DEPARTMENT OF THE INTERIOR
Hubert Work, Secretary

U. S. GEOLOGICAL SURVEY
George Otis Smith, Director

WATER-SUPPLY PAPER 529

SURFACE WATER SUPPLY OF THE UNITED STATES

1921

PART IX. COLORADO RIVER BASIN

NATHAN C. GROVER, Chief Hydraulic Engineer
ROBERT FOLLANSBEE, A. B. PURTON, and ROGER C. RICE
District Engineers

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

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25 CENTS PER COPY

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ILLUSTRATIONS.

SURFACE WATER SUPPLY OF COLORADO RIVER BASIN, 1921.

AUTHORIZATION AND SCOPE OF WORK.

This volume is one of a series of 14 reports presenting records of measurements of flow made on streams in the United States during the year ending September 30, 1921.

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

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

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

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

Annual appropriations for the fiscal years ending June 30, 1895–1922.

1895	$12,500.00
1896	20,000.00
1897 to 1900, inclusive	50,000.00
1901 to 1902, inclusive	100,000.00
1903 to 1906, inclusive	200,000.00
1907	150,000.00
1908 to 1910, inclusive	100,000.00
1911 to 1917, inclusive	150,000.00
1918	175,000.00
1919	148,244.10
1920	175,000.00
1921	180,000.00
1922	180,000.00

In the execution of the work many private and State organizations have cooperated either by furnishing data or by assisting in collecting data. Acknowledgments for cooperation of the first kind are made in connection with the description of each station affected; cooperation of the second kind is acknowledged on page 9.

Measurements of stream flow have been made at about 5,200 points in the United States and also at many points in Alaska and the Hawaiian Islands. In July, 1921, 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 water-supply papers from time to time.

DEFINITION OF TERMS.

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

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

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

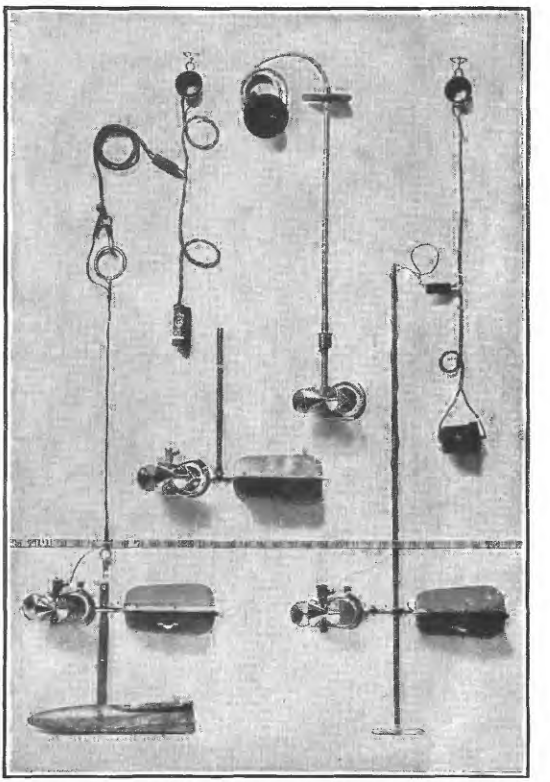
"Run-off in inches" is the depth to which an area would be covered if all the water flowing from it in a given period were uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in inches.

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

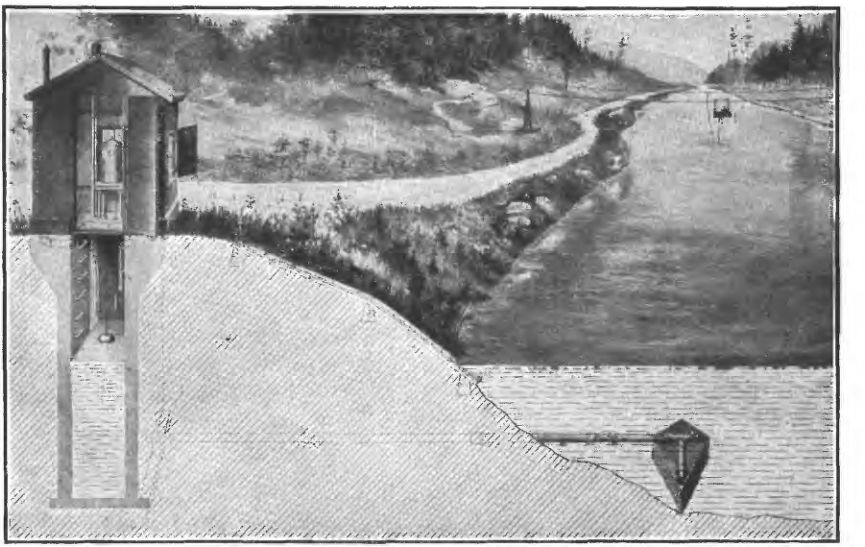
The following terms not in common use are here defined:

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

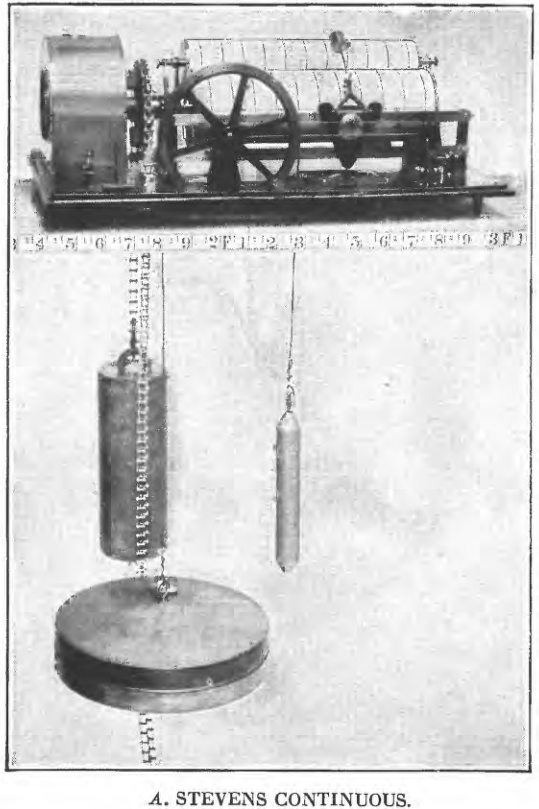
"Control," a term used to designate the section or sections of the stream channel below the gage which determine the stage-discharge relation at the gage. It should be noted that the control may not be the same section or sections at all stages.



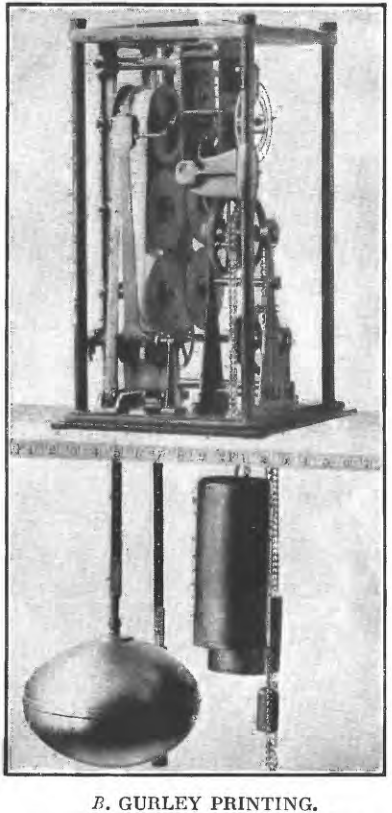
A. PRICE CURRENT METERS.



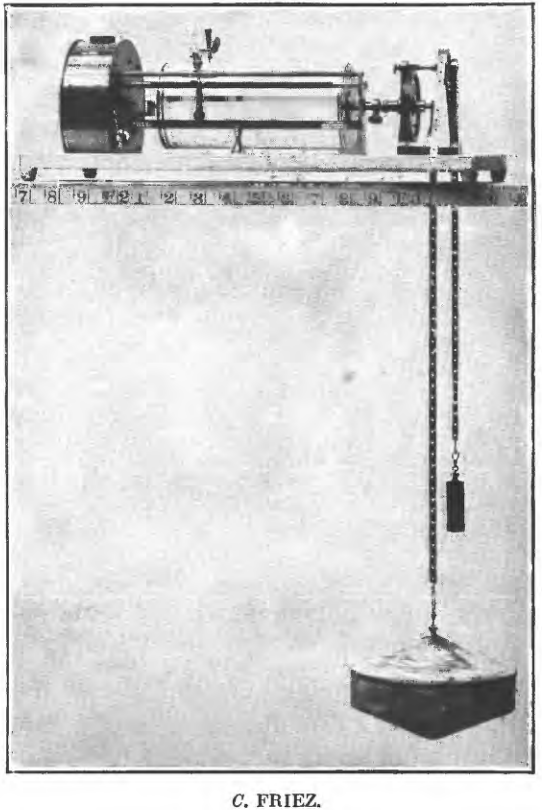
B. TYPICAL GAGING STATION.



A. STEVENS CONTINUOUS.



B. GURLEY PRINTING.



C. FRIEZ.

WATER-STAGE RECORDERS.

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

EXPLANATION OF DATA.

The data presented in this report cover the year beginning October 1, 1920, and ending September 30, 1921. At the beginning of January in most parts of the United States much of the precipitation in the preceding three months is stored as ground water, in the form of snow or ice, or in ponds, lakes, and swamps, and this stored water passes off in the streams during the spring break-up. At the end of September, on the other hand, the only stored water available for run-off is possibly a small quantity in the ground; therefore the run-off for the year beginning October 1 is practically all derived from precipitation within that year.

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

From the discharge measurements rating tables are prepared that give the discharge for any stage. The application of the daily gage heights to these rating tables gives 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 records of discharge measurements, a table showing the daily discharge of the stream, and a table of monthly and yearly discharge and run-off.

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

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

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

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

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

ACCURACY OF FIELD DATA AND COMPUTED RESULTS.

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

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

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

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

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

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

PUBLICATIONS.

Investigation of water resources by the United States Geological Survey has consisted in large part of measurements of the volume of flow 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 monographs, bulletins, 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 basin in three parts:
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.

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 Superin-

tendent of Documents, Government Printing Office, Washington, D. C., who will, on application, furnish lists giving prices.

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

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

Boston, Mass., 2500 Customhouse.
Albany, N. Y., 704 Journal Building.
Trenton, N. J., Statehouse.
Asheville, N. C., 316 Jackson Building.
Chattanooga, Tenn., 37 Municipal Building.
Columbus, Ohio, Brown Hall, Ohio State University.
Chicago, Ill., 1404 Kimball Building.
Madison, Wis., care of Railroad Commission of Wisconsin.
Ames, Iowa, State Highway Commission Building.
Rolla, Mo., Rolla Building, School of Mines and Metallurgy.
Topeka, Kans., 23 Federal Building.
Helena, Mont., 45–46 Federal Building.
Denver, Colo., 403 Post Office Building.
Salt Lake City, Utah, 313 Federal Building.
Idaho Falls, Idaho, 228 Federal Building.
Boise, Idaho, 615 Idaho Building.
Tacoma, Wash., 406 Federal Building.
Portland, Oreg., 606 Post Office Building.
San Francisco, Calif., 328 Customhouse.
Los Angeles, Calif., 600 Federal Building.
Tucson, Ariz., 210 Agricultural Building, University of Arizona.
Austin, Tex., State Capitol.
Honolulu, Hawaii, 25 Capitol Building.

A list of the Geological Survey's publications may be obtained by applying to the Director, United States Geological Survey, Washington, D. C.

Stream-flow records have been obtained at about 5,200 points in the United States, and the data obtained have been published in the reports tabulated below and on pages 7 and 8.

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

Report.	Character of data.	Year.
10th A, pt. 2	Descriptive information only	1884 to Sept., 1890.
11th A, pt. 2	Monthly discharge and descriptive information	1884 to June 30, 1891.
12th A, pt. 2	do	1884 to Dec., 31, 1892.
13th A, pt. 3	Mean discharge in second-feet	
14th A, pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B 131	Description, 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.

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

Report.	Character of data.	Year.
19th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records), 1897.	1897.
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.
W 431 to 444	do	1916.
W 451 to 464	do	1917.
W 471 to 484	do	1918.
W 501 to 514	do	1919 and 1920.
W 521 to 534	do	1921.

NOTE.—No stream-flow data are given in the Fifteenth and Seventeenth annual reports.

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 1920. The data for any particular station will be found in the reports covering the years during which the station was maintained. For example, data from 1902 to 1921 for any station in the area covered by Part III are published in Water-Supply Papers 83, 98, 128, 169, 205, 243, 263, 283, 303, 323, 353, 383, 403, 433, 453, 473, 503, and 523 which contain records for the Ohio River basin for those years.

Numbers of water-supply papers containing results of stream measurements, 1899–1921.

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 and eastern Gulf of Mexico (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.	Snake River basin.	Lower Columbia River 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 [a]	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, 75	66, 75
1902	82	[b] 82, 83	83	[l] 82, 83	[k] 83, 85	84	[k] 83, 84	84	85	85	85	85	85	85
1903	97	[b] 97, 98	98	97	[k] 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] 106, [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	387	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
1916	431	432	433	434	435	436	437	438	439	440	441	442	443	444
1917	451	452	453	454	455	456	457	458	459	460	461	462	463	464
1918	471	472	473	474	475	476	477	478	479	480	481	482	483	484
1919–20	501	502	503	504	505	506	507	508	509	510	511	512	513	514
1921	521	522	523	524	525	526	527	528	529	530	531	532	533	534

[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.

COOPERATION.

The work in Arizona, Utah, and Wyoming was carried on under cooperative agreement between the United States Geological Survey and the States, and special acknowledgments are due to the cooperating State officials, G. E. P. Smith, irrigation engineer, of the agricultural experiment station, University of Arizona, and W. S. Norveil, State water commissioner; G. F. McGonagle and R. E. Caldwell, State engineers of Utah; and Frank C. Emerson, State engineer of Wyoming.

The State engineer of Colorado, A. J. McCune, paid the gage observers and furnished other assistance at four stations in Colorado.

The United States Forest Service furnished the services of a hydrographer for part of the time during the winter for work in Colorado and Wyoming.

The United States Weather Bureau paid the gage observers for Colorado River near Fruita, Colo., and Green River at Green River, Wyo. The Eden Irrigation & Land Co. paid for installing and maintaining the station on Big Sandy Creek near Farson, Wyo.

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

In Arizona the United States Bureau of Reclamation furnished financial assistance in installing and maintaining the station on Colorado River at Topock. The Office of Indian Affairs cooperated in the maintenance of the stations on Gila River near San Carlos, Gila River at Kelvin, and North Fork of White River at Whiteriver.

DIVISION OF WORK.

Data for stations in Arizona were collected under the direction of Roger C. Rice, district engineer, who was assisted by J. H. Gardiner. The records were compiled and prepared for publication under direction of Roger C. Rice and W. E. Dickinson, district engineers, who were assisted by J. H. Gardiner.

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 P. V. Hodges, J. B. Spiegel, T. J. Watkins, and Mrs. Esther D. Rae.

Data for stations in Utah were collected and prepared for publication under the direction of A. B. Purton, district engineer, who was assisted by W. E. Dickinson, R. R. Rowe, and E. C. Howard.

The records were reviewed and the manuscript assembled by J. J. Dirzulaitis.

GAGING-STATION RECORDS.

COLORADO RIVER BASIN.

COLORADO RIVER AND TRIBUTARIES ABOVE GREEN RIVER.

COLORADO RIVER AT HOT SULPHUR SPRINGS, COLO.

LOCATION.—In sec. 2, T. 1 N., R. 78 W., at highway bridge near Denver & Salt Lake Railway station in Hot Sulphur Springs, Grand County.

DRAINAGE AREA.—785 square miles (revised measurement on map of Colorado, scale 1:500,000).

RECORDS AVAILABLE.—July 22, 1904, to September 30, 1909; September 23, 1910, to September 30, 1921.

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

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of well-compacted gravel. Control 150 feet downstream; shifting at long intervals. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.7 feet at 5 a. m. June 15 (discharge, 10,300 second-feet); minimum discharge occurred during winter.

1904–1909; 1910–1921: Maximum stage recorded in 1921; minimum discharge occurs during winter (estimated at 63 second-feet on February 15 and 25–27, 1908).

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

DIVERSIONS.—Court decrees for diversions of 800 second-feet from Colorado River and North Fork above station, of which 525 second-feet is for diversion across the divide into headwaters of Cache la Poudre River. Under this decree 9,200 acre-feet was diverted during 1921.

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

ACCURACY.—Stage-discharge relation shifted considerably during spring breakup; affected by ice November 6 to April 5. Rating curve used from April 1 to September 30 well defined. Shifting-control method used for October and November with previous rating curve as standard. Gage read to hundredths twice daily; readings for September apparently in error. Daily discharge ascertained by applying mean daily gage height to rating table except for periods of ice effect and period for which gage readings are in error, for which it was ascertained as noted in footnote to tables of daily discharge and except for period for which shifting-control method was used. Open-water records good except for September, for which they are fair; winter records fair.

Discharge measurements of Colorado River at Hot Sulphur Springs, Colo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 9	H. E. Grosbach	1.83	237	June 1	Robert Follansbee	7.14	5,770
Jan. 18	P. V. Hodges	[a] 4.2	129	23	do	5.52	2,930
Feb. 22	E. H. Peck	[a] 3.32	103	Sept. 21	do	1.79	269

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Colorado River at Hot Sulphur Springs, Colo., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	310	185					141	740	6,090	2,020	822	
2	296	185					210	1,150	5,400	1,750	822	
3	303	171					261	1,300	4,990	1,930	822	
4	296	165					275	1,670	5,620	1,670	822	
5	289	167					270	1,750	6,090	1,430	768	
				147								
6	278	154					302	1,930	8,310	1,360	640	
7	264	149					298	2,110	6,860	1,360	590	
8	247	144	173				251	1,840	6,860	1,360	565	
9	240	138					268	1,430	6,340	1,300	565	
10	244	134					272	1,300	7,130	1,300	615	
11	247	127					358	1,360	8,000	1,360	565	
12	247	127					445	1,360	8,000	1,430	540	
13	247	134					445	1,670	8,000	1,360	565	
14	244	141					445	1,840	8,000	1,360	565	
15	237	147			111		445	2,110	9,280	1,360	640	
						118						330
16	247	154					450	2,110	8,630	1,300	640	
17	225	161					445	2,110	7,700	1,300	640	
18	228	165					445	2,020	6,600	1,300	615	
19	219	181					468	1,670	6,340	1,300	590	
20	228	185					468	2,210	4,990	1,240	590	
				127								
21	213	192					491	2,310	3,870	1,180	590	
22	200	185					516	2,640	3,130	1,180	590	
23	200	179	134				516	2,760	2,880	1,180	540	
24	219	173					540	3,270	3,000	1,070	540	
25	228	169					565	3,710	3,000	1,070	540	
26	205	167					540	3,710	2,880	1,150	565	
27	183	167					491	3,130	2,760	1,100	540	
28	183	165					445	3,870	2,880	905	565	
29	181	167					516	4,590	2,530	822	540	
30	183	173					565	5,190	2,310	822	540	
31	183	------			------		------	5,400	------	850	540	------

NOTE.—Stage-discharge relation affected by ice Nov. 6 to Apr. 5; discharge ascertained by means of study discharge measurements, gage-height and temperature records. Gage readings unreliable Sept. 1-30; mean discharge ascertained by comparison with flow of other streams in the drainage basin. Discharge estimated for Apr. 16, on account of error in gage height.

Monthly discharge of Colorado River at Hot Sulphur Springs, Colo., for the year ending Sept. 30, 1921.

Month	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	310	181	236	14,500
November	192	127	162	9,640
December	----------	----------	153	9,410
January	----------	----------	133	8,180
February	----------	----------	111	6,160
March	----------	----------	118	7,260
April	565	141	405	24,100
May	5,400	740	2,400	148,000
June	9,280	2,310	5,620	334,000
July	2,020	822	1,290	79,300
August	822	540	615	37,800
September	----------	----------	330	19,600
The year	9,280	----------	964	698,000

NOTE.—See footnote to table of daily discharge.

COLORADO RIVER AT GLENWOOD SPRINGS, COLO.

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

DRAINAGE AREA.—4,560 square miles (revised; measured on map of Colorado, scale 1:500,000).

RECORDS AVAILABLE.—January 1, 1900, to September 30, 1921; also May 12 to July 17, 1899, at point just above Roaring Fork.

GAGE.—Friez water-stage recorder on right bank in front of power house; installed May 17, 1910; inspected by Forest Service employee. See Water-Supply Paper 175 for history of early gages and gage used in 1905 which was also used until May 17, 1910. No change in gage datum.

DISCHARGE MEASUREMENTS.—Made from cable beneath 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 at riffle 300 feet downstream; slightly shifting. Banks not subject to overflow except at extreme high stages.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 12.3 feet at 8 p. m. June 15 (discharge, 29,000 second-feet); minimum stage, 1.6 feet at 5 p. m. February 6 (discharge, 80 second-feet).

1900–1921: Maximum stage recorded, 12.55 feet at noon June 14 and 15, 1918 (discharge, 30,100 second-feet); minimum stage recorded that of February 6, 1921.

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

DIVERSIONS.—Court decrees for diversion of 48 second-feet of water from Colorado River for irrigation between this station and Hot Sulphur Springs and 1,250 second-feet for power. Water diverted for power is returned to river above Glenwood Springs.

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

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Operation of water-stage recorder fairly satisfactory (see footnote to daily-discharge table). Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable diurnal fluctuation, by averaging the bi-hourly discharge, except for periods during which recorder did not operate for which it was ascertained as indicated in footnote to daily-discharge table. Records excellent except for periods of missing gage-height record, for which they are fair.

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

Discharge measurements of Colorado River at Glenwood Springs, Colo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 30	H. E. Grosbach	3.90	1,120	Jan. 25	Peck and Hodges	3.71	1,050
Dec. 17	P. V. Hodges	2.63	338	Mar. 7	Peck and Perkins	4.02	1,370
Jan. 24	Peck and Hodges	3.34	770	Sept. 9	Robert Follansbee	4.58	2,080
25	do	3.32	782				

Daily discharge, in second-feet, of Colorado River at Glenwood Springs, Colo., for the year ending Sept. 30, 1921.

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,500	1,160	860	874	780	928	1,080	2,180	21,700	8,720	3,050	3,500
2	1,500	1,250	885	738	696	984	1,110	3,020	21,700	8,390	3,100	3,820
3	1,500	1,260	994	852	679	1,020	1,100	3,920	21,200	8,390	3,150	3,300
4	1,440	1,230	1,040	962	842	1,120	1,330	5,230	20,400	7,740	3,150	2,930
5	1,440	1,190	951	915	753	1,240	1,680	6,800	21,200	7,420	3,200	2,600
6	1,380	1,130	908	860	539	1,400	1,800	8,390	22,500	6,800	2,930	2,310
7	1,380	1,170	913	820	690	1,420	1,680	9,750	24,300	6,200	2,930	2,180
8	1,330	1,200	922	780	742	1,330	1,380	9,060	23,400	5,630	2,600	2,120
9	1,280	1,260	917	735	679	1,230	1,300	7,110	23,400	5,360	2,450	2,050
10	1,280	1,250	832	798	700	1,050	1,310	6,500	25,100	5,100	2,520	1,980
11	1,270	1,250	936	682	761	1,010	1,280	5,910	26,400	5,100	2,520	1,920
12	1,310	1,130	883	631	719	1,000	1,500	5,630	27,300	5,200	2,450	1,860
13	1,300	1,070	679	695	596	987	1,860	6,500	26,800	5,400	2,450	1,800
14	1,330	1,080	846	792	697	774	1,800	8,060	26,000	5,600	2,450	1,740
15	1,330	1,200	678	880	765	1,120	1,800	9,060	27,700	5,800	2,760	1,680
16	1,280	1,210	573	815	632	1,210	1,740	10,100	27,700	5,630	3,200	1,620
17	1,330	987	662	882	601	1,560	1,330	11,200	25,600	5,630	2,930	1,560
18	1,290	1,060	811	941	631	1,500	1,560	11,600	22,100	5,360	2,680	1,560
19	1,500	1,220	827	983	687	1,620	1,800	11,900	19,100	5,500	2,450	1,560
20	1,300	1,240	710	964	690	1,680	1,920	10,800	16,100	5,630	2,450	1,620
21	1,260	1,160	1,050	805	670	1,740	2,180	9,750	13,100	4,850	2,520	1,560
22	1,310	1,190	807	796	650	1,560	2,120	10,800	11,600	4,730	2,520	1,500
23	1,260	1,150	668	731	640	1,440	2,050	11,900	11,600	5,360	3,200	1,440
24	1,330	1,140	786	638	650	1,560	2,310	13,100	11,900	5,230	4,140	1,440
25	1,330	960	666	902	670	1,440	2,760	14,400	11,900	4,850	4,260	1,330
26	1,290	960	661	751	730	1,310	2,310	14,800	11,200	4,490	4,030	1,380
27	1,260	1,070	788	726	805	1,180	2,120	14,400	10,800	4,260	3,500	1,280
28	1,250	1,090	720	794	919	1,090	1,920	15,700	10,500	3,820	3,300	1,220
29	1,250	1,040	776	823	-------	1,090	1,860	17,400	10,100	3,500	3,200	1,220
30	1,220	820	829	653	-------	1,090	1,920	20,000	9,400	3,200	3,200	1,210
31	1,180	-------	984	766	-------	1,080	-------	21,200	-------	3,020	3,110	-------

NOTE.—Recorder not operating Oct. 8, Jan. 5-8, Feb. 20-26, Mar. 4-5, July 12-15, Aug. 1-4, Sept. 11-16; discharge determined by comparison with flow of Colorado River at Hot Sulphur Springs and Eagle River at Eagle. Daily discharge determined by averaging bi-hourly discharge, Nov. 18, 30, Dec. 1 to Jan. 4, Jan. 11 to Feb. 19, Feb. 27 to Mar. 3, and Mar. 14.

Monthly discharge of Colorado River at Glenwood Springs, Colo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1,500	1,180	1,330	81,800
November	1,260	820	1,140	67,800
December	1,050	573	825	50,700
January	983	631	806	49,600
February	919	539	700	38,900
March	1,740	774	1,250	76,900
April	2,760	1,080	1,730	103,000
May	21,200	2,180	10,200	627,000
June	27,700	9,400	19,400	1,150,000
July	8,720	3,020	5,550	341,000
August	4,260	2,450	2,980	183,000
September	3,820	1,210	1,910	114,000
The year	27,700	539	3,990	2,880,000

COLORADO RIVER NEAR PALISADE, COLO.

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

DRAINAGE AREA.—8,790 square miles (revised; measured on map of Colorado, scale 1:500,000).

RECORDS AVAILABLE.—April 9, 1902, to September 30, 1921.

GAGE.—Chain gage on downstream side of bridge near midspan; read to tenths twice daily by A. Barnhisel.

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

CHANNEL AND CONTROL.—Bed composed of gravel, silt, and scattered boulders. Control at rapids 300 feet downstream; practically permanent. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—No data.

ICE.—Stage-discharge relation affected by ice. Data insufficient to warrant determination of discharge.

DIVERSIONS.—Principal diversion between Glenwood Springs and the gaging station near Palisade is the high-line canal of the Bureau of Reclamation which has a capacity of 1,425 second-feet. Of the amount diverted, power water is returned to the river to supply a priority of 521 second-feet for the Grand Valley canal.

REGULATION.—None.

COOPERATION.—Complete records furnished by United States Bureau of Reclamation.

Discharge measurements of Colorado River near Palisade, Colo., during the year ending Sept. 30, 1921.

[Made by C. S. Hoag.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Apr. 12	13.32	2,750	Aug. 11	13.9	3,850
May 5	17.2	12,800	Sept. 26	12.9	2,110
July 22	15.65	7,680			

Daily discharge, in second-feet, of Colorado River near Palisade, Colo., for the year ending Sept. 30, 1921

Day.	Oct.	Nov.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,250	2,460	1,500	2,250	2,120	3,980	34,600	18,000	5,480	6,340
2	2,250	2,320	1,500	2,460	1,820	5,030	34,000	17,000	6,740	7,160
3	2,250	2,250	1,500	2,540	2,180	6,880	33,100	14,500	6,210	6,210
4	2,180	2,320	1,580	2,780	2,250	9,740	32,500	13,900	5,960	5,360
5	2,120	2,180	1,700	2,860	2,780	12,400	32,500	14,100	5,250	4,810
6	2,120	2,390	1,640	2,780	2,940	15,600	34,300	12,700	4,810	4,600
7	2,120	4,180	1,580	2,940	3,030	17,800	40,200	10,900	4,280	3,780
8	2,060	2,700	1,370	2,620	2,620	16,600	38,200	10,100	3,980	3,580
9	2,000	2,390	1,480	2,460	2,460	13,800	37,000	9,900	3,680	3,390
10	2,000	2,320	1,480	2,120	2,320	11,400	41,900	10,400	3,580	3,030
11	2,000	2,320	1,820	2,060	2,390	10,600	44,400	9,900	3,580	3,030
12	2,000	2,180	1,820	2,060	2,620	10,200	46,200	10,100	3,480	2,780
13	2,000	2,250	1,580	1,940	3,210	11,400	47,700	11,000	3,300	2,620
14	2,000	2,120	1,640	1,820	3,390	14,100	45,800	11,200	2,120	2,460
15	2,000	2,180	1,940	1,880	3,480	16,800	48,800	11,900	3,480	2,120
16	2,000	2,250	1,820	2,250	3,210	19,500	50,800	11,000	3,880	2,180
17	2,000	2,000	1,640	2,540	2,860	21,200	43,600	10,200	4,080	2,120
18	2,060	2,000	1,480	2,700	2,320	20,100	37,600	9,900	3,880	2,120
19	2,060	1,880	1,580	2,780	3,030	21,400	31,600	9,260	3,390	2,180
20	2,060	2,000	1,640	2,940	3,120	18,200	26,800	9,420	3,120	2,060
21	2,320	2,250	1,320	2,940	3,390	17,000	22,600	8,790	3,390	2,060
22	2,320	2,000	1,640	2,780	3,480	18,000	20,500	7,740	3,680	2,120
23	2,120	1,940	1,820	2,700	3,580	20,100	21,400	8,480	4,280	2,060
24	2,120	2,000	1,880	2,620	2,980	22,600	20,500	9,100	7,740	2,000
25	1,940	2,000	1,940	2,460	4,600	23,500	19,900	8,180	8,030	2,000
26	1,940	1,880	2,180	2,180	4,390	23,300	19,700	7,740	6,740	1,940
27	2,000	1,940	2,460	2,060	3,480	23,800	19,700	7,160	6,080	1,880
28	1,940	1,880	2,180	2,000	3,210	25,000	19,400	6,600	5,360	1,820
29	1,940	1,880	-------	2,060	3,210	28,400	19,200	5,840	5,250	1,820
30	1,940	1,760	-------	2,060	3,300	32,200	18,600	5,250	5,140	1,760
31	2,060	-------	-------	2,120	-------	34,000	-------	4,920	5,250	-------

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

Monthly discharge of Colorado River near Palisade, Colo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	2,320	1,940	2,070	127,000
November	4,180	1,760	2,210	132,000
February	2,460	1,320	1,700	94,400
March	2,940	1,820	2,410	148,000
April	4,600	1,820	3,030	180,000
May	34,000	3,980	17,600	1,080,000
June	50,800	18,600	32,800	1,950,000
July	18,000	4,920	10,200	627,000
August	8,030	3,120	4,720	290,000
September	7,160	1,760	3,050	181,000

NOTE.—See footnote to table of daily discharge.

COLORADO RIVER NEAR FRUITA, COLO.

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

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

RECORDS AVAILABLE.—Flood records during 1908, 1909, 1910; continuous records April 1, 1911, to September 30, 1921.

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

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

CHANNEL AND CONTROL.—Bed composed of silt and gravel which will shift during high water, scouring out at high stages and filling in afterwards. Control is riffle 600 feet downstream; somewhat shifting. Banks subject to overflow at stage of 14 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 15.2 feet at 8 a. m. and 5 p. m. June 16 (discharge, 81,100 second-feet); minimum stage probably occurred during winter.

1908–1921: Maximum stage recorded that of June 16, 1921. Weather Bureau states that highest stage known was about 18.5 feet on July 4, 1884 (discharge estimated from extension of rating curve and levels across overflow, 125,000 second-feet); minimum stage, 1.9 feet August 26–30, 1919 (discharge, 1,270 second-feet).

ICE.—Stage-discharge relation seriously affected by ice; daily discharge not determined during winter.

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

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Rating curve fairly well defined below 40,000 second-feet. Gage read to tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except for period affected by ice December 14 to January 31 and shifting control September 11–30. Records good below 40,000 second-feet and fair above.

Discharge measurements of Colorado River near Fruita, Colo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 26	H. E. Grosbach	3.84	3,610
Apr. 9	Robert Follansbee	4.02	4,010
Sept. 6	Follansbee and Snyder	5.48	6,970

Daily discharge, in second-feet, of Colorado River near Fruita, Colo., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3,910	4,200	3,040		2,730	3,720	3,540	6,380	57,100	25,600	9,380	9,380
2	3,910	4,100	3,040		2,730	3,910	3,200	9,710	55,100	22,600	10,800	9,710
3	3,910	3,910	3,040		2,730	3,910	3,200	13,700	53,100	21,300	9,380	9,060
4	3,720	3,910	3,200		2,730	4,100	3,910	17,200	53,100	20,000	8,750	9,060
5	3,540	4,000	3,040		2,730	4,290	4,860	21,300	51,100	18,800	7,880	8,160
				2,680								
6	3,370	3,720	3,040		2,730	4,290	5,270	27,200	55,100	17,700	7,610	7,100
7	3,370	3,910	2,880		2,580	4,480	5,060	28,800	62,100	15,200	7,100	6,380
8	3,540	4,290	2,880		2,580	4,290	4,480	24,800	63,100	14,200	6,380	5,920
9	4,720	3,910	2,880		2,580	4,100	3,720	21,300	61,100	13,300	5,920	5,480
10	3,720	3,910	2,880		2,730	3,540	3,720	17,700	67,100	13,300	5,480	5,270
11	3,040	3,910	2,880		2,730	3,200	3,540	15,700	69,100	13,300	5,480	4,480
12	3,200	3,910	2,880		2,730	2,880	3,910	14,700	71,100	12,400	5,480	4,670
13	3,200	3,910	2,730	2,660	2,730	3,200	4,670	16,600	75,100	14,200	5,060	4,480
14	3,200	3,820			2,880	3,720	4,860	21,900	73,100	15,200	5,060	4,290
15	3,370	3,720			3,200	3,720	5,060	26,400	77,100	15,700	5,700	4,100
16	3,370	3,540	2,800		3,040	3,910	5,060	30,500	81,100	16,200	6,380	3,720
17	3,370	3,370			2,730	4,480	4,670	37,600	72,100	15,200	6,380	3,370
18	3,370	3,370		2,900	2,730	4,860	4,290	34,000	61,100	15,200	5,920	3,370
19	3,370	3,200			2,730	4,480	4,290	34,000	53,100	14,200	5,920	3,540
20	3,370	3,460			2,730	4,480	5,060	30,500	46,100	13,700	5,480	3,720
21	4,290	3,460			2,880	4,670	5,480	25,600	39,500	12,800	5,920	3,540
22	3,720	3,540			2,730	4,670	5,270	25,600	35,800	12,000	6,380	3,540
23	3,910	3,540			2,580	4,670	5,920	28,800	34,000	12,400	8,750	3,540
24	3,820	3,370			2,730	4,670	6,850	34,000	35,800	13,300	14,700	3,540
25	3,460	3,370			3,040	4,480	8,160	37,600	34,000	12,800	12,000	3,370
26	3,460	3,370	2,410	2,830	3,200	4,290	7,880	38,600	32,200	12,800	10,800	3,040
27	3,630	3,200			3,370	4,290	6,380	35,800	31,400	12,800	9,380	2,880
28	3,630	3,200			3,720	4,100	5,480	37,600	30,500	10,800	9,380	2,730
29	3,540	3,200				3,720	5,270	45,200	26,400	9,710	8,750	2,580
30	3,370	3,040				3,540	5,480	53,100	26,400	8,450	8,160	2,580
31	3,910					3,540		56,100		9,060	8,450	

NOTE.—Stage-discharge relation affected by ice Dec. 14 to Jan. 31. Braced figures show mean discharges for periods indicated and are based on records of Gunnison River near Grand Junction, Colo. Shifting-control method used Sept. 10–30.

Monthly discharge of Colorado River near Fruita, Colo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	4,720	3,040	3,590	221,000
November	4,290	3,040	3,650	217,000
December			2,730	168,000
January			2,770	170,000
February	3,720	2,580	2,830	157,000
March	4,860	2,880	4,070	250,000
April	8,160	3,200	4,950	295,000
May	56,100	6,380	28,000	1,720,000
June	81,100	26,400	52,800	3,140,000
July	25,600	8,450	14,700	904,000
August	14,700	5,060	7,680	472,000
September	9,710	2,580	4,890	291,000
The year	81,100		11,100	8,000,000

COLORADO RIVER NEAR TOPOCK, ARIZ.

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

DRAINAGE AREA.—171,000 square miles.

RECORDS AVAILABLE.—February 1, 1917, to September 30, 1921.

GAGE.—Stevens continuous water-stage recorder on right bank at mouth of Mohave Wash just above point where river enters a narrow section of the canyon.

DISCHARGE MEASUREMENTS. Made from cable just below gage.

CHANNEL AND CONTROL.—Channel straight above and below gage. Above the gage the channel is wide and the bed of loose sand is constantly shifting. At low stages large sand bars form numerous islands between Topock and the gage. Below the gage the river enters a steep walled rock canyon and the channel contracts from about 800 feet to 400 feet. The bed in the canyon scours during floods and fills during low stages. The control is indefinite.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 28.2 feet on June 22 (discharge, 174,000 second-feet); minimum discharge 5,900 second-feet on December 27.

1917–1921: Maximum stage and discharge occurred on June 22, 1921;. minimum discharge, 4,100 second-feet on January 16, 1919.

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

ACCURACY.—Stage-discharge relation not permanent. During the year 30 discharge measurements were made covering a range in discharge from 8,000 to 80,000 second-feet. Operation of water-stage recorder satisfactory during most of the year. Mean daily gage heights determined by inspecting recorder graph. Daily discharge ascertained by shifting-control method. Records fair.

Daily discharge, in second-feet, of Colorado River near Topock, Ariz., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	7,800	10,300	7,900	6,500	8,900	10,500	18,500	27,000	87,800	70,000	47,700	31,600
2	7,900	10,800	7,920	6,100	8,900	10,800	18,300	23,500	90,500	67,000	45,000	30,800
3	8,000	10,400	7,930	6,100	8,900	10,500	18,300	21,300	96,600	64,000	49,000	30,100
4	7,900	10,200	7,950	6,100	9,000	11,000	17,400	19,900	104,000	60,000	52,500	29,400
5	8,200	10,000	7,960	6,100	9,000	11,000	17,100	18,700	111,900	57,000	60,000	28,700
6	8,500	9,700	7,980	6,100	9,000	11,500	16,800	18,700	112,000	55,000	51,700	28,000
7	8,600	9,500	8,000	6,100	9,000	12,500	15,900	19,000	116,000	50,000	43,300	27,200
8	9,200	9,200	8,010	6,200	8,900	12,800	15,500	32,500	115,000	47,000	35,000	26,400
9	9,500	9,000	8,030	6,200	7,700	12,800	14,400	51,000	114,000	44,000	28,500	24,700
10	9,200	8,800	8,040	6,300	7,700	12,800	13,700	63,000	116,000	41,000	26,000	24,900
11	9,000	8,560	8,060	6,700	7,700	13,600	12,800	74,500	118,000	39,000	28,500	24,100
12	8,800	8,340	8,080	6,900	7,700	13,600	13,000	79,500	118,000	34,000	24,000	23,400
13	8,300	8,120	8,090	7,000	8,900	13,600	15,000	79,500	121,000	38,000	24,500	22,600
14	8,200	7,910	8,110	7,200	9,000	14,500	13,000	78,500	122,000	42,000	19,500	19,500
15	8,500	7,690	8,120	7,100	8,900	14,500	13,500	72,000	124,000	42,000	20,500	17,500
16	8,500	7,480	8,140	7,100	8,900	14,900	14,800	68,800	136,000	42,000	19,000	16,500
17	8,700	7,260	8,160	7,100	9,000	15,500	14,500	64,100	141,000	40,200	17,500	14,500
18	8,600	7,300	8,170	7,100	9,000	15,500	15,100	62,100	148,000	39,500	17,500	13,300
19	8,800	7,350	8,000	7,500	9,000	15,800	16,000	66,600	154,000	42,000	22,000	12,800
20	8,900	7,390	7,900	7,800	9,000	15,800	17,000	74,100	162,000	42,000	26,500	12,500
21	9,300	7,440	7,800	7,800	9,000	15,400	17,500	82,200	170,000	44,000	22,200	12,200
22	9,600	7,480	7,200	7,500	9,500	15,000	18,000	89,000	174,000	42,000	18,000	11,800
23	9,800	7,530	6,700	6,400	9,500	15,400	18,100	93,300	166,000	36,000	11,000	11,500
24	9,600	7,570	6,300	6,000	9,950	15,800	19,100	95,300	153,000	38,900	35,000	11,200
25	9,400	7,620	6,100	6,700	9,950	15,800	19,500	93,300	132,000	33,800	55,500	10,100
26	9,600	7,660	6,000	7,800	10,000	16,800	20,000	83,000	119,000	36,000	66,500	9,000
27	9,600	7,710	5,900	7,800	9,500	19,000	21,800	79,500	105,000	34,800	63,000	9,000
28	9,600	7,750	6,000	7,730	10,000	19,500	22,000	78,000	92,000	35,500	59,500	9,000
29	9,600	7,800	6,100	8,500	-------	19,500	22,300	79,500	78,000	41,000	48,500	9,000
30	9,600	7,850	6,100	8,500	-------	19,000	25,500	82,200	72,000	43,000	33,000	9,900
31	9,400	-------	6,500	8,500	-------	18,500	-------	85,000	-------	44,500	32,300	-------

Monthly discharge of Colorado River near Topock, Ariz., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	9,800	7,800	8,910	548,000
November	10,800	7,260	8,390	499,000
December	8,170	5,900	7,460	459,000
January	8,500	6,000	6,990	430,000
February	10,000	7,700	8,980	499,000
March	19,500	10,500	14,600	898,000
April	25,500	12,800	17,100	1,020,000
May	95,300	18,700	63,100	3,880,000
June	174,000	72,000	122,000	7,260,000
July	70,000	33,800	44,700	2,750,000
August	66,500	11,000	35,600	2,190,000
September	31,600	9,000	18,700	1,110,000
The year	174,000	5,900	29,800	21,500,000

COLORADO RIVER AT YUMA, ARIZ.

LOCATION.—In NE. ¼ NE. ¼ sec. 35, T.16 S., R. 22 E., San Bernardino base and meridian, 100 feet upstream from Southern Pacific Co.'s original bridge at Yuma, Yuma County. Since the change in channel on June 7, 1920, Gila River enters from the east 5 miles upstream from this station.

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

RECORDS AVAILABLE.—April 1, 1878, to September 30, 1921. Gage heights only before January 1, 1902.

GAGE.—Vertical staff in two sections on left bank; zero of gage is 102.79 feet above mean sea level. Published incorrectly in Water-Supply Paper 509.

DISCHARGE MEASUREMENTS.—Made from cable 1,000 feet downstream from gage.

CHANNEL AND CONTROL.—Bed composed of shifting sand and silt; subject to much scour during high water. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge during year, 186,000 second-feet on June 28; minimum mean daily discharge, 5,100 second-feet on December 27.

1902–1921: Maximum mean daily discharge, 240,000 second-feet, January 22, 1916; minimum mean daily discharge, 1,800 second-feet January 16, 1919. Maximum discharge on January 22, 1916, was caused by a flood from Gila River.

DIVERSIONS.—Water is diverted for irrigation and power from main river and tributaries above station. At Laguna dam about 15 miles upstream water is diverted for the Yuma project of the United States Bureau of Reclamation. The annual diversion is about 500,000 acre-feet. Some of the water diverted is returned to the river at the spillway below the gaging station at Yuma.

REGULATION.—Flow affected at times by sluicing at Laguna dam.

ACCURACY.—During the year 164 discharge measurements were made at the station; daily discharge determined by shifting-control method.

COOPERATION.—Complete records furnished by the Bureau of Reclamation, but data have been revised slightly to conform to the computation rules used by the United States Geological Survey.

Daily discharge, in second-feet, of Colorado River at Yuma, Ariz., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	6,000	8,000	8,000	6,500	8,400	7,400	13,900	17,500	61,400	106,000	33,400	37,500
2	6,400	8,200	8,200	6,200	11,000	7,100	13,900	19,500	62,500	94,200	38,000	36,300
3	6,000	8,100	8,300	6,100	10,000	7,800	13,600	24,000	63,700	77,000	36,000	35,900
4	5,900	9,400	8,500	6,000	9,100	8,600	13,700	24,300	66,000	73,500	50,000	31,500
5	5,900	10,600	8,700	5,800	8,800	8,900	13,500	21,500	64,500	68,600	45,600	28,900
6	5,900	10,800	9,000	6,000	8,000	9,200	13,800	20,800	68,300	66,300	47,600	29,700
7	6,300	11,000	8,800	6,200	7,800	9,000	13,200	21,000	74,200	61,800	40,000	27,400
8	6,700	11,100	8,600	6,300	7,500	9,500	12,800	18,200	79,300	55,300	39,800	24,200
9	7,200	11,900	8,500	5,700	7,300	10,200	12,300	18,300	83,100	52,200	31,000	23,500
10	7,000	12,600	8,600	5,200	6,800	15,000	12,000	27,000	85,300	49,200	27,700	20,300
11	6,700	12,000	8,000	5,400	6,600	20,000	11,400	34,800	92,000	46,900	22,200	20,000
12	6,700	11,800	7,500	5,300	6,600	17,500	10,900	41,000	89,000	43,200	21,900	19,600
13	6,600	11,000	6,900	5,500	6,600	18,800	10,500	45,300	94,100	41,400	26,000	16,500
14	6,700	10,000	7,000	5,800	6,600	21,000	12,600	51,000	101,000	39,700	21,300	15,900
15	6,800	9,600	7,100	6,200	6,300	20,000	13,500	51,000	101,000	38,100	21,700	14,500
16	7,000	9,800	7,100	6,600	6,000	18,600	14,500	50,100	104,000	38,000	19,900	14,000
17	6,800	10,200	7,100	7,600	6,400	18,600	14,300	52,000	106,000	34,000	20,200	13,500
18	6,200	11,300	7,600	8,200	6,800	18,700	13,500	52,700	113,000	31,500	18,000	12,600
19	6,000	12,300	7,700	8,600	7,000	16,500	13,500	51,000	115,000	31,500	17,800	11,800
20	5,800	12,000	7,800	8,500	6,800	13,500	13,600	49,300	124,000	31,400	17,500	11,000
21	6,000	12,100	7,600	8,500	6,600	13,100	14,600	50,600	134,000	33,000	22,200	10,700
22	6,100	11,900	7,400	8,600	6,500	12,300	15,100	51,600	136,000	30,200	23,100	11,200
23	6,300	11,000	7,000	8,400	6,400	10,300	14,800	52,900	148,000	34,500	38,600	9,800
24	6,500	10,400	7,200	8,400	6,700	10,600	14,200	56,000	149,000	34,000	43,600	10,000
25	6,700	10,000	7,300	7,500	7,100	10,900	14,600	60,100	161,000	31,300	43,600	9,300
26	6,400	9,800	6,200	6,800	7,300	12,800	14,500	64,100	172,000	30,200	43,700	8,700
27	6,100	9,800	5,100	7,200	7,500	12,800	14,500	66,200	182,000	28,200	50,800	8,000
28	6,500	9,100	5,200	7,900	7,700	13,200	15,000	68,000	186,000	28,300	51,000	7,900
29	6,900	8,300	5,300	8,000	-------	13,900	15,500	64,000	173,000	28,400	61,300	8,000
30	7,500	8,200	5,200	8,100	-------	14,600	16,700	61,400	144,000	29,000	60,700	10,600
31	8,000	-------	5,400	8,200	-------	14,300	-------	61,000	---------	33,000	56,000	-------

Monthly discharge of Colorado River at Yuma, Ariz., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	8,000	5,800	6,500	400,000
November	12,600	8,000	10,400	619,000
December	9,000	5,100	7,350	452,000
January	8,600	5,200	6,950	427,000
February	11,000	6,000	7,360	409,000
March	21,000	7,100	13,400	824,000
April	16,700	10,500	13,700	815,000
May	68,000	17,500	43,400	2,670,000
June	186,000	61,400	111,000	6,600,000
July	106,000	28,200	45,800	2,820,000
August	61,300	17,500	35,200	2,160,000
September	37,500	7,900	18,000	1,070,000
The year	186,000	5,100	26,600	19,300,000

FRASER RIVER NEAR ARROW, COLO.

LOCATION.—In NE. ¼ sec. 4, T. 2 S., R. 75 W., a quarter of a mile from Vasquez siding on Denver & Salt Lake Railroad in Arapahoe National Forest and 1½ miles southwest of Arrow, Grand County. Nearest tributary enters half a mile above.

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

RECORDS AVAILABLE.—September 23, 1910, to September 30, 1921.

GAGE.—Friez water-stage recorder on left bank 300 feet upstream from old logging road crossing at Vasquez; inspected by forest ranger. Prior to June 3, 1916, vertical staff attached to downstream side of bridge on trail to Arrow and a quarter of a mile above railroad bridge was used. During winter, readings taken from staff gage 1 mile upstream at railroad bridge.

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

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

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 2.5 feet at 8 p. m. June 11 (discharge, 525 second-feet); minimum discharge probably occurred during winter.

1911–1921: Maximum discharge recorded, 820 second-feet at 9 p. m., June 13, 1918 (gage height, 2.9 feet); minimum discharge, 2 second-feet on March 30 1912 (gage-height, 0.60 foot).

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—Court decrees for diversions of 53 second-feet across divide from headwaters of Fraser River into headwaters of Clear Creek. During 1921 100 acre-feet were diverted. Below station, court decrees for 74 second-feet for irrigation and 61 second-feet for placer mining and power.

REGULATION.—Diurnal fluctuation during spring, caused by alternate melting and freezing of mountain snow. No artificial regulation.

ACCURACY.—Stage-discharge relation for regular station practically permanent; for winter station not permanent. Rating curve for regular station well defined between 15 and 400 second-feet. Staff gage read to hundredths once daily from October 8 to May 21. Operation of water-stage recorder satisfactory except for short periods, as shown in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table one daily gage reading or mean daily gage height determined by inspecting gage-height graph. Records excellent except during winter, for which they are fair.

Discharge measurements of Fraser River near Arrow, Colo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 7	H. E. Grosbach	0.45	16.2	June 22	Robert Follansbee	1.57	195
Jan. 19	P. V. Hodges	[a].81	6.8	Sept. 19	do	[b].54	20.7
Feb. 23	E. H. Peck	[a].66	6.1				

[a] Made at winter gage.
[b] Winter gage read 0.82 feet.

Daily discharge, in second-feet, of Fraser River near Arrow, Colo., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	18	16	12			7	13	15	281	162	52	38
2	17	21	12			7	13	15	281	157	49	36
3	17	22				8	14	16	323	142	45	34
4	16	23				8	14	17	323	127	42	32
5	16	25				9	15	17	337	120	40	31
6	16	20				9	15	16	340	110	39	30
7	16	23				10	15	17	323	105	38	30
8	16	20				10	15	17	327	101	36	29
9	16	19	10			10	16	17	381	99	35	27
10	15	18				11	16	25	429	96	35	25
11	15	16				11	18	33	453	94	35	24
12	15	18				11	18	51	473	96	35	24
13	15	17				11	15	73	441	92	35	23
14	15	17				12	14	85	417	90	37	22
15	14	18			6	12	14	92	453	88	35	22
16	15	18		7		12	14	92	373	85	32	22
17	14	17				11	14	108	337	84	28	22
18	13	18				11	14	100	300	80	26	22
19	13	19				11	15	100	271	80	25	22
20	13	15				12	14	103	229	73	25	21
21	13	14				12	16	97	210	72	27	20
22	14	31				12	15	150	204	71	30	20
23	15	18				12	14	202	213	70	33	19
24	16	19	7			12	14	235	218	69	33	19
25	16	18				12	14	268	227	65	37	19
26	16	16				11	13	271	215	64	36	19
27	16	14				11	13	265	204	58	39	18
28	16	14				12	13	291	194	55	46	18
29	29	18			-------	12	14	307	177	50	43	18
30	16	12			-------	12	14	271	170	45	42	18
31	15	-------			-------	12	-------	294	-------	50	39	-------

NOTE.—Stage-discharge relation affected by ice Dec. 3 to Mar. 10; discharge determined from discharge measurements and gage-height and temperature records. Braced figures show mean discharge for period indicated. No gage-height record Oct. 12, 13, 21–23, Jan. 1–18, 20–22, 27, 28, Mar. 17, Apr. 4–9, 15, 28–30, May 22, July 15, 22, 29, and Aug. 5–7; discharge interpolated except for period in January.

Monthly discharge of Fraser River near Arrow, Colo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	29	13	15.7	965
November	31	12	18.5	1,100
December	----------	----------	8.6	529
January	----------	----------	7	430
February	----------	----------	6	333
March	12	7	10.7	658
April	18	13	14.5	863
May	307	15	118	7,260
June	473	170	304	18,100
July	162	45	88.7	5,450
August	52	25	36.4	2,240
September	38	18	24.1	1,430
The year	473	----------	54.4	39,400

WILLIAMS FORK NEAR PARSHALL, COLO.

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

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

RECORDS AVAILABLE.—July 25, 1904, to September 30, 1921.

GAGE.—Bristol float type water-stage recorder at left end of bridge installed October 18, 1919, and referred to previously used vertical staff on downstream side of bridge pier; inspected by F. A. Field.

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

CHANNEL AND CONTROL.—Bed composed of coarse gravel and small boulders; shifts. Control is gravel bar 50 feet downstream; slightly shifting at intervals. Water flows through small overflow channels at and above stage of 4.1 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.95 feet at 8 a. m. June 9 (discharge, 1,510 second-feet); minimum discharge occurred during winter.

1904–1921: Maximum stage recorded, 6.0 feet at 9.45 a. m. June 14, 1918 (discharge, 2,520 second-feet); minimum stage, 2.1 feet on November 7, 1919 (discharge, 15 second-feet).

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—Court decrees for diversion of 1,416 second-feet from Williams Fork, all above station. Of this amount 700 second-feet is to be diverted to the eastern slope, but this diversion has not been made.

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

ACCURACY.—Stage-discharge relation practically permanent; affected by ice during winter. Rating curve well defined. Staff gage read to hundredths twice daily from November 21 to April 11. Water-stage recorder worked satisfactorily the remainder of the year except November 16, 17. Daily discharge ascertained by applying mean daily gage height to rating table except for periods during which stage-discharge relation was affected by ice. Records excellent except during winter period, for which they are fair.

Discharge measurements of Williams Fork near Parshall, Colo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Oct. 8	H. E. Grosbach	2.75	71	June 2	Robert Follansbee	4.50	1,090
Jan. 20	Hodges and Peck	[a] 2.68	44.2	Sept. 21	do	2.79	95
Feb. 24	E. H. Peck	2.43	39.8				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Williams Fork near Parshall, Colo., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	93	84				48	76	142	1,140	700	185	152
2	89	81				45	76	176	1,090	660	188	145
3	84	63				48	89	260	1,140	652	179	130
4	81	71				60	96	334	1,180	620	158	128
5	81	76				76	96	412	1,180	596	152	120
6	82	82				54	61	486	1,220	532	158	113
7	82	76				63	74	465	1,180	508	148	113
8	82	79	64	42		51	66	334	1,270	472	138	111
9	82	79				52	79	300	1,270	437	138	115
10	82	71				56	66	260	1,320	430	132	120
11	89	69				63	88	260	1,360	406	132	120
12	86	71				71	96	310	1,320	437	130	113
13	96	82				61	84	388	1,270	406	167	107
14	91	68				57	93	412	1,220	424	161	102
15	84	63			35	66	72	430	1,270	400	140	100
16	86	64				60	54	500	1,090	352	158	100
17	82	65				76	81	540	1,040	340	142	100
18	82	66				66	88	644	1,000	346	128	102
19	82	55				82	93	604	865	370	126	100
20	74	55				98	111	486	780	305	128	88
21	76	63				86	104	556	740	280	152	91
22	61	55				74	96	644	780	290	152	95
23	61	46	38	41		82	104	660	820	290	164	98
24	84	42				79	122	740	820	240	158	98
25	84	48				82	111	820	780	220	145	93
26	79	55				63	104	780	780	224	128	88
27	60	52				48	104	740	780	210	138	88
28	74	50				45	98	910	764	188	128	84
29	79	48			-------	63	96	1,000	740	185	132	79
30	86	45			-------	66	115	1,090	740	170	152	79
31	84	-------			-------	66	-------	1,140	-------	158	158	-------

NOTE.—Stage-discharge relation affected by ice Nov. 26 to Mar. 1, Mar. 9, and 10. Discharge determined from gage height and temperature records, discharge measurements, and observer's notes. Braced figures show mean discharge for period indicated.

Monthly discharge of Williams Fork near Parshall, Colo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	96	60	81.2	4,990
November	84	42	64.1	3,810
December	----------	----------	50.6	3,110
January	----------	----------	41.5	2,550
February	----------	----------	35.0	1,940
March	98	45	64.7	3,980
April	122	54	89.8	5,340
May	1,140	142	543	33,400
June	1,360	740	1,030	61,300
July	700	158	382	23,500
August	188	126	148	9,100
September	152	79	106	6,310
The year	1,360	----------	220	159,000

BLUE RIVER AT DILLON, COLO.

LOCATION.—In sec. 18, T. 5 S., R. 77 W., at highway bridge in outskirts of Dillon, Summit County. Nearest tributaries, Snake River and Tenmile Creek, enter a short distance below.

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

RECORDS AVAILABLE.—October 15, 1910, to September 30, 1921.

GAGE.—Gurley water-stage recorder installed April 21, 1920, and referred to previously used vertical staff on right abutment of bridge; inspected by employee of United States Forest Service.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of compact gravel upon which lodges detritus from hydraulic dredges near Breckenridge. Control is riffle 50 feet downstream; shifts at intervals. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.15 feet at 7 a. m. June 10 (discharge, 1,100 second-feet); minimum discharge occurred during winter.

1911–1921: Maximum stage recorded, 4.35 feet June 2, 1914 (discharge, 1,180 second-feet); minimum discharge, 14 second-feet on January 30 and February 9, 1915 (gage height, 1.10 feet).

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—Court decrees for diversion of 2.3 second-feet for irrigation from Blue River above station and 63 second-feet below; also placer decrees for diversion of 118 second-feet near Breckenridge. Small unadjudicated diversion from headwaters of Blue River across Boreas Pass to Tarryall Creek.

REGULATION.—Diurnal fluctuation during spring, caused by alternate melting and freezing of mountain snow, no artificial regulation.

ACCURACY.—Stage-discharge relation not permanent. Rating curves well defined between 30 and 700 second-feet; applied indirectly October 1 to June 10. Operation of water-stage recorder satisfactory except during periods of missing gage heights. Daily discharge ascertained by applying to rating table mean gage height obtained by inspection of recorder graph except as noted in footnote to table of daily discharge. Records fair.

Discharge measurements of Blue River at Dillon, Colo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 3	H. E. Grosbach	1.44	50	Mar. 3	Peck and Heaton	[a] 1.20	21.8
Jan. 28	Hodges and Peck	[a] 1.38	25.1	June 25	Robert Follansbee	3.08	568

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Blue River at Dillon, Colo., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.
1	54	47	43	55	650	490	239	261
2	51	46	44	66	750	482	242	248
3	49	44	46	95	800	469	242	236
4	48	44	48	135	850	434	221	230
5	48	44	48	184	875	455	200	215
6	48	44	48	224	900	332	160	200
7	47	44	50	263	875	324	140	190
8	46	45	50	240	900	328	130	160
9	46	44	50	178	1,000	332	135	123
10	46	42	46	140	1,020	332	144	120
11	46	41	44	128	1,040	309	160	110
12	46	40	42	126	1,070	324	172	110
13	46	40	42	148	1,020	374	169	105
14	46	40	42	175	1,020	408	169	105
15	46	40	41	311	1,040	396	172	100
16	46	40	37	331	935	413	172	100
17	46	40	38	323	908	378	172	100
18	46		40	363	880	422	170	100
19	46		42	331	770	486	170	100
20	46		43	291	700	357	165	100
21	46		42	315	584	349	175	95
22	46		43	375	611	378	200	94
23	46		48	371	645	378	236	94
24	46	38	52	429	616	357	236	91
25	46		53	452	616	336	236	88
26	46		50	429	580	309	224	86
27	46		48	464	539	287	221	83
28	46		46	498	548	258	270	88
29	46		47	532	539	242	277	81
30	46		50	568	499	239	239	78
31	47			625		236	258	

NOTE.—Discharge Oct. 11 to Nov. 17 and Apr. 13 to June 10, computed by shifting-control method. No gage-height record Oct. 12–18, 20–27, Nov. 18 to Apr. 8, Apr. 10–12, 26, 27, May 6, 27, 28, June 2–4, 20, 26, Aug. 5–9, 18–22, Sept. 4–8, and 10–21. Discharge for days in October that have no gage-height record, interpolated; in November, estimated; and from Apr. 1 to Sept. 21, obtained by comparing hydrograph with that for Eagle River at Eagle.

Monthly discharge of Blue River at Dillon, Colo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	54	46	46.8	2,880
November	47		40.6	2,420
December			35	2,150
January			30	1,840
February			26	1,440
March			23	1,410
April	53	37	45.4	2,700
May	625	55	296	18,200
June	1,070	499	793	47,200
July	490	236	362	22,300
August	277	130	197	12,100
September	261	78	130	7,740
The year	1,070		169	122,000

NOTE.—Mean monthly discharge for December, January, February, and March, based on discharge measurements, weather records, and observer's notes.

EAGLE RIVER AT REDCLIFF, COLO.

LOCATION.—In sec. 29, T. 6 S., R. 80 W., at footbridge in Redcliff, Eagle County. Nearest tributary, Turkey Creek, enters 100 yards below station; Homestake Creek enters 1 mile below.

DRAINAGE AREA.—74 square miles, measured on topographic map).

RECORDS AVAILABLE.—January 8, 1911, to September 30, 1921.

GAGE.—Chain on downstream side of footbridge; read by forest ranger. Staff gage in same section and referred to same datum, read during high water.

DISCHARGE MEASUREMENTS.—Made from highway bridge 300 yards above station or by wading.

CHANNEL AND CONTROL.—Bed composed of boulders and is very rough. Control short distance below gage; shifts between narrow limits. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage not recorded, as gage was not read during period of high water. Minimum discharge, 7 second-feet March 12.

1911–1921: Maximum stage recorded, 4.0 feet, June 5, 1912 (discharge, 1,010 second-feet); minimum stage, 0.01 foot at 7 a. m., October 15, 1917 (discharge, 1 second-foot).

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

DIVERSIONS.—Court decrees for diversions of 6 second-feet from Eagle River above station, and also a decree for diversion to the Arkansas basin of 18.5 second-feet from Piney Creek, a tributary. During 1921, 1,850 acre-feet were diverted.

REGULATION.—Diurnal fluctuation during spring, caused by alternate melting and freezing of mountain snow. Filling of Pando ice pond in fall reduces flow for a few days.

ACCURACY.—Stage-discharge relation shifts between narrow limits. Rating curve well defined between 5 and 500 second-feet. Gage read to hundredths twice daily. Readings for July 10 to September 24 unreliable. Daily discharge ascertained by applying mean daily gage height to rating table, except as noted in footnote to table of daily discharge. Records fair.

Discharge measurements of Eagle River at Redcliff, Colo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 2	H. E. Grosbach	0.71	15.7	Mar. 13	E. H. Peck	0.75	15.2
Jan. 26	Hodges and Peck	.65	13.1	June 13	Robert Follansbee	2.85	440

Daily discharge, in second-feet, of Eagle River at Redcliff, Colo., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	20	13		10	12	12	10	52	580	140		
2	20	12		10	12	12	11	59	500	122		
3	20	11		10	12	12	14	92	450	125		
4	19	10		11	12	12	14	156	495	125		
5	19	8		12	12	14	14	206	520	133		
6	19	8		12	12	14	14	193	490	102		
7	19	8		12	12	12	14	168	450	83		
8	19	8		12	12	12	14	206	500	92		
9	19	8		12	12	12	14	180	650	83		
10	19			10	12	8	14	180	700			
11	18			12	13	8	15	193	600			
12	18			12	14	7	18	156	500			
13	18			12	15	8	20	180	444			
14	17			10	16	8	22	168	450			
15	17			10	12	8	25	206	480			
16	17			12	10	11	25	274	440			
17	16			12	10	12	22	333	400			
18	15			12	10	12	22	364	360			
19	14			12	8	12	24	303	340			
20	13			12	8	12	25	180	300			
21	13			12	8	14	25	246	246			
22	13			12	8	34	25	411	219			
23	13			12	8	16	32	460	200			
24	13			12	10	16	41	444	168			
25	15			12	12	11	41	427	168			16
26	17			12	10	15	38	478	144			16
27	17			12	12	12	35	395	168			16
28	16			10	10	10	30	495	180			16
29	15			12		25	24	550	168			16
30	15			12		16	36	600	168			16
31	14			12		10		620				

NOTE.—No gage-height record Nov. 10 to Jan. 8, Feb. 7–13, Mar. 27, Apr. 4, 6–9, 11–14, 26–28, May 29, 31, June 1–3, 5–12, 14–20, 23, July 1, 3–4; discharge based on comparison with flow of Eagle River at Eagle, Colo. Gage readings July 10 to Sept. 24 not reliable; monthly means estimated by comparison with flow for Eagle River at Eagle.

Monthly discharge of Eagle River at Redcliff, Colo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	20	13	16.7	1,000
November	13	8	9	536
December			9	553
January	12	10	11.5	707
February	16	8	11.2	622
March	34	7	12.8	787
April	41	10	22.6	1,340
May	620	52	290	17,800
June	700	144	383	22,800
July			83	5,100
August			43	2,640
September			39	2,320
The year	700		77.8	56,200

NOTE.—Monthly mean for November and December estimated; for July, August, and September determined from flow of Eagle River at Eagle by means of average monthly percentage of flow for six years.

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EAGLE RIVER AT EAGLE, COLO.

LOCATION.—In sec. 33, T. 4 S., R. 84 W., at left bank 500 feet below highway bridge at Eagle, Eagle County. Nearest tributary, Brush Creek, enters three-quarters of a mile below station.

DRAINAGE AREA.—650 square miles (revised; measured on map of Colorado, scale 1:500,000).

RECORDS AVAILABLE.—January 17, 1911, to September 30, 1921. March 12, 1905, to February 10, 1907, station was maintained short distance below mouth of Brush Creek.

GAGE.—Stevens water-stage recorder installed April 5, 1919, and referred to same datum as chain gage, 500 feet upstream which has been used since January 17, 1911. The readings at the recorder were less than the chain gage owing to slope of the river; therefore, an inclined gage was installed October 28, 1919, near recorder at same datum as chain gage. Datum of inclined gage and recorder lowered 1.00 foot.

DISCHARGE MEASUREMENTS.—Made from private bridge half a mile downstream or by wading.

CHANNEL AND CONTROL.—Bed composed of boulders. Control at rapids in which gage intake is located; somewhat shifting. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.5 feet at 6 a. m. June 12 (discharge, 6,150 second-feet); minimum discharge occurred during winter.

1911–1921: Maximum stage recorded, 6.3 feet at 6 a. m. June 3, 1914 (discharge, 6,760 second-feet); minimum stage occurred during winter.

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

DIVERSIONS.—Between Eagle and Redcliff, court decrees for diversions of 80 second-feet from Eagle River. There are decrees for diversions of 22 second-feet from Eagle River below Eagle.

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

ACCURACY.—Stage-discharge relation slightly shifting; affected by ice December 19 to January 15. Rating curve well defined. Operation of water-stage recorder satisfactory except as explained in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection. Records good except for period affected by ice, for which they are fair.

Discharge measurements of Eagle River at Eagle, Colo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 1	H. E. Grosbach	0.86	176	May 18	Robert Follansbee	3.16	1,920
Dec. 16	P. V. Hodges	.63	99	June 13	do	4.94	5,040
Jan. 23	Hodges and Peck	.67	112	July 17	do	2.50	1,150
Mar. 6	E. H. Peck	.82	189				

Daily discharge, in second-feet, of Eagle River at Eagle, Colo., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	227	176	135			187	152	405	4,380	2,070	652	820
2	223	170	144			193	157	491	4,020	2,070	785	1,170
3	220	154	142			214	179	659	4,020	1,910	694	1,170
4	214	157	128			233	202	868	4,020	1,580	590	820
5	211	157	121		95	243	240	1,130	4,380	1,510	539	694
6	208	168	142			187	220	1,400	4,580	1,340	509	666
7	208	168	116			173	196	1,460	4,400	1,280	463	590
8	205	157	135	95		162	193	1,130	3,860	1,340	425	558
9	202	150	140			154	182	900	4,580	1,340	390	515
10	202	147	108			154	187	785	5,330	1,340	390	425
11	214	140	123			160	208	715	5,550	1,340	366	375
12	214	140	130			157	240	750	5,750	1,340	351	366
13	217	147	106			173	233	980	4,780	1,390	332	350
14	220	144	116			165	243	1,170	4,960	1,510	370	324
15	217	128	106		105	170	260	1,580	5,550	1,450	468	311
16	205	119	97	100		170	202	1,700	4,780	1,340	446	294
17	193	157	92	100		168	250	1,700	4,420	1,120	420	286
18	190	147		100		173	230	1,990	4,240	1,070	366	275
19	190	137		100		187	250	1,840	3,030	1,170	337	294
20	187	142		100		202	303	1,450	2,710	980	337	283
21	190	142		105		173	290	1,640	2,390	900	380	270
22	193	116		105		162	275	1,990	2,550	1,070	400	253
23	187	142		112		214	319	2,470	2,870	1,020	550	246
24	183	119		114	125	182	395	2,790	2,870	940	750	240
25	179	119	90	110		168	342	2,950	2,710	860	750	236
26	182	140		100		168	298	2,810	2,550	860	730	236
27	170	132		95	176	147	275	2,490	2,550	743	700	227
28	157	129		90	182	154	260	3,290	2,390	666	729	217
29	162	126		90	-------	150	250	4,010	2,390	631	743	214
30	179	126		88	-------	176	307	4,370	2,230	578	715	211
31	180	-------		101	-------	150	-------	4,550	-------	552	694	-------

NOTE.—Discharge Dec. 18 to Feb. 26 determined from study of temperature and gage-height records, discharge measurements, and observer's notes. Braced figures show mean discharge for period included. Shifting-control method used Nov. 30 to Mar. 24 and Apr. 1 to June 10. No gage-height record Aug. 22–26; discharge based on comparison with near-by streams.

Monthly discharge of Eagle River at Eagle, Colo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	227	157	198	12,200
November	176	116	143	8,510
December	144	-------	108	6,640
January	114	-------	98	6,030
February	182	-------	111	6,160
March	243	147	176	10,800
April	395	152	245	14,600
May	4,550	405	1,820	112,000
June	5,750	2,230	3,830	228,000
July	2,070	552	1,200	73,800
August	785	332	528	32,500
September	1,170	211	431	25,600
The year	5,750	-------	741	537,000

TURKEY CREEK AT REDCLIFF, COLO.

LOCATION.—In sec. 19, T. 6 S., R. 80 W., at highway bridge in Redcliff, Eagle County, 800 feet above mouth of creek.

DRAINAGE AREA.—27 square miles (measured on map in Forest Service atlas).

RECORDS AVAILABLE.—June 30, 1913, to September 30, 1921, when station was discontinued.

GAGE.—Chain attached to guardrail of bridge; read by forest ranger. Prior to November 9, 1915, vertical staff at same datum on downstream side of left abutment.

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

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

EXTREMES OF DISCHARGE.—Maximum stage not recorded, as gage was not read during period of highest water. Minimum stage recorded, 1.10 feet at 8 a. m. March 9 (discharge, 3 second-feet).

1913–1921: Maximum stage recorded, 4.7 feet at 7.15 p. m., June 13, 1918 (discharge, 670 second-feet); minimum discharge, 1 second-foot October 21, 1919.

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

DIVERSIONS.—Court decrees for diversion of 5.5 second-feet from Turkey Creek.

REGULATION.—Diurnal fluctuation during spring, caused by alternate melting and freezing of mountain snow. No artificial regulation.

ACCURACY.—Stage-discharge relation not permanent. Rating curves not well defined. Gage read to hundredths twice daily. Daily discharge obtained by applying mean daily gage height to rating table except as explained in footnote to table of daily discharge. Records fair.

Discharge measurements of Turkey Creek at Redcliff, Colo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 2	H. E. Grosbach	1.21	6.2	June 13	Robert Follansbee	3.39	374
Jan. 26	Hodges and Peck	1.18	3.9	24	do	2.45	142
Mar. 5	E. H. Peck	1.28	6.7				

Daily discharge, in second-feet, of Turkey Creek at Redcliff, Colo., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	9	6	4	4	7	6	17	310	80	38	13
2	9	6	4	4	6	8	20	300	77	36	10
3	9	6	4	5	5	9	26	290	75	34	9
4	9	6	4	5	7	12	34	290	65	33	9
5	9	6	4	5	7	17	47	300	56	32	9
6	9	6	4	4	7	16	52	340	49	30	9
7	9	6	4	4	7	12	49	300	49	29	9
8	9	6	4	4	6	10	37	285	53	26	9
9	9	6	4	4	6	8	29	310	53	26	9
10	9	------	4	4	6	7	26	350	49	25	9
11	9	------	5	5	6	8	28	420	59	23	9
12	9	------	5	6	6	10	28	380	52	22	8
13	9	------	5	6	5	12	30	375	54	20	8
14	------	------	5	6	6	15	39	405	53	20	8
15	------	------	5	6	6	17	51	370	49	18	8
16	------	------	5	6	6	15	61	340	48	16	8
17	------	------	4	5	6	13	75	320	47	15	8
18	------	------	4	5	7	12	84	230	48	13	8
19	------	------	5	5	7	14	85	180	47	14	8
20	------	------	4	5	7	16	71	150	46	13	8
21	------	------	4	5	7	16	79	160	45	11	8
22	------	------	5	5	7	15	79	169	47	16	8
23	------	------	5	5	7	19	118	174	46	14	8
24	------	------	5	6	8	18	104	155	46	14	8
25	------	------	4	6	7	17	91	142	44	12	8
26	------	------	4	6	7	16	98	141	43	11	8
27	------	------	4	6	7	16	104	111	45	10	8
28	------	------	4	6	7	15	98	106	45	10	7
29	------	------	4	------	7	15	148	96	42	10	7
30	------	------	4	------	7	17	197	86	43	10	7
31	------	------	4	------	7	------	250	------	40	10	------

NOTE.—No gage-height record Oct. 14 to Nov. 1, Nov. 10 to Jan. 8, Feb. 7–13, Mar. 27, Apr. 4–9, 11–14, 26–28, May 29, 31, June 1–3, 5–12, 14–21, 23, 29, July 1, 3, 4; discharge interpolated or based on comparison with flow of Eagle River at Eagle, Colo. Shifting-control method used July 27 to Aug. 16. No record Oct. 14–31 and Nov. 10 to Dec. 31.

Monthly discharge of Turkey Creek at Redcliff, Colo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October 1-13	9	9	9.0	232
November 1-9	6	6	6.0	107
January	5	4	4.3	264
February	6	4	5.1	283
March	8	5	6.6	406
April	19	6	13.4	797
May	250	17	72.7	4,470
June	420	86	253	15,100
July	80	40	51.5	3,170
August	38	10	19.7	1,210
September	13	7	8.4	500

NOTE.—No record for December.

ROARING FORK AT ASPEN, COLO.

LOCATION.—In sec. 7, T. 10 S., R. 84 W., at bridge near old power plant at Aspen, Pitkin County. Castle, Maroon, and Hunter creeks all enter below.

DRAINAGE AREA.—109 square miles (measured on topographic map).

RECORDS AVAILABLE.—February 25, 1915, to September 30, 1921, when station was discontinued. From January 1, 1911, to February 24, 1915, station was maintained just below Cooper Avenue bridge three-quarters of a mile upstream.

GAGE.—Vertical staff at downstream end of right bridge abutment; read by Clement McDonnell.

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

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.8 feet at 9 a. m. June 14 (discharge, 2,310 second-feet); minimum stage, 0.50 foot at 5 p. m. January 2 (discharge, 23 second-feet).

1911–1921: Maximum stage recorded, 7.1 feet during night of June 18, 1917, determined from high-water marks (discharge, 3,170 second-feet); minimum discharge recorded, 15 second-feet on March 11, 1919 (gage height, 0.25 foot).

ICE.—Stage-discharge relation practically unaffected by ice during winter, except for brief periods.

DIVERSIONS.—Salvation ditch, the only diversion above the station, diverted a small amount of water during 1921. Prior to April 15, 1919, the mines at Aspen pumped into the river approximately 6 second-feet, which entered above station.

REGULATION.—Diurnal fluctuation during spring, caused by alternate melting and freezing of mountain snow. No artificial regulation.

ACCURACY.—Stage-discharge relation permanent; affected by ice for short periods. Rating curve well defined from 20 to 1,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Roaring Fork at Aspen, Colo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 27	H. E. Grosbach	0.82	39.9
June 12	Robert Follansbee	4.94	1,610
Sept. 8	do	1.42	103

Daily discharge, in second-feet, of Roaring Fork at Aspen, Colo., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	66	54	50	54	56	34	47	84	845	670	181	178
2	68	54	50	26	55	41	49	101	845	620	164	154
3	47	54	50	54	50	53	56	130	910	500	158	142
4	54	54	49	54	54	66	60	154	910	535	154	120
5	41	52	54	54	56	49	60	218	910	535	138	112
6	41	54	54	54	54	49	56	257	910	375	122	105
7	54	54	63	54	48	48	63	237	785	362	108	105
8	54	54	58	54	45	50	49	75	1,430	388	112	96
9	54	54	54	52	48	50	62	91	1,350	362	108	91
10	54	51	57	50	48	59	49	132	1,590	375	110	84
11	54	49	49	50	54	58	60	133	1,830	375	100	80
12	57	58	56	54	50	49	58	148	1,590	375	94	77
13	62	54	56	49	49	51	67	140	1,590	518	94	75
14	66	58	51	49	56	49	58	133	2,230	500	126	69
15	60	53	54	54	50	58	58	325	1,990	448	121	66
16	65	58	58	51	54	62	60	300	1,510	415	114	66
17	58	58	58	44	52	64	63	325	1,430	350	103	64
18	63	58	59	54	50	68	63	300	1,120	338	98	66
19	68	57	54	51	48	72	63	278	725	312	87	84
20	70	58	51	54	49	49	67	257	725	278	98	68
21	69	51	56	62	49	54	68	257	845	289	121	64
22	58	53	52	56	49	58	62	362	845	289	128	64
23	54	54	48	54	49	62	77	375	785	268	197	54
24	46	57	46	52	54	58	64	415	725	268	179	59
25	57	58	44	50	52	60	58	400	725	237	167	53
26	58	58	42	48	50	63	60	388	785	237	146	53
27	58	51	40	51	49	43	60	350	845	289	136	56
28	51	51	40	54	49	49	58	535	845	257	156	54
29	47	58	44	54	-------	56	63	910	670	268	132	53
30	58	51	45	54	-------	51	70	910	670	164	151	53
31	54	-------	48	54	-------	41	-------	910	-------	190	132	-------

NOTE.—Stage-discharge relation affected by ice Nov. 1–9, Dec. 1–3, 22–31, Jan. 9–11, 24–27, Feb. 2, 3, 8–10, 17–19, 25, 26; discharge determined from a study of temperature and gage-height records and observer's notes.

Monthly discharge of Roaring Fork at Aspen, Colo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	70	41	57	3,500
November	58	49	54.6	3,250
December	63	40	51.3	3,150
January	62	26	51.8	3,190
February	56	45	51	2,830
March	72	34	54	3,320
April	77	47	60.3	3,590
May	910	75	311	19,100
June	2,230	670	1,100	65,500
July	670	164	367	22,600
August	197	87	130	7,990
September	178	53	82.2	4,890
The year	2,230	26	197	143,000

ROARING FORK AT GLENWOOD SPRINGS, COLO.

LOCATION.—In sec. 9, T. 6 S., R. 89 W., 1,500 feet above mouth of river in Glenwood Springs, Garfield County.

DRAINAGE AREA.—1,460 square miles (revised; measured on map of Colorado, scale 1:500,000).

RECORDS AVAILABLE.—April 6, 1906, to September 30, 1909; September 21, 1910, to September 30, 1921.

GAGE.—Gurley water-stage recorder installed October 27, 1917, and referred to inclined staff on left bank 800 feet above highway bridge, used since November 20, 1915; inspected by United States Forest Service employee. Chain gage on downstream side of highway bridge previously used; relation between gages, not determined.

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

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

EXTREMES OF DISCHARGE.—Maximum stage during year from high-water mark, 8.7 feet on June 14 (discharge, 17,600 second-feet); minimum stage, 0.68 foot at 7 p. m. January 30 (discharge, 310 second-feet).

1906–1909; 1910–1921: Maximum discharge, 17,600 second-feet June 14, 1918, and June 14, 1921. Minimum discharge, 270 second-feet on January 23, 1911 (gage height, 0.90 foot).

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

DIVERSIONS.—Court decrees for diversion of 164 second-feet from Roaring Fork between Glenwood Springs and Aspen.

REGULATION.—Diurnal fluctuation during spring, caused by alternate melting and freezing of mountain snow. No artificial regulation.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Operation of water-stage recorder satisfactory except as shown in footnote to table of daily discharge. Mean daily gage height obtained by inspection of recorder graph. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

Discharge measurements of Roaring Fork at Glenwood Springs, Colo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 29	H. E. Grosbach	1.24	675	Mar. 7	E. H. Peck	1.05	506
Dec. 17	P. V. Hodges	1.03	545	July 19	Robert Follansbee	3.38	3,210
Jan. 24	Hodges and Peck	.94	453	Sept. 8	do	1.77	1,150

Daily discharge, in second-feet, of Roaring Fork at Glenwood Springs, Colo., for the year ending Sept. 30, 1921.

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	792	688	521	430	365	450	500	1,030	6,860	5,480	1,900	1,840
2	774	656	556	430	365	500	528	1,280	6,600	5,980	2,020	2,090
3	756	626	528	430	382	550	577	1,660	6,860	6,100	1,840	1,720
4	738	640	486	424	394	600	633	2,090	6,350	4,910	1,600	1,490
5	729	648	486	412	382	528	696	2,570	7,120	4,480	1,550	1,380
6	712	648	521	412	370	493	648	3,120	7,380	3,500	1,490	1,290
7	704	648	444	418	365	458	598	2,870	7,640	2,950	1,440	1,220
8	704	640	500	382	330	418	570	2,220	6,860	3,000	1,360	1,180
9	696	633	493	340	345	458	556	1,840	8,730	2,950	1,310	1,130
10	747	619	430	394	382	465	556	1,660	10,200	3,300	1,320	1,080
11	720	605	486	444	360	472	584	1,600	10,700	3,120	1,260	1,060
12	712	612	480	430	355	444	633	1,780	12,700	3,490	1,230	990
13	704	591	480	430	365	465	640	2,220	14,700	3,880	1,200	945
14	696	584	500	458	388	479	656	2,720	17,300	3,980	1,300	909
15	680	577	525	493	400	507	688	3,210	16,000	3,780	1,380	891
16	688	570	560	514	355	500	605	3,680	16,700	3,400	1,340	873
17	680	584	591	500	355	521	656	3,580	12,500	3,120	1,310	864
18	680	570	598	451	388	542	633	3,580	8,450	2,950	1,190	855
19	704	570	486	458	365	584	680	3,040	6,860	2,950	1,160	891
20	696	577	451	424	394	577	756	2,500	6,350	2,720	1,170	846
21	688	584	430	382	388	535	756	2,720	5,850	2,500	1,270	828
22	664	563	400	360	376	521	720	3,210	5,850	2,570	1,440	819
23	656	584	388	424	370	563	837	3,680	6,800	2,430	1,340	810
24	656	535	382	430	370	528	909	4,080	6,350	2,500	1,340	792
25	656	556	400	370	376	514	855	4,380	6,100	2,360	1,960	765
26	680	556	479	365	394	542	774	3,780	6,100	2,290	1,720	738
27	688	563	472	406	412	493	720	3,580	6,100	2,160	1,540	720
28	664	542	458	400	410	472	704	4,800	5,980	1,960	1,600	712
29	656	458	451	376	------	479	688	6,100	5,850	1,840	1,490	704
30	672	451	437	330	------	500	828	7,120	5,720	1,720	1,660	688
31	704	------	437	394	------	479	------	7,380	------	1,720	1,600	------

NOTE.—No gage-height record Feb. 28, Mar. 1–4, June 12–17, July 6–8; discharge based on comparison with flow of Roaring Fork at Aspen, Colo., and observer's notes. Stage-discharge relation affected by ice Dec. 11–16.

Monthly discharge of Roaring Fork at Glenwood Springs, Colo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	792	656	700	43,000
November	688	451	589	35,000
December	598	382	479	29,500
January	514	330	416	25,600
February	412	330	375	20,800
March	600	418	504	31,000
April	909	500	673	40,000
May	7,380	1,030	3,200	197,000
June	17,300	5,720	8,590	511,000
July	6,100	1,720	3,230	199,000
August	2,020	1,160	1,490	91,600
September	2,090	688	1,040	61,900
The year	17,300	330	1,770	1,290,000

PARACHUTE CREEK AT GRAND VALLEY, COLO.

LOCATION.—In NW. ¼ sec. 12, T. 7 S., R. 96 W., at Aplin's ranch, half a mile northwest of Grand Valley, Garfield County. No tributary between station and mouth, 1 mile below.

DRAINAGE AREA.—196 square miles (measured on map of Colorado; scale, 1:500,000).

RECORDS AVAILABLE.—April 7 to September 30, 1921.

GAGE.—Vertical staff attached to side of left abutment of private bridge; read by R. H. Aplin.

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

CHANNEL AND CONTROL.—Bed composed of compact silt on shale rock. Control at rapids 200 feet downstream; apparently permanent. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period April 7 to September 30, 1921, 2.45 feet at 6 p. m. May 17 (discharge, 556 second-feet); minimum stage recorded, 0.20 foot, July 21 and September 22–27 (discharge, 11 second-feet).

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

DIVERSIONS.—Court decrees for diversion of 71 second-feet from Parachute Creek, all above station.

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

ACCURACY.—Stage-discharge relation permanent. Rating table well defined below 500 second-feet. Gage read to hundredths twice daily. Discharge obtained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Parachute Creek at Grand Valley, Colo., during the period Apr. 7 to Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 7	Robert Follansbee	0.77	56	July 18	Robert Follansbee	0.30	14.9
May 19	do	2.15	440	Sept. 14	F. C. Snyder	.31	16.5
June 11	do	1.05	112				

Daily discharge, in second-feet, of Parachute Creek at Grand Valley, Colo., for the period Apr. 7 to Sept. 30, 1921.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	------	122	176	28	49	64	16	67	442	118	13	24	15
2	------	184	166	28	24	26	17	64	545	118	18	20	15
3	------	280	146	24	18	24	18	64	499	104	15	20	15
4	------	370	141	24	20	24	19	72	454	100	15	19	13
5	------	388	127	22	20	20	20	81	406	100	13	20	13
6	------	381	122	20	20	20	21	96	352	96	11	26	12
7	64	388	146	20	20	20	22	96	325	85	15	26	11
8	47	359	127	20	19	19	23	96	335	78	16	28	11
9	52	292	122	20	15	18	24	118	325	67	15	52	11
10	49	261	118	20	18	20	25	111	312	64	16	28	11
11	52	240	111	20	15	19	26	104	292	49	20	28	11
12	61	231	100	22	15	15	27	100	270	47	18	28	11
13	61	261	96	18	13	15	28	96	255	43	15	24	13
14	67	345	96	18	90	15	29	85	240	43	13	24	15
15	72	406	151	13	24	15	30	90	225	35	14	22	15
							31	------	197	------	15	20	------

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Monthly discharge of Parachute Creek at Grand Valley, Colo., for the period Apr. 7 to Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 7-30	118	47	77.7	3,700
May	545	122	322	19,800
June	176	35	103	6,130
July	28	11	18.0	1,110
August	90	13	25.5	1,570
September	64	11	17.5	1,040
The period				33,400

ROAN CREEK NEAR DE BEQUE, COLO.

LOCATION.—On line between secs. 10 and 15, T. 7 S., R. 98 W., at highway bridge 11 miles north of De Beque, Mesa County. Nearest tributary, Kimball Creek, enters half a mile above.

DRAINAGE AREA.—210 square miles (measured on map of Colorado; scale, 1:500,000).

RECORDS AVAILABLE.—April 8 to September 30, 1921.

GAGE.—Chain attached to downstream side of bridge; read by W. L. Hart.

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

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.3 feet morning of May 18 (discharge, 632 second-feet); minimum stage recorded, 0.08 foot September 28, 29 (discharge, 24 second-feet).

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

DIVERSIONS.—Court decrees for diversion of 28 second-feet from Roan Creek above station and 70 second-feet below. Decrees for diversion of 62 second-feet from tributaries entering above.

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

ACCURACY.—Stage-discharge relation not permanent. Rating curve used May 18 to September 30 well defined between 15 and 600 second-feet. Shifting-control method used April 18 to May 17. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except for period April 8 to May 17, for which they are fair.

Discharge measurements of Roan Creek near De Beque, Colo., during the period Apr. 8 to Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 8	Robert Follansbee	1.10	50	July 18	Robert Follansbee	0.24	58
May 19	do	2.03	541	Sept. 14	F. V. Snyder	.02	33.9
June 11	do	.80	170				

Daily discharge, in second-feet, of Roan Creek near De Beque, Colo., for the period Apr. 8 to Sept. 30, 1921.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	------	132	404	60	45	72	16	69	557	121	74	32	31
2	------	181	342	52	41	60	17	66	581	119	63	34	33
3	------	236	294	52	32	45	18	63	615	113	56	33	38
4	------	285	264	58	28	43	19	79	557	119	51	34	38
5	------	386	250	55	27	43	20	74	507	117	63	37	35
6	------	439	222	51	32	42	21	82	510	100	74	49	33
7	------	433	208	51	33	39	22	86	497	104	69	44	33
8	48	427	197	51	31	38	23	91	478	96	66	44	33
9	50	401	191	46	33	38	24	100	478	86	60	72	33
10	52	401	181	52	41	35	25	100	510	82	52	45	31
11	63	386	166	48	39	33	26	100	510	80	50	37	27
12	63	370	144	50	37	33	27	96	468	72	45	34	25
13	66	423	146	51	35	33	28	91	475	66	40	32	24
14	74	459	156	59	33	33	29	91	455	66	34	39	24
15	66	507	126	80	38	31	30	100	465	65	32	41	27
							31	------	449	------	34	32	------

Monthly discharge of Roan Creek near De Beque, Colo., for the period Apr. 8 to Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 8-30	100	48	77.0	3,510
May	615	132	438	26,900
June	404	65	157	9,340
July	80	32	54.2	3,330
August	72	27	37.5	2,310
September	72	24	36.1	2,150
The period				47,500

TAYLOR RIVER AT ALMONT, COLO.

LOCATION.—In sec. 22, T. 51 N., R. 1 E., at highway bridge at Almont, Gunnison County, 300 feet above junction of Taylor and East rivers.

DRAINAGE AREA.—440 square miles (revised; measured on map of Colorado, scale 1:500,000).

RECORDS AVAILABLE.—July 27, 1910, to September 30, 1921.

GAGE.—Vertical staff on downstream side of center pier; read by J. W. Brittain.

DISCHARGE MEASUREMENTS.—Made from two-span bridge.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.0 feet morning of June 15 (discharge, 3,680 second-feet); minimum discharge occurred during winter.

1910–1921: Maximum stage recorded, 5.00 feet at 7.25 a. m., June 9, 1920 (discharge, 3,760 second-feet); minimum stage, 1.2 feet, on several days during August, 1913 (discharge, 50 second-feet).

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—No court decrees for diversions from Taylor River.

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

ACCURACY.—Stage-discharge relation shifted within narrow limits. Rating curves well defined between 150 and 2,500 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Gage-height records October to March doubtful. Records good except for period of doubtful gage heights, for which they are fair.

COOPERATION.—Gage heights furnished by United States Bureau of Reclamation.

Discharge measurements of Taylor River at Almont, Colo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 13	H. E. Grosbach	2.07	228	Mar. 17	E. H. Peck	1.75	152
Dec. 22	P. V. Hodges	[a] 1.95	129	July 10	United States Bureau of Reclamation engineers	3.00	761
Feb. 7	E. H. Peck	[a] 2.25	128				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Taylor River at Almont, Colo., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	230						162	392	2,000	1,090	455	455
2	230						172	478	1,840	1,090	425	401
3	230	200				140	200	640	1,760	1,090	488	368
4	230						200	730	2,000	1,090	419	346
5	230						200	775	1,920	1,030	332	318
			140		130							
6	230						200	870	2,000	810	318	295
7	224						200	775	1,920	810	313	283
8	224						200	460	1,840	810	303	275
9	218					130	212	460	1,920	760	308	263
10	212						212	419	2,160	810	308	252
		195										
11	212						212	442	2,640	760	318	238
12	206						212	525	2,640	715	318	238
13	200				135	150	212	685	2,640	970	318	230
14	200						206	775	3,040	1,030	318	217
15	224					160	200	820	3,200	1,090	318	211
			135	130								
16	224					162	200	685	2,720	915	318	238
17	218					162	188	820	2,380	810	318	238
18	218	190			130	162	191	730	2,060	810	300	238
19	218					162	200	600	1,680	760	300	238
20	218					162	212	525	1,400	715	300	238
21	218					162	200	640	1,540	715	413	238
22	218		130			162	200	820	1,400	715	514	230
23	218	180				172	200	775	1,470	630	590	211
24	218					150	200	975	1,400	670	555	205
25	218				140	150	200	1,030	1,340	630	555	196
26	218					150	200	730	1,280	555	395	193
27	218					150	200	1,030	1,150	520	368	182
28	218	170	135			150	200	1,470	1,150	455	390	178
29	218				-------	150	200	1,540	1,150	419	368	175
30	218				-------	150	305	1,840	1,090	413	378	172
31	218	-------	-------	-------	-------	150	-------	2,000	-------	425	368	-------

NOTE.—Stage-discharge relation affected by ice Nov. 1 to Mar. 14; discharge determined from a study of temperature and gage-height records and discharge measurements. Braced figures show mean daily discharge for periods indicated. Discharge for June 14–16 computed by shifting-control method.

Monthly discharge of Taylor River at Almont, Colo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	230	200	219	13,500
November			188	11,200
December			136	8,360
January			130	7,990
February			134	7,440
March			148	9,100
April	305	162	203	12,100
May	2,000	392	821	50,500
June	3,200	1,090	1,890	112,000
July	1,090	413	778	47,800
August	590	300	377	23,200
September	455	172	252	15,000
The year	3,200		440	318,000

GUNNISON RIVER NEAR GUNNISON, COLO.

LOCATION.—In sec. 3, T. 49 N., R. 1 W., at highway bridge 2 miles southwest of Gunnison, Gunnison County. Nearest tributary, Tomichi Creek, enters 1 mile below.

DRAINAGE AREA.—1,010 square miles (measured on map in Hayden's atlas).

RECORDS AVAILABLE.—November 27, 1910, to November 30, 1914; April 27, 1916, to September 30, 1921.

GAGE.—Chain on downstream side of bridge; datum lowered 1.00 foot October 15, 1918; read by C. W. Chinery. For description of previous gages, see Water-Supply Paper 509.

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 below bridge; shifting during high water. Banks not subject to overflow except during extreme high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.0 feet at 10 a. m. June 12 (discharge, 6,600 second-feet); minimum discharge occurred during winter.

1910–1914; 1916–1921: Maximum stage recorded, 4.05 feet (old datum) at 8 a. m. June 13, 1918 (discharge, 11,400 second-feet); minimum discharge, 126 second-feet on January 2, 1919.

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

DIVERSIONS.—Court decrees for diversions of 274 second-feet of water from Gunnison River between this station and forks at Almont.

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

ACCURACY.—Stage-discharge relation not permanent; affected by ice. Rating curve not well definited. Gage read to hundredths twice daily. Discharge ascertained by applying mean daily gage height to rating table, except for period affected by ice as noted in footnote to table of daily discharge. Records fair.

Discharge measurements of Gunnison River near Gunnison, Colo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 14	H. E. Grosbach	1.32	394	May 24	Robert Follansbee	2.78	2,260
Dec. 21	P. V. Hodges	1.08	275	June 16	T. J. Watkins	4.82	5,650
Feb. 8	E. H. Peck	a 1.62	197	July 22	Robert Follansbee	2.39	1,550
Mar. 18	do	a 1.20	299				

a Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Gunnison River near Gunnison, Colo., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	393	330	284				340	790	4,050	2,350	940	1,050
2	393	330	240				370	1,100	3,650	2,440	840	940
3	393	307	262				370	1,410	4,050	2,260	840	790
4	366	330	240				370	1,550	4,050	2,350	740	650
5	340	340	200				340	2,180	4,050	1,620	740	650
				230	200	230						
6	340	356	200				340	2,350	4,050	1,410	740	650
7	340	330	200				310	2,090	4,260	1,410	740	570
8	340	330	200				310	1,480	4,050	1,410	650	570
9	340	330	200				370	1,410	4,470	1,410	650	570
10	340	330	182				310	1,550	5,310	1,410	695	570
11	340	356	165				370	1,550	5,730	1,410	650	500
12	340	284	182				370	1,620	6,160	1,410	650	500
13	340	284	165				400	1,700	5,730	1,620	650	500
14	340	284	200			260	382	1,930	6,380	1,850	740	500
15	393	284	200				370	2,180	6,380	1,780	840	430
16	340	330	220				370	2,350	5,730	1,480	695	430
17	340	330	240			290	382	2,180	5,310	1,480	650	444
18	340	330	262			290	370	2,100	4,260	1,410	650	444
19	330	307	220			300	370	2,100	4,260	1,410	650	444
20	330	307	284		220	310	430	1,780	3,650	1,480	570	535
				235								
21	330	330	284			310	465	1,850	3,250	1,410	695	430
22	330	330	284			310	465	1,780	3,250	1,550	890	430
23	330	307	240			285	740	1,850	3,250	1,410	1,100	418
24	330	307	240			285	740	2,010	3,250	1,410	995	400
25	330	284	240			310	570	2,350	2,870	1,280	940	370
26	330	307	240			260	535	1,930	2,870	1,220	840	370
27	330	307	240			310	430	2,100	2,780	1,050	840	340
28	330	307	230			260	430	2,960	2,690	940	840	322
29	330	284	230		-------	260	430	3,550	2,600	940	890	340
30	330	275	230		-------	310	500	3,850	2,600	940	940	370
31	356	-------	230		-------	310	-------	4,050	-------	890	1,050	-------

NOTE.—Stage-discharge relation affected by ice Dec. 28 to Mar. 18; discharge determined from study of weather and gage-height records and discharge measurements. Braced figures show mean daily discharge for periods indicated.

Monthly discharge of Gunnison River near Gunnison, Colo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	393	330	344	21,200
November	356	275	315	18,700
December	284	165	227	14,000
January	----------	----------	233	14,300
February	----------	----------	213	11,800
March	340	----------	269	16,500
April	740	310	421	25,100
May	4,050	790	2,040	125,000
June	6,380	2,600	4,130	246,000
July	2,440	890	1,500	92,200
August	1,100	570	784	48,200
September	1,050	322	518	30,800
The year	6,380	----------	918	664,000

GUNNISON RIVER NEAR GRAND JUNCTION, COLO.

LOCATION.—In NW. ¼ sec. 35, T. 1 S., R. 1 W., a quarter of a mile below Redlands Co.'s canal and 2 miles above Grand Junction, Mesa County, and mouth of river; below all tributaries.

DRAINAGE AREA.—8,020 square miles (revised; measured on map of Colorado, scale, 1:500,000).

RECORDS AVAILABLE.—April 1, 1917, to September 30, 1921. From October 19, 1894, to December 21, 1895, and May 2, 1897, to September 30, 1899, station maintained nearer mouth.

GAGE.—Vertical staff at left bank a quarter of a mile below canal intake; read by employee of Redlands Co.

DISCHARGE MEASUREMENTS.—Made from car and cable at gage section.

CHANNEL AND CONTROL.—Bed composed of well-compacted gravel; permanent. Control at rapids 500 feet downstream; practically permanent. Banks high and not subject to overflow.

EXTREMES OF STAGE.—Maximum stage recorded during year, 13.3 feet at 11 a. m. June 15 (discharge, 29,700 second-feet); minimum stage recorded, 1.75 feet on September 30 (discharge, 380 second-feet).

1917–1921: Maximum stage recorded, 14.95 feet at 8 a. m. and at noon May 23, 1920 (discharge, 35,300 second-feet); minimum stage, 0.49 foot August 24 to September 21, September 6, 7, 1919 (discharge, 11 second-feet).

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

DIVERSIONS.—Below all diversions from Gunnison River. Most of water diverted through Redlands canal is used for pumping and is returned to Colorado River below Gunnison River.

COMBINED FLOW.—Combined flow of Gunnison River and Redlands canal represents flow of Gunnison River which enters Colorado River, less about 25 second-feet which is used during irrigation season.

ACCURACY.—Stage-discharge relation permanent except as affected by ice. Rating curve well defined between 100 and 22,000 second-feet. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except as indicated in footnote to daily-discharge table. Records excellent.

COOPERATION.—Daily gage-height record for station on river and complete records for power canal furnished by Redlands Co.

Discharge measurements of Gunnison River near Grand Junction, Colo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 23	H. E. Grosbach	2.78	1,060	Mar. 9	E. H. Peck	3.03	1,330
Jan. 30	E. H. Peck	3.22	1,030	May 20	Robert Follansbee	7.16	8,500

Daily discharge, in second-feet, of Gunnison River near Grand Junction, Colo., for the year ending Sept. 30, 1921

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	790	1,510	432		1,020	1,210	1,030	2,780	16,900	6,770	3,650	2,640
2	755	1,560	432		1,010	1,260	990	5,140	15,600	6,100	2,920	2,920
3	720	1,400	520	1,030	1,000	1,300	1,030	7,490	14,900	5,900	2,640	2,500
4	720	1,300	650		990	1,400	1,400	9,370	14,900	5,700	2,370	2,500
5	720	1,260	790		980	1,740	2,110	11,200	16,200	5,700	1,860	2,370
6	720	1,400	720		970	1,740	2,110	13,200	16,600	4,780	1,620	2,110
7	720	1,560	720		990	1,740	1,740	12,900	17,600	4,110	1,510	1,740
8	720	1,560	580		1,010	1,510	1,740	9,660	19,600	3,800	1,210	1,510
9	650	1,460	550		1,080	1,300	1,030	7,740	19,600	3,200	1,210	1,400
10	615	1,400	490		1,080	1,300	1,030	6,100	21,700	3,350	1,120	1,300
				1,050								
11	580	1,260	440		1,160	1,210	870	5,320	23,400	3,650	910	1,120
12	580	1,160	430		1,300	1,120	950	5,140	24,400	2,920	830	950
13	580	1,030	440		1,300	1,120	1,160	6,320	25,400	4,270	870	870
14	650	950	450		1,400	1,210	1,510	8,800	24,700	4,110	870	720
15	650	910	460		1,510	1,400	1,860	10,300	29,400	4,960	990	650
16	870	910	470		1,510	1,400	1,800	11,900	29,000	4,780	1,350	586
17	870	830	480		1,260	1,510	1,620	13,500	24,400	5,510	1,300	520
18	830	790	490		1,160	1,620	1,030	11,900	20,300	4,440	1,080	460
19	790	790	490		990	1,860	1,160	10,600	17,300	4,440	790	405
20	790	830	520		870	1,980	1,920	8,530	13,900	3,950	720	405
				1,090								
21	1,120	830	490		870	2,110	1,860	7,240	11,500	3,350	870	432
22	950	790	490		870	1,980	1,740	8,000	11,500	3,650	1,210	432
23	1,120	720	480		830	1,740	1,740	9,370	10,900	3,950	2,500	405
24	1,210	755	460		790	1,860	3,500	10,600	10,900	3,500	6,320	550
25	1,120	720	460		870	1,620	4,270	11,500	10,300	3,350	4,110	432
26	1,120	685	450		990	1,510	3,280	8,530	10,300	4,110	2,950	432
27	1,210	685	860		1,120	1,300	2,500	10,300	9,660	3,950	4,110	405
28	1,300	650	850		1,160	1,160	1,920	11,900	9,080	3,350	3,200	405
29	1,210	685	820	1,000	-------	1,030	1,680	14,900	8,000	2,780	2,920	405
30	1,210	490	820		-------	1,030	1,740	16,900	7,240	2,640	2,640	380
31	1,300	-------	860		-------	1,030	-------	18,300	-------	2,110	2,640	-------

NOTE.—Stage-discharge relation affected by ice Dec. 11–17, Dec. 22 to Feb. 11; discharge determined from study of weather and gage-height records, discharge measurements, and observer's notes. Braced figures show mean daily discharge for periods indicated.

Monthly discharge of Gunnison River near Grand Junction, Colo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1,300	580	877	53,900
November	1,560	490	1,030	61,300
December	860	430	568	34,900
January	-------	-------	1,050	64,600
February	1,510	790	1,070	59,400
March	2,110	1,030	1,460	89,800
April	4,270	870	1,740	104,000
May	18,300	2,780	9,850	606,000
June	29,400	7,240	16,800	1,000,000
July	6,770	2,110	4,170	256,000
August	6,320	720	2,070	127,000
September	2,920	380	1,060	63,100
The year	29,400	380	3,480	2,520,000

Combined daily discharge, in second-feet, of Gunnison River and Redlands canal near Grand Junction, Colo., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,220	1,780	834		1,020	1,210	1,350	3,240	17,400	7,270	4,160	3,070
2	1,180	1,700	868		1,010	1,260	1,810	5,590	16,000	6,600	3,420	3,350
3	1,150	1,670	952	1,030	1,000	1,300	1,350	7,950	15,400	6,400	3,130	2,930
4	1,150	1,600	1,090		990	1,400	1,730	9,830	15,400	6,200	2,850	2,920
5	1,150	1,550	1,150		980	1,740	2,460	11,700	16,700	6,200	2,340	2,800
6	1,140	1,690	1,130		970	1,740	2,530	13,600	17,100	5,280	2,100	2,560
7	1,140	1,860	1,140		990	1,740	2,140	13,300	18,100	4,600	1,990	2,200
8	1,140	1,860	1,000		1,010	1,510	2,060	10,100	20,100	4,300	1,690	1,960
9	1,070	1,760	975		1,030	1,300	1,350	8,220	20,100	3,700	1,680	1,850
10	1,040	1,700	915		1,080	1,300	1,340	6,580	22,200	3,850	1,580	1,750
11	1,000	1,560	848	1,050	1,160	1,210	1,300	5,800	23,900	4,150	1,370	1,570
12	1,000	1,540	838		1,300	1,120	1,430	5,620	24,900	3,420	1,290	1,400
13	1,000	1,440	872		1,300	1,120	1,640	6,730	25,900	4,770	1,360	1,320
14	1,080	1,380	869		1,400	1,210	1,920	9,190	25,200	4,600	1,360	1,170
15	1,070	1,340	918		1,510	1,400	2,200	10,700	29,800	5,450	1,490	1,100
16	1,300	1,340	925		1,510	1,400	2,130	12,300	29,400	5,280	1,850	1,020
17	1,300	1,260	909		1,260	1,510	1,960	13,900	24,900	6,010	1,800	987
18	1,260	1,220	938		1,160	1,620	1,460	12,300	20,800	4,930	1,580	942
19	1,220	1,210	938		990	1,860	1,630	11,000	17,800	4,900	1,290	890
20	1,220	1,260	968	1,090	870	1,980	2,390	8,980	14,400	4,400	1,200	890
21	1,560	1,240	906		870	2,110	2,320	7,680	12,000	3,830	1,360	917
22	1,380	1,220	945		870	1,980	2,200	8,450	12,000	4,140	1,680	917
23	1,550	1,140	935		830	1,740	2,200	9,800	11,400	4,450	2,960	895
24	1,640	1,130	915		790	1,860	3,960	11,100	11,400	4,000	6,740	1,040
25	1,550	1,150	915		870	1,620	4,720	12,000	10,800	3,850	4,310	917
26	1,540	1,090	905		990	1,510	3,730	8,980	10,800	4,610	3,950	917
27	1,620	1,100	860		1,120	1,300	2,950	10,800	10,200	4,450	4,370	877
28	1,700	1,060	850		1,160	1,160	2,370	12,400	9,580	3,840	3,680	877
29	1,610	1,080	820	1,000	------	1,030	2,130	15,400	8,500	3,280	3,330	890
30	1,610	896	820		------	1,030	2,190	17,400	7,740	3,140	3,060	870
31	1,700	-------	860		------	1,030	-------	18,800	-------	2,610	3,070	-------

Combined monthly discharge of Gunnison River and Redlands canal near Grand Junction, Colo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1,700	1,000	1,300	79,900
November	1,860	896	1,390	82,700
December	1,150	820	929	57,100
January			1,050	64,600
February	1,510	790	1,070	59,400
March	2,110	1,030	1,460	89,800
April	4,720	1,300	2,150	128,000
May	18,800	3,240	10,300	633,000
June	29,800	7,740	17,300	1,030,000
July	7,270	2,610	4,660	287,000
August	6,740	1,200	2,510	154,000
September	3,350	870	1,530	91,000
The year	29,800		3,810	2,760,000

EAST RIVER AT ALMONT, COLO.

LOCATION.—In sec. 22, T. 51 N., R. 1 E., at highway bridge at Almont, Gunnison County, 100 feet above junction of East and Taylor rivers.

DRAINAGE AREA.—295 square miles (measured on map in Forest Service atlas).

RECORDS AVAILABLE.—July 27, 1910, to September 30, 1921. From April 15, to October 8, 1905, a station was maintained at this point, gage being referred to different datum.

GAGE.—Vertical staff on downstream side of right abutment; read by J. W. Brittain.

DISCHARGE MEASUREMENTS.—Made from two-span bridge.

CHANNEL AND CONTROL.—Bed composed of small boulders and coarse gravel. Control shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.6 feet morning of June 15 (discharge not computed); minimum discharge occurred during winter.

1910–1921: Maximum stage recorded that of June 15, 1921; minimum stage recorded, 0.30 foot on August 13, 1913 (discharge, 19 second-feet).

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—Court decrees for diversions of 78 second-feet from East River.

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

ACCURACY.—Stage-discharge relation not permanent; affected by ice. Standard rating curve well defined below 1,800 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table, except as noted in footnote to table of daily discharge. Records fair. Owing to insufficient discharge measurements, daily discharge not computed for period from May 1 to September 30.

COOPERATION.—Gage heights furnished by United States Bureau of Reclamation.

Discharge measurements of East River at Almont, Colo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 13	H. E. Grosbach	1.05	135	May 24	Robert Follansbee	2.90	1,160
Dec. 22	P. V. Hodges	a 1.85	86	July 10	United States Bureau of Reclamation engineers.	2.50	1,030
Feb. 7	E. H. Peck	a 1.30	59				
Mar. 17	do	.75	74				

a Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of East River at Almont, Colo., for the period Oct. 1, 1920, to Apr. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1	112					80	94
2	112						100
3	112			85			100
4	112					85	100
5	112		85		60		100
6	112						100
7	112					80	100
8	112						100
9	112						112
10	112			80			120
11	112					85	120
12	112						120
13	112				65		130
14	120					90	125
15	100	90	80				120
16	100					94	120
17	100					94	120
18	100				60	94	128
19	100					94	145
20	100			70		94	175
21	100					94	175
22	100					94	175
23	100					94	175
24	100				70	94	175
25	100		85			94	175
26	100					94	175
27	100				75	94	175
28	100			65		94	175
29	100				--------	94	175
30	100				--------	94	303
31	100	--------			--------	94	--------

NOTE.—Stage-discharge relation affected by ice Nov. 1 to Mar. 15; discharge based on discharge measurements and comparison of flow of Taylor River at Almont and Gunnison River near Gunnison. Braced figures show mean daily discharge for periods indicated. Discharge May 1 to Sept. 30 not computed owing to insufficient discharge measurements; gage-height record for this period published in following table:

Daily gage height, in feet, of East River at Almont, Colo., for the period May 1 to Sept. 30, 1921.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	1.68	4.0	3.2	1.85	1.53	16	2.75	5.4	2.4	1.48	1.11
2	1.9	3.8	3.1	1.85	1.69	17	2.8	4.8	2.35	1.44	1.10
3	2.05	3.8	3.0	1.75	1.54	18	2.8	4.2	2.3	1.40	1.10
4	2.35	4.0	2.65	1.75	1.46	19	2.65	3.7	2.25	1.40	1.10
5	2.55	4.0	2.45	1.67	1.40	20	2.4	3.5	2.2	1.40	1.10
6	2.8	4.2	2.4	1.60	1.37	21	2.45	3.6	2.15	1.48	1.10
7	2.7	4.2	2.4	1.59	1.32	22	2.75	3.4	2.15	1.69	1.09
8	2.35	4.0	2.4	1.58	1.29	23	2.8	3.5	2.15	1.85	1.07
9	2.1	5.0	2.4	1.58	1.27	24	2.95	3.4	2.15	1.85	1.06
10	2.0	5.0	2.45	1.56	1.22	25	3.2	3.4	2.05	1.85	1.00
11	2.05	5.4	2.4	1.51	1.20	26	2.9	3.4	1.85	1.66	1.00
12	2.1	5.4	2.45	1.48	1.20	27	3.0	3.4	1.85	1.58	1.00
13	2.25	5.3	2.5	1.48	1.18	28	3.4	3.4	1.8	1.53	1.00
14	2.4	5.8	2.5	1.50	1.14	29	3.6	3.2	1.75	1.48	1.00
15	2.85	6.3	2.45	1.53	1.12	30	3.7	3.2	1.7	1.54	.98
						31	4.0	-------	1.7	1.49	-------

Monthly discharge of East River at Almont, Colo., for the period Oct. 1, 1920, to Apr. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	120	100	106	6,520
November	----------	----------	90	5,360
December	----------	----------	83.4	5,130
January	----------	----------	74.7	4,590
February	----------	----------	64.1	3,560
March	----------	----------	89.0	5,470
April	303	94	140	8,330

TOMICHI CREEK AT SARGENTS, COLO.

LOCATION.—In NW. ¼ sec. 28, T. 48 N., R. 5 E., at railroad bridge three-quarters of a mile west of Sargents, Saguache County. Nearest tributary, Marshall Creek, enters a quarter of a mile above.

DRAINAGE AREA.—165 square miles (measured on map in Hayden's atlas).

RECORDS AVAILABLE.—May 12, 1917, to September 30, 1921.

GAGE.—Lallie water-stage recorder installed October 5, 1917, and referred to vertical staff attached to downstream piling of railroad bridge; read by H. R. Aikin.

DISCHARGE MEASUREMENTS.—Made by wading or from pile bent bridge.

CHANNEL AND CONTROL.—Bed composed of gravel. Control 30 feet downstream at small rapids of compact gravel; shifting during high water.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 4.06 feet during June 9 (discharge, 792 second-feet); minimum discharge, 6 second-feet on November 16.

1917–1921: Maximum stage recorded that of June 9, 1921; minimum stage recorded that of November 16, 1920.

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

DIVERSIONS.—A few small ditches divert water for irrigation above Sargents.

REGULATION.—Diurnal fluctuation during spring, caused by alternate melting and freezing of mountain snow. No artificial regulation.

ACCURACY.—Stage-discharge relation not permanent; affected by ice. Rating curves used from October 1 to November 30 and from June 21 to September 30 not well defined above 250 second-feet. Curve used from April 10 to June 18 well defined between 20 and 600 second-feet. Operation of water-stage recorder not satisfactory except for short periods, as noted in footnote to table of daily discharge. Mean daily gage height obtained from recorder graph by inspection. Daily discharge ascertained by applying mean daily gage height to rating table, except as explained in footnote to table of daily discharge. Records fair.

Discharge measurements of Tomichi Creek at Sargents, Colo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 12	H. E. Grosbach	1.90	30.1	Mar. 25	F. C. Snyder	2.05	49.5
Nov. 16	F. C. Snyder	1.71	6.5	May 25	Robert Follansbee	3.70	560
Dec. 20	P. V. Hodges	[a]	25.8	June 27	....do	3.38	242
Jan. 19	F. C. Snyder	[a]	30.7	July 5	Baily and Snyder	3.14	162
Mar. 19	E. H. Peck	[b] 2.51	67				

[a] Creek frozen to bottom at gage.
[b] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Tomichi Creek at Sargents, Colo., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	22	28			200	740	204	89	56
2	19	21			200	720	201	87	55
3	18	20			207	700	186	86	54
4	20	22			216	720	183	84	53
5	22	36			260	736	178	86	52
6	22	35			323	722	175	86	50
7	22	29			288	708	168	78	48
8	22	26			216	736	162	76	46
9	22	24			210	792	155	77	46
10	23	20		82	195	771	151	78	45
11	29	20		86	204	750	151	74	44
12	29	18		93	264	764	149	73	43
13	28	16		78	292	757	151	73	42
14	26	14		88	338	750			41
15	24	12		57	338	750			40
16	22	6		53	350	757			44
17	22	12		99		764			40
18	22	18		106		750			42
19	20	24	67	114		500		70	42
20	20	24		112	400	400	130		43
21	17	22		114		291			42
22	17	20		112		268			40
23	18	18		144		261			38
24	18	18		175	505	264			37
25	18	18	50	175	560	272			36
26	18	18		130	450	216		65	35
27	20	18		140	560	240	108	62	34
28	20	16		150	650	234	104	61	33
29	22	18		160	680	228	98	60	32
30	34	20		180	720	192	94	59	30
31	32				740		91	58	

NOTE.—No gage-height record Oct. 17-22, Nov. 25, 26, 28-30, Apr. 18, 23, 27-30, May 1, 2, 17-23, 26-31, June 1-4, 19, 20, July 14-26, Aug. 14-25, 28-31, Sept. 1, 3-8, 11-14, 25-29; discharge determined from comparison of flow of Taylor River at Almont. Braced figures show mean discharge for period indicated. Stage-discharge relation affected by ice Oct. 14-16, 23-28, Nov. 11-24, 27; discharge, based on study of weather and gage-height records. No record Dec. 1 to Apr. 9.

Monthly discharge of Tomichi Creek at Sargents, Colo., for the year ending Sept. 30 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	34	17	22.2	1,360
November	36	6	20.4	1,210
April 10–30	180	53	117	4,870
May	740	195	380	23,400
June	792	192	558	33,200
July	204	91	142	8,730
August	89	58	72.6	4,460
September	56	30	42.8	2,550

NOTE.—No record Dec. 1 to Apr. 9.

LAKE FORK AT LAKE CITY, COLO.

LOCATION.—In sec. 34, T. 44 N., R. 4 W., at private bridge one-third mile above Henson Creek, in Lake City, Hinsdale County.

DRAINAGE AREA.—126 square miles (measured on topographic map).

RECORDS AVAILABLE.—April 21, 1918, to September 30, 1921.

GAGE.—Vertical staff fastened to downstream side of right bridge abutment; read by Eugene Otis.

DISCHARGE MEASUREMENTS.—Made by wading or from bridge.

CHANNEL AND CONTROL.—Bed composed of coarse gravel well compacted. Control at small rapids 250 feet downstream; shifting during extreme high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 3.0 feet at 8 a. m. June 16 and 17 (discharge, 1,560 second-feet); minimum discharge occurred during winter.

1918–1921: Maximum stage recorded during 1921. Minimum stage, 0.57 foot on March 20, 1919 (discharge, 10 second-feet).

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

DIVERSIONS.—Practically none which do not return to stream above station. Court decrees for diversions of 22 second-feet from Lake Fork below station.

REGULATION.—Flow naturally regulated by Lake San Cristobal, 4 miles upstream; area 1 square mile. During low water operation of power plant, 1 mile upstream, may influence discharge slightly.

ACCURACY.—Stage-discharge relation not permanent; affected by ice. Rating curves well defined below 800 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except as noted in footnote to table of daily discharge. Records good.

Discharge measurements of Lake Fork at Lake City, Colo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 15	H. E. Grosbach	0.92	46.8	May 22	Robert Follansbee	1.59	202
Feb. 4	E. H. Peck	a 1.34	13.8	July 22	do	2.15	336
Mar. 15	do	.64	18.8				

a Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Lake Fork at Lake City, Colo., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	44	39	32				24	54	612	660	213	234
2	44	40	32				23	69	665	660	213	213
3	44	39	32				21	133	665	605	198	198
4	41	39	32				27	235	665	605	183	183
5	40	39					28	305	612	502	169	150
6	40	38					29	330	515	415	155	136
7	40	38					31	330	470	415	147	123
8	39	36					31	214	560	415	142	119
9	38	36					31	181	795	455	131	107
10	35	34				19	29	166	1,110	455	128	97
11	34	35					29	136	1,470	415	126	90
12	32	34					29	133	1,560	455	119	84
13	31	34					29	160	1,470	455	116	79
14	31	34					32	175	1,470	415	126	77
15	41	34			17		35	228	1,560	415	126	73
16	44	34		19			36	305	1,470	502	128	73
17	44	31					36	305	1,390	455	123	73
18	41	30	17				35	280	1,050	455	112	77
19	41	29				26	36	261	910	415	128	77
20	43	30				24	36	214	780	375	142	75
21	44	29				24	39	204	910	375	152	71
22	41	29				27	39	207	845	375	169	66
23	39	29				24	47	235	910	375	282	64
24	38	29				30	55	238	910	375	310	61
25	36	29				27	58	242	980	342	310	58
26	36	29				28	58	242	910	502	310	56
27	32	29				28	54	261	910	455	255	56
28	32	31				27	52	362	845	375	255	52
29	35	31			-------	27	51	470	780	310	255	50
30	38	31			-------	26	50	560	720	310	255	50
31	39	-------			-------	24	-------	612	-------	310	255	-------

NOTE.—Stage-discharge relation affected by ice Dec. 5 to Mar. 18; discharge based on weather and gage-height records, one discharge measurement, and observer's notes. Braced figures show mean daily discharge for periods indicated. Discharge June 13–16 computed by shifting-control method.

Monthly discharge of Lake Fork at Lake City, Colo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	44	31	38.6	2,370
November	40	29	33.3	1,980
December	----------	----------	18.9	1,160
January	----------	----------	19	1,170
February	----------	----------	17	944
March	----------	----------	22	1,350
April	58	21	37	2,200
May	612	54	253	15,600
June	1,560	470	950	56,500
July	660	310	440	27,100
August	310	112	185	11,400
September	234	50	97.4	5,800
The year	1,560	----------	176	128,000

LEROUX CREEK NEAR LAZEAR, COLO.

LOCATION.—In sec. 33, T. 13 S., R. 93 W., at highway bridge 8 miles north of Lazear, Delta County. No important tributary within several miles.

DRAINAGE AREA.—52 square miles (measured on map in Forest Service atlas).

RECORDS AVAILABLE.—May 15, 1917, to September 30, 1921.

GAGE.—Stevens water-stage recorder installed during 1920 to replace Lallie water-stage recorder installed April 23, 1918, and referred to vertical staff fastened to face of left bridge abutment; inspected by G. H. Henderson. Datum lowered 0.40 foot July 20, 1917, and 0.45 foot October 11, 1917. All gage heights referred to latter datum.

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

CHANNEL AND CONTROL.—Bed composed of gravel and boulders; very rough. Control 50 feet downstream; shifts during high water.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 4.0 feet at 5 p. m. May 29 (discharge, 1,420 second-feet); minimum stage, creek practically dry during winter.

1918–1921: Maximum discharge, 1,420 second-feet June 17, 1917, and May 29, 1921; minimum stage, creek practically dry during winter.

ICE.—No data. Practically the entire flow of stream is stored in reservoirs during winter.

DIVERSIONS.—Court decrees for diversion of 55 second-feet from Leroux Creek above station, of which 33 second-feet is for diversions out of the drainage basin. Below, adjudicated decrees for 290 second-feet.

REGULATION.—Diurnal fluctuation during spring caused by alternate melting and freezing of mountain snow. Flow in nonirrigating season stored in reservoirs on headwaters. Decrees for such storage amounts to 606 acre-feet.

COOPERATION.—Complete records furnished by State engineer.

Discharge measurements of Leroux Creek near Lazear, Colo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 21	H. E. Grosbach	−0.47	3.9	June 10	F. C. Snyder	2.38	512
Feb. 14	F. C. Snyder	[a]	2.4	July 14	do	.42	32.2
Mar. 21	do	−.60	[b]1.0	Aug. 31	do	.30	25.8
May 3	do	1.58	205	Sept. 27	do	−.06	8.2

[a] Gage not read. [b] Discharge estimated.

Daily discharge, in second-feet, of Leroux Creek near Lazear, Colo., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	8.0				13	173	696	41	33	41
2	8.3				23	253	620	33	26	41
3	7.6				41	302	570	30	23	33
4	7.2	0.8		16	55	403	570	46	20	30
5	7.2			15	50	496	496	41	20	25
6	7.0			9.2	33	545	595	30	20	26
7	7.0			13	33	302	830	30	20	19
8	6.8			11	37	162	670	26	20	13
9	6.8			20	37	118	749	26	20	15
10	6.8			20	33	103	620	33	20	16
11	6.0	.5		18	37	103	520	30	18	18
12	5.0			11	47	143	472	30	15	14
13	4.0			11	37	253	472	41	13	13
14	3.0		2.44	12	42	425	425	37	11	14
15	3.0			13	37	570	425	33	11	13
16	3.2			13	33	830	285	30	11	13
17	3.2			11	33	722	238	33	9.2	11
18	3.4	1.8		13	33	496	162	30	9.2	12
19	3.4			11	46	268	118	30	13	21
20	3.6			9.2	37	173	96	26	15	13
21	3.7			7.5	33	224	71	30	33	13
22	4.5			7.5	37	285	77	30	37	13
23	5.3			13	55	403	77	60	46	12
24	5.6			13	41	620	71	50	77	11
25	6.2	3.0		18	33	595	60	30	37	11
26	5.8			13	30	472	55	26	26	11
27	4.6			11	41	670	46	20	23	10
28	3.5			11	33	971	41	18	26	9.6
29	3.0			11	30	914	41	23	46	8.9
30	2.5			11	71	804	41	26	30	7.9
31	2.0			11		776		26	30	

NOTE.—No record during months for which no record is given.

Monthly discharge of Leroux Creek near Lazear, Colo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	8.3	2.0	5.07	312
March 4-31	20	7.5	12.6	701
April	71	13	38.0	2,260
May	971	103	438	26,900
June	830	41	340	20,200
July	60	18	32.1	1,970
August	77	9.2	24.5	1,510
September	41	7.9	17.0	1,010

SURFACE CREEK AT CEDAREDGE, COLO.

LOCATION.—About sec. 29, T. 13 S., R. 94 W., at Cedaredge, Delta County. Nearest tributary, Mill Creek, enters 4 miles above.

DRAINAGE AREA.—43 square miles (measured on map in Forest Service atlas).

RECORDS AVAILABLE.—May 16, 1917, to September 30, 1921.

GAGE.—Stevens water-stage recorder installed July 24, 1919, and referred to vertical staff fastened to right concrete abutment of footbridge 400 feet upstream from highway bridge in Cedaredge; inspected by J. C. Rock. Lallie water-stage recorder at same site and datum used prior to July 24, 1919.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage section.

CHANNEL AND CONTROL.—Bed composed of small boulders and gravel filled in behind and up flush with crest of old concrete weir 12 feet below gage which forms control.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 1.8 feet at 10 p. m. May 27 and 1 a. m. June 7 (discharge, 442 second-feet); minimum discharge during winter when creek was practically dry.

1917–1921: Maximum stage, 1.8 feet at 7 a. m. May 24, 1920 (discharge, 715 second-feet); minimum stage during winter when stream is practically dry.

ICE.—No data. Flow very small as most of it is stored during winter.

DIVERSIONS.—Court decrees for diversion of 142 second-feet from Surface Creek above station, of which 67 second-feet is for diversion out of the drainage basin. Below, adjudicated decrees for 272 second-feet.

REGULATION.—Alternate melting and freezing of snow in mountains caused diurnal fluctuation during spring of year. Court decrees for storage of 8,140 acre-feet on headwaters of Surface Creek. The storage and release of this water changes the natural flow.

COOPERATION.—Complete records furnished by State engineer.

Discharge measurements of Surface Creek at Cedaredge, Colo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 15	F. C. Snyder	0.23	3.6	June 28	H. C. Getty	0.83	74
Mar. 22	do	.23	2.9	July 11	F. C. Snyder	.82	82
May 4	do	1.15	127	Aug. 30	do	.33	12.6
June 11	do	1.49	280	Sept. 29	H. C. Getty	.26	8.3

Daily discharge, in second-feet, of Surface Creek at Cedaredge, Colo., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4.4	4.8	7.6		1.4	80	298	68	40.0	40
2	4.0	6.0	8.0		1.2	152	288	65	51.0	40
3	4.0	13	8.0		.7	203	264	68	7.8	34
4	4.0	10	8.0		.3	264	259	99	11.0	34
5	4.0	5.2			7.0	323	269	82	7.8	30
6	3.8	3.0			4.0	313	323	96	7.8	30
7	3.8	3.0			4.0	194	374	79	7.8	33
8	3.6	2.6			9.0	104	348	72	7.8	28
9	3.6	2.2			9.0	75	390	74	7.8	33
10	3.6	2.0			6.0	64	364	89	2.6	40
11	4.0	2.2			7.0	63	338	84	33	51
12	4.4	2.6			17	113	298	110	32	51
13	4.0	2.4		3.5	7.0	169	278	84	41	35
14	3.8	2.4		3.5	11	240	254	86	41	28
15	4.0	2.4		3.5	9.0	264	230	58	43	24
16	4.8	2.2		3.2	7.0	318	206	54	38	23
17	3.8	2.0		2.9	7.0	259	182	96	35	26
18	3.4	2.2		2.0	7.0	182	158	79	29	23
19	3.6	2.2		2.0	17	104	134	56	40	28
20	3.8	2.2		2.0	12	68	110	40	56	20
21	8.8	2.0		1.4	8.0	61	110	47	72	16
22	10	1.8		.6	12	91	110	54	54	18
23	8.8	1.6		.4	25	131	110	63	51	17
24	10	1.8		1.2	20	208	110	34	91	17
25	9.6	2.4		1.2	13	217	110	34	43	15
26	8.8	2.8		1.5	9.5	160	99	26	24	12
27	8.0	3.0		1.4	11	217	72	28	22	11
28	7.6	6.8		1.2	15	269	79	18	14	8.4
29	8.0	8.0		1.5	11	278	74	11	14	8.4
30	4.0	7.2		1.4	59	308	94	18	13	10
31	4.0			1.4		318		18	18	

NOTE.—No record Dec. 5 to Mar. 12.

Monthly discharge of Surface Creek at Cedaredge, Colo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	10	3.4	5.35	329
November	13	1.6	3.73	222
March 13–31	3.5	.4	1.9	71
April	59	.3	10.9	649
May	323	61	187	11,500
June	390	72	211	12,600
July	110	11	61.0	3,750
August	91	2.6	30.8	1,890
September	51	8.4	26.1	1,550

UNCOMPAHGRE RIVER AT OURAY, COLO.

LOCATION.—River: In sec. 31, T. 44 N., R. 7 W., in box canyon a short distance upstream from highway bridge half a mile south of Ouray, Ouray County. Nearest tributary, Canyon Creek, enters 150 feet below; nearest tributary above is Bear Creek.

Power-house flume: In tailrace of power-house flume in Ouray about 100 feet upstream from entrance to river. Water diverted from Uncompahgre River above river station.

DRAINAGE AREA.—44 square miles (measured on topographic map).

RECORDS AVAILABLE.—January 25, 1911, to September 30, 1921, for river station and February 25, 1916, to September 30, 1921, for power-house flume. Combined daily flow for river and flume are given, as intermittent operation of power house causes low-water flow in river to fluctuate to such an extent that one daily gage height does not represent essentially the mean daily stage. From January 7 to March 17, 1908, records were kept at dam of Ouray Electric Light & Power Co., 1 mile south of present station.

GAGE.—River: Stevens water-stage recorder installed April 22, 1919, and referred to vertical staff used since 1911 and attached to rock cliff at left side of stream 150 feet above mouth of Canyon Creek; inspected by T. J. Watkins.

Power house flume: Vertical staff fastened to side of wooden flume just below power house.

DISCHARGE MEASUREMENTS.—River: Made from footbridge at gage or by wading.

Flume: Made from footbridge just below gage.

CHANNEL AND CONTROL.—River: Bed composed of small boulders. Control short distance downstream, shifting at intervals; station is in box canyon that has high vertical walls.

Flume: Control is plank nailed across bottom of flume at lower end.

EXTREMES OF DISCHARGE.—River: Maximum stage during year from water-stage recorder, 5.9 feet at 7 p. m. June 11 (discharge, 1,930 second-feet); minimum stage, 0.28 foot at 10 a. m. December 25 (discharge, 0.5 second-feet).

1911–1921: Maximum stage recorded that of June 11 during 1921; minimum discharge, no flow February 2, 3, and 29, 1912.

ICE.—Stage-discharge relation not affected by ice, as warm springs keep stream open.

DIVERSIONS.—No diversion above station other than pipe line whose flow is included in these records.

REGULATION.—Diurnal fluctuation during spring from alternate melting and freezing of mountain snow.

ACCURACY.—River: Stage-discharge relation not permanent; not affected by ice during winter. Two standard rating curves fairly well defined used during the year. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating tables mean daily gage height determined by inspection of gage-height graph, or for days of considerable fluctuations during low water by averaging bihourly discharge, as noted in footnote to table of daily discharge. Shifting-control method used during the year. Records good.

Flume: Daily discharge from October 1 to December 31 obtained by applying poorly defined rating table to one daily gage height, as diversion was continuous. From January 1 to June 11 diversions were made intermittently, and discharge was determined from study of charts for river station which is below diversion. No diversion subsequent to June 11. Records fair except from January to April, for which they are good.

Records of combined discharge of river and flume good except those for October to December which are only fair, as the quantity of water diverted by the flume during the period is a large percentage of the total discharge.

Discharge measurements of Uncompahgre River at Ouray, Colo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 26	T. J. Watkins	1.34	39.7
Feb. 2	E. H. Peck	.98	10.4
June 2	T. J. Watkins	2.70	379

Discharge measurement of power-house flume at Ouray, Colo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 2	E. H. Peck	1.1	4.3

Daily discharge, in second-feet, of Uncompahgre River and power-house flume at Ouray, Colo., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	20	26	23	12	11	27	32	110	459	359	118	84
2	19	27	21	15	11	31	41	166	441	385	97	72
3	19	27	21	13	13	38	51	186	482	308	92	62
4	23	28	21	13	14	39	61	226	385	255	84	59
5	18	29	21	14	15	27	50	306	254	162	76	54
6	18	26	21	14	14	25	40	236	278	170	70	51
7	18	26	21	13	15	22	34	156	355	198	72	48
8	17	26	23	10	15	21	34	136	429	182	70	48
9	18	26	21	13	15	18	31	126	846	193	59	47
10	18	26	21	14	16	21	28	106	1,040	158	56	46
11	18	26	21	13	13	22	29	111	1,370	170	54	45
12	23	26	21	13	17	21	33	126	1,350	155	52	45
13	18	26	21	10	16	23	36	156	1,260	160	51	44
14	20	27	18	8	16	21	36	188	1,210	175	72	42
15	24	26	14	10	16	22	38	221	1,270	178	65	49
16	24	26	19	12	16	22	40	266	945	233	52	46
17	20	27	22	12	16	26	42	234	800	198	46	40
18	19	27	22	13	16	32	44	214	570	216	42	41
19	18	26	22	6	14	30	44	158	419	193	54	41
20	19	25	22	8	15	27	40	143	407	195	59	40
21	20	25	21	17	14	26	41	161	464	198	72	37
22	18	25	21	17	14	26	43	194	527	190	116	35
23	23	25	19	18	16	27	54	214	518	185	122	34
24	28	27	18	18	16	24	53	231	480	155	105	32
25	28	26	18	13	18	24	46	254	452	139	105	32
26	27	25	22	15	21	24	41	208	460	180	93	33
27	31	25	18	17	24	25	40	256	448	122	88	31
28	24	25	14	18	27	26	37	397	424	112	79	32
29	28	23	20	14	-------	28	44	482	382	95	77	33
30	27	23	20	14	-------	27	71	526	338	103	79	32
31	28	-------	6	16	-------	25	-------	490	-------	120	88	-------

NOTE.—River: No gage-height record Nov 8–17, Dec. 5–10, 12–27, Apr. 11–15, and May 2–13; discharge based on comparison with discharge of Uncompahgre River below Ouray. Jan. 1 to Feb. 2, 10–12, 19–26, 28, Mar. 2, 9, daily discharge computed by averaging bihourly discharge. Shifting-control method used during year.

Power-house flume: Discharge through pipe line during low-water period determined from inspection of continuous record at river station. Plant not operated Oct. 24–28 and from June 15 to Sept. 30.

Monthly discharge of Uncompahgre River and power-house flume at Ouray, Colo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	31	17	21.7	1,330
November	29	23	25.9	1,540
December	23	6	19.8	1,220
January	18	6	13.3	818
February	27	11	15.9	883
March	39	18	25.7	1,580
April	71	28	41.8	2,490
May	526	106	225	13,800
June	1,370	254	635	37,800
July	385	95	188	11,600
August	122	42	76.3	4,690
September	84	31	44.5	2,650
The year	1,370	6	111	80,400

UNCOMPAHGRE RIVER BELOW OURAY, COLO.

LOCATION.—In sec. 30, T. 44 N., R. 7 W. New Mexico principal meridian, near lowest bridge in Ouray, Ouray County, a third of a mile below railroad station; below all tributaries in Ouray.

DRAINAGE AREA.—76 square miles (measured on topographic map).

RECORDS AVAILABLE.—May 12, 1913, to September 30, 1921.

GAGE.—Gurley water-stage recorder installed March 28, 1917, referred to vertical staff, attached to rock cliff 500 feet above bridge, used since March 22, 1916; inspected by T. J. Watkins. Original gage, vertical staff attached to downstream side of right bridge abutment, was used prior to March 22, 1916.

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

CHANNEL AND CONTROL.—Bed composed of coarse gravel and small boulders. Control is broken rock ledge 50 feet downstream on which mill tailings are alternately deposited and scoured out. Banks not subject to overflow except at extreme high water stage of 6.5 feet.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 6.05 feet at 5 a. m. June 12 (discharge, 1,900 second-feet); minimum stage 1.0 foot at 1 p. m. November 16 (discharge, 14 second-feet).

1913–1921: Maximum discharge 2,530 second-feet at 1 a. m. June 14, 1918; minimum discharge, 10 second-feet at 9 a. m. February 5 and 6, 1915.

ICE.—Stage-discharge relation not affected by ice; warm springs keep river open.

DIVERSIONS.—All diversions returned to river above stations except one of 5.2 second-feet from Oak Creek.

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

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve well defined between 10 and 700 second-feet. Operation of water-stage recorder satisfactory. Mean daily gage height obtained by inspection of recorder graph. Daily discharge ascertained by shifting-control method, except for month of June, when mean daily gage height was applied to rating table. Records good.

Discharge measurements of Uncompahgre River below Ouray, Colo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 26	T. J. Watkins	1.68	65
Feb. 2	E. H. Peck	1.28	25.9
June 2	T. J. Watkins	3.78	624

Daily discharge, in second-feet, of Uncompahgre River below Ouray, Colo., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	65	55	38	33	28	59	44	169	775	676	222	122
2	63	54	39	34	27	70	55	225	810	666	185	117
3	62	57	38	34	30	84	63	324	835	568	175	111
4	60	58	37	34	30	71	76	464	770	460	171	104
5	59	56	37	34	29	50	58	576	563	335	167	96
6	59	53	37	34	30	41	47	486	504	335	151	92
7	58	55	34	34	29	37	40	276	626	370	147	90
8	55	52	34	28	28	34	40	212	750	378	143	86
9	53	51	34	32	29	31	43	171	1,120	419	135	78
10	53	50	34	32	29	34	61	153	1,280	374	130	74
11	53	48	35	33	30	34	73	157	1,360	366	128	71
12	54	47	31	32	34	34	75	195	1,280	406	123	67
13	52	47	32	29	37	32	71	265	1,250	360	126	65
14	59	49	32	29	38	32	62	346	1,330	402	155	64
15	74	44	32	31	29	32	49	446	1,550	414	139	67
16	67	46	35	31	28	37	54	486	1,120	437	124	65
17	61	46	36	32	29	48	65	442	914	419	117	61
18	56	48	37	32	30	53	74	378	770	540	105	64
19	57	49	35	24	30	51	68	276	563	406	114	62
20	54	47	36	23	31	44	62	255	563	346	112	60
21	55	44	35	35	32	43	62	273	622	342	114	56
22	58	45	32	31	32	46	81	314	730	342	177	54
23	53	44	34	31	34	43	90	349	750	349	198	52
24	61	37	33	29	40	40	86	363	730	324	175	51
25	68	46	32	27	48	41	70	428	750	338	171	52
26	64	40	34	29	59	38	62	356	800	414	151	51
27	59	43	34	29	59	37	61	455	780	307	137	50
28	59	34	37	29	67	40	60	685	755	291	135	50
29	55	37	37	29	------	45	75	810	695	255	130	50
30	51	40	37	29	------	41	111	865	666	210	122	51
31	60	------	35	29	------	40	------	825	------	212	122	------

Monthly discharge of Uncompahgre River below Ouray, Colo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	74	51	58.6	3,600
November	58	34	47.4	2,820
December	39	31	34.9	2,150
January	35	23	30.7	1,890
February	67	27	34.9	1,940
March	84	31	43.9	2,700
April	111	40	64.6	3,840
May	865	153	388	23,900
June	1,550	504	867	51,600
July	676	210	389	23,900
August	222	105	145	8,920
September	122	50	71.1	4,230
The year	1,550	23	182	131,000

UNCOMPAHGRE RIVER AT COLONA, COLO.

LOCATION.—In sec. 5, T. 46 N., R. 8 W., just below highway bridge 4 miles south of Colona, Ouray County. Nearest tributary, Billy Creek, enters 1½ miles downstream.

DRAINAGE AREA.—403 square miles (measured on topographic map).

RECORDS AVAILABLE.—April 6, 1917, to September 30, 1921.

GAGE.—Friez water-stage recorder located a short distance below highway bridge, installed June, 1921. Original gage was vertical staff located half a mile east of Colona and used until station was washed out June 11, 1921.

DISCHARGE MEASUREMENTS.—Made from highway bridge.
CHANNEL AND CONTROL.—Shifts during high water.
EXTREMES OF DISCHARGE.—No data.
ICE.—Station discontinued during winter.
DIVERSIONS.—Only a few small diversions above station.
COOPERATION.—Discharge measurements and records of daily discharge furnished by United States Bureau of Reclamation.

Discharge measurements of Uncompahgre River at Colona, Colo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
Mar. 16	United States Bureau of Reclamation	*Feet.* 1.70	*Sec.-ft.* 130	May 21	United States Bureau of Reclamation	*Feet.* 3.01	*Sec.-ft.* 682
31	do	1.83	131	June 24[a]	do	2.85	1,470
Apr. 4	do	2.11	232	July 1	do	2.62	1,380
19	do	2.26	293	14	do	2.19	957
23	do	2.45	370	Aug. 6	do	1.31	486
30	do	2.50	424	13	do	.90	269
May 3	do	3.29	884	Sept. 17	do	.69	175
19	do	2.96	586	24	do	.57	135

[a] Gage moved 4 miles upstream.

Daily discharge, in second-feet, of Uncompahgre River at Colona, Colo., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.	Sept.
1	128	140	99	230	665	1,320	1,370	670	521
2	119	135	88	220	872	1,270	1,290	587	500
3	112	130	99	240	1,050	1,350	1,210	556	447
4	110	127	88	250	1,190	1,310	1,080	530	412
5	107	117	94	253	1,250	1,100	890	505	382
6	100	120	99	202	1,230	1,030	790	455	360
7	100	123	88	185	900	1,300	805	420	341
8	98	127	81	170	680	1,360	812	389	330
9	95	127	90	180	555	2,120	820	370	330
10	98	127	74	190	560	2,400	835	340	294
11	110	127	86	208	477	3,000	800	280	262
12	110	127	75	267	523	3,500	890	280	246
13	108	127	63	260	570	4,080	970	256	242
14	123	127	86	257	695	4,080	1,050	365	224
15	139	127	50	211	810	3,900	1,140	412	215
16	145	127	75	223	910	3,600	1,060	377	222
17	132	127	81	258	886	2,940	1,020	330	182
18	123	127	95	240	886	2,650	1,140	298	172
19	120	127	99	285	735	2,530	950	287	172
20	140	127	97	272	620	2,530	875	337	160
21	135	127	95	261	695	2,480	820	364	160
22	145	99	74	272	800	2,530	812	450	157
23	149	77	77	352	860	2,100	875	575	149
24	139	77	70	415	850	1,700	796	516	138
25	151	99	77	322	925	1,620	800	568	133
26	166	81	79	386	815	1,530	900	510	131
27	166	99	74	267	805	1,560	738	527	127
28	159	99	81	260	1,120	1,560	692	500	127
29	159	99	95	284	1,230	1,530	653	514	122
30	159	99	95	460	1,390	1,460	627	500	119
31	154	-------	105	-------	1,400	-------	650	522	-------

NOTE.—Quantities changed slightly to conform to computation rules used by U. S. Geol. Survey. No record Jan. 1 to Mar. 31.

Monthly discharge of Uncompahgre River at Colona, Colo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	166	95	129	7,930
November	140	77	117	6,960
December	105	50	84.8	5,210
April	460	170	263	15,600
May	1,400	477	869	53,400
June	4,080	1,030	2,180	130,000
July	1,370	627	908	55,800
August	670	256	438	26,900
September	521	119	246	14,600

NOTE.—Monthly means computed by engineers of the U. S. Geol. Survey.

UNCOMPAHGRE RIVER AT MONTROSE, COLO.

LOCATION.—In sec. 31, T. 49 N., R. 9 W., New Mexico principal meridian, at highway bridge, one-fourth mile west of Montrose, Montrose County. Nearest important tributary, Happy Canyon Creek, enters 2 miles below.

DRAINAGE AREA.—565 square miles.

RECORDS AVAILABLE.—April 22, 1903, to September 30, 1921.

GAGE.—Vertical staff attached to bridge; read by L. R. Allen.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Bed composed of sand and gravel; shifts occasionally.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.2 feet on June 13 and 14 (discharge, 3,580 second-feet); minimum discharge, 9 second-feet October 30 and 31.

ICE.—Although ice forms along the banks during winter, river is not frozen over. Observations, however, are discontinued.

DIVERSIONS.—Uncompahgre River is so overappropriated that the United States Bureau of Reclamation has constructed a tunnel and canal to divert 1,300 second-feet from Gunnison River into the Uncompahgre above Uncompahrge.

COOPERATION.—Discharge measurements and daily-discharge record furnished by United States Bureau of Reclamation.

Discharge measurements of Uncompahgre River at Montrose, Colo., during the year ending Sept. 30, 1921.

[Made by U. S. Bureau of Reclamation.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Mar. 16	0.78	66	May 21	2.18	776
17	.73	58	June 14	4.05	3,250
May 3	2.36	920	30	1.74	768
11	1.34	405	July 14	1.80	927
12	1.83	638			

Daily discharge, in second-feet, of Uncompahgre River at Montrose, Colo., for the year ending Sept. 30, 1921.

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1	210	80	808	865	880	630	440
2	137	65	808	820	868	522	430
3	149	50	808	1,050	868	472	320
4	162	50	820	945	590	457	320
5	158	95	845	920	590	422	200
6	92	52	893	905	635	340	200
7	90	150	453	1,620	680	297	165
8	78	180	367	1,270	720	248	250
9	61	665	277	2,060	745	220	210
10	78	668	520	2,360	760	430	255
11	92	670	480	2,530	810	370	255
12	92	676	582	2,990	942	333	200
13	90	676	754	3,580	900	310	180
14	100	585	850	3,580	983	440	132
15	108	585	920	3,400	1,050	575	100
16	52	630	1,000	3,100	1,110	472	220
17	31	525	1,000	2,440	1,180	410	200
18	17	550	1,000	2,150	1,220	370	200
19	15	545	950	2,030	1,220	345	230
20	17	535	710	2,030	720	370	220
21	17	530	760	1,980	720	370	215
22	18	545	890	2,030	622	370	215
23	20	550	1,020	1,810	549	522	215
24	15	530	908	1,860	540	422	200
25	12	475	1,060	1,920	533	480	200
26	15	390	903	1,700	622	472	172
27	13	325	952	1,600	705	370	212
28	12	326	1,100	1,400	666	380	208
29	10	333	958	1,170	622	395	42
30	9	380	958	1,010	432	320	42
31	9	-------	834	--------	432	380	--------

NOTE.—Quantities changed slightly to conform to computation rules used by U. S. Geol. Survey. No record Nov. 1 to Mar. 31.

Monthly discharge of Uncompahgre River at Montrose, Colo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	210	9	63.8	3,920
April	676	50	414	24,600
May	1,100	277	813	50,000
June	3,580	820	1,900	113,000
July	1,220	432	771	47,400
August	630	220	404	24,800
September	440	42	214	12,700

NOTE.—Monthly means computed by engineers of the U. S. Geol. Survey.

UNCOMPAHGRE RIVER NEAR DELTA, COLO.

LOCATION.—In T. 15 S., on line between Rs. 95 and 96 W., at highway bridge 2 miles south of Delta, Delta County. No tributaries below station and none for several miles above.

DRAINAGE AREA.—1,110 square miles (revised; measured on map of Colorado, scale 1:500,000).

RECORDS AVAILABLE.—April 29, 1903, to September 30, 1921.

GAGE.—Vertical staff at present site since November 20, 1906; present datum in use since April 19, 1920. Gage read by Miss Eva Helmick. For history of gages used see water-supply paper 479.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Bed composed of silt and gravel. Banks are not subject to overflow. Control shifts at intervals.

EXTREMES OF DISCHARGE.—No data.

ICE.—Although ice forms along banks and slush ice frequently occurs, the stage-discharge relation is probably not materially affected thereby; observations, however, are discontinued during winter.

DIVERSIONS.—Ditches above station divert the normal flow during irrigation season; records represent largely return seepage water.

REGULATION.—None.

COOPERATION.—Discharge measurements and records of daily discharge furnished by United States Bureau of Reclamation.

Discharge measurements of Uncompahgre River near Delta, Colo., during the year ending Sept. 30, 1921.

[Made by U. S. Bureau of Reclamation.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Mar. 17	1.74	75
29	1.46	31.5
May 18	3.61	740

Daily discharge, in second-feet, of Uncompahgre River near Delta, Colo., for the year ending Sept. 30, 1921.

Day.	Oct.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	515		25	270	300	90	532	440
2	520		24	480	245	30	390	442
3	297		35	565	225	69	329	350
4	252		58	670	298	104	303	230
5	218		71	680	329	156	340	192
6	212		71	735	520	152	345	95
7	218		91	490	1,200	32	75	69
8	175		115	305	910	30	62	75
9	145		190	240	1,420	28	60	100
10	150		183	210	1,820	104	120	123
11	155		197	21	1,970	202	95	60
12	160		42	22	2,300	295	22	142
13	160		230	260	2,300	201	60	105
14	162		126	303	2,150	165	50	85
15	171		108	640	2,150	360	332	92
16	184		141	685	1,090	473	250	39
17	162	75	75	720	1,090	482	200	112
18	143		120	670	1,090	505	150	92
19	130		100	650	880	343	105	104
20	150		112	370	598	232	98	102
21	151		105	237	455	210	175	128
22	162		77	210	355	170	294	115
23	190		96	562	333	128	513	120
24	210		835	615	420	172	456	190
25	229		480	615	115	735	456	185
26	230		185	660	237	490	130	195
27	208		102	485	316	350	267	185
28	230		150	235	214	328	350	202
29	208	32	95	793	238	344	315	220
30	208		105	755	69	193	350	185
31	208			565		598	340	

NOTE.—No record Nov. 1 to Mar. 31.

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Monthly discharge of Uncompahgre River near Delta, Colo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	520	130	210	12,900
April	835	24	145	8,630
May	793	21	475	29,200
June	2,300	69	855	50,900
July	735	28	251	15,400
August	532	22	244	15,000
September	442	39	159	9,460

NOTE.—Monthly means computed by engineers of U. S. Geol. Survey.

KAHNAH CREEK NEAR WHITEWATER, COLO.

LOCATION.—In sec. 34, T. 12 S., R. 97 W., a quarter of a mile below intake for water supply of Grand Junction and 17 miles east of Whitewater, Mesa County. Nearest tributary, Coal Creek, enters short distance above station.

DRAINAGE AREA.—38 square miles (measured on map in Forest Service atlas).

RECORDS AVAILABLE.—October 15, 1917, to September 30, 1921, when station was discontinued.

GAGE.—Vertical staff located at right bank 300 feet above footbridge; read by James Woods.

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

CHANNEL AND CONTROL.—Bed composed of gravel and small boulders; shifting at long intervals. Control at riffle of small boulders 75 feet downstream; shifting during extreme high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.5 feet at 11 p. m. June 6 (discharge, 1,630 second-feet); minimum stage recorded, no flow at 9 a. m. March 9.

1918–1921: Maximum stage recorded that of June 6, 1921; minimum discharge no flow at 9 a. m. February 26, 1920, and at 9 a. m. March 9, 1921.

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

DIVERSIONS.—City of Grand Junction diverts an average of 5 second-feet above station for domestic use; maximum diversion, about 8 second-feet. Flow measured over Cippoletti weir.

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

COMBINED FLOW.—Flow diverted by city intake measured by weir and flow added to that at gaging station to show total flow of creek.

ACCURACY.—Stage-discharge relation not permanent; affected by ice. Rating curve used October 1 to May 29 well defined below 300 second-feet; curve used May 30 to September 30 not well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except as explained in footnote to table of daily discharge. Records good except for high water, for which they are fair.

Discharge measurements of Kahnah Creek near Whitewater, Colo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 25	H. E. Grosbach	0.80	10.1	May 6	F. C. Snyder	1.53	97
Jan. 31	E. H. Peck	.57	6.3	June 16	do	2.12	344
Mar. 10	do	.50	2.1	Aug. 11	do	.80	31
10	do	.50	2.2				

Daily discharge, in second-feet, of Kahnah Creek near Whitewater, Colo., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	9	11		4	5	8	7	76	880	55	39	36
2	9	10		5	5	9	7	87	795	53	32	35
3	9	9		5	6	9	9	92	850	47	28	34
4	9	8		5	6	10	9	98	850	38	28	33
5	9	8		6	6	9	9	90	795	45	29	32
			4									
6	9	9		6	6	9	9	88	1,210	45	30	32
7	9	8		6	7	9	10	108	1,210	42	35	32
8	9	9		6	7	9	11	125	1,330	41	35	32
9	9	9		6	7	7	12	116	1,330	41	35	28
10	9	9		6	6	6	13	118	1,090	41	38	26
11	10	9		6	7	8	13	127	850	40	39	23
12	9	9		6	7	9	13	122	520	34	40	22
13	9	9		6	7	9	13	102	445	34	39	20
14	9	9		6	7	9	14	104	1,030	35	43	20
15	9	10		6	7	9	13	106	740	33	43	19
			3									
16	9	9		7	7	10	11	98	630	32	42	19
17	9	9		7	7	10	13	110	470	39	41	19
18	9	9		7	7	11	14	106	272	32	40	19
19	9	9		7	8	9	14	100	150	32	39	18
20	9	9		7	8	9	14	114	130	29	42	17
21	9	8		7	9	9	17	114	121	28	44	17
22	9	8		7	8	9	19	108	117	32	49	15
23	9	9		6	7	8	21	140	111	30	48	15
24	8	9		5	7	8	20	140	106	28	243	15
25	9	9		5	7	8	22	145	104	28	111	12
			2									
26	10	9		6	7	7	30	167	95	27	64	13
27	10	8		7	7	7	43	206	82	27	48	14
28	10	9		7	7	7	55	340	74	28	42	14
29	10	7		7	-------	7	71	672	65	28	41	13
30	11	5		7	-------	8	88	880	58	63	39	11
31	11	-------		6	-------	7	-------	880	-------	45	36	-------

NOTE.—Stage-discharge relation affected by ice from Nov. 29 to Dec. 31 and Jan. 25–27; discharge based on weather and gage-height records. Braced figures show mean daily discharge for periods indicated. Discharge May 30 to June 8 computed by shifting-control method. No gage-height record Aug. 20; discharge interpolated.

Monthly discharge of Kahnah Creek near Whitewater, Colo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	11	8	9.3	572
November	11	5	8.7	518
December	-------	-------	3.0	184
January	7	4	6.1	375
February	9	5	6.9	383
March	11	6	8.5	523
April	88	7	20.5	1,220
May	880	76	190	11,700
June	1,390	58	552	32,800
July	63	27	37.2	2,290
August	243	28	48.5	2,980
September	36	11	21.8	1,300
The year	1,390	-------	75.8	54,800

Daily discharge, in second-feet, of Kahnah Creek weir near Whitewater, Colo., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5.96	5.24	4.53	4.53	4.53	4.53	5.24	5.67	6.74	8.04	7.53	5.24
2	5.96	5.24	4.53	4.53	4.53	4.53	5.24	5.96	6.74	8.04	7.53	5.24
3	5.96	4.53	4.53	4.53	4.53	4.53	5.24	7.53	6.74	8.04	7.53	5.24
4	5.96	4.53	4.53	5.39	4.53	4.53	5.24	7.53	6.74	6.74	7.22	5.24
5	5.96	4.53	4.53	4.53	4.53	4.53	5.24	6.74	6.74	6.74	7.22	5.24
6	5.96	4.53	4.53	4.53	4.53	4.53	5.24	6.74	5.96	6.74	7.22	5.24
7	5.96	4.53	4.53	4.53	4.53	4.53	5.24	6.74	7.53	7.53	7.22	5.24
8	5.96	4.53	4.53	4.53	4.53	4.53	5.24	6.74	7.22	7.53	7.22	5.24
9	5.96	4.53	4.53	4.53	4.53	4.53	5.24	6.74	6.74	7.53	7.22	5.24
10	5.96	4.53	4.53	4.53	4.53	4.53	5.24	6.74	6.74	7.53	7.22	5.24
11	5.96	4.53	4.53	4.53	4.53	4.53	4.53	6.74	7.53	7.53	7.22	5.24
12	5.96	4.53	4.53	4.53	4.53	4.53	5.24	6.74	6.74	7.53	7.22	5.96
13	5.96	4.53	4.53	4.53	4.53	4.53	5.24	6.74	6.74	7.53	7.22	5.96
14	5.96	4.53	4.53	4.53	4.53	4.53	5.24	6.74	6.74	2.67	7.22	5.96
15	5.96	4.53	4.53	4.53	4.53	4.53	5.24	6.74	6.74	7.53	7.22	5.96
16	5.96	4.53	4.53	4.53	4.53	4.53	5.24	7.53	6.74	7.53	7.22	5.96
17	5.96	4.53	4.53	4.53	4.53	4.53	5.24	7.53	6.74	7.53	6.74	5.96
18	5.96	4.53	4.53	4.53	4.53	4.53	5.24	7.53	6.74	7.53	6.27	5.96
19	5.96	4.53	4.53	4.53	5.82	4.53	5.24	7.53	6.74	7.53	6.27	4.82
20	5.96	4.53	5.39	4.53	4.53	5.24	5.24	6.74	6.74	7.53	6.27	5.24
21	5.96	4.53	4.53	4.53	4.53	5.24	5.96	6.74	7.53	7.53	6.27	5.24
22	5.96	4.53	4.53	4.53	4.53	5.24	5.96	6.74	7.53	7.53	6.27	5.24
23	5.96	4.53	4.53	4.53	4.53	5.24	5.96	6.74	7.53	7.53	6.27	5.24
24	5.96	4.53	4.53	4.53	4.53	5.24	5.96	6.74	7.53	7.53	7.53	5.24
25	5.96	4.53	4.53	5.39	4.53	5.24	5.96	6.74	7.53	7.53	6.27	5.96
26	5.24	4.53	4.53	4.53	4.53	5.24	5.96	6.74	7.53	7.53	6.27	5.96
27	5.24	4.53	4.53	4.53	4.53	5.24	5.96	6.74	7.53	7.53	5.24	5.96
28	5.24	4.53	4.53	4.53	4.53	5.24	5.96	7.53	7.53	7.53	5.24	5.96
29	5.24	4.53	4.53	4.53	------	5.24	6.74	7.53	7.53	7.53	5.24	5.96
30	5.24	4.53	4.53	4.53	------	5.24	6.74	8.04	8.04	7.53	5.24	5.96
31	5.24	------	4.53	4.53	------	5.24	------	6.74	------	7.53	5.24	------

Monthly discharge of Kahnah Creek weir near Whitewater, Colo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	5.96	5.24	5.82	358
November	5.24	4.53	4.58	273
December	5.39	4.53	4.56	280
January	5.39	4.53	4.59	282
February	5.82	4.53	4.58	254
March	5.24	4.53	4.80	295
April	6.74	4.53	5.51	328
May	8.04	5.67	6.93	426
June	8.04	5.96	7.06	420
July	8.04	2.67	7.35	452
August	7.53	5.24	6.68	411
September	5.96	4.82	5.54	330
The year	8.04	2.67	5.67	4,110

Combined monthly discharge of Kahnah Creek and Kahnah Creek weir near Whitewater, Colo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	16.2	14.0	15.1	928
November	16.2	9.53	13.3	791
December			7.53	463
January	12.4	8.53	10.7	658
February	13.8	9.53	11.4	633
March	15.5	10.5	13.3	818
April	94.7	12.2	26.0	1,550
May	888	81.7	197	12,100
June	1,400	66.0	559	33,300
July	70.5	34.5	44.5	2,740
August	251	35.2	55.1	3,390
September	41.2	17.0	27.4	1,630
The year	1,400	8.53	81.4	59,000

DOLORES RIVER AT RICO, COLO.

LOCATION.—In sec. 36, T. 40 N., R. 11 W., at highway bridge at upper edge of Rico, Dolores County. Silver Creek enters just above station.

DRAINAGE AREA.—83 square miles (measured on topographic map).

RECORDS AVAILABLE.—June 9 to December 31, 1914; June 1, 1919, to June 10, 1921, when station was destroyed by high water.

GAGE.—Vertical staff fastened to right abutment used during 1914 and until August 12, 1919. On August 14, 1919, a chain gage referred to datum 1.84 feet lower, was installed on bridge; read by G. E. Hicks.

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

CHANNEL AND CONTROL.—Bed composed of small boulders. Control 175 feet downstream at rapids composed of well-compacted boulders; shifting during extreme high water.

EXTREMES OF DISCHARGE.—Maximum stage not recorded, as gage was destroyed by flood June 11; minimum stage, 0.90 foot at 5 p. m., January 3 (discharge, 10 second-feet).

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

REGULATION.—None.

DIVERSIONS.—The Syndicate Mining Co. diverts about 2 second-feet from Horse Creek, a tributary of Dolores River, and carries it to pressure pipe located several hundred yards below gage. Water is diverted from April to November. The flow through the pipe varies between 1.7 and 2.0 second-feet, but this does not include the entire amount diverted as considerable is wasted over a spillway just below the gage. No other diversions above.

ACCURACY.—Stage-discharge relation not permanent; affected by ice for short periods. Rating curve not well defined above 200 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily height to rating table, except as explained in footnote to table of daily discharge. Records good.

COOPERATION.—The Syndicate Mining Co. furnished the gage-height record.

Discharge measurements of Dolores River and power-house tailrace at Rico, Colo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
	River	*Feet.*	*Sec.-ft.*		**Tailrace**	*Feet.*	*Sec.-ft.*
Oct. 19	H. E. Grosbach	1.24	27.3	Oct. 19	H. E. Grosbach		2.9
Jan. 10	F. C. Snyder	[a] 1.22	20.7	Jan. 10	F. C. Snyder	1.04	.87
Mar. 12	E. H. Peck	1.38	36	Mar. 12	E. H. Peck	.90	1.55
May 22	F. C. Snyder	3.52	385	12	do	.90	1.65

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Dolores River at Rico, Colo., for the period Oct. 1, 1920, to June 10, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	29	36	25	15	15	32	41	306	570
2	29	36	26	15	15	33	70	330	570
3	28	41	24	16	14	36	78	378	510
4	27	30	24	14	13	36	66	480	510
5	28	32	20	15	13	38	61	510	690
6	28	28	23	15	13	37	64	440	840
7	28	32	22	15	13	36	66	440	870
8	26	28	25	15	13	26	64	415	870
9	28	26	23	15	13	26	58	390	900
10	26	28	22	15	17	26	70	390	930
11	23	29	20	15	22	26	76	354	------
12	23	28	20	15	21	27	92	330	------
13	26	29	20	16	32	23	92	330	------
14	26	25	20	16	19	26	106	378	------
15	26	25	20	16	17	28	106	378	------
16	26	28	21	14	16	20	106	366	------
17	26	25	22	14	16	20	99	366	------
18	26	26	25	15	16	30	106	366	------
19	26	26	26	14	16	40	106	390	------
20	32	28	23	14	22	32	113	390	------
21	46	25	25	15	22	37	113	378	------
22	40	26	20	14	25	34	113	378	------
23	37	24	20	14	26	32	157	354	------
24	35	29	22	16	16	28	138	330	------
25	36	28	22	14	17	42	121	378	------
26	35	27	20	15	20	31	99	452	------
27	43	26	19	14	29	27	92	540	------
28	37	27	19	19	30	32	85	750	------
29	29	25	19	17	------	32	85	750	------
30	42	29	16	16	------	29	177	630	------
31	26	------	17	15	------	29	------	570	------

NOTE.—Stage-discharge relation affected by ice Dec. 12–15, Jan. 1, 2, 6, 9, and 14; discharge interpolated. Discharge computed by shifting-control method May 1 to June 10.

Monthly discharge of Dolores River at Rico, Colo., for the period Oct. 1, 1920, to June 10, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	46	23	30.4	1,870
November	41	24	28.4	1,690
December	26	16	21.6	1,330
January	19	14	15.1	928
February	32	13	18.6	1,030
March	42	20	30.7	1,890
April	177	41	94.0	5,590
May	750	306	427	26,300
June 1–10	930	510	726	14,400
The period				55,000

DOLORES RIVER AT BEDROCK, COLO.

LOCATION.—In sec. 17, T. 47 N., R. 18 W., at highway bridge at Bedrock, Montrose County. Nearest perennial tributary, West Paradox Creek, enters below station.

DRAINAGE AREA.—1,910 square miles (measured on map issued by Colorado Geological Survey, scale, 1:500,000).

RECORDS AVAILABLE.—April 26, 1918, to September 30, 1921.

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

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

CHANNEL AND CONTROL.—Bed of stream composed of compact sand and silt, which shifts. Control at bend of river 500 feet downstream; will shift during high water.

ICE.—Ice forms complete cover; records discontinued during winter.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.1 feet at 5.30 p. m. May 7 (discharge, 4,090 second-feet); minimum stage recorded, 0.5 foot August 8 and 9 and September 23 (discharge, 11 second-feet).

1918–1921: Maximum stage recorded, 8.6 feet at 5 p. m. May 23 (discharge, 4,040 second-feet); minimum stage, −0.3 foot September 27 to October 7, 1918 (discharge, 6 second-feet).

DIVERSIONS.—Water is diverted from Dolores River and tributaries above station for the irrigation of 25,500 acres, of which 20,000 acres are in Montezuma Valley. The Montezuma Valley Irrigation Co. has an adjudicated decree for diversion of 1,300 second-feet.

REGULATION.—None.

COOPERATION.—Beginning April 15, 1921, complete records furnished by State engineer.

Discharge measurements of Dolores River at Bedrock, Colo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 18	Grosbach and Snyder	1.19	.87	June 1	F. C. Snyder	6.93	3,180
Apr. 15	F. C. Snyder	4.32	1,110	July 15	H. C. Getty	2.20	445

Daily discharge, in second-feet, of Dolores River at Bedrock, Colo., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.	Sept.
1	42	130	49		1,340	3,420	886	139	602
2	33	130			1,760	3,060	960	62	503
3	25	130			2,460	2,810	935	81	465
4	22	132			2,780	2,810	770	62	210
5	22	134			3,120	2,950	1,210	54	340
6	17	134			3,420	2,640	662	46	256
7	17	130			3,730	2,600	642	32	240
8	17	130			2,950	2,700	522	16	160
9	17	125			2,880	3,200	288	11	152
10	17	125			2,500	3,610	240	102	126
11	17	125			2,390	3,610	288	92	102
12	17	124			2,180	3,610	446	72	81
13	17	115			2,080	3,160	256	114	92
14	15	98			2,500	3,610	288	46	62
15	14	98		1,110	2,420	3,540	340	392	62
16	14	134		1,130	2,500	3,360	428	240	32
17	77	124		1,150	2,880	3,340	726	195	26
18	83	115		1,170	3,060	3,060	960	225	20
19	83	115		1,190	3,160	2,920	748	195	20
20	106	115		1,200	3,020	2,670	503	272	16
21	115	115		1,220	2,140	2,080	503	562	32
22	154	115		1,240	2,140	1,700	392	562	20
23	144	115		1,370	2,360	1,790	357	1,670	11
24	115	115		1,820	2,420	1,880	256	1,610	16
25	134	106		1,700	2,640	2,040	288	1,240	20
26	134	106		1,240	2,740	1,700	304	1,790	20
27	106	106		1,060	2,530	1,490	240	1,240	20
28	115	83		1,160	2,600	1,460	225	910	20
29	134	90		1,160	3,090	1,340	304	960	20
30	134	42		1,110	3,420	1,160	126	839	20
31	134				3,460		92	748	

NOTE.—Discharge for Apr. 16–21 interpolated. Record discontinued during winter.

Monthly discharge of Dolores River at Bedrock, Colo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	154	14	67.5	4,150
November	134	49	115	6,840
April	1,820	1,110	1,250	39,700
May	3,730	1,340	2,670	164,000
June	3,610	1,160	2,640	157,000
July	1,210	92	490	30,100
August	1,790	11	469	28,800
September	602	11	126	7,500

SAN MIGUEL RIVER AT NATURITA, COLO.

LOCATION.—In T. 46 N., on line between Rs. 15 and 16 W. at highway bridge in Naturita, Montrose County. Nearest tributary, Basin Creek, enters half a mile downstream.

DRAINAGE AREA.—1,080 square miles (measured on map issued by United States Geological Survey; scale, 1:500,000).

RECORDS AVAILABLE.—April 26, 1918, to September 30, 1921.

GAGE.—Chain fastened to upstream side of bridge; read by Mrs. A. R. Payson.

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

CHANNEL AND CONTROL.—Bed composed of coarse gravel and small boulders and is rough. Control is at rapids 300 feet downstream; shifts during high water.

EXTREMES OF DISCHARGE.—Maximum stage from high-water mark, 7.5 feet during night of May 4 (discharge, 6,000 second-feet); minimum stage recorded, 0.10 foot December 28 (discharge, 40 second-feet).

1918–1921: Maximum stage, that of May 4, 1921; minimum discharge recorded, 0.05 foot on August 31, 1918 (discharge, 38 second-feet).

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—Court decrees for diversions of 102 second-feet from San Miguel River, of which approximately 84 second-feet are above station.

REGULATION.—Diurnal fluctuation during spring from alternate melting and freezing of mountain snow.

COOPERATION.—Records after April 30, 1921, were furnished by State engineer.

Discharge measurements of San Miguel River at Naturita, Colo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 18	Grosbach and Snyder	0.65	104	Apr. 15	F. C. Snyder	0.58	460
Nov. 28	F. C. Snyder	.58	102	June 1	do	1.98	1,780
Jan. 25	do	a.89	98				

a Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of San Miguel River at Naturita, Colo., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	132	137	90	88	114	215	280	1,560	1,830	1,510	892	640
2	126	116	90	90	110	190	348	1,930	1,880	1,420	580	524
3	120	106	90	92	105	228	365	2,440	1,740	1,420	524	448
4	122	122	91	94	105	240	570	2,610	1,780	1,140	404	382
5	117	127	88	94	105	252	480	2,390	1,510	995	326	344
6	110	120	96	92	105	190	420	2,500	1,780	824	344	292
7	105	144	98	92	105	179	348	1,780	2,030	858	344	260
8	105	120	95	92	106	168	240	1,260	2,180	926	382	231
9	98	122	90	92	106	114	280	1,420	2,610	892	404	218
10	92	120	85	92	106	122	382	1,260	2,610	892	404	218
11	102	112	80	94	106	122	480	1,100	2,940	892	404	194
12	102	112	80	96	114	122	400	960	2,880	960	382	170
13	96	114	75	98	122	114	440	1,300	3,060	1,030	792	170
14	98	112	80	100	148	139	570	1,340	3,240	1,140	760	148
15	104	112	98	100	168	158	570	1,100	4,160	1,180	470	148
16	110	108	85	100	130	168	330	1,640	3,600	1,260	382	148
17	104	104	93	102	106	202	382	1,690	2,560	1,260	344	148
18	108	106	106	102	114	265	400	1,690	1,980	1,260	344	148
19	106	100	83	104	106	312	710	1,340	1,930	1,030	326	170
20	141	100	105	104	130	265	685	1,380	1,780	960	344	170
21	102	99	102	104	106	252	638	1,180	1,600	960	580	148
22	105	102	80	102	99	295	685	1,140	1,600	960	892	148
23	127	100	83	100	114	348	1,120	1,180	1,880	892	1,000	132
24	114	100	80	100	114	295	1,040	1,420	1,830	824	892	132
25	124	98	80	98	179	280	760	1,510	1,780	892	1,340	140
26	127	95	80	100	190	265	615	1,510	1,640	1,030	960	132
27	128	92	79	104	190	252	570	1,340	1,640	892	858	109
28	146	91	40	108	202	215	710	1,690	1,640	824	700	109
29	148	84	60	112	-------	252	710	1,830	1,460	760	730	97
30	152	88	85	116	-------	295	960	2,180	1,510	580	640	102
31	150	-------	85	120	-------	265	-------	2,180	-------	760	580	-------

NOTE.—No gage-height record Dec. 24, 25, and Jan. 12; discharge interpolated. Stage-discharge relation affected by ice Nov. 23–27, Dec. 1–3, 8–12, 26, 29–31; Jan. 1–8, 10–30, Feb. 1, 2, 4–10; discharge based on study of weather and gage-height records, one discharge measurement, and observer's notes.

11582—25†—WSP 529——6

Monthly discharge of San Miguel River at Naturita, Colo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	152	92	117	7,190
November	144	84	109	6,490
December	106	40	85.5	5,260
January	120	88	99.4	6,110
February	202	99	125	6,940
March	348	114	219	13,500
April	1,120	240	550	32,700
May	2,610	960	1,610	99,000
June	4,160	1,460	2,160	129,000
July	1,510	580	1,010	62,100
August	1,340	326	591	36,300
September	640	97	214	12,700
The year	4,160	40	575	417,000

GREEN RIVER BASIN.

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, Sublette County. No large tributary within several miles.

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

RECORDS AVAILABLE.—April 1, 1915, to September 30, 1921. State engineer maintained station at this point during 1913 and 1914.

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

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

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.8 feet at 11 a. m. June 15 (discharge, 5,710 second-feet); minimum discharge occurred during winter.

1915–1921: Maximum stage recorded, 7.0 feet at 10 a. m. June 16, 1918. (discharge, 8, 750 second-feet); minimum discharge occurred during winter

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

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 241 second-feet from Green River above station.

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

ACCURACY.—Stage-discharge changed slightly during winter. Rating curves well defined below 7,000 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good except for high stages, for which they are fair.

Discharge measurements of Green River near Daniel, Wyo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 4	P. V. Hodges	2.23	274	June 21	J. B. Spiegel	3.94	2,260
May 6	Robert Follansbee	3.84	1,800	Aug. 28	do	2.68	561

Daily discharge, in second-feet, of Green River near Daniel, Wyo., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.	Sept.
1	310	286	262	-------	800	3,090	2,180	720	610
2	302	294	254	-------	1,040	2,350	1,960	720	575
3	294	302	294	-------	1,340	2,350	1,960	720	575
4	286	310	254	-------	1,600	2,180	1,530	645	575
5	278	320	294	-------	1,880	2,710	940	645	575
6	278	350	262	-------	1,880	2,900	845	645	575
7	270	370	262	-------	1,660	3,090	800	610	542
8	262	380	254	-------	1,460	3,680	845	610	542
9	262	390	294	610	1,400	4,090	940	575	510
10	262	320	-------	486	1,340	4,630	1,040	575	510
11	262	270	-------	336	1,280	4,970	1,160	575	498
12	262	262	-------	375	1,220	5,210	1,220	610	486
13	262	262	-------	428	1,160	5,210	1,220	645	474
14	262	262	-------	510	1,280	5,460	1,220	645	462
15	262	340	-------	575	1,340	5,710	1,220	682	450
16	262	262	-------	682	1,460	5,210	1,550	720	439
17	262	254	-------	800	1,660	3,880	1,220	720	428
18	254	294	-------	1,040	1,810	3,680	1,100	720	417
19	254	262	-------	940	1,740	3,090	1,100	720	417
20	254	262	-------	990	1,600	2,710	940	720	406
21	262	254	-------	1,040	1,220	2,030	940	682	395
22	262	294	-------	1,040	1,220	1,740	890	682	406
23	254	262	-------	1,040	1,280	1,460	845	682	417
24	254	262	-------	940	1,460	1,880	845	682	439
25	262	262	-------	720	1,660	2,180	800	682	450
26	262	294	-------	645	1,880	2,520	800	682	439
27	270	262	-------	682	2,350	2,710	800	682	428
28	270	262	-------	610	2,710	2,350	760	645	417
29	270	294	-------	610	2,710	2,180	760	645	406
30	270	262	-------	682	2,710	2,110	720	610	395
31	278	-------	-------	-------	2,710	-------	720	610	-------

Monthly discharge of Green River near Daniel, Wyo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	310	254	268	16,500
November	390	254	292	17,400
December 1–9	294	254	270	4,820
April 9–30	1,040	336	717	31,300
May	2,710	800	1,640	101,000
June	5,710	1,460	3,250	193,000
July	2,180	720	1,090	67,000
August	720	575	661	40,600
September	610	395	475	28,300

GREEN RIVER AT GREEN RIVER, WYO.

LOCATION.—In sec. 22, T. 18 N., R. 107 W., at Union Pacific Railroad pumping station, 100 feet below railroad bridge at Green River, Sweetwater County. No tributary within several miles.

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

RECORDS AVAILABLE.—May 2, 1895, to October 31, 1906; March 1, 1915, to September 30, 1921.

GAGE.—Chain gage on left bank at pumping station; read by E. H. Craver. From March 1, 1915, to September 28, 1920, chain gage located at highway bridge, a third of a mile downstream. Gage used from 1895 to 1906 was vertical staff on submerged cribbing near present location. No determined relation between different gages.

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

CHANNEL AND CONTROL.—Bed composed of small boulders. Control of well-compacted small boulders 400 feet downstream; apparently permanent, except as changed by low wing wall during 1921.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.2 feet at 5 p. m. June 15 (discharge, 21,200 second-feet); minimum discharge occurred during winter.

1895–1906; 1915–1921: Maximum stage recorded, 12.3 feet at 5 p. m. June 19, 1918 (discharge, 22,200 second-feet); minimum discharge recorded, 160 second-feet, November 17, 1898.

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

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversion of 223 second-feet from Green River between this station and station near Daniel.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent because of artificial change; affected by ice. Rating curves well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except as noted in footnote to table of daily discharge. Records excellent except during low-water period, for which they are good.

Discharge measurement of Green River at Green River, Wyo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 19	P. V. Hodges	2.82	1,910	June 25	J. B. Spiegel	4.54	7,490
May 3	Robert Follansbee	2.67	1,650	July 28	Robert Follansbee	2.80	1,930
June 18	J. B. Spiegel	6.82	19,100				

Daily discharge, in second-feet, of Green River at Green River, Wyo., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	825	820	1,470	1,340	1,760	11,500	6,050	1,760	1,060
2	790	800	1,760	1,340	1,610	12,000	5,250	1,610	1,060
3	790	790	1,760	1,470	1,760	11,500	5,250	1,610	1,060
4	790	760	1,760	1,760	2,090	10,600	5,250	1,610	1,060
5	790	790	1,920	2,490	2,720	9,620	4,520	1,610	1,060
6	790	825	1,920	2,720	3,240	11,500	3,840	1,470	1,060
7	760	860	1,760	2,280	3,840	12,500	3,530	1,610	1,060
8	760	825	1,850	2,280	5,250	13,500	2,970	1,610	1,060
9	760	825	1,750	1,760	3,840	16,800	2,490	1,760	1,060
10	760	760	1,650	1,610	3,530	16,800	2,280	1,760	1,060
11	790	702	1,610	1,610	3,240	17,900	2,720	1,610	1,060
12	760	730	985	1,470	3,240	18,400	2,720	1,340	950
13	790	790	940	1,760	2,970	19,000	2,720	1,470	950
14	825	790	900	1,920	2,970	20,100	2,720	1,470	950
15	790	790	860	1,920	2,970	21,200	2,720	1,340	950
16	790	790	1,080	2,090	3,240	20,100	2,720	1,340	950
17	790	790	1,180	2,090	3,530	20,100	2,720	1,340	950
18	825	860	1,470	2,090	4,520	19,000	2,490	1,340	960
19	825	900	2,090	2,090	5,250	15,700	2,490	1,340	950
20	860	900	2,280	2,280	5,640	13,000	2,490	1,230	950
21	940	790	2,280	2,490	5,250	11,500	2,490	1,230	950
22	940	750	1,920	2,490	4,520	9,160	2,490	1,130	850
23	980	700	1,470	2,490	3,840	7,350	2,280	1,130	770
24	940	700	1,470	2,720	4,170	6,910	2,280	1,130	770
25	900	700	1,340	2,970	4,170	6,910	2,280	1,130	770
26	860	650	1,340	4,170	4,520	6,910	2,280	1,130	770
27	825	650	1,340	4,170	4,880	7,790	2,280	1,130	770
28	825	650	1,340	3,840	5,250	7,790	1,920	1,130	770
29	860	650	1,340	3,240	6,470	7,350	1,760	1,130	770
30	860	650	1,340	2,280	8,240	7,350	1,760	1,130	770
31	840	------	1,230	------	10,100	------	1,610	1,230	------

NOTE.—Stage-discharge relation affected by ice Oct. 31, Nov. 1, 2, 22–30, and Mar. 1–10; discharge based on temperature record and comparison with flow of Big Horn River at Thermopolis.

Monthly discharge of Green River at Green River, Wyo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	980	760	827	50,800
November	900	650	766	45,600
March	2,280	860	1,530	94,100
April	4,170	1,340	2,310	137,000
May	10,100	1,610	4,150	255,000
June	21,200	6,910	13,000	774,000
July	6,050	1,610	2,950	181,000
August	1,760	1,130	1,380	84,800
September	1,060	770	939	55,900

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

LOCATION.—In sec. 4, T. 22 S., R. 16 E., 1 mile above old Little Valley ferry and 6 miles downstream from Green River, Emery County. San Rafael River enters Green River 16 miles downstream, in sec. 25, T. 23 S., R. 16 E.

DRAINAGE AREA.—41,000 square miles (measured in 1915, on best available maps of Colorado River basin).

RECORDS AVAILABLE.—December 18, 1910, to September 30, 1921. 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.—Stevens continuous water-stage recorder on left bank 1 mile above old ferry, since December 16, 1917, referred to hook gage inside well and inclined staff gage outside; inspected by A. I. Anderson. For history of previous gages see Water-Supply Paper 479.

DISCHARGE MEASUREMENTS.—Made from car on old ferry cable.

CHANNEL AND CONTROL.—Bed composed of gravel and sand. Fairly permanent gravel riffle two-thirds of a mile below gage. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 14.12 feet at 11 a. m. June 17 (discharge, 65,500 second-feet); minimum stage recorded, 0.02 foot at 2 p. m. December 18 (discharge, 1,040 second-feet).

1894–1899; 1905–1921: Maximum discharge recorded, 68,800 second-feet May 29, 1897; minimum stage recorded, —0.95 foot December 1, 1919 (discharge, 510 second-feet).

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

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

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed slightly March 16–18, and considerably May 16 to June 6; affected by ice January 3–31. Rating curves well defined between 800 and 70,000 second-feet. Operation of water-stage recorder satisfactory except December 16 to January 2, for which record is slightly uncertain; January 3–31, when recorder was not operating becuase of ice; and June 8–11, July 8–12, 24, and August 5–6, 13, when no record was obtained. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph or, for periods of faulty gage-height record by comparison with flow at a gaging station maintained at Ouray, Utah, by Utah Power & Light Co. For period of ice effect mean discharge ascertained by means of one meter measurement, fragmentary gage-height record, weather records, and observer's notes. Open-water records excellent; winter records fair.

COOPERATION.—Since December 16, 1917, station has been maintained in cooperation with Utah Power & Light Co., which made most of the discharge measurements.

Discharge measurements of Green River at Little Valley, near Green River, Utah, during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 18	A. B. Purton	1.16	2,490	July 13	E. G. Thorum [a]	4.02	8,820
Jan. 7	E. G. Thorum [a]	[b]1.48	2,280	Aug. 29	do	2.60	4,920
Mar. 9	do	4.46	11,400	30	do	2.56	4,770
May 14	do	6.38	21,700				

[a] Engineer, Utah Power & Light Co.
[b] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Green River at Little Valley, near Green River, Utah, for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,290	3,440	2,420	1,670	2,290	6,040	5,250	9,100	42,200	22,800	6,930	4,640
2	2,310	3,760	2,390	1,680	2,320	9,330	5,130	8,390	43,200	21,500	7,040	4,490
3	2,400	4,120	2,140		2,290	10,500	5,100	8,460	44,100	19,900	6,620	4,670
4	2,390	3,740	2,140		2,290	11,200	5,060	9,020	44,900	18,500	6,160	4,490
5	2,370	3,500	2,290		2,180	11,100	5,060	10,100	45,400	16,900	5,800	4,400
6	2,350	3,360	2,280	1,900	2,220	11,400	5,060	12,400	45,400	15,900	5,500	4,580
7	2,350	3,360	2,320		2,240	10,500	5,390	16,300	45,300	14,800	5,220	4,420
8	2,320	3,380	2,260		2,400	10,300	6,160	21,000	45,300		5,490	4,270
9	2,280	3,760	2,200		2,340	11,300	7,460	25,300	50,000		5,490	4,270
10	2,280	3,660	2,170		2,280	9,690	8,460	27,700	54,000	12,000	5,980	4,160
11	2,220	3,520	2,120		2,200	8,010	8,180	29,200	57,000		5,300	4,010
12	2,220	3,480	2,110		2,170	7,430	7,490	27,300	58,800		5,250	3,890
13	2,290	3,460	2,000	1,750	2,180	6,870	6,760	23,700	59,700	8,760	4,600	3,780
14	2,350	3,600	1,960		2,450	6,400	6,240	21,900	62,600	8,180	4,620	3,640
15	2,350	3,520	1,950		2,940	6,140	6,160	22,000	63,900	8,080	6,320	3,480
16	2,350	3,210	1,380		2,780	6,040	6,620	22,900	64,100	8,250	5,640	3,230
17	2,370	2,910	1,190	2,000	2,710	6,010	7,560	24,700	64,100	8,500	5,200	3,040
18	2,390	2,750	1,100		3,000	6,060	7,680	28,000	62,600	9,900	4,900	2,910
19	2,400	2,600	1,160		3,440	6,240	8,140	31,000	59,800	9,130	4,580	2,800
20	2,570	2,620	1,230		4,010	6,650	8,110	33,300	58,000	8,360	4,220	2,760
21	2,690	2,780	1,410		4,100	6,760	7,650	34,100	53,100	8,040	5,250	2,670
22	2,940	2,940	1,810		4,160	6,960	7,750	33,500	44,500	7,590	5,250	2,670
23	3,040	3,280	2,220		4,140	7,130	8,010	31,100	37,000	7,400	5,980	2,620
24	3,060	3,420	2,340		4,120	7,220	9,210	28,900	33,200	7,120	6,700	2,590
25	3,020	3,460	2,240	2,150	4,310	6,810	9,770	29,800	30,900	6,840	4,960	2,570
26	3,000	3,540	2,000		4,550	6,460	9,900	31,500	28,400	6,870	6,620	2,480
27	3,000	3,340	1,520		4,400	6,220	10,100	32,900	27,100	6,460	4,850	2,430
28	3,100	3,190	1,510		4,670	6,010	10,300	34,600	26,000	6,140	4,990	2,420
29	3,150	2,940	1,610		-------	5,840	10,200	35,800	25,000	5,940	4,870	2,350
30	3,210	2,750	1,600		-------	5,660	9,530	36,800	24,000	5,880	4,710	2,310
31	3,760	-------	1,710		-------	5,460	--------	39,200	--------	5,610	5,510	-------

NOTE.—Braced figures show mean discharge for periods indicated, estimated because of ice or because of faulty operation of recorder; see under "Accuracy" in station description.

Monthly discharge of Green River at Little Valley, near Green River, Utah, for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	3,760	2,220	2,610	160,000
November	4,120	2,600	3,310	197,000
December	2,420	1,100	1,900	117,000
January			1,970	121,000
February	4,670	2,170	3,040	169,000
March	11,400	5,460	7,670	472,000
April	10,300	5,060	7,450	443,000
May	39,200	8,390	25,200	1,550,000
June	64,100	24,000	46,700	2,780,000
July	22,800	5,610	10,800	664,000
August	7,040	4,220	5,500	338,000
September	4,670	2,310	3,430	204,000
The year	64,100	1,100	9,950	7,220,000

EAST FORK AT EAST FORK CANAL, WYO.

LOCATION.—In sec. 10, T. 31 N., R. 106 W., 300 feet above intake of East Fork canal, 18 miles southeast of Boulder, Sublette County. Nearest tributary, Canal Creek, enters just below.

DRAINAGE AREA.—106 square miles (measured on base map of Wyoming, scale 1:500,000).

RECORDS AVAILABLE.—During irrigation seasons of 1916, 1917, and 1921.

GAGE.—Vertical staff on left bank; read by Robert Hawkins.

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

CHANNEL AND CONTROL.—Bed composed of small boulders; control 100 feet downstream, apparently permanent.

EXTREMES OF DISCHARGE.—1916–1917; 1921: Maximum stage recorded during irrigation seasons, 4.6 feet on June 23 and 25, 1917 (discharge, 1,400 second-feet); minimum stage, 1.0 foot September 23, 1916, and August 20–23, 25–28, and 30, 1921 (discharge, 8 second-feet).

ICE.—No data.

DIVERSIONS.—Prior to July 1, 1921, there was adjudicated diversion of 26 second-feet from East Fork above the station.

REGULATION.—Flow regulated to small extent by many small lakes at headwaters. Alternate melting and freezing of mountain snow causes diurnal fluctuation during spring.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined below 1,200 second-feet. Gage read to tenths once daily. Daily discharge ascertained by applying gage-height to rating table. Records fair.

COOPERATION.—Gage-height record furnished by East Fork Canal Co.

Discharge measurements of East Fork at East Fork canal, Wyo., during the irrigation seasons of 1916 and 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1916.		*Feet.*	*Sec.-ft.*	1921.		*Feet.*	*Sec.-ft.*
May 29	R. H. Fletcher	2.40	228	June 22	J. B. Spiegel	3.00	416
Aug. 4	H. K. Smith	1.53	59				
Oct. 31	do	1.11	[a] 12				

[a] Discharge estimated.

Daily discharge, in second-feet, of East Fork at East Fork canal, Wyo., for the irrigation seasons of 1916, 1917, and 1921.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1916.						1917.					
1		380	455	97	12	16	135	710	415	38	18
2		345	455	81	12	17	155	900	455	38	18
3		315	415	65	12	18	168	1,200	380	38	18
4		345	380	65	12	19	155	1,180	345	38	18
5		835	345	51	12	20	155	1,330	285	51	18
6		710	380	65	12	21	180	1,110	345	38	18
7		500	380	51	12	22	180	1,260	230	38	18
8		600	345	65	12	23	205	1,400	145	44	27
9		710	345	65	12	24	205	1,260	180	41	38
10		770	315	51	12	25	192	1,400	155	38	51
11		1,040	285	51	18	26	180	1,330	180	27	65
12		835	255	51	12	27	180	1,110	205	27	65
13		550	230	38	12	28	192	1,180	155	27	38
14	255	655	205	51	12	29	205	1,040	155	27	38
15	222	835	230	51	12	30	205	1,180	135	27	38
16	149	1,260	205	38	12	31	205		135	27	
17	185	1,110	180	27	12	1921.					
18	139	1,110	155	27	12	1		710	315	38	12
19	185	1,180	135	18	12	2		600	255	51	10
20	205	900	135	18	18	3		550	180	38	12
21	235	770	115	12	12	4		710	135	38	27
22	185	600	115	12	12	5		770	115	27	27
23	235	455	97	18	8	6		1,110	135	27	27
24	210	345	115	12	12	7		1,180	135	27	18
25	185	380	115	12	12	8		1,180	135	18	18
26	160	455	115	12	18	9		1,040	135	18	18
27	185	500	97	12	12	10		1,110	155	18	18
28	160	710	97	12	12	11		1,110	155	18	12
29	210	600	115	12	18	12		1,180	135	18	12
30	255	455	115	12	18	13		900	135	18	12
31	315		97	12		14		835	135	18	12
1917.						15	230	770	135	18	12
1		180	900	115	27	16	255	710	135	12	12
2		205	770	97	27	17	345	500	135	12	12
3		218	835	81	27	18	380	415	135	12	12
4		155	835	65	38	19	315	380	115	12	12
5		155	770	51	65	20	285	315	97	8	12
6		180	900	51	65	21	380	315	97	8	12
7		205	835	51	38	22	285	415	97	8	12
8		230	455	51	27	23	285	415	81	8	12
9		345	770	51	27	24	380	380	65	12	12
10		455	655	51	38	25	380	380	65	8	12
11		380	500	51	51	26	415	348	65	8	12
12		345	380	51	38	27	655	315	51	8	12
13		315	415	27	27	28	1,040	315	51	8	12
14		315	380	38	27	29	1,040	285	51	12	12
15	135	600	380	51	18	30	1,110	285	38	8	12
						31	1,110		38	12	

Monthly discharge of East Fork at East Fork canal, Wyo., for the irrigation seasons of 1916, 1917, and 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1916.				
May 14-31	315	139	204	7,280
June	1,260	315	675	40,200
July	455	97	227	14,000
August	97	12	37.5	2,310
September	18	8	12.9	768
The period				64,600
1917.				
May 15-31	205	135	178	6,000
June	1,400	155	731	43,500
July	900	135	441	27,100
August	115	27	46.6	2,870
September	65	18	34.2	2,040
The period				81,500
1921.				
May 15-31	1,110	230	523	17,600
June	1,180	285	651	38,700
July	315	38	120	7,380
August	51	8	17.6	1,080
September	27	12	14.3	851
The period				65,600

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, Sublette County. No tributary between station and mouth, 1 mile below.

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

RECORDS AVAILABLE.—April 1, 1905, to October 31, 1906; May 11, 1915, to September 30, 1921.

GAGE.—Vertical staff on downstream side of left abutment; read by J. W. Glaze. Gage a quarter of a mile upstream used during 1905; gage for 1906 located at bridge and referred to datum 0.27 foot higher than present gage.

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

CHANNEL AND CONTROL.—Bed composed of sand and gravel. Control 100 feet downstream at gravel bar which is slightly shifting. Banks subject to overflow at stage of 6 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 6.75 feet at 7 a. m. June 9 (discharge, 2,920 second-feet); minimum discharge occurred during winter.

1915–1921: Maximum discharge recorded, 3,020 second-feet at 6 a. m. June 11, 1918 (gage height, 6.8 feet); minimum discharge, 25 second-feet at 6 p. m. April 4, 1920.

ICE.—Discharge relation seriously affected by ice; observations discontinued during winter.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversion of 141 second-feet from East Fork, all above station.

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

ACCURACY.—Stage-discharge relation permanent during year; affected by ice. Rating curve well defined below 1,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except as noted in footnote to table of daily discharge. Records good except for stages above 1,000 second-feet, for which they are fair.

Discharge measurements of East Fork at Newfork, Wyo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 5	P. V. Hodges	1.20	51
June 23	J. B. Spiegel	3.04	547
Aug. 27	do	1.21	53

Daily discharge, in second-feet, of East Fork at Newfork, Wyo., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	56	59	------	74	56	2,800	290	59	52
2	56	59	------	94	52	1,390	245	64	52
3	56	68	------	102	56	1,150	230	64	52
4	56	68	------	87	56	1,270	129	59	52
5	56	64	------	80	74	1,650	120	59	52
6	52	59	------	68	110	1,720	102	59	52
7	52	59	------	59	129	2,190	87	56	50
8	52	59	------	64	129	2,720	80	56	50
9	52	59	------	59	129	2,800	80	56	52
10	52		------	64	110	2,490	80	56	50
11	59		------	64	110	2,490	80	56	52
12	59		------	64	120	2,420	80	56	52
13	59		110	64	129	2,260	80	59	52
14	59		129	64	162	1,840	80	59	50
15	59		140	64	230	1,910	80	56	50
16	59		150	68	325	1,650	80	56	50
17	56		162	64	480	1,270	74	56	50
18	59		400	59	615	865	74	56	50
19	59		290	56	570	715	74	56	52
20	59	55	140	56	460	570	68	56	52
21	59		87	56	420	525	68	56	50
22	59		80	56	420	502	68	56	50
23	59		87	59	400	615	68	56	50
24	59		94	59	480	615	64	56	50
25	56		74	59	525	615	64	52	50
26	56		64	56	615	525	64	56	50
27	56		64	56	975	440	64	52	50
28	59		59	56	1,460	400	64	52	50
29	59		64	56	1,980	342	59	52	50
30	59		64	56	2,340	308	59	52	50
31	59		59	------	2,340	------	59	52	------

NOTE.—Stage-discharge relation affected by ice Nov. 10–30. Braced figure shows estimated mean daily discharge for period affected. No record Dec. 1 to Mar. 12.

Monthly discharge of East Fork at Newfork, Wyo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	59	52	57.0	3,500
November			57.0	3,390
March 13-31	400	59	122	4,600
April	102	56	64.8	3,860
May	2,340	52	518	31,900
June	2,800	308	1,370	81,500
July	290	59	94.0	5,780
August	64	52	56.3	3,460
September	52	50	50.8	3,020

NEW FORK NEAR BOULDER, WYO.

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

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

RECORDS AVAILABLE.—May 11, 1915, to September 30, 1921.

GAGE.—Vertical staff on downstream side of left abutment; read by Miss Tula Brandt.

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

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.6 feet at 7 a. m. and 6 p. m. June 15 (discharge, 4,740 second-feet); minimum discharge occurred during winter.

1915–1921: Maximum stage recorded, 8.7 feet at 6 a. m. June 17, 1918 (discharge, 12,300 second-feet); minimum discharge of 42 second-feet occurred from December 15 to 17, 1915.

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

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 191 second-feet from New Fork above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent; shifted during high water in June. Rating curve used October 1 to June 30 well defined below 6,000 second-feet, curve used July 1 to September 30 fairly well defined below 4,000 second-feet. Gage read to hundredths twice daily. Discharge ascertained by applying mean daily gage height to rating table, except from June 6 to July 31, for which period shifting-control method was used. Records good except for period of shifting control, for which they are fair.

Discharge measurements of New Fork near Boulder, Wyo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 5	P. V. Hodges	2.10	145	June 23	J. B. Spiegel	4.82	2,030
May 6	Robert Follansbee	2.30	204	Aug. 27	do	2.43	222

Daily discharge, in second-feet, of New Fork near Boulder, Wyo., for the year ending Sept. 30, 1921.

Day.	Oct.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	157		130	227	1,510	1,840	470	207
2	157		151	227	1,510	1,840	470	204
3	145		183	223	1,510	1,740	445	201
4	135		227	220	1,430	1,550	445	201
5	140		235	220	1,600	1,370	445	201
6	145		205	223	1,720	1,200	422	201
7	145		187	242	1,920	1,050	422	207
8	140		176	270	2,360	972	400	207
9	140		167	290	2,860	900	379	224
10	145		176	290	3,500	900	358	224
11	157		183	290	3,880	865	338	207
12	151		190	270	4,300	865	338	197
13	145		270	270	4,300	865	318	191
14	151		290	270	4,510	865	318	188
15	157		270	290	4,740	865	298	185
16	145		360	360	4,300	830	298	178
17	160		312	460	4,080	830	298	172
18	176		312	562	3,680	830	279	169
19	183		312	650	3,320	830	260	169
20	176		270	650	3,000	762	260	169
21	183		250	590	2,380	665	260	164
22	176		250	562	2,260	605	242	158
23	167		250	535	1,950	605	242	147
24	154		235	535	2,050	578	242	142
25	170	138	227	562	2,160	550	224	137
26	170	140	235	562	2,380	550	207	137
27	164	140	227	590	2,260	550	207	132
28	160	145	227	808	2,160	550	224	127
29	160	145	220	975	2,050	522	224	122
30	173	135	227	1,190	1,950	495	224	122
31	176	130		1,350		470	224	

Monthly discharge of New Fork near Boulder, Wyo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	183	135	158	9,720
March 25-31	145	130	139	1,930
April	360	130	232	13,800
May	1,350	220	476	29,300
June	4,740	1,430	2,720	162,000
July	1,840	470	900	55,300
August	470	207	316	19,400
September	224	122	176	10,500

NOTE.—No record during winter.

PINE CREEK AT PINEDALE, WYO.

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

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

RECORDS AVAILABLE.—May 8, 1915, to September 30, 1921.

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

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

CHANNEL AND CONTROL.—Bed composed of gravel. Control at rapids just below gage; slightly shifting. Banks subject to overflow at extreme high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.0 feet at 5 p. m. June 15 (discharge, 1,640 second-feet); minimum discharge occurred during winter.

1915–1921: Maximum stage recorded, 5.0 feet at 8 a. m. and 5 p. m., June 17, 1918 (discharge, 2,310 second-feet); minimum discharge occurred January 28–30, 1916, when stage-discharge relation was affected by ice (discharge estimated as 6 second-feet).

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

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 73 second-feet from Pine Creek above Pinedale and 4 second-feet below.

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

ACCURACY.—Stage-discharge relation not permanent; shifted during high water in June. Rating curves well defined between 40 and 1,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table, except as explained in footnote to table of daily discharge. Records good except for October, November, June, and July, for which they are fair.

Discharge measurements of Pine Creek at Pinedale, Wyo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 4	P. V. Hodges	0.84	41.6	June 21	J. B. Spiegel	3.05	963
May 7	Robert Follansbee	.79	33.4	Aug. 28	do	1.42	86

Daily discharge, in second-feet, of Pine Creek at Pinedale, Wyo., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.	Sept.
1	45	40	40	28	40	345	910	275	82
2	44	40	34	28	40	400	875	275	80
3	43	40	32	31	40	430	840	275	90
4	42	40	33	31	38	422	735	252	92
5	42	41	31	31	38	588	665	210	92
6	42	41	33	32	40	620	630	210	95
7	42	41	34	31	42	725	595	210	100
8	42	41	31	32	46	900	560	210	98
9	42	40	28	32	48	1,120	528	190	100
10	42	40	28	33	50	1,260	528	172	95
11	42	40	28	34	46	1,400	528	155	90
12	42	40		34	40	1,470	560	140	88
13	42	40		35	38	1,610	560	140	80
14	42	40		35	32	1,610	544	140	73
15	42	40		34	37	1,640	528	125	65
16	43	40		34	44	1,580	512	122	61
17	43	40		34	55	1,500	495	125	57
18	43	40		34	69	1,440	475	115	57
19	43	40		34	84	1,360	455	102	52
20	43	40		34	88	1,220	435	100	50
21	43	39		34	88	1,080	435	98	49
22	43	38		34	90	945	405	95	46
23	42	38		37	112	945	375	95	42
24	42	38		40	97	945	358	90	39
25	42	38		39	100	945	342	90	36
26	42	38		40	104	962	325	88	35
27	42	38		40	116	980	325	85	34
28	41	38		40	130	980	300	85	34
29	40	43		40	168	980	300	88	29
30	40	40		40	215	910	275	88	28
31	40				295		275	85	

NOTE.—No gage-height record Oct. 1–5, 7–21, 24, 25, 28, 30, 31, Nov. 1, 2, 6–18, June 26, July 14–16, 18, 19, 24, 25, and Aug. 6; discharge interpolated. Discharge June 9–25, and Aug. 17 to Sept. 30 computed by shifting-control method. No record Dec. 20 to Mar. 31.

Monthly discharge of Pine Creek at Pinedale, Wyo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	45	40	42.2	2,590
November	43	38	39.7	2,360
December 1-11	40	28	32.0	698
April	40	28	34.5	2,050
May	295	32	79.7	4,900
June	1,640	345	1,040	61,900
July	910	275	506	31,100
August	275	85	146	8,980
September	100	28	65.6	3,900

BOULDER CREEK NEAR BOULDER, WYO.

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

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

RECORDS AVAILABLE.—April 23, 1904, to October 31, 1906; May 10, 1915, to September 30, 1921.

GAGE.—Chain installed May 19, 1920, 50 feet upstream from vertical staff used prior to that date and referred to same datum; read by Mrs. M. M. Sandlin. Gage used 1904–1906 is not comparable with the above gages, it was located a short distance upstream.

DISCHARGE MEASUREMENTS.—Made by wading or from bridge 1¾ miles downstream.

CHANNEL AND CONTROL.—Bed composed of gravel; deep pool at gage. Control 150 feet downstream at rapids which shift slightly at intervals. Banks are high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.3 feet at 7 a. m. and 5 p. m. June 12 (discharge, 2,760 second-feet); minimum stage. 0.48 foot October 2–4 (discharge, 7 second-feet).

1904–1906; 1915–1921: Maximum stage recorded, 6.8 feet on June 14, 1918 (discharge, 3,240 second-feet); minimum stage, 0.38 foot at 7 a. m. and 7 p. m. August 31, 1915 (discharge, 0.9 second-foot).

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

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 83 second-feet from Boulder Creek, all above station.

REGULATION.—Natural regulation by Boulder Lake. Low-water discharge affected by irrigation above station.

ACCURACY.—Stage-discharge relation not permanent, shifted during high water in June; affected by ice. Rating curves fairly well defined below 2,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table, except as explained in footnote to table of daily discharge. Records good, except those for November and June, which are fair.

Discharge measurements of Boulder Creek near Boulder, Wyo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 5	P. V. Hodges	0.50	9.2	June 23	J. B. Spiegel	3.90	956
May 6	Robert Follansbee	.82	29.0	Aug. 27	----do	.85	13

Daily discharge, in second-feet, of Boulder Creek near Boulder, Wyo., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.
1	8	45	-------	14	1,360	580	41	13
2	7	44	-------	14	1,220	625	40	13
3	7	44	-------	15	980	495	40	13
4	7	44	-------	15	860	375	40	11
5	8	44	-------	16	1,100	284	40	11
6	9	46	-------	23	1,390	254	40	11
7	8	40	-------	44	2,000	212	32	11
8	8	39	-------	48	2,640	200	32	11
9	8	38	-------	52	2,640	187	30	11
10	8	36	23	56	2,560	187	28	11
11	8	36	24	62	2,680	200	24	11
12	8	37	24	69	2,760	212	22	11
13	8	38	26	82	2,600	200	22	10
14	8	39	25	92	2,340	187	20	10
15	8	40	28	63	2,340	200	19	10
16	8	42	28	178	2,180	176	19	10
17	8	44	35	260	2,010	176	19	10
18	10	46	26	350	1,480	164	18	10
19	12	48	30	370	1,140	143	16	10
20	38	48	27	310	1,020	143	15	10
21	41	47	28	275	900	134	15	10
22	44	46	23	275	785	124	15	10
23	44	45	23	260	900	106	15	10
24	44	44	23	260	1,020	98	17	9
25	44	43	24	275	1,080	82	15	8
26	44	44	25	330	1,020	75	17	8
27	44	48	20	450	900	70	14	8
28	44	44	22	750	785	63	14	8
29	44	44	14	1,100	730	56	14	8
30	44	42	13	1,360	495	49	14	8
31	44	-------	-------	1,420	-------	42	13	-------

NOTE.—Stage-discharge relation affected by ice Nov. 8–19, 21–26, 28–30; discharge based on study of temperature and gage-height records. Discharge for June 5–12 computed by shifting-control method. No record from Dec. 1 to Apr. 9.

Monthly discharge of Boulder Creek near Boulder, Wyo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	44	7	21.8	1,340
November	48	36	42.8	2,550
April 10–30	35	13	24.3	1,010
May	1,420	14	287	17,600
June	2,760	495	1,530	91,000
July	625	42	197	12,100
August	41	13	23.2	1,430
September	13	8	12.9	768

BIG SANDY CREEK NEAR FARSON, WYO.

LOCATION.—In sec. 18, T. 27 N., R. 106 W., three-quarters of a mile below Ten Trees and 18 miles north of Farson, Sweetwater County. No tributary within several miles of station.

DRAINAGE AREA.—322 square miles (measured on United States Geological Survey map of Wyoming; scale, 1:500,000).

RECORDS AVAILABLE.—May 10, 1915, to September 30, 1917; April 28 to September 30, 1921.

GAGE.—Stevens 8-day water-stage recorder at left bank, half a mile above head gate of Eden canal, installed May 1, 1921, and referred to datum of staff gage used from 1915 to 1917; inspected by employee of Eden Land & Irrigation Co.

DISCHARGE MEASUREMENTS.—Made from cable 100 feet upstream from gage; low-water measurements made by wading.

CHANNEL AND CONTROL.—Bed composed of well-compacted sand; control 150 feet downstream, fairly permanent. Banks subject to overflow at stage of 3.7 feet.

EXTREMES OF DISCHARGE.—Maximum stage during the period April 28 to September 30, 1921, from water-stage recorder, 5.7 feet at 2 p. m. June 9 (discharge, 1,130 second-feet); minimum stage, 1.54 feet at 6 a. m. September 28 (discharge, 7 second-feet).

1915-1917; 1921: Maximum discharge recorded, 1,160 second-feet on June 26, 1917 (gage height, 5.65 feet); minimum discharge, 7 second-feet September 28-30, 1917, and September 28, 1921.

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

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 43 second-feet from Big Sandy Creek above station, and 4 second-feet below.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Rating curve used during 1917 fairly well defined. Rating curve used during 1921 well defined between 10 and 500 second-feet. Gage read to half-tenths once daily during 1917. Water-stage recorder operated satisfactorily during 1921 except for short periods as shown in table of daily discharge. Mean daily gage height for 1921 obtained by inspection of recorder graph. Daily discharge ascertained by applying daily gage heights in 1917 and mean daily gage height in 1921 to rating table. Records fair for 1917 and excellent for 1921.

Discharge measurements of Big Sandy Creek near Farson, Wyo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 28	P. V. Hodges	1.83	38.5
June 20	J. B. Spiegel	3.62	452
Aug. 29	....do	1.62	11.3

Daily discharge, in second-feet, of Big Sandy Creek near Farson, Wyo., for the years ending Sept. 30, 1917 and 1921.

Day.	Oct.	May.	June.	July.	Aug.	Sept.	Day.	Oct.	May.	June.	July.	Aug.	Sept.
1916-17.							1916-17.						
1	----	329	278	902	127	46	16	40	356	766	382	36	22
2	46	329	268	888	94	46	17	----	303	834	329	34	46
3	----	329	262	834	60	46	18	----	329	868	303	46	34
4	----	329	278	766	52	41	19	40	345	972	252	60	34
5	----	278	262	766	34	34	20	----	356	1,040	242	66	22
6	----	278	252	702	12	34	21	----	366	1,120	204	60	22
7	169	252	303	672	22	39	22	----	382	1,080	228	94	17
8	----	278	410	690	22	46	23	----	382	1,040	238	278	22
9	----	303	464	610	76	46	24	----	356	1,040	252	204	12
10	----	329	522	464	70	76	25	----	329	1,030	228	158	12
11	----	329	522	410	34	60	26	----	345	1,160	204	76	10
12	85	356	550	382	22	34	27	----	356	1,120	204	70	10
13	----	356	492	345	22	34	28	----	329	1,120	204	94	7
14	----	382	382	329	46	34	29	----	329	1,010	204	76	7
15	----	410	610	366	39	22	30	----	303	938	194	60	7
							31	----	293	----	180	70	----

Daily discharge, in second-feet, of Big Sandy Creek near Farson, Wyo., for the years ending Sept. 30, 1917 and 1921—Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1921							1921.						
1		28	720	338	83	14	16		291	752	219	35	31
2		31	625	340	78	14	17		353	720	233	34	30
3		67	550	310	87	14	18		393	595	177	27	28
4		93	520	280	85	15	19		420	506	159	25	19
5		128	625	251	78	15	20		353	448	148	23	13
6		170	672	222	65	22	21		314	406	144	21	12
7		190	752	193	60	22	22		314	393	135	20	11
8		190	915	198	54	20	23		314	420	128	14	10
9		190	1,020	209	48	18	24		314	462	120	12	10
10		190	915	212	45	18	25		420	462	109	13	10
11		185	985	209	39	18	26		393	462	97	13	10
12		184	1,020	224	34	22	27		462	434	91	11	9
13		189	980	191	31	34	28	28	610	492	79	10	8
14		202	900	184	34	34	29	28	704	477	74	10	8
15		231	800	200	35	32	30	28	752	880	85	11	9
							31		752		85	12	

NOTE.—No gage-height record Aug. 16, Sept. 30, 1917, May 6–11, June 13–15, July 3–6, Sept. 2–4, 1921; discharge based on a comparison of flow of East Fork at Newfork, Wyo. No record Oct. 1, 3–6, 8–11, 13–15, 17, 18, Oct. 20 to Dec. 31, 1916, Jan. 1, to Apr. 30, 1917, and Oct. 1, 1920, to Apr 27, 1921.

Monthly discharge of Big Sandy Creek near Farson, Wyo., for the years ending Sept. 30, 1917 and 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917.				
May	410	252	333	20,500
June	1,160	252	700	41,700
July	902	180	419	25,800
August	278	12	71.4	4,390
September	76	7	30.7	1,830
The period				94,200
1921.				
May	752	28	304	18,700
June	1,020	380	647	38,500
July	353	74	183	11,300
August	87	10	37.0	2,280
September	34	8	17.6	1,050
The period				71,800

NOTE.—See footnote to table of daily discharge.

BLACKS FORK NEAR URIE, WYO.

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

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

RECORDS AVAILABLE.—August 21, 1913, to September 30, 1921.

GAGE.—Vertical staff on downstream side of center pier; read by Miss Myrtle Anderson. Datum lowered 0.50 foot August 19, 1915.

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

CHANNEL AND CONTROL.—Bed composed of well-compacted gravel. Control is small rapids just below bridge; shifts slightly at long intervals. Right bank is high and not subject to overflow; left bank is overflowed at stage of about 3 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.4 feet at 9 a. m. June 7 (discharge, 2,310 second-feet); minimum stage recorded, 0.60 foot at 6.30 p. m. August 6 to 6.30 p. m. August 7 (discharge, 5 second-feet).

1913–1921: Maximum stage recorded, 4.72 feet at 7 p. m., June 19 and 9 a. m. June 20, 1917 (discharge, 2,680 second-feet); minimum discharge, 1 second-foot September 17–22, 1916 (gage height, 0. 3 foot).

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

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 636 second-feet from Blacks Fork above station, and 4 second-feet below.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Rating curves well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Blacks Fork near Urie, Wyo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 4	Robert Follansbee	1. 28	110
June 16	J. B. Spiegel	4. 05	1, 870

Daily discharge, in second-feet, of Blacks Fork near Urie, Wyo., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	20	13	------	28	38	680	455	30	33
2	20	13	------	30	49	650	480	30	38
3	20	16	------	42	64	680	382	24	84
4	10	16	------	45	102	650	320	20	106
5	10	16	------	54	144	805	245	13	80
6	10	16	------	38	153	1, 090	172	7	74
7	10	13	------	38	215	2, 050	106	5	54
8	10	15	------	20	186	1, 920	80	6	49
9	10	13	------	38	172	1, 800	74	6	45
10	20	18	------	33	136	1, 570	84	8	45
11	20	13	------	42	158	1, 800	95	10	45
12	20	15	------	33	186	2, 050	84	8	45
13	20	13	------	38	230	2, 050	84	13	33
14	18	------	------	33	300	2, 180	84	42	18
15	15	------	------	38	430	1, 570	84	38	20
16	20	------	------	42	560	1, 800	68	30	18
17	20	------	------	42	590	1, 570	84	18	18
18	20	------	------	49	560	870	126	18	20
19	20	------	------	42	405	455	111	18	24
20	20	------	24	42	320	455	88	18	24
21	20	------	28	33	360	430	84	18	24
22	20	------	30	33	405	620	95	18	24
23	20	------	45	42	560	710	88	28	18
24	18	------	38	54	772	455	80	30	18
25	16	------	28	45	680	320	68	30	24
26	18	------	33	38	740	620	49	30	20
27	13	------	20	28	870	560	60	19	24
28	16	------	20	30	1, 180	590	45	30	18
29	13	------	24	54	1, 270	560	38	28	16
30	13	------	33	42	1, 180	532	30	30	13
31	13	------	30	------	838	------	28	30	------

NOTE.—No record Nov. 14, 1920, to Mar. 19, 1921.

Monthly discharge of Blacks Fork near Urie, Wyo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	20	10	16.5	1,010
November 1–13	18	13	14.6	376
March 20–31	45	20	29.4	700
April	54	20	38.9	2,310
May	1,270	38	447	27,500
June	2,180	320	1,070	63,700
July	480	28	128	7,870
August	42	5	21.1	1,300
September	106	13	35.7	2,120

HAMS FORK AT DIAMONDVILLE, WYO.

LOCATION.—In SW. ¼ sec. 24, T. 21 N., R. 116 W., at highway bridge at Diamondville, Lincoln County. Nearest tributary, Willow Creek, enters 4 miles upstream.

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

RECORDS AVAILABLE.—October 1, 1918, to September 30, 1921. From May 1 to September 30, 1918, station maintained at Kemmerer 2 miles upstream; records at two points comparable.

GAGE.—Vertical staff fastened to downstream end of center pier; read by Notsie Garnick.

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

CHANNEL AND CONTROL.—Bed composed of small boulders and well-compacted gravel. Control located 200 feet downstream at small rapids composed of well-compacted gravel, which shifts during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 4.22 feet at 5 p.m. May 30 (discharge, 2,200 second-feet); minimum discharge, probably occurred during winter.

1918–1921: Maximum stage recorded, 4.4 feet at 8 a.m. May 23, 1920 (discharge, 2,980 second-feet); minimum discharge, river dry August 29–31, 1919.

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

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 50 second-feet from Hams Fork above station and 112 second-feet below.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent; affected by ice. Rating curve used October 1 to November 21 well defined; curve used March 15 to September 30 fairly well defined below 1,200 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table, except as noted in footnote to table of daily discharge. Records fair.

Discharge measurements of Hams Fork at Diamondville, Wyo., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 1	P. V. Hodges	1.62	37.8	June 17	J. B. Spiegel	3.50	1,050
May 2	Robert Follansbee	3.10	691	July 29	Robert Follansbee	1.94	64

Daily discharge, in second-feet, of Hams Fork at Diamondville, Wyo., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	42	53	-------	78	444	1,830	306	68	40
2	42	47	-------	116	688	1,830	290	76	43
3	42	47	-------	205	937	1,590	280	83	44
4	42	55	-------	285	1,120	1,360	275	72	48
5	42	56	-------	290	1,120	1,360	265	58	48
6	40	55	-------	270	1,290	1,440	236	52	43
7	40	55	-------	214	1,440	1,510	205	49	40
8	42	45	-------	210	1,590	1,360	181	46	38
9	42	45	-------	177	1,360	1,290	169	42	36
10	39	42	-------	193	1,160	1,290	162	44	36
11	45	40	-------	189	1,160	1,290	137	49	36
12	44	40	-------	236	1,290	1,360	122	49	36
13	52	40	-------	336	1,360	1,360	116	58	35
14	53	40	-------	409	1,360	1,360	116	83	36
15	52	40	78	348	1,510	1,290	119	64	36
16	53	42	83	270	1,670	1,220	119	56	33
17	51	49	130	306	2,000	1,160	113	52	31
18	56	52	228	324	2,000	970	110	48	33
19	57	49	218	479	2,170	860	108	41	33
20	59	56	165	479	1,830	810	108	36	38
21	60	35	122	444	1,440	715	124	36	39
22	59	-------	110	374	1,220	670	113	36	38
23	59	-------	97	643	1,360	580	100	36	38
24	47	-------	95	479	1,290	580	92	46	38
25	45	-------	78	360	1,440	540	85	54	35
26	46	-------	72	306	1,670	500	78	54	35
27	49	-------	76	265	1,670	465	78	44	35
28	51	-------	64	265	1,830	395	78	38	35
29	52	-------	66	290	2,170	360	78	35	33
30	53	-------	64	360	2,170	330	68	38	35
31	53	-------	60	-------	2,000	-------	68	36	-------

NOTE.—Stage-discharge relation affected by ice Nov. 9–16; discharge based on temperature and gage-height records. Discharge Mar. 15 to May 5 computed by shifting-control method. No record during winter.

Monthly discharge of Hams Fork at Diamondville, Wyo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	60	39	48.7	2,990
November 1–21	56	35	46.8	1,950
March 15–31	228	60	106	3,570
April	643	78	307	18,300
May	2,170	444	1,480	91,000
June	1,830	330	1,060	63,100
July	306	68	145	8,920
August	83	35	50.9	3,130
September	48	31	37.6	2,240

LITTLE SNAKE RIVER NEAR DIXON, WYO.

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

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

RECORDS AVAILABLE.—May 27, 1910, to September 30, 1921.

GAGE.—Chain gage on upstream side of bridge; read by Mrs. J. E. Herold.

CHANNEL AND CONTROL.—Slightly shifting during high water.

EXTREMES OF DISCHARGE.—Maximum mean daily gage height recorded, 7.7 feet on May 29 (discharge, 6,680 second-feet); minimum stage recorded, 1.08 feet on August 20 (discharge, 22 second-feet).

1910–1921: Maximum mean daily stage recorded, 8.3 feet on May 23, 1920 (discharge, 8,960 second-feet); minimum stage recorded, 0.2 foot on August 6, 1911 (discharge, 5 second-feet).

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversion from Little Snake River of 68 second-feet in Wyoming and 33 second-feet in Colorado; below station, 68 second-feet in Wyoming and 54 second-feet in Colorado.

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

Daily discharge, in second-feet, of Little Snake River near Dixon, Wyo., for the year ending Sept. 30, 1921.

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1	155	251	1,290	5,260	908	115	38
2	125	352	2,060	4,960	780	162	46
3	140	466	2,660	4,540	667	130	54
4	155	978	3,350	4,580	578	115	54
5	140	1,090	4,280	4,810	500	87	87
6	112	538	5,110	5,110	419	74	54
7	100	374	5,260	5,590	361	70	54
8	125	290	3,280	5,340	318	58	51
9	155	251	2,680	5,410	302	64	46
10	155	251	2,560	5,180	278	203	46
11	155	466	2,710	6,280	240	124	51
12	172	563	3,070	5,410	162	79	51
13	172	528	3,600	4,880	270	58	38
14	190	694	3,980	5,110	270	146	38
15	155	640	4,390	4,660	251	87	27
16	155	466	4,960	4,280	270	106	24
17	155	442	6,040	3,600	240	70	27
18	190	500	6,200	2,940	240	54	38
19	190	722	5,800	2,490	251	24	27
20	210	762	5,720	1,820	203	22	51
21	280	667	4,880	1,560	169	54	46
22	240	548	5,340	1,580	136	54	51
23	210	667	5,410	1,510	146	54	54
24	210	780	5,640	1,490	115	54	51
25	190	722	5,560	1,420	87	58	54
26	190	614	4,960	1,400	64	51	58
27	190	588	5,690	1,320	70	41	51
28	190	640	6,170	1,210	58	38	51
29	210	651	6,680	1,050	70	38	54
30	230	780	6,490	1,010	64	38	54
31	230	------	5,690	------	54	38	------

NOTE.—No record during winter.

Monthly discharge of Little Snake River near Dixon, Wyo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	280	100	173	10,600
April	1,090	251	576	34,300
May	6,680	1,290	4,560	280,000
June	6,280	1,010	3,530	210,000
July	908	54	275	16,900
August	203	22	76.3	4,690
September	87	24	47.5	2,830

SAVERY CREEK AT SAVERY, WYO.

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

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

RECORDS AVAILABLE.—May 1, 1915, to September 30, 1916; April 5, 1918, to September 30, 1921.

GAGE.—Vertical staff read by Marie Kilgore.

EXTREMES OF DISCHARGE.—Maximum mean daily stage recorded during the year, 5.6 feet on May 7 (discharge, 1,710 second-feet); minimum stage recorded, 1.0 foot July 26–31, August 26–31, September 13–30 (discharge, 18 second-feet).

1915–1916; 1918–1921: Maximum stage recorded, 5.7 feet on May 19, 21, 22, 1920 (discharge, 1,770 second-feet); no flow July 6 to September 3, 1915; August 5, 6, 9–31, September 1–14, 1918.

DIVERSIONS.—Prior to July 1, 1921, adjudicated diversions of 64 second-feet from Savery Creek, and 13 second-feet from tributaries entering above.

REGULATION.—None.

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

Daily discharge, in second-feet, of Savery Creek at Savery, Wyo., for the year ending Sept. 30, 1921.

Day.	Oct.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	40	------	328	292	1,300	84	56	18
2	40	------	622	382	1,300	69	69	32
3	50	------	622	976	952	62	108	32
4	50	------	622	1,100	952	62	133	36
5	50	------	584	1,300	904	62	142	40
6	24	------	527	1,590	860	62	152	32
7	24	------	328	1,710	820	62	274	32
8	24	------	188	860	760	62	220	32
9	24	------	188	860	740	62	152	32
10	24	------	188	1,050	720	62	124	32
11	24	------	188	1,300	660	62	124	32
12	24	------	188	1,410	660	92	124	40
13	24	------	238	1,410	660	62	142	18
14	32	------	256	1,410	641	62	62	18
15	32	------	292	1,410	622	62	62	18
16	40	------	400	1,500	546	62	62	18
17	32	------	400	1,590	490	76	62	18
18	32	------	400	1,590	400	69	62	18
19	40	------	400	1,470	292	62	56	18
20	40	------	400	1,470	292	50	32	18
21	40	------	436	1,440	274	50	32	18
22	40	------	472	1,590	256	50	24	18
23	40	------	400	1,590	188	45	24	18
24	40	204	292	1,470	152	40	24	18
25	40	220	292	1,470	142	24	21	18
26	40	188	292	1,410	142	18	18	18
27	32	188	292	1,150	142	18	18	18
28	32	188	256	952	162	18	18	18
29	32	188	256	952	124	18	18	18
30	32	188	292	952	116	18	18	18
31	32	188	------	860	------	18	18	------

NOTE.—No record during winter.

Monthly discharge of Savery Creek at Savery, Wyo., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	50	24	34.5	2,120
March 24-31	220	188	194	3,080
April	622	188	355	21,100
May	1,710	292	1,240	76,200
June	1,300	116	542	32,300
July	92	18	524	3,220
August	274	18	79.1	4,860
September	40	18	23.8	1,420

ASHLEY CREEK NEAR VERNAL, UTAH.

LOCATION.—In sec. 1, T. 3 S., R. 20 E., three-quarters of a mile above heading of power canal of Vernal Milling & Light Co., 4 miles above mouth of Dry Fork, and 12 miles northwest of Vernal, Uinta County.

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

RECORDS AVAILABLE.—June 6, 1914, to September 30, 1921. From October 8, 1911, to June 5, 1914, fragmentary records were obtained at the power plant, the total flow of the creek being determined by including the discharge from the tailrace. Records are also available for a point below the mouth of Dry Fork from March 15, 1900, to December 31, 1904.

GAGE.—Stevens continuous water-stage recorder on left bank three-quarters of a mile above heading of power canal, installed June 14, 1919. Recorder inspected and supplementary staff gage read once a week by Adam Erickson and William Thomas.

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

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year, 8.23 feet at 9 p. m. May 29 (discharge, 2,050 second-feet); minimum stage recorded, 4.18 feet in February and March (discharge, 32 second-feet).

1911–1921: Maximum discharge recorded that of May 29, 1921; minimum discharge, 26 second-feet on February 7, 1920 (gage height, 3.36 feet).

ICE.—None.

DIVERSIONS.—None above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not affected by ice. Changes in channel conditions caused slight change in stage-discharge relation about June 10, 1921. Rating curves well defined from 30 to 300 second-feet and extended above. Operation of water-stage recorder satisfactory except November 15 to March 25 and June 6–10. Weekly staff gage readings obtained during winter and no record June 6–10. Daily discharge determined only for days when gage was read during the period November 15 to March 25. For remainder of year daily discharge ascertained by applying to rating table the mean daily gage height determined from recorder graph, mean discharge June 6–10 interpolated. Monthly mean discharge estimated November to March. Records good.

Discharge measurements of Ashley Creek near Vernal, Utah, during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 29	A. B. Purton	4.38	54.6	July 1	A. B. Purton	5.25	254
Mar. 27	R. R. Rowe	4.20	34.2	27	Dickinson and Howard	4.86	124

Daily discharge, in second-feet, of Ashley Creek near Vernal, Utah, for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	58	60		40			35	57	1,580	254	175	159
2	58	62					36	103	1,570	262	175	153
3	57	60					37	183	1,620	246	153	172
4	57	62	49				39	284	1,690	235	134	131
5	57	60			36		42	336	1,500	224	123	120
6	56	60				32	43	300		203	112	112
7	56	60					41	244		196	112	109
8	56	60		38			41	197	1,400	175	112	106
9	54	60					40	183		165	112	106
10	54	58					40	169		165	128	112
11	54	57	47				41	183	1,320	165	114	112
12	56	57			32	32	42	252	1,200	165	101	112
13	57	57					44	328	1,110	165	101	109
14	57	57					45	376	976	162	112	106
15	58						48	480	922	179	106	104
16	60			36			47	590	770	175	104	101
17	60						47	560	644	162	101	97
18	60		44				47	470	556	159	92	97
19	58				32	36	45	364	500	159	90	99
20	58	57					47	312	455	153	88	99
21	56						47	328	445	150	88	99
22	54			38			49	396	465	175	85	94
23	54						50	490	460	185	94	90
24	54						52	600	426	153	94	88
25	54		42				52	650	402	143	92	88
26	54				32	34	52	795	379	137	90	88
27	54	47					34	53	1,030	343	126	88	88
28	54						35	53	1,280	317	123	85	88
29	54			38			35	52	1,590	289	120	85	88
30	57						35	52	1,750	277	112	92	88
31	62						35		1,680		128	109	

Monthly discharge of Ashley Creek near Vernal, Utah, for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	62	54	56.4	3,470
November	62		55.8	3,320
December			44.9	2,760
January			37.8	2,320
February			33.2	1,840
March			33.6	2,070
April	53	35	45.3	2,700
May	1,750	57	534	32,800
June	1,690	277	907	54,000
July	262	112	172	10,600
August	175	85	108	6,640
September	172	88	107	6,370
The year	1,750		178	129,000

VERNAL MILLING & LIGHT CO.'S TAILRACE NEAR VERNAL, UTAH.

LOCATION.—In NW. ¼ sec. 18, T. 3 S., R. 21 E., at power plant of Vernal Milling & Light Co., 10 miles northwest of Vernal, Uinta County.

RECORDS AVAILABLE.—May 3 to September 30, 1917, and March 18, 1920, to September 30, 1921.

GAGE.—Indicating gage in office of power plant actuated by float in stilling well in tailrace beneath plant; also vertical enamel staff in stilling well; established March 17, 1920.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Channel straight for 50 feet below gage. Banks high and one channel at all stages. Bed of gravel and cobbles; fairly permanent.

ICE.—None.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined. Gage read hourly to hundredths and reading made a part of hourly record of the power plant. Daily discharge ascertained by applying mean daily gage height to rating table except for days when plant was not operated continuously. For these days hourly discharge was used to determine the daily mean. Records good.

Discharge measurements of Vernal Milling & Light Co.'s tailrace near Vernal, Utah, during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 29	A. B. Purton	4.73	30.1	July 27	Dickinson and Howard	4.55	23.2
31	do	4.44	19.3	27	do	4.00	6.2
Mar. 27	R. R. Rowe	4.42	17.5	27	do	4.77	31.3
July 1	A. B. Purton	4.80	32.9				

Daily discharge, in second-feet, of Vernal Milling & Light Co.'s tailrace near Vernal, Utah, for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	22	26	24	22	22	21	23	10	24	25	25	25
2	23	27	23	20	23	22	23	22	24	16	27	25
3	13	25	25	26	23	21	10	21	24	22	27	25
4	23	24	26	25	24	22	22	22	24	22	25	22
5	23	27	21	26	23	22	23	23	22	24	26	26
6	23	26	25	25	20	14	23	23	23	25	25	25
7	22	21	24	25	24	21	23	24	22	26	21	25
8	24	25	26	23	24	22	22	20	23	25	25	26
9	23	26	26	20	24	22	22	23	24	25	24	27
10	19	25	26	23	24	21	12	24	23	21	25	26
11	22	25	27	23	24	21	22	22	22	25	25	22
12	24	27	21	23	24	22	22	22	6	24	25	27
13	24	26	26	23	19	19	22	22	23	25	26	26
14	24	22	26	24	24	22	21	22	25	25	18	26
15	24	27	26	25	21	22	21	10	25	24	23	27
16	24	25	26	20	24	22	21	15	24	24	25	27
17	19	26	26	25	23	23	19	23	24	20	25	27
18	24	26	26	27	24	23	22	25	24	23	23	22
19	22	25	21	25	23	23	23	10	21	24	26	27
20	24	25	26	25	15	19	22	4	23	24	24	27
21	25	22	24	23	23	23	22	25	24	23	21	25
22	25	24	26	23	21	23	22	11	24	25	25	26
23	25	24	26	20	24	23	23	25	24	24	24	26
24	20	24	26	22	23	23	16	24	24	20	25	24
25	25	22	22	23	24	23	22	24	23	22	25	23
26	25	23	21	23	23	24	23	23	21	18	24	24
27	25	24	25	22	20	19	22	23	25	24	24	25
28	25	21	25	23	23	23	23	23	24	26	21	23
29	26	24	25	22	------	24	22	20	25	26	25	0
30	26	24	25	20	------	23	22	21	24	25	25	15
31	22	------	26	22	------	24	------	23	------	22	25	------

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Monthly discharge of Vernal Milling & Light Co.'s tailrace near Vernal, Utah, for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	26	13	23.1	1,420
November	27	21	24.6	1,460
December	27	21	24.8	1,520
January	27	20	23.2	1,430
February	24	15	22.6	1,260
March	24	14	21.8	1,340
April	23	10	21.2	1,260
May	25	4	20.3	1,250
June	25	6	22.9	1,360
July	26	16	23.4	1,440
August	27	18	24.3	1,490
September	27	0	24.0	1,430
The year	27	0	23.0	16,700

NORTH FORK OF DUCHESNE RIVER NEAR HANNA, UTAH.

LOCATION.—In NW. ¼ NE. ¼ sec. 35, T. 2 N., R. 9 W., Uinta special base and meridian, 250 feet below Hades Creek, 6 miles above confluence with West Fork, and 10 miles northwest of Hanna, Duchesne County.

DRAINAGE AREA.—75 square miles (measured on topographic map).

RECORDS AVAILABLE.—August 16 to September 30, 1921.

GAGE.—Vertical enamel staff on left bank 10 feet downstream from cable; read by V. R. Savage.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Channel straight for half a mile above gage; makes sharp turn to left 50 feet below gage. Steep cobble riffle immediately below gage. One channel at all stages. Bed of gravel and small boulders. Right bank high. Left bank lower but probably not subject to overflow. Stage of zero flow —0.8 foot as determined October 1, 1921.

EXTREMES OF DISCHARGE.—Extremes for the year do not occur during period of present records.

ICE.—Stream probably freezes over at times each winter.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Rating curve for gage-height records thus far obtained is based on two discharge measurements made August 16 and October 1, 1921, and point of zero flow on October 1. It is well defined for range in stage occurring during period of records. Gage read to hundredths once daily except September 25–29. Daily discharge determined by applying daily gage height to rating table and interpolating for September 25–29. Records good.

The following discharge measurement was made by Purton and Woolley: August 16, 1921: Gage height, 1.16 feet; discharge, 74 second-feet.

Daily discharge, in second-feet, of North Fork of Duchesne River near Hanna, Utah, for the period Aug. 16 to Sept. 30, 1921.

Day.	Aug.	Sept.	Day.	Aug.	Sept.	Day.	Aug.	Sept.
1		80	11		56	21	72	46
2		106	12		52	22	72	44
3		116	13		49	23	61	41
4		80	14		49	24	65	41
5		72	15		46	25	65	40
6		70	16	74	46	26	58	39
7		61	17	70	46	27	56	38
8		58	18	70	46	28	58	38
9		58	19	70	46	29	56	37
10		58	20	70	46	30	52	36
						31	49	

Monthly discharge of North Fork of Duchesne River near Hanna, Utah, for the period Aug. 16 to Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
August 16–31	74	49	63.6	2,020
September	116	36	54.7	3,250
The period				5,270

DUCHESNE RIVER NEAR TABIONA, UTAH.

LOCATION.—In SW. ¼ sec. 17, T. 2 S., R. 6 W., Uinta special base and meridian, at highway bridge 8 miles southeast of Tabiona, Duchesne County, and 5½ miles above Rock Creek.

DRAINAGE AREA.—352 square miles.

RECORDS AVAILABLE.—January 16, 1919, to September 30, 1921.

GAGE.—Stevens steel tape gage on downstream side of bridge; installed March 8, 1920; read by Lyman Duke.

DISCHARGE MEASUREMENTS.—Made by wading or from bridge.

CHANNEL AND CONTROL.—Channel composed of gravel and sand. Left bank high and not subject to overflow. Right bank overflowed at extreme high stage allowing water to pass around the bridge. Gravel riffle 50 feet below gage. Zero flow at gage height 0.9 foot as determined on September 21, 1919.

EXTREMES OF DISCHARGE.—Maximum discharge about 2,500 second-feet on June 13; uncertain because gage readings for that time are doubtful and river was over right bank. Minimum discharge, 83 second-feet on February 26 (gage height, 9.40 feet).

1919–1921: Maximum discharge that of June 13, 1921. Minimum discharge probably less than 70 second-feet in January, 1919, when river was frozen over.

ICE.—River freezes over each winter.

DIVERSIONS.—Some small diversions for irrigation above this station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation below 800 second-feet changed during high water about May 31; affected by ice November 29, 30, and December 13 to January 21. Rating curves fairly well defined. Gage read to hundredths once a day throughout the year. Daily discharge ascertained by applying daily gage height to rating table, except for period of ice effect and period June 14–24 for which gage readings are doubtful. Discharge for period of ice effect estimated from observer's notes, temperature records, and comparison with flow of Duchesne River at Duchesne. Discharge for period June 14–24 estimated from comparison with flow of Duchesne River at Duchesne. Records good.

Discharge measurements of Duchesne River near Tabiona, Utah, during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 6	A. B. Purton	9.84	156	July 24	W. E. Dickinson	10.44	343
Mar. 24	R. R. Rowe	9.73	141	Aug. 4	do	9.91	218

Daily discharge, in second-feet, of Duchesne River near Tabiona, Utah, for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	130	156	113		102	223	141	215	1,370	1,110	192	211
2	128	122	122		100	223	144	302	1,380	915	190	211
3	130	115	115		102	215	152	318	1,390	815	190	211
4	134	110	115		107	218	156	398	1,400	765	207	215
5	134	139	115		102	210	179	445	1,710	698	192	220
6	135	144	116		100	158	175	503	1,880	585	194	218
7	139	127	127		107	135	168	461	2,000	557	196	220
8	143	105	116		105	134	160	425	2,160	465	205	222
9	141	105	123		105	120	156	391	2,220	430	211	222
10	148	113	125		103	118	168	425	2,360	505	229	222
11	148	127	123	92	103	103	179	391	2,380	529	231	220
12	148	137	116		103	103	190	445	2,420	537	238	215
13	148	137			102	113	195	512	2,490	585	240	211
14	148	132			103	130	190	642		621	235	211
15	144	134			103	125	168	755		630	240	207
16	141	130			103	122	172	735		585	229	207
17	139	130			102	123	172	715	1,750	545	207	205
18	154	134			102	125	177	705		505	200	205
19	164	137			103	122	177	690		465	200	203
20	166	134			103	127	181	705		430	203	200
21	156	108	100		105	135	179	700		378	229	198
22	158	113		97	90	130	183	695	1,200	369	211	198
23	144	128		102	87	123	186	685		353	215	198
24	116	130		102	86	127	186	680		338	213	198
25	134	127		102	86	116	186	680	1,290	318	213	196
26	148	102		100	83	113	181	815	1,320	310	213	198
27	152	122		100	148	110	166	1,180	1,270	256	213	194
28	137	105		103	220	107	168	1,300	1,250	238	211	190
29	150	102		102	-------	103	179	1,330	1,220	211	211	188
30	175	108		102	-------	107	188	1,350	1,140	190	211	188
31	186	-------		103	-------	134	-------	1,360	-------	194	211	-------

Monthly discharge of Duchesne River near Tabiona, Utah, for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	186	116	146	8,980
November	156	102	124	7,380
December	127	----------	107	6,580
January	103	----------	95	5,840
February	220	83	106	5,890
March	223	103	137	8,420
April	195	141	173	10,300
May	1,360	215	676	41,600
June	2,490	1,140	1,660	98,800
July	1,110	190	498	30,600
August	240	190	212	13,000
September	222	188	207	12,300
The year	2,490	83	345	250,000

DUCHESNE RIVER AT DUCHESNE, UTAH.

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

DRAINAGE AREA.—660 square miles.

RECORDS AVAILABLE.—December 3, 1917, to September 30, 1921.

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

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Channel straight for several hundred feet below gage. Prior to high water in 1921 main channel from upstream approached bridge at sharp angle from the right and at low water a bar under bridge caused two separate channels which reunited a few feet below gage. Since high water, stream has been in one channel normal to bridge resulting in a straight channel from a hundred feet above gage to several hundred feet below. Bed composed of gravel and cobbles. The head of a long heavy gravel riffle is a short distance below gage. Banks are low but not subject to overflow. Stage of zero flow at gage height 2.6 feet as determined August 4 and 18, 1921.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.40 feet on June 13 (discharge, 4,060 second-feet). Minimum discharge probably less than 150 second-feet in latter part of December when stage-discharge relation was affected by ice.

1918–1921: Maximum discharge that of June 13, 1921. Minimum discharge, 53 second-feet July 29 and August 23–27, 1919.

ICE.—Stream freezes every winter.

DIVERSIONS.—Below all diversions above mouth of Strawberry River; numerous diversions above and below station. Rock Creek enters between this station and the station near Tabiona.

REGULATION.—None except by diversion.

ACCURACY.—Stage-discharge relation changed during high water of about June 12; also changed slightly during winter; affected by ice December 10 to February 23. Rating curves fairly well defined. Gage read to half-tenths once a day except September 26–30. Daily discharge ascertained by applying daily gage height to rating table except as follows: Discharge for period of ice effect estimated from temperature records, observer's notes, and hydrographic study of flow at this station in conjunction with that of Duchesne River at Myton, Strawberry River at Duchesne, and Lake Fork near Myton; interpolated for September 26-30. Records good.

Discharge measurements of Duchesne River at Duchesne, Utah, during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 5	A. B. Purton	4.78	281	July 24	E. C. Howard	5.16	700
Mar. 23	R. R. Rowe	4.61	242	Aug. 4	W. E. Dickinson	4.68	361
July 3	A. B. Purton	6.08	1,500	18	A. B. Purton	4.63	311

Daily discharge, in second-feet, of Duchesne River at Duchesne, Utah, for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	225	315	225			305	220	260	2,400	1,770	450	330
2	225	290	225			305	240	330	2,460	1,620	450	395
3	225	268	245			330	240	380	2,460	1,520	420	750
4	225	268	245			330	330	470	2,460	1,460	355	515
5	225	272	225			330	355	640	2,520	1,230	310	420
6	225	290	225			330	305	720	2,760	1,140	290	350
7	225	290	225			305	280	720	3,060	1,100	275	370
8	225	290	225			305	305	570	3,420	1,000	260	350
9	225	268	188			260	260	605	3,540	960	275	350
10	225	268				260	260	570	3,670	915	310	350
11	245	245				260	305	535	3,670	915	310	350
12	268	245			200	260	280	605	3,930	830	290	350
13	245	245				280	305	760	4,060	960	290	310
14	245	245				240	280	845	3,960	830	515	310
15	225	245				260	330	1,070	3,600	915	450	275
16	225	245		170		240	280	1,120	3,480	960	395	275
17	205	245				260	305	1,470	2,450	1,180	350	275
18	245	245				260	280	1,420	2,450	1,100	325	260
19	268	245				305	305	1,270	2,120	870	310	260
20	268	245	160			280	305	1,170	2,020	790	290	260
21	315	245				260	330	1,120	2,120	710	710	260
22	315	245				260	330	1,070	2,230	670	370	260
23	290	245				250	305	1,070	2,450	670	350	245
24	268	245			220	240	305	1,170	2,450	735	395	245
25	268	245			220	240	305	1,170	2,450	670	420	245
26	245	245			240	240	280	1,320	2,560	550	395	245
27	245	245			260	240	260	1,740	2,450	515	370	245
28	245	245			305	240	260	2,120	2,340	420	350	245
29	245	225			-------	260	305	2,400	2,120	420	350	245
30	290	225			-------	260	260	2,580	1,820	370	330	245
31	340	-------			-------	240	-------	2,580	-------	420	330	-------

Monthly discharge of Duchesne River at Duchesne, Utah, for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	340	205	250	15,400
November	315	225	256	15,200
December	245	----------	179	11,000
January	----------	----------	170	10,500
February	305	----------	209	11,600
March	330	240	272	16,700
April	355	220	290	17,300
May	2,580	260	1,090	67,000
June	4,060	1,820	2,780	165,000
July	1,770	370	910	56,000
August	710	260	364	22,400
September	750	245	320	19,000
The year	4,060	----------	591	427,000

DUCHESNE RIVER AT MYTON, UTAH.

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

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

RECORDS AVAILABLE.—October 26, 1899, to November 30, 1910, and July 26, 1911, to September 30, 1921.

GAGE.—Chain gage on upstream rail near the left end of steel highway bridge; installed August 6, 1910; read by Owen Smith.

DISCHARGE MEASUREMENTS.—Made from the highway bridge or by wading about 500 feet below the bridge.

CHANNEL AND CONTROL.—Bed composed 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. Gravel riffle at ford 100 or 200 feet below the gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.8 feet at 9.30 a. m. June 12 and 8 a. m. June 13 (discharge, 9,500 second-feet); minimum stage recorded, 1.8 feet on October 1 and 2 (discharge, 285 second-feet).

1899–1921: Maximum stage recorded, 7.4 feet, June 20, 22, and 23, 1917 (discharge, 9,690 second-feet). Minimum stage recorded, 0.75 foot at 8.30 p. m. August 23 and 8 a. m. August 24, 1919 (discharge, 8 second-feet).

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

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

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

ACCURACY.—Stage-discharge relation below 1,500 second-feet changed during high water in June and July, and again during freshet August 31 to September 5; affected by ice November 28 to February 28. Rating curves well defined below 6,000 second-feet and extended above. Gage read to half-tenths twice a day. Readings reported for the periods March 11–31 and August 31 to September 5 discarded as unreliable. Daily discharge ascertained by applying mean daily gage height to rating table except as follows: For periods of ice effect discharge was estimated from observer's notes, recorded gage heights, weather records, and hydrographic comparison with Duchesne River at Duchesne, Strawberry River at Duchesne, and Lake Fork near Myton; for March 11–31 and August 31 to September 5, discharge estimated from hydrographic study as for ice periods; discharge interpolated October 24, May 25, 26, and September 21 and 22 because gage was not read. Records good.

Discharge measurements of Duchesne River at Myton, Utah, during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 4	A. B. Purton	2.24	534	July 26	Dickinson and Howard	2.58	828
Mar. 20	R. R. Rowe	2.38	627	Aug. 6	do	2.04	483
July 3	A. B Purton	4.37	2,600				

Daily discharge, in second-feet, of Duchesne River at Myton, Utah, for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	285	645				1,320	386	703	4,080	3,560	771	
2	285	572				1,340	386	838	3,900	3,100	704	
3	310	572				1,230	506	964	3,900	2,600	672	1,000
4	310	572				1,250	474	1,180	4,260	2,530	640	
5	335	586				1,160	643	1,360	4,740	2,300	518	
6	335	643				1,070	680	1,660	4,930	2,100	483	695
7	335	643				838	505	1,710	6,100	1,560	489	695
8	335	629				781	443	1,590	7,370	1,410	405	695
9	335	572				680	443	1,390	7,940	1,300	432	695
10	415	559				586	432	1,180	8,110	1,230	460	615
11	490	518			400		455	1,070	8,640	1,230	460	540
12	540	505					386	1,070	9,350	1,230	548	472
13	335	505					538	1,140	9,110	1,230	518	472
14	385	505					608	1,460	9,110	1,320	840	472
15	415	505					718	1,950	9,230	1,410	826	472
16	415	505	350	325		550	586	2,160	8,520	1,560	771	410
17	445	493					559	2,280	7,830	1,630	771	410
18	505	455					608	2,530	6,820	1,710	738	410
19	560	443					505	2,400	4,930	1,460	704	410
20	505	443				627	572	2,160	4,450	1,340	672	410
21	505	443					643	1,820	4,740	1,180	700	410
22	505	443					643	1,460	5,230	1,140	1,610	410
23	505	443					629	1,590	5,960	1,140	738	410
24	490	414					718	1,710	5,850	1,510	806	304
25	475	397			700		718	1,980	5,890	1,280	910	344
26	445	386				500	680	2,250	5,130	940	840	399
27	445	386					643	2,530	5,330	840	724	382
28	445						505	2,940	4,830	704	609	354
29	445	380					538	3,900	4,260	640	704	354
30	445						608	4,260	4,080	690	578	304
31	645							4,450		738	900	

Monthly discharge of Duchesne River at Myton, Utah, for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	645	285	427	26,300
November	645		497	29,600
December			350	21,500
January			325	20,000
February			486	27,000
March	1,340		688	42,300
April	718	386	559	33,300
May	4,450	703	1,930	119,000
June	9,350	3,900	6,150	366,000
July	3,560	640	1,500	92,200
August	1,610	405	695	42,700
September		304	551	32,800
The year	9,350	285	1,180	853,000

WEST FORK OF DUCHESNE RIVER NEAR HANNA, UTAH.

LOCATION.—Near east line in SE. ¼ sec. 27, T. 1 N., R. 9 W., Uinta special base and meridian, a quarter of a mile above Wolf Creek, 3 miles above confluence with North Fork, and 6 miles northwest of Hanna, Duchesne County.

DRAINAGE AREA.—54 square miles.

RECORDS AVAILABLE.—August 16 to September 30, 1921.

GAGE.—Vertical enamel staff on left bank; read by J. T. Murdock.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Channel straight for 200 feet above and below gage. Cobble riffle immediately below gage. One channel at all stages. Bed of gravel and cobbles. Left bank high. Right bank may be overflowed during extreme high water. Stage of zero flow at gage height −0.4 foot as determined on September 29, 1921.

EXTREMES OF DISCHARGE.—Extremes for the year do not occur during period of present records.

ICE.—Stream probably freezes over at times each winter.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Rating curve for gage-height records thus far obtained is based on two discharge measurements made August 16 and September 29, 1921, and point of zero flow on September 29. It is well defined for range in stage occurring during period of records. Gage read once a day to hundredths except September 26–28, 30. Daily discharge determined by applying daily gage height to rating table and interpolating for September 26–28, 30. Records good.

Discharge measurement of West Fork of Duchesne River near Hanna, Utah, during sthe period Aug. 16 to Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Aug. 16	Purton and Woolley	1.02	43.3
Sept. 29	W. E. Dickinson	.84	25.7

Daily discharge, in second-feet, of West Fork of Duchesne River near Hanna, Utah, for the period Aug. 16 to Sept. 30, 1921.

Day.	Aug.	Sept.	Day.	Aug.	Sept.	Day.	Aug	Sept.
1		41	11		26	21	36	26
2		44	12		26	22	36	26
3		44	13		26	23	36	26
4		41	14		26	24	41	26
5		41	15		26	25	41	26
6		39	16	42	26	26	36	26
7		39	17	41	26	27	36	26
8		36	18	39	26	28	36	26
9		32	19	36	26	29	48	26
10		30	20	36	26	30	41	26
						31	39	

Monthly discharge of West Fork of Duchesne River near Hanna, Utah, for the period Aug. 16 to Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
August 16–31	48	36	38.8	1,230
September	44	26	30.2	1,800
The period				3,030

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WOLF CREEK NEAR HANNA, UTAH.

LOCATION.—Near west line in SW. ¼ sec. 26, T. 1 N., R. 9 W., Unita special base and meridian, 600 feet above mouth and 6 miles northwest of Hanna, Duchesne County.

DRAINAGE AREA.—19 square miles.

RECORDS AVAILABLE.—August 16 to September 30, 1921.

GAGE.—Vertical enamel staff on left bank; read by J. T. Murdock.

DISCHARGE MEASUREMENTS.—Made by wading or from bridge 150 feet downstream.

CHANNEL AND CONTROL.—Channel winding. Bed composed of sand and cobbles. Cobble riffle 10 feet below gage. Banks heavily covered with willows which trail in water. Natural open place on left bank at gage and riffle. Trailing willows on right bank cut away at this place. One channel at all stages. Banks may be overflowed during possible sudden floods. Stage of zero flow at gage height 0.0 foot as determined on September 29, 1921.

EXTREMES OF DISCHARGE.—Extremes for the year do not occur during period of present records.

ICE.—Seldom forms at this station.

DIVERSIONS.—Small ditches divert water for use at Murdock ranch.

REGULATION.—None.

ACCURACY.—Rating curve for gage-height record thus far obtained is based on two discharge measurements made August 16 and September 29, and point of zero flow on September 29. It is well defined for range in stage occurring during period of records. Gage read to hundredths once daily except September 26 and 27. Daily discharge determined by applying daily gage height to rating table and interpolating for September 26 and 27. Records good.

Discharge measurements of Wolf Creek near Hanna, Utah, during the period Aug. 16 to Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Aug. 16	Purton and Woolley	1.12	15.9
Sept. 29	W. E. Dickinson	1.04	13.0

Daily discharge, in second-feet, of Wolf Creek near Hanna, Utah, for the period Aug. 16 to Sept. 30, 1921.

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

Monthly discharge of Wolf Creek near Hanna, Utah, for the period Aug. 16 to Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
August 16–31	25	16	16.9	537
September	18	13	13.9	827
The period				1,360

STRAWBERRY RIVER AT DUCHESNE, UTAH.

LOCATION.—In E. ½ sec. 2, T. 4 S., R. 5 W., Uinta special base and meridian, at Winslow's ranch, 1 mile west of post office at Duchesne, Duchesne County, half a mile above mouth of Indian Canyon, a small tributary entering from south, and 1½ miles above confluence of Strawberry and Duchesne rivers.

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

RECORDS AVAILABLE.—June 10, 1908, to November 30, 1910; March 16, 1914, to September 30, 1921.

GAGE.—Vertical staff installed July 30, 1918, on downstream side of right abutment of bridge; read by E. S. Winslow. For gages used prior to July 30, 1918, see Water-Supply Paper 479.

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

CHANNEL AND CONTROL.—Channel straight for several hundred feet above and below gage. Bed composed of sand and fine gravel. Gravel riffle 200 feet below gage. Natural channel about 50 feet wide is constricted at bridge to 36 feet wide. Banks comparatively low; covered with underbrush; left bank subject to overflow at very high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.85 feet at 7 a. m. May 31 and 7 p. m. June 9 (discharge, 1,440 second-feet); minimum stage recorded, 2.20 feet at 8 a. m. November 30 (discharge, 74 second-feet).

1908–1921: Maximum discharge recorded, 1,860 second-feet, April 22, 1910; minimum discharge, 30 second-feet, November 20, 1914. Records obtained prior to 1914 incomplete.

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

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

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

ACCURACY.—Stage-discharge relation changed slightly during winter; affected by ice December 7 to March 3. Rating curves well defined below 500 second-feet and fairly well defined above. Gage read to half-tenths twice a day until August 4 and to hundredths thereafter. Daily discharge ascertained by applying mean daily gage height to rating table except for period when stage-discharge relation was affected by ice. For this period, discharge was estimated from weather records, observer's notes, and hydrographic comparison with Duchesne River at Duchesne and at Myton, and Lake Fork near Myton. Records good.

Discharge measurements of Strawberry River at Duchesne, Utah, during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 5	A. B. Purton	2.45	119	July 23	Howard and Dickinson	2.78	221
Mar. 22	R. R. Rowe	2.58	183	Aug. 4	W. E. Dickinson	2.55	164
July 3	A. B. Purton	3.08	319	17	Purton and Woolley	2.78	216

Daily discharge, in second-feet, of Strawberry River at Duchesne, Utah, for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	100	155	91				156	492	1,350	387	423	218
2	100	140	91			400	160	580	1,290	345	271	210
3	100	129	88				183	740	1,310	302	197	400
4	95	119	91			416	223	828	1,310	362	174	200
5	91	119	91			387	250	840	1,310	302	163	185
6	91	125	91			292	256	908	1,330	302	148	176
7	95	119				250	228	920	1,370	292	143	167
8	100	119				197	223	852	1,370	280	137	158
9	100	113			100	167	228	800	1,430	256	137	156
10	100	109				152	215	720	1,370	250	169	156
11	146	109	90			152	215	708	1,340	242	165	158
12	113	109				160	234	760	1,320	242	158	158
13	109	109				174	242	880	1,280	345	710	156
14	109	109				160	242	1,020	1,280	302	405	156
15	109	109				156	286	1,100	1,240	292	359	156
16	109	109		90		152	292	1,200	1,160	352	810	154
17	109	109				174	280	1,240	1,100	359	239	152
18	113	109				183	262	1,280	800	318	202	152
19	133	109				197	271	1,150	680	286	180	152
20	146	109				202	271	1,070	652	256	171	152
21	140	109				190	292	940	620	234	750	152
22	119	105			180	178	302	852	572	228	730	150
23	119	91	85			167	380	828	540	228	387	148
24	109	91				167	416	840	500	215	580	148
25	109	82				160	370	900	492	202	349	143
26	109	82				160	370	960	460	202	300	143
27	109	88				156	352	1,010	430	183	332	143
28	109	100				156	345	1,230	416	174	228	139
29	109	88				156	359	1,340	394	156	344	135
30	113	82				160	394	1,410	387	156	320	127
31	203					160		1,410		416	610	

Monthly discharge of Strawberry River at Duchesne, Utah, for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	203	91	113	6,950
November	155	82	108	6,430
December			87.5	5,380
January			90	5,530
February			137	7,610
March		152	212	13,000
April	416	156	277	16,500
May	1,410	492	962	59,200
June	1,430	387	970	57,700
July	416	156	271	16,700
August	810	137	332	20,400
September	400	127	167	9,940
The year	1,430		311	225,000

RED CREEK NEAR FRUITLAND, UTAH.

LOCATION.—In SE. ¼ sec. 21, T. 3 S., R. 8 W., Uinta special base and meridian, 400 feet above State highway crossing at D. S. Murdock's ranch, 1½ miles above confluence with Currant Creek, and 4 miles southeast of Fruitland, Duchesne County.

DRAINAGE AREA.—89 square miles.

RECORDS AVAILABLE.—November 23, 1917, to September 30, 1921.

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

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—One channel at all stages. Banks subject to overflow at extremely high water. Left bank overgrown with willows. Right bank sloping meadow. Stream bed composed of silt and sand.

EXTREMES OF DISCHARGE.—Maximum discharge during year occurred in sudden flood on August 21; quantity not determined. Practically no flow August 7–12.

1918–1921: Sudden floods of high discharge occur nearly every summer; quantity not determined. Creek practically dry a part of each summer.

ICE.—Stream freezes over every winter.

DIVERSIONS.—Below all diversions from Red Creek.

REGULATION.—None except by diversion.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined. Gage read once a day to half-tenths, occasionally to hundredths, except June 26–30 and July 22–30 when observer was away, August 7–12 when water was below gage and August 21 when water was over top of gage. Daily discharge ascertained by applying daily gage height to rating table. Discharge for periods when water was over or below gage estimated from elevation of high-water marks and observer's notes. Creek dry August 7–12. Records good.

Discharge measurements of Red Creek near Fruitland, Utah, during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 23	R. R. Rowe	4.09	15.6
July 4	A. B. Purton	3.92	9.0
23	Howard and Dickinson	3.82	5.9

Daily discharge, in second-feet, of Red Creek near Fruitland, Utah, for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	12	16					14	20	86	6	14	14
2	12	16					14	46	77	6	2	18
3	12	16					14	62	83	6	2	29
4	12	16				50	14	63	86	9	.5	18
5	12	16					15	77	86	7	.5	14
6	12	16					16	74	83	6	.5	14
7	11	16				18	16	77	80	6	0	14
8	12	16				14	15	46	79	6	0	14
9	12	16				14	14	46	67	6	0	14
10	29	16			8	14	16	36	67	6	0	14
11	20	16				14	16	52	68	6	0	14
12	13	16				16	17	49	92	6	0	14
13	12	16				16	17	62	68	6	22	14
14	12	16				16	17	92	52	6	42	14
15	12	15				16	17	68	36	10	52	14
16	12	15	10	8		16	17	74	22	8	18	14
17	12	15				16	18	68	18	8	10	14
18	12	15				16	18	62	14	6	6	16
19	12	15				16	18	65	14	4	6	15
20	12	15				16	18	46	14	2	8	14
21	12	15				14	18	44	10	2	200	14
22	13	15				10	18	18	8	4	62	14
23	16					14	18	16	6	6	54	14
24	18					14	18	27	6	30	42	14
25	16				30	13	18	42	6		22	14
26	16	15				12	17	57	6		22	14
27	16					12	17	74	6	10	20	14
28	16					14	17	98	6		18	14
29	16				-------	14	18	104	6		14	14
30	16				-------	14	18	92	6		14	14
31	16	-------			-------	14	-------	95	-------	22	14	-------

Monthly discharge of Red Creek near Fruitland, Utah, for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	29	11	14.1	867
November	16	----------	15.5	922
December	----------	----------	10.0	615
January	----------	----------	8.0	492
February	----------	----------	14.3	794
March	----------	10	21.4	1,320
April	18	14	16.6	988
May	104	16	59.7	3,670
June	92	6	41.9	2,490
July	30	2	8.06	496
August	200	0	21.5	1,320
September	29	14	14.9	887
The year	200	0	20.5	14,900

ANTELOPE CREEK NEAR MYTON, UTAH.

LOCATION.—In SE. ¼ sec. 10, T. 4 S., R. 3 W., Uinta special base and meridian, at crossing of Gray Mountain canal over creek, 1¼ miles above mouth and 10 miles west of Myton, Duchesne County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 1, 1917, to July 15, 1921, when record was discontinued.

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

DISCHARGE MEASUREMENTS.—Made by wading. High water can be measured from wagon bridge 25 feet above gage.

CHANNEL AND CONTROL.—Channel is composed of hard clay and is straight for a few feet above and below gage. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum discharge not determined. Creek dry a large part of each year.

ICE.—Considerable ice during winter.

DIVERSIONS.—Station is below all diversions.

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

ACCURACY.—Stage-discharge relation permanent except as affected by ice November 21 to March 4. Rating curve well defined below 15 second-feet. No measurements of discharge have been made at higher stages. Gage read once a day to half-tenths. Daily discharge ascertained by applying daily gage height to rating table. Discharge estimated because of ice, November 21 to March 4. Creek dry April 1 to May 3 and July 7–14. Sudden summer floods occurred frequently from July 16 to August 13. Records fair.

Discharge measurements of Antelope Creek near Myton, Utah, during the period Oct. 1, 1920, to July 15, 1921.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Nov. 5	A. B. Purton	7.28	5.5
Mar. 22	R. R. Rowe	7.00	2.7

Daily discharge, in second-feet, of Antelope Creek near Myton, Utah, for the period Oct. 1, 1920, to July 15, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	1.0	6.2						0	13	4.8
2	1.0	6.2						0	13	4.8
3	2.1	6.2				6		0	13	8.0
4	2.1	6.2						1.7	8.0	4.8
5	2.5	5.9				4.8		1.4	4.8	4.8
6	2.5	6.2				4.8		4.8	13	2.5
7	2.5	6.2				4.8		1.7	14	0
8	2.5	6.2				4.8		8.0	13	0
9	2.5	6.2				4.8		6.2	13	0
10	1.0	6.2				4.8		5.5	13	0
11	2.5	6.2				4.8		6.2	13	0
12	2.5	6.2				4.8		6.2	14	0
13	4.8	6.2				2.5		6.2	14	0
14	4.8	6.2				2.5		6.2	13	0
15	4.8	6.2			4	2.5		6.2	19	31
16	4.8	6.2	3	3		2.5	0	8.0	14	---
17	3.5	6.2				2.5		6.2	13	---
18	3.5	6.2				2.5		13	13	---
19	4.2	6.2				2.5		16	13	---
20	4.2	6.2				2.5		16	13	---
21	4.2					2.5		13	19	---
22	4.8					2.5		16	16	---
23	4.8					2.5		16	8.0	---
24	4.8					2.5		31	13	---
25	4.8					2.5		23	13	---
26	4.8	5				2.5		23	13	---
27	4.8					2.5		23	13	---
28	4.8					1.7		23	1.0	---
29	6.2				---	1.0		8.0	4.8	---
30	6.2				---	1.0		13	6.2	---
31	5.5	---			---	1.0	---	13	---	---

Monthly discharge of Antelope Creek near Myton, Utah, for the period Oct. 1, 1920, to July 15, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	6.2	1.0	3.71	228
November			5.79	345
December			3.00	184
January			3.00	184
February			4.00	222
March		1.0	3.37	207
April	0	.0	.0	0
May	31	.0	10.4	640
June	19	1.0	12.1	720
July 1–15	31	.0	4.05	120
The period				2,850

LAKE FORK NEAR MYTON, UTAH.

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

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

RECORDS AVAILABLE.—July 3, 1900, to December 31, 1903; June 13, 1907, to November 30, 1910; July 26, 1911, to September 30, 1921.

GAGE.—Stevens 8-day water-stage recorder on right bank; installed May 7, 1919; inspected by Eddie Verholz. Also inside hook and outside inclined staff gages.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Channel fairly straight for several hundred feet above and below gage. Banks high and not subject to overflow. Bed composed of silt and gravel. Gravel riffle about 300 feet below gage. Sluggish pool at gage during low water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, from water-stage recorder, 9.1 feet at 12.50 p. m. June 12 (discharge, 4,010 second-feet). Minimum stage, from recorder, 0.89 foot at 6 p. m. September 28 (discharge, 9 second-feet).

1900–1903, 1907–1921: Maximum stage recorded, 9.4 feet, June 22 and 23, 1917 (discharge, 4,350 second-feet). Minimum discharge July 24, 1916, probably zero.

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

DIVERSIONS.—No diversions below station; several canals of the United States Indian Office and some privately-owned canals divert water above for irrigation. Some return water from irrigation enters a short distance above station.

REGULATION.—Flow affected by irrigation diversions above.

ACCURACY.—Stage-discharge relation below 200 second-feet changed during winter; affected by ice December 1 to February 28. Rating curves well defined. Operation of water-stage recorder unsatisfactory during winter and April 20–23, 27–29, June 14 to July 18, August 17–19, and September 6–9, 15, and 16. Outside staff gage read June 23 to July 2 and July 10–18. Daily discharge ascertained by applying mean daily gage height to rating table except for period of ice effect and periods of no gage-height record. For ice period, discharge was estimated from weather records and observer's notes. For other periods, discharge was estimated from hydrographic study of Duchesne River and tributaries. Records good.

Discharge measurements of Lake Fork near Myton, Utah, during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 4	A. B. Purton	2.03	94	July 26	Dickinson and Howard	1.71	59
Mar. 22	R. R. Rowe	1.98	94	Aug. 5	W. E. Dickinson	1.57	46.7
July 2	A. B. Purton	4.06	840				

Daily discharge, in second-feet, of Lake Fork near Myton, Utah, for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	31	99				351	38	41	558	1,500	49	151
2	30	97				328	40	34	570	850	180	214
3	28	95				243	41	27	576		58	366
4	29	93				234	40	24	612		41	370
5	29	82				180	53	32	725		41	306
6	27	92				155	61	43	1,010	425	39	
7	27	102				140	47	69	1,690		36	
8	26	93			80	122	41	51	2,550		24	125
9	27	82				94	36	43	2,690		24	
10	29	78				96	35	40	2,850	208	82	97
11	36	82				112	34	34	3,220	221	64	90
12	44	93				114	33	30	3,680	224	54	74
13	50	88				118	33	29	3,640	250	58	49
14	57	88				120	33	30		234	118	30
15	69	95				118	44	33		261	125	27
16	72	95	70	75		109	45	50		267	133	25
17	75	112				111	41	65		328		22
18	75	102				109	43	118	2,700	425	60	22
19	78	102				114	39	106		374		25
20	88	104				104		79		230	49	27
21	92	101				96	25	49		155	60	26
22	102	102			180	96		39		127	54	19
23	102	102				97		36	2,090	109	69	16
24	102	88				96	33	90	1,790	86	66	13
25	104	95				90	54	180	1,730	65	97	10
26	102	77				88	45	118	1,730	51	144	10
27	101	90				72		133	1,670	45	114	13
28	99	65				74	25	202	1,760	41	76	12
29	99	70				82		347	1,560	35	52	19
30	99	75				56	39	570	1,560	32	67	20
31	99					43		635		33	104	

Monthly discharge of Lake Fork near Myton, Utah, for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	104	26	65.4	4,020
November	112	65	91.3	5,430
December			70.0	4,300
January			75.0	4,610
February			126	7,000
March	351	43	128	7,870
April	61		37.4	2,230
May	635	24	109	6,700
June	3,680	558	2,090	124,000
July	1,500	32	294	18,100
August	180	24	72.8	4,480
September	370	10	85.1	5,060
The year	3,680	10	268	194,000

UINTA RIVER NEAR NEOLA, UTAH.

LOCATION.—About on line between secs. 25 and 26, T. 2 N., R. 2 W., Uinta special base and meridian, 800 feet above tailrace of Pole Creek power plant, 1½ miles above mouth of Pole Creek, and 9 miles north of Neola, Duchesne County.

DRAINAGE AREA.—181 square miles.

RECORDS AVAILABLE.—July 30 to September 30, 1921.

GAGE.—Stevens continuous recorder on left bank, supplemented by inside hook and outside vertical staff gages; inspected by Jed Timothy.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading. Measuring conditions exceptionally bad on account of rough channel.

CHANNEL AND CONTROL.—Channel steep and rough. Bed composed of boulders and gravel. Banks fairly high and probably not subject to overflow unless channel changes, which may readily occur during high water. Gage height of zero flow at 0.25 foot as determined on August 2, 1921.

EXTREMES OF DISCHARGE.—Not determined.

ICE.—River freezes over every winter.

DIVERSIONS.—None above station.

REGULATION.—None.

ACCURACY.—Rating curve for gage-height records thus far obtained is based on two discharge measurements made August 2 and October 3, 1922, and point of zero flow on August 2. It is well defined for range in stage occurring during period of records. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph. Records good.

The following discharge measurement was made by W. E. Dickinson:
August 2, 1921: Gage height, 2.53 feet; discharge, 420 second-feet.

Daily discharge, in second-feet, of Uinta River near Neola, Utah, for the period July 30 to Sept. 30, 1921.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1		533	363	11		379	242	21		268	185
2		424	446	12		348	236	22		281	179
3		387	477	13		344	230	23		301	174
4		356	399	14		348	221	24		294	172
5		337	356	15		333	213	25		348	169
6		337	322	16		308	204	26		287	164
7		315	291	17		281	198	27		255	162
8		291	274	18		268	193	28		294	159
9		379	264	19		261	193	29		301	156
10		399	255	20		255	190	30	383	304	156
								31	399	348	

Monthly discharge of Uinta River near Neola, Utah, for the period July 30 to Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
July 30-31	399	383	391	1,550
August	533	255	328	20,200
September	477	156	241	14,300
The period	533	156	289	36,000

WHITEROCKS CREEK NEAR WHITEROCKS, UTAH.

LOCATION.—In sec. 18, T. 2 N., R. 1 E., Uinta special base and meridian, 8 miles north of Whiterocks, Uinta County. United States Whiterocks canal diverts from left side and Farm Creek canal from right side 2 miles below station.

DRAINAGE AREA.—118 square miles.

RECORDS AVAILABLE.—August 1 to September 30, 1921, at present site. November 8, 1917, to June 2, 1921, at a point about 2 miles downstream below diversion of United States Whiterocks canal and above Farm Creek canal. 1899 to 1904 and 1907 to 1910 somewhere in vicinity of present site. Records are comparable.

GAGE.—Stevens continuous water-stage recorder on left bank; installed August 4, 1921; inspected by J. F. Wilkin. Also inside hook and outside vertical enamel staff gages.

DISCHARGE MEASUREMENTS.—Made by wading or from cable a quarter of a mile above gage.

CHANNEL AND CONTROL.—Narrow box canyon. Stream bed is steep and rough; composed of boulders and gravel. Channel is subject to change by erosion during high water.

EXTREMES OF DISCHARGE.—Maximum stage during year not recorded, but maximum discharge occurred in June and probably exceeded 1,700 second-feet. Minimum discharge, less than 14 second-feet in the winter.

1918–1921: Maximum and minimum discharge occurred in 1921.

ICE.—Stream freezes over each winter.

DIVERSIONS.—After August 1, 1921, above all diversions. Prior to August 1, above all diversions except United States Whiterocks canal which diverts from left bank just above this station. Records of discharge of this canal for the irrigation season accompany records for this station.

REGULATION.—None.

ACCURACY.—Station destroyed by flood in June; rebuilt at present site in August. Stage-discharge relation at each site permanent for periods of record, except as affected by ice in winter. Rating curve for period October to May well defined below 800 second-feet; curve for August and September well defined. Operation of water-stage recorder satisfactory only during periods for which daily discharge is given continuously in table; weekly staff gage readings used for other periods. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph. Recorder not in operation August 1–3 and September 4–27. Staff gage read September 9, 14, and 22. Daily discharge for these periods estimated by hydrographic comparison with Uinta River near Neola. Monthly mean discharge estimated October to March from weather records, observer's notes, and interpolated between values obtained from weekly gage readings. Records fair.

Records of discharge of the United States Whiterocks canal for the irrigation season are published with this station to supplement the records of flow at the station prior to August 1, 1921, as this was the only diversion in the Whiterocks Creek basin above this station. The records of daily discharge of this canal were furnished by C. C. Jacob, Federal Court water commissioner.

Discharge measurements of Whiterocks Creek near Whiterocks, Utah, during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Nov. 2	A. B. Purton	3.30	17.7
Mar. 25	R. R. Rowe	3.20	15.4
Aug. 5[a]	E. C. Howard	1.47	157

[a] This and subsequent measurements made at relocated station above diversions.

Daily discharge, in second-feet, of Whiterocks Creek near Whiterocks, Utah, for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	Aug.	Sept.
1					17	19		280	205
2		19		16	18	25	754	225	242
3		20			18	45		200	256
4		19			20	58		176	235
5		20			20	72		166	220
6		21			18	90		155	205
7		22			17	88		148	190
8		20			18	72		143	180
9		20			17	62		199	171
10		18			18	58		212	160
11		20	14		18	64		201	155
12		20		16	18			186	150
13		20			18			184	145
14		19			19			188	139
15	26	19			18	156		175	135
16					18			164	130
17					18			152	127
18			14		18			142	124
19				16	18			135	120
20					18			131	118
21		17			18			134	116
22		19			18			148	114
23	24	18			19			164	111
24		17			18			193	109
25		19		16	18			182	106
26				16	18	342		166	104
27				16	17			152	102
28		15		16	17			145	99
29				16	17			152	98
30				16	18			175	96
31				16				190	

NOTE.—Station moved above diversions on Aug. 1.

Monthly discharge of Whiterocks Creek near Whiterocks, Utah, for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October			25	1,540
November			19	1,130
December			14	860
January			14	860
February			15	830
March			16	980
April	20	17	18.0	1,070
May 1–11	90	19	59.4	1,300
August	280	131	173	10,600
September	256	96	149	8,870

NOTE.—Station moved above diversions on Aug. 1.

Daily discharge, in second-feet, of United States Whiterocks canal near Whiterocks, Utah, for the period May 1 to Sept. 15, 1921.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	1	48	0	62	23	16	28	18	62	38	
2	1	54	13	47	24	17	24	23	64	35	
3	1	62	30	36	23	18	20	33	62	34	
4	3	64	26	36		19	18	50	59	34	
5	16	68	33	36		20	18	47	50	34	
6	16	69	45	18		21	18	55	56	34	
7	9	36	58	35		22	18	36	58	31	
8	2	25	61	32		23	19	30	56	30	
9	3	14	58	47		24	20	24	56	32	
10	12	20	63	43	20	25	24	36	56	30	
11	12	17	62	40		26	24	47	55	25	
12	23	17	56	40		27	26	47	54	25	
13	25	17	50	40		28	32	49	53	25	
14	26	16	50	40		29	37	50	56	23	
15	27	17	62	39		30	32	50	53	23	
						31	37		59	23	

Monthly discharge of United States Whiterocks canal near Whiterocks, Utah, for the period May 1 to Sept. 15, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May	37	1	18.5	1,140
June	69	14	38.0	2,260
July	64	0	50.8	3,120
August	62	18	34.4	2,120
September 1–15			20.7	613
The period				9,250

PRICE RIVER NEAR HELPER, UTAH.

LOCATION.—In sec. 36, T. 13 S., R. 9 E., at ford 300 feet west of Denver & Rio Grande Western Railroad main line at Spring Glenn, 1 mile above diversion dam of Price River Irrigation Co., 2 miles south of Helper, Carbon County, and 3 miles below Spring Creek.

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

RECORDS AVAILABLE.—February 21, 1904, to September 30, 1921.

GAGE.—Vertical staff on left bank; installed July 16, 1907; read by D. S. Rowley. For gages used prior to July 16, 1907, see Water-Supply Paper 479.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed of stream composed of gravel and fine sand. A riffle immediately below ford shifts occasionally during floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.12 feet on May 30 (discharge, 1,950 second-feet). Unrecorded floods of short duration were much higher on August 1, 22, 23, 25, 30, and 31. Minimum discharge not determined.

1904–1921: Summer floods occur nearly every year and often greatly exceed any recorded stage. Maximum stage recorded for which discharge was determined, 8.43 feet at 9 p. m. June 25, 1917, determined by leveling from hub set at high-water mark (discharge determined from extension of rating curve, 8,500 second-feet). Minimum stage recorded, 3.1 feet (old chain gage) during December, 1905, and January, 1906 (discharge, 4 second-feet).

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

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

REGULATION.—Flow of river was affected by storage at Mammoth reservoir (capacity about 11,000 acre-feet) of Price Irrigation Co. on Gooseberry Fork, 40 miles above station, until June 24, 1917, when dam broke.

ACCURACY.—Stage-discharge relation changed during winter and again during spring high water in early part of June; affected by ice December to February. Rating curves fairly well defined below 400 second-feet; extended above. Gage read to hundredths once a day and oftener during periods of rapidly changing stage. Daily discharge ascertained by applying mean daily gage height to rating table. Discharge for period of ice effect estimated from one meter measurement, temperature records, and observer's notes on ice conditions. Records fair.

Discharge measurements of Price River near Helper, Utah, during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 14	A. B. Purton	2.31	47.3	June 26	A. B. Purton	1.50	239
Dec. 16	W. E. Dickinson	[a] 2.44	22.5	Aug. 7	Howard and Dickinson.	.87	75
Mar. 17	R. R. Rowe	2.89	199	14	E. C. Howard	1.12	127

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Price River near Helper, Utah, for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	44	52				129	177	330	1,800	158	------	858
2	41	52				171	229	477	1,690	142	127	362
3	41	46				219	236	639	1,580	122	122	142
4	41	46				293	297	799	1,470	122	104	100
5	41	52				274	277	1,020	1,400	118	100	92
6	41	79				196	251	1,110	1,330	109	80	84
7	41	46				177	236	1,210	1,260	92	80	80
8	39	46			25	124	202	1,050	1,190	80	70	77
9	39	46				96	222	990	1,120	77	73	73
10	39	46				105	229	892	1,050	77	84	73
11	46	46				124	236	874	1,000	73	100	70
12	55	46				143	229	963	908	80	80	70
13	61	46				143	257	1,240	842	109	70	66
14	49	46				202	276	1,400	794	109	153	63
15	46	46				219	276	1,610	715	104	122	66
16	46	49	25	25		215	243	1,770	627	100	120	66
17	44	49				261	247	1,920	585	100	92	66
18	52	55				236	266	1,720	521	147	73	63
19	52	46				209	258	1,560	463	122	63	63
20	52	44				202	270	1,400	431	96	45	63
21	55	41			35	212	276	1,220	381	362	80	63
22	46	41				193	293	1,150	362	100	------	63
23	46	41				193	297	1,150	318	77	------	63
24	44	41				171	306	1,360	293	80	492	63
25	41	39				171	285	1,400	247	63	------	60
26	46	36				143	289	1,460	240	90	80	63
27	46	34			74	140	274	1,580	233	63	73	63
28	46	32			92	143	289	1,800	220	57	92	60
29	46	30			------	148	289	1,920	206	48	88	57
30	49	31			------	171	297	1,950	181	80	------	54
31	75	------			------	148	------	1,800	------	80	------	------

Monthly discharge of Price River near Helper, Utah, for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	75	39	46.8	2,880
November	79	30	45.0	2,680
December	----------	----------	25.0	1,540
January	----------	----------	25.0	1,540
February	----------	----------	33.1	1,840
March	293	96	180	11,100
April	306	177	260	15,500
May	1,950	330	1,280	78,700
June	1,800	181	782	46,500
July	362	48	104	6,400
August	----------	45	[a]140	[a]8,600
September	858	54	107	6,370
The year	----------	----------	252	184,000

[a] Estimated.

FISH CREEK NEAR SCOFIELD, UTAH.

LOCATION.—In sec. 10, T. 12 S., R. 7 E., three-quarters of a mile above railroad siding at Hale, 5 miles northeast of Scofield, Carbon County, and 10 miles above point where Fish Creek and White River unite to form Price River.

DRAINAGE AREA.—163 square miles (measured on United States Forest Service map, 1920).

RECORDS AVAILABLE.—November 17, 1917, to September 30, 1921, when station was discontinued; fragmentary.

GAGE.—Stevens eight-day water-stage recorder on left bank 85 feet below railroad bridge; installed November 17, 1917; inspected by J. E. Jensen. Also inside and outside vertical enamel staff gages.

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

CHANNEL AND CONTROL.—One channel at all stages. Right bank is a high rock cliff; left bank lower but probably not subject to overflow. Railroad embankment a few feet back from left bank can not be overflowed. Stream bed gravel and sand. Riffle a short distance below gage.

EXTREMES OF DISCHARGE.—Not determined for current year.

1918–1921: Maximum stage recorded, 10.4 feet about May 24, 1920, from high-water mark in gage house (discharge about 1,000 second-feet). Minimum discharge not determined.

ICE.—Stream freezes over each winter

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

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

ACCURACY.—Stage-discharge relation changed slightly during period, December to June, when no record was obtained. Rating curves well defined below 400 second-feet. Operation of water-stage recorder satisfactory only for periods of discharge given in daily-discharge table. Daily discharge ascertained by applying to rating table the mean daily gage height determined from recorder graph. Discharge not determined December 16 to June 24 and July 3–27. Records given are good.

Discharge measurements of Fish Creek near Scofield, Utah, during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 13	A. B. Purton	5.06	24.0	June 25	A. B. Purton	6.15	148
Dec. 15	W. E. Dickinson	[a] 5.05	19.2	Aug. 16	E. C. Howard	5.30	45.8
Mar. 15	R. R. Rowe	[a] 5.71	63				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Fish Creek near Scofield, Utah, for the year ending Sept. 30, 1921.

Day	Oct.	Nov.	Dec.	June.	July.	Aug.	Sept.
1	21	31	14		101	54	48
2	20	26	14		95	44	58
3	19	26	14			40	67
4	19	26	14			36	42
5	19	26	17			35	37
6	21	26	17			33	35
7	20	26	17			33	33
8	21	26	14			33	31
9	21	26	14			36	31
10	22	26	14			36	31
11	28	26	17			36	30
12	26	26	16			34	29
13	24	26	14			35	28
14	24	21	14			46	28
15	24	21	19			54	28
16	24	17				46	28
17	24	21				42	28
18	25	21				40	28
19	26	21				39	29
20	27	26				37	30
21	24	17				38	30
22	23	14				38	30
23	22	17				38	30
24	21	17				38	30
25	21	21		149		38	30
26	21	21		138		34	29
27	26	21		129		35	28
28	31	17		124	35	37	28
29	31	17		116	35	36	28
30	31	17		106	35	42	27
31	31				36	46	

Monthly discharge of Fish Creek near Scofield, Utah, for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	31	19	23.8	1,460
November	31	14	22.3	1,330
August	54	33	39.0	2,400
September	67	27	33.0	1,960

HUNTINGTON CREEK NEAR HUNTINGTON, UTAH.

LOCATION.—In SE. ¼ sec. 6, T. 17 S., R. 8 E., at Cunha ranch, 7 miles northwest of Huntington, Emery County. Below all main tributaries except Fish Creek.

DRAINAGE AREA.—188 square miles (measured on United States Forest Service map, 1920).

RECORDS AVAILABLE.—May 3, 1909, to September 30, 1921, fragmentary.

GAGE.—Stevens continuous water-stage recorder on right bank installed September 11, 1917; inspected by Joseph Cunha. For gages used prior to September 11, 1917, see Water-Supply Paper 479.

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

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

EXTREMES OF DISCHARGE.—Not determined for current year.

1909–1921: Maximum discharge recorded, 1,340 second-feet at 9.30 p. m. May 25, 1920. Discharge may have been greater in 1921. Minimum discharge recorded, 12 second-feet March 20–23, 1912.

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

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

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

ACCURACY.—Stage-discharge relation permanent during the year except for a slight change about August 1; affected by ice December to March. Rating curves well defined below 400 second-feet and extended above, guided by high-water curves developed from 1909 and 1922. Operation of water-stage recorder satisfactory only during periods for which daily discharge is given continuously in table. During other periods of record given outside staff gage was read about once a week to hundredths. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph. Mean discharge given for various periods interpolated or estimated. Discharge not determined December 3 to March 18. Records of daily discharge given are good; estimated periods fair.

Discharge measurements of Huntington Creek near Huntington, Utah, during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 15	A. B. Purton	2.24	41.6	June 27	A. B. Purton	3.50	336
Dec. 18	W. E. Dickinson	[a] 4.02	56	Aug. 8	Dickinson and Howard	2.69	139
Mar. 19	R. R. Rowe	2.34	57				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Huntington Creek near Huntington, Utah, for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	30	36	43		55	271		302		228
2	38	50	43		54	302		280		189
3	38	53			54	335		242		182
4	37	58			45	328		226	150	137
5	39	49			52	322				106
6	45	50				315		200		95
7	43	48			65	277			141	87
8	42	43				256	1,000		139	86
9	40				65	256			164	84
10	53				62	262		179	164	84
		43								
11	53				60	299			150	84
12	50				62	370			146	80
13	50	43			68	800			172	77
14	49				84	908		175	248	84
15	46	44			74	992			223	84
16	45				79	1,120			199	84
17	45	45			72	1,050			176	84
18	45	44	56		72	848		179	143	86
19	45			54	84				124	87
20	44			59	89				110	93
21	52			59	86		600	150	100	93
22	40			59	87				96	93
23	40	44		59	114				124	
24	39			60					176	
25	43			60		800			189	75
26	43			60	150			100	176	
27	42						370		164	60
28	42	43					356	200	152	60
29	42	43		57			346		126	60
30	54						322		130	60
31	48							133	186	

Monthly discharge of Huntington Creek near Huntington, Utah, for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	54	30	43.6	2,680
November	58	36	44.9	2,670
March 19-31			58.1	1,500
April		45	88.8	5,280
May		256	636	39,100
June		322	766	45,600
July	302		184	11,300
August	248	96	155	9,530
September	228	60	94.9	5,650

HUNTINGTON CREEK NEAR CASTLEDALE, UTAH.

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

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

RECORDS AVAILABLE.—May 12, 1911, to August 13, 1921, when station was discontinued; fragmentary.

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

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

CHANNEL AND CONTROL.—Bed composed of sand and small gravel. Banks fairly high; subject to erosion but not to overflow. Original artificial control which was formed by 2 by 12 inch planks, placed edgewise in a trench and anchored to pipes driven into stream bed, has been obliterated.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 7.45 feet at 9 a. m. June 10 (discharge, 1,000 second-feet). Floods in July and August probably exceeded this. Discharge probably less than 10 second-feet at times during the winter.

1911–1921: Maximum stage recorded, 11.3 feet, September 8, 1913, when dam above station broke (discharge estimated, 1,750 second-feet). Minimum stage recorded, 0.95 foot, September 10, 1915 (discharge, 2.5 second-feet).

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

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

REGULATION.—Flow affected by irrigation in Huntington district.

ACCURACY.—Stage-discharge relation changed during high water about June 10 and changed radically during floods in August; affected by ice December 1 to March 10. Rating curves fairly well defined below 200 second-feet and extended above parallel to 1914 curve. Operation of water-stage recorder not satisfactory owing to silting up of stilling well during frequent periods. No record obtained during winter. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph. Discharge interpolated or estimated for a few short periods of no gage-height record. Records given are good.

Discharge measurements of Huntington Creek near Castledale, Utah, during the period Oct. 1, 1920, to Jan. 28, 1922.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1920.		*Feet.*	*Sec.-ft.*	1921.		*Feet.*	*Sec.-ft.*
Oct. 16	A. B. Purton	1.96	15.0	Aug. 12	E. C. Howard	2.47	35.9
Dec. 18	W. E. Dickinson	[a] 2.64	13.1	Dec. 7	R. R. Rowe	[a] 3.28	14.2
1921.				1922.			
Mar. 19	R. R. Rowe	2.44	29.1	Jan. 28	W. E. Dickinson	[a] 5.33	37
June 28	A. B. Purton	3.37	122				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Huntington Creek near Castledale, Utah, for the period Oct. 1, 1920, to Aug. 13, 1921.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.
1	12	40	-------	43	17	490	61	142
2	12	32	-------	46	42	536	57	47
3	11	31	-------	49	82	568		34
4	12	30	-------	49	121	529		32
5	11	28	-------	47	121	510	47	30
6	12	30	-------	46	121	623		26
7	12	32	-------	54	81	712		24
8	13	30	-------	51		784	37	23
9	14	30	-------	40		849	36	74
10	15	30	-------	41	50	856	36	Flood.
11	15	27	44			820	36	-------
12	15	28	39		56	868	38	36
13	15	26	44		117	765	39	34
14	14	26	41		253	736	46	Flood.
15	14	25	33		363	634	47	-------
16	14	25	28	25	392	557	74	-------
17	15	26	28		559	391	317	-------
18	16	27	30		312	317	273	-------
19	20	28	30		196	239	118	-------
20	21	28	24		150	210	65	-------
21	18	28	23		114	212	115	-------
22	19	27	23		105	203	97	Flood.
23	19	28	23	19	204	187	65	-------
24	18	27	25	21	274			
25	19	26	24	21	270	150	30	-------
26	20	26	34	20	270			
27	20	28	40	18	480	111		
28	20	26	41	16	589	103	Flood.	-------
29	22	26	42	16	637	93	Flood.	-------
30	36	25	42	17	705	67	Flood.	-------
31	71	-------	42	-------	480	-------	Flood.	-------

Monthly discharge of Huntington Creek near Castledale, Utah, for the period Oct. 1, 1920, to July 27, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum	Minimum.	Mean.	
October	71	11	18.2	1,120
November	40	25	28.2	1,680
March 11–31	44	23	33.3	1,390
April	54	16	30.5	1,810
May	705	17	236	14,500
June	868	67	447	26,600
July 1–27	317		70.8	3,790

COTTONWOOD CREEK NEAR ORANGEVILLE, UTAH.

LOCATION.—In SW. ¼ sec. 9 or 10, T. 18 S., R. 7 E., at Johnson ranch, 5 miles northwest of Orangeville, Emery County.

DRAINAGE AREA.—200 square miles (measured on United States Forest Service map, 1920).

RECORDS AVAILABLE.—May 1, 1909, to July 16, 1921.

GAGE.—Stevens continuous water-stage recorder installed August 11, 1921, on left bank near ranch house; inspected by George Sitterud. Inclined staff on left bank 10 feet downstream read September 5, 1919, to July 16, 1921.

DISCHARGE MEASUREMENTS.—Made from cable 500 feet downstream or by wading.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during period October 1, 1920, to July 16, 1921, 5.9 feet June 10 (discharge, 1,880 second-feet). Short-time discharge of sudden floods in July, August, and September greatly exceeded this. Minimum discharge probably less than 15 second-feet in winter.

1909–1921: Maximum discharge recorded, 1,980 second-feet, September 7, 1913; minimum discharge recorded, 5 second-feet, September 21, 1910.

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

DIVERSIONS.—Two or three small ditches divert water above station but all the main ditches take out below.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed slightly about June 10, during spring high water, and changed considerably several times during July, August, and September during period of sudden floods; affected by ice December 1 to February 24. Rating curves fairly well defined below 800 second-feet and extended above. No rating could be determined for the period July 17 to September 30. Gage read to tenths four to six times a week. Daily discharge ascertained by applying daily gage height to rating table and by interpolation for days when gage was not read, except for period when stage-discharge relation was affected by ice. For this period discharge was estimated from observer's notes, weather records, and one discharge measurement. Discharge not determined July 17 to September 30. Records good.

Discharge measurements of Cottonwood Creek near Orangeville, Utah, during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 15	A. B. Purton	2.89	25.6	June 27	A. B. Purton	4.43	565
Dec. 17	W. E. Dickinson	[a] 3.47	30.4	Aug. 11	E. C. Howard	2.82	78
Mar. 18	R. R. Rowe	3.08	44.6				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Cottonwood Creek near Orangeville, Utah, for the period Oct. 1, 1920, to July 16, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	27	27				36	36	125	790	485
2	23	19				27	36	165	915	425
3	27	6				27	36	200	890	320
4	27	8				36	36	285	890	320
5	23	10				36	47	240	890	320
6	25	12				36	47	240	1,250	285
7	27	14				32	47	135	1,500	275
8	27	13		20	15	27	47	135	1,700	255
9	30	11				14	43	135	1,800	225
10	32	10				19	40	135	1,880	210
11	27	19				19	36	150	1,760	225
12	27	23				19	40	208	1,430	210
13	27	23				23	43	285	1,380	190
14	26	23				27	47	330	1,680	225
15	26	23				27	27	380	1,630	190
16	27	23	20			27	36	380	1,230	210
17	27	23				32	36	435	955	-------
18	27	19				35	36	410	955	-------
19	32	23				32	53	310	650	-------
20	27	23			20	27	53	285	685	-------
21	24	21				19	47	285	775	-------
22	22	19				19	47	240	835	-------
23	19	14		15		32	59	310	795	-------
24	14	18				27	53	285	795	-------
25	27	23			23	19	47	285	835	-------
26	27	18			23	27	42	355	650	-------
27	19	14			27	27	62	447	580	-------
28	14	18			32	19	82	560	615	-------
29	14	23			-------	27	73	760	615	-------
30	27	19			-------	27	82	685	515	-------
31	36	-------			-------	19	-------	665	-------	-------

Monthly discharge of Cottonwood Creek near Orangeville, Utah, for the period Oct. 1, 1920, to July 16, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	36	14	25.3	1,560
November	27	6	18.0	1,070
December	-------	-------	20.0	1,230
January	-------	-------	17.4	1,070
February	32	-------	18.2	1,010
March	36	14	26.5	1,630
April	82	27	47.2	2,810
May	760	125	318	19,600
June	1,880	515	1,060	63,100
July 1–16	485	190	273	8,690
The period	-------	-------	-------	102,000

FERRON CREEK (UPPER STATION) NEAR FERRON, UTAH.

LOCATION.—In SW. ¼ sec. 1, T. 20 S., R. 6 E., a quarter of a mile below house at Peterson ranch, 1½ miles above grist mill, and 5 miles northwest of Ferron, Emery County.

DRAINAGE AREA.—140 square miles (measured on United States Forest Service map, 1920).

RECORDS AVAILABLE.—May 6, 1911, to September 30, 1921.

GAGE.—Inclined staff on right bank; read by Joseph Peterson; installed September 13, 1911. Datum lowered 1.00 foot September 4, 1919.

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

CHANNEL AND CONTROL.—Banks high and not subject to overflow. Bed composed of sand and gravel. Current swift and has tendency to cut channel deeper. Stage of zero flow at gage height, −0.5 foot as determined August 12, 1921.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.6 feet at 9 p. m. June 9 (discharge, 1,290 second-feet); minimum stage recorded, 0.90 foot on November 15 and March 27 (discharge, 8 second-feet).

1911–1921: Maximum stage recorded, 10.0 feet at 3 p. m. July 25, 1920 (discharge probably 2,000 second-feet); minimum discharge recorded, 1 second-foot, March 22 and 23, 1912.

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

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

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during high water May 26 to June 8. From November 28 to March 5 there was ice in the creek but during a large part of January and February ice was supported clear of the water by the banks of the narrow channel. Rating curves fairly well defined below 400 second-feet and extended above. Gage read to hundredths twice a day April to September and once a day October to March. Not read November 23, January 17, March 19, and September 26 and 28. During thunder-storm period in July and August high-water marks were noted. Daily discharge ascertained by applying mean daily gage height to rating table except for days of large fluctuation and periods when stage-discharge relation was affected by ice. For these periods discharge was estimated from one meter measurement, observer's notes, recorded gage heights, and weather records. Discharge interpolated for days when gage was not read. Records good.

Discharge measurements of Ferron Creek (upper station) near Ferron, Utah, during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 16	A. B. Purton	1.22	17.9	June 28	A. B. Purton	3.03	348
Dec. 17	W. E. Dickinson	[a]1.80	12.6	Aug. 12	E. C. Howard	.98	48.5
Mar. 18	R. R. Rowe	1.27	18.1				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Ferron Creek (upper station) near Ferron, Utah, for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	16	10	10		13		17	113	473	281	64	70
2	16	20	10		16		20	148	519	291	61	47
3	16	13	10	12	14	20	20	154	600	229	61	44
4	17	10			14		21	175	611	208	63	49
5	16	14		13	14		36	186	656	194	57	44
6	16	10		13	13	16	20	148	781	168	59	42
7	16	13		14	14	13	25	100	1,040	168	56	45
8	16	16		13	16	18	22	148	973	172	54	40
9	16	10		13	14	17	33	111	1,070	168	130	43
10	20	10	10	10	13	15	18	123	990	145	50	39
11	17	10		13		18	25	220	1,040	243	47	36
12	16	14		13	20	17	22	230	934	142	57	35
13	18	15		14		22	42	275	934	152	48	37
14	15	10		13		21	25	318	878	108	49	34
15	16	8		14	16	20	16	424	851	200	61	37
16	17	14		16	10	13	18	359	757	200	49	36
17	17	13	13	15	13	25	16	212	579	220	50	34
18	17	15		14	14	20	25	201	496	131	49	34
19	16	10		13	13	16	36	189	473	138	44	34
20	15	14		16	16	13	39	178	446	108	45	34
21	10	14		14	15	22	29	142	496	104	120	32
22	13	10		16	14	16	31	154	450	124	67	31
23	10	13		14		22	56	182	450	180	120	33
24	13	16		13	20	13	46	186	428	95	100	30
25	13	18	12	14		14	26	175	428	160	150	32
26	17	10		16		10	19	245	402	79	95	31
27	10	10		16	25	8	17	336	406	76	49	30
28	13	15		14		12	72	376	342	70	70	30
29	12	12		15	-------	14	68	393	338	66	100	29
30	18	10		14	-------	16	90	406	332	65	80	28
31	20	-------		14	-------	10	-------	397	-------	79	95	-------

Monthly discharge of Ferron Creek (upper station) near Ferron, Utah, for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	20	10	15.4	947
November	20	8	12.6	750
December	----------	----------	11.0	676
January	16	10	13.7	842
February	----------	10	16.7	928
March	25	8	16.8	1,030
April	90	16	31.7	1,890
May	424	100	226	13,900
June	1,070	332	639	38,000
July	291	65	154	9,470
August	150	44	71.0	4,370
September	70	28	37.3	2,220
The year	1,070	8	104	75,000

LITTLE COLORADO RIVER BASIN.

ZUNI RIVER AT BLACK ROCK, N. MEX.

LOCATION.—At reservoir of Zuni Indian Reservation at Black Rock, McKinley County. Rio de Los Nutrias, nearest large tributary, enters from north 4 miles above.

DRAINAGE AREA.—About 660 square miles.

RECORDS AVAILABLE.—Yearly flow July 1, 1903, to June 30, 1905; July 1, 1908, to June 30, 1910. Monthly flow October 1, 1910, to September 30, 1921. Record since July 1, 1908, shows inflow into reservoir.

METHOD OF COLLECTING DATA.—From July 1, 1903, to June 30, 1905, records were obtained by the ordinary stream-gaging methods. Reservoir completed in 1908. Record beginning July 1, 1908, obtained by means of gage in reservoir and capacity curve for reservoir, quantity of water released from the reservoir during the periods of inflow being taken into consideration.

FLOODS.—Channel dry greater part of the year below point where it leaves mountains, but stream is subject to sudden floods of considerable volume and usually of short duration.

DIVERSIONS.—Reservoir at Ramah, about 18 miles above station, capacity of which is given as 4,240 acre-feet, is used to irrigate about 1,150 acres in T. 11 N., R. 16 W. There are other small ponds or reservoirs in drainage area.

COOPERATION.—Record furnished by the United States Indian Service, through H. F. Robinson, supervising engineer, Albuquerque, N. Mex.

Monthly run-off of Zuni River at Black Rock, N. Mex., for the year ending Sept. 30, 1921.

Month.	Run-off in acre-feet.
October	0
November	10
December	10
January	190
February	460
March	60
April	27
May	220
June	165
July	5,140
August	227
September	280
The year	6,790

VIRGIN RIVER BASIN.

VIRGIN RIVER AT VIRGIN, UTAH.

LOCATION.—In. NW. ¼ sec. 27 or NE. ¼ sec. 28, T. 41 S., R. 12 W., a few hundred feet above point where river enters a steep, narrow gorge, and three-quarters of a mile west of Virgin, Washington County. Station replaces one maintained prior to February, 1915, half a mile above Virgin and gives practically same record of flow.

DRAINAGE AREA.—1,010 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 18, 1909, to September 30, 1921.

GAGE.—Chain gage on the right bank near the lower end of sandstone bluff. Installed February 1, 1915; read by Lawrence Earl.

DISCHARGE MEASUREMENTS.—Made by wading below the gage, except during high water, when 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. Principal control is a gravel bar a short distance below the gage; shifting.

EXTREMES OF DISCHARGE.—Not determined for current year.

1909–1918: Maximum stage recorded, 11.6 feet at upper station October 27, 1912 (discharge estimated, 12,000 second-feet). The flood of August 31, 1909, probably equaled or exceeded this flow. Minimum discharge, 24 second-feet, July 1, 2, 4, and 5, 1909.

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

DIVERSIONS.—Above all important diversions.

REGULATION.—None.

ACCURACY.—Stage-discharge relation variable. Gage read to hundredths four or five times a week. Occasional floods of short duration occurred which do not appear in recorded gage heights. Rating curves not sufficiently well defined to warrant publication of daily discharge. Monthly discharge is believed to be accurate enough for general studies.

Discharge measurements of Virgin River at Virgin, Utah, during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 7	W. E. Dickinson	2.80	246
July 7	E. C. Howard	2.68	103

Monthly discharge of Virgin River at Virgin, Utah, for the years ending Sept. 30, 1919–1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19				
October	460	148	192	11,800
November	225	130	164	9,760
December	1,300	90	180	11,100
January	170	123	140	8,610
February	231	116	141	7,830
March	460	126	228	14,000
April	----------	215	385	22,900
May	460	123	221	13,600
June	184	68	110	6,550
1919–20				
October	----------	102	148	9,100
November	----------	123	176	10,500
December	723	148	196	12,100
January	281	155	189	11,600
February	----------	123	248	14,300
March	----------	95	241	14,800
April	720	116	396	23,600
May	----------	446	677	41,600
June	501	102	198	11,800
July	73	22	41.8	2,570
September	130	64	85.6	5,090
1920–21				
October	281	95	165	10,100
November	----------	139	229	13,600
December	330	165	257	15,800
January	500	130	213	13,100
February	270	102	177	9,830
March	501	156	273	16,800
April	515	247	358	21,300
May	487	318	386	23,700

NOTE.—Discharge for months for which no records are given, not computed because of frequent floods for which sufficient gage readings were not obtained, and also because of uncertainties in rating for June to September, 1921.

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SANTA CLARA CREEK NEAR CENTRAL, UTAH.

LOCATION.—In sec. 11, T. 39 S., R. 16 W., just above bridge at R. H. Hunt's ranch, 1 mile southeast of Central, Washington County, on road to Pine Valley. Hunt's spring, which has fairly constant discharge of about 3 second-feet, enters 10 feet below gage.

DRAINAGE AREA.—84 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 21, 1909, to September 30, 1921.

GAGE.—Vertical staff nailed to cottonwood tree on left bank about 20 feet above the ford; read by Mrs. R. H. Hunt. Datum of gage was raised 0.45 foot on January 20, 1910, 2.00 feet on February 22, 1916, and lowered 1.00 foot on August 12, 1918.

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

CHANNEL AND CONTROL.—Stream bed consists of gravel and sand. Banks fairly high but may be overflowed at extreme stage; one channel at all stages. A riffle formed by small boulders 100 feet below gage is fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.55 feet on May 30 (discharge, 52 second-feet); minimum stage recorded, 1.00 foot on February 18 (discharge, 9 second-feet).

1909–1921: Maximum stage recorded, 5.00 feet at 11 a. m. October 6, 1916 (discharge, 1,450 second-feet); minimum stage recorded, 0.82 foot on January 8, 1920 (discharge, 4 second-feet).

ICE.—Stage-discharge relation seldom 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 diverted into the reservoir from Santa Clara Creek above town of Pine Valley and released into tunnel through rim of the Great Basin for irrigation of lands outside the Colorado River basin. 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 the diversions and storage above.

ACCURACY.—Stage-discharge relation changed by sudden freshet on March 13; constant before and after that date. No ice during current year. Rating curves well defined below 250 second-feet. Gage read to hundredths once a day with frequent omissions of one to two days. Daily discharge ascertained by applying daily gage height to rating table and interpolating discharge for days when gage was not read. Records good.

Discharge measurements of Santa Clara Creek near Central, Utah, during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 6	W. E. Dickinson	1.20	20.6
July 7	E. C. Howard	1.06	13.7

Daily discharge, in second-feet, of Santa Clara Creek near Central, Utah, for the year ending Sept. 30, 1921.

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	18	23	14	14	15	17	19	42	42	16	13	20
2	18	22	14	13	14	19	19	43	42	14	13	16
3	18	22	14	12	12	21	21	44	42	14	13	13
4	18	22	15	12	12	22	23	42	44	13	13	12
5	18	22	16	13	12	23	22	40	38	13	13	12
6	18	22	16	14	12	21	21	37	32	13	13	12
7	18	22	14	12	11	17	20	35	29	13	15	13
8	19	22	13	10	11	16	19	20	34	14	14	13
9	19	22	13	10	12	16	20	20	39	14	13	13
10	19	22	13	11	13	15	20	23	37	17	13	13
11	19	22	13	12	14	16	19	24	33	15	13	13
12	19	22	12	11	14	17	20	26	30	14	13	13
13	19	22	12	13	14	18	20	42	26	16	13	12
14	19	22	12	14	15	33	20	42	21	17	13	11
15	19	21	12	14	22	24	19	40	23	15	13	11
16	19	21	12	14	14	24	19	39	22	15	13	11
17	20	21	11	14	12	23	19	42	21	15	13	11
18	21	21	11	14	9	25	20	35	21	15	13	11
19	21	21	11	14	12	24	24	24	21	16	12	11
20	22	20	11	14	16	22	27	24	21	17	12	11
21	22	20	11	13	15	21	30	24	20	16	12	11
22	22	19	11	13	14	21	30	24	20	16	13	11
23	22	21	11	12	13	20	29	24	19	15	13	11
24	22	21	11	12	11	19	29	25	21	15	25	12
25	22	18	12	12	12	18	29	26	23	15	15	12
26	22	14	12	13	14	19	28	34	24	14	13	12
27	22	14	12	14	17	18	27	42	21	15	14	12
28	22	14	12	15	19	18	29	42	20	16	15	12
29	23	14	14	17	-------	18	32	47	19	15	15	12
30	25	14	12	17	-------	18	35	52	17	14	14	12
31	24	-------	13	16	-------	17	-------	47	-------	13	18	-------

Monthly discharge of Santa Clara Creek near Central, Utah, for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	25	18	20.3	1,250
November	23	14	20.1	1,200
December	16	11	12.6	775
January	17	10	13.2	812
February	22	9	13.6	755
March	33	15	20.0	1,230
April	35	19	23.6	1,400
May	52	20	34.5	2,120
June	44	17	27.4	1,630
July	17	13	14.8	910
August	25	12	13.8	848
September	20	11	12.3	732
The year	52	9	18.9	13,700

GILA RIVER BASIN.

GILA RIVER NEAR SOLOMONVILLE, ARIZ.

LOCATION.—In NE. ¼ sec. 31., T. 6 S., R. 28 E., 1 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, 1921.

GAGE.—Stevens continuous water-stage recorder on left bank, directly opposite J. W. Earven's ranch; inspected by J. W. Earven.

DISCHARGE MEASUREMENTS.—Made by cable at gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel, sand, and silt; shifts considerably during rises.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.55 feet at 10.30 p. m. August 21 (discharge, 15,700 second-feet); minimum stage, 0.75 foot June 30 and July 1 (discharge, 60 second-feet).

1914–1921: Maximum stage, determined from flood marks on gage, 14.0 feet January 19, 1916 (discharge, about 100,000 second-feet from extension of rating curve); minimum discharge, that of June 30 and July 1, 1921.

DIVERSIONS.—Brown canal, which irrigates a few hundred acres on the north side of the river, heads 1 mile above this station, maximum capacity about 25 second-feet. About 8,000 acres are irrigated from Gila River above the gaging station, principally in Duncan Valley.

ACCURACY.—Stage-discharge fairly permanent between rises. 27 measurements made during the year defined rating curves used as follows: October 1–15, fairly well defined below 1,000 second-feet; October 16 to November 30, indirect method for shifting control used; December 1 to February 15, well defined below 250 second-feet; February 17 to March 1, indirect method for shifting control used; March 2 to August 21, well defined; August 22 to September 25, well defined; September 26–30, well defined. Water-stage recorder checked on days when measurements were made, and at other times by J. W. Earven. The operation of the recorder was satisfactory throughout the year except for short periods when clock trouble occurred. The observer's staff gage readings were used during these missing periods as follows: December 20–23, January 13–15, 27, May 23, 25, July 5, August 2–6. No records December 16–19, January 12, 24–26, May 24, July 4, 6, 31, August 1, 4, and 5. Discharge interpolated for these periods. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Gila River near Solomonville, Ariz., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 1	H. D. Empie	1.05	108	May 2	H. D. Empie	0.92	94
15	do	1.07	112	16	do	.85	80
Nov. 1	do	1.42	225	23	Rice and Gardiner	.93	91
15	do	1.52	285	25	do	.86	82
Dec. 1	do	1.42	216	June 2	H. D. Empie	.80	66
15	do	1.38	204	14	do	1.03	127
Jan. 1	do	1.40	205	July 1	do	.76	62
15	do	1.34	198	15	do	1.27	210
29	do	1.26	169	Aug. 2	do	3.80	3,640
Feb. 16	do	1.16	146	15	do	2.85	1,660
Mar. 2	do	1.12	152	22	do	5.10	7,310
15	do	1.18	168	Sept. 2	do	2.41	1,040
Apr. 1	do	1.02	124	14	do	1.50	229
16	do	.98	111				

Daily discharge, in second-feet, of Gila River near Solomonville, Ariz., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	109	239	210	210	180	142	115	90	69	60	3,570	1,350
2	109	263	210	210	167	165	115	90	69	69	3,900	1,080
3	109	330	210	210	167	165	115	80	69	69	2,010	885
4	109	305	195	210	167	165	131	80	69	126	2,010	720
5	109	285	195	210	154	165	131	80	69	183	2,010	585
6	109	285	195	195	167	165	131	80	69	142	2,010	545
7	109	285	195	210	167	165	131	90	69	102	1,920	468
8	109	305	195	210	180	165	131	90	69	90	1,500	430
9	109	365	195	210	167	165	131	90	69	131	1,500	360
10	109	390	195	195	167	165	115	90	69	183	1,350	325
11	109	365	195	195	154	165	115	80	69	244	1,210	290
12	109	365	195	188	154	165	115	80	80	390	1,140	260
13	109	340	195	180	154	165	115	80	102	266	1,350	230
14	109	315	195	210	154	183	115	80	115	244	1,350	230
15	109	320	195	195	154	183	115	80	131	222	1,580	260
16	109	295	198	195	167	165	115	80	131	202	1,080	260
17	110	270	201	195	148	147	115	80	102	638	1,280	230
18	110	270	204	195	148	131	115	80	102	313	1,740	230
19	119	243	207	195	148	131	115	80	90	222	3,780	260
20	119	243	210	195	148	131	115	90	90	417	2,100	260
21	132	243	210	180	148	131	102	90	80	313	9,540	230
22	132	215	210	180	132	131	102	90	80	222	7,320	202
23	142	215	195	180	132	131	102	102	69	363	2,600	202
24	154	206	195	177	142	131	102	91	69	835	2,010	230
25	160	206	195	174	142	131	102	80	69	2,010	2,600	948
26	160	206	195	170	142	131	102	90	69	2,700	1,830	548
27	160	235	210	167	142	131	115	80	69	1,920	1,500	440
28	148	206	210	167	142	131	102	80	69	1,580	1,280	375
29	165	206	210	167	------	131	102	80	69	2,100	1,140	315
30	165	206	210	167	------	131	90	80	60	2,920	1,500	315
31	196	------	210	180	------	131	------	69	------	3,250	1,500	------

Monthly discharge of Gila River near Solomonville, Ariz., for the year ending Sept. 30, 1921

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	196	109	126	7,750
November	390	206	274	16,300
December	210	195	201	12,400
January	210	167	191	11,700
February	180	132	155	8,610
March	183	131	149	9,160
April	131	90	114	6,780
May	102	69	83.9	5,160
June	131	60	80.2	4,780
July	3,250	60	727	44,700
August	9,540	1,080	2,300	141,000
September	1,350	202	435	25,900
The year	9,540	60	407	294,000

GILA RIVER NEAR SAN CARLOS, ARIZ.

LOCATION.—1 mile above dam site in box canyon on San Carlos Indian Reservation, 8 miles below mouth of San Carlos River, and 6 miles below San Carlos Indian Agency, San Carlos, Gila County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 29, 1914, to September 30, 1921, at present site; July 11, 1899, to November 27, 1905, at point one-half mile south of Indian Agency at San Carlos and below San Carlos River; August 17, 1910, to February 5, 1911, at point just below Arizona Eastern Railroad bridge and half a mile above San Carlos River.

GAGE.—Stevens continuous water-stage recorder on left bank; inspected by Tecora Ketchayan and Harvey Ford.

DISCHARGE MEASUREMENTS.—Made from cable 1 mile above gage or by wading.

CHANNEL AND CONTROL.—Bed consists of sand, gravel, and boulders; shifting. Control afforded by rapids over heavy boulders just below gage. Channel at measuring cable, 1 mile upstream from gage, is wide and shallow; fills with quicksand at certain stages. Banks not subject to overflow. Poor for measurements under 1,000 second-feet. At a point 400 feet above gage river makes abrupt entry into box canyon filled with gravel and boulders. At low stages gravel bar is formed on left bank around point of rock at gage location, necessitating the maintenance of a ditch from channel to gage well. This low-water condition develops a changeable control, and frequent inspection of well and ditch, as well as frequent measurements, are required to obtain the stage-discharge relation under these control conditions.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 9.9 feet at 4 p. m., July 31 (discharge, 12,800 second-feet); minimum stage 0.75 foot, June 15 and June 27 to July 2 (discharge, 0.2 second-foot).

1914–1921: Maximum stage 25.5 feet, January 20, 1916 (discharge, from extension of rating curve, about 92,000 second-feet); minimum stage dry June 28 to July 1, 1919.

DIVERSIONS.—Water for irrigating about 24,000 acres is diverted from river above station by Safford Valley. About 8,000 acres is irrigated from this stream above station near Solomonville.

ACCURACY.—Stage-discharge relation changes on account of changes in ditch to gage during low water, and changes in gravel bar about gage at other stages. Standard rating curve fairly well defined between 1,000 and 14,000 second-feet, and poorly defined above. Below 1,000 second-feet, three rating curves covering different periods of time, dependent upon changes in ditch and control, and discharge measurements have been used. Water-stage recorder checked weekly, or semiweekly, during year by observer's staff gage readings, read to half-tenths. The reliability of the low-flow records during the year has been somewhat affected by the low-water channel conditions. See "Channel and control." Comparison has been made with records obtained on Gila River near Solomonville and at Kelvin. The operation of water-stage recorder was reasonably satisfactory except when influenced by poor channel conditions at low water, as indicated in footnote to daily discharge table. Daily discharge ascertained by applying mean daily gage height to rating table, except for missing periods as indicated in footnote to daily-discharge table. Records fair.

Discharge measurements of Gila River near San Carlos, Ariz., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 1	J. B. Spiegel	1.55	121	June 7	Rice and Gardiner	0.94	0.7
28	do	1.19	59	16	J. H. Gardiner	.86	.5
May 20	Rice and Gardiner	.77	9.4	July 28	do	5.85	3,160
27	do	.64	6.0	28	do	5.68	2,690
June 7	do	1.08	1.3	Sept. 9	do	2.25	198

Daily discharge, in second-feet, of Gila River near San Carlos, Ariz., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	28	148	138	206	119	61	54	24	1.5	0.2	7,000	1,200
2	28	128	138	194	119	54	54	30	1.5	.2	6,330	900
3	38	119	148	206	110	54	54	24	3.5	.4	2,700	800
4	50	128	159	232	101	54	54	20	4	6	3,530	800
5	46	206	159	232	101	46	54	20	3	25	2,830	660
6	28	232	159	219	128	46	61	20	3	14	1,990	424
7	28	232	159	206	138	46	61	20	2	9	1,990	354
8	34	232	159	219	128	54	61	24	1.4	6	1,990	294
9	34	219	159	206	119	61	61	24	1.4	8	1,990	228
10	42	194	159	206	110	61	54	24	1.4	1,460	1,900	153
11	42	206	159	219	101	61	54	20	1.4	444	1,900	112
12	46	244	159	244	101	68	40	15	2	387	1,890	90
13	46	232	170	232	84	76	40	12	4	266	1,890	90
14	54	219	182	219	84	68	35	12	2	194	1,890	90
15	54	219	194	206	68	68	35	9	.2	135	1,880	90
16	54	219	182	206	68	61	35	7	.6	90	1,700	90
17	54	219	182	206	68	68	40	5	.6	173	1,500	90
18	54	219	182	232	68	68	35	9	.6	632	1,300	200
19	42	206	182	232	76	46	35	12	.6	464	1,080	200
20	61	170	194	206	68	54	35	15	.6	173	975	184
21	61	159	206	182	68	61	35	15	.6	294	3,240	
22	54	138	206	182	68	54	30	7	.6	240	3,800	
23	46	138	194	170	68	54	30	7	.4	135	4,000	
24	54	138	182	159	61	54	30	7	.4	112	4,520	
25	61	138	194	148	54	54	30	5	.4	605	3,000	
26	61	128	194	159	54	46	30	5	.4	3,530	3,000	180
27	61	128	219	159	54	46	30	7	.2	4,100	2,500	
28	61	128	232	148	61	61	30	5	.2	2,460	1,500	
29	68	128	232	159	-------	61	24	7	.2	3,100	900	
30	84	138	219	148	-------	61	24	4	.2	4,970	2,580	
31	128	-------	206	128	-------	54	-------	2	-------	7,470	1,200	-------

NOTE.—Braced figures show mean discharges for periods indicated for which no records are available, estimated by comparison with flow at other stations in basin. Staff readings used May 20 to June 7, because water-stage recorder did not operate; June 15, 16, July 16, Aug. 15, 24, and Aug. 30 to Sept. 20, because ditch to well was out of order, or well filled with mud from flood. Discharge estimated Aug. 8–14, 16–18, 22, 23, 25–29, Aug. 31 to Sept. 4, Sept. 13–19, and 21–30, by comparison with flow at other stations in basin; record lost on these dates because ditch to well was out of order or mud in well during flood.

Monthly discharge of Gila River near San Carlos, Ariz., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	128	28	51.7	3,180
November	244	119	178	10,600
December	232	138	181	11,100
January	244	128	196	12,100
February	138	54	87.4	4,850
March	76	46	57.5	3,540
April	61	24	41.5	2,470
May	30	2	13.5	830
June	4	.2	1.30	77.4
July	7,470	.2	1,020	62,700
August	7,000	900	2,530	156,000
September	1,200	-------	295	17,600
The year	7,470	.2	393	285,000

GILA RIVER AT KELVIN, ARIZ.

LOCATION.—In sec. 12, T. 4 S., R. 13 E., 1,000 feet[1] below mouth of Mineral Creek, one-fourth mile below concrete highway bridge, 1 mile below Kelvin,[2] Pinal County, and 25 miles above Florence.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 26, 1911, to September 30, 1921.

GAGE.—Stevens continuous water-stage recorder installed June 15, 1914, on left bank half a mile above original gage and referred to new datum. Original gage, an inclined staff fastened to basalt ledge on right bank opposite observer's house. For description of various gages used, see Water-Supply Paper 459.

DISCHARGE MEASUREMENTS.—Made from highway bridge one-fourth mile above gage or by wading.

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

EXTREMES OF DISCHARGE.—Maximum stage during year from staff reading, 8 feet on August 22 (discharge, 15,500 second-feet); minimum stage from water-stage recorder, 1.6 feet June 18 to July 4 (discharge, 1.0 second-foot).

1911–1921: Maximum stage 19.5 feet about noon January 20, 1916, determined from flood marks (discharge, from extension of rating curve, about 93,000 second-feet); no flow June 29 to July 11, 1913.

DIVERSIONS.—About 24,000 acres is irrigated from this stream between this station and Solomonville, and about 8,000 acres above Solomonville.

ACCURACY.—Stage-discharge relation continually changing. Standard rating curve fairly well defined below 30,000 second-feet, poorly defined above. Rating curves for short periods between rises used. Water-stage recorder checked weekly during year by observer's staff gage readings read to hundredths. Operation of water-stage recorder satisfactory except for periods indicated in footnote to daily-discharge table. Daily discharge ascertained by applying mean daily gage height to rating table except for February 9–15, when indirect method for shifting control was used; and for missing periods as indicated in footnote to daily-discharge table. Records good.

Discharge measurements of Gila River at Kelvin, Ariz., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 28	H. D. Empie	2.80	280	June 8	Rice and Gardiner	1.62	1.6
Jan. 20	do	2.75	259	July 26	J. H. Gardiner	5.50	6,260
Feb. 16	J. B. Spiegel	2.47	114	27	do	5.22	4,280
27	do	2.38	99	29	do	5.40	5,450
Mar. 28	H. D. Empie	2.20	54	Aug. 17	Rice and Gardiner	4.05	1,760
May 18	Rice and Gardiner	1.78	9.6	Sept. 8	J. H. Gardiner	3.05	424

[1] Given in previous reports as one-half mile.
[2] Ray Junction on Arizona & Eastern Railroad.

Daily discharge, in second-feet, of Gila River at Kelvin, Ariz., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	34	115	180	259	198	84	54	27	5	1	11,500	1,500
2	28	115	180	259	198	84	46	27	3	1	13,000	1,290
3	28	100	180	259	198	73	46	22	3	1	4,000	950
4	28	100	180	282	198	73	54	22	3	1	5,000	815
5	28	115	180	282	179	73	64	22	3	10	5,000	610
6	28	172	160	259	198	73	73	22	3	10	5,000	400
7	23	172	160	259	217	73	73	22	3	10	4,000	400
8	23	193	160	259	217	73	64	22	3	10	1,800	430
9	23	172	160	259	205	73	54	22	3	10	6,000	372
10	23	172	160	259	185	73	54	22	3	10	6,000	320
11	23	172	160	259	180	73	46	22	3	900	1,750	272
12	28	193	160	282	160	73	46	22	18	900	1,750	295
13	23	220	160	259	150	73	46	18	33	600	1,750	215
14	23	193	160	259	145	73	46	18	18	400	1,730	215
15	23	193	160	236	130	73	46	14	8	390	1,730	198
16	23	193	180	259	110	73	46	14	6	390	1,730	180
17	28	220	180	259	124	73	46	11	3	465	1,970	198
18	28	220	180	259	124	73	46	11	1	505	1,730	180
19	34	220	180	259	124	73	46	11	1	425	2,950	345
20	56	220	180	259	124	84	39	11	1	1,030	10,600	250
21	56	220	200	259	124	73	39	11	1	645	11,400	232
22	56	220	200	236	110	73	33	11	1	595	15,500	215
23	56	220	200	236	96	73	33	11	1	645	8,320	215
24	56	220	200	217	96	73	27	11	1	1,290	3,460	215
25	56	220	200	198	96	73	27	11		550	3,200	198
26	56	200	240	198	96	64	27	11	1	3,590	3,460	198
27	56	200	240	198	96	64	33	11	1	5,520	2,450	215
28	56	200	282	198	96	54	33	8	1	6,710	1,730	250
29	56	200	282	198	-------	54	33	5	1	6,030	1,110	430
30	64	200	259	198	-------	54	27	5	1	6,540	950	180
31	86	-------	259	198	-------	54	-------	5	-------	11,800	1,730	-------

NOTE.—Staff readings used for period Aug. 14 to Sept. 8, as well was heavily filled with mud. Discharge interpolated June 16, 17, 25-29, owing to clock's stopping. Discharge estimated Nov. 20 to Dec. 27, June 12, July 2-14, owing to clock's stopping. Aug. 1-13, well was heavily filled with mud; estimates by comparison with flow at other stations in basin.

Monthly discharge of Gila River at Kelvin, Ariz., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	86	23	39.0	2,400
November	-------	-------	186	11,100
December	-------	-------	192	11,800
January	282	198	244	15,000
February	217	96	149	8,280
March	84	54	71.0	4,370
April	73	27	44.9	2,670
May	27	5	15.5	953
June	33	1	4.5	268
July	11,800	1	1,610	99,000
August	15,500	950	4,590	282,000
September	1,500	180	393	23,400
The year	15,500	1	638	461,000

BROWN CANAL NEAR SOLOMONVILLE, ARIZ.

LOCATION.—In SE. ¼ sec. 30, T. 6 S., R. 28 E., near Earven ranch, 10 miles above Solomonville, Graham County.

RECORDS AVAILABLE.—June 1, 1914, to September 30, 1915; December 20, 1920, to September 30, 1921.

GAGE.—Enamel section on right bank 10 feet below head gate; read by J. W. Earven.

11582—25†—WSP 529——10

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed composed of silt, banks not subject to overflow, control affected by periodic deposits from wash on right bank just below gage.

DIVERSIONS.—No diversions above gage.

ACCURACY.—Stage-discharge relation not permanent. Rating curves fairly well defined. Gage read to nearest two-hundredths twice a day. Daily discharge ascertained by applying mean daily gage height to rating table, except for periods March 14, July 11–13, 17–20, 31, August 12, 16, 22–30, and September 3–6, when canal was dry. Records fair.

Discharge measurements of Brown canal near Solomonville, Ariz., during the period Dec. 20, 1920, to Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 20	H. D. Empie	4.70	12.3	May 23	J. H. Gardiner	4.52	10.1
Jan. 15	do	4.95	18.3	June 2	H. D. Empie	4.50	10.1
Feb. 16	do	4.86	15.8	July 1	do	4.43	9.4
Mar. 2	do	4.86	16.2	Aug. 2	do	4.72	9.0
Apr. 1	do	4.60	12.9	15	do	4.80	13.9
May 2	do	4.57	12.7	Sept. 2	H. E. Turner	4.85	2.1

Daily discharge, in second-feet, of Brown canal near Solomonville, Ariz., for the period Dec. 20, 1920, to Sept. 30, 1921.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		10	20	15	14	13	11	11	7	4
2		11	18	16	13	12	11	11	6	1
3		12	20	16	13	11	11	11	6	
4		11	20	16	13	11	11	14	5	
5		15	18	16	13	12	11	6	5	
6		17	18	16	13	12	11	11	6	
7		22	18	16	13	11	11	11	5	5
8		18	18	17	13	11	11	11	6	6
9		18	18	16	13	12	11	11	3	13
10		18	18	16	13	12	12	11	4	13
11		20	20	16	13	12	12		4	13
12		18	17	16	13	12	12			15
13		17	16	13	13	11	14		2	17
14		18	16		13	11	14	14	6	12
15		17	16	5	13	11	14	15	9	1
16		18	16	19	13	11	14	11		1
17		18	16	19	13	11	14		6	1
18		18	16	16	13	11	14		8	1
19		17	17	15	13	11	14		19	1
20	12	18	16	16	13	11	14		10	1
21	12	18	15	13	13	11	14	10	7	1
22	11	18	16	16	12	11	14	14		1
23	11	18	16	19	12	11	14	15		1
24	12	18	16	15	12	11	14	15		11
25	12	20	16	13	13	11	13	14		23
26	11	20	16	13	13	11	12	15		21
27	11	20	16	13	13	11	11	13		21
28	12	18	16	13	13	11	11	16		15
29	12	18		13	13	11	11	11		9
30	11	18		13	13	11	11	14		9
31	11	20		13		11			5	

Monthly discharge of Brown canal near Solomonville, Ariz., for the period Dec. 20, 1920, to Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
December 20-31	12	11	11.5	274
January	22	10	17.3	1,060
February	20	15	17.1	950
March	19	0	14.5	892
April	14	12	12.9	768
May	13	11	11.3	695
June	14	11	12.4	738
July	15	0	8.9	547
August	19	0	4.2	258
September	23	0	7.2	428
The period				6,610

BROWN CANAL WASTEWAY NEAR SOLOMONVILLE, ARIZ.

LOCATION.—In SE. ¼ NE. ¼ sec. 31, T. 6 S., R. 28 E., near Earven ranch, 10 miles above Solomonville, Graham County.

RECORDS AVAILABLE.—December 20, 1920, to September 30, 1921.

GAGE.—Enamel section on right bank 200 feet below waste gate; read by J. W. Earven.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed composed of silt, straight channel, banks not subject to overflow.

DIVERSIONS.—None.

ACCURACY.—Stage-discharge relation not permanent. Rating curves fairly well defined. Gage read to nearest two-hundredths twice a day. Daily discharge ascertained by applying mean daily gage height to rating table, except for periods of shifting control, and for periods January 20–22, March 14, July 4–7, 11–13, 16–21, 28, 29, 31, August 11–31, September 1–8, 13, when wasteway was dry. Records fair.

Discharge measurements of Brown canal wasteway near Solomonville, Ariz., during the period Dec. 20, 1920, to Sept, 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharg e
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 20	H. D. Empie	4.80	4.9	May 2	J. D. Empie	5.00	9.4
Jan. 15	do	5.25	13.2	23	J. H. Gardiner	5.03	7.4
Feb. 16	do	4.56	3.8	June 2	H. D. Empie	5.00	7.4
Mar. 2	do	4.82	6.6	July 1	do	5.00	8.1
Apr. 1	do	4.86	6.3				

Daily discharge, in second-feet, of Brown canal wasteway near Solomonville, Ariz., for the period Dec. 20, 1920, to Sept. 30, 1921.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		4	14	8	8	9	7	10	3	0
2		4	13	8	8	10	9	9	4	0
3		5	13	8	8	11	9	8	4	0
4		5	13	8	8	11	9	0	4	0
5		6	10	8	8	11	9	0	5	0
6		10	8	8	9	11	9	0	5	0
7		5	13	8	9	11	9	0	4	0
8		10	13	10	9	11	9	5	5	0
9		10	13	10	9	11	9	7	4	3
10		10	13	10	9	10	9	2	4	3
11		12	12	10	9	10	9	0	0	3
12		13	10	12	9	10	11	0	0	3
13		13	9	3	9	10	15	0	0	0
14		13	9	0	9	11	15	2	0	3
15		13	9	3	9	11	12	2	0	3
16		13	6	10	9	10	12	0	0	2
17		8	4	9	9	9	12	0	0	2
18		5	4	9	9	9	12	0	0	3
19		5	4	7	9	9	12	0	0	3
20	5	0	8	6	9	9	12	0	0	3
21	5	0	8	7	9	9	12	0	0	3
22	7	0	10	8	9	9	12	1	0	3
23	7	2	10	8	9	9	12	6	0	3
24	7	10	10	6	9	9	12	6	0	3
25	6	10	10	6	9	9	11	5	0	4
26	7	14	10	5	9	9	8	4	0	7
27	5	14	8	5	9	8	8	4	0	9
28	5	17	8	6	9	7	8	0	0	8
29	5	17	-------	8	9	7	8	0	0	6
30	4	16	-------	8	9	7	8	5	0	6
31	4	14	-------	8	-------	8	-------	0	0	-------

Monthly discharge of Brown canal wasteway near Solomonville, Ariz., for the period Dec. 20, 1920, to Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
December 20-31	7	4	5.6	133
January	17	0	9.0	553
February	14	4	9.7	539
March	12	0	7.4	455
April	9	8	8.8	524
May	11	7	9.5	584
June	15	7	10.3	613
July	10	0	2.5	154
August	5	0	1.4	86
September	9	0	2.8	167
The period				3,810

MICHELANA CANAL NEAR SOLOMONVILLE, ARIZ.

LOCATION.—In NE. ¼ SW. ¼ sec. 13, T. 7 S., R. 27 E., on right bank of river at Moody ranch, 6 miles from Solomonville, Graham County.

RECORDS AVAILABLE.—October 1, 1914, to September 30, 1915. December 21, 1920, to September 30, 1921.

GAGE.—Vertical staff on right bank 30 feet below wagon bridge; read by Edwin Moody.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed composed of silt, vertical banks; shifting.

DIVERSIONS.—No diversions above gage.

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve fairly well defined. Gage read twice daily to hundredths. Daily discharge ascertained by using shifting-control method, shifting between measurements throughout, except for periods February 14, 15, April 2, July 5, 6, 25–31, August 1–7, 12–14, 16, 17, 20–31, September 1–8, when canal was dry. Records fair.

Discharge measurements of Michelana canal near Solomonville, Ariz., during the period Dec. 21, 1920, to Sept. 30, 1921.

[Made by H. D. Empie.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Dec. 20	4.50	4.3	May 2	4.42	6.1
Jan. 15	5.06	11.3	June 2	4.12	4.4
Feb. 17	4.55	4.2	29	4.02	3.6
Mar. 10	4.6	8.1	July 1	3.92	3.0
Apr. 1	4.85	10.4	Sept. 8	4.50	3.2

Daily discharge, in second-feet, of Michelana canal near Solomonville, Ariz., for the period Dec. 21, 1920, to Sept. 30, 1921.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		10	8	7	9	6	5	3		
2		10	8	7		6	5	3		
3		11	8	7	7	5	4	3		
4		10	2	7	7	5	5	2		
5		11	2	7	6	5	5			
6		11	8	7	6	5	4			
7		11	8	7	6	6	4	3		
8		11	8	7	6	6	4	7	6	
9		11	8	8	8	6	5	8	5	3
10		11	7	8	9	6	5	6	4	3
11		11	7	7	8	6	4	7	2	5
12		11	7	7	8	5	3	7		6
13		11	4	7	6	5	3	6		4
14		11		7	6	5	3	5		5
15		11		6	8	5	4	5	22	5
16		11	3	8	8	5	4	14		5
17		11	6	10	7	5	5	4		4
18		11	6	10	7	5	5	4	5	4
19		9	3	11	7	6	4	3	1	5
20		9	6	11	7	6	5	3		6
21	4	9	6	10	7	6	5	3		6
22	4	9	6	10	7	6	5	3		7
23	4	9	6	10	7	6	5	3		6
24	4	9	6	9	6	6	5	3		6
25	5	9	6	9	6	6	4			7
26	6	9	6	9	6	5	4			6
27	8	8	6	9	6	5	4			6
28	8	8	6	9	6	5	4			6
29	9	8		10	7	5	4			7
30	9	9		10	7	5	4			7
31	10	8		10		5				

Monthly discharge of Michelana canal near Solomonville, Ariz., for the period Dec. 21, 1920, to Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
December 21-31	10	4	6.5	142
January	11	8	9.9	609
February	8	0	5.6	311
March	10	6	8.4	516
April	9	0	6.7	399
May	6	5	5.5	338
June	5	3	4.3	256
July	14	0	3.4	209
August	22	0	1.5	92
September	7	0	4.0	238
The period				3,110

FOURNESS CANAL NEAR SOLOMONVILLE, ARIZ.

LOCATION.—In SE. ¼ SE. ¼ sec. 35, T. 6 S., R. 27 E., 8 miles above Solomonville, Graham County.

RECORDS AVAILABLE.—October 1, 1914, to September 30, 1915; December 20, 1920, to September 30, 1921.

GAGE.—Vertical staff gage on right bank; read by David Jurado.

DISCHARGE MEASUREMENTS.—Made by wading at gage.

CHANNEL AND CONTROL.—Bed consists of silt, channel small in cross-section; control shifts.

DIVERSIONS.—No diversions above gage.

ACCURACY.—Stage-discharge relation not permanent. Rating curves fairly well defined. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table, except for periods of no flow on January 12–17, February 21, May 3, 4, July 11, 17–22, 25–28, 30, 31, August 1–12, 16–31, and September 1–5. Records fair.

Discharge measurements of Fourness canal near Solomonville, Ariz., during the period Dec. 20, 1920, to Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 20	H. D. Empie	4.80	5.1	May 24	Rice and Gardiner	4.26	0.9
Feb. 17	do	4.80	4.8	June 2	H. D. Empie	4.20	.6
Mar. 10	do	4.75	4.2	July 1	do	4.25	.7
Apr. 1	do	4.60	2.5	Aug. 15	do	4.74	2.0
May 2	do	4.60	2.2	Sept. 14	do	4.90	3.0
23	Rice and Gardiner	4.38	1.4				

Daily discharge, in second-feet, of Fourness canal near Solomonville, Ariz., for the period Dec. 20, 1920, to Sept. 30, 1921.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		6.5	5.0	3.5	2.5	2.0	0.7	0.7		
2		6.5	5.5	3.5	2.0	1.5	.7	.7		
3		6.5	5.5	3.5	2.0		.7	.7		
4		7.0	5.0	5.0	2.0		.7	1.0		
5		6.5	5.0	5.0	2.0	1.5	.7	1.0		
6		6.5	5.0	5.0	2.0	1.5	.7	1.0		0.8
7		6.5	5.0	5.0	2.0	1.5	.7	1.5		1.5
8		5.5	5.0	5.0	1.0	1.5	.7	.6		1.5
9		6.5	5.0	4.0	2.0	1.0	.7	.9		2.0
10		6.5	5.0	3.5	2.0	1.5	.7	1.5		2.0
11		6.5	5.0	2.5	2.0	1.5	.7			2.0
12			5.0	3.0	2.0	1.5	.7	1.0		2.0
13			5.0	2.5	1.5	1.0	.8	1.0	2.0	2.5
14			4.0	2.5	2.0	1.5	.7	.8	2.0	3.0
15			4.0	2.5	2.0	1.5	.9	.8	2.0	2.5
16			4.0	2.5	2.0	1.5	.7	1.0		2.5
17			5.0	2.5	2.0	1.5	.8			2.5
18		3.0	5.0	2.5	2.0	1.5	.6			2.0
19		5.0	5.0	2.5	2.0	1.0	.6			2.0
20	4.0	1.5	3.5	3.0	2.0	1.5	.6			2.0
21	4.0	5.0		3.0	2.0	1.5	.6			2.0
22	5.0	5.5	2.0	3.0	2.0	1.5	.6			2.0
23	4.0	5.0	3.5	3.0	2.0	1.0	.6	1.0		2.0
24	5.5	5.0	3.5	3.0	1.5	.9	.6	1.5		2.0
25	6.5	5.0	3.5	3.0	2.0	.9	.6			1.0
26	6.5	5.0	3.5	3.0	1.5	.9	.6			2.5
27	6.5	5.0	3.5	3.0	2.0	.9	.6			2.0
28	6.5	5.0	3.5	3.0	2.0	.9	.6			2.0
29	6.5	5.5		3.0	1.5	.9	.6	.6		2.0
30	6.5	5.0		3.0	2.0	.9	.6			2.0
31	6.5	5.0		3.0		.9				

NOTE.—No flow on days for which no discharge is given.

Monthly discharge of Fourness canal near Solomonville, Ariz., for the period Dec. 20, 1920, to Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
December 20-31	6.5	4	5.67	135
January	7	0	4.40	271
February	5.5	0	4.27	237
March	5	2.5	3.29	202
April	2.5	1	1.92	114
May	2	0	1.20	74
June	.9	.6	.67	40
July	1.5	0	.56	34
August	2	0	.19	12
September	3	0	1.68	100
The period				1,220

SAN JOSE CANAL NEAR SOLOMONVILLE, ARIZ.

LOCATION.—In NW. ¼ NE. ¼ sec. 10, T. 7 S., R. 27 E., near Curtis ranch, 4 miles above Solomonville, Graham County.

RECORDS AVAILABLE.—April 1, 1914, to September 30, 1915; December 21, 1920, to September 30, 1921.

GAGE.—Vertical enamel section on right bank fastened to wall of concrete drop, 200 feet below wastegate and 2 miles below heading; read by Gonzalo Palma.

DISCHARGE MEASUREMENTS.—Made by wading at gage.

CHANNEL AND CONTROL.—Wide uniform section, well-defined banks. Control is formed by concrete drop just below gage.

DIVERSIONS.—One diversion above gage, irrigating 90 acres.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to hundredths twice a day. Daily discharge ascertained by applying mean daily gage height to rating table, except for periods July 25, 26, 30, when flow was for part day only, and for periods July 27, August 4, 5, 19, 21–30, when canal was dry. Records good.

Discharge measurements of San Jose canal near Solomonville, Ariz., during the period Dec. 21, 1920, to Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 21	H. D. Empie	0.60	38.2	May 24	Rice and Gardiner	0.49	28.2
Jan. 15	do	.68	48.0	June 1	H. D. Empie	.43	24.1
Feb. 17	do	.64	45.1	July 3	do	.34	16.5
Mar. 10	do	.54	34.8	Aug. 1	do	.58	41.4
Apr. 1	do	.50	32.0	Sept. 1	do	.36	18.3
May 2	do	.37	19.4				

Daily discharge, in second-feet, of San Jose canal near Solomonville, Ariz., for the period Dec. 21, 1920, to Sept. 30, 1921.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		59	56	32	32	26	26	17	36	25
2		60	37	33	29	22	22	17	33	29
3		60	36	34	29	26	22	17	42	30
4		57	34	35	29	26	22	27		37
5		57	35	35	29	26	22	48		46
6		54	37	36	27	26	22	48	68	58
7		49	39	39	29	26	22	47	52	70
8		48	41	39	29	26	22	41	50	76
9		50	42	34	30	26	22	41	40	68
10		50	42	31	30	26	18	54	43	70
11		48	41	31	28	26	19	62	45	76
12		47	40	32	28	26	19	60	64	66
13		48	39	30	28	26	23	54	55	60
14		49	37	30	28	26	26	56	53	60
15		48	37	31	28	23	24	57	56	55
16		47	37	30	28	26	26	50	64	59
17		52	36	30	28	26	28	32	66	61
18		47	32	30	28	26	28	59	67	45
19		47	32	30	25	26	28	58		45
20		49	33	30	28	26	28	44	59	50
21	35	52	32	30	28	26	25	29		48
22	34	49	32	31	28	26	22	40		47
23	49	47	33	31	28	26	16	36		45
24	30	49	33	31	28	26	22	47		42
25	30	52	32	31	26	26	22	13		76
26	41	54	32	32	26	26	18	17		78
27	39	62	32	33	26	26	20			76
28	47	57	32	33	26	22	20	45		80
29	47	61		33	26	26	18	40		77
30	54	58		33	26	26	17	9		78
31	59	64		32		26		29	32	

NOTE.—No flow on days for which no discharge is given.

Monthly discharge of San Jose canal near Solomonville, Ariz., for the period Dec. 21, 1920, to Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
December 21-31	59	30	42.3	923
January	64	47	52.6	3,230
February	56	32	36.5	2,030
March	39	30	32.3	1,990
April	32	25	27.9	1,660
May	26	22	25.6	1,570
June	28	16	22.3	1,330
July	62	0	38.5	2,370
August	68	0	29.8	1,830
September	80	25	57.8	3,440
The period				20,400

MONTEZUMA CANAL NEAR SOLOMONVILLE, ARIZ.

LOCATION.—In SE. ¼ SE. ¼ sec. 18, T. 7 S., R. 27 E., on Carrasco ranch, 1¼ miles above Solomonville, Graham County.

RECORDS AVAILABLE.—April 1, 1914, to September 30, 1915; December 29, 1920, to September 30, 1921.

GAGE.—Vertical staff on right bank 2 miles below intake; read by Frank Carrasco. Previous gage one-quarter mile upstream.

DISCHARGE MEASUREMENTS.—Made by wading or from bridge.

CHANNEL AND CONTROL.—Bed composed of silt, vertical banks; control affected by bridge just below gage and by fence wires 200 feet below gage.

DIVERSIONS.—No diversions above gage.

ACCURACY.—Stage-discharge relation not permanent. Rating curves fairly well defined. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table, except for periods January 17 to March 14, and July 4 to September 30, when shifting-control method was used, and for periods July 4–7, August 2–8, when canal was dry. Records fair.

Discharge measurements of Montezuma canal near Solomonville, Ariz., during the period Dec. 21, 1920, to Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 21	H. D. Empie	5.70	48.4	June 1	H. D. Empie	5.22	29.5
Jan. 16	do	5.58	44.5	July 3	do	5.15	28.8
Feb. 17	do	5.34	30.2	9	do	5.08	23.2
Mar. 7	do	5.42	40.3	15	do	6.58	63.8
15	do	5.25	31.6	Aug. 1	do	5.81	44.1
Apr. 3	do	5.30	33.6	Sept. 1	do	6.50	53.5
27	do	5.15	28.5	12	do	6.70	58.1
May 2	do	4.98	23.6	23	do	6.30	50.6
24	Rice and Gardiner	5.19	29.1				

Daily discharge, in second-feet, of Montezuma canal near Solomonville, Ariz., for the period Dec. 29, 1920, to Sept. 30, 1921.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		46	39	36	37	26	28	30	44	67
2		46	40	38	37	26	27	30		63
3		46	41	35	34	27	30	30		66
4		44	41	42	37	28	30			66
5		46	41	38	35	28	30			57
6		44	41	38	34	27	28			61
7		44	41	36	34	24	27			64
8		48	36	39	30	30	27	80		61
9		48	34	35	30	30	27	87	21	59
10		50	36	35	32	30	30	81	24	64
11		46	40	39	34	28	30	81	38	68
12		44	42	34	30	27	32	76	54	54
13		50	33	38	28	34	28	73	62	57
14		46	33	36	27	37	30	60	19	60
15		48	36	34	26	27	30	57	40	65
16		44	35	37	24	30	30	59	56	66
17		48	39	40	30	28	30	57	67	62
18		44	37	40	26	27	30	71	67	51
19		44	37	40	24	28	30	71	58	58
20		42	37	39	27	28	28	65	17	54
21		40	37	37	24	27	30	65	42	55
22		44	35	35	21	27	30	63	50	59
23		46	34	34	22	27	27	65	54	61
24		44	34	34	24	30	24	70	60	56
25		38	36	32	28	30	26	66	64	58
26		50	39	34	22	30	30	74	67	53
27		50	42	37	27	28	27	74	62	60
28		46	40	35	26	27	30	79	58	60
29	46	46		40	27	27	30	75	62	60
30	46	48		37	24	27	30	76	67	58
31	46	44		37		26		67	62	

NOTE.—No flow on days for which no discharge is given.

Monthly discharge of Montezuma canal near Solomonville, Ariz., for the period Dec. 29, 1920, to Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
December 29-31				
January	50	38	45.6	2,800
February	42	33	37.7	2,090
March	42	32	36.8	2,260
April	37	21	28.7	1,710
May	37	26	28.3	1,740
June	32	24	28.9	1,720
July	87	0	57.5	3,540
August	67	0	39.2	2,410
September	68	51	60.1	3,580
The period				21,800

UNION CANAL NEAR SOLOMONVILLE, ARIZ.

LOCATION.—In SE. ¼ NE. ¼ sec. 14, T. 7 S., R. 26 E., 1½ miles northwest of Solomonville, Graham County.

RECORDS AVAILABLE.—April 1, 1914, to September 30, 1915; January to September 30, 1921.

GAGE.—Vertical staff on right bank 1,300 feet below waste gate and 1¾ miles below heading; read by M. R. Nanez.

DISCHARGE MEASUREMENTS.—Made by wading at gage.

CHANNEL AND CONTROL.—Bed composed of silt and sand; vertical banks; shifting.
DIVERSIONS.—None.
ACCURACY.—Stage-discharge relation not permanent. Rating curves fairly well defined. Gage read to nearest two-hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating tables, except for periods February 4 to May1 and June 19 to September 27, when shifting-control method was used. Records fair.

Discharge measurements of Union canal near Solomonville, Ariz., during the period Dec. 21, 1920, to Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 21	H. D. Empie	2.82	78.6	May 24	Rice and Gardiner	1.76	23.5
Jan. 17	do	2.22	39.8	June 1	H. D. Empie	1.14	7.7
Feb. 3	do	3.40	83.7	18	do	2.33	42.7
17	do	2.57	57.9	July 3	do	1.32	6.5
Mar. 7	do	2.90	75.3	16	do	2.49	44.7
23	do	2.54	60.0	Aug. 1	do	2.28	42.3
Apr. 3	do	2.38	49.7	Sept. 1	do	2.93	57.3
21	do	2.32	46.0	12	do	3.23	82.6
May 2	do	1.96	32.7	24	do	3.24	87.0
10	do	1.86	27.4	28	do	3.40	98.6

Daily discharge, in second-feet, of Union canal near Solomonville, Ariz., for the period Jan. 1 to Sept. 30, 1921.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	36	84	86	45	32	5.5	8	51	64
2	39	92	86	48	32	13	9	45	101
3	46	84	89	50	32	9	6	43	71
4	64	84	89	53	32	7.8	72	104	70
5	39	84	87	58	24	10	52	31	60
6	42	84	83	58	24	10	64	31	61
7	46	84	75	62	26	9	36	53	61
8	48	84	75	58	26	7.8	34	66	71
9	50	83	71	56	28	.5	42	72	82
10	50	83	71	49	24	1	45	72	119
11	53	83	69	46	28	9	76	64	91
12	53	77	79	46	26	10	102	54	87
13	41	74	83	48	24	23	94	69	86
14	48	65	94	49	23	53	64	77	76
15	37	63	83	49	14	72	73	101	72
16	37	60	83	49	14	80	54	99	78
17	34	59	65	49	17	51	103	82	74
18	36	59	63	49	20	42	103	54	64
19	64	57	60	46	23	35	103	86	74
20	62	56	60	49	24	27	97	115	99
21	60	56	56	46	24	21	107	58	95
22	56	56	58	43	26	21	107	49	86
23	62	56	58	43	26	17	110	73	80
24	64	57	54	39	26	14	112	42	81
25	64	68	54	37	17	10	70	73	144
26	60	68	49	40	22	9	51	83	109
27	55	75	49	40	20	10	99	83	108
28	72	86	46	38	22	8	70	79	99
29	72	------	44	36	12	5	83	81	94
30	68	------	44	36	10	5	83	92	94
31	76	------	46	------	10	------	34	92	------

Monthly discharge of Union canal near Solomonville, Ariz., for the period Jan. 1 to Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
January	76	34	52.7	3,240
February	92	56	72.2	4,010
March	94	44	68.0	4,180
April	62	36	47.2	2,810
May	32	10	22.8	1,400
June	80	.5	19.9	1,180
July	112	6	69.8	4,290
August	115	31	70.1	4,310
September	144	60	85.0	5,060
The period				30,500

SAN SIMON CREEK NEAR RODEO, N. MEX.

LOCATION.—In SE. ¼ sec. 6, R. 21 E., T. 27 S., 10 miles north of Rodeo, Hidalgo County, N. Mex.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 25, 1920, to September 30, 1921.

GAGE.—Vertical staff in midstream; read by A. J. Love.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Uniform channel 300 feet wide covered with sacaton grass and small mesquite.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge for year, 1,340 second-feet July 25; minimum discharge zero October 1 to June 30, parts of July and August, and September 1–30.

1920–1921: Maximum mean daily discharge, 1,340 second-feet July 25, 1921; minimum discharge, zero flow greater part of each year.

DIVERSIONS.—None.

COOPERATION.—Record of daily discharge and discharge measurement furnished by University of Arizona, Prof. G. E. P. Smith, irrigation engineer.

The following discharge measurement was made by H. C. Schwalen:
July 26, 1921: Gage height, 2 feet; discharge, 58 second-feet.

Daily discharge, in second-feet, of San Simon Creek near Rodeo, N. Mex., for the year ending Sept. 30, 1921.

Day.	July.	Aug.	Day.	July.	Aug.	Day.	July.	Aug.
1		12	11			21		
2		3	12			22		
3		2	13			23	30	
4		144	14			24	58	
5		25	15			25	1,340	
6		141	16			26	510	
7		40	17	11	60	27	34	
8		3	18		69	28	8	
9		3	19		7	29	25	
10		2	20			30	740	
						31	115	

NOTE.—No flow on days for which no discharge is given.

Monthly discharge of San Simon Creek near Rodeo, N. Mex., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
July	1,340	0	92.6	5,690
August	144	0	18.8	1,160
The year	1,340	0	9.5	6,850

NOTE.—See footnote to table of daily discharge.

SAN SIMON CREEK NEAR SAN SIMON, ARIZ.

LOCATION.—In SW. ¼ sec. 29, T. 13 S., R. 31 E., 1 mile east of San Simon, Cochise County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 1, 1919, to September 30, 1921.

GAGE.—Vertical enamel staff fastened to bridge, low-water section on right pier, high-water section on left pier; read by Ed Gentner.

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

CHANNEL AND CONTROL.—Bed composed of gravel, scouring to heavy clay at high water. Low-water control is a gravel bar 50 feet below gage. High-water control formed by right angle turn to right 400 feet below station.

EXTREMES OF DISCHARGE.—Maximum daily mean discharge for year, 1,070 second-feet on July 25; minimum discharge, zero during greater part of the year.

1919–1921: Maximum mean daily discharge, 1,070 second-feet on July 25, 1921; minimum discharge, zero flow greater part of each year.

DIVERSIONS.—None.

COOPERATION.—Discharge measurements and record of daily discharge furnished by University of Arizona, Prof. G. E. P. Smith, irrigation engineer.

Discharge measurements of San Simon Creek near San Simon, Ariz., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
July 10	H. C. Schwalen	4.36	1.9	July 31	H. C. Schwalen	6.52	592
26	do	5.50	320	Aug. 1	do	4.85	81
28	do	3.75	.4	25	do	4.3	1
30	do	5.62	283				

Daily discharge, in second-feet, of San Simon Creek near San Simon, Ariz., for the year ending Sept. 30, 1921.

Day.	Oct.	July.	Aug.	Sept.	Day.	Oct.	July.	Aug.	Sept.
1			110		16				645
2			.5		17			65	
3		25	115		18			75	
4			615		19			160	
5			50		20			290	
6			.5		21			80	
7					22			200	
8		765	120		23		75	95	
9		410	20		24	50	350	35	
10		10			25		1,070	.5	
11					26		185		
12					27		95		
13		430			28		7		
14					29		430		
15				50	30		315		
					31		555		

NOTE.—No flow on days for which no discharge is given, except Feb. 28, when there was a trace of water only.

Monthly discharge of San Simon Creek near San Simon, Ariz., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	50	0	1.61	99
July	1,070	0	152	9,350
August	615	0	65.5	4,030
September	645	0	23.1	1,370
The year	1,070	0	20.5	14,800

NOTE.—See footnote to table of daily discharge.

CAVE CREEK NEAR PARADISE, ARIZ.

LOCATION.—In SW. ¼ SE. ¼ sec. 34, T. 17 S., R. 31 E., at Portal ranger station 8 miles by road southeast of Paradise, Cochise County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 5, 1919, to September 30, 1921.

GAGE.—Vertical enamel staff on right bank 100 feet from ranger station; read by Mrs. O. P. Schoenberg.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Channel composed of gravel and boulders. Channel fairly straight and fairly uniform in cross section.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year, 5.30 feet on August 7 (discharge, 3,360 second-feet); minimum discharge, zero June 14 to July 10.

1919–1921: Maximum stage 5.30 feet August 7, 1921 (discharge, 3,360 second-feet); minimum stage, zero during part of each year.

DIVERSIONS.—Cave Creek canal, records of which are given in this report, diverts water 700 feet above station on left bank. One other canal diverts water to about 5 acres above station.

ACCURACY.—Stage-discharge relation fairly permanent and rating curves fairly well defined to 60 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating tables and by hydrograph during flood periods, except for periods October 8-30, February 18–27, May 21 to June 13, September 15, 16, 29, 30, when there was a trace of water only, and June 14 to July 10, when stream was dry. Records fair.

COOPERATION.—Discharge measurements and record of daily discharge furnished by University of Arizona, Prof. G. E. P. Smith, irrigation engineer.

Discharge measurements of Cave Creek near Paradise, Ariz., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 30	H. C. Schwalen	0.70	0.61	July 27	H. C. Schwalen	2.12	217
Apr. 23	Rice and Schwalen	.72	.45	27	do	2.12	203
July 11	H. C. Schwalen	.63	.28	28	do	1.76	97
26	do	1.55	88	28	do	1.73	83
27	do	2.35	334	Aug. 3	do	1.12	35
				Sept. 2	do	.95	6.1

Daily discharge, in second-feet, of Cave Creek near Paradise, Ariz., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	July.	Aug.	Sept.
1	0.5	29	0.5	0.5	0.5	0.5	0.5	0.5	-------	68	8
2	.5	24	.5	.5	.5	.5	.5	.5	-------	48	7
3	.5	19	.5	.5	.5	.5	.5	.5	-------	36	5
4	.5	14	.5	.5	.5	.5	.5	.5	-------	69	6
5	.5	10	1	.5	.5	.5	.5	.5	-------	62	5
6	.5	5	1	.5	.5	.5	.5	.5	-------	42	4
7	.5	7	1	.5	.5	.5	.5	.5	-------	360	4
8	-------	5	1	.5	.5	.5	.5	.5	-------	85	.5
9	-------	4	1	.5	.5	.5	.5	.5	-------	76	.5
10	-------	3.5	1	.5	.5	.5	.5	.5	-------	41	.5
11	-------	2	1	.5	.5	.5	.5	.5	-------	31	.5
12	-------	1.5	1	.5	.5	.5	.5	.5	0.5	22	.5
13	-------	1.5	1	.5	.5	.5	.5	.5	.5	20	.5
14	-------	1	1	.5	.5	.5	.5	.5	.5	23	.5
15	-------	.5	1	.5	.5	.5	.5	.5	.5	61	-------
16	-------	.5	1	.5	.5	.5	.5	.5	.5	27	-------
17	-------	.5	1	.5	.5	.5	.5	.5	-------	43	3.5
18	-------	.5	1	.5	-------	.5	.5	.5	-------	54	14
19	-------	.5	1	.5	-------	.5	.5	.5	-------	40	12
20	-------	.5	1	.5	-------	.5	.5	.5	-------	28	10
21	-------	.5	1	.5	-------	.5	.5	-------	-------	29	8
22	-------	.5	1	.5	-------	.5	.5	-------	-------	29	7
23	-------	.3	1	.5	-------	.5	.5	-------	1.5	33	6
24	-------	.5	.5	.5	-------	.5	.5	-------	12	23	5
25	-------	.5	.5	.5	-------	.5	.5	-------	75	15	4
26	-------	.5	.5	.5	-------	.5	.5	-------	70	14	3
27	-------	.5	.5	.5	-------	.5	.5	-------	165	12	2
28	-------	.5	.5	.5	.5	.5	.5	-------	13	8	1
29	-------	.5	.5	.5	-------	.5	.5	-------	95	7	-------
30	-------	.5	.5	.5	-------	.5	.5	-------	215	5	-------
31	-------	-------	.5	.5	-------	.5	-------	-------	90	8	-------

NOTE.—Trace of water only on days for which no discharge is given. Stream dry June 14 to July 10.

Monthly discharge of Cave Creek near Paradise, Ariz., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	34	[a] T.	1.21	74
November	29	0.5	4.47	266
December	1	.5	.81	50
January	.5	.5	.5	31
February	.5	T.	.32	18
March	.5	.5	.5	31
April	.5	.5	.5	30
May	.5	T.	.32	20
June	T.	0	T.	T.
July	215	0	27.6	1,700
August	360	5	45.8	2,820
September	14	T.	3.93	234
The year	360	0	7.28	5,270

[a] Trace of water only.

CAVE CREEK CANAL NEAR PARADISE, ARIZ.

LOCATION.—In SW. ¼ SE. ¼ sec. 34, T. 17 S., R. 31 E., at Portal ranger station of United States Forest Service, 750 feet below head of ditch and 8 miles by road southeast of Paradise, Cochise County.

RECORDS AVAILABLE.—October 14, 1919, to September 30, 1921.

GAGE.—Vertical staff on left bank; read by Mrs. O. P. Schoenberg.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Earth section. Bed composed of small gravel.

DIVERSIONS.—Above all diversions from ditch.

ACCURACY.—Stage-discharge relation fairly permanent. Rating curves poorly defined. Staff gage read to half-tenths daily and oftener during flood periods. Daily discharge ascertained by applying mean daily gage height to rating tables except when shifting-control method was used, and for periods October 1–31, May 17 to July 9, July 27 to August 4, August 8, 9, 16, 20–23, when canal was dry. Records fair.

COOPERATION.—Discharge measurements and record of daily discharge furnished by University of Arizona, Prof. G. E. P. Smith, irrigation engineer.

Discharge measurements of Cave Creek canal near Paradise, Ariz., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 30	H. C. Schwalen	1.15	0.3	July 11	H. C. Schwalen	1.00	*0.003
Apr. 23	Schwalen and Rice	1.20	.5	Sept. 2	do	1.50	3.5

* Estimated.

Daily discharge, in second-feet, of Cave Creek canal near Paradise, Ariz., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	July.	Aug.	Sept.
1		4.4	1.1	0.5	0.5	2.0	1.0	0.6			0.8
2		4.2	1.1	.5	.5	2.0	1.0	.5			.8
3		4.0	1.1	.5	.5	2.0	1.0	.5			2.0
4		3.8	1.1	.5	.5	2.0	.7	.5			2.0
5		3.5	.5	.5	.5	2.0	.6	.5		2.0	1.1
6		3.2	.5	.5	.7	2.0	1.0	.5		2.0	4.6
7		3.2	.5	.5	.7	2.0	1.8	.4		2.6	4.6
8		3.2	.5	.5	.7	2.0	1.1	.4			3.9
9		3.2	.5	.5	.7	2.0	1.1	.4			3.2
10		2.0	.2	.5	.6	2.0	1.1	.4	0.5	4.6	2.0
11		2.0	.2	.5	.5	1.5	1.1	.3		4.6	4.6
12		2.0	.2	.5	.5	1.5	1.1	.2	.2	4.6	3.2
13		2.0	.2	.5	.5	1.5	1.0	.2		4.6	3.2
14		1.1	.2	.5	.3	1.5	1.1	.2		2.0	3.2
15		1.1	.2	.5	.3	1.3	2.0	.2		1.1	2.0
16		1.1	.2	.5	.2	1.1	2.4		.5		4.6
17		1.1	.2	.5	.2	1.1	2.0		.2	4.6	7.8
18		1.1	.2	.5	.2	1.1	1.5			.2	7.3
19		1.1	.2	.5	.2	2.0	1.5			4.6	6.8
20		1.1	.2	.5	.2	2.0	1.5				6.3
21		1.1	.2	.5	.2	2.0	1.3				5.9
22		1.1		.5	.2	2.0	.8				5.5
23		1.1		.5	.2	2.0	.8		6.2		5.1
24		1.1		.5	.2	2.0	1.5		7.6	8.0	4.7
25		1.1		.5	.2	2.0	1.4		3.2	4.6	4.3
26		1.1	.5	.5	.2	1.5	1.1		5.0	2.0	3.9
27		1.1	.5	.5	.5	1.5	1.1			1.1	3.5
28		1.1	.5	.5	2.6	1.5	1.1			.8	3.1
29		1.1	.5*	.5		1.3	.8			.8	2.7
30		1.1	.5	.5		1.1	.8			.8	1.6
31	4.6		.5	.5		1.1				.8	

NOTE.—No flow on days for which no discharge is given.

Monthly discharge of Cave Creek canal near Paradise, Ariz., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	4.6	0	0.15	9
November	4.4	1.1	1.98	118
December	1.1	0	.40	25
January	.5	.5	.50	31
February	2.6	.2	.48	27
March	2.0	1.1	1.70	105
April	2.4	.6	1.21	72
May	.6	0	.19	12
June	0	0	0	0
July	7.6	0	.75	46
August	8.0	0	1.82	112
September	7.8	.8	3.81	227
The year	8.0	0	1.08	784

EAST TURKEY CREEK AT PARADISE, ARIZ.

LOCATION.—In SW. ¼ sec. 19, T. 17 S., R. 31 E., at Paradise, Cochise County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 4, 1919, to September 30, 1921.

GAGE.—Vertical enamel staff on right bank 300 feet downstream from post office; read by John Hancock.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Bed composed of boulders and gravel. Control formed by concrete wall extending across section and inclined downstream 100 feet with 2-foot drop. Channel fairly uniform in cross-section.

EXTREMES OF DISCHARGE.—Maximum daily mean discharge during the year, 170 second-feet, August 18; minimum discharge, dry during periods of May, June, and July.

1919–1921: Maximum mean daily discharge, 170 second-feet, August 18, 1921; minimum discharge, zero for periods of each year.

DIVERSIONS.—Several small diversions above station, but most of the water returns to the creek above station.

ACCURACY.—Stage-discharge relation fairly permanent. Rating curves fairly well defined between 0 and 20 second-feet, poorly defined above. Gage read to hundredths once daily, and oftener during flood periods. Daily discharge ascertained by applying mean daily gage height to rating table, and by hydrograph during flood periods, except for periods October 1–30, November 1 to February 27, March 1 to May 29, July 3, 7, 13, 22, August 20, 23–31, September 1–30, when there was a trace of water only, and May 30 to June 30, July 1, 2, 4–6, 8–12, 14, 15, 18–21, when stream was dry. Records fair.

COOPERATION.—Discharge measurements and record of daily discharge furnished by University of Arizona, Prof. G. E. P. Smith, irrigation engineer.

Discharge measurements of East Turkey Creek at Paradise, Ariz., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 23	Rice and Schwalen	.28	0.01
Aug. 3	H. C. Schwalen	.65	2.9

Daily discharge, in second-feet, of East Turkey Creek at Paradise, Ariz., for the year ending Sept. 30, 1921.

Day.	Oct.	Feb.	July.	Aug.	Day.	Oct.	Feb.	July.	Aug.
1				5.5	16			31	4.0
2				5.5	17				4.5
3				84	18				170
4				14	19				8.0
5				3.5	20				
6				26	21				5.5
7				67	22				2.0
8				19	23			.5	
9				41	24			9.0	
10				50	25			8.5	
11				4.0	26			18.0	
12				3.5	27			13.0	
13				2.5	28		0.5	.5	
14				3.0	29			2.0	
15				3.5	30			91	
					31	4.5		23	

NOTE.—See "Accuracy" paragraph.

Monthly discharge of East Turkey Creek at Paradise, Ariz., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	4.5	[a] T.	0.15	9
February	.5	T.	.01	1
July	91	0	6.34	390
August	170	T.	17.0	1,045
The year	170	0	2.0	1,450

[a] Trace.

NOTE.—See "Accuracy" paragraph.

GRAHAM CANAL NEAR SAFFORD, ARIZ.

LOCATION.—In NE. ¼ SW. ¼ sec. 5, T. 7 S., R. 26 E., on right bank of Gila River near Hatfield's ranch, 2 miles from Safford, Graham County.

RECORDS AVAILABLE.—October 1, 1914, to September 30, 1915; December 30, 1920, to September 30, 1921.

GAGE.—Vertical staff on left bank 600 feet below head gate; read by J. M. Hatfield.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge.

CHANNEL AND CONTROL.—Bed composed of silt, frequently covered by deposits of sand; shifting.

DIVERSIONS.—One diversion just above gage, irrigating 52 acres.

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve well defined. Gage read to hundredths twice daily. Daily discharge ascertained by using shifting-control method, shifting between measurements throughout, except for periods July 17–19, 28, August 3, 22–29, when canal was dry. Records good.

Discharge measurements of Graham canal near Safford, Ariz., during the period Dec. 22, 1920, to Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 22	H. D. Empie	5.60	46.2	Apr. 5	H. D. Empie	5.15	22.5
Jan. 7	do	5.95	56.8	May 9	do	5.03	14.0
Feb. 18	do	5.34	37.0	25	Rice and Gardiner	4.98	13.6
23	do	5.32	32.6	June 4	H. D. Empie	5.00	13.8
Mar. 4	do	5.05	23.0	July 3	do	4.88	8.0
12	do	5.20	30.0	8	do	5.30	26.6
25	do	5.10	21.1	Sept. 6	do	5.54	35.1

Daily discharge, in second-feet, of Graham canal near Safford, Ariz., for the period Dec. 30, 1920, to Sept. 30, 1921.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		43	31	18	19	14	12	7	60	71
2		43	42	18	18	14	12	7	42	68
3		45	20	18	19	14	12	21		71
4		40	15	21	21	12	12	28	47	55
5		44	34	15	21	15	12	20	21	40
6		47	36	17	19	13	12	24	18	28
7		49	41	22	17	13	12	23	20	34
8		51	38	29	19	13	11	23	20	45
9		56	37	27	19	11	11	32	26	23
10		56	37	27	17	11	11	42	21	14
11		55	33	28	17	10	10	32	20	13
12		55	34	32	18	11	10	36	20	14
13		55	36	30	16	13	13	40	20	11
14		55	40	29	18	12	11	42	16	21
15		49	40	29	18	12	11	45	16	24
16		57	38	25	18	13	13	34	14	26
17		56	36	32	16	12	11		14	62
18		56	37	28	16	12	13		58	47
19		49	36	21	14	12	11		58	34
20		47	34	20	14	14	10	34	47	30
21		50	35	21	15	14	10	71	55	28
22		48	33	22	15	14	9	80		28
23		43	34	22	15	14	8	83		25
24		43	36	21	15	14	8	77		29
25		37	26	21	15	14	8	60		49
26		44	25	19	15	14	8	71		49
27		49	21	19	14	12	8	58		39
28		45	21	19	14	12	7			44
29		34		19	14	12	6	58		57
30	44	41		21	14	12	7	32	21	58
31	39	32		19		12		50	55	

Monthly discharge of Graham canal near Safford, Ariz., for the period Dec. 30, 1920 to Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
December 30-31			41.5	165
January	57	32	47.5	2,920
February	42	15	33.1	1,840
March	32	15	22.9	1,410
April	21	14	16.7	994
May	15	10	12.7	781
June	13	6	10.3	613
July	83	0	36.5	2,240
August	60	0	22.2	1,360
September	71	11	37.9	2,260
The period				14,600

SMITHVILLE CANAL NEAR THATCHER, ARIZ.

LOCATION.—In 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; December 23, 1920, to September 30, 1921.

GAGE.—Vertical enamel section on left bank, 300 feet below wastegate, three-fourths of a mile below heading; read by Patricia Vasquez.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage.

CHANNEL AND CONTROL.—Uniform section, well-defined banks; shifting.

DIVERSIONS.—None.

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve well defined. Gage read to hundredths twice daily. Daily discharge ascertained by using shifting-control method, shifting between measurements throughout, except for periods July 5–11, August 23, 28, 30, September 2–6, 8, 18–20, when canal was dry. Records good.

Discharge measurements of Smithville canal near Thatcher, Ariz., during the period Dec. 22, 1920, to Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 22	H. D. Empie	6.65	52.0	May 26	Rice and Gardiner	5.42	12.9
Jan. 17	do	6.40	43.8	June 3	H. D. Empie	5.25	10.4
Feb. 18	do	5.92	29.1	July 2	do	5.08	7.2
Mar. 11	do	5.85	29.1	Aug. 1	do	6.54	42.7
Apr. 2	do	5.65	23.0	Sept. 13	do	6.12	27.8
May 3	do	5.55	17.2				

Daily discharge, in second-feet, of Smithville canal near Thatcher, Ariz, for the period Dec. 23, 1920, to Sept. 30, 1921.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		49	44	62	25	16	10	7	62	5
2		50	34	75	23	16	10	7	40	
3		54	34	59	23	16	8	43	37	
4		50	56	56	22	16	9	48	46	
5		69	41	44	22	16	8		33	
6		57	34	44	22	16	8		33	
7		52	36	43	22	16	8		32	3
8		47	33	38	21	16	8		29	
9		54	35	35	21	16	8		18	3
10		54	35	30	18	16	8		17	15
11		50	35	29	18	16	8		10	26
12		57	35	29	18	16	9	39	7	30
13		57	32	28	17	14	8	44	10	30
14		52	29	28	17	13	8	9	20	33
15		47	29	28	18	11	8	66	10	36
16		47	29	29	18	11	8	65	10	36
17		44	29	28	18	11	8	64	30	9
18		44	29	28	18	11	8	42	21	
19		37	29	28	18	12	9	9	32	
20		32	32	26	18	11	8	12	25	
21		36	3	26	18	1 1	8	12	39	26
22		32	38	25	18	13	8	54	28	32
23	50	32	35	25	17	11	8	30		31
24	55	31	31	25	17	10	8	17	18	28
25	57	37	35	25	17	10	8	10	15	62
26	59	36	35	25	17	11	8	39	7	58
27	57	31	36	25	17	10	8	24	2	57
28	57	33	49	25	17	10	8	53		54
29	54	34		25	19	11	8	65	4	51
30	52	36		25	16	10	7	72		44
31	50	39		28		9		29	7	

NOTE.—No flow on days for which no discharge is given.

Monthly discharge of Smithville canal near Thatcher, Ariz., for the period Dec. 23, 1920, to Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
December 23-31	59	50	54.6	975
January	69	31	44.5	2,740
February	56	29	35.0	1,940
March	75	25	33.7	2,070
April	25	16	19.0	1,130
May	16	9	13.0	799
June	10	7	8.3	488
July	72	0	27.7	1,700
August	62	0	20.7	1,270
September	62	0	22.3	1,330
The period				14,400

DODGE-NEVADA CANAL NEAR PIMA, ARIZ.

LOCATION.—In NW. ¼ SE. ¼ sec. 18, T. 6 S., R. 25 E., 1½ miles north of Pima, Graham County.

RECORDS AVAILABLE.—December 31, 1920, to September 30, 1921.

GAGE.—Vertical staff on right bank 200 feet upstream from siphon at county highway crossing; read by W. W. Crockett.

DISCHARGE MEASUREMENTS.—Made by wading at gage.

CHANNEL AND CONTROL.—Bed consists of silt, vertical banks; shifting. Control affected by siphon 200 feet below gage.

DIVERSIONS.—One diversion above gage, irrigating 14½ acres.

ACCURACY.—Stage-discharge relation not permanent. Rating curves well defined. Gage read to nearest two-hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except for periods February 3–11, July 27–31, August 1–16, 22–31, September 1–7, when canal was dry. Records good.

Discharge measurements of Dodge-Nevada canal near Pima, Ariz., during the period Dec. 23, 1920, to Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 23	H. D. Empie	1.80	29.6	May 26	J. H. Gardiner	0.57	2.9
Jan. 17	do	1.60	26.4	June 3	H. D. Empie	.74	5.2
Feb. 18	do	1.18	19.4	July 2	do	.62	2.6
Mar. 11	do	1.38	25.2	Aug. 17	do	1.80	7.7
Apr. 2	do	1.14	15.1	Sept. 9	do	2.60	23.2
May 3	do	.92	10.4				

Daily discharge, in second-feet, of Dodge-Nevada canal near Pima, Ariz., for the period Dec. 31, 1920, to Sept. 30, 1921.

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

NOTE.—No flow on days for which no discharge is given.

Monthly discharge of Dodge-Nevada canal near Pima, Ariz., for the period Dec. 31, 1920, to Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
December 31			25.0	50
January	30	19	23.6	1,450
February	28	0	15.5	861
March	34	14	19.3	1,190
April	18	12	14.4	857
May	14	5	8.7	535
June	6	4	4.5	268
July	28	0	12.3	756
August	8	0	.8	49
September	27	0	9.7	577
The period				6,590

CURTIS-KEMPTON CANAL NEAR EDEN, ARIZ.

LOCATION.—In SE. ¼ SE. ¼ sec. 4, T. 6 S., R. 24 E., on Christensen ranch, near Eden, Graham County.

RECORDS AVAILABLE.—December 26, 1920, to September 30, 1921.

GAGE.—Vertical staff gage on left bank at ranch house; read by Mrs. R. T. Hancock.

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

CHANNEL AND CONTROL.—Bed consists of silt, vertical banks; shifting. Control affected by two checks just below gage.

DIVERSIONS.—Three diversions above gage, irrigating 87 acres.

ACCURACY.—Stage-discharge relation not permanent. Rating curves fairly well defined. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except for periods January 30 to February 16, 28, March 17, 20, April 6, 7, May 12, 22, July 11–15, August 11 to September 16, 18–23, and 26, when canal was dry. Records fair.

Discharge measurements of Curtis-Kempton canal near Eden, Ariz., during the period Dec. 23, 1920, to Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 23	H. D. Empie	5.30	21.1	May 7	H. D. Empie	4.25	13.9
Jan. 17	do	5.55	26.2	27	J. H. Gardiner	4.20	12.6
Feb. 19	do	4.40	19.2	June 3	H. D. Empie	4.03	10.8
Mar. 1	do	4.30	16.1	July 2	do	3.82	7.1
Apr. 2	do	4.38	18.7				

Daily discharge, in second-feet, of Curtis-Kempton canal near Eden, Ariz., for the period Dec. 26, 1920, to Sept. 30, 1921.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		25.3		8.2	16.5	13.6	9.0	6.5	27.5	
2		27.5		15.5	16.5	12.6	9.0	5.6	27.5	
3		25.3		27.3	14.5	12.6	7.2	15.5	18.1	
4		23.0		28.4	7.2	13.6	7.2	26.2	27.5	
5		23.0		22.8	7.2	12.6	7.2	25.0	24.2	
6		25.3		25.0		12.6	7.2	18.5	17.1	
7		25.3		22.8		12.6	6.4	14.5	24.2	
8		25.3		20.5	13.6	14.5	4.5	12.4	8.8	
9		25.3		20.5	12.6	12.6	6.5	14.5	3.8	
10		26.4		18.5	13.6	13.6	8.3	17.5	6.1	
11		26.4		20.5	14.5	13.6	8.3			
12		25.3		20.5	12.6		9.3			
13		12.6		19.5	13.6	5.4	12.4			
14		12.6		18.5	12.6	18.7	11.4			
15		12.6		18.5	13.6	9.0	8.3			
16		27.5		20.5	13.6	9.0	9.3	8.6		
17		27.5	8.2		16.6	9.0	8.3	20.1		19.1
18		26.4	19.5	11.4	23.0	10.8	7.4	15.3		
19		26.4	18.5	20.5	16.6	9.0	7.4	13.5		
20		26.4	22.8		13.6	9.0	8.3	12.7		
21		28.6	21.6	21.6	13.6	9.0	11.4	26.4		
22		29.8	20.5	21.6	13.6		8.3	34.5		
23		28.6	20.5	18.5	13.6	9.0	7.4	18.1		
24		27.5	22.8	17.5	12.6	7.2	3.2	25.3		6.0
25		25.3	30.6	6.5	16.6	7.2	7.4	27.5		6.4
26	23.0	27.5	21.6	6.5	12.6	7.2	7.4	23.2		
27	23.0	30.9	12.5	17.5	13.6	7.2	8.3	25.3		8.8
28	23.0	28.6		16.5	12.6	7.2	8.3	31.0		4.9
29	22.0	16.0		16.5	12.6	8.1	6.5	41.4		19.1
30	22.0			16.5	12.6	8.1	6.5	29.8		19.1
31	22.0			16.5		9.0		8.8		

NOTE.—No flow on days for which no discharge is given.

Monthly discharge of Curtis-Kempton canal near Eden, Ariz., for the period Dec. 26, 1920, to Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
December 26–30	23.0	22.0	22.5	268
January	30.9	0	23.2	1,430
February	30.6	0	7.82	434
March	28.4	0	17.3	1,060
April	23.0	0	12.9	768
May	18.7	0	9.79	602
June	12.4	3.2	7.92	471
July	41.4	0	16.7	1,030
August	27.5	0	5.96	366
September	19.1	0	2.78	165
The period	41.4	0	----------	6,590

NOTE.—See "Accuracy" paragraph.

FORT THOMAS CONSOLIDATED CANAL AT ASHURST, ARIZ.

LOCATION.—In NE. ¼ SE. ¼ sec. 30, T. 5 S., R. 24 E., one-half mile east of State highway, at Ashurst, Graham County.

RECORDS AVAILABLE.—December 26, 1920, to September 30, 1921.

GAGE.—Vertical staff on right bank one-half mile below waste gate; read by Tom Hundley.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage.

CHANNEL AND CONTROL.—Bed consists of silt and is frequently covered by moss; shifting.

DIVERSIONS.—No diversions above gage.

ACCURACY.—Stage-discharge relation not permanent. Rating curves well defined. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table, except for periods January 22, 23, 27, 28, July 10–15, 19, 20, August 1–19, 22–26, when canal was dry. Records good.

Discharge measurements of Fort Thomas canal at Ashurst, Ariz., during the period Dec. 24, 1920, to Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 24	H. E. Empie	9.30	38.9	May 3	H. D. Empie	8.50	10.7
Jan. 17	do	9.40	43.1	26	J. H. Gardiner	8.38	7.6
Feb. 19	do	9.05	31.1	June 3	H. D. Empie	8.18	6.5
Mar. 1	do	8.60	19.9	July 2	do	8.10	4.6
Apr. 2	do	8.55	16.0	Sept. 3	do	9.11	35.6

Daily discharge, in second-feet, of Fort Thomas Consolidated canal at Ashurst, Ariz., for the period Dec. 26, 1920, to Sept. 30, 1921.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		29	43	22	13	8	6	4		50
2		29	43	22	17	8	7	4		38
3		33	43	28	14	8	7	32		33
4		23	43	26	14	8	7	81		33
5		26	43	20	14	8	9	79		46
6		32	44	22	13	8	7	17		28
7		36	46	26	11	7	7	10		26
8		36	46	23	12	8	4	9		19
9		39	43	23	11	8	4	4		19
10		39	43	20	11	8	4			12
11		39	43	17	8	8	4			11
12		39	43	17	8	8	7			16
13		39	39	20	10	8	7			26
14		41	39	12	8	8	4			31
15		39	36	14	10	8	4			31
16		39	37	13	10	8	4	15		34
17		43	32	12	10	6	4	61		36
18		37	32	12	11	6	6	3		5
19		29	29	12	11	8	4			10
20		29	32	13	11	7	6		21	24
21		24	36	14	10	7	7	21	2	22
22			29	13	10	7	7	48		38
23			23	12	11	7	7	48		36
24		13	19	12	8	6	7	41		34
25		23	19	14	8	6	7	15		41
26	43	21	19	17	10	6	6	17		18
27	43		17	15	10	5	6	1	43	43
28	43		17	13	11	7	7	17	26	43
29	39	54		13	11	7	4	69	28	39
30	43	54		14	11	6	4	59	27	32
31	32	50		14		4		32	27	

NOTE.—Canal dry on days for which no record is given. Discharge Jan. 13, July 9, 18, 21, 27, Aug. 30, 31, Sept. 18, 19, and 26 is for part of day only.

Monthly discharge of Fort Thomas Consolidated canal at Ashurst, Ariz., for the period Dec. 26, 1920, to Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
December 26–31	43	32	40.5	482
January	54	0	30.2	1,860
February	46	17	34.9	1,940
March	28	12	16.9	1,040
April	17	8	10.9	649
May	8	4	7.2	443
June	9	4	5.8	345
July	81	0	22.2	1,360
August	43	0	5.6	344
September	50	5	29.1	1,730
The period				10,200

11582—25†—WSP 529——11

SAN PEDRO RIVER NEAR FAIRBANK, ARIZ.

LOCATION.—Opposite Boquillas Land & Cattle Co.'s ranch house, 1½ miles southeast of Fairbank, Cochise County, and 3 miles below old Charleston mill.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 28, 1912, to September 30, 1921. January 27, 1904, to August 31, 1906, and October 8, 1910, to November 15, 1911, for station at Charleston; November 15, 1911, to September 28, 1912, for station at diversion dam of Boquillas Land & Cattle Co.

GAGE.—Vertical and inclined staff on right bank just upstream from ford leading to ranch house (datum lowered 10.0 feet April 27, 1921); read by A. H. Zachau. For description of previous gages used at this station, see Water-Supply Paper 479, p. 154.

DISCHARGE MEASUREMENTS.—Made from cable 600 feet downstream from gage or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and gravel; shifting. Both banks steep in vicinity of gage and cable, channel fairly straight with considerable fall. At low stages channel bears away from gage and a ditch has to be maintained from gage to river.

EXTREMES OF DISCHARGE.—Maximum stage during year, 20.2 feet at 7.30 p. m. July 19 (discharge, 19,000 second-feet, from extension of rating curve); minimum stage, 9.83 feet June 20, 21, 25, 26, 28–30 (discharge, 1.5 second-feet).

1912–1921: Maximum stage recorded, 16.0 feet (26.0 feet on 1921 datum) at 5 p. m. December 22, 1915 (discharge not determined); minimum discharge, 1 second-foot, occurred on June 13, 14, September 26–28, 1918, and June 23–30, 1919.

DIVERSIONS.—Boquillas Land & Cattle Co. diverts water at various points above station for irrigation. Total area irrigated not known.

ACCURACY.—Stage-discharge relation not permanent. Rating curves well defined except for discharges above 2,000 second-feet. Gage read to hundredths once daily and oftener during flood periods. Daily discharge ascertained by applying mean daily gage height to rating table, except when shifting-control method was used. Records fair.

Discharge measurements of San Pedro River near Fairbank, Ariz., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 19	H. C. Schwalen	−0.90	2.9	July 16	H. C. Schwalen	10.48	223
Nov. 19	do	− .80	11	16	do	10.31	147
Jan. 23	do	− .81	14	16	do	10.21	96
Feb. 24	do	− .76	14	17	do	10.09	54
Mar. 17	do	− .75	14	Aug. 3	J. H. Gardiner	9.85	166
Apr. 27	Gardiner and Schwalen[a]	9.90	5.8	4	do	11.50	1,280
July 7	H. C. Schwalen	10.13	29	4	do	11.18	1,090
16	do	10.79	451	6	H. C. Schwalen	10.67	431

[a] New datum.

Daily discharge, in second-feet, of San Pedro River near Fairbank, Ariz., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3.5	10	10	13	17	19	8	4	2	2	2,830	335
2	3.5	10	10	13	17	18	8	4	2	1.5	490	138
3	3.5	10	11	13	14	17	7	5	3	1,640	210	79
4	3.5	9	11	14	13	16	7	5	2	1,070	1,480	52
5	3.5	9	10	14	13	17	7	4	2	490	555	34
6	3.5	10	11	14	13	17	7	4	2	52	2,660	30
7	4	10	11	17	13	17	7	4	2	22	335	15
8	3.5	12	12	18	13	17	7	2	2	14	5,600	11
9	3.5	12	11	18	15	16	7	2	2	204	480	9
10	3.5	12	11	17	15	15	5	2	2	605	168	7
11	3.5	13	11	16	15	16	4	2	2	187	108	14
12	3.5	13	11	16	15	17	4	2	2	21	113	13
13	3.5	13	11	17	13	17	4	2	88	15	118	83
14	3.5	13	11	17	13	17	3	2	29	275	123	11
15	3.5	13	11	18	12	17	3	2	15	40	108	12
16	3	13	11	18	12	17	3	2	8	338	312	47
17	3	13	11	19	12	15	4	2	2	138	108	63
18	3	13	11	19	11	17	4	2	2	40	580	19
19	3	11	11	17	11	16	4	2	2	710	2,300	18
20	3	11	11	15	11	17	4	2	1.5	190	420	17
21	4	11	11	14	11	17	4	2	1.5	174	203	18
22	4	10	13	14	11	16	5	2	2	158	108	19
23	4	10	13	14	11	8	5	3	2	995	96	20
24	10	10	13	14	13	6	5	2	2	295	580	20
25	10	10	13	15	13	5	5	2	1.5	1,700	47	19
26	8	10	13	15	14	6	5	2	1.5	1,230	34	18
27	10	10	13	17	15	6	6	2	2	1,940	23	15
28	8	10	13	17	19	7	6	2	1.5	2,680	19	17
29	8	10	13	17	------	7	6	2	1.5	1,540	14	18
30	8	10	13	17	------	8	5	3	1.5	6,700	23	18
31	8	------	13	17	------	8	------	3	------	3,690	21	------

Monthly discharge of San Pedro River near Fairbank, Ariz., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	10	3	4.8	295
November	13	9	11.0	655
December	13	10	11.6	713
January	19	13	15.9	978
February	19	11	13.4	744
March	19	5	13.8	848
April	8	3	5.3	315
May	5	2	2.6	160
June	88	1.5	6.32	376
July	6,700	1.5	876	53,900
August	5,600	14	654	40,200
September	335	7	39.6	2,360
The year	6,700	1.5	140	102,000

ARAVAIPA CREEK NEAR FELDMAN, ARIZ.

LOCATION.—In sec. 9, T. 7 S., R. 16 E., 2 miles east of Feldman, Pinal County, 1,200 feet above junction of Aravaipa Creek and San Pedro River, and at concrete highway dip.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 21, 1919, to September 30, 1921, when station was discontinued.

GAGE.—Painted on downstream side of concrete dip from 1.0 to 3.0 feet and from 3.0 to 8.0 feet on county vertical pipes at either end of dip; gage read by Della E. Barker.

DISCHARGE MEASUREMENTS.—Made by wading up to 1,000 second-feet; above 1,000 second-feet, by floats.

CHANNEL AND CONTROL.—Bed consists of gravel and boulders; shifting. Control afforded by concrete dip, affected by deposits of gravel and sand. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year, 5.0 feet on July 31 (discharge, 12,600 second-feet); minimum stage, zero flow each month.

1919–1921: Maximum stage 6.3 feet on August 2, 1919 (discharge, 20,000 second-feet); minimum stage, zero flow each month.

ICE.—None.

DIVERSIONS.—Approximately 2,000 acres irrigated above gage.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changes on account of gravel deposits on dip and shifting of low-water channel. Curves for short periods used for low water. Standard curve poorly defined above 500 second-feet. Gage read to quarter-tenths once daily and oftener during rises. Daily discharge ascertained by applying mean daily gage height to rating table or by hourly discharges on rapidly changing stages. Records poor on account of changing control and lack of measuring equipment.

Discharge measurements of Aravaipa Creek near Feldman, Ariz., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 22	Schwalen and Code	1.20	2.1
July 30	J. H. Gardiner	1.69	6.3
Aug. 16	Rice and Gardiner	1.22	16.5

Daily discharge, in second-feet, of Aravaipa Creek near Feldman, Ariz., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Feb.	July.	Aug.	Sept.	Day.	Oct.	Nov.	Feb.	July.	Aug.	Sept.
1	------	137	------	------	450	27	16	------	------	------	------	50	2
2	------	27	190	------	7	14	17	------	------	------	------	14	------
3	------	14	------	375	------	10	18	------	------	------	------	27	------
4	------	14	------	750	180	------	19	------	------	------	------	20	------
5	------	14	------	20	105	------	20	5	------	------	100	14	------
6	------	14	------	7	14	------	21	2	------	------	280	14	------
7	------	------	------	------	14	------	22	2	------	------	27	700	------
8	------	------	------	------	255	------	23	2	------	------	27	490	------
9	------	------	------	------	390	------	24	1	------	------	65	340	------
10	------	------	------	100	7	------	25	------	------	------	490	110	------
11	------	------	------	5	------	------	26	------	------	------	100	38	------
12	------	------	------	5	------	------	27	------	------	------	810	30	------
13	------	------	------	------	------	------	28	------	------	------	675	27	60
14	------	------	------	------	------	------	29	------	------	------	137	20	5
15	------	------	------	------	------	30	30	1,400	------	------	630	35	------
							31	1,010		------	1,610	25	------

NOTE.—Stream dry on days for which no discharge is given.

Monthly discharge of Aravaipa Creek near Feldman, Ariz., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1,400	0	78.1	4,800
November	137	0	7.3	434
February	190	0	6.8	378
July	1,610	0	200	12,300
August	700	0	109	6,700
September	60	0	4.9	292
The year	1,610	0	34.4	24,900

NOTE.—See footnote to table of daily discharge.

SANTA CRUZ RIVER NEAR NOGALES, ARIZ.

LOCATION.—In sec. 36, T. 23 S., R. 14 E., at city of Nogales pumping plant, 7 miles northeast of Nogales, Santa Cruz County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 22 to November 30, 1907, and April 1, 1909, to September 30, 1920 (incomplete). April 28, 1921, to September 30, 1921.

GAGE.—Painted on vertical pier of highway bridge. One gage to each pier designated A, B, and C, from left to right bank; read by O. R. Harrington. For description of previous gages used at this station, see Water-Supply Paper 479, p. 157.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed composed of sand and gravel which is constantly shifting. No well-defined control. Channel is wide and shallow with low banks.

EXTREMES OF DISCHARGE.—Maximum stage for the period April 28 to September 30, 1921, 8.3 feet at 6 p. m. August 9 (discharge, 2,600 second-feet from extension of curve); channel dry April 28 to July 19, July 22–24.

No reliable record of maximum floods during previous years. Channel is usually dry during long periods of each year.

DIVERSIONS.—Water is diverted above station for irrigation of about 140 acres.

ACCURACY.—Stage-discharge relation continually changing. Standard rating curve poorly defined. Staff gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except for period July 20, 21, when discharge was obtained by hydrograph, and for periods of no flow. Records poor.

Discharge measurements of Santa Cruz River near Nogales, Ariz., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 8	J. B. Spiegel	[a] 1.62	2.4	July 20	Rice and Gardiner	5.50	154
28	R. R. Herrera	[a] 1.62	2.5	20	do	5.40	98
Mar. 8	do	[a] 1.58	1.9	20	do	5.36	78
12	Spiegel and Herrera	[a] 1.58	1.7	21	do	5.30	28
July 20	Rice and Gardiner	5.25	44				

[a] Old gage datum.

Daily discharge, in second-feet, of Santa Cruz River near Nogales, Ariz., for the period Apr. 28 to Sept. 30, 1921.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1		742	125	11		465	14	21	17	742	10
2		80	205	12		184	14	22		205	10
3		351	45	13		56	14	23		94	94
4		425	36	14		67	14	24		67	14
5		110	45	15		230	14	25	275	80	14
6		162	36	16		286	14	26	28	94	14
7		110	28	17		80	10	27	275	110	14
8		230	22	18		56	10	28	28	80	22
9		1,120	17	19		125	10	29	36	80	22
10		317	14	20	186	693	10	30	144	36	22
								31	742	162	

NOTE.—No flow Apr. 28 to July 19, July 22-24.

Monthly discharge of Santa Cruz River near Nogales, Ariz., for the period Apr. 28 to Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
July	742	0	55.8	3,430
August	1,120	36	246	15,100
September	205	10	31.1	1,850
The period				20,380

NOTE.—See footnote to table of daily discharge.

SANTA CRUZ RIVER AT TUCSON, ARIZ.

LOCATION.—In sec. 14, T. 14 S., R. 13 E., at Congress Street Bridge at Tucson, Pima County, 7 miles above Rillito Creek.

RECORDS AVAILABLE.—October 15, 1905, to September 30, 1921.

DRAINAGE AREA.—Not measured.

GAGE.—Staff gages painted on downstream side of each bridge abutment. Original gage was painted on bridge pier on left bank. During 1911 and up to September 30, 1912, gage heights were observed from temporary staff or by measuring to the water surface from a reference point on bridge. October 1, 1912, to July 7, 1913, a chain gage installed on bridge was used. Original datum was maintained until November 22, 1913, when it was lowered 2 feet. From December 12, 1914, to September 7, 1916, gage heights were obtained from a reference point to 16.73 feet above datum. During summer of 1916 a new bridge was constructed and a staff gage was installed September 7, on one side of the piers at a different datum. Since then, additional painted gages, set to the same datum, have been used to facilitate observations when river flows in several channels past the bridge. Observer, J. O. Kenny.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of sand; channel wide and shallow; shifts badly at all stages. High water of August 2, 1921, washed out bank protection on right bank upstream from bridge and permitted the river to encroach on road embankment. The direction of approach of river to bridge measuring section was considerably altered. Temporary revetment was later placed on right bank to protect bank from further cutting.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 4,000 second-feet, about 7 a. m. August 1, from hydrograph; minimum flow, zero most of year.

1905–1921: Maximum stage recorded, 9.8 feet, December 24, 1914 (discharge, approximately 9,000 second-feet). Stream dry most of each year at this point.

DIVERSIONS.—Diversions above the station for irrigation, amounts unknown.

ACCURACY.—Stage-discharge relation not permanent. Loose sand channel and control continually changing. Gage read to tenths several times daily during flow periods. Daily discharge computed by indirect methods, and hydrographs prepared for high-water periods. Records fair. During part of winter for a period of one or two months usually from 2 to 6 second-feet flows past the gage which is not measured. This is waste from irrigation ditch that enters the river about one-quarter mile upstream.

COOPERATION.—Daily-discharge record furnished by University of Arizona through Prof. G. E. P. Smith, irrigation engineer.

Discharge measurements of Santa Cruz River at Tucson, Ariz., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
July 4	H. C. Schwalen		212	July 28	W. E. Code	5.15	1,340
4	Rice and Code	3.97	22	Aug. 1	G. E. P. Smith	5.90	a 1,530
4	do	5.39	983	2	Smith and Code	4.45	31
4	do	4.71	607	10	Schwalen and Code	5.65	1,170
15	Schwalen and Code	4.58	296	14	do	5.20	447
15	J. H. Gardiner	4.10	28	16	H. C. Schwalen	6.70	2,600
15	do	4.00	19	17	do	5.16	473
22	W. E. Code	3.20	8.6	18	do	3.70	42
27	do	3.40	11	20	Schwalen and Code	6.02	984

a Floats.

Daily discharge, in second-feet, of Santa Cruz River at Tucson, Ariz., for the year ending Sept. 30, 1921.

Day.	Dec.	July.	Aug.	Sept.	Day.	Dec.	July.	Aug.	Sept.
1			2,080	355	16	5	84	1,700	
2			47	405	17	3	10	495	5
3			30	330	18			225	
4		356	76		19			610	
5		28	20		20			1,020	
6			40		21			810	
7			5		22		12	450	
8			350		23		5	250	
9			160		24		76	375	
10			510		25		29	720	
11			400	500	26			315	
12			60		27		8	390	
13	10		5		28		970	280	
14	5		125		29		175	4	20
15	5	150	285		30		8	1	
					31		710	80	

NOTE.—Stream reported dry on days of no record.

Monthly discharge of Santa Cruz River at Tucson, Ariz., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
July	970	0	84.5	5,200
August	2,080	1	384	23,600
September	500	0	53.7	3,200
The year	2,080	0	44.3	32,100

NOTE.—Monthly discharge computed by engineer of U. S. Geol. Survey from daily discharge furnished by University of Arizona, Prof. G. E. P. Smith, irrigation engineer. See "Accuracy" in station description, and footnote to table of daily discharge.

RILLITO CREEK NEAR TUCSON, ARIZ.

LOCATION.—In sec. 23, T. 13 S., R. 13 E., at highway bridge on Oracle road, 4 miles above confluence with Santa Cruz River and 4 miles north of Tucson, Pima County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 12, 1911, to September 30, 1921 (incomplete).

GAGE.—Staff gage painted on downstream side of right abutment, referred to as gage A. Additional painted gages as needed, set to same datum, are located on the several piers of the highway bridge to facilitate observations when river flows in several channels past the bridge. These are designated as gages B, C, D, E, and F, starting from first pier from right abutment. Gage E was installed January 19, 1920; gage F was installed in the fall of 1921 after the pier was rebuilt. A Richard Freres water-stage recorder attached to right abutment of bridge was used part of the time prior to July 21, 1916, when it was destroyed. Observer, Morgan Mason.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of sand which is constantly shifting. On July 31, 1921, at 5 p. m. the fifth pier from the right abutment (first pier from left abutment) became undermined and washed out allowing two bridge spans to drop into the channel. Low-water flows passed through that opening and in a narrow channel parallel to the bridge through the last span. On about August 28, 1921, bridge repair operations again changed the low-water channel. Repairs were completed about October 17, 1921, leaving a hill of sand some 16 feet high immediately downstream from the bridge.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, midnight, July 31, 16,000 second-feet, from hydrograph. Stream dry greater part of year.

1911–1921: Maximum discharge recorded, as given above; maximum mean daily discharge, about 16,000 second-feet on December 23, 1914 (no record of discharge at peak of flood). Stream dry greater part of each year.

DIVERSIONS.—Flood water is diverted for irrigation above station, amount unknown.

ACCURACY.—Stage-discharge relation not permanent. Loose sand channel and control continually changing. Gage read to tenths several times daily during flow periods. Daily discharge computed by indirect methods and hydrographs. Many of the small flows that did not reach gage were estimated. Records poor.

COOPERATION.—Discharge measurements and record of daily discharge furnished by University of Arizona, Prof. G. E. P. Smith, irrigation engineer.

Discharge measurements of Rillito Creek near Tucson, Ariz., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
July 15	W. E. Code	4.68	[a] 46	Aug. 1	G. E. P. Smith	5.35	[ac] 1,020
[a] 20	do	4.65	[a] 46	2	Smith and Code	4.60	[a] 168
28	do	7.70	[b] 9,800	4	W. E. Code	5.00	[a] 470

[a] Gage E read.
[b] Gage A read. Readings from gage E not reliable on account of wooden current deflector lodged against pier by high water.
[c] Made by floats over 40-foot section.

Daily discharge, in second-feet, of Rillito Creek near Tucson, Ariz., for the year ending Sept. 30, 1921.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1		3,410	3	11			40	21		750	
2		160	2	12			45	22		370	
3		20		13				23		90	
4	400	370		14		18		24		15	
5		24		15		5		25	45	720	
6		84		16		350		26		100	
7				17				27	29	5	
8		15		18				28	3,200		90
9		18		19		180		29	300	16	4
10		40		20	504	1,380		30	3,700	2	
								31	4,920		

NOTE.—No flow except where discharge is given.

Monthly discharge of Rillito Creek near Tucson, Ariz., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
July	4,920	0	423	26,000
August	3,410	0	263	16,200
September	90	0	6.1	363
The year	4,920	0	58.6	42,600

NOTE.—See footnote to table of daily discharge.

SALT RIVER NEAR ROOSEVELT, ARIZ.

LOCATION.—At diversion dam for power canal, 10 miles above upper end of Roosevelt reservoir and 20 miles east of Roosevelt, Gila County.

DRAINAGE AREA.—4,222 square miles (measured by United States Bureau of Reclamation).

RECORDS AVAILABLE.—October 1, 1913, to September 30, 1921 (including all water diverted for the development of power but not flow of Tonto Creek); February 7, 1901, to December 9, 1907, at site of Roosevelt dam (including flow of Tonto Creek).

1910–1913: Discharge at Roosevelt dam computed from records of flow into and out of the reservoir (representing natural flow of Salt River, including Tonto Creek and water diverted for the development of power).

GAGE.—Principal gage is vertical staff on left bank, bolted to concrete wall at head of canal. Temporary gages are used from time to time on account of the channel shifting away from the main gage.

DISCHARGE MEASUREMENTS.—Made from cable at dam site or by wading near dam site. Prior to January 19, 1916, when the dam was destroyed by flood, low-water measurements were made by wading below the dam. Above wading stage, discharge was determined from elevation of water surface in reservoir, taking into account known outflow and computed inflow from other sources besides Salt River.

CHANNEL AND CONTROL.—Shifting sand and gravel. Prior to its destruction by flood on January 19, 1916, the dam formed a permanent control.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge during the year, 12,000 second-feet, August 22; minimum discharge, 152 second-feet, July 4.

1913–1921: Maximum mean daily discharge, 79,200 second-feet January 15, 1916; minimum discharge, 152 second-feet September 25, 1918, and July 4, 1921.

DIVERSIONS.—None.

ACCURACY.—Discharge measurements are made nearly every day when discharge is less than about 3,000 second-feet, and the results should be excellent. For flow greater than 3,000 second-feet there are no facilities for making discharge measurements. Discharge determined from extension of rating curve and study of reservoir contents, and results are subject to considerable error.

COOPERATION.—Daily-discharge records furnished by Salt River Valley Water Users' Association.

Daily discharge, in second-feet, of Salt River near Roosevelt, Ariz., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	236	480	338	298	342	414	327	306	258	160	5,450	5,820
2	235	598	313	301	335	485	318	297	257	160	5,920	3,950
3	235	494	305	305	333	515	310	298	246	154	3,680	2,940
4	230	445	305	278	330	510	307	320	255	152	3,410	2,500
5	223	445	332	284	325	493	310	326	246	221	2,320	2,180
6	220	465	333	288	337	515	324	332	243	228	2,700	1,310
7	218	1,200	318	288	442	510	330	334	245	195	3,190	1,110
8	216	1,030	326	295	410	493	335	354	245	193	2,580	850
9	214	710	308	308	396	368	336	354	245	186	2,610	928
10	216	610	308	310	396	402	324	338	245	221	2,540	825
11	218	570	312	312	330	368	312	325	204	372	2,550	762
12	218	538	315	312	335	353	308	326	219	402	2,360	675
13	235	495	326	322	329	359	309	355	222	326	2,220	625
14	235	480	332	328	349	344	316	345	262	240	2,490	602
15	244	431	326	317	397	344	318	264	258	295	2,610	545
16	246	428	318	292	380	344	318	258	255	286	2,550	580
17	254	425	308	290	406	380	370	257	249	325	2,060	500
18	256	425	308	287	420	374	335	258	255	356	1,790	500
19	266	424	319	352	415	360	321	262	252	367	2,180	488
20	274	395	326	364	410	346	316	262	247	502	2,310	490
21	650	400	365	368	386	356	315	265	215	408	2,630	455
22	555	400	360	368	375	374	315	264	212	382	12,000	430
23	410	377	370	357	377	374	318	264	196	365	9,410	415
24	375	377	358	348	370	366	308	257	184	490	4,210	368
25	363	377	353	328	383	373	302	258	181	635	3,520	375
26	355	377	345	325	353	351	308	265	167	722	4,650	530
27	343	372	330	311	332	346	321	261	166	2,240	5,380	432
28	340	373	313	300	349	333	314	261	168	2,200	3,400	400
29	328	362	306	320	-------	368	306	255	166	1,480	2,820	355
30	334	365	312	338	-------	360	304	242	163	3,360	2,800	355
31	354	-------	331	338	-------	356	-------	240	-------	4,040	3,490	-------

Monthly discharge of Salt River near Roosevelt, Ariz., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	650	214	293	18,000
November	1,200	362	496	29,500
December	370	305	326	20,000
January	368	278	317	19,500
February	442	325	369	20,500
March	515	333	395	24,300
April	370	302	318	18,900
May	355	240	290	17,800
June	262	163	224	13,300
July	4,040	152	699	43,000
August	12,000	1,790	3,610	222,000
September	5,820	355	1,080	64,300
The year	12,000	152	706	511,000

NORTH FORK OF WHITE RIVER AT WHITERIVER, ARIZ.

LOCATION.—At power plant half a mile from Fort Apache Indian School at Whiteriver, Navajo County, 2½ miles above junction of north and east forks of White River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1916, to September 30, 1921 (incomplete).

GAGE.—Vertical staff on right bank just below tailrace of power plant; after June 6 an inclined staff 140 feet below power plant (datum lowered 3.0 feet); read by Chester Gatewood.

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

CHANNEL AND CONTROL.—Bed composed of sand and gravel; shifts during high water. Control is of gravel and boulders.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.0 feet in afternoon of August 4 and 5 (discharge, 2,700 second-feet); minimum discharge, 10 second-feet June 22 and 27.

1916–1921: Maximum stage recorded, 7 feet during February, 1920 (discharge, not determined); minimum discharge, 10 second-feet June 22 and 27, 1921.

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

DIVERSIONS.—Water diverted for power development and returned to river above gage.

REGULATION.—Slight fluctuation may occasionally be caused by operation of power plant just above gage.

ACCURACY.—Stage-discharge relation fairly permanent. Rating curves poorly defined. Gage read to quarter-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except for periods December 17–29, April 1, 2, 4–12, 17, May 21–23, when discharge was interpolated, and January 19 to March 31, when no record was obtained. Records poor.

Discharge measurements of North Fork of White River at Whiteriver, Ariz., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 29	Rice and Gardiner	3.05	79
29	----do	3.05	63
June 6	----do	2.97	58

Daily discharge, in second-feet, of North Fork of White River at Whiteriver, Ariz., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Apr.	May.	June.	July.	Aug.	Sept.
1	40	90	40	40	90	102	80	15	838	942
2	40	90	40	40	90	102	80	15	425	570
3	40	90	40	40	90	115	80	15	790	455
4	40	90	40	40	90	115	80	28	1,690	425
5	40	90	40	40	90	102	80	28	1,690	175
6	40	500	40	40	90	102	55	20	395	148
7	40	430	40	40	90	102	45	20	425	148
8	40	300	40	40	90	102	45	20	425	230
9	40	128	40	40	90	90	35	20	425	192
10	40	115	40	40	90	102	35	35	1,000	65
11	40	102	40	40	90	90	35	35	942	162
12	40	90	40	40	90	90	45	45	1,060	108
13	40	90	40	40	90	102	75	35	1,000	65
14	40	80	40	40	102	102	75	55	425	134
15	40	70	40	40	102	102	108	35	425	134
16	40	80	40	40	102	90	35	55	395	85
17	40	80	40	40	102	90	35	55	395	85
18	40	80	40	40	102	90	35	55	395	108
19	40	70	40	------	102	102	45	55	455	108
20	90	70	40	------	90	90	35	75	1,060	75
21	70	70	40	------	102	90	20	55	1,390	55
22	60	60	40	------	102	90	10	55	425	75
23	60	60	40	------	102	90	20	65	885	75
24	70	50	40	------	102	90	20	65	425	108
25	70	50	40	------	102	90	20	85	655	108
26	70	50	40	------	115	102	20	65	570	65
27	70	50	40	------	115	102	10	270	1,000	85
28	70	40	40	------	128	102	15	340	700	75
29	60	40	40	------	128	102	15	395	655	85
30	60	40	40	------	128	90	20	425	1,690	85
31	70	------	40	------	------	90	------	425	1,120	------

NOTE.—See "Accuracy" paragraph.

Monthly discharge of North Fork of White River at Whiteriver, Ariz., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	90	40	51.0	3,140
November	500	40	108	6,430
December	40	40	40.0	2,560
January 1–18	------	------	40.0	1,490
April	128	90	99.9	5,940
May	115	90	97.4	5,990
June	108	10	43.6	2,590
July	425	15	95.5	5,870
August	1,690	395	780	48,000
September	942	55	174	10,400

WHITE RIVER AT FORT APACHE, ARIZ.

LOCATION.—At highway bridge on Fort Apache Military Reservation, just below junction of North and East forks, at Fort Apache, Navajo County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 23, 1912, to September 30, 1920 (incomplete). June 1, 1921, to September 30, 1921.

GAGE.—Vertical and inclined staff fastened to downstream end of left abutment of bridge; installed June 6, 1921; read by George Bond. For previous gages see Water-Supply Paper 479.

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

CHANNEL AND CONTROL.—Bed composed of sand and gravel; shifts during floods. Left bank subject to overflow during extreme high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the period June 1, to September 30, 1921, 4.3 feet at 4.25 p. m., August 27 (discharge, 2,500 second-feet); minimum discharge, 40 second-feet, June 29 to July 3.

1912–1921: Records incomplete, maximum discharge not determined. A minimum discharge of 25 second-feet occurred on November 3 and 4, 1915.

DIVERSIONS.—Small quantity of water diverted for irrigation by Indians several miles above station; amount not known.

ACCURACY.—Stage-discharge relation not permanent. Rating curves poorly defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records poor.

Discharge measurements of White River at Fort Apache, Ariz., during the period May 30 to Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 30	Rice and Gardiner	1.12	102
June 6	do	1.06	78

Daily discharge, in second-feet, of White River at Fort Apache, Ariz., for the period June 1 to Sept. 30, 1921.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1		40	870	1,180	16	88	88	608	165
2		40	608	925	17	80	88	492	150
3	88	40	465	790	18	72	88	520	150
4		50	870	675	19	72	120	548	135
5	88	58	575	608	20	65	130	548	135
6	88	45	492	548	21	58	102	1,675	135
7	88	40	492	492	22	58	102	1,180	122
8	80	45	520	465	23	50	110	1,110	135
9	80	45	575	415	24	50	185	790	150
10	72	58	575	415	25	50	310	1,110	135
11	72	65	675	392	26	45	310	925	122
12	80	72	710	370	27	45	290	830	122
13	80	65	710	370	28	45	1,560	925	110
14	80	95	750	350	29	40	415	830	110
15	102	72	790	330	30	40	925	1,400	110
					31		520	1,180	

Monthly discharge of White River at Fort Apache, Ariz., for the period June 1 to Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June	102	40	70.7	4,210
July	1,560	40	199	12,200
August	1,675	465	785	48,300
September	1,180	110	344	20,500
The period				85,200

TONTO CREEK NEAR ROOSEVELT, ARIZ.

LOCATION.—In sec. 14, T. 6 N., R. 10 E., 6 miles above upper end of Roosevelt reservoir and 15 miles northwest of Roosevelt, Gila County.

DRAINAGE AREA.—1,004 square miles (measured by United States Bureau of Reclamation).

RECORDS AVAILABLE.—October 1, 1913, to September 30, 1921.

GAGE.—Vertical staff on right bank. Site of gage is changed from time to time owing to shifting control.

DISCHARGE MEASUREMENTS.—Made by wading at low stages and by slope method at high stages.

CHANNEL AND CONTROL.—Bed composed of boulders and gravel; shifts at high stages. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge during year, 1,020 second-feet, August 1; minimum mean daily discharge, 1 second-foot, June 28 to July 3 and July 7–9, 11, and 12.

1913–1921: Maximum daily discharge, 15,800 second-feet, January 19, 1916; minimum discharge, 1 second-foot, September 1–3, October 2–21, 1918, June 28 to July 3, and July 7–9, 11, and 12, 1921.

DIVERSIONS.—There are no diversions near this station. The entire flow is discharged into Roosevelt reservoir.

ACCURACY.—Discharge measurements made as often as appears necessary to determine changes in stage-discharge relation. Records fair for low and medium stages. Records for high stages poor; based on extension of rating curve and study of contents of Roosevelt reservoir.

COOPERATION.—Record of daily discharge furnished by Salt River Valley Water Users' Association.

Daily discharge, in second-feet, of Tonto Creek near Roosevelt, Ariz., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	11	166	33	27	33	14	22	11	5	1	1,020	118
2	10	116	33	26	33	29	22	11	5	1	470	89
3	10	122	29	26	29	29	16	11	5	1	276	75
4	10	117	27	26	29	33	16	10	4	33	178	65
5	9	59	27	26	26	36	21	8	4	8	178	65
6	8	103	27	26	26	36	21	8	3	4	95	54
7	8	42	27	24	26	36	23	8	3	1	50	54
8	8	165	27	24	33	36	23	8	3	1	95	42
9	7	128	27	24	37	30	23	12	3	1	73	38
10	7	118	27	24	56	20	23	12	3	4	45	22
11	7	102	27	24	49	28	21	12	3	1	65	22
12	7	65	27	24	49	28	21	12	3	1	75	20
13	7	54	27	24	44	28	23	12	3	15	75	20
14	7	88	27	24	44	28	23	12	3	57	88	20
15	7	86	27	24	44	28	23	12	3	110	75	14
16	7	85	27	21	44	31	21	10	3	16	55	14
17	7	76	27	21	44	31	21	8	3	4	118	14
18	7	76	27	21	40	62	21	8	3	34	75	11
19	7	76	27	20	40	62	21	8	3	21	65	11
20	8	74	27	23	40	62	22	8	3	106	105	11
21	140	40	27	23	34	50	21	8	2	92	325	8
22	140	38	27	23	35	46	21	8	2	66	755	8
23	75	38	27	30	35	40	21	7	2	55	500	8
24	60	37	27	31	29	40	21	5	2	34	260	8
25	50	32	27	30	29	33	16	5	2	276	450	8
26	50	33	27	30	20	31	16	5	2	176	260	14
27	27	33	27	29	20	31	15	5	2	406	180	14
28	20	33	27	29	14	32	15	5	1	340	135	11
29	20	33	27	30	------	32	12	5	1	178	105	11
30	20	33	27	33	------	23	11	5	1	178	118	8
31	60	------	27	33	------	22	------	5	------	530	102	------

Monthly discharge of Tonto River near Roosevelt, Ariz., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	140	7	26.5	1,630
November	166	32	75.6	4,500
December	33	27	27.5	1,690
January	33	20	25.8	1,590
February	56	14	35.1	1,950
March	62	14	34.4	2,120
April	23	11	19.9	1,180
May	12	5	8.5	523
June	5	1	2.8	167
July	530	1	88.7	5,450
August	1,020	45	209	12,900
September	118	8	29.2	1,740
The year	1,020	1	48.9	35,400

VERDE RIVER NEAR CLARKDALE, ARIZ.

LOCATION.—In T. 17 N., R. 3 E., 4 miles below mouth of Sycamore Creek and 5 miles above Clarkdale, Yavapai County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 18, 1915, to July 25, 1921, when station was discontinued (incomplete).

GAGE.—Stevens continuous water-stage recorder on left bank. Recorder referred to vertical staff 30 feet upstream until October 8, 1918, when it was referred to a vertical staff fastened to gage well. Datum lowered 0.65 foot December 8, 1917. Inspected by engineers of United Verde Copper Co.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

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

EXTREMES OF DISCHARGE.—Maximum stage during period October 1, 1920, to July 25, 1921, from water-stage recorder, 4.35 feet at 6 a. m., March 15 (discharge, 950 second-feet); minimum stage, from water-stage recorder, 1.85 feet October 1, 2, July 4–8 (discharge, 66 second-feet).

1915–1921: Maximum stage recorded, 19.1 feet at 1.30 p. m. February 21, 1920 (discharge, 50,600 second-feet); minimum discharge recorded, 1.75 feet, August 31 to September 1 (discharge, 55 second-feet).

DIVERSIONS.—Water is diverted above and below station for irrigating a few small ranches; amount not known.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph. Records fair.

COOPERATION.—Station established and maintained in cooperation with United Verde Copper Co.

Discharge measurements of Verde River near Clarkdale, Ariz., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 8	Gerrish and Terry	1.94	81	Aug. 26	Rice and Gardiner	2.48	190
Apr. 22	Gerrish and Moore	1.92	75	27	do	2.56	201
July 22	Moore and Bundy	1.92	81				

Daily discharge, in second-feet, of Verde River near Clarkdale, Ariz., for the period Oct. 1, 1920, to July 25, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	66	73	80	80	80	80	80	73	73	73
2	66	73	80	80	80	80	80	73	73	73
3	73	73	80	80	88	80	80	73	73	73
4	73	73	80	80	88	80	80	73	73	66
5	73	73	80	80	88	80	80	73	73	66
6	73	73	80	80	88	80	80	80	73	66
7	73	73	80	80	88	80	80	88	73	66
8	73	73	80	80	88	80	80	80	73	66
9	73	73	80	80	88	80	80	80	73	73
10	73	73	80	80	88	80	80	73	73	73
11	73	73	80	80	88	80	80	73	73	80
11	73	73	80	80	88	80	80	73	73	125
13	73	80	80	80	88	80	73	73	73	105
14	73	80	80	80	88	80	73	73	73	135
15	73	80	80	80	88	665	73	73	73	156
16	73	80	80	80	88	511	73	73	73	115
17	73	80	80	80	88	217	73	73	73	96
18	73	80	80	80	88	135	73	73	73	88
19	73	80	80	80	88	105	73	73	73	145
20	73	80	80	80	88	96	73	73	73	88
21	73	80	80	80	88	80	73	73	73	80
22	73	80	80	80	88	80	73	73	73	73
23	73	80	80	80	80	80	73	73	73	96
24	73	80	80	80	80	80	73	73	73	73
25	73	80	80	80	80	80	73	73	73	135
26	73	80	80	80	80	80	73	73	73	-------
27	73	80	80	80	80	80	73	73	73	-------
28	73	80	80	80	80	80	73	73	73	-------
29	73	80	80	80	-------	80	73	73	73	-------
30	73	80	80	80	-------	80	73	73	73	-------
31	73	-------	80	80	-------	80	-------	73	-------	-------

Monthly discharge of Verde River near Clarkdale, Ariz., for the period Oct. 1, 1920, to July 25, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	73	66	72.5	4,460
November	80	73	77.2	4,590
December	80	80	80.0	4,920
January	80	80	80.0	4,920
February	88	80	85.7	4,760
March	665	80	120	7,380
April	80	73	75.8	4,510
May	88	73	74.2	4,560
June	73	73	73.0	4,340
July 1-25	156	66	91.4	4,530
The period				49,000

VERDE RIVER NEAR McDOWELL, ARIZ.

LOCATION.—At dam site on Salt River Indian Reservation, three-fourths mile above junction with Salt River and 5½ miles below McDowell, Maricopa County.

DRAINAGE AREA.—6,000 square miles (furnished by United States Bureau of Reclamation).

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, 1921.

GAGE.—Painted on granite rocks on right bank.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading. Since November, 1913, measurements have been made regularly 3 or 4 times a week by a resident hydrographer.

CHANNEL AND CONTROL.—Sand; shifts.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge during year, 7,170 second-feet, August 2; minimum discharge, 80 second-feet, July 9.

1897–1921: Maximum mean daily discharge, 61,500 second-feet, November 27, 1905; minimum mean daily discharge, 32 second-feet, July 19 and 20, 1904.

DIVERSIONS.—Water is diverted 5 miles above station for use on Indian reservation.

COOPERATION.—Daily-discharge record furnished by Salt River Valley Water Users' Association.

Daily discharge, in second-feet, of Verde River near McDowell, Ariz., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	215	395	364	330	294	490	274	172	139	104	4,440	1,040
2	215	560	355	324	294	585	256	158	138	102	7,170	987
3	216	650	358	320	293	567	224	168	131	103	2,410	900
4	216	565	362	320	287	508	212	164	143	93	1,260	975
5	216	490	363	320	284	466	216	168	132	96	898	762
6	215	461	365	320	284	426	212	156	130	93	600	550
7	213	441	362	324	292	404	245	152	126	88	512	485
8	210	445	365	324	324	386	330	171	123	89	1,210	439
9	208	537	369	320	324	385	304	166	128	80	1,870	408
10	202	912	349	320	304	377	272	188	122	276	1,240	333
11	200	776	335	312	293	360	257	210	116	186	1,480	320
12	200	602	328	314	289	340	279	223	116	156	992	276
13	203	459	328	320	291	340	314	230	108	148	812	250
14	202	428	328	320	300	357	308	225	113	181	648	246
15	203	420	328	320	348	337	265	212	113	265	558	232
16	203	407	328	318	366	342	257	180	116	263	532	208
17	204	403	328	314	407	1,750	230	170	126	248	508	207
18	205	397	340	306	513	1,560	223	160	130	208	792	198
19	235	395	338	310	459	1,140	218	156	133	365	710	181
20	255	392	338	324	398	795	206	152	130	287	858	232
21	255	385	322	320	375	620	203	152	135	274	1,180	230
22	255	385	334	324	353	512	217	149	136	278	6,600	178
23	300	386	340	324	345	482	207	142	136	292	4,340	176
24	303	378	344	328	337	427	202	144	133	271	2,200	176
25	300	372	340	304	327	392	190	143	128	234	2,150	176
26	304	372	328	304	317	361	195	140	130	264	1,450	176
27	304	376	328	300	317	340	195	140	128	626	1,480	170
28	300	370	328	300	356	305	190	153	120	545	1,210	167
29	300	368	336	298	-------	286	185	149	110	965	905	173
30	301	365	332	297	-------	280	182	149	108	1,050	800	169
31	308	-------	332	296	-------	275	-------	147	-------	960	720	-------

Monthly discharge of Verde River near McDowell, Ariz., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	308	200	241	14,800
November	912	365	463	27,600
December	369	322	342	21,000
January	330	296	315	19,400
February	513	284	335	18,600
March	1,750	275	522	32,100
April	330	182	236	14,000
May	230	140	167	10,300
June	143	108	126	7,500
July	1,050	80	296	18,200
August	7,170	508	1,690	104,000
September	1,040	167	367	21,800
The year	7,170	80	428	309,000

AGUA FRIA RIVER NEAR GLENDALE, ARIZ.

LOCATION.—In sec. 28, T. 6 N., R. 1 E., at uncompleted masonry diversion dam of Beardsley irrigation project at Camp Dyer, 4 miles below mouth of Castle Creek and 22 miles northwest of Glendale, Maricopa County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 10, 1910, to September 30, 1921.

GAGE.—Staff gage fastened to damaged stilling well at same datum on right bank at upstream face of dam; read by Will Benson. (For record of earlier gages used see Water-Supply Paper 479, p. 179.)

DISCHARGE MEASUREMENTS.—Made from cable about one-third of a mile below gage or by wading.

CHANNEL AND CONTROL.—Channel composed of gravel and shifting sand. Principal control is formed by the unfinished portion of the masonry diversion dam and ledge on which it is built. This dam has a large gap or opening near the right bank through which the low and medium flow passes, a scour gate opening, 4 feet by 7½ feet, in the base near the left bank through which flow from the left channel passes at higher stages, and another gap or opening near the left bank that carries flow at still higher stages. At extreme high stages the stream flows over the entire broad crest of the dam, which is at elevation 28.2 feet on the gage. Sand fills in and scours out of the crevices in the right gap of the dam continually with each rise in the river. The stage-discharge relation, therefore, is not permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year, 15.6 feet at 6 p. m. July 31; minimum stage, 2.75 feet August 12 and 13.

1910–1921: Maximum stage, 33 feet November 27, 1919, determined from flood marks (discharge, about 105,000 second-feet from extension of rating curve); minimum discharge, 0.6 second-foot September 24 to 26, 1919.

DIVERSIONS.—Water is diverted above gage for irrigating two or three small ranches; amount not known.

ACCURACY.—No daily discharges computed, as base data was insufficient. Gage-height record good.

Discharge measurements of Agua Fria River near Glendale, Ariz., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 22	J. B. Spiegel	4.36	14
Aug. 28	Rice and Gardiner	4.02	70

Daily gage height, in feet, of Agua Fria River near Glendale, Ariz., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4.5	5.2	4.7	4.7	4.6	4.25	4.05	3.8	3.75	3.7	5.25	4.6
2	4.55	4.95	4.7	4.7	4.6	4.2	4.0	3.8	3.75	3.7	4.1	4.5
3	4.55	4.85	4.7	4.7	4.6	4.2	4.0	3.8	3.75	3.7	3.6	3.85
4	4.55	4.8	4.7	4.7	4.55	4.2	4.0	3.8	3.75	3.7	3.25	3.5
5	4.55	4.8	4.7	4.7	4.55	4.5	4.2	3.8	3.7	3.7	3.2	3.4
6	4.5	4.8	4.7	4.7	4.6	4.15	4.3	3.8	3.7	3.7	3.1	3.3
7	4.55	4.85	4.7	4.7	4.65	4.15	4.25	3.9	3.7	3.7	3.8	3.2
8	4.55	4.85	4.7	4.65	4.6	4.15	4.2	3.9	3.7	3.7	4.1	3.15
9	4.55	4.85	4.7	4.65	4.6	4.15	4.1	3.9	3.7	3.7	3.0	3.15
10	4.55	4.85	4.7	4.65	4.6	4.15	4.05	3.95	3.7	3.7	2.85	3.1
11	4.55	4.85	4.7	4.65	4.55	4.15	4.05	3.9	3.7	3.7	2.8	3.1
12	4.55	4.85	4.7	4.65	4.5	4.15	3.95	3.9	3.7	3.8	2.75	3.05
13	4.55	4.85	4.7	4.7	4.5	4.3	3.9	3.8	3.7	3.9	2.75	3.05
14	4.6	4.85	4.7	4.7	4.5	4.35	3.9	3.8	3.7	6.35	5.55	3.05
15	4.55	4.85	4.7	4.65	4.5	4.35	3.9	3.75	3.7	4.25	4.25	3.0
16	4.6	4.8	4.7	4.65	4.45	4.5	3.9	3.75	3.7	3.4	4.5	3.0
17	4.6	4.8	4.7	4.65	4.45	4.5	3.9	3.75	3.7	3.4	3.9	3.0
18	4.65	4.8	4.7	4.65	4.45	4.4	3.9	3.75	3.7	3.6	3.6	3.0
19	4.65	4.8	4.7	4.65	4.4	4.35	3.85	3.75	3.7	3.6	3.6	3.0
20	4.65	4.8	4.7	4.7	4.4	4.3	3.85	3.75	3.7	3.4	4.6	3.0
21	4.7	4.8	4.7	4.65	4.4	4.3	3.8	3.75	3.7	4.05	9.3	3.0
22	4.7	4.75	4.7	4.65	4.35	4.25	3.8	3.75	3.7	4.30	6.05	3.0
23	4.7	4.75	4.7	4.7	4.3	4.25	3.8	3.75	3.7	3.85	5.0	3.0
24	4.65	4.75	4.7	4.7	4.3	4.2	3.8	3.75	3.7	3.85	5.0	3.0
25	4.65	4.75	4.7	4.7	4.25	4.2	3.8	3.75	3.7	4.7	4.55	2.95
26	4.65	4.75	4.7	4.65	4.25	4.15	3.8	3.75	3.7	5.9	4.25	2.95
27	4.7	4.75	4.7	4.65	4.25	4.15	3.8	3.75	3.7	4.8	4.0	2.95
28	4.65	4.75	4.7	4.65	4.25	4.1	3.8	3.75	3.7	4.9	4.05	2.95
29	4.7	4.7	4.7	4.65	-------	4.1	3.8	3.75	3.7	6.05	3.85	2.95
30	4.7	4.7	4.7	4.6	-------	4.05	3.8	3.75	3.7	6.55	4.0	2.95
31	5.4	-------	4.7	4.6	-------	4.05	-------	3.75	-------	11.95	4.15	-------

BARREN FLAT BASIN.

WEST TURKEY CREEK NEAR LIGHT, ARIZ.

LOCATION.—In SW. ¼ sec. 17, T. 18 S., R. 29 E., at Sanders ranch, 2½ miles south and 9½ miles east from Light, Cochise County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 30, 1919, to September 30, 1921.

GAGE.—Vertical enamel staff on right bank directly north of Sanders' ranch; read by R. V. Sanders.

DISCHARGE MEASUREMENTS.—Measurements made by wading near gage.

CHANNEL AND CONTROL.—Low-water control 20 feet below gage, high-water control 100 feet below gage. Banks high, not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge for year, 990 second-feet on July 31; minimum mean daily discharge, trace of water only during various periods throughout year.

1919–1921: Maximum mean daily discharge, 990 second-feet on July 31, 1921; minimum mean daily discharge, trace of water only during periods of 1920 and 1921.

DIVERSIONS.—Minor diversions above and below station.

ACCURACY.—Stage-discharge relation fairly permanent. Rating curve fairly well defined between 0 and 30 second-feet. Gage read twice a day to nearest two-hundredths and oftener during flood periods. Daily discharge ascertained by applying mean daily gage height to rating tables and by hydrograph during flood periods, except for periods October 1–30, February 1–26, March 16–31, April 1 to June 30, July 1–9, 11, September 25, 27–30, when there was a trace of water only. Records fair.

COOPERATION.—Discharge measurements and record of daily discharge furnished by University of Arizona, Prof. G. E. P. Smith, irrigation engineer.

Discharge measurements of West Turkey Creek near Light, Ariz., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 27	H. C. Schwalen	0.20	0.2	Aug. 5	H. C. Schwalen	2.20	83
Apr. 24	Rice and Gardiner	.05	.02	24	do	1.88	39
July 8	H. C. Schwalen	−.05	.003				

Daily discharge, in second-feet, of West Turkey Creek near Light, Ariz., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	July.	Aug.	Sept.
1		6.5	1	0.5		1		360	9.5
2		7	1	.5		2		165	9
3		6	1	.5	0.5	2		102	7.5
4		7	1	.5		2		150	7
5		6.5	1	.5	.5	1.5		83	5.5
6		6	.5	.5		1.5		52	4.5
7		6	.5	.5		1.5		140	4
8		6	.5	.5	.5	1		200	3.5
9		6	.5	.5	.5	1.5		146	2.5
10		6	.5	.5	.5	1	9	74	2.5
11		5	.5	.5		1		52	2.5
12		5	.5	.5	.5	1	15	66	2.5
13		5	.5	.5		1	10	140	2.5
14		5	.5	.5		.5	5	95	2.5
15		5	.5	.5		.5	4	76	2.5
16		4	.5	.5			18	72	66
17		4	.5	.5			12	52	66
18		4	.5	.5			12	52	24
19		4	.5	.5			9	46	10
20		4	.5	.5			6	39	7.5
21		3	.5	.5			6	39	7.5
22		3	.5	.5			4	102	3.5
23		3	.5	.5			95	120	2.5
24		3	.5	.5			85	41	1.5
25		3	.5	.5			180	29	
26		2	.5	.5			133	23	.5
27		2	.5	.5	.5		97	20	
28		2	.5	.5	.5		245	14	
29		2	.5	.5			233	13	
30		2	.5	.5			340	11	
31	8		.5	.5			990	10	

NOTE.—Trace of water only, on days for which no discharge is given.

Monthly discharge of West Turkey Creek near Light, Ariz., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	8	T.	0.26	16
November	7	2	4.4	262
December	1	.5	.58	36
January	.5	.5	.5	31
February	.5	T.	.14	8
March	2	T.	.61	38
July	990	T.	80.9	4,970
August	360	10	83.4	5,130
September	66	T.	8.6	512
The year	990	T.	15.2	11,000

NOTE.—T. = Trace of water only. See "Accuracy" paragraph.

WHITEWATER BASIN.

WHITEWATER DRAW NEAR RUCKER, ARIZ.

LOCATION.—In sec. 29, T. 19 S., R. 29 E., at Heyne ranch, 6 miles east of Rucker, Cochise County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 7, 1919, to September 30, 1921.

GAGE.—Vertical enamel staff fastened to tree on left bank; read by F. W. Heyne.

DISCHARGE MEASUREMENTS.—Made from cable 100 feet below gage or by wading near gage.

CHANNEL AND CONTROL.—Channel composed of boulders, gravel, and bedrock, with pronounced drop 300 feet below gage. Channel fairly straight and fairly uniform in cross-section.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge for year, 315 second-feet on August 17; minimum discharge, trace of water only during various periods throughout year.

1919–1921: Maximum mean daily discharge, 1,240 second-feet November 23, 1919; minimum discharge zero August 1–12, 1920.

DIVERSIONS.—Minor diversions above and below station.

ACCURACY.—Stage-discharge relation fairly permanent. Rating curve fairly well defined between 0 and 200 second-feet. Gage read to nearest two-hundredths twice daily and oftener during flood periods. Daily discharge ascertained by applying mean daily gage height to rating tables, and by hydrograph during flood periods, except for periods October 10–31, May 18 to July 22, when there was a trace of water only. Records good.

COOPERATION.—Discharge measurements and record of daily discharge furnished by University of Arizona, Prof. G. E. P. Smith, irrigation engineer.

Discharge measurements of Whitewater Draw near Rucker, Ariz., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 26	H. C. Schwalen	0.20	0.4	Aug. 5	H. C. Schwalen	1.73	111
Apr. 24	Schwalen and Rice	.28	.3	5	do	1.61	83
Aug. 4	H. C. Schwalen	2.04	172	23	do	1.41	44.3

Daily discharge in second-feet, of Whitewater Draw near Rucker, Ariz., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	July.	Aug.	Sept.
1	5	13.	0.5	0.5	0.5	0.5	1	0.5		96	19
2	5	8.5	.5	.5	.5	.5	1	.5		59	17
3	5	5	.5	.5	.5	.5	1	.5		32	14
4	5	3	.5	.5	.5	.5	1	.5		220	12
5	5	2.5	.5	.5	.5	.5	1	.5		80	9
6	5	2.5	.5	.5	.5	.5	1	.5		47	7
7	5	2.5	.5	.5	.5	.5	1	.5		31	6.5
8	5	2.5	.5	.5	.5	.5	.5	.5		36	5
9	5	3	.5	.5	.5	.5	.5	.5		23	4
10		3	.5	.5	.5	.5	.5	.5		47	3.5
11		3	.5	.5	.5	.5	.5	.5		31	3.5
12		3	.5	.5	.5	.5	.5	.5		25	3.5
13		2.5	.5	.5	.5	.5	.5	.5		18	3.5
14		2.5	.5	.5	.5	.5	.5	.5		65	3
15		2	.5	.5	.5	.5	.5	.5		85	3
16		2	.5	.5	.5	.5	.5	.5		75	3
17		2	.5	.5	.5	.5	.5	.5		315	3
18		2	.5	.5	.5	.5	.5			195	4
19		1.5	.5	.5	.5	.5	.5			98	3.5
20		1	.5	.5	.5	.5	.5			71	3
21		1	.5	.5	.5	.5	.5			82	2.5
22		1	.5	.5	.5	.5	.5			64	2.5
23		1	.5	.5	.5	.5	.5		15	50	2.5
24		1	.5	.5	.5	1	.5		95	36	2.5
25		1	.5	.5	.5	1	.5		195	27	2
26		1	.5	.5	.5	1	.5		110	20	2
27		.5	.5	.5	.5	1	.5		125	16	2
28		.5	.5	.5	.5	1	.5		90	13	2
29		.5	.5	.5		1	.5		145	12	2
30		.5	.5	.5		1	.5		140	12	2
31			.5	.5		1			210		

NOTE.—Trace of water only, on days for which no discharge is given.

Monthly discharge of Whitewater Draw near Rucker, Ariz., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	0.5	T.	0.14	9
November	13	0.5	2.5	149
December	.5	.5	.5	31
January	.5	.5	.5	31
February	.5	.5	.5	28
March	1	.5	6.0	37
April	1	.5	6.2	37
May	.5	T.	.27	17
July	210	T.	36.3	2,230
August	315	12	63.9	3,930
September	19	2	5.1	304
The year	315	T.	9.4	6,800

NOTE.—T=Trace of water only.

WHITEWATER DRAW NEAR DOUGLAS, ARIZ.

LOCATION.—In sec. 10, T. 24 S., R. 27 E., opposite city pumping plant, a quarter of a mile above highway bridge and El Paso & Southwestern Railroad bridge, 1 mile above electric-railway bridge, and about 1¼ miles west of Douglas, Cochise County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 24 to October 10, 1911, at electric railway bridge; July 21, 1912, to February 15, 1916, at highway bridge; and February 16, 1916, to September 30, 1921, at present location.

GAGE.—Vertical and inclined staff on right bank opposite city pumping plant; read by Mrs. L. E. King and Mrs. Joseph Harris. For description of previous gages used at station, see Water-Supply Paper 479.

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

CHANNEL AND CONTROL.—Bed composed of sand and gravel; shifts frequently. Slag dumped into the channel below the gage causes backwater at the gage and scours out at high water.

EXTREMES OF DISCHARGE.—Maximum stage during year, 10.4 feet, 7.30 a. m., July 25; minimum discharge less than 0.5 second-foot for long periods.

1911–1921: Maximum stage recorded, 14.5 feet about 8 p. m. July 28, 1919 (estimated discharge, 4,050 second-feet). Stream dry or carries less than 0.5 second-foot the greater part of each year.

DIVERSIONS.—Some flood water is diverted above station for irrigation, quantity unknown.

ACCURACY.—No daily discharge computed, as base data were insufficient. Gage-height record good.

Discharge measurements of Whitewater Draw near Douglas, Ariz., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 26	H. C. Schwalen	3.73	0.5	July 8	H. C. Schwalen	3.80	0.2
Apr. 25	Rice and Gardiner	3.70	.2	Aug. 4	do	3.86	3.9

Daily gage height, in feet, of Whitewater Draw near Douglas, Ariz., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1								3.75	3.75	3.75	5.10	4.40
2			3.75	3.75				3.75	3.75	3.75	4.40	4.25
3	3.75				3.75	3.75	3.75	3.75	3.75	4.50	4.00	4.00
4		3.75						3.75	3.75	5.00	3.80	3.95
5			3.75					3.75	3.75	3.90	4.45	3.75
6				3.75	3.75	3.75		3.75	3.75	3.80	3.95	3.75
7	3.75	3.75					3.75	3.75	3.75	3.80	3.80	3.75
8								3.75	3.75	3.80	3.75	3.75
9			3.75	3.75				3.75	3.75	4.45	3.75	3.75
10					3.75	3.75	3.75	3.75	3.75	4.00	3.75	3.75
11		3.75						3.75	3.75	4.50	3.75	3.75
12			3.75					3.75	3.75	3.40	3.90	3.75
13				3.75	3.75	3.75		3.75	3.75	4.05	3.75	3.75
14	3.75	3.75					3.75	3.75	3.75	3.90	3.85	3.75
15								3.75	3.75	3.80	3.85	3.75
16			3.75	3.75				3.75	3.75	3.85	3.90	3.75
17	3.75				3.75	3.75	3.75	3.75	3.75	5.05	3.85	3.75
18		3.75						3.75	3.75	4.30	3.95	3.75
19			3.75					3.75	3.75	4.00	3.80	3.75
20				3.75	3.75	3.75		3.75	3.75	4.60	4.45	3.75
21	3.75	3.75					3.75	3.75	3.75	4.00	5.90	3.75
22								3.75	3.75	3.95	4.90	3.75
23			3.75	3.75				3.75	3.75	4.20	4.05	3.75
24					3.75	3.75	3.75	3.75	3.75	4.60	3.85	3.75
25		3.75						3.75	3.75	7.95	4.80	3.75
26			3.75					3.75	3.75	4.70	3.00	3.75
27				3.75	3.80	3.75		3.75	3.75	4.05	3.85	3.75
28		3.75					3.75	3.75	3.75	4.30	3.75	3.75
29								3.75	3.75	4.60	3.90	3.75
30			3.75					3.75	3.75	8.70	3.95	3.75
31	3.75					3.75		3.75		7.60	3.75	

NOTE.—No record on days for which no gage height is given.

MISCELLANEOUS DISCHARGE MEASUREMENTS.

In addition to the records of stream flow obtained at gaging stations and reported in the preceding pages, measurements of flow were made at a number of other points, as shown by the following table:

Miscellaneous discharge measurements in Colorado River drainage basin during the year ending Sept. 30, 1921.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Jan. 22	Colorado River		State bridge, Colorado	1.72	350
28	Blue River	Colorado	Below Snake River at Dillon, Colo.		36.1
Mar. 3	do	do	do		33.2
Jan. 28	Snake River	Blue River	Dillon, Colo.		11.1
Mar. 3	do	do	do		11.4
21	Lake Fork	Duchesne River	Former gaging station, "Lake Fork near Altonah, Utah," in S. ½ sec. 32, T. 1 N., R. 1 E.	1.21	116
Oct. 28	Uinta River	do	Former gaging station, "Uinta River near Whiterocks, Utah," in SE. ¼ sec. 31, T. 2 N., R. 1 W.	4.13	90
Mar. 25	do	do	do	4.01	72
26	do	do	Former gaging station, "Uinta River near Fort Duchesne, Utah," in W. ½ sec. 25, T. 2 S., R. 1 E.	4.59	88
Oct. 28	Pole Creek	Uinta River	Sec. 31, T. 2 N., R. 1 W.		8.2
Mar. 25	Cedar View canal	do	do		5.0
15	Price River	Green River	Sec. 26, T. 11 S., R. 8 E., near Colton, Utah.		113
15	Fish Creek	Price River	do		65
June 26	do	do	do		142
Mar. 15	White River	do	Sec. 22, T. 11 S., R. 8 E., near Colton, Utah.		45
Apr. 7	Leeds (Quail) Creek	Virgin River	Former gaging station, "Leeds (Quail) Creek near Leeds, Utah," in N. ½ sec. 36, T. 40 S., R. 14 W.	4.80	8.3
July 6	do	do	do	4.88	11.1
Apr. 6	Hunts Springs	Santa Clara Creek	Sec. 11, T. 39 S., R. 16 W., enters Santa Clara Creek 10 feet below gaging station "Santa Clara Creek near Central, Utah."		2.7
Oct. 18	San Pedro River	Gila River	Hereford, Ariz.	4.65	4.0
Nov. 19	do	do	do	4.80	8.3
Mar. 16	do	do	do	4.78	6.6
Apr. 26	do	do	do	4.73	3.8
July 7	do	do	do	4.81	12.3
17	do	do	do	5.02	30.7
Aug. 4	do	do	do	6.17	185
July 13	Queen Creek	do	Near Superior, Ariz.	1.05	.5
24	do	do	do	1.10	9.1
31	do	do	do	1.62	65
May 28	Black River	Salt River	Fort Apache, Ariz.	1.04	57
30	East Fork of White River.	White River	do		19

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