11, 1907; read twice daily 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 a datum 0.7 foot above that of original chain gage.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Bed of stream composed of gravel and fine sand. Control is at riffle immediately below ford; shifts occasionally during floods. Point of zero flow, about 1.7 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.40 feet at 11.15 p. m. September 3 (discharge, 850 second-feet); minimum stage, 2.20 feet at 8 a. m. November 22, 1914 (discharge, 21 second-feet).

1904–1915: Maximum stage recorded, 5.52 feet July 19, 1913 (discharge, 2,100 second-feet); minimum stage recorded, 3.1 feet during December, 1905, and January, 1906 (discharge, 4 second-feet).

WINTER FLOW.—Stage-discharge relation affected by ice for short periods; determinations of discharge based on climatic data and observer's notes.

DIVERSIONS.—Main diversions from Price River are below station. Water is stored at the Mammoth reservoir of the Price River Irrigation Co., on the Gooseberry Fork, about 40 miles above station.

REGULATION.—Flow of river is affected by the storage at Mammoth reservoir.

ACCURACY.—Records good.

Discharge measurements of Price River near Helper, Utah, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 12	L. W. Jordan	2.39	38	June 7	L. W. Jordan	3.44	274
Feb. 5	J. J. Sanford	2.44	58	24	Lynn Crandall	2.84	116
Apr. 6	Lynn Crandall	3.05	150	July 8	L. W. Jordan	3.06	141
May 12	L. W. Jordan	3.55	296	Sept. 18	do	2.26	26

Daily discharge, in second-feet, of Price River near Helper, Utah, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	65	50	28	32	28	52	106	370	326	148	77	25
2	61	50	30	30	28	46	146	348	326	148	77	25
3	326	50	41	28	29	46	168	326	326	148	80	444
4	116	46	42	26	26	40	153	326	338	148	72	90
5	83	46	40	38	58	40	150	288	326	148	77	47
6	72	46	45	30	40	46	148	288	307	160	77	34
7	58	46	38	28	45	40	136	260	260	148	77	29
8	141	46	39	26	38	46	136	252	260	160	77	30
9	96	44	36	30	42	50	136	260	252	136	74	26
10	80	41	33	30	40	46	126	260	252	134	72	25
11	72	40	30	31	40	40	136	288	235	132	68	30
12	62	40	30	31	40	58	126	307	218	128	65	30
13	56	45	30	31	40	52	148	307	218	128	62	36
14	56	42	30	32	30	52	148	326	218	110	62	34
15	54	26	30	33	40	58	160	326	218	150	65	30
16	52	33	30	26	40	65	186	326	202	160	74	30
17	52	34	30	26	40	65	186	326	186	160	65	28
18	52	36	38	27	40	72	218	338	186	148	62	28
19	52	36	39	27	52	58	235	338	173	160	61	44
20	52	45	40	27	46	80	270	394	160	160	57	52
21	52	30	40	28	40	80	288	394	126	132	39	38
22	53	21	40	28	40	88	288	370	136	108	36	30
23	53	34	39	28	40	124	270	370	116	96	33	26
24	52	38	38	29	35	134	252	338	116	102	30	26
25	52	36	37	29	46	155	270	394	126	104	65	51
26	52	36	36	29	46	155	288	370	126	93	30	50
27	52	34	30	30	40	120	270	370	136	100	28	45
28	52	40	40	30	52	114	288	288	126	93	28	42
29	50	41	38	29	.....	106	348	326	136	80	28	40
30	50	34	38	27	.....	74	418	338	148	77	28	36
31	50	.....	38	27	.....	82	.....	288	.....	77	26	.....

NOTE.—Discharge determined from two fairly well defined rating curves, one used Oct. 1 to Feb. 4 and Apr. 7 to Sept. 30, the other from Feb. 10 to Mar. 22. Mar. 22 to Apr. 6 used indirect method for shifting control. Discharge for July 10 interpolated. Discharge estimated, on account of ice Dec. 1, 9, 10, 12–16, 19, 20, 22 24, 26, 29, 31, Jan. 1–3, 5–14, 17–27, 29–31, Feb. 1–3, and 5–9.

Monthly discharge of Price River near Helper, Utah, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	326	50	71.8	4,410	B.
November	50	21	39.5	2,350	B.
December	40	28	35.9	2,210	C.
January	38	26	29.1	1,790	C.
February	52	26	40.0	2,220	C.
March	155	40	73.7	4,530	B.
April	418	106	207	12,300	B.
May	394	252	326	20,000	B.
June	338	116	209	12,400	B.
July	160	77	128	7,870	B.
August	80	26	57.2	3,520	B.
September	444	25	50.0	2,980	C.
The year	444	21	106	76,600	

2142°—18—WSP 409——4

SAN RAFAEL RIVER BASIN.

HUNTINGTON CREEK NEAR HUNTINGTON, UTAH.

LOCATION.—In sec. 6, T. 17 S., R. 8 E., at the Cunha ranch, about 7 miles northwest of Huntington; below all main tributaries except Fish Creek.

DRAINAGE AREA.—158 square miles.

RECORDS AVAILABLE.—May 3, 1909, to September 30, 1915.

GAGE.—Stevens water-stage recorder on left bank, installed April 30, 1913, to replace the inclined staff used since October 7, 1912; set to read the same, but is about 100 feet above inclined gage which is 20 feet above cable. A vertical staff on right bank at same site and datum as inclined gage used May 3, 1909, to October 6, 1912.

DISCHARGE MEASUREMENTS.—Made by wading or from a cable.

CHANNEL AND CONTROL.—Bed composed of coarse gravel; shifts occasionally during high stages.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 4.50 feet at 10 a. m. May 16 (discharge, 520 second-feet); minimum stage (staff), 2.35 feet at 11 a. m. February 24 (discharge, 26 second-feet).

1909–1915: Maximum discharge, 1,100 second-feet on May 22 and 23, 1914; minimum discharge, 12 second-feet March 20, 21, 22, and 23, 1912.

WINTER FLOW.—Stream frozen entirely over during greater part of winter. Winter records based largely on climatic data and interpolation between days when water was reported to be running freely under the ice.

DIVERSIONS.—Above all diversions (except Cunha's ditch). Several small ditches divert from tributaries above station.

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

ACCURACY.—All records except those for winter good.

Discharge measurements of Huntington Creek near Huntington, Utah, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 14	L. W. Jordan	2.62	45	May 16	L. W. Jordan	3.98	317
Feb. 2	J. J. Sanford	[a] 2.51	34	July 9	do	3.32	141
Apr. 3	Lynn Crandall	2.73	59	Sept. 16	do	2.55	37
May 13	L. W. Jordan	3.74	241				

[a] Shore ice present; stage-discharge relation apparently not affected.

Daily discharge, in second-feet, of Huntington Creek near Huntington, Utah, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	65	45	31	.....	35	33	51	194	396	160	82	40
2	64	46	.....	.....	36	34	51	167	396	150	81	41
3	76	44	.....	.....	36	35	57	148	288	144	81	63
4	73	43	.....	.....	34	37	56	142	302	142	81	54
5	61	41	.....	.....	34	38	60	140	267	144	82	52
6	60	44	.....	.....	34	37	57	133	250	134	84	46
7	60	45	.....	.....	34	36	55	129	236	127	86	44
8	71	40	.....	28	33	35	65	138	255	129	91	41
9	77	40	30	.....	33	34	58	142	315	142	82	38
10	69	34	.....	.....	33	34	61	162	354	140	75	38
11	65	39	.....	.....	33	34	69	204	354	158	65	42
12	60	42	.....	.....	33	34	72	244	305	136	62	43
13	58	45	.....	.....	32	37	84	276	250	125	61	39
14	56	41	.....	.....	32	40	87	322	233	118	61	38
15	55	33	.....	.....	32	43	89	322	236	115	63	38
16	52	41	.....	.....	31	46	101	366	238	110	63	38
17	53	41	.....	.....	31	50	104	404	238	107	61	38
18	53	36	.....	43	31	54	129	322	225	117	58	38
19	52	38	.....	43	31	54	140	273	212	115	57	38
20	51	34	.....	43	31	54	178	244	197	114	55	38
21	51	35	.....	.....	30	54	204	220	190	117	55	38
22	55	37	.....	.....	28	54	176	204	178	109	55	37
23	51	38	.....	.....	27	54	165	199	169	110	55	37
24	48	43	.....	.....	26	54	173	207	160	107	58	37
25	47	41	.....	.....	28	54	169	230	154	106	60	50
26	47	42	.....	.....	30	54	187	209	142	117	53	47
27	46	42	.....	.....	31	54	192	194	138	118	42	45
28	46	46	.....	.....	32	50	230	214	136	118	39	40
29	45	47	.....	.....	.....	45	326	247	138	114	40	38
30	46	39	.....	.....	.....	40	305	267	142	110	40	38
31	46	.....	.....	.....	.....	48	.....	273	.....	91	38	.....

NOTE.—Discharge determined from rating curve fairly well defined between 30 and 350 second-feet; estimated, on account of ice, as follows: Dec. 2–8, 31 second-feet; Dec. 10–31, 30 second-feet; Jan. 1–7, 29 second-feet; Jan. 9–17, 34 second-feet; Jan. 21–31, 37 second-feet; Feb. 1, 35 second-feet; Feb. 12 to Mar. 29 the recording gage was out of commission and staff gage readings were obtained twice a week; discharge interpolated for days for which gage heights were not reported.

Monthly discharge of Huntington Creek near Huntington, Utah, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	77	45	56.7	3,490	A.
November	47	33	40.7	2,420	B.
December	.....	.....	30.3	1,860	C.
January	.....	.....	34.6	2,130	D.
February	36	26	31.8	1,770	C.
March	54	33	43.9	2,700	B.
April	326	51	125	7,440	A.
May	404	129	224	13,800	A.
June	396	136	236	14,000	A.
July	160	91	124	7,620	A.
August	91	38	63.4	3,900	A.
September	63	37	41.8	2,490	B.
The year	404	.....	87.9	63,600	

NOTE.—See footnote to table of daily discharge.

HUNTINGTON CREEK NEAR CASTLEDALE, UTAH.

LOCATION.—In sec. 33, T. 18 S., R. 9 E., about half a mile below county bridge on road to Green River, 5 miles above mouth of Cottonwood Creek, 6 miles east of Castledale, and 8 miles southeast of Huntington.

DRAINAGE AREA.—325 square miles.

RECORDS AVAILABLE.—May 12, 1911, to September 30, 1915.

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

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

CHANNEL AND CONTROL.—Bed composed of sand and small gravel. Banks fairly high; subject to erosion but not to overflow. Fairly permanent control formed by 2 by 12 inch planks placed edgewise in a trench and anchored to pipes driven into stream bed. Point of zero flow, approximately 0.9 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 3.95 feet between April 20 and 24 (discharge, 305 second-feet); minimum stage 0.95 foot at noon September 10 (discharge, 2.5 second-feet).

1911–1915: Maximum stage recorded, 6.62 feet at noon May 24, 1914 (discharge, 823 second-feet); minimum stage, 0.95 foot September 10, 1915 (discharge, 2.5 second-feet).

WINTER FLOW.—Stage-discharge relation seriously affected by ice. Winter records determined largely by a comparison with the records at the upper station, and are poor. Ice forms 4 or 5 feet in thickness and the stream is often icebound until the 1st of April.

DIVERSION.—Station is below all diversions in Castle Valley.

REGULATION.—Flow effected by irrigation in Huntington district.

ACCURACY.—All records fair except those for winter.

Discharge measurements of Huntington Creek near Castledale, Utah, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 13	L. W. Jordan	[a] 1.72	20.1	July 11	L. W. Jordan	[c] 1.41	12.6
Apr. 4	Lynn Crandall	[b] 2.07	43.3	Sept. 18	....do	1.13	4.4
May 14	L. W. Jordan	3.02	153				

[a] Repairs to artificial control raised gage height from 1.72 to 1.93.
[b] Control repaired; changing gage height from 2.12 to 2.07.
[c] Automatic gage moved closer to creek; gage reading referred to old datum, 1.55 feet.

Daily discharge, in second-feet, of Huntington Creek near Castledale, Utah, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.	Sept.
1	31	26	.....	40	104	46	12	4.8	2.7
2	31	.....	.....	40	96	180	11	4.6	2.6
3	31	.....	.....	40	83	150	10	4.2	3.4
4	31	.....	.....	42	67	100	9	3.9	6.0
5	.....	.....	.....	40	65	80	8	3.9	4.2
6	.....	.....	.....	45	63	60	.....	3.9	3.6
7	.....	.....	.....	40	62	57	.....	4.2	3.4
8	.....	25	.....	38	45	57	.....	4.6	3.0
9	27	.....	28	37	42	64	.....	4.6	2.8
10	.....	.....	28	27	42	66	.....	4.6	2.6
11	.....	.....	.....	26	45	111	12	4.2	3.0
12	.....	.....	.....	27	92	79	11	3.9	3.5
13	.....	21	.....	28	128	.....	8	3.7	3.5
14	.....	20	.....	35	118	.....	8	3.7	3.7
15	.....	14	.....	37	102	.....	7	3.9	3.8
16	.....	13	.....	42	116	.....	7	3.9	4.4
17	.....	15	.....	71	144	.....	7	3.6	4.6
18	.....	13	.....	75	125	.....	6	3.6	4.6
19	22	15	.....	165	103	.....	6	3.4	4.6
20	.....	16	.....	.....	81	29	5	3.4	4.6
21	.....	19	.....	.....	59	.....	5	3.2	4.4
22	.....	23	.....	.....	37	.....	5	3.4	4.2
23	.....	19	.....	.....	37	.....	5	3.4	4.2
24	.....	22	.....	.....	37	.....	5	3.2	4.2
25	20	34	.....	148	.....	.....	6	3.0	10
26	.....	30	.....	155	.....	.....	6	2.8	10
27	.....	31	.....	155	.....	16	6	3.0	8
28	.....	32	.....	144	.....	15	6	3.0	7
29	.....	30	.....	180	.....	14	6	3.1	7
30	.....	30	.....	204	60	13	6	3.2	6
31	.....	.....	.....	.....	55	.....	5	2.8	.....

NOTE.—Discharge determined from four fairly well-defined rating curves used as follows: Oct. 1 to Nov. 12, Nov. 13–28; Apr. 4 to July 11; and July 12 to Sept. 30. Mean flow estimated Nov. 2–7 as 26 second-feet; Nov. 9–12, interpolated, 23 second-feet, as gage record was not available. Mean flow estimated, on account of ice, as follows: Nov. 29 and 30, 30 second-feet; Dec. 1–31, 28 second-feet; Jan. 1–31, 32 second-feet; Feb. 1–28, 30 second-feet; Mar. 1–31, 35 second-feet; Apr. 1–3, 40 second-feet. Mean flow estimated, on account of gage clock stopping, or inlet pipe being clogged, as follows: Apr. 20–24, 180 second-feet; May 25–29, 40 second-feet; June 13–19, 55 second-feet; June 21–26, 22 second-feet; July 6–10, 10 second-feet.

Monthly discharge of Huntington Creek near Castledale, Utah, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	.....	.....	26	1,600	C.
November	34	13	23.2	1,380	C.
December	.....	.....	28	1,720	D.
January	.....	.....	32	1,970	D.
February	.....	.....	30	1,670	D.
March	.....	.....	35	2,150	D.
April	204	26	92.7	5,520	B.
May	144	37	71.2	4,380	B.
June	180	13	55.1	3,280	C.
July	12	5	7.68	472	C.
August	4.8	2.8	3.70	228	C.
September	15	2.6	4.82	287	C.
The year	204	2.6	34.0	24,700	

NOTE.—See footnote to table of daily discharge.

SAN RAFAEL RIVER NEAR GREEN RIVER, UTAH.

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

DRAINAGE AREA.—1,690 square miles.

RECORDS AVAILABLE.—May 5, 1909, to September 30, 1915.

GAGE.—Vertical staff on downstream side of right-crib abutment of bridge; read once daily by Mrs. W. E. Tomlinson.

DISCHARGE MEASUREMENTS.—Usually made from cable about 300 feet above bridge because of condition of bottom.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.3 feet at 6 p. m. June 11 (discharge, 1,300 second-feet); minimum stage recorded 1.25 feet August 14 (discharge, 0.1 second-foot); water standing in pools August 15 to September 8.

1909–1915: Maximum stage recorded, 8.95 feet September 2, 1909 (discharge, 4,720 second-feet); water standing in pools during August and September, 1910 and August 15 to September 8, 1915.

WINTER FLOW.—Stage-discharge relation seriously affected by ice. Records determined from discharge measurements and climatic data.

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

REGULATION.—None.

ACCURACY.—Records only fair, owing to shifting of channel and control.

Discharge measurements of San Rafael River near Green River, Utah, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 27	J. J. Sanford	[a] 2.32	59.0	June 6	L. W. Jordan	3.92	518
Feb. 6	do	[a] 2.85	44.3	July 14	do	1.98	23.3
Mar. 26	L. W. Jordan	2.60	206	Aug. 7	R. C. Pierce	[b] 1.40	0.5

[a] Discharge relation affected by ice.

[b] Stage of zero flow at gage height 1.30 feet.

Daily discharge, in second-feet, of San Rafael River near Green River, Utah, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	400	43	50	.....	130	676	438	100	15	.....
2	77	43	50	.....	130	386	914	76	10	.....
3	67	46	50	.....	122	274	992	76	7	.....
4	88	50	77	.....	107	206	730	65	2.5	.....
5	88	50	67	.....	100	174	470	54	1.0	.....
6	77	46	58	88	114	146	486	43	.5	.....
7	58	43	58	88	146	138	434	38	.5	.....
8	58	43	62	88	114	130	417	19	.1	.....
9	38	43	82	82	122	130	400	14	.1	0 2
10	38	40	67	88	107	122	1,020	12	.1	3
11	148	38	67	88	107	130	1,030	12	.1	3
12	148	38	.....	82	107	164	750	12	.1	3
13	148	40	.....	77	107	403	560	18	.1	2.8
14	158	38	.....	.....	107	494	515	24	.1	3
15	168	38	.....	.....	146	626	398	12	.....	6
16	168	38	.....	.....	146	728	382	12	.....	3
17	168	40	.....	.....	164	728	398	11	.....	1.8
18	168	38	.....	.....	184	702	382	11	.....	.2
19	168	38	.....	.....	250	676	352	10	.....	.2
20	168	38	.....	780	300	676	338	10	.....	.2
21	236	38	.....	494	313	494	325	9	.....	.1
22	236	34	.....	420	386	326	286	9	.....	.1
23	236	31	.....	300	313	250	274	8	.....	.1
24	236	34	.....	300	300	300	214	70	.....	.1
25	260	38	.....	228	274	274	190	60	.....	665
26	272	46	.....	206	228	326	190	35	.....	260
27	284	50	.....	195	184	354	168	38	.....	56
28	236	50	.....	164	217	420	148	158	.....	6
29	148	38	.....	174	300	438	114	100	.....	5
30	100	46	.....	164	580	420	148	39	.....	4.5
31	77	.....	.....	130	.....	456	.....	24	.....	.....

NOTE.—Discharge determined from three poorly defined rating curves, one used Oct. 1 to Mar. 13 and June 3–11; another Mar. 20 to June 2; and the third from June 12 to Sept. 30. Mean flow estimated on account of ice, as follows: Dec. 12–31, 60 second-feet; Jan. 1–31, 48 second-feet: Feb. 1–28, 47 second-feet; Mar. 1–5, 82 second-feet. Observer ill Mar. 14–19 and mean flow estimated 300 second-feet. Water standing in pools Aug. 15 to Sept. 8.

Monthly discharge of San Rafael River near Green River, Utah, for the year ending Sept. 30, 1915.

Month.	Discharge in second feet.			Run-off (in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	400	38	159	9,780	C.
November	50	38	41.2	2,450	C.
December	82	.....	60.9	3,740	C.
January	.....	.....	48	2,950	D.
February	.....	.....	47	2,610	D.
March	780	77	208	12,800	C.
April	580	100	197	11,700	B.
May	728	122	380	23,400	C.
June	1,030	114	449	26,700	C.
July	158	8	38.0	2,340	B.
August	15	0	1.20	74	
September	665	0	34.1	2,030	C.
The year	1,030	0	139	101,000	

NOTE.—See footnote to table of daily discharge.

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.

DRAINAGE AREA.—240 square miles.

RECORDS AVAILABLE.—May 1, 1909, to Sept. 30, 1915.

GAGE.—Inclined staff on left bank just below corral at ranch house and about 300 feet above cable; used March 22, 1910, to November 23, 1913, and May 24, 1914, to September 30, 1915; read 4 or 5 times a week by Robert Johnson. Records obtained November 24, 1913, to May 23, 1914, were referred to a different gage at independent datum installed November 20, 1913, at cable. From May 1, 1909, to August 21, 1909, stage was determined by measuring down from a nail in a tree at about the location of the present gage. August 22, 1909, an inclined staff was installed at the same site as reference point; gage was washed out August 31, 1909; and from September 1, 1909, to March 22, 1910, the records were uncertain and unreliable. March 22 an inclined staff was installed at present site and at datum 0.8 foot lower than the datum used in 1909. An inclined staff was installed in 1911 about 400 feet below present gage, but no published records have been referred to it, and it was destroyed by floods in the spring of 1913.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Bed rough; shifts. Banks fairly high but have been overflowed during the sudden floods, to which the stream is subject.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.0 feet at 4 p. m. June 1 (discharge, 954 second-feet); minimum stage, 4.3 feet February 19, 20, 23-25, and March 4 and 5 (discharge, 16 second-feet).

1909-1915: Maximum discharge recorded, 1,980 second-feet September 7, 1913; minimum discharge recorded, 5 second-feet September 21, 1910.

WINTER FLOW.—Stage discharge relation affected by ice. Winter records determined from discharge measurements and climatic data.

DIVERSIONS.—There are two or three small diversions above station, but all the main ditches take out below.

REGULATION.—None.

ACCURACY.—Records only fair.

Discharge measurements of Cottonwood Creek near Orangeville, Utah, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 3	J. J. Sanford	[a]4.88	11.7	July 12	L. W. Jordan	5.20	100
Apr. 4	Lynn Crandall	4.60	33.3	Sept. 17	do	4.62	25.7
May 14	L. W. Jordan	5.80	327				

[a] Stream frozen over.

Daily discharge, in second-feet, of Cottonwood Creek near Orangeville, Utah, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	56	34	26	.....	20	26	130	954	156	57	34
2	34	34	26	.....	20	30	121	784	156	57	34
3	44	34	26	.....	18	34	112	616	156	57	57
4	39	34	26	.....	16	34	112	460	150	57	57
5	34	30	26	.....	16	34	96	412	143	57	46
6	34	26	.....	.....	17	34	100	370	136	57	34
7	34	26	.....	.....	19	39	120	327	136	53	34
8	39	23	.....	.....	20	44	124	412	136	49	34
9	44	20	.....	.....	20	34	127	616	136	45	34
10	34	20	.....	.....	20	34	130	672	202	45	34
11	34	20	.....	.....	20	45	152	728	150	45	34
12	34	20	.....	.....	20	56	184	672	100	45	34
13	34	26	.....	.....	20	56	244	591	100	45	34
14	34	26	.....	.....	20	56	327	510	100	45	24
15	34	26	.....	.....	20	62	412	672	100	45	24
16	34	26	.....	.....	20	68	514	784	92	45	24
17	34	26	.....	.....	20	68	616	562	84	45	24
18	34	26	.....	.....	20	75	460	672	84	45	24
19	34	26	.....	16	20	82	394	728	84	40	24
20	34	26	.....	16	20	82	327	635	84	34	24
21	34	26	.....	16	22	96	288	544	84	34	24
22	34	26	.....	16	23	96	288	424	84	34	24
23	34	26	.....	16	25	96	266	380	70	34	24
24	34	26	.....	16	26	96	254	320	80	34	24
25	34	26	.....	16	26	104	254	312	90	34	34
26	34	23	.....	21	26	112	254	264	156	34	29
27	34	20	.....	26	26	112	254	246	70	34	24
28	34	20	.....	23	26	130	288	230	70	34	24
29	34	22	.....	.....	26	192	368	188	70	34	24
30	34	24	.....	.....	20	168	465	184	70	34	24
31	34	.....	.....	.....	20	.....	562	.....	57	34	.....

NOTE.—Discharge determined from three poorly defined rating curves applicable Oct. 1 to May 5, May 14 to June 19, and July 1 to Sept. 30, respectively. Discharge May 6–13 and June 20–30 determined by methods used for shifting control. Discharge interpolated for days on which gage was not read. Mean discharge estimated, because of ice, Dec. 6–31, 18 second-feet; Jan. 1–31, 16 second-feet; and Feb. 1–17, 13 second-feet.

Monthly discharge of Cottonwood Creek near Orangeville, Utah, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	56	34	35.7	2,200	C.
November	34	20	25.6	1,520	C.
December	.....	.....	19.3	1,190	D.
January	.....	.....	16.0	984	D.
February	.....	.....	14.9	828	D.
March	26	16	21.0	1,290	C.
April	192	26	73.2	4,360	B.
May	616	96	269	16,500	C.
June	954	184	509	30,300	C.
July	202	57	109	6,700	B.
August	57	34	43.3	2,660	B.
September	57	24	30.8	1,830	C.
The year	954	.....	97.2	70,400	

NOTE.—See footnote to table of daily discharge.

FERRON CREEK (UPPER STATION) NEAR FERRON, UTAH.

LOCATION.—In sec. 1, T. 20 S., R. 6 E., about a quarter of a mile below house at the Peterson ranch (formerly Christensen's), 1½ miles above the grist mill and 5 miles northwest of Ferron.

DRAINAGE AREA.—150 square miles.

RECORDS AVAILABLE.—May 6, 1911, to September 30, 1915.

GAGE.—Inclined staff on right bank at cable installed September 13, 1911, to replace the original vertical staff 150 feet above the cable.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Banks high and not likely to overflow; stream bed of sand and gravel; shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.00 feet at 6.30 p. m. June 1 (discharge, 640 second-feet); minimum stage 0.95 foot March 30 to April 1 (discharge, 11 second-feet).

1911–1915: 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.

WINTER FLOW.—Observations discontinued. Operator at mill estimates minimum during winter at 6 or 7 second-feet.

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

REGULATION.—None.

ACCURACY.—Records fair.

Discharge measurements of Ferron Creek (upper station) near Ferron, Utah, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 5	Lynn Crandall	1.20	22.3	July 12	L. W. Jordan	1.04	69
May 15	L. W. Jordan	2.45	230	Sept. 17	do	.50	17.4

Daily discharge, in second-feet, of Ferron Creek (upper station) near Ferron, Utah, for the year ending Sept. 30, 1915.

Day.	Oct.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	22	.....	11	89	605	124	39	25
2	22	.....	15	49	535	119	39	25
3	33	.....	23	46	395	113	38	29
4	23	.....	21	52	353	106	36	26
5	21	.....	21	52	311	139	36	25
6	21	.....	21	56	298	100	36	25
7	21	.....	19	56	347	91	36	24
8	21	.....	34	87	430	88	35	26
9	25	.....	23	82	488	83	35	24
10	23	.....	30	103	505	83	35	23
11	22	.....	28	121	435	76	32	24
12	22	.....	31	172	353	71	32	23
13	21	.....	39	226	325	69	30	23
14	20	.....	45	284	284	62	30	23
15	19	.....	39	260	303	59	30	23
16	19	.....	45	377	347	62	30	23
17	19	.....	48	319	320	62	30	16
18	19	.....	53	223	298	57	30	12
19	19	.....	57	172	271	56	29	12
20	19	.....	89	138	258	52	29	12
21	18	.....	85	127	276	50	28	12
22	25	17	69	117	233	50	27	12
23	22	17	59	117	220	50	27	11
24	19	17	69	138	198	52	26	11
25	18	17	61	149	155	52	26	49
26	18	17	82	138	174	50	26	14
27	17	17	92	117	162	49	26	14
28	16	16	123	138	155	46	26	12
29	15	13	170	223	150	45	25	12
30	15	11	156	223	132	41	25	12
31	15	11	.....	292	.....	39	25	.....

NOTE.—Discharge determined from three fairly well defined rating curves used as follows: Oct. 1-31, Mar. 22 to May 31, and June 2 to September 30. Discharge June 1 determined by indirect method for shifting control. No records were kept Nov. 1 to March 21.

Monthly discharge of Ferron Creek (upper station) near Ferron, Utah, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	25	15	20.3	1,250	C.
March 22–31	17	11	15.3	303	C.
April	170	11	55.3	3,290	B.
May	377	46	15.3	9,410	B.
June	605	132	311	18,500	C.
July	139	39	70.8	4,350	B.
August	39	25	30.8	1,890	B.
September	49	11	20.1	1,200	C.

GRAND RIVER BASIN.

NORTH FORK OF GRAND RIVER NEAR GRAND LAKE, COLO.

LOCATION.—In sec. 13, T. 3 N., R. 76 W., at highway bridge 3 miles southwest of Grand Lake. Nearest tributary, Grand Lake outlet, enters some distance below; no tributaries for several miles above station.

DRAINAGE AREA.—107 square miles (measured on Forest atlas).

RECORDS AVAILABLE.—July 29, 1904, to September 30, 1909; September 20, 1910, to September 30, 1915.

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

DISCHARGE MEASUREMENTS.—Made from highway bridge at gage.

CHANNEL AND CONTROL.—Bed composed of boulders; rough; gravity section which shifts slightly from year to year. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.2 feet at 6.30 p. m. June 19 (discharge, 565 second-feet); minimum discharge, 15 second-feet on January 30. No record for winter of 1915.

WINTER FLOW.—Ice forms along banks, but springs keep river open.

DIVERSIONS.—There are court decrees for the diversion of 699 second-feet from the headwaters above station. Of this amount 525 second-feet is for diversion across the divide into the headwaters of the Cache la Poudre, 12,488 acre-feet being so diverted in 1915. There is also a reservoir decree for 19,000 acre-feet from the flood water.

REGULATION.—None.

ACCURACY—Determinations of mean daily stage based on one reading may be in error at certain seasons, owing to fluctuations caused by alternate melting and freezing at the headwaters. Records good for October and June to September; fair, November and March to May.

The following discharge measurement was made by Fletcher and Whitsit:
January 30, 1915: Gage height, 3.29 feet; discharge, 15 second-feet.

Daily discharge, in second-feet, of North Fork of Grand River near Grand Lake, Colo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	85	52	.....	22	228	380	332	85	58
2	58	47	.....	22	160	405	310	85	56
3	58	46	.....	23	140	270	290	82	56
4	58	46	.....	24	100	252	270	74	58
5	71	44	.....	24	91	235	290	71	58
6	58	40	.....	24	85	221	310	79	56
7	58	37	21	29	91	200	252	85	56
8	58	35	20	31	94	200	252	91	85
9	71	35	20	33	94	235	235	100	71
10	64	40	20	35	108	332	235	94	66
11	64	46	20	94	108	405	235	85	61
12	71	47	20	150	182	510	235	79	61
13	64	.....	20	170	235	355	235	77	63
14	61	.....	20	182	310	290	207	71	61
15	64	.....	20	235	270	290	200	71	61
16	64	.....	20	235	270	270	176	71	61
17	71	.....	20	252	270	355	160	71	56
18	64	.....	20	270	290	430	150	66	53
19	64	.....	20	176	235	565	145	120	46
20	61	.....	20	228	221	510	140	100	48
21	64	.....	20	155	214	405	135	88	40
22	71	.....	20	160	200	455	125	79	42
23	85	.....	20	140	207	430	116	77	39
24	78	.....	20	120	214	405	112	74	39
25	71	.....	20	112	207	405	100	74	44
26	68	.....	20	104	207	405	100	71	77
27	64	.....	20	94	214	310	100	68	77
28	61	.....	20	120	242	310	97	66	68
29	58	.....	21	176	270	310	94	66	68
30	56	.....	21	252	310	355	94	63	66
31	52	.....	21	.....	332	.....	88	61	.....

NOTE.—Discharge determined from rating curve fairly well defined throughout.

Monthly discharge of North Fork of Grand River near Grand Lake, Colo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off total in acre-feet.	Accuracy.
	Maximum.	Minimum.	Mean.		
October	85	52	65.0	4,000	B.
November 1-12	52	35	42.9	1,020	C.
March 7-31	21	20	20.2	1,000	C.
April	252	22	123	7,320	C.
May	332	85	200	12,300	C.
June	565	200	350	20,800	B.
July	332	88	188	11,600	B.
August	120	61	78.8	4,850	B.
September	85	39	58.4	3,480	B.

GRAND RIVER AT HOT SULPHUR SPRINGS, COLO.

LOCATION.—In sec. 2, T. 1 N., R. 78 W., at bridge connecting the Denver & Salt Lake Railway station with the town of Hot Sulphur Springs, in Grand County. Nearest tributary, Beaver Creek, enters 2 miles below.

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

RECORDS AVAILABLE.—July 22, 1904, to September 30, 1909; September 23, 1910, to September 30, 1915.

GAGE.—Chain gage on downstream side of bridge; read morning and evening by D. B. Thompson. Prior to April 16, 1906, readings were obtained from a staff gage, 1,000 feet down stream, set to datum 6.07 feet lower.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel. Control 150 feet downstream from gage; Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.95 feet at 8.15 a. m. June 25 (discharge, 4,060 second-feet); minimum discharge occurs during winter.

WINTER FLOW.—Stage-discharge relation seriously affected by ice; flow determined from discharge measurements, and comparison with flow at Kremmling and Glenwood Springs.

DIVERSIONS.—Court decrees for diversion of 96 second-feet from Grand River between station and mouth of North Fork; also a reservoir decree for 31,300 acre-feet from floodwaters.

REGULATION.—None.

ACCURACY.—Open-water records good, as control was practically permanent during the year.

COOPERATION.—Gage-height records furnished by United States Forest Service.

Discharge measurements of Grand River at Hot Sulphur Springs, Colo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 18	R. H. Fletcher	2.20	274	Mar. 10	R. H. Fletcher	*a* 3.28	98
Jan. 30	Fletcher and Whitsit	*a* 2.96	82	July 28	W. R. King	2.96	650

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, 1915.

Day.	Oct.	Nov.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	263	246	.....	.....	300	1,060	1,930	2,550	447	230
2	263	230	.....	.....	520	725	2,550	2,550	472	215
3	260	215	.....	.....	725	665	2,050	2,170	447	246
4	253	212	.....	.....	1,280	578	1,820	2,050	424	263
5	246	212	.....	.....	898	550	1,600	1,930	400	280
6	246	201	.....	.....	497	497	1,490	2,290	378	263
7	234	193	.....	.....	378	400	1,380	2,050	378	263
8	230	167	.....	.....	357	636	1,190	1,930	492	280
9	246	187	.....	.....	400	542	1,490	1,700	606	337
10	253	174	.....	.....	424	447	1,930	1,820	578	317
11	253	151	.....	.....	298	497	2,680	1,820	472	317
12	263	158	.....	.....	337	695	3,380	1,820	447	280
13	277	158	.....	.....	357	975	2,780	1,820	424	280
14	280	167	.....	.....	400	1,380	2,170	1,700	400	263
15	266	162	.....	.....	472	1,490	1,930	1,600	400	263
16	273	167	.....	.....	447	1,490	1,820	1,380	400	263
17	263	155	.....	.....	550	1,490	2,420	1,190	378	246
18	263	130	.....	.....	497	1,600	2,420	1,020	337	215
19	263	120	.....	.....	606	1,490	3,530	935	317	215
20	249	110	.....	.....	578	1,190	3,980	860	357	215
21	260	108	.....	.....	636	1,020	3,830	825	337	201
22	287	106	.....	.....	606	860	3,830	790	327	187
23	317	104	.....	.....	606	935	3,680	790	317	187
24	317	102	.....	.....	550	975	3,830	695	298	187
25	302	100	.....	.....	524	1,100	3,830	650	298	174
26	302	98	.....	.....	497	1,280	3,680	606	298	246
27	298	96	.....	.....	497	1,280	3,680	665	280	317
28	284	94	.....	.....	578	1,060	3,680	578	263	337
29	277	92	.....	.....	758	1,020	3,530	578	263	357
30	260	90	82	.....	1,190	1,190	2,420	550	263	337
31	249	.....	.....	.....	.....	1,380	.....	497	230	.....

NOTE.—Discharge determined as follows: Oct. 1 to Nov. 16, Apr. 3 to Sept. 30, from rating curve well defined throughout; Nov. 17 to 30, Apr. 1 to 2, estimated because of ice; discharge May 9, June 13, 27, July 11, 25, Aug. 8, 22, and Sept. 26 interpolated, as gage was not read.

Monthly discharge of Grand River at Hot Sulphur Springs, Colo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	317	230	268	16,500	B.
November	246	90	150	8,930	B.
December	.....	.....	80	4,920	
January	.....	.....	80	4,920	
February	.....	.....	85	4,720	
March	.....	.....	125	7,690	
April	1,280	298	559	33,300	B.
May	1,600	400	984	60,500	A.
June	3,980	1,190	2,680	159,000	A.
July	2,550	497	1,370	84,200	A.
August	606	230	378	23,200	B.
September	357	174	259	15,400	B.
The year	3,980	.....	586	423,000	

NOTE.—Discharge for December, January, February, and March determined from two discharge measurements and comparison with record of flow at stations at Kremmling and Glenwood Springs.

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, in Grand County. Nearest tributary, Blue River, enters a mile below Kremmling.

DRAINAGE AREA.—2,380 square miles.

RECORDS AVAILABLE.—July 24, 1904, to September 30, 1915.

GAGE.—Friez water-stage recorder; during winter, staff gage; read twice daily by C. H. Yust. Prior to October 18, 1906 a chain gage on opposite side of river was used; datum 0.80 foot lower.

DISCHARGE MEASUREMENTS.—Made from cable just below gage or by wading; Measurements during winter 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; banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 12.95 feet at noon, June 21 (discharge, 8,410 second-feet). Minimum discharge occurs during winter. In 1915 minimum discharge of 180 second-feet occurred on Dec. 16.

WINTER FLOW.—River frozen over at station, but rapids below remain open and prevent backwater except for short intervals when jammed by ice.

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

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

REGULATION.—None.

ACCURACY.—Records considered good except those for winter, which are fair. Slight shift in control well defined by measurements.

Discharge measurements of Grand River near Kremmling, Colo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1915.		*Feet.*	*Sec.-ft.*	1915.		*Feet.*	*Sec.-ft.*
Oct. 17	R. H. Fletcher	2.49	809	Feb. 1	Fletcher and Whitsit	*a* .80	245
Nov. 11	.....Do	2.06	604	Mar. 11	R. H. Fletcher	*a* 1.12	310
12	.....Do	.96	338	Apr. 16	.....Do	4.37	1,580
14	.....Do	1.55	436	July 29	W. R. King	4.36	1,380

a Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Grand River near Kremmling, Colo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	739	707	342	245	330	305	650	2,820	4,060	4,990	1,120	650
2	739	707	268	256	305	305	770	2,270	5,620	4,990	1,080	650
3	739	707	268	268	292	305	945	1,970	4,900	4,540	1,050	650
4	771	676	280	268	280	280	1,200	1,820	4,380	4,220	1,020	710
5	771	645	292	255	268	268	1,050	1,560	3,980	4,060	945	680
6	739	602	292	242	242	318	1,030	1,480	3,680	4,380	945	710
7	739	587	305	205	218	318	1,030	1,360	3,540	4,060	945	710
8	771	559	342	205	218	330	962	1,280	3,330	3,680	1,160	710
9	837	531	305	192	242	280	1,300	1,280	3,610	3,400	1,680	770
10	871	531	230	205	268	318	892	1,320	4,460	3,400	1,480	740
11	837	559	205	205	268	342	945	1,520	5,440	3,400	1,280	710
12	837	464	205	218	268	305	1,160	1,870	6,630	3,540	1,160	710
13	804	545	242	230	280	305	1,320	2,580	6,220	3,400	1,050	710
14	837	464	205	242	292	305	1,360	3,610	4,990	3,190	1,020	680
15	771	518	192	205	268	330	1,640	3,610	4,460	3,000	980	680
16	771	477	180	230	242	355	1,600	3,540	4,630	2,760	980	680
17	804	518	255	218	280	342	1,680	3,820	5,350	2,520	945	680
18	804	518	255	218	292	342	1,640	3,900	5,820	2,320	910	680
19	771	425	255	218	305	342	1,680	3,540	6,520	2,120	875	605
20	771	388	255	242	292	330	1,720	3,190	7,750	2,020	840	575
21	804	375	250	268	318	330	1,770	2,700	8,110	1,770	840	545
22	804	464	250	268	292	368	1,870	2,470	7,630	1,680	840	530
23	940	438	250	268	292	380	1,820	2,370	7,750	1,680	805	515
24	940	425	250	268	318	380	1,720	2,580	7,630	1,640	770	500
25	871	425	250	268	305	395	1,600	3,190	7,400	1,600	770	515
26	837	425	245	268	280	455	1,680	3,610	7,290	1,480	770	605
27	837	425	245	255	280	500	1,480	3,470	6,850	1,480	770	620
28	804	412	245	255	280	545	1,640	2,940	6,320	1,480	740	875
29	771	412	245	268	.....	620	1,520	2,880	5,440	1,400	710	910
30	771	412	245	255	.....	635	2,820	3,120	5,350	1,320	710	875
31	771	.....	245	255	.....	605	.....	3,540	.....	1,240	680	.....

NOTE.—Discharge determined as follows: Oct. 1 to Nov. 28, from well-defined rating curve; Nov. 29, 30; Dec. 18 to Jan. 2, estimated, on account of ice, by comparison with record obtained at Glenwood Springs, Mar. 21–25, July 11–15, from rating curve; remainder of year by indirect method for shifting control.

Monthly discharge of Grand River near Kremmling, Colo., for the year ending Sept. 30, 1915.

Month.	Discharge in second feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	940	739	802	49,300	B.
November	707	375	511	30,400	B.
December	342	180	255	15,700	C.
January	268	192	241	14,800	C.
February	330	218	279	15,500	C.
March	635	268	372	22,900	B.
April	2,820	650	1,420	84,500	B.
May	3,900	1,280	2,620	161,000	A.
June	8,110	3,330	5,640	336,000	B.
July	4,990	1,240	2,800	172,000	B.
August	1,680	680	964	59,300	A.
September	910	500	673	40,000	B.
The year	8,110	180	1,380	1,000,000	

GRAND RIVER AT GLENWOOD SPRINGS, COLO.

LOCATION.—In front of the electric power house at Glenwood Springs, in Garfield County. No Name Creek enters Grand River about 2 miles above and Roaring Fork half a mile below station.

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

RECORDS AVAILABLE.—January 1, 1900, to September 30, 1915; 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. Since 1902 a number of water-stage recorders, referred to datum of staff gage installed in 1900, have been used. Chain gage at railroad bridge, just above mouth of Roaring Fork, used previous to 1900.

DISCHARGE MEASUREMENTS.—Made from cable beneath the State Street Bridge, a third of a mile below gage.

CHANNEL AND CONTROL.—Bed composed of well compacted gravel, on which silt is deposited. Control is at riffle 300 feet downstream; shifts slightly. Banks not subject to overflow except at extreme high water.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 8.6 feet from 8 a. m. to 1 p. m. June 21 (discharge, 13,400 second-feet); minimum stage from recorder, 2.30 feet at noon March 28 (discharge, 235 second-feet).

WINTER FLOW.—Stage-discharge relation not affected by ice, as river is kept open by hot water from springs.

DIVERSIONS.—Court decrees for diversion of 13 second-feet of water from Grand River for irrigation, 1,250 second-feet absolute for power, and 14,400 second-feet conditional for power between station and that near Kremmling.

REGULATION.—The Shoshone power plant of the Colorado Power Co., 6 miles upstream, controls the flow during the day at low water but has insufficient pondage to control it for more than a few hours.

ACCURACY.—Records excellent; rating curve well defined.

Discharge measurements of Grand River at Glenwood Springs, Colo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 15	Robert Follansbee	4.15	1,520	July 11	W. R. King	6.15	5,260
Jan. 6	T. J. Watkins	3.12	611	Aug. 23	do	4.02	1,280

Daily discharge, in second-feet, of Grand River at Glenwood Springs, Colo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,410	1,290	778	594	652	763	994	4,940	7,160	7,890	1,910	945
2	1,480	1,450	707	540	626	749	994	4,360	9,720	7,590	1,760	1,000
3	1,480	1,350	628	588	692	679	1,170	3,430	9,720	7,300	1,710	828
4	1,480	1,350	623	606	689	652	1,540	3,060	8,040	6,740	1,630	905
5	1,540	1,110	661	677	613	777	1,760	2,730	7,160	6,470	1,590	985
6	1,540	1,220	673	635	582	632	1,760	2,500	6,740	6,470	1,500	961
7	1,480	1,190	752	600	606	696	1,760	2,350	6,470	6,740	1,510	985
8	1,580	1,160	693	620	639	672	1,820	2,210	6,200	5,940	1,550	1,010
9	1,860	1,160	712	606	619	665	2,010	2,080	6,340	5,560	2,210	1,030
10	1,860	1,110	585	679	660	721	1,940	2,080	7,440	5,300	2,570	1,080
11	1,740	1,060	564	626	642	646	1,700	2,210	9,360	5,180	2,270	1,180
12	1,670	1,010	598	606	664	735	1,760	2,980	11,200	5,300	2,090	1,090
13	1,580	956	564	594	691	639	2,010	4,140	11,200	5,430	1,910	1,050
14	1,580	947	545	620	654	777	2,210	5,810	9,360	5,060	1,680	1,100
15	1,320	957	500	620	594	728	2,420	6,600	8,040	4,820	1,600	1,120
16	1,580	1,000	470	702	672	652	2,500	6,470	8,200	4,580	1,550	1,100
17	1,940	830	535	620	673	632	2,730	6,740	8,850	4,360	1,590	1,070
18	1,700	879	622	613	712	700	2,730	7,020	10,300	3,720	1,510	1,020
19	1,700	796	666	620	679	770	2,730	6,360	10,300	3,340	1,430	945
20	1,520	849	545	620	695	652	2,890	5,690	11,800	3,150	1,390	1,030
21	1,620	782	580	686	742	707	2,890	5,020	13,000	2,980	1,350	913
22	1,650	753	570	639	686	686	3,060	4,360	12,600	2,810	1,290	860
23	1,790	760	580	606	660	658	2,980	4,250	12,200	2,730	1,280	868
24	1,860	773	622	588	714	791	2,810	4,820	12,200	2,570	1,240	800
25	1,940	769	606	576	658	692	2,650	5,560	11,800	2,420	1,210	822
26	1,750	761	580	626	770	957	2,500	6,070	11,400	2,420	1,190	890
27	1,670	764	611	626	770	865	2,420	6,340	11,000	2,210	1,210	1,020
28	1,670	774	616	626	652	745	2,650	5,680	10,300	2,210	1,160	1,340
29	1,670	727	694	707	.....	1,010	3,150	5,300	9,190	2,210	1,040	1,380
30	1,540	838	655	665	.....	1,020	4,140	5,680	8,520	2,140	1,060	1,390
31	1,510	.....	611	696	.....	1,010	.....	6,340	.....	2,010	1,020	.....

NOTE.—Discharge determined as follows: Oct. 1 to Dec. 31, Apr. 1 to Aug. 22, by indirect method for shifting control; Jan. 1 to Mar. 31 and Aug. 23 to Sept. 30, from two rating curves well defined. Oct. 1–7, 11, 12, 18–30, Nov. 1 to Dec. 14, Jan. 5, 6, 16, 31, Feb. 3, 4, 9–14, 17–20, 23, Mar. 7, 25, 26, 28, Sept. 3 determined from hourly discharges on account of fluctuations in stage; discharge May 19–21, Aug. 12, 13, interpolated, as water-stage recorder was out of order.

Monthly discharge of Grand River at Glenwood Springs, Colo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	1,940	1,320	1,640	101,000	A.
November	1,450	727	979	58,300	A.
December	778	470	618	38,000	A.
January	791	540	627	38,600	A.
February	770	582	668	37,100	A.
March	1,020	632	744	45,700	A.
April	4,140	994	2,290	136,000	A.
May	7,020	2,080	4,620	284,000	A.
June	13,000	6,200	9,530	567,000	A.
July	7,890	2,010	4,440	273,000	A.
August	2,570	1,020	1,550	95,300	A.
September	1,390	800	1,020	60,700	A.
The year	13,000	470	2,400	1,730,000	

GRAND RIVER NEAR PALISADE, COLO.

LOCATION.—In sec. 2, T. 11 S., R. 98 W., at the State bridge 2 miles above Palisade. Nearest large tributary, Plateau Creek, enters about 6 miles above station.

DRAINAGE AREA.—8,550 square miles.

RECORDS AVAILABLE.—April 9, 1902, to September 30, 1915.

GAGE.—Chain gage on down-stream side near center of bridge; read daily by Mrs. Inez Nelson.

DISCHARGE MEASUREMENTS.—Made at new bridge 2 miles below gage.

CHANNEL AND CONTROL.—No information.

WINTER FLOW.—Stage-discharge relation affected by ice; data insufficient to warrant determinations of flow.

DIVERSIONS.—Between Palisade and the Glenwood Springs station there are court decrees for diversion of 1,828 second-feet from Grand River—628 second-feet for irrigation and 1,200 second-feet for power in pumping to higher levels. The proposed high-line canal of the United States Reclamation Service will divert 700 second-feet 5 miles above Palisade station.

REGULATION.—None.

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

The following discharge measurement was made by Harper and Alderman:

September 15: Gage height, 12.35 feet; discharge, 1,290 second-feet.

Daily discharge, in second-feet, of Grand River near Palisade, Colo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,320	2,460	1,760	1,370	1,530	8,180	11,400	13,200	2,700	1,320
2	2,250	2,320	1,320	1,420	1,420	7,440	15,600	12,700	2,460	1,230
3	3,210	2,620	1,280	1,420	1,580	5,960	17,000	11,900	2,390	1,230
4	7,880	2,540	1,280	1,280	1,880	5,030	14,700	11,400	2,250	1,150
5	4,500	2,320	1,280	1,320	1,320	4,180	12,700	10,700	2,060	1,110
6	3,580	2,060	1,420	1,320	2,540	3,780	11,500	10,600	2,000	1,230
7	3,300	2,180	1,370	1,280	2,620	3,390	11,200	10,700	2,000	1,230
8	3,300	2,120	1,420	1,280	2,700	3,210	10,900	9,740	2,120	1,230
9	5,600	1,940	1,370	1,230	2,780	3,030	10,900	8,950	3,030	1,230
10	3,780	2,060	1,370	1,280	2,780	2,860	12,700	8,180	3,680	1,230
11	3,580	1,940	1,280	1,370	2,780	2,940	15,800	8,180	3,580	1,190
12	3,390	1,820	1,230	1,280	2,320	3,580	19,000	8,640	2,860	1,230
13	3,300	1,700	1,230	1,320	2,620	5,600	19,400	8,640	2,860	1,230
14	2,860	1,880	1,280	1,370	3,210	8,950	15,800	8,180	2,540	1,270
15	3,030	1,640	1,280	1,480	3,680	11,400	14,300	7,740	2,460	1,370
16	2,860	1,580	1,280	1,480	3,780	10,600	14,300	7,880	2,390	1,320
17	2,860	1,760	.....	1,480	4,080	11,000	15,600	6,610	2,250	1,320
18	2,860	1,640	.....	1,320	4,080	11,900	17,200	6,080	2,120	1,270
19	2,860	1,700	.....	1,370	3,980	11,700	17,600	5,600	2,060	1,320
20	2,860	1,480	.....	1,370	4,280	10,700	19,200	5,030	1,820	1,230
21	2,860	1,820	.....	1,150	4,920	11,000	20,500	4,810	1,760	1,230
22	3,030	1,530	.....	1,190	5,250	7,880	19,700	4,390	1,640	1,150
23	3,030	1,480	.....	1,370	5,030	7,020	19,400	4,080	1,580	1,150
24	3,030	1,320	.....	1,320	4,700	7,590	19,700	3,680	1,580	1,150
25	3,030	1,480	.....	1,420	4,390	8,030	18,400	3,880	1,700	1,420
26	3,030	1,370	.....	1,420	3,980	10,200	17,800	3,880	1,640	1,880
27	3,030	1,420	.....	1,580	3,780	10,700	17,400	3,300	1,700	1,820
28	3,030	1,580	.....	1,640	3,880	10,400	16,800	3,210	1,640	1,820
29	2,860	1,760	.....	1,280	4,810	8,630	14,500	3,210	1,580	2,250
30	2,700	1,530	.....	1,530	6,740	9,000	13,600	3,120	1,230	2,060
31	2,700	.....	.....	1,580	.....	10,400	.....	2,860	1,420	.....

NOTE.—Record of discharge furnished by United States Reclamation Service. Ice present Dec. 17–Feb. 28; discharge not determined.

Monthly discharge of Grand River near Palisade, Colo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	7,880	2,250	3,310	204,000
November	2,620	1,320	1,840	109,000
December 1–16	1,760	1,230	1,340	42,500
March	1,640	1,150	1,370	84,200
April	6,740	1,320	3,450	205,000
May	11,900	2,860	7,620	469,000
June	20,500	10,900	15,800	940,000
July	13,200	2,860	7,130	438,000
August	3,680	1,230	2,160	133,000
September	2,250	1,110	1,360	80,900

GRAND RIVER NEAR FRUITA, COLO.

LOCATION.—In sec. 20, T. 1 N., R. 2 W., at highway bridge 1½ miles south of Fruita, in Mesa County. Nearest large tributary, Little Salt Wash, enters a mile below the station; Gunnison River enters at Grand Junction, about 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, 1915.

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

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Bed composed of silt and gravel; shifts at high water. Control at riffle 600 feet downstream; practically permanent; banks high; subject to overflow at stages below 18 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.9 feet at 8 a. m. June 13 and 8 a. m. and 5 p. m. June 21 (discharge, 26,900 second-feet); minimum stage recorded, 1.8 feet September 9, 22, and 24 (discharge, 1,540 second-feet). Records discontinued during winter when minimum flow probably occurs.

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

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

REGULATION.—None.

ACCURACY.—Records considered excellent.

Discharge measurements of Grand River near Fruita, Colo., during the year ending Sept 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 16	Robert Follansbee	4.26	4,870	Apr. 2	R. H. Fletcher	3.05	3,050
Dec. 14	R. H. Fletcher	2.67	2,530	July 10	W. R. King	6.30	10,600
Jan. 21	do		2,310				

Daily discharge, in second-feet, of Grand River near Fruita, Colo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3,510	4,010	2,970	.....	3,140	15,500	16,400	16,400	3,770	1,630
2	3,510	4,010	2,970	.....	3,290	13,800	21,600	14,600	3,610	1,540
3	3,660	4,010	2,760	.....	3,290	11,000	23,900	14,200	3,290	1,540
4	16,400	4,010	2,760	.....	3,770	9,200	19,400	14,200	2,990	1,730
5	8,090	4,010	2,607	.....	4,110	8,670	18,400	13,100	2,990	1,730
6	6,510	3,660	2,760	.....	5,450	7,910	17,400	12,800	2,430	1,940
7	5,360	3,830	2,760	2,430	5,050	7,200	17,400	13,500	2,560	1,730
8	5,570	3,510	2,860	2,430	5,450	6,740	16,400	12,400	2,430	1,630
9	8,090	3,660	2,760	2,430	5,450	6,300	15,900	11,400	3,140	1,540
10	8,090	3,510	2,860	2,700	5,660	6,080	17,400	10,400	2,990	1,940
11	6,020	3,360	2,760	2,560	5,450	5,870	21,600	10,400	4,470	1,940
12	5,570	3,510	2,680	2,560	5,050	6,740	26,300	10,400	3,940	1,830
13	5,570	3,220	2,600	2,430	5,660	10,400	26,300	10,400	3,290	1,730
14	5,150	3,360	2,530	2,560	6,740	16,400	23,900	10,100	3,290	1,730
15	5,150	3,220	.....	2,560	7,200	18,900	19,400	9,200	2,990	1,730
16	4,750	3,220	.....	2,700	7,200	17,400	20,000	9,200	2,700	1,730
17	4,560	3,360	.....	2,700	7,670	17,400	20,500	8,670	2,840	1,730
18	4,750	2,970	.....	2,700	7,670	18,400	22,700	8,160	2,700	2,050
19	4,560	3,090	.....	2,700	7,670	17,900	23,900	6,970	2,700	1,940
20	4,560	2,760	.....	2,700	8,160	15,500	24,500	6,300	2,430	1,730
21	4,560	2,760	.....	2,560	9,200	14,600	26,900	6,300	2,170	1,730
22	4,560	2,860	.....	2,430	10,400	13,800	26,300	5,660	2,170	1,540
23	5,150	2,760	.....	2,700	10,400	13,100	25,100	5,050	2,430	1,540
24	5,150	2,860	.....	2,560	9,200	13,800	25,100	4,660	2,300	1,540
25	5,150	2,760	.....	2,700	8,670	15,000	24,500	4,660	2,170	2,300
26	5,150	2,760	.....	2,990	8,160	16,400	23,900	4,660	2,170	2,700
27	4,750	2,860	.....	3,140	8,160	16,400	23,300	4,470	2,170	3,290
28	4,750	2,760	.....	3,290	8,160	15,000	20,000	4,660	2,430	3,290
29	4,750	2,970	.....	3,290	10,400	13,800	19,400	4,660	1,940	3,290
30	4,190	2,970	.....	3,610	13,100	13,800	17,900	4,470	1,730	3,290
31	4,190	.....	.....	3,610	.....	14,600	.....	4,110	1,730	.....

NOTE.—Discharge determined as follows: Oct. 1 to Dec. 14 from fairly well defined rating curve; Mar. 7 to Sept. 30 from rating curve well defined above 2,300 second-feet; discharge Dec. 12–13 interpolated.

Monthly discharge of Grand River near Fruita, Colo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	16,400	3,510	5,540	341,000	B.
November	4,010	2,760	3,290	196,000	B.
December 1-14	2,970	2,530	2,760	76,600	B.
March 7-31	3,610	2,430	2,760	137,000	B.
April	13,100	3,140	6,970	415,000	A.
May	18,900	5,870	12,800	787,000	A.
June	26,900	15,900	21,500	1,280,000	A.
July	16,400	4,110	8,910	548,000	A.
August	4,470	1,730	2,740	168,000	A.
September	3,290	1,540	1,990	118,000	A.

GRAND RIVER NEAR CISCO, UTAH.

LOCATION.—About sec. 7, T. 23 S., R. 24 E., at the Dewey ferry, three-quarters of a mile below mouth of Dolores River and 14 miles southeast of Cisco, 90 miles above the junction of the Green and Grand.

DRAINAGE AREA.—23,800 square miles (measured on special map of Colorado River basin).

RECORDS AVAILABLE.—November 10, 1914, to September 30, 1915, at present site; 25 miles downstream, at Moab, October 1, 1913, to November 10, 1914; flow approximately the same at both places.

GAGE.—Stevens water-stage recorder on left bank 500 feet above ferry cable.

DISCHARGE MEASUREMENTS.—Made from car on ferry cable.

CHANNEL AND CONTROL.—Channel straight for several hundred feet above and below station. Left bank high and not subject to overflow; right bank fairly high and will probably not be overflowed. Bed at the gage composed of sand and gravel. Control probably about a quarter of a mile below the gage; somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 10.9 feet at 8 p. m. June 13 (discharge, 35,500 second-feet); minimum stage, from water-stage recorder, 1.55 feet at 5.30 p. m. September 10 (discharge, 1,460 second-feet).

WINTER FLOW.—Stage-discharge relation at times seriously affected by ice. Determinations based on current-meter measurements and climatic data.

DIVERSIONS.—Below practically all diversions. A large amount of water is diverted in Colorado for irrigation.

REGULATION.—Station too far down to be affected, except in a general way, by regulation in Colorado.

ACCURACY.—Records good.

Discharge measurements of Grand River near Cisco, Utah, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 11	L. W. Jordan	2.91	3,460	June 23	Lynn Crandall	10.17	30,100
Dec. 28	J. J. Sanford	a2.52	2,270	8	W. R. King	6.48	14,800
Feb. 8	do	a3.10	2,180	13	L. W. Jordan	5.65	11,300
Apr. 8	L. W. Jordan	4.40	7,820	Aug. 6	R. C. Pierce	2.48	2,840
May 12	R. C. Pierce	4.65	8,750	21	do	2.18	2,290
12	do	4.74	8,650	Sept. 13	L. W. Jordan	1.70	1,660
June 2	L. W. Jordan	8.38	23,600	14	do	1.62	1,550
3	do	9.62	30,000	Oct. 18	do	2.24	2,560
4	do	9.38	29,000				

a Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Grand River near Cisco, Utah, for the year ending Sept. 30, 1915.

Day.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	2,880	2,780	3,840	22,500	20,300	19,400	4,820	1,680
2	.....	2,880	2,700	3,840	20,700	23,400	18,500	4,390	1,550
3	.....	2,780	2,620	3,840	17,700	28,700	16,800	3,980	1,540
4	.....	2,480	2,530	4,380	14,700	28,200	16,000	3,590	2,390
5	.....	2,380	2,450	5,990	13,500	25,100	14,700	3,220	2,010
6	.....	2,570	2,370	7,250	12,300	22,900	13,900	2,780	1,690
7	.....	2,680	2,280	8,230	11,900	22,500	14,700	2,890	1,940
8	.....	2,570	2,200	7,900	10,300	21,200	14,300	2,890	1,660
9	.....	2,680	2,490	8,560	9,600	19,900	12,700	2,890	1,560
10	3,710	2,570	2,780	7,900	8,900	20,700	11,100	3,980	1,520
11	3,580	2,380	2,880	7,900	8,560	24,300	10,700	4,820	1,790
12	3,450	2,200	3,100	7,900	8,900	29,600	10,700	4,530	1,800
13	3,450	2,200	3,140	7,900	11,900	33,600	11,100	3,850	1,660
14	3,330	.....	3,170	9,240	17,700	31,800	10,700	3,460	1,560
15	3,450	.....	3,210	11,100	23,400	26,000	9,970	3,220	1,580
16	3,450	.....	3,210	11,500	23,800	22,900	9,590	3,220	1,660
17	3,210	.....	3,210	10,700	23,800	22,900	9,210	2,890	1,660
18	3,210	.....	2,990	9,960	24,700	25,100	8,390	2,780	1,660
19	2,880	.....	2,990	10,700	25,600	27,300	7,750	2,680	1,980
20	2,880	.....	2,780	11,500	24,700	27,700	7,110	2,580	1,840
21	2,680	.....	2,680	12,300	23,400	30,800	6,480	2,300	1,660
22	2,780	.....	2,380	13,900	22,900	31,800	6,170	2,220	1,610
23	2,680	.....	2,380	13,900	20,700	30,400	5,710	2,130	1,580
24	2,680	.....	2,480	13,500	19,400	30,400	5,260	2,390	1,620
25	2,680	.....	2,570	12,300	19,900	29,500	5,260	2,480	4,640
26	2,680	.....	2,990	11,900	21,600	27,700	5,710	2,130	4,500
27	2,680	.....	3,210	11,100	22,100	26,800	5,710	1,970	3,830
28	2,780	.....	3,210	11,500	21,200	25,100	5,860	2,050	3,700
29	2,780	.....	3,580	13,100	19,000	22,900	5,860	2,130	3,700
30	2,780	.....	3,710	17,700	18,600	21,100	5,710	1,920	3,580
31	.....	.....	3,970	.....	19,400	.....	5,410	1,670	.....

NOTE.—Discharge determined from several fairly well defined rating curves used for different periods as follows: Nov. 11 to June 12, June 17 to July 17, July 31 to Sept. 3, and Sept. 5-30. Indirect method for shifting control used June 13-16, July 18-30, and Sept. 4. Mean flow estimated, on account of ice, as follows: Dec. 14-31, 2,200 second-feet; Jan. 1-31, 2,120 second-feet; and Feb. 1-28, 2,780 second-feet. Interpolated Mar. 2-7, 9, 13, and 14, when recordlng gage was out of commission.

Monthly discharge of Grand River, near Cisco, Utah, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
November 10-30	3,710	2,680	3,040	127,000	B.
December	2,880	.....	2,350	144,000	C.
January	.....	.....	2,120	130,000	D.
February	.....	.....	2,540	141,000	D.
March	3,970	2,200	2,870	176,000	C.
April	17,700	3,840	9,710	578,000	B.
May	25,600	8,560	18,200	1,120,000	B.
June	33,600	19,900	26,000	1,550,000	B.
July	19,400	5,260	10,000	615,000	B.
August	4,820	1,670	3,000	184,000	B.
September	4,640	1,520	2,170	129,000	B.
The period	.....	.....	.....	4,890,000	

NOTE.—See footnote to table of daily discharge.

FRASER RIVER NEAR ARROW, COLO.

LOCATION.—In sec. 3, T. 2 S., R. 75 W., at trail bridge, a quarter of a mile from Idlewild ranger station, in Arapahoe National Forest, 2 miles from Arrow, in Grand County. Nearest tributary, Cooper Creek, enters a short distance below.

DRAINAGE AREA.—28 square miles (revised measurement on special map).

RECORDS AVAILABLE.—September 23, 1910, to September 30, 1915.

GAGE.—Vertical staff at downstream side of bridge abutment; read once daily by R. M. Bradshaw and W. M. Thomas.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of boulders and coarse gravel. Control 15 feet downstream; practically permanent during 1915. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.1 feet at 8 p. m. June 19 (discharge, 609 second-feet); minimum discharge occurs during the winter.

WINTER FLOW.—Control remains open during greater part of winter; except for short periods there is little if any backwater at gage.

DIVERSIONS.—There is a court decree for the diversion of 53 second-feet across the divide from the headwaters above station, and 650 acre-feet was so diverted during 1915. There are also court decrees for the diversion of 74 second-feet for irrigation and 61 second-feet for placer mining and power development below station.

REGULATION.—None.

ACCURACY.—Determination of mean daily stage based on one gage reading may be in error at certain seasons owing to fluctuations caused by alternate melting and freezing at the headwaters. Records for spring months only fair; those for the rest of the open-water period considered good.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Fraser River near Arrow, Colo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 29	Fletcher and Whitsit	[a] 0.70	4.24
Mar. 9	R. H. Fletcher	.69	4.35
July 27	W. R. King	1.15	64

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Fraser River near Arrow, Colo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	26	20	5	.....	.....	5	7	48	.....	275	62	25
2	26	20	5	.....	.....	4	6	42	.....	275	52	25
3	26	20	5	.....	.....	5	7	36	.....	275	42	30
4	25	19	5	.....	4	4	8	25	.....	245	42	25
5	24	18	5	.....	.....	5	8	20	84	245	42	30
6	23	18	4	.....	.....	5	9	16	.....	245	42	28
7	23	18	4	.....	.....	4	10	8	.....	216	62	25
8	23	18	4	.....	.....	4	10	30	.....	245	81	36
9	23	18	4	.....	3	4	12	36	.....	216	62	30
10	23	18	4	.....	4	4	12	42	.....	189	52	25
11	23	14	3	.....	.....	4	16	69	.....	164	42	25
12	23	12	4	.....	.....	4	20	101	120	164	42	25
13	23	12	.....	.....	.....	5	21	141	306	141	36	20
14	23	7	4	.....	.....	5	22	101	245	164	36	25
15	23	7	5	.....	4	5	30	110	338	152	36	28
16	20	7	3	.....	.....	5	26	126	405	141	33	25
17	20	7	.....	.....	4	5	22	141	507	141	30	25
18	20	7	.....	.....	.....	5	30	92	541	120	30	25
19	20	7	.....	.....	.....	4	25	69	609	120	30	25
20	20	7	.....	.....	.....	5	30	48	507	101	30	20
21	22	7	.....	.....	.....	5	30	54	473	101	30	20
22	23	7	.....	.....	.....	5	28	62	507	101	30	20
23	23	6	.....	2	4	4	25	69	575	101	36	20
24	22	6	.....	.....	.....	4	20	75	541	101	32	20
25	22	6	.....	.....	.....	6	20	69	507	84	30	22
26	23	6	.....	.....	4	6	20	112	473	84	30	20
27	23	5	.....	.....	5	6	30	112	439	62	30	20
28	23	5	.....	.....	.....	6	30	84	338	69	25	25
29	23	6	.....	4	.....	6	69	69	306	69	25	20
30	20	5	.....	.....	.....	6	62	101	306	62	25	20
31	20	.....	.....	.....	.....	6	.....	130	.....	62	25	.....

NOTE.—Discharge determined as follows: Oct. 1 to Aug. 18 from well-defined rating curve; Aug. 19 to Sept. 30 by indirect method for shifting control; Oct. 4, 5, 9, 11, 18, 19, 25, 31, Nov. 26, Dec. 13, 19–21, 25, 27, 29, Mar. 7, 8, 14, 15, 21, 28, Apr. 11, 13, 16, 25, May 4–7, 9, 16, 21–24, 26–28, 30, 31, Aug. 2, 10, 16, discharge determined by comparison with near-by stations, as gage was not read. Dec. 22 to Jan. 22, observer reported stream frozen solid at gage; flow probably less than 3 second-feet. No determination June 1–4, 6–11, as no consistent relation with other stations could be established.

Monthly discharge of Fraser River near Arrow, Colo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	26	20	22.6	1,390	B.
November	20	5	11.1	660	C.
December	.....	.....	4.0	246	
February	.....	.....	4.0	222	
March	6	4	4.87	299	C.
April	69	6	22.2	1,320	C.
May	141	8	72.2	4,440	C.
June 12–30	609	120	423	15,900	C.
July	275	62	153	9,410	B.
August	81	25	38.8	2,390	B.
September	36	20	24.3	1,450	B.

NOTE.—Discharge December and February determined from discharge measurements and climatic records.

WILLIAMS FORK NEAR SCHOLL, COLO.

LOCATION.—In sec. 3, T. 2 S., R. 78 W., at the Horseshoe ranger station in Arapahoe National Forest, about 5 miles southeast of Scholl. Nearest large tributary, Keyser Creek, which enters three-fourths of a mile above station.

DRAINAGE AREA.—141 square miles (measured on Forest atlas).

RECORDS AVAILABLE.—September 22, 1910, to June 30, 1912; April 27, 1913, to September 30, 1915.

GAGE.—Vertical staff on right bank 100 feet below bridge; read morning and evening by L. C. Davis.

DISCHARGE MEASUREMENTS.—Made from cable 400 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed is composed of boulders; rough. Control 25 feet downstream; will shift slightly. Banks not subject to overflow except during extreme high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.9 feet at 6 p. m. June 11, 7 a. m. and 6 p. m. June 12, and 6 p. m. June 18 (discharge, 1,310 second-feet); minimum stage recorded 0.90 foot at 7 a. m. December 22 and 23 (discharge, 18 second-feet).

WINTER FLOW.—Stage-discharge relation not seriously affected by ice, as shown by comparing record with those obtained at Parshall; open-channel rating curve assumed applicable.

DIVERSIONS.—There are court decrees for the diversion of 858 second-feet from Williams Fork above station, of which 700 second-feet is to be diverted to the eastern slope.

REGULATION.—None.

ACCURACY.—Determinations of mean daily stage based on two readings may be in error at certain seasons owing to fluctuations caused by alternate melting and freezing at the headwaters. High-water records fair or probably good; those for other stages during open water considered excellent.

COOPERATION.—Gage-height records furnished by United States Forest Service.

Discharge measurements of Williams Fork near Scholl, Colo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 19	R. H. Fletcher	1.42	70
July 28	W. R. King	1.98	197

Daily discharge, in second-feet, of Williams Fork near Scholl, Colo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	79	55	32	20	22	22	19	190	400	770	89	84
2	76	53	30	20	22	23	20	74	425	730	73	84
3	78	42	28	20	22	24	20	82	425	690	68	84
4	55	38	23	20	22	24	20	82	480	650	68	84
5	64	36	27	20	22	26	20	89	508	620	65	84
6	64	35	33	20	22	26	21	93	590	590	60	84
7	67	37	29	20	22	26	21	97	535	562	54	81
8	65	38	22	20	26	26	20	115	562	508	68	81
9	78	44	22	20	23	30	29	123	680	480	74	79
10	70	42	22	20	22	27	38	125	770	480	84	78
11	70	40	22	21	21	28	47	133	1,030	480	84	78
12	65	42	22	21	21	24	56	302	1,100	480	84	78
13	74	38	23	22	23	28	65	350	1,030	480	84	78
14	61	38	22	22	22	19	74	350	1,030	425	84	78
15	61	40	22	22	22	19	74	375	1,030	425	84	78
16	58	42	21	23	25	19	73	375	1,030	400	84	74
17	73	42	20	23	33	20	97	375	1,030	400	102	74
18	58	44	19	22	27	19	79	375	1,100	375	102	74
19	58	42	19	22	27	19	84	375	1,030	350	102	73
20	76	43	19	22	23	19	93	350	1,030	325	102	68
21	74	43	19	23	24	19	93	350	1,030	325	102	68
22	79	43	19	23	25	19	98	350	1,030	280	100	65
23	88	44	19	23	25	19	112	350	1,030	276	97	64
24	74	42	19	22	24	19	112	350	1,030	268	95	54
25	76	43	19	22	22	20	123	350	1,030	248	93	54
26	76	41	20	23	23	20	123	375	965	236	89	58
27	68	39	20	23	24	20	112	375	930	230	89	62
28	65	37	20	23	24	19	145	400	890	205	84	65
29	65	36	20	23	.....	19	190	400	850	205	84	71
30	65	35	20	22	.....	20	186	375	810	174	84	78
31	62	.....	20	22	.....	20	.....	375	.....	102	84	.....

NOTE.—Discharge determined from rating curve well defined throughout. Discharge Nov. 14, 15, 26, Dec. 10, 11, 24 to Jan. 4, 10–16, Apr. 9–13, June 27 to July 3, interpolated, as gage was not read; Dec. 1, 2, Jan. 23, 24, interpolated because of ice.

Monthly discharge of Williams Fork near Scholl, Colo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	88	55	69.1	4,250	A.
November	55	35	41.1	2,450	B.
December	33	19	22.3	1,370	C.
January	23	20	21.6	1,330	C.
February	33	21	23.6	1,310	C.
March	30	19	22.0	1,350	C.
April	190	19	75.5	4,490	B.
May	400	74	274	16,800	B.
June	1,100	400	847	50,400	B.
July	770	102	412	25,300	A.
August	102	54	84.4	5,190	A.
September	84	54	73.8	4,390	A.
The year	1,100	19	164	119,000	

WILLIAMS FORK NEAR PARSHALL,[1] COLO.

LOCATION.—About sec. 36, T. 1 N., R. 79 W., at highway bridge at Field's ranch, 4 miles above mouth, 4 miles south of Parshall, Grand County, and 7 miles southwest of Sulphur Springs. Nearest tributary, Battle Creek, enters from the west 2 miles below station.

DRAINAGE AREA.—185 square miles (measured on Forest atlas map).

RECORDS AVAILABLE.—July 25, 1904, to September 30, 1915.

GAGE.—Vertical staff at downstream side of bridge pier; read twice daily by F. A. Field.

[1] Formerly called Williams Fork near Sulphur Springs.

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

CHANNEL AND CONTROL.—Bed composed of coarse gravel and small boulders; shifts. Control is gravel bar 50 feet downstream; will shift at high water. At stage of 4.1 feet water begins to flow through small overflow channel.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.86 feet at 8.40 a. m. June 25 (discharge, 1,230 second-feet); minimum stage recorded, 2.60 feet at 5 p. m. December 17, 18, January 1, 13, 15, 29–31, March 22 (discharge, 37 second-feet).

WINTER FLOW.—Main channel is kept open by springs, but ice forms along the banks, and the channel frequently contains slush ice. Morning readings usually show effect of backwater from ice but afternoon readings are practically unaffected. In the winter of 1915 gage was read in the afternoon.

DIVERSIONS.—There are court decrees for the diversion of 558 second-feet from Williams Fork between the station near Scholl and that near Parshall, and two decrees for storage, one for 80,700 acre-feet and the other for 1,420 acre-feet. The storage sites have not yet been utilized.

REGULATION.—None.

ACCURACY.—Records considered excellent for greater part of open-water period but poor during winter.

Discharge measurements of Williams Fork near Parshall, Colo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 19	R. H. Fletcher	3.00	86
Feb. 1	do	2.69	45
July 28	W. R. King	3.40	151

Daily discharge, in second-feet, of Williams Fork near Parshall, Colo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	79	94	70	37	45	41	49	190	510	840	142	68
2	76	94	57	38	44	41	55	138	590	795	129	66
3	74	79	64	40	46	42	63	113	475	750	116	64
4	70	77	60	42	46	42	71	103	408	710	103	70
5	65	91	68	44	41	44	70	107	475	710	100	68
6	63	77	71	46	41	44	70	101	408	670	102	66
7	74	74	46	42	41	42	64	96	375	670	103	65
8	84	71	57	44	41	41	67	71	375	670	132	69
9	91	58	60	46	41	42	60	89	375	590	172	77
10	85	56	52	44	41	42	60	101	440	590	140	66
11	81	57	46	46	41	41	70	165	670	510	111	62
12	85	56	52	44	45	41	85	178	795	550	105	61
13	94	61	57	37	45	42	85	217	630	510	102	62
14	85	63	57	37	41	41	105	275	670	510	96	65
15	94	84	60	37	41	41	109	256	670	475	102	65
16	96	71	57	44	42	41	126	320	670	440	111	68
17	92	71	37	46	41	40	124	298	710	408	93	65
18	91	57	37	43	41	41	109	348	750	408	93	61
19	89	67	46	46	41	41	122	256	795	375	91	60
20	94	71	44	44	42	38	124	224	995	270	89	59
21	94	57	46	46	41	42	124	204	1,050	270	88	57
22	98	57	57	44	41	37	131	201	1,100	248	89	53
23	107	81	57	43	42	39	122	224	1,160	218	89	52
24	98	68	57	42	41	39	109	298	1,160	195	88	52
25	101	68	44	41	44	41	103	320	1,220	188	84	53
26	98	68	46	40	41	45	105	375	1,050	182	83	77
27	98	68	57	39	41	48	109	320	1,100	175	80	86
28	98	71	46	38	41	44	144	256	1,100	162	77	91
29	98	60	44	37	.....	50	170	298	1,050	162	77	100
30	98	64	44	37	.....	50	256	320	940	162	77	105
31	94	.....	44	37	.....	42	.....	320	.....	151	74	.....

NOTE.—Discharge determined as follows: Oct. 1 to July 15 from rating curve well defined throughout; July 16 to Sept. 30 from rating curve fairly well defined; Jan. 2–5, 22–28, Feb. 6–10 interpolated because of ice.

Monthly discharge of Williams Fork near Parshall, Colo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	107	63	88.5	5,440	A.
November	94	56	69.7	4,150	B.
December	71	37	52.9	3,250	C.
January	46	37	41.6	2,560	D.
February	46	41	42.1	2,340	D.
March	50	37	42.1	2,590	D.
April	256	49	102	6,070	B.
May	375	71	219	13,500	A.
June	1,220	375	757	45,000	A.
July	840	151	438	26,900	B.
August	172	74	101	6,210	A.
September	105	52	67.8	4,030	A.
The year	1,220	37	169	122,000	

BLUE RIVER AT BRECKENRIDGE, COLO.

LOCATION.—At outlet of Gold Pan Pit at Breckenridge, in Summit County. Nearest tributary, Illinois Creek, enters a short distance below.

DRAINAGE AREA.—49 square miles.

RECORDS AVAILABLE.—June 5, 1914, to March 31, 1915.

GAGE.—Vertical staff in Gold Pan Pit near outlet; read twice daily by S. C. Hulse and H. L. Thackwell.

DISCHARGE MEASUREMENTS.—Made by wading at outlet.

CHANNEL AND CONTROL.—Bed and control composed of well-compacted cobblestones.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, 3.10 feet June 13 (discharge, 610 second-feet); minimum stage recorded, 0.09 foot January 11 (discharge, 5.3 second-feet).

DIVERSIONS.—Above the Gold Pan Pit are two diversions, one through the Gold Run ditch and the other through the power-house ditch. Quantity of water in these ditches is added to measured flow at Gold Pan Pit to show the total run-off.

REGULATION.—None.

COOPERATION.—Records compiled and furnished by S. C. Hulse, consulting engineer.

Daily discharge, in second-feet, of Blue River at Breckenridge, Colo., for the period June 5, 1914, to Mar. 31, 1915.

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1	.....	216	218	54	21.1	11.5	7.1	6.5	6.2	6.2
2	.....	203	178	50	18.7	10.8	7.5	6.2	6.2	6.3
3	.....	193	193	47	18.7	11.2	7.1	6.1	6.4	6.6
4	.....	182	156	45	18.7	11.2	7.1	6.1	6.1	6.5
5	568	172	141	45	17.5	11.2	7.0	6.1	5.6	6.5
6	503	167	150	46	16.9	11.0	6.8	5.7	6.0	6.6
7	463	163	111	45	16.6	11.0	6.6	5.6	6.2	6.6
8	424	174	97	44	16.6	11.0	6.8	5.8	6.4	6.7
9	354	180	92	42	16.6	11.6	7.2	6.3	6.4	6.7
10	389	220	86	42	16.2	9.7	7.3	6.1	6.3	6.7
11	524	182	81	40	15.8	8.4	7.0	5.7	6.1	6.7
12	546	170	76	42	15.0	7.6	7.1	6.1	6.1	6.8
13	610	152	73	38	15.4	7.6	7.7	6.1	6.1	6.8
14	503	180	68	36	15.8	7.8	6.7	6.4	6.2	6.6
15	483	174	63	36	14.2	7.7	6.4	6.3	6.4	6.4
16	424	180	65	35	14.2	9.7	6.4	6.1	6.6	6.3
17	463	154	56	33	13.8	8.0	6.3	5.6	6.6	6.5
18	483	165	62	30	13.6	8.6	6.5	6.4	6.5	6.5
19	483	146	58	27	13.0	9.2	6.5	6.3	6.3	6.5
20	463	146	60	27	13.8	7.2	6.6	6.0	6.3	6.2
21	389	137	65	35	13.7	7.2	6.8	5.7	6.3	6.2
22	389	199	99	34	15.6	6.8	6.4	5.5	6.3	5.8
23	354	184	84	31	15.4	7.0	6.5	5.9	6.3	6.5
24	354	154	71	28	15.4	6.8	6.5	6.0	6.5	6.2
25	321	135	66	26	15.6	7.8	6.5	6.1	6.2	6.4
26	272	142	65	23	14.2	7.3	6.3	5.9	6.2	6.6
27	228	154	67	23	13.9	8.3	6.5	5.8	6.3	6.6
28	228	272	64	23	13.5	7.7	6.1	5.8	6.5	6.6
29	182	259	71	21	13.3	7.1	6.5	5.8	.....	6.8
30	182	272	68	20	12.8	7.0	6.4	6.4	.....	6.7
31	.....	351	62	.....	12.2	.....	6.2	6.3	.....	6.7

Monthly discharge of Blue River at Breckenridge, Colo., for the period June 5, 1914, to Mar. 31, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
June 5–30	610	182	407	21,000
July	351	135	186	11,400
August	218	56	92.5	5,690
September	54	20	35.6	2,120
October	21.1	12.2	15.4	947
November	11.6	6.8	9.11	542
December	7.7	6.1	6.94	427
January	6.5	5.5	6.02	370
February	6.6	5.6	6.50	361
March	6.8	5.8	6.51	400
The period				43,300

Monthly discharge of Blue River above diversions at Breckenridge, Colo., for the period June 5, 1914, to Mar. 31, 1915.

Month.	Mean discharge in second-feet.			Total, Blue River.	Run-off (total in acre-feet).
	Gold Run ditch.	Power ditch.	Blue River gaging station.		
June 5–30	12	8	407	427	22,000
July	12	7	186	205	12,600
August	12	6	92.5	110	6,760
September	10	5	35.6	50.6	3,010
October	9	2.5	15.4	26.9	1,650
November	2.5	1.01	9.11	12.6	750
December	0.0	1.10	6.94	8.04	494
January	0.0	1.09	6.02	7.11	437
February	0.0	1.30	6.50	7.80	433
March	0.0	2.26	6.51	8.77	539
The period					48,700

BLUE RIVER AT DILLON, COLO.

LOCATION.—In sec. 18, T. 5 S., R. 77 W., at cemetery bridge in the outskirts of Dillon, in Summit County, near boundary of Leadville National Forest. Nearest tributaries, Snake River, which enters a short distance below station, and Tenmile Creek, which also enters below.

DRAINAGE AREA.—110 square miles (measured on Forest atlas).

RECORDS AVAILABLE.—October 15, 1910, to September 30, 1915.

GAGE.—Vertical staff on right abutment of bridge facing channel; read twice daily by Miss Gaybriella Warren.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of compact gravel upon which lodge tailing slimes from hydraulic dredges near Breckenridge. Control is 50 feet downstream from gage at riffle; permanent. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.5 feet at 9.30 a. m. and 4.30 p. m. June 18, and 8.15 a. m. and 6.30 p. m. June 23, and 9.20 a. m. and 4.30 p. m. June 25 (discharge, 715 second-feet); minimum stage occurred during winter, when record was discontinued.

WINTER FLOW.—Stage-discharge relation seriously affected by ice.

DIVERSIONS.—There are court decrees for the diversion of 2.3 second-feet for irrigation from Blue River above station and 63 second-feet below, exclusive of a decree for 350 second-feet for the Green Mountain canal. In addition, there are placer decrees for diversions of 118 second-feet from the Blue near Breckenridge, and there is an unadjudicated diversion from the headwaters of the Blue, across Boreas Pass to Tarryall Creek, but this diversion was very small during 1915.

REGULATION.—None.

ACCURACY.—Determinations of mean daily stage based on two gage readings may be in error at certain seasons owing to fluctuations caused by alternate melting and freezing at the headwaters. Record good.

Discharge measurements of Blue River at Dillon, Colo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
July 12	Robert Follansbee	2.66	307
Aug. 17	W. R. King	2.06	123
Aug. 18	.....do	2.00	110

Daily discharge, in second-feet, of Blue River at Dillon, Colo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	58	54	.....	17	.....	33	78	345	458	126	70
2	56	50	.....	.....	.....	33	76	390	458	121	70
3	56	53	.....	.....	.....	33	108	345	458	164	70
4	56	53	.....	.....	.....	34	96	345	325	185	70
5	56	50	.....	.....	.....	36	96	390	285	134	70
6	53	49	.....	.....	.....	37	96	390	285	108	70
7	52	48	.....	.....	.....	38	96	345	345	134	70
8	49	.....	.....	.....	.....	39	96	345	305	208	96
9	46	.....	.....	14	.....	40	86	325	305	208	86
10	46	.....	.....	.....	.....	40	86	345	245	179	86
11	46	.....	.....	.....	.....	40	83	325	208	179	86
12	46	.....	.....	.....	.....	40	78	305	345	143	70
13	58	.....	.....	.....	.....	43	78	345	305	108	70
14	68	.....	.....	.....	.....	47	390	345	285	88	86
15	64	.....	.....	.....	.....	50	502	345	285	116	73
16	60	.....	.....	.....	.....	54	170	390	245	116	58
17	56	.....	.....	.....	.....	58	185	480	245	108	58
18	56	.....	.....	.....	.....	62	185	665	245	106	53
19	56	.....	.....	.....	.....	67	191	592	245	106	50
20	56	.....	.....	.....	20	72	208	592	245	106	48
21	52	.....	.....	.....	.....	64	225	502	225	86	48
22	48	.....	.....	.....	.....	60	245	592	185	86	48
23	48	.....	.....	.....	26	64	170	665	179	86	48
24	48	.....	.....	.....	.....	64	305	665	208	86	48
25	58	.....	.....	.....	.....	58	325	665	208	96	167
26	58	.....	.....	.....	.....	64	325	592	179	70	167
27	56	.....	.....	.....	30	111	345	502	208	86	161
28	56	.....	.....	.....	.....	96	345	525	191	106	118
29	56	.....	.....	.....	33	96	345	502	191	106	118
30	55	.....	14	.....	.....	96	345	458	164	96	118
31	54	.....	.....	.....	.....	.....	345	.....	149	90	.....

NOTE.—Discharge determined as follows: Oct. 1 to Nov. 7, Mar. 20 to Sept. 30, from rating curve well defined below 700 second-feet discharge, Apr. 1, 2, 4, 6–9, 11, 13–16, 18, 19, interpolated as gage was not read. Jan. 30, Feb. 1, 9, rating curve applied as river was believed to be open.

Monthly discharge of Blue River at Dillon, Colo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	68	46	54.3	3,340	A.
November 1–7	54	48	51.0	708	B.
April	111	33	55.6	3,310	C.
May	502	76	203	12,500	B.
June	665	305	454	27,000	B.
July	458	149	265	16,300	A.
August	208	70	121	7,440	A.
September	167	48	81.7	4,860	A.

SPRUCE CREEK (UPPER STATION) NEAR BRECKENRIDGE, COLO.

LOCATION.—In sec. 23, T. 7 S., R. 78 W., at outlet of Mohawk Lake No. 1, 4 miles southwest of Breckenridge in Summit County.

DRAINAGE AREA.—1.7 square miles (all above timber line).

RECORDS AVAILABLE.—July, 14, 1914, to March 24, 1915.

GAGE.—Vertical staff arranged to give maximum and minimum readings to hundredths. Visited twice daily by S. C. Hulse, and H. L. Thackwell.

DISCHARGE MEASUREMENTS.—Made at weir and in sluice box below weir.

DIVERSIONS.—None above station.

REGULATION.—Natural regulation afforded by chain of six small lakes.

COOPERATION.—Records furnished by S. C. Hulse, consulting engineer, who considers them accurate within 5 per cent.

Daily discharge, in second-feet, of Spruce Creek (upper station) near Breckenridge, Colo., for the period July 14, 1914, to Mar. 24, 1915.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1		19.40	4.50	2.15					
2		14.40	4.95	1.60					
3		13.15	5.20	1.40					
4		10.80	5.95				0		0
5		9.45	4.25						
6		8.15	5.20					0	
7		7.60	4.50						
8		2.85	5.45						
9		5.95	5.20			0			
10		5.20	5.70		0.19				
11		4.95	5.70						
12		4.75	2.70						
13		4.50	5.70				0		
14	13.55	4.25	5.70						
15	13.95	4.05	4.85						
16	13.55	4.05	3.05						
17	12.75	4.25	2.50			0			
18	13.95	4.95	2.50					0	
19	12.00	4.50	2.30						
20	11.55	4.95	2.50		.20				
21	12.00	8.15	2.30						
22	16.20	9.10	2.15				0		
23	14.80	7.60	2.50						
24	11.20	6.45	2.70						0
25	10.45	4.95	2.85	.55					
26	10.45	4.75	2.85			0			
27	13.55	5.20	3.05						
28	21.00	4.50	2.00		.20				
29	22.00	5.45	2.30						
30	22.00	5.45	2.70						
31	27.15	4.50							

Monthly discharge of Spruce Creek (upper station) near Breckenridge, Colo., for the period July 14 to Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
July 14–31	27.2	10.4	15.1	539
August	19.4	2.85	6.72	413
September	5.95	2.00	3.79	226

SPRUCE CREEK (LOWER STATION) NEAR BRECKENRIDGE, COLO.

LOCATION.—In sec. 24, T. 7 S., R. 78 W., above power canal intake, 3½ miles south of Breckenridge, in Summit County.

DRAINAGE AREA.—3.4 square miles, ranging in altitude from 10,500 to 13,000 feet.

RECORDS AVAILABLE.—July 6, 1914, to March 24, 1915.

GAGE.—Vertical staff.

WINTER FLOW.—Stage-discharge relation seriously affected by ice; current-meter measurements made to determine discharge.

DIVERSIONS.—None above station.

REGULATION.—None.

COOPERATION.—Records compiled and furnished by S. C. Hulse, consulting engineer.

Daily discharge, in second-feet, of Spruce Creek (lower station) near Breckenridge, Colo., for the period July 14 1914, to Mar. 24, 1915.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1		25	6.8	2.3					
2		21	5.9	2.4					
3		19	6.4	2.4					
4		16	7.6	2.6			0.20		0.15
5		13	7.6	2.4					
6	22	13	6.4	2.2				0.20	
7	22	11	6.4	2.1					
8	22	7.8	8.6	1.7					
9	22	8.4	7.6	1.6					
10	22	8.1	7.4	1.6	1.0				
11	22	7.8	7.6	1.6					
12	20	6.8	7.4	1.5					
13	26	6.1	7.1	1.5			.25		
14	19	5.3	6.6	1.5					
15	19	5.1	7.1	1.5					
16	20	5.1	4.2	1.5					
17	24	5.5	3.6	1.4		0.35			
18	21	7.6	3.2	1.5				.20	
19	17	6.1	2.6	1.5					
20	18	6.6	2.6	1.4					
21	21	6.8	3.6	1.4					
22	22	16	2.3	1.4			.20		
23	22	11	2.4	1.5					
24	17	9.6	4.0	1.5					.15
25	15	7.6	3.6	1.5					
26	15	7.6	4.4			.25			
27	20	7.8	4.4		7.5				
28	27	6.8	3.6						
29	26	7.4	2.3						
30	26	8.1	3.3						
31	34	7.6							

Monthly discharge of Spruce Creek (lower station) near Breckenridge, Colo., for the period July 6 to Oct. 25, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
July 6–31	34	15	21.6	1,110
August	25	5.1	9.70	596
September	8.6	2.3	5.22	311
October 1–25	2.6	1.4	1.74	86

CRYSTAL CREEK NEAR BRECKENRIDGE, COLO.

LOCATION.—In sec. 24, T. 7 S., R. 78 W., above power canal intake, 3 miles south of Breckenridge in Summit County.

DRAINAGE AREA.—2.0 square miles, ranging in altitude from 10,500 to 13,000 feet.

RECORDS AVAILABLE.—July 7, 1914, to March 24, 1915.

GAGE.—Vertical staff.

WINTER FLOW.—Stage-discharge relation seriously affected by ice; discharge determined by current-meter measurements.

REGULATION.—None.

COOPERATION.—Records compiled and furnished by S. C. Hulse, consulting engineer.

Daily discharge, in second-feet, of Crystal Creek near Breckenridge, Colo., for the period July 7, 1914, to Mar. 24, 1915.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1		19	3.9	1.8					
2		13	3.1	1.5					
3		14	3.1	1.2					
4		9.6	2.8	1.5			0.15		0.10
5		7.4	2.8	1.4					
6		6.3	2.3	1.2				0.10	
7	19	6.1	2.0	1.0					
8	28	5.9	1.9	.95					
9	22	5.4	1.8	.87					
10	21	5.2	1.9	.83	0.45				
11	19	5.0	1.8	.80					
12	17	4.2	1.8	.74					
13	17	3.7	1.9	.80			.20		
14	21	3.5	1.8						
15	16	2.9	1.8						
16	17	2.8	1.6						
17	20	3.5	1.6			0.20			
18	22	4.4	1.5					.10	
19	15	4.2	1.4						
20	14	7.1	1.6						
21	9.3	17	2.2	.71					
22	17	19	2.6	.71			.15		
23	14	10	2.3	.80					
24	10	6.6	2.0	.71					.10
25	9.3	4.8	1.8	.62					
26	9.6	4.8	1.6			.15			
27	16	4.6	1.6						
28	28	3.3	1.5		.45				
29	26	4.4	1.8						
30	29	4.8	1.9						
31	31	4.8							

Monthly discharge of Crystal Creek near Breckenridge, Colo., for the period July 7 to Oct. 13, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
July 7-31	31	9.3	18.7	927
August	19	2.8	7.01	431
September	3.9	1.4	2.06	123
October 1-13	1.8	.74	1.12	29

SNAKE RIVER AT DILLON, COLO.

LOCATION.—In sec. 18, T. 5 S., R. 77 W., at highway bridge 200 yards above mouth at Dillon, in Summit County. Nearest tributary, a small stream from the north that enters 1 mile above station.

DRAINAGE AREA.—92 square miles (measured on Forest atlas).

RECORDS AVAILABLE.—October 15, 1910, to September 30, 1915.

GAGE.—Vertical staff at downstream side of right bridge abutment; read twice daily by Miss Gaybriella Warren. Prior to April 26, 1913, gage was 2 feet farther upstream and 3 feet nearer the center of the channel at same datum. The water piled up on the gage at high stages, giving a higher reading for the 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 will shift slightly at long intervals. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.6 feet at 8 a. m. and 4.40 p. m. June 19, and 8 a. m. and 4.30 p. m. June 21 (discharge, 660 second-feet); minimum stage recorded, 0.56 foot at 4 p. m. February 13 (discharge, 11 second-feet).

WINTER FLOW.—Stage-discharge relation seriously affected by ice; flow estimated from current-meter measurements, observer's notes, and records of precipitation and temperature.

DIVERSIONS.—The Summit Power Co. diverts about 30 second-feet from Snake above Dillon. Water is usually diverted from April to November; current-meter measurements are made of water in ditch. There is also an irrigation decree for 4.5 second-feet above Dillon.

REGULATION.—(See diversions).

ACCURACY.—Determinations of mean daily stage based on two gage readings may be in error at certain seasons, owing to fluctuations caused by alternate melting and freezing at the headwaters. Records good.

Discharge measurements of Snake River at Dillon, Colo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 15	T. J. Watkins	0.64	13	Aug. 17	W. R. King	1.07	54
Feb. 8	H. L. Thackwell	.68	16	18	do	1.03	49
July 12	Robert Follansbee	1.56	151				

Discharge measurements of Snake River ditch at Dillon, Colo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 29	J. A. Ober		25	Aug. 18	W. R. King	1.45	34
July 12	Robert Follansbee	1.34	28	17	do		[a] 32

[a] Measured at headgate.

Daily discharge, in second-feet, of Snake River at Dillon, Colo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	17	14	.....	14	22	26	196	165	380	57	23
2	17	14	.....	.....	.....	27	55	165	240	55	23
3	17	14	.....	.....	.....	28	55	148	240	50	20
4	17	14	.....	.....	.....	30	55	134	240	47	17
5	17	14	.....	.....	.....	32	55	98	200	47	17
6	17	14	.....	.....	17	32	53	90	200	74	17
7	17	14	.....	.....	.....	33	53	96	200	76	17
8	17	14	.....	15	.....	34	32	126	176	90	20
9	17	14	.....	13	23	35	32	126	165	88	17
10	17	14	.....	.....	.....	35	32	126	165	83	17
11	17	14	.....	.....	.....	41	32	150	165	77	17
12	18	14	14	.....	.....	47	32	150	156	76	17
13	18	14	.....	11	27	47	32	165	179	76	17
14	18	14	.....	.....	.....	46	32	258	176	60	16
15	18	14	14	.....	22	46	32	240	153	60	16
16	18	14	.....	.....	.....	45	13	240	105	60	15
17	17	14	.....	14	.....	45	13	330	90	57	14
18	17	14	.....	.....	.....	45	14	330	90	45	13
19	17	.....	15	.....	.....	45	14	380	96	45	13
20	16	.....	.....	.....	14	45	14	380	103	45	13
21	14	.....	.....	.....	.....	26	14	660	90	32	13
22	14	.....	.....	.....	.....	14	53	485	92	32	13
23	14	.....	13	.....	19	14	45	485	85	32	12
24	14	.....	.....	.....	.....	14	45	512	79	32	12
25	14	.....	.....	17	.....	14	90	485	83	38	25
26	14	.....	17	.....	.....	45	94	458	76	32	25
27	14	.....	.....	20	22	66	240	430	86	32	25
28	14	.....	.....	.....	.....	179	240	430	70	32	16
19	14	.....	.....	.....	25	172	240	405	66	32	16
30	14	.....	15	.....	.....	186	189	380	66	32	16
31	14	.....	.....	.....	.....	.....	172	.....	63	32	.....

NOTE.—Discharge determined from rating curve well defined below 330 second-feet; discharge Apr. 1, 2, 4, 6–9, 11, 13–16, 18, 19, interpolated as gage was not read. No estimate Nov. 24 to Jan. 9 because of ice. Snake River ditch shut down from last of November to last of April.

Monthly discharge of Snake River at Dillon, Colo., for the year ending Sept. 30, 1915.

Month.	Discharge in second feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	18	14	16.1	990	B.
November 1-18	14	14	14.0	500	B.
January	.....	.....	15.0	922	D.
February	.....	.....	14.0	778	D.
March	.....	.....	20.0	1,230	D.
April	186	14	49.8	2,960	C.
May	240	13	73.2	4,500	B.
June	660	90	288	17,100	B.
July	380	63	141	8,670	A.
August	90	32	52.5	3,230	A.
September	25	12	17.1	1,020	B.

NOTE.—Discharge for January, February, and March determined from two current-meter measurements and the assumption that ice caused no backwater.

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, Canyon Creek, enters from the west about 4 miles above.

DRAINAGE AREA.—113 square miles (measured on map in Forest atlas).

RECORDS AVAILABLE.—October 5, 1910, to September 30, 1915.

GAGE.—Vertical staff at downstream side of center bridge pier; read twice daily by Miss Gaybriella Warren. Prior to June 10, 1914, gage was at side of pier at same datum. During high stages the water piled up on the gage, so that readings for the same discharge were higher at some times than at others.

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

CHANNEL AND CONTROL.—Bed composed of small boulders; rough but permanent. Control 50 feet downstream from gage; permanent. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.6 feet at 4.30 p. m. June 21 (discharge, 975 second-feet); minimum discharge occurred during winter when record was discontinued.

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

DIVERSIONS.—There are court decrees for the diversion of 11 second-feet from Tenmile Creek above station.

REGULATION.—None so far as known.

ACCURACY.—Determinations of mean daily stage based on two gage readings may be in error at certain seasons owing to fluctuations caused by alternate melting and freezing at the headwaters. Records good.

Discharge measurements of Tenmile Creek at Dillon, Colo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
July 12	Robert Follansbee	2.48	212	Aug. 18	W. R. King	1.99	62
Aug. 17	W. R. King	2.03	82				

Daily discharge, in second-feet, of Tenmile Creek at Dillon, Colo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.
1	49	45	.....	116	465	370	90	43
2	53	49	.....	95	370	400	80	43
3	53	49	.....	67	432	340	70	49
4	53	48	.....	116	465	340	70	55
5	45	49	.....	190	465	312	70	43
6	45	49	.....	190	400	296	70	43
7	49	49	.....	235	329	285	90	43
8	53	49	.....	212	312	226	340	45
9	53	49	.....	190	465	212	190	55
10	49	49	.....	212	465	212	116	55
11	45	49	.....	190	465	116	116	55
12	43	49	.....	212	465	230	103	43
13	49	49	.....	260	465	226	80	43
14	55	49	.....	285	465	212	80	49
15	49	49	.....	340	432	212	74	55
16	45	50	.....	190	465	182	58	43
17	45	53	.....	212	782	170	90	43
18	43	53	.....	212	670	190	55	38
19	43	.....	.....	212	670	182	55	38
20	43	.....	80	235	820	170	70	38
21	43	.....	82	245	935	143	62	38
22	43	.....	82	296	858	133	55	38
23	49	.....	82	340	670	123	62	38
24	49	.....	70	370	670	170	62	38
25	49	.....	55	530	670	116	62	123
26	49	.....	55	530	635	116	55	116
27	49	.....	55	635	600	170	43	116
28	49	.....	70	670	498	116	55	116
29	49	.....	80	670	370	103	103	116
30	49	.....	80	565	340	90	70	90
31	49	.....	.....	530	.....	90	49	.....

NOTE.—Oct. 1 to Sept. 30, discharge determined from rating curve fairly well defined below 300 second-feet.

Monthly discharge of Tenmile Creek at Dillon, Colo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	55	43	48.0	2,950	B.
November 1–18	53	45	49.2	1,760	B.
April 20–30	82	55	71.9	1,570	B.
May	670	67	302	18,600	B.
June	935	312	537	32,000	B.
July	400	90	202	12,400	A.
August	340	43	85.3	5,240	B.
September	123	38	58.3	3,470	B.

EAGLE RIVER AT REDCLIFF, COLO.

LOCATION.—In sec. 29, T. 6 S., R. 80 W., at footbridge in the town of 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, 1915.

GAGE.—Chain gage on downstream side of footbridge; read twice daily.

DISCHARGE MEASUREMENTS.—Made from highway bridge 800 feet above station or by wading.

CHANNEL AND CONTROL.—Bed composed of boulders; very rough. Control is a short distance below gage and will shift at long intervals. A decided shift occurred during last part of 1915. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.97 feet at 7.30 a. m. June 12 (discharge, 510 second-feet); minimum stage recorded, 0.25 foot at 8 a. m. January 8 (discharge, 2 second-feet).

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—There are court decrees for the diversion of 6 second-feet from Eagle River above station, and also an old placer decree for diversion to the Arkansas basin of 18.5 second-feet from Piney Creek, a tributary of Eagle River.

REGULATION.—None.

ACCURACY.—Determinations of mean daily stage based on two gage readings may be in error at certain seasons owing to fluctuations caused by alternate melting and freezing at the headwaters. Control was practically permanent except during September. Records excellent for low and good for higher stages.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Eagle River at Redcliff, Colo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec-ft.*			*Feet.*	*Sec.-ft.*
Oct. 14	Robert Follansbee	0.69	17	July 10	Robert Follansbee	1.38	64
Jan. 24	R. H. Fletcher	.39	6.3	Aug. 25	W. R. King	.86	26
Feb. 20	do	.51	9.1				

Daily discharge, in second-feet, of Eagle River at Redcliff, Colo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	22	23	11	4	6	10	15	97	336	78	34	19
2	24	23	11	5	9	10	16	85	280	81	33	17
3	21	22	12	4	6	9	20	67	191	79	35	18
4	21	18	14	4	5	9	20	68	167	86	32	18
5	20	15	13	5	9	9	20	65	191	78	30	18
6	22	15	12	3	9	10	22	63	156	72	30	18
7	22	15	10	7	9	10	23	57	145	68	41	2
8	22	14	10	3	9	11	29	57	136	71	67	5
9	22	14	14	4	9	10	29	77	167	68	49	5
10	23	13	7	4	9	9	28	76	247	65	40	9
11	22	15	9	4	9	8	35	108	264	63	33	12
12	22	16	9	6	8	8	37	145	375	59	32	18
13	23	18	9	4	10	8	44	280	191	59	29	15
14	19	17	7	5	9	13	50	298	191	57	29	15
15	6	17	5	4	9	13	57	167	191	52	29	15
16	5	16	7	5	9	13	51	179	204	49	29	15
17	4	18	6	5	9	15	49	232	218	46	28	16
18	5	13	6	6	9	14	46	232	191	41	27	17
19	5	19	5	6	9	14	51	167	218	40	27	17
20	4	13	5	6	9	11	65	145	218	40	26	16
21	5	6	7	5	10	11	65	117	218	40	26	15
22	13	5	4	6	10	11	69	145	167	40	24	15
23	24	9	4	6	10	11	59	117	167	39	24	15
24	27	9	5	7	10	11	44	167	218	38	26	15
25	34	9	4	5	9	13	68	280	156	38	26	16
26	34	10	5	7	9	14	57	167	136	38	28	17
27	25	15	5	5	10	14	67	167	145	40	27	18
28	23	12	4	6	11	14	117	156	126	40	25	20
29	19	12	4	6	.....	14	156	191	108	39	25	22
30	23	12	4	8	.....	14	145	156	93	38	24	23
31	22	.....	4	8	.....	15	.....	191	.....	36	23	.....

NOTE.—Discharge determined as follows: Oct. 1 to Dec. 31 from rating curve fairly well defined; Jan. 1 to Aug. 31 from rating curve well defined throughout; Sept. 1–30 by indirect method for shifting control. Oct. 15, 21, and Sept. 6, filling Pando ice pond; Oct. 25, 26, and Sept. 12, emptying pond.

Monthly discharge of Eagle River at Redcliff, Colo., for the year ending Sept. 30, 1915.

Month.	Discharge in second feet.			Run-off total (in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	34	4	18.8	1,160	A.
November	23	5	14.4	857	B.
December	14	4	7.5	461	B.
January	8	3	5.3	326	B.
February	11	5	8.9	494	B.
March	15	8	11.5	707	B.
April	156	15	51.8	3,080	B.
May	298	57	146	8,980	B.
June	375	93	194	11,500	B.
July	86	36	54.1	3,330	A.
August	67	23	30.9	1,900	A.
September	23	2	15.4	916	A.
The year	375	2	46.6	33,700	

EAGLE RIVER AT EAGLE, COLO.

LOCATION.—At highway bridge at Eagle, in Eagle County. Nearest tributary, Brush Creek, enters three-fourths of a mile below station.

DRAINAGE AREA.—630 square miles (measured on Forest atlas).

RECORDS AVAILABLE.—January 17, 1911, to September 30, 1915. March 12, 1905, to February 10, 1907, a station was maintained a short distance below the mouth of Brush Creek.

GAGE.—Chain gage on downstream side of bridge read once daily by S. D. Ackley and D. L. Wedmore. Gage used prior to August, 1915, was a vertical staff fastened to right abutment, at same datum as present gage and Weather Bureau gage near by.

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

CHANNEL AND CONTROL.—Channel is composed of boulders; very rough; control not well defined; banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.2 feet at 6 p m. June 22 and 10 a. m. June 23 (discharge, 3,760 second-feet); minimum discharge occurred during winter, when record was discontinued.

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

DIVERSIONS.—Between Eagle and the station at Redcliff there are court decrees for the diversion of 380 second-feet from Eagle River, of which 300 second-feet is for power. Below Eagle there are decrees for 22 second-feet from Eagle River.

REGULATION.—None.

ACCURACY.—Records considered excellent except for spring period, when one daily reading probably does not show the correct mean daily stage owing to diurnal fluctuations.

The following discharge measurement was made by W. R. King:

August 25, 1915: Gage height, 0.55 foot; discharge, 202 second-feet.

Daily discharge, in second-feet, of Eagle River at Eagle, Colo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	304	295	.....	118	126	982	2,340	1,860	390	167
2	295	286	.....	119	129	705	2,850	1,800	390	167
3	295	286	.....	119	147	570	2,850	1,740	445	167
4	331	286	.....	120	163	480	1,740	1,740	505	190
5	340	251	.....	120	143	390	1,740	1,740	505	190
6	331	230	.....	121	163	364	1,520	1,740	445	190
7	318	230	.....	122	153	338	1,310	1,420	570	190
8	331	219	.....	123	163	314	1,360	1,520	940	190
9	385	208	.....	123	185	338	1,420	1,470	635	167
10	349	208	.....	126	174	390	2,100	1,420	635	167
11	304	208	.....	118	210	505	2,850	1,420	505	167
12	295	200	.....	123	245	860	2,850	1,420	338	167
13	295	200	.....	118	245	1,640	2,980	1,210	390	167
14	295	187	.....	118	390	2,220	3,110	1,310	291	167
15	295	166	.....	114	364	1,640	2,980	1,120	218	167
16	295	146	.....	114	364	1,860	2,720	860	190	147
17	295	166	.....	109	390	1,980	2,590	860	190	147
18	295	.....	.....	112	404	2,100	2,460	860	167	167
19	295	.....	.....	109	418	1,740	2,590	860	167	190
20	273	.....	.....	114	390	1,310	2,850	860	147	190
21	284	.....	.....	114	364	1,980	2,850	860	147	167
22	296	.....	.....	114	364	1,740	3,630	705	167	167
23	307	.....	.....	112	364	1,860	3,760	705	190	167
24	318	.....	.....	123	418	1,210	3,110	635	190	167
25	251	.....	118	123	418	1,740	2,980	570	218	167
26	295	.....	118	123	418	2,100	2,940	635	190	167
27	295	.....	118	123	364	1,310	2,910	570	190	252
28	273	.....	.....	120	475	780	2,880	445	190	338
29	251	.....	.....	118	705	1,420	2,850	505	190	252
30	295	.....	.....	118	1,160	1,120	2,100	445	190	218
31	295	.....	.....	118	.....	1,740	.....	338	167	.....

NOTE.—Discharge determined as follows: Oct. 1 to Nov. 18 from fairly well-defined rating curve; Nov. 18 to Feb. 24 no estimate because of ice; Feb. 25 to Sept. 30 from rating curve well defined throughout; discharge Mar. 2–8 interpolated because of ice; discharge Mar. 28, Apr. 11, 18, 25, May 4, June 6, 8, 26–28, July 2, 4, 5, 9, interpolated, as gage was not read.

Monthly discharge of Eagle River at Eagle, Colo., for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off total (in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	385	251	302	18,600	A.
November 1-17	295	146	222	7,480	B.
February 25-28	118	118	118	702	
March	126	109	118	7,260	C.
April	1,160	126	334	19,900	B.
May	2,220	314	1,220	75,000	B.
June	3,760	1,310	2,570	153,000	A.
July	1,860	338	1,090	67,000	A.
August	940	147	326	20,000	A.
September	338	147	184	10,900	A.

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.

DRAINAGE AREA.—27 square miles (measured on Forest atlas map).

RECORDS AVAILABLE.—June 30, 1913, to September 30, 1915.

GAGE.—Vertical staff on downstream side of left abutment; read morning and evening.

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

CHANNEL AND CONTROL.—Bed composed of coarse gravel and small boulders; will shift. Control not well defined. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.8 feet at 5 p. m. June 19 (discharge, 245 second-feet); minimum stage recorded, 0.70 foot at 7 a. m. December 1 (discharge, 1 second-foot).

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—There is a court decree for the diversion of 5.5 second-feet from Turkey Creek.

REGULATION.—None.

ACCURACY.—Records fair or good.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Turkey Creek at Redcliff, Colo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 14	Robert Follansbee	1.19	8.8	June 23	R. G. Hosea	2.40	186
Jan. 24	R. H. Fletcher	1.05	4.7	July 10	Robert Follansbee	1.58	57
Feb. 20	do	.99	4.4	Aug. 25	W. R. King	1.09	11

Daily discharge, in second-feet, of Turkey Creek at Redcliff, Colo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	15	7	2	4	4	5	10	58	151	110	20	10
2	14	7	4	4	4	6	11	50	135	102	18	10
3	14	7	3	4	4	6	14	41	120	95	18	10
4	14	6	5	4	4	7	14	39	110	89	18	10
5	13	7	3	4	4	6	14	37	104	87	18	9
6	11	5	3	4	4	6	14	34	101	76	17	9
7	9	6	3	5	4	6	14	30	92	73	21	9
8	9	4	3	4	4	6	14	31	101	67	23	12
9	9	4	3	4	4	7	15	47	135	58	18	10
10	9	5	3	4	5	7	16	37	143	56	17	9
11	9	4	3	4	4	6	19	47	205	50	17	9
12	10	5	3	4	5	9	17	71	197	43	17	9
13	10	5	3	4	5	7	19	98	197	43	14	9
14	7	5	4	4	5	8	26	100	166	43	14	9
15	8	4	4	4	6	7	27	91	174	40	14	10
16	9	3	4	4	5	7	29	97	197	39	14	10
17	9	5	4	3	5	8	29	115	205	35	14	9
18	9	4	5	3	5	7	30	112	197	33	13	9
19	9	3	5	4	5	7	32	92	213	31	13	9
20	8	3	5	4	5	7	38	82	213	30	13	9
21	9	3	5	4	5	7	35	71	213	27	13	9
22	9	3	5	4	5	7	29	68	205	26	13	9
23	9	3	5	4	5	8	28	88	190	25	13	8
24	9	4	5	3	5	8	27	97	182	25	13	9
25	9	4	5	3	5	8	14	112	174	25	13	11
26	8	3	5	3	7	9	14	127	166	25	12	10
27	7	4	5	3	5	10	29	102	151	25	11	9
28	7	3	4	3	7	10	33	104	135	25	10	10
29	7	4	5	3	.....	9	38	102	126	25	10	10
30	7	4	4	3	.....	9	53	120	118	23	10	9
31	7	.....	4	4	.....	9	.....	134	.....	21	10	.....

NOTE.—Discharge determined by indirect method for shifting control; discharge Dec. 3, July 11, 22, Aug. 1, Sept. 3–6, 11, 12, 19–21, 26, interpolated as gage was not read.

Monthly discharge of Turkey Creek at Redcliff, Colo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	15	7	9.4	578	B.
November	7	3	4.5	268	B.
December	5	2	4	246	B.
January	5	3	3.7	228	C.
February	7	4	4.8	267	C.
March	10	5	7.4	455	C.
April	53	10	23.4	1,390	C.
May	134	30	78.5	4,830	C.
June	213	92	161	9,580	B.
July	110	21	47.5	2,920	B.
August	23	10	14.8	910	C.
September	12	8	9.5	565	C.
The year	213	2	30.7	22,200	

HOMESTAKE CREEK AT REDCLIFF, COLO.

LOCATION.—In sec. 30, T. 6 S., R. 80 W., three-fourths mile above mouth of creek at Forest Service bridge, and 1 mile from Redcliff, in Eagle County, below all tributaries.

DRAINAGE AREA.—64 square miles (measured on topographic map).

RECORDS AVAILABLE.—August 17, 1914, to September 30, 1915. From January 8, 1911, to August 16, 1914, station was a quarter of a mile downstream.

GAGE.—Vertical staff at left abutment of bridge; read irregularly. Gage used prior to August 17, 1914, was vertical staff attached to large boulder on right bank one-fourth mile downstream and just above the cascades.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of well-compacted gravel. Control 50 feet downstream at small rapids; apparently permanent. Several small overflow channels around the left bank carry water when stage is above 2.3 feet.

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

DIVERSIONS.—There are court decrees for the diversion of 1.2 second-feet from a tributary of Homestake Creek.

REGULATION.—None.

ACCURACY.—Determinations of mean daily stage based on one reading may be in error at certain seasons owing to fluctuations caused by alternate melting and freezing at headwaters. Records fair.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Homestake Creek at Redcliff, Colo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 14	Robert Follansbee	[a] 0.52	14	July 10	Robert Follansbee	1.62	166
Jan. 25	R. H. Fletcher	[b]	.6	June 23	R. G. Hosea	2.45	401
Feb. 20	Do	[b]	.7				

[a] Old gage read 0.58 foot. [b] Water surface below gage. Thick ice cover.

Daily discharge, in second-feet, of Homestake Creek at Redcliff, Colo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.	Sept.
1	22	18	4	3	146	610	205	44	10
2	22	16	4	3	99	450	218	38	10
3	22	14	4	3	79	257	205	44	10
4	22	10	4	3	153	215	225	30	15
5	22	10	3	3	76	257	205	28	20
6	22	9	3	13	73	194	187	28	15
7	22	8	3	16	68	142	174	76	10
8	22	5	3	28	56	161	182	161	8
9	23	5	3	33	62	230	174	84	21
10	24	6	3	26	79	388	161	65	21
11	25	6	3	38	128	432	153	50	20
12	26	6	3	40	176	670	148	40	20
13	26	6	3	57	485	257	142	36	20
14	13	6	3	58	415	244	138	35	19
15	14	6	3	69	230	257	133	34	19
16	16	6	3	62	230	331	107	33	18
17	17	6	2	58	347	381	99	30	17
18	18	6	2	52	315	432	84	27	16
19	20	6	2	62	218	485	84	25	14
20	22	5	2	79	142	485	84	23	12
21	24	4	.....	76	124	468	79	21	10
22	26	4	.....	80	94	415	73	20	10
23	25	4	.....	69	257	398	72	20	8
24	24	4	.....	76	285	381	70	21	7
25	24	5	.....	80	485	398	68	22	12
26	25	5	.....	68	215	347	66	20	50
27	26	5	.....	79	161	364	64	19	33
28	28	5	.....	137	126	347	62	18	36
29	26	5	.....	142	257	300	57	16	37
30	23	5	.....	176	194	257	54	14	40
31	20	.....	.....	.....	285	.....	49	12	.....

NOTE.—Discharge determined from rating curve well defined throughout. Gage read two or three times a week. Discharge for days on which gage was not read determined by comparison with record of flow of Eagle Creek at Redcliff.

Monthly discharge of Homestake Creek at Redcliff, Colo., for the year ending Sept. 30, 1915.

Month.	Discharge in second feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	28	13	22.3	1,370	C.
November	18	4	6.87	409	D.
December 1–20	4	2	3.00	119	D.
April	176	3	56.3	3,350	C.
May	485	56	195	12,000	C.
June	670	142	352	20,900	C.
July	218	49	123	7,560	C.
August	161	12	36.6	2,250	C.
September	50	7	18.6	1,110	D.

ROARING FORK AT ASPEN, COLO.

LOCATION.—At bridge near the old power plant at Aspen, in Pitkin County. Castle, Maroon, and Hunter creeks all enter below.

DRAINAGE AREA.—109 square miles (measured on topographic maps).

RECORDS AVAILABLE.—February 25, to September 30, 1915. From January 1, 1911, to February 24, 1915, station was maintained just below Cooper Avenue bridge three-fourths of a mile upstream.

GAGE.—Vertical staff at downstream end of right bridge abutment; read at irregular intervals by J. B. Hill and H. O. Halleck. Gage used at original station was vertical staff fastened to old crib abutment on right bank, 25 feet below Cooper Avenue bridge. Relation between the two gages not known.

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

CHANNEL AND CONTROL.—Bed composed of small boulders; fairly smooth. Control practically permanent. Banks high; not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.6 feet during night of June 24, as determined from high-water marks (discharge, 2,180 second-feet); minimum stage occurs during winter.

WINTER FLOW.—Stage-discharge relation seriously affected by ice.

DIVERSIONS.—Salvation ditch, which has a decree for 58 second-feet, diverts water above the station from the middle of May to middle of September.

REGULATION.—None.

ACCURACY.—Records considered good except for spring run-off, when determinations of mean daily stage based on one gage reading may be in error, owing to fluctuations caused by alternate melting and freezing at headwaters; records for this period only fair.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Roaring Fork at Aspen, Colo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 24	R. H. Fletcher	[a] 1.07	26	Apr. 11	R. H. Fletcher	1.16	38
Apr. 4	do	1.17	40	July 15	W. R. King	2.52	332
7	do	1.18	43	Aug. 21	do	1.35	60

[a] New gage established Feb. 24.

Daily discharge, in second-feet, of Roaring Fork at Aspen, Colo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	87	64	.....	.....	32	30	118	575	655	109	50
2	96	64	.....	.....	32	33	120	485	600	107	55
3	106	63	.....	22	32	36	112	400	530	92	61
4	106	62	.....	.....	32	40	92	339	508	92	55
5	106	61	.....	.....	32	40	77	311	575	70	59
6	106	54	.....	23	32	41	112	297	575	84	59
7	106	54	.....	.....	28	41	104	283	432	195	53
8	106	53	.....	.....	23	40	65	290	498	152	51
9	106	53	.....	.....	23	40	104	376	472	112	43
10	106	52	.....	.....	23	39	95	615	432	107	48
11	102	52	.....	.....	25	39	131	805	557	105	43
12	99	54	.....	.....	27	43	175	1,010	562	100	61
13	96	54	.....	19	39	45	325	665	392	84	55
14	92	55	.....	.....	36	50	368	530	530	80	53
15	89	56	.....	.....	32	59	360	650	332	84	62
16	86	56	23	.....	32	50	350	775	325	84	55
17	83	39	.....	.....	32	32	428	875	353	80	49
18	80	48	.....	.....	32	32	512	875	325	76	55
19	77	56	.....	.....	33	65	311	875	252	65	55
20	74	65	.....	22	33	59	262	1,040	294	62	55
21	80	65	.....	.....	33	67	200	795	262	61	55
22	87	52	.....	.....	34	65	225	1,140	240	62	49
23	94	39	.....	.....	34	63	220	1,180	210	67	43
24	88	38	.....	30	34	70	255	996	276	72	41
25	83	36	.....	30	35	59	440	1,250	212	70	53
26	78	34	.....	30	36	63	350	996	166	67	65
27	72	32	.....	32	34	74	283	886	161	61	67
28	67	31	.....	32	34	92	249	840	148	53	61
29	66	30	.....	.....	33	112	318	800	142	57	55
30	66	30	.....	.....	32	146	294	655	127	57	74
31	65	.....	.....	.....	32	.....	360	.....	102	55	.....

NOTE.—Discharge determined as follows: Oct. 1 to Nov. 30, Feb. 3–20, from fairly well defined rating curve; Feb. 24 to Sept. 30, from rating curve fairly well defined between 30 and 1,000 second-feet. Gage read two or three times a week; discharge for days on which gage was not read determined by comparison with records of flow of Castle Creek. Stream icebound during December and January; flow not determined.

Monthly discharge of Roaring Fork at Aspen, Colo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	106	65	88.9	5,470	B.
November	65	30	50.0	2,980	B.
February	.....	.....	[a]24.3	1,350	D.
March	39	23	31.6	1,940	B.
April	146	30	55.5	3,300	C.
May	512	65	239	14,700	C.
June	1,250	283	720	42,800	C.
July	655	102	363	22,300	B.
August	195	53	84.6	5,200	B.
September	74	41	54.7	3,250	B.

[a] Estimated.

ROARING FORK BELOW ASPEN, COLO.

LOCATION.—In sec. 1, T. 10 S., R. 85 W., at the first highway bridge 2 miles below Aspen, in 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 September 30, 1915.

GAGE.—Vertical staff at right abutment of bridge; read at irregular intervals by J. B. Hull and H. O. Halleck.

DISCHARGE MEASUREMENTS.—Made from two-span bridge.

CHANNEL AND CONTROL.—Bed composed of gravel and small boulders; shifts somewhat during high water. Control not well defined. Banks high and not subject to overflow.

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Between this station and the one at Aspen are a number of small diversions, some of which return the water to the river above this station. The Roaring Fork Light & Power Co. diverts water from Maroon Creek into Castle Creek and thence into Roaring Fork above station.

REGULATION.—None so far as known.

ACCURACY.—Records considered good except for period of spring run-off when determinations of stage based on one gage reading may be in error owing to fluctuations caused by alternate melting and freezing at headwaters; results for that period fair.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Roaring Fork below Aspen, Colo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 9	T. J. Watkins	0.09	100	July 16	W. R. King	1.05	484
Feb. 25	R. H. Fletcher	.09	96	Aug. 22	do	.32	150
Apr. 11	do	.12	102				

Daily discharge, in second-feet, of Roaring Fork below Aspen, Colo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	184	154	118	99	98	98	92	315	905	1,060	254	142
2	185	152	112	98	97	97	94	284	817	950	259	144
3	186	151	118	97	96	96	96	252	730	840	232	140
4	188	150	125	96	96	95	97	220	642	850	206	137
5	196	148	124	96	96	94	98	212	555	860	180	140
6	204	146	123	95	96	92	99	202	588	880	180	134
7	212	145	122	95	96	90	100	192	620	836	170	128
8	220	144	120	94	96	88	100	181	653	792	200	122
9	220	143	119	94	100	88	105	181	685	777	400	117
10	220	142	118	95	98	88	110	181	1,020	762	330	117
11	215	140	116	95	97	90	115	250	1,355	830	259	117
12	210	140	115	96	96	92	120	318	1,690	898	239	150
13	205	137	114	98	94	112	125	420	1,550	965	219	140
14	200	136	112	100	95	104	130	520	1,400	700	199	140
15	195	135	110	100	96	96	140	620	1,260	600	192	159
16	190	134	108	100	98	94	150	735	1,120	500	185	150
17	185	148	105	100	100	92	160	830	1,690	490	178	140
18	180	136	105	100	96	92	170	838	1,630	490	172	130
19	175	124	105	102	92	92	181	685	1,570	490	166	135
20	171	112	105	105	92	92	181	532	1,460	480	159	129
21	170	120	105	102	93	92	181	380	1,350	470	152	123
22	169	120	105	100	94	92	181	465	1,460	460	144	120
23	168	120	105	101	95	92	181	550	1,580	1,060	150	117
24	166	121	105	102	96	92	181	635	1,690	533	160	114
25	165	123	105	103	96	93	190	720	2,070	450	170	110
26	164	124	105	104	100	94	210	647	1,880	367	180	250
27	162	125	104	105	100	92	230	574	1,700	315	158	169
28	161	125	103	100	99	91	252	564	1,520	299	137	150
29	160	125	102	100	.....	90	325	555	1,340	283	138	200
30	158	125	101	100	.....	89	320	671	1,160	266	139	169
31	156	.....	100	100	.....	88	.....	788	.....	250	140	.....

NOTE.—Discharge determined as follows: Oct. 1 to June 30, July 1 to Sept. 30, from fairly well-defined rating curve. Gage read two or three times a week; discharge for days on which gage was not read determined by comparison with record obtained at upper station at Aspen.

Monthly discharge of Roaring Fork below Aspen, Colo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	220	156	185	11,400	C.
November	154	112	135	8,030	B.
December	125	100	111	6,820	B.
January	105	94	99.1	6,090	B.
February	100	92	96.4	5,350	B.
March	112	88	93.1	5,720	B.
April	325	92	157	9,340	C.
May	838	181	468	28,800	C.
June	2,070	555	1,260	75,000	C.
July	1,060	250	639	39,300	C.
August	400	137	195	12,000	B.
September	250	110	141	8,390	B.
The year	2,070	88	298	216,000	

ROARING FORK AT GLENWOOD SPRINGS, COLO.

LOCATION.—At bridge 500 feet above junction with Grand River at Glenwood Springs. Nearest large tributary enters about 3 miles above station.

DRAINAGE AREA.—1,450 square miles (measured on Nell's map of Colorado, 1903).

RECORDS AVAILABLE.—April 6, 1906, to September 30, 1909; September 21, 1910, to September 30, 1915.

GAGE.—Chain gage on downstream side of bridge; read once daily by J. M. Dougherty and L. T. Mahurin.

DISCHARGE MEASUREMENTS.—Made from highway bridge.

CHANNEL AND CONTROL.—Slightly shifting at intervals. Extreme high water in Grand River may cause backwater at the gage. Measurements made at stages as high as 5.7 feet in Roaring Fork and 9.2 feet on the Grand have shown no backwater, but a measurement at 7.45 feet on Roaring Fork and one at 12.0 feet stage on Grand River showed approximately 0.8 foot backwater. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.2 feet at 10 a. m. June 27 (discharge, 6,530 second-feet); minimum stage recorded, 0.9 foot at 5 p. m. February 6 and 8 (discharge, 342 second-feet).

WINTER FLOW.—Stream rarely frozen over, but slush and anchor ice frequently form. Discharge measurements made during the winter sometimes indicate backwater.

DIVERSIONS.—There are court decrees for the diversion of 164 second-feet from Roaring Fork between the station at Glenwood Springs and the lower Aspen station.

REGULATION.—None.

ACCURACY.—Records considered good, as changes in control are well defined by measurements.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Roaring Fork at Glenwood Springs, Colo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec. ft.*			*Feet.*	*Sec.-ft.*
Oct. 15	Robert Follansbee	1.98	829	Feb. 27	R. H. Fletcher	1.12	376
Jan. 7	T. J. Watkins	1.21	385	July 11	W. R. King	3.35	2,680
23	R. H. Fletcher	1.02	354				

Daily discharge, in second-feet, of Roaring Fork at Glenwood Springs, Colo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	620	602	430	370	400	350	370	1,370	3,100	3,290	768	455
2	638	596	410	360	405	350	388	835	4,910	3,290	705	455
3	844	590	410	370	360	350	430	800	3,880	3,100	675	480
4	927	590	430	370	370	350	405	768	2,910	3,000	705	480
5	806	560	485	405	360	360	430	705	2,550	2,910	675	455
6	868	535	445	360	350	350	455	645	2,380	3,290	615	455
7	884	490	470	405	388	350	505	588	2,380	2,730	768	405
8	838	492	470	.....	350	350	480	560	2,210	2,380	1,370	455
9	792	495	455	.....	370	360	430	560	2,910	2,380	1,140	505
10	804	495	358	.....	370	360	455	560	3,880	2,380	835	455
11	816	530	358	370	360	360	480	615	4,280	3,680	800	532
12	828	535	445	405	360	370	505	1,040	6,530	2,730	735	532
13	757	505	398	.....	360	360	532	1,620	3,880	2,730	705	532
14	785	505	378	.....	355	360	615	2,550	3,290	2,550	675	532
15	829	475	358	.....	350	374	615	2,050	3,480	2,380	660	560
16	708	445	370	.....	360	388	735	2,300	4,080	2,210	645	588
17	668	480	430	370	388	370	615	2,550	4,910	2,050	615	532
18	662	462	442	.....	388	388	645	2,380	4,910	1,840	560	560
19	656	445	455	.....	370	370	768	1,900	4,910	1,620	560	532
20	656	440	480	.....	388	370	835	1,490	5,580	1,370	615	532
21	656	480	460	.....	377	360	910	1,250	5,350	1,370	615	480
22	680	520	460	.....	368	370	870	1,250	4,910	1,250	602	480
23	722	505	435	360	360	350	800	1,440	5,810	1,140	588	480
24	722	530	370	.....	350	370	705	1,620	5,350	1,250	645	480
25	686	480	460	.....	360	405	735	1,620	6,530	1,250	615	532
26	650	455	485	.....	370	388	705	1,490	6,050	1,090	645	735
27	620	490	460	.....	370	430	835	1,250	6,050	995	588	645
28	608	490	460	.....	388	418	800	1,370	4,280	995	532	645
29	578	480	485	.....	.....	405	1,090	1,620	4,280	950	455	645
30	620	490	410	.....	.....	388	1,490	2,050	3,780	870	505	615
31	608	.....	390	.....	.....	388	.....	2,380	.....	835	455	.....

NOTE.—Discharge determined as follows: Oct. 1 to Dec. 31 by indirect method for shifting control; Jan. 1 to Sept. 30, from a rating curve well defined throughout; Oct. 8, 10, 11, 18, 20, 25, Nov. 1, 2, 8, 15, 18, Mar. 3, 15, 28, May 9, 16, 23, June 30, July 4, 18, Aug. 15, 22, discharge interpolated, as gage was not read; Dec. 4, 18, discharge estimated, because of ice; Jan. 8–10, 13–16, 18–22, 24–31, no estimate because of ice.

Monthly discharge of Roaring Fork at Glenwood Springs, Colo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	927	578	724	44,700	B.
November	602	440	506	30,100	B.
December	485	358	431	26,500	B.
February	405	350	369	20,500	D.
March	430	350	371	22,800	C.
April	1,490	370	654	38,900	C.
May	2,550	560	1,390	85,500	B.
June	6,530	2,210	4,310	256,000	B.
July	3,680	835	2,060	127,000	B.
August	1,370	455	680	41,800	B.
September	735	405	526	31,300	C.

CASTLE CREEK NEAR ASPEN, COLO.

LOCATION.—In sec. 35, T. 10 S., R. 85 W., near highway bridge 4½ miles above Aspen, in Sopris National Forest. No inflow below except in spring from small gulches nearest tributary, Conundrum Creek, enters about 1 mile upstream.

DRAINAGE AREA.—72 square miles (measured on topographic maps).

RECORDS AVAILABLE.—February 16, 1911, to September 30, 1915.

GAGE.—Gurley water-stage recorder on left bank 75 feet below bridge. From February 29, 1912, to April 9, 1915, a staff gage fastened to right bridge abutment was used, referred to same datum, but on account of slope, readings were somewhat higher. From February 16, 1911, to February 28, 1912, gage was on opposite side of creek at datum 1 foot higher.

DISCHARGE MEASUREMENTS.—Made from cable 20 feet below gage or by wading nearby.

CHANNEL AND CONTROL.—Bed composed of coarse gravel; will shift during high water. Control is at small rapids just below cable. Left bank high and not subject to overflow; at gage height 4.3 feet, water overflows right bank a distance of 75 feet.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 2.7 feet at 10 p. m. June 18 (discharge, 442 second-feet). Minimum stage recorded, 0.65 foot on December 21 (discharge, 24 second-feet).

WINTER FLOW.—Stage-discharge relation seriously affected by ice; flow estimated from discharge measurements, observer's notes, records of temperature and precipitation.

DIVERSIONS.—No water diverted above station except possibly a small amount for irrigation; there are court decrees for the diversion of 160 second-feet below the station.

REGULATION.—None.

ACCURACY.—Control permanent after April 9, 1915. Records considered excellent for greater part of open-water period; winter estimates considered fair.

Discharge measurements of Castle Creek near Aspen, Colo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 9	T. J. Watkins	[a] 0.68	26	Apr. 11	R. H. Fletcher	[b] 0.48	31
Feb. 24	R. H. Fletcher	.66	34	July 15	W. R. King	1.97	258
Apr. 5	do	.68	35	Aug. 21	do	1.0	67
11	do	.70	31				

[a] Stage-discharge relation affected by ice. [b] New gage, installed Apr. 10.

Daily discharge, in second-feet, of Castle Creek near Aspen, Colo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	58	50	35	26	35	31	30	38	129	310	111	60
2	59	50	34	26	34	31	31	36	121	294	99	62
3	60	50	34	26	34	30	31	35	95	274	95	67
4	61	48	34	26	33	31	32	35	79	270	95	65
5	62	48	34	26	32	32	34	35	72	290	89	65
6	63	47	34	26	31	32	34	35	69	267	89	60
7	64	47	34	26	30	32	33	34	66	249	111	58
8	65	46	34	26	31	32	33	33	67	246	184	58
9	65	46	34	26	32	31	32	34	99	260	139	56
10	61	45	35	26	33	31	31	35	160	277	113	55
11	57	45	35	26	33	31	32	38	217	294	107	57
12	53	44	35	26	34	30	30	50	219	284	103	67
13	53	43	34	26	36	30	29	76	154	280	89	63
14	53	46	32	26	36	31	30	87	135	274	87	59
15	52	49	31	26	35	32	30	67	169	256	89	57
16	52	52	30	27	35	32	30	82	214	212	89	57
17	52	55	29	27	34	31	29	105	246	195	85	55
18	52	52	28	27	33	31	29	93	239	212	82	54
19	48	49	28	27	33	30	30	72	280	203	78	54
20	45	46	26	27	32	30	30	63	292	203	71	52
21	41	43	24	27	32	30	31	56	297	192	69	52
22	45	42	25	27	33	30	30	54	332	184	69	50
23	48	40	25	27	34	30	30	53	352	169	72	50
24	52	39	26	27	34	30	30	60	374	164	78	50
25	51	37	26	27	33	30	30	82	372	171	75	69
26	49	36	26	28	32	31	30	75	374	154	71	71
27	47	36	26	29	32	31	31	64	360	148	67	60
28	46	35	26	30	32	30	32	59	350	137	65	57
29	49	35	26	32	.....	30	35	66	342	133	64	57
30	49	35	26	35	.....	30	40	69	330	123	64	57
31	49	.....	26	35	.....	30	.....	85	.....	115	62	.....

NOTE.—Discharge computed as follows: Oct. 1 to Apr. 9 by indirect method for shifting control; Apr. 10 to Sept. 30 from rating curve well defined throughout, applied to readings from water-stage recorder. Discharge interpolated for days on which gage was not read. Discharge Jan. 7–9, 19–25, Feb. 5–9, Mar. 8, estimated, because of ice. Gage read twice a week Oct. 1 to Apr. 7; daily thereafter.

Monthly discharge of Castle Creek near Aspen, Colo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	65	41	53.6	3,300	C.
November	55	35	44.5	2,650	C.
December	35	24	30.1	1,850	C.
January	35	26	27.4	1,680	C.
February	36	30	33.1	1,840	C.
March	32	30	30.7	1,890	C.
April	40	29	31.3	1,860	A.
May	105	33	58.3	3,580	A.
June	374	66	220	13,100	A.
July	310	115	221	13,600	A.
August	184	62	89.1	5,480	A.
September	71	50	58.5	3,480	A.
The year	374	24	75.0	54,310	

MAROON CREEK NEAR ASPEN, COLO.

LOCATION.—In sec. 22, T. 10 S., R. 85 W., just above Roaring Fork Light & Power Co.'s head gate, 5 miles above Aspen, Pitkin County, in Sopris National Forest. Nearest tributary, Willow Creek, enters just below station.

DRAINAGE AREA.—42 square miles (measured on topographic map).

RECORDS AVAILABLE.—January 1, 1911, to September 30, 1915.

GAGE.—Vertical staff on right bank 100 feet above canal head gate; read twice daily by Harry Burnett.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Channel composed of compact gravel; practically permanent. Banks not subject to overflow to any great extent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.88 feet at 6.35 a. m. June 25 (discharge, 266 second-feet); minimum stage recorded, 0.56 foot on March 30, 31 (discharge, 22 second-feet).

WINTER FLOW.—Stage-discharge relation seldom affected by ice.

DIVERSIONS.—One or two small diversions above station; the Roaring Fork Light & Power Co. diverts just below.

REGULATION.—None.

ACCURACY.—Determinations of mean daily stage based on two gage readings may be in error at certain seasons owing to fluctuations caused by alternate melting and freezing at the headwaters. Records good.

Discharge measurements of Maroon Creek near Aspen, Colo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 8	T. J. Watkins	0.88	34	July 16	W. R. King	1.65	193
Feb. 25	R. H. Fletcher	.63	26	Aug. 22	do	1.09	60
Apr. 11	do	.60	25				

Daily discharge, in second-feet, of Maroon Creek near Aspen, Colo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	43	36	34	34	25	24	23	31	122	241	102	46
2	44	36	34	28	24	24	23	28	129	226	95	46
3	50	34	34	28	25	24	23	28	119	226	90	47
4	59	36	34	28	24	24	23	28	112	211	90	45
5	47	36	34	28	24	24	24	28	109	211	86	45
6	47	36	34	36	24	24	24	28	114	211	81	44
7	47	34	34	27	24	24	24	28	109	196	81	44
8	47	34	35	28	25	24	24	27	109	196	97	43
9	47	34	36	28	26	23	23	28	114	196	86	43
10	45	34	36	28	24	23	24	28	139	196	81	42
11	43	36	36	28	24	23	24	28	168	196	79	43
12	42	36	36	27	24	24	24	34	182	211	77	46
13	42	36	34	27	24	23	25	41	155	196	73	43
14	40	36	33	26	24	23	25	56	155	211	72	43
15	39	34	32	26	25	23	25	50	171	211	70	42
16	39	36	32	28	26	23	24	50	182	196	66	41
17	39	34	31	37	24	23	24	66	196	182	64	39
18	37	34	30	31	24	23	25	70	211	182	66	38
19	37	34	30	26	24	23	25	66	211	171	62	37
20	37	33	30	26	24	24	25	70	226	166	62	38
21	39	34	30	26	24	23	26	72	241	155	59	37
22	39	33	30	29	24	23	26	73	241	152	59	37
23	39	34	30	28	24	23	26	77	241	145	59	37
24	38	34	30	39	24	23	26	81	256	139	59	36
25	37	33	30	27	24	23	26	90	256	139	56	43
26	37	34	30	34	24	23	26	88	241	134	54	47
27	37	34	30	28	24	23	26	86	241	126	53	41
28	37	33	30	33	24	23	28	79	241	119	50	41
29	37	33	30	25	.....	23	30	86	241	119	48	39
30	36	33	30	25	.....	22	31	81	241	109	47	41
31	36	.....	31	25	.....	22.	.....	90	.....	106	47	.....

NOTE.—Discharge determined as follows: Oct. 1–30, Dec. 17 to Sept. 30, from rating curve well defined throughout; Oct. 31 to Dec. 16, by indirect method for shifting control, because of presence of temporary earth dam just below station; Feb. 5 and 6, estimated because of ice.

Monthly discharge of Maroon Creek near Aspen, Colo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	59	36	41.4	2,550	A.
November	36	33	34.5	2,050	B.
December	36	30	32.3	1,990	B.
January	39	25	28.8	1,770	C.
February	26	24	24.3	1,350	C.
March	24	22	23.3	1,430	B.
April	31	23	25.1	1,490	B.
May	90	27	55.4	3,410	B.
June	256	109	182	10,800	B.
July	241	106	177	10,900	A.
August	102	47	70.0	4,390	A.
September	47	36	41.8	2,490	A.
The year	256	22	61.5	44,500	

MAROON CREEK (LOWER STATION) NEAR ASPEN, COLO.

LOCATION.—In sec. 15, T. 10 S., R. 85 W., at highway bridge 2½ miles southwest of Aspen, Pitkin County, in Sopris National Forest. Nearest tributary, Willow Creek, enters a mile above.

DRAINAGE AREA.—54 square miles (measured on topographic map).

RECORDS AVAILABLE.—February 13, 1914, to November 30, 1915, when the station was discontinued.

GAGE.—Vertical staff at upstream corner of left bridge abutment; read irregularly by J. B. Hull and G. H. Hutchins.

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

CHANNEL AND CONTROL.—Bed composed of small boulders; rough. Control just below bridge; shifts slightly; banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.95 feet during night of July 7 (discharge, 615 second-feet).

WINTER FLOW.—Stage-discharge relation not seriously affected by ice; open-channel rating curve assumed applicable. Ice forms along the sides, but control remains practically open.

DIVERSIONS.—Roaring Fork Light & Power Co. diverts water from Maroon Creek 1½ miles above station. Records at the station show flow entering Roaring Fork.

REGULATION.—None.

ACCURACY.—Determinations of mean daily stage based on one gage reading may be in error at certain seasons, owing to fluctuations caused by alternate melting and freezing at the headwaters. Records considered fair during greater part of open-water season.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Maroon Creek (lower station) near Aspen, Colo., during the period Oct. 1, 1914, to Nov. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1915.		*Feet.*	*Sec.-ft.*	1915.		*Feet.*	*Sec.-ft.*
Jan. 8	T. J. Watkins	0.72	10	July 16	W. R. King	1.82	179
Feb. 25	R. H. Fletcher	.66	11	Aug. 22	do	1.18	44
Apr. 11	do	.69	13	Nov. 21	do	.74	8.3

Daily discharge, in second-feet, of Maroon Creek (lower station) near Aspen, Colo., for the period Oct. 1, 1914, to Nov. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	60	41	22	13	12	12	11	17	93	290	96	46	.....	.....
2	62	33	21	13	12	12	11	14	98	250	115	44	.....	7
3	64	26	20	13	12	12	11	13	103	245	88	42	.....	.....
4	65	30	18	12	12	12	11	12	100	230	61	61	54	.....
5	64	35	16	12	12	12	11	12	97	230	58	40	13	7
6	64	35	15	12	11	12	12	13	94	230	54	35	.....	7
7	63	34	14	12	10	11	12	14	97	555	54	30	.....	.....
8	62	33	13	13	10	11	12	15	100	220	68	25	.....	.....
9	62	33	12	12	12	11	12	15	103	210	60	22	.....	.....
10	62	34	12	11	12	11	12	16	138	200	56	22	.....	7
11	64	34	11	10	12	12	12	16	165	220	54	22	46	.....
12	67	34	11	11	13	12	12	26	180	240	54	25	46	5
13	69	34	10	12	13	12	12	36	150	260	54	23	.....	.....
14	72	34	10	12	12	12	12	46	150	200	54	23	.....	.....
15	74	33	15	12	12	11	12	57	170	185	54	22	.....	7
16	77	33	20	12	12	11	12	57	190	170	54	21	.....	.....
17	79	33	16	12	12	11	12	60	210	170	54	20	.....	6
18	82	31	15	12	12	11	12	65	230	170	54	54	13	.....
19	84	30	14	12	12	11	12	62	245	170	54	18	.....	.....
20	87	28	14	12	12	11	12	60	245	157	46	16	.....	.....
21	76	26	14	12	12	11	12	57	245	144	47	15	.....	8
22	64	26	14	11	12	11	12	58	265	132	48	15	9	.....
23	52	26	14	11	12	11	13	70	290	125	49	15	.....	.....
24	56	26	14	11	12	11	14	83	290	118	49	15	.....	.....
25	59	26	14	11	12	11	13	85	290	111	47	15	.....	.....
26	62	25	13	11	12	11	12	83	290	104	45	20	13	5
27	66	25	13	12	12	11	13	80	290	97	260	18	.....	.....
28	69	24	13	12	12	11	14	77	290	92	45	18	.....	.....
29	65	24	13	12	.....	11	16	74	290	87	43	16	.....	8
30	57	23	12	12	.....	11	17	70	290	82	42	18	13	7
31	49	.....	12	12	.....	11	.....	80	.....	78	42	.....	.....	.....

NOTE.—Discharge determined as follows: Oct. 1 to July 7, from rating curve fairly well defined below 435 second-feet; July 10 to Nov. 30, from rating curve fairly well defined throughout. Discharge for days on which gage was not read prior to Sept. 30, 1915, determined by comparison with record of flow at upper station on Maroon Creek. Gage read two or three times a week.

Monthly discharge of Maroon Creek (lower station) near Aspen, Colo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	87	49	66.4	4,080	B.
November	41	23	30.3	1,800	C.
December	22	10	14.4	885	C.
January	13	10	11.8	726	D.
February	13	10	11.9	661	D.
March	12	11	11.3	695	D.
April	17	11	12.4	738	C.
May	85	12	46.5	2,860	C.
June	290	93	193	11,500	C.
July	555	78	186	11,400	C.
August	260	42	63.2	3,890	B.
September	61	15	25.9	1,540	B.
The year	555	10	56.4	40,800	

FRYINGPAN CREEK AT NORRIE, COLO.

LOCATION.—In sec. 28, T. 8 S., R. 83 W., at highway bridge at Norrie, Pitkin County, in Sopris National Forest. North Fork enters a mile below.

DRAINAGE AREA.—92 square miles (measured on topographic map).

RECORDS AVAILABLE.—February 18, 1911, to September 30, 1915.

GAGE.—Vertical staff on downstream side of center pier; read three to five times a week by B. J. Beaty. From February 18, 1911, to July 13, 1915, gage was at side of pier at same datum but gave a higher reading at high water as water piled up on it. On August 20, 1915, gage datum was raised 1 foot.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed is composed of boulders which shift at intervals. Current not greatly disturbed, as at ordinary stages a pool is formed by the control, which is 100 feet downstream at well-defined rapids. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.4 feet at 7 p. m. June 23 (discharge, 910 second-feet); minimum discharge occurred during winter.

WINTER FLOW.—Stage-discharge relation seriously affected by ice; data insufficient for determination of flow.

DIVERSIONS.—None above the station.

REGULATION.—None.

ACCURACY.—Determinations of mean daily stage based on one gage reading may be in error at certain seasons owing to fluctuations caused by alternate melting and freezing at headwaters. Records considered fair; control shifted slightly during 1915.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Fryingpan Creek at Norrie, Colo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 12	T. J. Watkins	[a] 2.80	23	July 13	W. R. King	[b] 3.88	255
June 20	R. G. Hosea	5.05	728	Aug. 20	do	[c] 1.80	64

[a] Stage-discharge relation affected by ice. [b] Gage height at new location, 3.52 feet.
[c] Datum raised 1.00 foot.

Daily discharge, in second-feet, of Fryingpan Creek at Norrie, Colo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Apr.	May.	June.	July.	Aug.	Sept.
1	49	36	.....	.....	22	93	400	325	74	51
2	48	34	30	.....	23	93	400	325	70	52
3	47	30	.....	.....	25	93	355	278	67	54
4	46	30	.....	.....	28	93	300	278	61	56
5	46	24	.....	.....	30	93	278	265	61	56
6	46	24	.....	.....	32	86	260	250	56	55
7	46	30	.....	.....	35	80	235	240	100	55
8	46	35	.....	.....	40	95	305	235	167	54
9	44	40	.....	.....	60	120	455	211	131	53
10	42	46	.....	.....	80	150	690	195	100	51
11	42	42	.....	.....	86	178	700	178	86	46
12	42	38	.....	23	93	200	635	175	84	55
13	42	38	.....	.....	80	542	498	180	82	51
14	42	34	.....	.....	80	378	455	185	80	51
15	38	35	.....	.....	80	325	470	188	78	51
16	39	36	.....	.....	93	400	610	178	76	51
17	41	37	.....	.....	95	455	800	160	73	51
18	42	38	.....	.....	105	430	810	140	61	49
19	44	36	.....	.....	80	400	810	123	61	47
20	46	34	.....	.....	86	200	810	116	61	46
21	46	34	.....	.....	93	158	810	108	61	46
22	46	32	.....	.....	93	158	810	100	61	46
23	46	32	.....	.....	93	180	910	100	61	46
24	46	30	.....	.....	93	235	910	108	61	48
25	48	30	.....	.....	93	342	810	104	61	56
26	51	30	.....	.....	93	290	810	100	61	75
27	46	30	.....	.....	80	260	500	95	59	70
28	42	34	.....	.....	80	270	498	90	53	65
29	38	34	.....	.....	86	308	415	85	54	59
30	38	34	.....	.....	93	285	305	80	56	57
31	38	.....	.....	.....	.....	278	.....	77	54	.....

NOTE.—Discharge determined as follows: Oct. 1 to Dec. 2, Apr. 10 to Sept. 30, from well-defined rating curve; Dec. 3 to Mar. 31, no estimate because of ice; Apr. 1–8, discharge estimated because of ice. Gage read three or four times a week; discharge for days on which gage was not read determined by comparison with record of flow at Thomasville.

Monthly discharge of Fryingpan Creek at Norrie, Colo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	51	38	44.0	2,710	C.
November	46	24	33.9	2,020	C.
April	105	34	71.7	4,270	C.
May	542	80	234	14,400	C.
June	910	235	568	33,800	C.
July	325	77	170	10,500	B.
August	167	53	73.3	4,510	B.
September	75	46	53.4	3,180	B.

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. Nearest tributary, Deadman Gulch, enters a quarter of a mile below.

DRAINAGE AREA.—175 miles (measured on Forest atlas and topographic maps).

RECORDS AVAILABLE.—February 26 to September 30, 1915. From January 2, 1911, to February 25, 1915, station was maintained a mile downstream.

Drainage area at original site was 190 square miles.

GAGE.—Vertical staff on upstream side of right bridge abutment; read twice daily by J. H. Swineford. Gage at original section was a vertical staff attached to side of center bridge pier. No determined relation between the two gages.

DISCHARGE MEASUREMENTS.—Made from single-span bridge to which the gage is attached or by wading.

CHANNEL AND CONTROL.—Bed composed of large boulders; rough; gravity section, practically permanent. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.7 feet at 6 p. m. June 17 and 5 p. m. June 20 (discharge, 1,460 second-feet); minimum stage recorded, 0.28 foot on January 5 (discharge, 20 second-feet).

WINTER FLOW.—Stage-discharge relation affected by ice; flow estimated from discharge measurements, observer's notes, and records of temperature and precipitation.

DIVERSIONS.—No court decrees for diversion of water above station.

REGULATION.—None.

ACCURACY.—Determinations of daily stage based on one or two daily gage readings may be in error at certain seasons owing to fluctuations caused by alternate melting and freezing at the headwaters. Winter record poor; October, November, and March to April, fair; June, good; July to September, excellent.

Discharge measurements of Fryingpan Creek at Thomasville, Colo., during the year ending Sept. 30 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 15	T. J. Watkins	[a] 0.35	22	July 14	W. R. King	2.78	440
Feb. 26	R. H. Fletcher	[b] 1.10	26	Aug. 20	....do	1.72	101

[a] Stage-discharge relation affected by ice. [b] At new station established Feb. 26.

Daily discharge, in second-feet, of Fryingpan Creek at Thomasville, Colo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	101	83	40	21	22	25	30	375	885	600	139	78
2	101	83	38	21	22	25	31	310	940	600	133	74
3	101	74	38	21	22	26	38	245	650	550	109	70
4	101	66	38	20	23	28	40	181	525	550	98	69
5	101	61	38	20	23	27	43	160	502	502	94	70
6	101	56	37	23	22	27	45	151	480	435	92	68
7	105	52	37	21	22	26	48	155	435	395	285	66
8	109	51	37	21	22	26	51	158	480	435	355	68
9	113	51	36	21	23	26	64	162	575	415	355	66
10	117	50	36	21	24	26	70	165	1,160	415	252	66
11	117	50	35	21	24	26	105	236	1,400	395	192	59
12	113	50	35	22	24	26	109	358	1,220	395	170	76
13	109	50	35	22	25	25	110	480	725	415	146	62
14	105	50	34	22	26	25	115	625	750	395	130	68
15	101	50	34	22	28	25	125	480	725	375	130	66
16	101	50	33	22	28	26	140	540	830	355	130	74
17	101	50	33	21	28	26	190	600	1,340	338	116	72
18	101	50	32	21	28	26	285	562	1,160	285	110	70
19	101	50	32	22	27	28	192	525	1,280	285	105	66
20	98	50	32	23	27	31	210	450	1,400	252	105	65
21	96	45	30	22	26	28	236	376	1,160	221	98	56
22	109	45	29	21	26	26	236	302	1,220	206	87	59
23	107	45	28	21	26	25	236	368	1,050	206	98	57
24	105	45	27	22	26	26	205	435	1,050	221	94	59
25	103	45	25	22	26	26	190	550	1,050	206	86	70
26	101	44	23	22	26	27	146	504	995	206	84	105
27	96	42	21	22	25	28	192	458	700	187	81	92
28	91	40	21	21	25	28	200	458	725	187	82	91
29	86	39	22	21	.....	29	225	458	650	176	81	86
30	83	40	22	22	.....	29	435	502	550	160	78	81
31	83	.....	22	22	.....	30	.....	502	.....	146	78	.....

NOTE.—Discharge determined as follows: Oct. 1 to Nov. 6, from fairly well defined rating curve; Nov. 27–30, Dec. 20 to Feb. 25, from rating curve based on one winter measurement and form of previous curves; Feb. 26 to Sept. 30, from fairly well defined rating curve applicable to gage 1 mile upstream from original station. Gage read three or four times a week October to May, daily June to September. Discharge for days on which gage was not read determined by comparison with flow at Norrie stations; interpolated Nov. 8, 11, 12, 16, 17, 19, 21, 23, Dec. 1, 3, 5, 7, 9, 12, 16, as ice caused backwater.

Monthly discharge of Fryingpan Creek at Thomasville, Colo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	117	83	102	6,270	C.
November	83	39	51.9	3,090	C.
December	40	21	31.6	1,940	D.
January	23	20	21.4	1,320	D.
February	28	22	24.9	1,380	D.
March	31	25	26.7	1,640	C.
April	435	30	145	8,630	C.
May	625	151	382	23,500	C.
June	1,400	435	887	52,800	B.
July	600	146	339	20,800	A.
August	355	78	135	8,300	A.
September	105	56	71.0	4,220	A.
The year	1,400	20	185	134,000	

NORTH FORK OF FRYINGPAN CREEK NEAR NORRIE, COLO.

LOCATION.—In sec. 21, T. 8 S., R. 83 W., at highway bridge about a mile from Norrie, Pitkin County, in Sopris National Forest. No tributaries below station.

DRAINAGE AREA.—42 square miles (measured on topographic maps).

RECORDS AVAILABLE.—February 18, 1911, to September 30, 1915.

GAGE.—Vertical staff on downstream side of right bridge abutment; read irregularly by B. J. Beaty.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of small boulders, rough and slightly shifting. Banks high; not subject to overflow. Control not well defined.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.60 feet at 8 p. m. June 23 (discharge, 425 second-feet); minimum stage occurred during winter when records were discontinued.

WINTER FLOW.—Stage-discharge relation affected by ice; observations discontinued during winter.

DIVERSIONS.—None above station.

REGULATION.—None.

ACCURACY.—Records rated only fair because of irregular reading of gage and error in mean daily stage derived from one reading of gage. Control slightly shifting.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of North Fork of Fryingpan Creek near Norrie, Colo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 12	T. J. Watkins	(a)	3.9
June 19	R. G. Hosea	2.20	314
July 13	W. R. King	1.40	115

a Gage height not obtained. Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of North Fork of Fryingpan Creek near Norrie, Colo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	13	13	.....	.....	6	6	6	80	300	200	22	10
2	13	13	.....	.....	6	6	6	75	280	185	20	10
3	13	13	.....	.....	6	6	6	69	240	185	18	10
4	13	12	.....	.....	6	6	6	66	200	170	16	10
5	13	12	.....	.....	6	6	7	63	163	165	14	10
6	13	12	.....	.....	6	6	7	60	140	141	13	10
7	13	11	.....	.....	6	6	8	56	120	135	45	10
8	13	11	.....	.....	6	6	10	60	150	130	100	10
9	13	10	.....	.....	6	6	14	64	185	125	69	10
10	12	10	6	.....	6	6	18	69	250	120	45	10
11	12	10	.....	.....	6	6	22	101	300	120	32	10
12	12	10	.....	4	6	6	26	120	280	120	26	10
13	12	9	.....	.....	6	6	26	300	200	120	22	10
14	12	9	.....	.....	6	6	36	203	180	110	18	10
15	14	9	.....	.....	6	6	45	120	210	101	18	10
16	16	9	.....	.....	6	6	58	208	255	78	18	10
17	17	8	.....	.....	6	6	60	250	305	56	16	10
18	18	8	.....	.....	7	6	75	210	305	62	16	10
19	18	8	5	.....	7	6	70	170	305	56	15	10
20	18	8	.....	.....	7	6	76	130	300	50	15	10
21	18	8	.....	.....	7	6	84	101	270	50	15	9
22	18	8	.....	.....	7	6	84	84	255	45	14	9
23	17	8	.....	.....	6	6	84	84	425	45	14	8
24	16	8	.....	.....	6	6	84	110	375	40	13	10
25	16	8	.....	.....	6	6	84	150	325	40	13	26
26	15	7	.....	.....	6	6	76	185	280	35	12	40
27	14	7	.....	.....	6	6	69	150	305	35	12	35
28	13	7	.....	.....	6	6	69	120	280	32	12	22
29	13	7	.....	6	.....	7	69	159	250	30	11	18
30	13	7	.....	6	.....	7	80	170	220	30	10	18
31	13	.....	.....	6	.....	7	.....	185	.....	26	10	.....

NOTE.—Discharge determined as follows: Oct. 1 to Nov. 9, from well-defined rating curve; Jan. 29 to Sept. 30, by indirect method for shifting control. Gage read three or four times a week. Discharge for days on which gage was not read determined by comparison with records of Fryingpan Creek at Norrie and Thomasville.

Monthly discharge of North Fork of Fryingpan Creek near Norrie, Colo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	18	12	14.3	879	C.
November	13	7	9.33	555	C.
December	.....	.....	a6.0	369	
January	.....	.....	a5.0	307	
February	7	6	6.18	343	D.
March	7	6	6.10	375	D.
April	84	6	45.5	2,710	D.
May	300	56	128	7,870	C.
June	425	120	255	15,200	C.
July	200	26	91.5	5,630	C.
August	100	10	22.4	1,380	C.
September	40	8	13.2	786	C.
The year	425	.....	50.3	36,400	

a Estimated.

CRYSTAL RIVER AT MARBLE, COLO.

LOCATION.—In sec. 26, T. 11 S., R. 88 W., at the electric railway bridge of the Colorado-Yule Marble Co., half a mile west of Marble, in Gunnison County. Nearest tributary, Carbonate Creek, enters at Marble.

DRAINAGE AREA.—77 square miles (measured on Forest atlas map).

RECORDS AVAILABLE.—November 1, 1910, to September 31, 1915.

GAGE.—Vertical hook gage at downstream side of left abutment; read morning and evening by F. V. Mueller.

DISCHARGE MEASUREMENTS.—Made from cable a short distance downstream or by wading.

CHANNEL AND CONTROL.—Bed is slightly rocky but has been cleared and is smooth at measuring section. Control practically permanent. Banks subject to slight overflow, but all water passes under cable and bridge.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.37 feet at 5 p. m. June 23 (discharge, 1,450 second-feet); minimum stage recorded, 1.54 feet at 5 p. m. March 28 (discharge, 17 second-feet).

WINTER FLOW.—Stage-discharge relation affected little if at all by ice, as shown by current-meter measurements.

DIVERSIONS.—Court decrees for diversion of 114 second-feet below station; none for diversions above.

REGULATION.—None.

ACCURACY.—Determinations of mean daily stage based on two gage readings may be in error at certain seasons owing to fluctuations caused by alternate melting and freezing at the headwaters. Records good.

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

February 22: Gage height, 1.78 feet; discharge, 23 second-feet.

Daily discharge, in second-feet, of Crystal River at Marble, Colo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	73	68	53	49	25	22	24	213	685	1,040	305	70
2	76	65	56	49	24	22	25	186	658	1,100	270	73
3	226	62	55	49	23	22	25	130	658	915	226	83
4	213	62	55	49	25	22	28	120	452	795	186	83
5	140	56	56	47	27	22	31	111	385	975	162	76
6	120	56	53	44	28	22	36	102	345	975	162	80
7	102	65	53	47	25	22	35	60	325	975	174	65
8	111	79	56	47	28	22	33	111	288	975	226	78
9	120	79	44	47	25	22	44	130	365	975	200	72
10	111	78	45	44	25	22	35	130	550	1,040	186	68
11	100	75	58	41	24	22	35	151	795	975	186	66
12	94	76	51	38	24	22	45	200	1,040	1,040	174	111
13	92	78	42	36	24	22	42	385	630	1,000	174	83
14	79	80	44	34	24	22	44	525	795	960	174	72
15	80	65	44	32	22	22	56	365	975	920	162	70
16	86	60	47	30	23	22	51	430	1,100	880	151	60
17	86	61	52	28	24	22	53	525	1,160	840	151	62
18	86	60	49	30	24	22	60	475	1,100	800	140	62
19	86	61	56	31	23	22	86	452	1,100	760	130	60
20	85	60	56	34	23	22	70	305	1,280	725	120	58
21	92	62	49	30	23	22	102	240	1,220	690	111	60
22	97	62	47	27	22	22	111	213	1,280	665	111	58
23	92	60	53	25	23	22	111	213	1,340	620	111	60
24	86	55	56	26	22	22	96	270	1,280	585	111	60
25	83	56	55	27	22	22	111	345	1,340	550	111	200
26	82	56	55	27	22	22	111	305	1,280	515	91	130
27	78	58	51	24	22	22	120	270	1,220	480	86	92
28	76	58	53	24	18	22	186	255	1,160	445	80	86
29	72	60	51	24	.....	23	226	270	1,100	410	78	86
30	67	57	51	24	.....	24	345	325	1,040	375	80	92
31	67	.....	51	24	.....	24	.....	408	.....	340	83	.....

NOTE.—Discharge determined from the rating curve fairly well defined throughout; discharge Jan. 10–16, July 13–31, interpolated, as gage was not read.

Monthly discharge of Crystal River at Marble, Colo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	226	67	98.6	6,060	B.
November	80	55	64.3	3,830	B.
December	58	42	51.5	3,170	B.
January	49	24	35.1	2,160	B.
Vebruary	28	18	23.7	1,320	B.
March	24	22	22.2	1,360	B.
April	345	24	79.2	4,710	B.
May	525	60	265	16,300	B.
June	1,340	288	898	53,400	B.
July	1,100	340	785	48,300	C.
August	305	78	152	9,350	B.
September	200	58	79.2	4,710	B.
The year	1,340	18	214	155,000	

EAST FORK OF ELK CREEK NEAR NEWCASTLE, COLO.

LOCATION.—On line between secs. 24 and 25, T. 5 S., R. 91 W., at highway bridge 2½ miles northwest of Newcastle, in Garfield County. No tributaries below station.

DRAINAGE AREA.—60 square miles (measured on Forest Atlas map).

RECORDS AVAILABLE.—January 19, 1911, to July 12, 1915, when the station was discontinued.

GAGE.—Vertical staff at downstream side of left abutment; read irregularly by W. F. Bates.

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

CHANNEL AND CONTROL.—Bed composed of coarse gravel and small boulders; control at well-defined rapids 30 feet downstream; shifts at long intervals. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.35 feet at 6.30 p. m. June 18 (discharge, 312 second-feet); minimum stage recorded, 0.85 foot March 4, 11, 14, and 19 (discharge, 8 second-feet).

WINTER FLOW.—Stage-discharge relation not seriously affected by ice; open-channel rating curve assumed applicable.

DIVERSIONS.—Court decrees for diversion of 44 second-feet from above station.

REGULATION.—None.

ACCURACY.—Control practically permanent during 1915. Gage readings insufficient to warrant determination of monthly discharge.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of East Fork of Elk Creek near Newcastle, Colo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 5	T. J. Watkins	0.95	13
July 12	W. R. King	*a* .68	20
Nov. 18	.....do	.93	9.7

a Gage height probably 0.5 foot too low.

Daily discharge, in second-feet, of East Fork of Elk Creek near Newcastle, Colo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1						9	10	77		
2						13	11			64
3	160	31					10		145	
4						9			145	
5	42		16	12	11			31		
6										
7	31	36					13		124	
8						10	15	23		
9			17	12					145	
10					10		15		192	
11						8		23		
12	48						19	25		20
13		20			9	10				
14	31			12		8	27		230	
15								77		
16	31	17							250	
17								132		
18			15			9			312	
19			17		10	8	40			
20			20		11					
21						9	55		290	
22								48		
23	36							64		
24							42			
25					9			73	175	
26					10	10				
27				9			42	73		
28				12					145	
29	31	15				10	84		119	
30		17	15	10						
31								160		

NOTE.—Discharge determined from well-defined rating curve. No determination for days when gage was not read.

TAYLOR RIVER AT ALMONT, COLO.

LOCATION.—In sec. 22, T. 51 N., R. 1 E., at highway bridge 800 feet above junction of Taylor and East rivers, at Almont.

DRAINAGE AREA.—413 square miles (measured on Forest Atlas).

RECORDS AVAILABLE.—July 27, 1910, to September 30, 1915.

GAGE.—Vertical staff on downstream side of center pier; read twice daily by Sam Ogden.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Bed composed of small bowlders and coarse gravel. Control practically permanent. Banks not subject to overflow.

WINTER FLOW.—Stage-discharge relation affected by ice.

DIVERSIONS.—No court decrees for diversions from Taylor River.

REGULATION.—None.

COOPERATION.—Field data furnished by United States Reclamation Service.

Daily discharge, in second-feet, of Taylor River at Almont, Colo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	215	215	.....	215	305	915	868	258	215
2	258	215	.....	215	258	1,020	820	258	215
3	258	215	.....	235	258	778	778	258	215
4	415	215	.....	258	258	655	695	258	215
5	305	215	.....	258	258	618	655	215	215
6	258	215	.....	358	258	545	695	215	215
7	258	235	.....	258	258	545	695	258	215
8	258	215	.....	280	258	545	618	385	195
9	305	215	.....	305	258	695	545	330	178
10	305	215	.....	358	280	868	545	305	178
11	305	215	.....	385	358	1,270	545	305	215
12	305	195	.....	358	510	1,410	510	305	178
13	305	178	.....	305	618	1,080	510	305	178
14	258	178	.....	305	820	968	478	305	178
15	258	178	178	358	510	1,020	415	305	178
16	258	215	178	358	545	1,080	358	305	178
17	258	215	178	305	655	1,340	330	305	178
18	258	195	178	305	545	1,270	305	280	178
19	258	215	178	358	478	1,270	305	258	178
20	258	215	178	415	445	1,560	305	258	178
21	258	215	178	415	358	1,560	305	258	178
22	330	215	178	385	415	1,480	305	258	178
23	305	215	178	358	415	1,410	305	258	178
24	305	195	178	305	445	1,270	305	258	178
25	258	195	178	358	655	1,200	305	258	178
26	258	215	178	358	618	1,080	305	258	358
27	258	215	178	415	545	1,020	358	258	305
28	215	215	178	415	510	968	305	258	258
29	215	215	178	478	545	868	305	215	258
30	215	215	215	415	415	820	280	215	258
31	215	.....	215	.....	510	.....	258	215	.....

NOTE.—Discharge determined from a well-defined rating curve based on measurements made 1913 and 1916. Ice present Dec. 1 to Mar. 14, discharge not determined.

Monthly discharge of Taylor River at Almont, Colo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	415	215	271	16,700
November	235	178	209	12,400
March 15-31	215	178	182	6,150
April	478	215	333	19,800
May	820	258	438	26,900
June	1,560	545	1,040	61,900
July	868	258	462	28,400
August	385	215	270	16,600
September	358	178	207	12,300

EAST RIVER AT ALMONT, COLO.

LOCATION.—In sec. 22, T. 51 N., R. 1 E., at highway bridge at Almont, 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, 1915. From April 15 to October 8, 1905, a station was maintained at this point, the gage being referred to a different datum.

GAGE.—Vertical staff on downstream side of right abutment; read twice daily by Sam Ogden.

DISCHARGE MEASUREMENTS.—Made from two-span bridge.

CHANNEL AND CONTROL.—Bed composed of small bowlders and coarse gravel. Extreme high water in Taylor River probably causes backwater at gage. Control slightly shifting at ordinary stages.

WINTER FLOW.—Stage-discharge relation affected by ice.

DIVERSIONS.—Court decrees for diversion of 78 second-feet from East River.

COOPERATION.—Gage-height record furnished by United States Reclamation Service; no current-meter measurements made durfng the year.

Daily gage height, in feet, East River at Almont, Colo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.25	1.25	1.20	1.35	1.20	1.10	1.20	1.90	2.35	2.15	1.35	1.15
2	1.30	1.25	1.20	1.30	1.15	1.15	1.20	1.65	2.55	2.15	1.35	1.15
3	1.45	1.25	1.25	1.25	1.15	1.15	1.25	1.65	2.35	2.10	1.35	1.25
4	1.70	1.25	1.25	1.25	1.20	1.10	1.25	1.65	2.15	2.10	1.25	1.15
5	1.45	1.25	1.25	1.25	1.20	1.10	1.25	1.60	2.05	2.15	1.25	1.15
6	1.35	1.25	1.25	1.25	1.20	1.10	1.25	1.60	2.05	2.10	1.25	1.15
7	1.35	1.25	1.25	1.25	1.25	1.05	1.25	1.60	2.05	2.00	1.40	1.15
8	1.45	1.25	1.25	1.25	1.25	1.05	1.30	1.60	2.05	1.90	1.60	1.15
9	1.60	1.25	1.25	1.25	1.25	1.05	1.35	1.60	2.15	1.90	1.50	1.15
10	1.45	1.25	1.20	1.25	1.30	1.05	1.40	1.65	2.20	1.90	1.40	1.15
11	1.45	1.25	1.30	1.25	1.25	1.05	1.35	1.70	2.35	1.95	1.35	1.15
12	1.50	1.15	1.40	1.25	1.25	1.05	1.45	1.95	2.45	1.90	1.40	1.15
13	1.45	1.15	1.30	1.25	1.35	1.05	1.50	2.15	2.25	1.90	1.30	1.15
14	1.45	1.15	1.50	1.25	1.25	1.05	1.45	2.30	2.25	1.90	1.30	1.10
15	1.35	1.15	1.70	1.25	1.25	1.05	1.50	2.05	2.30	1.85	1.35	1.05
16	1.35	1.20	1.85	1.30	1.25	1.05	1.45	2.15	2.45	1.75	1.35	1.05
17	1.35	1.25	1.80	1.25	1.25	1.05	1.35	2.25	2.55	1.75	1.35	1.05
18	1.35	1.15	1.50	1.25	1.15	1.05	1.30	2.15	2.55	1.70	1.25	1.05
19	1.35	1.15	1.30	1.25	1.15	1.05	1.35	2.00	2.55	1.70	1.25	1.05
20	1.35	1.20	1.35	1.25	1.15	1.05	1.65	1.90	2.70	1.65	1.25	1.05
21	1.45	1.25	1.35	1.25	1.15	1.05	1.70	1.90	2.60	1.55	1.25	1.05
22	1.45	1.25	1.35	1.25	1.15	1.05	1.65	1.95	2.50	1.55	1.25	1.05
23	1.45	1.20	1.40	1.25	1.15	1.05	1.65	2.00	2.50	1.55	1.25	1.05
24	1.45	1.20	1.45	1.30	1.15	1.05	1.55	2.05	2.40	1.55	1.25	1.05
25	1.35	1.25	1.45	1.30	1.15	1.05	1.65	2.05	2.40	1.55	1.25	1.05
26	1.35	1.25	1.45	1.35	1.15	1.05	1.65	2.05	2.40	1.55	1.25	1.35
27	1.35	1.25	1.40	1.25	1.15	1.05	1.75	1.95	2.40	1.65	1.25	1.25
28	1.35	1.25	1.45	1.25	1.10	1.10	1.90	1.85	2.40	1.60	1.25	1.20
29	1.25	1.25	1.50	1.25	.....	1.10	2.05	1.90	2.35	1.50	1.20	1.15
30	1.25	1.30	1.45	1.15	.....	1.15	2.10	1.85	2.30	1.45	1.15	1.15
31	1.25	.....	1.45	1.15	.....	1.15	.....	1.95	.....	1.35	1.15	.....

NOTE.—Ice present Nov. 20 to Mar. 6.

UNCOMPAHGRE RIVER AT OURAY, COLO.

LOCATION.—In sec. 31, T. 44 N., R. 7 W., near highway bridge half a mile south of Ouray, in Ouray County. Nearest tributary, Canyon Creek, enters 150 feet below; nearest tributary above is Bear Creek.

DRAINAGE AREA.—44 square miles (measured on topographic map).

RECORDS AVAILABLE.—January 25, 1911, to September 30, 1915. From January 7 to March 17, 1908, records were kept at the dam of the Ouray Electric Light & Power Co., a mile above present station, and were furnished by Wheeler and Whinnerah.

GAGE.—Vertical staff attached to vertical rock cliff on left side; read once daily by T. J. Watkins, except from May 11–16, June 1 and 2 and June 9 to July 24, 1915, when gage was read twice daily and the maximum stage for the 24-hour period noted from high-water mark.

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

CHANNEL AND CONTROL.—Bed composed of small boulders; rough and shifting. Control a short distance downstream; shifts at high water. Station is in box canyon with high vertical walls.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.42 feet at 7 a. m. June 22 (discharge, 670 second-feet); minimum stage recorded, 0.20 foot at 8 a. m. September 23–24 (discharge, 3 second-feet).

WINTER FLOW.—Stage-discharge relation not affected by ice, as warm springs keep the stream open.

DIVERSIONS.—The Ouray Light & Power Co. diverts approximately 8 second-feet 2 miles above station and returns it to the river a short distance below. No other diversions above station.

REGULATION.—None.

ACCURACY.—Determinations of mean daily stage based on two gage readings and the high-water mark for the day may be in error at certain seasons, owing to fluctuations caused by alternate melting and freezing at the headwaters. Records December to June, fair; those for remainder of year, good.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Uncompahgre River at Ouray, Colo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 18	Follansbee and Watkin	1.00	25	June 11	T. J. Watkins	2.84	416
Jan. 2	T. J. Watkins	.46	6.5	16	do	2.34	259
Feb. 4	do	.38	5.0	21	do	2.59	360
May 25	do	1.91	163	Aug. 13	do	.86	28

Daily discharge, in second-feet, of Uncompahgre River at Ouray Colo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	31	31	6	7	4	4	16	100	244	285	68	29
2	31	31	7	7	5	4	17	82	261	282	68	27
3	84	27	6	6	5	4	22	68	206	263	66	26
4	84	27	5	6	5	4	28	72	173	247	62	20
5	73	27	5	7	5	4	42	72	182	294	58	18
6	73	27	5	7	5	4	36	72	140	266	60	17
7	63	27	5	9	5	4	25	62	122	253	58	17
8	53	21	7	8	5	4	29	73	236	239	58	17
9	40	18	5	8	6	4	27	85	333	218	58	16
10	40	17	6	8	6	4	21	102	420	206	48	16
11	40	16	7	9	5	4	38	184	518	244	47	16
12	40	14	5	8	5	4	51	263	378	253	47	16
13	40	14	5	8	4	4	58	302	266	204	46	15
14	40	12	5	8	4	4	58	224	250	194	40	15
15	40	9	5	7	5	5	54	228	282	204	39	14
16	40	9	5	7	5	5	46	234	323	184	37	14
17	40	12	6	5	5	5	46	208	474	180	37	14
18	35	8	8	7	5	5	44	199	530	154	37	14
19	27	7	8	8	4	5	58	156	570	144	37	13
20	35	7	8	7	5	5	75	119	570	131	37	13
21	35	8	8	5	5	5	85	106	530	114	36	8
22	35	8	9	4	5	6	79	102	550	114	36	5
23	35	9	9	4	5	7	67	129	550	114	36	3
24	53	9	9	5	5	7	65	138	510	108	33	3
25	44	10	9	6	5	7	68	182	458	92	33	95
26	44	10	9	7	5	8	87	156	443	92	33	21
27	40	11	8	7	5	9	180	136	439	90	33	20
28	35	11	8	7	5	11	192	140	382	85	32	18
29	35	9	7	7	.....	10	269	144	317	80	32	16
30	33	8	7	7	.....	9	184	148	288	80	32	15
31	33	.....	7	3	.....	12	.....	164	.....	75	30	.....

NOTE.—Discharge determined as follows: Oct. 1 to Mar. 31 from a well-defined rating curve; Apr. 1 to May 24 by indirect method for shifting control; May 25 to Sept. 30 from well-defined rating curve; discharge Aug. 11, 12, 17, 18, 20, 21, 27, 28, interpolated, as gage was not read.

Monthly discharge of Uncompahgre River at Ouray, Colo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	84	31	44.2	2,720	B.
November	31	7	15.1	898	B.
December	9	5	6.74	414	C.
January	9	3	6.74	414	C.
February	6	4	4.93	274	C.
March	12	4	5.71	551	C.
April	269	16	68.9	4,100	C.
May	302	62	144	8,850	C.
June	570	122	365	21,700	C.
July	294	75	177	10,900	B.
August	68	30	44.3	2,720	B.
September	95	3	18.4	1,090	B.
The year	570	3	75.4	54,400	

UNCOMPAHGRE RIVER BELOW OURAY, COLO.

LOCATION.—At the 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, 1915.

GAGE.—Vertical staff on downstream side of right bridge abutment; read once daily by T. J. Watkins except May 11–15; June 1 and 2, June 9 to July 23, when gage was read twice daily and the high-water mark for the 24-hour period noted.

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

CHANNEL AND CONTROL.—Bed composed of coarse gravel and small boulders; shifts during high water. Control not well defined. Banks not subject to overflow except at high-water stage of 6.5 feet or more.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.74 feet at 8 p. m. June 18 (discharge, 1,400 second-feet); minimum stage recorded, 2 feet at 9 a. m. February 5 and 6 (discharge, 10 second-feet).

WINTER FLOW.—Stage-discharge relation not affected by ice. Warm springs kept the water from freezing.

DIVERSIONS.—All diversions returned to river above station except one of 5.2 second-feet from Oak Creek.

REGULATION.—None.

ACCURACY.—Determinations of mean daily stage based on two gage readings and the high-water mark for the day may be in error at certain seasons owing to fluctuations caused by alternate melting and freezing at the headwaters. Records considered good for October and January to March, fair for remainder of year.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Uncompahgre River below Ouray, Colo., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 18	Follansbee and Watkins	2.45	61	June 11	T. J. Watkins	3.79	523
Jan. 2	T. J. Watkins	2.26	20	21	do	4.33	955
Feb. 4	do	2.30	25	Aug. 13	do	2.58	98
May 24	do	3.00	166				

Daily discharge, in second-feet, of Uncompahgre River below Ouray, Colo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	64	66	22	22	22	27	40	125	384	478	141	58
2	64	63	25	21	25	28	44	113	369	472	128	58
3	118	61	26	20	24	27	62	90	263	426	119	58
4	118	61	29	20	21	27	68	87	233	384	115	55
5	100	61	28	21	10	27	71	87	214	472	111	55
6	92	55	25	20	10	28	69	79	201	432	121	54
7	92	55	25	21	15	29	58	72	172	395	121	54
8	84	55	26	19	20	29	55	75	214	359	121	51
9	70	55	22	20	25	29	53	79	438	350	121	51
10	70	45	22	21	27	29	45	82	682	331	101	51
11	70	41	22	25	29	30	65	217	857	374	100	51
12	70	43	22	22	28	30	71	321	530	405	100	49
13	70	43	22	22	26	30	87	416	395	364	99	49
14	70	41	22	22	25	30	87	416	410	364	85	47
15	64	41	24	22	25	30	83	263	443	359	79	47
16	64	34	22	23	25	31	79	283	600	369	77	45
17	62	38	22	18	25	31	75	255	884	345	74	45
18	62	36	24	23	25	32	75	214	1,110	321	71	45
19	59	34	25	22	24	32	89	189	1,180	278	68	45
20	68	32	25	21	25	32	92	162	1,090	259	67	43
21	68	31	24	20	26	33	109	149	1,070	244	66	39
22	68	32	24	19	26	33	101	130	1,130	244	65	39
23	66	34	25	17	28	33	94	178	1,070	237	62	31
24	81	34	25	18	28	37	87	169	983	227	62	31
25	81	34	25	18	28	53	101	211	947	189	59	278
26	81	32	24	20	26	36	111	207	911	192	58	62
27	81	36	22	20	26	39	181	162	798	175	58	59
28	78	38	22	21	26	43	220	167	586	164	58	54
29	78	32	21	22	.....	41	259	172	551	159	58	54
30	76	31	21	24	.....	39	255	201	404	159	58	51
31	73	.....	24	18	.....	41	.....	207	.....	149	58	.....

NOTE.—Discharge determined as follows: Oct. 1 to May 24, June 26 to Sept. 30, by indirect method for shifting control; May 25 to June 25 from fairly well defined rating curve; discharge Aug. 11, 12, 17, 18, 20, 21, 27, 28, interpolated, as gage was not read.

Monthly discharge of Uncompahgre River below Ouray, Colo., for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	118	59	76.2	4,680	B.
November	66	31	43.1	2,560	C.
December	29	21	23.8	1,460	C.
January	25	17	20.7	1,270	B.
February	29	10	23.9	1,330	B.
March	43	27	32.1	1,970	B.
April	259	40	96.2	5,720	C.
May	416	72	180	11,100	C.
June	1,180	172	637	37,900	C.
July	478	149	312	19,200	C.
August	141	58	86.5	5,320	C.
September	278	31	57.0	3,390	C.
The year	1,180	10	133	95,900	

UNCOMPAHGRE RIVER AT MONTROSE, COLO.

LOCATION.—At highway bridge a quarter of a mile west of Montrose, in Montrose County. Nearest large tributary, Happy Canyon Creek, enters about 2 miles below.

DRAINAGE AREA.—565 square miles.

RECORDS AVAILABLE.—April 22, 1903, to September 30, 1915.

GAGE.—Vertical staff, attached to bridge; read daily by L. R. Allen.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Fairly permanent during 1915.

WINTER FLOW.—Ice forms along banks but does not cover the river; observations are, however, discontinued.

DIVERSIONS.—Uncompahgre River is so over-appropriated 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.—Field data furnished by the United States Reclamation Service.

Discharge measurements of Uncompahgre River at Montrose, Colo., during the year ending Sept. 30, 1915.

[Made by W. T. Ferguson.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Apr. 14	2.82	75	Apr. 30	5.00	920
29	3.78	311	June 3	3.58	235

Daily discharge, in second-feet, of Uncompahgre River at Montrose, Colo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	60	51	.....	57	400	196	422	168	84
2	101	55	.....	27	247	364	258	111	111
3	71	55	.....	35	168	210	196	106	117
4	160	45	.....	42	155	168	196	84	47
5	84	55	.....	49	196	190	240	102	21
6	105	45	.....	57	210	378	400	102	84
7	109	43	.....	125	193	176	181	144	92
8	115	45	57	35	176	258	275	275	42
9	121	35	71	20	210	204	240	155	27
10	115	43	35	20	210	355	295	150	75
11	130	45	31	14	240	860	323	163	72
12	121	51	27	9	335	778	391	139	68
13	168	35	35	38	445	445	315	117	92
14	87	27	35	92	490	225	295	75	96
15	79	27	35	84	275	295	258	92	92
16	24	7	35	92	335	225	155	84	42
17	24	35	57	71	400	540	102	84	25
18	14	20	71	132	347	590	92	75	84
19	7	.....	71	303	176	832	68	87	105
20	9	.....	87	210	210	950	54	87	92
21	33	.....	87	347	128	750	54	39	84
22	64	.....	87	219	128	832	144	115	102
23	91	.....	87	196	160	1,020	150	87	98
24	115	.....	105	146	155	750	155	102	102
25	119	.....	87	137	155	640	258	102	98
26	109	.....	87	89	144	750	258	60	219
27	109	.....	105	141	111	668	315	111	105
28	87	.....	88	343	68	590	258	92	89
29	74	.....	71	327	96	445	176	92	132
30	51	.....	71	778	115	445	225	84	126
31	57	.....	57	.....	115	.....	144	84	.....

NOTE.—Discharge determined as follows: Oct. 1 to Apr. 17 from well-defined rating curve; Apr. 11 to July 31 from a rating curve well defined between 92 and 920 second-feet; Aug. 1 to Sept. 30 by indirect method for shifting control; discharge Mar. 14, 21, 28, Apr. 4, 5, 11, interpolated, as gage was not read.

Monthly discharge of Uncompahgre River at Montrose, Colo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	168	7	84.3	5,180
November 1–18	55	7	39.9	1,420
March 8–31	105	27	65.8	3,130
April	778	9	141	8,390
May	490	68	219	13,500
June	1,020	168	504	30,000
July	422	54	222	13,600
August	275	39	109	6,700
September	219	21	87.4	5,200

UNCOMPAHGRE RIVER NEAR DELTA, COLO.

LOCATION.—On line between Rs. 95 and 96 W., T. 15 S., at highway bridge 2 miles south of Delta, in 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, 1915.

GAGE.—Vertical staff; read daily by Mrs. W. J. Lance. Original gage at 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, which was installed near bridge April 21, 1904, and 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. Relation between various gages not known.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Bed composed of silt and gravel. Banks not subject to overflow. Control shifting at intervals.

WINTER FLOW.—Stage-discharge relation probably not greatly affected by ice, although ice forms along banks and slush ice frequently forms. Observations discontinued during winter.

DIVERSIONS.—Ditches above station divert normal flow during irrigation season; records represent largely return seepage water.

REGULATION.—None.

COOPERATION.—Field data furnished by United States Reclamation Service.

Discharge measurements of Uncompahgre River near Delta, Colo., during the year ending Sept. 30, 1915.

[Made by W. T. Ferguson].

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 10	1.96	342
July 30	1.22	121

Daily discharge, in second-feet, of Uncompahgre River near Delta, Colo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	289	250	.....	64	750	118	152	108	50
2	235	250	.....	57	325	191	129	98	50
3	220	241	.....	57	164	164	98	89	64
4	305	285	.....	68	118	152	89	89	64
5	365	244	.....	80	108	152	118	89	64
6	353	285	.....	98	140	435	140	80	64
7	313	241	.....	98	98	325	118	98	72
8	325	220	152	164	89	235	98	191	72
9	365	211	140	98	80	235	108	152	80
10	333	226	140	89	98	191	98	140	64
11	345	220	129	84	89	410	89	118	64
12	345	191	118	80	129	570	140	108	64
13	325	206	129	77	250	515	118	98	64
14	285	191	114	118	450	250	108	98	64
15	293	206	98	89	305	191	98	98	72
16	285	108	118	98	365	191	108	108	80
17	250	164	129	80	388	250	89	140	80
18	220	178	164	89	317	250	57	118	80
19	229	.....	152	178	235	410	80	118	89
20	250	.....	164	140	191	630	98	80	98
21	235	.....	146	191	268	600	80	64	98
22	285	.....	129	152	220	630	64	64	98
23	285	.....	118	108	164	810	64	64	98
24	285	.....	140	80	178	630	64	72	98
25	325	.....	118	108	191	542	108	64	285
26	325	.....	129	89	164	410	129	72	410
27	313	.....	118	89	164	542	129	64	178
28	293	.....	118	129	129	410	129	64	140
29	285	.....	118	220	118	365	140	64	164
30	285	.....	98	750	108	345	108	57	220
31	274	.....	57	.....	80	.....	98	57	.....

NOTE.—Discharge determined from rating curve fairly well defined; discharge Mar. 14, 21, 28, Apr. 4, 11, estimated, as gage was not read.

Monthly discharge of Umcompahgre River near Delta, Colo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	365	220	294	18,100
November 1–18	285	108	218	7,780
March 8–31	164	57	126	6,000
April	750	57	127	7,560
May	750	80	209	12,900
June	810	118	372	22,100
July	152	57	105	6,460
August	191	57	94.3	5,800
September	410	50	106	6,310

CANYON CREEK AT OURAY, COLO.

LOCATION.—In sec. 31, R. 44 N., R. 7 W., 200 feet above the mouth at Ouray, in Ouray County, in the Uncompahgre National Forest. Nearest tributary, a small stream that enters from the east some distance above.

DRAINAGE AREA.—26 square miles (measured on topographic map.)

RECORDS AVAILABLE.—January 25, 1911, to November 30, 1915, when the station was discontinued.

GAGE.—Vertical staff fastened to vertical rock cliff at left bank; read once daily by T. J. Watkins except May 11–15, January 1–2, 9, and July 24, 1915, when gage was read morning and evening and the high-water mark for the 24-hour period noted. From January 25, 1911, to August 31, 1913, the gage was a vertical staff fastened to downstream side of right abutment of footbridge, 130 feet downstream. Relation between the datums of the two gages not known.

DISCHARGE MEASUREMENTS.—Made from footbridge just below gage and by wading.

CHANNEL AND CONTROL.—Bed composed of coarse gravel and boulders; rough. During 1915 tailings and detritus from work in tunnel just above the station caused shifts in channel and control. Station is in canyon; banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.4 feet during the night of June 21-22, as determined from high-water marks (discharge, about 600 second-feet); minimum discharge, recorded 2 second-feet on February 3.

WINTER FLOW.—Stage-discharge relation not affected by ice as warm springs keep the stream open.

DIVERSIONS.—None above the station.

REGULATION.—None.

ACCURACY.—Records considered only fair, as determinations of mean daily stage during spring run-off based on two gage readings, and the maximum stage for the day may be in error owing to fluctuations caused by alternate melting and freezing.

Discharge measurements of Canyon Creek at Ouray, Colo., during the period Oct. 1, 1914, to Nov. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 18	Follansbee and Watkins	2.10	18	June 11	T. J. Watkins	3.54	222
				16	do	3.46	232
Jan. 2	T. J. Watkins	2.00	8.5	21	do	3.57	311
Feb. 4	do	2.04	8.9	Aug. 13	do	2.30	41
May 25	do	2.90	72				

Daily discharge, in second-feet, of Canyon Creek at Ouray, Colo., for the period Oct. 1, 1914, to Nov. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	12	11	3	3	7	8	20	49	151	291	79	22	16	8
2	12	11	4	8	8	8	25	36	143	285	64	22	16	8
3	45	10	4	8	2	8	39	29	113	264	59	22	14	8
4	45	10	6	8	11	8	35	29	94	258	57	19	13	8
5	45	10	4	9	8	8	43	29	98	310	54	19	13	8
6	30	10	4	8	8	8	37	24	93	314	62	19	13	8
7	26	10	4	9	8	8	31	21	84	301	64	19	12	9
8	26	6	4	9	9	8	29	22	96	267	66	19	12	6
9	18	6	3	9	11	8	29	25	170	244	64	12	10	6
10	18	6	3	9	11	8	28	32	222	227	52	12	9	6
11	18	5	5	9	9	8	21	76	258	294	48	15	9	5
12	18	5	5	9	9	8	27	116	225	273	44	15	8	4
13	18	5	4	9	8	8	40	145	190	267	41	15	7	4
14	18	5	4	9	8	8	42	145	170	264	39	15	7	5
15	17	4	4	10	8	8	44	118	209	264	35	15	6	5
16	17	4	4	11	9	9	34	143	252	261	33	14	6	9
17	17	6	8	3	9	9	30	121	359	244	32	14	6	8
18	17	5	8	8	8	11	36	105	401	217	32	14	6	9
19	17	5	8	8	8	11	42	76	426	192	31	12	6	9
20	18	5	8	8	9	11	46	62	452	170	31	12	5	12
21	18	5	8	8	9	12	50	53	469	161	30	12	8	12
22	18	6	8	8	8	12	43	44	469	159	30	12	8	12
23	18	6	8	7	8	12	41	65	438	153	29	11	8	10
24	35	6	8	7	8	17	37	58	409	145	27	11	8	10
25	30	5	8	8	9	15	45	70	374	123	25	111	8	9
26	26	5	8	8	9	17	50	71	366	113	25	15	8	9
27	26	5	8	8	8	18	90	54	366	98	25	12	8	9
28	26	5	8	7	8	21	119	62	352	98	24	12	8	6
29	17	5	3	7	.....	20	141	69	330	94	24	17	8	8
30	17	4	3	7	.....	18	143	74	317	94	24	15	8	8
31	15	.....	3	6	.....	21	.....	82	.....	83	24	.....	8	.....

NOTE.—Discharge determined as follows: Oct. 1 to Dec. 16 from rating curve fairly well defined; Dec. 17 to Apr. 10 from rating curve not well defined; Apr. 11-Nov. 30 by indirect method for shifting control.

Monthly discharge of Canyon Creek at Ouray, Colo., for the peroid Oct. 1, 1914, to Nov. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1914-15.					
October	45	12	22.5	1,380	B.
November	11	4	6.4	381	C.
December	8	3	5.5	338	C.
January	11	3	7.9	486	C.
February	11	2	8.4	467	C.
March	21	8	11.4	701	C.
April	143	20	47.7	2,840	D.
May	145	21	67.9	4,180	D.
June	469	84	270	16,100	C.
July	314	83	211	13,000	D.
August	79	24	41.1	2,530	C.
September	111	11	18.5	1,100	C.
The year	469	2	60.0	43,500	
1915.					
October	16	5	9.2	566	C.
November	12	4	7.9	470	C.

MILL CREEK NEAR MOAB, UTAH.

LOCATION.—In sec. 8, T. 26 S., R. 22 E., about a quarter of a mile above the dam and three-quarters of a mile above power plant of Moab Light & Power Co., 1½ miles above the mouth of Pack (Deep) Creek, and 2 miles southeast of Moab.

DRAINAGE AREA.—76 square miles.

RECORDS AVAILABLE.—October 24, 1914, to September 30, 1915.

GAGE.—Vertical staff on left bank; read once daily by Bruce Cox, operator at the plant.

DISCHARGE MEASUREMENTS.—Made by wading in the vicinity of the gage.

CHANNEL AND CONTROL.—Stream bed rocky and banks high. Control is a rock ledge a few feet below the gage and is practically permanent. Point of zero flow about −0.2 foot.

EXTREMES OF DISCHARGE.—Maximum stage of 2.2 feet, determined from water mark on gage, occurred about 7.30 p. m. April 29 (discharge determined, by prolonging rating curve as a tangent, 220 second-feet); minimum stage recorded, 0.52 foot September 11–23 (discharge, 7.4 second-feet).

WINTER FLOW.—Stage-discharge relation affected at times by ice. No records of stage were kept during December and January.

DIVERSIONS.—Above practically all diversions.

REGULATION.—None.

ACCURACY.—Records good when gage was read regularly.

Discharge measurements of Mill Creek near Moab, Utah, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 24	L. W. Jordan	0.66	15.0	Aug. 22	R. C. Pierce	0.62	11.7
Mar. 28	do	.58	9.8	Oct. 19	L. W. Jordan	.55	8.1
May 14	R. C. Pierce	1.00	42.7				

Daily discharge, in second-feet, of Mill Creek near Moab, Utah, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	13	10	9.9	9.9	36	43	30	17	11
2	.....	13	9.9	9.9	11	29	48	27	17	21
3	.....	13	11	9.1	11	24	48	26	17	32
4	.....	12	11	11	12	24	41	26	16	43
5	.....	12	9.6	9.9	12	30	35	24	15	13
6	.....	12	8.2	9.9	14	24	29	24	16	11
7	.....	11	9.0	9.9	13	22	27	22	17	9.1
8	.....	11	9.9	9.9	15	21	27	21	15	8.6
9	.....	10	11	9.9	13	20	30	20	14	8.2
10	.....	10	12	9.9	13	20	36	20	14	7.8
11	.....	10	12	9.9	14	21	40	20	14	7.4
12	.....	10	12	9.9	15	26	43	18	14	7.4
13	.....	11	11	9.9	17	34	41	17	13	7.4
14	.....	11	11	9.9	18	43	39	15	13	7.4
15	.....	9.1	15	9.9	16	41	36	15	13	7.4
16	.....	15	13	9.1	15	41	32	14	13	7.4
17	.....	17	11	9.9	15	41	36	14	13	7.4
18	.....	18	10	9.9	20	39	36	13	12	7.4
19	.....	20	9.9	9.9	20	68	38	13	12	7.4
20	.....	21	12	9.1	22	39	39	12	12	7.4
21	.....	18	11	8.2	22	39	39	17	12	7.4
22	.....	14	9.9	9.1	22	39	39	45	12	7.4
23	.....	14	9.9	9.9	21	39	39	69	12	7.4
24	.....	14	11	9.9	21	39	39	20	12	22
25	14	14	11	9.9	21	41	39	13	12	48
26	.....	13	10	9.9	20	39	38	30	12	25
27	.....	12	10	9.9	20	34	36	17	12	9.9
28	.....	11	9.9	9.9	20	32	34	14	11	9.5
29	.....	10	.....	9.9	112	36	32	13	11	9.1
30	.....	9.1	.....	9.1	36	36	30	13	9.9	8.2
31	.....	.....	.....	9.9	.....	36	.....	15	10	.....

NOTE.—Discharge determined from a rating curve well defined below 50 second-feet; interpolated for days on which no record of stage was obtained. No record kept Dec. 1 to Jan. 31, and no determinations made. Flow is constant and probably averaged 8 or 9 second-feet during December and January.

Monthly discharge of Mill Creek near Moab, Utah, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
November	21	9.1	12.9	768	C.
February	15	8.2	10.8	600	B.
March	11	8.2	9.75	600	B.
April	112	9.9	20.4	1,210	B.
May	68	20	34.0	2,090	B.
June	48	27	37.0	2,200	B.
July	30	12	21.2	1,300	B.
August	17	9.9	13.3	818	C.
September	43	7.4	13.1	780	C.

NOTE.—See footnote to table of daily discharge.

SAN JUAN RIVER BASIN.

SAN JUAN RIVER NEAR BLUFF, UTAH.

LOCATION.—In sec. 7, T. 42 S., R. 19 E., at the suspension bridge about a quarter of a mile from Spencer's trading post at Goodridge, a quarter of a mile below Gypsum Creek, 6 miles below Lime Creek, and 25 miles west of Bluff.

DRAINAGE AREA.—24,000 square miles.

RECORDS AVAILABLE.—October 30, 1914, to September 30, 1915.

GAGE.—Chain gage on right bank 100 feet above the suspension bridge; read once daily by A. H. Spencer.

DISCHARGE MEASUREMENTS.—Made from a cable 200 feet below the bridge.

CHANNEL AND CONTROL.—Bed composed of shifting sand. Stream confined between rock walls, one channel only. Point of zero flow, approximately −2 feet. Control probably a rock ledge about three-eighths mile below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 15.06 feet at 7 p. m. July 28 (discharge, 26,400 second-feet); minimum stage, 0.05 feet at 10 a. m. September 24 (discharge, 380 second-feet).

WINTER FLOW.—Stage-discharge relation probably not affected by ice.

DIVERSIONS.—No diversions between Bluff and the gaging station. Considerable water is diverted farther up the stream.

REGULATION.—Regulation of the stream probably does not affect the diurnal flow at the gage.

ACCURACY.—Records are considered good, particularly for low and medium stage. Rating curve well defined except at high stages when conditions for measurement are poor, owing to swift current and pronounced sand waves.[a]

Discharge measurements of San Juan River near Bluff, Utah, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 30	L. W. Jordan	[b] 3.10	2,310	July 27	R. C. Pierce	9.47	[c] 15,000
Apr. 3	do	[b] 4.26	3,680	27	do	12.80	[c] 27,300
May 21	R. C. Pierce	[b] 8.19	[c] 11,500	28	do	14.18	[c] 27,200
June 18	do	8.79	12,000	28	do	11.92	[c] 18,400
19	do	8.69	11,500	28	do	11.39	[c] 17,900
20	do	8.63	11,400	29	do	8.77	12,000
July 7	do	5.70	6,260	29	do	7.75	9,620
7	do	5.56	6,130	30	do	6.52	7,380
8	do	5.76	6,300	Aug. 1	do	4.38	4,120
9	do	5.30	5,710	27	do	1.74	1,330
9	do	4.89	4,980	27	do	1.58	1,240
10	do	5.18	5,200	28	do	.73	700

[a] Pierce, R. C., The measurement of silt-laden streams: U. S. Geol. Survey Water-Supply Paper 400, pp. 39-51, 1916.

[b] Made from bridge. All other measurements made from cable.

[c] Results not very reliable, owing to changing stage, and use of surface velocities and standard cross section.

Daily discharge, in second-feet, of San Juan River near Bluff, Utah, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	2,360	1,210	840	2,150	1,800	4,020	13,100	8,830	9,020	3,880	580
2	.....	2,330	1,210	740	2,330	1,720	3,740	13,100	9,020	8,640	3,320	840
3	.....	2,270	1,170	630	2,280	1,640	4,020	10,900	10,300	8,450	2,720	630
4	.....	2,210	1,140	680	2,240	1,560	4,340	9,020	11,700	6,340	2,510	530
5	.....	2,150	1,110	730	1,800	1,380	5,660	7,360	11,300	6,340	2,240	530
6	.....	1,960	1,080	780	1,350	1,210	7,020	7,540	7,900	5,490	1,970	440
7	.....	1,880	1,080	840	1,220	1,120	8,260	7,360	7,190	6,850	1,880	420
8	.....	1,800	1,080	900	1,080	1,020	9,590	6,510	6,340	6,170	1,800	840
9	.....	1,720	1,080	960	1,080	990	8,080	5,830	4,820	5,320	2,330	755
10	.....	1,680	1,080	900	1,140	960	6,680	5,660	5,490	5,320	2,330	680
11	.....	1,640	1,040	990	2,980	990	6,170	5,320	6,850	4,660	2,060	505
12	.....	1,600	1,000	1,080	4,820	1,020	5,320	4,980	9,210	4,500	1,880	460
13	.....	1,560	960	1,080	4,280	1,120	5,830	5,830	11,900	4,660	1,720	380
14	.....	1,530	810	1,080	3,740	1,210	6,510	9,400	12,200	4,820	1,490	440
15	.....	1,490	660	1,080	2,690	1,180	7,720	12,900	10,700	3,740	1,720	440
16	.....	1,450	505	1,080	1,640	1,140	9,210	13,100	9,780	3,600	1,420	420
17	.....	1,420	580	1,080	2,300	2,150	10,700	12,400	9,970	3,740	1,280	440
18	.....	1,390	755	1,080	2,960	2,510	11,300	12,100	10,900	3,320	1,280	420
19	.....	1,370	860	1,080	3,080	2,510	13,900	12,900	11,900	2,840	1,210	480
20	.....	1,350	960	1,080	4,020	2,610	13,100	13,100	12,100	2,610	1,210	580
21	.....	1,300	1,000	1,020	3,370	2,510	9,780	10,700	12,900	3,080	1,280	555
22	.....	1,260	1,040	960	2,720	2,330	11,900	10,400	12,400	2,960	1,140	555
23	.....	1,210	1,080	870	2,220	1,560	9,780	9,400	12,100	4,500	960	555
24	.....	1,210	1,080	780	1,720	2,060	9,970	8,080	12,200	4,500	1,020	380
25	.....	1,210	1,080	930	1,490	3,600	8,080	7,900	12,200	6,170	1,020	730
26	.....	1,210	1,140	1,080	1,460	4,020	8,080	9,020	12,100	8,640	1,210	4,820
27	.....	1,210	1,210	960	1,420	3,600	7,020	9,590	11,300	19,000	1,880	5,830
28	.....	1,140	1,210	1,020	1,610	4,820	6,850	8,640	10,400	21,900	705	3,320
29	.....	1,210	1,210	1,080	.....	4,980	7,190	7,720	9,590	11,500	730	2,150
30	2,420	1,210	1,110	2,060	.....	4,820	14,300	8,640	9,210	7,540	810	1,800
31	2,390	.....	1,020	1,970	.....	4,980	.....	8,830	.....	4,820	555	.....

NOTE.—Discharge determined from a rating curve well defined below and fairly well defined above 13,000 second-feet.

Monthly discharge of San Juan River near Bluff, Utah, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
November	2,360	1,140	1,580	94,000	B.
December	1,210	505	1,020	62,700	C.
January	2,060	630	1,010	62,100	C.
February	4,820	1,080	2,330	129,000	C.
March	4,980	960	2,230	137,000	B.
April	13,900	3,740	8,040	478,000	B.
May	13,100	4,980	9,270	570,000	B
June	12,900	4,820	10,100	601,000	B.
July	21,900	2,610	6,490	399,000	B
August	3,880	705	1,660	102,000	B.
September	5,830	380	1,050	62,500	B.
The period	21,900	380	4,060	2,700,000	

NORTH FORK OF NORTH MONTEZUMA CREEK AT MONTICELLO, UTAH.

LOCATION.—In the NE. ¼ sec. 35, T. 33 S., R. 23 E., 200 yards below the heading of Middle canal, 300 yards below the ranger's cabin, three-quarters of a mile west of Monticello and a mile east of the boundary of the La Sal National Forest.

DRAINAGE AREA.—About 10.5 square miles.

RECORDS AVAILABLE.—June 4, 1914, to September 30, 1915.

GAGE.—Vertical staff on right bank; read daily by J. W. Palmer, forest ranger. Datum raised 1.50 feet on July 22, 1915.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Stream bed of gravel and boulders. Right bank high; left bank fairly high but may be overflowed. Control consists of boulders set in a trench at the head of a riffle about 10 feet below gage. Point of zero flow, about 0.3 foot (new datum).

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and also for the period 1914–15, 3.20 feet old datum, 1.70 feet new datum at 9.30 a. m. May 18 (discharge determined by prolonging rating curve as a tangent above 3.0 feet, 54 second-feet); minimum stage 1.9 feet (0.4 new datum) June 29 and 30 (discharge, 0.2 second-foot). This was seepage water and remained constant during the summer.

WINTER FLOW.—There is heavy snowfall but stage-discharge relation does not seem to be greatly affected by ice. Station has been discontinued during winter.

DIVERSION.—Middle canal diverts about 200 yards above the gage. During the winter only a small quantity of water is carried in this ditch, and the rest wastes into the creek above the gaging station. The Wood High-line and North canals also take water by means of a common diversion about a mile upstream. Water from the South Fork of North Montezuma Creek is carried by means of the South canal and turned into the North Fork just above the heading of the Middle canal.

REGULATION.—Flow affected by operation of canals.

ACCURACY.—Records fair for periods in which gage was read regularly.

Discharge measurements of North Fork of North Montezuma Creek at Monticello, Utah, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 30	L. W. Jordan	2.05	0.5	May 26	R. C. Pierce	2.75	14.6
Apr. 6	do	2.63	11.1	31	do	2.72	13.6
May 17	R. C. Pierce	2.86	22.1	July 15	do	1.92	.2
17	do	2.86	21.6				

Daily discharge, in second-feet, of North Fork of North Montezuma Creek at Monticello, Utah, for the year ending Sept. 30, 1915.

Day.	Apr.	May.	June.	Day.	Apr.	May.	June.	Day.	Apr.	May.	June.
1		15	15	11		15	0.3	21	8	22	0.3
2		15	15	12		15	6	22	10	15	.3
3		15	22	13		22	3.3	23	6	22	1.0
4		15	15	14		22	3.3	24	8	15	1.4
5		11	29	15		25	2.0	25	8	22	1.0
6		11	15	16		25	2.0	26	7	18	.7
7		8	15	17		24	1.4	27	7	15	.3
8		11	11	18	15	39	.7	28	11	22	.3
9		25	11	19	8	39	1.4	20	15	29	.2
10		25	.3	20	8	39	.7	30	15	22	.2
								31		18	

NOTE.—Discharge determined from a rating curve well defined up to 25 second-feet. Gage-height record is complete from April 18 to June 30 only. During the remainder of the summer the flow remained practically constant at an estimated discharge of 0.2 second-foot, which was seepage water entering below the heading of the Middle canal.

Monthly discharge of North Fork of North Montezuma Creek at Monticello, Utah, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April 18–30	15	7	9.69	250	B.
May	39	8	20.5	1,260	B.
June	29	.2	5.84	348	B.
The period				1,860	

NOTE.—See footnote to table of daily discharge.

GORDON CANAL NEAR MONTICELLO, UTAH.

LOCATION.—In the NE. ¼ sec. 28, T. 33 S., R. 23 E, about 400 feet below the head of the canal and 3½ miles northwest of Monticello.

RECORDS AVAILABLE.—May 25 to August 1, 1914; May 25 to August 31, 1915.

GAGE.—Vertical staff read by J. C. Bronson; datum of gage used in 1915 is 1.50 feet lower than that of 1914.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed consists of clay and gravel. Control formed by imbedding a plank in the bottom of the canal. Point of zero flow, about 1.94 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.57 feet June 23 (discharge, 6.1 second-feet). Canal dry June 2–16 and 24.

1914–15: Maximum stage recorded, 1.08 feet (2.58 feet 1915 datum) June 8, 1914 (discharge, 6.3 second-feet).

WINTER FLOW.—No records kept during winter. Flow October 21, 1915, 0.2 second-foot.

DIVERSIONS.—None above the station.

ACCURACY.—Records fair.

Gordon canal receives water from a feeder canal that diverts from the North Fork of North Montezuma Creek near the west line of sec. 28 and that also supplies the Wood High-line and north canals. The water is used for irrigation in the Spring Creek basin.

Discharge measurements of Gordon canal near Monticello, Utah, during the year ending Sept. 30, 1915.

[Made by R. C. Pierce.]

	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
June 25	2.52	5.1
25	2.44	3.5
25	2.11	.5

Daily discharge, in second-feet, of Gordon canal near Monticello, Utah, for the year ending Sept. 30, 1915.

Day.	May.	June.	July.	Aug.	Day.	May.	June.	July.	Aug.
1		0.1			16				0.4
2				0.7	17		2.8	0.6	
3			2.6		18		5.8		.4
4				.6	19		4.5	.5	
5			2.0		20		4.3		.4
6				.5	21		3.5	.4	
7			1.2		22		2.8		.3
8				.5	23		6.1	.4	
9			.6		24				.3
10				.4	25	1.6	4.2	.5	
11			.9		26		6.3		.3
12				.3	27		4.9	.7	
13			1.4		28	.2	4.5		.3
14				.3	29		4.2	.5	
15			.7		30	.1			.3
					31			.5	

NOTE.—Discharge determined from a well-defined rating curve. No interpolation for days on which gage was not read.

WOOD HIGH-LINE CANAL NEAR MONTICELLO, UTAH.

LOCATION.—In sec. 26, T. 33 S., R. 23 E., at the head of the canal, about 2 miles northwest of Monticello.

RECORDS AVAILABLE.—May 25 to July 3, 1914; May 25 to July 9, 1915.

GAGE.—Vertical staff in the flume immediately below the division gate.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Rectangular wooden flume. Control is afforded by a Cippoletti weir notch in a 2-inch plank at the lower end of the flume. Point of zero flow, about 0.48 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.50 feet June 3 (discharge, 11 second-feet). Canal dry except during irrigation season.

1914-15: Maximum stage recorded, 1.75 feet June 7 and 8, 1914 (discharge, 14.4 second-feet).

DIVERSIONS.—None above the gage.

ACCURACY.—Records fair.

Wood high-line canal receives water from a feeder canal that diverts from the North Fork of North Montezuma Creek at two different points. The upper diversion is about on the west line of sec. 28 and part of this water is delivered to the Gordon canal. The remainder, supplemented by a second diversion made near the west line of sec. 27, is divided between the Wood high-line and North canals in the W. ½, sec. 26. The water is used for irrigation and is not returned directly to the stream.

Discharge measurements of Wood high-line canal near Monticello, Utah, during the year ending Sept. 30, 1915.

[Made by R. C. Pierce.]

Date.	Gage height.	Discharge	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 25	[a] 0.57	0.11	June 1	1.44	9.4	June 26	0.78	0.7
June 1	1.45	9.8	24	1.12	3.7			

[a] Point of zero flow, 0.47 foot.

Daily discharge, in second-feet, of Wood high-line canal near Monticello, Utah, for the year ending Sept. 30, 1915.

Day.	May.	June.	July.	Day.	May.	June.	July.	Day.	May.	June.	July.
1		9.6	0.04	11		11		21		6.0	
2				12		10		22		6.0	
3		11	.04	13		8.7		23		4.2	
4				14		7.2		24		4.2	
5		6.8		15		6.8		25	0.1	2.2	
6				16		8.3		26		.7	
7		5.0	.2	17		6.8		27		.7	
8				18		6.8		28	0.02	.6	
9		8.7	.1	19		6.8		29		.2	
10				20		6.8		30	1.4	.1	
								31			

NOTE.—Discharge determined from a well-defined rating curve. No interpolations for days on which gage was not read.

NORTH CANAL NEAR MONTICELLO, UTAH.

LOCATION.—In sec. 26, T. 33 S., R. 23 E., at head of the canal, about 2 miles northwest of Monticello.

RECORDS AVAILABLE.—June 5 to July 29, 1914; May 25 to August 30, 1915.

GAGE.—Vertical staff near lower end of flume below the division gate; read by J. C. Bronson.

DISCHARGE MEASUREMENTS.—Made by wading below flume.

CHANNEL AND CONTROL.—Wooden flume. Control is a Cippoletti weir notch in a 2-inch plank at the lower end of the flume. Point of zero flow, about 0.15 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.41 feet June 24 (discharge, 12 second-feet). Canal is dry at times.

1914-15: Maximum stage recorded, 1.72 feet June 15 and 16, 1914 (discharge 19.4 second-feet).

WINTER FLOW.—No information. Probably a small flow in ditch most of the time to supply domestic needs. On November 3, 1914, there was 0.7 second-foot and on October 21, 1915, there was 0.2 second-foot flowing.

DIVERSIONS.—Above all diversions.

ACCURACY.—Records are fair.

See Wood high-line canal for description of the feeder that supplies this canal. The North canal diverts for irrigation and domestic use in and around Monticello and the water is not returned to the creek.

Discharge measurements of North canal near Monticello, Utah, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 3	L. W. Jordan		0.7	June 26	R. C. Pierce	1.33	10.4
May 25	R. C. Pierce	1.04	5.6	July 1	do	1.09	6.0
25	do	1.04	5.2	15	do	.50	1.1
June 24	do	1.38	11.2	22	do	.48	1.1

Daily discharge, in second-feet, of North canal near Monticello, Utah, for the year ending Sept. 30, 1915.

Day.	May.	June.	July.	Aug.	Day.	May.	June.	July.	Aug.
1		6.0	6.0		16		6.2		.6
2				1.0	17		11	1.2	
3		9.6	4.9		18		12		.4
4				.9	19		11	1.4	
5		5.9	4.7		20		11		.5
6				.7	21		10	1.3	
7		3.9	3.5		22		10		.4
8				.6	23		8.9	1.4	
9		6.5	2.6		24		12		.3
10				.6	25	5.4	9.3	1.3	
11		10	2.8		26		9.8		.4
12		12		.5	27		8.5	2.1	
13		9.6	1.5		28	4.5	7.4		.5
14		10		.6	29		7.1	1.4	
15		11	1.2		30	3.7	6.5		.4
					31			1.3	

NOTE.—Discharge determined from a rating curve well defined up to about 15 second-feet. No interpolation for days on which gage was not read.

MIDDLE CANAL AT MONTICELLO, UTAH.

LOCATION.—In the NE. ¼ sec. 35, T. 33 S., R. 23 E, 100 feet below the head of the canal, at the ranger station about three-quarters of a mile west of Monticello, Utah, and a mile east of the Forest boundary.

RECORDS AVAILABLE.—May 24 to July 31, 1914; May 26 to August 31, 1915.

GAGE.—Vertical staff; datum used in 1915, 1.0 foot lower than that used in 1914.

DISCHARGE MEASUREMENTS.—Made from a foot plank at the gage.

CHANNEL AND CONTROL.—Sand and gravel. Control formed by a 2-inch plank with a Cippoletti weir notch set in the ditch just below the gage. Point of zero flow, 2.1 (datum of 1915).

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.94 feet June 27 (discharge, 13 second-feet); minimum stage recorded, 2.18 feet August 22 and 24 (discharge, 0.4 second-foot). Cleaning ditch about June 1 and ditch was broken July 24–26, at which times there was probably no flow.

1914–1915: Maximum stage recorded, 2.2 feet (3.2 feet datum of 1915) July 11, 1914 (discharge, 23.6 second-feet).

WINTER FLOW.—No records during winter. A small flow is probably maintained to supply domestic needs practically all the year round.

DIVERSIONS.—Above all diversions. There is a wasteway just below the heading.

REGULATION.—Flow regulated at waste gate.

ACCURACY.—Records fair.

The Middle canal diverts water from the North Fork of North Montezuma Creek for irrigation and domestic use in and around Monticello. The water is not returned directly to the stream. Part of the water carried in the Middle canal is brought around from the South Fork of North Montezuma Creek in the South canal and emptied into the North Fork just above the heading of the Middle canal.

Discharge measurements of Middle canal at Monticello, Utah, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 30	L. W. Jordan	1.27	0.6	July 1	R. C. Pierce	2.80	9.8
Apr. 6	do	1.67	6.0	15	do	2.47	2.3
May 26	R. C. Pierce	[a]2.21	.4	20	do	2.40	1.7
June 5	do	2.58	4.3	22	do	2.30	.8
24	do	2.81	9.8	Aug. 4	do	2.31	1.1
27	do	2.90	12.6	Oct. 21	L. W. Jordan	2.22	.6
27	do	2.92	12.2				

[a] Datum of gage lowered one foot; point of zero flow 2.07 feet.

Daily discharge, in second-feet, of Middle canal at Monticello, Utah, for the year ending Sept. 30, 1915.

Day.	May.	June.	July.	Aug.	Day.	May.	June.	July.	Aug.
1			9.4		16		11		0.7
2			7.3	1.3	17		9.4	1.6	
3		3.6	7.6		18		12		.5
4				1.1	19		13	1.3	
5		4.2	8.1		20		12	1.6	.5
6				1.0	21		9.4	1.6	
7		3.6	6.8		22		9.4	.8	.4
8				1.0	23		8.4	.8	
9		8.1	4.5		24		9.9		.4
10				.9	25		8.9		
11		8.4	4.5		26	0.4	7.1		.7
12		8.9		.7	27		13	1.3	
13		8.6	4.0		28	.4	8.6		.6
14		9.9		.6	29	.4	7.3	1.5	
15		10	2.2		30	.4	7.6		.5
					31			1.5	

NOTE.—Discharge determined from two rating curves fairly well defined, one applicable March 30 to July 27, the other July 27 to August 31. No interpolations made for days on which gage was not read.

SOUTH FORK OF NORTH MONTEZUMA CREEK AT MONTICELLO, UTAH.

LOCATION.—At the ford at Frost's ranch, about half a mile above the confluence of the North and South forks of North Montezuma Creek and three-quarters of a mile scuthwest of Monticello.

DRAINAGE AREA.—15 square miles.

RECORDS AVAILABLE.—May 24 to August 16, 1914; March 30 to July 23, 1915.

GAGE.—Vertical staff about 25 feet below the ford, installed March 30, 1915, and washed out July 24, 1915. This gage was about 25 feet upstream and at different datum from that used in 1914.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Stream bed of gravel. A notched plank set on edge in a trench just below the gage acts as the control. Point of zero flow, about 1.55 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and also for 1914–15, 3.0 feet at 5 p. m. April 30 (discharge, obtained by extension of rating curve above 40 second-feet, estimated at about 170 second-feet); minimum stage recorded, 1.52 feet July 4–10 (no flow), water standing in pools.

WINTER FLOW.—No records during winter.

DIVERSIONS.—The Pioneer canal diverts about 2½ miles and the South canal about three-quarters of a mile above station.

REGULATION.—None.

ACCURACY.—Records fair.

Discharge measurements of South Fork of North Montezuma creek at Monticello, Utah, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 30	L. W. Jordan	1.90	7.2	May 26	R. C. Pierce	2.15	20.9
May 17	R. C. Pierce	2.25	34.0	31	do	2.01	11.2
17	do	2.25	34.8	July 15	do	1.58	.05

Daily discharge, in second-feet, of South Fork of North Montezuma Creek at Monticello, Utah, for the year ending Sept. 30, 1915.

Day.	Mar.	Apr.	May.	June.	July.	Day.	Mar.	Apr.	May.	June.	July.
1		8	40	12	0	16		47	40	0.4	1.0
2		55	40	14	0	17		4	37	.3	1.0
3		14	33	15	0	18		7	29	1.0	1.0
4		73	21	11	0	19		40	33	1.0	1.0
5		102	21	10	0	20		27	33	1.0	2.0
6		59	27	9	0	21			33	1.0	1.0
7		40	14	7	0	22			21	.6	1.0
8		102	17	9	0	23			21	.1	1.0
9		73	15	9	0	24		47	18	.1	
10		47	14	9	0	25		40	27	.1	
11		27	14	8	.6	26		47	21	.1	
12		36	21	8	.6	27		59	21	.3	
13		46	17	6	.6	28		47	21	.3	
14		55	43	3	.6	29		55	26	.3	
15		21	40	.6	.4	30	7	125	17	0	
						31	2		14		

NOTE.—Discharge determined from a rating curve fairly well defined up to 40 second-feet. Discharge Apr. 12 and 13 and June 11 interpolated and mean discharge Apr. 21–23 interpolated, 37 second-feet.

Monthly discharge of South Fork of North Montezuma Creek at Monticello, Utah, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April	125	4	47.1	2,800	C.
May	43	14	25.5	1,570	B.
June	15	0	4.57	272	C.
July 1-23	2	0	.513	23	
The period				4,660	

PIONEER CANAL NEAR MONTICELLO, UTAH.

LOCATION.—In sec. 11, T. 34 S., R. 23 E., at the division box 1¼ miles below the head of the canal of the Pioneer Canal Co., about 2½ miles southwest of Monticello.

RECORDS AVAILABLE.—May 24 to August 23, 1914, and May 28 to June 30, 1915.

GAGE.—Vertical staff on the right side of the flume or dividing box.

DISCHARGE MEASUREMENTS.—Made by wading above flume.

CHANNEL AND CONTROL.—Rectangular wooden flume. Water is divided at the lower end of flume, and a control is afforded by the crest of a 2-inch plank extending 4 inches above the floor.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.01 feet June 13 (discharge, 13 second-feet); minimum stage recorded 0.32 foot May 28 (discharge, 0.6 second-foot).

1914–15: Maximum discharge, 15 second-feet on June 16, 1914 (stage 1.00 foot). Different rating curve used in 1914; minimum discharge, 0.4 second-foot August 23, 1914 (stage 0.36 foot).

WINTER FLOW.—No records kept during winter.

DIVERSIONS.—Above all diversions.

REGULATION.—Regulated at head gates.

ACCURACY.—Records fair.

Pioneer canal diverts water from the South Fork of North Montezuma Creek in the NW. ¼ sec. 10, T. 34 S., R. 23 E., for irrigation of lands south of Monticello. The water is not returned directly to the stream.

Discharge measurements of Pioneer canal near Monticello, Utah, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec-ft.*			*Feet.*	*Sec.-ft.*
Nov. 3	L. W. Jordan	0.32	0.2	June 24	R. C. Pierce	0.72	6.1
June 1	R. C. Pierce	.87	9.3	26	do	.67	5.3
1	do	.87	9.6	26	do	.33	.7
24	do	.72	6.2				

Daily discharge, in second-feet, of Pioneer canal near Monticello, Utah, for the year ending Sept. 30, 1915.

Day.	May.	June.	Day.	May.	June.	Day.	May.	June.
1		9.4	11		13	21		
2			12		12	22		9
3		12	13		13	23		7.5
4			14		10	24		6.8
5		6.7	15			25		6.8
6		7.5	16			26		3.8
7		6.5	17		9	27		
8			18		9	28	0.6	
9		9	19			29		4.9
10		12	20		8.4	30	0.6	4.1
						31		

NOTE.—Discharge determined from a fairly well defined rating curve. No interpolations have been made for days for which gage was not read. Ditch reported to be carrying little if any water after June 30.

SOUTH CANAL AT MONTICELLO, UTAH.

LOCATION.—In sec. 35, T. 33 S., R. 23 E., about 200 yards above where the canal empties into the North Fork of North Montezuma Creek, 300 yards south of the ranger station, and 1½ miles below the head of the canal, about three-quarters of a mile west of Monticello.

RECORDS AVAILABLE.—May 24 to July 29, 1914, and May 28 to August 31, 1915.

GAGE.—Vertical staff on left bank.

CHANNEL AND CONTROL.—Bed consists of earth and gravel. Control is Cippoletti weir notch in a plank set in the bed of the canal just below the gage. Point of zero flow, 1.63 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year, 2.3 feet on June 27 (discharge, 7.9 second-feet); minimum stage recorded, 1.63 feet May 30 (no flow).

1914–15: Maximum stage recorded, 2.8 feet July 10, 1914 (discharge, 15.4 second-feet).

WINTER FLOW.—No records kept. The ditch freezes and fills with snow, but there is usually a small quantity of water running.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY RECORDS.—Fair.

South canal is a feeder for the Middle canal. Water is diverted from the South Fork of North Montezuma Creek near the center of sec. 2, T. 34 S., R. 23 E., and emptied into North Fork of North Montezuma Creek just above the heading of the Middle canal in the NW. ¼ sec. 35, T. 33 S., R. 23 E.

Discharge measurements of South canal at Monticello, Utah, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 3	L. W. Jordan		0.8	July 15	R. C. Pierce	2.02	2.2
June 25	R. C Pierce	2.08	2.9	20	....do	2.00	1.6
July 1	.....do	2.24	6.6	22	....do	1.90	1.1
2	.....do	2.19	5.3	Aug. 4	....do	1.92	1.0

Daily discharge, in second-feet, of South canal at Monticello, Utah, for the year ending Sept. 30, 1915.

Day.	May.	June.	July.	Aug.	Day.	May.	June.	July.	Aug.
1		0	6.6	1.4	16		6.9	1.8	0.6
2		0	5.2	1.4	17		5.4	1.7	.5
3		0	5.4	1.3	18		7.4	1.6	.4
4		0	5.5	1.2	19		5.4	1.5	.4
5		0	5.6	1.0	20		5.4	1.6	.4
6		0	5.3	.8	21		4.6	1.7	.4
7		0	5.0	.8	22		4.3	1.4	.4
8		0	4.1	.8	23		3.3	1.0	.4
9		3.7	3.2	.8	24		3.2	1.0	.3
10		3.5	3.2	.8	25		3.7	0	.4
11		3.3	3.3	.8	26		3.0	1.0	.5
12		3.3	3.2	.7	27		7.9	1.2	.5
13		3.2	3.0	.6	28	0.1	4.8	1.4	.5
14		5.9	2.0	.5	29	.1	4.1	1.5	.4
15		5.9	1.9	.6	30	0	4.8	1.5	.4
					31	0		1.5	.4

NOTE.—Discharge determined from a well-defined rating curve. During July and August the gage was read every other day and discharge was interpolated for intervening days.

Monthly discharge of South canal at Monticello, Utah, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
May 28-31	0.1	0.0	0.05	0.4
June	7.9	.0	3.43	204
July	6.6	.0	2.71	167
August	1.4	.3	.66	40.6
The period	7.9	.0	2.16	412

CHRISTENSEN CANAL AT MONTICELLO, UTAH.

LOCATION.—In the S. W. ¼ sec. 36, T. 33 S., R. 23 E., about 150 feet above the Monticello-Blanding stage road, a quarter of a mile below the head of the canal, and half a mile south of Monticello.

RECORDS AVAILABLE.—May 29 to July 15, 1915 (fragmentary).

GAGE.—Vertical staff; read by C. R. Christensen.

DISCHARGE MEASUREMENTS.—Made from a foot plank.

CHANNEL AND CONTROL.—Bed consists of earth and gravel. Control formed by rocks placed in a trench about 6 feet below the gage. Point of zero flow, about 0.1 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 0.85 foot June 12 and 13 (discharge, 4.7 second-feet); minimum stage recorded, 0.32 July 15 (discharge, 0.1 second-foot). This is seepage water.

WINTER FLOW.—No information.

DIVERSION.—Above diversions.

ACCURACY.—Records fair up to 1 second-foot discharge. Approximate above that.

Canal diverts water from the South Fork of North Montezuma Creek in the S. W. ¼ sec. 36, T. 33 S., R. 23 E., for irrigation and domestic use. The water is not returned to the creek.

Discharge measurements of Christensen canal at Monticello, Utah, during the year ending Sept. 30, 1915.

[Made by R. C. Pierce.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
May 31	0.49	0.8
31	.47	.7
July 15	.32	.1

Daily discharge, in second-feet, of Christensen canal at Monticello, Utah, for the year ending Sept. 30, 1915.

Day.	May.	June.	Day.	May.	June.	Day.	May.	June.
1			11		4.0	21		
2		0.5	12		4.7	22		
3			13		4.7	23		
4			14		3.3	24		
5		.4	15		1.6	25		
6			16		3.3	26		
7			17		.6	27		
8			18		.4	28		
9			19			29	1.3	
10			20		1.6	30		
						31	.7	

NOTE.—Discharge determined from a rating curve fairly well defined below 1 second-foot.

SPRING (VAGA) CREEK NEAR MONTICELLO, UTAH.

LOCATION.—In the SE. ¼ sec. 7, T. 33 S., R. 23 E., at the Trujillo ranch, 40 feet below the head of the Green canal, and 8 miles northwest of Monticello.

DRAINAGE AREA.—8.5 square miles.

RECORDS AVAILABLE.—May 26 to August 25, 1914, and April 6 to September 30, 1915.

GAGE.—Vertical staff on the right bank; read once daily by Gusman Trujillo. New gage at different datum installed May 27, 1915.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Stream bed of gravel; channel crooked and banks overgrown with grass and weeds. Control of rocks placed in a trench just below the gage. Point of zero flow, about 0.2 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.30 feet at 4 p. m. June 11 (discharge, 20 second-feet); minimum stage recorded, 0.05 foot August 21 to September 2 (no flow; water standing in pools).

1914–15: Maximum stage recorded, 2.05 feet July 26, 1914 discharge, 33 second-feet).

WINTER FLOW.—No information; creek probably frozen.

DIVERSIONS.—Above all diversions except Green canal and the Davenport & Campbell canal.

REGULATION.—None.

ACCURACY.—Records fair.

Discharge measurements of Spring Creek near Monticello, Utah, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge
		Feet.	*Sec-ft.*			*Feet.*	*Sec.-ft.*
Oct. 27	L. W. Jordan	1.12	0.6	June 28	R. C. Pierce	0.61	5.0
Apr. 6	do	1.10	.9	28	do	.60	5.0
May 27	R. C. Pierce	*a*.67	5.2	July 2	do	.52	3.0
27	do	.69	5.2	2	do	.52	3.8
June 4	do	.87	7.6	16	do	.36	.3
4	do	.86	7.4	16	do	.35	.3
6	do	.54	3.3	16	do	.41	.9
6	do	.54	3.3	Oct. 21	do	.29	.2

a Old gage read 1.37.

Daily discharge, in second-feet, of Spring Creek near Monticello, Utah, for the year ending Sept. 30, 1915.

Day.	Apr.	May.	June.	July.	Aug.	Day.	Apr.	May.	June.	July.	Aug.
1		6.0	8.6	5.1	0.3	16	5.4	10	7.0	0.6	
2		6.0	10	5.1	.3	17	4.9	19	6.5	.2	
3		6.0	11	5.1	.1	18	4.9	16	6.0	.2	
4		4.9	7.6	4.7	.1	19	5.4	16	6.2	.2	
5		5.4	7.2	4.7	.1	20	5.4	16	5.8	.2	
6	0.8	5.4	7.2	2.6	.1	21	5.4	16	5.6	.2	
7	.6	5.4	2.3	2.6	.1	22	5.2	4.4	5.8	.2	
8	.6	5.4	8.6	2.2	.1	23	5.2	4.4	5.2	.2	
9	2.3	6.0	16	1.7	.1	24	5.4	6.6	5.3	.2	
10	2.3	6.6	19	1.5	.1	25	5.4	6.6	5.2	.2	
11	4.4	6.6	20	1.5		26	5.4	6.6	5.1	.3	
12	4.4	6.6	19	1.3		27	5.4	6.6	5.5	.3	
13	4.4	6.6	14	1.3		28	5.4	6.8	5.2	.3	
14	5.4	8.2	8.6	.9		29	5.4	6.8	5.1	.2	
15	5.4	10	6.7	.8		30	5.4	10	5.3	.2	
						31		8.6		.2	

NOTE.—Daily discharge determined from two rating curves fairly well defined up to 10 second-feet and applicable April 6 to June 8, and June 11 to September 30. Discharge, June 9 and 10 determined by indirect method for shifting control. Discharge June 25 interpolated. No flow Aug. 11 to Sept. 30.

Monthly discharge of Spring Creek near Monticello, Utah, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April 6–30	5.4	0.6	4.41	218	B.
May	19	4.4	8.24	507	B.
June	20	2.3	8.35	497	B.
July	5.1	.2	1.45	89	C.
August	.3	.0	.045	2.8	D.
September	.0	.0	0	0	
The period				1,310	

DAVENPORT & CAMPBELL CANAL NEAR MONTICELLO, UTAH.

LOCATION.—In sec. 7, T. 33 S., R. 23 E., at Trujillo's ranch, half a mile below the head of the canal and 8 miles northwest of Monticello.

RECORDS AVAILABLE.—May 26 to June 24, 1914, and April 20 to July 16, 1915.

GAGE.—Vertical staff just above the Trujillo ranch house. Datum raised 0.8 foot on May 27, but all 1915 records have been reduced to the old datum.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed consists of earth and gravel; control is a riffle formed by rocks placed in a trench. Point of zero flow, about 0.55 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and also for the period 1914–15, 2.1 feet May 24–28, and June 1 and 2 (discharge 9.0 second-feet) minimum stage recorded, 0.54 foot July 15 (no flow).

WINTER FLOW.—No information.

DIVERSION.—Water is diverted above the gage at times. See footnote to table of daily discharge.

REGULATION.—Regulated at the head gate.

ACCURACY.—Records only fair.

Canal diverts from Spring Creek in the SW. ¼ sec. 7 T., 33 S., R. 23 E., and the water is used for irrigation in Dry Valley and not returned to the creek. A small amount of water is taken out of the ditch above the gage.

Discharge measurements of Davenport & Campbell canal near Monticello, Utah, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec-ft.*			*Feet.*	*Sec.-ft.*
May 27.	R. C. Pierce	2.01	6.7	July 16	R. C. Pierce	1.34	0.05
27.	do	2.02	6.4	16	do	1.12	.0
June 4.	do	2.00	6.4	Oct. 21	L. W. Jordan	1.44	.1
6.	do	1.93	4.8				

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Daily discharge, in second-feet, of Davenport & Campbell canal near Monticello, Utah, for the year ending Sept. 30, 1915.

Day.	Apr.	May.	June.	July.	Day.	Apr.	May.	June.	July.
1		0.3	9.0	0.2	16		4.1	4.1	
2		.3	9.0	.2	17		6.4	.2	
3		.4	7.7	.2	18		4.1	.2	
4		.2	8.4	.2	19		2.0	.2	
5		.2	6.0	.2	20	0.1	6.4	.2	
6		.2	3.1	.1	21	.1	6.4	.2	
7		.2	3.1	.1	22	.1	6.4	.2	
8		.2	.2	.1	23	.2	4.1	.2	
9		6.4	.2	.1	24	.2	9.0	.2	
10		6.4	.2	.1	25	.2	9.0	.2	
11		6.4	3.1	.1	26	.1	9.0	.2	
12		6.4	2.4		27	.1	9.0	.2	
13		6.4	4.1		28	.1	9.0	.2	
14		4.1	4.1		29	.1	6.4	.2	
15		4.1	4.1		30	.2	6.4	.2	
					31		7.7		

NOTE.—Daily discharge determined from a poorly defined rating curve. Additions have been made to the flow at the gage in order to give the total supply in the ditch as follows: June 1–5, 0.6 second-foot added, and June 6 and 7, 0.5 second-foot added for water taken out between the gage and the head. June 7–27, 0.2 second-foot added for water diverted above the gage. This was gradually decreased to 0.05 second-foot on July 16. After June 16 no water was diverted from Spring Creek, and the 0.2 second-foot came from a small spring in the ditch itself.

Monthly discharge of Davenport & Campbell canal near Monticello, Utah, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April 20–30	0.2	0.1	0.14	3.0	
May	9.0	.2	4.76	293	D.
June	9.0	.2	2.39	142	D.
July 1–16	.2	0	.16	3.2	
The period				441	

GREEN CANAL NEAR MONTICELLO, UTAH.

LOCATION.—In sec. 7, T. 33 S., R. 23 E., 50 feet below the head of the canal, near Trujillo's ranch, and 8 miles northwest of Monticello.

RECORDS AVAILABLE.—May 26 to August 21, 1914, and June 8 to August 16, 1915.

GAGE.—Vertical staff set at new datum in 1915.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Earth section. Point of zero flow, about 1.9 feet.

EXTREMES OF DISCHARGE.—Maximum stage during year and for the period 1914-15 not recorded as water was over gage on June 11, 1915; mean flow for the day estimated at 5 second-feet. Highest stage recorded 2.70 feet on June 13, 1915 (discharge, 3.6 feet); canal dry July 25 to August 1.

WINTER FLOW.—No information.

DIVERSIONS.—Above all diversions.

REGULATION.—By head gate at point of diversion.

ACCURACY.—Records fair.

Canal diverts water from Spring Creek in the SW. ¼ sec. 7, T. 33 S., R. 23 E., for irrigation use on the Green ranch. The water is not returned directly to the creek.

Discharge measurements of Green canal near Monticello, Utah, during the year ending Sept. 30, 1915.

[Made by R. C. Pierce.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
June 28	2.16	0.2
July 2	2.05	.1
16	2.28	.6

Daily discharge, in second-feet, of Green canal near Monticello, Utah, for the year ending Sept. 30, 1915.

Day.	June.	July.	Aug.	Day.	June.	July.	Aug.	Day.	June.	July.	Aug.
1	.....	0.1	0.0	11	5.0	.....	.4	21	1.9	.4	.....
2	.....	0.1	.6	12	3.2	.7	.4	22	1.9	.4	.....
3	.....	.....	.6	13	3.6	.6	.4	23	2.1	.6	.....
4	.....	.....	.6	14	2.1	.6	.4	24	1.6	.4	.....
5	.....	.....	.4	15	1.9	.4	.4	25	1.9	0	.....
6	.....	.....	.4	16	1.9	.6	.4	26	1.3	0	.....
7	.....	.....	.4	17	1.9	.4	.....	27	0	0	.....
8	0.0	.....	.4	18	1.2	.4	.....	28	.3	0	.....
9	1.2	.....	.4	19	1.6	.4	.....	29	.3	0	.....
10	1.9	.....	.4	20	2.7	.4	.....	30	.2	0	.....
								31	.....	0	.....

NOTE.—Daily discharge determined from a fairly-well defined rating curve. Daily flow interpolated June 28 to July 1. Mean flow July 3-11 estimated 0.1 second-foot.

Monthly discharge of Green canal near Monticello, Utah, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
June 8-30	5.0	0.0	1.73	79.1	C.
July	.7	.0	.24	14.7	D.
August 1-16	.6	.0	.41	13.1	
The period	.....	.....	.....	107	

VERDURE (SOUTH MONTEZUMA) CREEK NEAR VERDURE, UTAH.

LOCATION.—In sec. 27, T. 34 S., R. 23 E., 300 feet above the heading of Barton's upper ditch, about 2½ miles above Verdure postoffice, which is 6 miles south of Monticello.

DRAINAGE AREA.—About 8 square miles.

RECORDS AVAILABLE.—June 6 to 26, 1914; fragmentary records March 30 to July 31, 1915.

GAGE.—Vertical staff on left bank; read by J. F. Barton.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Stream bed of gravel and rock, banks of earth and subject to erosion. Solid rock ledge 5 feet below the gage forms control. Point of zero flow, about 1.3 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and for period 1914-15, 2.5 feet April 7, 1915 (discharge, 33 second-feet); minimum stage, 1.53 July 31, 1915 (discharge, 1.0 second-feet); minimum discharge, 0.9 second-foot November 3, 1914 (stage, 1.6 feet); minimum stage and minimum discharge on different days due to change in conditions at control.

WINTER FLOW.—No information, but flow is probably very small.
DIVERSIONS.—Above all diversions.
REGULATION.—None.
ACCURACY.—Records only fair owing to fragmentary gage-height record.

Discharge measurements of Verdure (South Montezuma) Creek near Verdure, Utah, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 3	L. W. Jordan	1.60	0.9	June 29	R. C. Pierce	1.68	3.3
Mar. 30	do	2.00	12.2	29	do	1.67	3.2
May 29	R. C. Pierce	1.95	12.7	July 14	do	1.56	1.3
29	do	1.94	12.5	14	do	1.55	1.2
June 5	do	1.94	12.0				

Daily discharge, in second-feet, of Verdure (South Montezuma) Creek near Verdure, Utah, for the year ending Sept. 30, 1915.

Day.	Apr.	May.	June.	July.	Day.	Apr.	May.	June.	July.
1			13		16				1.2
2			11		17				
3	12		12		18				1.9
4	8.6		15		19				
5	8.6		12		20				1.2
6	31		10		21				
7	33		12		22				1.2
8	27		10		23				
9	23		10		24				2.7
10	16		11		25				
11			10		26				1.9
12			11		27				
13			10		28				1.1
14			10	1.2	29		13	3.3	
15					30		14		1.0
					31		12		

NOTE.—Discharge determined from two fairly well defined rating curves, one applied Mar. 30 to Apr. 10 and the other May 29 to July 31. No interpolations for days on which gage was not read.

LITTLE COLORADO RIVER BASIN.

ZUNI RIVER AT BLACK ROCK, N. MEX.

LOCATION.—At the reservoir of the Zuni Indian Reservation at Black Rock. Rio de Los Nutrias, the nearest large tributary, enters from the north, about 4 miles above.

DRAINAGE AREA.—Approximately 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, 1915. Record since July 1, 1908, shows inflow into reservoir.

METHOD OF COLLECTING DATA.—From July 1, 1903, to June 30, 1905, the records were obtained by the ordinary stream-gaging methods. Reservoir completed in 1908. Record beginning July 1, 1908, obtained by means of a gage in the reservoir and a capacity curve for the reservoir, the quantity of water released from the reservoir during the periods of inflow being taken into consideration.

FLOODS.—Channel dry the greater part of the year below the point where it leaves the mountains, but stream is subject to sudden floods of considerable volume and usually of short duration. An account of the flood of September 6, 1909, which damaged the reservoir, is given in Water-Supply Paper 269, pages 206–210.

DIVERSIONS.—A reservoir at Ramah, about 18 miles above the station (the 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 the drainage area.

COOPERATION.—Record furnished by the Office of Indian Affairs, through H. F. Robinson, superintendent of irrigation, Albuquerque, N. Mex.

Monthly run-off of Zuni River at Black Rock, N. Mex., for the year ending Sept. 30, 1915.

Month.	Run-off (total in acre-feet).	Month.	Run-off (total in acre-feet).
October	450	May	5,080
November	0	June	1,940
December	130	July	1,380
January	48	August	760
February	4,600	September	955
March	26,700		
April	13,700	The year	55,700

VIRGIN RIVER BASIN.

VIRGIN RIVER AT VIRGIN, UTAH.

LOCATION.—In the NW. ¼ sec. 27 or the NE. ¼ sec. 28, T. 41 S., R. 12 W, a few hundred feet above the point at which the river enters a steep, narrow gorge, and three-quarters of a mile west of Virgin. Station replaces one half a mile above Virgin and gives practically the same record of flow.

DRAINAGE AREA.—1,010 square miles.

RECORDS AVAILABLE.—April 18, 1909 to September 30, 1915.

GAGE.—Chain gage on right bank near lower end of sandstone bluff; installed February 1, 1915; read once a day about 5 or 6 days a week by Niles Earl. Gage used April 18 to August 31, 1909, was an inclined staff on right bank half a mile above Virgin and a few hundred feet below North Creek; washed out August 31, 1909, and replaced October 14 by an inclined staff on the left bank at a new datum. This gage was damaged by flood January 1, 1910, and on January 25 a new inclined staff was installed, also on the left bank, about 65 feet upstream and at datum 0.8 foot higher than that of gage installed October 14, 1909. This gage was used until the chain gage was installed below Virgin February 1, 1915.

DISCHARGE MEASUREMENTS.—Made by wading below the gage except during high water when the old cable above Virgin must be used.

CHANNEL AND CONTROL.—Bed consists of sand and gravel. Right bank high; left bank low and is overflowed. One channel at all stages. Control is a gravel bar a short distance below the gage. Shifts slightly.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.5 feet at 6 p. m. September 3 (discharge, 4,360 second-feet); minimum stage recorded, 2.2 feet July 19–22, August 4–8, 10, 13, 17, 21, 22, 25, 31, and September 1 (discharge, 80 second-feet).

1909–1915: 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.

WINTER FLOW.—Not affected by ice to any extent.

DIVERSIONS.—Above all important diversions.

REGULATION.—None.

ACCURACY.—River is subject to sudden and violent floods. Conditions very unstable at station above Virgin. Records only fair.

Discharge measurements of Virgin River at Virgin, Utah, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharg
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 1	Lynn Crandall	2.67	133	May 25	Lynn Crandall	3.43	823
Apr. 12	L. A. Snow	3.53	664	27	do	3.36	787
29	do	4.75	2,090	Sept. 6	L. A. Snow	2.39	142

Daily discharge, in second-feet, of Virgin River at Virgin, Utah, for the year ending Sept. 30, 1915.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	139	200	.....	850	660	117	.....	80
2	126	212	.....	772	585	110	.....	.....
3	190	.....	.....	.....	.....	110	.....	4,360
4	.....	190	.....	810	515	110	80	2,390
5	139	.....	.....	930	515	110	80	145
6	105	190	.....	890	.....	110	80	138
7	139	148	320	890	482	110	80	124
8	148	126	.....	890	463	110	80	.....
9	200	.....	.....	.....	418	.....	95	120
10	158	308	320	930	385	110	80	89
11	230	260	380	970	.....	110	.....	89
12	158	.....	538	.....	333	.....	89	110
13	139	200	.....	1,130	.....	.....	80	92
14	174	174	.....	1,130	308	110	89	117
15	200	200	.....	.....	.....	.....	.....	.....
16	.....	.....	320	.....	248	95	95	117
17	200	230	380	970	230	.....	80	117
18	230	.....	.....	970	.....	.....	95	131
19	230	260	.....	1,010	172	80	95	200
20	200	260	440	890	200	80	.....	.....
21	.....	260	.....	850	.....	80	80	.....
22	200	290	.....	735	162	80	80	.....
23	.....	290	605	735	145	110	89	.....
24	200	260	805	.....	145	145	89	.....
25	200	260	538	850	145	110	80	.....
26	200	.....	505	810	145	128	145	.....
27	174	260	570	772	.....	260	.....	131
28	190	320	472	.....	128	172	120	138
29	.....	.....	2,150	810	.....	.....	95	124
30	.....	290	.....	.....	120	.....	89	131
31	.....	320	.....	735	.....	110	80	.....

NOTE.—Discharge determined from two curves fairly well defined below 1,000 second-feet, one applicable Feb. 1 to Apr. 28, the other Apr. 29 to Sept. 30. Gage not read on days for which no discharge is given. No records obtained Oct. 1, 1914, to Jan. 31, 1915, but observer reports that there were no floods during that period.

Monthly discharge of Virgin River at Virgin, Utah, for the year ending Sept. 30, 1915.

Month.	Mean discharge in second-feet.	Run-off (total in acre-feet).	Accuracy.
February	180	10,000	B.
March	236	14,500	B.
April	501	29,800	C.
May	884	54,400	B.
June	304	18,100	B.
July	115	7,070	C.
August	90.5	5,560	C.
September	344	20,500	C.
The period	.....	160,000	

NOTE.—Monthly discharge computed by interpolating or estimating discharge for days on which gage was not read.

ASH CREEK AT TOQUERVILLE, UTAH.

LOCATION.—In the SW. ¼ sec. 2, T. 41 S., R. 13 W., a few hundred feet above the ford at the southwest corner of Toquerville, about a mile below steel bridge on Grand; Canyon highway 2½ miles above mouth of La Verkin Creek, and 3 miles above confluence of Ash Creek with Virgin River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 28 to September 30, 1915.

GAGE.—Vertical staff bolted to rock wall on right bank; read once daily by H. M. Wallace during spring run-off. Gage heights prior to May 25 referred to slightly different datum.

DISCHARGE MEASUREMENTS.—Made by wading. If necessary a high water measurement could be made at the bridge a mile above the gage.

CHANNEL AND CONTROL.—Stream bed of boulders and gravel with considerable sand. Banks high and rocky; not subject to overflow. Control of gravel and boulders shifts during high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 1.75 feet May 6 (discharge estimated 500 second-feet); minimum stage recorded, −0.1 foot July 11 (discharge, 0.2 second-foot).

WINTER FLOW.—No information. Probably not seriously affected by ice.

DIVERSION.—Below all diversions.

REGULATION.—None.

ACCURACY.—Records fair.

Discharge measurements of Ash Creek at Toquerville, Utah, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 28	L. A. Snow	.....	76	May 27	Lynn Crandall	0.83	100
29	do	[a]1.28	253	27	do	.82	94
30	do	[a]1.64	435	Sept. 7	L. A. Snow	.24	8.3
May 24	Lynn Crandall	.88	90				

[a] Gage height determined on May 24 from reference marks left at time of original measurements.

Daily discharge, in second-feet, of Ash Creek at Toquerville, Utah, for the year ending Sept. 30, 1915.

Day.	Apr.	May.	June.	July.	Aug.	Day.	Apr.	May.	June.	July.	Aug.
1	.....	336	68	6	.....	16	.....	246	8	.....	.....
2	.....	234	62	6	.....	17	.....	234	7	.....	.....
3	.....	331	60	5	.....	18	.....	239	6	.....	.....
4	.....	478	34	5	.....	19	.....	221	6	.....	.....
5	.....	478	25	4	.....	20	.....	208	6	.....	.....
6	.....	500	28	4	.....	21	.....	115	6	.....	.....
7	.....	416	24	4	.....	22	.....	111	6	.....	.....
8	.....	472	20	4	.....	23	.....	104	5	162	.....
9	.....	357	20	3	.....	24	.....	93	4	6	.....
10	.....	341	25	2	.....	25	.....	121	4	.....	.....
11	.....	310	19	2	.....	26	.....	98	4	.....	294
12	.....	331	11	.....	.....	27	.....	105	4	.....	32
13	.....	373	11	.....	.....	28	76	75	4	.....	6
14	.....	357	10	.....	.....	29	253	73	4	.....	.....
15	.....	257	9	.....	.....	30	438	68	4	.....	.....
						31	.....	73	.....	.....	.....

NOTE.—Discharge determined from two curves fairly well defined above and rather poorly defined below 90 second-feet, one curve applicable Apr. 28 to May 24, the other May 25 to Sept. 30. Depth of water at the gage measured by observer May 2–24 referred to gage datum by means of comparative reading May 24. Datum was changed an unknown amount May 25, 1915. After July 11 the observer ceased reading the gage except when a rainstorm caused the creek to rise, but from all available evidence the flow probably varied from about 1 to 4 second-feet.

Monthly discharge of Ash Creek at Toquerville, Utah, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April 28–30	438	76	256	1,520	B.
May	500	68	250	15,400	B.
June	68	4	16.8	1,000	C.
The period				17,900	

LEEDS (QUAIL) CREEK NEAR LEEDS, UTAH.

LOCATION.—In the N. ½ sec. 36, T. 40 S., R. 14 W., just above heading of R. C. Savage's canal and about a quarter of a mile above head of Leeds canal, three-quarters of a mile north of the abandoned mining camp of Silver Reef, and 2½ miles north of Leeds.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 31 to September 30, 1915.

GAGE.—Vertical staff on left bank 60 feet above head of Savage ditch; read two or three times a week by R. C. Savage.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Stream bed consists of gravel and boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.75 feet May 8 (discharge, 54 second-feet); minimum stage recorded, 1.98 feet January 31 (discharge, 3.9 second-feet). These values are perhaps not the true maximum and minimum due to the infrequency with which gage readings can be secured.

WINTER FLOW.—No information. Probably not seriously affected by ice for any length of time.

DIVERSIONS.—Above all diversions. R. C. Savage diverts water about 60 feet below the station for irrigation and domestic uses. Measurements of this ditch have shown from 1 to 3 second-feet. Measurements of the Leeds canal, which diverts about a quarter of a mile below have shown discharges up to 18.5 second-feet.

REGULATION.—None.

ACCURACY.—Records only fair as daily gage readings are impracticable.

Discharge measurements of Leeds (Quail) Creek near Leeds, Utah, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 31	Lynn Crandall	1.98	3.9	May 25	Lynn Crandall	2.48	24.7
May 1	L. A. Snow	2.46	24.6	Sept. 7	L. A. Snow	2.15	7.1

Daily discharge, in second-feet, of Leeds (Quail) Creek near Leeds, Utah, for the year ending Sept. 30, 1915.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1			12	16	25	36		10
2					25		16	
3					27		16	
4								
5			13		27			
6			13			33		
7			12		27	32		7.1
8			13	54				7.1
9			12		27			6.9
10			12				12	
11	46	14		46				6.9
12				48	27			
13				48			12	6.4
14					27			
15		16	10					
16		16	11		27	28		
17		19	11			28	11	5.7
18		21						5.7
19	5.9	23		46	27		11	
20	5.9	27		48		26		
21					32			
22			12					5.5
23			13					
24			16		36	25		
25		16		27				5.2
26	5.5	14	12		36	21	11	
27	5.9	14	12					
28			42	25				
29		12	23	26	37	20		
30		12					10	
31		12				21		

NOTE.—Discharge determined from a rating curve fairly well defined below 30 second-feet. Observer reports warm rain Feb. 11.

Monthly discharge of Leeds (Quail) Creek near Leeds, Utah, for the year ending Sept. 30, 1915.

Month.	Mean discharge in second-feet.	Run-off (total in acre-feet.)	Accuracy.
February	7.0	389	C.
March	14.6	898	C.
April	13.6	809	C.
May	38.6	2,370	C.
June	29.3	1,740	C.
July	27.6	1,700	C.
August	12.2.	750	C.
September	6.3	375	C.
The period		9,030	

NOTE.—Monthly means determined by estimating or interpolating discharge for days on which gage was not read.

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, on road to Pine Valley. Hunt's spring, which has a fairly constant discharge of about 3 second-feet, enters 10 feet below the gage.

DRAINAGE AREA.—84 square miles.

RECORDS AVAILABLE.—April 21, 1909, to September 30, 1915.

GAGE.—Vertical staff nailed to cottonwood tree on left bank about 20 feet above the ford. Datum of gage was raised 0.45 foot January 20, 1910; read once daily by R. H. Hunt.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge.

CHANNEL AND CONTROL.—Stream bed consists of gravel and boulders. Banks fairly high but may be overflowed at extreme stages; one channel at all stages. Control is at a riffle formed by small boulders just below ford; shifts at times.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.60 feet at 7 a. m. April 29 (discharge, 310 second-feet); minimum stage, 2.75 feet during December and January (discharge, 5.5 second feet).

1909–1915: Maximum stage recorded 7.5 feet (7.05 feet present datum) January 1, 1910 (discharge, estimated roughly by extending later rating curves and assuming absence of backwater due to drift or other obstructions, 1,200 or 1,300 second-feet; no discharge measurements have been made above about 400 second-feet); minimum discharge February 6–8 and September 10–17, 1914, 5 second-feet.

WINTER FLOW.—Stage-discharge relation not usually affected by ice.

DIVERSIONS.—The New Castle Reclamation Co. has constructed a reservoir on Grass Valley Creek with a capacity of 23,000 acre-feet. Water is taken from Santa Clara Creek above the town of Pine Valley, stored in the reservoir, and diverted by means of a tunnel through the rim of the Great Basin to irrigate lands outside the Colorado River Basin. The 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 and storage.

ACCURACY.—Records fair; flood estimates rough.

Discharge measurements of Santa Clara Creek near Central, Utah, during the year ending Sept. 30, 1915.

[Made by Lynn Crandall.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Jan. 29	2.87	9.8
May 22	3.58	65
Do.	3.54	59

Daily discharge, in second-feet, of Santa Clara Creek near Central, Utah, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	11	9.0	7.0	5.5	11	10	20	103	123	14	16	20
2	11	9.0	7.0	5.5	13	11	27	90	151	12	16	35
3	11	9.0	7.0	5.5	11	11	33	130	109	14	15	27
4	11	9.0	7.0	5.5	11	11	35	178	69	16	15	26
5	11	9.0	7.0	5.5	11	11	37	170	60	16	15	24
6	11	9.0	7.0	5.5	11	11	27	99	44	16	15	20
7	11	9.0	7.0	5.5	11	11	29	178	81	14	15	16
8	11	9.0	7.0	5.5	11	11	31	186	103	13	15	16
9	11	9.0	7.0	5.5	11	11	35	186	90	26	15	16
10	11	9.0	7.0	5.5	15	11	35	137	95	24	15	16
11	11	9.0	7.0	5.5	24	11	27	165	81	24	15	16
12	11	9.0	5.5	7.0	11	12	31	178	74	24	15	20
13	11	9.0	5.5	7.0	9.0	12	27	186	54	20	15	20
14	11	9.0	5.5	7.0	7.8	13	20	146	46	19	15	20
15	11	9.0	5.5	5.5	9.0	16	19	141	40	19	15	20
16	11	7.0	5.5	5.5	11	14	10	168	37	19	16	20
17	11	7.0	5.5	5.5	11	15	10	191	33	19	18	20
18	11	7.0	5.5	5.5	11	54	10	123	31	19	18	20
19	11	7.0	5.5	7.0	11	15	20	103	29	19	19	20
20	11	7.0	5.5	7.0	11	13	40	99	44	19	19	20
21	11	7.0	5.5	5.5	11	13	47	82	20	20	19	20
22	11	7.0	5.5	5.5	11	15	54	64	16	20	19	20
23	11	7.0	5.5	5.5	11	15	44	56	15	24	19	20
24	11	7.0	5.5	7.0	11	13	44	64	15	27	19	20
25	11	7.0	5.5	7.0	11	14	44	130	16	20	19	20
26	11	7.0	5.5	7.0	11	15	42	74	15	20	19	20
27	11	7.0	5.5	7.4	11	20	40	137	15	19	19	21
28	9.0	7.0	5.5	7.8	11	20	44	132	31	18	19	21
28	9.0	7.0	5.5	10	.....	31	254	146	11	18	19	21
30	9.0	7.0	5.5	10	.....	27	141	137	20	16	19	20
31	9.0	.....	5.5	9.0	.....	20	.....	90	.....	16	19	.....

NOTE.—Discharge determined from a rating curve fairly well defined up to 100 second-feet; interpolated for a few days on which gage was not read.

Monthly discharge of Santa Clara Creek near Central, Utah, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	11	9.0	10.7	658	C.
November	9.0	7.0	8.00	476	C.
December	7.0	5.5	6.03	371	C.
January	10	5.5	6.43	395	C.
February	24	7.8	11.4	633	C.
March	54	10	15.7	965	B.
April	254	10	42.6	2,530	B.
May	191	56	131	8,060	C.
June	151	11	52.3	3,110	B.
July	27	12	18.8	1,160	B.
August	19	15	17.0	1,050	C.
September	35	16	20.5	1,220	C.
The year	254	5.5	28.5	20,600	

SANTA CLARA CREEK AT SANTA CLARA, UTAH.

LOCATION.—In sec. 16, T. 42 S., R. 16 W., at west edge of the town of Santa Clara, a short distance above the headings of the North and South St. George & Santa Clara canals and about 6 miles above confluence of Santa Clara Creek with Virgin River.

DRAINAGE AREA.—468 square miles.

RECORDS AVAILABLE.—February 3 to September 30, 1915. April 16, 1909, to January 31, 1913, for station known as Santa Clara Creek near St. George, 2 miles downstream. There are diversions between the two points.

GAGE.—Inclined staff on right bank; read once daily by H. W. Stucki.

DISCHARGE MEASUREMENTS.—Made by wading or from cable one-eighth mile above gage.

CHANNEL AND CONTROL.—Stream bed consists of clay, gravel, and considerable sand very unstable. The diversion dam for the North and South canals causes a large amount of sand to fill in below the gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.0 feet at 8 a. m. April 28 (discharge, estimated roughly at 800 second-feet); minimum stage recorded, 0.6 foot September 7–14 (discharge, 18 second-feet); minimum discharge recorded 11 second-feet July 6 (stage, 1.2 feet); minimum stage and discharge did not occur on same day owing to shifting stage-discharge relation.

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—The Santa Clara Town canal diverts from 8 to 10 second-feet of water, about half a mile upstream, and the St. George and Santa Clara North and South canals divert immediately below the station; the water is used for irrigation.

REGULATION.—None.

ACCURACY.—Records poor owing to extremely unstable conditions.

Discharge measurements of Santa Clara Creek at Santa Clara, Utah, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 3	Lynn Crandall	1.89	51	June 17	L. A. Snow	1.40	44.0
Apr. 6	L. A. Snow	[a] 2.3	55	July 9	do	1.30	16.7
May 3	do	1.76	155	Sept. 2	do	1.10	19.4
23	Crandall and Snow	1.24	87	16	do	.80	31.8

[a] Observer's reading for day; gage height not recorded at time of measurement.

Daily discharge, in second-feet, of Santa Clara Creek at Santa Clara, Utah, for the year ending Sept. 30, 1915.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Sept.
1	.....	62	64	223	75	24	300
2	.....	52	64	207	64	17	58
3	52	52	73	176	54	17	620
4	40	52	64	240	35	17	102
5	27	52	64	305	27	17	32
6	27	52	55	392	27	11	24
7	27	52	55	322	19	17	18
8	27	52	55	305	19	17	18
9	27	52	55	272	35	17	18
10	20	43	55	223	54	17	18
11	310	43	45	207	54	17	18
12	132	52	45	191	64	17	18
13	72	52	45	191	54	24	18
14	62	52	45	191	44	24	18
15	52	72	38	191	44	24	24
16	43	62	38	191	35	24	28
17	52	62	38	191	40	24	32
18	52	62	38	176	35	17	32
19	132	62	38	161	35	17	32
20	83	52	45	147	35	14	32
21	83	52	55	120	54	15	32
22	35	52	64	107	44	16	32
23	35	72	73	95	35	50	32
24	27	62	84	83	19	50	32
25	20	62	64	83	19	45	32
26	20	52	46	83	19	45	32
27	20	52	46	83	19	30	32
28	52	52	800	95	27	25	32
29	.....	45	272	95	23	25	32
30	.....	46	357	90	20	20	32
31	.....	64	.....	80	.....	18	.....

NOTE.—Daily discharge determined from a number of poorly defined rating curves applicable as follows: Feb. 3 to Mar. 28, Mar. 31 to Apr. 27, Apr. 29 to May 29, June 2–29, July 1–19, and Sept. 3–30. Indirect methods for shifting control were used for days in between. Mean discharge Aug. 1–31 estimated at 20 second-feet, on account of unstable channel conditions and lack of measurements.

Monthly discharge of Santa Clara Creek at Santa Clara, Utah, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
February 3–28	310	20	58.8	3,030
March	72	43	54.9	3,380
April	800	38	96.0	5,710
May	392	80	178	10,900
June	75	19	37.6	2,240
July	50	11	23.0	1,410
August	.....	.....	a20.0	1,230
September	620	18	59.3	3,530
The period	800	.....	66.1	31,400

a Estimated.

TOWN CANAL AT SANTA CLARA, UTAH.

LOCATION.—In sec. 16, T. 42 S., R. 16 W, at weir near head of canal near northwest corner of town of Santa Clara.

RECORDS AVAILABLE.—May 23 to September 30, 1915.

GAGE.—Vertical staff just above weir; read once a week by H. W. Stucki.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Control is crest of weir immediately below gage. Point of zero flow, about zero on gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 0.76 foot September 2 (discharge, 12.3 second-feet).

WINTER FLOW.—No information. Probably a small flow is maintained for domestic use.

DIVERSION.—Above all diversions.

REGULATION.—Regulated at the headgates.

ACCURACY.—Records incomplete but are fair when gage readings are available.

Canal diverts water from Santa Clara Creek near west edge of sec. 16 for irrigation and domestic use in and around Santa Clara.

Discharge measurements of Town canal at Santa Clara, Utah, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 23	Crandall and Snow	0.50	5.4
July 9	L. A. Snow	.60	7.6
Sept. 2	....do	.76	12.2

Daily discharge, in second-feet, of Town canal at Santa Clara, Utah, for the year ending Sept. 30, 1915.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	.....	.....	.....	8.1	.....	16	.....	.....	.....	.....	0
2	.....	.....	7.6	.....	12.3	17	.....	.....	.....	.....	.....
3	.....	.....	.....	.....	.....	18	.....	9.8	.....	.....	.....
4	.....	.....	.....	.....	.....	19	.....	.....	.....	.....	8.1
5	.....	.....	.....	.....	8.7	20	.....	.....	.....	.....	.....
6	.....	.....	.....	.....	.....	21	.....	.....	.....	.....	.....
7	.....	.....	.....	.....	.....	22	.....	.....	.....	7.6	.....
8	.....	.....	.....	7.2	.....	23	5.4	.....	.....	.....	.....
9	.....	.....	7.6	.....	.....	24	.....	.....	.....	.....	.....
10	.....	.....	.....	.....	.....	25	.....	.....	.....	.....	.....
11	.....	9.8	.....	.....	.....	26	.....	.....	.....	.....	9.8
12	.....	.....	.....	.....	8.1	27	.....	.....	9.8	.....	.....
13	.....	.....	.....	.....	.....	28	.....	.....	.....	.....	.....
14	.....	.....	.....	.....	.....	29	.....	.....	.....	8.1	.....
15	.....	.....	7.6	7.6	.....	30	.....	.....	.....	.....	.....
						31	.....	.....	.....	.....	.....

NOTE.—Daily discharge determined from a fairly well defined rating curve. No interpolations or estimates have been made for days when the gage was not read.

ST. GEORGE AND SANTA CLARA NORTH CANAL AT SANTA CLARA, UTAH.

LOCATION.—In the SW. ¼ sec. 16, T. 42 S., R. 16 W., at weir about half a mile below head of canal and near southeast corner of town of Santa Clara.

RECORDS AVAILABLE.—April 12 to September 30, 1915.

GAGE.—Vertical staff just above 5-foot weir, read about once a week by H. W. Stucki. Gage was moved a few feet downstream and closer to the weir about August 1, reset presumably at the same datum.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—5-foot Cippoletti weir just below gage forms control. Conditions not favorable for obtaining accurate results by use of weir formulas.

EXTREMES OF DISCHARGE.—Maximum stage recorded during season, 1.24 feet June 2 (discharge, 18 second-feet); minimum stage recorded, 0.21 at 5.40 p. m. May 23 (discharge, 1.3 second-feet). Canal may have been practically dry at times due to floods damaging diversion works.

WINTER FLOW.—No information.

DIVERSION.—Above diversions.

REGULATION.—No information.

Canal diverts water from Santa Clara Creek for use in irrigation near mouth of stream.

Discharge measurements of St. George and Santa Clara North canal at Santa Clara, Utah, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 23	Crandall and Snow	0.21	[a]1.3
Sept. 16	L. A. Snow	[b] .74	8.2

[a] Leak around weir control above present water level.
[b] New gage a few feet downstream from old one; established about Aug. 1. 1915.

Daily discharge, in second-feet, of St. George and Santa Clara North canal at Santa Clara, Utah, for the year ending Sept. 30, 1915.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	.....	.....	10	4.5	.....	16	7.5	.....	.....	.....	4.5	6.4
2	.....	.....	18	.....	.....	.....	17	.....	.....	.....	7.5	.....	.....
3	.....	.....	.....	.....	.....	.....	18	.....	.....	13	.....	.....	.....
4	.....	.....	.....	.....	.....	.....	19	.....	.....	.....	.....	.....	.....
5	.....	.....	.....	7.5	.....	.....	20	.....	.....	.....	7.5	.....	.....
6	.....	.....	.....	.....	.....	.....	21	.....	.....	.....	.....	.....	5.1
7	.....	.....	16	5.2	.....	.....	22	.....	.....	12	.....	.....	.....
8	.....	.....	.....	.....	.....	6.2	23	13	5.3	.....	13	.....	.....
9	.....	.....	.....	9.2	.....	.....	24	.....	.....	.....	.....	5.2	.....
10	.....	.....	.....	8.4	.....	.....	25	.....	.....	.....	.....	.....	.....
11	.....	.....	17	.....	.....	.....	26	.....	.....	.....	.....	.....	.....
12	15	.....	.....	8.5	.....	.....	27	.....	.....	4.5	11	.....	9.2
13	.....	.....	.....	.....	.....	.....	28	.....	12	.....	.....	.....	.....
14	.....	.....	15	.....	.....	.....	29	.....	.....	.....	.....	.....	.....
15	.....	13	.....	.....	.....	.....	30	.....	.....	.....	.....	.....	.....
							31	.....	.....	.....	.....	6.7	.....

NOTE.—Discharge determined from a poorly defined rating curve. No attempt has been made to interpolate or estimate discharge for days on which gage was not read. Aug. 27 observer reports that the water was out of the ditch on account of a flood.

ST. GEORGE AND SANTA CLARA SOUTH CANAL AT SANTA CLARA, UTAH.

LOCATION.—Probably in sec. 21, T. 42 S., R. 16 W., at the weir about half a mile below head of canal and near south edge of the town of Santa Clara.

RECORDS AVAILABLE.—April 12 to September 30, 1915 (discharge measurements and gage heights only).

GAGE.—Vertical staff a short distance above weir.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—5-foot Cippoletti weir below gage forms the control. Point of zero flow, zero on gage. Conditions do not warrant the use of weir formulas to determine discharge.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year, 1.20 feet June 14 (discharge estimated roughly at 15 second-feet); minimum stage recorded, 0.52 foot August 16 (discharge, probably 3 second-feet or less). Observer reports water out of canal on August 27 owing to storms damaging diversion works.

WINTER FLOW.—No information.

DIVERSIONS.—Above diversions.

REGULATION.—Flow regulated at headworks.

Canal diverts water from Santa Clara Creek in the S ½ of sec. 16 for irrigation of lands near mouth of creek.

Discharge measurements of St. George and Santa Clara South canal at Santa Clara, Utah, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 23	Lynn Crandall	[a]0.83	8.4
Sept. 16	L. A. Snow	1.23	6.5

[a] Zero of gage is at level of crest of weir which is about smothered out by sand washing in above control.

Daily gage height, in feet, of St. George and Santa Clara South canal, for the year ending Sept. 30, 1915.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1				1.00	0.70		16	0.84				0.52	0.58
2			1.00				17				0.65		
3							18			0.90			
4							19						
5				.70			20				.66		
6							21						.64
7			1.00	.50			22			.85			
8						0.66	23	.80	0.86		.90		
9				.72			24					.50	
10				.75			25						
11			.95				26						
12	0.90			.74			27				.80	1.00	.64
13							28		.95				
14			1.20				29						
15		0.85					30						
							31					.60	

NOTE.—Observer reports water out of ditch on August 27.

MUDDY RIVER NEAR MOAPA, NEV.

LOCATION.—In the SE. ¼ sec. 15, T. 14 S., R. 65 E., at the concrete weir about three quarters of a mile below Home ranch and 6 miles northwest of Moapa, a short distance below the springs that form the source of the stream.

DRAINAGE AREA.—1,080 square miles. A large drainage area above Arrow Canyon is tributary to Muddy River, but produces no surface run-off except during cloud-bursts or periods of heavy rainfall.

RECORDS AVAILABLE.—July 1, 1913, to September 30, 1915.

GAGE.—Stevens water-stage recorder in pool above weir.

DISCHARGE MEASUREMENTS.—Made from a foot plank below weir.

CONTROL.—A 10-foot Cippoletti weir. Point of zero flow, zero on gage.

EXTREMES OF DISCHARGE.—Maximum discharge for the year occurred during the night of February 10 and 11; record lost owing to tearing of paper by pencil; stage, 1.9 feet, estimated by comparison with record obtained at station 2 miles below (discharge, 88 second-feet); minimum stage, 1.02 feet at 8 p. m. September 21 (discharge, 37 second-feet).

1913–1915: Maximum stage recorded, 9.9 feet at 11 p. m. February 21, 1914 (discharge estimated 765 second-feet); minimum stage, 1.02 feet September 21, 1915 (discharge, 37 second-feet).

WINTER FLOW.—Stage-discharge relation not affected by ice, but stream is subject to sudden freshets in winter.

DIVERSIONS.—Several ranch ditches above the station divert water for irrigation.

REGULATION.—Flow affected by irrigation diversions.

ACCURACY.—Records good. Rating curves are well defined except for high stages. Flow is very uniform.

Discharge measurements of Muddy River near Moapa, Nev., during the year ending Sept. 30, 1915.

[Made by Leonard Tanner.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 11	1.24	45.8	Apr. 10	1.20	51	May 14	1.13	42.4
20	1.28	48.1	May 13	1.20	45.3	22	1.24	46.6
Dec. 28	1.27	49.6	14	1.13	42.2	July 10	1.20	45.1
Mar. 19	1.21	48.8						

Daily discharge, in second-feet, of Muddy River near Moapa, Nev., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	45	47	47	50	50	54	50	46	42	46	42
2	45	46	47	50	50	53	47	50	42	45	42
3	45	46	48	50	50	53	46	50	42	47	42
4	45	46	47	50	50	53	46	50	42	48	41
5	45	47	47	50	50	52	47	50	42	47	41
6	46	48	47	50	50	52	50	50	42	47	42
7	46	48	46	50	50	52	49	50	42	45	43
8	43	47	46	50	50	52	51	49	42	45	45
9	42	47	48	50	52	52	51	49	42	45	44
10	43	48	48	50	52	52	42	47	43	45	46
11	45	48	47	50	83	52	50	44	46	45	46
12	46	48	47	50	62	50	47	44	46	47	45
13	46	48	48	50	58	48	48	45	45	48	46
14	46	48	49	50	56	48	48	44	43	44	44
15	47	48	50	50	55	48	50	45	45	39	42
16	48	48	49	50	54	49	50	45	41	39	42
17	48	48	50	49	54	48	50	45	40	39	43
18	48	48	51	49	54	48	50	45	39	39	42
19	48	48	50	49	53	48	50	47	39	41	42
20	48	48	50	49	55	48	49	47	38	46	41
21	44	47	50	50	56	48	48	46	39	47	37
22	40	46	50	49	54	47	49	47	40	54	37
23	40	47	50	49	54	47	49	48	41	47	38
24	41	47	50	49	54	48	49	49	42	54	40
25	42	46	50	49	54	49	49	47	43	48	42
26	42	46	50	49	54	51	48	46	45	48	53
27	44	46	50	49	53	51	46	45	45	48	61
28	45	46	50	49	54	50	47	46	45	44	52
29	45	46	50	67	.....	51	47	46	46	42	51
30	45	47	50	58	.....	52	47	46	46	43	50
31	46	.....	50	51	.....	51	.....	44	.....	43	50

NOTE.—Discharge determined from four rating curves well defined between 35 and 60 second-feet, applicable as follows: Curve I, Oct. 11 to Dec. 20; Curve II, Dec. 24 to Feb. 10, Apr. 2 to May 14, and July 11 to Aug. 26; Curve III, Feb. 12 to Apr. 1; Curve IV, May 19 to July 6. Indirect method for shifting contro used Oct. 1–10, Dec. 21–23, and July 7–10. Discharge Jan. 24–30, Feb. 11, May 15–18, 23–31, June 7 and 8, and Aug. 27–31 determined by comparison with the record of flow at the station above Indian Reservation. Mean discharge Sept. 1–30, estimated from flow at lower station, 48 second-feet.

Monthly discharge of Muddy River near Moapa, Nev., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	48	40	44.8	2,750	A.
November	48	46	47.1	2,800	A.
December	51	46	48.8	3,000	A.
January	67	49	50.5	3,110	B.
February	83	50	54.3	3,020	B.
March	54	47	50.2	3,090	A.
April	52	46	48.7	2,900	A.
May	50	44	46.8	2,880	B.
June	46	38	42.5	2,530	A.
July	54	39	45.3	2,790	A.
August	61	37	44.3	2,720	A.
September	.....	.....	a48.0	2,860	B.
The year	83	37	47.6	34,400	

a Estimated.

MUDDY RIVER ABOVE INDIAN RESERVATION, NEAR MOAPA, NEV.

LOCATION.—In the SW. ¼ sec. 26, T. 14 S., R. 65 E., about a quarter of a mile above upper end of the Moapa River Indian Reservation, 2 miles below the station at the Home ranch, and 5 miles west of Moapa.

DRAINAGE AREA.—1,100 square miles.

RECORDS AVAILABLE.—August 24, 1914, to September 30, 1915. Several current-meter measurements were made in 1914 before the gage-height record was started.

GAGE.—Stevens water-stage recorder installed August 24, 1914. Current-meter measurements prior to August 24 referred to a vertical staff gage at same site and datum.

DISCHARGE MEASUREMENTS.—Made from a foot plank about 4 feet below gage.

CHANNEL AND CONTROL.—Bed consists of sand, clay, and gravel. Banks are fairly high but are overflowed at extreme stages, when the river flows in more than one channel. Control is at riffle about 100 feet below gage; stage discharge relation affected by moss growth.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year and for the period 1914–15, 3.21 feet at 4 a. m. February 11 (discharge, 86 second-feet); minimum stage recorded 1.79 feet at 6 p. m. August 21 (discharge, 37 second-feet).

WINTER FLOW.—Stage discharge relation not affected by ice. Flow very uniform as stream is fed by springs.

DIVERSIONS.—None except one small ditch between this station and the one 2 miles above, near the Home ranch.

REGULATION.—None.

ACCURACY.—Records good.

Discharge measurements of Muddy River above Indian reservation, near Moapa, Nev., during the year ending Sept. 30, 1915.

[Made by Leonard Tanner.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 20	2.28	50	Mar. 19	2.08	48.3	July 13	2.14	47.2
Dec. 28	2.25	49.6	Apr. 10	2.20	51	Aug. 16	2.00	42.5
Mar. 15	1.99	46.2	May 20	2.12	48.5	Sept. 5	2.30	50

Daily discharge, in second-feet, of Muddy River above Indian reservation, near Moapa, Nev., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	47	48	49	49	48	52	49	47	43	45	43	50
2	47	48	49	49	48	51	46	51	42	45	43	51
3	47	48	49	49	48	51	47	51	43	47	42	51
4	47	49	49	49	47	51	46	51	44	48	42	65
5	47	50	49	49	47	50	48	51	43	47	42	52
6	48	50	49	49	47	50	50	51	43	48	43	51
7	47	50	48	49	47	50	50	51	42	46	44	50
8	46	50	48	48	47	50	52	50	42	45	45	50
9	45	50	48	48	49	50	52	50	42	44	45	50
10	45	50	48	48	51	50	51	48	43	44	46	50
11	46	50	49	48	82	50	50	45	45	44	47	50
12	47	50	50	48	62	48	48	46	45	46	47	50
13	47	50	51	48	54	46	48	47	45	47	47	51
14	47	50	51	48	54	46	48	46	44	46	45	51
15	49	50	51	48	53	46	50	46	46	40	43	50
16	50	50	51	48	53	48	50	46	42	40	43	50
17	51	50	51	48	53	47	50	46	41	40	45	49
18	50	50	52	48	52	48	50	46	40	40	43	48
19	50	50	50	48	52	48	50	48	40	41	44	48
20	50	49	50	48	53	47	49	49	39	45	41	47
21	46	47	50	48	54	46	48	48	40	46	38	47
22	42	47	50	47	52	46	49	48	41	54	39	47
23	42	48	50	47	52	46	50	49	42	47	40	47
24	43	48	50	47	52	48	49	50	43	54	42	47
25	43	47	50	47	52	49	50	48	44	49	43	47
26	44	47	50	47	51	50	49	47	45	49	53	47
27	45	47	50	47	51	50	47	46	45	49	62	42
28	47	47	50	47	51	50	47	47	45	45	53	42
29	47	48	49	65	.....	50	48	47	46	43	52	40
30	47	49	49	56	.....	51	47	47	46	44	51	41
31	48	.....	49	49	.....	50	.....	45	.....	44	51	.....

NOTE.—Discharge determined from two rating curves well defined from 40 to 50 second-feet, one used, Oct. 6 to Feb. 10; and June 1 to Sept. 30; the other Feb. 12 to May 30. Discharge Feb. 11 and May 31 determined by indirect method for shifting control. Discharge Oct. 1–5, Oct. 28 to Nov. 4, Dec. 8–9, Apr. 16–20 May 3–10, June 15–22, and July 7–9, 17, 22–25, and 28 determined by comparison with record of flow at the Home ranch station.

Monthly discharge of Muddy River above Indian reservation, near Moapa, Nev., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	51	42	46.7	2,870	B.
November	50	47	48.9	2,910	A.
December	52	48	49.6	3,050	A.
January	65	47	48.8	3,000	A.
February	82	47	52.2	2,900	A.
March	52	46	48.9	3,010	A.
April	52	46	48.9	2,910	A.
May	51	45	48.0	2,950	B.
June	46	39	43.0	2,560	B.
July	54	40	45.5	2,800	A.
August	62	38	45.3	2,790	A.
September	65	40	48.7	2,900	A.
The year	82	38	47.9	34,600	

MUDDY RIVER AT RAILROAD PUMPING PLANT NEAR, MOAPA, NEV.

LOCATION.—In sec. 5, T. 15 S., R. 66 E., at railroad bridge on main-line track of Salt Lake Route, about a mile below the Indian Reservation and 1¾ miles south of Moapa. About confluence of Meadow Valley Wash.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 8, 1914, to September 30, 1915.

GAGE.—Vertical staff on right bank, attached to pile of railroad bridge; read twice daily by James Borbridge.

DISCHARGE MEASUREMENTS.—Made from foot plank about 150 feet below gage.

CHANNEL AND CONTROL.—Bed composed of clay and sand; conditions unstable, despite the well-defined rock reef about 200 feet downstream. Banks comparatively low; overflowed during freshets; one channel, however, at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 2.4 feet at 3 p. m. February 11, 1915 (discharge approximately 145 second-feet); minimum stage recorded, 0.34 foot at 6.30 p. m. June 20, 1915 (discharge, 29 second-feet).

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Water for approximately 200 acres is diverted at the Indian Reservation, and for another ranch between the reservation and the station.

REGULATION.—None.

ACCURACY.—Records good.

Discharge measurements of Muddy River at railroad pumping plant near Moapa, Nev., during the year ending Sept. 30, 1915.

[Made by Leonard Tanner.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Nov. 22	0.62	42.2	Mar. 13	0.56	44.1	Apr. 11	0.67	47.8
Dec. 29	.75	48.2	19	.60	44.1	Aug. 14	.58	37.5

Daily discharge, in second-feet, of Muddy River at railroad pumping plant near Moapa, Nev., for the year ending Sept. 30, 1915.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	45	49	50	54	48	43	32	41	38	46
2	.....	45	48	49	53	44	46	34	38	36	46
3	.....	46	49	48	52	45	48	34	39	36	46
4	.....	44	48	48	52	40	48	39	40	32	75
5	.....	44	48	48	52	44	48	36	41	33	62
6	.....	44	48	48	50	41	48	36	38	34	55
7	.....	45	47	48	49	44	47	38	36	33	52
8	46	45	48	48	49	46	49	37	36	37	50
9	45	46	48	50	49	45	49	36	36	37	50
10	45	47	47	50	50	48	45	35	36	38	51
11	45	45	48	145	49	46	42	36	36	37	50
12	45	47	47	70	49	44	41	36	38	37	50
13	45	47	47	58	44	44	41	37	40	38	50
14	45	48	47	56	43	45	38	37	39	35	50
15	45	48	47	55	43	48	37	36	32	35	51
16	45	48	48	55	43	46	37	34	31	36	50
17	45	50	48	55	43	45	39	32	31	37	50
18	45	50	48	54	43	46	40	32	34	35	50
19	45	50	48	54	44	42	40	32	33	34	48
20	45	48	48	54	44	42	40	30	37	33	49
21	43	48	48	56	41	42	42	30	39	34	48
22	43	48	48	54	40	44	42	31	48	30	48
23	43	48	47	54	44	45	43	32	40	30	48
24	43	48	47	54	45	46	43	32	45	32	47
25	43	48	46	54	46	46	42	34	44	34	47
26	43	48	47	53	50	47	40	35	43	35	46
27	44	48	47	52	49	43	39	38	42	52	43
28	44	48	48	53	48	41	40	37	41	48	44
29	44	48	65	.....	49	43	37	39	38	45	39
30	45	48	62	.....	51	42	33	40	37	45	40
31	.....	49	51	.....	51	.....	36	.....	38	46	.....

NOTE.—Discharge determined from three rating curves fairly well defined between 35 and 55 second-feet, and used as follows: Curve I, Nov. 7 to Feb. 10 and Sept. 5–30; Curve II, Feb. 13 to May 20; Curve III, May 27 to Sept. 3. Discharge Feb. 11 and 12, May 21–26, and Sept. 4 determined by indirect methods for shifting control.

Monthly discharge of Muddy River at railroad pumping plant near Moapa, Nev., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
November 7-30	46	43	44.4	2,030	A.
December	50	44	47.1	2,900	A.
January	65	47	48.8	3,000	B.
February	135	48	55.9	3,100	B.
March	54	40	47.4	2,910	A.
April	48	40	44.4	2,640	A.
May	49	33	42.0	2,580	B.
June	40	30	34.9	2,080	C.
July	48	31	38.3	2,360	C.
August	52	30	36.8	2,260	B.
September	75	39	49.4	2,940	B.
The period	135	30	44.4	28,800	

MUDDY RIVER NEAR ST. THOMAS, NEV.

LOCATION.—In sec. 13, T. 17 S., R. 68 E., about a quarter of a mile above the confluence of Muddy River with the Virgin and 1½ miles below St. Thomas, Nev.

DRAINAGE AREA.—3,980 square miles.

RECORDS AVAILABLE.—May 23, 1913, to September 30, 1915.

GAGE.—Vertical staff on right bank about a quarter of a mile above the mouth of the stream; read once daily by J. H. Foxley. Installed March 15, 1914, to replace the gage washed out on February 22, 1914. The gage used May 23, 1913, to February 22, 1914, was a vertical staff half a mile upstream from the present site.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Stream bed consists of clay and mud; shifting; channel greatly changed by floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.25 feet during night of February 11 (discharge about 820 second-feet); minimum stage recorded, 2.55 feet June 9 (discharge, 0.6 second-foot); minimum discharge recorded, 0.1 second-foot August 3–26 (stage, 3.05 feet); minimum stage and discharge do not occur simultaneously owing to shifting channel conditions.

1913–1915: Maximum discharge occurred about 6 a. m. February 22, 1914, determined later by use of Kutter's formula to be about 6,500 second-feet; stage probably between 8 and 9 feet. Water standing in pools June 1 and 2, and August 11, 12, 19, 21 and 30, 1913.

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Below all diversions. At times a small amount of waste water from the St. Thomas district returns below station.

REGULATION.—None except that caused by irrigation.

ACCURACY.—Records only fair; flood estimates roughly approximate.

Discharge measurements of Muddy River near St. Thomas, Nev., during the year ending Sept. 30, 1915.

[Made by Leonard Tanner.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Jan. 17	3.39	25.7	Mar. 25	2.92	7.8	May 8	4.90	238
17	3.47	32.6	May 7	5.00	297	Aug. 26	3.08	.2

Daily discharge, in second-feet, of Muddy River near St. Thomas, Nev., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	1.8	10	15	18	45	41	5.5	10	2.9	.....	.....
2	2.5	10	17	15	43	38	5.0	30	2.5	.....	.....
3	2.5	11	20	27	47	39	4.1	38	2.2	.....	0.1
4	4.5	12	21	34	45	38	3.5	35	1.3	.....	.1
5	5.8	10	22	36	45	38	3.3	40	1.0	.....	.1
6	4.5	10	20	37	43	35	2.9	70	1.3	.....	.1
7	4.5	10	20	35	43	38	2.9	283	.9	.....	.1
8	4.5	12	20	38	45	32	2.5	253	1.0	.....	.1
9	5.8	13	21	34	47	33	3.1	132	.6	0.2	.1
10	4.5	11	20	35	49	35	2.4	115	.8	.2	.1
11	4.5	13	20	37	107	33	2.5	100	.....	.2	.1
12	5.8	13	20	39	387	34	2.9	80	.....	.2	.1
13	4.5	13	21	35	80	35	2.5	74	.....	.2	.1
14	5.8	12	22	37	58	31	3.5	63	.....	.2	.1
15	4.5	12	23	35	56	25	6.2	58	.....	.2	.1
16	4.5	12	20	38	58	25	10	34	.....	.2	.1
17	4.5	12	22	30	54	20	9.4	28	.....	.2	.1
18	5.8	13	22	33	49	18	8.5	20	.....	.2	.1
19	7.0	12	22	35	54	16	7.0	18	.....	.2	.1
20	5.8	12	21	33	54	15	7.6	15	.....	.2	.1
21	7.0	12	22	31	49	14	7.0	13	.....	.2	.1
22	10	12	23	31	47	13	6.5	12	.....	.2	.1
23	5.8	12	25	29	47	13	7.9	9.1	.....	.2	.1
24	10	12	23	31	45	12	7.6	8.5	.....	50	.2
25	10	13	25	32	47	7.6	5.8	8.5	.....	.....	.2
26	7.0	12	23	31	49	8.5	6.5	7.6	.....	.....	.2
27	8.5	12	22	28	46	9.1	7.0	7.0	.....	.....	.....
28	5.8	13	22	29	45	8.2	7.6	10	.....	.....	.....
29	7.0	14	21	70	.....	7.2	7.0	7.6	.....	.....	.....
30	7.0	15	20	62	.....	7.6	8.5	5.8	.....	.....	.....
31	10	.....	25	45	.....	5.8	.....	3.3	.....	.....	.....

NOTE.—Daily discharge determined from two rating curves as follows: One curve fairly well defined up to 300 second-feet used October 1 to June 10. The curve used July 9 to August 26 is defined only at the lower end and discharge over half a second-foot is roughly approximate.

Monthly discharge of Muddy River near St. Thomas, Nev., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	10	1.8	5.86	360	D.
November	15	10	12.0	714	C.
December	25	15	21.3	1,310	C.
January	70	15	34.8	2,140	C.
February	387	43	63.7	3,540	C.
March	41	5.8	23.4	1,440	C.
April	10	2.4	5.56	331	C.
May	283	3.3	51.2	3,150	C.
June 1–10	2.9	.6	1.45	28	D.
July 9–31	50	.2	9.91	452	
August 1–26	.....	.1	.49	25	

NOTE.—Discharge July 25–31 estimated at 25 second-feet; Aug. 1, and 2, at 5 second-feet.

WILLIAMS RIVER BASIN.

WILLIAMS RIVER NEAR SWANSEA, ARIZ.

LOCATION.—In canyon a mile below Planet mine 9 miles northwest of Swansea, Yuma County, and 28 miles north of Bouse.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 26, 1910, to December 31, 1915, when station was discontinued.

GAGE.—Staff in four sections; two low-water sections on right bank a short distance above cable; upper sections bolted to cliffs on left bank just above cable; read by L. G. Martinez. Auxiliary staff gage installed March 25, 1915, on right bank at datum 0.45 feet above that of regular gage, was read until July 9, 1915, when observations were resumed on original gage.

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

CHANNEL AND CONTROL.—Shifting sand; wide nonsensitive section. Permanent spring discharging about 14 second-feet just above station.

EXTREMES OF DISCHARGE.—1910–1915: Maximum stage recorded during year, 7.50 feet at 8.30 a. m. January 30, 1915 (discharge, determined from extension of rating curve, about 9,000 second-feet); minimum stage bears no definite relation to minimum discharge because of shifting control; a minimum discharge about 14 second-feet occurred at numerous times during 1914 and the period covered by records.

DIVERSIONS.—Sufficient water to irrigate a few acres of land is diverted at ranch about a mile above station. Desert claim of about 500 acres about 20 miles above station has been partly irrigated, principally from flood water; other small ranches above station pump water from river sands.

ACCURACY.—Records poor on account of shifting control and lack of discharge measurements. Gage read once daily to half tenths. Discharge determined by indirect method for shifting control. Upper part of standard rating surve determined by extending area and mean velocity curves. Data insufficient for determination of daily or monthly discharge from October 1 to December 31, 1915.

Discharge measurements of Williams River near Swansea, Ariz., during the period Oct. 1, 1914, to Dec. 31, 1915.

[Made by M. D. Anderson.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1914.	*Feet.*	*Sec.-ft.*	1915.	*Feet.*	*Sec.-ft.*	1915.	*Feet.*	*Sec.-ft.*
Oct. 8	3.30	22.5	Mar. 25	4.05	48.0	Nov. 15	4.02	21.4
Dec. 6	3.15	22.0	July 14	3.90	14.5	15	4.02	21.7

Daily discharge, in second-feet, of Williams River near Swansea, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	22	34	22	22	1,060	75	36	14	120	36	25	14
2	22	34	22	22	315	48	48	14	120	36	36	120
3	22	34	22	22	3,000	25	48	14	135	25	36	50
4	22	34	22	22	155	210	48	63	135	25	36	36
5	22	34	22	20	155	170	36	270	135	25	36	36
6	22	34	22	20	155	190	36	170	135	25	36	36
7	22	34	22	20	120	335	36	170	135	25	36	36
8	22	34	22	20	90	210	36	170	135	25	36	36
9	22	34	22	20	75	170	36	270	135	14	36	36
10	22	34	22	20	65	170	36	155	135	14	36	36
11	22	34	22	18	50	170	36	170	135	14	36	36
12	22	22	34	18	7,220	170	36	170	135	14	36	36
13	22	22	34	18	2,700	170	36	170	135	14	36	36
14	22	22	34	16	2,050	170	36	63	135	14	36	36
15	22	22	34	16	1,400	135	36	120	135	14	25	36
16	22	22	34	16	730	105	25	120	120	14	25	36
17	22	22	47	16	315	90	25	120	77	14	25	36
18	22	22	47	16	315	75	25	120	63	14	25	36
19	22	22	47	15	315	75	25	120	63	14	25	36
20	22	22	34	15	1,710	75	36	120	63	14	25	36
21	22	22	34	15	1,710	48	36	120	63	14	25	25
22	22	22	34	15	3,400	48	36	120	63	25	25	25
23	100	22	34	15	2,050	48	36	120	63	155	25	25
24	60	22	34	15	250	48	25	120	48	130	25	25
25	100	22	34	15	210	48	25	120	48	36	25	25
26	60	22	34	15	170	36	14	90	48	210	25	14
27	46	22	34	15	135	36	14	90	36	36	25	14
28	46	22	34	15	105	36	14	90	36	25	25	14
29	46	22	22	155	.....	36	14	90	36	25	14	14
30	46	22	22	8,100	.....	36	14	90	36	25	14	14
31	34	.....	22	3,000	.....	36	.....	120	.....	25	14	.....

Daily gage height, in feet, of Williams River near Swansea, Ariz., from Oct. 1 to Dec. 31, 1915.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	3.8	4.0	4.05	11	3.85	4.0	4.0	21	3.95	4.0	3.95
2	3.8	4.0	4.05	12	3.85	4.0	4.0	22	3.95	4.05	3.95
3	3.8	4.0	4.0	13	3.85	4.0	4.0	23	3.95	4.05	3.95
4	3.8	4.0	4.0	14	3.9	4.0	4.0	24	3.95	4.05	3.95
5	3.85	4.0	4.0	15	3.9	4.05	4.0	25	3.95	4.05	3.9
6	3.85	4.05	4.0	16	3.9	4.05	4.0	26	3.95	4.05	3.9
7	3.85	4.0	4.0	17	3.9	4.05	3.95	27	4.0	4.05	3.85
8	3.85	4.0	4.0	18	3.9	4.05	3.95	28	4.0	4.05	3.85
9	3.85	4.05	4.0	19	3.9	4.05	3.95	29	4.0	4.05	3.85
10	3.85	4.05	4.0	20	3.9	4.05	3.95	30	4.0	4.05	3.85
								31	4.0	.....	3.8

Monthly discharge of Williams River near Swansea, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	100	22	33	2,030	D.
November	34	22	26.4	1,570	D.
December	47	22	29.8	1,830	D.
January	8,100	15	379	23,300	D.
February	7,220	50	1,070	59,500	D.
March	335	25	106	6,520	D.
April	48	14	31.3	1,860	D.
May	270	14	122	7,500	D.
June	135	36	95.3	5,670	D.
July	210	14	35.3	2,170	D.
August	36	14	28.5	1,750	D.
September	120	14	33	1,960	D.
The year	8,100	14	160	116,000	

GILA RIVER BASIN.

GILA RIVER NEAR DUNCAN, ARIZ.

LOCATION.—In the N. W. ¼ sec. 21, T. 19 S., R. 20 W., Grant County, N. Mex., at lower end of a box canyon, 1,000 feet above heading of Sunset canal, about 7½ miles east of Arizona-New Mexico State line and 15 miles above Duncan.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 1, 1914 to September 30, 1915 when station was discontinued.

GAGE.—Stevens water-stage recorder attached to vertical ledge on left bank.

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

CHANNEL AND CONTROL.—Sand and gravel; very unstable at high stages. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the period covered by the records, 8.1 feet at 9 p. m., December 20, 1914 (discharge not determined); minimum stage bears no definite relation to minimum discharge because of shifting control. The minimum discharge for the period covered by these records was 40 second-feet and occurred on several days during September, 1915.

DIVERSION.—Many diversions for irrigation are made above station; no data regarding actual amount.

ACCURACY.—Records poor, because of shifting control and lack of discharge measurements at high stages.

Discharge measurements of Gila River near Duncan, Arix., during the period Oct. 1, 1914 to Nov. 17, 1915.

[Made by J. B. Spiegel.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1914.	*Feet.*	*Sec.-ft.*	1915.	*Feet.*	*Sec.-ft.*	1915.	*Feet.*	*Sec.-feet*
Oct. 17	2.78	239	Mar. 4	3.46	1,350	July 23	4.1	506
Nov. 20	3.39	308	4	3.49	1,450	Aug. 29	2.5	226
20	3.4	326	Apr. 17	3.8	1,480	29	2.5	234
1915.			17	3.8	1,480	Sept. 26	2.65	156
Jan. 8	3.03	532	20	3.54	1,230	Oct. 20	2.40	93
8	3.03	562	20	3.53	1,180	20	2.40	97
Feb. 11	2.83	771	June 3	3.4	291	Nov. 17	2.43	108
11	2.81	712	3	3.4	281	17	2.43	112

Daily discharge, in second-feet, of Gila River near Duncan, Ariz., for the years edning Sept. 30, 1914-15.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1914.						1914.					
1	60	230	170	515	610	16	63	60	980	245	265
2	60	218	890	455	515	17	69	69	890	400	225
3	60	207	1,560	420	455	18	63	74	1,740	515	225
4	60	218	1,280	400	425	19	82	495	645	515	225
5	60	207	1,280	515	425	20	90	110	3,000	455	205
6	60	175	800	400	350	21	78	105	1,860	680	225
7	60	148	610	350	325	22	69	95	935	1,180	245
8	60	143	645	305	305	23	78	94	1,230	980	225
9	60	138	610	190	265	24	304	74	1,080	720	205
10	60	124	610	155	245	25	304	55	1,440	1,330	205
11	74	119	720	140	245	26	254	48	1,180	845	205
12	66	111	720	170	265	27	230	43	980	935	205
13	52	86	610	170	225	28	207	32	1,030	680	190
14	50	77	645	205	225	29	170	38	800	610	190
15	63	66	800	245	245	30	160	115	800	1,030	190
						31	241	.....	645	845	.....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914-15.												
1	180	300	290	1,050	.....	1,160	2,800	950	355	100	.....	150
2	180	330	308	950	.....	1,100	2,250	1,000	330	95	.....	130
3	240	330	320	850	.....	1,270	2,150	1,000	285	95	.....	100
4	3,600	330	308	760	.....	1,400	2,250	900	300	95	.....	100
5	4,200	330	284	685	.....	1,200	2,250	860	310	95	.....	80
6	2,200	330	272	640	.....	1,260	2,500	720	310	90	.....	70
7	1,600	330	266	600	.....	1,320	2,950	660	310	90	.....	60
8	1,300	330	260	560	.....	1,260	2,500	640	295	90	.....	55
9	1,050	360	254	.....	.....	1,200	2,150	620	280	90	.....	55
10	850	360	254	.....	.....	1,260	1,950	610	265	95	.....	50
11	750	685	254	.....	760	1,200	1,780	549	260	95	.....	50
12	620	1,030	260	.....	760	1,540	1,700	530	240	95	.....	45
13	480	625	260	.....	805	1,360	1,620	600	230	95	.....	45
14	375	550	260	.....	805	1,260	1,620	680	230	.....	.....	40
15	330	510	248	.....	805	1,260	1,550	720	225	.....	.....	40
16	270	430	248	.....	850	1,480	1,500	680	225	.....	.....	45
17	220	395	248	.....	850	1,540	1,480	720	220	.....	.....	40
18	220	360	260	.....	950	1,790	1,350	630	210	.....	.....	120
19	220	320	.....	.....	1,380	2,020	1,260	680	190	.....	.....	230
20	270	320	.....	.....	3,200	2,020	1,200	630	185	.....	.....	700
21	270	320	.....	.....	3,200	1,900	1,220	600	185	.....	.....	330
22	300	320	.....	.....	2,300	1,720	1,280	550	185	.....	.....	270
23	300	320	.....	.....	1,560	1,540	1,280	500	175	400	.....	250
24	300	314	.....	.....	1,500	1,790	1,130	470	165	800	.....	250
25	300	308	.....	.....	1,380	3,150	1,000	470	160	1,580	.....	220
26	300	290	.....	.....	1,320	3,150	900	470	160	.....	.....	170
27	270	284	.....	.....	1,270	2,800	790	490	150	.....	.....	170
28	270	278	.....	.....	1,270	3,350	750	470	145	.....	.....	170
29	270	272	.....	.....	.....	3,600	750	460	140	.....	230	170
30	300	272	.....	.....	.....	3,150	810	420	125	.....	210	170
31	300	.....	.....	.....	.....	2,650	.....	380	.....	.....	170	.....

NOTE.—Discharge determined from a poorly defined rating curve and by indirect method for shifting control. Gage heights missing. May 1–10 and June 19–22, 1914, July 14–22 and July 26 to Aug. 28, 1915, discharge for these days and also Sept. 7–17, 1915, determined by comparison with records of flow at other stations.

Monthly discharge of Gila River near Duncan, Ariz., for years ending Sept. 30, 1914–15.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1914.					
May	304	50	109	6,700	D.
June	.....	32	126	7,500	C.
July	3,000	170	1,000	61,500	D.
August	1,330	140	535	32,900	D.
September	610	190	278	16,500	C.
The period	3,000	32	413	125,000	
1914–15.					
October	4,200	180	720	44,300	D.
November	1,030	272	384	22,800	D.
December 1–18	320	248	270	9,640	D.
January 1–8	1,050	560	762	12,100	D.
February 11–28	3,200	760	1,390	49,600	D.
March	3,600	1,100	1,800	111,000	D.
April	2,950	750	1,620	96,600	D.
May	1,000	380	649	39,900	D.
June	355	125	229	13,600	D.
July	.....	.....	545	33,500	D.
August	.....	.....	387	23,800	D.
September	700	40	146	8,690	D

NOTE.—Mean discharge for May and June, 1914, and for July, August, and September, 1915, estimated by comparison with records obtained at other stations.

GILA RIVER AT GUTHRIE, ARIZ.

LOCATION.—In sec. 3, T. 6 S., R. 30 E., about 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 September 30, 1915.

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.

DISCHARGE MEASUREMENTS.—Made from cable 1,000 feet below gage or by wading.

CHANNEL AND CONTROL.—Sand and gravel; shifts at high stages. Semipermanent control at low stages.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 11.4 feet at 7 p. m., December 20 (discharge, determined from extension of rating curve, about 16,500 second-feet); minimum stage, from water-stage recorder, 0.80 feet at 1 p. m., July 16 (discharge, 30 second-feet).

1910–1915: Maximum stage and discharge occurred December 20, 1914 (see above); minimum discharge, 18.0 second-feet May 21, 1914; minimum stages for different years not comparable because of shifting control.

DIVERSIONS.—Sufficient water to irrigate about 7,000 acres of land is diverted from stream above station.

ACCURACY.—Records good for October, November, May, June, and July; fair for March and August, and poor for December, January, and February.

Discharge measurements of Gila River at Guthrie, Ariz., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 16	J. B. Spiegel	3.35	311	Apr. 13	J. B. Spiegel	4.99	1,790
20	do	3.20	207	15	do	5.00	2,050
Nov. 20	M. D. Anderson	3.55	328	19	do	4.25	1,080
20	do	3.55	343	19	do	4.28	1,140
Jan. 6	J. B. Spiegel	3.68	721	June 2	do	2.17	225
6	do	3.67	718	2	do	2.17	219
Feb. 9	do	3.79	873	July 22	do	1.10	53
9	do	3.76	907	22	do	1.10	54
Mar. 3	do	4.31	1,390	Aug. 26	do	2.93	340
3	do	4.31	1,400	26	do	2.97	348
Apr. 13	do	4.97	1,980	Sept. 25	do	2.5	169

Daily discharge, in second-feet, of Gila River at Guthrie, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	118	205	225	1,200	6,350	1,280	2,970	765	245	44	520	225
2	116	205	260	1,080	4,350	1,230	2,760	790	220	40	450	200
3	820	205	255	950	3,250	1,360	2,500	740	205	40	430	200
4	3,550	200	270	840	2,900	1,410	2,630	640	210	40	330	90
5	4,150	195	255	740	2,320	1,360	2,690	610	215	40	300	140
6	2,080	195	250	740	1,650	1,280	2,900	570	215	38	300	100
7	1,500	190	240	680	1,230	1,320	3,110	570	220	36	315	80
8	1,200	190	225	590	1,040	1,320	2,970	550	210	34	1,520	100
9	950	190	220	540	895	1,230	2,500	550	200	33	1,270	85
10	750	450	215	490	825	1,190	2,320	550	185	33	850	80
11	650	1,420	210	470	760	1,190	2,080	510	170	33	625	80
12	550	1,280	215	420	790	1,410	2,020	530	150	32	540	95
13	450	825	220	380	1,000	1,410	2,000	550	135	32	500	90
14	375	680	215	340	965	1,230	2,000	575	130	32	430	85
15	325	570	215	300	860	1,190	2,020	595	125	31	450	100
16	300	500	210	260	790	1,230	1,620	595	120	30	540	90
17	250	420	205	220	790	1,500	1,580	550	110	30	330	90
18	205	400	225	200	825	1,850	1,320	530	105	55	315	300
19	205	350	2,500	185	1,230	1,970	1,100	510	100	70	210	130
20	208	335	15,000	170	3,320	2,080	1,000	490	100	100	150	500
21	205	315	9,250	155	3,550	2,140	1,000	455	100	55	125	410
22	400	295	14,300	140	2,560	1,850	1,060	420	95	80	150	360
23	260	280	12,800	126	1,970	1,600	1,060	390	85	155	150	240
24	250	270	10,500	112	1,700	1,650	1,030	365	85	400	150	200
25	240	250	7,150	98	1,550	2,260	950	345	80	1,760	160	170
26	220	250	4,550	86	1,360	3,180	895	335	75	5,300	300	150
27	205	240	3,420	74	1,360	2,900	815	325	75	2,950	210	140
28	200	235	2,650	74	1,410	3,250	765	320	75	3,080	200	135
29	200	220	2,150	170	.....	3,530	715	310	70	1,360	235	125
30	195	225	1,720	3,850	.....	3,670	715	275	55	870	230	120
31	220	.....	1,420	13,500	.....	3,040	.....	265	.....	640	230	.....

NOTE.—Discharge determined by indirect method for shifting control and by use of two rating curves, each fairly well defined below 3,000 second-feet. Discharge Oct. 7–15, 17–19, Aug. 19–25 and Aug. 29 to Sept. 15 estimated, because of missing gage heights, from records at other stations. Determinations for the floods of Dec. 20–25 and Jan. 30 to Feb. 1 are not accurate.

Monthly discharge of Gila River at Guthrie, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	4,150	116	689	42,400	B.
November	1,420	190	386	23,000	B.
December	15,000	205	2,950	181,000	D.
January	13,500	74	941	57,800	D.
February	6,350	760	1,840	102,000	D.
March	3,670	1,190	1,840	113,000	C.
April	3,110	715	1,770	105,000	C.
May	790	265	502	30,900	B.
June	245	55	139	8,300	B.
July	5,300	30	564	34,700	B.
August	1,520	125	404	24,800	C.
September	500	80	164	9,800	B.
The year	15,000	30	1,010	733,000	

GILA RIVER NEAR SOLOMONVILLE, ARIZ.

LOCATION.—In the NE. ¼ sec. 31, T. 6 S., R. 28 E., about a mile below intake of Brown canal and 10 miles above Solomonville, Graham County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 21, 1914, to September 30, 1915.

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.—Sand and fine silt; shifts at high stages. Control at low stages is the rapids below gage.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 8.6 feet at 10 a. m. December 20 (discharge 40,800 second-feet); minimum stage, from water-stage recorder, 0.75 feet on June 2, 3, and 14 (discharge, 80 second-feet).

1914–15: Maximum stage and discharge same as for 1915 (see above); minimum stage, from water-stage recorder, 0.56 foot on June 29, 1914 (discharge, 64 second-feet).

DIVERSIONS.—Brown canal which is used to irrigate a few hundred acres on the north side of the river heads about 1 mile above station. See p. —. About 7,000 acres are irrigated from this stream above the station at Guthrie.

ACCURACY.—Records good except for months of July and December, for which they are fair.

Discharge measurements of Gila River near Solomonville, Ariz., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 6	J. B. Spiegel	2.65	3,670	Apr. 2	J. B. Spiegel	3.42	5,920
12	do	1.35	649	30	do	2.43	2,280
Nov. 18	Anderson and Spiegel	1.38	735	30	do	2.43	2,310
18	do	1.37	715	May 13	do	2.18	1,160
Dec. 7	J. B. Spiegel	.95	388	13	do	2.24	1,270
7	do	.94	391	24	do	1.91	801
28	do	2.92	5,550	24	do	1.91	798
28	do	2.88	5,460	June 9	do	1.45	418
Jan. 11	Jacob and Spiegel	1.36	860	9	do	1.45	399
11	do	1.35	867	July 7	do	.80	97
Feb. 2	J. B. Spiegel	3.42	6,440	10	do	.78	96
4	do	3.24	5,950	10	do	.78	84
16	do	2.23	2,220	Aug. 4	do	1.78	1,130
16	do	2.23	2,190	4	do	1.78	1,020
27	do	2.43	2,650	20	do	1.20	396
27	do	2.48	2,720	20	do	1.20	427
Mar. 13	do	2.54	3,070	Sept. 27	do	1.29	473
13	do	2.54	3,020	27	do	1.29	474
27	do	3.55	7,040				

Daily discharge, in second-feet, of Gila River near Solomonville, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	215	340	385	2,200	10,200	2,780	6,300	2,370	520	90	1,000	340
2	205	310	450	2,000	6,300	2,840	6,080	2,100	500	80	810	340
3	620	310	460	1,730	5,620	2,900	5,620	1,550	490	80	700	340
4	12,500	310	440	1,560	5,620	2,900	5,850	1,220	480	95	870	230
5	11,200	290	425	1,440	3,850	2,840	6,300	1,150	475	95	700	230
6	4,400	280	400	1,300	3,200	2,720	6,520	1,100	470	90	595	215
7	2,660	280	390	1,200	2,480	2,720	7,120	1,180	440	100	700	195
8	1,740	280	370	1,080	2,180	2,660	6,580	1,140	420	95	1,990	190
9	1,360	280	350	1,000	1,980	2,600	5,850	1,060	400	95	2,500	175
10	1,080	290	340	950	1,830	2,690	4,800	1,030	390	95	1,580	170
11	840	1,880	330	875	1,880	2,660	4,400	1,020	365	90	1,140	170
12	650	5,000	330	815	2,480	3,200	4,200	1,040	355	85	810	165
13	590	2,350	340	770	3,350	3,050	3,850	1,200	340	85	755	160
14	545	1,460	330	735	2,900	2,750	3,850	1,180	330	80	700	155
15	470	1,140	315	710	2,600	2,660	4,020	1,200	290	100	590	150
16	440	995	295	710	2,300	2,900	3,570	1,220	280	95	645	150
17	390	850	290	700	2,300	3,680	3,100	1,200	275	100	535	150
18	360	720	295	660	2,600	4,200	2,800	1,120	255	155	485	490
19	340	680	12,500	630	3,350	4,400	2,480	1,060	250	205	400	490
20	325	655	31,000	605	7,400	5,000	2,500	1,000	245	339	340	810
21	315	570	21,600	595	8,600	4,800	2,500	820	205	545	315	700
22	490	535	21,000	605	5,400	4,200	2,550	890	180	1,260	315	595
23	545	510	21,000	615	3,850	3,850	2,580	840	175	730	290	390
24	475	490	19,600	625	3,350	4,400	2,580	800	160	980	290	390
25	410	465	15,200	640	3,200	6,080	2,400	760	150	3,400	275	595
26	370	440	10,600	605	2,900	7,700	2,300	740	140	12,500	315	645
27	330	425	5,750	605	2,900	8,600	2,180	700	120	6,250	370	490
28	315	410	6,000	605	3,050	8,180	2,200	655	110	4,100	400	390
29	300	385	4,780	650	.....	7,760	2,800	615	100	1,980	400	390
30	290	385	3,330	22,300	.....	7,940	2,300	575	100	1,380	370	345
31	325	.....	2,670	18,500	.....	6,960	.....	545	.....	1,000	370	.....

NOTE.—Discharge determined by indirect method for shifting control and by use of four well-defined rating curves. Discharge July 27–31 estimated, because of missing gage heights, by comparison with records obtained at stations upstream.

Monthly discharge of Gila River near Solomonville, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	12,500	205	1,460	89,800	B.
November	5,000	280	777	46,200	B.
December	31,000	290	5,860	360,000	C.
January	22,300	595	2,200	135,000	B.
February	10,200	1,830	3,840	213,000	B.
March	8,600	2,600	4,280	263,000	B.
April	7,120	2,180	3,990	237,000	B.
May	2,370	545	1,060	65,200	B.
June	520	100	300	17,800	B.
July	12,500	80	1,170	71,900	D.
August	2,500	290	695	42,700	B.
September	810	150	342	20,400	B.
The year	31,000	80	216	1,560,000	

GILA RIVER NEAR SAN CARLOS, ARIZ.

LOCATION.—One mile above dam site in box canyon on San Carlos Indian Reservation, 6 miles below San Carlos Indian Agency.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 29, 1914, to September 30, 1915, at present site; 1899 to 1905 at a point half a mile south of the Indian Agency at San Carlos and below San Carlos Creek; August 17, 1910, to February 5, 1911, at a point just below the Arizona & Eastern Railroad bridge and half a mile above San Carlos Creek.

GAGE.—Stevens water-stage recorder installed over float box bolted to ledge on left side of river. Gage was carried away by flood of December 18, 1914, and replaced at same datum September 11, 1915.

DISCHARGE MEASUREMENTS.—Made from cable about half a mile above gage or by wading near gage.

CHANNEL AND CONTROL.—Bed composed of sand and gravel. Semi-permanent control afforded by rapids over bed rock just below station; shifts during extreme high water.

EXTREMES OF DISCHARGE.—Maximum stage during year, from high water marks, 16.4 feet about December 20, 1914 (discharge, 42,000 second-feet); minimum stage, from water-stage recorder, 0.80 foot at 6 p. m. September 11 (discharge, 57 second-feet).

1914–1915 maximum stage and discharge in 1915 (see preceding paragraph); 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. At times this diversion reduces the low flow practically to zero at the station. About 7,000 acres are irrigated from this stream above the station at Guthrie.

ACCURACY.—Records fair for September and October and good for November; those for remainder of year are rough estimates.

Discharge measurements of Gila River near San Carlos, Ariz., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 5	J. B. Spiegel	8.55	6,540	June 11	J. B. Spiegel	1.77	208
23	do	3.00	490	11	do	1.77	211
Nov. 3	do	2.70	389	July 2	do	.72	28
16	Anderson and Spiegel	4.27	1,180	2	do	.72	28
Dec. 18	J. B. Spiegel	3.00	489	Aug. 6	do	3.85	822
18	do	3.05	510	Sept. 11	do	.81	57
May 27	do	2.71	516	23	M. D. Anderson	3.36	556
27	do	2.71	494	23	do	3.32	548

Daily discharge, in second-feet, of Gila River near San Carlos, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	May.	June.	July.	Aug.	Sept.
1	116	405	510						225
2	116	405	530				28		190
3	116	405	530						155
4	3,320	375	530						155
5	6,150	360	530						125
6	5,850	315	530					820	125
7	3,200	300	510						95
8	2,080	265	490						95
9	1,710	250	490						95
10	1,530	345	490						65
11	1,300	1,980	490			210			57
12	1,090	3,220	490						64
13	940	3,140	490						67
14	800	1,890	490						68
15	650	1,490	490	870					69
16	530	1,265	490						71
17	455	1,060	490						160
18	390	910	490						220
19	345	750							530
20	315	675							620
21	300	675							570
22	850	600							600
23	550	575							600
24	600	575							600
25	510	530			550				600
26	475	510			505				485
27	440	490							485
28	405	490							395
29	405	490							250
30	405	490							185
31	405								

NOTE.—Discharge Oct. 1 to Dec. 18 and Sept. 17–30 determined from a well-defined rating curve; Sept. 11–16, from a parallel curve through the measurement of Sept. 11. Mean discharge Dec. 19–31, estimated 14,000 second-feet; Sept. 1–10 as in table.

Monthly discharge of Gila River near San Carlos, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	6,150	116	1,170	71,900	C.
November	3,220	250	781	46,500	B.
December		490	6,180	380,000	
January			2,420	149,000	
February			3,950	219,000	
March			3,570	220,000	
April			3,870	230,000	
May			1,130	69,500	
June			193	11,500	
July			907	55,800	
August			500	30,700	
September	620	57	267	15,900	C.
The year			2,100	1,500,000	

NOTE.—Mean discharge January to August estimated by comparison with records obtained at other stations on this stream and from miscellaneous discharge measurements.

GILA RIVER AT KELVIN, ARIZ.

LOCATION.—In sec. 12, T. 4 S., R. 13 E., about half a mile below the mouth of Mineral Creek, a mile below Kelvin,[1] Pinal County, and 25 miles above Florence, Ariz.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 26, 1911, to September 30, 1915.

GAGE.—Stevens water-stage recorder installed June 15, 1914, on left bank half a mile above the original gage and referred to new datum. The original gage, an inclined staff fastened to basalt ledge on right bank opposite observer's house, was destroyed by the flood March 8, 1911, and replaced by painting the graduations on the ledge a few feet downstream. November 23, 1911, an inclined staff for low-water readings was fastened to the rock at the same location as first gage, and on September 20, 1912, an auxiliary vertical staff for low-water readings was installed on left bank opposite the inclined section. All gages previous to present gage were referred to same datum.

DISCHARGE MEASUREMENTS.—Made from suspension footbridge about 1½ miles above gage or by wading near gage.

CHANNEL AND CONTROL.—Shifting sand. Semipermanent control at new site.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 14.0 feet on December 24 (discharge, about 90,000 second-feet); minimum stage, 1.7 feet July 17 (discharge, 45 second-feet).

1911–1915: Maximum stage and discharge same as for 1915 (see above); minimum discharge June 29 to July 11, 1913, 0 second-feet.

DIVERSIONS.—About 30,000 acres are irrigated from this stream between this station and Guthrie, and about 7,000 acres above Guthrie.

ACCURACY.—Records poor, owing to poor definition of rating curves for high stages, except for the months of October, November, and September, for which they are fair.

Discharge measurements of Gila River at Kelvin, Ariz., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 7	C. C. Jacob	3.75	3,330	May 9	Wallace Adams	3.25	1,430
8	....do	3.40	2,420	13	Anderson and Adams	3.05	1,160
31	M. D. Anderson	2.02	512	14	.....do	3.12	* 1,040
Nov. 19	C. C. Jacob	2,34	834	14	.....do	3.12	1,100
Dec. 12	M. D. Anderson	1.90	494	27	Adams and Carwile	2.71	466
Jan. 7	Wallace Adams	3.82	2,920	27	.....do	2.71	507
27	M. D. Anderson	3.06	954	28	.....do	2.77	547
27	.....do	3.06	982	28	.....do	2.77	505
Feb. 6	....do	4.90	3,690	June 15	C. C. Jacob	2.28	231
Mar. 2	Jacob and Anderson	4.25	3,620	July 2	M. D. Anderson	1.86	69
2	.....do	4.25	3,620	Aug. 4	.....do	2.70	922
Apr. 3	Anderson and Adams	4.80	5,920	4	.....do	2.70	949
3	....do	4.80	5,640	5	.....do	2.75	1,020
4	....do	4.65	5,120	Sept. 1	Anderson and Adams	2.05	233
4	....do	4.65	5,070	1	.....do	2.04	218
30	....do	3.53	2,070	2	.....do	2.03	224
May 8	Adams and Lane	3.32	1,640	2	.....do	2.03	216
8	....do	3.35	1,600	30	C. C. Jacob	2.28	430
9	Wallace Adams	3.28	1,530				

[1] Ray Junction on Arizona & Eastern Railroad.

Daily discharge, in second-feet, of Gila River at Kelvin, Ariz., for the year ending Sept. 30, 1915.

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.
1	120	725	400	12,800	32,500	3,460	6,250	2,030	480	70	1,750	235
2	120	725	1,130	4,930	10,800	3,620	5,800	2,130	460	70	1,450	200
3	525	560	975	3,770	10,800	3,460	5,800	2,450	430	60	1,260	165
4	1,320	490	860	3,770	10,800	3,180	5,040	2,030	395	60	1,170	165
5	5,200	450	770	3,460	9,200	3,050	4,930	1,930	440	60	2,340	135
6	8,800	425	680	3,460	4,700	2,930	6,250	1,740	405	60	1,170	135
7	3,700	400	600	2,930	3,460	2,930	7,300	1,550	380	60	1,260	105
8	2,460	400	600	2,350	1,650	2,950	8,090	1,550	350	60	1,000	105
9	2,020	370	525	1,900	1,220	3,050	6,940	1,550	330	60	1,620	105
10	1,820	375	525	1,650	1,100	2,900	5,580	1,420	310	60	2,800	75
11	1,550	860	450	1,650	1,100	3,050	4,120	1,300	290	50	2,025	75
12	1,310	1,080	450	1,650	4,930	3,050	3,460	1,300	270	70	1,620	75
13	1,140	3,700	450	1,650	4,120	3,180	3,320	1,150	255	120	1,500	75
14	980	1,940	450	1,650	2,460	3,180	3,460	1,040	240	60	1,170	75
15	810	1,320	400	1,430	2,460	2,930	3,320	1,150	230	60	1,170	60
16	650	1,250	400	1,430	1,650	2,930	3,460	1,300	230	60	1,080	60
17	570	1,190	400	1,430	1,490	3,180	3,050	1,300	225	45	935	60
18	500	1,020	9,480	1,220	1,490	3,460	3,690	1,040	220	70	865	200
19	480	815	30,300	1,220	2,690	3,770	3,690	1,040	215	230	935	445
20	460	725	82,000	1,020	18,000	4,120	3,570	930	210	300	795	660
21	470	680	82,000	1,020	25,000	4,300	2,690	850	197	640	725	605
22	490	640	54,000	1,020	18,000	4,930	2,690	700	170	480	595	660
23	500	640	89,000	1,020	12,800	4,930	2,460	630	165	840	550	660
24	520	600	90,000	1,020	9,000	5,040	2,810	570	135	1,320	490	550
25	530	560	51,000	1,020	5,800	4,510	2,570	570	126	5,550	445	1,350
26	550	525	35,500	1,020	3,460	4,120	2,240	525	120	13,000	445	550
27	560	450	28,800	1,020	3,460	5,360	2,030	525	120	14,500	445	660
28	560	490	23,600	1,020	3,460	4,510	2,030	525	120	9,700	660	550
29	560	450	20,000	20,400	.....	4,510	2,130	520	100	8,300	550	445
30	560	450	14,700	53,500	.....	5,360	2,130	515	83	4,100	445	445
31	560	.....	10,500	58,800	.....	5,800	.....	505	.....	2,550	340	.....

NOTE.—Discharge determined from several fairly well defined rating curves and by indirect method for shifting control. Discharge Oct. 9–31 determined by comparison with records obtained at upper Gila River stations. Determinations exceeding 10,000 second-feet rough.

Monthly discharge of Gila River at Kelvin, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	8,800	120	1,300	79,900	C.
November	3,700	370	810	48,200	C.
December	90,000	400	20,400	1,250,000	D.
January	58,800	1,020	6,330	389,000	D.
February	32,500	1,100	7,420	412,000	D.
March	5,800	2,930	3,800	234,000	D.
April	8,090	2,030	4,030	240,000	D.
May	2,450	505	1,170	71,900	D.
June	480	83	257	15,300	D.
July	13,000	45	2,020	124,000	D.
August	2,800	340	1,090	66,700	D.
September	1,350	60	323	19,200	D.
The year	90,000	45	4,080	2,950,000	

GILA RIVER NEAR SENTINEL, ARIZ.

LOCATION.—In sec. 10, T. 5 S., R. 9 W., 1 mile below the old diversion dam of the Southwestern Arizona Fruit & Irrigation Co., about 10 miles north of Sentinel, Maricopa County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July, 1, 1913, to September 30, 1915.

GAGE.—Vertical staff on left bank; read twice daily by J. T. Lee.

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

CHANNEL AND CONTROL.—Shifting sand.

EXTREMES OF DISCHARGE.—Channel dry part of each year at this point. On January 31, 1915, the river reached a stage of 17.1 feet, corresponding to an estimated discharge of 120,000 second-feet.

DIVERSIONS.—Some water is diverted above and below station for irrigating small ranches; quantity unknown.

ACCURACY.—Records for October 1 to December 20 fair. Discharge not determined for remainder of year, owing to shifting control and lack of discharge measurements.

Discharge measurements of Gila River near Sentinel, Ariz., during the year ending Sept. 30, 1915.

[Made by H. E. Jones.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 8	8.86	5,490	Apr. 25	10.50	7,000
Nov. 25	6.30	647	June 9	8.40	173

Daily gage height, in feet, of Gila River near Sentinel, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4.6	5.95	5.7	10.45	15.6	9.5	11.05	10.45	9.1	7.36	9.6	7.45
2	4.55	6.5	5.95	10.3	13.8	9.6	10.55	12.35	9.15	7.33	9.5	7.65
3	5.45	6.35	5.8	9.85	12.05	9.75	10.5	12.3	8.85	7.31	9.45	7.45
4	4.95	6.25	6.15	9.5	10.3	9.8	10.45	12.25	8.8	7.29	9.45	7.3
5	5.1	6.2	6.45	9.4	10.4	9.7	10.35	12.3	8.65	7.23	9.15	7.55
6	5.1	6.05	6.4	9.4	9.9	9.85	10.25	12.25	8.5	7.18	8.95	7.9
7	8.5	5.9	6.25	9.4	9.35	9.85	10.25	12.35	8.5	7.12	8.7	7.8
8	8.7	5.7	6.2	9.4	9.0	9.8	10.45	12.0	8.45	.....	8.6	7.5
9	7.65	5.55	6.15	9.3	8.75	9.55	10.35	11.95	8.4	7.4	8.75	7.4
10	7.25	6.1	6.1	9.1	8.65	9.55	10.35	11.75	8.45	7.6	8.4	7.3
11	6.9	6.1	6.1	9.1	8.7	9.55	10.15	11.0	8.3	7.55	8.4	7.15
12	6.75	6.6	6.05	9.1	8.95	9.55	10.1	10.65	8.15	7.45	8.25	7.1
13	6.7	7.05	5.95	9.2	9.7	9.6	10.1	10.45	8.05	7.30	8.45	7.05
14	6.6	7.1	5.9	9.15	9.85	9.65	10.0	10.25	7.95	7.15	8.8	6.95
15	6.55	8.15	5.95	9.2	9.65	9.75	9.9	10.15	7.9	7.1	8.55	.....
16	6.4	7.45	6.05	9.3	9.5	9.7	9.8	10 0	7.95	.....	8.55	.....
17	6.15	7.25	6.1	9.2	9.25	9.5	9.8	10.05	7.95	.....	8.3	.....
18	5.95	7.1	6.45	9.25	9.05	9.45	9.9	10.1	7.9	.....	8.1	.....
19	5.75	6.95	8.0	9.25	9.0	9.75	9.95	10.15	7.85	.....	7.95	.....
20	5.5	6.9	9.45	9.2	9.15	9.9	9.9	10.15	7.8	.....	7.9	.....
21	5.4	6.9	12.8	9.2	10.6	10.15	9.9	10.1	7.75	.....	7.75	.....
22	5.3	6.85	15.75	9.25	12.25	10.3	10.1	10.1	7.6	.....	7.6	.....
23	5.25	6.8	12.45	9.2	11.65	10.3	10.35	10.05	7.6	.....	7.45	.....
24	5.2	6.75	11.7	9.15	10.57	10.2	10.5	10.0	7.6	.....	7.3	.....
25	6.45	6.4	16.25	9.15	10.3	10.25	10.5	10.15	7.55	.....	7.25	.....
26	6.15	6.2	13.6	9.1	9.75	10.6	11.5	9.95	7.5	.....	7.2	.....
27	5.9	6.1	12.6	9.05	9.65	11.0	11.45	9.75	7.45	.....	7.3	.....
28	5.85	6.05	12.25	9.05	9.55	11.05	11.35	9.5	7.45	11.5	7.2	.....
29	5.65	5.9	11.8	9.35	.....	11.15	11.2	9.4	7.4	11.35	7.2	.....
30	5.6	5.85	11.35	12.35	.....	10.75	11.0	9.35	7.4	10.2	7.25	.....
31	5.5	.....	10.9	17.15	.....	10.8	.....	9.3	.....	10.15	7.65	.....

NOTE.—Channel dry July 16–27 and Sept. 15–30.

Daily discharge, in second-feet, of Gila River near Sentinel, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	1	377	225	11	1,240	480	480	21	80	1,240	.....
2	0	825	377	12	1,080	925	445	22	50	1,190	.....
3	100	680	285	13	1,030	1,420	377	23	40	1,140	.....
4	5	595	512	14	925	1,480	345	24	30	1,080	.....
5	15	555	775	15	875	3,320	377	25	775	725	.....
6	15	445	725	16	725	1,960	445	26	518	555	.....
7	4,200	345	595	17	517	1,670	410	27	345	480	
8	4,860	225	555	18	377	1,480	775	28	315	445	.....
9	2,300	145	518	19	255	1,300	3,000	29	198	345	.....
10	1,670	480	480	20	120	1,240	8,050	30	170	315	.....
								31	120	.....	.....

NOTE.—Discharge Oct. 1 to Dec. 21, determined from fairly well defined rating curve. Mean dsicharge as follows: October, 740 second-feet (45,500 acre-feet); November, 915 second-feet (54,400 acre-feet); December 1-20, 988 second-feet (39,200 acre-feet).

SUNSET CANAL NEAR DUNCAN, ARIZ.

LOCATION.—In the NW. ¼ sec. 17, T. 19 S., R. 20 W., Grant County, N. Mex., a mile above village of San Antonio, 1¼ miles below station on Gila River, near Duncan, Ariz., and 14 miles above Duncan.

RECORDS AVAILABLE.—October 1, 1914, to September 30, 1915, when station was discontinued. Discharge measurements April 23 to September 30, 1914.

GAGE.—June 13, 1914, to April 17, 1915, vertical staff on left side of flume, 6 feet from upper end. April 18 to September 30, vertical staff on left bank 10 feet below lower end of flume; referred to a new datum. Read to tenths once or more daily by F. A .Stowell, C. P. Houlihan, or S. E. Webster.

DISCHARGE MEASUREMENTS.—Made by wading or from timber across flume.

CHANNEL AND CONTROL.—Fairly permanent.

EXTREMES OF DISCHARGE.—Maximum discharge during year, 40 second-feet October 4–6. Canal dry during winter and also for short periods during other months.

ACCURACY.—Records poor; determination of daily discharge not sufficiently accurate to warrant publication.

Canal diverts water for irrigation from right side of Gila River in NE. ¼ sec. 20, T. 19 S., R. 20 W. New Mexico principal meridian, about 1,000 feet below station on Gila River, near Duncan. There are three wasteways, all between the heading and the gage. Entire canal is in New Mexico.

Discharge measurements of Sunset canal near Duncan, Ariz., during 1914 and 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1914.		*Feet.*	*Sec.-ft.*	1915.		*Feet.*	*Sec.-ft.*
June 23	E. S. Borgquist	1.40	19.4	Apr. 18	J. B. Spiegel	1.65	16.0
July 20	J. B. Spiegel	1.12	7.2	June 3	.....do	2.15	30.8
Aug. 4	.....do	2.50	34.9	3	.....do	2.15	31.1
Sept. 17	.....do	1.87	21.0	July 23	.....do	1.90	21.8
Oct. 17	.....do	1.80	18.5	Aug. 29	.....do	2.20	31.2
Nov. 20	.....do	.90	3.3				

NOTE.—Apr. 18, 1915, gage moved and set at an independent datum.

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Daily gage height, in feet, of Sunset canal near Duncan, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.8	1.8	1.9	.....	2.6	2.15	2.05	.....	2.17
2	2.05	1.8	2.0	.....	2.6	2.2	2.05	.....	2.13
3	2.4	1.8	1.4	.....	2.7	2.15	2.05	.....	2.05
4	2.7	1.8	1.4	.....	2.8	2.15	2.1	.....	2.04
5	2.7	1.8	1.35	.....	.....	2.1	2.0	.....	2.01
6	2.7	1.8	1.3	.....	.....	2.2	1.95	1.28	1.94
7	.....	1.7	1.3	.....	.....	2.15	1.95	1.02	1.92
8	.....	1.65	1.3	.....	1.95	2.15	1.95	1.06	1.92
9	.7	1.65	1.3	.....	2.15	2.15	2.05	1.65	1.97
10	.....	1.7	1.3	.....	2.2	2.1	2.05	1.28	1.94
11	.....	1.7	1.25	.....	2.3	2.1	2.0	1.14	1.94
12	.....	1.2	1.25	.....	2.4	2.1	2.0	1.01	1.83
13	.....	.65	1.25	.....	2.35	2.1	2.0	1.03	1.77
14	2.05	.7	1.25	.....	2.4	2.05	2.05	.97	1.97
15	2.0	.....	1.25	.....	2.4	2.05	2.05	1.25	2.32
16	2.0	.....	2.5	.....	2.35	2.05	1.95	1.3	2.29
17	1.8	.....	1.2	.....	2.4	2.1	2.1	2.07	2.28
18	1.8	.....	.....	1.65	2.3	2.1	2.2	2.18	2.42
19	1.7	.....	.....	1.1	2.4	2.05	2.2	2.21	2.05
20	1.7	.9	.....	1.65	2.35	2.05	2.3	2.22	1.85
21	1.7	.9	.....	2.5	2.4	2.05	2.4	2.17	1.60
22	2.05	.85	.....	2.25	2.3	2.1	2.35	2.18	1.57
23	1.55	.85	.....	1.75	2.4	2.05	2.15	2.24	1.29
24	1.6	.5	.....	1.52	2.35	2.05	1.75	2.25	1.34
25	1.5	1.9	.....	1.35	2.35	2.05	.....	2.18	1.67
26	1.5	1.85	.....	1.2	2.35	2.1	.....	2.16	1.64
27	1.5	1.9	.....	1.5	2.4	2.1	.....	2.15	1.53
28	1.45	1.9	.....	2.1	.....	2.0	.....	2.21	1.66
29	1.1	1.9	.....	2.45	.....	2.1	.....	2.24	1.64
30	.....	1.9	.....	2.55	2.3	2.1	.....	2.21	1.63
31	.....	.....	.....	.....	2.25	.....	.....	.....	.....

Monthly discharge of Sunset canal near Duncan, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	40	0	15.0	923
November	21	0	11.5	686
December	23	0	6.1	373
January	0	0	0	0
February	0	0	0	0
March	0	0	0	0
April	36	0	8.6	515
May	38.5	0	25.9	1,590
June	28	23	25.2	1,500
July	32.5	0	19.1	1,170
August	32.5	0	17.3	1,060
September	37	12	24.1	1,430
The year	40	0	12.8	9,250

NOTE.—Discharge determined from one rating curve fairly well defined for all stages and by indirect method for shifting control. See "Accuracy" in station description. Canal dry Oct. 7–8, 10–13, and 30–31; Nov. 15–19; Dec. 18 to Apr. 17; May 5–7 and 28–29; and July 25 to Aug. 5.

COSPER & MARTIN CANAL NEAR DUNCAN, ARIZ.

LOCATION.—In the SE. ¼ sec. 12, T. 19 S., R. 21 W., Grant County, N. Mex., about 2½ miles below gaging station on Gila River near Duncan Ariz., and 12½ mile above Duncan.

RECORDS AVAILABLE.—Discharge measurements June, 1914, to August, 1915; gage height record October 2, 1914, to September 30, 1915, when station was discontinued.

GAGE.—Vertical staff on right bank about a mile below intake; read to tenths twice daily by S. E. Webster, J. F. Pace, or Doll Campbell.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Shifts badly owing to growth of aquatic plants and deposition of sediment.

ACCURACY.—Records not sufficiently accurate for publication.

Canal diverts water for irrigation from right side of Gila River. There is one wasteway about one-quarter mile below heading. Entire canal is in New Mexico. Total amount diverted during year ending September 30, 1915, approximately 2,300 acre-feet. Canal dry October 5 to April 17 and for short periods during other months.

Discharge measurements of Cosper & Martin canal near Duncan, Ariz., during the years 1914 and 1915.

[Made by J. B. Spiegel.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1914.	*Feet.*	*Sec.-ft.*	1915.	*Feet.*	*Sec.-ft.*	1915.	*Feet.*	*Sec.-ft.*
June 24	0.92	6.5	Apr. 18	1.01	10.6	July 23	.88	4.8
July 18	1.09	8.4	June 3	.98	11.1	Aug. 29	1.50	12.1
Sept. 17	.30	.5	3	1.03	12.4			

Daily gage height in feet, of Cosper & Martin canal near Duncan, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	.....	0.6	0.85	1.4	.....	0.85
2	0.7	.....	.4	.9	1.15	.....	.75
3	1.2	.....	.35	1.1	1.15	.....	.65
4	1.6	.....	.8	1.3	.9	.....	.7
5	.....	.....	1.3	1.4	1.35	.....	.58
6	.....	.....	1.3	1.3	.75	.....	.62
7	.....	.....	1.3	.95	1.05	.....	.85
8	.....	.....	1.3	.7	1.2	.....	85
9	.....	.....	1.3	.7	1.1	.....	.55
10	.....	.....	1.3	75	.9	.....	.65
11	.....	.....	1.25	.8	.95	.....	1.0
12	.....	.....	1.1	.6	.85	0.55	.93
13	.....	.....	1.2	.4	.8	.65	.9
14	.....	.....	1.6	.4	.75	.75	1.0
15	.....	.....	1.75	.35	.65	.8	1.0
16	.....	.....	1.7	.4	.55	.8	.95
17	.....	.....	1.35	.35	.6	1.1	1.2
18	.....	1.0	1.35	.3	1.4	1.35	1.1
19	.....	.6	1.4	.15	1.4	1.5	1.05
20	.....	.5	1.45	.15	1.6	1.5	.45
21	.....	.7	1.1	.15	1.55	1.5	.5
22	.....	.8	.....	.4	1.55	1.5	.....
23	.....	.9	.....	.35	.85	1.3	.....
24	.....	.7	.....	.8	1.15	1.15	.....
25	.....	.65	.....	1.25	.3	1.0	.....
26	.....	.55	.....	1.05	.45	1.15	.....
27	.....	.9	.....	.25	.....	1.4	.....
28	.....	.55	1.0	.2	.....	1.55	.....
29	.....	.95	1.1	.....	.....	1.5	.....
30	.....	1.3	1.05	1.75	.....	1.25	.....
31	.....	.....	.7	.....	.....	.9	.....

NOTE.—No flow in canal Oct. 5 to Apr. 17, May 22–27, June 18–21, 27–29, July 25 to Aug. 11 and Sept. 22–30.

COSPER & WINDHAM CANAL NEAR DUNCAN, ARIZ.

LOCATION.—In the SE. ¼ sec. 3, T. 19 S., R. 21 W., New Mexico, 1¼ miles below heading and about 10 miles above Duncan, Ariz.

RECORDS AVAILABLE.—October 1, 1914, to September 30, 1915, when station was discontinued.

GAGE.—Vertical staff on left bank about three-quarters of a mile below wasteway. Prior to April 18 gage was on right bank about 100 feet below wasteway. Read twice daily to tenths by S. E. Webster from October to December and by Foy Foster during remainder of year.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Slightly shifting.

EXTREMES OF DISCHARGE.—Maximum discharge during year, 34 second-feet October 4–6. Canal dry during winter and for short periods during other months.

ACCURACY.—Records poor; determination of daily discharge not sufficiently accurate to warrant publication.

Water diverted for irrigation on right bank of Gila River in SE ¼ sec. 11, T. 19 S., R. 21 W. Canal extends a short distance into Arizona, but most of it is in New Mexico.

Discharge measurements of Cosper & Windham canal near Duncan, Ariz., during the year ending Sept. 30, 1915.

[Made by J. B. Spiegel.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1914.	*Feet.*	Sec.-ft.	1915.	*Feet.*	*Sec.-ft.*
June 24	.79	7.7	Apr. 18	1.30	8.3
July 20	.20	.0	June 3	1.53	11.8
Sept. 18	.80	7.1	3	1.53	11.9
Nov. 21	.20	.0	July 23	1.83	13.3
			Aug. 30	2.10	18.8

NOTE.—Apr. 18, 1915, gage was moved and set to an independent datum.

Daily gage height, in feet, of Cosper & Windham canal near Duncan, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.9	0.8	.....	.....	2.35	1.67	1.89	.....	1.85
2	.9	.8	.....	.....	2.23	1.6	1.85	.....	1.81
3	1.6	.8	.....	.....	2.27	1.53	1.9	.....	1.85
4	2.3	.8	.....	.....	1.97	1.55	1.6	.....	1.69
5	2.3	.8	0.8	.....	1.8	1.55	1.78	.....	1.71
6	2.3	.8	.4	.....	1.85	1.64	1.69	.....	1.6
7	.....	.8	.35	.....	1.75	1.53	1.54	.....	1.5
8	.....	.8	.35	.....	1.72	1.39	1.88	1.36	1.1
9	.....	.8	.3	.....	1.75	1.32	1.79	1.8	1.1
10	.....	.75	.3	.....	1.7	1.66	1.6	1.71	1.15
11	.....	.7	.3	.....	1.6	1.21	1.85	1.75	.95
12	.....	.55	.3	.....	1.6	1.16	1.65	.....	.91
13	.....	.4	.3	.....	1.73	1.47	1.78	.....	1.4
14	.4	.....	.3	.....	2.07	.8	1.81	.....	1.7
15	.4	.....	.3	.....	2.15	.....	1.8	.....	1.7
16	.4	.65	.3	.....	2.2	.....	1.4	.....	1.55
17	.6	.6	.3	.....	2.2	1.4	1.4	.....	1.5
18	.8	.55	.....	1.3	2.45	1.55	2.08	.....	.....
19	.8	.55	.....	1.47	2.5	1.63	1.78	.....	.....
20	.9	.35	.....	1.32	2.1	1.48	2.4	.....	.....
21	.95	.2	.....	.9	2.05	1.51	2.46	1.8	.....
22	1.0	.....	.....	2.0	1.85	1.38	.....	1.9	.....
23	1.0	.....	.....	2.1	1.75	1.33	.....	2.05	.....
24	1.0	.....	.....	2.0	1.8	1.2	1.85	1.85	.....
25	1.0	.....	.....	2.05	1.8	1.46	.....	2.0	.....
26	.....	.....	.....	2.05	1.8	1.80	.....	1.85	.....
27	.35	.....	.....	2.15	1.8	1.77	.....	1.91	.....
28	.3	.....	.....	2.05	1.85	1.76	.....	1.95	.....
29	.3	.....	.....	2.2	1.6	1.55	.....	2.0	.....
30	.55	.....	.....	2.3	1.73	1.88	.....	1.95	.....
31	.8	.....	.....	.....	1.6	.....	.....	1.5	.....

Monthly discharge of Cosper & Windham canal near Duncan, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	34.0	0.0	7.8	478
November	7.5	0	3.5	209
December	7.5	0	.7	42
January	.0	0	.0	0
February	.0	0	.0	0
March	.0	0	.0	0
April	26.0	0	7.6	451
May	30.0	13.0	18.8	1,150
June	18.0	0	10.4	622
July	17.0	0	11.0	675
August	18.0	0	7.2	440
September	15.0	0	6.0	356
The year	34.0	0	6.1	4,220

NOTE.—Discharge determined from two poorly defined rating curves and by indirect method for shifting control. See "Accuracy" in station description. Canal dry Oct. 7–13 and 26; Nov. 14–15; Nov. 21 to Dec. 4; Dec. 18 to Apr. 17; June 15–16; July 22; July 25 to Aug. 7; Aug. 12–20; and Sept. 18–30.

MODEL CANAL NEAR DUNCAN, ARIZ.

LOCATION.—In the NE. ¼ sec. 10, T. 19 S., R. 21 W., Grant County, N. Mex., about 10 miles above Duncan, Ariz.

RECORDS AVAILABLE.—October 1, 1914, to September 30, 1915, when station was discontinued. Discharge measurements June 24 to September 30, 1914.

GAGE.—Vertical staff on left bank at downstream end of inverted siphon about three-fourths mile below intake. From October 1, 1914, to April 17, 1915, gage was on right bank 300 feet below intake. From April 17–20, 1915, it was on left bank 500 feet below its present site. Gage read to hundredths twice daily by S. E. Webster from October 1 to December 17 and by W. W. Lloyd from April 17 to September 30.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Control fairly permanent for gages used since April 17; previous to that date it shifted considerably.

EXTREMES OF DISCHARGE.—Maximum discharge during year, 46.5 second-feet on August 29. Canal dry during winter and for short periods during other months.

ACCURACY.—Records poor; determination of daily discharge not sufficiently accurate to warrant publication.

Water diverted for irrigation on left side of Gila River in NW. ¼ sec. 11, T. 19 S., R. 21 W., about half a mile below Cosper and Windham heading on opposite side of river.

Discharge measurements of Model canal near Duncan, Ariz., during the years 1914–15.

[Made by J. B. Spiegel.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1914.	*Feet.*	*Sec.-ft.*	1915.	*Feet.*	*Sec.-ft.*	1915.	*Feet.*	*Sec.-ft.*
June 24	1.59	18.6	Apr. 17	.50	3.1	June 4	1.59	39.7
July 19	1.98	25.3	20	.70	23.8	July 24	1.60	39.6
Sept. 18	1.29	6.7	20	.70	20.9	Aug. 30	1.38	35.1
Nov. 21	1.57	7.2	June 4	1.59	39.5			
21	1.57	7.2						

NOTE.—Apr. 17, 1915, gage was moved and set at an independent datum. Apr. 20, 1915, gage again moved and set at an independent datum. June 4, 1915, gage datum lowered 0.30 foot.

Daily gage height, in feet, of Model canal near Duncan, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.45	1.2	.....	.....	1.41	1.31	0.44	.....	1.28
2	2.35	1.23	1.64	.....	1.36	1.25	.36	.....	1.22
3	2.1	1.2	2.2	.....	1.26	1.25	.27	.....	1.00
4	2.85	.....	2.2	.....	1.15	1.35	.19	.....	1.02
5	2.58	.....	2.1	.....	1.02	1.51	.18	.....	1.06
6	2.59	.....	2.0	.....	1.06	1.49	.38	.....	.91
7	2.6	.....	2.0	.....	.97	1.44	.....	.....	.87
8	2.6	1.22	1.9	.....	1.01	1.38	.....	.....	1.13
9	1.4	1.6	1.85	.....	.97	1.23	.....	.....	1.03
10	.....	2.0	1.78	.....	.96	1.2	.....	.....	.90
11	.....	2.35	1.7	.....	.96	1.14	.....	.....	.74
12	1.7	2.0	1.65	.....	1.07	1.14	.....	.....	.70
13	1.5	1.65	1.65	.....	1.36	1.13	.....	.....	.50
14	1.3	.....	1.3	.....	1.52	1.19	.....	.....	.41
15	1.3	.....	1.3	.....	1.6	1.21	.....	.....	.43
16	1.35	.....	1.2	.....	1.32	1.20	.....	0.33	.44
17	1.35	.....	1.1	0.5	1.31	1.23	.....	.15	.34
18	1.35	.....	.....	.45	1.32	1.36	.75	.73	.68
19	.....	1.8	.....	.6	1.26	1.28	1.00	1.02	1.18
20	.....	1.7	.....	.86	1.26	1.14	1.17	1.18	.06
21	.....	1.57	.....	1.0	1.22	1.07	1.51	1.27	.....
22	1.33	1.49	.....	1.21	1.21	1.24	1.08	1.00	.....
23	1.3	1.4	.....	1.36	1.15	1.40	1.28	1.06	.60
24	1.3	1.32	.....	.97	1.15	1.52	.94	.96	.84
25	1.2	1.25	.....	.85	1.22	1.48	.....	.92	.93
26	1.2	1.2	.....	.75	1.21	1.48	.....	1.02	.73
27	1.15	1.15	.....	.7	1.16	1.43	.....	1.19	1.01
28	1.04	.....	.....	.81	1.06	1.38	.....	1.41	1.08
29	1.03	.....	.....	1.11	1.06	1.41	.....	1.44	1.17
30	1.25	.....	.....	1.31	1.31	.91	.....	1.35	1.08
31	1.2	.....	.....	.....	1.31	.....	.....	1.26	.....

Monthly discharge of Model canal near Duncan, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	31.5	0.0	11.6	712
November	19.0	.0	4.0	242
December	16.5	.0	5.0	306
January	.0	.0	.0	0
February	.0	.0	.0	0
March	.0	.0	.0	0
April	35.0	.0	10.3	610
May	38.5	22.5	30.1	1,850
June	38.5	26.0	33.5	1,990
July	38.0	.0	10.8	666
August	46.5	.0	15.0	923
September	33.0	.0	23.0	1,370
The year	46.5	.0	12.0	8,670

NOTE.—Discharge determined from two fairly well-defined rating curves and by indirect method for shifting control. See "Accuracy" in station description. Canal dry Oct. 10, 11, 19–21; Nov. 4–7, 14–18; Nov. 28 to Dec. 1; Dec. 18 to Apr. 16; July 25 to Aug. 15; and Sept. 21 and 22.

VALLEY CANAL NEAR DUNCAN, ARIZ.

LOCATION.—In the SW. ¼ sec. 32, T. 18 S., R. 21 W., Grant County, N. Mex., half a mile above Arizona and New Mexico State line and 7 miles above Duncan, Ariz.

RECORDS AVAILABLE.—October 1, 1914, to September 30, 1915, when station was discontinued. Discharge measurements June 23 to September 30, 1914.

GAGE.—Vertical staff on left bank about 2 miles below heading; read twice daily to tenths by S. E. Webster, George Hagan, or Bettie Cosper.

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

CHANNEL AND CONTROL.—Channel soft and subject to aquatic growth, causing control to shift considerably.

EXTREMES OF DISCHARGE.—Maximum discharge during year, 37.5 second-feet May 15. Canal dry during winter and for short periods during other months.

ACCURACY.—Records poor. Determination of daily discharge not sufficiently accurate to warrant publication.

Water diverted for irrigation from right side Gila River in NW. ¼ sec. 4, T. 19 S., R. 21 W. Wasteway about 1¼ miles below heading.

Discharge measurements of Valley canal near Duncan, Ariz., during the years 1914–1915.

[Made by J. B. Spiegel.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1914.	*Feet.*	*Sec.-ft.*	1914.	*Feet.*	*Sec.-ft.*	1915.	*Feet.*	*Sec.-ft.*
June 23	1.68	9.6	Nov. 20	1.25	2.8	June 3	2.13	22.6
July 18	3.00	46.2				3	2.13	21.8
21	2.29	25.7	1915.			July 23	1.65	12.6
Sept. 18	1.80	13.8	Apr. 18	1.70	9.4	Aug. 30	2.12	26.3

Daily gage height, in feet, of Valley canal near Duncan, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.	Sept.
1			1.88		2.10	2.25	1.70		2.05
2		1.25			1.90	2.20	1.65		2.15
3		1.60	1.70		1.80	2.16	1.55		2.30
4		1.90	1.80		1.75	2.10	1.55		2.25
5		1.70	1.70		1.70	2.05	1.45		2.20
6		1.42	1.60		1.90	2.00	1.45		2.10
7	1.76	1.40	1.60		1.55	1.95	1.35		2.10
8	2.12	1.40	1.65		1.00	2.05	1.35		2.05
9	2.48	1.55	1.70		1.45	2.15	1.25		1.95
10	1.70	1.70	1.80		1.90	2.35	1.25	1.70	1.90
11		1.90	1.80		2.00	2.40	1.20	1.55	1.90
12		1.90	1.85		2.25	2.35	1.15	1.35	1.90
13		1.85	1.90		2.45	2.30	1.30	1.20	2.00
14	1.86	1.30	1.90		2.50	2.25	1.25	1.30	
15	1.84		1.90		2.35	2.15	1.20	1.40	
16	1.81		1.80		2.15	2.05	1.35	1.90	
17	2.00	1.65	1.75		1.00	1.95	1.30	2.30	1.10
18	2.09	1.50		1.70	1.00	1.75	1.80	2.40	1.40
19	1.95	1.35		1 70	2.05	1.65	1.70	2.45	1.90
20	1.95	1.25	2.40	1.35	2.20	1.60	2.40	1.75	
21	2.10	1.20		2.15	2.20	1.85	2.30	2.25	1.80
22	1.65	1.00		2.40	2.10	2.20	2.15	2.15	1.70
23	1.75	.95		2.50	2.30	2.40	1.50	2.15	2.00
24	1.90	1.25		2.45	2.30	2.30	1.30	2.15	2.00
25	1.80	1.75		2.25	2.25	2.20		2.15	1.95
26	2.00	1.80		2.15	2.30	2.25		2.05	1.95
27	1.95	1.70		1.55	2.35	2.25		2.30	2.00
28	1.95			1.90	2.20	2.10		2.35	2.05
29	1.95	1.90		1.90	2.20	1.95		2.30	2.10
30	1.60	1.90		2.00	2.10	1.90		2.15	2.10
31	1.30				2.20			2.10	

Monthly discharge of Valley canal near Duncan, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	31	0	10.7	657
November	15	0	7.1	422
December	28	0	8.5	524
January	.0	0	.0	0
February	.0	0	.0	0
March	.0	0	.0	0
April	31.5	0	8.6	514
May	37.5	0	19.9	1,220
June	29	12	21.7	1,290
July	28	0	6.1	375
August	36	0	16.8	1,030
September	31	0	19.4	1,160
The year	37.5	0	9.9	7,190

NOTE.—Discharge determined from two fairly well defined rating curves and by indirect method for shifting control. See "Accuracy" in station description. Canal dry Oct. 1–6, 11–13; Nov. 1, 15, 16, 28; Dec. 2; Dec. 21 to Apr. 17; May 8, 17, 18; July 25 to Aug. 9; Sept. 14–16, and 20.

BLACK & McCLESKY CANAL AT DUNCAN, ARIZ.

LOCATION.—In T. 8 S., R. 32 E., 150 feet below highway bridge across Gila River at Duncan, Greenlee County.

RECORDS AVAILABLE.—April 16 to September 30, 1915, when station was discontinued.

GAGE.—Vertical staff on right bank about 1,000 feet below heading.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Shifting.

ACCURACY.—Records poor; daily and monthly records not sufficiently accurate for publication, because of insufficient discharge measurements and shifting control.

Water is diverted from left side of Gila River at Duncan. Canal is about 3 miles long, has no wasteway, irrigates only a few small farms, and is out of commission for greater part of each year. Total amount diverted from April 1 to September 30 about 1,800 acre-feet.

Discharge measurements of Black & McClesky canal at Duncan, Ariz., during the year ending Sept. 30, 1915

[Made by J. B. Spiegel.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Apr. 16	2.53	15.7	June 2	2.10	7.6	July 24	2.94	7.1
16	2.53	16.5	2	2.10	7.6			

NOTE.—July 24, 1914: Gage height 1.07 feet; discharge 0.0 second-foot.

Daily gage height, in feet, of Black & McClesky canal at Duncan, Ariz., for the year ending Sept. 30, 1915.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	2.1	2.4	2.36	.....	.....	16	2.57	2.4	1.8	2.43	2.22	2.54
2	.....	2.1	2.2	2.29	.....	.....	17	2.35	2.4	1.7	2.40	2.30	2.47
3	.....	2.1	2.15	2.22	.....	.....	18	2.35	2.25	1.55	2.55	2.35	.....
4	.....	1.5	2.25	2.20	.....	.....	19	2.15	2.2	1.95	2.55	2.65	2.35
5	.....	1.9	2.2	2.30	.....	.....	20	2.20	2.15	2.41	2.15	2.69	2.60
6	.....	1.8	2.2	2.54	.....	.....	21	2.20	2.0	2.23	1.86	2.60	.....
7	.....	1.75	2.1	2.56	.....	.....	22	2.35	1.45	2.0	2.34	2.60	.....
8	.....	1.7	2.1	.....	3.0	.....	23	2.20	1.75	2.1	2.50	2.50	.....
9	.....	1.6	2.0	2.20	2.17	.....	24	2.20	1.6	2.25	2.58	2.46	.....
10	.....	1.6	2.05	2.31	.....	.....	25	2.15	1.5	2.36	2.85	2.43	.....
11	.....	1.55	1.9	2.49	2.17	.....	26	2.10	1.6	2.55	2.85	.....	.....
12	.....	1.9	1.8	2.54	2.30	2.78	27	2.00	1.6	2.67	3.30	.....	.....
13	.....	1.9	1.7	2.55	2.34	2.50	28	2.00	1.75	2.58	3.30	.....	.....
14	.....	2.2	1.8	2.45	2.34	2.43	29	1.50	1.95	2.47	2.85	.....	.....
15	.....	2.35	1.8	2.52	2.35	2.56	30	2.10	2.25	2.43	1.90	.....	.....
							31	.....	2.35	.....	1.80	.....	.....

COLMONERO CANAL NEAR DUNCAN, ARIZ.

LOCATION.—In the NE. ¼ sec. 3, T. 8 S., R. 32 E.; in J. H. Gready's yard, about 4 miles below Duncan, Greenlee County.

RECORDS AVAILABLE.—September 19, 1914, to September 30, 1915, when station was discontinued.

GAGE.—Vertical staff on left bank, 1¾ miles below heading; read twice daily to hundredths by S. E. Webster or J. H. Gready.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Shifting.

ACCURACY.—Records poor. Determinations of daily and monthly discharge not sufficiently accurate for publication.

Canal diverts for irrigation from right side Gila River, has several wasteways, and is dry the greater part of each year. Total amount diverted during year ending September 30, 1915, about 1,900 acre-feet.

Discharge measurements of Colmonero canal near Duncan, Ariz., during the years 1914–15.

[Made by J. B. Spiegel.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1914.	*Feet.*	*Sec.-ft.*	1915.	*Feet.*	*Sec.-ft.*
Sept. 19	1.76	5.6	Apr. 19	0.40	1.8
			June 2	.80	7.2
			2	.80	7.4

NOTE.—Apr. 19, 1915, gage reset at an independent datum.

Daily gage height, in feet, of Colmonero canal near Duncan, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.05	1.05	.....	1.0	0.95	1.0	.....	0.9
2	1.05	1.05	.....	1.2	.9	1.2	.....	1.0
3	1.05	1.0	.....	1.1	1.0	1.05	.....	1.2
4	.....	1.0	.....	1.0	1.15	1.0	.....	1.2
5	.....	1.05	.....	1.0	1.15	1.0	.....	1.2
6	.....	1.05	.....	.9	.8	1.15	.....	.....
7	.....	1.0	.....	.8	.8	1.0	.....	.....
8	.....	1.0	.....	.6	1.1	1.05	.....	1.3
9	.....	1.0	.....	.55	1.05	.75	.....	1.2
10	.....	1.0	.....	.65	.95	.7	.....	1.1
11	.....	1.0	.....	.8	.95	.9	.....	1.1
12	.....	.....	.....	.8	.95	.85	.....	1.15
13	.....	.....	.....	.75	.95	.85	.....	1.2
14	.....	.....	.....	.9	.95	.75	.....	1.2
15	.....	.....	.....	.9	.95	.75	.....	1.3
16	.....	.....	.....	1.1	.9	.....	.....	1.3
17	.....	.....	.....	1.05	.85	.....	.....	1.3
18	.....	.....	.....	1.05	.85	1.1	.....	.....
19	.....	.....	0.4	.85	.75	1.0	0.75	.....
20	.....	.....	.6	.7	.6	.8	.....	.....
21	.....	.....	.55	.6	.7	.85	.7	.....
22	.....	.....	.8	.55	.85	.75	.7	.....
23	.....	.....	.75	.65	.95	.7	.65	.....
24	.....	.....	.7	.85	.8	1.05	.75	.....
25	.....	.....	.55	.8	.....	.....	.9	.....
26	.....	.....	.55	.85	.4	.....	.....	.....
27	.....	.....	.5	.9	.65	.....	.....	.....
28	.....	.....	.5	.9	.9	.....	.....	.....
29	.....	.....	.5	.95	.85	.....	.....	.....
30	.....	.....	.7	1.05	.8	.....	.....	.....
31	.....	.....	.....	.95	.....	.....	.....	.....

YORK CANAL AT YORK, ARIZ.

LOCATION.—In the SE. ¼ sec. 9, T. 6 S., R. 31 E., about 1,000 feet southeast of York, Greenlee County.

RECORDS AVAILABLE.—September 19, 1914, to September 30, 1915, when station was discontinued.

GAGE.—Vertical staff on left bank near Ernst Shade's barn, about 300 feet above inverted siphon and 1 mile below heading.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Channel composed of mud and silt; control shifting.

ACCURACY.—Owing to shifting control and insufficient discharge measurements, records of daily and monthly discharge not of sufficient accuracy for publication.

Canal diverts from right side of Gila River for irrigating about 300 acres and is dry the greater part of each year. Amount diverted during the year ending September 30, 1915, about 1,200 acre-feet.

Discharge measurements of York canal at York, Ariz., during the years 1914–15.

[Made by J. B. Spiegel.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1914.	*Feet.*	*Sec.-ft.*	1915.	*Feet.*	*Sec.-ft.*
Sept. 19	0.70	3.0	Apr. 19	0.80	4.1
			June 2	1.87	6.9
			Aug. 28	1.55	7.4

Daily gage height, in feet, of York canal at York, Ariz., for the year ending Sept. 30, 1915.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	0.9	2.15	1.0	.....	2.05	16	.....	2.15	1.85	2.1	.....	.....
2	.....	1.0	1.95	1.1	.....	1.9	17	.....	2.15	1.9	2.15	.....	.....
3	.....	.95	1.95	1.5	.....	1.7	18	.....	2.2	1.9	2.2	.....	.....
4	.....	1.00	2.2	2.3	.....	1.4	19	1.05	2.15	1.7	.....	.....	.....
5	.....	1.15	2.35	2.3	.....	1.5	20	1.0	1.85	1.55	.....	1.7	.....
6	.....	1.15	2.25	1.9	.....	1.4	21	.95	1.85	1.35	1.9	2.1	.....
7	.....	1.5	1.95	1.5	.....	1.35	22	.9	1.7	1.1	2.15	2.35	.....
8	.....	1.45	1.9	1.55	.....	1.25	23	.85	1.65	.95	.....	1.9	.....
9	.....	1.45	1.9	1.6	.....	1.2	24	.8	2.15	.7	.....	1.65	.....
10	.....	1.4	1.95	1.8	.....	1.2	25	.8	2.15	.5	.....	.....	.....
11	.....	1.8	2.0	2.0	.....	1.45	26	.7	2.0	.4	.....	.....	.....
12	.....	1.85	2.25	2.25	.....	1.5	27	.7	1.95	.2	.....	.....	.....
13	.....	1.9	2.35	2.1	.....	1.4	28	.7	1.8	.....	.....	1.65	.....
14	.....	1.9	2.1	.....	.....	1.3	29	.8	1.6	.....	.....	1.65	.....
15	.....	2.15	1.95	1.9	.....	1.25	30	.85	1.55	.....	.....	1.6	.....
							31	.....	1.2	.....	.....	1.1	.....

SAN FRANCISCO RIVER AT CLIFTON, ARIZ.

LOCATION.—In sec. 30, T. 4 S., R. 30 E., at railroad bridge at Clifton, Greenlee County, 1¾ 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; and August 5, 1912, to September 30, 1915.

GAGE.—Stevens water-stage recorder installed on the railroad bridge May 15, 1914, to replace the vertical staff which was read from August 6, 1913, to May 14, 1914, and which was also attached to the railroad bridge and referred to the same datum Original gage, read from October 24, 1910, to September 30, 1912, was a vertical staff attached to the highway bridge one-fourth mile above the railroad bridge; replaced October 1, 1912, by a chain gage set at the same datum and read until August 5, 1913. The gages on the railroad bridge are referred to a different datum from that of the gages at the highway bridge.

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

CHANNEL AND CONTROL.—Sand and gravel; shifting. Section is flat and nonsensitive.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 12.5 feet at 1 a. m., December 20 (discharge, determined from an extension of the rating curve about 23,000 second-feet); minimum stage not recorded; minimum discharge determined by comparison with other stations to have been about 30 second-feet on June 29.

1910–1915: Maximum stage and discharge same as for 1915 (see above); minimum stage recorded, 2.6 feet July 3, 6, and 7, 1913 (discharge, 5.0 second-feet).

DIVERSIONS.—Small amount of water is used for irrigation above station.

ACCURACY.—Because of shifting control and lack of discharge measurements at high stages, records are poor, except for May, August, and September, for which they are fair.

Discharge measurements of San Francisco River at Clifton, Ariz., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 15	J. B. Spiegel	5.05	139	Mar. 2	J. B. Spiegel	5.80	942
19	do	5.00	125	Apr. 14	do	6.28	2,360
Nov. 19	M. D. Anderson	4.90	237	June 1	do	5.66	275
Jan. 7	J. B. Spiegel	5.40	374	1	do	5.66	277
7	do	5.40	418	July 21	do	6.05	662
7	do	5.40	354	21	do	6.05	684
Feb. 10	do	5.58	499	Aug 26	do	5.35	116
10	do	5.58	495	26	do	5.35	126
Mar. 2	do	5.80	961	Sept. 24	do	5.55	175

Daily discharge, in second-feet, of San Francisco River at Clifton, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	100	118	90	555	2,600	950	3,800	850	275	45	320	115
2	100	118	84	495	1,500	950	3,650	725	280	45	285	140
3	650	118	90	470	1,070	980	3,650	610	285	45	250	140
4	9,000	114	72	470	890	1,010	3,800	560	270	45	320	140
5	2,800	128	72	370	730	960	3,650	525	260	45	285	90
6	1,170	134	72	345	660	920	4,206	500	255	50	285	115
7	590	128	72	360	590	870	4,500	525	220	50	320	115
8	290	128	70	360	590	870	3,650	535	210	50	355	90
9	170	124	64	345	530	910	2,850	500	200	50	385	90
10	118	124	62	330	595	920	2,400	455	205	50	385	90
11	118	2,800	64	320	620	980	1,950	455	195	40	250	90
12	118	1,900	56	305	1,600	1,460	1,950	455	205	40	250	70
13	118	590	56	290	960	1,070	2,150	610	205	45	250	70
14	118	370	54	285	790	920	2,150	725	200	60	220	70
15	118	290	54	265	760	980	1,950	725	165	50	220	50
16	118	195	54	265	810	1,350	1,550	675	160	50	220	70
17	114	142	56	270	875	2,020	1,420	650	165	50	220	90
18	114	100	70	255	1,370	2,280	1,250	610	150	50	220	140
19	118	84	6,600	245	1,870	2,900	1,150	560	140	165	190	160
20	114	88	14,600	240	4,400	2,750	1,420	500	135	90	190	180
21	102	110	4,550	225	3,380	2,280	1,550	470	105	670	190	200
22	170	94	8,900	230	1,700	1,800	1,700	425	85	805	165	200
23	230	94	7,200	240	1,220	2,150	1,600	410	80	620	140	175
24	192	100	5,250	255	1,090	3,250	1,450	410	75	745	140	175
25	138	98	3,700	250	1,010	4,750	1,450	390	70	1,300	115	175
26	142	90	2,220	255	980	4,200	1,350	390	65	9,300	90	295
27	134	88	1,380	240	990	4,200	1,300	375	45	3,300	190	295
28	118	88	1,750	225	1,010	4,650	1,300	370	35	1,020	165	175
29	108	84	1,500	7,100	.....	4,750	1,450	325	30	620	165	175
30	102	78	890	14,600	.....	4,350	1,320	310	45	505	140	175
31	114	.....	730	4,200	.....	3,800	.....	290	.....	355	140	.....

NOTE.—Discharge determined by indirect method for shifting control and by comparison with records obtained at other stations.

Monthly discharge of San Francisco at Clifton, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	9,000	100	574	35,300	D.
November	2,800	78	291	17,300	D.
December	14,600	54	1,950	120,000	D.
January	14,600	225	1,120	68,900	D.
February	4,400	530	1,260	70,000	D.
March	4,750	870	2,140	132,000	D.
April	4,500	1,150	2,250	134,000	D.
May	850	290	515	31,700	C.
June	285	30	161	9,580	D.
July	9,300	40	656	40,300	D.
August	385	90	228	14,000	C.
September	295	50	139	8,270	C.
The period	14,600	30	939	681,000	

BROWN CANAL ABOVE WASTEWAY, NEAR SOLOMONVILLE, ARIZ.

LOCATION.—In the NE. ¼ sec. 31, T. 6 S., R. 28 E., on opposite side of river from gaging station on Gila River near Solomonville, about 10 miles above Solomonville, Graham County.

RECORDS AVAILABLE.—June 1, 1914, to September 30, 1915, when station was discontinued.

GAGE.—Vertical staff on left bank 800 feet above lower wasteway and three-quarters of a mile below intake; read twice daily to hundredths by J. W. Earven.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Shifting because of deposition of silt; control affected by operation of waste gate.

EXTREMES OF DISCHARGE.—Maximum stage during period covered by records 33 second-feet October 4, 1915. Canal dry for several months each year.

ACCURACY.—Records poor because of shifting control. Records of daily discharge not sufficiently accurate for publication.

Water diverted for irrigation from right side of Gila River. Two wasteways; upper one, used during flood periods is midway between heading and gage; lower one, about 800 feet below gage, is used by water commissioner in regulating flow.

Discharge measurements of Brown canal above wasteway, near Solomonville, Ariz., during the years 1914–15.

[Made by J. B. Spiegel.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1914.	*Feet.*	*Sec.-ft.*	1914.	*Feet.*	*Sec.-ft.*	1915.	*Feet.*	*Sec.-ft.*
May 21	1.30	6.3	Dec. 7	1.78	8.2	May 24	1.20	9.2
June 3	1.65	15.9	7	1.78	10.2	June 9	1.69	20.7
5	1.40	12.6				9	1.69	21.9
9	1.53	8.3	1915.			July 7	1.59	6.0
27	1.41	6.5	Mar. 27	2.50	31.5	10	1.70	6.1
Sept. 30	1.56	4.9	Apr. 2	1.65	20.4	Aug. 20	1.65	10.9
Oct. 12	1.90	8.4	2	1.65	20.9	20	1.65	11.2
Nov. 18	1.83	8.4	May 24	1.20	8.9			

Daily gage height, in feet, of Brown canal above wasteway, near Solomonville, Ariz., for the years ending Sept. 30, 1914–15.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1914.					1914.				
1	1.65	1.46	1.80	1.68	16	1.43	1.97	.90	2.05
2	1.65	2.19	1.59	1.55	17	1.41	1.92	2.20	2.24
3	1.65	2.19	1.87	.....	18	1.40	1.94	1.96	2.12
4	1.60	2.00	1.93	.....	19	1.65	2.10	2.03	1.88
5	1.60	2.10	1.73	.....	20	.92	1.92	2.23	1.93
6	1.60	2.01	1.69	.....	21	1.87	2.00	2.22	2.13
7	1.55	2.07	.....	.....	22	1.69	1.09	1.99	2.13
8	1.55	2.04	.....	.....	23	1.68	2.02	2.15	2.10
9	1.53	1.98	.....	.....	24	1.68	2.38	2.24	2.18
10	1.52	2.09	.....	.....	25	1.62	2.09	2.16	2.09
11	1.53	2.03	.....	1.02	26	1.65	1.80	2.16	1.97
12	1.50	1.97	.....	2.04	27	1.53	1.74	2.15	1.73
13	1.48	1.95	.....	2.14	28	1.41	1.58	2.13	1.69
14	1.48	1.94	1.32	2.26	29	1.40	.....	2.22	1.65
15	1.47	2.06	.....	1.99	30	1.40	.....	1.81	1.59
					31	.....	.....	1.88	.....

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914–15.										
1	1.85	1.98	1.88	.....	1.73	1.85	1.82	1.25	.....	1.78
2	1.85	1.95	1.96	.....	1.64	1.64	1.82	1.20	.....	1.78
2	2.18	1.89	1.92	.....	1.53	1.48	1.81	1.45	.....	1.78
4	2.60	1.82	1.88	.....	1.59	1.39	2.21	1.71	.....	1 59
5	2.08	1.76	1.86	.....	1.64	1.25	.29	1.66	.....	1.59
6	1.89	1.76	1.80	.....	1.73	1.19	2.18	1.63	.....	1.56
7	1.79	1.78	1.76	.....	1.68	1.13	1.90	1.65	.....	1.47
8	.83	1.80	1.82	.....	1.78	1.09	1.81	1.63	.....	1.60
9	.....	1.75	1.85	.....	1.55	1.08	1.71	1.65	.....	1.59
10	1.00	1.88	1.85	.....	1.48	1.04	1.71	1.70	1.15	1.54
11	1.31	2.45	1.76	.....	1.21	.97	1.69	1.69	1.28	1.54
12	2.08	2.22	1.83	.....	1.31	.95	1.64	1.72	1.70	1 59
13	2.02	2.15	1.83	.....	1.39	.....	1.63	1.71	1.42	1 30
14	2.00	2.05	1.83	.....	1.33	.....	1.62	1.70	1.55	1.52
15	1.95	1.94	1.80	.....	1.38	1.44	1.60	1.41	1.67	1.58
16	1.80	1.87	1.76	.....	1.40	1.43	1.55	1.54	1.56	1.61
17	1.90	1.83	1.82	.....	1.21	1.38	1.47	1.26	1.84	1.75
18	2.05	1.81	1.86	.....	.70	1.40	1.43	2.17	1.84	2.14
19	2.03	1.82	2.37	.....	.....	1.39	1.38	2.68	1.75	2.29
20	2.02	1.94	3.00	.....	1.23	1.23	1.32	1.32	1.62	2.56
21	1.97	1.89	2.87	1.38	1.31	1.55	1.40	.....	1.68	2.42
22	2.07	1.89	1.17	1.37	1.27	1.05	1.64	.....	1.64	1.85
23	2.16	1.74	.....	1.29	1.31	.93	1.59	.....	1.56	1 48
24	2.03	1.80	.....	1.35	1.28	1.43	1.41	.....	1.50	1.54
25	2.06	1.87	.....	1.93	1.52	2.00	1.39	.....	1.51	1.69
26	2.18	1.85	.....	2.08	1.57	2.00	1.39	.....	1.95	1.81
27	1.98	1.80	.....	2.23	1.59	2.00	2.11	.....	2.20	1.72
28	1.92	1.70	.....	1.87	1.85	2.00	1.62	.....	1.90	1.39
29	1.83	1.83	.....	1.87	1.85	2.00	1.30	.....	1.88	1.43
30	1.83	1.87	.....	1.76	1.85	2.00	1.31	.....	1.90	1.54
31	1.97	.....	.....	1.77	.....	1.86	.....	.....	1.81	.....

Monthly discharge of Brown canal above wasteway, near Solomonville, Ariz., for the years ending Sept. 30, 1914–15.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
1914.				
June	16	1	8.2	490
July	22	0	11.4	700
August	19	0	9.3	572
September	19.5	0	8.9	528
The period				2,290
1914–15.				
October	33	0.0	10.0	615
November	14	6	8.8	525
December	23	.0	7.0	430
January	.0	.0	.0	0
February	.0	.0	.0	0
March	27	.0	7.6	468
April	23	.0	17.4	1,040
May	23	.0	13.2	815
June	22	16	9.5	565
July	17.5	.0	5.4	326
August	18	.0	8.2	506
September	23	7.5	11.9	710
The year	33	.0	8.3	6,000

NOTE.—Discharge determined by indirect method for shifting control. See "Accuracy" in station description. Canal dry July 29–31; Aug. 7–13, 15, and 16; Sept. 3–10; Oct. 8, 9, and Dec. 23–31, 1914; Jan. 1 to Mar. 20; Apr. 19; May 13, 14; and July 21 to Aug. 9, 1915.

BROWN CANAL BELOW WASTEWAY, NEAR SOLOMONVILLE, ARIZ.

LOCATION.—In the SE. ¼ sec. 31, T. 6 S., R. 28 E., on opposite side of river and 2,000 feet southeast of gaging station on Gila River near Solomonville, and 10 miles above Solomonville, Gila County.

RECORDS AVAILABLE.—April 1, 1914, to September 30, 1915, when station was discontinued.

GAGE.—Vertical staff on left bank about 200 feet below lower wasteway and a mile below intake; read twice daily to hundredths by J. W. Earven.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Channel fairly permanent; control affected by backwater from lateral diversion gate below.

EXTREMES OF DISCHARGE.—Maximum discharge during period covered by records, 25 second-feet April 15, and August 26 to September 2, 1915. Canal dry for several months each year.

ACCURACY.—Records poor. Accuracy decreased somewhat by uncertain backwater effect from lateral diversion gate below gage. Figures for daily discharge not sufficiently accurate for publication.

See description of station on Brown canal above wasteway near Solomonville, Ariz.

Discharge measurements of Brown canal below wasteway, near Solomonville, Ariz., during 1914–15.

[Made by J. B. Spiegel.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1914.	*Feet.*	*Sec.-ft.*	1914.	*Feet.*	*Sec.-ft.*	1915.	*Feet.*	*Sec.-ft.*
Apr. 7	1.50	11.6	Sept. 30	1.20	5.1	Apr. 2	1.60	19.8
16	1.47	13.1	Nov. 18	1.37	5.1	2	1.60	19.9
May 4	1.35	9.6	Dec. 7	.99	2.7	June 9	1.50	12.5
20	1.10	6.2	7	.99	2.5	9	1.50	12.7
June 3	1.05	3.8				July 7	.83	2.0
27	.80	1.6				10	.98	3.8

Daily gage height, in feet, of Brown canal below wasteway, near Solomonville, Ariz., for the years ending Sept. 30, 1914–1915.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1914.							1914.						
1	1.50	1.35	1.05	0.85	1.17	1.00	16	1.47	.....	0.93	1.25	1.80	1.47
2	.....	.....	.....	1.33	1.28	1.03	17	.....	.....	.90	1.23	1.61	1.53
3	.....	.....	1.05	1.63	1.19	.....	18	.....	.....	.92	1.21	1.53	1.43
4	.....	1.35	.....	1.48	1.32	.....	19	.....	.....	.65	1.18	1.53	1.45
5	.....	.....	1.08	1.43	1.45	.....	20	.....	1.10	.70	1.25	1.56	1.51
6	.....	.....	1.05	1.47	1.48	.....	21	.....	.90	1.45	1.30	1.48	1.48
7	1.50	.....	1.00	1.38	.....	.....	22	.....	.....	1.30	1.20	1.56	1.49
8	.....	.....	.95	1.38	.....	.....	23	.....	.....	1.28	1.46	1.39	1.49
9	.....	.....	.90	1.44	.....	.....	24	.....	.....	1.28	1.95	1.63	1.47
10	.....	.....	.90	1.49	.....	.....	25	.....	.....	1.27	1.45	1.45	1.49
11	.....	1.25	.90	1.37	.....	.....	26	.....	.....	1.22	1.42	1.50	1.40
12	.....	.....	.90	1.29	.....	1.45	27	.....	.....	1.06	1.09	1.44	1.32
13	.....	.....	.91	1.27	.52	1.42	28	.....	.....	.98	.....	1.58	1.14
14	.....	.....	.90	1.38	.....	1.45	29	.....	.....	.78	.....	1.28	1.04
15	.....	.....	.90	1.24	.....	1.30	30	.....	.....	.77	.....	1.13	1.20
							31	.....	.....	.....	.....	.95	.....

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914–15.										
1	1.15	1.25	1.40	.....	1.53	1.22	1.64	1.32	.....	1.66
2	1.30	1.30	1.35	.....	1.52	1.23	1.66	1.30	.....	1.66
3	1.40	1.30	1.35	.....	1.44	1.19	1.70	1.30	.....	1.50
4	1.20	1.25	1.30	.....	1.49	1.29	1.70	.97	.....	1.49
5	1.55	1.15	1.25	.....	1.43	1.28	1.70	.87	.....	1.49
6	1.30	1.15	1.30	.....	1.41	1.20	1.68	.93	.....	1.45
7	1.30	1.05	1.00	.....	1.49	1.11	1.70	91.	.....	1.43
8	.60	1.00	1.15	.....	1.47	1.02	1.68	1.03	.....	1.53
9	.....	1.20	1.25	.....	1.30	1.00	1.66	1.10	.....	1.61
10	1.30	1.20	1.45	.....	1.13	.98	1.61	1.04	1.10	1.56
11	1.15	1.40	1.40	.....	1.53	.89	1.63	.98	1.10	1.56
12	1.25	1.15	1.40	.....	1.57	.82	1.61	.98	.....	1.40
13	1.45	1.10	1.40	.....	1.60	.....	1.55	.98	1.10	1.32
14	1.60	1.00	1.40	.....	1.50	.....	1.56	1.00	1.20	1.42
15	1.55	1.00	1.35	.....	1.64	1.33	.....	1.00	1.36	1.55
16	1.45	1.00	1.35	.....	1.21	1.42	1.50	.97	1.40	1.55
17	1.45	1.10	1.35	.....	1.13	1.32	1.32	.98	1.40	1.41
18	1.45	1.25	1.35	.....	.....	1.41	1.39	1.30	1.40	1.43
19	1.40	1 30	.....	.....	.....	1.37	1.30	2.75	1.56	1.60
20	1.35	1.30	.....	.....	1.15	1.33	1.30	1.00	1.55	1.60
21	1.30	1.30	.....	1.16	1.19	1.24	1.39	.....	1.57	1.60
22	1.45	1.40	.....	1.25	1.20	1.08	1.35	.....	1.53	1.46
23	1.55	1.35	.....	1.10	1.22	1.01	1.40	.....	1.41	1.47
24	1.35	1.40	.....	1.15	1.16	1.00	1.38	.....	1.36	1.38
25	1.35	1.45	.....	1.66	1.43	1.00	1.37	.....	1.39	1.50
26	1.50	1.40	.....	1.72	1.43	1.00	1.20	.....	1.84	1.30
27	1.45	1.35	.....	1.40	1.30	1.00	1.20	.....	1.72	1.30
28	1.35	1.30	.....	1.48	1.30	1.00	1.20	.....	1.72	1.51
29	1.25	1.30	.....	1.53	1.30	1.00	1.21	.....	1.80	1.36
30	1.20	1.25	.....	1.53	1.30	1.95	1.36	.....	1.72	1.34
31	1.35	.....	.....	1.53	.....	1.64	.....	.....	1.72	.....

Monthly discharge of Brown canal below wasteway, near Solomonville, Ariz., for the years ending Sept. 30, 1914–15.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
1914.				
April	12.5	12.0	12.2	728
May	9.5	2.5	6.4	394
June	11.5	.0	4.2	250
July	24.0	.0	8.5	523
August	16.5	.0	6.8	418
September	10.5	.0	4.8	286
The period				2,600
1914–15.				
October	20	0.0	8.6	530
November	10.5	3	5.9	353
December	10.5	.0	4.4	272
January	.0	.0	.0	0
February	.0	.0	.0	0
March	15	.0	4.5	281
April	25	.0	9.1	545
May	12	.0	5	307
June	12.5	.0	9.3	556
July	8	.0	2.9	176
August	25	.0	10.1	625
September	25	7.5	15.8	944
The year	25	.0	6.3	4,590

NOTE.—Discharge determined from two rating curves fairly well defined and by indirect method for shifting control. See "Accuracy" in station description. Canal dry June 19 and 20; July 28–31; Aug. 7–15 Sept. 3–11; Oct. 9; Dec. 19–31, 1914; Jan. 1 to Mar. 20; Apr. 18 and 19; May 13 and 14; June 15; July 21 to Aug. 9; and Aug. 12, 1915.

FOURNESS CANAL NEAR SOLOMONVILLE, ARIZ.

LOCATION.—In the SW. ¼ sec. 36, T. 6 S., R. 27 E., about 2 miles below gaging station on Gila River near Solomonville, Graham County, and about 8 miles above Solomonville.

RECORDS AVAILABLE.—October 1, 1914, to September 30, 1915, when station was discontinued. Discharge measurements April 3 to September 30, 1914.

GAGE.—Vertical staff on left bank at lower end of wasteway about half a mile below intake. Prior to May 4, 1915, the gage was about 15 feet below the wasteway at a different datum; gage read morning and evening, to tenths, by Trinidad Hernandez.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Channel fairly permanent; control affected by backwater from checks in canal.

EXTREMES OF DISCHARGE.—Maximum discharge during year, 30 second-feet May 29. Canal dry during January and February and parts of other months.

ACCURACY.—Records poor; daily discharge not sufficiently accurate for publication.

Water diverted for irrigation on left side of Gila River. There are two wasteways, one just below intake and one half a mile below.

Discharge measurements of Fourness canal near Solomonville, Ariz., during the years 1914–15.

[Made by J. B. Spiegel.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1914.	*Feet.*	*Sec.-ft.*	1914.	*Feet.*	*Sec.-ft.*	1915.	*Feet.*	*Sec.-ft.*
April 3	2.25	20.7	Dec. 9	.63	5.1	May 4	1.40	11.1
14	1.00	16.9	9	.63	5.1	4	1.40	11.5
May 4	.20	1.9				17	1.42	10.9
June 2	.97	11.2	1915.			17	1.42	11.1
July 10	.83	11.2	April 1	1.10	7.3	Aug. 16	1.54	9.8
Sept. 23	.98	11.3	1	1.10	6.5	16	1.54	10.2
Nov. 5	1.00	9.5						

NOTE.—May 4, 1915, gage moved 15 feet upstream and set at an independent datum.

Daily gage height, in feet, of Fourness canal near Solomonville, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	1.20	1.40	.....	0.90	0.95	1.70	0.79	.....	1.15
2	.....	1.10	1.15	0.70	.80	.85	1.65	.....	1.60	1.10
3	.....	1.05	.80	.80	1.10	1.35	1.55	.....	1.75	1.15
4	.....	1.00	.80	.85	1.55	1.15	1.60	.....	1.65	1.12
5	.....	1.00	.80	.90	1.45	.85	1.55	.....	1.60	1.00
6	.....	.95	.80	.90	.90	1.00	1.45	.....	1.60	1.25
7	.....	.95	.75	.78	.55	1.10	1.45	.....	1.60	1.55
8	.....	.95	.70	.73	.....	1.05	1.05	.....	.85	1.65
9	0.60	.95	.65	.70	.....	1.20	.85	.....	1.60	1.70
10	.50	1.00	.60	.70	.80	1.00	.65	.....	1.55	1.90
11	.35	1.00	.60	.....	.80	.90	.85	.....	1.20	1.85
12	.....	.60	.30	1.10	.85	.90	1.10	.....	1.35	1.80
13	.....	.....	.....	1.10	.80	1.20	1.05	.....	1.60	1.30
14	.....	.35	.30	1.00	.75	1.50	1.10	.....	1.55	.80
15	.....	.55	.30	1.20	90	1.70	1.15	.....	1.40	.75
16	.....	.35	.20	1.45	.92	1.65	1.05	.....	1.60	.70
17	.....	.15	.20	1.45	.95	1.43	1.00	.....	1.40	.70
18	.....	.15	.20	1.10	.80	1.45	1.10	0.70	1.35	.90
19	.....	.....	.85	.85	.55	1.40	1.15	1.25	1.25	.95
20	.....	.20	.85	.95	.55	1.25	1.10	1.45	1.15	1.40
21	.....	.40	.75	.75	.75	1.03	.90	1.65	1.10	1.87
22	.80	.35	1.00	.85	1.00	1.15	.95	1.40	.95	1.75
23	.40	.30	.50	.80	1.05	1.40	.90	.....	1.05	1.45
24	.20	.30	.....	.85	.85	1.55	.65	.....	1.15	1.35
25	.10	.30	.....	.95	.70	1.55	.50	.....	1.20	1.25
26	.10	.20	.....	.80	.....	1.80	.50	.....	1.45	1.45
27	.....	.20	.....	.75	.70	.85	.70	.....	1.15	.90
28	.40	.60	.....	.75	.70	1.35	.70	.....	1.25	.75
29	.65	1.30	.....	.95	.85	2.15	.15	.....	1.50	1.00
30	.95	1.35	.....	1.20	1.25	1.05	.40	.....	1.45	1.20
31	1.10	.....	.....	.80	.....	1.40	.....	.....	1.25	.....

Monthly discharge of Fourness canal near Solomonville, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	12.5	0.0	1.8	112
November	20	.0	6.6	392
December	22	.0	4.6	286
January	.0	.0	.0	0
February	.0	.0	0	0
March	11.5	.0	4.7	293
April	13.5	.0	4.3	258
May	30	4.5	10.0	597
June	16.5	.0	6.8	405
July	11.5	.0	1.5	64
August	13.5	.0	7.7	473
September	16.5	2	7.3	433
The year	30	.0	4.6	3,310

NOTE.—Discharge determined by indirect method for shifting control. See "Accuracy" in station description. Canal dry Oct. 1–8, 12–21, and 27; Nov. 13 and 19; Dec. 13; Dec. 24 to Mar. 1; Mar. 11; Apr. 8, 9, and 26; June 29; July 2–17; July 23 to Aug. 1.

SAN JOSE CANAL NEAR SOLOMONVILLE, ARIZ.

LOCATION.—In the NW. ¼ sec. 10, T. 7 S., R. 27 E., about 4 miles above Solomonville, Graham County.

RECORDS AVAILABLE.—April 1, 1914, to September 30, 1915, when station was discontinued.

GAGE.—Vertical staff attached to large cottonwood tree on right bank 200 feet below measuring weir and 1¾ miles below intake. Read morning and evening to tenths by Ezra Curtis. Datum was lowered 5.5 feet March 12, 1915.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Shifting.

EXTREMES OF DISCHARGE.—Maximum discharge during period covered by records 110 second-feet April 17, 1915. Canal dry during a part of each year.

ACCURACY.—Results poor; daily discharge not sufficiently accurate for publication. Water diverted for irrigation from left side of Gila River. There are two wasteways, one about 100 feet below intake and one 1¾ miles below intake.

Discharge measurements of San Jose canal near Solomonville, Ariz., during 1914–15.

[Made by J. B. Spiegel.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1914.	*Feet.*	*Sec.-ft.*	1914.	*Feet.*	*Sec.-ft.*	1915.	*Feet.*	*Sec.-ft.*
Apr. 3	2.50	70	Aug. 22	1.90	42.6	Apr. 1	8.35	82
14	2.50	68	Sept. 23	2.89	62	1	8.35	85
18	2.35	64	Oct. 14	2.65	64	May 4	7.33	45.2
May 5	1.55	34.6	Nov. 5	2.47	53	4	7.40	44.0
21	1.40	30.6	Dec. 9	2.63	51	17	8.61	84
22	1.40	31.1	9	2.61	48.4	17	8.61	83
June 2	2.18	56				July 10	6.95	28.2
8	1.40	30.3	1915.			14	7.00	33.0
July 6	2.02	54	Mar. 12	8.06	67	14	7.00	32.5
10	2.53	64	12	8.06	65	Aug. 16	8.38	70
16	1.89	46.6	16	7.35	43.0	16	8.38	70
31	1.32	30.2	16	7.35	42.1			

NOTE.—Gage datum lowered 5.50 feet Mar. 12, 1915.

Daily gage height, in feet, of San Jose canal near Solomonville, Ariz., for the year ending Sept. 30, 1914–15.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1914.							1914.						
1	2.50	1.55	2.18	0.90	1.32	2.90	16	2.42	1.40	1.18	1.89	2.16	2.65
2	2.50	1.51	2.18	.90	1.32	2.88	17	2.38	1.40	1.18	1.87	2.12	2.60
3	2.50	1.47	2.03	2.50	1.32	2.87	18	2.35	1.40	1.18	1.84	2.08	2.70
4	2.50	1.45	1.70	2.34	1.32	2.85	19	2.35	1.40	2.75	1.82	2.04	2.80
5	2.50	1.55	1.70	2.18	1.32	2.84	20	2.35	1.40	2.36	1.79	2.00	2.85
6	2.50	1.52	1.52	2.02	2.90	2.82	21	2.27	1.40	1.97	1.77	1.95	2.90
7	2.50	1.48	1.35	2.15	2.82	2.81	22	2.18	1.40	1.58	1.74	1.90	2.89
8	2.50	1.45	1.40	2.28	2.74	2.80	23	2.15	1.40	1.35	1.72	2.01	2.89
9	2.50	1.46	1.38	2.41	2.66	2.79	24	2.10	1.40	1.32	1.69	2.12	2.89
10	2.50	1.46	1.18	2.53	2.58	2.78	25	2.10	1.40	1.29	1.67	2.23	2.90
11	2.50	1.47	1.18	2.42	2.50	2.76	26	2.10	1.40	1.25	1.64	2.33	2.89
12	2.50	1.47	1.18	2.31	2.42	2.74	27	1.80	1.40	1.17	1.62	2.44	2.87
13	2.50	1.47	1.18	2.20	2.34	2.72	28	1.63	1.40	1.17	1.60	2.55	2.85
14	2.50	1.40	1.18	2.09	2.26	2.70	29	1.63	1.40	1.17	1.51	2.66	2.83
15	2.46	1.40	1.18	1.98	2.20	2.70	30	1.59	1.40	.90	1.42	2.77	2.80
							31	.....	1.40	.....	1.32	2.90	.....

Daily gage height, in feet, of San Jose canal near Solomonville, Ariz., for the year ending Sept. 30, 1914–15—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914-15.												
1	.....	2.70	3.00	.....	.....	1.50	8.35	8.35	8.50	7.20	.....	8.47
2	.....	2.60	2.75	.....	.....	1.50	8.90	7.75	8.38	6.80	.....	8.65
3	.....	2.70	2.60	.....	.....	1.55	8.20	7.35	7.38	6.83	.....	8.60
4	.....	2.65	2.60	.....	.....	1.90	8.20	7.70	8.40	7.00	7.00	8.58
5	.....	2.55	2.60	.....	.....	1.45	7.55	7.78	8.55	6.70	7.03	8.40
6	.....	2.35	2.60	.....	.....	1.00	8.25	7.35	8.50	6.80	7.40	8.16
7	.....	2.70	2.60	.....	.....	.85	7.75	7.08	8.40	7.00	8.40	7.95
8	1.42	2.60	2.70	2.30	.....	.70	8.20	6.55	8.40	7.00	8.40	7.77
9	2.10	2.60	2.65	2.00	.....	.85	8.28	.....	8.30	6.90	8.10	7.55
10	1.65	2.70	2.60	2.00	.....	.85	8.25	.....	8.30	7.00	8.15	7.55
11	1.75	2.30	2.60	2.05	.....	1.00	8.25	.....	8.00	7.00	8.20	7.50
12	2.00	2.05	2.60	1.98	.....	7.45	8.37	8.40	7.90	6.95	8.40	7.53
13	2.32	2.35	2.70	2.12	.....	7.45	8.40	8.40	8.45	6.95	8.40	7.45
14	2.70	2.35	2.60	2.25	.....	6.95	8.40	8.50	8.37	6.90	8.50	7.35
15	2.90	1.95	2.60	2.20	.....	7.00	8.40	8.40	8.30	6.95	8.40	7.30
16	.....	1.80	2.65	2.20	.....	7.00	8.48	8.55	8.12	6.60	8.40	7.30
17	1.90	1.65	2.70	.....	.....	8.38	8.70	8.63	7.70	7.00	8.35	7.25
18	2.60	1.70	2.72	.....	.....	8.12	8.25	8.47	8.35	.....	8.33	8.35
19	2.70	1.95	2.65	.....	.....	7.00	7.50	8.57	8.15	.....	8.35	8.50
20	2.65	2.75	.....	.....	1.80	7.00	7.17	8.47	8.20	7.10	8.40	8.25
21	2.60	2.65	.....	.....	1.40	8.15	7.57	8.67	7.30	7.10	8.57	8.40
22	2.01	2.70	.....	.....	1.55	8.20	7.47	8.45	7.60	.....	8.40	8.60
23	1.00	2.60	.....	.....	1.45	8.12	5.55	8.35	7.30	.....	8.35	7.80
24	2.10	2.50	.....	.....	1.45	8.27	7.30	8.50	7.15	.....	8.35	.....
25	1.25	2.40	.....	.....	1.20	8.25	7.00	8.60	7.00	.....	8.40	.....
26	2.35	2.90	.....	.....	1.20	8.30	6.87	8.60	7.20	.....	8.35	8.40
27	2.45	3.20	.....	.....	1.40	8.20	7.90	8.50	7.10	.....	7.70	7.72
28	2.50	3.00	.....	.....	1.40	8.35	6.92	8.55	7.15	.....	8.35	7.60
29	2.45	3.00	.....	.....	.....	8.35	7.38	8.60	7.20	.....	8.40	7.72
30	2.50	2.90	.....	.....	.....	8.30	8.25	8.55	7.10	.....	8.40	7.97
31	1.00	.....	.....	.....	.....	8.30	.....	8.55	.....	.....	8.30	.....

Monthly discharge of San Jose canal near Solomonville, Ariz., for years ending Sept. 30, 1914–15.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
1914.				
April	69	37	61.3	3,650
May	36	31	32.0	1,970
June	78	17	33.9	2,020
July	70	17	47.0	2,890
August	84	29	58.5	3,590
September	63	50	58.7	3,490
The period	.....	.....	.....	17,600
1914-15.				
October	60	0	26	1,640
November	72	23	46	2,640
December	64	0	31	1,900
January	39	0	10	602
February	41	0	10	564
March	84	16	50	3,080
April	110	9	64	3,810
May	87	0	63	3,860
June	76	33	55	3,270
July	35	0	20	1,210
August	81	0	57	3,520
September	88	0	53	3,190
The year	110	0	40.6	29,300

NOTE.—Discharge determined by indirect method for shifting control. Canal dry Oct. 1–7 and 16; Dec. 20–31, 1914: Jan. 1–7; Jan. 17 to Feb. 19; May 9–11; July 18–19; July 22 to Aug. 3; and Sept. 24–25, 1915. See "Accuracy" in station description.

MICHELLENA CANAL NEAR SOLOMONVILLE, ARIZ.

LOCATION.—In the NW. ¼ sec. 9, T. 7 S., R. 27 E., 4 miles above Solomonville, Graham County, and 6 miles below gaging station on Gila River near Solomonville.

RECORDS AVAILABLE.—October 1, 1914, to September 30, 1915, when station was discontinued. Discharge measurements April 3 to September 30, 1914.

GAGE.—Vertical staff on left bank about 2 miles above intake; read morning and evening to hundredths by Mrs. N. A. Stewart. Prior to May 20, 1915, the gage was on right bank 1½ miles above present gage and referred to an independent datum. It was read morning and evening to hundredths by David Jurado.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Channel fairly permanent; control probably affected at times by backwater from lateral diversion gates.

EXTREMES OF DISCHARGE.—Maximum discharge during year, 13 second-feet June 4–9. Canal dry about half the year.

ACCURACY.—Determinations of monthly discharge poor; those of daily discharge not sufficiently accurate for publication.

Water diverted for irrigation from right side of Gila River. Main wasteway is 500 feet above first gage.

Discharge measurements of Michellena canal near Solomonville, Ariz., during 1914–15.

[Made by J. B. Spiegel.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1914.	*Feet.*	*Sec.-ft.*	1914.	*Feet.*	*Sec.-ft.*	1915.	*Feet.*	*Sec.-ft.*
Apr. 3	1.98	8.2	June 8	1.85	4.9	May. 20	1.50	9.1
14	1.95	10.3	Sept. 23	2.25	4.2	20	1.50	9.5
May 5	1.95	7.7	Dec. 9	3.00	8.8	July 10	.73	1.2
22	2.00	7.9	9	3.00	9.0	14	1.07	4.6

NOTE.—May 20, 1915, gage moved 1½ miles downstream and set at an independent datum.

Daily gage height, in feet, of Michellena canal near Solomonville, Ariz., for the year ending Sept. 30, 1915.

Day.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		2.75		2.04	2.21	1.45	0.95		1.70
2		2.75		2.03	2.15	1.60	1.15		1.70
3		2.75		2.03	2.10	1.75	1.15		1.70
4		2.75		1.93	2.13	1.80	1.01		1.70
5		2.75		1.93	2.20	1.80	.95		1.45
6		2.75		1.89	2.10	1.80	.95		1.85
7		3.15		1.85	2.10	1.80	1.18		1.75
8		3.10		1.81	2.12	1.80	1.03		1.70
9		3.15		1.77	2.07	1.80	1.05		1.70
10		2.95		1.72	2.03	1.65	1.20		1.68
11		2.95		1.60	2.00	1.65	1.15		1.63
12		2.95		1.30	1.93	1.60	1.10		1.67
13		2.95		1.22	1.83	1.65	1.10		1.63
14		2.95		1.12	1.82	1.00	1.07		1.62
15		2.90		1.60	1.95	1.00	1.08		1.90
16		2.90		2.20	2.01	1.00	1.10		1.88
17		2.90		2.11	2.08	1.65		1.60	1.88
18		2.90	1.90	1.95	2.13	1.35		1.70	1.88
19		3.20	1.93	1.87	2.14	1.00		1.79	1.70
20		2.70	1.92	2.10	1.50	1.30		1.65	1.70
21		2.70	1.93	2.15	1.50	1.00		1.70	1.70
22	2.50		1.95	2.17	1.33	1.00		1.70	1.70
23	2.50		1.95	2.15	1.30	1.40		1.70	1.70
24	2.40		1.95	2.05	1.30	1.65		1.70	1.70
25	2.40		1.93	2.20	1.40	1.30		1.70	1.70
26	2.30		1.99	2.20	1.40	1.30		1.70	1.70
27	2.30		2.04	2.07	1.40	1.30		1.70	1.70
28	2.30		2.03	2.28	1.40	.50		1.70	1.90
29	2.70		2.05	2.20	1.65			1.70	1.80
30	2.70		2.05	2.20	1.50			1.70	1.65
31			2.03		1.45			1.70	

Monthly discharge of Michellena canal near Solomonville, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	0	0.0	0.00	0
November	7	.0	1.65	98
December	10	.0	5.64	347
January	0	.0	.00	0
February	0	.0	.00	0
March	8	.0	3.26	200
April	11	.5	7.13	424
May	11	5.5	8.33	512
June	13	.0	8.10	482
July	4	.0	0.39	24
August	5	.0	1.92	118
September	6	3.5	4.45	265
The year	13	.0	3.41	2,470

NOTE.—Discharge determined from two fairly well defined rating curves. Canal dry Oct. 1 to Nov. 21; Dec. 22 to Mar. 17; June 28 to July 1; July 4–6, and July 17 to Aug. 16.

MONTEZUMA CANAL AT SOLOMONVILLE, ARIZ.

LOCATION.—In SE. ¼ sec. 18, T. 7 S., R. 27 E., three-quarters of a mile above Solomonville, Graham County.

RECORDS AVAILABLE.—April 1, 1914, to September 30, 1915, when station was discontinued.

GAGE.—Vertical staff on right bank 1¾ miles below intake; read morning and evening to tenths. Observers, Benjamin Contreras, Jean Gillispie, and Lazero Banuelos. Datum lowered 4.00 feet March 10, 1915.

DISCHARGE MEASUREMENTS.—Made by wading or from plank across canal.

CHANNEL AND CONTROL.—Channel sandy and shifting; control affected by scour and fill caused by sudden changes in velocity due to removing and replacing boards on weir above gage.

EXTREMES OF DISCHARGE.—Maximum discharge during period covered by records, 150 second-feet July 31, 1915. Canal dry during winter and for short periods during other months.

ACCURACY.—Records of monthly discharge fair for Octobr, November, and December, 1914, and poor for the remainder of the period. Determinations of daily discharge not sufficiently accurate for publication.

Canal diverts for irrigation from left side of Gila River. Two wasteways, one about three-quarters of a mile below intake and one at Solomonville.

Discharge measurements of Montezuma canal at Solomonville, Ariz., during 1914–15.

[Made by J. B. Spiegel.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1914.	*Feet.*	*Sec.-ft.*	1914.	*Feet.*	*Sec.-ft.*	1915.	*Feet.*	*Sec.-ft.*
Apr. 1	2.35	110	Sept. 23	2.90	93	Apr. 9	7.10	95
13	2.35	114	Oct. 14	2.40	80	May 4	5.85	41.1
May 5	.10	33.1	Nov. 5	2.59	79	4	5.85	41.7
9	.10	34.6	Dec. 9	2.02	60	15	7.10	98
22	.10	33.1	9	2.02	55	15	7.10	92
June 2	1.60	82				20	6.85	96
17	.05	29.9	1915.			20	6.85	92
July 6	1.25	82	Mar. 12	5.16	8	July 12	5.10	31.7
16	1.81	98	12	5.16	6.9	15	5.12	33.1
31	2.18	97	16	6.65	96	Aug. 13	5.85	72
Aug. 22	2.10	77	16	6.65	101	13	5.85	68

NOTE.—Gage datum lowered 4.00 feet Mar. 10, 1915.

Daily gage height, in feet, of Montezuma canal at Solomonville, Ariz., for the years ending Sept. 30, 1914–15.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1914.							1914.						
1.....	5.35	3.20	3.85	3.00	5.27	5.90	16.....	5.23	3.10	3.09	4.81	5.28	5.40
2.....	5.35	3.16	4.60	3.00	5.36	5.84	17.....	5.20	3.08	3.05	4.79	5.27	5.70
3.....	5.35	3.13	4.00	4.85	5.45	5.78	18.....	4.45	3.05	3.98	4.76	5.26	5.80
4.....	5.35	3.10	3.73	4.65	5.54	5.72	19.....	4.35	3.07	4.90	4.73	5.25	5.90
5.....	5.35	3.10	3.46	4.45	5.63	5.66	20.....	4.25	3.09	4.42	4.70	5.23	5.90
6.....	5.35	3.10	3.33	4.25	5.70	5.60	21.....	4.15	3.10	3.94	4.68	5.21	5.90
7.....	5.35	3.10	3.20	4.33	5.66	5.54	22.....	4.20	3.10	3.45	4.65	5.10	5.87
8.....	5.35	3.10	3.10	4.41	5.61	5.48	23.....	4.25	3.10	3.40	4.62	5.19	5.85
9.....	5.35	3.10	3.10	4.49	5.57	5.42	24.....	4.05	3.08	3.35	4.60	5.23	5.77
10.....	5.35	3.05	3.09	4.58	5.52	5.36	25.....	4.07	3.05	3.30	4.57	5.28	5.70
11.....	5.35	3.00	3.09	4.62	5.47	5.30	26.....	3.95	3.05	3.25	4.54	5.32	5.60
12.....	5.35	3.05	3.09	4.66	5.43	5.24	27.....	3.85	3.08	2.85	4.51	5.37	5.50
13.....	5.35	3.10	3.09	4.70	5.39	5.16	28.....	3.45	3.10	2.92	4.48	5.37	5.40
14.....	5.31	3.05	3.09	4.74	5.35	5.10	29.....	3.43	3.05	3.00	4.72	5.37	5.30
15.....	5.27	3.10	3.09	4.78	5.30	5.10	30.....	3.30	3.00	3.00	4.96	5.90	5.20
							31.....	.....	3.10	.....	5.18	5.90	.....

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914–15.										
1.....	.....	1.90	1.90	.....	6.75	6.55	6.80	5.30	.....	6.13
2.....	.....	1.90	1.65	.....	6.90	6.25	6.95	5.30	.....	6.13
3.....	.....	1.85	2.05	.....	6.85	6.15	6.90	5.30	.....	6.37
4.....	.....	1.90	2.30	.....	6.90	5.90	6.90	5.20	.....	6.25
5.....	.....	2.00	2.35	.....	6.90	5.65	6.95	5.25	.....	5.85
6.....	.....	2.60	2.15	.....	6.85	6.25	6.95	5.10	5.20	6.45
7.....	1.70	2.65	2.15	.....	6.90	6.65	7.00	5.20	5.57	6.05
8.....	2.10	2.65	2.10	.....	6.90	6.75	7.10	5.20	6.32	6.05
9.....	2.15	2.75	2.00	.....	7.10	7.05	6.95	5.20	5.00	5.95
10.....	2.35	2.60	1.95	5.30	7.05	6.95	7.00	5.20	5.00	5.98
11.....	2.40	2.50	1.90	5.30	7.00	7.00	6.90	5.10	5.10	5.80
12.....	2.15	2.30	1.95	5.80	7.00	7.10	6.90	5.10	6.10	5.60
13.....	2.35	2.00	1.90	6.35	7.15	7.05	5.95	5.10	5.55	5.55
14.....	2.20	1.55	1.90	6.15	7.10	7.00	5.10	5.10	5.20	5.33
15.....	2.65	.35	1.90	6.35	6.95	7.10	6.70	5.10	5.52	5.20
16.....	2.80	.....	1.95	6.80	6.90	7.00	6.78	5.10	6.10	5.20
17.....	2.35	.....	1.85	6.80	6.45	6.95	6.35	5.12	6.40	5.20
18.....	2.60	.70	1.75	6.80	6.35	6.00	6.10	5.25	6.35	5.15
19.....	2.50	2.35	1.15	6.75	5.80	6.50	6.05	5.35	5.85	6.20
20.....	2.40	2.60	.....	6.70	6.40	6.90	5.95	6.45	5.45	6.40
21.....	2.05	2.60	.....	6.70	6.00	6.85	6.20	6.38	6.53	6.25
22.....	2.00	2.60	.....	6.60	6.95	6.55	6.15	6.40	6.45	6.15
23.....	2.15	2.50	.....	6.65	6.70	6.15	5.25	6.47	6.15	5.90
24.....	2.15	2.45	.....	6.80	6.70	6.10	5.45	6.60	6.12	6.05
25.....	1.90	2.50	.....	6.80	6.40	6.15	5.40	5.23	6.10	6.10
26.....	1.80	2.50	.....	6.25	6.15	6.10	5.30	5.20	6.23	6.00
27.....	1.90	2.35	.....	6.40	5.40	6.60	5.30	5.28	6.45	6.08
28.....	2.00	2.30	1.60	6.45	5.55	6.95	5.25	5.13	6.40	6.03
29.....	1.90	2.05	1.60	6.65	5.85	6.95	5.25	5.10	6.30	5.83
30.....	2.00	1.95	.....	6.70	6.10	6.85	5.50	5.20	6.23	5.70
31.....	1.85	.....	.....	6.75	.....	6.80	.....	7.00	6.03	.....

Monthly discharge of Montezuma canal at Solomonville, Ariz., for years ending Sept. 30, 1914–15.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
1914.				
April	112	37	88.7	5,280
May	34	29	31.6	1,940
June	94	26	42.2	2,510
July	98	29	77.8	4,780
August	120	77	95.3	5,860
September	110	59	79.6	4,740
The period				25,100
1194–15.				
October	106	0.0	55.3	3,400
November	103	.0	66.1	3,930
December	79	.0	35.5	2,180
January	0	.0	.0	0
February	0	.0	.0	0
March	103	.0	52.8	3,250
April	118	17.	78.1	4,650
May	117	27.	80.2	4,930
June	140	24.	91.4	5,440
July	150	32.	51.7	3,180
August	110	.0	62.	3,810
September	105	34.	73.4	4,370
The year	150	.0	51.3	39,100

NOTE.—Discharge determined by indirect method for shifting control. See "Accuracy" in station description. Canal dry Oct. 1–6; Nov. 15–17; Dec. 20–27, 30–31, 1914: Jan. 1 to Mar. 9; and Aug. 1–5, 1915

UNION CANAL NEAR SOLOMONVILLE, ARIZ.

LOCATION.—In the SW. ¼ sec. 14, T. 7 S., R. 26 E., 1¼ miles northwest of Solomonville, Graham County.

RECORDS AVAILABLE.—April 1, 1914, to September 30, 1915, when station was discontinued.

GAGE.—Vertical staff. From April 1 to May 5, 1914, it was on right bank just below bridge near observer's house and 1¼ miles below intake; on May 5 moved about 1,000 feet downstream on left bank and read in that position until October 9, 1914, when it was moved to a point on left bank just above bridge near its first location. An independent datum was used for each gage; read morning and evening to tenths by Lloyd Zundel, Maroni Larson, or Rudger Phillips.

DISCHARGE MEASUREMENTS.—Made by wading or from plank across canal.

CHANNEL AND CONTROL.—Sandy and shifting. A weir below the gages, which was sometimes used as a check, produced a variable backwater effect.

EXTREMES OF DISCHARGE.—Maximum discharge during period covered by records, 178 second-feet May 26 and 28, 1915. Canal dry during winter and for short periods during other months.

ACCURACY.—Records of monthly discharge poor for April, May, July, August, and September, 1914; remainder of period fair. Daily discharge not sufficiently accurate for publication.

This canal, which diverts for irrigation from left side of Gila River, is the largest in the vicinity of Solomonville. Wasteway is about one-quarter mile below intake.

Discharge measurements of Union canal near Solomonville, Ariz., during 1914–15.

[Made by J. B. Spiegel.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1914.	*Feet.*	*Sec.-ft.*	1914.	*Feet.*	*Sec.-ft.*	1915.	*Feet.*	*Sec.-ft.*
Apr. 1	5.27	137	Sept. 23	5.75	137	May 5	7.55	84
13	4.95	120	Nov. 5	2.40	116	5	7.54	83
18	4.35	85	Dec. 10	.45	42	15	7.58	86
May 5	3.80	54	10	.45	41.3	15	7.62	88
9	3.35	40.4	1915.			22	7.36	74
22	2.90	14.1	Apr. 1	7.72	78	22	7.38	77
June 2	4.10	64	9	6.55	38.6	Aug. 14	8.00	129
July 6	4.55	105	9	6.55	39.3	14	8.00	122
16	4.62	114				Sept. 16	7.16	73
Aug. 22	5.30	92						

NOTE.—Gage moved and datum changed May 5 and Oct. 9, 1914. See "Gage" in station description.

Daily gage height, in feet, of Union canal near Solomonville, Ariz., for the years ending Sept. 30, 1914–15.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1914.							1914.						
1	5.27	4.00	.....	2.80	4.00	5.90	16	.....	.....	2.91	4.62	5.55	5.55
2	.....	3.87	4.10	2.80	4.00	5.86	17	.....	.....	2.90	4.62	5.51	5.70
3	.....	3.68	3.87	4.90	4.00	5.83	18	4.35	.....	2.90	4.62	5.47	5.15
4	.....	3.58	3.75	4.78	4.00	5.80	19	4.34	.....	5.40	4.62	5.43	4.60
5	.....	3.80	3.62	4.64	4.00	5.76	20	4.33	.....	4.76	4.62	5.39	4.45
6	.....	3.73	3.48	4.55	.....	5.72	21	4.13	.....	4.12	4.62	5.35	4.30
7	.....	3.66	3.35	4.55	.....	5.68	22	4.20	2.90	3.48	4.60	5.30	5.02
8	.....	3.62	3.02	4.55	.....	5.64	23	4.10	.....	3.37	4.58	5.17	5.75
9	.....	3.35	3.00	4.55	.....	5.60	24	4.00	.....	3.25	4.56	5.04	5.02
10	.....	.....	2.97	4.56	.....	5.57	25	4.07	.....	3.13	4.52	4.91	4.30
11	.....	.....	2.95	4.56	.....	5.54	26	3.80	.....	2.90	4.48	4.78	4.30
12	.....	.....	2.95	4.57	.....	5.50	27	3.77	.....	2.80	4.44	4.65	4.25
13	4.95	.....	2.94	4.57	5.64	5.47	28	3.80	.....	2.80	4.40	4.60	4.20
14	.....	.....	2.93	4.58	5.61	5.44	29	3.80	.....	2.80	4.27	4.55	4.15
15	.....	.....	2.92	4.58	5.58	5.40	30	3.80	.....	2.80	4.13	4.50	4.10
							31	.....	.....	.....	4.00	5.90	.....

Day.	Oct.	Nov.	Dec.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914–15.											
1	.....	1.65	2.05	.....	.....	7.85	8.75	8.55	6.65	.....	7.75
2	.....	1.05	1.90	.....	.....	8.15	8.65	8.30	6.55	.....	7.35
3	.....	1.25	1.65	.....	.....	7.80	8.70	8.15	6.60	.....	7.85
4	.....	2.10	.55	.....	.....	8.35	7.85	8.10	6.55	.....	8.25
5	.....	2.60	.65	.....	.....	8.30	8.05	8.15	6.65	6.30	.....
6	.....	2.35	.55	.....	.....	8.10	7.50	8.25	6.55	7.30	.....
7	.....	2.35	.55	.....	.....	8.05	7.35	8.60	6.55	8.55	.....
8	.....	2.25	.55	.....	.....	7.35	7.05	8.00	6.75	8.10	.....
9	.....	2.35	.65	.....	.....	7.60	7.60	8.45	6.65	8.10	.....
10	.....	1.70	.60	.....	.....	6.25	6.75	8.45	6.65	8.05	.....
11	.....	1.65	.95	.....	.....	.....	6.45	7.15	6.65	7.75	.....
12	.....	2.30	1.05	.....	.....	.....	6.50	7.25	6.45	7.60	.....
13	.....	1.60	1.25	.....	.....	6.30	6.85	6.85	6.60	7.75	.....
14	.25	1.45	1.45	.....	.....	7.25	7.25	8.20	6.60	8.10	.....
15	1.00	1.50	1.45	.....	.....	8.35	7.60	7.70	6.50	8.45	7.50
16	1.35	1.60	1.35	.....	.....	8.70	8.10	7.55	6.60	8.60	7.20
17	1.25	1.75	1.35	.....	.....	8.50	7.95	6.25	6.65	8.05	7.15
18	1.20	1.45	1.30	.....	.....	8.25	7.90	6.05	7.80	7.55	7.65
19	1.50	1.25	1.70	.....	.....	8.05	8.20	.....	8.05	7.95	.....
20	1.65	1.25	1.25	.....	.....	7.80	8.15	6.90	8.05	7.75	.....
21	1.75	1.05	1.15	.....	.....	8.60	8.15	7.55	8.30	7.55	8.05
22	1.80	.95	1.05	.....	6.30	8.55	7.30	7.25	8.75	7.65	5.75
23	2.10	.85	.80	.....	.....	8.35	8.00	7.35	8.60	7.65	5.90
24	.85	1.45	.....	.....	6.35	8.55	8.10	7.35	8.70	6.95	8.00
25	1.00	2.25	.....	.....	7.10	8.75	8.55	7.45	8.45	6.25	8.25
26	1.00	1.95	.....	.25	7.20	8.35	8.95	7.55	7.45	7.10	7.25
27	1.55	1.95	.....	.40	6.75	8.15	8.80	7.45	6.20	8.05	.....
28	1.25	1.95	.....	.75	8.20	8.10	8.95	7.15	.....	8.35	.....
29	1.25	1.85	.....	1.35	7.80	8.40	8.85	6.98	.....	8.25	.....
30	1.25	1.90	.....	1.30	7.65	8.75	8.85	6.85	.....	8.35	7.50
31	1.45	.....	.....	.90	7.65	.....	8.65	.....	.....	8.10	.....

NOTE.—Gage heights missing Apr. 2–12 and 14–17; May 10–21; May 23 to June 1, 1914; and Sept. 5–14, 1915; there was no flow during all other periods for which gage heights are not given. See "Gage" in station description.

Monthly discharge of Union canal near Solomonville, Ariz., for 1914–15.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
1914.				
April	139	54	97.2	5,780
May	64	14	32.3	1,990
June	148	24	43.2	2,570
July	129	27	102	6,270
August	140	0	70.8	4,350
September	140	43	96.8	5,760
The period				26,700
1914–15.				
October	98	0	36.8	2,260
November	130	51	81.7	4,860
December	96	0	43.2	2,660
January	63	0	9.7	597
February	0	0	0	0
March	104	0	18.6	1,140
April	163	0	105	6,250
May	178	47	113	6,950
June	152	0	90.8	5,400
July	163	0	65.9	4,050
August	174	0	99.5	6,120
September	145	0	67.9	4,040
The year	178	0	61.3	44,300

NOTE.—Discharge determined from four fairly well-defined rating curves and by indirect method for shifting control. See "Accuracy" in station description. Canal dry Aug. 6–12; Oct. 1–13; and Dec. 24–31, 1914; Jan. 1–25; Feb. 1 to Mar. 21; Mar. 23; Apr. 11–12; June 19; July 28 to Aug 4; Sept. 19, 20, 27–29, 1915.

GRAHAM CANAL NEAR SAFFORD, ARIZ.

LOCATION.—In the W. ½ sec. 5, T. 7 S., R. 26 E., 1¼ miles north of Safford, Graham County.

RECORDS AVAILABLE.—October 1, 1914, to September 30, 1915, when station was discontinued. Discharge measurements April 12 to September 30, 1914.

GAGE.—Vertical staff on left bank 400 feet east of Safford road and 1½ miles below intake; gage read morning and evening to tenths by J. H. Allen or C. W. Bledsoe. Prior to October 10 the gage was on right bank about half a mile below present gage, at an independent datum.

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

CHANNEL AND CONTROL.—Sand; shifting.

EXTREMES OF DISCHARGE.—Maximum discharge during year, 45 second-feet July 18. Canal dry for several periods during year.

ACCURACY.—Records of monthly discharge fair; daily discharge not sufficiently accurate for publication.

Canal diverts for irrigation from right side of Gila River. One wasteway about 1 mile below intake.

Discharge measurements of Graham canal near Safford, Ariz., during 1914-15.

[Made by J. B. Spiegel.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1914.	*Feet.*	*Sec.-ft.*	1914.	*Feet.*	*Sec.-ft.*	1915.	*Feet.*	*Sec.-ft.*
Apr. 2	2.35	20.2	Sept. 25	2.38	17.3	May 21	2.21	25.9
11	3.15	29.2	Nov. 7	1.28	14.3	Aug. 10	1.71	8.5
15	3.25	33.9	Dec. 11	2.18	32.1	10	1.71	8.5
May 7	2.10	13.8	11	2.20	33.4	18	2.71	32.6
29	1.97	12.2				18	2.71	28.8
June 10	1.77	9.7	1915.					
July 15	2.02	14.1	May 21	2.21	25.5			
Sept. 11	2.60	20.0	21	2.21	26.0			

NOTE.—Oct. 10, 1914, gage moved 1 mile downstream and set at an independent datum.

Daily gage height, in feet, of Graham canal near Safford, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.70	.....	2.25	0.80	.....	1.20	1.80	2.10	2.40	1.40	.....	2.31
2	2.70	.....	2.25	.75	.....	1.10	2.20	2.10	2.30	1.40	.....	2.26
3	2.70	.....	2.10	.70	.....	1.05	2.50	2.10	2.30	1.80	.....	2.23
4	.....	1.20	1.75	.65	.....	1.10	2.30	2.40	2.10	1.50	.....	2.15
5	.....	1.20	1.65	.63	.....	1.10	2.30	2.20	2.10	1.50	.....	2.01
6	.....	1.20	1.60	.85	.....	1.00	2.10	1.90	2.10	1.50	.....	2.00
7	.....	1.28	1.60	1.20	.....	1.00	2.10	1.70	2.10	1.50	.....	1.60
8	.....	1.20	1.60	1.10	.....	1.00	2.10	1.70	1.90	1.50	1.00	1.41
9	.....	1.20	2.40	1.05	1.40	1.00	2.10	1.70	1.60	1.50	1.82	1.57
10	.....	1.25	2.25	.95	1.45	1.00	2.10	1.25	1.00	1.50	1.82	1.66
11	.....	1.45	2.25	.90	1.45	.95	1.90	1.10	.90	1.90	1.82	1.72
12	.....	1.30	2.20	.70	1.50	1.10	2.30	1.10	1.45	1.90	1.62	1.87
13	.....	.80	1 90	.65	1.50	1.10	2.40	1.10	2.00	1.90	1.61	2.04
14	.....	1.20	1.80	.60	1.30	.90	2.40	1.10	2.00	1.90	1.80	2.18
15	.....	1.80	1.80	.90	1.20	.80	2.40	1.10	2.10	1.80	2.32	2.25
16	.....	1.80	1.85	1.40	1.10	1.60	2.40	1.10	2.10	1.80	2.45	2.35
17	.....	1.80	1.80	1.35	1.10	1.80	2.10	1.10	2.10	1.80	2.49	2.50
18	.....	1.80	1.75	1.30	1.10	1.90	1.90	1.10	2.00	3.00	2.64	.....
19	.....	1.70	1.60	1.30	1.45	1.90	1.80	1.10	1.90	.70	2.64	.....
20	.....	1.70	1.30	1.25	2.00	1.90	1.80	1.10	1.80	1.00	2.46	.....
21	.....	1.90	.90	1.10	1.20	1.95	1.80	1.65	1.70	.....	2.34	.....
22	.....	2.05	.75	1.00	.80	1.60	2.00	2.00	1.60	.....	2.54	.....
23	.....	2.05	.80	1.00	.95	1.50	2.00	2.00	1.30	.....	2.45	.....
24	.....	2.25	1.50	1.35	.60	1.60	1.90	1.85	1.20	.....	2.48	.....
25	.....	2.20	1.60	1.00	.60	1.70	1.70	1.12	1.60	.....	2.42	1.66
26	.....	2.20	.90	.95	1.20	2.30	1.70	1.57	1.60	.....	2.25	1.38
27	.....	2.20	.95	1.70	1.20	2.20	1.70	2.05	1.40	.....	2.84	1.38
28	.....	2.20	1.15	1.70	1.30	1.80	1.70	2.00	1.40	.....	2.61	1.38
29	.....	2.10	1.15	1.70	.....	1.90	1.70	2.00	1.40	.....	2.60	2.22
30	.....	2.10	1.00	1.10	.....	1.90	1.80	2.10	1.40	.....	2.43	2.22
31	.....	.....	.85	.....	.....	1.70	.....	2.50	.....	.....	2.34	.....

NOTE.—Gage moved and set at independent datum Oct. 10, 1914.

Monthly discharge of Graham canal near Safford, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	22	0.0	2.1	131
November	34	.0	19.7	1,170
December	38	7.5	20.8	1,270
January	21.5	.0	10.8	662
February	21	.0	7.1	394
March	28	6	13.4	825
April	33	16	22.4	1,330
May	33	8.5	16.3	1,000
June	30.5	7	18.0	1,070
July	45	.0	10.3	633
August	35	.0	15.8	970
September	25	.0	10.1	640
The year	45	.0	14.0	10,100

NOTE.—Discharge determined from four fairly well defined rating curves and by indirect method for shifting control. See "Accuracy" in station description. Canal dry Oct. 4 to Nov. 3; Jan. 30 to Feb. 8; July 21 to Aug. 7, and Sept. 18–24.

OREGON CANAL NEAR THATCHER, ARIZ.

LOCATION.—In the NE. ¼ sec. 35, T. 6 S., R. 25 E., 1½ miles northeast of Thatcher, Graham County.

RECORDS AVAILABLE.—October 1, 1914, to September 30, 1915, when station was discontinued. Discharge measurements April 2 to September 30, 1914.

GAGE.—Vertical staff attached to pier of footbridge near right bank about 700 feet below lower wasteway and 2 miles below intake.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Sand and clay channel; control slightly shifting.

EXTREMES OF DISCHARGE.—Maximum stage during year, 99 second-feet December 20; Canal dry during winter and for short periods during other months.

ACCURACY.—Records of monthly discharge poor for October, November, and December, fair for remainder of the year. Determinations of daily discharge not sufficiently accurate for publication.

Discharge measurements of Oregon canal near Thatcher, Ariz., during 1914–15.

[Made by J. B. Spiegel.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1914.	*Feet.*	*Sec.-ft.*	1914.	*Feet.*	*Sec.-ft.*	1915.	*Feet.*	*Sec.-ft.*
Apr. 2	1.90	49.5	July 15	1.27	25.5	Aug. 10	1.48	28.6
10	1.65	40.6	Sept. 11	.50	1.1	18	1.35	25 0
May 1	1.00	16.4	25	1.74	35.3	18	1.35	26.4
7	1.00	16.8	Nov. 7	1.40	29.7	Sept. 17	.82	10.1
8	.90	14.5	Dec. 11	1.48	33.6			
29	.60	7.7						
June 10	.75	12.5	1915.					
17	.67	10.2	Aug. 10	1.48	28.5			

Daily gage height, in feet, of Oregon canal near Thatcher, Ariz., for the year ending Sept. 30, 1915.

Day	Oct.	Nov.	Dec.	Jan.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	.....	1.8	0.1	.....	.....	2.2	1.4	2.0	1.0	.....	1.6
2	.....	1.2	.1	.....	.....	2.2	1.4	2.0	1.0	.....	1.4
3	.....	1.2	.1	.....	.....	1.8	.....	1.6	1.0	.....	1.4
4	.....	1.2	.1	.....	.....	2.4	.....	1.6	1.0	1.0	1.4
5	.....	1.25	.1	.....	.....	1.8	.....	1.6	1.0	.1.0	1.4
6	.....	1.3	.....	.....	.....	2.4	.....	1.8	1.0	1.0	1.3
7	.....	1.4	.3	.....	.....	2.4	.....	1.8	1.0	1.0	1.2
8	.....	1.5	1.2	.....	.....	2.4	.....	1.8	1.0	1.0	1.15
9	.....	1.55	1.35	.....	.....	1.8	.....	1.5	1.0	1.0	1.1
10	.....	1.6	1.4	.....	.....	1.8	.....	1.4	1.0	1.5	1.0
11	.....	1.8	1.5	.....	.....	1.8	.....	1.6	1.0	1.35	1.4
12	.....	2.2	1.5	.....	.....	1.6	.....	1.8	1.0	2.0	1.8
13	.....	1.2	1.5	.....	.....	1.8	.....	1.8	1.0	2.0	1.9
14	.....	1.2	1.5	.....	.....	1.8	.....	1.8	1.0	1.5	1.9
15	.....	1.3	1.55	.....	.....	1.8	.....	1.8	1.0	1.5	1.8
16	1.6	1.05	1.55	.....	.....	1.8	.....	1.7	1.0	1.5	1.65
17	1.5	.7	1.5	.....	.....	1.8	1.4	1.4	1.0	1.7	1.7
18	1.4	.7	1.5	.....	.....	.8	1.4	1.35	.....	1.1	.....
19	1.4	.65	2.3	.....	2.6	.8	1.45	1.3	.....	1.1	.....
20	1.4	.6	2.9	.....	2.45	.8	1.35	1.0	.....	1.1	.....
21	1.4	.2	2.5	.....	2.4	1.8	1.3	1.0	.....	.8	.....
22	1.4	.2	2.5	.....	2.4	1.75	1.3	1.0	.....	.9	.....
23	1.5	.2	1.2	.....	2.0	1.8	1.65	1.0	.....	1.0	.....
24	1.4	.1	.....	.....	1.85	1.8	2.0	1.0	.....	1.2	.....
25	1.4	.1	.....	.....	2.25	1.6	2.0	1.0	.....	1.2	1.2
26	1.3	.1	.....	.....	2.55	1.6	2.0	1.0	.....	1.8	.....
27	1.3	.1	.....	.....	2.4	1.4	2.0	1.0	.....	1.8	.....
28	1.35	.1	.....	.....	2.4	1.4	2.0	1.0	.....	1.8	.....
29	1.35	.1	.....	2.7	2.4	1.4	2.0	1.0	.....	1.7	.....
30	1.35	.1	.....	2.75	2.4	1.4	2.0	1.0	.....	1.6	.....
31	1.35	.....	.....	2.3	2.4	.....	2.0	.....	.....	1.6	.....

Monthly discharge of Oregon canal near Thatcher, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	38	0	15.5	952
November	64	1	18.4	1,090
December	99	0	23.0	1,410
January	93	0	6.6	407
February	0	0	.0	0
March	80	0	28.2	1,730
April	73	12	44.3	2,640
May	54	0	22.7	1,400
June	54	17	32.0	1,900
July	17	0	9.3	573
August	50	0	23.1	1,420
September	46	0	17.1	1,020
The year	99	0	20.1	14,500

NOTE.—Discharge determined from two fairly well-defined rating curves. See "Accuracy" in station description. Canal dry Oct. 1–15, Dec. 6; Dec. 24 to Jan. 28; Feb. 1 to Mar. 18; May 3–16; July 18 to Aug. 3; Sept. 18–24 and 26–30.

SMITHVILLE CANAL NEAR THATCHER, ARIZ.

LOCATION.—In the NW. ¼ sec. 35, T. 6 S., R. 25 E., 1½ miles north of Thatcher, Graham County.

RECORDS AVAILABLE.—October 1, 1914, to September 30, 1915, when station was discontinued. Discharge measurements March 31 to September 30, 1914.

GAGE.—Vertical staff on right bank 100 feet below wasteway and a mile below intake.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Slightly shifting.

EXTREMES OF DISCHARGE.—Maximum discharge during year, 78 second-feet March 25. Canal dry during winter and for short periods during other months.

ACCURACY.—Records of monthly discharge fair; determinations of daily discharge not sufficiently accurate for publication.

Canal diverts for irrigation from left side of Gila River. During extreme low stage of river, canal depends partly on seepage and return water from other canals.

Discharge measurements of Smithville canal near Thatcher, Ariz., during 1914–15.

[Made by J. B. Spiegel.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1914.	*Feet.*	*Sec.-ft.*	1914.	*Feet.*	*Sec.-ft.*	1915.	*Feet.*	*Sec.-ft.*
Mar. 31	2.40	56	Jply 13	2.63	40.8	Apr. 7	3.30	76
Apr. 11	2.35	46.8	27	2.45	31.6	7	3.30	74
15	2.15	39.1	Aug. 17	2.19	24.7	May 5	1.64	13
May 7	1.43	15.4	Sept. 25	2.50	48	5	1.61	13.7
23	1.37	14.4	Nov. 7	2.05	27	Aug. 18	1.96	23.2
29	1.40	14.6	Dec. 16	1.71	17.8	18	1.96	23.4
June 4	1.25	10.9	16	1.70	17.8	Sept. 17	1.64	16
11	1.15	10						
July 3	2.46	47.4	1915.					
7	1.95	25.7	Mar. 23	2.49	46.7			
9	2.07	30.1	23	2.49	45.4			

Daily gage height, in feet, of Smithville canal near Thatcher, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	1.65	.....	.....	2.90	1.70	2.79	2.04	.....	2.16
2	.....	1.45	.....	.....	2.90	2.25	2.56	1.92	.....	1.86
3	.....	1.25	.40	.....	2.90	2.15	2.33	1.46	.....	2.00
4	.....	1.35	1.40	.....	2.90	1.80	2.25	1.47	.....	2.28
5	.....	1.70	2.05	.....	2.90	1.70	2.37	1.85	.....	2.12
6	.....	2.20	2.05	.....	.....	1.46	2.40	1.92	.....	2.19
7	.....	2.00	2.05	.....	3.30	1.72	2.37	1.84	.....	1.98
8	1.20	2.05	2.00	.....	3.25	1.35	2.14	1.84	.....	1.89
9	1.10	2.20	1.95	.....	3.20	1.40	2.60	1.67	2.82	1.83
10	1.00	2.30	2.00	.....	3.25	1.27	2.16	1.68	2.66	1.82
11	1.45	2.75	2.00	.....	3.15	1.15	2.05	1.82	2.26	1.77
12	1.25	2.85	2.25	.....	2.95	1.06	1.55	1.58	2.21	1.72
13	1.20	2.35	2.00	.....	2.90	1.09	1.47	1.57	2.23	1.64
14	1.20	2.00	1.95	.....	2.90	1.47	2.26	1.60	2.33	1.59
15	1.65	1.65	1.80	.....	2.85	1.67	2.70	1.54	2.35	1.51
16	1.50	1.45	1.75	2.10	2.75	1.76	2.70	2.41	2.30	1.58
17	1.40	1.05	1.75	2.25	2.75	1.74	2.65	2.47	2.70	1.64
18	1.45	.....	1.85	2.70	2.65	1.97	2.54	1.74	1.95	2.73
19	1.50	.....	1.15	2.85	2.50	2.03	2.61	1.99	2.00	2.42
20	1.55	1.15	.....	2.75	2.50	1.94	2.48	2.51	2.42	2.80
21	1.60	1.15	.....	2.88	2.55	1.46	2.31	3.03	2.63	2.77
22	1.55	.65	.....	2.68	2.65	1.82	2.09	2.91	2.60	2.82
23	1.95	.45	.....	2.55	2.60	2.70	2.34	2.74	2.34	2.70
24	2.05	.50	.....	2.50	2.50	2.60	2.67	2.31	2.00	2.40
25	1.65	1.10	.....	2.95	2.55	1.33	2.53	2.33	1.78	2.29
26	1.40	.50	.....	2.85	2.35	2.16	2.32	2.76	1.75	2.84
27	1.45	.....	.....	2.80	2.10	1.99	2.33	2.62	2.38	2.53
28	1.75	.45	.....	2.90	1.80	1.58	1.97	2.18	2.52	2.53
29	2.60	.40	.....	2.90	1.80	1.32	1.95	1.96	2.26	.....
30	2.35	.....	.....	2.85	1.90	2.58	1.93	1.72	2.28	.....
31	1.75	.....	.....	2.90	.....	2.80	.....	.....	2.20	.....

Monthly discharge of Smithville canal near Thatcher, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	52	0	13	804
November	70	0	17	1,000
December	35	0	12	736
January	0	0	0	0
February	0	0	0	0
March	78	0	31	1,930
April	75	0	46	2,750
May	45	8	18	1,090
June	45	11.5	29	1,710
July	74	0	30	1,790
August	57	0	27	1,680
September	62	14	34	2,050
The year	78	0	21.5	15,500

NOTE.—Discharge determined from three fairly well-defined rating curves and by indirect method for shifting control. See "Accuracy" in station description. Canal dry Oct. 1–7; Nov. 18, 19, 27, and 30; Dec. 1–2; Dec. 20 to Mar. 15; Apr. 6; and July 31 to Aug. 8

BRYCE CANAL NEAR PIMA, ARIZ.

LOCATION.—In sec. 21, T 6 S., R. 25 E., about 2 miles east of Pima, Graham County.

RECORDS AVAILABLE.—Discharge measurements from April 6 to December 16, 1914; gage height record October 1, 1914, to September 30, 1915, when the station was discontinued.

GAGE.—April 6 to July 6, 1914, vertical staff on left bank 600 feet below intake and about three-quarters of a mile above wasteway; after July 6 vertical staff on right bank 1¼ miles below wasteway.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Shifting sand.

ACCURACY.—Record for daily and monthly discharge not sufficiently accurate for publication because of shifting control and insufficient discharge measurements.

Water diverted for irrigation from right side of Gila River. Canal not used the greater part of the time. Total amount diverted during year ending September 30, 1915, about 2,000 acre-feet.

Discharge measurements of Bryce canal near Pima, Ariz., during 1914.

[Made by J. B. Spiegel.]

Date.	Gage height.	Discharge.	Date.	Gage. height.	Discharge.	Date.	Gage. height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Apr. 6	2.10	18	May 30	1.70	11	Dec. 16	7.52	7.8
9	2.30	24	July 7	7.50	9.5	16	7.52	7.5
May 1	2.00	18	13	7.40	7.3			
8	1.80	14	15	7.45	8.8			

NOTE.—July 7 gage moved about 2 miles downstream and set at a different datum.

Daily gage height, in feet, Bryce canal near Pima, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Mar.	Apr.	June.	July.	Aug.	Sept.
1	.....	8.7	7.6	.....	.....	7.6	.....	7.6	.....	7.0
2	.....	8.7	7.6	.....	.....	7.2	.....	7.65	.....	7.0
3	.....	7.8	7.5	.....	.....	.....	.....	7.55	.....	7.0
4	.....	7.8	7.4	.....	.....	.....	.....	7.5	.....	.....
5	.....	7.9	7.4	.....	.....	.....	.....	7.35	.....	.....
6	.....	8.0	7.4	.....	.....	.....	.....	7.3	.....	.....
7	.....	8.1	7.45	.....	.....	.....	.....	7.45	.....	.....
8	.....	8.1	7.5	.....	.....	.....	.....	7.55	.....	7.0
9	.....	7.4	7.5	.....	.....	.....	.....	7.6	.....	7.2
10	.....	.....	7.5	.....	.....	.....	.....	7.6	.....	7.1
11	.....	.....	7.5	.....	.....	.....	.....	7.6	.....	.....
12	.....	.....	7.5	.....	.....	.....	.....	7.7	.....	.....
13	.....	.....	7.5	.....	.....	.....	.....	7.55	.....	.....
14	.....	7.6	7.5	.....	.....	.....	.....	7.65	.....	.....
15	.....	7.6	7.5	.....	.....	.....	.....	7.65	.....	.....
16	.....	7.3	7.5	.....	.....	.....	.....	7.6	.....	.....
17	.....	7.3	7.5	.....	.....	.....	.....	7.65	.....	.....
18	.....	7.3	7.55	.....	.....	.....	.....	.....	7.58	.....
19	.....	7.3	8.35	.....	.....	.....	.....	.....	7.58	.....
20	.....	7.3	8.9	.....	.....	.....	.....	.....	7.35	.....
21	7.5	7.3	7.5	.....	.....	.....	.....	.....	7.4	.....
22	8.05	7.3	7.3	.....	.....	.....	.....	.....	7.68	.....
23	8.2	7.45	7.3	.....	.....	.....	.....	.....	7.7	.....
24	8.2	7.6	.....	.....	.....	.....	.....	.....	7.5	.....
25	8.1	7.6	.....	.....	.....	.....	.....	.....	7.4	.....
26	8.1	7.6	.....	.....	7.4	.....	.....	.....	7.0	.....
27	8.05	7.6	.....	.....	7.4	.....	7.2	.....	8.3	.....
28	8.0	7.6	.....	.....	7.35	.....	7.3	.....	7.9	.....
29	8.0	7.6	.....	.....	7.35	.....	7.3	.....	7.2	.....
30	8.0	7.6	.....	8.9	7.1	.....	7.55	.....	7.3	.....
31	8.7	.....	.....	7.85	7.15	.....	.....	.....	7.0	.....

DODGE CANAL AT PIMA, ARIZ.

LOCATION.—In the SE. ¼ sec. 18, T. 6 S., R. 25 E., three-quarters of a mile north of Pima, Graham County.

RECORDS AVAILABLE.—Discharge measurements from July 7, 1914, to September 17, 1915. Gage height record October 1, 1914, to September 30, 1915. Station discontinued September 30, 1915.

GAGE.—Vertical staff near left bank attached to timber supporting crossing flume, 100 feet east of Pima road and 1½ miles below intake.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Shifting sand.

ACCURACY.—Because of shifting control and lack of discharge measurements determinations of daily and monthly discharge are not sufficiently accurate for publication.

Water diverted for irrigation from left side of Gila River. Canal dry during the greater part of each year. Total amount diverted during the year ending September 30, 1915, approximately 1,100 acre-feet.

Discharge measurements of Dodge canal at Pima, Ariz., during 1914–15.

[Made by J. B. Spiegel.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1914.	*Feet.*	*Sec.-ft.*	1914.	*Feet.*	*Sec.-ft.*	1915.	*Feet.*	*Sec.-ft.*
July 7	7.00	5.4	Sept. 24	7.35	4.4	Sept. 17	7.30	4.3
13	6.92	4.4	Dec. 16	7.00	2.0			
27	7.60	6.5	16	7.00	2.0			

Daily gage height, in feet, of Dodge canal at Pima, Ariz., for the year ending Sept. 30, 1915.

Day.	Dec.	June.	July.	Aug.	Sept.	Day.	Dec.	June.	July.	Aug.	Sept.
1	.....	.....	7.55	.....	7.4	16	7.0	8.05	7.2	.....	7.3
2	.....	.....	7.45	.....	7.4	17	7.0	8.15	7.2	.....	7.3
3	.....	8.05	7.55	.....	7.4	18	7.1	8.05	.....	.....	.....
4	.....	8.15	7.55	.....	7.4	19	7.2	7.85	.....	.....	.....
5	.....	8.15	7.6	.....	7.4	20	7.73	7.85	.....	.....	.....
6	6.75	8.15	7.55	.....	7.4	21	7.35	7.75	.....	7.3	.....
7	6.8	.....	8.0	.....	7.5	22	6.75	7.75	.....	7.3	.....
8	6.75	8.15	8.0	.....	7.5	23	7.2	8.1	.....	7.3	.....
9	6.95	8.15	8.0	.....	7.5	24	6.9	8.05	.....	.....	7.4
10	7.0	8.15	8.0	.....	7.5	25	.....	7.75	.....	.....	7.4
11	6.85	8.05	8.0	.....	7.5	26	.....	7.65	.....	.....	7.4
12	6.85	8.05	7.95	.....	7.4	27	.....	7.65	.....	.....	7.4
13	7.05	7.9	8.0	.....	7.3	28	.....	7.45	.....	.....	.....
14	7.05	8.05	8.0	.....	7.3	29	.....	7.45	.....	.....	.....
15	6.95	8.05	7.1	.....	7.3	30	.....	7.75	.....	.....	.....
						31	.....	.....	.....	7.4	.....

NEVADA CANAL NEAR PIMA, ARIZ.

LOCATION.—In the NE. ¼ sec. 13, T. 6 S., R. 24 E., 1¼ miles north of Pima, Graham County.

RECORDS AVAILABLE.—October 1, 1914, to September 30, 1915, when station was discontinued. Discharge measurements April 4 to September 30, 1914.

GAGE.—Vertical staff on right bank under crossing flume, 100 feet below wasteway and about one-fourth of a mile below intake; read morning and evening to tenths by George Kerby. Datum lowered 0.14 foot April 9, 1915.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Fairly permanent.

EXTREMES OF DISCHARGE.—Maximum discharge during year, 30 second-feet, December 20. Canal dry during winter and for short periods during the year.

ACCURACY.—Records of monthly discharge fair. Determinations of daily discharge not sufficiently accurate for publication.

Canal diverts for irrigation from left side of Gila River.

Discharge measurements of Nevada canal near Pima, Ariz., during 1914–15.

[Made by J. B. Spiegel.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1914.	*Feet.*	*Sec.-ft.*	1914.	*Feet.*	*Sec.-ft.*	1914.	*Feet.*	*Sec.-ft.*
Apr. 4	1.57	12	June 11	1.46	11	Dec. 16	1.58	11
9	1.89	18	July 2	1.00	5.8	1915.		
May 1	1.59	15	9	1.49	13	Apr. 9	.82	2.5
6	1.73	17	13	1.65	15	9	.82	2.5
8	1.60	18	Aug. 1	1.68	15	May 6	1.28	7.9
30	1.35	11	Sept. 24	1.80	17	6	1.27	8.1
June 4	1.81	15	Dec. 16	1.58	11			

NOTE.—Gage datum lowered 0.14 foot Apr. 9, 1915.

Daily gage height, in feet, of Nevada canal near Pima, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Sept.
1	.....	1.15	1.15	.....	2.00	1.45	1.72	1.37	.....
2	.....	1.10	1.35	.....	2.25	1.50	.....	1.34	.....
3	.....	1.10	1.45	.....	1.75	1.60	.....	1.27	.....
4	.....	1.15	1.60	.....	1.95	.....	1.35	1.47	.....
5	.....	1.35	1.75	.....	2.40	.....	1.37	1.39	.....
6	.....	.....	1.65	.....	2.30	1.65	1.42	1.23	.....
7	.....	1.25	1.55	.....	2.05	1.76	1.37	1.34	.....
8	.....	1.25	1.55	.....	2.15	1.60	1.23	1.23	.....
9	.....	1.65	1.35	.....	1.05	1.45	.95	1.29	.....
10	.....	1.80	1.55	.....	1.55	1.36	1.46	1.49	.....
11	.....	1.75	1.65	.....	2.00	.....	1.43	1.16	.....
12	.....	1.45	1.55	.....	2.05	.....	.60	1.10	.....
13	.....	1.65	1.45	.....	2.05	.....	1.07	1.01	.....
14	.....	1.55	1.45	.....	1.00	1.36	1.19	.88	1.18
15	1.25	1.55	1.60	.....	1.80	1.33	1.61	.78	1.10
16	1.45	1.50	1.60	.....	1.60	1.38	1.42	.68	1.14
17	1.25	1.15	1.55	.....	1.95	1.27	1.52	.57	1.07
18	1.20	1.15	1.55	.....	1.95	1.32	1.17	.....	1.05
19	1.30	1.35	1.55	.....	1.80	1.23	1.12	1.60	.73
20	1.15	1.80	2.90	.....	1.80	1.20	.95	1.41	1.08
21	.....	1.70	1.20	.....	1.85	1.24	.85	1.17	.97
22	1.15	1.25	1.40	.....	1.75	1.40	.50	1.21	.87
23	1.15	1.45	1.30	.....	1.65	1.78	.....	1.28	.....
24	1.05	1.45	1 65	.....	1 75	1.71	.....	1.30	.....
25	1.00	1.60	1.50	.....	1.80	1.82	.....	.....	.90
26	.90	1.55	1.45	.....	1.70	1.83	.....	2.03	.....
27	.90	1.40	.....	.....	1.15	1.74	.60	2.16	.....
28	.90	1.40	.....	.....	1.05	.....	1.10	.....	.....
29	1.30	1.30	.....	2.29	1.25	.....	1.23	.....	.....
30	1.25	1.20	.....	2.00	1.75	.....	1.41	.....	.....
31	1.20	.....	.....	1.75	.....	.....	.....	.....	.....

Monthly discharge of Nevada canal near Pima, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	12.0	0	4.0	247
November	17.0	0	11.0	656
December	30.0	0	11.1	684
January	0	0	0	0
February	0	0	0	0
March	19.0	0 0	1.4	89
April	26.0	4.5	15.3	910
May	15.0	0	7.4	455
June	13.5	0	5.8	335
July	20.0	0	6.5	402
August	0	0	0	0
September	7.0	0	1.6	96
The year	30.0	0	5.4	3,870

NOTE.—Discharge determined from two rating curves, both fairly well defined, but based principally on measurements made during the year ending Sept. 30, 1914. The measurements made during 1915 indicate that the control remained fairly constant. See "Accuracy" in station description. Canal dry Oct. 1–14 and 21; Nov. 6; Dec. 27 to Mar. 28; May 4, 5, 11–13, and 28–31; June 2, 3, and 23–26; July 18 and 25; July 28 to Sept. 13; Sept. 23, 24, and 26–30.

CURTIS CANAL NEAR FAIRVIEW, ARIZ.

LOCATION.—In the NE. ¼ sec. 4, T. 6 S., R. 24 E., about 2 miles northwest of Fairview, Graham County.

RECORDS AVAILABLE.—October 1, 1914, to September 30, 1915, when station was discontinued. Discharge measurements April 8 to September 30, 1914.

GAGE.—Vertical staff attached to large cottonwood tree on left bank 50 feet below highway bridge, about 3 miles below intake.

DISCHARGE MEASUREMENTS.—Made by wading or from plank across canal.

CHANNEL AND CONTROL.—Channel fairly permanent. Control occasionally affected by backwater caused by operation of divesrion gates below gage.

EXTREMES OF DISCHARGE.—Maximum discharge, 44 second-feet on several days during year. Canal dry during winter and for short periods during other months.

ACCURACY.—Records of monthly discharge fair except those for August, which are poor. Determinations of daily discharge not sufficiently accurate for publication.

Discharge measurements of Curtis canal near Fairview, Ariz., during 1914–15.

[Made by J. B. Spiegel.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1914.	*Feet.*	*Sec.-ft.*	1914.	*Feet.*	*Sec.-ft.*	1915.	*Feet.*	*Sec.-ft.*
Apr. 8	1.70	26	Sept. 24	2.25	36	July 9	1.23	11
17	1.47	20	Nov. 6	2.45	34	19	1.23	11
May 6	1.15	14	Dec. 17	2.34	34	Aug. 17	2.28	32
June 1	1.32	18	17	2.34	32	17	2.28	32
July 2	.82	5.7						

Daily gage height, in feet, of Curtis canal near Fairview, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	2.6	2.5	.....	2.55	2.4	2.4	1.1	.....	2.0
2	.....	2.6	2.5	.....	2.5	2.5	2.3	1.15	.....	1.7
3	.....	2.55	2.5	.....	2.5	2.55	2.2	1.0	.....	1.6
4	.....	2.6	2.4	.....	2.4	2.5	2.1	1.1	.....	1.5
5	.....	2.5	2.3	.....	2.5	2.4	2.05	1.1	1.06	1.48
6	.....	2.7	2.4	.....	2.5	2.45	2.1	1.1	2.0	1.46
7	.....	2.5	2.45	.....	2.6	2.4	2.2	1.1	2.04	1.4
8	.....	2.6	2.5	.....	2.5	2.4	2.3	1.0	2.04	1.36
9	.....	2.6	2.5	.....	2.4	2.3	2.25	1.23	2.0	1.32
10	.....	2.64	2.5	.....	2.6	2.3	2.25	1.2	2.02	1.3
11	.....	2.7	2.5	.....	2.7	2.2	2.25	1.18	2.0	1.3
12	.....	2.7	2.5	.....	2.7	2.1	2.25	1.18	1.96	1.28
13	.....	2.7	2.5	.....	2.6	2.7	2.3	1.16	1.9	1.32
14	.....	2.8	2.5	.....	2.6	2.8	2.2	1.16	1.8	1.36
15	.....	2.7	2.5	.....	2.6	2.7	2.1	1.14	.....	1.4
16	1.85	2.65	2.4	.....	2.7	2.7	2.0	1.12	.....	1.5
17	2.0	2.65	2.35	2.5	2.7	2.6	2.1	1.1	2.28	1.54
18	1.9	2.7	2.3	2.5	2.7	2.6	2.1	2.2	.....	2.4
19	1.9	2.7	2.3	2.5	2.6	2.3	2.1	2.2	.....	2.5
20	1.7	2.65	2.2	2.4	2.6	2.2	2.3	2.1	.....	2.44
21	2.5	2.65	2.2	2.4	2.55	2.2	2.3	2.8	.....	2.4
22	2.6	2.6	2.15	2.3	2.5	2.0	2.2	2.18	.....	2.5
23	2.6	2.7	2.0	2.6	2.5	2.3	2.0	2.2	.....	2.5
24	2.6	2.65	1.9	2.5	2.5	2.3	1.5	2.6	.....	2.4
25	2.6	2.7	.....	2.5	2.4	2.2	1.5	2.16	.....	2.34
26	2.6	2.7	.....	2.4	2.4	2.3	1.45	2.14	.....	2.28
27	2.6	2.74	.....	2.5	2.4	2.5	1.5	2.1	.....	2.2
28	2.6	2.8	.....	2.6	2.4	2.4	1.4	2.0	.....	2.16
29	2.6	2.8	.....	2.7	2.4	2.5	1.3	1.04	2.2	2.1
30	2.65	2.7	.....	2.8	2.35	2.5	1.2	1.6	2.08	2.0
31	2.60	.....	.....	2.7	.....	2.5	.....	1.1	2.0	.....

Monthly discharge of Curtis canal near Fairview, Ariz., for the year ending Sept. 30, 1915

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	40	0	17.4	1,070
November	44	36	40.7	2,420
December	36	0	25.7	1,580
January	0	0	.0	0
February	0	0	.0	0
March	44	0	17.9	1,100
April	42	33	37.3	2,220
May	44	25	34.4	2,120
June	34	10	25.4	1,510
July	44	8	17.6	1,080
August	32	8	23.8	1,460
September	36	12	22.3	1,330
The year	44	0	22.0	15,900

NOTE.—Discharge determined from one rating curve fairly well defined for all stages. Gage heights missing Aug. 15, 16, and 18–28. Canal dry Oct. 1–15; Dec. 25 to Mar. 16; and Aug. 1–4.

CONSOLIDATED CANAL NEAR FAIRVIEW, ARIZ.

LOCATION.—In the NW. ¼ sec. 4, T. 6 S., R. 24 E., about 2½ miles northwest of Fairview, Graham County.

RECORDS AVAILABLE.—October 1, 1914, to September 30, 1915, when station was discontinued. Discharge measurements April 8 to September 30, 1914.

GAGE.—Vertical staff near left bank attached to abandoned waste gate about 1,000 feet below intake; read morning and evening to hundredths by J. E. Follett. Datum raised 0.60 foot May 6, 1915.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Channel composed of sand and silt; control shifting.

EXTREMES OF DISCHARGE.—Maximum discharge during year, 128 second-feet December 20. Canal dry during winter and for other periods during year.

ACCURACY.—Records of monthly discharge poor because of shifting control and insufficient discharge measurements. Determinations of daily discharge not sufficiently accurate for publication.

Water diverted for irrigation from left side of Gila River.

Discharge measurements of Consolidated canal near Fairview, Ariz., during 1914–15.

[Made by J. B. Spiegel.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1914.	*Feet.*	*Sec.-ft.*	1914.	*Feet.*	*Sec.-ft.*	1915.	*Feet.*	*Sec.-ft.*
Apr. 8	2.00	37	Aug. 1	2.80	33	May 6	0.84	7.5
17	1.60	19	Sept. 24	3.66	65	6	0.87	6.7
May 6	1.45	14	Nov. 6	3.00	63	14	1.42	26
June 1	1.58	15	Dec. 17	3.20	76	14	1.42	26
July 2	1.41	8	17	3.20	76			

NOTE.—Gage datum raised 0.60 foot May 6, 1915.

Daily gage height, in feet, of Consolidated canal near Fairview, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.
1		3.55	3.65		1.75	1.50	1.49	0.73	0.54
2		3.35	3.80		1.50	1.50	1.37	.73	.39
3		3.20	3.85			1.40	.95	.71	.28
4		3.20	3.70			1.30	.99	.69	.08
5		3.10	3.65			1.20	.79	.69	
6		2.95	3.60			1.00	.80	.67	
7		2.80	3.50			1.05	.77	.64	
8		2.80	3.45			1.20	.71	.61	
9		2.85	3.50			1.20	.69	.51	
10		2.80	3.35			1.26	.80	.56	
11		3.85	3.30			1.37	.76	.63	
12		3.60	3.20			1.33	.81	.60	
13		2.85	3.20			1.38	.77	.55	
14		2.45	3.25			1.43	.64	.54	
15		2.05	3.30			1.39	.65	.51	
16	1.35	1.60	3.25			.87	.67	.53	
17	2.40	1.35	3.20			1.09	.52	.50	
18	2.25		3.20			1.23	.34	1.55	
19	2.50		4.20			1.10	.29	.80	
20	2.45	1.95	4.50		1.20	1.16	.67		
21	2.65	1.95			1.70	1.24	.61		
22	3.55	1.90			1.90	1.41	.47		
23	3.60	1.95			2.00	.90	.44		
24	3.60	1.90			2.00	.98	.78	2.09	
25	3.40	3.10			1.90	.89	.98	3.05	
26	3.50	3.40			1.65	.82	1.04	1.84	
27	3.20	3.40			1.20	1.45	.92	1.59	
28	3.10	3.50			1.50	1.41	.88	1.32	
29	3.00	3.50		1.25	1.65	1.27	.82	1.44	
30	2.90	3.60		1.45	2.15	1.19	.76	.74	
31	2.90			1.95		.94			

Monthly discharge of Consolidated canal near Fairview, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	89	0	32	1,960
November	100	0	55	3,270
December	128	0	56	3,440
January	0	0	.0	0
February	0	0	.0	0
March	27	0	1.5	91
April	34	0	8.5	507
May	27	6	16.5	1,010
June	28	1	7.0	398
July	85	0	11.5	707
August	3	0	.5	32
September	0	0	.0	0
The year	128	0	15.8	11,400

NOTE.—Discharge determined by indirect method for shifting control. See "Accuracy" in station description. Canal dry Oct. 1-15; Nov. 18-19; Dec. 21 to Mar. 28; Apr. 3-19; July 20-23; Aug. 3-8, 11-12; and Aug. 16 to Sept. 30.

SAN CARLOS RIVER AT SAN CARLOS, ARIZ.

LOCATION.—Opposite railroad station at San Carlos, Graham County, on Indian Reservation, about half a mile above junction with Gila River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 17, 1910, to January 12, 1911, and April 1, 1914, to September 30, 1915, when station was discontinued.

GAGE.—Stevens water-stage recorder on left bank. Datum lowered 1.10 feet on October 1, 1914. The original gage which was used from August 17, 1910, to January 12, 1911, was a vertical staff fastened to right pier of railroad bridge, downstream end.

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

CHANNEL AND CONTROL.—Sand, badly shifting at all stages. Section flat and nonsensitive.

EXTREMES OF DISCHARGE.—Stream dry a part of each year. July 26, 1915 a heavy flood occurred, covering the surrounding lowlands. Discharge not determined.

ACCURACY.—Records poor because of shifting control and in sufficient discharge measurements.

Discharge measurements of San Carlos River at San Carlos, Ariz., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 6	J. B. Spiegel	2.10	54	Feb. 19	J. B. Spiegel	1.05	128
Nov. 3	do	2.14	20.7	Mar. 24	do	1.40	53
15	Anderson and Spiegel	2.21	30.1	24	do	1.39	53
Dec. 31	J. B. Spiegel	.92	153	Apr. 6	do	1.38	56
31	do	.92	146	6	do	1.38	55
Jan. 15	do	.80	42	23	do	1.32	21.4
15	do	.80	39.3	May 28	do	1.15	2.0

Daily discharge, in second-feet, of San Carlos River at San Carlos, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	5	25	40	145	210	10	40	85	2
2	30	25	65	130	5	7	35	130	2
3	325	25	65	95	130	85	40	210	2
4	375	40	40	65	130	160	25	125	2
5	95	40	65	85	130	110	30	135	30
6	55	40	40	85	130	160	60	95	15
7	55	40	40	55	130	160	190	85	12
8	35	40	65	55	130	160	160	60	2
9	20	40	65	75	130	160	120	55	2
10	20	125	65	45	130	160	100	35	1
11	20	290	65	70	130	135	95	15	1
12	20	195	65	40	130	135	45	12	1
13	20	150	65	40	130	135	35	7	1
14	20	85	65	40	130	135	30	10	1
15	10	30	65	40	130	135	9	5	1
16	10	40	65	95	130	110	8	2	1
17	10	40	40	95	130	110	9	2	1
18	10	40	150	95	130	110	8	2	
19	10	25	.....	65	130	110	7	2	.....
20	10	25	.....	95	.....	85	6	2	.....
21	35	40	.....	95	.....	85	6	2	.....
22	315	40	.....	95	.....	85	9	2	.....
23	45	40	.....	65	10	85	20	2	.....
24	45	40	.....	95	7	50	35	2	.....
25	40	40	.....	65	7	45	23	5	.....
26	40	40	.....	95	5	45	24	7	.....
27	35	65	.....	95	5	45	17	6	.....
28	35	65	.....	95	60	45	35	2	.....
29	30	40	.....	.....	60	50	85	2	.....
30	30	40	.....	.....	.....	50	75	2	.....
31	25	.....	150	.....	.....	45	.....	7	.....

NOTE.—Discharge determined by indirect method for shifting control. Gage heights missing Oct. 24 to Nov. 2, Feb. 4–18, and Aug. 1 to Sept. 20, and discharge estimated. Floods above the limit covered by the rating curve occurred during the periods Dec. 19–30. Jan. 29–31, Feb. 20–22, and July 26–31. Stream dry June 18 to July 25.

Monthly discharge of San Carlos River at San Carlos, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	375	10	59	3,630
November	290	25	60	3,570
March	160	7	97	5,960
April	190	6	46	2,740
May	135	2	36	2,210
June	130	0	2.6	155
August	.....	.....	a15	920
September	.....	.....	a5	300

aEstimated because of missing gage heights, shifting control and insufficient discharge measurements.

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, 1915. 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 the Boquillas Land & Cattle Co.

GAGE.—Vertical and inclined staff on right bank; read once daily to half tenths by J. M. Barnes. Original gage—a vertical staff on right bank about 800 feet below the present gage—was installed September 28, 1912, destroyed by flood on August 17, 1914, and replaced at the same datum August 24, 1914; second gage was washed out on December 23, 1914, and was replaced by the present gage on January 21, 1915, at an independent datum.

DISCHARGE MEASUREMENTS.—Made from a suspension footbridge a mile above station or by wading near gage.

CHANNEL AND CONTROL.—Sand and clay; semipermanent at low stages; shifting at high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 16.0 feet at 5 p. m., December 22 (discharge not determined); minimum stage 0.7 feet, present datum, during parts of May, June, July, and August (discharge 17 second-feet).

1912–1915: Maximum stage recorded same as for 1915 (see above); minimum stage recorded, 3.54 feet, old datum, on June 26 to July 8, 1913 (discharge, 1.7 second-feet).

DIVERSIONS.—The Boquillas Land & Cattle Co. diverts water at various points above station for irrigation. Total acreage irrigated not known.

ACCURACY.—Records poor because of shifting control and insufficient discharge measurements.

Discharge measurements of San Pedro River near Fairbank, Ariz., during the year ending Sept. 30, 1915.

[Made by M. D. Anderson.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Nov. 23	4.70	31.1	Jan. 22	1.00	72
23	4.70	31.4	Mar. 12	1.80	350

NOTE.—Gage heights beginning Jan. 22, 1915, refer to new datum.

Daily discharge, in second-feet, of San Pedro River near Fairbank, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	17	70	24	.....	1,100	135	90	32	17	17	150	85
2	32	32	24	.....	390	135	90	32	24	17	135	85
3	43	32	24	.....	238	135	70	32	32	17	135	85
4	330	24	24	.....	238	150	60	32	17	17	120	85
5	70	24	24	.....	200	150	60	32	17	17	295	85
6	37	24	24	.....	170	150	60	32	17	17	72	72
7	32	24	24	.....	170	150	60	32	24	17	120	60
8	32	24	24	.....	170	150	60	32	32	17	135	60
9	32	24	24	.....	150	150	60	32	32	17	100	60
10	32	32	24	.....	135	300	60	32	24	17	100	60
11	32	70	24	.....	118	220	60	32	24	135	100	60
12	28	55	24	.....	102	340	60	32	24	650	85	50
13	28	32	24	.....	350	350	60	32	24	100	60	50
14	28	32	24	.....	167	290	60	24	24	135	60	50
15	28	32	24	.....	167	200	60	24	24	50	50	50
16	24	32	24	.....	150	170	60	24	24	540	50	50
17	24	32	24	.....	135	170	50	24	24	295	50	40
18	24	32	24	.....	135	170	40	24	17	850	40	40
19	24	32	.....	.....	135	135	40	24	17	205	32	240
20	24	32	.....	.....	292	135	40	17	17	295	32	120
21	20	32	.....	.....	350	135	32	17	17	205	32	100
22	20	42	.....	72	167	135	32	17	17	205	24	100
23	20	32	.....	72	150	135	32	17	17	150	17	85
24	17	32	.....	72	150	120	32	17	17	350	24	72
25	17	32	.....	60	150	100	32	17	17	240	120	1,090
26	17	24	.....	60	135	100	32	17	17	280	50	80
27	17	24	.....	60	135	90	32	17	17	170	50	55
28	17	24	.....	60	135	90	32	17	17	460	60	55
29	17	24	.....	60	.....	70	32	17	17	280	240	45
30	315	24	.....	910	.....	90	32	17	17	240	100	35
31	70	.....	.....	.....	.....	100	.....	17	.....	205	85	.....

NOTE.—Discharge Oct. 1 to Dec. 18 determined by indirect method for shifting control based on standard curve defined by measurements made in 1911–1914. Gage destroyed Dec. 19, and replaced Jan. 22. Discharge not determined for this interval. Records of daily discharge from Jan. 22 to Sept. 30 ascertained from poorly defined rating curve. The gage height on Dec. 22 and Jan. 31 was 11.0 feet and 6.2, respectively; determinations of discharge for those days not warranted because of lack of discharge measurements at high stages.

Monthly discharge of San Pedro River near Fairbank, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	330	17	47.4	2,910	C.
November	70	24	32.7	1,940	C.
December 1–18	24	24	24.0	857	C.
January 22–30	910	60	158	2,820	C.
February	1,100	102	217	12,100	C.
March	350	70	160	9,830	B.
April	90	32	50.7	3,020	B.
May	32	17	24.6	1,520	B.
June	32	17	20.8	1,240	B.
July	850	17	200	12,300	C.
August	295	17	88	5,410	B.
September	1,090	35	107	6,370	B.

FLORENCE CANAL NEAR FLORENCE, ARIZ.

LOCATION.—In T. 4 S., R. 10 E., 4 miles below intake and 10 miles northeast of Florence, Pinal County.

RECORDS AVAILABLE.—October 1, 1914, to September 30, 1915, when station was discontinued. Discharge measurement September 22, 1914.

GAGE.—Vertical staff installed November 1 on right bank, opposite old Lorona ranch house, 150 feet above first diversion from canal and 4 miles below intake; read twice daily to hundredths by Maria L. Lorona. From October 1–31 the gage was about 2 miles above present gage.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge during year, 94 second-feet on November 13 and 14; dry about half the year.

ACCURACY.—Records poor for October, November, and December on account of insufficient gage heights; remainder of year fair. Record of daily discharge not sufficiently accurate to warrant publication.

Canal diverts from left side of Gila River for irrigation. The heading, which is a little below and across river from the Arizona Eastern Railroad station at Price, is constructed of brush and rock, and breaks at each rise of river. Two wasteways, one, not used, about three-quarters of a mile below heading, and one about 1¼ miles below heading.

Discharge measurements of Florence canal near Florence, Ariz., during 1914–15.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1914.		*Feet.*	*Sec.-ft.*	1914.		*Feet.*	*Sec.-ft.*
Sept. 22	M. D. Anderson	3.30	0.0	June 11	N. Carwile	2.36	69
Nov. 9	W. Adams	1.85	70	15	do	2.26	64
Dec. 5	do	1.98	41.1	19	do	2.20	63
1915.				22	do	1.98	62
Apr. 28	Anderson and Adams	1.10	15.8	26	do	2.22	64
29	do	1.35	23.7	29	do	2.04	57
May 21	Adams and Carwile	.68	4.6	July 1	Anderson and Carwile	1.88	44.4
26	do	1.39	30.5	1	do	1.88	45.2
June 1	N. Carwile	2.12	57	5	N. Carwile	1.58	36.3
5	do	2.49	70	10	do	1.44	35.0
8	do	2.31	65	13	do	2.61	75
				16	do	1.92	52

Daily gage height, in feet, of Florence canal near Florence, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.60	.....	2.27	.....	1.00	2.05	1.91	0.94	2.04
2	1.60	.....	.....	.....	1.00	2.25	1.90	1.26	2.07
3	2.70	.....	.....	.....	1.16	2.33	1.71	.54	2.00
4	.....	.....	.....	.....	1.18	2.40	1.61	.35	2.03
5	.....	.....	1.98	.....	.77	2.40	1.56	.40	2.03
6	.....	.....	.....	.....	.....	2.50	1.52	.....	2.07
7	.....	1.70	.....	.....	.....	2.44	1.50	.....	2.10
8	.....	.....	2.06	.....	.....	2.32	1.25	1.48	2.17
9	.70	1.85	.....	.....	.....	2.20	1.25	1.40	2.30
10	.....	.....	2.16	2.15	.....	2.40	1.41	2.08	2.63
11	.....	1.82	.....	1.98	.....	2.39	1.55	1.86	2.45
12	.....	.....	.....	1.99	.....	2.30	2.09	1.52	2.48
13	1.20	2.21	.....	1.94	1.55	2.30	2.54	1.50	2.39
14	.....	2.20	2.23	1.78	1.75	2.25	2.45	1.46	1.81
15	1.88	.....	.....	1.83	2.00	2.25	1.72	1.56	1.83
16	.....	.....	2.08	1.86	2.10	2.20	2.40	1.86	1.78
17	1.88	.60	.....	1.85	2.10	2.30	1.71	1.47	1.71
18	.....	.....	.....	1.70	1.92	2.30	1.48	1.83	1.96
19	1.28	1.98	.....	1.50	1.41	2.20	.....	1.90	1.39
20	1.20	1.85	.....	1.40	1.70	2.06	.....	2.05	1.09
21	.....	1.00	.....	1.40	1.80	2.00	.....	2.04	1.10
22	2.00	.....	.....	1.50	.....	2.00	.....	2.15	1.15
23	.....	.....	.....	1.61	1.60	2.20	.....	2.04	1.03
24	.....	.....	.....	1.59	1.65	2.15	.....	1.86	1.50
25	.....	1.70	.....	1.80	1.60	2.20	.70	2.00	1.21
26	.....	.....	.....	1.70	1.40	2.23	1.55	2.16	.....
27	.....	1.95	.....	1.90	1.45	2.21	2.00	2.07	.....
28	.....	1.75	.....	1.15	1.35	2.17	2.18	2.27	.....
29	.....	.....	.....	1.29	1.70	2.13	2.49	1.95	1.18
30	.....	.....	.....	1.47	1.90	1.99	2.79	1.85	1.58
31	.....	.....	.....	.....	.....	.....	1.35	1.90	.....

Monthly discharge of Florence canal near Florence, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	84	0	18	1,130
November	94	0	31	1,850
December	54	0	20	1,220
January	0	0	0	0
February	0	0	0	0
March	0	0	0	0
April	59	0	27	1,610
May	57	0	26	1,610
June	75	53	63	3,750
July	90	0	34	2,130
August	64	0	37	2,280
September	80	0	41	2,440
The year	94	0	24.9	18,000

NOTE.—Discharge determined from a rating curve fairly well defined for all stages. Canal dry Oct. 4–7, Oct. 23 to Nov. 6, Nov. 15–18, 22–24, 26, 29–30, Dec. 2–4, Dec. 17 to Apr. 9, May 6–12, 22, July 19–25, Aug. 3–7, and Sept. 26–28. Gage heights missing for Oct. 10–12, 14, 16, 18, 21, Nov. 8, 10, 12, Dec. 6–7, 9, 11–13, and 15; discharge interpolated. See "Accuracy" in station description.

O. T. CANAL NEAR FLORENCE, ARIZ.

LOCATION.—In the SW. ¼ sec. 11, T. 4 S., R. 10 E., 100 feet below wasteway, half a mile below Lorona's house and 7 miles northeast of Florence, Pinal County.

RECORDS AVAILABLE.—October 1, 1914, to September 30, 1915, when station was discontinued. Discharge measurement September 22, 1914.

GAGE.—Vertical staff on left bank 100 feet below wasteway; read twice daily to hundredths by Maria L. Lorona. Datum raised 2.80 feet on May 26.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Slightly shifting.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge during year, 30 second-feet on November 11; dry about half the year.

ACCURACY.—Records poor for October, November, and December on account of insufficient gage heights; remainder of year fair. Determination of daily discharge not sufficiently accurate for publication.

Canal diverts from left side of Gila River for irrigation. Wasteway about three-quarters of a mile below intake and 100 feet above gage.

Discharge measurements of O. T. canal near Florence, Ariz., during 1914–15.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
1914.				June 1	N. Carwile	1.79	12.1
Sept. 22	M. D. Anderson	3.40	0.2	5	do	1.70	9.6
Nov. 7	W. Adams	4.20	11.6	8	do	1.38	4.7
Dec. 5	do	4.42	16.2	15	do	1.30	3.5
				19	do	1.51	6.1
1915.				22	do	1.50	6.3
Apr. 28	Anderson and Adams	3.78	.8	26	do	1.10	1.7
29	do	4.36	7.2	July 8	do	1.27	3.2
May 21	Adams and Carwile	4.61	14.4	13	do	1.55	7.3
26	do	2.11	27.0				

Daily gage height, in feet, of O. T. canal near Florence, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.	Sept.
1	4.53		4.61		4.26	1.80	1.70		1.17
2	4.55				4.22	1.69	1.62		1.10
3	4.45				4.32	1.55	1.53		1.05
4					4.08	1.50	1.52		1.16
5	3.40		4.42			1.56	1.51		1.21
6		4.15				1.50	1.19		1.00
7		4.20				1.41	1.24		1.11
8			4.39			1.23	1.17		1.55
9		3.82				1.22	1.51		1.58
10			4.20	4.83		1.11	1.32	1.10	1.43
11		5.15		4.75		1.11	1.18	.80	1.39
12				4.63	3.50	1.00	1.12		1.48
13	4.42	4.94		4.46	3.50		1.59		1.53
14			4.52	4.34	3.60	1.20	1.34		1.36
15				4.32		1.25	1.30		1.38
16			4.05	4.23	3.90		1.23		1.43
17	4.40			4.10	3.92		1.18		1.28
18		4.28			4.17	1.15	1.15		1.13
19		4.35		4.02	4.28	1.15	1.48		1.95
20	4.25	3.65		4.00	4.35	1.70		1.48	1.48
21				4.01	4.35	1.61		1.65	1.24
22	4.45			4.03	4.64	1.52		1.61	1.28
23				4.02	4.80	1.33		1.58	1.44
24				4.05	4.81	1.29		1.60	1.41
25				4.10	4.80	1.19		1.52	
26				3.80	2.00	1.11		1.59	
27	4.10			3.75	1.73			1.58	
28				3.80	1.35				
29				4.20	1.14			1.17	
30				4.10	1.70		2.00	1.06	
31					1.90		1.38	1.19	

Monthly discharge of O. T. canal near Florence, Ariz., for the year ending Sept. 30, 1915

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	20	0	4.4	272
November	30	0	5.6	336
December	22	0	4.5	280
January	0	0	.0	0
February	0	0	.0	0
March	0	0	.0	0
April	18	0	3.6	213
May	18.5	0	5.6	344
June	12	0	3.4	205
July	18.5	0	3.5	213
August	8.5	0	2.0	122
September	16.5	0	3.5	208
The year	30	0	3.03	2,190

NOTE.—Discharge determined from three rating curves fairly well defined for all stages. Canal dry Oct. 5–12, 14–16, 18–19, 21, 23–26, Oct. 28 to Nov. 5, Nov. 14–17, 21–30, Dec. 2–4, 11–13, Dec. 17 to Apr. 9, Apr. 26–28, May 5–15, June 13, 16, 17, 27–30, July 20–29, Aug. 1–9, 11–19, 28, and Sept. 25–30. Gage heights missing for Oct. 4, Nov. 8, 10, and 12, Dec. 6, 7, 9, and 15, and Apr. 18; discharge interpolated. See "Accuracy" in station description.

PRICE & POWELL DITCH NEAR FLORENCE, ARIZ.

LOCATION.—In T. 5 S., R. 8 E., about 5½ miles west of Florence, Pinal County, and about 8 miles below intake.

RECORDS AVAILABLE.—Discharge measurements September 25, 1914, to June 18, 1915. Station discontinued September 30, 1915.

GAGE.—Vertical staff near left bank about 300 feet above junction with Safford ditch.

DISCHARGE MEASUREMENTS—Made by wading.

CHANNEL AND CONTROL.—Slightly shifting.

ACCURACY.—Owing to missing gage heights, figures for daily and monthly discharge not sufficiently accurate for publication.

Ditch diverts from left side of Gila River for irrigation; dry from October 23 to May 29 and for several other short periods. Approximately 800 acre-feet diverted during year ending September 30, 1915.

Discharge measurements of Price & Powell ditch near Florence, Ariz., during 1914–15.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1914.		*Feet.*	*Sec.-ft.*	1915.		*Feet.*	*Sec.-ft.*
Sept. 25	M. D. Anderson	2.86	3.4	June 1	N. Carwile	1.66	3.5
				7	.....do	1.64	3.6
1915.				12	.....do	1.40	2.4
May 30	Adams and Carwile	1.74	4.2	18	.....do	1.28	2.7

PIERSON-NICHOLAS CANAL NEAR FLORENCE, ARIZ.

LOCATION.—In sec. 1, T. 5 S., R. 8 E., half a mile south of Nicholas ranch house and 6 miles west of Florence, Pinal County.

RECORDS AVAILABLE.—October 1, 1914, to September 30, 1915, when station was discontinued. Discharge measurement September 22, 1914.

GAGE.—Vertical staff on left bank at lower end of concrete section just below waste-way; read once daily by Emile E. Pierson. Datum raised 0.20 feet on May 25.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Shifting.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge during year, 34.5 second-feet on April 29. Canal dry about half the year.

ACCURACY.—Records poor for October, November, December, and August because of insufficient gage records; remainder of year fair. Record of daily discharge is not sufficiently accurate for publication.

Canal diverts from right side Gila River for irrigation. It has two wasteways, one near heading—seldom used—and a lower one on Nicholas ranch, used for convenience.

Discharge measurements of Pierson-Nicholas canal near Florence, Ariz., during 1914–15.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1914.		*Feet.*	*Sec.-ft.*	1915.		*Feet.*	*Sec.-ft.*
Sept. 22	M. D. Anderson	1.40	0.0	June 2	N. Carwile	2.26	6.6
Dec. 11	do	1.78	3.7	6	do	2.36	12.6
11	Wallace Adams	1.78	3.6	8	do	2.24	10.9
1915.				11	do	2.20	6.8
Apr. 14	do	2.58	16.8	14	do	2.34	14.7
29	do	2.85	32.0	18	do	2.42	16.6
May 25	Adams and Carwile	2.15	5.9	21	do	2.21	7.0
				July 23	do	2.28	9.5

Daily gage height, in feet, of Pierson-Nicholas canal near Florence, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.	Sept.
1					2.45	2.27		2.50	
2	2.10	2.00			2.42	2.18		2.50	
3	2.12	1.75			2.39	1.46		2.50	
4		1.65	2 05		2.37	2.40		2.60	
5	2.30	1.78			2.36	2.34		2.30	
6					2.34	2.30			2.30
7			1.87		2.30	2.26		2.60	2.20
8					2.29	2.42			2.10
9			1.88		2.28	2.32		2.30	
10		1.60		2.52	2.29	2.24			
11			1.78		2.31	2.23			
12		2.42			2.44	2.30			
13	2.10			2.72	2.43	2 26			
14				2.57	2.40	2 2 0			
15	1.38		1.76	2.70	2.33	2.30			
16				2.69	2.36	2.30		2.40	
17	2.00		1.72	2.68	2.40	2.50			
18		2.45		2.69	2.43	2.47			
19	2.12			2.73	2.42	2.44			2.14
20		2.18		2.87	2.43	2.18		2.40	2.14
21	2.28			2.86	2.40	2.30		2.50	
22				2.88	2.39			2.20	2.60
23	2.25	1.55		2.60	2.39	2.10	2.28	2.30	2.50
24				2.65	2.28	1.90			2.40
25	2.30	2.00		2.75	2.24				2.60
26				2.72	2.30			2.60	2.60
17	2.00	.40		2.56	2.32			2.80	2 30
28				2.58	2.24			2.10	2.44
29	2.30			2.89	2.23			2.70	
30				2.69	2.30			2.60	
31	1.90				2.30			2.40	

Monthly discharge of Pierson-Nicholas canal near Florence, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	10	0	5.07	312
November	12.5	0	2.88	171
December	6.5	0	1.92	118
January	.0	0	.00	0
February	.0	0	.00	0
March	.0	0	.00	0
April	34.5	0	18.1	1,070
May	23	7	12.8	786
June	18	0	8.05	478
July	9.5	0	.31	19
August	30	4	14.5	890
September	22	0	7.22	429
The year	34.5	0	5.92	4,270

NOTE.—Discharge determined from two rating curves, both fairly well defined for all stages. Canal dry Oct. 1, 6–12, 14–16, Nov. 1, 6–9, 13–17, Nov. 26 to Dec. 3, Dec. 18 to Apr. 9, June 22, 24–30, July 1–31, Sept. 9–18 and 29–30. Gage heights missing Oct. 4, 18, 20, 22, 24, 26, 28, 30, Nov. 11, 19, 21, 22, 24, Dec. 5, 6, 8, 10, 12–14, 16, Apr. 11, 12, Aug. 6–15, 17–19, 24, 25, Sept. 1–5; discharge interpolated. See "Accuracy" in station description.

QUEEN CREEK NEAR SUPERIOR, ARIZ.

LOCATION.—At Whitlow's ranch, 12 miles below Superior, Pinal County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—February 14 to September 30, 1915.

GAGE.—Vertical staff painted on rock ledge on right bank at lower end of box canyon, about 500 feet above Whitlow's ranch; read morning and evening to half-tenths by W. C. Mullins.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Main channel confined between high rocky banks about 300 feet apart. Bed of stream composed of constantly shifting sand and gravel. At low stages stream meanders from side to side of channel.

EXTREMES OF DISCHARGE.—Stream reaches very low stage for greater part of each year and becomes dry a short distance below gage. Floods are flashy and of short duration. No information on extreme floods.

DIVERSIONS.—Water diverted above gage to irrigate a few acres. Amount unknown.

ACCURACY.—Discharge not determined because of shifting control and insufficient discharge measurements.

Discharge measurements of Queen Creek near Superior, Ariz., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 14	Jacob and Peabody	3.20	66	Mar. 30	Anderson and Enger	3.04	12.0
Mar. 29	Anderson and Enger	3.01	10.5	30	....do	3.03	11.5

Daily gage height, in feet, of Queen Creek near Superior, Ariz., for the year ending Sept. 30, 1915.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	3.7	3.0	3.45	3.0	3.0	2.85	3.15
2	.....	4.0	3.0	3.5	3.0	.....	.....	3.15
3	.....	3.9	2.95	3.3	3.0	.....	.....	3.15
4	.....	3.8	2.95	3.2	3.05	.....	2.85	3.15
5	.....	3.8	3.0	3.25	3.0	.....	2.9	3.15
6	.....	3.75	3.0	3.2	3.0	.....	2.85	3.15
7	.....	3.7	3.0	3.2	3.0	3.0	2.85	3.15
8	.....	3.7	3.0	3.15	3.0	3.0	2.85	3.15
9	.....	3.6	2.95	3.15	.....	3.0	2.85	3.15
10	.....	3.5	2.95	3.15	3.0	3.0	2.85	3.15
11	.....	3.5	2.95	3.15	3.0	3.0	2.85	3.15
12	.....	3.4	2.95	.....	3.0	3.0	2.8	3.15
13	.....	3.4	2.95	3.1	3.0	3.0	2.72	3.15
14	3.6	3.3	2.95	3.1	3.0	3.0	2.65	3.15
15	3.3	3.3	2.95	3.1	3.0	3.0	2.65	3.15
16	3.2	3.3	2.95	3.05	3.0	.....	2.65	3.14
17	3.2	3.3	2.9	3.05	3.0	3.0	2.65	3.14
18	3.1	3.25	2.9	3.05	3.0	3.0	2.65	3.14
19	3.1	3.2	2.9	3.05	3.0	3.0	2.65	3.14
20	4.0	3.15	.....	3.05	3.0	3.5	2.65	3.14
21	4.0	3.1	2.9	3.05	3.0	2.9	2.65	3.14
22	3.9	3.05	2.95	3.05	.....	2.95	2.65	3.14
23	3.8	3.05	2.95	.....	3.0	2.75	3.15	3.14
24	3.8	3.05	3.1	3.05	3.0	2.75	3.15	3.14
25	3.75	3.05	2.95	3.05	3.0	2.85	3.15	3.14
26	3.9	.....	2.95	3.05	3.0	2.85	3.15	3.14
27	3.9	.....	2.95	3.0	3.0	2.85	5.00	3.14
28	3.75	3.05	2.95	3.0	3.0	2.85	4.25	3.12
29	.....	3.05	3.1	3.0	3.0	2.85	3.92	3.12
30	.....	3.05	3.35	3.0	3.0	2.85	3.82	3.12
31	.....	3.0	.....	3.0	.....	2.85	3.15	.....

SANTA CRUZ RIVER NEAR NOGALES, ARIZ.

LOCATION.—Just below proposed dam site on Yerba Buena ranch, at city pumping plant and about 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, 1915 (incomplete).

GAGE.—Vertical staff on right bank at pumping plant, installed March 13, 1915; read morning and evening to half-tenths by George Gillingham. Bears no definite relation to previous gages. The original gage, which was a vertical staff on right bank about 500 feet below the intake of a small irrigation ditch, was used until January 18, 1912, when a Richard Frères water-stage recorder was installed on left bank about one-fourth mile downstream and half a mile above pumping plant, at a new datum. This gage was used until December 18, 1914 when it was replaced by a Stevens water-stage recorder which was used until March 13, 1915. The datum of the Stevens gage is 1.3 feet higher than that of the Richard Freres gage.

DISCHARGE MEASUREMENTS.—Made by wading or from cable.

CHANNEL AND CONTROL.—Shifting sand. Banks fairly clean; subject to overflow during high stages.

EXTREMES OF DISCHARGE.—Channel dry during a part of each year. The maximum flood occurred December 20, 1914; gage height not determined.

DIVERSIONS.—Water is diverted above station for the irrigation of about 140 acres.

ACCURACY.—Determinations rough because of shifting control and insufficient number of discharge measurements.

Discharge measurements of Santa Cruz River near Nogales, Ariz., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 24	M. D. Anderson	[a] 2.25	24	Mar. 13	M. D. Anderson	[c] 1.35	180
Dec. 18	do	[b] .98	26	July 12	C. C. Jacob	[c] .60	0
Jan. 22	do	[b] .65	89				

[a] Referred to datum of Richard Frères recorder.
[b] Referred to datum established Dec. 18, 1914.
[c] Referred to datum of gage at pumping plant.

Daily discharge, in second-feet, of Santa Cruz River near Nogales, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	6	1	1	160	185	160	93	50	19	1	50	13
2	6	1	1	160	130	160	93	50	13	1	50	8
3	6	1	1	160	107	160	93	50	8	1	50	13
4	4	1	1	160	107	160	93	50	8	0	50	13
5	4	1	1	160	85	160	93	50	8	0	295	13
6	4	1	1	160	85	160	110	50	8	0	150	13
7	4	42	1	160	70	160	110	50	8	0	78	8
8	4	6	1	160	70	160	93	50	8	0	50	13
9	4	4	1	160	55	160	93	50	8	0	50	13
10	4	4	1	160	55	160	78	50	8	0	50	13
11	4	4	1	160	85	160	78	50	8	64	50	13
12	2	4	1	130	330	180	78	50	8	27	50	13
13	2	4	1	130	185	180	78	50	8	5	50	13
14	1	4	1	130	185	180	93	50	8	5	110	13
15	1	2	1	107	185	180	78	50	5	38	78	13
16	1	2	1	107	185	130	78	50	5	5	78	13
17	2	6	1	107	185	130	78	50	5	255	78	13
18	2	6	26	107	185	130	78	50	5	295	50	13
19	2	9	.....	89	185	110	64	50	5	215	50	13
20	2	24	.....	89	185	110	64	50	5	150	50	8
21	2	24	.....	89	220	110	64	50	5	93	50	6
22	2	24	.....	89	185	110	50	50	5	50	50	7
23	2	24	.....	110	160	93	50	50	5	50	50	8
24	2	24	.....	130	160	110	50	38	5	50	27	8
25	2	24	160	130	160	93	50	27	2	50	27	7
26	6	30	160	130	160	93	50	27	.....	50	27	7
27	6	30	160	130	160	93	50	27	1	[a] 760	19	7
28	6	16	160	130	160	93	50	27	1	215	19	6
29	28	1	160	188	.....	93	50	27	1	50	13	6
30	2	1	160	[a] 1,460	.....	93	50	27	1	50	13	6
31	1	.....	160	[a] 800	.....	93	.....	19	.....	50	13	.....

[a] Estimated; curve not defined.

NOTE.—Discharge determined by indirect method for shifting control. Dec. 13–17 and Mar. 28 to Apr. 3, gage heights missing; discharge estimated. Dec. 19–24 gage out of commission; heavy flood; no data available.

Monthly discharge of Santa Cruz River near Nogales, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	28	1	4.0	246
November	42	1	10.8	643
January	a1,460	89	198	12,200
February	330	55	150	8,330
March	180	93	134	8,240
April	110	50	74.3	4,420
May	50	19	44.2	2,720
June	19	0	6.1	363
July	a760	0	82.3	5,060
August	295	13	58.9	3,620
September	13	6	10.4	619

a Estimated.

NOTE.—See footnote to table of daily discharge, also "Accuracy" in station description.

SANTA CRUZ RIVER AT TUCSON, ARIZ.

LOCATION.—In sec. 23, T. 14 S., R. 13 E., at Congress Street Bridge in Tucson, Pima County.

RECORDS AVAILABLE.—October 15, 1905, to September 30, 1915 (incomplete).

DRAINAGE AREA.—Not measured.

GAGE.—Staff on right bank installed July 7, 1913. Original gage was painted on bridge pier on left bank; during 1911 and up to September 30, 1912, gage heights were observed from a temporary staff or by measuring to the water surface from a reference point on the bridge. October 1, 1912, to July 7, 1913, a chain gage installed on the bridge was used. Original datum was maintained until November 22, 1913, when it was lowered 2 feet. After the flood of December 12, 1914, gage heights were obtained by measuring down from a reference point on the bridge, elevation 19.28 above new datum. Observer, J. O. Kenny.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Sand; shifts.

EXTREMES OF DISCHARGE.—The stream is dry part of each year at this point. On December 24, 1914, the maximum gage height was 9.8 feet, indicating a discharge of about 9,000 second-feet. This was probably the maximum ever recorded at the station.

ACCURACY.—Records poor.

Discharge measurements of Santa Cruz River at Tucson, Ariz., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 16	C. C. Jacobs	1.00	0.0	Jan. 4	A. L. Enger	2.47	17
Dec. 20	A. D. Micotti	4.40	1,110	Feb. 4	Pickrell and Kriegbaum	4.00	311
21	Smith and Micotti	4.27	2,060	13	Haghurst and Micotti	4.39	491
21	A. D. Micotti	3.27	1,270	27	Enger and Haghurst	3.12	48
23	Krowl and Storrs	7.59	5,120	Mar. 9	Anderson and Enger	3.08	78
23	....do	8.90	7,100	9	....do	3.08	82
24	A. D. Micotti	6.45	8,720	31	F. A. Luis	2.82	8.8
26	F. A. Krowl	3.95	1,070	Apr. 6	....do	2.72	1.5
28	Enger and Micotti	2.69	157	7	....do	.....	.0

Daily discharge, in second-feet, of Santa Cruz River at Tucson, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	July.
1				16	730	37	7	
2				16	590	47	5	
3	30			19	450	64	4	
4	40			22	310	84	3	
5				22	270	130	2	
6				19	230	130	2	
7				19	190	120		
8				19	155	110		
9				19	120	84		
10				19	120	68		
11		85		19	120	68		
12		40		19	235	60		
13				22	560	60		
14				22	265	52		
15				22	180	52		
16				22	100	52		
17				22	100	44		
18				22	85	36		
19				22	85	28		2
20			1130	22	110	28		
21			2020	22	140	28		
22		55	780	22	170	28		
23			8430	25	92	20		
24			8510	25	59	20		
25			3960	25	59	20		
26			1960	16	53	20		1
27			260	4	47	15		200
28			220	4	42	15		100
29			200	5		15		
30			190	312		12		
31	16		85	4400		9		

NOTE.—Discharge determined by indirect method for shifting control, based on frequent discharge measurements during flood periods. Rating curve poorly defined. Stream dry on days of missing discharge. Record of discharge for Dec. 20–27 furnished by Arizona Agr. Experiment Station. Gage heights missing Jan. 1, Feb. 2–8, 21, and 28, and Mar. 7, 21, and 28; discharge interpolated.

Monthly discharge of Santa Cruz River at Tucson, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	40	0	2.8	170
November	85	0	6	360
December	8510	0	893	54900
January	4400	4	170	10400
February	730	42	202	11200
March	130	9	50	3070
April	7	0	.7	4
May	0	0	0	0
June	0	0	0	0
July	200	0	9.8	60
August	0	0	0	0
September	0	0	0	0
The year	8,510	0	112	80,200

NOTE.—Records poor. See footnote to table of daily discharge also "Accuracy" in station description.

RILLITO CREEK NEAR TUCSON, ARIZ.

LOCATION.—In sec. 23, T. 13 S., R. 13 E., at highway bridge on Oracle Road about 4 miles north of Tucson, Pima County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—1909 to September 30, 1915 (incomplete).

GAGE.—Richard Frères water-stage recorder on right abutment of highway bridge.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Sand, wide and shallow; shifts badly at all stages.

EXTREMES OF DISCHARGE.—On December 23, 1914 there was a mean discharge of about 16,000 second-feet, the maximum flood recorded. Stream dry the greater part of each year.

ACCURACY.—Records poor. Daily discharge not sufficiently accurate for publication. Determinations of flood flow based on frequent discharge measurements, which are rough, owing to extreme width of section and shifting channel.

COOPERATION.—Records furnished by Arizona Agricultural Experiment Station.

Discharge measurements of Rillito Creek near Tucson, Ariz., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 4	A. L. Enger	4.32	334	Feb. 5	Micotti and Hayhurst	5.05	383
10	C. C. Jacob	3.50	0	10	do	5.57	122
Nov. 11	A. D. Micotti	3.65	64	12	do	5.06	702
Dec. 19	do	5.75	3,310	13	do	4.99	394
19	do	5.75	3,550	18	do	4.90	229
30	Enger and Hayhurst	4.50	131	23	do	4.75	453
Jan. 2	do	4.23	54	Mar. 9	M. D. Anderson	4.68	255
5	A. L. Enger	4.15	25	9	Enger and Luis	4.68	266
30	Micotti and Hayhurst	5.32	2,650	31	F. A. Luis	4.56	59
30	do	5.25	3,370	Apr. 6	do	4.58	37
30	do	5.21	3,590	7	do	4.64	60
Feb. 2	do	5.23	614	13	do	4.47	13

Monthly discharge of Rillito Creek near Tucson, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	46	0	1.5	92
November	572	0	22.8	1,360
December	16,000	0	1,740	107,000
January	4,000	0	347	21,300
February	1,780	120	458	25,500
March	380	59	170	10,400
April	60	0	20.3	1,200
May	.0	0	.00	0
June	.0	0	.00	0
July	2.5	0	.08	5
August	.0	0	.00	0
September	.0	0	.00	0
The year	16,000	0	230	167,000

NOTE.—Channel reported dry Oct. 1-30; Nov. 1, 4-10, 12-21, Nov. 23 to Dec. 17; Jan. 9-28; Apr. 26 to July 18; and July 20 to Sept. 30. See "Accuracy" in station description.

BLACK RIVER NEAR FORT APACHE, ARIZ.

LOCATION.—About one-fourth mile below the bridge on road from Rice to Fort Apache, 1½ 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 September 30, 1915.

GAGE.—Vertical staff, fastened to float well of water-stage recorder. Staff gage about three-fourths mile above present gage was used from November 24, 1912, to October 16, 1913, when a Gurley water-stage recorder was installed at present site, but at independent datum. Recorder was damaged by the flood December 19, 1914, and the staff gage on float well was read twice daily after January 20, 1915 by Mrs. Tom Wanslee.

DISCHARGE MEASUREMENTS.—Made from cable near gage or by wading about three-fourths of a mile above gage.

CHANNEL AND CONTROL.—Boulders and gravel; shifts during flood stages, fairly permanent at low stages.

EXTREMES OF DISCHARGE.—Maximum stage during year, 15.9 feet on December 20, determined from flood marks (discharge determined from extension of rating curve, about 18,000 second-feet); minimum stage, 3.2 feet on several days during September (discharge, 70 second-feet).

1912–1915: Maximum stage and discharge same as for 1915 (see above); minimum stage, 3.86 feet (not comparable with 1915 minimum, because of shift in control) from June 27 to July 2, 1914 (discharge, 61 second-feet).

DIVERSIONS.—None.

ACCURACY.—Determinations are rough, on account of lack of high-stage discharge measurements, except for the months of October, November, June, and September, for which they are fair.

Discharge measurements of Black River near Fort Apache, Ariz., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 28	J. B. Spiegel	4.46	293	Jan. 20	J. B. Spiegel	4.04	184
Jan. 18	do	3.78	125	Sept. 25	M. D. Anderson	3.58	151
18	do	3.82	126	27	do	3.70	176
20	do	4.04	188	27	do	3.70	173

Daily discharge, in second-feet, of Black River near Fort Apache, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	230	275	230	475	1,360	1,120	4,100	4,620	565	175	1,260	130
2	230	320	230	435	1,330	840	4,830	3,020	565	175	1,560	130
3	230	335	230	395	6,000	1,120	5,180	2,700	565	175	1,880	130
4	355	320	230	355	2,550	1,260	6,000	2,550	610	175	1,120	120
5	1,150	305	230	320	1,400	1,330	6,000	2,400	610	150	565	110
6	735	275	230	320	860	1,330	6,000	2,300	565	130	2,750	120
7	565	260	230	290	1,120	990	6,000	2,150	540	130	1,800	145
8	475	260	230	260	710	1,260	5,700	1,970	495	120	930	130
9	395	245	230	230	735	870	5,330	1,560	415	110	610	120
10	355	245	230	230	1,220	870	4,830	1,640	395	110	455	110
11	320	245	230	230	1,840	810	4,480	1,640	395	110	245	100
12	290	290	230	200	2,550	1,050	4,760	1,520	395	110	150	70
13	260	415	230	200	1,720	810	6,000	1,680	375	110	110	70
14	245	415	230	175	1,640	785	5,620	2,200	335	120	90	90
15	230	375	230	175	1,400	840	5,260	2,600	335	110	150	80
16	230	335	230	175	1,330	1,120	4,830	2,450	320	100	160	70
17	230	320	230	150	1,190	1,560	3,660	1,920	320	100	130	70
18	230	305	230	130	1,330	1,800	3,360	1,800	305	100	150	80
19	230	290	4,160	150	1,440	2,150	3,540	1,680	320	160	130	90
20	230	275	18,000	200	1,480	2,250	3,720	1,440	320	200	120	80
21	230	245	11,600	200	2,150	2,350	4,030	1,220	320	260	110	70
22	245	230	4,390	175	1,560	2,250	2,840	1,020	290	260	110	90
23	275	230	1,970	185	1,360	2,150	3,660	1,020	275	260	100	110
24	320	230	1,640	175	930	3,300	3,300	960	260	290	120	120
25	355	230	1,260	175	900	4,220	3,080	870	260	540	415	185
26	355	230	870	200	870	3,480	2,800	785	245	1,050	340	245
27	335	230	760	200	990	4,500	2,600	710	215	2,750	200	175
28	320	230	710	6,000	1,050	4,620	2,800	735	200	6,000	245	160
29	305	230	610	6,000	.....	5,050	3,480	660	175	5,550	200	160
30	275	230	565	2,100	.....	5,850	3,900	585	175	2,650	150	150
31	275	.....	520	1,750	.....	4,620	.....	565	.....	1,360	130	.....

NOTE.—Determinations of daily discharge based on rating curve fairly well defined below but poorly defined above 1,500 second-feet. Flood of Dec. 19 rendered water-stage recorder inoperative; stage from Dec. 20 to Jan. 17 determined from observer's notes, high-water marks, and by comparison with record of Salt River near Roosevelt. Jan. 28–29, Feb. 3, and Mar. 4–7 and 13, water was over top of gage; mean discharge estimated at 6,000 second-feet.

Monthly discharge of Black River near Fort Apache, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	1,150	230	339	20,800	C.
November	415	230	281	16,700	C.
December	18,000	230	1,650	101,000	D.
January	6,000	130	718	44,100	D.
February	6,000	710	1,540	85,500	D.
March	5,850	785	2,150	132,000	D.
April	6,000	2,600	4,420	263,000	D.
May	4,620	565	1,710	105,000	D.
June	610	175	372	22,100	D.
July	6,000	100	764	47,000	D.
August	2,750	90	532	32,700	D.
September	245	70	117	6,960	C.
The year	18,000	70	1,210	877,000	

NOTE.—See footnote to table of daily discharge; also "Accuracy" in station description.

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 the town of Roosevelt, Gila County.

RECORDS AVAILABLE.—October 1, 1913, to September 30, 1915 (including 180 second-feet diverted for power development 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 power development).

DRAINAGE AREA.—4,222 square miles (furnished by U. S. Reclamation Service).

GAGE.—Vertical staff on left bank, bolted to concrete wall at head of canal.

DISCHARGE MEASUREMENTS.—Made by wading below dam at low stages. At high stages discharge is 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.—Concrete dam acts as artificial control.

EXTREMES OF DISCHARGE.—The maximum mean daily discharge from October 1, 1913, to September 30, 1915, was 37,500 second-feet on January 30, 1915. Minimum mean daily discharge for that period was 164 second-feet on June 29, 1914.

DIVERSIONS.—About 180 second-feet diverted at dam for power development.

ACCURACY.—Results good.

COOPERATION.—Daily-discharge record furnished by United States Reclamation Service.

Daily discharge, in second-feet, of Salt River near Roosevelt, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	297	589	391	1,030	5,881	2,625	6,378	5,557	1,586	675	960	552
2	297	535	446	1,031	5,882	2,238	6,058	6,731	1,097	652	812	522
3	299	553	400	960	5,881	2,363	4,847	7,046	1,487	628	724	512
4	1,191	553	400	772	8,691	2,363	4,847	6,426	1,642	604	739	426
5	1,378	541	373	735	3,736	3,760	5,867	6,847	1,911	580	676	406
6	1,464	511	365	735	2,276	4,087	6,042	5,442	1,866	580	753	398
7	1,154	499	357	675	1,695	3,772	7,300	4,627	1,796	569	1,250	394
8	897	499	357	676	1,542	2,642	7,862	4,992	1,619	550	863	384
9	737	499	335	675	1,341	2,778	7,114	4,222	1,446	519	707	347
10	643	475	327	615	1,292	2,662	6,912	3,958	1,366	479	676	342
11	505	517	327	616	1,446	2,322	6,446	3,467	1,306	469	563	338
12	616	559	298	586	3,541	2,322	6,426	3,467	1,347	463	490	338
13	562	529	298	558	5,080	2,159	6,757	3,907	1,346	458	478	303
14	501	654	335	558	3,098	2,184	7,211	4,359	1,236	443	514	278
15	490	589	327	604	3,217	2,134	7,707	4,359	1,016	442	514	255
16	443	559	320	550	2,609	2,359	7,206	4,359	1,150	431	514	247
17	420	499	254	551	2,066	2,773	6,001	3,828	1,151	509	520	247
18	404	547	234	514	1,942	3,193	5,147	3,486	1,133	400	483	244
19	445	511	1,759	448	2,422	3,273	5,303	3,271	1,097	443	472	264
20	390	511	19,354	448	3,528	3,553	5,427	2,787	1,114	533	407	330
21	386	511	17,234	478	5,722	3,778	6,401	2,454	1,115	589	497	330
22	411	499	5,314	489	6,618	3,853	6,136	2,341	1,080	647	442	340
23	1,357	430	4,684	499	3,471	3,422	6,426	2,026	1,065	641	453	380
24	624	419	7,924	524	2,490	3,430	6,002	1,911	925	837	453	360
25	578	419	6,029	537	2,237	4,664	5,532	1,899	925	6,794	432	350
26	620	419	3,314	488	2,113	6,370	5,217	1,958	868	8,245	438	355
27	619	400	2,159	488	2,275	6,180	4,512	1,888	878	10,890	422	870
28	609	400	1,921	488	2,388	6,180	4,222	1,819	802	1,902	466	588
29	571	400	1,374	489	.....	6,715	4,222	1,752	768	1,777	642	457
30	511	391	1,374	37,492	.....	7,635	5,136	1,647	699	1,352	687	426
31	499	.....	1,232	15,656	.....	7,720	.....	1,626	.....	1,193	630	.....

NOTE.—Record of daily discharge furnished by U. S. Reclamation Service. Flow of Tonto Creek (record of which is given on p. 216) not included.

Monthly discharge of Salt River near Roosevelt, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	1,460	297	643	39,500
November	654	391	501	29,800
December	19,400	234	2,570	158,000
January	37,500	448	2,290	141,000
February	8,690	1,290	3,370	187,000
March	7,720	2,130	3,730	229,000
April	7,860	4,220	6,020	358,000
May	7,050	1,630	3,690	227,000
June	1,910	699	1,230	73,200
July	10,900	400	1,460	89,800
August	1,250	407	602	37,000
September	870	244	386	23,000
The year	37,500	234	2,200	1,590,000

NOTE.—Monthly discharge computed by engineers of United States Geological Survey from daily discharge record furnished by United States Reclamation Service.

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 24, 1912, to September 30, 1915.

GAGE.—Vertical staff fastened to downstream end of left abutment of bridge, read twice daily by M. Jesus Velasquez. On January 20, 1915, datum of gage was raised 4.4 feet.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Sand and gravel, slightly shifting. Banks high and not likely to overflow. Point of zero flow approximately same as new datum of gage.

EXTREMES OF DISCHARGE.—Maximum stage and discharge during year not determined; minimum stage recorded, 0.50 foot August 27 at 8 a. m. and 2 p. m. (discharge, 75 second-feet).

1912–1915: Maximum stage and discharge not determined; minimum stage recorded, 4.62 (0.22 new datum) December 21, 1912 (discharge, 30 second-feet).

DIVERSIONS.—A small quantity of water is diverted for irrigation by the Indians several miles above station; amount not known.

ACCURACY.—On account of missing gage heights and lack of high stage discharge measurements records are poor, except for the months of October and August, for which they are fair.

COOPERATION.—Gage-height record furnished by United States Army.

Discharge measurements of White River at Fort Apache, Ariz., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 29[a]	J. B. Spiegel	5.10	149	Jan. 20[a]	J. B. Spiegel	.56	95
Jan. 19	do	.60	110	Sept. 26	M. D. Anderson	.80	169
19	do	.60	91				

[a] North and East forks measured separately and the sum of the results taken as discharge of main stream.

NOTE.—Beginning Jan. 19 gage height refers to datum 4.4 feet above original datum.

Daily discharge, in second-feet, of White River at Fort Apache, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	90	85	210	210	285	1,020	1,500	935	550	230	.....
2	90	85	210	210	285	1,020	1,410	935	515	230	.....
3	640	85	210	210	285	1,370	1,280	1,020	515	230	.....
4	610	85	210	260	285	1,550	1,410	1,070	480	285	.....
5	410	85	210	180	285	1,700	1,410	1,110	435	285	.....
6	380	85	100	140	285	1,700	1,320	1,000	390	260	.....
7	275	85	100	140	210	1,460	1,320	890	345	210	.....
8	275	85	100	160	285	1,460	1,320	845	345	180	.....
9	225	85	100	210	285	1,370	1,320	845	315	180	.....
10	225	.....	85	210	285	1,410	1,240	845	285	160	.....
11	225	.....	85	210	260	1,410	1,330	845	260	160	.....
12	225	.....	100	410	260	1,550	1,410	845	245	140	.....
13	175	.....	100	285	260	1,620	1,490	890	230	140	.....
14	175	.....	100	285	260	1,680	1,570	800	230	140	.....
15	175	.....	100	305	315	1,750	1,650	760	210	160	.....
16	175	.....	100	325	410	1,550	1,550	760	210	120	.....
17	175	.....	100	345	480	1,370	1,550	710	180	100	.....
18	175	.....	100	360	480	1,370	1,440	710	140	100	.....
19	175	.....	100	375	550	1,650	1,340	710	185	180	.....
20	175	.....	100	390	585	1,650	1,240	670	230	180	.....
21	175	.....	100	410	550	1,820	1,150	670	180	160	.....
22	175	.....	100	315	550	1,820	1,020	670	345	140	.....
23	150	.....	100	285	670	1,410	1,020	670	445	120	.....
24	150	.....	100	285	800	1,410	1,020	630	890	105	.....
25	150	.....	100	285	935	1,280	1,070	630	940	95	.....
26	150	.....	100	285	935	1,280	1,110	585	1,220	85	170
27	150	.....	100	315	1,110	1,240	1,020	585	1,500	75	140
28	150	.....	100	315	1,240	1,370	980	585	1,370	80	120
29	150	230	760	.....	1,240	1,820	980	585	1,240	90	95
30	150	230	410	.....	1,200	2,000	980	550	980	100	95
31	150	210	270	.....	1,150	.....	935	.....	800	100	.....

NOTE.—Discharge determined from rating curve fairly well defined between 70 and 600 second-feet. Gage heights missing for November, Dec. 10–28, Feb. 15–20, Apr. 13–14, May 11-14 and 18–19, June 6 and 27, July 5, 6, 12, 19, and 26, Aug. 1, 24–26, 28–29, 31, and Sept. 1–25, for which periods discharges were interpolated or determined by comparison with records of flow of Salt River near Roosevelt. Determination of discharge for Dec. 10–28 not practicable on account of missing gage heights and rapidly changing stage.

Monthly discharge of White River at Fort Apache, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	640	90	218	13,400	C.
November	.....	.....	120	7,140	D.
January	760	85	154	9,470	D.
February	410	140	276	15,300	D.
March	1,240	210	549	33,800	D.
April	2,000	1,020	1,500	89,300	D.
May	1,650	935	1,270	78,100	D.
June	1,110	550	778	46,300	D.
July	1,500	140	523	32,200	D.
August	285	75	156	9,590	C.
September	.....	.....	150	8,930	D.

NOTE.—Mean discharge for November and September determined by comparison with Salt River near Roosevelt. See footnote to table of daily discharge and "Accuracy" in station description.

EAST FORK OF WHITE RIVER AT FORT APACHE, ARIZ.

LOCATION.—On Fort Apache Military Reserve at Fort Apache, Navajo County, about half a mile above junction with North Fork of White River

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 8, 1912, to September 30, 1915.

GAGE.—Vertical staff fastened to ash tree on left bank opposite officers' quarters. January 20, 1915, a new staff gage was installed and the datum raised 5 feet.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Boulders and gravel; shifting slightly.

EXTREMES OF DISCHARGE.—Maximum stage and discharge during year not recorded; minimum stage December 1–9, 5.35 old datum (discharge, 18 second-feet).

1912–1915: Maximum stage and discharge not recorded; minimum stage, 4.95 feet February 14–16, 1914 (discharge, 5 second-feet).

ACCURACY.—Records for October, January, March, and April good; for June and July, fair; and for November, February, May, August, and September, poor. Discharge for December not determined because of lack of high-stage discharge measurements.

COOPERATION.—Gage heights furnished by United States Army.

Discharge measurements of East Fork of White River at Fort Apache, Ariz., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec-ft.*			*Feet.*	*Sec.-ft.*
Oct. 29	J. B. Spiegel	5.66	38	Jan. 20	J. B. Spiegel	.54	25
Jan. 19	.....do	.63	36	Sept. 26	M. D. Anderson	.75	47
19	.....do	.62	36	26	.....do	.75	47
20	.....do	.54	28				

NOTE.—Gage heights after Jan. 18 refer to datum 5.00 feet above original datum.

Daily discharge, in second-feet, of East Fork of White River at Fort Apache, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	26	18	36	60	82	242	242	217	112	.....	.....
2	26	18	36	60	82	242	242	217	112	.....	.....
3	255	18	36	153	82	325	242	205	104	.....	.....
4	172	18	36	70	82	355	242	205	97	.....	.....
5	172	18	36	55	82	355	242	205	88	60	.....
6	136	18	36	36	82	355	242	205	79	60	.....
7	136	18	36	45	60	295	217	205	70	70	.....
8	104	18	36	55	89	295	230	205	70	70	.....
9	70	18	36	65	89	295	230	205	60	60	.....
10	55	.....	36	65	89	295	230	205	60	50	.....
11	55	.....	36	65	65	325	255	217	60	48	.....
12	55	.....	36	65	65	325	280	217	55	45	.....
13	55	.....	36	65	65	295	305	205	50	.....	.....
14	55	.....	36	65	65	242	330	205	50	.....	.....
15	55	.....	36	72	97	242	355	205	45	.....	.....
16	55	.....	36	79	112	242	355	205	40	.....	.....
17	36	.....	36	86	136	242	355	205	40	.....	.....
18	29	.....	36	93	145	242	355	205	32	.....	.....
19	26	.....	36	100	143	242	315	205	36	.....	.....
20	26	.....	32	106	162	242	242	205	40	.....	.....
21	26	.....	32	112	143	325	205	205	32	.....	.....
22	26	.....	32	97	143	325	205	193	70	.....	.....
23	26	.....	32	82	143	325	205	193	97	.....	.....
24	26	.....	32	82	217	295	205	181	281	.....	.....
25	26	.....	32	82	217	242	205	181	205	.....	.....
26	26	.....	32	82	217	217	242	181	255	.....	.....
27	26	.....	32	82	268	205	217	154	310	.....	29
28	55	.....	32	82	295	230	217	128	230	.....	29
29	55	55	32	.....	295	310	217	128	217	.....	26
30	55	55	32	.....	280	310	217	120	181	.....	23
31	55	55	60	.....	268	.....	205	.....	162	.....	.....

NOTE.—Discharge determined from a rating curve fairly well defined from 10 to 200 second-feet. Gage heights missing for the following periods, for which discharge was interpolated or determined by comparison with records of flow of White River at Fort Apache: November, Feb. 15–20; May 11–14 and 19–20; June 20 and 27; July 5, 6, 12, 19, and 27; Aug. 1–4, and Aug. 13 to Sept. 26. Discharge Dec. 10–28 not determined because of rapidly fluctuating stage during period for which gage heights are missing.

Monthly discharge of East Fork of White River at Fort Apache, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	255	26	64.5	3,970	B.
November	.....	.....	35	2,080	D.
January	36	32	35.3	2,170	B.
February	153	36	77.3	4,290	D.
March	295	60	140	8,610	B.
April	355	205	283	16,800	B.
May	355	205	253	15,600	D.
June	205	120	194	11,500	C.
July	310	32	104	6,390	C.
August	.....	.....	30	1,840	D.
September	.....	.....	30	1,790	D.

NOTE.—Mean discharge for November, August and September determined by comparison with White River at Fort Apache. See footnote to table of daily discharge, also "Accuracy" in station description.

TONTO CREEK NEAR ROOSEVELT, ARIZ.

LOCATION.—In sec. 14, T. 6 N., R. 10 E., 6 miles above upper end of Roosevelt reser voir and 15 miles northwest of the town of Roosevelt, Gila County.

DRAINAGE AREA.—1,004 square miles (furnished by United States Reclamation Service).

RECORDS AVAILABLE.—October 1, 1913, to September 30, 1915.

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.—A maximum mean daily discharge of 11,000 second-feet was recorded on January 30, 1915, but the maximum flood discharge was not determined. The stream has reached a minimum flow at this point of about 2 second-feet.

DIVERSIONS.—There are no diversions in the vicinity of this station. The entire flow is discharged into Roosevelt reservoir.

ACCURACY.—Records fair.

COOPERATION.—Record of daily discharge furnished by United States Reclamation Service.

Daily discharge, in second-feet, of Tonto Creek near Roosevelt, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5	25	18	388	4,980	550	125	375	150	10	60	25
2	5	25	30	250	1,466	550	125	525	112	10	50	25
3	8	25	20	150	1,223	812	125	525	112	8	25	20
4	38	20	20	150	3,223	812	125	450	112	8	20	20
5	50	30	15	125	2,100	850	125	525	125	8	20	15
6	38	30	15	100	1,200	965	200	450	125	8	15	15
7	38	30	15	100	995	900	200	375	125	5	15	15
8	38	30	15	62	462	800	200	300	100	5	25	15
9	38	30	15	50	305	750	200	200	100	5	20	15
10	38	30	15	87	300	650	150	145	88	5	20	15
11	38	30	15	62	255	500	95	162	80	5	20	10
12	30	30	15	88	1,125	500	95	162	75	5	15	10
13	12	50	15	88	1,608	480	95	162	60	5	15	7
14	12	45	15	88	1,300	480	75	275	60	5	15	8
15	12	40	15	75	1,025	470	75	295	50	5	15	8
16	12	40	15	75	615	600	75	295	50	5	15	8
17	12	35	15	62	600	725	75	270	32	5	15	8
18	12	35	15	62	600	600	75	270	32	5	12	8
19	12	35	500	62	600	500	75	250	30	5	12	8
20	12	30	1,250	50	925	400	75	225	30	5	12	8
21	12	25	500	50	1,075	400	75	225	25	5	10	8
22	25	25	388	45	1,350	300	75	225	15	30	10	8
23	105	22	388	45	1,225	250	70	225	15	25	10	8
24	100	20	1,250	38	1,025	150	70	225	15	25	10	8
25	52	20	1,800	38	1,025	150	62	218	15	60	5	8
26	52	18	1,800	38	825	250	62	210	12	125	5	8
27	30	18	862	30	550	250	62	210	12	162	37	8
28	30	18	862	38	550	250	62	200	10	150	37	8
29	25	18	625	65	.....	175	62	190	10	150	25	8
30	16	18	625	11,000	.....	175	100	175	10	100	25	8
31	25	.....	554	5,181	.....	175	.....	150	.....	80	25	.....

Monthly discharge of Tonto Creek near Roosevelt, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	105	5	30.1	1,850
November	50	18	28.2	1,680
December	1,800	15	377	23,200
January	11,000	30	605	37,200
February	4,980	550	1,160	64,400
March	965	175	497	30,600
April	200	62	103	6,130
May	525	145	274	16,800
June	150	10	59.6	3,550
July	162	5	33.4	2,050
August	60	5	19.8	1,220
September	25	7	11.4	678
The year	11,000	5	262	189,000

NOTE.—Monthly discharge computed by engineers of United States Geological Survey from daily-discharge record furnished by United States Reclamation Service.

VERDE RIVER NEAR CLARKDALE, ARIZ.

LOCATION.—In T. 17 N., R. 3 E., 4 miles below the mouth of Sycamore Creek and 5 miles above Clarkdale, Yavapai County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 18, 1915, to September 30, 1915; discharge measurements April 3, to June 9, 1915.

GAGE.—Stevens water-stage recorder on left bank, installed June 18. A vertical staff was installed by the United Verde Copper Co. in April on the left bank about 30 feet above the water-stage recorder. All measurements and gage heights are referred to the staff gage datum.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Gravel and boulders, fairly permanent at low stages, may shift at high stages.

EXTREMES OF DISCHARGE.—Maximum stage during period covered by record from water-stage recorder, 5.65 feet at 6 a. m., July 25 (discharge, 1,040 second-feet); minimum stage from water-stage recorder, 2.10 feet on August 4, 11 and 12 (discharge, 70 second-feet).

DIVERSION.—Water is diverted above and below station for irrigating a few small ranches, amount not known.

ACCURACY.—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, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 3	Gittings and Larson	5.50	984	May 12	Gittings and Larson	2.80	237
7	do	3.50	305	14	Jacob and Gittings	2.50	123
12	do	2.70	115	June 9	Gittings and Larson	2.10	83
May 4	do	6.50	2,450	July 31	do	2.20	89
7	do	6.40	2,400	Sept. 9	Anderson and Gittings	2.18	79
10	do	3.80	518	9	do	2.18	78
11	do	3.25	420				

Daily discharge, in second-feet, of Verde River near Clarkdale, Ariz., for the year ending Sept. 30, 1915.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1		87	73	73	16		86	73	72
2		87	72	90	17		86	72	72
3		87	71	85	18	82	87	72	72
4		87	70	85	19	82	87	72	72
5		87	80	73	20	82	87	72	72
6		87	92	73	21	82	89	72	73
7		87	95	74	22	84	108	72	73
8		85	80	73	23	82	112	72	73
9		86	75	73	24	82	138	72	74
10		86	72	73	25	82	390	75	74
11		87	70	73	26	82	230	132	73
12		89	70	72	27	82	220	125	74
13		88	72	72	28	84	75	90	73
14		87	72	72	29	84	75	88	72
15		86	75	73	30	85	75	80	73
					31		74	75	

NOTE.—Discharge determined from two rating curves, both fairly well defined for all stages.

Monthly discharge of Verde River near Clarkdale, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
June 18-30	85	82	82.7	2,130	C.
July	390	74	107	6,600	C.
August	132	70	79.1	4,860	C.
September	90	72	74.2	4,420	C.
The period				18,000	

VERDE RIVER AT CAMP VERDE, ARIZ.

LOCATION.—In sec. 30, T. 14 N., R. 5 E., at steel highway bridge just above the town of Camp Verde, Yavapai County, and above mouth of Beaver Creek.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 5, 1912, to September 30, 1915.

GAGE.—Vertical staff painted on east bridge pier; read morning and evening to half-tenths by N. A. Vyne.

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

CHANNEL AND CONTROL.—Straight channel; banks fairly high and wooded, not likely to be overflowed; clay and sand bottom, shifting at high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.5 feet at 8.30 a. m., March 26 (discharge, 4,000 second-feet); minimum stage, 2.85 at 3.30 p. m., July 12 (discharge, 42 second-feet).

1912–1915: Maximum stage recorded, 8.1 feet on February 22, 1914 (discharge, 7,180 second-feet); minimum discharge, 31 second-feet on June 28 and 29, 1914 (gage height, 2.90); minimum gage height for different years not comparable because of shift in control.

DIVERSIONS.—Made for irrigation at various points up the valley, much of the low-stage flow being diverted.

ACCURACY.—Records fair for October to January, June, August, and September; poor for remainder of year.

Discharge measurements of Verde River at Camp Verde, Ariz., during the year ending Sept. 30, 1915.

[Made by M. D. Anderson.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 5	3.50	264	July 12	2.85	41.9
Dec. 2	3.35	151	Sept. 11	3.20	68
Mar. 17	5.60	1,900			

Daily discharge, in second-feet, of Verde River at Camp Verde, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	315	205	150	265	900	825	2,160	3,080	115	60	185	165
2	265	205	150	245	540	750	2,060	2,300	115	60	185	150
3	265	185	150	245	1,520	605	1,900	2,250	115	60	150	150
4	860	185	150	205	1,160	675	3,150	3,700	100	55	115	130
5	480	185	150	205	540	570	1,720	4,800	100	55	710	115
6	675	165	150	205	390	540	1,520	8,560	100	55	315	100
7	245	165	150	205	315	605	1,250	2,100	115	50	205	100
8	245	165	150	205	315	540	940	1,160	115	50	205	85
9	205	165	150	205	315	540	750	1,340	115	50	185	85
10	185	165	150	205	365	540	605	940	115	45	185	70
11	185	165	135	205	480	480	450	900	115	45	150	70
12	165	165	135	205	2,300	540	420	710	100	42	165	70
13	150	150	150	205	1,720	605	390	605	100	42	150	70
14	150	165	150	205	1,520	825	365	510	100	42	115	70
15	135	165	135	205	1,430	1,300	340	245	100	42	115	70
16	135	165	165	205	1,340	2,100	340	245	100	42	100	70
17	135	150	165	205	1,340	2,160	340	185	86	42	100	70
18	135	165	185	205	1,620	2,720	315	165	72	1,160	100	85
19	135	150	290	205	1,340	2,360	315	150	72	1,070	85	70
20	135	150	265	205	1,340	2,550	480	365	72	750	70	70
21	150	150	265	205	1,480	2,200	390	315	60	710	70	70
22	265	150	265	225	1,250	2,550	245	290	60	640	60	70
23	290	150	290	225	1,160	2,880	1,160	265	60	605	60	70
24	265	135	290	225	980	3,080	2,720	245	72	605	50	70
25	225	135	315	225	825	3,200	2,300	165	72	540	50	70
26	185	135	315	225	750	3,400	1,120	165	72	480	70	70
27	165	135	290	225	825	3,150	710	135	60	420	605	70
28	165	135	290	245	825	2,400	540	135	60	390	540	85
29	150	135	290	1,860	.....	2,060	640	135	60	365	365	85
30	150	135	265	3,150	.....	3,150	3,040	115	60	265	365	85
31	165	.....	265	1,620	.....	2,010	.....	115	.....	225	185	.....

NOTE.—Discharge determined by indirect method for shifting control, based on a fairly well defined rating curve. Discharge for July 4–11 and 13–17 determined by comparison with Verde River near Clarkdale.

Monthly discharge of Verde River at Camp Verde, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	860	135	238	14,600	C.
November	235	135	159	9,460	C.
December	315	135	207	12,700	C.
January	3,150	205	409	25,200	C.
February	2,300	750	1,030	5,720	D.
March	3,400	540	1,670	10,300	D.
April	3,150	315	1,090	64,900	D.
May	3,080	115	980	60,300	D.
June	115	60	88.6	5,270	C.
July	1,160	42	292	18,000	D.
August	605	50	194	11,900	C.
September	165	70	87.0	5,180	C.
The year	3,400	42	535	244,000	

VERDE RIVER AT CHILDS, NEAR CAMP VERDE, ARIZ.

LOCATION.—Just below power plant of Arizona Power Co. at Childs, 3 miles above mouth of Fossil Creek and 18 miles southeast of Camp Verde, Yavapai County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—February 25, 1911, to September 30, 1915.

GAGE.—Inclined staff in three sections on left bank about 300 feet below power plant of Arizona Power Co.

DISCHARGE MEASUREMENTS.—Made from cable a mile above gage or by wading. No discharge measurements were made in 1915.

CHANNEL AND CONTROL.—Boulders and bedrock; apparently fairly permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year, 12.9 feet at 7.20 a. m. May 5; minimum stage, 4.3 feet on several days during June, July, and August. 1911–1915: Maximum stage recorded, 13.75 feet on March 11, 1911; minimum stage, 3.2 feet on April 27–28, 1911.

DIVERSION.—Water is diverted above station for irrigation. (See Verde at Camp Verde.)

REGULATION.—A fairly constant flow of approximately 48 second-feet is diverted from Fossil Creek for power developement and discharged into the river above gage.

COOPERATION.—Gage-height record furnished by the United States Reclamation Service.

Discharge not determined on account of lack of discharge measurements.

Daily gage height, in feet, of Verde River at Childs near Camp Verde, Ariz., for the year ending Sept. 30, 1915.

Day	Oct	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5.95	5.0	5.0	5.1	6.95	6.1	7.6	9.1	4.5	4.4	4.55	4.5
2	5.15	5.1	5.05	5.1	6.3	6.15	7.55	8.65	4.45	4.4	4.7	4.45
3	5.05	5.05	5.0	5.1	6.75	5.95	8.2	8.25	4.45	4.35	4.7	4.65
4	5.8	5.0	5.0	5.1	7.0	6.05	8.3	10.2	4.5	4.35	4.65	4.7
5	5.45	5.0	5.0	5.0	6.2	6.0	7.75	11.95	4.6	4.4	4.6	4.7
6	5.25	5.0	5.0	5.0	5.85	6.05	7.25	10.35	4.6	4.4	5.75	4.65
7	5.1	5.0	5.0	5.0	5.65	6.05	6.9	10.35	4.5	4.4	5.1	4.6
8	5.1	5.0	5.0	5.0	5.5	6.1	6.45	9.65	4.6	4.4	4.9	4.6
9	5.05	5.0	5.0	5.0	5.4	5.8	6.25	7.6	4.5	4.4	4.8	4.6
10	5.0	5.05	5.0	5.0	5.6	6.05	6.0	7.0	4.5	4.4	4.8	4.6
11	5.0	5.05	5.0	5.0	6.1	5.9	5.9	6.4	4.5	4.4	4.7	4.55
12	5.0	5.0	5.05	5.0	7.85	5.8	5.75	6.0	4.45	4.4	4.65	4.55
13	5.0	5.0	5.1	5.0	7.65	5.9	5.7	5.75	4.45	4.4	4.6	4.5
14	4.9	5.0	5.05	5.0	8.95	6.05	5.55	5.45	5.45	4.35	4.6	4.5
15	4.9	5.0	5.0	5.0	6.5	6.8	5.4	5.3	4.45	4.3	4.6	4.5
16	4.9	5.0	5.0	5.0	6.4	7.85	5.1	5.0	4.45	4.3	4.6	4.45
17	4.9	5.0	5.0	5.0	6.3	8.1	5.05	4.9	4.4	4.3	4.5	4.4
18	4.9	5.0	5.0	5.0	7.2	8.25	5.0	4.9	4.4	4.3	4.45	4.45
19	4.9	5.0	5.15	5.0	7.15	8.7	5.6	4.8	4.35	4.3	4.4	4.45
20	4.9	5.0	5.3	5.0	7.3	8.6	5.6	4.75	4.3	4.5	4.3	4.55
21	4.9	5.0	5.4	5.0	7.75	8.35	5.2	5.15	4.3	4.55	4.3	4.55
22	5.45	5.0	5.3	5.0	6.9	7.75	5.05	5.3	4.4	4.7	4.3	4.55
23	5.4	5.0	5.3	5.0	6.6	8.65	6.75	5.2	4.4	5.25	4.3	4.55
24	5.05	5.0	5.3	5.0	6.4	9.95	8.55	5.0	4.4	5.6	4.3	4.55
25	5.0	5.0	5.3	5.0	6.45	11.4	8.7	4.8	4.4	5.7	4.3	4.55
26	5.0	5.0	5.3	5.1	6.2	10.75	6.7	4.7	4.4	6.95	4.3	4.55
27	5.0	5.0	5.2	5.1	6.3	9.5	6.0	4.6	4.4	6.0	5.15	4.5
28	5.0	5.0	5.2	5.1	6.5	8.45	5.55	4.6	4.4	5.45	5.0	4.55
29	5.0	5.0	5.2	7.3	.....	8.55	5.55	4.6	4.4	5.2	4.9	4.5
30	5.0	5.0	5.2	10.85	.....	8.75	11.25	4.5	4.4	5.1	4.75	4.45
31	5.05	.....	5.15	7.75	.....	7.8	.....	4.5	.....	5.0	4.55	.....

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, 1915.

GAGE.—Painted directly 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 was 15,675 second-feet on January 30; minimum mean daily discharge, 95 second-feet on July 20. (Maximum or minimum gage heights not available.)

1897–1915: Maximum mean daily gage height 17.0 feet on November 27, 1905 (discharge, 61,460 second feet); minimum mean daily discharge, 32 second-feet on July 19 and 20, 1904 (minimum gage height for different years not comparable because of shifting control).

DIVERSIONS.—See Verde River at Camp Verde. Water is also diverted 5 miles above station for use on Indian Reservation.

ACCURACY.—Records good.

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

Daily discharge, in second-feet, of Verde River near McDowell, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	140	325	242	517	5,120	1,700	3,300	4,350	290	125	670	262
2	170	275	275	510	1,850	1,612	3,312	5,715	250	122	632	250
3	275	275	265	500	1,700	1,890	3,200	5,045	250	120	545	825
4	300	275	260	400	4,520	1,890	2,882	3,215	262	120	437	585
5	350	262	260	388	2,494	1,895	3,010	3,620	238	120	425	422
6	612	262	260	368	2,197	2,162	2,875	3,870	238	120	358	285
7	500	262	250	362	1,280	2,230	2,540	3,490	238	118	290	275
8	420	262	262	362	1,108	1,890	2,188	3,222	238	115	620	272
9	300	262	255	348	930	1,710	1,695	2,615	238	118	502	250
10	300	262	255	342	888	1,588	1,520	2,400	238	115	325	250
11	288	262	242	340	740	1,445	1,452	2,250	248	115	275	225
12	262	306	250	332	1,662	1,445	1,338	2,250	240	115	242	215
13	268	306	260	312	3,740	1,335	880	1,900	238	112	235	205
14	260	306	250	300	3,508	1,245	768	1,620	240	108	232	198
15	248	288	272	292	3,338	1,290	728	1,308	240	108	232	188
16	215	288	288	300	2,240	1,300	700	1,028	238	102	225	175
17	250	288	288	295	1,838	2,110	675	965	230	100	222	170
18	232	288	288	295	1,728	2,400	645	710	230	100	220	148
19	165	288	1,175	295	1,912	2,400	625	585	212	98	212	149
20	188	260	1,950	268	2,632	2,750	552	508	180	95	190	140
21	138	268	1,325	295	3,539	2,650	575	460	162	98	170	135
22	1,050	238	925	295	6,645	2,600	662	400	162	225	142	138
23	500	230	700	290	2,870	2,450	602	400	150	250	125	135
24	562	237	1,900	292	2,125	2,400	568	400	150	350	120	142
25	325	262	2,000	292	2,275	3,500	2,412	450	150	538	110	145
26	400	250	1,562	315	2,125	4,700	2,950	405	135	865	225	142
27	300	250	1,200	285	1,890	4,525	1,092	372	135	1,340	1,212	142
28	275	255	850	285	1,650	4,400	675	350	130	1,295	450	150
29	262	250	718	335	.....	3,875	638	325	128	1,235	325	158
30	255	250	516	15,675	.....	3,762	670	300	128	920	450	158
31	325	.....	585	13,000	.....	4,135	.....	300	.....	780	390	.....

NOTE.—Discharge determined by indirect method for shifting control, from fairly well-defined rating curves and by discharge measurements made three or four times a week.

Monthly discharge of Verde River near McDowell, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	1,050	138	327	20,105
November	325	230	270	16,065
December	1,950	242	652	4,090
January	15,675	263	1,241	76,335
February	5,120	740	2,448	135,957
March	4,700	1,245	2,427	149,188
April	3,312	525	1,524	90,702
May	5,775	300	1,772	108,956
June	290	128	207	12,305
July	1,340	95	332	20,320
August	1,212	110	349	21,410
September	825	135	173	13,757
The year	15,675	95	960	669,190

BEAVER CREEK AT CAMP VERDE, ARIZ.

LOCATION.—In sec. 30, T. 14 N., R. 5 E., one-fourth mile above junction with Verde River and about a mile northeast of Camp Verde, Yavapai County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 1, 1912, to September 30, 1915.

GAGE.—Vertical staff fastened to willow stump on right bank; read by N. A. Vyne twice daily to half tenths.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Sand, clay, and solid rock; somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.50 feet at 8.45 a. m., April 30 (discharge, about 5,050 second-feet); minimum discharge 2 second-feet on October 21 (minimum stage for different days not comparable because of shifting control).

1912–1915: Maximum stage and discharge recorded same as for 1915 (see above); minmum discharge, 1.5 second-feet, April 26–30, 1913. (Minimum stage for different years not comparable because of shifting control).

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.—Records fair for all months excepting March, April, and July, for which they are poor on account of lack of high-stage discharge measurements.

Discharge measurements of Beaver Creek at Camp Verde, Ariz., during the year ending Sept. 30, 1915.

[Made by M. D. Anderson.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 5	4.24	15.5	Mar. 17	5.38	579	July 12	4.00	9.0
Dec. 2	4.20	8.0	July 12	4.00	9.1	Sept. 11	3.95	9.5

Daily discharge, in second-feet, of Beaver Creek at Camp Verde, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	12	5	5	47	244	300	1,100	1,350	20	9	12	20
2	12	5	8	40	180	225	965	1,410	16	16	9	12
3	47	5	8	33	1,100	30	965	2,250	16	9	9	12
4	200	5	8	26	160	300	1,020	1,150	20	9	9	12
5	20	5	5	26	180	300	965	680	16	9	201	9
6	26	5	5	22	70	300	900	585	16	9	201	9
7	10	5	8	20	55	50	390	1,410	16	9	40	9
8	5	5	8	16	46	300	300	1,670	16	9	26	9
9	5	5	8	16	70	300	225	248	16	9	16	9
10	5	5	8	12	300	225	180	70	16	9	16	9
11	5	5	26	8	360	180	110	80	20	9	12	9
12	5	5	40	8	460	300	110	32	16	9	20	9
13	5	5	40	8	360	300	110	40	16	9	16	9
14	5	5	40	8	300	360	80	32	16	9	12	9
15	5	5	26	8	360	730	70	20	12	9	12	9
16	5	5	16	8	540	960	60	16	12	9	12	12
17	5	8	12	8	500	900	45	9	12	9	12	12
18	5	8	12	8	620	1,150	32	9	12	60	9	12
19	5	5	22	8	425	1,340	140	9	12	26	9	9
20	5	5	80	8	500	1,150	95	9	20	26	9	9
21	2	5	55	8	670	900	60	12	20	300	9	9
22	8	5	40	12	390	1,100	45	12	12	201	9	9
23	5	5	40	12	360	1,100	1,410	9	12	125	9	9
24	5	5	40	12	200	1,020	965	9	16	70	9	9
25	5	5	55	12	275	2,670	1,280	9	16	201	12	9
26	5	5	65	12	250	2,650	540	12	16	95	12	9
27	8	5	55	12	455	2,150	95	12	16	80	248	9
28	5	5	55	12	390	1,600	70	12	16	49	40	9
29	5	5	47	2,150	.....	965	80	12	12	26	26	9
30	5	5	47	630	.....	1,350	5,050	12	12	26	60	9
31	5	.....	47	330	.....	730	.....	12	.....	16	26	.....

NOTE.—Discharge determined by indirect method for shifting control, based on rating curve fairly well defined below 800 second-feet. Gage heights missing July 4–11 and 14–17; discharge determined by comparison with Verde River at Camp Verde.

Monthly discharge of Beaver Creek at Camp Verde, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	200	2	14.5	890	C.
November	8	5	5.2	310	C.
December	80	5	30.0	1,840	C.
January	2,150	8	114	7,010	C.
February	1,100	46	350	19,400	C.
March	2,650	30	837	51,500	D.
April	5,050	32	582	34,600	D.
May	2,250	9	362	22,300	C.
June	20	12	15.5	920	C.
July	300	9	47.2	2,900	D.
August	248	9	36.2	2,230	C.
September	20	9	10.0	600	C.
The year	5,050	2	200	144,000	

AGUA FRIA RIVER NEAR GLENDALE, ARIZ.

LOCATION.—In sec. 28, T. 6 N., R. 1 E., at old diversion dam of the 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, 1915.

GAGE.—Stevens water-stage recorder on right bank installed October 2, 1913, to take the place of a Richard Frere's water-stage recorder which was installed August 28, 1913. Prior to August 28, 1913, the gages were vertical staffs, either painted on or attached to the masonry diversion dam, with a datum 20.00 feet lower than that used for the water-stage recorders.

DISCHARGE MEASUREMENTS.—Made from cable about one-third of a mile below gage, or by wading near gage.

CHANNEL AND CONTROL.—The channel above and below the dam is composed of shifting sand and gravel. The principal control is formed by the remains of the old diversion dam which failed during the flood of 1895, when a portion of masonry near each end was washed out. At low and medium stages the entire stream flows through the larger opening which is near right bank. This control shifted considerably because of the crevices in the 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 the dam but was partly destroyed by the flood of January 29, 1915.

EXTREMES OF DISCHARGE.—Maximum stage during year, 22.6 feet during night of January 29, determined from flood marks (discharge determined from extension of rating curve about 60,000 second-feet); minimum discharge, 2 second-feet on several days during October (minimum stage not comparable with minimum discharge because of shifting control).

1910–1915: Maximum stage and discharge same as for 1915 (see above); minimum discharge, 1 second-foot for several days during May and June, 1914.

DIVERSIONS.—Water is diverted above gage for irrigating two or three small ranches, amount not known.

ACCURACY.—Records good for November, February, June, August, and September; fair for rest of year except January, March, and April, for which they are poor owing to missing gage heights and lack of high-stage discharge measurements.

Discharge measurements of Agua Fria River near Glendale, Ariz., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 14	M. D. Anderson	2.84	3.3	Feb. 3	Jacob and Anderson	5.48	1,250
28	do	3.30	3.5	4	do	4.67	840
Nov. 6	do	3.30	2.9	12	Anderson and Guthrie	7.50	3,030
12	Anderson and Spiegel	3.46	15.9	18	do	3.95	210
Dec. 9	M. D. Anderson	3.22	3.8	Mar. 13	C. C. Jacob	3.30	137
Jan. 5	do	3.50	11.0	Apr. 14	M. D. Anderson	1.63	25.7
31	Jacob and Anderson	6.25	1,770	14	do	1.63	26
Feb. 1	do	4.55	779	May 27	do	1.52	11.6
2	do	4.20	437	27	do	1.52	11.3
2	do	4.10	417	July 28	do	2.79	61
3	do	5.37	1,410	Sept. 27	C. C. Jacob	2.02	5.5
3	do	5.12	1,080				

Daily discharge, in second-feet, of Agua Fria River near Glendale, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2	13	8	50	800	420	66	1,050	11	8	39	145
2	3	10	8	30	500	350	62	690	11	8	39	220
3	70	6	10	20	1,050	220	58	600	11	8	39	600
4	725	6	8	11	850	210	54	690	17	8	39	67
5	70	3	8	11	680	200	50	645	18	8	37	41
6	5	3	6	.....	350	185	47	200	14	8	480	22
7	3	3	6	.....	900	175	44	158	12	8	103	13
8	3	3	6	.....	800	170	41	138	11	8	98	7
9	3	3	4	.....	30	165	38	119	11	8	92	6
10	3	3	6	.....	20	155	35	84	10	8	92	5
11	3	3	8	.....	1,750	152	32	65	9	8	92	5
12	3	16	8	.....	3,000	146	29	61	9	8	92	4
13	3	13	8	.....	1,600	137	27	57	9	8	92	4
14	3	10	6	.....	900	135	26	53	8	8	92	4
15	3	8	8	.....	590	128	27	49	9	8	92	4
16	3	8	8	.....	130	135	28	46	9	8	92	4
17	3	8	13	.....	130	140	28	42	9	8	92	4
18	3	8	600	.....	130	140	26	38	9	8	92	4
19	3	6	600	.....	600	137	25	36	8	8	92	4
20	3	6	800	.....	3,320	121	22	29	8	8	92	4
21	70	8	350	.....	1,090	110	22	25	8	47	92	5
22	9	8	160	.....	1,090	106	22	21	8	52	92	5
23	6	8	180	.....	870	102	34	16	8	69	92	5
24	2	8	650	.....	800	98	40	13	9	52	92	5
25	2	8	400	.....	750	94	43	12	9	1,300	92	6
26	2	8	180	.....	650	90	36	11	9	750	92	6
27	2	8	220	.....	600	86	29	11	8	115	145	6
28	2	8	350	.....	480	82	31	11	8	61	135	6
29	2	8	150	.....	.....	78	59	11	8	50	135	6
30	70	8	130	.....	.....	74	158	11	8	44	140	7
31	250	.....	190	1,330	.....	70	.....	11	.....	42	145	.....

NOTE.—Discharge determined by indirect method for shifting control and by use of rating curve fairly well defined below 4,000 second-feet. Discharge, Mar. 22–31 and Apr. 1–13, estimated because of missing gage heights. Discharge Jan. 6–27, estimated at 11 second-feet; Jan. 28–30 at 25,000 second-feet.

Monthly discharge of Agua Fria River near Glendale, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	725	2	43.0	2,640	C.
November	16	3	7.3	434	B.
December	800	6	164	10,080	C.
January	.....	.....	2,470	152,000	D.
February	3,320	20	870	48,300	B.
March	420	70	148	9,130	D.
April	158	22	41.3	2,460	D.
May	1,050	11	161	9,900	C.
June	18	8	9.9	589	B.
July	1,300	8	88.5	5,440	C.
August	480	37	104	6,410	B.
September	600	4	40.8	2,430	B.
The year	.....	2	345	250,000	

NOTE.—See footnote to table of daily discharge, also "Accuracy" in station description.

HASSAYAMPA RIVER NEAR WAGONER, ARIZ.[1]

LOCATION.—Near line between sec. 23 and 26,[2] T. 11 N., R. 3 W., at road crossing opposite Moore's ranch, 2½ miles above Milk Creek, 4½ miles above Wagoner, 6 miles above Walnut Grove dam site and 25 miles north of Wickenburg, Yavapai County.

[1] Formerly referred to Walnut Grove. Walnut Grove post office was discontinued in 1914.

[2] Published erroneously as sec. 33 in Water-Supply Papers 329, 359, and 389.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 21, 1912, to September 30, 1915.

GAGE.—Vertical staff on left bank, read once daily to tenths by Mrs. A. A. Moore. Auxiliary gages were used from time to time but always referred to same datum

DISCHARGE MEASUREMENTS.—Made by wading or from cable.

CHANNEL AND CONTROL.—Sand and gravel; shifting.

EXTREMES OF DISCHARGE.—Maxmum stage recorded during year, 6.7 feet at 1 p. m., July 23 and 10 a. m. August 27 (discharge determined from extension of rating curve, about 660 second-feet). Stream is dry at gage for periods of various lengths nearly every year. During 1915 it was dry on October 28 and 29.

1912–1915: Same as for 1915. (See above.)

DIVERSIONS.—Nearly the entire low-water flow is diverted for irrigation above station.

ACCURACY.—Records for May, July, and August poor, owing to shifting control and insufficient number of discharge measurements; records for other months fair.

Discharge measurements of Hassayampa River near Wagoner, Ariz., during the year ending Sept. 30, 1915.

[Made by M. D. Anderson.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 7	5.25	1.5	Mar. 19	5.84	60	July 14	4.68	1.3
Dec. 5	4.60	1.8	19	5.84	58	Sept. 13	5.30	1.3

Daily discharge, in second-feet, of Hassayampa River near Wagoner, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1	88	1	1.5	55	135	20	100	25	2.5	48	0.5
2	.5	70	1	1.5	36	175	20	55	25	4	48	.5
3	28	55	1	1.5	210	210	10	55	100	5.5	48	25
4	1.5	20	1.5	1.5	175	135	10	88	100	7	80	7
5	1	20	2	1.5	25	160	10	260	90	7	90	6
6	1	194	1.5	1.5	175	160	10	275	80	7	100	5
7	1	55	1.5	1.5	175	135	10	400	80	7	100	4
8	1	55	1.5	1.5	120	135	10	460	62	7	48	3
9	.5	30	1.5	1.5	30	120	10	250	48	1.5	48	3
10	1	10	1.5	1.5	110	110	10	250	36	1.5	48	2
11	1	10	1.5	1.5	100	135	30	175	25	1.5	48	2
12	1	10	1	1.5	175	135	30	175	25	1.5	48	2
13	.5	10	1	1.5	120	135	30	175	25	1.5	48	1.5
14	.5	10	1	1.5	60	135	30	175	15	1.5	48	1 5
15	.5	5	1	1.5	55	110	30	110	15	1.5	48	1.5
16	1	2	1	1.5	45	110	30	100	7	1.5	48	1.5
17	1	1.5	1	1.5	45	135	30	100	7	1.5	25	1.5
18	1	1.5	1	1.5	45	110	30	100	7	1.5	25	1.5
19	1.5	1.5	1.5	1.5	70	60	30	100	2.5	1.5	25	1
20	5	1	1.5	1.5	100	55	30	80	1.5	1.5	25	1
21	88	1	1.5	1.5	70	60	30	80	1.5	7	36	1
22	42	1	1.5	1.5	135	60	30	80	1.5	25	36	1
23	5	1	1.5	2	145	55	30	80	1.5	660	36	1.5
24	5	1	1.5	1.5	135	70	30	62	1	295	36	1.5
25	1.5	1	1.5	1.5	135	70	30	48	1	355	36	1
26	1	1	1.5	1.5	135	70	30	36	1	295	275	1.5
27	.5	1	10	1.5	135	70	30	36	1	295	660	1.5
28	0	1	10	1.5	135	60	30	36	1	250	36	1.5
29	0	1	10	250	.....	60	10	36	1.5	175	.5	1.5
30	160	1	2	100	.....	55	90	25	1.5	48	.5	1.5
31	88	.....	1.5	70	.....	55	.....	25	.....	48	.5	.....

NOTE.—Discharge determined by indirect method for shifting control based on rating curves poorly defined at all stages. No gage-height record Oct. 6 and July 1–3; discharge interpolated for those days.

Monthly discharge of Hassayampa River near Wagoner, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	160	0.0	14.2	873
November	194	1.0	22.0	1,310
December	10	1.5	2.2	135
January	250	1.5	14.9	916
February	210	25	105	5,850
March	175	55	106	6,520
April	110	10	28.7	1,710
May	460	25	130	7,990
June	100	1.0	26.3	1,560
July	660	1.5	81.2	4,990
August	660	.5	70.9	4,360
September	25	1.0	2.8	168
The year	660	0.0	50.2	36,400

NOTE.—See footnote to table of daily discharge and "Accuracy" in station description.

WHITEWATER DRAW BASIN.

WHITEWATER DRAW NEAR DOUGLAS, ARIZ.

LOCATION.—In the SE. ¼ sec. 10, T. 24 S., R. 27 E., at highway bridge just above El Paso & Southwestern Railroad bridge, three-fourths of a mile above former station at electric railway bridge and a mile west of Douglas, Cochise County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April, 1911, to March 16, 1912, at electric railway bridge; March 17, 1912, to September 30, 1915, at present site.

GAGE.—Vertical staff on center pier of bridge read two or more times daily by Mrs. L. E. King when stream is flowing. During the flood of December 21–25, 1914, the bridge pier was undermined and settled. On January 20 a new vertical staff gage was fastened to the same pier referred to a datum 3.00 feet above old datum. Prior to March 17, 1912, the gage was a vertical staff painted on pier of electric railway bridge. Readings on this gage bear no relation to those on present gage.

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

CHANNEL AND CONTROL.—Sand and gravel; fairly permanent. The dumping of slag in the channel about 1,200 feet below the gage created a variable backwater effect at high stages. After the winter floods the stage of zero flow remained constantly at about 1.0 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded since the station was established was 13.6 feet at 9 a. m., December 23, 1914 (discharge determined by extension of rating curve, about 3,000 second-feet). Stream is dry the greater part of each year.

DIVERSIONS.—Some flood water is diverted above station for irrigation; quantity unknown.

ACCURACY.—Records poor, owing to rapid changes of stage during floods and to changes in control from slag dumped into the stream below the gage.

Discharge measurements of Whitewater Draw near Douglas, Ariz., during the year ending Sept. 30, 1915.

[Made by M. D. Anderson.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Nov. 22	4.58	2.9	Jan. 20	1.00	0.3
22	4.58	2.9	Mar. 11	1.08	.8

NOTE.—Gage heights beginning Jan. 20, 1915, refer to new datum.

Daily discharge, in second-feet, of Whitewater Draw near Douglas, Ariz., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	July.	Aug.	Sept.
1		133			18				1
2		17			6				
3		4			4	1			
4		2			2				
5	85	1			1			0.5	
6	40				1			20	
7	5				1				
8	1				1				
9								10	
10						2		3	
11		170				1		0.5	
12		61							
13		26							
14		6							
15		2							
16		1							
17							15		
18							420		
19			67				230		
20			180	0.2			680		55
21		2	235				110		15
22		1	1,960			1	18		1
23		1	2,640				180		1
24			630				15		.5
25			550				20		125
26			87				65	0.5	15
27			26				55	.5	15
28			6				25	.5	
29			2				65	.5	
30	6		1	10			5	.5	
31	585		1	65		1	.5	.5	

NOTE.—Discharge determined from well defined rating curve based on high-stage measurements made in 1912 and on four low-stage measurements during 1915. Small seepage flow of less than 1 second-foot during April, May, and June. For other periods of missing data stream was dry or only slight flow occurred.

Monthly discharge of Whitewater Draw near Douglas, Ariz., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	585	0	23.3	1,430
November	170	0	14.2	845
December	2,640	0	206	12,700
January	65	0	2.7	165
February	18	0	2.0	110
March			1.0	60
April			.5	30
May			.5	30
June			.2	10
July	680	0	61.4	3,780
August	20	0	1.6	100
September	125	0	10	595
The year	2,640	0		19,900

NOTE.—Mean discharge for March, April, May, and June estimated from observer's notes.

MISCELLANEOUS MEASUREMENTS.

Miscellaneous measurements in Colorado River drainage basin during the year ending Sept. 30, 1915.

Date.	Stream.	Tributary to or diverting from—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Mar. 13	Green River	Colorado River	Horseshoe Canyon in Utah		487
Oct. 2	do	do	Ouray, Utah	1.88	1,300
Apr. 11	do	do	do	4.84	4,940
May 20	do	do	do	8.08	10,500
20	do	do	do	8.04	10,600
28	do	do	do	6.80	7,950
June 19	do	do	do	8.40	9,430
Aug. 18	do	do	do	2.14	1,480
May 15	Cottonwood Creek	Green River	Near Marbleton, Wyo	3.15	6.5
June 11	do	do	do	3.48	32
July 29	do	do	do	2.85	.3
June 10	North Piney Creek	do	Old State Station at Big Piney, Wyo.	.95	4.1
Oct. 1	Ashley Creek	do	Jensen, Utah		25.0
Aug. 18	Duchesne River	do	Ouray, Utah		136
22	do	do	Duchesne, Utah		144
17	Uinta River	Duchesne River	Randollet, Utah		[a] 6.0
July 21	Indian Creek	Grand River	Northwest of Monticello, Utah		7.1
Nov. 2	Recapture Creek	San Juan River	Above canals near Blanding, Utah		.3
Mar. 31	do	do	do	.71	54.0
May 22	do	do	do	1.07	16.2
22	do	do	do	1.07	17.2
June 23	do	do	do	.27	.2
Nov. 2	White Mesa canal	Recapture Creek	Head, near Blanding, Utah		2.0
May 23	do	do	do	2.37	24.2
23	do	do	do	2.37	24.3
June 22	do	do	do	1.67	10.1
July 12	do	do	do	1.36	3.1
June 23	San Juan Irrigation Co. canal	do	do	.80	1.9
Oct. 27	Kanab Creek	Colorado River	2½ miles above Kanab, Utah		9.6
28	do	do	Below Sink Creek		.8
May 27	North Creek	Virgin River	Virgin, Utah		[b] 20
Apr. 11	La Verkin canal	do	La Verkin, Utah		5.1
29	do	do	do		7.8
Feb. 2	La Verkin Creek	Ash Creek	Ford near La Verkin, Utah		7.5
May 27	do	do	do		35
Jan. 31	Harrisburg Creek	Virgin River	Harrisburg, Utah		6.8
May 24	Leeds (Quail) Creek	Harrisburg Creek	do		[c] 16.2
Apr. 13	Leeds canal	Leeds (Quail) Creek	Leeds, Utah		10.6
28	do	do	do		13.5
Jan. 30	Cottonwood Creek	Harrisburg Creek	Below St. George power plant		1.5
May 24	do	do	Harrisburg, Utah		[d] 8.4
Jan. 29	Central canal	Santa Clara Creek	Central, Utah	.44	2.4
May 22	do	do	do	.80	8.4
June 29	Muddy River	Virgin River	Mills bridge near Logan, Nev		39.1
Aug. 24	do	do	Below St. Joe canal heading		[e] 24.2
24	do	do	do		[f] 30.1
25	do	do	do		[g] 27.1
Apr. 9	Baldwin No. 2 ditch	Fed by springs	Below sources of supply		.2
July 14	do	do	do		.2
Mar. 20	Stone Cabin spring	Muddy River	¼ mile below spring		1.9
Apr. 9	do	do	do		1.9
9	do	do	do		2.0
9	Stone Cabin upper ditch	Stone Cabin spring	150 feet below intake		2.3
Mar. 20	do	do	600 feet below Muddy River		2.0
Apr. 9	do	do	400 feet from Muddy River		1.9
June 9	Powers ditch	Muddy River	¾ mile below intake		2.2
Jan. 16	St. Joe canal	do	1,700 feet below intake	.62	5.0
June 29	do	do	do	.53	5.4
Aug. 24	do	do	do	.60	6.6
24	do	do	do	.62	7.1
24	do	do	do	.49	4.6
24	do	do	do	.36	2.8
25	Overton canal	do	40 feet above weir	.57	12.8
25	Capalappa ditch	do	25 feet above weir	.38	2.7

[a] About 4.5 second-feet of this water estimated to be waste from canals diverting from Duchesne River.
[b] Estimated.
[c] Just above junction with Cottonwood Creek to form Harrisburg Creek.
[d] Just above junction with Leeds Creek.
[e] St. Joe canal, carrying 4.6 second-feet.
[f] St. Joe canal, carrying 6.2 second-feet.
[g] St. Joe canal, carrying 5.9 second-feet.

Miscellaneous measurements in Colorado River drainage basin during the year ending Sept. 30, 1915—Continued.

Date.	Stream.	Tributary to or diverting from—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
June 20	Gila River	Colorado River	½ mile south of south line of T. 17 S., R. 17 W., New Mexico		110
July 7	do	do	Just above mouth of Bonita Creek, Ariz.		100
7	do	do	Just below mouth of Bonita Creek, Ariz.		110
14	do	do	Below heading San Jose Canal, Ariz.		28
14	do	do	do		26.3
10	do	do	Opposite spillway San Jose Canal, Ariz.		28.1
14	do	do	Below heading Montezuma Canal, Ariz.		14.3
14	do	do	do		12.7
15	do	do	do		13.2
15	do	do	do		13.9
15	do	do	Below Union Canal heading, Ariz.		8.2
15	do	do	do		7.9
16	do	do	Below heading Sunflower Canal, Ariz.		19.8
16	do	do	do		18.7
16	do	do	Road crossing at Safford, Ariz		10.1
16	do	do	do		10.4
Sept. 17	do	do	do		14.9
17	do	do	Below heading Bryce Canal, Ariz.		15.5
17	do	do	Below heading Dodge Canal, Ariz.		19.7
May 25	do	do	Geronimo, Ariz		548
25	do	do	do		557
June 10	do	do	do		203
10	do	do	do		193
Jan 13	do	do	Fort Thomas, Ariz		895
13	do	do	do		916
July 5	do	do	Below Florence Canal heading, Ariz.		22
9	do	do	do		12.5
Aug. 19	do	do	400 feet above bridge at Florence, Ariz.		278
June 25	do	do	Florence Bridge, Ariz		642
July 19	do	do	do		181
Aug. 6	do	do	do		1,180
Jan. 13	do	do	¼ mile below Florence Bridge, Ariz.		1,160
May 29	do	do	¾ mile below Florence Bridge, Ariz.		352
Oct. 2	do	do	Just above east line of Gila River Indian Reservation, Ariz.		12
18	do	do	do		338
20	do	do	do		305
28	do	do	do		415
Nov. 28	do	do	do		291
Jan. 16	do	do	do		996
22	do	do	do		914
June 2	do	do	do		192
4	do	do	do		129
7	do	do	do		144
10	do	do	do		87
12	do	do	do		78
14	do	do	do		54.0
16	do	do	do		35.5
18	do	do	do		10.3
21	do	do	do		.8
July 23	do	do	do		308
June 8	Eagle Creek	do	West line Greenlee County, Ariz.		4.4
10	Blue River	San Francisco River.	Gila and Salt River base line, Arizona.		46.5
11	do	do	Arizona and New Mexico State line.		9.0
15	San Francisco River	Gila River	South line T. 7 S., R. 19 W., New Mexico.		31.6
July 7	Bonita Creek	do	Just above mouth, Arizona		2.8
Apr. 13	San Pedro River	do	5,400 feet below St. David canal, Ariz.		26.6
13	do	do	do		24.6
14	do	do	Benson, Ariz		29.2
18	do	do	do		3.4

Miscellaneous measurements in Colorado River drainage basin during the year ending Sept. 30, 1915—Continued.

Date.	Stream.	Tributary to or diverting from—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Apr. 20	San Pedro River	Gila River	12 miles below Benson, Ariz.		9.3
21	do	do	do		7.3
25	do	do	5 miles above Reddington, Ariz.		26.8
25	do	do	do		27.6
27	do	do	East line T. 9 S., R. 17 E., Arizona.		33.4
27	do	do	do		34.4
28	do	do	2 miles above Mammoth, Ariz.		42.3
28	do	do	do		38.8
30	do	do	3 miles above Aravaipa Creek, Ariz.		43.6
May 30	do	do	do		47.0
5	do	do	150 feet above mouth, Arizona.		89
5	do	do	do		90
Apr. 30	Aravaipa Creek	San Pedro River	3,000 feet above mouth, Arizona.		21.5
30	do	do	do		20.5
May 14	Sycamore Creek	Verde River	5 miles above Clarkdale, Ariz.	1.00	24.5
Dec. 11	North side canal Blackwater.	Diverts from Gila River.	Just above east line Gila River Indian Reservation, Ariz.		8.7
Apr. 14	do	do	do		21.9
July 8	Verde River	Salt River	Above Perkins ranch in sec. 31, T. 18 N., R. 2 E., Arizona.		12.9
8	do	do	4 miles above Sycamore Creek		59
8	do	do	Just above Sycamore Creek		62
8	do	do	5 miles above Clarkdale, Ariz.		83
Apr. 14	do	do	Just above Oak Creek		77
14	do	do	Just below Oak Creek		116
June 28	Sycamore Creek	Verde River	Just below Sycamore Springs in T. 20 N., R. 4 E., Arizona.		13.8
28	Sycamore Spring	Sycamore Creek	In T. 20 N., R. 4 E., Arizona.		6 6
Aug. 1	Oak Creek	Verde River	Just above Page Springs in T. 16 N., R. 4 E., Arizona.		15
1	do	do	Just below Page Springs		57
Apr. 13	do	do	Cornville, Ariz.		111
July 14	do	do	do		36.3
Apr. 14	do	do	Mouth near Cornville, Ariz.		92
June 26	do	do	do		51
Aug. 1	Page Springs	Oak Creek	On west side of Oak Creek in T. 16 N., R. 4 E., Arizona.		7.0
1	do	do	Four springs on east side of Oak Creek in T. 16 N., R. 4 E., Arizona.		33.7

NOTE.—Measurements in Muddy River basin furnished by Leonard Tanner, engineer for the Muddy River Irrigation District. Measurements made in upper Gila River basin furnished by United States Indian Service. Measurements in Verde River basin furnished by United Verde Copper Co.

INDEX.

STREAM-GAGING STATIONS

AND

PUBLICATIONS RELATING TO WATER RESOURCES

PART IX.—COLORADO RIVER BASIN

STREAM-GAGING STATIONS AND PUBLICATIONS RELATING TO WATER RESOURCES.

INTRODUCTION.

Investigation of water resources by the United States Geological Survey has consisted in large part of measurements of the volume of flow of streams and studies of the conditions affecting that flow, but it has comprised also investigation of such closely allied subjects as irrigation, water storage, water powers, ground waters, and quality of waters. Most of the results of these investigations have been published in the series of water-supply papers, but some have appeared in the bulletins, monographs, professional papers, and annual reports.

The results of stream-flow measurements are now published annually in 12 parts, each part covering an area whose boundaries coincide with natural drainage features, as indicated below:

Part I. North Atlantic slope basins.
II. South Atlantic slope and eastern Gulf of Mexico basins.
III. Ohio River basin.
IV. St. Lawrence River basin.
V. Upper Mississippi River and Hudson Bay basins.
VI. Missouri River basin.
VII. Lower Mississippi River basin.
VIII. Western Gulf of Mexico basins.
IX. Colorado River basin.
X. Great Basin.
XI. Pacific slope basins in California.
XII. North Pacific slope basins, in three volumes:
A. Pacific slope basins in Washington and Upper Columbia River basin.
B. Snake River basin.
C. Lower Columbia River basin and Pacific slope basins in Oregon.

HOW GOVERNMENT REPORTS MAY BE OBTAINED OR CONSULTED.

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

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

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

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

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

Boston, Mass., 2500 Customhouse.
Albany, N. Y., Room 18, Federal Building.
Atlanta, Ga., Post Office Building.
Madison, Wis., care of Railroad Commission of Wisconsin.
St. Paul, Minn., Old Capitol Building.
Helena, Mont., Montana National Bank Building.
Denver, Colo., 403 New Post Office Building.
Topeka, Kans., 25 Federal Building.
Salt Lake City, Utah, 421 Federal Building.
Boise, Idaho, 615 Idaho Building.
Portland, Oreg., 416 Couch Building.
Tacoma, Wash., 406 Federal Building.
San Francisco, Cal., 328 Customhouse.
Los Angeles, Cal., 619 Federal Building.
Phoenix, Ariz., 417 Fleming Building.
Austin, Tex., Old Post Office Building.
Honolulu, Hawaii, 14 Capitol Building.

A list of the Geological Survey's publications may be obtained by applying to the Director of the United States Geological Survey, Washington, D. C.

STREAM-FLOW REPORTS.

Stream-flow records have been obtained at more than 3,800 points in the United States, and the data obtained have been published in the reports tabulated below:

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

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

Report.	Character of data.	Year.
10th A, pt. 2.....	Descriptive information only.....	
11th A, pt. 2.....	Monthly discharge and descriptive information.....	1884 to September, 1890.
12th A, pt. 2.....	.....do.....	1884 to June 30, 1891.
13th A, pt. 3.....	Mean discharge in second-feet.....	1884 to Dec. 31, 1892.
14th A, pt. 2.....	Monthly discharge (long-time records, 1871 to 1893).....	1888 to Dec. 31, 1893.
B 131.....	Descriptions, measurements, gage heights, and ratings.....	1893 and 1894.
16th A, pt. 2.....	Descriptive information only.....	
B 140.....	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
W 11.....	Gage heights (also gage heights for earlier years).....	1896.
18th A, pt. 4.....	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).	1895 and 1896.
W 15.....	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
W 16.....	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A, pt. 2.....	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.

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

Report.	Character of data.	Year.
W 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
W 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.
20th A, pt. 4	Monthly discharge (also for many earlier years)	1898.
W 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A, pt. 4	Monthly discharge	1899.
W 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A, pt. 4	Monthly discharge	1900.
W 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
W 75	Monthly discharge	1901.
W 82 to 85	Complete data	1902.
W 97 to 100	do	1903.
W 124 to 135	do	1904.
W 165 to 178	do	1905.
W 201 to 214	do	1906.
W 241 to 252	do	1907–8.
W 261 to 272	do	1909.
W 281 to 292	do	1910.
W 301 to 312	do	1911.
W 321 to 332	do	1912.
W 351 to 362	do	1913.
W 381 to 394	do	1914.
W 401 to 414	do	1915.

The records at most of the stations discussed in these reports extend over a series of years, and miscellaneous measurements at many points other than regular gaging stations have been made each year. An index of the reports containing records obtained prior to 1904 has been published in Water-Supply Paper 119.

The following table gives, by years and drainage basins, the numbers of the papers on surface-water supply published from 1899 to 1915. The data for any particular station will, as a rule, be found in the reports covering the years during which the station was maintained. For example, data for Machias River at Whitneyville, Me., 1903 to 1915, are published in Water-Supply Papers 97, 124, 165, 201, 241, 261, 281, 301, 321, 351, 381, and 401, which contain records for the New England streams from 1903 to 1915. Results of miscellaneous measurements are published by drainage basins.

In these papers and in the following lists the stations are arranged in downstream order. The main stem of any river is determined by measuring or estimating its drainage area—that is, the headwater stream having the largest drainage area is considered the continuation of the main stream, and local changes in name and lake surface are disregarded. All stations from the source to the mouth of the main stem of the river are presented first, and the tributaries in regular order from source to mouth follow, the streams in each tributary basin being listed before those of the next basin below.

In exception to this rule the records for Mississippi River are given in four parts, as indicated on page III, and the records for large lakes are presented in order of streams around the rim of the lake.

2142°—18—WSP 409——16

Numbers of water-supply papers containing results of stream measurements, 1899–1915.

Year.	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII		
												North Pacific slope basins.		
	North Atlantic slope basins (St. John River to York River).	South Atlantic slope and eastern Gulf of Mexico basins (James River to the Mississippi).	Ohio River basin.	St. Lawrence River and Great Lakes basins.	Hudson Bay and upper Mississippi River basins.	Missouri River basin.	Lower Mississippi River basin.	Western Gulf of Mexico basins.	Colorado River basin.	Great Basin.	Pacific slope basins in California.	Pacific slope basins in Washington and upper Columbia River basin.	Snake River basin.	Lower Columbia River basin and Pacific slope basins in Oregon.
1899 [a]	35	[b] 35, 36	36	36	36	[c] 36, 37	37	37	[d] 37, 38	38, [e] 39	38, [f] 39	38	38	38
1900 [g]	47, [h] 48	48	48, [i] 49	49	49	49, [j] 50	50	50	50	51	51	51	51	51
1901	65, 75	65, 75	65, 75	65, 75	[k] 65, 66, 75	66, 75	[k] 65, 66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 78	66, 75
1902	82	[b] 82, 83	83	[l] 82, 83	[k] 83, 85	84	[k] 83, 84	84	85	85	85	85	55	85
1903	97	[b] 97, 98	98	97	[h] 98, 99, [m] 100	99	[k] 98, 99	99	100	100	100	100	100	100
1904	[n] 124, [o] 125, [p] 126	[p] 126, 127	128	129	[k] 128, 130	130, [q] 131	[k] 128, 131	132	133	133, [r] 134	134	135	135	135
1905	[n] 165, [o] 166, [p] 167	[p] 167, 168	169	170	171	172	[k] 169, 173	174	175, [s] 177	176, [r] 177	177	178	178	[t] 177, 178
1906	[n] 201, [o] 202, [p] 203	[p] 203, 204	205	206	207	208	[k] 205, 209	210	211	212, [r] 213	213	214	214	214
1907–8	241	242	243	244	245	246	247	248	249	250, [r] 251	251	252	252	252
1909	261	262	263	264	265	266	267	268	269	270, [r] 271	271	272	272	272
1910	281	282	283	284	285	286	287	288	289	290	291	292	292	292
1911	301	302	303	304	305	306	307	308	309	310	311	312	312	312
1912	321	322	323	324	325	326	327	328	329	330	331	332–A	332–B	332–C
1913	351	352	353	354	355	356	357	358	359	360	361	362–A	362–B	362–C
1914	381	382	383	384	385	386	387	388	389	390	391	392	393	394
1915	401	402	403	404	405	406	407	408	409	410	411	412	413	414

[a] Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39. Tables of monthly discharge for 1899 in Twenty-first Annual Report, Part IV.
[b] James River only.
[c] Gallatin River.
[d] Green and Gunnison rivers and Grand River above junction with Gunnison.
[e] Mohave River only.
[f] Kings and Kern rivers and south Pacific slope basins.
[g] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52. Tables of monthly discharge for 1900 in Twenty-second Annual Report, Part IV.
[h] Wissahickon and Schuylkill rivers to James River.
[i] Scioto River.
[j] Loup and Platte rivers near Columbus, Nebr., and all tributaries below junction with Platte.
[k] Tributaries of Mississippi from east.
[l] Lake Ontario and tributaries to St. Lawrence River proper.
[m] Hudson Bay only.
[n] New England rivers only.
[o] Hudson River to Delaware River, inclusive.
[p] Susquehanna River to Yadkin River, inclusive.
[q] Platte and Kansas rivers.
[r] Great Basin in California, except Truckee and Carson river basins.
[s] Below junction with Gila.
[t] Rogue, Umpqua, and Siletz rivers only.

PART IX. COLORADO RIVER BASIN.

PRINCIPAL STREAMS.

The largest tributaries of the Colorado River are Green River (considered the continuation of the main stream), Grand River, Dolores, San Juan, Little Colorado, Virgin, and Gila rivers. The principal streams flowing into the Green are East Fork, Yampa River, Ashley Creek, Duchesne River, and White River. The principal tributaries of Grand River are Grand Lake, Frazier River, Williams Fork, Blue River, and Gunnison River. The streams of the Colorado basin drain wholly or in part the States of Arizona, Colorado, Nevada, New Mexico, Utah, and Wyoming.

In addition to the list of gaging stations and annotated list of publications relating specifically to the section, these pages contain a similar list of reports that are of general interest in many sections and cover a wide range of hydrologic subjects, and also brief references to reports published by State and other organizations. (See p. XXII.)

GAGING STATIONS.

NOTE.—Dash after a date indicates that station was being maintained Sept. 30, 1915. Period after a date indicates discontinuance.

Green River (head of Colorado River) near Kendall, Wyo., 1910–1912.
Green River near Daniel, Wyo., 1915–
Green River at Green River, Wyo., 1895–1906; 1915–
Green River at Bridgeport, Utah, 1911–
Green River at Jensen, near Vernal, Utah, 1903–1906; 1914–15.
Green River at Ouray, Utah, 1904–5.
Green River at Green River (formerly Blake), Utah, 1894–1899; 1905–1911.
Green River at Little Valley, near Green River, Utah, 1910–
Colorado River at Bulls Head, near Mohave, Ariz., 1902–3.
Colorado River at Hardyville, Ariz., 1905–1907.
Colorado River at Yuma, Ariz., 1891–
    Horse Creek at Daniel, Wyo., 1915–
    East Fork at Newfork, Wyo., 1905–6; 1915–
        New Fork at Alexander's ranch, near Cora, Wyo., 1910–11.
        New Fork at Pinedale crossing, near Cora, Wyo., 1905.
        New Fork near Boulder, Wyo., 1915–
            Pine Creek near Pinedale, Wyo., 1904–1906; 1910–
            Pole Creek near Fayette, Wyo., 1904–1906.
            Pole Creek near Pinedale, Wyo., 1910.
                Fall Creek at Fayette, Wyo., 1904–5.
            Boulder Creek near Boulder (Newfork), Wyo., 1904–1906; 1915–
    North Piney Creek near Marbleton, Wyo., 1915–
    Middle Piney Creek near Big Piney, Wyo., 1915–
    Labarge Creek near Labarge, Wyo., 1915–

Colorado River tributaries—Continued.
Grand River tributaries—Continued.
Roaring Fork tributaries—Continued.
Fryingpan Creek at Basalt, Colo., 1908–9.
North Fork of Fryingpan Creek near Norrie, Colo., 1911–
Crystal River at Marble, Colo., 1910–
Crystal River near Carbondale (Sewell), Colo., 1908–9
Elk Creek, West Fork (head of Elk Creek), near Newcastle, Colo., 1911.
Middle Fork of Elk Creek near Newcastle, Colo., 1911–1914.
East Fork of Elk Creek near Newcastle, Colo., 1911–
West Divide Creek (head of Divide Creek) at Hostetler's ranch, near Raven, Colo., 1909.
West Divide Creek at Beard's ranch, near Raven, Colo., 1910–11.
West Divide Creek at Raven, Colo., 1909–1911.
West Mamm Creek near Rifle, Colo., 1909–10.
Taylor River (head of Gunnison River) near Almont, Colo., 1905.
Taylor River at Almont, Colo., 1910–
Gunnison River near Gunnison, Colo., 1910–1914.
Gunnison River near Iola, Colo., 1900–1903.
Gunnison River near Cimarron, Colo., 1903–1905.
Gunnison River at River Portal, Colo., 1905–1911.
Gunnison River near Cory, Colo., 1903–1905.
Gunnison River at Roubideau, Colo., 1897.
Gunnison River at Whitewater, Colo., 1895; 1897; 1901–1906.
Gunnison River near Grand Junction, Colo., 1894–95; 1897–1899.
East River at Almont, Colo., 1905; 1910–
Cement Creek near Crested Butte, Colo., 1910–1913.
Tomichi Creek near Gunnison, Colo., 1910.
Quartz Creek near Pitkin, Colo., 1910–1913.
Cimarron Creek at Cimarron, Colo., 1903–1905.
North Fork of Gunnison River neat Hotchkiss, Colo., 1903–1906.
Sapinero Creek at Sapinero, Colo., 1911–1914.
Uncompahgre River near Colona, Colo., 1903–1906.
Uncompahgre River at Ouray, Colo., 1908; 1911–
Uncompahgre River below Ouray, Colo., 1913–
Uncompahgre River near Fort Crawford, Colo., 1910–11.
Uncompahgre River at Fort Crawford, Colo., 1895–1899; 1908–1910.
Uncompahgre River at Montrose, Colo., 1900; 1903–
Uncompahgre River near Delta, Colo., 1903–
Canyon Creek at Ouray, Colo., 1911–1915.
Dolores River at Rico, Colo., 1914.
Dolores River at Dolores, Colo., 1895–1903; 1910–1912.
Rico Mining Co.'s tailrace at Rico, Colo., 1914–
San Miguel River near Fall Creek, Colo., 1895–1899; 1910.
San Miguel River at Placerville, Colo., 1910–1912.
Mill Creek near Moab, Utah, 1914–
Fremont River near Thurber, Utah, 1909–1912.
Muddy Creek near Emery, Utah, 1909–1914.
Muddy Creek (lower station) near Emery, Utah, 1911–1914.
Ivie Creek near Emery, Utah, 1911–12.
Escalante Creek (head of Escalante River) near Escalante, Utah, 1909–1913.
San Juan River at Pagosa Springs, Colo., 1911–1914.
San Juan River at Arboles, Colo., 1895–1899; 1910–1914.
San Juan River at Turley, N. Mex., 1907–8.

[1] Flows into Gulf of California in Mexico.

REPORTS ON WATER RESOURCES OF COLORADO RIVER BASIN.

PUBLICATIONS OF UNITED STATES GEOLOGICAL SURVEY.

WATER-SUPPLY PAPERS.

Water-supply papers are distributed free by the Geological Survey as long as its stock lasts. An asterisk (*) indicates that this stock has been exhausted. Many of the papers marked in this way may, however, be purchased (at price noted) from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. Omission of the price indicates that the report is not obtainable from Government sources. Water supply papers are of octavo size.

*2. Irrigation near Phoenix, Ariz., by A. P. Davis. 1897. 98 pp., 31 pls. 15c.

Describes physiographic features, temperature, rainfall, stream flow, soils, and projected irrigation works in Gila River basin; discusses briefly possible use of ground water for irrigation and gives data concerning wells in Pinal and Maricopa counties. Chiefly of historic interest, as indicated by the date of publication.

*33. Storage of water on Gila River, Arizona, by J. B. Lippincott. 1900. 98 pp., 33 pls. 15c.

Describes conditions existing in 1896-99, available water supply, silt, and reservoir sites (Buttes, Riverside, San Carlos, and Queen Creek); contains section on cement, and treats of irrigable land, distribution canals, and organization of irrigation. Interest chiefly historic.

*43. Conveyance of water in irrigation canals, flumes, and pipes, by Samuel Fortier. 1901. 86 pp., 15 pls. 15c.

Describes various types of canals for irrigation.

*44. Profiles of rivers in the United States, by Henry Gannett. 1901. 100 pp., 11 pls. 15c.

Gives elevations and distances along Colorado, Little Colorado, San Juan, Mancos, La Plata, Animas, Los Pinos, Grand, Gunnison, Dolores, Uncompahgre, Lake Fork, Roaring Fork, and Eagle rivers; also brief descriptions of several of the streams.

*57. Preliminary list of deep borings in the United States, Part I (Alabama–Montana), by N. H. Darton. 1902. 60 pp. 5c.

*61. Preliminary list of deep borings in the United States, Part II (Nebraska–Wyoming), by N. H. Darton. 1902. 67 pp. 5c.

A second, revised, edition of Nos. 57 and 61 was published in 1905 as Water-Supply Paper 149 (q. v.).

*73. Water storage on Salt River, Arizona, by A. P. Davis. 1903. 54 pp., 25 pls. 20c.

Discusses Verde and Salt River basins and McDowell and Salt River reservoirs.

74. Water resources of the State of Colorado, by A. L. Fellows. 1902. 151 pp., 14 pls. 25c.

Discusses drainage and irrigation; gives records of stream flow.

93. Proceedings of first conference of engineers of the Reclamation Service, with accompanying papers compiled by F. H. Newell, chief engineer. 1904. 361 pp. 25c. Contains:

Investigations in Arizona, by A. P. Davis. Describes the proposed storage reservoir on Salt River at the mouth of Tonto Creek.

Salt River Valley Water Users' Association, by B. A. Fowler. Contains Judge Kibbey's address presenting a plan for the organization of the owners of lands to be irrigated.

Topographic work in the Grand Canyon of the Gunnison, by I. W. McConnell. Discusses the proposed diversion of water from Gunnison River into Uncompahgre Valley.

The Colorado River, by J. B. Lippincott.

Colorado River reclamation projects, by E. T. Perkins. Describes the site of the Yuma dam and summarizes the advantages of the Yuma site.

*103. A review of the laws forbidding pollution of inland waters in the United States, by E. B. Goodell. 1904. 120 pp. Superseded by 152.

Cites statutory restrictions of water pollution in Colorado, Nevada, Utah, New Mexico and Wyoming.

104. The underground waters of Gila Valley, Arizona, by W. T. Lee. 1904. 71 pp., 5 pls. 10c.

Presents information concerning the topographic features and surficial geology of the area between The Buttes, 12 miles east of Florence and the junction of Gila and Salt rivers; treats of the source, amount, quality, and methods of securing the underflow.

*122. Relation of the law to underground waters, by D. W. Johnson. 1905. 55 pp. 5c.

Cites legislative acts relating to ground waters in Colorado, Nevada, New Mexico, Utah and Wyoming.

136. Underground waters of Salt River valley, Arizona, by W. T. Lee. 1905. 196 pp., 23 pls. 25c.

Describes the physiography and geology of the Mesa and Phoenix regions, gives many well records, and discusses the amount and chemical character of the ground waters, duty of water, and cost of pumping.

147. Destructive floods in United States in 1904, by E. C. Murphy and others. 1905. 206 pp., 18 pls. 15c. Contains:

Troxton Canyon flood, Arizona, by E. C. Murphy. Globe flood, Arizona, by O. T. Reedy. La Plata River flood, Colorado, from report of Theo. Tobish.

149. Preliminary list of deep borings in the United States, second edition, with additions, by N. H. Darton. 1905. 175 pp. 10c.

Gives by States (and within the States by counties) location, depth, diameter, yield, height of water, and other valuable information concerning wells 400 feet or more in depth; includes all wells listed in Water Supply Papers 57 and 61; mentions also principal publications relating to deep borings.

152. A review of the laws forbidding pollution of inland waters in the United States (second edition), by E. B. Goodell. 1905. 149 pp. 10c.

Cites statutory restrictions of water pollution in Colorado, Nevada, Utah, New Mexico, and Wyoming.

*162. Destructive floods in the United States in 1905, with a discussion of flood discharge and frequency and an index to flood literature, by E. C. Murphy and others. 1906. 105 pp., 4 pls. 15c.

Contains accounts of floods on Colorado, Green, Grand, Gunnison, San Juan, Little Colorado, Gila, San Francisco, Verde, San Pedro, and Salt rivers, and of the flow of the Colorado into Salton Sink; gives index to literature on floods on American streams.

274. Some stream waters of the western United States, with chapters on sediment carried by the Rio Grande and the industrial application of water analyses, by Herman Stabler. 1911. 188 pp. 15c.

Describes collection of samples, plan of analytical work, and methods of analysis; discusses soap-consuming power of waters, water softening, boiler waters, and water for irrigation; gives results of analyses of waters of Colorado, Green, Grand, Gunnison, Animas, Little Colorado, Gila, San Francisco, Salt, and Verde rivers.

320. Geology and water resources of the Sulphur Spring Valley, Arizona, by O. E. Meinzer and F. C. Kelton, with a section on agriculture, by R. H. Forbes. 1913. 231 pp., 15 pls. 45c.

Describes the physiography and drainage of the region, geologic formations, and geologic history; discusses the seasonal and geographic distribution of rainfall, the occurrence and level of ground waters, the flowing and nonflowing wells, the quality of ground waters, the effect of alkali on plant life and on waters for irrigation, the relation of zones of vegetation to water supply and geographic controls, and the plants used for pumping water; treats also of the early history of agriculture and agricultural methods.

364. Water analyses from the laboratory of the United States Geological Survey, tabulated by F. W. Clarke, chief chemist. 1914. 40 pp. 5c.

Contains analyses of spring and well waters from Colorado and New Mexico and of mine waters from Dunton, Colo., and Tombstone, Ariz.

365. Ground water in southeastern Nevada, by Everett Carpenter. 1915. 86 pp., 5 pls. 15c.

Describes an area in Clark, Lincoln, White Pine, and Nye counties, drained in part by streams tributary to Colorado River and in part by streams discharging into the Great Basin. Discusses stream, lake, and wind topography; vegetation, crops, and industrial development; rainfall; water in bedrock and unconsolidated sediments; source and permanence of artesian waters, and character and distribution of springs; also the quality of waters for domestic use and for irrigation, and gives analyses. Contains details of water supply by areas in Las Vegas and Virgin river basins and the Great Basin. Gives information in regard to watering places on routes of travel.

*375. Contributions to the hydrology of the United States, 1915; N. C. Grover, chief hydraulic engineer. 1916. 181 pp., 9 pls. 15c. Contains:

(*b*) Ground water in Paradise Valley, Ariz., by O. E. Meinzer and A. J. Ellis, pp. 51–75, pls. 3–5. Describes an area north of Phoenix, in Maricopa County, between Phoenix Mountains on the west and McDowell Mountains on the east, terminated on the north by a rocky upland but on the south opening into the Salt River Valley. Discusses briefly physiography and drainage, soil and vegetation, climate, occurrence, source, and disposal of ground water, artesian prospects, quality of water, wells, and irrigation.

380. The Navajo country—a geographic and hydrographic reconnaissance of parts of Arizona, New Mexico, and Utah, by Herbert E. Gregory. 1916. 219 pp., 29 pls. 80c.

Contains a historical sketch of the Navajo country and discusses geographic provinces climate, soil, stream flow, the utilization of the streams, the source of the ground water, springs, wells, and artesian areas; gives a table of geographic names and a bibliography of books and pamphlets examined in connection with the study.

395. Colorado River and its utilization, by E. C. La Rue. 1916. 231 pp., 25 pls. 50c.

Assembles the principal facts relating to the water resources and gives the result of a study of the "possibility of controlling the flow of the whole river by means of storage reservoirs in order to avoid further danger of overflow to the Salton Sink and to render available for profitable use the enormous quantity of water which now flows unused and largely unusable to the Gulf of California in the form of floods."

396. Profile surveys in the Colorado River Basin in Wyoming, Utah, Colorado, and New Mexico, prepared under the direction of W. H. Herron, acting chief geographer, 1917. 6 pp., 43 pls. 50c.

Consists chiefly of maps showing outlines of river banks, islands, position of rapids, falls, and shoals, and existing dams. The streams to which the surveys relate are fully described in Water-Supply Paper 395.

425. Contributions to the hydrology of the United States, 1917 ; N. C. Grover, chief hydraulic engineer. Contains:

(*a*) Ground water in San Simon Valley, Arizona and New Mexico, by A. T. Schwennesen, with a section on agriculture, by R. H. Forbes, pp. 1–35, pls. 1–3. 1917.

ANNUAL REPORTS.

Each of the papers contained in the annual reports was also issued in separate form.

Annual reports are distributed free by the Geological Survey as long as its stock lasts. An asterisk (*) indicates that this stock has been exhausted. Many of the papers so marked, however, may be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C.

*Ninth Annual Report of the United States Geological Survey, 1887–88, J. W. Powell, Director. 1889. xiii, 717 pp., 88 pls. $2. Contains:

*On the geology and physiography of a portion of northwestern Colorado and adjacent parts of Utah and Wyoming, by C. A. White, pp. 677–712, pl. 88. Describes the canyons of Green, Yampa, Snake, and White rivers.

*Tenth Annual Report of the United States Geological Survey, 1888–89, J. W. Powell, Director. 1890. 2 parts. *Pt. II—Irrigation, viii, 123 pp. 35c.

Makes a preliminary report on the organization and prosecution of the survey of the arid lands for purposes of irrigation; includes an account of the methods of topographic and hydraulic work, the segregation work on reservoir sites and irrigable lands, field and office methods, and brief descriptions of the topography of some of the river basins.

Eleventh Annual Report of the United States Geological Survey, 1889–90, J. W. Powell, Director. 1891. 2 parts. Pt. II—Irrigation. xiv, 395 pp., 30 pls., and maps. $1.25. Contains:

*Hydrography, pp. 1–110. Discusses scope of work, methods of stream measurement, rainfall, and evaporation, and describes the more important streams.

*Engineering, pp. 111–200. Defines the scope of the work and gives an account of the surveys in the Sun River basin and in the Arkansas, Rio Grande, California, Lahontan, Utah, and Snake River divisions.

*The arid lands, pp. 201–289. Includes statement of the Director to the House Committee on Irrigation, extracts from the constitutions of States relating to irrigation, and a report on artesian irrigation on the Great Plains, including a discussion of the general considerations affecting artesian water supply, the economic limit to the utilization of artesian water for irrigation, irrigation by artesian wells in various countries, and the geologic conditions and statistics of artesian wells on the Great Plains.

*Topography, pp. 291–343. Comprises reports of the topographic surveys in California, Nevada, Colorado, Idaho, Montana, and New Mexico, and a report on reservoir sites.

*Irrigation literature, pp. 345–388. Gives a list of books and pamphlets on irrigation and allied subjects, mainly contained in the library of the United States Geological Survey.

Twelfth Annual Report of the United States Geological Survey, 1890–91, J. W. Powell, Director. 1891. 2 parts. Pt. II—Irrigation, xviii, 576 pp., 93 pls. $2. Contains:

*Hydrography of the arid regions, by F. H. Newell, pp. 213–361, pls. 58–106. Discusses the available water supply of the arid regions, the duty of water, flood waters, relation of rainfall to river flow; classifies the drainage basins; and describes the rivers of the Missouri, Arkansas, Rio Grande, Colorado, Sacramento, and San Joaquin basins, and the principal streams of the Great Basin in Nevada and Utah and the Snake River drainage.

Sixteenth Annual Report of the United States Geological Survey, 1894–95, Charles D. Walcott, Director. 1896. (Pts. II, III, and IV, 1895.) 4 parts. *Pt. II, Papers of an economic character, xix, 598 pp., 43 pls. $1.25. Contains:

The public lands and their water supply, by F. H. Newell, pp. 457–533, pls. 35–39. Describes general character of the public lands, the lands disposed of (railroad, grant, and swamp lands, and private miscellaneous entries), lands reserved (Indian, forest, and military reservations), the vacant lands, and the rate of disposal of vacant lands; discusses the streams, wells, and reservoirs as sources of water supply; gives details for each State.

Eighteenth Annual Report of the United States Geological Survey, 1896–97, Charles D. Walcott, Director. 1897. (Pts. II and III, 1898.) 5 parts in 6 vols. *Pt. IV, Hydrography, x, 756 pp., 102 pls. $1.75. Contains:

*Reservoirs for irrigation, by J. D. Schuyler, pp. 617–740, pls. 48–102. Describes the Agua Fria dam, Arizona, and reservoir projects on Rio Verde, Salt River, Queen Creek, Hassayampa River, and Little Colorado River, Arizona, and in the Tonto basin; gives tables of reservoir capacities and areas.

Twentieth Annual Report of the United States Geological Survey, 1898–99, Charles D. Walcott, Director. 1899. (Parts II, III, IV, V, and VII, 1900.) 7 parts in 8 vols. and separate case for maps with Pt. V. *Pt. V, Forest reserves, xix, 498 pp., 159 pls., 8 maps in separate case. $2.80. Contains:

*White River Plateau timber land reserve, by G. B. Sudworth, pp. 117–179, pls. 49–58. Battlement Mesa forest reserve, by G. B. Sudworth, pp. 181–243, pls. 59–75. Describes briefly the streams and lakes in the reserves.

BULLETINS.

An asterisk (*) indicates that the Geological Survey's stock of the paper is exhausted. Many of the papers so marked may be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. Bulletins are of octavo size.

*264. Record of deep-well drilling for 1904, by M. L. Fuller, E. F. Lines, and A. C. Veatch. 1905. 106 pp. 10c.

Discusses the importance of accurate well records to the driller, to owners of oil, gas, and water wells, and to geologists; describes the general methods of work; gives tabulated record of well in Sweetwater County, Wyo.

*298. Record of deep-well drilling for 1905, by M. L. Fuller and Samuel Sanford. 1906. 299 pp. 25c.

Gives an account of progress in the collection of well records and samples; contains tabulated records of wells in Arizona, California, Colorado, New Mexico, Utah, and Wyoming; and detailed record of well near Phoenix, Maricopa County, Ariz. The well of which a detailed section is given was selected because it affords valuable stratigraphic information.

*350. Geology of the Rangely oil district, Rio Blanco County, Colorado, with a section on the water supply, by H. S. Gale, 1908. 61 pp., 4 pls. 20c.

Discusses White River and its tributaries as sources of water supply and the possibility of obtaining artesian flows; treats of the quality of the water of White River and gives analyses.

GEOLOGIC FOLIOS.

Under the plan adopted for the preparation of a geologic map of the United States the entire area is divided into small quadrangles, bounded by certain meridians and parallels, and these quadrangles, which number several thousand, are separately surveyed and mapped.[1] The unit of survey is also the unit of publication, and the maps and description of each quadrangle are issued in the form of a folio. When all the folios are completed they will constitute the Geologic Atlas of the United States.

A folio is designated by the name of the principal town or of a prominent natural feature within the quadrangle. Each folio includes maps showing the topography, geology, underground structure, and mineral deposits of the area mapped and several pages of descriptive text. The text explains the maps and describes the topographic and geologic features of the country and its mineral products. The topographic map shows roads, railroads, waterways, and, by contour lines, the shapes of the hills and valleys and the height above sea level of all points in the quadrangle. The areal-geology map shows the distribution of the various rocks at the surface. The structural-geology map shows the relations of the rocks to one another underground. The economic-geology map indicates the location of mineral deposits that are commercially valuable. The artesian-water map shows the depth to underground-water horizons. Economic-geology and artesian-water maps are included in folios if the conditions in the areas mapped warrant their publication. The folios are of special interest to students of geography and geology and are valuable as guides in the development and utilization of mineral resources.

The folios numbered from 1 to 163, inclusive, are published in only one form (18 by 22 inches), called the library edition. Some of the folios that bear numbers higher than 163 are published also in an octavo edition (6 by 9 inches). Owing to a fire in the Geological Survey building May 18, 1913, the stock of geologic folios was more or less damaged by fire and water, but 80 or 90 per cent of the folios are usable. They will be sold at the uniform price of 5 cents each, with no reduction for wholesale orders. This rate applies to folios in stock from 1 to 184, inclusive (except reprints), also to the library edition of folio 186. The library edition of folios 185, 187, and higher numbers sells for 25 cents a copy, except that some folios which contain an

[1] Index maps showing areas in the Colorado River basin covered by topographic maps and by geologic folios will be mailed on receipt of request addressed to the Director, U. S. Geological Survey, Washington, D. C.

unusually large amount of matter sell at higher prices. The octavo edition of folio 185 and higher numbers sells for 50 cents a copy, except folio 193, which sells for 75 cents a copy. A discount of 40 per cent is allowed on an order for geologic folios amounting to $5 at the retail price—that is, 20 of the 25-cent folios (or their equivalent in higher priced folios) will be sold for $3. The discount is allowed on an order for folios alone, either of one kind or in any assortment, or for folios together with topographic maps, but no discount is allowed on the damaged folios sold at 5 cents each.

All the folios contain descriptions of the drainage of the quadrangles. The folios in the following list contain also brief discussions of the underground waters in connection with the economic resources of the areas and more or less information concerning the utilization of the water resources.

An asterisk (*) indicates that the Geological Survey's stock of the folio is exhausted.

*111. Globe, Arizona.

Describes the physiographic divisions of Arizona and the topography, climate, and vegetation of the Globe quadrangle; gives a brief account of the water resources.

*120. Silverton, Colorado.

Describes an area in the San Juan Mountains including a portion of the Continental Divide.

*129. Clifton, Arizona.

Describes the streams and springs of the area; gives analyses of spring water from San Francisco River.

*130. Rico, Colorado.

Describes the San Juan Mountains and Dolores River valley; includes a brief paragraph on water resources.

*153 Ouray, Colorado.

Describes the river waters used for irrigation, the underground waters, and the thermal springs; gives analyses of water from Hot Spring at Ouray.

171. Engineer Mountain, Colorado. 5c.

Describes the topography and geology of the Engineer Mountain quadrangle, in southwestern Colorado, about 60 miles east of the Utah boundary and 34 miles north of New Mexico; gives a brief paragraph on the water resources.

199. Silver City, New Mexico. 25c.

"The Continental Divide passes through the quadrangle from its southwest to its northeast corner. All northerly drainage reaches Gila River and ultimately the Gulf of California and the Pacific Ocean. All southerly drainage flows toward the Rio Grande," but is lost in the sands of a desert region. The underground-water resources are discussed by N. H. Darton. The discussion of the surface waters is restricted to Mimbres River, one of the southward-flowing streams.

MISCELLANEOUS REPORTS.

Other Federal bureaus and State and other organizations have from time to time published reports relating to water resources of various sections of the country. Notable among those pertaining to the Colorado River basin are the reports of the State engineers of Colorado, Nevada, New Mexico, and Wyoming, and the annual reports of the United States Reclamation Service. The following reports deserve special mention:

Canyons of the Colorado, by J. W. Powell. 1895. A popular, revised, and enlarged edition of his original journal of exploration, which appeared as part of a report entitled "Exploration of the Colorado River of the West and its tributaries, explored in 1869, 1870, 1871, and 1872," published by the Smithsonian Institution in 1875.

A canyon voyage; the narrative of the second Powell expedition down the Green-Colorado River from Wyoming, and the explorations on land, in the years 1871–72, by Frederick S. Dellenbaugh, artist and assistant topographer of the expedition. 1908.

Preliminary examination of reservoir sites in Wyoming and Colorado; letter from the Secretary of War transmitting a letter from the chief of engineers, together with a report of Capt. Chittenden. 55th Cong., 2d sess., House Doc. 141. 1898.

Irrigation pumping in Nevada, etc., by Charles A. Norcross: Nevada bureau of industry, agriculture, and irrigation Bull. 8, 1913.

Report of irrigation investigations in Utah under the direction of Elwood Mead: U. S. Dept. Agr. Office Exper. Sta., Bull. 124, 1903.

Irrigation in Utah, Utah Irrigation Commission, 1894.

Irrigation and agricultural practice in Arizona, by R. H. Forbes: Univ. Arizona Agr. Exper. Sta. Bull. 63, 1911.

Ground-water supply and irrigation in Rillito Valley, Arizona: Univ. Arizona, College of Agriculture, Exper. Sta., Bull. 64, 1910.

Oil engines for pump irrigation and the cost of pumping, by G. E. P. Smith: Univ. Arizona Agr. Exper. Sta. Bull. 74, 1915.

The lower Colorado River and the Salton Basin, by C. E. Grunsky: Am. Soc. Civil Eng. Trans., vol. 59, pp. 1–51; discussion, pp. 52–62, December, 1907.

Irrigation and river control in the Colorado River delta, by H. T. Cory: Am. Soc. Civil Eng. Trans., vol. 76, pp. 1204–1453; discussion, pp. 1454–1571, December, 1913.

GEOLOGICAL SURVEY HYDROLOGIC REPORTS OF GENERAL INTERESTS.

The following list comprises reports not readily classifiable by drainage basins and covering a wide range of hydrologic investigations:

WATER-SUPPLY PAPERS.

*1. Pumping water for irrigation, by H. M. Wilson. 1896. 57 pp., 9 pls.

Describes pumps and motive powers, windmills, water wheels, and various kinds of engines; also storage reservoirs to retain pumped water until needed for irrigation.

*3. Sewage irrigation, by G. W. Rafter. 1897. 100 pp., 4 pls. (See Water-Supply Paper 22.) 10c.

Discusses methods of sewage disposal by intermittent filtration and by irrigation; describes utilization of sewage in Germany, England, and France, and sewage purification in the United States.

*8. Windmills for irrigation, by E. C. Murphy. 1897. 49 pp., 8 pls. 10c.

Gives results of experimental tests of windmills during the summer of 1896 in the vicinity of Garden, Kans.; describes instruments and methods and draws conclusions.

*14. New tests of certain pumps and water lifts used in irrigation, by O. P. Hood. 1898. 91 pp., 1 pl.

Discusses efficiency of pumps and water lifts of various types.

*20. Experiments with windmills, by T. O. Perry. 1899. 97 pp., 12 pls. 15c.

Includes tables and descriptions of wind wheels, compares wheels of several types, and discusses results.

*22. Sewage irrigation, Part II, by G. W. Rafter. 1899. 100 pp., 7 pls. 15c.

Gives résumé of Water-Supply Paper 3; discusses pollution of certain streams, experiments on purification of factory wastes in Massachusetts, value of commercial fertilizers, and describes American sewage-disposal plants by States; contains bibliography of publications relating to sewage utilization and disposal.

*41. The windmill; its efficiency and economic use, Part I, by E. C. Murphy. 1901. 72 pp., 14 pls. 5c.

*42. The windmill; its efficiency and economic use, Part II, by E. C. Murphy. 1901. 75 pp., 2 pls. 10c.

Nos. 41 and 42 give details of results of experimental tests with windmills of various types.

*43. Conveyance of water in irrigation canals, flumes, and pipes, by Samuel Fortier. 1901. 86 pp., 15 pls. 15c.

*56. Methods of stream measurement.. 1901. 51 pp., 12 pls. 15c.

Describes the methods used by the Survey in 1901–2. See also Nos. 64, 94, and 95.

*64. Accuracy of stream measurementa, by E. C. Murphy. 1902. 99 pp., 4 pls. (See No. 95.) 10c.

Describes methods of measuring velocity of water and of measuring and computing stream flow and compares results obtained with the different instruments and methods; describes also experiments and results at the Cornell University hydraulic laboratory. A second, enlarged, edition published as Water-Supply Paper 95.

*67. The motions of underground waters, by C. S. Slichter. 1902. 106 pp., 8 pls. 15c.

Discusses origin, depth, and amount of ground waters; permeability of rocks and porosity of soils; causes, rates, and laws of motions of ground water; surface and deep zones of flow, and recovery of waters by open wells and artesian and deep wells; treats of the shape and position of the water table; gives simple methods of measuring yield of flowing wells; describes artesian wells at Savannah, Ga.

72. Sewage pollution in the metropolitan area near New York City and its effect on inland water resources, by M. O. Leighton. 1902. 75 pp., 8 pls. 10c.

Defines "normal" and "polluted" waters and discusses the damage resulting from pollution.

*80. The relation of rainfall to run-off, by G. W. Rafter. 1903. 104 pp. 10c.

Treats of measurements of rainfall and laws and measurements of stream flow; gives rainfall, run-off, and evaporation formulas; discusses effects of forests on rainfall and run-off.

87. Irrigation in India (second edition), by H. M. Wilson. 1903. 238 pp., 27 pls., 25c.

First edition was published in Part II of the Twelfth Annual Report.

93. Proceedings of first conference of engineers of the Reclamation Service, with accompanying papers, compiled by F. H. Newell, chief engineer. 1904. 361 pp. 25c. [Requests for this report should be addressed to the U. S. Reclamation Service.]

Contains the following papers of more or less general interest:
Limits of an irrigation project, by D. W. Ross.
Relation of Federal and State laws to irrigation, by Morris Bien.
Electrical transmission of power for pumping, by H. A. Storrs.
Correct design and stability of high masonry dams, by Geo. Y. Wisner.
Irrigation surveys and the use of the plane table, by J. B. Lippincott.
The use of alkaline waters for irrigation, by Thomas H. Means.

*94. Hydrographic manual of the United States Geological Survey, prepared by E. C. Murphy, J. C. Hoyt, and G. B. Hollister. 1904. 76 pp., 3 pls. 10c.

Gives instruction for field and office work relating to measurements of stream flow by current meters. See also No. 95.

*95. Accuracy of stream measurements (second, enlarged edition), by E. C. Murphy. 1904. 169 pp., 6 pls.

Describes methods of measuring and computing stream flow and compares results derived from different instruments and methods. See also No. 94.

*103. A review of the laws forbidding pollution of inland waters in the United States, by E. B. Goodell. 1904. 120 pp. (See No. 152.)

Explains the legal principles under which antipollution statutes become operative, quotes court decisions to show authority for various deductions, and classifies according to scope the statutes enacted in the different States.

110. Contributions to the hydrology of eastern United States, 1904; M. L. Fuller, geologist in charge. 1905. 211 pp., 5 pls. 10c.

Contains the following reports of general interest. The scope of each paper is indicated by its title.

Description of underflow meter used in measuring the velocity and direction of underground water, by Charles S. Slichter.

The California or "stovepipe" method of well construction, by Charles S. Slichter.

Approximate methods of measuring the yield of flowing wells, by Charles S. Slichter.

Corrections necessary in accurate determinations of flow from vertical well casings, from notes furnished by A. N. Talbot.

Experiment relating to problems of well contamination at Quitman, Ga., by S. W. McCallie.

113 The disposal of strawboard and oil-well wastes, by R. L. Sackett and Isaiah Bowman. 1905. 52 pp., 4 pls. 5c.

The first paper discusses the pollution of streams by sewage and by trade wastes, describes the manufacture of strawboard, and gives results of various experiments in disposing of the waste. The second paper describes briefly the topography, drainage, and geology of the region about Marion, Ind., and the contamination of rock wells and of streams by waste oil and brine

*114. Underground waters of eastern United States; M. L. Fuller, geologist in charge. 1905. 285 pp., 18 pls. 25c.

Contains report on "Occurrence of underground waters," by M. L. Fuller, discussing sources, amount, and temperature of waters, permeability and storage capacity of rocks, water-bearing formations, recovery of water by springs, wells, and pumps, essential conditions of artesian flows, and general conditions affecting underground waters in eastern United States.

119. Index to the hydrographic progress reports of the United States Geological Survey, 1888 to 1903, by J. C. Hoyt and B. D. Wood. 1905. 253 pp. 15c.

120. Bibliographic review and index of papers relating to underground waters published by the United States Geological Survey, 1879–1904, by M. L. Fuller. 1905. 128 pp. 10c.

*122. Relation of the law to underground waters, by D. W. Johnson. 1905. 55 pp. 5c.

Defines and classifies underground waters, gives common-law rules relating to their use, and cites State legislative acts affecting them.

140. Field measurements of the rate of movement of underground waters, by C. S. Slichter. 1905. 122 pp., 15 pls. 15c.

Discusses the capacity of sand to transmit water, describes measurements of underflow in Rio Hondo, San Gabriel, and Mohave River valleys, Cal., and on Long Island, N. Y.; gives results of tests of wells and pumping plants, and describes stovepipe method of well construction.

143. Experiments on steel-concrete pipes on a working scale, by J. H. Quinton. 1905. 61 pp., 4 pls. 5c.

Scope indicated by title.

145. Contributions to the hydrology of eastern United States, 1905; M. L. Fuller, geologist in charge. 1905. 220 pp.; 6 pls. 10c.

Contains brief reports of general interest as follows:

Drainage of ponds into drilled wells, by Robert E. Horton. Discusses efficiency, cost, and capacity of drainage wells, and gives statistics of such wells in southern Michigan.

Construction of so-called fountain and geyser springs, by Myron L. Fuller.

A convenient gage for determining low artesian heads, by Myron L. Fuller.

146. Proceedings of second conference of engineers of the Reclamation Service, with accompanying papers, compiled by F. H. Newell, Chief Engineer. 1905. 267 pp. 15c. [Requests for this report should be addressed to the Reclamation Service.]

Contains brief account of the organization of the hydrographic [water-resources] branch and the Reclamation Service, reports of conferences and committees, circulars of instruction, and many brief reports on subjects closely related to reclamation, and a bibliography of technical papers by members of the service. Of the papers read at the conference those listed below (scope indicated by title) are of more or less general interest:

Proposed State code of water laws, by Morris Bien.

Power engineering applied to irrigation problems, by O. H. Ensign.

Estimates on tunneling in irrigation projects, by A. L. Fellows.

Collection of stream-gaging data, by N. C. Grover.

Diamond-drill methods, by G. A. Hammond.

Mean-velocity and area curves, by F. W. Hanna.

Importance of general hydrographic data concerning basins of streams gaged, by R. E. Horton.

Effect of aquatic vegetation on stream flow, by R. E. Horton.

Sanitary regulations governing construction camps, by M. O. Leighton.

Necessity of draining irrigated land, by Thos. H. Means.

Alkali soils, by Thos. H. Means.

Cost of stream-gaging work, by E. C. Murphy.

Equipment of a cable gaging station, by E. C. Murphy.

Silting of reservoirs, by W. M. Reed.

Farm-unit classification, by D. W. Ross.

Cost of power for pumping irrigating water, by H. A. Storrs.

Records of flow at current-meter gaging stations during the frozen season, by F. H. Tillinghast.

147. Destructive floods in the United States in 1904, by E. C. Murphy and others. 1905. 206 pp., 18 pls. 15c.

Contains a brief account of "A method of computing cross-section area of waterways," including formulas for maximum discharge and area of cross section.

*150. Weir experiments, coefficients, and formulas, by R. E. Horton. 1906. 189 pp., 38 pls. (See Water-Supply Paper 200.) 15c.

Scope indicated by title.

151. Field assay of water, by M. O. Leighton. 1905. 77 pp., 4 pls.

Discusses methods, instruments, and reagents used in determining turbidity, color, iron, chlorides, and hardness in connection with the studies of the quality of water in various parts of the United States.

152. A review of the laws forbidding pollution of inland waters in the United States, second edition, by E. B. Goodell. 1905. 149 pp. 10c.

Scope indicated by title.

*155. Fluctuations of the water level in wells, with special reference to Long Island, N. Y., by A. C. Veatch. 1906. 83 pp., 9 pls. 25c.

Includes general discussion of fluctuations due to rainfall and evaporation, barometric changes, temperature changes, changes in rivers, changes in lake level, tidal changes, effects of settlement, irrigation, dams, underground water developments, and to indeterminate causes.

*160. Underground-water papers, 1906; M. L. Fuller, geologist in charge. 1906. 104 pp., 1 pl.

Gives account of work in 1905, lists publications relating to ground waters, and contains the following brief reports of general interest:

Significance of the term "artesian," by Myron L. Fuller.
Representation of wells and springs on maps, by Myron L. Fuller.
Total amount of free water in the earth's crust, by Myron L. Fuller.
Use of fluorescein in the study of underground waters, by R. B. Dole.
Problems of water contamination, by Isaiah Bowman.
Instances of improvement of water in wells, by Myron L. Fuller.

*162. Destructive floods in the United States in 1905, with a discussion of flood discharge and frequency and an index to flood literature, by E. C. Murphy and others. 1906. 105 pp., 4 pls. 15c.

*163. Bibliographic review and index of underground-water literature published in the United States in 1905, by M. L. Fuller, F. G. Clapp, and B. L. Johnson. 1906. 130 pp. 15c.

*179. Prevention of stream pollution by distillery refuse, based on investigations at Lynchburg, Ohio, by Herman Stabler. 1906. 34 pp., 1 pl. 10c.

Describes grain distillation, treatment of slop, sources, character, and effects of effluents on streams; discusses filtration, precipitation, fermentation, and evaporation methods of disposal of wastes without pollution.

*180. Turbine water-wheel tests and power tables, by R. E. Horton. 1906. 134 pp., 2 pls. 20c.

*185. Investigations on the purification of Boston sewage, * * * with a history of the sewage disposal problem, by C.-E. A. Winslow and E. B. Phelps. 1906. 163 pp. 25c.

Discusses composition, disposal, purification and treatment of sewages and tendencies in sewage-disposal practice in England, Germany, and the United States; describes character of crude sewage at Boston, removal of suspended matter, treatment in septic tanks, and purification in intermittent sand filtration and coarse material; gives bibliography.

*186. Stream pollution by acid-iron wastes, a report based on investigations made at Shelby, Ohio, by Herman Stabler. 1906. 36 pp., 1 pl.

Gives history of pollution by acid-iron wastes at Shelby, Ohio, and of resulting litigation; discusses effect of acid-iron liquors on sewage purification processes, recovery of copperas from acid, iron wastes, and other processes for removal of pickling liquor.

*187. Determination of stream flow during the frozen season, by H. K. Barrows and R. E. Horton. 1907. 93 pp., 1 pl. 15c.

Scope indicated by title.

*189. The prevention of stream pollution by strawboard waste, by E. B. Phelps. 1906. 29 pp., 2 pls.

Describes manufacture of strawboard, present and proposed methods of disposal of waste liquors, laboratory investigations of precipitation and sedimentation, and field studies of amount and character of water used, raw material and finished product, and mechanical filtration.

*194. Pollution of Illinois and Mississippi rivers by Chicago sewage (a digest of the testimony taken in the case of the State of Missouri *v.* the State of Illinois and the Sanitary District of Chicago), by M. O. Leighton. 1907. 369 pp., 2 pls.

Scope indicated by amplification of title.

*200. Weir experiments, coefficients, and formulas (revision of paper No. 150), by R. E. Horton. 1907. 195 pp., 38 pls. 35c.

*226. The pollution of streams by sulphite-pulp waste, a study of possible remedies, by E. B. Phelps. 1909. 37 pp., 1 pl. 10c.

Describes manufacture of sulphite pulp, the waste liquors, and the experimental work leading to suggestions as to methods of preventing stream pollution.

*229. The disinfection of sewage and sewage filter effluents, with a chapter on the putrescibility and stability of sewage effluents, by E. B. Phelps. 1909. 91 pp., 1 pl. 15c.

Scope indicated by title.

*234. Papers on the conservation of water resources. 1909. 96 pp., 2 pls. 15c.

Contains the following papers, whose scope is indicated by their titles: Distribution of rainfall, by Henry Gannett; Floods, by M. O. Leighton; Developed water powers, compiled under the direction of W. M. Steuart, with discussion by M. O. Leighton; Undeveloped water powers, by M. O. Leighton; Irrigation, by F. H. Newell; Underground waters, by W. C. Mendenhall; Denudation, by R. B. Dole and Herman Stabler; Control of catchment areas, by H. N. Parker.

*235. The purification of some textile and other factory wastes, by Herman Stabler and G. H. Pratt. 1909. 76 pp. 10c.

Discusses waste waters from wool scouring, bleaching and dyeing cotton yarn, bleaching cotton piece goods, and manufacture of oleomargarine, fertilizer, and glue.

236. The quality of surface waters in the United States: Part I. Analyses of waters east of the one hundredth meridian, by R. B. Dole. 1909. 123 pp. 10c.

Describes collection of samples, methods of examination, preparation of solutions, accuracy of estimates, and expression of analytical results.

238. The public utility of water powers and their governmental regulation, by René Tavernier and M. O. Leighton. 1910. 161 pp. 15c.

Discusses hydraulic power and irrigation, French, Italian, and Swiss legislation relative to the development of water powers, and laws proposed in the French Parliament; reviews work of bureau of hydraulics and agricultural improvement of the French department of agriculture: and gives résumé of Federal and State water power legislation in the United States.

*255. Underground waters for farm use, by M. L. Fuller. 1910. 58 pp., 17 pls. 15c.

Discusses rocks as sources of water supply and the relative safety of supplies from different materials; springs and their protection; open or dug and deep wells, their location, yield, relative cost, protection, and safety; advantages and disadvantages of cisterns and combination wells and cisterns.

*257. Well-drilling methods, by Isaiah Bowman. 1911. 139 pp., 4 pls. 15c.

Discusses amount, distribution, and disposal of rainfall, water-bearing rocks, amount of ground water, artesian conditions, and oil and gas bearing formations; gives history of well drilling in Asia, Europe, and the United States; describes in detail the various methods and the machinery used; discusses loss of tools and geologic difficulties; contamination of well waters and methods of prevention; tests of capacity and measurement of depth; and costs of sinking wells.

*258. Underground-water papers, 1910, by M. L. Fuller, F. G. Clapp, G. C. Matson, Samuel Sanford, and H. C. Wolff. 1911. 123 pp., 2 pls. 15c.

Contains the following papers (scope indicated by titles) of general interest:
Drainage by wells, by M. L. Fuller.
Freezing of wells and related phenomena, by M. L. Fuller.
Pollution of underground waters in limestone, by G. C. Matson.
Protection of shallow wells in sandy deposits, by M. L. Fuller.
Magnetic wells, by M. L. Fuller.

*315. The purification of public water supplies, by G. A. Johnson. 1913. 84 pp., 8 pls. 10c.

Discusses ground, lake, and river waters as public supplies, development of waterworks systems in the United States, water consumption, and typhoid fever; describes methods of filtration and sterilization of water and municipal water softening.

334. The Ohio Valley flood of March-April, 1913 (including comparisons with some earlier floods), by A. H. Horton and H. J. Jackson. 1913. 96 pp., 22 pls. 20c.

Although relating specifically to floods in the Ohio Valley, this report discusses also the causes of floods and the prevention of damage by floods.

337. The effects of ice on stream flow, by William Glenn Hoyt. 1913. 77 pp., 7 pls. 15c.

Discusses methods of measuring the winter flow of streams.

*345. Contributions to the hydrology of the United States, 1914; N. C. Grover, chief hydraulic engineer. 1915. 225 pp., 17 pls. 30c. Contains:

(*e*) A method of determining the daily discharge of rivers of variable slope, by M. R. Hall, W. E. Hall, and C. H. Pierce, pp. 53–65.

364. Water analyses from the laboratory of the United States Geological Survey, tabulated by F. W. Clarke, chief chemist. 1914. 40 pp. 5c.

Contains analyses of waters from rivers, lakes, wells, and springs in various parts of the United States, including analyses of the geyser water of Yellowstone National Park, hot springs in Montana, brines from Death Valley, water from the Gulf of Mexico, and mine waters from Tennessee, Michigan, Missouri and Oklahoma, Montana, Colorado and Utah, Nevada and Arizona, and California.

371. Equipment for current-meter gaging stations, by G. J. Lyon. 1915. 64 pp., 37 pls. 20c.

Describes methods of installing automatic and other gages and of constructing gage wells shelters, and structures for making discharge measurements and artificial controls.

*375. Contributions to the hydrology of the United States, 1915; N. C. Grover, chief hydraulic engineer. 1916. 181 pp., 9 pls. 15c.

Contains three papers presented at the conference of engineers of the water-resources branch in December, 1914.

(*c*) The relation of stream gaging to the science of hydraulics, by C. H. Pierce and R. W. Davenport, pp. 77–84.

(*e*) A method of correcting river discharge for a changing stage, by B. E. Jones, pp. 117–130.

(*f*) Conditions requiring the use of automatic gages in obtaining records of stream flow, by C. H. Pierce, pp. 131–139.

*400. Contributions to the hydrology of the United States, 1916. N. C. Grover, chief hydraulic engineer. 1917. 108 pp., 7 pls. Contains:

(a) The people's interest in water-power resources, by G. O. Smith, pp. 1–8.
*(c) The measurement of silt-laden streams, by R. C. Pierce, pp. 39–51.
(d) Accuracy of stream-flow data, by N. C. Grover and J. C. Hoyt, pp. 53–59.

416. The divining rod, a history of water witching, with a bibliography, by A. J. Ellis. 1917. 59 pp. 10c.

A brief paper published "merely to furnish a reply to the numerous inquiries that are continually being received from all parts of the country" as to the efficacy of the divining rod for locating underground water.

425. Contributions to the hydrology of the United States, 1917; N. C. Grover, chief hydraulic engineer. 1918. Contains:

*(c) Hydraulic conversion tables and convenient equivalents, pp. 71–94. 1917

ANNUAL REPORTS.

*Fifth Annual Report of the United States Geological Survey, 1883–84, J. W. Powell, Director. 1885. xxxvi, 469 pp., 58 pls. $2.25. Contains:

*The requisite and qualifying conditions of artesian wells, by T. C. Chamberlin, pp. 125–173, pl. 21. Scope indicated by title.

Twelfth Annual Report of the United States Geological Survey, 1890–91, J. W. Powell, Director. 1891. 2 parts. Pt. II, Irrigation, xviii, 576 pp., 93 pls. $2. Contains:

*Irrigation in India, by H. M. Wilson, pp. 363–561, pls. 107 to 146. See Water-Supply Paper 87.

Thirteenth Annual Report of the United States Geological Survey, 1891–92, J. W. Powell, Director. 1892. (Pts. II and III, 1893.) 3 parts. *Pt. III, Irrigation, xi, 486 pp., 77 pls. $1.85. Contains:

*American irrigation engineering, by H. M. Wilson, pp. 101–349, pls. 111 to 146. Discusses the economic aspects of irrigation, alkaline drainage, silt, and sedimentation; gives brief history of legislation; describes perennial canals in Idaho-California, Wyoming, and Arizona; discusses water storage at reservoirs of the California and other projects, subsurface sources of supply, pumping, and subirrigation.

Fourteenth Annual Report of the United States Geological Survey, 1892–93, J. W. Powell, Director. 1893. (Pt. II, 1894.) 2 parts. *Pt. II, Accompanying papers, xx, 597 pp., 73 pls. $2.10. Contains:

*The potable waters of eastern United States, by W J McGee, pp. 1–47. Discusses cistern water, stream waters, and ground waters, including mineral springs and artesian wells.

*Natural mineral waters of the United States, by A. C. Peale, pp. 49–88, pls. 3 and 4. Discusses the origin and flow of mineral springs, the source of mineralization, thermal springs, the chemical composition and analysis of spring waters, geographic distribution, and the utilization of mineral waters; gives a list of American mineral spring resorts; contains also some analyses.

Nineteenth Annual Report of the United States Geological Survey, 1897–98, Charles D. Walcott, Director. 1898. (Parts II, III, and V, 1899.) 6 parts in 7 vols. and separate case for maps with Pt. V. *Pt. II, Papers chiefly of a theoretic nature, v, 958 pp., 172 pls. $2.65. Contains:

*Principles and conditions of the movements of ground water, by F. H. King, pp. 59–294, pls. 6 to 16. Discusses the amount of waters stored in sandstone, in soil, and in other rocks, and the depth to which ground water penetrates; gravitational, thermal, and capillary moyements of ground waters, and the configuration of the ground-water surface; gives the results of experimental investigations on the flow of air and water through a rigid, porous medium and through sand, sandstones, and silts; discusses results obtained by other investigators and summarizes results of observations; discusses also rate of flow of water through sand and rock, the growth of rivers, rate of filtration through soil, interference of wells, etc.

*Theoretical investigation of the motion of ground waters, by C. S. Slichter, pp. 295–384, pl. 17. Scope indicated by title.

PROFESSIONAL PAPERS.

*72. Denudation and erosion in the southern Appalachian region and the Monongahela basin, by L. C. Glenn. 1911. 137 pp., 21 pls. 35c.

Describes the topography, geology, drainage, forests, climate and population, and transportation facilities of the region, the relation of agriculture, lumbering, mining, and power development to erosion and denudation, and the nature, effects, and remedies of erosion; gives details of conditions in Holston, Nolichucky, French Broad, Little Tennessee, and Hiwassee River basins, along Tennessee River proper, and in the basins of the Coosa-Alabama system, Chattahooche, Savannah, Saluda, Broad, Catawba, Yadkin, New, and Monongahela rivers.

86. The transportation of débris by running water, by G. K. Gilbert, based on experiments made with the assistance of E. C. Murphy. 1914. 263 pp., 3 pls. 70c.

The results of an investigation which was carried on in a specially equipped laboratory at Berkeley, Cal., and was undertaken for the purpose of learning "the laws which control the movement of bed load and especially to determine how the quantity of load is related to the stream slope and discharge and to the degree of comminution of the débris."

A highly technical report.

105. Hydraulic-mining débris in the Sierra Nevada, by G. K. Gilbert. 154 pp., 34 pls. 1917. 50c.

Presents the results of an investigation undertaken by the United States Geological Survey in response to a memorial from the California Miners' Association asking that a particular study be made of portions of the Sacramento and San Joaquin valleys affected by detritus from torrential streams. The report deals largely with geologic and physiographic aspects of the subject, traces the physical effects, past and future, of the hydraulic mining of earlier decades, the similar effects which certain other industries induce through stimulation of the erosion of the soil, and the influence of the restriction of the area of inundation by the construction of levees. Suggests cooperation by several interests for the control of the streams now carrying heavy loads of débris.

BULLETINS.

*32. Lists and analyses of the mineral springs of the United States (a preliminary study), by A. C. Peale. 1886. 235 pp.

Defines mineral waters, lists the springs by States, and gives tables of analyses.

*319. Summary of the controlling factors of artesian flows, by M. L. Fuller. 1908. 44 pp., 7 pls. 10c.

Describes underground reservoirs, the sources of ground waters, the confining agents, the primary and modifying factors of artesian circulation, the essential and modifying factors of artesian flow, and typical artesian systems.

*479. The geochemical interpretation of water analyses, by Chase Palmer. 1911. 31 pp. 5c.

Discusses the expression of chemical analyses, the chemical character of water and the properties of natural waters; gives a classification of waters based on property values and reacting values, and discusses the character of the waters of certain rivers as interpreted directly from the results of analyses; discusses also the relation of water properties to geologic formations, silica in river water, and the character of the water of the Mississippi and the Great Lakes and St. Lawrence River as indicated by chemical analyses.

INDEX BY AREAS AND SUBJECTS.

[A=Annual Reports; M=Monograph; B=Bulletin; P=Professional Paper; W=Water-Supply Paper; G F=Geologic folio.]

[1] Many of the reports contain brief subject bibliographies. See abstracts.

[2] Many analyses of river, spring, and well waters are scattered through publications, as noted in abstracts.

INDEX OF STREAMS.

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