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

WATER-SUPPLY PAPER 289

SURFACE WATER SUPPLY OF THE UNITED STATES

1910

PART IX. COLORADO RIVER BASIN

PREPARED UNDER THE DIRECTION OF M. O. LEIGHTON

BY

W. B. FREEMAN, E. C. LA RUE
AND H. D. PADGETT

WASHINGTON
GOVERNMENT PRINTING OFFICE
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SURFACE WATER SUPPLY OF COLORADO RIVER BASIN, 1910.

By W. B. FREEMAN, E. C. LA RUE, and H. D. PADGETT.

INTRODUCTION.

AUTHORITY FOR INVESTIGATIONS.

This volume contains results of measurements of the flow of certain streams in the United States. The work was performed by the United States Geological Survey, either independently or in cooperation with private or State organizations. The organic law of the Geological Survey (Stat. L., vol. 20, p. 394) contains the following paragraph:

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

As water is the most abundant and most valuable of the minerals the investigation of water resources is authorized under the provision for examining mineral resources. The work has been supported since the fiscal year ending June 30, 1895, by appropriations in successive sundry civil bills passed by Congress under the following item:

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.

The various appropriations that have been made for this purpose are as follows:

Annual appropriations for the fiscal year ending June 30—

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

SCOPE OF INVESTIGATIONS.

These investigations are not complete nor are they inclusive of all the streams that might purposefully be studied. The scope of the work is limited by the appropriations available. The field covered is the widest and the character of the work is believed to be the best possible under the controlling conditions. The work would undoubtedly have greater scientific importance and ultimately be of more practical value if the money now expended for wide areas were concentrated on a few small drainage basins; but such a course is impossible because general appropriations made by Congress are applicable to all parts of the country. Each part demands its proportionate share of the benefits.

It is essential that records of stream flow shall be kept during a period of years long enough to determine within reasonable limits the entire range of flow from the absolute maximum to the absolute minimum. The length of such a period manifestly differs for different streams. Experience has shown that the records for some streams should cover 5 to 10 years, and those for other streams 20 years or even more, the limit being determined by the relative importance of the stream and the interdependence of the results with other long-time records on adjacent streams.

In the performance of this work an effort is made to reach the highest degree of precision possible with a rational expenditure of time and a judicious expenditure of a small amount of money. In all engineering work there is a point beyond which refinement is needless and wasteful, and this statement applies with especial force to stream-flow measurements. It is confidently believed that the stream-flow data presented in the publications of the Survey are in general sufficiently accurate for all practical purposes. Many of the records are, however, of insufficient length, owing to the unforeseen reduction of appropriations and consequent abandonment of stations. All persons are cautioned to exercise the greatest care in using such incomplete records.

Records have been obtained at nearly 2,000 different points in the United States. The surface water supply of small areas in Seward Peninsula and the Yukon-Tanana region, Alaska, and in Hawaii has also been investigated. During 1910 regular gaging stations were maintained by the Survey and cooperating organizations at about 1,100 points in the United States, and many discharge measurements were made at other points. Data were also obtained in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country, and will be made available in the regular surface water-supply papers and in special papers from time to time.

PUBLICATIONS.

The data on stream flow collected by the United States Geological Survey have appeared in the annual reports, bulletins, and water-supply papers. Owing to natural processes of evolution and to changes in governmental requirements the character of the work and the territory covered by these different publications have varied greatly. For the purpose of uniformity in the presentation of reports a general plan has been agreed upon by the United States Reclamation Service, the United States Forest Service, the United States Weather Bureau, and the United States Geological Survey, according to which the area of the United States has been divided into twelve parts, whose boundaries coincide with certain natural drainage lines. The areas so described are indicated by the following list of papers on surface water supply for 1910. The dividing line between the north Atlantic and south Atlantic drainage areas lies between York and James rivers.

Papers on surface water supply of the United States, 1910.

Part.	No.	Title.
I	281	North Atlantic coast.
II	282	South Atlantic coast and eastern Gulf of Mexico.
III	283	Ohio River basin.
IV	284	St. Lawrence River basin.
V	285	Upper Mississippi River and Hudson Bay basins
VI	286	Missouri River basin.
VII	287	Lower Mississippi River basin.
VIII	288	Western Gulf of Mexico.
IX	289	Colorado River basin.
X	290	Great Basin.
XI	291	Pacific coast in California.
XII	292	North Pacific coast.

The following table gives the character of data regarding stream flow at regular stations to be found in the various publications of the United States Geological Survey, exclusive of special papers:

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

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

Report.	Character of data.	Year.
10th A., pt. 2	Descriptive information only	
11th A., pt. 2	Monthly discharge	1884 to Sept., 1890.
12th A., pt. 2	do	1884 to June 30, 1891.
13th A., pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A., pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B. 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A., pt. 2	Descriptive information only	
B. 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
W S. 11	Gage heights (also gage heights for earlier years)	1896.
18th A., pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for earlier years).	1895 and 1896.
W S. 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.

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

Report.	Character of data.	Year.
W S. 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A., pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
W S. 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
W S. 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 S. 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A., pt. 4	Monthly discharge	1899.
W S. 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A., pt. 4	Monthly discharge	1900.
W S. 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
W S. 75	Monthly discharge	1901.
W S. 82 to 85	Complete data	1902.
W S. 97 to 100	do	1903.
W S. 124 to 135	do	1904.
W S. 165 to 178	do	1905.
W S. 201 to 214	Complete data, except descriptions	1906.
W S. 241 to 252	Complete data	1907–8.
W S. 261 to 272	do	1909.
W S. 281 to 292	do	1910.

NOTE.—No data regarding stream flow 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. An index of the reports containing records prior to 1904 has been published in Water-Supply Paper 119.

The first table which follows gives, by years and drainage basins, the numbers of the papers on surface-water supply published from 1899 to 1910. Wherever the data for a drainage basin appear in two papers the number of one is placed in parentheses and the portion of the basin covered by that paper is indicated in the second table. For example, in 1904 the data for Missouri River were published in Water-Supply Papers 130 and 131, and the portion of the records contained in Water-Supply Paper 131, as indicated by the second table, is that relating to Platte and Kansas rivers.

Numbers of water-supply papers containing results of stream measurements, 1899–1910.

	1899 [a]	1900 [b]	1901	1902	1903
Atlantic coast and eastern Gulf of Mexico:					
New England rivers	35	47	65, 75	82	97
Hudson River to Delaware River, inclusive	35	47, (48)	65, 75	82	97
Susquehanna River to York River, inclusive	35	48	65, 75	82	97
James River to Yadkin River, inclusive	(35), 36	48	65, 75	(82), 83	(97), 98
Santee River to Pearl River, inclusive	36	48	65, 75	83	98
St. Lawrence River	36	49	65, 75	(82), 83	97
Hudson Bay			66, 75	85	100
Mississippi River:					
Ohio River	36	48, (49)	65, 75	83	98
Upper Mississippi River	36	49	65, 75	83	98, (99)
Missouri River	(36), 37	49, (50)	66, 75	84	99
Lower Mississippi River	37	50	(65), 66, 75	(83), 84	(98), 99
Western Gulf of Mexico	37	50	66, 75	84	99
Pacific coast and Great Basin:					
Colorado River	(37), 38	50	66, 75	85	100
Great Basin	38, (39)	51	66, 75	85	100
South Pacific coast to Klamath River, inclusive	(38), 39	51	66, 75	85	100
North Pacific coast	38	51	66, 75	85	100

[a] Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39.
[b] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52.

Numbers of water-supply papers containing results of stream measurements, 1899–1910—Continued.

	1904	1905	1906	1907–8	1909	1910
Atlantic coast and eastern Gulf of Mexico:						
New England rivers	124	165	201	241	261	281
Hudson River to Delaware River, inclusive	125	166	202	241	261	281
Susquehanna River to York River, inclusive	126	167	203	241	261	281
James River to Yadkin River, inclusive	126	167	203	242	262	282
Santee River to Pearl River, inclusive	127	168	204	242	262	282
St. Lawrence River	129	170	206	244	264	284
Hudson Bay	130	171	207	245	265	285
Mississippi River:						
Ohio River	128	169	205	243	263	283
Upper Mississippi River	128, (130)	171	207	245	265	285
Missouri River	130, (131)	172	208	246	266	286
Lower Mississippi River	(128), 131	(169), 173	(205), 209	247	267	287
Western Gulf of Mexico	132	174	210	248	268	288
Pacific coast and Great Basin:						
Colorado River	133, (134)	175, (177)	211, (213)	249, (251)	269, (271)	289, (291)
Great Basin	133, (134)	176, (177)	212, (213)	250, (251)	270, (271)	290
South Pacific coast to Klamath River, inclusive	134	177	213	251	271	291
North Pacific coast	135	(177), 178	214	252	272	292

Numbers of water-supply papers containing data covering portions of drainage basins.

No.	River basin.	Tributaries included.
35	James	
36	Missouri	Gallatin.
37	Colorado	Green, Gunnison, Grand above junction with Gunnison.
38	Sacramento	Except Kings and Kern.
39	Great Basin	Mohave.
48	Delaware	Wissahickon and Schuylkill.
49	Ohio	Scioto.
50	Missouri	Loup and Platte near Columbus, Nebr. All tributaries below junction with Platte.
65	Lower Mississippi	Yazoo.
82	James	
	St. Lawrence	Lake Ontario, tributaries to St. Lawrence River proper.
83	Lower Mississippi	Yazoo.
97	James	
98	Lower Mississippi	Do.
99	Upper Mississippi	Tributaries from the west.
128	Lower Mississippi	Yazoo.
130	Upper Mississippi	Tributaries from the west.
131	Missouri	Platte, Kansas.
134	Colorado	Data near Yuma, Ariz., repeated.
	Great Basin	Susan, Owens, Mohave.
169	Lower Mississippi	Yazoo.
177	Colorado	Below junction with Gila.
	Great Basin	Susan repeated, Owens, Mohave.
	North Pacific coast	Rogue, Umpqua, Siletz.
205	Lower Mississippi	Yazoo, Homochitto.
213	Colorado	Data at Hardyville repeated; at Yuma, Salton Sea.
	Great Basin	Owens, Mohave.
251	Colorado	Yuma and Salton Sea stations repeated.
271	Great Basin	Owens River basin.
291		

The order of treatment of stations in any basin in these papers is downstream. The main stem of any river is determined by measuring or estimating the drainage area; that is, the headwater stream having the largest drainage area is considered the continuation of the main stream, and local changes in name and lake surface are disregarded. Records for all stations from the source to the mouth of the

main stem of the river are presented first, and records for the tributaries in regular order from source to mouth follow, all records in each tributary basin being given before those of the next basin below.

The exceptions to this rule occur in the records for Mississippi River, which are given in four parts, as indicated above, and in the records for large lakes, where it is simpler to take up the streams in regular order around the rim of the lake than to cross back and forth over the lake surface.

DEFINITION OF TERMS.

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

"Second-foot" is an abbreviation for cubic foot per second and is the rate of discharge of water flowing in a stream 1 foot wide, 1 foot deep, at a rate of 1 foot per second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the following table of equivalents.

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

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

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

CONVENIENT EQUIVALENTS.

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

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

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

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

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

1 second-foot equals 6.23 British imperial gallons per second.
1 second-foot for one year covers 1 square mile 1.131 feet or 13.572 inches deep.
1 second-foot for one year equals 31,536,000 cubic feet.
1 second-foot equals about 1 acre-inch per hour.
1 second-foot for one day covers 1 square mile 0.03719 inch deep.
1 second-foot for one 28-day month covers 1 square mile 1.041 inches deep.
1 second-foot for one 29-day month covers 1 square mile 1.079 inches deep.
1 second-foot for one 30-day month covers 1 square mile 1.116 inches deep.
1 second-foot for one 31-day month covers 1 square mile 1.153 inches deep.
1 second-foot for one day equals 1.983 acre-feet.
1 second-foot for one 28-day month equals 55.54 acre-feet.
1 second-foot for one 29-day month equals 57.52 acre-feet.
1 second-foot for one 30-day month equals 59.50 acre-feet.
1 second-foot for one 31-day month equals 61.49 acre-feet.
100 California miner's inches equals 18.7 United States gallons per second.
100 California miner's inches equals 96.0 Colorado miner's inches.
100 California miner's inches for one day equals 4.96 acre-feet.
100 Colorado miner's inches equals 2.60 second-feet.
100 Colorado miner's inches equals 19.5 United States gallons per second.
100 Colorado miner's inches equals 104 California miner's inches.
100 Colorado miner's inches for one day equals 5.17 acre-feet.
100 United States gallons per minute equals 0.223 second-foot.
100 United States gallons per minute for one day equals 0.442 acre-foot.
1,000,000 United States gallons per day equals 1.55 second-feet.
1,000,000 United States gallons equals 3.07 acre-feet.
1,000,000 cubic feet equals 22.95 acre-feet.
1 acre-foot equals 325,850 gallons.
1 inch deep on 1 square mile equals 2,323,200 cubic feet.
1 inch deep on 1 square mile equals 0.0737 second-foot per year.
1 foot equals 0.3048 meter.
1 mile equals 1.60935 kilometers.
1 mile equals 5,280 feet.
1 acre equals 0.4047 hectare.
1 acre equals 43,560 square feet.
1 acre equals 209 feet square, nearly.
1 square mile equals 2.59 square kilometers.
1 cubic foot equals 0.0283 cubic meter.
1 cubic foot equals 7.48 gallons.
1 cubic foot of water weighs 62.5 pounds.
1 cubic meter per minute equals 0.5886 second-feet.
1 horsepower equals 550 foot-pounds per second.
1 horsepower equals 76.0 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horsepower equals 1 second-foot falling 8.80 feet.
1⅓ horsepower equals about 1 kilowatt.

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

EXPLANATION OF DATA.

For each drainage basin there is given a brief general description covering such items as area, source, tributaries, topography, geology, forestation, rainfall, irrigation, storage, power, and other interesting or important facts.

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

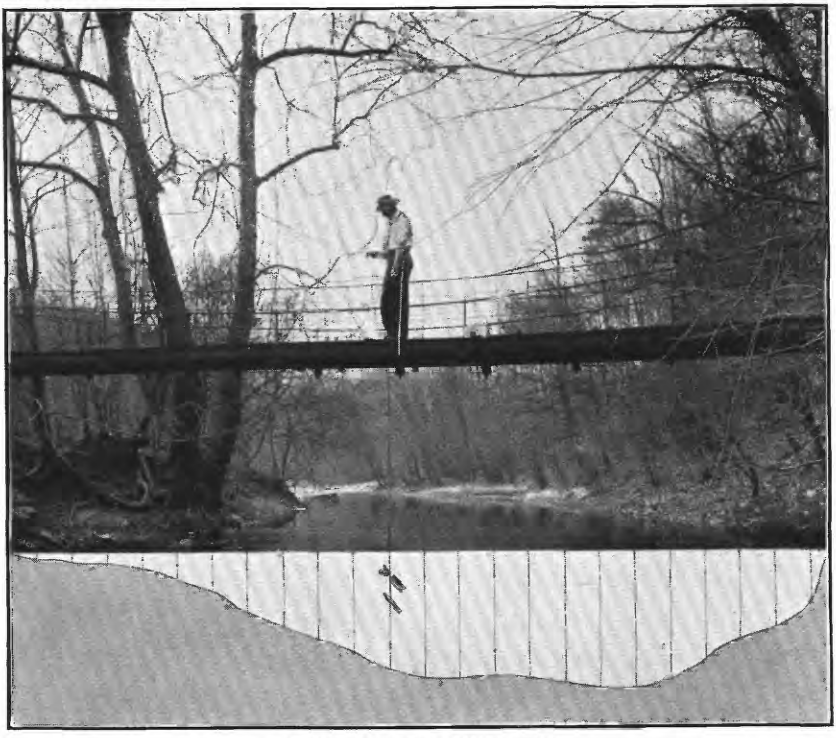
In addition to statements regarding the location and installation of current-meter stations, the descriptions give information in regard to any conditions which may affect the constancy of the relation of gage height to discharge, covering such points as ice, logging, shifting channels, and backwater; also information regarding diversions which decrease the total flow at the measuring section. Statements are also made regarding the accuracy and reliability of the data.

The discharge-measurement table gives the result of the discharge measurements made during the year, including the date, name of hydrographer, width and area of cross section, gage height, and discharge in second-feet.

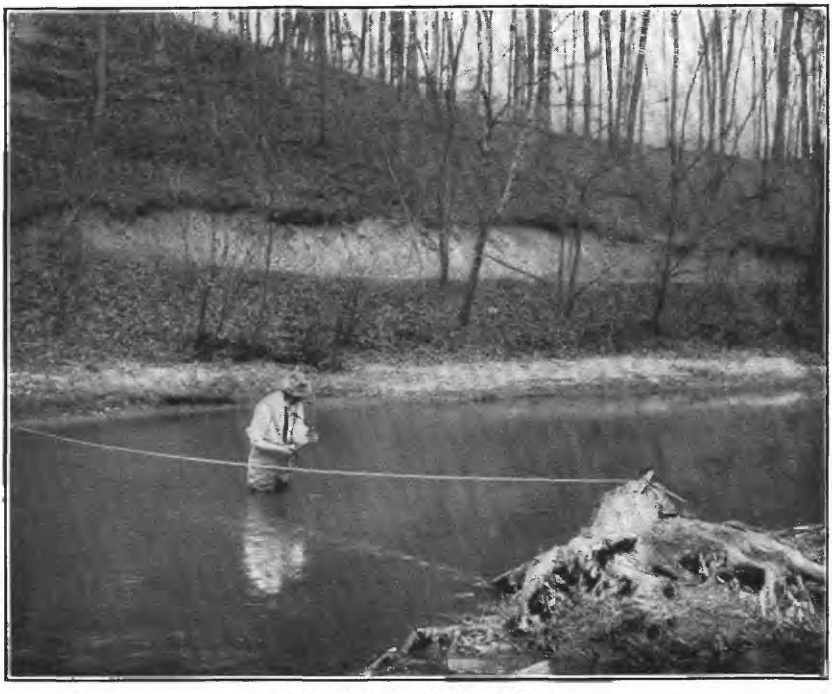
The table of daily gage heights records the daily fluctuations of the surface of the river as found from the mean of the gage readings taken each day. At most stations the gage is read in the morning and in the evening. The gage height given in the table represents the elevation of the surface of the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

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

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

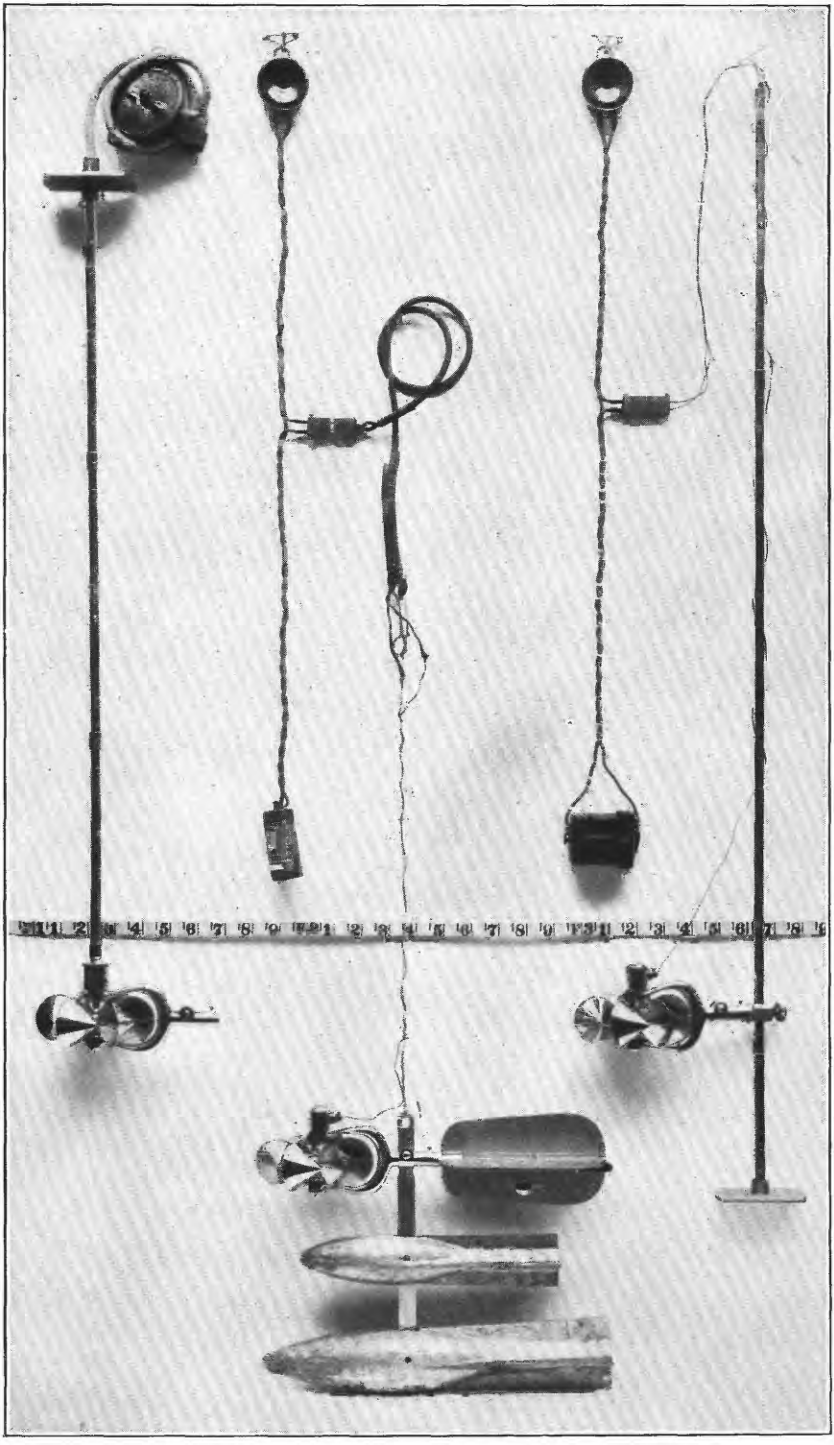


A. FOR BRIDGE MEASUREMENT.



B. FOR WADING MEASUREMENT.

TYPICAL GAGING STATIONS.



SMALL PRICE CURRENT METERS.

First plot the discharge measurements for the current and earlier years on cross-section paper, with gage heights in feet as ordinates and discharge in second-feet as abscissas. Then tabulate a number of gage heights taken from the daily gage-height table for the complete range of stage given and the corresponding discharges for the days selected from the daily discharge table and plot the values on cross-section paper. The last points plotted will define the rating curve used and will lie among the plotted discharge measurements. After drawing the rating curve, a table can be made by scaling off the discharge in second-feet for each tenth of a foot of gage height. These values should be so adjusted that the first differences shall always be increasing or constant, except for known backwater periods.

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

In the table of monthly discharge the column headed "Maximum" gives the mean flow, as determined from the rating table, for the day when the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the stage when the water surface was at crest height, and the corresponding discharge was consequently larger than given in the maximum column. Likewise, in the column of "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this the computations for the remaining columns, which are defined in page 12, are based.

The field methods used in the collection of the data presented in this series of reports are described in the introductory sections of Water-Supply Papers 261 to 272, inclusive, "Surface water supply of the United States, 1909." Plate I shows typical gaging stations and Plate II shows the various types of current meters [1] used in the work.

ACCURACY AND RELIABILITY OF FIELD DATA AND COMPARATIVE RESULTS.

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

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

[1] See Hoyt, J. C., and others, Use and care of current meter as practiced by the United States Geological Survey: Trans. Am. Soc. Civil Eng., vol. 66, 1910, p. 70.

Practically all discharge measurements made under fair conditions are well within 5 per cent of the true discharge at the time of observation. Inasmuch as the errors of meter measurements are largely compensating, the mean rating curve, when well defined, is much more accurate than the individual measurements. Numerous experiments made to test the accuracy of current-meter work show that it compares very favorably with the results from standard weirs and, owing to simplicity of methods, usually gives results that are much more reliable than those from stations at dams, where the coefficient may be uncertain and conditions of flow are complicated.

The work is, of course, dependent on the reliability of the gage observers. With relatively few exceptions the observers perform their work honestly. The records are, however, closely watched, and the cause of any discrepancy is investigated. It is obvious that one gage reading a day does not always give the mean height for that day. As an almost invariable rule, however, errors from this source are compensating and virtually negligible in a period of one month, although a single day's reading may, when taken by itself, be considerably in error.

An effort is made to visit every station at least once each year for the purpose of making a measurement to determine the constancy of conditions of flow since the last measurement made in the preceding year, and also to check the elevation of the gage. On account of lack of funds or for other causes some stations were not visited during the current year. If conditions of flow have been reasonably permanent up to the time of the last preceding measurement, it is considered best to publish estimates of discharge based on the latest verified rating curve rather than to omit them altogether, although it should be distinctly understood that such records are at times subject to considerable error. This is also true, although to a less degree, of the period of records since the date of the last measurement of the current year. As a rule, the accuracy notes are based on the assumption that the rating curve used is strictly applicable to the current year.

In order to give engineers and others information regarding the probable accuracy of the computed results, footnotes are added to the daily discharge tables, stating the probable accuracy of the rating tables used, and an accuracy column is inserted in the monthly discharge table. For the rating tables "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined" or "approximate," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The accuracy column in the monthly discharge table does not apply to the maximum or minimum nor to any individual day, but to the

monthly mean. It is based on the accuracy of the rating, the probable reliability of the observer, and knowledge of local conditions. In this column A indicates that the mean monthly flow is probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

In general, the base data which are collected in the field each year by the survey engineers are published, not only to comply with the law, but also for the express purpose of giving to any engineer the opportunity of examining the computed results and of changing and adjusting them as may seem best to him. Although it is believed that the rating tables and computed monthly discharges are as good as the base data up to and including the current year will warrant, it should always be borne in mind that the additional data collected at each station from year to year nearly always throw new light on data already collected and published, and hence allow more or less improvement in the computed results of earlier years. It is therefore expected that the engineer who makes serious use of the figures presented in these papers will verify all ratings and make such adjustments for earlier years as may seem necessary. The work of compiling, studying, revising, and republishing data for different drainage basins for 5 or 10 year periods or more is carried on by the United States Geological Survey so far as the funds for such work are available.

The estimates in the table of monthly discharge are so arranged as to give only a general idea of the conditions of flow at the station, and it is not expected that they will be used for other than preliminary estimates.

The daily discharges are published to allow a more detailed study of the variation in flow and to determine the periods of deficient flow.

COOPERATIVE DATA.

Cooperative data of various kinds and data regarding the run-off at many stations maintained wholly by private funds are incorporated in the surface water-supply reports of the United States Geological Survey.

Many stations throughout the country are maintained for specific purposes by private parties who supply the records gratuitously to the United States Geological Survey for publication. When such records are furnished by responsible parties and appear to be reasonably accurate, they are verified, so far as possible, and estimated values of accuracy are given. Records clearly worthless or misleading are not published. As it is, however, impossible to completely verify all such records furnished—because of lack of funds or for other causes—they are published for what they are worth, as they are of value as a matter of record and afford at least approximate

information regarding stream flow at the particular localities. The survey does not, however, assume any responsibility for inaccuracies found in such records, although most of them are believed to be reasonably good.

COOPERATION AND ACKNOWLEDGMENTS.

Special acknowledgments as follows are due for records furnished:

The United States Indian Office for the maintenance of stations on the Uinta Reservation in the vicinity of the Uinta irrigation survey.

The United States Reclamation Service, for data in the Gunnison River basin in Colorado, the Strawberry River drainage basin in Utah, the Santa Cruz [1] and Salt River basins in Arizona, and for the maintenance of the station on Grand River at Palisades, Colo.

The United States Forest Service, for cooperation on stations in the Colorado River basin or near the forest reserves.

The Territory of New Mexico, through the Territorial engineer, Mr. Vernon L. Sullivan, for cooperation in the maintenance of all stations in the Colorado River basin in New Mexico.

The Atchison, Topeka & Santa Fe Railway, through Mr. Vernon L. Sullivan, for cooperation in maintenance of stations in Colorado River basin in New Mexico.

The State engineer of Colorado, Mr. C. W. Comstock, for cooperation in the maintenance of certain stations in the Grand River basin; also for data, furnished complete for publication in this water-supply paper, obtained in the Green, Grand, and San Juan drainage basins in Colorado by his hydrographers independently of the United States Geological Survey.

The State of Utah, through Mr. Caleb Tanner, State engineer, for cooperation in maintenance of stations in the Colorado River basin in Utah.

Mr. Thomas Lyons, of Gila, N. Mex., for cooperation in the maintenance of the station on the Gila at Redrock and for other assistance in the work.

Mr. R. E. Vickery, of Grand Junction, Colo., for cooperation in the maintenance of the stations on West Divide and West Mamm creeks.

The Central Colorado Power Co., for cooperation on the maintenance of stations in the Grand River basin.

Assistance was rendered or records furnished by the United States Weather Bureau, the Denver Reservoir & Irrigation Co., Mr. G. H. Matthes, Mr. E. C. Jensen, Mr. Stanley Krajicek, Mr. Jay Turley, Mr. G. W. Vallery, the Socorro Mines Co., Mr. H. F. Robinson, Mr. R. I. Meeker, the Green River Irrigation Co., Mr. H. W. Sheley, the Beardsley Irrigation Co., and other companies and individuals.

[1] The data for the Santa Cruz at Tucson, Ariz., were obtained from the Reclamation Service, but the station is maintained by the University of Arizona.

DIVISION OF WORK.

The field data in the Colorado River basin in Colorado were collected under the direction of W. B. Freeman, district engineer, assisted by James B. Stewart, G. H. Russell, George J. Lyon, S. T. Harding, and E. O. Christiansen.

The field data in the Colorado River basin in Utah and western Wyoming for 1910 were collected under the direction of E. C. La Rue, district engineer, assisted by G. C. Baldwin, E. S. Fuller, A. B. Purton, G. H. Canfield, and J. C. Dort.

The field data in the Duchesne River basin in Utah were collected under the direction of W. B. Freeman, district engineer, assisted by R. H. Fletcher, who was under the more immediate supervision of H. C. Means, superintendent of irrigation, United States Indian Office.

The field data for the San Juan and Gila River basins in New Mexico were collected under the general direction of W. B. Freeman, district engineer, assisted by James B. Stewart, G. H. Russell, and George J. Lyons. This work was done in cooperation with Vernon L. Sullivan, Territorial engineer, assisted by C. D. Miller.

The field data for all stations in Arizona have been collected under the direction of W. B. Clapp, district engineer, by C. C. Jacob.

Rating curves and special estimates were made by W. B. Freeman, E. C. La Rue, O. W. Hartwell, J. B. Stewart, G. C. Stevens, and H. D. Padgett. The completed data were prepared for publication by H. D. Padgett. Computations were made by H. D. Padgett, J. B. Stewart, J. J. Phelan, and M. E. McChristie.

The report has been edited by Mrs. B. D. Wood.

GAGING STATIONS IN COLORADO RIVER BASIN.

The following is a list of gaging stations maintained in the Colorado River basin by the United States Geological Survey and cooperators. The stations are arranged by river basins, in downstream order, as explained on page 11, tributaries being indicated by indention. Data for these stations have been published in the reports listed in tables on pages 9–11.

Green River (head of Colorado) near Kendall, Wyo., 1910.
Green River at Green River, Wyo., 1895–1906.
Green River at Jensen, Utah, 1903–1906.
Green River at Ouray, 1904–5.
Green River at Green River, Utah, 1894–1899 and 1905–1910.
Green River at Little Valley, Utah, 1910.
Colorado River at Hardyville, Ariz., 1905–1907.
Colorado River at Mohave City, Ariz., 1902–3.
Colorado River at Yuma, Ariz., 1895–1909.
New Fork River near (10 miles above) Cora, Wyo., 1910.
New Fork River near (3 miles below) Cora, Wyo., 1905.

Colorado River—Continued.
Pine Creek near Pinedale, Wyo., 1904–1906 and 1910 (diversions between old and new stations).
Pole Creek at Fayette, Wyo., 1904–1906.
Pole Creek near Pinedale, Wyo., 1910.
Fall Creek at Fayette, Wyo., 1904–5.
Boulder Creek at Boulder (New Fork), Wyo., 1904–1906.
East Fork River at New Fork, Wyo., 1905–6.
Green River, Black Fork, at Granger, Wyo., 1896–1900.
Big Sandy Creek near Big Sandy, Colo., 1910.
Beaver Creek near Ladore, Colo., 1910.
Vermilion Creek at Ladore, Colo., 1910.
Yampa River at Yampa, Colo., 1910.
Yampa River at Steamboat Springs, Colo., 1904–1906 and 1910.
Yampa River at Craig, Colo., 1901–2, 1904–1906, and 1910.
Yampa River near Maybell, Colo., 1904–5 and 1910.
Trout Creek at Pinnacle, Colo., 1910 (tributary to Terrible Creek).
Soda Creek at Steamboat Springs, Colo., 1910.
Elk River near Clark, Colo., 1910.
Elk River near Trull, Colo., 1904–1906, and 1910.
Fish Creek at Dunkley, Colo., 1910 (tributary to Sage Creek).
Elk Head Creek near Craig, Colo., 1906 and 1910.
Fortification Creek at Craig, Colo., 1905–6, and 1910.
Williams River near Pyramid, Colo., 1910.
Williams River at Hamilton, Colo., 1904–1906, and 1910.
Milk Creek at Axial, Colo., 1904–5.
Little Snake River at Dixon, Wyo., 1910.
Little Snake River at Maybell, Colo., 1904.
Slater Creek near Slater, Colo., 1910.
Ashley Creek at Vernal, Utah, 1900–1904.
Ashley Creek, Dry Fork, at Vernal, Utah, 1904.
Duchesne River, North Fork, above Forks, Utah, 1904.
Duchesne River at Myton, Utah, 1899–1910.
Duchesne River, West Fork, above Forks, Utah, 1904.
Rock Creek (East Creek), 10 miles above mouth, Utah, 1904.
Strawberry River above mouth of Indian Creek, near Strawberry Valley, Utah, 1909–10.
Strawberry River below mouth of Indian Creek, near Strawberry Valley, Utah, 1903–1906 and 1908–9.
Strawberry River at Theodore, Utah, 1908–1910.
Indian Creek in Strawberry Valley, Utah, 1905–6 and 1909–10.
Trail Hollow Creek in Strawberry Valley, Utah, 1909–10.
Currant Creek 13 miles above mouth, Utah, 1904.
Currant Creek 3 miles above mouth, Utah, 1904.
Red Creek above Narrows, Utah, 1904.
Lake Fork, West Fork, 10 miles above Forks, Utah, 1904.
Lake Fork below Forks, Utah, 1904, 1907–1910.
Lake Fork near Myton, Utah, 1900–1904, 1907–1910.
Lake Fork, East Fork, 8 miles above Forks, Utah, 1904.
Uinta River near Whiterocks, Utah, 1899–1904, 1907–1910.
Uinta River at Fort Duchesne, Utah, 1899–1904, 1906–1910.
Uinta River at Ouray School, Utah, 1899–1904.
Whiterocks River near Whiterocks, Utah, 1899–1904, 1907–1910.

Colorado River—Continued.
White River, North Fork, at Buford, Colo., 1903–1906, and 1910.[1]
White River at Meeker, Colo., 1901–1906, and 1910.
White River at White River City, Colo., 1895.
White River at Rangely, Colo., 1904–5.
White River at Dragon, Utah, 1906.
White River at Ouray, Utah, 1904.
Marvine Creek near Buford, Colo., 1903–1906.
White River, South Fork, near Buford, Colo., 1903–1906, and 1910.
Price River near Helper, Utah, 1904–1910.
Price River at Woodside, Utah, 1910.
San Rafael River near Green River, Utah, 1909–10.
Cottonwood Creek near Orangeville, Utah, 1909–10.
Ferron Creek near Ferron, Utah, 1909–10.
Huntington Creek near Huntington, Utah, 1909–10.
Grand River, North Fork, near Grand Lake, Colo., 1904–1910.
Grand River near Granby, Colo., 1908–1910.
Grand River at Sulphur Springs, Colo., 1904–1910.
Grand River near Kremmling, Colo., 1904–1910.
Grand River near Wolcott, Colo., 1906–1908.
Grand River at Shoshone, Colo., 1897.
Grand River at Glenwood Springs, Colo., 1899–1910.
Grand River near Palisades, Colo., 1902–1910.
Grand River near Grand Junction, Colo., 1895–1900.
North Inlet to Grand Lake at Grand Lake, Colo., 1905–1910.
Grand Lake Outlet at Grand Lake, Colo., 1904–1910.
Grand River, South Fork, near Lehman, Colo., 1907–8.
Fraser River near Arrow, Colo., 1910.
Fraser River at upper station near Fraser, Colo., 1908–1910.
Fraser River at lower station near Fraser, Colo., 1907–1909.
Fraser River at Granby Coulter, Colo., 1904–1909.
Big Jim Creek near Fraser, Colo., 1907–1909.
Little Jim Creek near Fraser, Colo., 1907–1909.
Vasquez Creek at upper station near Fraser, Colo., 1908–9.
Vasquez Creek at lower station near Fraser Colo., 1907–1909.
Elk Creek near Fraser, Colo., 1907–1909.
St. Louis Creek at upper station near Fraser, Colo., 1908–9.
St. Louis Creek at lower station near Fraser, Colo., 1908–9.
North Ranch Creek at upper station near Rollins Pass, Colo., 1908–9.
North Ranch Creek at lower station near Rollins Pass, Colo., 1907–1909.
Middle Ranch Creek at upper station near Arrow, Colo., 1908–9.
Middle Ranch Creek at lower station near Arrow, Colo., 1907–1909.
South Ranch Creek at upper station near Arrow, Colo., 1908–9.
South Ranch Creek at lower station near Arrow, Colo., 1907–1909.
Williams Fork near Scholl, Colo., 1910.
Williams Fork near Sulphur Springs, Colo., 1904–1910.
Troublesome River at Troublesome, Colo., 1904–5.
Muddy River at Kremmling, Colo., 1904–5.
Blue River near Dillon, Colo., 1910.

[1] The station maintained in 1910 is 5 miles below the old station, but no large tributaries enter between.

Colorado River—Continued.
Grand River—Continued.
Blue River near Kremmling, Colo., 1904–1908.
Tenmile Creek near Kokomo, Colo., 1904.
Tenmile Creek near Uneva Lake, Colo., 1903.
Tenmile Creek near Dillon, Colo., 1910.
Snake River near Dillon, Colo., 1910.
Eagle River near Eagle, Colo., 1905–1907.
Eagle River at Gypsum, Colo., 1907–1909.
Roaring Fork near Emma, Colo., 1908–9.
Roaring Fork at Glenwood Springs, Colo., 1906–1910.
Frying Pan River at Basalt, Colo., 1908–9.
Crystal River near Marble, Colo., 1910.
Crystal River near Carbondale (Sewell), Colo., 1908–9.
West Divide Creek at Hostutler's ranch, near Raven, Colo., 1909.
West Divide Creek at Beard's ranch, near Raven, Colo., 1909–10.
West Divide Creek at Raven, Colo., 1909–10.
West Mamm Creek near Rifle, Colo., 1909–10.
Taylor River near Almont, Colo., 1905 and 1910.
Gunnison River near Gunnison, Colo., 1910.
Gunnison River near Iola, Colo., 1900–1903.
Gunnison River near Cimarron, Colo., 1903–1905.
Gunnison River at River Portal (east portal of Gunnison tunnel), Colo., 1905–1910.
Gunnison River near Cory, Colo., 1903–1905.
Gunnison River at Roubideau, Colo., 1897.
Gunnison River at Whitewater, Colo., 1897, 1901–1906.
Gunnison River near Grand Junction, Colo., 1895, 1897–1899.
East River at Almont, Colo., 1905 and 1910.
Cement Creek near Crested Butte, Colo., 1910.
Tomichi Creek near Gunnison, Colo., 1910.
Quartz Creek near Pitkin, Colo., 1910.
Cimarron Creek at Cimarron, Colo., 1903–1905.
Gunnison River, North Fork, near Hotchkiss, Colo., 1903–1906.
Uncompahgre River near Colona, Colo., 1903–1906.
Uncompahgre River near Ouray, Colo., 1908.
Uncompahgre River near Fort Crawford, Colo., 1910.
Uncompahgre River at Fort Crawford, Colo., 1895–1899, 1908–1910.
Uncompahgre River at Montrose, Colo., 1900, 1903–1910.
Uncompahgre River near Delta, Colo., 1903–1910.
Dolores River near Dolores, Colo., 1895–1903 and 1910.
San Miguel River near Fall Creek, Colo., 1895–1899 and 1910.
San Miguel River near Placerville, Colo., 1910.
Fremont River near Thurber, Utah, 1909–10.
Muddy Creek near Emery, Utah, 1909–10.
Escalante Creek near Escalante, Utah, 1909–10.
San Juan River at Arboles, Colo., 1895–1899 and 1910.
San Juan River at Turley, N. Mex., 1907–8.
San Juan River at Blanco, N. Mex., 1908–1910.
San Juan River near Bloomfield, N. Mex., 1909–10.
San Juan River near Farmington, N. Mex., 1904–1906.
Piedra River at Arboles, Colo., 1895–1899 and 1910.
Los Pinos River near Ignacio, Colo., 1899–1903 and 1910.
Animas River at Silverton, Colo., 1903.
Animas River at Durango, Colo., 1895–1905 and 1910.

Colorado River—Continued.
San Juan River—Continued.
Animas River at Aztec, N. Mex., 1904, 1907–1910.
Animas River near Farmington, N. Mex., 1904–5.
Florida River near Durango, Colo., 1899, 1901–1903, and 1910.
La Plata River at Hesperus, Colo., 1904–1906 and 1910.
La Plata River at La Plata, N. Mex., 1905–1910.
Mancos River at Mancos, Colo., 1898–1900.
West Mancos River near Mancos, Colo., 1910.
Little Colorado River at St. Johns, Ariz., 1906–1909.
Little Colorado River at Woodruff, Ariz., 1905–1908.
Little Colorado River at Holbrook, Ariz., 1905–1909.
Silver Creek at Snowflake, Ariz., 1906–1908.
Silver Creek at Canyon Station, Ariz., 1906.
Woodruff ditch at Woodruff, Ariz., 1906.
Chevelon Fork near Winslow, Ariz., 1906–1908.
Clear Creek near Winslow, Ariz., 1906–1909.
Virgin River at Virgin, Utah, 1909–10.
Santa Clara River near Central, Utah, 1909–10
Santa Clara River near St. George, Utah, 1909–10.
Muddy River near Moapa, Nev., 1904–1906 and 1910.
Bill Williams River near Swansea, Ariz., 1910.
Gila River near Cliff, N. Mex., 1904–1907.
Gila River near Redrock, N. Mex., 1908–1910.
Gila River at Guthrie, Ariz., 1910.
Gila River at San Carlos, Ariz., 1899–1905 and 1910.
Gila River near Buttes, Ariz., 1889–1890 and 1895–1899.
Gila River at Dome (Gila City), Ariz., 1903–1906.
San Francisco River at Alma, N. Mex., 1904–1907 and 1909–10.
San Francisco River at Clifton, Ariz., 1910.
Whitewater Creek near Mogollon, N. Mex., 1910.
San Carlos River near San Carlos, Ariz., 1910.
San Pedro River near Lewis Springs, Ariz., 1904–1906 and 1910.
San Pedro River near Dudleyville, Ariz., 1890.
Santa Cruz River near Nogales, Ariz., 1907 and 1909–10.
Santa Cruz River and ditches at Tucson, Ariz., 1905–1910.
Queens Creek at Whitlows, Ariz., 1896.
Salt River at Roosevelt, Ariz., 1901–1907 and 1910.
Salt River below mouth of Cherry Creek, near Roosevelt, Ariz., 1906.
Salt River 50 miles above Phoenix, Ariz., 1890.
Salt River at Arizona dam, Ariz., 1888–1891.
Salt River at McDowell, Ariz., 1888–1910.
Tonto Creek at Roosevelt, Ariz., 1901–1904.
Verde River at McDowell, Ariz., 1888–1910.
Agua Fria River near Glendale, Ariz., 1910.
Hassayampa River near Wickenburg, Ariz., 1910.
Salton Sea near Salton, Cal., 1904–1910.
Alamo River near Brawley, Cal., 1908–1910.
New River near Brawley, Cal., 1908–1910.
Canal stations in Colorado River basin:
Imperial canal (main) near Calexico, Cal., 1904–5.
Boundary canal near Calexico, Cal., 1905.

*

Colorado River—Continued.
Canal stations in Colorado River basin—Continued.
Wisteria canal near Calexico, Cal., 1905.
Imperial canal 10 miles below Yuma, Ariz., Mexican boundary line, 1903–1905.
Holt canal at Calexico, Cal., 1904–5.
Hemlock canal at Calexico, Cal., 1904–5.
Alamo channel near Calexico, Cal., 1904.
Alamitos canal near Calexico, Cal., 1904–5.

GENERAL FEATURES OF COLORADO RIVER BASIN.

Colorado River is formed in the southeastern part of Utah by the junction of Grand and Green rivers. The Green is larger than the Grand and is the upward continuation of the Colorado. Including the Green, the Colorado is about 2,000 miles long. The region drained is about 800 miles long, ranges in width from 300 to 500 miles, and contains about 300,000 square miles. It comprises the southwestern part of Wyoming, the western part of Colorado, the eastern half of Utah, practically all of Arizona, and small portions of California, Nevada, New Mexico, and old Mexico. Most of this area is arid, the mean annual rainfall being about 8½ inches. The streams receive their supply from the melting snows on the high mountains of Wyoming, Utah, and Colorado.

The basin comprises two distinct portions. The lower third is but little above the level of the sea, though here and there ranges of mountains rise to elevations of 2,000 to 6,000 feet. This part of the valley is bounded on the north by a line of cliffs which present a bold and in many places vertical step of hundreds or thousands of feet to the tableland above. The upper two-thirds of the basin stands from 4,000 to 8,000 feet above sea level and is bordered on the east, west, and north by ranges of snow-clad mountains, which attain altitudes ranging from 8,000 to 14,000 feet above sea level. Through this plateau the Colorado and its tributaries have cut narrow gorges or canyons in which they flow at almost inaccessible depths. At points where lateral streams enter, the canyons are broken by narrow transverse valleys, diversified by bordering willows, clumps of box elder, and small groves of cottonwood. The whole upper basin of the Colorado is traversed by a labyrinth of these canyons, most of which are dry during the greater portion of the year and carry water only during the melting of the snow and the brief periods of the autumnal and spring rains.

GREEN RIVER AND THE MAIN COLORADO RIVER.

GENERAL FEATURES OF AREA DRAINED.

Green River and its tributaries [1] drain an area rudely triangular in outline, bounded on the north and east by the Wind River Mountains and the ranges forming the Continental Divide, on the south and east by the White River Plateau and the Roan or Book Cliffs, and on the north and west by the Gros Ventre and Wyoming mountains and the great Wasatch Range. The greatest length of the basin, north and south, is about 370 miles. In an east-west direction it measures at the widest part about 240 miles. The total drainage area is approximately 41,000 square miles. Altitudes range from 14,000 feet in the high mountains to about 3,800 feet at the mouth of the Grand.

The area includes a large part of western Wyoming, northwestern Colorado, and eastern Utah. The Uinta and Uncompahgre Indian reservations are located in this basin in northeastern Utah.

Green River heads on the western slope of the Wind River Mountains in western Wyoming, its ultimate source being a number of small lakes fed by the glaciers and immense snow deposits always to be found on Fremont and neighboring peaks. For perhaps 25 miles the river flows northwestward through the mountains; it then turns abruptly and runs in a general southerly direction across western Wyoming and Utah. A few miles below the Wyoming-Utah boundary another sharp turn carries the river eastward near the east end of the range. It then flows southward in Colorado for about 25 miles, turns back into Utah, and continues to flow in a southwesterly and southerly direction until it unites with the Grand to form the Colorado. Its length, measured roughly along the course, is approximately 425 miles.

In its upper course the Green receives as tributaries numerous streams heading in the Wind River, Gros Ventre, and Wyoming ranges, some of them extending so far back into the abrupt, ragged canyons that they dovetail with streams flowing in the opposite direction. The most important of these tributaries are New Fork River, Big Sandy Creek, Labarge Creek, Fontenelle Creek, Black Fork, and Henry Fork. South of the Uinta Mountains the first large stream flowing into the Green is the Yampa, which comes in from the east at the point where the Green turns westward to reenter Utah after its southward journey in Colorado. Farther south Ashley Creek and Duchesne and White rivers discharge their waters into the Green, Ashley Creek and the Duchesne from the west and the White from the east. Below this point the only tributaries of

[1] The geology of this basin is described in the Eleventh Ann. Rept. U. S. Geol. and Geog. Survey Terr., for 1877, pp. 509–646. Information in regard to the hydrography is contained in the first to fourth annual reports of the Reclamation Service and in the United States Geological Survey reports.

importance are Price, Minnie Maud, and San Rafael rivers, which enter from the west, the San Rafael at a point about 32 miles above the junction of the Green and the Grand.

Over the plains portion of the basin, which includes considerably over half of it, the average annual precipitation is probably less than 10 inches annually; over much of the remainder the rainfall averages between 10 and 15 inches, and in only a very small area in the high mountains does the annual precipitation exceed 20 inches.

Throughout this basin the winters are severe and most of the streams have a heavy ice cover for several months. There is usually an abundance of snow in the high mountains, but the winters on the plains are frequently open.

The waters of the Green and its tributaries are practically unused except for irrigation. From Wells, Wyo., to the Wyoming State line, a distance of 225 miles, the stream has an average fall of 11 feet to the mile; and from the Wyoming State line to the mouth of Minnie Maud Creek, a distance of 200 miles, the average fall is 7 feet to the mile. Along these two sections of the river and on the headwaters there are many unutilized power sites.

From the junction of Green and Grand rivers the Colorado flows southwestward, passes across the northwestern corner of Arizona, then turns to the south, and for the remainder of its course forms a part of the southeastern boundary of Nevada and California and the western boundary of Arizona. It empties into the Gulf of California about 60 miles below Yuma, Ariz. The canyons through which it flows are world famed and need not here be described.

The Colorado has been called the Nile of America, and, like the Nile, it is subject to an annual summer rise which comes at the time the water is most needed for irrigation. It is of interest to compare the Colorado with the Nile and the Susquehanna. The Nile is similar in type; the Susquehanna shows the difference in flow between arid and humid regions. In the comparison a normal year, based on a 10-year record for Colorado and Susquehanna rivers and such data as could be found in regard to the Nile, have been used. The Colorado has been taken as the standard of comparison.

The Nile has 5.7 times the drainage area and the Susquehanna about one-eighth the area of the Colorado.

The rainfall in the Nile basin is 3.8 times greater; that in the Susquehanna basin is 4.5 times greater. The run-off per square mile from the Nile basin is 1.9 times greater; that from the Susquehanna basin is 37 times greater. The ratio of run-off to rainfall in the Nile basin is 2 times smaller; that of the Susquehanna basin is 8.2 times greater.

The discharge of the Nile is 10.8 times greater; that of the Susquehanna is 4.5 times greater.

The maximum flow of the Colorado is from 50,000 to 150,000 second-feet and occurs in May, June, or July; for the Nile it is about 353,000 second-feet and occurs about the first of September; for the Susquehanna it is from 150,000 to 550,000 second-feet and occurs during March, April, and May.

The minimum flow of the Colorado is from 2,500 to 3,000 second-feet and occurs during January and February; that of the Nile is about 14,500 second-feet and occurs about the end of May; for the Susquehanna it is from 2,200 to 11,000 second-feet and occurs in September and October.

The mean flow of the Colorado for the period 1894–1903 is 10,700 second-feet, as previously published. The mean flow for the period 1904–1910, however, is 25,400 second-feet; for the Nile it is about 115,800 second-feet; for the Susquehanna it is about 41,000 second-feet.

GREEN RIVER NEAR KENDALL, WYO.

This station, which is located just above the mouth of Gypsum Creek and at the Kendall forest ranger station, was established August 3, 1910.

Gage heights are obtained from chain gage.

Discharge measurements are made from a cable and car.

The stream bed is composed of small rounded bowlders and is probably permanent.

During the winter the relation between gage heights and discharge is probably affected by slush ice which collects on a riffle below the station.

This station is maintained in cooperation with the Forest Service, by which the gage heights are furnished.

Discharge measurements of Green River near Kendall, Wyo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 24	G. C. Baldwin	120	129	3.02	244
Oct. 15	George Belknap	112	114	.....	176

Daily gage height, in feet, of Green River near Kendall, Wyo., for 1910.

Day.	Aug.	Sept.	Oct.	Day.	Aug.	Sept.	Oct.	Day.	Aug.	Sept.	Oct.
1	.....	.....	.....	11	3.4	.....	2.8	21	3.5	.....	.....
2	3.75	.....	2.8	12	3.5	.....	2.75	22	.....	3.05	2.7
3	.....	3.1	2.8	13	3.5	.....	2.8	23	3.4	.....	2.8
4	.....	.....	2.8	14	3.5	.....	2.75	24	.....	3.0	.....
5	.....	.....	.....	15	.....	.....	.....	25	.....	.....	2.8
6	.....	3.0	2.8	16	.....	.....	.....	26	.....	.....	2.8
7	.....	2.9	2.8	17	.....	.....	.....	27	.....	.....	.....
8	.....	.....	2.8	18	3.3	.....	.....	28	.....	.....	.....
9	3.5	2.85	2.8	19	.....	.....	2.75	29	.....	2.8	.....
10	3.4	.....	2.8	20	3.5	.....	2.8	30	.....	.....	.....
								31	.....	.....	.....

GREEN RIVER AT GREEN RIVER, UTAH.

This station, which is located at the highway bridge 200 feet upstream from the Rio Grande Western Railway bridge at Green River railroad station, near Elgin post office (originally called Blake), was established October 21, 1894, discontinued October 15, 1899, and reestablished in February, 1905. The gage was moved December 2, 1910, from the railroad bridge to the highway bridge, 200 feet upstream. Its datum is the same as that of the old gage at 5.53 feet.

A new bridge was erected at this point between the periods of maintenance of the original station and the present one. The datum of the gage maintained up to December 2, 1910, as near as can be learned, is 1.68 feet below the original datum and has remained the same since its establishment; but owing to the change in conditions of flow caused by the relocation of the bridge piers, it is impossible to utilize the early measurements in studies of new discharge curves.

Price River enters from the west about 16 miles above the station. Several irrigation projects are completed and being promoted in this drainage basin. The last ditch above the station on the right bank is about 6 miles upstream and on the left bank about 3 miles upstream.

Discharge measurements, which were formerly made from the railroad bridge and from a ferryboat, are now made from the highway bridge, where conditions favor accurate measurements. This bridge divides the measuring section into three parts, each 168 feet wide. The channel is somewhat shifting.

A careful determination, in 1909, of the angle which the bridge makes with the main current, necessitated a correction of 15 per cent in all discharge measurements made at the bridge from 1905 to 1910. The daily and monthly estimates of discharge for 1905 to 1909 have been revised and supersede those previously published.[1]

Ice usually exists at the station during December, January, and February. Monthly estimates during these periods have been obtained by considering the general behavior of the river at this station and by the aid of climatologic data.

Discharge measurements of Green River at Green River, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 26	Fuller and Epperson	465	4,260	9.0	[a] 18,400
Oct. 3	Canfield and Dort	408	1,450	5.67	[b] 2,240
Dec. 3	G. H. Canfield	421	1,460	5.52	[c] 2,280

[a] Measurement made from railroad bridge. Coefficient of 0.876 applied for correction on account of angle of bridge with the current.
[b] Measurement made from boat under ferry cable.
[c] Measurement made from highway bridge 200 feet upstream from railroad bridge.

[1] See Water-Supply Paper U. S. Geol. Survey No. 269, 1911.

Daily gage height, in feet, of Green River at Green River, Utah, for 1910.

[L. H. Green, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.6	7.0	5.5	7.65	9.95	9.4	7.0	6.25	4.8	5.0	5.9	5.5
2	6.8	7.0	5.85	7.35	10 35	9.75	6.9	6.45	4.8	5.3	5.85	5.5
3	6.9	7.0	6.05	7.3	10.25	9.8	6.65	6.25	7.0	5.5	5.8	5.5
4	7.0	7.0	6.2	7.2	10.15	9.7	6.6	6.15	5.8	5.5	5.75	5.5
5	7.0	7.0	7.35	6.95	9.95	9.6	6.5	6.0	5.05	5.6	5.65	5.5
6	7.0	7.1	7.6	7.0	9.5	9.6	6.5	6.0	5.0	5.7	5.6	5.4
7	7.0	7.1	9.7	7.0	9.4	9.7	6.5	5.75	5.0	5.7	5.6	5.4
8	7.0	7.1	10.8	7.0	9.15	9.7	6.4	6.05	5.0	5.7	5.6	5.4
9	7.0	7.1	9.1	7.0	9.2	9.45	6.3	6.1	5.0	5.7	5.5	5.4
10	7.0	7.1	9.6	7.0	9.2	9.25	6.3	5.9	5.0	5.7	5.5	5.4
11	7.0	7.1	8.95	7.0	9.25	9.0	6.1	5.65	5.0	5.6	5.5	5.4
12	7.0	7.1	8.6	6.9	9.45	8.9	6.0	5.55	5.05	5.6	5.5	5.4
13	7.0	6.9	8.25	7.15	9.6	8.7	5.9	5.4	5.1	5.7	5.5	5.4
14	7.0	6.75	7.9	7.35	10.1	8.45	5.8	5.3	5.1	5.7	5.75	5.4
15	7.0	6.45	7.65	7.7	10.5	8.35	5.7	5.3	5.3	5.7	6.05	5.4
16	7.0	6.25	7.55	7.95	10.55	8.15	5.7	5.3	5.3	5.8	6.0	5.4
17	7.0	6.2	7.45	8.1	10.5	7.85	5.7	5.2	5.6	6.85	5.75	5.4
18	7.0	6.2	7.3	8.35	10.35	8.0	5.7	5.2	6.05	6.7	5.55	5.4
19	7.0	6.2	7.2	8.05	10.25	8.0	5.5	5.2	5.8	6.6	5.5	5.35
20	7.0	6.05	7.3	8.1	10.0	7.9	5.7	5.2	5.85	6.5	5.5	5.25
21	7.0	5.95	7.3	8.0	9.4	7.9	5.7	5.1	5.85	6.55	5.5	5.0
22	7.0	5.75	7.3	8.0	9.2	7.8	5.6	5.0	5.75	6.6	5.5	4.85
23	7.0	5.7	7.45	8.3	9.1	7.7	5.5	5.1	5.65	6.4	5.5	4.4
24	7.0	5.5	7.7	8.4	9.1	7.6	5.4	5.0	5.6	6.35	5.5	4.4
25	7.0	5.5	7.8	8.65	9.0	7.45	5.4	5.0	5.6	6.3	5.5	4.35
26	7.0	5.5	7.8	9.0	9.0	7.3	5.3	5.0	5.6	6.25	5.5	4.3
27	7.0	5.65	7.9	9.35	8.9	7.1	5.3	5.0	5.6	6.15	5.5	4.3
28	7.0	5.85	7.9	9.2	8.8	7.0	5.3	4.9	5.5	6.05	5.5	4.5
29	7.0	.....	8.0	9.45	8.55	6.95	5.5	4.9	5.4	6.0	5.5	4.6
30	7.0	.....	8.0	9.95	8.4	7.0	5.6	4.9	5.05	6.0	5.5	4.7
31	7.0	.....	7.9	.....	9.4	.....	6.05	4.8	.....	6.0	.....	4.7

NOTE.—Gage heights affected by ice from Jan. 1 to Feb. 20, Mar. 7 to 9, and Dec. 26 to 31.

Daily discharge, in second-feet, of Green River at Green River, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1,200	2,700	11,000	24,800	18,900	6,500	4,050	1,100	1,300	3,000	2,000
2	.....	1,200	3,660	9,580	27,500	21,000	6,120	4,650	1,100	1,640	2,860	2,000
3	.....	1,200	4,320	9,350	26,800	21,300	5,260	4,050	6,500	2,000	2,720	2,000
4	.....	1,200	4,820	8,890	26,100	20,700	5,100	3,750	2,720	2,000	2,590	2,000
5	.....	1,200	9,580	7,780	24,800	20,100	4,800	3,300	1,350	2,220	2,340	2,000
6	.....	1,200	10,800	8,000	21,800	20,100	4,800	3,300	1,300	2,460	2,220	1,800
7	.....	1,200	13,700	8,000	21,200	20,700	4,800	2,590	1,300	2,460	2,220	1,800
8	.....	1,200	16,600	8,000	19,500	20,700	4,500	3,450	1,300	2,460	2,220	1,800
9	.....	1,200	19,500	8,000	19,900	19,200	4,200	3,600	1,300	2,460	2,000	1,800
10	.....	1,200	22,400	8,000	19,900	18,000	4,200	3,000	1,300	2,460	2,000	1,800
11	.....	1,200	18,300	8,000	20,200	16,500	3,600	2,340	1,300	2,220	2,000	1,800
12	.....	1,300	16,200	7,560	21,500	15,900	3,300	2,110	1,350	2,220	2,000	1,800
13	.....	1,500	14,200	8,660	22,400	14,700	3,000	1,800	1,400	2,460	2,000	1,800
14	.....	2,000	12,300	9,580	25,800	13,200	2,720	1,640	1,400	2,460	2,590	1,800
15	.....	7,500	11,000	11,300	28,500	12,800	2,460	1,640	1,640	2,460	3,450	1,800
16	.....	3,000	10,500	12,500	28,800	11,800	2,460	1,640	1,640	2,720	3,300	1,800
17	.....	3,500	10,100	13,300	26,100	10,200	2,460	1,500	2,220	5,940	2,590	1,800
18	.....	4,000	9,350	14,700	25,000	11,000	2,460	1,500	3,450	5,420	2,110	1,800
19	.....	4,300	8,890	13,100	24,300	11,000	2,000	1,500	2,720	5,100	2,000	1,720
20	.....	4,320	9,350	13,300	22,600	10,500	2,460	1,500	2,860	4,800	2,000	1,570
21	.....	3,980	9,350	12,800	18,900	10,500	2,460	1,400	2,860	4,950	2,000	1,300
22	.....	3,360	9,350	12,800	17,700	10,000	2,220	1,300	2,590	5,100	2,000	1,150
23	.....	3,220	10,100	14,400	17,100	9,540	2,000	1,400	2,340	4,500	2,000	810
24	.....	2,700	11,300	15,000	17,100	9,080	1,800	1,300	2,220	4,350	2,000	810
25	.....	2,700	11,800	16,500	16,500	8,400	1,800	1,300	2,220	4,200	2,000	770
26	.....	2,700	11,800	18,600	16,500	7,740	1,640	1,300	2,220	4,050	2,000	930
27	.....	3,080	12,300	20,800	15,900	6,900	1,640	1,300	2,220	3,750	2,000	930
28	.....	3,660	12,300	19,900	15,300	6,500	1,640	1,200	2,000	3,450	2,000	900
29	.....	.....	12,800	21,500	13,800	6,310	2,000	1,200	1,800	3,300	2,000	900
30	.....	.....	12,800	24,800	13,000	6,500	2,220	1,200	1,350	3,300	2,000	900
31	.....	.....	12,300	.....	18,900	.....	3,450	1,100	.....	3,300	.....	900

NOTE.—Daily discharge, Feb. 1–20, Mar. 7–9, and Dec. 26–31, estimated on account of presence of ice. Mean discharge for January estimated at 1,000 second-feet.

Daily discharges except for period during which ice was present determined from two curves applicable as follows: Jan. 1 to May 16, fairly well defined between 1,800 and 24,000 second-feet; May 17 to Dec. 31, fairly well defined between 1,200 and 9,000 second-feet.

Monthly discharge of Green River at Green River, Utah, for 1910.

[Drainage area, 38,200 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	.....	.....	[a] 1,000	0.026	0.03	61,500	D.
February	7,500	[a] 1,200	2,500	.065	.07	139,000	D.
March	22,400	2,700	11,400	.298	.34	701,000	C.
April	24,800	7,560	12,500	.327	.36	744,000	A.
May	28,800	13,000	21,200	.555	.64	1,300,000	B.
June	21,300	6,310	13,700	.359	.40	815,000	C.
July	6,500	1,640	3,230	.085	.10	199,000	B.
August	4,650	1,100	2,160	.056	.06	133,000	B.
September	6,500	1,100	2,040	.053	.06	121,000	B.
October	5,940	1,300	3,280	.086	.10	202,000	B.
November	3,450	2,000	2,270	.059	.07	135,000	B.
December	2,000	770	1,520	.040	.05	93,500	B.
The year	28,800	770	6,420	.168	2.28	4,640,000	

[a] Estimated.

GREEN RIVER AT LITTLE VALLEY, UTAH.

This station, which is located at Little Valley, Utah, 6 miles downstream from the old station at Green River railroad station, near Elgin post office, was established December 18, 1910. No tributaries enter between these two stations except a few washes which carry water during floods.

Measurements are made from a ferry cable (Pl. III, *A*).

The gage is on the left bank, 100 feet upstream from the ferry, and is in two sections, a vertical staff for low-water and a slope gage for high-water readings.

The stream bed consists of loose sand overlying gravel and is liable to change during high water.

The following discharge measurement was made by G. H. Canfield:

December 18, 1910: Width, 310 feet; area, 1,030 square feet; gage height, 0.90 feet; discharge, 2,180 second-feet.

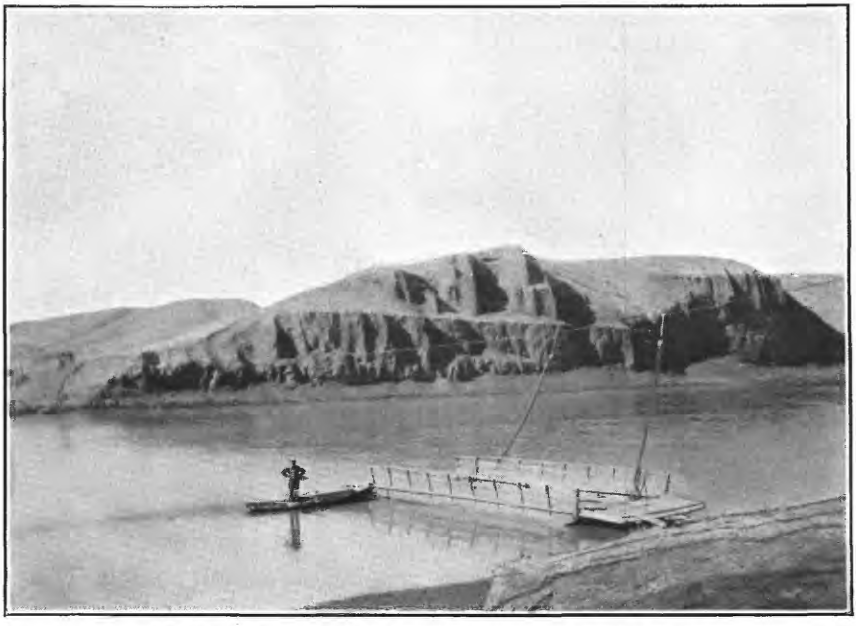
The following additional gage heights were obtained:

December 19, 0.9 foot; December 20, 0.75 foot; December 21, 0.6.

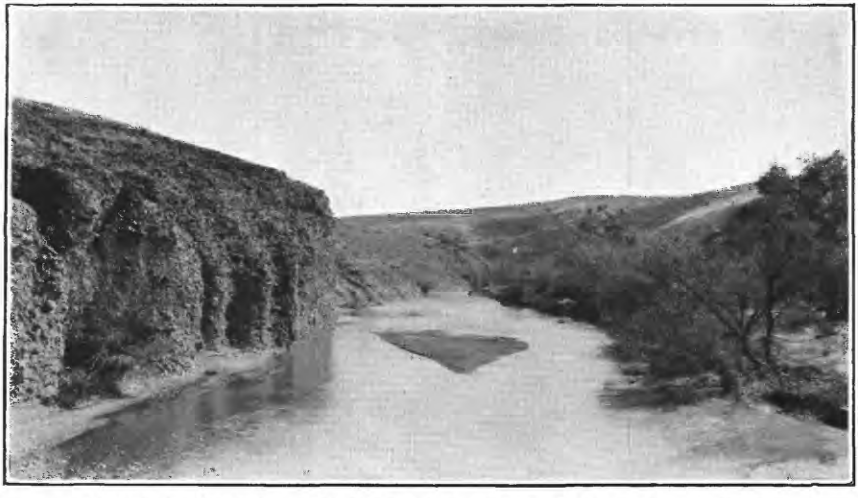
COLORADO RIVER AT YUMA, ARIZ.

This station, which is located in the town of Yuma, Ariz., 1½ miles below the mouth of Gila River and 10 miles by river above the Mexican border, furnishes information concerning the amount of water available for irrigation along the lower Colorado River. Records of river height have been kept by the Southern Pacific Co. since April 1, 1878.

At Laguna dam, 14 miles above the station, approximately 60 second-feet is diverted for irrigation on the California side. At



A. GAGING STATION ON GREEN RIVER AT LITTLE VALLEY, UTAH.



B. UPSTREAM VIEW OF GILA RIVER FROM RAILROAD BRIDGE AT GUTHRIE, ARIZ.

About 500 feet below the gaging station.

Yuma below the station, an average of 100 second-feet is pumped from the river for irrigation in the Yuma Valley. At the Imperial canal headworks, 6 miles below Yuma, approximately 1,500 second-feet is diverted for use in Imperial Valley.

The records given herewith are furnished by the United States Reclamation Service, through F. L. Sellew, project engineer, Yuma, Ariz.

The gage is a vertical staff, in two sections, the upper section, reading above 24 feet, being the original gage established in 1876. It is located at the railroad bridge, 600 feet above the cable station. The elevation of the zero of the gage is 102.79 feet above sea level.

As the bed of the stream is composed of silt and sand and is very unstable, frequent measurements are necessary to properly determine the daily discharge. Neither bank is subject to overflow. Previous to May 31, 1903, discharge measurements were made from the railroad bridge. On that date a cable station was established at a point 600 feet below the bridge, and all measurements are now made from a car, except during highest floods, when a boat is used. At flood stages a large part of the water flows through an old channel and does not pass under the cable. At such times this overflow water is measured at the point where it passes under the railway trestle, one-third mile north of the main channel.

Discharge measurements of Colorado River at Yuma, Ariz., in 1910.

[By R. L. North and N. B. Conway.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Jan. 1	14.65	4,400	Mar. 29	19.3	33,800
4	20.7	48,700	31	20.1	38,800
6	19.7	38,400	Apr. 2	20.1	36,400
8	17.3	21,200	5	19.15	30,200
11	16.9	19,300	7	18.6	27,300
13	15.8	13,400	9	18.3	24,100
15	15.0	10,000	12	18.5	23,500
18	15.0	9,100	14	18.1	22,000
20	15.5	12,300	16	18.1	22,400
22	16.2	15,200	19	18.7	24,900
25	16.4	15,500	23	19.2	30,500
29	15.8	12,600	26	19.1	30,100
Feb. 1	15.4	10,600	28	19.9	33,800
3	15.6	10,200	30	20.3	38,500
5	15.8	10,300	May 3	21.5	49,200
8	15.8	9,500	5	22.0	54,900
10	15.8	9,300	7	22.7	65,300
14	15.9	8,800	10	22.9	70,900
17	15.9	8,700	10	22.9	63,600
19	15.7	8,100	12	22.1	61,600
21	15.8	8,400	12	22.1	55,900
24	15.8	8,400	14	21.5	50,400
26	16.0	8,200	17	21.6	53,100
Mar. 1	15.9	8,200	19	22.0	60,100
3	15.9	7,600	24	23.0	70,300
5	16.3	8,700	26	21.95	57,500
8	17.0	13,700	26	21.95	61,600
10	17.6	20,000	28	21.0	48,400
12	18.2	24,000	31	20.1	42,100
15	20.4	40,600	31	20.1	44,400
17	19.9	36,100	June 2	19.9	40,100
19	18.9	29,500	4	20.0	41,900
22	18.3	26,500	7	21.8	56,200
24	18.2	25,000	11	23.2	67,100
26	18.4	26,000	14	23.2	69,100

Discharge measurements of Colorado River at Yuma, Ariz., in 1910—Continued.

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
June 16	22.15	57,000
18	21.25	48,100
21	20.35	40,500
23	19.95	35,200
25	19.4	32,200
28	18.75	28,700
30	18.35	26,900
July 2	18.05	23,500
5	17.8	21,100
7	18.3	23,900
9	17.4	19,300
12	16.95	16,800
14	16.5	14,300
16	16.6	15,100
19	16.1	12,100
21	16.1	10,600
23	16.0	9,800
26	16.0	10,000
28	15.7	7,600
30	15.7	7,700
Aug. 1	15.9	8,300
4	16.3	10,100
6	16.6	11,600
9	16.1	11,100
11	16.2	12,700
13	16.4	13,200
16	15.8	10,300
18	16.0	10,500
20	15.8	9,400
23	15.4	7,800
25	15.5	7,800
27	15.5	7,800
31	15.15	6,500
Sept. 3	15.0	5,500
6	14.9	4,800
8	14.9	4,800
10	15.3	5,300
13	14.7	4,800
15	15.8	8,000
17	15.6	7,100
20	15.2	6,100
22	15.5	6,900
24	15.5	6,200
27	15.2	5,600
29	15.8	7,600
Oct. 1	15.6	6,500
4	15.8	8,200
8	15.3	5,900
10	15.5	5,700
15	15.5	5,600
18	15.4	5,400
22	16.0	6,100
24	16.7	10,400
27	16.4	11,900
29	16.4	10,600
Nov. 1	16.2	8,710
3	16.25	8,470
5	16.4	8,970
8	16.2	8,040
10	16.2	7,160
12	16.2	7,450
15	16.5	8,410
19	16.3	7,840
22	16.4	8,210
26	16.8	8,890
30	16.3	7,790
Dec. 3	16.3	7,260
6	16.0	6,520
8	16.3	7,310
10	16.4	6,610
13	16.2	6,980
15	16.2	7,170
17	16.2	6,920
20	16.0	6,440
24	16.2	7,150
28	16.3	6,860
31	16.0	5,560

Daily gage height, in feet, of Colorado River at Yuma, Ariz., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	14.7	15.45	15.85	20.2	20.6	19.95	18.2	16.0	15.25	15.6	16.2	16.4
2	14.85	15.5	15.85	20.05	21.05	19.9	18.0	16.2	15.0	15.5	16.2	16.4
3	20.45	15.65	15.95	19.7	21.5	19.9	17.85	16.05	15.0	15.5	16.3	16.3
4	20.95	15.75	16.05	19.45	21.8	20.05	17.8	16.35	15.0	15.55	16.2	16.2
5	22.95	15.8	16.3	19.1	22.1	20.7	17.8	16.4	14.95	15.6	16.35	16.2
6	19.65	15.8	16.8	18.85	22.55	21.3	18.3	16.55	14.9	15.5	16.2	16.2
7	17.9	15.8	17.05	18.6	22.8	21.8	18.2	16.25	14.9	15.45	16.2	16.3
8	17.4	15.8	17.05	18.45	22.8	22.3	17.6	16.4	14.85	15.4	16.2	16.3
9	17.2	15.8	17.4	18.3	22.95	22.75	17.3	16.1	15.3	15.55	16.2	16.4
10	17.35	15.8	17.5	18.45	22.9	23.0	17.1	16.05	15.2	15.45	16.2	16.35
11	16.75	15.8	18.1	18.6	22.6	23.2	17.05	16.2	15.0	15.35	16.2	16.4
12	16.1	15.75	18.05	18.45	22.1	23.45	16.95	16.1	15.0	15.25	16.2	16.2
13	15.65	15.8	18.7	18.3	21.85	23.2	16.7	16.4	15.0	15.2	16.2	16.2
14	15.2	15.9	19.85	18.15	21.45	23.1	16.45	16.1	16.1	15.3	16.2	16.2
15	14.95	15.85	20.35	18.15	21.2	22.6	16.75	15.85	15.75	15.5	16.5	16.2
16	14.7	15.9	20.25	18.2	21.25	22.1	16.55	15.8	15.65	15.5	16.65	16.2
17	14.9	15.9	19.8	18.35	21.6	21.6	16.25	15.85	15.45	15.3	16.45	16.2
18	15.0	15.8	19.3	18.5	21.9	21.2	16.2	15.95	15.35	15.4	16.4	16.2
19	15.7	15.7	18.85	18.7	22.05	20.95	16.1	15.95	15.3	15.4	16.3	16.1
20	15.75	15.8	18.6	18.9	22.55	20.55	16.1	15.75	15.4	15.4	16.3	16.0
21	15.51	18.4	16.85	15.35	22.8	20.3	16.1	15.55	15.55	15.8	16.3	16.0
22	16.15	15.9	18.3	19.25	23.1	20.1	16.0	15.4	15.5	15.95	16.05	16.0
23	16.4	15.8	18.25	19.15	23.0	19.9	16.0	15.4	15.25	15.8	16.3	16.1
24	16.95	15.85	18.2	19.1	23.0	19.7	15.9	15.5	15.5	16.65	16.35	16.2
25	16.35	15.95	18.25	19.25	22.55	19.35	15.95	15.5	15.4	16.55	16.6	16.2
26	16.1	16.05	18.45	19.15	21.95	19.05	16.0	15.55	15.45	16.8	16.8	16.25
27	15.95	16.15	18.5	19.5	21.4	19.0	15.85	15.5	15.5	16.35	16.6	16.3
28	15.9	16.0	18.85	19.95	21.0	18.75	15.7	15.55	15.6	16.25	16.3	16.3
29	15.8	.....	19.3	20.15	20.7	18.7	15.7	15.15	15.8	16.35	16.3	16.0
30	15.55	.....	19.75	20.35	20.45	18.3	15.65	15.35	15.5	16.2	16.3	16.05
31	15.5	.....	20.1	.....	20.1	.....	15.6	15.2	.....	16.2	.....	16.0

Daily discharge, in second-feet, of Colorado River at Yuma, Ariz., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4,600	10,800	8,000	38,500	40,900	40,500	25,200	8,900	6,800	6,500	8,700	8,200
2	6,200	10,400	7,700	36,100	45,000	40,100	23,100	10,000	5,600	6,300	8,300	8,000
3	49,500	10,500	7,900	34,000	49,200	40,500	21,800	8,800	5,500	6,400	8,500	7,300
4	53,800	10,500	7,900	32,000	52,700	42,500	21,200	10,500	5,300	6,900	7,900	7,100
5	67,500	10,300	8,700	30,200	56,100	47,800	21,100	10,600	5,100	7,200	8,800	7,300
6	35,300	10,000	12,300	28,500	61,700	52,400	24,500	11,200	4,800	6,800	7,900	7,500
7	24,800	9,800	14,200	27,300	66,000	56,200	23,100	10,300	4,800	6,600	7,900	7,800
8	21,200	9,500	14,100	25,700	65,200	59,900	19,500	12,200	4,600	6,300	8,000	7,310
9	21,200	9,400	17,800	24,100	65,300	63,300	18,400	11,100	5,800	6,500	7,600	7,250
10	22,300	9,300	19,200	24,600	64,200	65,400	17,100	11,100	5,000	5,400	7,200	6,300
11	17,800	9,200	24,000	25,100	60,700	67,100	17,100	12,700	4,600	5,000	7,300	7,100
12	14,100	8,500	23,700	23,200	55,900	69,400	16,800	11,500	4,900	4,500	7,500	6,600
13	12,300	8,500	26,600	22,800	53,500	68,400	15,400	13,200	5,100	4,300	7,200	7,000
14	10,300	8,800	37,000	22,500	49,900	68,400	13,900	11,600	11,300	4,700	7,000	7,100
15	9,600	8,500	40,200	22,600	48,000	62,500	16,600	10,300	7,800	5,600	8,400	7,200
16	7,900	8,800	39,300	23,200	49,300	56,700	14,800	10,300	7,300	5,600	9,500	7,100
17	8,800	8,700	35,300	23,700	53,100	51,800	12,600	10,000	6,300	4,900	8,500	6,900
18	9,100	8,400	32,300	24,100	57,300	47,700	12,500	10,200	6,200	5,400	8,200	7,200
19	14,000	8,100	29,200	24,900	60,700	45,600	12,100	10,300	6,200	5,000	7,800	7,000
20	14,500	8,500	27,900	26,800	64,500	42,000	11,300	9,100	6,600	4,900	7,700	6,500
21	18,300	8,700	26,800	29,000	67,200	40,500	10,600	8,300	7,500	5,800	7,500	6,400
22	14,800	9,000	26,500	30,200	69,700	37,400	10,300	7,700	6,900	5,900	6,300	6,300
23	16,500	8,400	25,800	30,200	69,700	34,800	9,800	7,800	5,400	5,500	7,200	6,700
24	21,000	8,800	25,000	30,000	70,300	33,900	9,200	8,100	6,200	10,200	7,200	7,100
25	15,000	8,600	25,200	30,900	64,300	31,800	9,600	7,800	5,800	10,600	8,100	6,900
26	13,500	8,600	26,300	30,300	57,000	30,200	10,000	8,100	6,200	13,500	8,900	7,000
27	12,900	9,200	27,100	32,000	52,000	30,000	8,800	7,800	6,600	11,500	8,200	7,100
28	12,900	8,600	30,300	34,200	48,400	28,700	7,600	8,200	7,100	10,200	6,900	6,900
29	12,600	.....	33,800	36,500	46,300	28,700	7,600	6,300	7,600	10,300	7,400	5,600
30	11,000	.....	36,700	38,900	44,500	26,500	7,500	7,400	6,100	9,200	7,800	5,800
31	10,900	.....	38,800	.....	42,100	.....	6,900	6,800	.....	9,000	.....	5,600

Monthly discharge of Colorado River at Yuma, Ariz., for 1910.

[Drainage area, 225,000 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	67,500	4,600	18,800	0.084	0.10	1,160,000
February	10,800	8,100	9,160	.041	.04	509,000
March	40,200	7,700	24,400	.108	.12	1,500,000
April	38,900	22,500	28,700	.128	.14	1,710,000
May	70,300	40,900	56,500	.251	.29	3,470,000
June	69,400	26,500	47,000	.209	.23	2,800,000
July	25,200	6,900	14,700	.065	.08	904,000
August	13,200	6,300	9,620	.043	.05	592,000
September	11,300	4,600	6,170	.028	.03	367,000
October	13,500	4,300	6,980	.031	.04	429,000
November	9,500	6,300	7,850	.035	.04	467,000
December	8,200	5,600	6,940	.031	.04	427,000
The year	70,300	4,300	19,700	.088	1.20	14,300,000

TRIBUTARY BASINS.

NEW FORK RIVER BASIN.

GENERAL FEATURES.

New Fork River and its tributaries drain a portion of the western slopes of the Wind River Range, extending from Fremont Peak southeastward to Mount Bonneville, Mount Geikie, and Twin Buttes. The main stream flows in a general southerly course to a point near Cora, Wyo., where it turns sharply to the southwest, joining Green River about 40 miles below.

Pine, Pole, and Boulder creeks and East Fork River are the chief tributaries of the Newfork. These are all small streams, heading far back among the high peaks of the range and fed by the numerous springs and small mountain lakes with which the region is dotted. Fremont, Boulder, Fayette, Half Moon, Burnt, and Meadow lakes are the largest and most important of these. Fremont Lake, through which Pine Creek flows, has an area of approximately 2,500 acres.

The upper portions of the valleys of all these streams are forested and the valleys and rolling bench lands are covered with sagebrush and a sparse growth of nutritious grasses. The soil of the foothill region is sandy and gravelly in character, gradually becoming a rich loam at the lower levels.

NEW FORK RIVER NEAR CORA, WYO.

This station, which is located at the ranch of Eugene Alexander, 3½ miles below the outlet of New Fork Lake, was established July 29, 1910. A station was maintained on this stream 12 miles below the present site during 1905, but, as several tributaries enter and several ditches take water between the two sites, the records are not comparable.

Practically no water is diverted between the present station and New Fork Lake, and the records therefore indicate the amount of water available for storage in the lake.

The gage is a vertical staff. Discharge measurements are made by wading.

The following measurement was made by G. C. Baldwin:

September 23, 1910: Width, 24 feet; area, 11 square feet; gage height, 1.21 feet; discharge, 6.6 second-feet.

Daily gage height, in feet, and discharge, in second-feet, of New Fork River near Cora, Wyo., for 1910.

[Eugene Alexander, observer.]

Day.	July.		Aug.		Sept.		Oct.		Nov.		Dec.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	.....	.....	1.7	42	1.25	9	1.2	7	1.2	7	1.2	7
2	.....	.....	1.7	42	1.25	9	1.2	7	1.2	7	1.2	7
3	.....	.....	1.65	37	1.25	9	1.2	7	1.2	7	1.2	7
4	.....	.....	1.65	37	1.25	9	1.2	7	1.2	7	1.2	7
5	.....	.....	1.65	37	1.25	9	1.2	7	1.2	7	1.3	11
6	.....	.....	1.65	37	1.25	9	1.2	7	1.2	7	1.7	42
7	.....	.....	1.6	32	1.25	9	1.2	7	1.2	7	1.3	11
8	.....	.....	1.55	28	1.2	7	1.2	7	1.2	7	1.3	11
9	.....	.....	1.55	28	1.2	7	1.2	7	1.2	7	1.2	7
10	.....	.....	1.55	28	1.2	7	1.2	7	1.2	7	1.2	7
11	.....	.....	1.55	28	1.15	5	1.2	7	1.2	7	1.2	7
12	.....	.....	1.5	23	1.15	5	1.2	7	1.2	7	1.2	7
13	.....	.....	1.5	23	1.15	5	1.2	7	1.2	7	1.4	17
14	.....	.....	1.5	23	1.15	5	1.2	7	1.2	7	1.2	7
15	.....	.....	1.5	23	1.15	5	1.2	7	1.2	7	1.3	11
16	.....	.....	1.45	20	1.15	5	1.2	7	1.2	7	1.4	10
17	.....	.....	1.45	20	1.1	3	1.2	7	1.2	7	1.4	10
18	.....	.....	1.45	20	1.1	3	1.2	7	1.2	7	1.5	10
19	.....	.....	1.45	20	1.05	2	1.2	7	1.2	7	1.3	10
20	.....	.....	1.45	20	1.05	2	1.2	7	1.2	7	1.3	10
21	.....	.....	1.45	20	1.15	5	1.2	7	1.2	7	1.3	10
22	.....	.....	1.4	17	1.2	7	1.2	7	1.2	7	1.3	10
23	.....	.....	1.35	14	1.25	9	1.2	7	1.2	7	1.4	10
24	.....	.....	1.35	14	1.2	7	1.2	7	1.2	7	1.3	10
25	.....	.....	1.35	14	1.2	7	1.2	7	1.2	7	1.3	10
26	.....	.....	1.35	14	1.2	7	1.2	7	1.2	7	1.4	10
27	.....	.....	1.35	14	1.2	7	1.2	7	1.7	42	1.4	10
28	.....	.....	1.3	11	1.2	7	1.2	7	1.5	23	1.4	10
29	1.75	48	1.3	11	1.2	7	1.2	7	1.3	11	1.5	10
30	1.75	48	1.3	11	1.2	7	1.2	7	1.2	7	1.8	10
31	1.75	48	1.25	9	.....	.....	1.2	7	.....	.....	1.8	10

NOTE.—Daily discharge determined from a well-defined curve. Discharge estimated Dec. 16–31, on account of presence of ice, which probably affected the gage readings.

Monthly discharge of New Fork River near Cora, Wyo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
August	42	9	23.1	1,420	A.
September	9	2	6.5	387	A.
October	7	7	7.0	430	A.
November	42	7	8.8	524	A.
December	42	.....	10.5	646	C.

PINE CREEK NEAR PINEDALE, WYO.

Pine Creek, designated Fremont Creek on the earlier maps, rises on the southern slope of Fremont Peak, near the top, and flows southwestward about 25 miles to its junction with New Fork River. Its drainage area comprises 130 square miles, about 60 square miles being covered with forest. From its source to a point about 2 miles

beyond Fremont Lake, through which it flows, it is a winding stream descending by a series of falls and rapids, almost impassable even at low water.

The gaging station, which is located at an old Indian fording place below the outlet of Fremont Lake, about 4½ miles by wagon road from Pinedale and 115 miles from Rock Springs station, on the Union Pacific Railroad, was established July 22, 1910. A station described under the same name was maintained during 1904–1906 at a point about 1½ miles below the present station. Two ditches divert water from the stream between the old and the new sites.

A staff gage was installed July 22, 1910, and was reset September 26, 1910, at a different location. On September 20, 1910, a permanent chain gage was installed on the left bank.

High-stage measurements are made from a cable 50 feet below the chain gage; low-stage measurements are made by wading.

Gage heights are furnished by the Forest Service.

The following discharge measurement was made by G. C. Baldwin:

September 20, 1910: Width, 71 feet; area, 45 square feet; gage height, 1.72 feet; discharge, 36 second-feet.

Daily gage height, in feet, of Pine Creek near Pinedale, Wyo., for 1910.

Day.	Oct.	Nov.	Day.	Oct.	Nov.	Day.	Oct.	Nov.
1	0.7	0.6	11			21		
2	.7		12		0.55	22	0.6	0.5
3			13			23		
4		.6	14			24		
5			15	0.6		25		
6			16		.5	26	.6	
7			17		.5	27		
8		.55	18	.6		28		
9	.6		19		.5	29		
10			20			30	.6	
						31		

NOTE.—Creek frozen over on Nov. 24.

POLE CREEK NEAR PINEDALE, WYO.

Pole Creek rises on the southwestern slope of New Fork Peak, flows southwestward, and unites with New Fork River about midway between the points at which that stream is joined by Pine Creek and East Fork River. It is fed by numerous small lakes, of which Fayette and Half Moon lakes are the largest.

The gaging station, which is located just below the mouth of Fall Creek and about 5 miles from Pinedale, Wyo., was established July 25, 1910.

One ditch diverts water from Pole Creek above the present station.

A chain gage is fastened to the right bank of the stream.

Measurements are made by wading at all stages.

From 1904 to 1906 a gaging station was maintained on Pole Creek about 1¼ miles above the present site and above the mouth of Fall Creek, the outlet of Burnt Lake. During 1904 and 1905 a station was maintained on Fall Creek three-fourths of a mile above its mouth. The records obtained at the present station indicate the amount of water flowing from Pole Creek and Burnt Lake and available for power development.

Discharge measurements of Pole Creek near Pinedale, Wyo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 25	J. C. Hoyt			2.61	101
Sept. 21	G. C. Baldwin	36	29.0	2.00	17

Daily gage height, in feet, of Pole Creek near Pinedale, Wyo., for 1910.

[J. C. Coble, observer.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1			2.15	2.0	2.0		16						
2		2.5					17		2.15				
3						2.0	18						
4							19						
5		2.4					20			2.0			
6							21			2.0	2.0		
7		2.35					22						
8							23						
9							24						
10				2.0			25	2.6					
11							26						
12							27	2.6		2.0			
13							28						
14							29						
15							30	2.45					
							31						

NOTE.—A chain gage installed Sept. 21, 1910, read same as old gage.

BIG SANDY RIVER NEAR BIG SANDY, WYO.

This station, which is located at Leckie's ranch, just above the dam site of the Eaton Irrigation Co. and below all mountain tributaries, was established July 26, 1910.

A chain gage is located on the left bank about one-quarter mile below the Leckie ranch house.

Low-stage measurements are made by wading; at high stages measurements are made from a cable about 200 yards below the gage.

Discharge measurements of Big Sandy River near Big Sandy, Wyo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 26	J. C. Hoyt	34	41	5.50	50
Sept. 28	Baldwin and Belknap	24	19	5.26	20

Daily gage height, in feet, of Big Sandy River near Big Sandy, Wyo., for 1910.

[Mrs. Anna Leckie, observer.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Day.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	5.75	5.25	5.2	5.2	16	.....	5.3	.....	5.3	5.2
2	.....	5.6	.....	5.25	5.2	17	.....	5.3	5.25	5.3	5.2
3	.....	5.55	.....	.....	5.2	18	.....	5.3	.....	.....	5.15
4	.....	5.5	.....	5.3	5.2	19	.....	5.3	.....	5.3	5.2
5	.....	5.5	.....	5.3	5.2	20	.....	5.3	.....	5.25	5.2
6	.....	5.45	5.2	5.3	5.2	21	.....	5.3	.....	5.25	.....
7	.....	5.4	.....	5.3	5.2	22	.....	5.3	.....	5.25	.....
8	.....	5.4	5.2	5.25	5.2	23	.....	5.25	.....	5.3	.....
9	.....	5.35	5.2	5.25	5.2	24	.....	5.2	.....	5.3	.....
10	.....	5.35	.....	.....	5.2	25	.....	5.2	5.25	5.25	.....
11	.....	5.35	.....	.....	5.2	26	5.5	5.2	.....	5.25	.....
12	.....	5.35	.....	5.3	5.15	27	5.5	5.2	5.25	5.25	.....
13	.....	5.35	5.25	5.3	5.2	28	5.5	5.2	5.25	5.3	.....
14	.....	.....	.....	5.3	5.2	29	5.55	5.25	5.25	5.3	.....
15	.....	.....	.....	.....	5.2	30	5.55	5.25	5.25	5.3	.....
						31	5.7	5.25	.....	.....	.....

NOTE.—The observer's note of Nov. 21 states that creek was frozen over.

BEAVER CREEK NEAR LADORE, COLO.

This station, which is located at Meyer's ranch, about 16 miles from Ladore, Colo., was established June 17, 1910, by the State engineer of Colorado, by whom the records are furnished.

A vertical rod gage is fastened to the right bank at the footbridge.

Discharge measurements are made from a foot log 100 feet below the ranch house.

During the winter months the relation between gage height and discharge is affected by ice.

Discharge measurements of Beaver Creek near Ladore, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 17[a]	C. L. Chatfield	5	2.5	.....	2.1
Aug. 30[a]	.....do	.....	.....	.....	[b] 2.0
Oct. 29	.....do	3.5	1.5	0.60	1.2
29	.....do	.....	37	4.05	[c] 455

[a] No water in stream below ditches at station.
[b] Estimated.
[c] Discharge obtained by slope measurement and use of Kutter's formula.

Daily gage height, in feet, and discharge, in second-feet, of Beaver Creek near Ladore, Colo., for 1910.

Day.	April.		May.		September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1				400	0.2	0.3	0.55	1.0	0.55	1.0	0.75	3.0
2				350	.2	.3	.55	1.0	.6	1.2	.75	3.0
3				350	.2	.3	.55	1.0	.6	1.2	.75	3.0
4				300	.2	.3	.55	1.0	.6	1.2	.75	3.0
5				200	.3	.4	.55	1.0	.6	1.2	.75	3.0
6				200	.4	.5	.55	1.0	.6	1.2	.75	3.0
7				100	.5	.7	.55	1.0	.6	1.2	.75	3.0
8				50	.5	.7	.55	1.0	.6	1.2	.75	3.0
9				25	.5	.7	.55	1.0	.6	1.2	.75	3.0
10				10	.5	.7	.55	1.0	.7	2.3	.75	3.0
11				5	.5	.7	.55	1.0	.7	2.3	.75	3.0
12				5	.55	1.0	.55	1.0	.7	2.3	.75	3.0
13				5	.55	1.0	.55	1.0	.7	2.3	.75	3.0
14				3	.55	1.0	.55	1.0	.7	2.3	.75	3.0
15				3	.55	1.0	.55	1.0	.7	2.3	.75	3.0
16				2	.55	1.0	.55	1.0	.7	2.3	.75	3.0
17				2	.55	1.0	.7	2.3	.7	2.3		
18				2	.55	1.0	.7	2.3	.7	2.3		
19				2	.55	1.0	.6	1.2	.7	2.3		
20				2	.55	1.0	.6	1.2	.7	2.3		
21				2	.55	1.0	.6	1.2	.7	2.3		
22				1	.55	1.0	.6	1.2	.7	2.3		
23		455		1	.55	1.0	.6	1.2	.7	2.3		
24		455		1	.55	1.0	.6	1.2	.7	2.3		
25		455		1	.55	1.0	.55	1.0	.7	2.3		
26		455		0	.55	1.0	.55	1.0	.7	2.3		
27		455		0	.55	1.0	.55	1.0	.7	2.3		
28		455		0	.55	1.0	.55	1.0	.7	2.3		
29		455		0	.55	1.0	.55	1.0	.75	3.0		
30		455		0	.55	1.0	.55	1.0	.75	3.0		
31				0			.55	1.0				

NOTE.—High-water discharge determined by means of slope measurement and the use of Kutter's formula. No flow during June, July, and August.

Monthly discharge of Beaver Creek near Ladore, Colo., for 1910.

[Drainage area, 27 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
April 24–30			455	16.8	4.39	6,320
May			65.2	2.41	2.78	4,010
September	1.0	0.3	.82	.030	.03	49
October	2.3	1.0	1.12	.041	.05	69
November	3	1	2.01	.074	.08	119
December 1–16	3.0	3.0	3.0	.111	.07	101
The period						10,700

VERMILION CREEK NEAR LADORE, COLO.

This station, which is located near Bassett's ranch, about 5 miles from Ladore, Colo., was established August 29, 1910, by the State engineer of Colorado and is maintained by the State in cooperation

with Ward & Montgomery, of Denver. The records are furnished by the State engineer.

A vertical staff gage is spiked to an old bridge abutment.

A sandstone outcrop immediately below the station gives good control to the section. The stream channel is practically dry part of the year.

Low-stage measurements are made by wading. High-stage discharge is computed by means of Kutter's formula.

The relation between gage height and discharge is affected by ice during the winter months.

Discharge measurements of Vermilion Creek near Ladore, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 28	C. L. Chatfield	.....	563	6.85	[a]3,750
Aug. 29	.....do	5.5	.90	−1.90	.69
31	.....do	.....	.....	.....	[b]1.05
Oct. 28	.....do	.....	.....	.....	[b]5.0
29	.....do	.....	.....	.....	[b]4.5

[a] Discharge obtained by slope measurement and use of Kutter's formula. [b] Estimated.

Daily gage height, in feet, and discharge, in second-feet, of Vermilion Creek near Ladore, Colo., for 1910.

[E. Bassett, observer.]

Day.	July.		August.		September.		October.		November.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	.....	1	.....	21	.....	1	.....	1.5	.....	4.5
2	.....	1	.....	5	.....	1	.....	1.5	.....	4.5
3	.....	1	.....	3	.....	34	.....	1.5	.....	4.5
4	.....	1	.....	3	1.0	375	.....	1.5	.....	4.5
5	.....	1	.....	3	1.1	408	.....	1.5	.....	4.5
6	.....	1	.....	1	.1	128	.....	1.5	.....	4.5
7	.....	1	.....	1	.....	22	.....	1.5	.....	4.5
8	.....	1	.....	1	.....	3	.....	1.5	.....	4.5
9	.....	1	.....	1	.....	1.5	.....	1.5	.....	4.5
10	.....	1	.....	1	.....	1.5	.....	2.0	.....	4.5
11	.....	1	.....	1	.....	1.5	.....	2.0	.....	4.0
12	.....	1	.....	1	.....	1.5	.....	2.0	.....	4.0
13	.....	1	.....	1	.....	1.5	.....	2.0	.....	4.0
14	.....	1	.....	1	.....	1.5	.....	2.0	.....	4.0
15	.....	1	.....	1	.....	1.5	.....	2.0	.....	4.0
16	.....	1	.....	1	.....	1.5	1.2	417	.....	4.0
17	.....	1	.....	1	.....	1.5	1.0	331	.....	4.0
18	.....	1	.....	1	.....	1.5	.2	156	.....	4.0
19	.....	1	.....	1	.....	1.5	.....	44	.....	4.0
20	.....	1	.....	1	.....	1.5	.....	9	.....	4.0
21	.....	1	.....	1	.....	1.5	.....	4	.....	4.0
22	.....	1	.....	1	.....	1.5	.....	4	.....	4.0
23	.....	1	.....	1	.....	1.5	.....	4	.....	4.0
24	.....	1	.....	1	.....	1.5	.....	4	.....	4.0
25	.....	1	.....	1	.....	1.5	.....	4	.....	4.0
26	.....	1	.....	1	.....	1.5	.....	4	0.35	181
27	.....	898	.....	1	.....	1.5	.....	4	.2	174
28	.....	2,680	.....	1	.....	1.5	.....	4.5	.....	132
29	.....	389	.....	1	.....	1.5	.....	5.0	.....	42
30	.....	161	.....	1	.....	1.5	.....	5.0	.....	3
31	.....	72	.....	1	.....	.....	.....	5.0	.....	.....

Monthly discharge of Vermilion Creek near Ladore, Colo., for 1910.

[Drainage area, 1,017 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
July	2,680	1	136	0.134	0.15	8,360
August	21	1	2.0	.002	.002	123
September	408	1.5	33.5	.033	.04	1,990
October	417	1.5	33	.032	.04	2,030
November	181	3	21	.021	.02	1,250
The period						13,800

YAMPA RIVER BASIN.

GENERAL FEATURES.

Yampa River rises in Egeria Park, in the southeastern part of Routt County, Colo., runs in a general northerly direction to Steamboat Springs, and thence westward to its point of junction with Green River, just east of the Colorado-Utah State boundary. Through almost its entire course it flows in a succession of open valleys alternating with deep, narrow canyons, the longest and deepest of the canyons being that through which it enters the Green.

The drainage basin of the river lies for the most part within the boundaries of Routt County, which is a little larger than the State of Massachusetts and comprises about 6,000 square miles. Its eastern limit is formed by the Park Mountains. Westward from the mountains the basin is largely the eroded and dissected Yampa Plateau, whose wide terraces, abrupt cliffs, and deep-cut gulches and arroyos are the striking features of the region. The general level is over 6,000 feet above sea.

Elk River, Fortification Creek, Elk Head Creek, William River, and Little Snake River are the most important tributaries of the Yampa. The upper basins of these streams are within the forested region, but along their lower courses are many cultivated areas.

YAMPA RIVER AT YAMPA, COLO.

This station, which is located at the footbridge on the road between Yampa River and the Denver, Northwestern & Pacific Railway station, was established May 17, 1910, by the State engineer of Colorado, by whom the records are furnished.

A vertical staff gage is spiked to the upstream side of the footbridge.

The current makes an angle of about 15 degrees with the bridge. The bed of the stream affords fair conditions for discharge measurements.

Discharge measurements are made from the downstream side of the wagon bridge just above the footbridge.

The relation between gage height and discharge is affected by ice during the winter months.

Discharge measurements of Yampa River at Yampa, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 10	C. L. Chatfield	14	13	.....	21.5
May 17	.....do	15	22	2.00	81
July 9	.....do	7.5	3.7	.90	2.0
26	.....do	.....	1.0	.70	1.1
Aug. 2	.....do	.....	5.0	1.00	4.0
Sept. 16	.....do	20	14	1.50	21
Oct. 14	.....do	16	7.2	1.08	4.9
Nov. 17	.....do	22	14	1.47	23

Daily gage height, in feet, of Yampa River at Yampa, Colo., for 1910.

[O. D. Sibold, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.0	0.95	0.9	1.55	1.2	1.4	1.4
2	.....	2.05	.9	1.0	1.5	1.25	1.4	1.45
3	.....	2.0	.95	1.0	1.45	1.2	1.35	1.4
4	.....	1.9	1.0	1.0	1.5	1.2	1.4	.....
5	.....	1.85	.95	1.0	1.5	1.15	1.45	.....
6	.....	1.9	.9	1.2	1.5	1.2	1.4	.....
7	.....	1.9	.9	1.45	1.5	1.15	1.4	.....
8	.....	1.9	.85	1.45	1.5	1.1	1.4	.....
9	.....	1.85	.9	1.5	1.55	1.1	1.35	.....
10	.....	1.9	.9	1.5	1.6	1.15	1.4	.....
11	.....	1.85	.9	1.55	1.6	1.1	1.4	.....
12	.....	1.9	.85	1.5	1.65	1.2	1.4	.....
13	.....	1.95	.85	1.5	1.6	1.2	1.5	.....
14	.....	2.0	.8	1.5	1.6	1.25	1.5	.....
15	.....	2.0	.8	1.45	1.6	1.2	1.4	.....
16	.....	2.0	.8	1.5	1.6	1.3	1.4	.....
17	1.9	1.8	.8	1.5	1.6	1.25	1.35	.....
18	1.9	1.85	.8	1.5	1.65	1.3	1.3	.....
19	2.0	1.8	.8	1.5	1.6	1.3	1.35	.....
20	2.1	1.7	.8	1.55	1.65	1.35	1.3	.....
21	2.0	1.6	.7	1.5	1.6	1.3	1.35	.....
22	2.1	1.55	.7	1.5	1.55	1.3	1.3	.....
23	1.9	1.5	.75	1.5	1.5	1.35	1.4	.....
24	1.9	1.45	.7	1.5	1.5	1.3	1.4	.....
25	2.0	1.2	.7	1.5	1.4	1.4	1.4	.....
26	1.95	1.05	.7	1.45	1.4	1.4	1.45	.....
27	1.9	1.0	.7	1.5	1.35	1.4	1.4	.....
28	1.95	1.0	.75	1.5	1.35	1.4	1.5	.....
29	1.95	1.0	.85	1.5	1.3	1.4	1.45	.....
30	1.9	1.0	.9	1.5	1.2	1.4	1.4	.....
31	1.9	.....	.9	1.5	.....	1.4	.....	.....

Daily discharge, in second-feet, of Yampa River at Yampa, Colo., for 1910.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	80	2.6	1.8	26	9	17	17
2	.....	92	1.8	3.5	22	11	17	20
3	.....	80	2.6	3.5	20	9	15	17
4	.....	62	3.5	3.5	22	9	17	.....
5	.....	56	2.6	3.5	22	7.5	20	.....
6	.....	62	1.8	9	22	9	17	.....
7	.....	62	1.8	20	22	7.5	17	.....
8	.....	62	1.2	20	22	6	17	.....
9	.....	56	1.8	22	26	6	15	.....
10	.....	62	1.8	22	29	7.5	17	.....
11	.....	56	1.8	26	29	6	17	.....
12	.....	62	1.2	22	34	9	17	.....
13	.....	71	1	22	29	9	22	.....
14	.....	80	0.7	22	29	11	22	.....
15	.....	80	.7	20	29	9	17	.....
16	.....	80	.7	22	29	13	17	.....
17	62	49	.7	22	29	11	15	.....
18	62	56	.7	22	34	13	13	.....
19	80	49	.7	22	29	13	15	.....
20	104	38	.7	26	34	15	13	.....
21	80	29	.2	22	29	13	15	.....
22	104	26	.2	22	26	13	13	.....
23	62	22	.4	22	22	15	17	.....
24	62	20	.2	22	22	13	17	.....
25	80	9	.2	22	17	17	17	.....
26	71	4.8	.2	20	17	17	20	.....
27	62	3.5	.2	22	15	17	17	.....
28	71	3.5	.4	22	15	17	22	.....
29	71	3.5	1.2	22	13	17	20	.....
30	62	3.5	1.8	22	9	17	17	.....
31	62	.....	1.0	22	.....	17	.....	.....

Monthly discharge of Yampa River at Yampa, Colo., for 1910.

[Drainage area, 52 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
May 17-31	104	62	73.0	1.40	0.78	2,170
June	92	3.5	47.3	.910	1.02	2,810
July	3.5	.2	1.21	.023	.03	74
August	26	1.8	18.5	.356	.41	1,140
September	34	9	24.1	.463	.52	1,430
October	17	6	11.7	.225	.26	719
November	22	13	17.1	.329	.37	1,020
The period	.....	.....	.....	.....	.....	9,370

YAMPA RIVER AT STEAMBOAT SPRINGS, COLO.

This station, which is located at the lower steel bridge at the Denver, Northwestern & Pacific Railway station, Steamboat Springs, Colo., was established March 3, 1910, by the State engineer of Colorado, by whom the records are furnished.

A standard chain gage and a Bristol automatic gage, both referred to the same datum, are attached to the bridge.

The bed of the stream is composed of cobbles and bowlders and is permanent. Conditions favor accurate measurements.

Discharge measurements are made at the steel bridge between the railroad station and the town.

The relation between gage height and discharge is little affected by ice, as the hot springs above the station tend to keep the river open most of the winter.

During 1904, a station was maintained on the Yampa at a highway bridge about three-quarters of a mile above the present station, and in 1905 a station was maintained at a point half a mile below the present site. The gages are, however, not referred to the same datum and the records are not comparable.

Discharge measurements of Yampa River at Steamboat Springs, Colo., for 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 3	C. L. Chatfield	80	93	0.20	120
8	do	105	163	.80	319
Apr. 10	do	112	234	1.45	713
May 12	do	108	420	3.30	2,440
18	do	108	317	2.30	1,380
June 30	do	95	124	.60	216
Aug. 3	do	82	88	.15	106
Oct. 10	Chatfield and Hezmalhalch	65	99	.03	78
Dec. 10	C. L. Chatfield	82	95	a .22	117

a New gage read 1.20 feet.

Daily gage height, in feet, of Yampa River at Steamboat Springs, Colo., for 1910.

[Dr. L. G. Blackmur, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1.4	1.9	3.4	0.6	0.25	0.1	0.1	0.3	1.25
2	.....	1.5	2.0	3.35	.6	.25	.1	.1	.4	1.25
3	.....	1.3	2.2	3.3	.6	.15	.1	.0	.55	1.25
4	.....	1.25	2.2	3.15	.6	.1	.05	.1	.5	1.15
5	.....	1.35	2.4	2.95	.55	.15	.0	— .1	.35	1.05
6	.....	1.35	2.4	2.85	.45	.2	.05	— .15	.2	.95
7	.....	1.4	2.6	2.7	.5	.25	.05	— .05	.35	1.05
8	0.8	1.4	2.7	2.5	.4	.35	.05	.05	.45	1.0
9	.85	1.45	2.8	2.2	.2	.4	.05	.2	.35	1.15
10	.8	1.4	3.05	2.05	.15	.3	.0	.15	.2	1.2
11	.65	1.4	3.25	1.95	.1	.3	.1	.15	.15	.9
12	.65	1.4	3.25	1.85	.2	.3	.05	.1	.1	.....
13	.75	1.35	3.05	1.75	.15	.35	— .05	.1	.2	.....
14	.8	1.25	2.95	1.6	.15	.4	.15	.1	.2	.95
15	.85	1.2	2.9	1.45	.1	.4	.25	.15	1.2	.....
16	.95	1.3	2.6	1.4	.15	.35	.4	.25	1.2	.....
17	.95	1.3	2.45	1.4	.1	.35	.45	.3	1.2	.....
18	1.05	1.4	2.4	1.3	.1	.35	.5	.35	1.2	.....
19	1.15	1.5	2.5	1.15	.1	.3	.5	.25	1.25	.....
20	1.25	1.6	2.5	1.05	.1	.3	.5	.2	1.2	.....
21	1.35	1.65	2.4	1.0	.15	.3	.55	.1	1.2	1.0
22	1.45	1.7	2.3	.85	.15	.35	.45	.1	1.2	1.0
23	1.6	1.8	2.3	.75	.15	.4	.35	.25	1.2	1.0
24	1.5	1.8	2.5	.7	.1	.4	.25	.35	1.2	1.0
25	1.45	1.75	2.7	.65	.05	.2	.25	.5	1.2	1.0
26	1.4	1.8	2.75	.65	.1	.1	.05	.55	1.25	1.0
27	1.4	1.8	2.8	.65	.05	.15	— .05	.2	1.25	1.0
28	1.35	1.75	3.2	.65	.05	.1	— .05	.1	1.25	1.0
29	1.2	1.8	3.35	.6	.2	.1	— .05	.1	1.25	1.0
30	1.25	1.8	3.45	.6	.4	.1	— .05	.1	1.3	1.0
31	1.35	.....	3.5	.....	.35	.1	.....	.25	.....	1.0

NOTE.—Beginning Nov. 15, the gage heights refer to a different datum.

Daily discharge, in second-feet, of Yampa River at Steamboat Springs, Colo., for 1910.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	120	675	1,050	2,560	239	130	93	93	143	130
2	120	745	1,130	2,500	239	130	93	93	171	130
3	120	605	1,300	2,440	239	105	93	73	221	130
4	159	572	1,300	2,262	239	93	83	93	203	105
5	198	640	1,475	2,035	221	105	73	57	157	83
6	238	640	1,475	1,928	187	117	83	51	117	65
7	278	675	1,660	1,770	203	130	83	65	157	83
8	323	675	1,770	1,565	171	157	83	83	187	73
9	347	710	1,875	1,300	117	171	83	117	157	95
10	323	675	2,148	1,172	105	143	73	105	117	117
11	259	675	2,380	1,090	93	143	93	105	105	57
12	259	675	2,380	1,010	117	143	83	93	93	57
13	301	640	2,148	932	105	157	65	93	117	57
14	323	572	2,035	820	105	171	105	93	117	65
15	347	540	1,980	710	93	171	130	105	117	65
16	397	605	1,660	675	105	157	171	130	117	65
17	397	605	1,520	675	93	157	187	143	117	65
18	451	675	1,475	605	93	157	203	157	117	65
19	510	745	1,565	510	93	143	203	130	130	65
20	572	820	1,565	451	93	143	203	117	117	65
21	640	858	1,475	423	105	143	221	93	117	73
22	710	895	1,385	347	105	157	187	93	117	73
23	820	970	1,385	301	105	171	157	130	117	73
24	745	970	1,565	279	93	171	130	157	117	73
25	710	932	1,770	259	83	117	130	203	117	73
26	675	970	1,822	259	93	93	83	221	130	73
27	675	970	1,875	259	83	105	65	117	130	73
28	640	932	2,320	259	83	93	65	93	130	73
29	540	970	2,500	239	117	93	65	93	130	73
30	572	970	2,622	239	171	93	65	93	143	73
31	640	.....	2,685	.....	157	93	.....	130	.....	73

Monthly discharge of Yampa River at Steamboat Springs, Colo., for 1910.

[Drainage area, 572 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
March	820	120	433	0.757	0.87	26,600
April	970	540	753	1.32	1.47	44,800
May	2,680	1,050	1,780	3.11	3.59	110,000
June	2,560	239	996	1.74	1.94	59,300
July	239	83	134	.234	.27	8,240
August	171	93	134	.234	.27	8,240
September	221	65	115	.201	.22	6,840
October	221	51	110	.192	.22	6,760
November	221	93	134	.234	.26	7,970
December	103	57	78.7	.138	.16	4,840
The period	.....	.....	.....	.....	.....	284,000

YAMPA RIVER AT CRAIG, COLO.

This station, which is located at the steel highway bridge about 1 mile south of Craig, on the road to Hamilton, Colo., was established May 25, 1901, discontinued September 4, 1902, reestablished April 30, 1904, discontinued October 31, 1906, and again reestablished—this

time by the State engineer of Colorado—April 1, 1910. The records are furnished to the Survey by the State engineer.

A staff gage is bolted to an old pile at the south end of the bridge. The zero of the present gage is 0.35 foot higher than that of the original gage.

Discharge measurements are made from the bridge.

During the winter the relation between gage height and discharge is seriously affected by ice.

Discharge measurements of Yampa River at Craig, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 15	C. L. Chatfield	152	962	4.85	2,860
May 21	do	162	1,110	5.30	3,390
June 10	do	152	1,030	4.90	2,980
Aug. 12	do	.....	695	2.30	138
Sept. 4	do	75	59	2.30	145
Oct. 24	do	95	106	2.50	258

Daily gage height, in feet, of Yampa River at Craig, Colo., for 1910.

[W. E. Pratt, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.1	6.15	6.5	3.05	2.55	2.2	2.4	2.5	2.6
2	4.2	5.85	6.3	3.0	2.45	2.3	2.4	2.55	2.5
3	4.55	5.45	6.25	2.95	2.45	2.3	2.5	2.5	2.5
4	4.5	5.3	6.1	2.95	2.4	2.3	2.65	2.5	.....
5	4.2	5.35	5.8	2.85	2.45	2.7	2.65	2.5	.....
6	4.0	5.4	5.7	2.65	2.3	2.75	2.55	2.5	.....
7	4.05	5.25	5.6	2.6	2.4	2.55	2.55	2.45	.....
8	4.15	5.2	5.3	2.55	2.4	2.45	2.5	2.4	.....
9	4.2	5.35	5.2	2.5	2.25	2.4	2.5	2.5	.....
10	4.45	5.8	4.85	2.4	2.3	2.35	2.45	2.5	.....
11	4.8	6.3	4.75	2.4	2.25	2.4	2.4	2.5	.....
12	4.95	6.4	4.65	2.35	2.35	2.35	2.45	2.5	.....
13	5.05	6.25	4.65	2.3	2.35	2.4	2.4	2.5	.....
14	5.2	6.15	4.6	2.25	2.35	2.45	2.35	2.5	.....
15	4.95	6.0	4.45	2.3	2.4	2.55	2.3	2.5	.....
16	4.45	5.8	4.25	2.35	2.35	2.65	2.4	2.5	.....
17	4.4	5.4	4.25	2.25	2.35	2.55	2.5	2.55	.....
18	4.65	5.25	4.15	2.3	2.3	2.6	2.65	2.6	.....
19	4.65	5.15	4.1	2.25	2.3	2.5	2.8	2.6	.....
20	5.2	5.25	3.9	2.25	2.35	2.5	2.65	2.6	.....
21	5.7	5.3	3.85	2.25	2.35	2.45	2.65	2.55	.....
22	5.45	5.1	3.75	2.25	2.35	2.45	2.55	2.55	.....
23	5.3	4.9	3.65	2.25	2.3	2.45	2.55	2.65	.....
24	5.5	5.0	3.6	2.25	2.3	2.5	2.6	2.7	.....
25	5.75	5.25	3.45	2.2	2.4	2.5	2.6	2.6	.....
26	5.9	5.55	3.25	2.15	2.3	2.45	2.6	2.6	.....
27	6.1	5.55	3.05	2.15	2.25	2.4	2.6	2.6	.....
28	6.25	5.85	3.05	2.25	2.25	2.4	2.6	2.55	.....
29	6.4	6.3	3.1	2.4	2.25	2.4	2.55	2.6	.....
30	6.35	6.4	3.1	2.55	2.2	2.4	2.55	2.6	.....
31	.....	6.4	.....	2.35	2.25	.....	2.5	.....	.....

Daily discharge, in second-feet, of Yampa River at Craig, Colo., for 1910.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,740	5,120	5,870	662	292	95	200	260	325
2	1,860	4,505	5,435	620	230	145	200	292	260
3	2,320	3,745	5,330	580	230	145	260	260	260
4	2,250	3,480	5,015	580	200	145	360	260	.....
5	1,860	3,568	4,405	502	236	395	360	260	.....
6	1,620	3,655	4,210	360	145	330	292	260	.....
7	1,680	3,395	4,020	325	200	292	292	230	.....
8	1,800	3,310	3,480	292	200	230	260	200	.....
9	1,860	3,568	3,310	260	120	200	260	260	.....
10	2,182	4,405	2,755	200	145	172	230	260	.....
11	2,680	5,435	2,608	200	120	200	200	260	.....
12	2,908	5,650	2,462	172	172	172	230	260	.....
13	3,065	5,330	2,462	145	172	200	200	260	.....
14	3,310	5,120	2,390	120	172	230	172	260	.....
15	2,908	4,810	2,182	145	200	292	145	260	.....
16	2,182	4,405	1,922	172	172	360	200	260	.....
17	2,115	3,655	1,922	120	172	292	260	292	.....
18	2,462	3,395	1,800	145	145	325	360	325	.....
19	2,462	3,228	1,740	120	145	260	465	325	.....
20	3,310	3,395	1,505	120	172	260	360	325	.....
21	4,210	3,480	1,450	120	172	230	360	292	.....
22	3,745	3,145	1,340	120	172	230	292	292	.....
23	3,480	2,830	1,232	120	145	230	292	360	.....
24	3,835	2,985	1,180	120	145	260	325	395	.....
25	4,308	3,395	1,025	95	200	260	325	325	.....
26	4,605	3,928	835	72	145	230	325	325	.....
27	5,015	3,928	662	72	120	200	325	325	.....
28	5,330	4,505	662	120	120	200	325	292	.....
29	5,650	5,435	705	200	120	200	292	325	.....
30	5,542	5,650	705	292	95	200	292	325	.....
31	.....	5,650	.....	172	120	.....	260	.....	.....

Monthly discharge of Yampa River at Craig, Colo., for 1910.

[Drainage area, 1,730 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
April	5,650	1,740	3,080	1.78	1.98	183,000
May	5,650	2,830	4,130	2.39	2.75	254,000
June	5,870	662	2,490	1.44	1.60	148,000
July	662	72	237	.137	.16	14,600
August	292	95	167	.097	.11	10,300
September	360	95	233	.135	.15	13,800
October	465	145	281	.162	.19	17,300
November	325	260	288	.166	.18	17,100
The period	.....	.....	.....	.....	.....	658,000

YAMPA RIVER NEAR MAYBELL, COLO.

This station, which is located at the Thornberg bridge, about 9 miles below Maybell, Colo., was established by the United States Geological Survey April 17, 1904, and discontinued October 31, 1905; it was reestablished June 12, 1910, by the State engineer of Colorado, by whom the records are furnished.

The chain gage is attached to the downstream handrail of the bridge. The datum of the new gage is identical with that of the old.

Discharge measurements are made from the bridge.

During the winter the relation of gage height to discharge is affected by ice.

Discharge measurements of Yampa River near Maybell, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 12	C. L. Chatfield	.....	1,040	3.90	3,120
Aug. 27	do	80	66	.40	159
Sept. 1	do	77	63	.35	137
Oct. 27	do	120	117	.85	319

Daily gage height, in feet, of Yampa River near Maybell, Colo., for 1910.

[Peter E. Farrell, observer.]

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1.75	0.7	0.3	0.35	0.6	0.8	16	3.55	1.0	0.4	0.45	0.4	0.65	.....
2	.....	1.7	.55	.35	.3	.65	.85	17	3.6	1.0	.4	.45	.45	.7	.....
3	.....	1.65	.45	.3	.35	.75	.9	18	3.45	.9	.35	.5	.6	.75	.....
4	.....	1.6	.4	.25	.3	.65	.....	19	3.15	.85	.35	.4	.8	.6	.....
5	.....	1.9	.45	.3	.4	.55	.....	20	3.05	.8	.3	.55	.85	.55	.....
6	.....	1.85	.5	.4	.45	.5	.....	21	3.0	.7	.35	.45	.9	.6	.....
7	.....	1.7	.4	.4	.5	.55	.....	22	2.8	.65	.3	.55	1.15	.65	.....
8	.....	1.5	.35	.45	.4	.6	.....	23	2.6	.6	.3	.35	1.1	.6	.....
9	.....	1.4	.3	.3	.35	.65	.....	24	2.45	.5	.3	.4	.85	.7	.....
10	.....	1.2	.25	.3	.3	.6	.....	25	2.3	.45	.25	.35	.75	.7	.....
11	.....	1.2	.2	.4	.3	.55	.....	26	2.3	.4	.3	.45	.8	.75	.....
12	4.8	1.05	.3	.35	.35	.5	.....	27	2.05	.6	.35	.3	.8	.7	.....
13	3.6	.95	.3	.3	.4	.45	.....	28	2.05	.65	.35	.45	.75	.65	.....
14	3.1	.85	.35	.4	.4	.55	.....	29	1.9	.7	.3	.5	.7	.8	.....
15	3.3	.85	.3	.5	.35	.6	.....	30	1.9	.85	.35	.6	.65	.9	.....
								31	.....	.85	.3	.....	.6	.....	.....

Daily discharge, in second-feet, of Yampa River near Maybell, Colo., for 1910.

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	860	253	126	138	214	295	16	2,690	389	151	166	151	234	.....
2	.....	820	197	138	126	234	318	17	2,750	389	151	166	166	253	.....
3	.....	792	166	126	138	274	340	18	2,572	340	138	180	214	274	.....
4	.....	755	151	116	126	234	.....	19	2,235	318	138	151	295	214	.....
5	.....	985	166	126	151	197	.....	20	2,125	295	126	197	318	197	.....
6	.....	942	180	151	166	180	.....	21	2,070	253	138	166	340	214	.....
7	.....	820	151	151	180	197	.....	22	1,850	234	126	197	468	234	.....
8	.....	685	138	166	151	214	.....	23	1,640	214	126	138	441	214	.....
9	.....	618	126	126	138	234	.....	24	1,492	180	126	151	315	253	.....
10	.....	496	116	126	126	214	.....	25	1,350	166	116	138	274	253	.....
11	.....	496	105	151	126	197	.....	26	1,350	151	126	166	295	274	.....
12	4,340	415	126	138	138	180	.....	27	1,120	214	126	126	295	253	.....
13	2,750	364	126	126	151	165	.....	28	1,120	234	138	166	274	234	.....
14	2,180	318	138	151	151	197	.....	29	985	253	126	180	253	295	.....
15	2,400	318	126	180	138	214	.....	30	985	318	138	214	234	340	.....
								31	.....	318	126	.....	214	.....	.....

Monthly discharge of Yampa River near Maybell, Colo., for 1910.

[Drainage area, 3,670 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
June 12-30	4,340	985	2,000	0.545	0.38	75,400
July	985	151	450	.123	.14	27,700
August	253	105	141	.038	.04	8,670
September	214	116	153	.042	.05	9,100
October	468	126	216	.059	.07	13,300
November	340	165	216	.059	.07	12,900
The period						147,000

TROUT CREEK AT PINNACLE, COLO.

This station, which is located at a wagon bridge one-fourth mile above Pinnacle, 11 miles from Dunkley, and 17 miles from Yampa, Colo., was established April 9, 1910, by the State engineer of Colorado and is maintained by the State in cooperation with the Williams River High Line Irrigation Co.

A rod gage is fastened to the left bank 10 feet below the bridge.

High-stage measurements are made from the bridge; low-stage measurements are made by wading at various sections.

During the winter the relation between gage height and discharge is affected by ice.

Discharge measurements of Trout Creek at Pinnacle, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 9	C. L. Chatfield	16	13	1.80	13.9
May 15	do	24	25	2.35	72
July 22	do	18	12	1.85	13.8
Aug. 9	do	18	12.2	1.90	13.8
Oct. 21	do	20	19	1.95	22

Daily gage height, in feet, of Trout Creek at Pinnacle, Colo., for 1910.

[Mrs. D. M. Chapman, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.25	3.25	2.15	1.9	1.8	1.8	1.65	1.8
2	.....	2.1	3.0	2.1	1.85	1.8	1.8	1.65	1.8
3	.....	2.15	3.1	2.1	1.85	1.9	1.8	1.6	1.8
4	.....	2.15	3.0	2.1	1.9	2.0	1.8	1.6	1.8
5	.....	2.1	3.0	2.05	1.9	1.9	1.8	1.6	1.9
6	.....	2.15	2.1	2.3	1.9	1.8	1.75	1.7	2.35
7	.....	2.2	3.1	2.25	1.9	1.8	1.7	1.75	2.3
8	.....	2.3	3.05	2.0	1.8	1.8	1.7	1.7	2.55
9	1.8	2.35	2.95	2.0	1.85	1.75	1.7	1.7	2.6
10	1.8	2.45	2.85	2.0	1.85	1.75	1.7	1.7	2.1
11	1.9	2.65	2.8	2.0	1.9	1.8	1.7	1.7	.....
12	1.9	2.45	2.8	1.9	2.0	1.85	1.7	1.75	.....
13	1.9	2.3	2.8	1.9	1.95	1.95	1.7	1.8	.....
14	1.9	2.4	2.75	1.9	1.9	2.0	1.7	1.8	.....
15	1.9	2.4	2.7	1.9	1.9	1.95	1.7	1.8	.....
16	1.85	2.4	2.55	1.9	1.9	1.85	1.7	1.75	.....
17	1.85	2.3	2.5	1.9	1.9	1.8	1.7	1.8	.....
18	1.9	2.25	2.45	1.9	1.9	1.9	1.7	1.75	.....
19	1.95	2.3	2.45	1.9	1.9	1.85	1.7	1.8	.....
20	2.0	2.3	2.5	1.9	1.9	1.8	1.7	1.85	.....
21	2.0	2.3	2.4	1.85	1.9	1.8	1.7	1.9	.....
22	1.95	2.3	2.4	1.85	1.85	1.8	1.75	1.9	.....
23	1.95	2.3	2.3	1.85	1.8	1.8	1.75	1.8	.....
24	2.05	2.3	2.3	1.85	1.8	1.8	1.75	1.9	.....
25	2.2	2.35	2.3	1.8	1.8	1.8	1.75	1.8	.....
26	2.25	2.4	2.2	1.8	1.8	1.8	1.7	1.8	.....
27	2.25	2.5	2.2	1.8	1.8	1.8	1.7	1.8	.....
28	2.3	2.9	2.25	1.9	1.8	1.8	1.7	1.8	.....
29	2.3	3.0	2.2	2.0	1.8	1.8	1.8	1.8	.....
30	2.3	3.2	2.2	2.0	1.8	1.8	1.75	1.8	.....
31	.....	3.35	.....	1.95	1.8	.....	1.7	.....	.....

Daily discharge, in second-feet, of Trout Creek at Pinnacle, Colo., for 1910.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	55	316	42	18	12	12	4	12
2	.....	36	233	36	15	12	12	4	12
3	.....	42	264	36	15	18	12	2	12
4	.....	42	233	36	18	26	12	2	12
5	.....	36	233	31	18	18	12	2	.....
6	.....	42	264	62	18	12	9	6	.....
7	.....	48	264	55	18	12	6	9	.....
8	.....	62	248	26	12	12	6	6	.....
9	12	71	218	26	15	9	6	6	.....
10	12	78	188	26	15	9	6	6	.....
11	18	132	173	26	18	12	6	6	.....
12	18	79	173	18	26	15	6	9	.....
13	18	62	173	18	22	22	6	12	.....
14	18	79	159	18	18	26	6	12	.....
15	18	79	145	18	18	22	6	12	.....
16	15	79	109	18	18	15	6	9	.....
17	15	62	98	18	18	12	6	12	.....
18	18	55	88	18	18	18	6	9	.....
19	22	62	88	18	18	15	6	12	.....
20	26	62	98	18	18	12	6	15	.....
21	26	62	79	15	18	12	6	18	.....
22	22	62	79	15	15	12	9	18	.....
23	22	62	62	15	12	12	9	12	.....
24	31	62	62	15	12	12	9	18	.....
25	48	70	62	12	12	12	9	12	.....
26	55	79	48	12	12	12	6	12	.....
27	55	98	48	12	12	12	6	12	.....
28	62	202	55	18	12	12	6	12	.....
29	62	233	48	26	12	12	12	12	.....
30	62	299	48	26	12	12	9	12	.....
31	.....	354	.....	22	12	.....	6	.....	.....

NOTE.—Mean discharge Dec. 5–31, estimated at 12 second-feet.

Monthly discharge of Trout Creek at Pinnacle, Colo., for 1910.

[Drainage area, 27 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
April 9–30	62	12	29.8	1.10	0.90	1,300
May	354	36	91.8	3.40	3.92	5,640
June	316	48	145	5.37	5.99	8,630
July	42	12	24.3	.900	1.04	1,490
August	26	12	16.0	.592	.682	984
September	26	9	14.3	.530	.59	851
October	18	6	7.7	.285	.33	474
November	36	2	9.8	.370	.41	583
December			12.0	.445	.51	738
The period						20,700

SODA CREEK AT STEAMBOAT SPRINGS, COLO.

This station, which is located at a road bridge on Main Street, Steamboat Springs, was established June 8, 1910, by the State engineer of Colorado, by whom the records are furnished.

A chain gage is fastened to the bridge.

The bed of the stream is composed of cobbles and is permanent. The current makes an angle of 35° with the bridge; a coefficient of 0.81 has been used in correcting the discharge estimates. The measuring section is good.

Discharge measurements are made from the bridge.

The relation of gage height to discharge is affected by ice during the winter.

Discharge measurements of Soda Creek at Steamboat Springs, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 18	C. L. Chatfield	35	36	1.95	107
June 8	do	37	45	2.15	181
30	do	27	19	1.15	27
Aug. 3	do		3.3	.62	1.2

Daily gage height, in feet, and discharge, in second-feet, of Soda Creek at Steamboat Springs, Colo., for 1910.

[J. E. Milner, observer.]

Day.	June.		July.		August.		Day.	June.		July.		August.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	.....	.....	.....	26	.....	1.6	16	1.65	64	0.7	5	.....	2
2	.....	.....	.....	24	0.6	1.2	17	1.6	59	.....	5	.....	2
3	.....	.....	.....	22	.6	1.2	18	1.6	59	.....	5	.....	2
4	.....	.....	.....	20	.6	1.2	19	1.6	59	.....	5	.....	2
5	.....	.....	.....	18	.65	3.1	20	1.65	64	.....	4	.....	2
6	.....	.....	.....	16	.65	3.1	21	1.5	50	.....	4	.....	2
7	.....	.....	.....	14	.6	1.2	22	1.5	50	.....	4	.....	2
8	2.3	262	.....	12	.6	1.2	23	1.3	35	.65	3.1	.....	2
9	2.1	160	.....	12	.6	1.2	24	1.4	42	.....	3.1	.....	2
10	1.9	98	0.9	13	.6	1.2	25	1.3	35	.65	3.1	.....	2
11	2.0	121	.8	9	.6	1.2	26	1.35	38	.....	3.1	.....	2
12	1.9	98	.85	11	.7	5	27	1.2	29	.....	3.1	.....	2
13	1.85	90	.8	9	.7	5	28	1.1	23	.....	2.5	.....	2
14	1.8	82	.75	7	.6	1.2	29	1.2	29	.....	2.5	.....	2
15	1.7	69	.7	5	.....	2	30	1.15	26	.....	2.0	.....	2
							31	.....	.....	.....	2.0	.....	2

NOTE.—Discharge estimated for days on which gage heights are missing.

Monthly discharge of Soda Creek at Steamboat Springs, Colo., for 1910.

[Drainage area, 47 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
June 8–30	262	23	71.4	1.52	1.30	3,260
July	.....	.....	8.85	.188	.22	544
August	.....	.....	2.02	.043	.05	124
September	.....	.....	[a] 2.0	.043	.05	119
October	.....	.....	[a] 2.0	.043	.05	123
November	.....	.....	[a] 3.7	.079	.09	220
December	.....	.....	[a] 4.0	.085	.10	246
The period	.....	.....	.....	.....	.....	4,640

[a] Estimated.

ELK RIVER NEAR CLARK, COLO.

This station, which is located at Kinney's ranch, about 19½ miles from Steamboat Springs and 2 miles from Clark post office, was established May 1, 1910, and is maintained by the Elk River Canal Co.

The station is equipped with a gage similar to a standard chain gage.

The bed of the stream is composed of bowlders.

Discharge measurements have been made by the State engineer of Colorado, who has furnished the records.

Discharge measurements of Elk River near Clark, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 12	C. L. Chatfield	53	90	2.6	166
Nov. 15	do	48	52	1.9	57

Daily gage height, in feet, of Elk River near Clark, Colo., for 1910.

[Geo. B. Kinney, observer.]

Day.	May.	June.	July.	Aug.	Day.	May.	June.	July.	Aug.
1	5.3	5.1	3.1	2.4	16	4.0	4.2	2.4	1.8
2	4.8	5.2	2.9	2.4	17	4.0	3.8	2.5	1.9
3	4.7	5.4	2.8	2.4	18	4.1	3.8	2.5	2.0
4	4.6	5.5	2.8	2.4	19	4.0	3.7	2.5	2.0
5	4.9	5.0	2.8	2.4	20	3.9	3.6	2.5	2.0
6	4.6	4.9	2.7	2.4	21	3.8	3.5	2.5	1.9
7	4.4	5.1	2.7	2.4	22	4.1	3.3	2.5	1.8
8	3.1	6.0	2.6	2.4	23	4.2	3.3	2.4	1.9
9	3.1	4.0	2.6	2.2	24	4.8	3.3	2.4	1.9
10	3.1	4.2	2.6	2.2	25	4.9	3.2	2.4	2.0
11	3.6	4.0	2.6	2.2	26	5.0	3.3	2.4	2.0
12	3.6	4.1	2.5	2.0	27	5.1	3.3	2.4	1.9
13	3.6	4.0	2.5	2.0	28	5.3	3.2	2.4	1.9
14	4.7	4.5	2.5	1.9	29	5.4	3.3	2.4	1.8
15	3.9	4.0	2.4	1.9	30	5.3	3.2	2.4	1.9
					31	5.2	.....	2.4	2.0

Daily discharge, in second-feet, of Elk River near Clark, Colo., for 1910.

Day.	May.	June.	July.	Aug.	Day.	May.	June.	July.	Aug.
1	1,865	1,640	300	125	16	725	860	125	46
2	1,340	1,750	238	125	17	725	610	144	57
3	1,250	1,985	212	125	18	790	610	144	68
4	1,165	2,115	212	125	19	725	555	144	68
5	1,435	1,535	212	125	20	665	505	144	68
6	1,165	1,435	188	125	21	610	460	144	57
7	1,005	1,640	188	125	22	790	375	144	46
8	300	2,850	165	125	23	860	375	125	57
9	300	725	165	93	24	1,340	375	125	57
10	300	860	165	93	25	1,435	335	125	68
11	505	725	165	93	26	1,535	375	125	68
12	505	790	144	68	27	1,640	375	125	57
13	505	725	144	68	28	1,865	335	125	57
14	1,250	1,085	144	57	29	1,985	375	125	46
15	665	725	125	57	30	1,865	335	125	57
					31	1,750	.....	125	68

Monthly discharge of Elk River near Clark, Colo., for 1910.

[Drainage area, 213 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
May	1,980	300	1,060	4.98	5.74	65,200
June	2,850	335	915	4.30	4.80	54,400
July	300	125	157	.733	.84	9,650
August	125	46	78	.366	.42	4,800
September	.....	.....	a 36	.169	.19	2,140
October	.....	.....	a 57	.268	.31	3,500
November	.....	.....	a 57	.268	.30	3,390
The period	.....	.....	.....	.....	.....	143,000

a Estimated.

ELK RIVER NEAR TRULL, COLO.

This station, which is located at the steel bridge about 2 miles southeast of Trull on the road between Steamboat Springs and Hayden, Colo., was established May 2, 1904, by the United States Geological Survey, discontinued August 16, 1906, and reestablished March 24, 1910, by the State engineer of Colorado, by whom the records are furnished.

The original gage, a vertical rod, was replaced by a chain gage, installed at the same datum, June 22, 1904. The present chain gage is the same as that used by the United States Geological Survey. It is attached to the bridge, no change having been made either in the location or in the datum.

Discharge measurements are made from the bridge.

During the winter months the relation between gage height and discharge is affected by ice.

Discharge measurements of Elk River near Trull, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 11	C. L. Chatfield	115	267	7.00	976
May 12	.....do	115	454	8.50	2,280
June 7	.....do	115	378	7.88	1,640
July 11	.....do	85	109	5.55	216
Sept. 12	.....do	69	72	5.02	90
Nov. 12	.....do	68	70	5.05	81

Daily gage height, in feet, of Elk River near Trull, Colo., for 1910.

[Fred O. Smith, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	6.0	8.1	8.7	6.1	5.45	4.85	5.0	5.1	5.0
2	.....	6.3	7.8	8.6	5.95	5.4	4.9	5.0	5.1	4.9
3	.....	6.3	7.5	8.45	5.85	5.3	5.0	5.15	5.05	5.1
4	.....	6.0	7.55	8.3	5.8	5.2	5.8	5.1	5.05	.....
5	.....	5.95	7.8	8.1	6.0	5.2	5.55	5.1	4.95	.....
6	.....	6.1	7.55	8.0	5.8	5.2	5.3	5.05	4.95	.....
7	.....	6.2	7.35	8.1	5.75	5.1	5.2	5.05	5.0	.....
8	.....	6.3	7.4	8.0	5.65	5.1	5.1	5.05	5.0	.....
9	.....	6.6	7.7	7.8	5.6	5.1	5.05	5.05	5.1	.....
10	.....	6.9	8.2	7.55	5.5	5.05	5.0	5.05	5.05	.....
11	.....	7.1	8.5	7.55	5.5	5.05	5.0	5.05	5.0	.....
12	.....	7.4	8.5	7.6	5.4	5.1	5.15	5.0	5.0	.....
13	.....	7.5	8.4	7.65	5.35	5.15	5.35	5.0	5.0	.....
14	.....	7.5	8.1	7.5	5.4	5.15	5.5	5.0	5.0	.....
15	.....	7.0	8.0	7.4	5.3	5.15	5.3	5.0	5.0	.....
16	.....	6.7	7.6	7.3	5.3	5.1	5.2	5.0	5.0	.....
17	.....	6.7	7.4	7.1	5.35	5.0	5.15	5.2	5.0	.....
18	.....	7.1	7.3	7.05	5.35	5.0	5.15	5.25	5.0	.....
19	.....	7.5	7.45	7.0	5.3	5.0	5.1	5.2	5.1	.....
20	.....	7.8	7.5	6.0	5.4	4.95	5.1	5.1	4.9	.....
21	.....	7.85	7.6	6.8	5.3	5.0	5.1	5.1	5.0	.....
22	.....	7.45	7.25	6.7	5.3	5.0	5.1	5.1	5.1	.....
23	.....	7.55	7.2	6.5	5.3	5.0	5.1	5.1	5.05	.....
24	6.15	7.9	7.4	6.4	5.2	4.9	5.1	5.1	5.1	.....
25	6.45	8.1	7.65	6.3	5.15	4.9	5.05	5.1	5.1	.....
26	6.5	8.2	8.0	6.2	5.2	4.9	5.05	5.1	5.0	.....
27	6.3	8.4	7.8	6.2	5.15	4.85	5.05	5.1	5.1	.....
28	6.2	8.6	8.35	6.2	5.4	4.9	5.05	5.1	5.0	.....
29	6.1	8.6	8.7	6.2	5.55	4.9	5.0	5.0	5.05	.....
30	5.8	8.4	8.7	6.2	5.5	4.9	5.0	5.05	5.05	.....
31	5.9	.....	8.75	.....	5.4	4.85	.....	5.1	.....	.....

Daily discharge, in second-feet, of Elk River near Trull, Colo., for 1910.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	405	1,850	2,530	405	180	57	73	91	73
2	.....	560	1,565	2,405	382	165	61	73	91	61
3	.....	560	1,320	2,228	338	140	73	103	82	75
4	.....	405	1,360	2,060	315	115	315	91	82	.....
5	.....	382	1,565	1,850	405	115	212	91	67	.....
6	.....	455	1,360	1,750	315	115	140	82	67	.....
7	.....	505	1,210	1,850	292	91	115	82	73	.....
8	.....	560	1,245	1,750	250	91	91	82	73	.....
9	.....	730	1,480	1,565	230	91	82	82	91	.....
10	.....	910	1,955	1,360	195	82	73	82	82	.....
11	.....	1,040	2,285	1,360	195	82	73	82	73	.....
12	.....	1,245	2,285	1,400	165	91	103	73	73	.....
13	.....	1,320	2,170	1,440	152	103	152	73	73	.....
14	.....	1,320	1,850	1,320	165	103	195	73	73	.....
15	.....	975	1,750	1,245	140	103	140	73	73	.....
16	.....	790	1,400	1,175	140	91	115	73	73	.....
17	.....	790	1,245	1,040	152	73	103	115	73	.....
18	.....	1,040	1,175	1,008	152	73	103	128	73	.....
19	.....	1,320	1,282	975	140	73	91	115	91	.....
20	.....	1,565	1,320	910	165	67	91	91	61	.....
21	.....	1,610	1,400	850	140	73	91	91	73	.....
22	.....	1,282	1,140	790	140	73	91	91	91	.....
23	.....	1,360	1,105	670	140	73	91	91	82	.....
24	480	1,655	1,245	615	115	61	91	91	91	.....
25	642	1,850	1,440	560	103	61	82	91	91	.....
26	670	1,955	1,750	505	115	61	82	91	73	.....
27	560	2,170	1,565	505	103	57	82	91	91	.....
28	505	2,405	2,115	505	165	61	82	91	73	.....
29	455	2,405	2,530	505	212	61	73	73	82	.....
30	315	2,170	2,530	505	195	61	73	82	82	.....
31	360	.....	2,592	.....	165	57	.....	91	.....	.....

Monthly discharge of Elk River near Trull, Colo., for 1910.

[Drainage area, 415 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
March 24-31	670	315	498	1.20	0.36	7,900
April	2,400	382	1,190	2.87	3.20	70,800
May	2,590	1,100	1,640	3.95	4.55	101,000
June	2,530	505	1,240	2.99	3.34	73,800
July	405	103	203	.489	.56	12,500
August	180	57	89.1	.215	.25	5,480
September	315	57	107	.258	.29	6,370
October	128	73	87.5	.211	.24	5,380
November	91	61	78.8	.190	.21	4,690
The period						288,000

FISH CREEK AT DUNKLEY, COLO.

This station, which is located at the wagon bridge, one-fourth mile below Dunkley's ranch and one-half mile above Dunkley's reservoir dam site, was established April 8, 1910, by the State engineer of Colorado, and is maintained by the State in cooperation with the Williams River High Line Irrigation Co. The records are furnished by the State engineer.

High-stage measurements are made from the bridge; low-stage measurements are made by wading at various sections.

During the winter months the relation between gage height and discharge is affected by ice.

Discharge measurements of Fish Creek at Dunkley, Colo., for 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 8	C. L. Chatfield	10	8.0	2.60	18.5
May 15	....do	16	24	4.02	51
July 21	....do	.....	1.2	1.80	1.2
Oct. 22	....do	12	3.6	2.22	5.9

Daily gage height, in feet, of Fish Creek at Dunkley, Colo., for 1910.

[R. S. Bird, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	4.6	3.35	2.0	2.0	1.9	2.0	2.3	2.3
2	.....	4.45	3.25	1.95	2.0	1.9	2.15	2.2	2.3
3	.....	4.55	3.0	2.0	2.0	2.0	2.2	2.2	2.3
4	.....	4.95	2.85	2.1	2.0	2.3	2.1	2.2	2.3
5	.....	4.55	2.6	2.05	2.0	2.25	2.15	2.2	2.3
6	.....	4.6	2.45	2.0	1.95	2.1	2.1	2.1	2.2
7	.....	4.25	2.4	2.0	2.0	2.0	2.15	2.2	2.25
8	2.6	4.5	2.35	1.95	2.0	2.0	2.05	2.2	2.3
9	2.7	4.45	2.4	1.95	1.9	2.0	2.2	2.3	2.2
10	2.9	4.9	2.35	1.95	2.0	1.9	2.2	2.2	2.2
11	3.1	5.95	2.3	1.9	1.95	1.9	2.2	2.2	.....
12	3.25	6.0	2.15	1.9	2.0	2.0	2.2	2.2	.....
13	3.2	5.8	2.2	1.9	1.9	2.0	2.2	2.2	.....
14	3.1	5.4	2.2	1.95	1.9	2.0	2.2	2.3	.....
15	2.75	4.75	2.1	1.9	2.0	2.0	2.2	2.2	.....
16	2.65	3.75	2.1	1.9	2.0	2.0	2.35	2.2	.....
17	2.75	3.75	2.1	1.95	1.9	2.0	2.4	2.3	.....
18	3.1	3.55	2.1	1.9	1.9	2.0	2.3	2.15	.....
19	3.4	3.9	2.05	1.9	1.9	2.1	2.2	2.3	.....
20	4.35	3.4	2.0	1.9	1.9	2.0	2.2	2.3	.....
21	4.4	3.35	2.0	1.9	2.0	2.0	2.1	2.2	.....
22	3.75	3.5	2.0	1.9	1.95	2.0	2.0	2.2	.....
23	3.95	3.4	2.0	1.9	1.9	1.95	2.1	2.2	.....
24	4.4	3.4	1.95	1.9	1.9	2.0	2.05	2.2	.....
25	4.9	3.4	1.9	1.9	1.9	2.0	2.1	2.2	.....
26	5.6	3.6	1.95	1.9	1.9	2.0	2.1	2.2	.....
27	5.8	3.4	1.95	1.9	1.95	2.0	2.0	2.2	.....
28	5.8	3.8	2.0	2.1	1.9	2.0	2.1	2.25	.....
29	6.0	3.5	2.0	2.3	1.95	2.0	2.1	2.30	.....
30	4.95	3.45	2.0	2.45	1.9	2.0	2.3	2.2	.....
31	.....	3.35	.....	2.0	1.9	.....	2.25	.....	.....

Daily discharge, in second-feet, of Fish Creek at Dunkley, Colo., for 1910.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	70	33.5	6	3.2	2.2	3.2	6.7	6.7
2	.....	65	31	5	3.2	2.2	4.9	5.5	6.7
3	.....	68.5	26	6	3.2	3.2	5.5	5.5	6.7
4	.....	84	23	7	3.2	6.7	4.3	5.5	6.7
5	.....	68.5	19	6	3.2	6.1	4.9	5.5	6.7
6	.....	70	16.5	4.5	2.7	4.3	4.3	4.3	5.5
7	.....	58	16	4.5	3.2	3.2	4.9	5.5	6.1
8	19	67	15	4	3.2	3.2	3.8	5.5	6.7
9	20	65	16	4	2.2	3.2	5.5	6.7	6.1
10	24	82	15	4	3.2	2.2	5.5	5.5	5.5
11	28	128	14	2.5	2.7	2.2	5.5	5.5	[a] 5.5
12	31	131	11.5	2.5	3.2	3.2	5.5	5.5	5.5
13	30	121	12	2.5	2.2	3.2	5.5	5.5	5.5
14	28	102	12	3.0	2.2	3.2	5.5	6.7	5.5
15	21	76	11	2.5	3.2	3.2	5.5	5.5	5.5
16	19.5	43.5	10	2.2	3.2	3.2	7.4	5.5	5.5
17	21	43.5	10	2.7	2.2	3.2	8.0	6.7	5.5
18	28	38.5	10	2.2	2.2	3.2	6.7	4.9	5.5
19	35	47	9.5	2.2	2.2	4.3	5.5	6.7	5.5
20	61.5	35	9	2.2	2.2	3.2	5.5	6.7	5.5
21	63	33.5	8	2.2	3.2	3.2	4.3	5.5	5.0
22	43.5	37	8	2.2	2.7	3.2	3.2	5.5	5.0
23	48.5	35	8	2.2	2.2	2.7	4.3	5.5	5.0
24	63	35	7.5	2.2	2.2	3.2	3.8	5.5	5.0
25	82	35	7	2.2	2.2	3.2	4.3	5.5	5.0
26	111	40	6.5	2.2	2.2	3.2	4.3	5.5	5.0
27	121	35	6.5	2.2	2.7	3.2	3.2	5.5	5.0
28	121	45	7.0	4.3	2.2	3.2	4.3	6.1	5.0
29	131	37	7.0	6.7	2.7	3.2	4.3	6.7	5.0
30	84	36	7.0	8.6	2.2	3.2	6.7	5.5	5.0
31	.....	33.5	.....	3.2	2.2	.....	6.1	.....	5.0

[a] Dec. 11-31, discharge estimated.

Monthly discharge of Fish Creek at Dunkley, Colo., for 1910.

[Drainage area, 29 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
April 8-30	131	19	53.7	1.86	1.59	2,460
May	131	33.5	60.2	2.07	2.38	3,700
June	33.5	6.5	13.1	.448	.50	780
July	8.6	2.2	5.00	.172	.20	307
August	3.2	2.2	2.67	.093	.11	164
September	6.7	2.2	3.33	.114	.13	198
October	8	3.2	5.03	.176	.20	309
November	6.7	4.3	5.73	.197	.22	341
December			5.45	.188	.22	335
The period						8,590

ELK HEAD CREEK NEAR CRAIG, COLO.

This station, which is located at a wagon bridge at Harrison's ranch, about 6 miles above Craig, Colo., on the road from Steamboat Springs to Craig, was established by the United States Geological Survey, April 27, 1906, discontinued September 2, 1906, and reestablished April 15, 1910, by the State engineer of Colorado, by whom the records are furnished.

A chain gage is attached to the bridge. The location and datum of the present gage are identical with those of the original gage.

High-stage measurements are made from the bridge; low-stage measurements are made by wading at various sections.

During the winter months the relation between gage height and discharge is affected by ice.

Discharge measurements of Elk Head Creek near Craig, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 6	C. L. Chatfield				45
Apr. 15	do	39	128	6.70	361
May 26	Chatfield and Burke	38	76	5.93	204
June 9	C. L. Chatfield	27	76	4.80	60
Sept. 4	do	8	2.5	3.80	.8
Nov. 3	do	15	6.3	4.07	7.2

Daily gage height, in feet, of Elk Head Creek near Craig, Colo., for 1910.

[U. F. Harrison, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	8.3	5.6	3.9	3.95	3.6	4.0	4.1	4.0
2	.....	7.9	5.5	3.85	3.8	3.6	4.0	4.1	4.0
3	.....	7.3	5.35	3.8	3.9	3.8	4.0	4.1	4.0
4	.....	7.4	5.3	3.8	3.8	3.75	4.0	4.05	4.0
5	.....	7.75	5.15	3.8	3.8	3.65	4.1	4.0	4.0
6	.....	7.15	5.05	3.8	3.8	3.6	4.1	4.0	.....
7	.....	7.2	4.95	3.8	3.8	3.75	4.0	3.9	.....
8	.....	7.15	4.85	3.8	3.8	3.9	4.0	3.9	.....
9	.....	7.2	4.8	3.8	3.8	3.8	4.0	3.9	.....
10	.....	7.7	4.7	3.8	3.8	3.8	4.0	4.0	.....
11	.....	7.85	4.75	3.7	3.8	3.8	4.0	4.0	.....
12	.....	7.7	4.7	3.75	3.8	3.8	4.0	4.0	.....
13	.....	7.25	4.45	3.8	3.75	3.9	4.0	4.0	.....
14	.....	6.95	4.35	3.8	3.8	3.9	4.0	4.0	.....
15	.....	6.6	4.3	3.8	3.7	3.85	4.0	4.0	.....
16	.....	6.7	4.3	3.85	3.7	3.8	4.0	4.0	.....
17	6.55	6.45	4.25	3.8	3.7	3.9	4.25	4.1	.....
18	7.4	6.35	4.3	3.8	3.7	3.9	4.45	4.1	.....
19	7.75	6.0	4.3	3.9	3.65	3.9	4.3	4.1	.....
20	8.5	6.15	4.2	3.85	3.7	5.9	4.3	4.1	.....
21	9.6	6.4	4.0	3.85	3.7	3.9	4.25	4.1	.....
22	7.95	6.25	3.9	3.85	3.7	3.95	4.2	4.1	.....
23	7.7	6.05	3.9	3.85	3.6	3.9	4.15	4.1	.....
24	8.95	5.9	3.9	3.9	3.6	3.95	4.1	4.1	.....
25	9.35	6.05	3.8	3.85	3.6	4.0	4.1	4.1	.....
26	9.15	5.9	3.8	3.8	3.6	4.0	4.1	4.1	.....
27	9.55	5.8	3.8	3.8	3.6	4.0	4.1	4.1	.....
28	9.75	5.85	3.8	4.05	3.6	4.0	4.1	4.1	.....
29	9.45	5.8	4.0	4.4	3.6	4.0	4.1	4.0	.....
30	8.7	5.75	3.8	4.05	3.6	4.0	4.1	4.0	.....
31	.....	5.7	.....	3.95	3.6	.....	4.1	.....	.....

Daily discharge, in second-feet, of Elk Head Creek near Craig, Colo., for 1910.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	700	163	3	4	0	6	10	6
2	.....	610	148	2	1	0	6	10	6
3	.....	483	127	1	3	1	6	10	6
4	.....	504	120	1	1	0.8	6	8	6
5	.....	578	100	1	1	0.2	10	6	6
6	.....	452	88	1	1	0	10	6	.....
7	.....	462	75	1	1	0.8	6	3	.....
8	.....	452	64	1	1	3	6	3	.....
9	.....	462	59	1	1	1	6	3	.....
10	.....	567	50	1	1	1	6	6	.....
11	.....	599	54	0.5	1	1	6	6	.....
12	.....	567	50	1	1	1	6	6	.....
13	.....	472	30	1	0.8	3	6	6	.....
14	.....	412	24	1	1	3	6	6	.....
15	.....	342	21	1	0.5	2	6	6	.....
16	.....	362	21	2	0.5	1	6	6	.....
17	332	312	18	1	0.5	3	18	10	.....
18	504	294	21	1	0.5	3	30	10	.....
19	578	229	21	3	0.2	3	21	10	.....
20	746	256	15	2	0.5	3	21	10	.....
21	1,019	303	6	2	0.5	3	18	10	.....
22	621	274	3	2	0.5	4.5	15	10	.....
23	567	238	3	2	0	3	12	10	.....
24	854	212	3	3	0	4.5	10	10	.....
25	954	238	1	2	0	6	10	10	.....
26	904	212	1	1	0	6	10	10	.....
27	1,006	195	1	1	0	6	10	10	.....
28	1,058	204	1	8	0	6	10	10	.....
29	980	195	6	27	0	6	10	6	.....
30	794	187	1	8	0	6	10	6	.....
31	.....	179	.....	4.5	0	.....	10	.....	.....

Monthly discharge of Elk Head Creek near Craig, Colo., for 1910.

[Drainage area, 249 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
April 17-30	1,060	332	780	3.13	1.63	21,700
May	700	179	372	1.49	1.72	22,900
June	163	1	43.2	.173	.193	2,570
July	27	.5	2.81	.011	.01	173
August	4	0	.73	.003	.003	45
September	6	0	2.73	.011	.01	162
October	30	6	10.3	.041	.05	633
November	10	3	7.8	.031	.04	464
The period						48,600

FORTIFICATION CREEK AT CRAIG, COLO.

This station, which is located at a steel bridge one-eighth mile east of Main Street at Craig, Colo., on the road to Hayden and Steamboat Springs, was established by the United States Geological Survey, June 12, 1905, discontinued June 30, 1906, and reestablished March 5, 1910, by the State engineer of Colorado, by whom the records are furnished.

A chain gage is attached to the downstream side of the bridge.

High-stage measurements are made from the bridge; low-stage measurements are made by wading at various sections.

During the winter months the relation between gage height and discharge is affected by ice.

Discharge measurements of Fortification Creek at Craig, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 5	C. L. Chatfield	51	100	[a] 7.25	177
10	Foote and Burke			[a] 7.55	201
13	E. S. Foote	50		7.75	411
Apr. 15	C. L. Chatfield	48	74	5.40	145
May 26	Chatfield and Burke	47	30	3.72	50
June 10	C. L. Chatfield				[b] .5
29	do				[b] .3
Sept. 4	do	14	11	3.25	14
Nov. 3	do	7	2.8	2.6	2.9

[a] Gage height affected by ice.

[b] Estimated.

Daily gage height, in feet, of Fortification Creek at Craig, Colo., for 1910.

[Mrs. E. L. Jamason, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	4.6	5.25	3.7	.....	.....	.....	.....	2.7	2.75
2	.....	4.8	5.25	3.6	.....	.....	.....	.....	2.6	2.9
3	.....	4.85	4.7	3.85	.....	.....	.....	.....	2.7	2.8
4	.....	4.45	4.65	3.75	.....	.....	3.25	.....	2.7	2.8
5	7.25	4.25	4.7	.....	.....	.....	3.2	.....	2.7	2.9
6	7.95	4.3	4.9	.....	.....	.....	3.2	.....	2.8	3.1
7	8.45	4.3	4.5	.....	.....	.....	3.2	.....	2.65	2.9
8	9.0	4.4	4.75	.....	.....	.....	.....	.....	2.6	2.7
9	8.5	5.05	4.55	.....	.....	.....	.....	.....	2.55	2.9
10	7.05	5.8	4.6	.....	.....	.....	.....	.....	2.5	2.9
11	6.5	5.75	4.95	.....	.....	.....	.....	.....	2.5	3.0
12	6.8	6.4	5.2	.....	.....	.....	.....	.....	2.55	3.1
13	7.75	5.85	4.55	.....	.....	.....	.....	.....	2.65	3.0
14	6.9	6.0	4.35	.....	.....	.....	.....	.....	2.6	3.0
15	6.5	4.8	4.25	.....	.....	.....	.....	2.85	2.65	2.95
16	6.5	3.6	4.1	.....	.....	.....	.....	2.8	2.7	.....
17	7.1	4.25	3.95	.....	.....	.....	.....	3.0	2.6	.....
18	6.8	4.3	3.85	.....	.....	.....	.....	3.25	2.6	.....
19	7.1	5.2	3.65	.....	.....	.....	.....	3.3	2.6	.....
20	7.4	4.65	3.5	.....	.....	.....	.....	3.05	2.9	.....
21	8.0	5.9	3.65	.....	.....	.....	.....	2.9	2.8	.....
22	7.4	5.85	3.6	.....	.....	.....	.....	2.8	3.0	.....
23	8.3	5.95	3.65	.....	.....	.....	.....	2.8	2.7	.....
24	5.9	5.4	3.65	.....	.....	.....	.....	2.8	2.7	.....
25	5.9	5.7	3.7	.....	.....	.....	.....	2.8	2.7	.....
26	5.0	5.75	3.7	.....	.....	.....	.....	2.8	2.6	.....
27	4.9	5.8	3.6	.....	.....	.....	.....	2.8	2.75	.....
28	4.75	5.85	3.55	.....	3.2	.....	.....	2.85	2.8	.....
29	4.6	5.8	3.6	.....	4.0	.....	.....	2.85	2.7	.....
30	4.1	5.5	3.8	.....	3.2	.....	.....	2.8	2.6	.....
31	4.4	.....	3.85	.....	.....	.....	.....	2.8	.....	.....

Daily discharge, in second feet, of Fortification Creek at Craig, Colo., for 1910.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	95	136	30	.....	.....	.....	.....	4.5	5.2
2	.....	106	136	22	.....	.....	.....	.....	3.5	7.5
3	.....	109	100	25	.....	.....	.....	.....	4.5	6
4	.....	87	98	17	.....	.....	14	.....	4.5	6
5	178	76	100	10	.....	.....	13	.....	4.5	7.5
6	247	78	112	5	.....	.....	13	.....	6	11
7	306	78	90	1.5	.....	.....	13	.....	4	7.5
8	380	84	103	1.0	.....	.....	.....	.....	3.5	4.5
9	312	122	92	1.0	.....	.....	.....	.....	3	7.5
10	160	177	95	.5	.....	.....	.....	.....	2.5	7.5
11	120	173	115	.5	.....	.....	.....	.....	2.5	9
12	140	234	132	.5	.....	.....	.....	.....	3	11
13	411	181	92	.5	.....	.....	.....	.....	4	9
14	290	194	80	.5	.....	.....	.....	.....	3.5	9
15	245	106	76	.5	.....	.....	.....	6.8	4	8.2
16	245	45	68	.5	.....	.....	.....	6	4.5	.....
17	315	76	60	.5	.....	.....	.....	9	3.5	.....
18	278	78	56	.5	.....	.....	.....	14	3.5	.....
19	315	132	47	.5	.....	.....	.....	15	3.5	.....
20	358	98	42	.5	.....	.....	.....	10	7.5	.....
21	452	185	47	.3	.....	.....	.....	7.5	6	.....
22	358	181	45	.3	.....	.....	.....	6	9	.....
23	507	190	47	.3	.....	.....	.....	6	4.5	.....
24	185	146	47	.3	.....	.....	.....	6	4.5	.....
25	185	169	49	.3	.....	.....	.....	6	4.5	.....
26	118	173	49	.3	.....	.....	.....	6	3.5	.....
27	112	177	45	.3	.....	.....	.....	6	5.2	.....
28	103	181	44	.3	13	.....	.....	6.8	6	.....
29	95	177	41	.3	38	.....	.....	6.8	4.5	.....
30	68	153	44	.3	13	.....	.....	6	3.5	.....
31	84	.....	41	.....	.....	.....	.....	6	.....	.....

NOTE.—Discharge estimated June 5–30. No flow July 1–27, July 31 to Sept. 3, and Sept. 8 to Oct. 14.

Monthly discharge of Fortification Creek at Craig, Colo., for 1910.

[Drainage area, 256 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
March 5-31	507	68	243	0.949	0.95	13,000
April	234	45	135	.527	.59	8,030
May	136	41	75.1	.293	.34	4,620
June	30	3	4.03	.016	.02	240
July	38	0	2.06	.008	.01	127
August	0	0	0	0	0	0
September	14	0	1.77	.007	.01	105
October	14	0	4.19	.016	.02	258
November	9	3.5	4.34	.017	.02	258
December 1-15	11	4.5	7.76	.030	.02	231
The period						26,900

WILLIAMS RIVER NEAR PYRAMID, COLO.

This station, which is located at a footbridge at Dunston's ranch, 3 miles below Pyramid post office, was established April 14, 1910, by the State engineer of Colorado in cooperation with the Williams River High Line Irrigation Co. The records are furnished by the State engineer.

A vertical staff gage is bolted to the crib pier of the footbridge.

The bed of the stream is composed of bowlders and gravel and is probably permanent. The left bank is overflowed at high water. The measuring section is good.

Discharge measurements are made from the bridge.

The relation between gage height and discharge is affected by ice during the winter months.

Discharge measurements of Williams River near Pyramid, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 14	C. L. Chatfield	26	50	1.80	132
May 16	do	38	79	2.30	313
Aug. 10	do	28	45	1.50	51
Oct. 23	do	28	42	1.43	40

Daily gage height, in feet, of Williams River near Pyramid, Colo., for 1910.

[Edna B. Evans, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.4	2.95	1.75	1.65	1.4	1.4	1.35	1.4
2	.....	2.35	3.05	1.75	1.6	1.4	1.4	1.35	1.45
3	.....	2.4	3.1	1.7	1.55	1.45	1.4	1.35	1.3
4	.....	2.4	2.95	1.7	1.6	1.45	1.4	1.4	1.35
5	.....	2.2	2.8	1.65	1.55	1.5	1.4	1.45	1.45
6	.....	2.15	2.9	1.75	1.5	1.5	1.4	1.35	1.35
7	.....	2.2	2.85	1.75	1.5	1.4	1.4	1.35	1.5
8	.....	2.2	2.75	1.7	1.5	1.4	1.4	1.35	1.45
9	.....	2.3	2.6	1.7	1.5	1.4	1.4	1.35	1.35
10	.....	2.7	2.55	1.7	1.5	1.4	1.4	1.35	1.35
11	.....	3.1	2.6	1.7	1.5	1.4	1.4	1.35	1.3
12	.....	2.95	2.55	1.6	1.55	1.5	1.4	1.35	1.3
13	.....	2.9	2.55	1.5	1.5	1.7	1.4	1.35	1.3
14	1.8	2.55	2.55	1.5	1.5	1.5	1.4	1.3	1.25
15	1.75	2.45	2.45	1.5	1.5	1.5	1.4	1.4	1.25
16	1.7	2.35	2.4	1.5	1.5	1.6	1.4	1.35	1.3
17	1.7	2.2	2.35	1.5	1.5	1.6	1.5	1.3	1.15
18	1.8	2.25	2.35	1.65	1.5	1.5	1.5	1.35	1.25
19	1.9	2.25	2.3	1.6	1.5	1.5	1.5	1.3	1.3
20	2.0	2.25	2.3	1.6	1.5	1.5	1.35	1.35	1.25
21	1.95	2.2	2.2	1.6	1.5	1.5	1.4	1.4	1.25
22	1.9	2.15	2.1	1.6	1.5	1.4	1.45	1.35	1.35
23	1.8	2.4	2.0	1.6	1.5	1.4	1.45	1.35	1.3
24	1.9	2.45	1.95	1.6	1.5	1.4	1.45	1.35	1.25
25	2.15	2.45	1.95	1.6	1.5	1.4	1.45	1.35	.....
26	2.2	2.5	2.0	1.6	1.5	1.4	1.45	1.3	.....
27	2.6	2.6	1.95	1.65	1.5	1.4	1.35	1.25	.....
28	2.7	2.75	1.95	1.75	1.5	1.4	1.3	1.4	.....
29	2.55	2.75	1.95	1.8	1.4	1.4	1.45	1.35	.....
30	2.2	2.95	1.8	1.7	1.45	1.4	1.4	1.3	.....
31	.....	3.05	.....	1.65	1.4	.....	1.35	.....	.....

Daily discharge, in second-feet, of Williams River near Pyramid, Colo., for 1910.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	361	678	113	86	35	35	29	35
2	.....	338	751	113	73	35	35	29	43
3	.....	361	790	99	62	43	35	29	23
4	.....	361	678	99	73	43	35	35	29
5	.....	272	578	86	62	51	35	43	43
6	.....	252	643	113	51	51	35	29	29
7	.....	272	610	113	51	35	35	29	51
8	.....	272	548	99	51	35	35	29	43
9	.....	315	462	99	51	35	35	29	29
10	.....	518	436	99	51	35	35	29	29
11	.....	790	462	99	51	35	35	29	23
12	.....	678	436	73	51	51	35	29	23
13	.....	643	436	51	51	99	35	29	23
14	128	436	436	51	51	51	35	23	19
15	114	385	385	51	51	51	35	35	19
16	99	338	361	51	51	73	35	29	23
17	99	272	338	51	51	73	51	23	13
18	128	294	338	86	51	51	51	29	19
19	160	294	315	73	51	51	51	23	23
20	195	294	315	73	51	51	29	29	19
21	178	272	272	73	51	51	35	35	19
22	160	252	232	73	51	35	43	29	29
23	128	361	195	73	51	35	43	29	23
24	160	385	178	73	51	35	43	29	19
25	252	385	178	73	51	35	43	29	[a]21
26	272	410	195	73	51	35	43	23	21
27	462	462	178	86	51	35	29	19	21
28	518	548	178	113	51	35	23	35	21
29	436	548	178	128	35	35	43	29	21
30	272	678	128	99	43	35	35	23	21
31	.....	751	.....	86	35	.....	29	.....	21

[a] Discharge Dec. 25–31, estimated.

Monthly discharge of Williams River near Pyramid, Colo., for 1910.

[Drainage area, 98 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
April 14-30	518	99	221	2.26	1.43	7,450
May	790	252	413	4.21	4.85	25,400
June	790	128	397	4.05	4.52	23,600
July	128	51	85.2	.869	1.00	5,240
August	86	35	53.0	.541	.62	3,260
September	99	35	45.0	.459	.51	2,680
October	51	23	37.1	.379	.44	2,280
November	43	19	28.9	.295	.33	1,720
December	51	13	25.6	.261	.30	1,570
The period						73,200

WILLIAMS RIVER AT HAMILTON, COLO.

This station, which is located on the steel wagon bridge on the stage road between Craig and Meeker, three-fourths of a mile north of Hamilton post office, about 14 miles from Craig, Colo., was established by the United States Geological Survey April 29, 1904, discontinued October 31, 1906, and reestablished April 15, 1910, by the State engineer of Colorado, by whom the records are furnished.

A standard chain gage is attached to the bridge. The datum of the present gage is 0.18 foot lower than the datum of the original gage.

The bed of the stream consists of gravel and some small bowlders and is probably permanent. The measuring section is good.

Discharge measurements are made from the downstream side of the bridge.

The relation between gage height and discharge is affected by ice during the winter.

Discharge measurements of Williams River at Hamilton, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 15	C. L. Chatfield	58	132	4.10	332
May 25	do	63	207	5.28	706
June 28	do	56	101	3.50	202
Aug. 12	do	30	33	2.65	51
Oct. 23	do	30	34	2.78	68.5

Daily gage height, in feet, of Williams River at Hamilton, Colo., for 1910.

[Carrie A. Hamilton, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	5.75	6.45	3.4	2.8	2.55	2.7	2.7	2.65
2	.....	5.3	6.4	3.35	2.8	2.55	2.7	2.75	2.7
3	.....	5.05	6.4	3.3	2.75	2.6	2.8	2.75	2.7
4	.....	5.2	6.3	3.2	2.75	2.9	2.7	2.75	.....
5	.....	5.45	6.05	3.35	2.75	3.05	2.7	2.75	.....
6	.....	5.15	5.7	3.3	2.7	2.8	2.7	2.65	.....
7	.....	5.05	5.7	3.15	2.7	2.7	2.7	2.65	.....
8	.....	5.25	5.6	3.0	2.7	2.65	2.7	2.65	.....
9	.....	5.8	5.35	3.0	2.7	2.6	2.7	2.65	.....
10	.....	6.55	5.2	3.0	2.65	2.6	2.7	2.65	.....
11	.....	7.1	4.95	2.9	2.7	2.6	2.7	2.65	.....
12	.....	6.9	4.95	2.9	2.6	2.7	2.7	2.65	.....
13	.....	6.3	4.95	3.0	2.7	2.75	2.7	2.7	.....
14	.....	5.85	4.85	2.8	2.7	2.75	2.7	2.7	.....
15	4.05	5.85	4.7	2.9	2.7	2.9	2.7	2.7	.....
16	3.85	5.4	4.6	3.0	2.65	2.8	2.7	2.7	.....
17	3.9	5.1	4.55	2.95	2.65	2.9	2.7	2.7	.....
18	4.1	5.0	4.4	3.0	2.6	2.8	2.85	2.7	.....
19	4.45	4.95	4.35	2.85	2.6	2.8	3.0	2.7	.....
20	4.9	5.05	4.3	2.8	2.6	2.7	2.95	2.75	.....
21	5.35	5.2	4.2	2.8	2.65	2.7	2.9	2.65	.....
22	4.85	4.9	4.1	2.8	3.15	2.8	2.7	2.85	.....
23	4.7	4.9	4.0	2.8	2.75	2.8	2.7	2.8	.....
24	5.0	5.15	3.9	2.7	2.7	2.75	2.85	2.8	.....
25	5.4	5.3	3.7	2.7	2.6	2.7	2.85	2.7	.....
26	5.85	5.4	3.5	2.7	2.6	2.7	2.75	2.7	.....
27	6.2	5.45	3.5	2.7	2.6	2.7	2.75	2.7	.....
28	6.6	5.85	3.5	2.8	2.6	2.7	2.65	2.7	.....
29	6.65	6.1	3.8	3.0	2.6	2.7	2.65	2.7	.....
30	6.3	6.3	3.6	3.0	2.6	2.7	2.75	2.7	.....
31	.....	6.35	.....	3.0	2.6	.....	2.75	.....	.....

Daily discharge, in second-feet, of Williams River at Hamilton, Colo., for 1910.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	890	1,215	176	72	35	57	57	50
2	.....	710	1,190	166	72	35	57	64	57
3	.....	622	1,190	157	64	42	72	64	57
4	.....	675	1,140	139	64	88	57	64	.....
5	.....	770	1,022	166	64	112	57	64	.....
6	.....	658	870	157	57	72	57	50	.....
7	.....	622	870	130	57	57	57	50	.....
8	.....	692	830	104	57	50	57	50	.....
9	.....	910	730	104	57	42	57	50	.....
10	.....	1,268	675	104	50	42	57	50	.....
11	.....	1,580	588	88	57	42	57	50	.....
12	.....	1,460	588	88	42	57	57	50	.....
13	.....	1,140	588	104	57	64	57	57	.....
14	.....	932	554	72	57	64	57	57	.....
15	320	932	506	88	57	88	57	57	.....
16	272	750	474	104	50	72	57	57	.....
17	283	640	460	96	50	88	57	57	.....
18	333	605	416	104	42	72	80	57	.....
19	440	588	401	80	42	72	104	57	.....
20	570	622	387	72	42	57	96	64	.....
21	730	675	360	72	50	57	88	50	.....
22	554	570	333	72	130	72	57	80	.....
23	506	570	308	72	64	72	57	72	.....
24	605	658	283	57	57	64	80	72	.....
25	750	710	237	57	42	57	80	57	.....
26	932	750	196	57	42	57	64	57	.....
27	1,090	770	196	57	42	57	64	57	.....
28	1,295	932	196	72	42	57	50	57	.....
29	1,322	1,045	260	104	42	57	50	57	.....
30	1,140	1,140	216	104	42	57	64	57	.....
31	.....	1,165	.....	104	42	.....	64	.....	.....

Monthly discharge of Williams River at Hamilton, Colo., for 1910.

[Drainage area, 341 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
April 15–30	1,320	272	696	2.04	1.21	22,100
May	1,580	570	840	2.46	2.84	51,600
June	1,220	196	576	1.69	1.89	34,300
July	176	57	101	.296	.34	6,210
August	130	42	55.0	.161	.19	3,380
September	112	35	61.9	.182	.20	3,680
October	104	50	63.9	.187	.22	3,930
November	64	50	58.1	.170	.19	3,460
The period	.....	.....	.....	.....	.....	129,000

LITTLE SNAKE RIVER AT DIXON, WYO.

This station, which is located at the steel highway bridge 1 mile west of Dixon, Wyo., was established May 28, 1910, by the State engineer of Colorado, by whom the records are furnished.

A chain gage is attached to the upstream handrail of the bridge.

High-stage measurements are made from the bridge; low-stage measurements are made by wading at various sections. Discharge measurements must be corrected to eliminate errors caused by the angle at which the current passes beneath the bridge.

The relation between gage height and discharge is affected by ice during the winter months.

Discharge measurements of Little Snake River at Dixon, Wyo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 28	C. L. Chatfield	122	649	4.55	1,940
July 16	.....do	40	19	.50	17.4
Sept. 6	.....do	50	30	.80	53.0
Nov. 8	.....do	39	45	1.02	68.0

Daily gage height, in feet, of Little Snake River at Dixon, Wyo., for 1910.

[Nina Madsen, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	4.5	1.35	0.8	0.5	0.7	0.9	1.0
2	.....	4.5	1.0	.8	.5	.8	1.0	.9
3	.....	4.3	.9	.7	.5	.9	.95	.95
4	.....	4.05	.85	.5	.6	1.0	.9	1.0
5	.....	3.8	.9	.5	.95	1.0	.9	1.0
6	.....	3.65	.9	.5	.75	1.0	.85	1.0
7	.....	3.5	.85	.5	.6	1.0	1.0	1.0
8	.....	3.3	.8	.4	.5	.9	1.05	1.1
9	.....	3.1	.7	.4	.5	.85	1.0	1.0
10	.....	2.85	.7	.4	.5	.85	1.1	1.05
11	.....	2.7	.65	.4	.5	.85	1.0	.....
12	.....	2.65	.5	.4	.5	.8	1.0	.....
13	.....	2.65	.45	.4	.5	.9	1.0	.....
14	.....	2.55	.45	.4	.6	.9	1.0	.....
15	.....	2.35	.4	.4	.8	.9	1.0	.....
16	.....	2.2	.5	.4	.7	.9	1.0	.....
17	.....	2.4	.4	.4	.7	1.1	1.05	.....
18	.....	2.2	.4	.5	.9	1.35	1.0	.....
19	.....	2.05	.45	.45	.95	1.3	1.0	.....
20	.....	1.8	.5	.5	.9	1.2	1.0	.....
21	.....	1.65	.5	.5	.8	1.0	.85	.....
22	.....	1.5	.5	.5	.85	1.0	1.1	.....
23	.....	1.25	.45	.5	.85	1.05	1.1	.....
24	.....	1.15	.4	.4	.9	1.1	1.05	.....
25	.....	1.15	.5	.35	.85	1.1	1.1	.....
26	.....	1.15	.45	.4	.8	1.15	1.1	.....
27	4.1	1.1	.4	.35	.8	1.2	.95	.....
28	4.5	1.0	.4	.35	.8	1.1	.9	.....
29	4.65	1.25	.65	.5	.8	1.0	1.1	.....
30	4.7	1.2	.95	.5	.8	1.0	1.0	.....
31	4.6	.....	.9	.5	.....	1.05	.....	.....

Daily discharge, in second-feet, of Little Snake River at Dixon, Wyo., for 1910.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1,905	149	47	17	35	61	77
2	.....	1,905	77	47	17	47	77	61
3	.....	1,740	61	35	17	61	69	69
4	.....	1,552	54	17	25	77	61	77
5	.....	1,365	61	17	69	77	61	77
6	.....	1,255	61	17	41	77	54	77
7	.....	1,150	54	17	25	77	77	77
8	.....	1,015	47	11	17	61	86	95
9	.....	890	35	11	17	54	77	77
10	.....	748	35	11	17	54	95	86
11	.....	670	30	11	17	54	77	.....
12	.....	645	17	11	17	47	77	.....
13	.....	645	14	11	17	61	77	.....
14	.....	595	14	11	25	61	77	.....
15	.....	502	11	11	47	61	77	.....
16	.....	435	17	11	35	61	77	.....
17	.....	525	11	11	35	95	86	.....
18	.....	435	11	17	61	149	77	.....
19	.....	370	14	14	69	137	77	.....
20	.....	281	17	17	61	115	77	.....
21	.....	233	17	17	47	77	54	.....
22	.....	188	17	17	54	77	95	.....
23	.....	126	14	17	54	86	95	.....
24	.....	105	11	11	61	95	86	.....
25	.....	105	17	9	54	95	95	.....
26	.....	105	14	11	47	105	95	.....
27	1,590	95	11	9	47	115	69	.....
28	1,905	77	11	9	47	95	61	.....
29	2,032	126	30	17	47	77	95	.....
30	2,075	115	69	17	47	77	77	.....
31	1,990	.....	61	17	.....	86	.....	.....

NOTE.—Discharge Dec. 11 to 31 estimated at 77 second-feet per day.

Monthly discharge of Little Snake River at Dixon, Wyo., for 1910.

[Drainage area, 1.290 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
June	1,900	77	663	0.514	0.57	39,500
July	149	11	34.3	.027	.03	2,110
August	47	9	16.3	.013	.02	1,000
September	69	17	38.4	.030	.03	2,280
October	149	35	78.9	.061	.07	4,850
November	95	54	77.3	.060	.07	4,600
December			77.1	.060	.07	4,740
The period						59,100

SLATER CREEK NEAR SLATER, COLO.

This station, which is located at a private bridge 2 miles above the Slater reservoir dam site and 3 miles from Slater, was established May 28, 1910, by the State engineer of Colorado, by whom the records are furnished.

A rod gage is attached to the left abutment of the upstream side of the bridge.

High-stage measurements are made from the bridge; low-stage measurements are made by wading at various sections.

The relation between gage height and discharge is affected by ice during the winter months.

Discharge measurements of Slater Creek near Slater, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 15	C. L. Chatfield	29	25.8	1.17	9.8
Sept. 6	do	16	8.3	1.17	11
Nov. 7	do	17.8	12	1.20	13

Daily gage height, in feet, of Slater Creek near Slater, Colo., for 1910.

[H. V. Rowell, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.9	1.4	1.25	1.1	1.15	.....	1.25
2	.....	2.85	1.4	1.2	1.1	1.2	.....	1.25
3	.....	2.8	1.4	1.2	1.1	1.35	.....	1.3
4	.....	2.6	1.4	1.15	1.4	.....	.....	1.25
5	.....	2.5	1.4	1.2	1.3	.....	.....	1.2
6	.....	2.5	1.3	1.15	1.2	.....	.....	1.15
7	.....	2.4	1.3	1.1	1.15	.....	.....	1.25
8	.....	2.35	1.25	1.1	1.15	.....	.....	1.3
9	.....	2.25	1.25	1.1	1.15	.....	1.3	1.3
10	.....	2.15	1.25	1.1	1.1	.....	1.25	.....
11	.....	2.1	1.2	1.1	1.1	.....	1.25	.....
12	.....	2.1	1.2	1.05	1.1	.....	1.25	.....
13	.....	2.1	1.2	1.1	1.1	.....	1.25	.....
14	.....	2.15	1.2	1.1	1.4	.....	1.3	.....
15	.....	2.0	1.15	1.1	1.2	.....	1.3	.....
16	.....	1.95	1.2	1.1	1.15	.....	1.25	.....
17	.....	2.0	1.15	1.05	1.15	.....	1.25	.....
18	.....	1.9	1.3	1.0	1.15	.....	1.25	.....
19	.....	1.8	1.25	1.0	1.2	.....	1.25	.....
20	.....	1.7	1.2	1.0	1.2	.....	1.1	.....
21	.....	1.7	1.2	1.1	1.2	.....	1.3	.....
22	.....	1.6	1.15	1.1	1.2	.....	1.25	.....
23	.....	1.6	1.15	1.1	1.2	.....	1.25	.....
24	.....	1.5	1.15	1.1	1.2	.....	1.3	.....
25	.....	1.5	.95	1.1	1.2	.....	1.3	.....
26	.....	1.5	.9	1.05	1.15	.....	1.3	.....
27	.....	1.4	.95	1.05	1.15	.....	1.25	.....
28	2.95	1.4	.9	1.05	1.15	.....	1.25	.....
29	2.95	1.4	1.5	1.05	1.15	.....	1.3	.....
30	3.0	1.55	1.5	1.1	1.15	.....	1.3	.....
31	2.9	.....	1.2	1.1	.....	.....	.....	.....

Daily discharge, in second-feet, of Slater Creek near Slater, Colo., for 1910.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	143	22	14	8	10	.....	14
2	.....	138	22	12	8	12	.....	14
3	.....	133	22	12	8	20	.....	17
4	.....	113	22	10	22	.....	.....	14
5	.....	103	22	12	17	.....	.....	12
6	.....	103	17	10	12	.....	.....	10
7	.....	94	17	8	10	.....	.....	14
8	.....	90	14	8	10	.....	.....	17
9	.....	81	14	8	10	.....	17	17
10	.....	73	14	8	8	.....	14	.....
11	.....	69	12	8	8	.....	14	.....
12	.....	69	12	6	8	.....	14	.....
13	.....	69	12	8	8	.....	14	.....
14	.....	73	12	8	22	.....	17	.....
15	.....	61	10	8	12	.....	17	.....
16	.....	57	12	8	10	.....	14	.....
17	.....	61	10	6	10	.....	14	.....
18	.....	53	17	5	10	.....	14	.....
19	.....	46	14	5	12	.....	14	.....
20	.....	39	12	5	12	.....	8	.....
21	.....	39	12	8	12	.....	17	.....
22	.....	33	10	8	12	.....	14	.....
23	.....	33	10	8	12	.....	14	.....
24	.....	27	10	8	12	.....	17	.....
25	.....	27	4	8	12	.....	17	.....
26	.....	27	3	6	10	.....	17	.....
27	.....	22	4	6	10	.....	14	.....
28	148	22	3	6	10	.....	14	.....
29	148	22	27	6	10	.....	17	.....
30	153	30	27	8	10	.....	17	.....
31	143	.....	12	8	.....	.....	.....	.....

NOTE.—Discharge Dec. 10 to 31 estimated at 14 second-feet per day.

Monthly discharge of Slater Creek near Slater, Colo., for 1910.

[Drainage area, 143 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
June	143	22	65.0	0.454	0.51	3,870
July	27	3	13.9	.091	.10	855
August	14	5	8.03	.056	.06	494
September	22	8	11.2	.077	.09	664
November 9–30	17	8	15.0	.105	.09	655
December	17	10	14.1	.099	.11	867
The period						7,400

DUCHESNE RIVER BASIN.

GENERAL FEATURES.

Duchesne River rises in the high peaks of the Uinta and Wasatch mountains in northeastern Utah, flows for about 100 miles in a general southeasterly direction, and enters Green River at Ouray, Utah, about 3 miles above the mouth of White River. The stream has a total drainage area of 4,000 square miles. Altitudes range from 4,700 feet at the mouth of the river to more than 13,000 feet at the summits of the highest peaks.

The principal tributaries of the Duchesne are Rock (East) Creek, Strawberry River, Lake Fork, and Uinta River.

The drainage basin of the upper Duchesne proper is mountainous. The stream emerges from the mountains at the mouth of Rock Creek, at an elevation of about 6,000 feet. From the mouth of Strawberry River down to Lake Fork the valley of the Duchesne is about 2 miles in average width and is bordered by sandstone bluffs approximately 200 feet high. Along the lower course of the stream the plateaus on each side of the stream valley are comparatively low and can be easily reached by irrigation canals from the main stream.

Strawberry River, the main upper tributary of the Duchesne, rises in the Uinta Mountains and enters the Duchesne at Theodore. It drains an area comprising about 1,200 square miles. The upper stream basin has numerous tributaries, particularly from the north and west. Among the most important may be mentioned Indian Creek, Bryant's Fork, Mud Creek, Horse Creek, Sugar Springs, and Co-op Creek. All are short and all fall rapidly until they reach Strawberry Valley, through which they flow sluggishly in well-defined channels. The main stream traverses the valley from north to south and is very sluggish. As its average elevation is 7,500 feet above sea level, Strawberry Valley is not well suited for agricultural develop-

ment, but it is excellently adapted to grazing. At the mouth of the river, about 35 miles below Strawberry Valley, the elevation is about 5,500 feet, and the fall in that distance is, therefore, nearly 2,000 feet.

Rock Creek, Lake Fork, and the Uinta and its most important tributary, the Whiterocks, head in a series of small snow-fed lakes in the Uinta Mountains and drain areas mountainous and difficult of access, and emerge from their canyons at an elevation of about 7,000 feet.

The drainage area of the Duchesne includes about 1,400 square miles of forest reserve, of which about 1,000 square miles may be classed as timbered land. The timbered land is distributed through the areas of the tributaries about as follows: Upper Duchesne, 120 square miles; Rock Creek, 130 square miles; Strawberry River, 380 square miles; Lake Fork, 190 square miles; Uinta (above Whiterocks) 120 square miles; Whiterocks, 70 square miles.

In the plains area the average rainfall is probably less than 10 inches; in the middle part comprising considerably over half the area, it probably averages between 10 and 15 inches; in only a small part in the high mountains is there an annual precipitation in excess of 20 inches, and at Fort Duchesne, at an elevation of 5,000 feet, a record extending over several years shows a mean annual rainfall of only 7 inches. The winters are very severe. In the high mountains the snowfall is heavy, and in many places the snow lies through the whole year. All the streams in this region are usually covered with thick ice from about December 1 to April 1 of each year.

At the present time the water in these streams is unused except for irrigation. Practically no storage is used in connection with any of the irrigation systems now in operation or under construction, but as the mountain drainage areas of all the main tributaries are studded with lakes, reservoir sites can easily be found where water can be stored for the irrigation of the valley lands.

The United States Reclamation Service is constructing a tunnel, with a capacity of 500 second-feet, which will divert water from a 100,000-acre reservoir on the upper Strawberry across the divide to the headwaters of the Spanish Fork, there to be used for irrigation.

Very little water will be diverted for irrigation above an elevation of 6,500 feet, and as most of the reservoir sites are at an elevation of 8,000 feet or more, and some of the streams fall 100 to 150 feet or more to the mile in their upper stretches, good opportunities for power development exist above irrigation ditches.

DUCHESNE RIVER AT MYTON, UTAH.[1]

This station, which was located at the highway bridge at Myton, Utah, about 3 miles below the mouth of Lake Fork and about 15

[1] Described in the earlier reports as the Price Road Bridge station.

miles above the mouth of Uinta River, was established October 26, 1899. The records show practically the entire run-off of the Duchesne basin above the mouth of Uinta River.

The datum of the gage remained practically constant from the establishment of the station until June 6, 1909, when the river cut a new channel around the bridge and the bridge station was abandoned. A new chain gage was established July 9, 1909, about one-fourth of a mile upstream from the bridge and at a different datum. This gage was replaced on August 9, 1909, by another chain gage 100 feet downstream on right bank, at the same datum.

A chain gage was installed August 6, 1910, on the new single-span steel bridge across the river. This bridge is located near the northwest boundary of the Myton town site, about one-fourth of a mile upstream from the old gage and half a mile upstream from the original location at the wooden bridge.

There was no bridge or cable from which discharge measurements could be made during the latter part of 1909 and first part of 1910.

Discharge measurements are also made from the new bridge.

Ditches built by the United States Indian Office divert water from this stream and its tributaries for irrigation on the Uinta Reservation. Water is also diverted by private enterprise for irrigation outside the limits of the reservation.

Observations at this station are affected by ice for about four months each year, and during this period it is usually impossible to apply open-channel ratings.

Discharge measurements of Duchesne River at Myton, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 20	R. H. Fletcher	90	195	7.45	364
Feb. 12	do	80	172	7.80	355
24	do	95	271	7.80	636
June 22	do	128	360	5.60	1,140
July 13	do	96	206	4.90	467
27	do	96	187	4.70	390
Aug. 6	do	96	201	4.88	468
23	do	95	182	4.57	352
Sept. 8	do	95	163	4.50	293
26	do	96	204	5.00	494
Oct. 11	do	95	194	4.80	420
22	do	98	235	5.20	607
Nov. 6	do	95	198	4.90	453
19	do	95	198	4.88	441

NOTE.—Gage established at new location and datum Aug. 6, 1910; the reading that day was 2.10 feet. For measurements from Aug. 6 to Oct. 22, both gages were read and the new gage was found to read about 2.7 feet lower than the old gage, which was established Aug. 9, 1909. For the measurements made Nov. 6 and Nov. 19, the new gage only was read, so the readings were made to conform to the old gage by adding 2.7 feet.

Daily gage height, in feet, of Duchesne River at Myton, Utah, for 1910.

[George Elliott, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	5.5	7.6	8.0	5.6	5.2	4.45	4.9	4.95
2	.....	5.55	7.4	7.85	5.5	5.1	4.45	4.9	4.95
3	.....	5.6	7.1	7.7	5.45	5.1	4.45	4.85	4.95
4	.....	5.6	6.9	7.35	5.4	5.0	4.5	4.9	4.95
5	.....	5.6	6.9	7.15	5.4	4.9	4.55	4.9	4.95
6	.....	5.6	6.9	7.0	5.4	4.85	4.55	4.85	4.9
7	.....	5.6	6.8	6.8	5.3	4.7	4.5	4.85	4.9
8	.....	5.65	6.9	6.6	5.2	4.7	4.5	4.8	4.9
9	.....	5.7	7.15	6.45	5.1	4.65	4.4	4.8	4.9
10	.....	5.75	7.7	6.3	5.0	4.6	4.4	4.8	4.9
11	.....	5.9	8.2	6.3	4.9	4.55	4.4	4.8	4.9
12	6.5	6.1	8.3	6.2	4.9	4.65	4.4	4.8	4.9
13	6.1	6.2	8.2	6.2	4.9	4.75	4.5	4.9	4.9
14	5.7	6.3	7.95	6.1	4.8	4.75	4.5	4.9	4.9
15	5.4	6.3	7.8	6.0	4.9	4.75	4.65	4.95	4.9
16	5.4	6.25	7.6	5.95	5.0	4.7	4.85	5.5	4.9
17	5.4	6.2	7.25	5.9	5.1	4.6	5.35	5.4	4.9
18	5.4	6.3	7.1	5.9	5.1	4.5	5.35	5.3	4.9
19	5.45	6.4	7.0	5.8	5.0	4.5	5.5	5.3	4.9
20	5.5	6.5	7.05	5.8	5.0	4.8	5.4	5.3	4.9
21	5.5	6.65	7.0	5.7	4.9	4.6	5.65	5.2	4.9
22	5.6	6.7	6.9	5.6	4.9	4.55	5.55	5.2	4.9
23	5.7	6.75	6.8	5.55	4.8	4.55	5.1	5.1	4.9
24	5.7	6.8	7.1	5.5	4.8	4.5	5.0	5.15	4.9
25	5.65	6.95	7.45	5.5	4.7	4.4	5.0	5.05	4.9
26	5.7	7.15	7.3	5.4	4.75	4.4	5.0	5.05	4.9
27	5.65	7.4	7.15	5.4	4.7	4.4	5.0	5.05	4.9
28	5.6	7.55	7.4	5.4	4.85	4.4	4.95	5.0	4.9
29	5.6	7.85	7.65	5.6	4.95	4.45	4.95	5.0	4.9
30	5.55	7.8	8.0	5.8	4.9	4.45	4.9	5.0	4.9
31	5.5	.....	8.0	.....	4.9	4.45	.....	5.0	.....

NOTE.—Observations on the old gage established Aug. 9, 1909, were discontinued Oct. 22, 1910; new gage read from Oct. 23 to Nov. 30. These readings were reduced to the datum of the old gage by adding 2.7 feet—the difference between the two gages.

Daily discharge, in second-feet, of Duchesne River at Myton, Utah, for 1910.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	980	4,060	4,840	1,090	685	300	475	470
2	.....	1,040	3,700	4,540	980	605	300	475	470
3	.....	1,090	3,190	4,260	928	605	300	450	480
4	.....	1,090	2,860	3,610	875	535	315	475	480
5	.....	1,090	2,860	3,270	875	475	332	475	480
6	.....	1,090	2,860	3,020	875	450	332	450	455
7	.....	1,090	2,700	2,700	775	385	315	450	455
8	.....	1,150	2,860	2,400	685	385	315	425	455
9	.....	1,200	3,270	2,170	605	368	285	425	455
10	.....	1,260	4,260	1,960	535	350	285	425	455
11	.....	1,440	5,240	1,960	475	332	285	425	455
12	2,240	1,700	5,440	1,820	475	368	285	425	455
13	1,700	1,820	5,240	1,820	475	405	315	462	455
14	1,200	1,960	4,740	1,700	425	405	315	462	455
15	875	1,960	4,440	1,570	475	405	368	480	455
16	875	1,890	4,060	1,510	535	385	450	935	455
17	875	1,820	3,440	1,440	605	350	825	820	455
18	875	1,960	3,190	1,440	605	315	825	722	455
19	928	2,100	3,020	1,320	535	315	980	705	455
20	980	2,240	3,110	1,320	535	425	875	705	455
21	980	2,470	3,020	1,200	475	350	1,150	605	455
22	1,090	2,550	2,860	1,090	475	332	1,040	605	455
23	1,200	2,630	2,700	1,040	425	332	605	540	455
24	1,200	2,700	3,190	980	425	315	535	575	455
25	1,150	2,940	3,790	980	385	285	535	510	455
26	1,200	3,270	3,520	875	405	285	535	520	455
27	1,150	3,700	3,270	875	385	285	535	520	455
28	1,090	3,970	3,700	875	450	285	505	490	455
29	1,090	4,540	4,160	1,090	505	300	505	490	455
30	1,040	4,440	4,840	1,320	475	300	475	500	455
31	980	.....	4,840	.....	475	300	.....	500	.....

NOTE.—Daily discharge Mar. 12 to Oct. 11 determined from a rating curve fairly well defined between 300 and 1,200 second-feet. Daily discharge Oct. 12 to Nov. 30, determined by indirect method for shifting channels.

Monthly discharge of Duchesne River at Myton, Utah, for 1910.

[Drainage area, 2,750 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
Mar. 12-31	2,240	875	1,140	0.415	0.31	45,200	C.
April	4,540	980	2,110	.767	.86	126,000	D.
May	5,440	2,700	3,690	1.34	1.54	227,000	D.
June	4,840	875	1,970	.716	.80	117,000	D.
July	1,090	385	588	.214	.25	36,200	B.
August	685	285	384	.140	.16	23,600	A.
September	1,150	285	501	.182	.20	29,800	B.
October	935	425	533	.194	.22	32,800	B.
November	480	455	458	.167	.19	27,300	B.
December							
The period						665,000	

STRAWBERRY RIVER ABOVE MOUTH OF INDIAN CREEK, IN STRAWBERRY VALLEY, UTAH.

A station was established on Strawberry River September 15, 1909, in the narrows about 3 miles above the mouth of Indian Creek and about one-quarter mile below the dam site of the Strawberry Valley project, to determine the amount of water available for storage from Strawberry River for the Strawberry Valley project of the United States Reclamation Service. The station takes the place of the one previously maintained below Indian Creek. The new station is about 35 miles northeast of Thistle, Utah, the nearest railroad point. The drainage area above this station is 132 square miles.

The vertical staff gage is on the right bank directly underneath the cable from which discharge measurements are made.

Neither bank is likely to be overflowed except at extreme high water. The stream bed consists of coarse gravel and although rough is believed to be fairly permanent. The conditions for measuring during the open-water season are good.

The river is frozen and deeply covered with snow about five months of the year. The flow during the winter is, however, fairly constant and a fair estimate of it may be made.

This station was discontinued November 15, 1910.

Discharge measurements of Strawberry River above mouth of Indian Creek, in Strawberry Valley, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 20	A. B. Purton	47	105	3.91	237
July 23	....do	43	44	2.51	27
Aug. 23	....do	45	44	2.45	[a]20
25	....do	32	27	2.42	[a]17

[a] Wading above cable.

Daily gage height, in feet, of Strawberry River above mouth of Indian Creek, in Strawberry Valley, Utah, for 1910.

[J. C. Warfield, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1			3.3					
2					2.5			2.5
3						2.4		
4			3.1					
5		4.45						
6					2.5	2.45	2.55	
7		4.45	2.95					
8				2.6				
9					2.5	2.45		2.5
10								
11		5.0	2.9					
12				2.55	2.5			
13	5.15					2.4	2.55	
14		4.6						2.5
15			2.8					
16		4.25		2.55				
17				2.6		2.7		
18		4.0	2.75					
19					2.45		2.6	
20		3.9				2.55		
21								
22		3.7	2.7		2.5			
23				2.5				
24	5.55					2.55		
25			2.7					
26				2.5	2.4		2.55	
27		3.5	2.7					
28								
29			2.7			2.5		
30				2.5	2.4			
31								

Daily discharge, in second-feet, of Strawberry River above mouth of Indian Creek, in Strawberry Valley, Utah, for 1910.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		455	120	39	24	18	26	24
2		430	109	38	24	18	26	24
3		405	98	37	24	18	27	24
4		380	88	36	24	19	27	24
5		355	81	35	24	20	28	24
6		355	74	34	24	21	28	24
7		355	68	33	24	21	28	24
8		385	68	32	24	21	28	24
9		415	66	31	24	21	28	24
10		445	64	30	24	20	28	24
11		476	62	29	24	19	28	24
12		446	59	28	24	18	28	24
13	509	417	56	28	24	18	28	24
14		388	53	28	23	24	28	24
15		350	50	28	23	30	29	24
16		311	49	28	22	35	29	
17		282	47	32	22	40	30	
18		256	45	32	21	36	31	
19		246	44	30	21	32	32	
20		236	43	28	22	28	31	
21		216	42	26	23	28	30	
22		196	40	24	24	28	30	
23		188	40	24	22	28	29	
24	597	180	40	24	21	28	29	
25		172	40	24	20	28	28	
26		164	40	24	18	27	28	
27		156	40	24	18	26	27	
28		150	40	24	18	25	26	
29		143	40	24	18	24	26	
30		135	40	24	18	24	25	
31		128		24	18		25	

NOTE.—Daily discharge determined from a rating curve well defined below 75 second-feet and fairly well defined between 75 and 300 second-feet. Discharge interpolated for days of missing gage heights as the stage is very uniform.

Monthly discharge of Strawberry River above mouth of Indian Creek, in Strawberry Valley, Utah, for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May	476	128	297	18,300	B.
June	120	40	58.2	3,460	B.
July	a 39	24	29.1	1,790	B.
August	24	18	22.1	1,360	A.
September	40	18	24.8	1,480	A.
October	32	25	28.1	1,730	A.
November 1-15			24.0	714	A.
The period				28,800	

a Interpolated.

STRAWBERRY RIVER AT THEODORE, UTAH.

This station, which is located at the west boundary of the Theodore town site, along the wagon road to Heber, about 1¼ miles above the junction of the Strawberry with Duchesne River, about half a mile upstream from the mouth of Indian Canyon, and about 18 miles below the mouth of Currant Creek, was established June 10, 1908, and discontinued November 30, 1910. The drainage area above the station is 1,060 square miles.

The chain gage was located about 50 feet downstream from cable from which discharge measurements were made. The datum of the gage remained constant during the maintenance of the station.

The results obtained from observations at this station were good except at extremely high stages, when the stream overflows the left bank, rendering it impossible to make measurements.

Discharge measurements of Strawberry River at Theodore, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 10	W. B. Freeman	61	105	3.44	286
30	R. H. Fletcher	62	133	3.53	363
Apr. 12	do	66	220	4.93	938
26	do	75	359	6.89	1,630
May 10	do	70	282	6.05	1,240
June 21	do	62	112	3.54	300
July 12	do	61	91	3.20	211
26	do	61	83	3.10	172
Aug. 8	do	61	80	3.02	159
22	do	61	78	3.02	160
Sept. 9	do	60	70	2.90	127
25	do	60	73	2.98	150
Oct. 10	do	60	75	2.98	150
21	do	60	75	3.08	160
Nov. 5	do	60	73	2.96	138
18	do	60	71	2.92	136

Daily gage height, in feet, of Strawberry River at Theodore, Utah, for 1910.

[M. M. Smith, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	3.45	6.55	4.4	3.55	3.3	2.9	2.95	2.95
2	.....	3.5	6.35	4.35	3.4	3.2	2.9	3.0	2.95
3	.....	3.65	6.1	4.3	3.4	3.1	2.9	3.0	2.95
4	.....	3.7	5.9	4.2	3.4	3.05	2.9	3.0	2 95
5	.....	3.7	5.9	4.15	3.4	3.1	2.95	3.0	2 95
6	.....	3.75	5.9	4.1	3.4	3.05	2.9	3.0	2.95
7	.....	3.75	5.75	4.0	3.3	3.05	2.9	3.0	2.95
8	.....	3.8	5.8	4.0	3.3	3.0	2.9	2.95	2.95
9	.....	3.9	5.9	3.9	3.25	3.0	2.9	2.95	2.9
10	3.45	3.2	6.0	3.9	3.2	2.95	2.9	2.95	2.9
11	3.3	3.5	6.25	3.85	3.2	2.95	2.85	2.95	2.95
12	3.3	4.95	6.35	3.8	3.2	3.0	2.85	2.95	2.95
13	3.2	5.2	6.25	3.8	3.2	3.15	2.9	3.0	2.95
14	3.15	5.55	6.1	3.7	3.2	3.0	2.9	3.05	2.9
15	3.2	5.55	5.9	3.7	3.2	3.0	2.9	3.15	2.9
16	3.2	5.35	5.85	3.7	3.25	2.95	3.25	3.2	2.9
17	3.2	5.55	5.6	3.7	3.3	2.95	3.4	3.2	2.9
18	3.25	5.85	5.4	3.65	3.25	2.9	3.8	3.1	2.9
19	3.25	6.3	5.3	3.6	3.25	3.35	3.3	3.2	2.9
20	3.3	6.65	5.15	3.55	3.2	3.35	3.1	3.1	2.9
21	3.4	6.9	5.1	3.55	3.2	3.0	3.1	3.05	2.9
22	3.5	7.0	5.0	3.5	3.2	3.0	3.05	3.0	2.9
23	3.7	6.75	4.9	3.5	3.15	2.95	3.0	3.0	2.9
24	3.75	6.7	4.85	3.4	3.1	2.9	3.0	3.0	2.95
25	3.7	6.8	4.8	3.4	3.1	2.9	3.0	3.0	2.95
26	3.75	6.85	4.75	3.4	3.05	2.9	3.0	3.0	2.95
27	3.7	6.95	4.7	3.4	3.15	2.9	2.95	3.0	2.95
28	3.65	6.95	4.65	3.4	3.1	2.9	2.95	3.0	2.95
29	3.6	6.85	4.55	3.5	3.1	2.9	2.95	2.95	2.95
30	3.45	6.75	4.5	4.05	3.1	2.9	2.95	2.95	2.9
31	3.4	.....	4.45	.....	3.15	2.9	.....	2.95	.....

Daily discharge, in second-feet, of Strawberry River at Theodore, Utah, for 1910.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	329	1,480	585	305	235	135	148	148
2	.....	352	1,380	568	260	210	135	160	148
3	.....	398	1,260	550	260	185	135	160	148
4	.....	414	1,180	515	260	172	135	160	148
5	.....	414	1,180	498	260	185	148	160	148
6	.....	431	1,180	480	260	172	135	160	148
7	.....	431	1,110	445	235	172	135	160	148
8	.....	448	1,130	445	235	160	135	148	148
9	.....	484	1,180	410	222	160	135	148	135
10	329	265	1,220	410	210	148	135	148	135
11	290	352	1,330	395	210	148	122	148	148
12	290	941	1,380	380	210	160	122	148	148
13	265	1,060	1,330	380	210	198	135	160	148
14	263	1,240	1,260	350	210	160	135	172	135
15	265	1,240	1,180	350	210	160	135	198	135
16	265	1,140	1,150	350	222	148	222	210	135
17	265	1,240	1,040	350	235	148	260	210	135
18	278	1,390	960	335	222	135	380	185	135
19	278	1,620	920	320	222	248	235	210	135
20	290	1,750	860	305	210	248	185	185	135
21	316	1,850	840	305	210	160	185	172	135
22	352	1,860	800	290	210	160	172	160	135
23	414	1,700	760	290	198	148	160	160	135
24	431	1,620	742	260	185	135	160	160	148
25	414	1,640	725	260	185	135	160	160	148
26	431	1,620	708	260	172	135	160	160	148
27	414	1,680	690	260	198	135	148	160	148
28	398	1,680	672	260	185	135	148	160	148
29	382	1,620	638	290	185	135	148	148	148
30	329	1,580	620	462	185	135	148	148	135
31	316	.....	702	.....	198	135	.....	148	.....

NOTE.—Daily discharge determined from rating curves applicable as follows: Mar. 10 to Apr. 19, fairly well defined; Apr. 20 to 26, indirect method for shifting channels; Apr. 27 to Nov. 30, well defined below 400 second-feet and fairly well defined above.

Monthly discharge of Strawberry River at Theodore, Utah, for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
March 10-31	431	263	331	14,400	B.
April	1,860	265	1,090	64,900	D.
May	1,480	620	1,020	62,700	C.
June	585	260	379	22,600	C.
July	305	172	219	13,500	B.
August	248	135	165	10,100	A.
September	380	122	163	9,700	A.
October	210	148	165	10,100	A.
November	148	135	142	8,450	A.
The period				216,000	

INDIAN CREEK IN STRAWBERRY VALLEY, UTAH.

This station, which is located about 1 mile above the mouth of the creek and 500 feet below Trail Hollow Creek, the principal tributary, was established April 5, 1905, discontinued July 12, 1906, reestablished October 1, 1909, and again discontinued November15, 1910. The station was originally located about 250 feet above the mouth of the creek, but was reestablished in 1909 about half a mile farther upstream, in T. 4 S., R. 11 W. It is about 25 miles northeast of Thistle, Utah.

This point is below all tributaries, Trail Hollow Creek entering a few hundred feet above the new station. No water is diverted above the station. The drainage area above this station is 50 square miles. The records are of value to the United States Reclamation Service in connection with the Strawberry Valley project, which will divert the waters of Indian Creek across a low pass into the Strawberry Valley reservoir. The point of diversion is above this station and below Trail Hollow Creek.

The staff gage is driven vertically into the bed of the creek and braced to the right bank about 10 feet above a new footbridge from which measurements are made.

The river is frozen over and covered with a deep layer of snow during about five months of the year. The winter flow, however, is fairly constant and a fair estimate may be made. The open-water measuring conditions are excellent.

Discharge measurements of Indian Creek in Strawberry Valley, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 20	A. B. Purton	23.5	37	2.88	98
July 24	do	22	16	1.45	25
Aug. 23	do	18	16	1.37	19

Daily gage height, in feet, of Indian Creek in Strawberry Valley, Utah, for 1910.

[J. C. Warfield, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1			2.0					
2					1.45			1.3
3						1.35		
4			1.95					
5		3.0						
6					1.45	1.35	1.35	
7		2.8	1.90					
8				1.6				
9					1.4	1.35		1.3
10								
11		2.85	1.85					
12				1.55	1.4			
13	2.1					1.35	1.35	
14		2.6						1.3
15			1.8					
16		2.65		1.55				
17						1.4		
18		2.45	1.7	1.5				
19					1.45		1.35	
20		2.9				1.4		
21								
22		2.8	1.7		1.4			
23				1.5				
24	3.05					1.4		
25			1.7					
26				1.5	1.35		1.35	
27		2.15	1.7					
28								
29			1.7			1.4		
30				1.5	1.35			
31								

Daily discharge, in second-feet, of Indian Creek in Strawberry Valley, Utah, for 1910.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		110	51	35	26	21	22	19
2		110	50	35	25	21	22	19
3		110	49	34	25	21	22	19
4		110	49	34	25	21	21	19
5		107	48	33	25	21	21	19
6		101	47	33	25	21	21	19
7		95	46	32	25	21	21	19
8		95	46	31	24	21	21	19
9		96	45	31	23	21	21	19
10		97	45	30	23	21	21	19
11		98	44	30	23	21	21	19
12		93	44	29	23	21	21	19
13	56	88	43	29	23	21	21	19
14		83	42	29	23	22	21	19
15		84	41	29	23	22	21	19
16		86	40	29	24	22	21	
17		80	38	28	24	23	21	
18		74	36	27	25	23	21	
19		86	36	27	25	23	21	
20		101	36	27	24	23	21	
21		98	36	27	24	23	21	
22		95	36	27	23	23	21	
23		88	36	27	23	23	21	
24	110	81	36	27	22	23	21	
25		74	36	27	22	23	21	
26		67	36	27	21	23	21	
27		59	36	27	21	23	20	
28		58	36	27	21	23	20	
29		56	36	27	21	23	20	
30		54	36	27	21	23	19	
31		52		27	21		19	

NOTE.—Daily discharge determined from a curve fairly well defined. Discharge interpolated for days on which gage heights are missing.

Monthly discharge of Indian Creek in Strawberry Valley, Utah, for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May	a 110	a 52	86.7	5,330	B.
June	51	36	41.2	2,450	B.
July	a 35	27	29.3	1,800	B.
August	a 26	21	23.3	1,430	C.
September	23	21	22.0	1,310	C.
October	22	19	20.9	1,280	C.
November 1–15			19.0	565	C.
The period				14,200	

a Interpolated.

TRAIL HOLLOW CREEK IN STRAWBERRY VALLEY, UTAH.

This station, which is located just above the mouth of the stream, was established October 1, 1909, and discontinued November 15, 1910. No water is at present diverted above the station. The records indicate the portion of the flow of Indian Creek that can not be diverted into Strawberry Valley in connection with the Strawberry Valley project. The drainage area above this point is 21 square miles.

The staff gage was driven vertically into the bed of the stream and braced to the left bank.

High-stage measurements were made from a log bridge 15 feet above the gage; at low and ordinary stages measurements were made by wading.

The stream is frozen over and deeply covered with snow during about five months of the year.

Discharge measurements of Trail Hollow Creek in Strawberry Valley, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 20	A. B. Purton	4	6	4.25	14.2
July 23	do	3	4	2.92	2.1
Aug. 24	do	4	2	2.81	1.6

Daily gage height, in feet, of Trail Hollow Creek in Strawberry Valley, Utah, for 1910.

[J. C. Warfield, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1			3.75					
2					2.95			2.7
3						2.85		
4			3.6					
5		4.8						
6					2.95	2.85	2.8	
7		4.6	3.55					
8				3.1				
9						2.85		2.7
10					2.9			
11		4.9	3.4					
12				3.1	2.9			
13						2.8	2.8	
14		4.8						2.7
15			3.3					
16		4.7		3.1				
17						2.9		
18			3.25	3.0				
19					2.85		2.8	
20		3.9				2.9		
21								
22		3.4	3.2		2.85			
23				3.0				
24						2.85		
25	4.85		3.15					
26				2.95	2.8		2.8	
27		2.9	3.15					
28								
29			3.15			2.8		
30				2.95	2.8			
31								

Daily discharge, in second-feet, of Trail Hollow Creek in Strawberry Valley, Utah, for 1910.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		22	8.1	3.3	2.2	1.7	1.6	1.3
2		22	7	3.2	2.2	1.8	1.6	1.2
3		22	7	3.2	2.2	1.8	1.6	1.2
4		22	6.6	3.2	2.2	1.8	1.6	1.2
5		21.9	6.4	3.1	2.2	1.8	1.6	1.2
6		20.5	6.2	3.1	2.2	1.8	1.6	1.2
7		19.0	6.2	3.1	2.2	1.8	1.6	1.2
8		20	6	3.0	2.1	1.8	1.6	1.2
9		21	5	3.0	2.1	1.8	1.6	1.2
10		22	5	3.0	2.0	1.8	1.6	1.2
11		23.4	4.9	3.0	2.0	1.7	1.6	1.2
12		23	4.6	3.0	2.0	1.7	1.6	1.2
13		22	4.4	3.0	2.0	1.6	1.6	1.2
14		21.9	4.2	3.0	1.9	1.7	1.6	1.2
15		21	4.2	3.0	1.9	1.8	1.6	1.2
16		20.4	4.1	3.0	1.9	1.9	1.6	
17		18	4.0	2.8	1.8	2.0	1.6	
18		15	3.9	2.5	1.8	2.0	1.6	
19		12	3.8	2.5	1.8	2.0	1.6	
20		9.8	3.7	2.5	1.8	2.0	1.6	
21		7.5	3.6	2.5	1.8	2.0	1.6	
22		4.9	3.6	2.5	1.8	1.9	1.6	
23		5	3.5	2.5	1.8	1.9	1.6	
24		4	3.4	2.4	1.7	1.8	1.6	
25	22.8	3	3.3	2.3	1.7	1.8	1.6	
26		2	3.3	2.2	1.6	1.7	1.6	
27		2.0	3.3	2.2	1.6	1.7	1.5	
28		2	3.3	2.2	1.6	1.6	1.5	
29		4	3.3	2.2	1.6	1.6	1.4	
30		6	3.3	2.2	1.6	1.6	1.4	
31		8		2.2	1.7		1.3	

NOTE.—Daily discharge determined from a well-defined discharge rating curve. Discharge interpolated for days of missing gage heights.

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Monthly discharge of Trail Hollow Creek in Strawberry Valley, Utah, for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May	23.4	2.0	14.4	885	C.
June	8.1	3.3	4.64	276	B.
July	3.3	2.2	2.74	168	B.
August	2.2	1.6	1.90	117	B.
September	2.0	1.6	1.80	107	B.
October	1.6	1.3	1.57	96	B.
November 1-15	1.3	1.2	1.21	36	B.
The period				1,690	

LAKE FORK BELOW FORKS, NEAR WHITEROCKS, UTAH.

This station, which is located about 500 feet downstream from the junction of the East and West forks, on the old Indian trail from Spanish Fork to Whiterocks, Utah, about 30 miles west of Whiterocks, was established on May 10, 1907, but a fragmentary record was maintained at the same place during 1904.

No important tributaries enter between this station and the mouth of the stream, and none on either branch for some distance above. The station is above all present diversions.

The flow of this stream could doubtless be equalized at comparatively small expense by utilizing the storage facilities afforded by a number of small lakes and reservoir sites found on both branches of the stream above the station. As both of the main tributaries have rapid fall, opportunities for power development are presented above all irrigation diversions. The drainage area above the station is 331 square miles.

The stream is icebound for several months each year.

The chain gage established May 10, 1907, has no relation whatever to the 1904 gage. Still another chain gage and datum have been used since September 1, 1907. This gage is located about 100 feet upstream from the cable from which discharge measurements are made.

As the stream bed is rough and the current is swift at high and moderate stages, the results obtained at this station can be considered only fair or approximate except at low stages, when they are fairly good.

Discharge measurements of Lake Fork below forks, near Whiterocks, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 10	Freeman and Fletcher	36	50	1.22	[a] 126
29	R. H. Fletcher	48	72	1.60	218
Apr. 11	do	56	74	1.70	238
25	do	67	121	2.67	630
May 9	do	80	168	3.13	1,044
23	do	74	143	3.04	809
June 6	do	80	150	3.20	888
20	do	63	99	2.40	436
July 11	do	56	80	1.82	270
25	do	56	73	1.74	220
Aug. 8	do	57	75	1.73	223
22	do	57	79	1.65	243
Sept. 10	do	53	62	1.38	160
24	do	62	80	1.95	288
Oct. 8	do	55	72	1.70	233
20	do	57	78	1.78	238
Nov. 4	do	56	73	1.64	204
17	do	54	59	1.50	161

[a] Some ice present.

Daily gage height, in feet, of Lake Fork below forks, near Whiterocks, Utah, for 1910.

[Charles Elliott and Paul J. Elliott, observers.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	1.5	3.0	3.85	2.15	1.95	1.45	1.75	1.6
2	.....	1.55	2.8	3.6	2.05	2.05	1.45	1.8	1.6
3	.....	1.55	2.6	3.65	2.0	1.95	1.45	1.8	1.6
4	.....	1.55	2.6	3.35	2.05	1.95	1.45	1.8	1.6
5	.....	1.5	2.55	3.25	2.15	1.85	1.45	1.75	1.6
6	1.3	1.55	2.5	3.2	2.0	1.8	1.45	1.75	1.55
7	1.4	1.6	2.55	3.05	1.95	1.75	1.4	1.7	1.55
8	1.4	1.6	2.8	2.95	1.9	1.75	1.4	1.7	1.55
9	1.4	1.65	3.15	2.8	1.8	1.65	1.4	1.6	1.55
10	1.3	1.7	3.65	2.7	1.8	1.6	1.35	1.6	1.55
11	1.3	1.7	3.95	2.8	1.8	1.65	1.4	1.6	1.55
12	1.4	1.8	4.0	2.8	1.8	1.8	1.4	1.65	1.55
13	1.4	1.8	3.9	2.75	1.75	1.75	1.5	1.75	1.55
14	1.45	1.8	3.6	2.7	1.7	1.9	1.5	1.75	1.55
15	1.5	1.7	3.5	2.6	1.9	1.8	1.5	1.9	1.55
16	1.5	1.7	3.3	2.6	2.1	1.7	1.9	2.05	1.5
17	1.5	1.7	3.1	2.6	2.1	1.7	2.15	1.9	1.5
18	1.5	1.75	3.1	2.5	1.95	1.7	2.15	1.9	1.5
19	1.6	1.9	3.25	2.4	2.0	1.6	2.35	1.9	1.5
20	1.6	2.05	3.2	2.4	1.9	1.6	2.3	1.8	1.5
21	1.7	2.15	3.05	2.3	2.0	1.6	2.2	1.8	1.45
22	1.7	2.2	2.9	2.3	1.9	1.55	2.05	1.8	1.45
23	1.75	2.25	3.05	2.2	1.8	1.55	2.0	1.75	1.45
24	1.75	2.4	3.4	2.15	1.8	1.5	1.95	1.75	1.45
25	1.7	2.6	3.5	2.15	1.75	1.5	1.95	1.75	1.4
26	1.7	2.8	3.3	2.1	1.65	1.5	1.95	1.7	1.4
27	1.65	2.95	3.3	2.05	1.75	1.5	1.8	1.7	1.4
28	1.6	3.1	3.5	2.1	1.8	1.55	1.8	1.7	1.4
29	1.6	3.15	3.7	2.3	2.0	1.5	1.7	1.65	.....
30	1.5	3.05	3.7	2.2	1.95	1.45	1.7	1.65	.....
31	1.5	.....	3.8	.....	1.9	1.45	.....	1.65	.....

Daily discharge, in second-feet, of Lake Fork below forks, near Whiterocks, Utah, for 1910.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	125	196	880	1,580	350	285	160	229	192
2	125	206	740	1,280	316	316	160	242	192
3	125	206	610	1,340	300	285	160	242	192
4	125	206	610	1,050	316	285	160	242	192
5	125	196	580	970	350	256	160	229	192
6	125	206	550	930	300	242	160	229	181
7	125	215	580	820	285	229	150	216	181
8	125	215	740	750	270	229	150	216	181
9	125	226	995	650	242	204	150	192	181
10	125	236	1,450	590	242	192	141	192	181
11	130	236	1,760	650	242	204	150	192	181
12	150	260	1,770	650	242	242	150	204	181
13	150	260	1,640	620	229	229	170	229	181
14	187	260	1,280	590	216	270	170	229	181
15	196	236	1,180	535	270	242	170	270	181
16	196	236	1,010	535	332	216	270	316	170
17	196	236	855	535	332	216	350	270	170
18	196	248	855	485	285	216	350	270	170
19	215	287	970	440	300	192	421	270	170
20	215	334	930	440	270	192	402	242	170
21	236	374	820	402	300	192	366	242	160
22	236	395	715	402	270	181	316	242	160
23	248	420	820	366	242	181	300	229	160
24	248	495	1,100	350	242	170	285	229	160
25	236	610	1,180	350	229	170	285	229	150
26	236	740	1,010	332	204	170	285	216	150
27	226	845	1,010	316	229	170	242	216	150
28	215	955	1,180	332	242	181	242	216	150
29	215	995	1,400	402	300	170	216	204	150
30	196	918	1,400	366	285	160	216	204	150
31	196	.....	1,520	.....	270	160	.....	204	.....

NOTE.—Daily discharge Mar. 1–13 estimated because of presence of ice. Gage heights missing and discharge estimated Nov. 29 to 30.
Discharge Mar. 14 to May 11 determined from a rating curve fairly well defined below 1,200 second-feet. Discharge May 12 to Nov. 30 determined from a curve well defined throughout.

Monthly discharge of Lake Fork below forks, near Whiterocks, Utah, for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
March	248	160	180	11,100	C.
April	995	196	382	22,700	B.
May	1,770	550	1,040	64,000	C.
June	1,580	316	635	37,800	B.
July	350	204	274	16,800	B.
August	316	160	214	13,200	B.
September	421	141	230	13,700	B.
October	316	192	231	14,200	B.
November	192	150	172	10,200	B.
The period	.....	.....	.....	204,000	

LAKE FORK NEAR MYTON, UTAH.[1]

This station, which is located about 3 miles above Myton, Utah, about half a mile above the junction of the stream with Duchesne River, was established July 3, 1900, discontinued at the end of the

[1] Described in early reports as "Lake Fork at mouth."

season of 1903, reestablished in June, 1907, and again discontinued November 30, 1910.

In connection with the records obtained at the station on Lake Fork below the forks, which is about 20 miles upstream and above all present diversions, the records indicate the amount of water diverted for irrigation along the stream. No important tributaries enter between the two stations.

Several canal systems built by the United States Indian Office take water from this stream above the station for irrigation. Some private canal systems are proposed or in operation. The stream is icebound for several months during the winter season.

The gage was in the same position and the same datum was used from 1900 to 1904, inclusive. During 1907 and 1908 three distinct gages and datums were used—from June 13 to 30, 1907, from August 18 to December 31, 1907, and during 1908. Very satisfactory results were obtained during 1908 and 1909, but previous records are not so good. On June 22, 1909, the gage was removed to the opposite bank and reinstalled at a different datum. Gage heights, beginning June 22, 1909, are therefore not comparable with those of previous dates.

Discharge measurements of Lake Fork near Myton, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 19	R. H. Fletcher	65	87	3.80	[a] 127
Feb. 11	....do	60	99	4.00	[a] 147
23	....do	60	101	4.00	[a] 149
Mar. 11	W. B. Freeman	54	135	2.88	[b] 142
30	R. H. Fletcher	65	121	2.26	141
Apr. 12	....do	66	131	2.45	185
26	....do	66	206	3.52	519
May 10	....do	69	276	4.51	1,000
24	....do	68	242	4.08	790
June 7	....do	67	221	3.82	616
21	....do	66	141	2.58	212
July 12	....do	57	83	1.66	47
26	....do	56	75	1.50	30
Aug. 6	....do	59	87	1.76	61
23	....do	58	87	1.70	53
Sept. 8	....do	33	21	1.32	14
26	....do	63	111	2.10	111
Oct. 10	....do	60	93	1.88	73
21	....do	65	126	2.48	172
Nov. 5	....do	61	106	2.14	112
18	....do	59	98	2.00	110

[a] Measurement taken through holes cut in ice; gage height distorted.
[b] Channel open, ice along edges. Slight ice gorge below.

Daily gage height, in feet, of Lake Fork near Myton, Utah, for 1910.

[Mrs. A. F. Pitts, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	2.2	3.8	4.9	2.5	2.25	1.25	1.8	2.15
2	.....	2.2	3.5	4.8	2.4	2.05	1.3	2.0	2.15
3	.....	2.2	3.25	4.6	2.3	2.2	1.3	1.95	2.1
4	.....	2.2	3.15	4.2	2.3	2.05	1.4	1.95	2.1
5	.....	2.3	3.05	4.0	2.35	1.9	1.35	1.9	2.1
6	.....	2.3	3.05	3.9	2.2	1.7	1.3	1.9	2.05
7	.....	2.3	3.0	3.8	2.1	1.6	1.3	1.9	2.1
8	.....	2.3	3.2	3.5	2.0	1.6	1.3	1.95	2.1
9	.....	2.3	3.65	3.3	1.9	1.5	1.25	1.9	2.1
10	.....	2.3	4.35	3.1	1.7	1.5	1.25	1.9	2.1
11	2.85	2.4	5.05	3.1	1.6	1.45	1.3	1.9	2.05
12	2.9	2.4	5.3	3.2	1.65	1.5	1.3	1.9	2.1
13	2.8	2.5	5.1	3.2	1.6	1.65	1.3	2.0	2.05
14	2.45	2.5	4.7	3.05	1.5	1.7	1.45	2.0	2.1
15	2.4	2.5	4.5	3.0	1.5	1.7	1.5	2.1	2.1
16	2.4	2.45	4.15	2.9	1.9	1.65	1.8	2.7	2.1
17	2.3	2.4	3.8	2.9	2.0	1.6	2.6	2.5	2.0
18	2.3	2.4	3.7	2.8	1.8	1.5	2.45	2.5	2.0
19	2.4	2.5	3.8	2.7	1.7	1.5	2.7	2.45	2.0
20	2.45	2.6	3.9	2.6	1.6	1.5	2.7	2.5	2.05
21	2.45	2.8	3.75	2.6	1.6	1.6	2.55	2.4	2.1
22	2.4	2.8	3.5	2.5	1.8	1.7	2.45	2.4	2.1
23	2.4	2.9	3.6	2.45	1.7	1.6	2.3	2.4	2.1
24	2.4	3.0	4.15	2.5	1.65	1.5	2.3	2.4	2.05
25	2.4	3.25	4.45	2.45	1.5	1.45	2.25	2.4	2.05
26	2.4	3.2	4.2	2.4	1.5	1.4	2.1	2.35	2.1
27	2.4	3.65	4.15	2.35	1.5	1.4	2.0	2.3	2.1
28	2.35	3.8	4.35	2.4	1.55	1.4	2.0	2.2	2.1
29	2.3	4.0	4.65	2.65	1.8	1.4	1.9	2.2	2.1
30	2.3	3.95	4.95	2.65	1.9	1.35	1.9	2.2	2.05
31	2.3	.....	4.95	.....	1.9	1.3	.....	2.2	.....

NOTE.—Ice present Jan. 1 to Mar. 13.

Daily discharge, in second-feet, of Lake Fork near Myton, Utah, for 1910.

Day.	Mar.	Apr.	May.	June.	July	Aug.	Sept.	Oct.	Nov.
1	145	124	645	1,170	190	134	10	63	115
2	145	124	520	1,120	166	98	13	90	115
3	145	124	423	1,020	144	124	13	83	106
4	145	124	388	825	144	98	21	83	106
5	145	144	353	735	155	76	17	76	106
6	145	144	353	690	124	51	13	76	98
7	145	144	335	645	106	40	13	76	106
8	145	144	405	520	90	40	13	83	106
9	145	144	580	440	76	30	10	76	106
10	145	144	892	370	51	30	10	76	106
11	142	166	1,250	370	40	26	13	76	98
12	142	166	1,400	405	46	30	13	76	106
13	142	190	1,280	405	40	46	13	90	98
14	178	190	1,060	353	30	51	26	90	106
15	166	190	965	335	30	51	30	106	106
16	166	178	802	300	76	40	63	240	106
17	144	166	645	300	90	40	215	190	90
18	144	166	600	270	63	30	178	190	90
19	166	190	645	240	51	30	240	178	90
20	178	215	690	215	40	30	240	190	98
21	178	270	622	215	40	40	202	166	106
22	166	270	520	190	63	51	178	166	106
23	166	300	560	178	51	40	144	166	106
24	166	335	802	190	46	30	144	166	98
25	166	423	940	178	30	26	134	166	98
26	166	405	825	166	30	21	106	155	106
27	166	580	802	155	30	21	90	144	106
28	155	645	892	166	35	21	90	124	106
29	144	735	1,040	228	63	21	76	124	106
30	144	712	1,200	228	76	17	76	124	98
31	144	.....	1,200	.....	76	13	.....	124	.....

NOTE.—Daily discharge Mar. 1-13, estimated because of presence of ice. Discharge Mar. 14 to Nov. 30, determined from a rating curve well defined throughout.

Monthly discharge of Lake Fork near Myton, Utah, for 1910.

[Drainage area, 475 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	.....	.....	[a] 144	0.303	0.35	8,850	D.
February	.....	.....	[a] 146	.308	.36	8,110	D.
March	178	142	154	.324	.37	9,470	C.
April	735	124	262	.552	.62	15,600	A.
May	1,400	335	762	1.60	1.84	46,900	A.
June	1,170	155	421	.886	.99	25,100	A.
July	190	30	73.9	.156	.18	4,540	A.
August	134	13	45.2	.095	.11	2,780	A.
September	240	10	80.1	.169	.19	4,770	A.
October	240	63	124	.261	.30	7,620	A.
November	115	90	103	.217	.24	6,130	A.
The period	.....	.....	.....	.....	.....	143,000	

[a] Estimated.

UINTA RIVER NEAR WHITEROCKS, UTAH.

This station, which is located at the highway bridge on the Government road up Uinta Canyon (usually known as the sawmill road), about 8 miles northeast of the Indian agency at Whiterocks, was established September 16, 1899, discontinued the latter part of 1904, reestablished August 13, 1907, and again discontinued November 30, 1910.

Pole Creek enters about ⅛ mile above the station and Whiterocks comes in several miles below.

No water is diverted from the stream above the station, but the United States Indian Office has constructed a series of irrigation canals which divert water at various points below.

The same gage was used from 1899 to 1904, inclusive. The gage that was established in August, 1907, was located a short distance upstream from the old gage and at a different datum. The present chain gage has no determined relation to this last gage. It was established on October 22, 1907, on the bridge about a mile downstream from the other gate.

The gage was read only when the hydrographer visited the station to make discharge measurements, and the discharge for intermediate days is estimated by comparison with the hydrographs of other streams in that locality.

As the stream bed is rough and the current swift at high and moderate stages, the discharge measurements, except at low stages, are apt to be considerably in error.

The relation between gage height and discharge is affected by ice during the winter season. Winter measurements are usually taken at riffles or open places in the channel.

Discharge measurements of Uinta River near Whiterocks, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 15	R. H. Fletcher	68	94	1.48	*a*156
24	do	68	88	1.32	*a*142
Feb. 8	do	67	95	1.22	*a*145
26	do	67	86	1.24	*a*146
Mar. 7	Freeman and Fletcher	67	74	1.22	117
17	R. H. Fletcher	68	82	1.32	141
25	do	68	94	1.40	189
Apr. 7	do	68	87	1.32	159
18	do	72	102	1.45	224
30	do	77	147	2.30	654
May 7	do	74	122	1.80	429
17	do	74	133	1.92	505
30	do	77	159	2.20	769
June 4	do	74	150	2.05	636
15	do	73	117	1.78	398
25	do	72	108	1.60	318
July 5	do	74	120	1.78	422
19	do	72	112	1.68	342
29	do	75	128	1.90	437
Aug. 4	Fletcher and Palmer	73	115	1.74	381
16	R. H. Fletcher	73	103	1.60	258
30	do	72	93	1.46	192
Sept. 6	do	71	94	1.40	192
13	do	72	93	1.45	207
29	do	72	99	1.54	237
Oct. 6	do	70	89	1.46	196
17	do	73	108	1.56	265
26	do	70	88	1.46	192
Nov. 3	do	68	89	1.40	169
11	do	68	84	1.38	161
22	do	68	81	1.32	150

a Measurement through holes cut in ice. Gage height distorted.

Daily discharge, in second-feet, of Uinta River near Whiterocks, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	160	145	135	150	780	780	360	440	190	240	185
2	160	145	130	155	640	740	380	420	185	240	180
3	160	145	125	155	525	680	390	400	180	230	175
4	160	145	125	160	520	620	400	393	180	220	175
5	160	145	125	160	480	590	419	360	180	210	175
6	160	145	120	160	400	550	365	350	175	202	170
7	160	145	120	162	432	510	350	320	175	200	170
8	160	145	125	165	580	480	320	310	175	190	170
9	160	145	130	170	850	450	300	290	180	180	170
10	160	145	130	180	1,100	420	300	290	180	180	170
11	155	145	135	200	1,420	410	300	300	180	180	166
12	155	145	140	200	1,430	410	290	300	185	190	165
13	155	145	145	205	1,300	410	280	310	198	200	160
14	155	145	145	205	940	415	280	310	220	220	160
15	155	145	150	210	840	419	320	290	260	240	160
16	150	145	155	210	680	410	360	270	340	260	160
17	150	145	162	210	520	395	360	260	360	250	160
18	150	145	160	225	515	380	360	255	400	240	150
19	150	145	180	240	490	360	355	250	440	240	150
20	150	145	190	300	460	350	350	240	430	230	150
21	140	145	200	330	420	340	340	240	410	225	140
22	140	145	200	340	390	325	330	230	380	220	139
23	140	145	200	400	400	320	320	225	340	220	140
24	140	145	200	460	500	310	320	220	320	210	130
25	140	145	200	520	600	306	340	220	300	210	130
26	140	145	200	580	580	295	380	215	295	202	125
27	140	145	190	720	550	295	435	210	290	200	125
28	140	145	180	850	620	300	470	210	280	200	125
29	140	.....	160	850	720	320	505	205	240	190	125
30	140	.....	150	825	740	340	480	202	240	190	125
31	140	.....	150	.....	760	.....	460	195	.....	190	.....

NOTE.—Daily discharge determined by comparison with hydrographs of Lake Fork below forks and Uinta River at Fort Duchesne, except for Jan. 21 to Feb. 28, for which period the discharge was estimated from current meter measurements. Dicharge Mar. 7 to Nov. 22 obtained by applying to the rating curves the gage heights read on dates of measurements, instead of using the discharge as measured on those dates.

Monthly discharge of Uinta River near Whiterocks, Utah, for 1910.

[Drainage area, 218 square miles.]

Month.	Discharge in second-feet.		Run-off.	
	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	150	0.688	0.79	9,220
February	145	.665	.69	8,050
March	157	.720	.83	9,650
April	323	1.48	1.65	19,200
May	683	3.13	3.61	42,000
June	417	1.91	2.13	24,800
July	362	1.66	1.91	22,300
August	282	1.29	1.49	17,300
September	264	1.21	1.35	15,700
October	213	.977	1.13	13,100
November	154	.706	.79	9,160
The period				190,000

NOTE.—The accuracy of these estimates may be classed as C.

UINTA RIVER AT FORT DUCHESNE, UTAH.

This station, which is located at the wooden highway bridge on the road to Vernal, one-fourth of a mile from Fort Duchesne, Utah, was originally established on September 4, 1899, and continued until the end of 1904. It was also maintained for a brief period during 1906. The station was reestablished April 9, 1907, and again discontinued November 30, 1910.

The data obtained at this point show the amount of water contributed by this stream to Duchesne River, except the comparatively small amount diverted for irrigation below, and in connection with the records of the stations above on the Whiterocks and the Uinta they show the amount of water taken for irrigation by the numerous ditches on the Uinta and Whiterocks above the station. The upper tributaries, above irrigation diversions, afford excellent opportunities for storage and power development.

Practically the same datum was used for the gage up to and including 1906. The chain gage established April 9, 1907, has an entirely different datum. This gage was fastened to the bridge from which discharge measurements were made.

The flow of the stream is affected by ice for about four months during the winter season, and the accuracy of the results is somewhat impaired by eddies around the crib piers and by deposits of sediment brought down by Deep Creek during floods.

Discharge measurements of Uinta River at Fort Duchesne, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 18	R. H. Fletcher	70	174	8.60	*a* 150
Feb. 10	do	45	89	8.50	*a* 121
22	do	50	105	8.60	*a* 181
Mar. 16	do	88	108	6.48	212
31	do	88	111	6.50	200
Apr. 13	do	90	115	6.55	203
27	do	80	282	7.26	676
May 11	do	80	365	7.80	1,280
25	do	80	352	7.05	481
June 8	do	90	116	6.60	211
22	do	28	28	6.20	56
July 13	do	24	20	5.88	19
27	do	15	11	5.78	9
Aug. 5	do	31	45	6.28	106
24	do	27	41	6.06	41
Sept. 7	do	25	35	6.00	30
27	do	88	101	6.40	157
Oct. 11	do	32	46	6.29	105
22	do	90	114	6.48	183
Nov. 6	do	90	105	6.46	158
19	do	89	94	6.36	132

a Measurement taken through holes cut in ice. Gage height distorted.

Daily gage height, in feet, of Uinta River at Fort Duchesne, Utah, for 1910.

[Bertha L. Wouldhave, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	6.4	7.2	7.0	6.05	6.2	5.9	6.3	6.4
2	.....	6.4	7.1	7.1	6.0	6.35	5.95	6.4	6.4
3	.....	6.4	7.0	7.0	6.0	6.4	5.95	6.4	6.4
4	.....	6.4	6.9	6.8	5.95	6.25	6.0	6.3	6.4
5	.....	6.4	6.8	6.8	6.05	6.2	6.0	6.3	6.4
6	8.1	6.4	6.8	6.7	6.0	6.1	6.0	6.2	6.4
7	7.95	6.4	6.8	6.65	6.0	6.0	6.0	6.2	6.4
8	7.8	6.4	7.0	6.55	6.0	5.95	5.95	6.2	6.4
9	7.7	6.4	7.2	6.55	5.9	5.9	5.9	6.2	6.4
10	7.6	6.4	7.5	6.4	5.9	5.9	5.9	6.3	6.4
11	7.2	6.45	7.8	6.4	5.9	5.9	5.9	6.3	6.4
12	6.5	6.5	7.7	6.4	5.9	5.9	5.9	6.3	6.4
13	6.4	6.5	7.6	6.4	5.9	6.1	5.9	6.35	6.4
14	6.4	6.5	7.45	6.35	5.9	6.0	6.15	6.4	6.4
15	6.4	6.5	7.3	6.3	5.85	6.05	6.25	6.45	6.35
16	6.45	6.45	7.1	6.25	5.9	6.0	6.3	6.6	6.35
17	6.4	6.5	7.1	6.3	5.9	6.0	6.5	6.55	6.35
18	6.4	6.5	7.0	6.3	5.9	5.95	6.55	6.5	6.3
19	6.45	6.5	7.0	6.2	5.9	5.95	6.5	6.5	6.3
20	6.5	6.65	7.0	6.2	5.85	5.95	6.55	6.5	6.3
21	6.5	6.7	6.9	6.2	5.9	5.95	6.5	6.5	6.3
22	6.5	6.7	6.8	6.2	6.0	6.05	6.4	6.5	6.25
23	6.5	6.8	6.8	6.15	5.9	6.0	6.5	6.45	6.3
24	6.5	6.9	6.85	6.15	5.9	6.0	6.4	6.4	6.3
25	6.5	6.95	7.0	6.1	5.85	5.9	6.3	6.4	6.3
26	6.55	7.05	6.9	6.1	5.75	5.9	6.35	6.4	6.3
27	6.5	7.2	6.85	6.1	5.6	5.9	6.35	6.4	6.25
28	6.5	7.4	7.0	6.1	5.7	5.9	6.35	6.4	6.25
29	6.45	7.4	7.1	6.2	6.0	6.0	6.35	6.4	6.25
30	6.4	7.35	7.05	6.15	6.25	6.0	6.3	6.4	6.25
31	6.4	.....	7.05	.....	6.2	6.0	.....	6.4	.....

NOTE.—Ice present Jan. 1 to Mar. 11.

Daily discharge, in second-feet, of Uinta River at Fort Duchesne, Utah, for 1910.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	200	147	616	446	35	79	19	109	147
2	200	147	527	527	25	128	26	147	147
3	200	147	446	446	28	147	26	147	147
4	200	147	373	307	22	94	33	109	147
5	200	147	307	307	38	79	33	109	147
6	200	147	307	248	30	53	33	79	147
7	200	147	307	222	30	33	33	79	147
8	200	147	446	173	30	26	26	79	147
9	200	147	616	173	19	19	19	79	147
10	200	147	928	113	19	19	19	109	147
11	200	169	1,290	113	19	19	19	109	147
12	218	191	1,160	113	19	19	19	109	147
13	170	191	1,040	113	19	53	19	128	147
14	170	191	873	98	19	33	56	147	147
15	170	191	713	82	14	43	94	169	128
16	195	169	527	69	19	33	109	241	128
17	170	191	527	82	19	33	191	216	128
18	170	191	446	82	19	26	216	191	109
19	195	191	446	56	19	26	191	191	109
20	215	269	446	56	14	26	216	191	109
21	215	297	373	56	19	26	191	191	109
22	215	297	307	56	33	43	147	191	94
23	210	361	307	46	19	33	191	169	109
24	210	433	340	46	19	33	147	147	109
25	210	473	446	36	14	19	109	147	109
26	225	553	373	40	6	19	128	147	109
27	205	616	340	40	1	19	128	147	94
28	205	818	446	40	3	19	128	147	94
29	169	818	527	62	33	33	128	147	94
30	147	765	486	52	94	33	109	147	94
31	147	.....	486	.....	79	33	.....	147	.....

NOTE.—Daily discharge determined as follows: Mar. 1 to 11, estimated because of presence of ice; Mar. 12 to 28, Apr. 16 to 26, June 26 to July 8, indirect method for shifting channels used; Mar. 29 to Apr. 15, July 9 to Nov. 30, discharge determined from a curve fairly well defined below 400 second-feet; discharge Apr. 27 to June 25 obtained from a curve well defined throughout.

Monthly discharge of Uinta River at Fort Duchesne, Utah, for 1910.

[Drainage area, 672 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	.....	.....	a 151	0.225	0.26	9,280	D.
February	.....	.....	a 149	.222	.23	8,280	D.
March	225	147	195	.290	.33	12,000	D.
April	818	147	295	.439	.49	17,600	C.
May	1,290	307	541	.805	.93	33,300	C.
June	527	36	143	.213	.24	8,510	B.
July	94	1	25.0	.037	.04	1,540	B.
August	147	19	41.9	.062	.07	2,580	B.
September	216	19	93.8	.140	.16	5,580	B.
October	241	79	144	.214	.25	8,850	B.
November	147	94	126	.188	.21	7,500	B.
December	.....	.....	.....	.....	.....	.....	
The year	.....	.....	.....	.....	.....	115,000	

a Estimated.

WHITEROCKS RIVER NEAR WHITEROCKS, UTAH.

This station, which is located at the mouth of the canyon, at the foot of "Dugway," on the road from the plateau to the river bottom, about 10 miles above the Indian agency at Whiterocks, and below

all important tributaries of the Whiterocks, was established April 18, 1899, and continued until the end of 1904. On April 11, 1907, it was reestablished at practically the same place and was again discontinued on November 30, 1910.

The nearest irrigation ditch is about 3 miles below the station. Excellent storage and power sites exist above all irrigation diversions.

The same gage and datum were used from the establishment of the station until the end of 1904. A new chain gage and datum were used from April 11, 1907, to May 8, 1908, and a second chain gage at a still different datum from May 9, 1908, to November 30, 1910.

Owing to the remoteness of this gage from any dwelling, daily gage observations have not been made, and the daily and monthly discharge tables have been computed by comparing the relatively frequent discharge measurements with the hydrographs of other streams in that section.

Measurements were made from a cable about 100 feet downstream from the gage.

As the stream bed is rather rough and the current is swift, measurements at high or medium stages are not very accurate. The daily and monthly discharge estimates, computed by the method outlined above, are necessarily only approximate.

Like other streams in this region, the river is icebound for several months in the winter.

Discharge measurements of Whiterocks River near Whiterocks, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 6	R. H. Fletcher	35	36	.....	[a] 61
25	....do	32	36	.....	[a] 72
Feb. 9	....do	35	38	.....	[a] 78
28	....do	31	28	1.18	[b] 51
Mar. 8	....do	30	27	1.20	[c] 46
18	....do	30	28	1.30	53
27	....do	31	33	1.38	75
Apr. 6	....do	30	28	1.32	59
20	....do	34	44	1.74	120
29	....do	55	104	2.75	485
May 6	....do	39	57	2.10	233
16	....do	50	87	2.40	344
28	....do	52	86	2.54	390
June 3	....do	50	74	2.38	312
13	....do	37	53	2.00	194
27	....do	33	42	1.68	109
July 6	....do	34	41	1.72	119
20	....do	34	47	1.85	139
30	....do	37	53	1.92	182
Aug. 3	....do	36	51	1.90	177
15	....do	34	44	1.75	126
29	....do	33	38	1.65	101
Sept. 5	....do	32	39	1.60	101
12	....do	30	33	1.46	83
28	....do	34	41	1.67	115
Oct. 5	....do	33	39	1.58	106
15	....do	32	35	1.56	94
25	....do	33	35	1.58	101
Nov. 2	....do	31	33	1.48	81
10	....do	30	33	1.40	85
21	....do	30	27	1.36	67

[a] Measured through ice about 2 miles below station.
[b] Ice present.
[c] Practically open-channel.

Daily discharge, in second-feet, of Whiterocks River near Whiterocks, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	60	75	50	55	390	400	145	160	100	100	80
2	60	75	50	55	360	460	145	170	100	100	79
3	60	75	50	55	320	328	145	170	100	100	75
4	60	75	50	55	280	320	140	160	100	100	75
5	60	75	50	55	240	310	140	150	100	96	75
6	60	75	50	59	232	300	125	140	95	95	70
7	60	75	50	60	220	280	120	130	90	90	70
8	60	75	48	65	280	260	110	120	80	85	70
9	60	75	45	70	460	250	100	110	80	80	70
10	60	75	45	80	730	240	90	100	75	80	68
11	60	75	50	80	1,040	225	80	110	75	80	70
12	60	75	50	100	1,040	215	65	120	76	80	70
13	60	75	50	100	880	200	60	140	85	80	70
14	60	75	50	100	630	195	60	140	90	85	70
15	60	75	50	80	500	185	100	132	120	93	65
16	70	60	50	80	335	180	140	120	180	100	65
17	70	60	55	80	330	175	210	120	260	100	65
18	70	60	57	80	320	170	210	110	290	100	65
19	70	60	60	100	300	160	170	110	330	100	65
20	70	60	70	130	280	155	158	110	310	100	65
21	70	60	75	160	260	150	195	110	290	100	64
22	70	60	80	200	240	140	170	110	260	100	65
23	70	60	80	220	240	130	130	110	220	100	65
24	70	60	80	300	280	120	130	110	210	95	65
25	70	60	80	320	300	120	120	110	200	96	65
26	70	50	80	360	340	115	110	110	140	90	60
27	70	50	66	400	300	116	110	110	120	85	60
28	70	50	65	460	386	120	140	110	114	85	60
29	70	.....	65	470	460	130	180	110	100	85	60
30	70	.....	65	440	430	140	176	110	100	80	60
31	70	.....	60	.....	420	.....	170	105	.....	80	.....

NOTE.—Daily discharge determined by comparison of hydrographs of Lake Fork below forks and Uinta River at Fort Duchesne, except for period Jan. 1 to Feb. 28, for which it was estimated from discharge measurements. Discharge on dates of actual measurement, Mar. 8 to Nov. 21, determined by applying to the rating curve the gage heights of the measurements.

Monthly discharge of Whiterocks River near Whiterocks, Utah, for 1910.

[Drainage area, 114 square miles.]

Month.	Discharge in second-feet.		Run-off.	
	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	65.2	0.572	0.66	4,010
February	67.0	.588	.61	3,720
March	58.9	.517	.60	3,620
April	162	1.42	1.58	9,640
May	414	3.63	4.18	25,500
June	210	1.84	2.05	12,500
July	134	1.18	1.36	8,240
August	123	1.08	1.24	7,560
September	150	1.32	1.47	8,920
October	91.6	.804	.93	5,630
November	67.5	.592	.66	4,020
The period	.....	.....	.....	93,400

NOTE.—The accuracy of these estimates may be classed as C.

WHITE RIVER BASIN.

GENERAL FEATURES.

White River rises in Trappers Lake, which lies 9,500 feet above sea level in a small mountain basin of the White River Plateau in eastern Garfield County, Colo., and flows westward to its junction with Green River in west-central Uinta County, Utah. Throughout its course it occupies a narrow mountainous valley, with alternating parks and canyons, entering the longest and deepest of the canyons, in which it continues to its mouth, about 8 miles east of the Colorado-Utah State line.

The basin comprises an arid, broken, and much eroded plateau region, which topographically is a continuation of the Grand River Mesa south of Grand River. The headwater portion covers the greater area and is called the White River Plateau; below this and to the south is the Roan or Book Cliffs Plateau. Fragmentary plateaus also occur along the northern side of the river.

Numerous small streams, among which are Marvine Creek and South Fork, join the White in the upper, mountainous portion of the basin. Douglas, Piceance, and Evacuation creeks, draining the Book Cliffs Plateau, enter White River from the south. In the spring these creeks carry considerable water, derived mainly from melting snow, but in the summer they are very nearly dry.

The mean annual precipitation recorded at Meeker is 15.9 inches; farther west and at lower elevations it is undoubtedly much less.

NORTH FORK OF WHITE RIVER NEAR BUFORD, COLO.

This station, which is located at Genier's ranch, about 1½ miles above Buford, was established May 24, 1910, by the State engineer of Colorado, by whom the records are furnished. The station is about 5 miles below the site of a station established by the United States Geological Survey July 28, 1903, and discontinued October 31, 1906. No large tributaries enter between the former and the present site.

A staff gage is spiked to the support of a footbridge.

The bed of the stream is composed of cobbles and bowlders and is permanent. The right bank is overflowed at extreme high stages. The measuring section is good.

Discharge measurements are made from the bridge.

The relation between gage height and discharge is affected by ice during the winter months.

Discharge measurements of North Fork of White River near Buford, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 24	C. L. Chatfield	68	152	2.0	656
June 23	do	.....	127	1.6	505
Aug. 15	do	49	93	1.0	262
Nov. 26	do	.....	79	.8	208

Daily gage height, in feet, of North Fork of White River near Buford, Colo., for 1910.

[Mrs. H. Genier, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.95	1.4	1.05	0.9	0.8	0.8	0.7
2	.....	2.95	1.4	1.0	.9	.85	.8	.7
3	.....	3.1	1.4	1.0	1.0	.9	.9	.8
4	.....	3.15	1.4	1.0	1.3	.9	.9	.8
5	.....	2.9	1.4	1.1	1.1	.9	.8	.85
6	.....	2.9	1.4	1.05	1.1	.85	.8	.85
7	.....	2.9	1.4	1.0	1.0	.8	.8	.85
8	.....	2.8	1.3	1.0	.9	.8	.8	.8
9	.....	2.6	1.3	1.0	.9	.8	.8	.8
10	.....	2.5	1.3	.95	.9	.8	.8	.8
11	.....	2.5	1.3	.95	.9	.8	.8	.....
12	.....	2.5	1.3	1.1	.9	.8	.8	.....
13	.....	2.5	1.3	1.0	.95	.8	.8	.....
14	.....	2.3	1.2	1.0	.95	.8	.8	.....
15	.....	2.3	1.2	.9	.9	.8	.8	.....
16	.....	2.2	1.2	.9	.9	.8	.8	.....
17	.....	2.0	1.2	.9	.9	.85	.8	.....
18	.....	2.0	1.2	.9	.9	.9	.8	.....
19	.....	1.8	1.2	.9	.9	.9	.8	.....
20	.....	1.8	1.2	.9	.9	.9	.85	.....
21	.....	1.7	1.1	.9	.95	.95	.85	.....
22	.....	1.7	1.1	.9	.95	.9	.8	.....
23	.....	1.65	1.0	.9	.9	.8	.8	.....
24	2.1	1.6	1.0	.9	.9	.85	.8	.....
25	2.1	1.6	1.0	.9	.9	.85	.8	.....
26	2.15	1.55	1.0	.9	.9	.8	.8	.....
27	2.15	1.5	1.0	.9	.9	.8	.8	.....
28	2.4	1.5	1.0	.9	.9	.8	.8	.....
29	2.65	1.5	1.15	.9	.9	.8	.8	.....
30	2.7	1.45	1.1	.9	.8	.8	.7	.....
31	2.9	.....	1.1	.9	.....	.8	.....	.....

Daily discharge, in second-feet, of North Fork of White River near Buford, Colo., for 1910.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1,123	415	284	235	208	208	185
2	.....	1,123	415	266	235	222	208	185
3	.....	1,198	415	266	266	235	235	208
4	.....	1,223	415	266	376	235	235	208
5	.....	1,098	415	301	301	235	208	222
6	.....	1,098	415	284	301	222	208	222
7	.....	1,098	415	266	266	208	208	222
8	.....	1,048	376	266	235	208	208	208
9	.....	946	376	266	235	208	208	208
10	.....	896	376	250	235	208	208	208
11	.....	896	376	250	235	208	208	.....
12	.....	896	376	301	235	208	208	.....
13	.....	896	376	266	250	208	208	.....
14	.....	801	338	266	250	208	208	.....
15	.....	801	338	235	235	208	208	.....
16	.....	755	338	235	235	208	208	.....
17	.....	666	338	235	235	222	208	.....
18	.....	666	338	235	235	235	208	.....
19	.....	579	338	235	235	235	208	.....
20	.....	579	338	235	235	235	222	.....
21	.....	537	301	235	250	250	222	.....
22	.....	537	301	235	250	235	208	.....
23	.....	516	266	235	235	208	208	.....
24	710	496	266	235	235	222	208	.....
25	710	496	266	235	235	222	208	.....
26	732	476	266	235	235	208	208	.....
27	732	455	266	235	235	208	208	.....
28	848	455	266	235	235	208	208	.....
29	971	455	320	235	235	208	208	.....
30	998	435	301	235	208	208	185	.....
31	1,098	.....	301	235	.....	208	.....	.....

NOTE.—Mean daily discharge Dec. 11–31 estimated at 208 second-feet.

Monthly discharge of North Fork of White River near Buford, Colo., for 1910.

[Drainage area, 240 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
May 24–31	1,100	710	850	3.54	1.05	13,500
June	1,220	435	775	3.23	3.60	46,100
July	415	266	343	1.43	1.65	21,100
August	301	235	251	1.05	1.21	15,500
September	301	208	247	1.03	1.15	14,700
October	250	208	218	.908	1.05	13,400
November	235	185	210	.874	.98	12,500
December	.....	.....	208	.867	1.00	12,800
The period	.....	.....	.....	.....	.....	150,000

WHITE RIVER AT MEEKER, COLO.

This station, which is located at Van Cleave's ranch, about half a mile southeast of Meeker, Colo., was established by the United States Geological Survey May 24, 1901, discontinued October 31, 1906, and reestablished May 22, 1910, by the State engineer of Colorado, by

whom the records are furnished. The present station is about 50 feet above the site originally used.

A staff gage is bolted to the right abutment of the road bridge and an automatic gage was installed October 20, 1910. The datum of the present gage is 0.43 foot above the datum of the United States Geological Survey gage established in 1901.

The bed of the stream is composed of cobbles and is permanent. The banks are overflowed at extreme high water.

Discharge measurements are made from the bridge.

The relation between gage height and discharge is affected by ice during the winter.

Discharge measurements of White River at Meeker, Colo., in 1910.

Date.	Hydrographer.	Area of section.	Gage height.	Discharge.
		Sq. ft.	*Feet.*	*Sec.-ft.*
May 22	C. L. Chatfield	278	4.15	1,080
June 22	do	267	4.10	1,070
Aug. 20	do	184	1.02	358
22	do	188	1.10	391
23	do	183	1.06	373
Nov. 26	do	178	1.00	360

Daily gage height, in feet, of White River at Meeker, Colo., for 1910.

[Walter Van Cleave, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		5.45	3.6	3.2	0.95	1.0	0.95	0.9
2		5.4	3.5	3.1	1.0	1.0	.95	.9
3			3.5	3.1	1.05	1.0	.95	1.0
4			3.45	3.0	1.25	1.0	1.0	1.0
5			3.6	3.15	1.15	1.0	.95	.8
6			3.5	3.0	1.05	.95	.9	.9
7	4.35		3.4	3.0	1.0	1.0	.9	1.05
8			3.3	3.0	1.0	.95	.9	1.0
9			3.3	2.9	1.0	.95	.95	1.0
10			3.3	2.9	1.0	.95	.9	
11			3.3	2.9	.95	1.0	.95	
12			3.3	3.0	.95	.95	.95	
13			3.2	3.1	1.0	1.0	.95	
14			3.2	1.05	1.1	1.0	.9	
15			3.2	1.1	1.0	1.0	.95	
16			3.2	1.05	1.0	1.05	.95	
17			3.2	1.05	1.0	1.05	.9	
18			3.2	1.05	1.0	1.05	.95	
19			3.25	1.05	1.0	1.0	1.0	
20			3.15	1.05	.95	.95	.8	
21			3.1	1.0	1.0	1.0	.9	
22	4.15	4.0	3.0	1.0	.95	1.0	.95	
23	4.15	3.95	3.0	1.05	1.0	1.0	1.0	
24	4.25	3.9	3.0	1.0	1.0	1.0	.95	
25	4.35	3.8	3.0	.95	.95	1.0	.95	
26	4.55	3.7	2.95	1.0	.95	1.0	.95	
27	4.55	3.6	2.9	1.0	.95	.95	.95	
28	4.75	3.6	3.25	1.0	.95	.95	.95	
29	5.05	3.8	3.2	1.0	.95	1.0	1.0	
30	5.15	3.7	3.25	1.0	.95	.95	.95	
31	5.3		3.15	1.0		.95		

Daily discharge, in second-feet, of White River at Meeker, Colo., for 1910.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2,846	611	414	338	355	338	322
2	.....	2,756	556	371	355	355	338	322
3	.....	2,700	556	371	374	355	338	355
4	.....	2,700	531	328	458	355	355	355
5	.....	2,600	611	392	413	355	338	292
6	.....	2,600	556	328	374	338	322	322
7	1,186	2,500	506	328	355	355	322	374
8	1,100	2,400	460	328	355	338	322	355
9	1,100	2,300	460	288	355	338	338	355
10	1,100	2,200	460	288	355	338	322	.....
11	1,100	2,100	460	288	338	355	338	.....
12	1,100	2,000	460	328	338	338	338	.....
13	1,050	1,900	414	371	355	355	338	.....
14	1,050	1,800	414	374	392	355	322	.....
15	1,050	1,700	414	392	355	355	338	.....
16	1,050	1,600	414	374	355	374	338	.....
17	1,050	1,500	414	374	355	374	322	.....
18	1,004	1,400	414	374	355	374	338	.....
19	1,004	1,300	437	374	355	355	355	.....
20	1,004	1,200	392	374	338	338	292	.....
21	1,004	1,000	371	355	355	355	322	.....
22	1,004	881	328	355	338	355	338	.....
23	1,004	844	328	374	355	355	355	.....
24	1,091	806	328	355	355	355	338	.....
25	1,186	736	328	338	338	355	338	.....
26	1,406	671	308	355	338	355	338	.....
27	1,406	611	285	355	338	338	338	.....
28	1,676	611	437	355	338	338	338	.....
29	2,164	736	414	355	338	355	355	.....
30	2,328	671	437	355	338	338	338	.....
31	2,576	.....	392	355	.....	338	.....	.....

NOTE.—Discharge interpolated May 8 to 21 and June 3 to 21.

Monthly discharge of White River at Meeker, Colo., for 1910.

[Drainage area, 634 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
May 7-31	2,580	1,000	1,270	2.01	1.87	63,100
June	2,850	611	1,660	2.62	2.91	98,800
July	611	308	435	.686	.79	26,700
August	414	288	354	.558	.64	21,800
September	458	338	357	.563	.63	21,200
October	374	338	351	.554	.64	21,600
November	355	292	335	.529	.59	19,900
December 1-9	374	292	339	.535	.18	6,050
The period	.....	.....	.....	.....	.....	279,000

SOUTH FORK OF WHITE RIVER NEAR BUFORD, COLO.

This station, which is located at the private road bridge at Shephard's ranch, about 7 miles above Buford, Colo., was established May 29, 1910, by the State engineer of Colorado, by whom the records are furnished. The station is half a mile above the site of the station

established by the United States Geological Survey July 25, 1903, and discontinued October 31, 1906.

A vertical staff gage is spiked to a pier of the road bridge. From May 29 to June 24, 1910, the State engineer's gage was located at a highway bridge one-half mile below Shephard's ranch. The relation between the two gages has not been determined.

The bed of the stream is composed of gravel and is fairly permanent. The left bank is overflowed at extreme high stages. The measuring section is good.

High-stage measurements are made from the bridge; low-stage measurements are made by wading.

The relation between gage height and discharge is affected by ice during the winter.

Discharge measurements of South Fork of White River near Buford, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.		Discharge.
				Old gage.	New gage.	
		Feet.	*Sq. ft.*	*Feet.*	*Feet.*	*Sec.-ft.*
June 24	C. L. Chatfield	54	126	3.50	1.80	522
Aug. 19	do	59	93	2.60	.40	125
Nov. 25	do	59	81	2.45	.20	90

Daily gage height, in feet, of South Fork of White River near Buford, Colo., for 1910.

[Hugh Jones, observer.]

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.4	1.4	0.7	0.4	0.3	0.3	0.2	16	4.3	0.8	0.6	0.4	0.3	0.3	0.2
2	5.8	1.3	.7	.4	.3	.3	.2	17	4.2	.8	.6	.4	.3	.3	.2
3	6.2	1.2	.7	.4	.3	.3	.2	18	4.0	.8	.6	.4	.3	.3	.....
4	6.4	1.1	.6	.4	.3	.3	.2	19	3.9	.8	.6	.4	.4	.3	.....
5	5.8	1.2	.6	.4	.3	.3	.2	20	3.7	.8	.6	.4	.3	.2	.....
6	5.6	1.1	.6	.4	.3	.3	.2	21	3.5	.8	.5	.4	.3	.2	.....
7	5.5	1.0	.6	.4	.3	.3	.2	22	3.5	.8	.5	.4	.3	.2	.....
8	5.8	1.0	.6	.4	.3	.3	.2	23	3.4	.7	.5	.4	.3	.2	.....
9	4.9	.9	.6	.4	.3	.3	.2	24	3.5	.6	.5	.4	.3	.2	.....
10	4.7	.9	.6	.4	.3	.3	.2	25	1.8	.6	.4	.3	.3	.2	.....
11	4.7	.9	.6	.4	.3	.3	.2	26	1.6	.6	.4	.3	.3	.2	.....
12	4.7	.9	.6	.5	.3	.3	.2	27	1.5	.6	.4	.3	.3	.2	.....
13	4.6	.8	.6	.5	.3	.3	.2	28	1.5	1.1	.4	.3	.3	.2	.....
14	4.5	.8	.6	.4	.3	.3	.2	29	1.5	.8	.4	.3	.3	.2	.....
15	4.5	.8	.6	.4	.3	.3	.2	30	1.4	.7	.4	.3	.3	.2	.....
								31	.....	.7	.4	.....	.3	.....	.....

NOTE.—Beginning June 25 the gage heights refer to a different datum and section.

Daily discharge, in second-feet, of South Fork of White River near Buford, Colo., for 1910.

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,295	397	200	128	108	108	90	16	1,015	225	175	128	108	108	90
2	1,930	367	200	128	108	108	90	17	955	225	175	128	108	108	90
3	2,175	337	200	128	108	108	90	18	830	225	175	128	108	108	.....
4	2,295	308	175	128	108	108	90	19	765	225	175	128	128	108	.....
5	1,930	337	175	128	108	108	90	20	645	225	175	128	108	90	.....
6	1,810	308	175	128	108	108	90	21	525	225	150	128	108	90	.....
7	1,750	280	175	128	108	108	90	22	525	225	150	128	108	90	.....
8	1,930	280	175	128	108	108	90	23	465	200	150	128	108	90	.....
9	1,380	252	175	128	108	108	90	24	525	175	150	128	108	90	.....
10	1,260	252	175	128	108	108	90	25	522	175	128	108	108	90	.....
11	1,260	252	175	128	108	108	90	26	459	175	128	108	108	90	.....
12	1,260	252	175	150	108	108	90	27	428	175	128	108	108	90	.....
13	1,200	225	175	150	108	108	90	28	428	308	128	108	108	90	.....
14	1,140	225	175	128	108	108	90	29	428	225	128	108	108	90	.....
15	1,140	225	175	128	108	108	90	30	397	200	128	108	108	90	.....
								31	.....	200	128	.....	108	.....	.....

Monthly discharge of South Fork of White River near Buford, Colo., for 1910.

[Drainage area, 148 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
June	2,300	397	1,120	7.72	8.61	66,800
July	397	175	248	1.68	1.94	15,200
August	200	128	164	1.11	1.28	10,100
September	150	108	125	.844	.94	7,440
October	128	103	109	.736	.85	6,700
November	108	90	101	.682	.76	6,010
December 1-17	90	90	90.0	.608	.38	3,030
The period	.....	.....	.....	.....	.....	115,000

PRICE RIVER BASIN.

GENERAL FEATURES.

Price River rises in the Wasatch Mountains in the southeastern part of Utah County, flows southeastward, and unites with Green River at a point about 14 miles above Green River, Utah. The main source of supply is the snow in the upper reaches of the basin, where elevations range from 8,000 to 9,000 feet. The basin comprises about 1,500 square miles of extremely rough and rugged country. The predominant rock is a loose and badly disintegrated sandstone. The soil is scanty and supports practically no vegetation except small groves of scrubby cedar and a few scattered pines. The original sparse underbrush and grass have been almost entirely tramped out by sheep and cattle.

The river is subject to floods in the spring and early summer, during which time it carries immense quantities of sediment. Gordon and

Pleasant creeks, the principal tributaries, are both short, steep streams and enter from the west almost at right angles.

PRICE RIVER NEAR HELPER, UTAH.

This station, which is located at an old ford crossing in the settlement of Spring Glen, about 3 miles south of Helper, Utah, and about 350 feet west of the tracks of the Denver & Rio Grande Railroad, was established February 21, 1904.

This station is below Pleasant Creek and White River, the two principal tributaries above, and is above Gordon Creek, which enters about 5 miles below, and Grassy Trail Creek, which enters about 35 miles below. There are no important diversions above.

The datum of the original chain gage remained unchanged until the gage was washed out by high water April 11, 1907. It was replaced by a temporary gage June 23, 1907, and by a permanent gage July 16, 1907. All gage heights after June 22, 1907, are referred to a new datum 0.7 foot above the original datum.

Discharge measurements are made from a car and cable.

A fair estimate may be made of winter flow, though ice is usually rather heavy. The bed of the stream is somewhat shifting, but the records may, on the whole, be considered good.

Discharge measurements of Price River near Helper, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 27	E. S. Fuller	62	190	4.40	1,120
June 10	do	60	99	3.20	158
July 21	G. H. Canfield	57	62	2.79	54
Aug. 25	do	39	45	2.65	32
Oct. 1	do	50	47	2.70	38

Daily gage height, in feet, of Price River near Helper, Utah, for 1910.

[Ada Ostberg, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		4.6	3.5	2.9	2.7	2.6	2.7	2.7	2.6
2		4.5	3.4	2.9	2.7	2.6	3.0	2.7	2.6
3		4.5	3.4	2.8	2.7	2.6	2.9	2.7	2.7
4		4.4	3.4	2.8	2.7	2.6	2.8	2.7	2.7
5		4.3	3.3	2.7	2.7	2.6	2.8	2.7	2.7
6		4.3	3.3	2.7	2.7	2.6	2.7	2.7	2.6
7		4.2	3.2	2.7	2.7	2.6	2.7	2.7	2.6
8		4.2	3.2	2.7	2.7	2.6	2.7	2.8	2.6
9		4.2	3.1	2.7	2.6	2.6	2.7	2.8	2.6
10		4.3	3.1	2.7	2.6	2.6	2.7	2.7	2.7
11		4.3	3.1	2.7	2.6	2.7	2.7	2.7	2.7
12		4.3	3.1	2.7	2.6	2.7	2.9	2.7	2.7
13	4.1	4.4	3.1	2.7	2.5	3.2	2.8	2.7	2.7
14	4.0	4.4	3.1	2.7	2.5	2.8	2.8	2.7	2.7
15	3.9	4.3	3.3	2.85	2.5	2.8	2.8	2.7	2.7

Daily gage height, in feet, of Price River near Helper, Utah, for 1910—Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	3.8	4.2	3.3	2.7	2.7	2.8	3.4	2.7	2.7
17	3.8	4.2	3.3	2.7	2.6	3.9	3.4	2.7	2.7
18	3.8	4.1	3.3	2.7	2.6	3.0	3.2	2.7	2.7
19	3.9	4.0	2.9	2.7	2.6	2.9	3.0	2.7	2.8
20	4.0	3.9	2.9	2.7	2.6	2.9	2.9	2.7	3.0
21	4.1	3.9	2.8	2.7	2.6	2.8	2.8	2.7	3.0
22	4.3	3.8	2.8	2.7	2.6	2.8	2.8	2.8	3.1
23	4.2	3.8	2.8	2.7	2.6	2.7	2.8	2.8	3.1
24	4.1	3.8	2.8	2.7	2.6	2.7	2.8	2.8	2.7
25	4.2	3.8	2.8	2.7	2.6	2.7	2.8	2.7	3.0
26	4.3	3.7	2.8	2.7	2.6	2.7	2.8	2.7	2.8
27	4.5	3.7	2.8	2.7	2.6	2.7	2.7	2.7	2.9
28	4.6	3.6	2.8	2.7	3.35	2.7	2.7	2.7	2.8
29	4.6	3.6	3.0	2.8	2.7	2.7	2.7	2.6	2.7
30	4.7	3.6	2.9	3.0	2.6	2.7	2.7	2.6	2.6
31	.....	3.5	.....	2.7	2.6	.....	2.7	.....	2.6

NOTE.—Gage heights Jan. 1 to Apr. 10 are not published as they exhibit a variable error which can not be corrected by means of information at hand. Daily discharge determined from a well-defined discharge rating curve. Discharge interpolated for days of missing gage heights.

Daily discharge, in second-feet, of Price River near Helper, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	53	24	53	370	1,350	307	72	37	24	37	37	24
2	53	24	53	519	1,230	252	72	37	24	95	37	24
3	53	24	24	519	1,230	252	53	37	24	72	37	37
4	53	24	24	519	1,120	252	53	37	24	53	37	37
5	24	24	24	902	1,010	204	37	37	24	53	37	37
6	37	24	24	902	1,010	204	37	37	24	37	37	24
7	37	24	24	519	902	161	37	37	24	37	37	24
8	440	24	37	370	902	161	37	37	24	37	53	24
9	519	24	37	800	902	125	37	24	24	37	53	24
10	519	24	37	902	1,010	125	37	24	24	37	37	37
11	519	24	37	868	1,010	125	37	24	37	37	37	37
12	37	53	24	834	1,010	125	37	24	37	72	37	37
13	37	53	24	800	1,120	125	37	14	161	53	37	37
14	37	53	72	702	1,120	125	37	14	53	53	37	37
15	197	53	66	607	1,010	204	62	14	53	53	37	37
16	357	53	59	519	902	204	37	37	53	252	37	37
17	519	53	53	519	902	204	37	24	607	252	37	37
18	440	53	53	519	800	204	37	24	95	161	37	37
19	440	53	607	607	702	72	37	24	72	95	37	53
20	37	53	1,470	702	607	72	37	24	72	72	37	95
21	37	53	1,350	800	607	53	37	24	53	53	37	95
22	37	53	370	1,010	519	53	37	24	53	53	53	125
23	24	53	307	902	519	53	37	24	37	53	53	125
24	24	53	161	800	519	53	37	24	37	53	53	37
25	24	53	307	902	519	53	37	24	37	53	37	95
26	72	53	902	1,010	440	53	37	24	37	53	37	53
27	72	37	902	1,230	440	53	37	24	37	37	37	72
28	24	37	902	1,350	370	53	37	228	37	37	37	53
29	24	.....	1,010	1,350	370	95	53	37	37	37	24	37
30	24	.....	440	1,470	370	72	95	24	37	37	24	24
31	24	.....	405	.....	307	.....	37	24	.....	37	.....	24

Monthly discharge of Price River near Helper, Utah, for 1910.

[Drainage area, 530 square miles.]

Month	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	519	24	155	0.292	0.34	9,530	C.
February	53	24	40.5	.076	.08	2,250	C.
March	1,470	24	318	.600	.69	19,600	C.
April	1,470	370	794	1.50	1.67	47,200	B.
May	1,350	307	801	1.51	1.74	49,300	A.
June	307	53	136	.257	.29	8,090	A.
July	95	37	43.5	.082	.09	2,670	A.
August	228	14	33.8	.064	.07	2,080	A.
September	607	24	62.7	.118	.13	3 730	A.
October	252	37	67.7	.128	.15	4 160	A.
November	53	24	38.8	.073	.08	2,310	A.
December	125	24	47.6	.090	.10	2,930	B.
The year	1,470	14	212	.400	5.43	154,000	

PRICE RIVER AT WOODSIDE, UTAH.

This station is located at the Denver & Rio Grande Railroad bridge crossing Price River at Woodside, about 8 miles downstream from a proposed diversion dam for an irrigation project and about 15 miles above the junction of the Price with Grand River. By making due allowance for a few small tributaries entering the river between the dam site and station the records at this point will indicate the available water supply for that project.

Gage heights are obtained by measuring from a fixed point on the bridge to water surface.

These data are published as furnished by Mr. H. W. Sheley, a consulting engineer of Salt Lake City, Utah.

Discharge measurements of Price River at Woodside, Utah, in 1909-10.

Date.	Hydrographer.	Area of section.	Gage height.	Discharge.
1909.		*Sq. ft.*	*Feet.*	*Sec.ft.*
July 21	H. W. Sheley	195	10.2	800
22	....do	74.3	11.5	187
23	....do	278	9.1	1,080
24	....do	475	6.7	3,500
Aug. 23	....do	.....	11.0	245
26	....do	80	11.4	125
30	....do	53.6	11.7	93
31	....do	393	7.45	3,000
31	....do	458	6.6	3,910
31	....do	505	6.0	4,560
31	....do	550	5.35	4,210
Sept. 1	....do	626	4.4	5,720
1	....do	825	1.8	8,140
6	....do	478	6.15	3,250
17	....do	64	11.8	118
24	....do	63	11.7	121
Oct. 18	....do	50.9	12.1	75
1910.				
Mar. 25	E. S. Fuller	118	10.25	748
May 10	H. W. Sheley	238	9.2	1,276
June 16	....do	36.8	10.8	68
July 12	....do	16.4	11.3	22
Nov. 13	....do	30.1	11.3	38

NOTE.—All measurements during 1909 and that on Nov. 13, 1910, were made with floats; other measurements in 1910 were made with a current meter. All float measurements have been reduced by applying a coefficient varying from 0.85 to 1.0. Gage heights represent depths of water surface below a fixed point on Denver & Rio Grande Railroad bridge.

Monthly discharge of Price River at Woodside, Utah, for 1909-10.

[Drainage area, 1,500 square miles.]

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
1909.				
October	95	64	74	4,600
November	135	64	80	4,800
December	.....	.....	73	4,400
1910.				
January	.....	.....	70	4,300
February	.....	.....	70	4,200
March	2,870	270	792	48,700
April	1,880	465	918	54,600
May	1,710	480	1,102	67,800
June	[a] 1,300	37	187	11,100
July	1,600	0	114	7,000
August	450	0	41	2,500
September	1,700	0	221	13,200
October	2,750	59	207	12,700
November	370	38	128	7,600
December	150	68	92	5,600
The year	2,870	0	330	239,000

[a] Not mean for a day, but maximum.

SAN RAFAEL RIVER BASIN.

GENERAL FEATURES.

San Rafael River is formed in the western part of Emery County, crosses the central part of the county in a general southeasterly direction, and enters Green River about 36 miles below the mouth of the Price. The river has three principal branches, Ferron, Cottonwood, and Huntington creeks, which rise in the Wasatch Plateau at altitudes of about 10,000 feet above sea level. These streams fall rapidly in their upper courses and leave the plateau through almost impassable canyons cut in its eastern wall overlooking Castle Valley. They unite below Castledale, and the stream formed by their combined waters flows southeastward through the San Rafael Swell in a deep, narrow canyon, from which it emerges to flow across a low, broken country to its junction with the Green. The water of this river is derived chiefly from the melting snow on the high plateau. The drainage area of this basin is 2,390 square miles.

SAN RAFAEL RIVER NEAR GREEN RIVER, UTAH.

This station, which is located at the county bridge on the road from Green River to Hanksville, about 16 miles southwest of Green River, Utah, and about three-fourths of a mile below the Morris ranch dam, was established May 5, 1909. It is below all important tributaries and diversions.

The staff gage is nailed securely to the southwest pier of the bridge from which discharge measurements are made. The gage datum has remained unchanged since the station was established.

The winter flow is affected by ice, and as the bed of the stream shifts somewhat frequent measurements must be made in order to get satisfactory records.

Discharge measurements of San Rafael River near Green River, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 26	E. S. Fuller	69	401	4.32	1,410
July 28	G. H. Canfield	22	15	.65	7.4
Oct. 2	Canfield and Dort	43	35	1.10	54
Dec. 2	G. H. Canfield	45	50.6	1.55	80

Daily gage height, in feet, of San Rafael River near Green River, Utah, for 1910.

[E. F. Marshall, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		2.4	2.1	4.5	3.8	3.15	1.15	0.6	1.15	1.5	1.7
2		3.8	1.85	4.2	3.6	2.6	1.05	.75	1.2	1.6	1.85
3		5.15	2.05	3.95	3.55	2.05	1.1	.75	1.05	1.45	1.65
4		5.4	2.3	3.75	3.5	1.95	1.05	3.7	1.15	1.35	1.75
5		5.6	2.05	3.9	3.4	1.95	1.0	2.25	1.25	1.25	1.75
6		4.95	2.2	3.65	3.15	1.8	1.0	1.65	1.15	1.15	1.6
7		4.0	2.15	3.45	3.0	1.55	1.05	1.65	1.1	1.15	1.7
8		3.35	2.3	3.45	2.55	1.45	.95	1.35	1.05	1.25	1.55
9		3.15	2.15	4.05	2.55	1.35	.85	1.25	1.05	1.35	1.5
10		2.95	2.3	4.55	2.45	1.25	.7	.95	1.05	1.25	1.6
11		2.6	2.3	5.25	2.25	1.15	.55	.8	1.05	1.45	1.7
12		2.35	2.3	5.3	2.15	1.15	2.85	.7	1.05	1.35	1.9
13		2.5	2.45	5.2	2.0	1.0	1.4	.6	1.1	1.2	2.0
14		2.4	2.3	5.1	2.05	1.2	1.2	.6	1.2	1.4	1.95
15		2.2	2.85	5.0	2.0	1.05	1.25	.5	1.3	2.15	1.85
16		2.5	2.5	4.85	1.95	1.8	1.35	2.35	6.2	2.75	1.75
17		2.35	2.65	4.35	1.9	2.35	1.15	7.2	5.55	2.15	1.7
18		2.2	2.95	3.9	1.85	1.75	1.05	2.75	2.5	1.8	1.6
19		2.3	2.7	3.7	1.75	1.35	.95	2.7	2.15	1.65	1.7
20		2.45	3.0	3.65	1.6	1.15	.85	2.55	2.1	2.3	1.55
21		2.25	3.3	3.55	1.6	1.25	1.05	2.15	1.85	2.0	1.7
22		2.25	3.1	3.4	1.5	1.2	.8	2.45	1.95	1.85	1.65
23		2.3	2.9	3.15	1.4	1.0	.55	2.25	2.0	1.75	1.6
24		2.1	3.4	3.3	1.4	1.05	.5	1.8	2.4	1.6	1.5
25		2.3	4.3	3.2	1.35	.95	.5	1.45	1.8	1.6	1.45
26		2.2	4.15	3.35	1.25	.9	.5	1.4	1.9	1.9	1.45
27	2.7	2.2	4.8	3.3	1.15	.75	.5	1.15	1.85	1.8	1.65
28	2.45	2.3	4.9	3.6	1.25	.65	.9	1.2	2.0	1.7	1.7
29		2.25	5.0	3.65	2.0	1.3	.5	1.1	1.9	1.75	1.65
30		1.95	4.8	3.75	2.85	1.4	.65	1.15	1.55	1.55	1.75
31		1.9		3.8		1.6	.65		1.45		1.8

Daily discharge, in second-feet, of San Rafael River near Green River, Utah, for 1910.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		475	375	1,530	900	492	57	4	57	74	102
2		1,100	310	1,340	800	316	46	16	63	88	126
3		1,990	360	1,190	780	193	51	16	46	68	95
4		2,180	440	1,080	750	176	46	702	57	56	110
5		2,330	360	1,160	690	176	40	232	70	45	110
6		1,840	405	1,020	590	152	40	128	57	36	88
7		1,220	390	925	530	112	46	128	51	36	102
8		875	440	925	360	98	35	83	46	45	81
9		775	390	1,240	360	83	25	70	46	56	74
10		685	440	1,560	320	70	11	35	46	45	88

Daily discharge, in second-feet, of San Rafael River near Green River, Utah, for 1910—Con.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11		545	440	2,070	270	57	2	20	46	68	102
12		458	440	2,100	240	57	390	11	46	56	134
13		510	492	2,030	200	40	90	4	51	40	150
14		475	440	1,960	205	63	63	4	63	62	142
15		405	645	1,880	185	46	70	0	76	177	126
16		510	510	1,750	176	152	83	254	2,250	310	110
17		458	565	1,400	168	254	57	3,040	1,770	177	102
18		405	685	1,120	160	144	46	359	246	118	88
19		440	585	990	144	83	35	344	177	95	102
20		492	705	950	120	57	25	303	168	206	81
21		422	850	890	120	70	46	212	126	150	102
22		422	750	810	105	63	20	278	142	126	95
23		440	665	690	90	40	2	232	150	110	88
24		375	900	750	90	46	0	152	226	88	74
25		440	1,400	700	83	35	0	98	118	88	68
26		405	1,300	760	70	30	0	90	134	134	68
27	585	405	1,740	720	57	16	0	57	126	118	95
28	492	440	1,800	850	70	8	30	63	150	102	102
29		422	1,880	870	185	76	0	51	134	110	95
30		332	1,740	900	390	90	8	57	81	81	110
31		320		920		120	8		68		118

NOTE.—Daily discharge determined from rating curves applicable as follows: Feb. 27 to May 15, well defined between 1,000 and 1,800 second-feet; May 16 to June 15, indirect method for shifting channels used; June 16 to Oct. 17, well defined below 400 second-feet; Oct. 18 to Dec. 31, well defined.

Monthly discharge of San Rafael River near Green River, Utah, for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
March	2,330	320	729	44,800	C.
April	1,880	310	748	44,500	B.
May	2,100	690	1,200	73,800	B.
June	900	57	307	18,300	C.
July	492	8	110	6,760	B.
August	390	0	44.3	2,720	B.
September	3,040	0	235	14,000	C.
October	2,250	46	222	13,600	C.
November	310	36	98.8	5,880	B.
December	150	68	101	6,210	B.
The period				231,000	

COTTONWOOD CREEK NEAR ORANGEVILLE, UTAH.

This station, which is located at Johnson's ranch in the canyon about 5 miles northwest of Orangeville, Utah, and about 35 miles southwest of Price, the nearest railway point, was established May 1, 1909.

The station is below all important tributaries and above all diversions except Johnson's ditch, which takes out a small amount of water a short distance above the station.

Previous to August 22, 1909, the stage was recorded by measuring to the water surface from a reference point on a cottonwood tree 60 feet above the cable. A staff gage was installed August 22, 1909, at the same point, and all previous observations were corrected to the datum of this gage. During the flood of August 31 this gage was washed out. From September 1 to 17 the record was kept of the

water depth at the gage site. From September 20 observations were made of the distance to water surface from a mark on a rock at the site. All gage heights for 1909 have been reduced to the datum of the staff gage. On March 22, 1910, a slope gage was installed at a datum 0.8 foot lower than that used in 1909.

Discharge measurements at high stages are made from a cable 60 feet below the gage site. At low stages by wading at various sections above and below gage.

As the stream bed shifts, accurate determination of discharge is difficult. Heavy ice forms at this station during the winter months.

Discharge measurements of Cottonwood Creek near Orangeville, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 22	Fuller and Tanner	50	60	4.95	182
June 9[a]	E. S. Fuller	50	98	5.8	353
July 25	G. H. Canfield	24	30	4.69	43
25	do	22	36	4.69	47
Aug. 28	do	21	31	4.45	32
28	do	22	31	4.45	32
Sept. 29	do	21	27	3.61	30
Nov. 29	do	30	26	3.75	34

[a] Float measurement.

Daily gage height, in feet, of Cottonwood Creek near Orangeville, Utah, for 1910.

[Robert Johnson, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.7	.....	6.6	5.2	4.8	4.5	.....	3.6	3.7
2	4.7	6.0	6.6	5.1	4.7	4.5	.....	3.6	3.7
3	.....	6.2	6.5	.....	4.7	4.5	3.6	3.6	.....
4	4.8	6.0	6.4	.....	4.7	.....	3.6	3.6	.....
5	4.9	6.0	.....	5.1	4.6	4.6	3.6	3.6	3.8
6	4.7	6.1	6.1	5.1	4.6	4.4	3.6	.....	.....
7	4.7	6.4	6.0	5.0	.....	4.4	3.6	3.6	3.9
8	5.0	.....	5.9	5.0	4.6	4.4	3.6	.....	4.0
9	4.9	6.5	5.8	5.0	4.6	4.4	3.6	3.6	.....
10	.....	6.9	5.7	.....	4.6	4.4	3.6	3.7	3.8
11	5.1	7.5	5.6	4.9	4.7	.....	3.6	3.7	.....
12	5.2	7.5	.....	4.9	4.7	4.4	3.6	3.7	.....
13	5.1	7.3	5.7	4.9	4.6	4.4	3.6	.....	3.4
14	.....	6.7	5.6	4.9	.....	.....	3.6	3.7	3.7
15	5.1	.....	5.6	4.9	4.6	5.6	3.6	3.7	3.8
16	5.0	6.1	5.6	4.9	4.6	7.9	3.6	3.7	.....
17	.....	6.1	5.5	.....	4.6	4.6	3.6	3.7	3.7
18	5.2	6.2	5.5	.....	4.5	.....	3.6	3.7	.....
19	5.5	6.4	.....	4.8	5.5	5.0	3.6	3.7	4.0
20	5.5	6.3	5.4	4.8	4.8	4.6	3.6	.....	.....
21	5.3	6.2	5.4	4.7	.....	3.6	3.6	3.7	3.9
22	5.6	.....	5.3	4.7	4.5	3.6	3.6	3.7	.....
23	5.7	6.2	5.3	4.7	4.5	3.6	.....	3.7	4.2
24	.....	6.2	5.3	.....	4.5	3.6	3.6	.....	4.5
25	6.0	6.2	5.3	.....	4.5	.....	3.6	3.7	.....
26	6.3	6.3	.....	.....	4.5	3.6	3.6	3.7	4.3
27	6.4	6.4	5.2	4.9	4.5	3.6	3.6	.....	.....
28	6.3	6.6	5.4	4.8	.....	3.6	3.6	3.7	4.4
29	6.3	.....	5.6	4.7	4.5	3.6	3.6	3.7	4.3
30	6.2	6.8	5.2	4.7	4.5	3.6	.....	3.7	.....
31	.....	6.7	.....	.....	4.5	.....	.....	.....	4.2

NOTE.—Gage heights Jan. 1 to Mar. 31 are not published, as they are very uncertain. During part of this period the observer recorded distances to water surface from a mark on a rock, and later recorded the depth of water at some point not indicated. The date on which he changed from one method to the other is not known.

A slope gage was installed Mar. 22 at a datum 0.8 foot lower than that used in 1909, but this gage was not read until Apr. 1.

Relation between gage height and discharge affected by ice during January, February, and December.

Daily discharge, in second-feet, of Cottonwood Creek near Orangeville, Utah, for 1910.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	120	500	650	175	60	35	25	25
2	120	470	650	150	50	35	25	25
3	130	530	610	150	50	35	25	25
4	140	460	560	140	50	40	25	25
5	165	460	500	140	40	50	25	25
6	120	490	450	140	40	30	25	25
7	120	600	420	120	40	30	25	25
8	190	620	385	120	40	30	25	25
9	160	640	355	120	40	30	25	25
10	180	800	320	105	40	30	25	35
11	210	1,030	290	90	50	30	25	35
12	235	1,030	305	90	50	30	25	35
13	210	940	320	90	40	30	25	35
14	210	700	290	90	40	30	25	35
15	210	590	290	90	40	270	25	35
16	180	480	290	90	40	1,140	25	35
17	200	480	260	80	40	70	25	35
18	230	510	260	70	30	110	25	35
19	315	580	250	70	210	150	25	35
20	315	540	235	70	70	80	25	35
21	260	500	235	55	50	5	25	35
22	345	500	210	55	35	8	25	35
23	380	500	210	55	35	10	25	35
24	430	500	210	60	35	10	25	35
25	480	500	210	65	35	12	25	35
26	580	540	195	70	35	15	25	35
27	620	570	180	75	35	20	25	35
28	580	650	235	60	35	30	25	35
29	580	690	290	45	35	30	25	35
30	540	730	180	45	35	30	25	35
31	.....	685	.....	50	35	.....	25	.....

NOTE.—Daily discharge determined by the indirect method for shifting channels, and also by applying the standard rating curve direct for short periods when it averages two or more measurements.

Monthly discharge of Cottonwood Creek near Orangeville, Utah, for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	.....	.....	[a] 30.0	1,840	D.
February	.....	.....	[a] 30.0	1,670	D.
April	620	120	285	17,000	C.
May	1,030	460	607	37,300	C.
June	650	180	328	19,500	C.
July	175	45	91.1	5,600	C.
August	210	30	47.1	2,900	C.
September	1,140	5	81.8	4,870	C.
October	25	25	25.0	1,540	C.
November	35	25	32.0	1,900	C.
December	.....	.....	[a] 30.0	1,840	D.
The period	.....	.....	.....	96,000	

[a] Estimated.

FERRON CREEK NEAR FERRON, UTAH.

This station, which is located at Westingskow's ranch, about half a mile below the headgates of North and South canals, near the mouth of the canyon, about 2½ miles above the town of Ferron, Utah, and below all important tributaries, was established April 28, 1909.

The drainage area is 153 square miles.

Practically all the normal low-water flow is diverted above the station by the North and South canals, only enough water passing to supply one or two small ditches that take out below.

Several gages were used during 1909, all located in the same section. All gage heights were referred to one datum until August 31, when a flood destroyed the gage and bench mark and greatly changed the section. From September 1 to December 31 all gage heights refer to a new gage which was installed September 18, 1909, at a new datum.

Discharge measurements are made from a footbridge about 10 feet above the gage or by wading. Shifting of the stream bed makes it difficult to obtain accurate discharge records. The stream is icebound during the winter.

Discharge measurements of Ferron Creek near Ferron, Utah, for 1910.

Date.	Hydrographer	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 21	E. S. Fuller	19	24	2.40	91
21	.....do	38	28	2.40	90
June 8	.....do	38	28	1.95	48
July 24	G. H. Canfield	3	1.24	.80	[a] .47
Aug. 26	.....do	4.5	1.65	.70	[a] .22
Sept. 27	.....do	9.5	7.18	1.22	[a] 4.82
Nov. 29	.....do	3	1.3	.80	[a] .38

[a] Made by wading below the gage.

Daily gage height, in feet, of Ferron Creek near Ferron, Utah, for 1910.

[James Westingskow, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.2	1.4	2.6	2.0	3.0	3.2	1.2	0.7	0.7	1.2	0.7	0.8
2	2.0	1.3	2.4	2.0	3.0	3.1	1.2	.7	.7	1.2	.6	.8
3	2.0	1.3	2.5	2.0	2.9	3.2	1.2	.7	2.0	1.2	.6	.8
4	2.0	1.3	2.2	2.0	2.8	3.2	1.2	.7	.7	1.2	.6	.8
5	2.0	1.3	2.3	2.0	2.8	3.2	1.2	.7	.7	1.2	.6	.8
6	2.0	1.4	2.2	2.0	2.8	3.0	1.2	.7	.7	1.2	.6	.8
7	2.0	1.5	2.2	2.0	2.6	2.6	1.2	.7	.7	.9	.6	.8
8	2.0	1.5	2.2	2.0	3.3	2.1	1.2	.7	.7	.9	.6	.8
9	2.0	1.5	2.2	2.0	3.3	1.8	1.2	.7	.7	.9	.6	.8
10	2.0	1.5	2.2	2.2	3.3	1.8	1.2	.7	.7	.9	.6	.8
11	2.0	1.5	2.0	2.2	3.2	1.6	1.2	1.9	.7	.9	.6	.8
12	2.0	1.6	2.0	2.4	3.2	1.6	1.2	.7	.7	.9	.6	.8
13	2.0	1.6	2.1	2.2	3.3	1.5	1.2	.7	.7	.9	.6	.8
14	2.0	1.6	2.1	2.2	3.4	1.4	1.2	.7	6.4	.9	.7	.8
15	2.0	1.8	2.2	2.4	3.1	1.4	3.0	.7	1.7	6.0	.7	.8
16	2.0	1.8	2.1	2.4	3.2	1.4	1.2	.7	2.7	1.2	.6	.8
17	1.0	1.8	2.1	2.6	3.3	1.3	1.0	.7	1.2	1.0	.6	.8
18	.5	1.6	2.5	2.8	3.2	1.3	.9	.7	6.7	.9	.6	.8
19	.5	1.4	3.0	3.3	3.0	1.3	.9	.7	1.2	.9	.6	.8
20	1.0	1.4	3.0	3.3	3.0	1.3	.9	.7	5.0	.8	.6	.8
21	1.2	1.4	3.0	3.3	2.9	1.3	.9	.7	1.2	.8	.6	1.0
22	1.4	1.4	3.2	3.4	2.9	1.2	.9	.7	1.3	.8	.7	1.2
23	1.5	1.5	2.4	3.4	2.7	1.2	.8	.7	1.3	.8	.7	1.2
24	1.5	1.5	2.0	3.4	2.7	1.2	.8	.7	1.3	.8	.8	1.1
25	1.6	1.5	2.0	3.6	2.9	1.2	.8	.7	1.3	.8	.8	1.0
26	1.5	1.5	2.0	3.7	3.0	1.2	.8	.7	1.3	.8	.8	1.0
27	1.5	1.8	2.0	4.2	3.0	1.2	.9	.7	1.2	.8	.8	1.0
28	1.5	2.0	1.8	4.0	2.9	1.2	.8	.7	1.2	.8	.8	1.0
29	1.6	.....	1.6	3.5	3.2	1.2	1.7	.7	1.2	.8	.8	1.0
30	1.5	.....	1.6	3.3	3.3	1.2	.8	.7	1.2	.8	.8	1.0
31	1.4	.....	2.0	.....	3.3	.....	.7	.7	.....	.7	.....	1.0

NOTE.—Gage heights Jan. 1 to 16 and Dec. 21 to 31 affected by presence of ice.

Daily discharge, in second-feet, of Ferron Creek, near Ferron, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.5	10	110	51	150	170	4.0	0.2	0.2	4.0	0.2	0.4
2	1.5	6.5	90	51	150	160	4.0	.2	.2	4.0	.1	.4
3	1.5	6.5	100	51	140	170	4.0	.2	51	4.0	.1	.4
4	1.5	6.5	70	51	130	170	4.0	.2	.2	4.0	.1	.4
5	1.5	6.5	80	51	130	170	4.0	.2	.2	4.0	.1	.4
6	1.5	10	70	51	130	150	4.0	.2	.2	4.0	.1	.4
7	1.5	14	70	51	110	110	4.0	.2	.2	.9	.1	.4
8	1.5	14	70	51	180	60	4.0	.2	.2	.9	.1	.4
9	1.5	14	70	51	180	34	4.0	.2	.2	.9	.1	.4
10	1.5	14	70	70	180	34	4.0	.2	.2	.9	.1	.4
11	1.5	14	51	70	170	19	4.0	42	.2	.9	.1	.4
12	1.5	19	51	90	170	19	4.0	.2	.2	.9	.1	.4
13	1.5	19	60	70	180	14	4.0	.2	.2	.9	.1	.4
14	1.5	19	60	70	190	10	4.0	.2	490	.9	.2	.4
15	1.5	34	70	90	160	10	150	.2	26	450	.2	.4
16	1.5	34	60	90	170	10	4.0	.2	120	4.0	.1	.4
17	1.5	34	60	110	180	6.5	1.5	.2	4.0	1.5	.1	.4
18	0	19	100	130	170	6.5	.9	.2	520	.9	.1	.4
19	0	10	150	180	150	6.5	.9	.2	4.0	.9	.1	.4
20	1.5	10	150	180	150	6.5	.9	.2	350	.4	.1	.4
21	4.0	10	150	180	140	6.5	.9	.2	4.0	.4	.1	.4
22	10	10	170	190	140	4.0	.9	.2	6.5	.4	.2	.4
23	14	14	90	190	120	4.0	.4	.2	6.5	.4	.2	.4
24	14	14	51	190	120	4.0	.4	.2	6.5	.4	.4	.4
25	19	14	51	210	140	4.0	.4	.2	6.5	.4	.4	.4
26	14	14	51	220	150	4.0	.4	.2	6.5	.4	.4	.4
27	14	34	51	270	150	4.0	.9	.2	4.0	.4	.4	.4
28	14	51	34	250	140	4.0	.4	.2	4.0	.4	.4	.4
29	19	.....	19	200	170	4.0	26	.2	4.0	.4	.4	.4
30	14	.....	19	180	180	4.0	.4	.2	4.0	.4	.4	.4
31	10	.....	51	.....	180	.....	.2	.2	.....	0	.....	.4

NOTE.—Daily discharge Jan. 1 to 16 and Dec. 21 to 31, estimated because of presence of ice.
Discharge Jan. 17 to Dec. 20 determined from a discharge rating curve well defined below 150 second-feet.

Monthly discharge of Ferron Creek near Ferron, Utah, for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	19	0	5.58	343	C.
February	51	6.5	17.0	944	C.
March	170	19	75.8	4,660	B.
April	270	51	123	7,320	C.
May	190	110	155	9,530	C.
June	170	4.0	46.0	2,740	B.
July	150	.2	7.91	486	B.
August	42	.2	1.55	95	B.
September	520	.2	54.0	3,210	C.
October	450	.2	15.9	978	C.
November	.4	.1	.19	11	C.
December	.4	.4	.4	25	C.
The year	520	.1	41.90	30,300	

HUNTINGTON CREEK NEAR HUNTINGTON, UTAH.

This station, which is located at Cunha's ranch, in the canyon about 7 miles northwest of Huntington, Utah, was established May 3, 1909.

The ditch for the Cunha ranch diverts a small amount of water a short distance above the station; practically all the normal low-water flow is diverted for irrigation by canals heading near Huntington. This station is located below all principal tributaries and above

all the main diversions. A storage reservoir above the station controls the distribution of the flow to a considerable extent.

The vertical staff gage is in two sections. The low-water part is nailed to an old bridge abutment on the right bank about 3 feet from the cable; the high-water section is nailed to the west face of a cottonwood tree near the low-water section. The gage datum has remained unchanged since the station was established.

Discharge measurements are made from a cable.

The relation between gage height and discharge at this station is not seriously affected by ice. The shifting of the stream bed during the spring high water and summer floods impairs the reliability of the records.

Discharge measurements of Huntington Creek near Huntington, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 23	Fuller and Tanner	32	43	3.15	154
June 8	E. S. Fuller	37	71	3.75	231
July 26	G. H. Canfield	34	51	3.18	94
27	.....do	34	53	3.20	101
Aug. 29	.....do	32	35	2.76	41
29	.....do	32	32	2.76	41
Sept. 30	.....do	30	29	2.75	42
Nov. 30	.....do	30	22	2.63	31

Daily gage height, in feet, of Huntington Creek near Huntington, Utah, for 1910.

[Joseph Cunha, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.6	.....	.....	5.3	3.75	.....	.....	2.7	2.8	2.65	.....
2	.....	.....	2.4	.....	5.15	3.65	.....	.....	2.7	2.9	2.65	.....
3	.....	2.6	.....	3.2	5.55	3.75	.....	.....	2.8	2.8	2.65	.....
4	.....	.....	2.5	.....	5.7	3.65	.....	.....	2.8	2.7	2.65	.....
5	.....	2.5	.....	3.1	5.9	3.7	.....	.....	2.75	2.7	2.65	2.6
6	2.5	.....	2.4	.....	5.8	3.65	.....	.....	2.7	2.75	2.65	2.6
7	.....	2.6	.....	2.9	5.85	3.7	.....	.....	2.8	2.75	2.65	2.6
8	2.6	.....	2.5	.....	.....	3.65	.....	.....	2.8	2.75	2.65	.....
9	.....	2.5	.....	.....	5.65	3.65	.....	.....	2.75	2.75	2.65	.....
10	2.5	.....	2.5	3.0	5.3	3.55	.....	.....	2.8	2.75	2.65	.....
11	.....	2.4	.....	.....	5.45	3.55	.....	.....	2.75	2.7	2.65	.....
12	.....	2.6	2.5	3.5	5.65	3.45	.....	.....	2.85	2.7	2.65	2.6
13	2.4	.....	.....	3.8	5.8	3.45	.....	.....	2.9	2.7	2.65	2.65
14	.....	2.7	2.5	3.6	5.75	3.45	.....	.....	2.9	2.7	2.65	2.7
15	.....	2.7	.....	4.0	5.55	3.55	.....	2.6	3.2	2.7	2.65	.....
16	2.5	.....	2.4	4.0	5.45	3.65	.....	2.6	3.2	2.7	2.65	.....
17	.....	2.8	.....	3.9	5.1	3.65	.....	2.65	3.25	2.7	2.65	.....
18	2.6	2.7	.....	3.7	5.1	3.65	.....	2.65	3.2	2.7	2.65	.....
19	.....	2.7	.....	4.0	4.75	3.55	.....	2.6	3.0	2.7	2.65	.....
20	.....	.....	3.2	4.1	4.65	3.45	.....	2.65	2.9	2.7	2.65	.....
21	2.6	2.6	.....	4.2	4.65	3.45	.....	2.65	2.8	2.7	2.65	2.65
22	.....	.....	3.0	4.1	4.0	3.35	.....	2.7	2.85	2.7	2.65	2.65
23	.....	2.5	.....	.....	3.75	3.25	.....	2.65	2.85	2.7	2.65	2.65
24	2.6	.....	3.1	4.3	3.75	.....	.....	2.7	2.8	2.7	2.65	.....
25	.....	2.4	.....	4.4	3.7	.....	.....	2.65	2.85	2.7	2.65	.....
26	2.5	.....	2.9	4.6	3.7	.....	3.2	2.7	2.8	2.7	2.65	.....
27	.....	2.5	.....	4.8	3.75	.....	.....	2.6	2.9	2.7	2.65	.....
28	2.6	.....	.....	4.7	3.75	.....	.....	2.7	2.85	2.7	2.65	2.65
29	.....	.....	3.1	4.3	3.7	.....	.....	2.7	2.8	2.7	2.65	.....
30	2.5	.....	.....	4.9	3.65	.....	.....	2.8	2.8	2.7	2.65	.....
31	.....	.....	3.2	.....	3.7	.....	.....	2.8	.....	2.7	.....	.....

Daily discharge, in second-feet, of Huntington Creek near Huntington, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	45	56	33	165	830	232	.....	29	38	47	34	34
2	45	56	26	165	780	204	.....	29	38	58	34	34
3	45	56	33	165	925	232	.....	29	47	47	34	29
4	45	48	40	155	990	204	.....	29	47	38	34	29
5	45	40	33	145	1,070	217	.....	29	42	38	34	29
6	40	48	26	126	1,030	204	.....	29	38	42	34	29
7	48	56	33	107	1,050	217	.....	29	47	42	34	29
8	56	48	40	113	1,000	204	.....	29	47	42	34	29
9	48	40	40	119	960	204	.....	29	42	42	34	29
10	40	33	40	125	810	178	.....	29	47	42	34	29
11	35	26	40	180	870	178	.....	29	42	38	34	29
12	31	56	40	235	955	154	.....	29	52	38	34	29
13	26	64	40	320	1,000	154	.....	29	58	38	34	34
14	31	73	40	261	980	154	.....	29	58	38	34	38
15	35	73	33	385	900	178	.....	29	102	38	34	38
16	40	82	26	385	840	204	.....	29	102	38	34	38
17	48	90	61	350	700	204	.....	34	112	38	34	36
18	56	73	96	285	700	204	.....	34	102	38	34	36
19	56	73	130	375	560	178	.....	29	72	38	34	34
20	56	64	165	410	520	154	.....	34	58	38	34	34
21	56	56	145	440	520	154	.....	34	47	38	34	34
22	56	48	125	410	307	132	.....	38	52	38	34	34
23	56	40	135	435	232	112	.....	34	52	38	34	34
24	56	33	145	470	232	112	.....	38	47	38	34	34
25	48	26	126	500	217	102	.....	34	52	38	34	34
26	40	33	107	570	217	102	102	38	47	38	34	34
27	48	40	120	650	232	94	.....	29	58	38	34	34
28	56	33	132	610	232	94	.....	38	52	38	34	34
29	48	.....	145	455	217	87	.....	38	47	38	34	34
30	40	.....	155	680	204	87	.....	47	47	38	34	34
31	48	.....	165	.....	217	.....	.....	47	.....	38	.....	34

NOTE.—Daily discharge determined from curves applicable as follows: Jan. 1 to Apr. 16, poorly defined; Apr. 17 to May 21, indirect method for shifting channels used; May 22 to Dec. 31, rating curve well defined below 20 second-feet. Discharge estimated Aug. 1 to 14. Discharge interpolated for days of missing gage heights.

Ice not reported in 1910, but may have existed in January and February, and the use of the open-water rating curve for these months may have caused considerable errors. Ice reported at times of last two measurements in 1909.

Monthly discharge of Huntington Creek near Huntington, Utah, for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	56	26	45.9	2,820	D.
February	90	26	52.3	2,900	D.
March	165	26	81.1	4,990	C.
April	680	107	326	19,400	C.
May	1,070	204	655	40,300	C.
June	232	87	164	9,760	C.
August	47	29	32.6	2,000	C.
September	112	38	56.4	3,360	B.
October	58	38	39.9	2,450	B.
November	34	34	34.0	2,020	B.
December	38	29	32.9	2,020	C.
The period	.....	.....	.....	92,000	

GRAND RIVER BASIN.

GENERAL FEATURES.

Grand River and its tributaries drain an area comprising approximately 26,000 square miles, of which 22,300 is in Colorado and the rest in eastern Utah. On the east and southeast the basin is bounded by the high ranges of the Continental Divide, which separate it from the basins of Platte and Arkansas rivers; on the north it is limited by the White River and Book Cliffs Plateau, on the west by the canyon district of the Colorado.

Rising among the high peaks of the Rocky Mountains in the north-central portion of Colorado, the Grand flows southwestward to its junction with Green River, traversing approximately 350 miles. Its tributaries include Fraser, Blue, Eagle, Williams, and Roaring forks and Gunnison and Dolores rivers, all of which enter from the south.

In most respects the Grand is a typical mountain stream, flowing throughout its course in a succession of deep canyons, whose precipitous or even perpendicular walls range in height up to 3,000 feet above the water's edge, alternating with long, narrow fertile valleys. The headwater region, comprising approximately 50 per cent of the basin, is extremely rugged, elevations ranging from 7,000 to 14,000 feet above sea level. Stream channels are numerous, tributaries are rapid, and gradients are steep, the fall ranging from 20 to 150 feet to the mile. The intermediate or middle portion of the basin—that portion immediately east and west of the Colorado State line—is a dry, broken, much eroded region.

The precipitation ranges from 5 to 10 inches in the lower basin, 10 to 20 inches in the intermediate region, and 20 to 30 inches in the headwater region. By far the greater part of the precipitation is in the form of snow.

The greater part of the timbered area in the Grand River basin above the Gunnison is included in the Arapahoe and Holy Cross national forests. These reserves in the Grand drainage basin include about 1,400 square miles of merchantable timberland, 900 square miles of woodland, and about 800 square miles of burned area.

In the middle basin, from the lower end of Gore Canyon to about Rifle, 30,000 to 35,000 acres will be irrigated under half a dozen small projects now contemplated. In the lower basin the Reclamation Service has underway the Grand Valley project, to cover an irrigable area of 60,000 to 70,000 acres. Under other schemes, 40,000 to 50,000 acres more will be irrigated. The Uncompahgre Valley project, which diverts water from the Gunnison, has finished structures capable of irrigating about 50,000 acres. The completed project will serve about 150,000 acres.

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Natural storage within the basin is restricted to a few high mountain lakes, of which Grand Lake is the largest. There are, however, reservoir sites along the Grand and its tributaries which, if utilized, would make possible a development of 1,000,000 horsepower. The Kremmling reservoir site is by far the best in the drainage basin. It is located near the upper end of Gore Canyon and with a 230-foot dam would impound about 2,200,000 acre-feet of water. A standard-gage railroad now runs through this site.

Until recently the splendid power resources of this drainage basin have remained practically untouched. The estimated available power, including that on Dolores and Gunnison rivers, is as follows:

Minimum horsepower	540,000
Minimum horsepower, six high months	1,000,000
Horsepower from storage, six months' period	1,600,000

Of this amount less than 40,000 horsepower has so far been developed.

Hot sulphur springs are located along Grand River at two points, Hot Sulphur Springs and Glenwood Springs, Colo., and in both localities they increase the temperature of the river water, but probably all these springs together add less than 20 second-feet to the flow of the river.

Since 1899 the year of maximum run-off in this basin was 1909. The year of minimum run-off was 1902.

NORTH FORK OF GRAND RIVER NEAR GRAND LAKE, COLO.

This station, which is located at the highway bridge on the road between Grand Lake and Granby, about 12 miles from Granby station, on the Denver, Northwestern & Pacific Railway, about 3 miles southwest of Grand Lake post office, Colo., and about 2 miles above Grand Lake outlet, the most important tributary of this fork of the Grand, was established July 29, 1904, discontinued September 30, 1909, and reestablished September 21, 1910. The drainage area at this point comprises about 125 square miles.

One large ditch above the station diverts water into the headwaters of the Cache la Poudre, in the South Platte basin.

A staff gage is attached to the bridge. Its datum has remained unchanged during the maintenance of the station.

Winter records at this station are more satisfactory than at the other stations on the headwaters of the Grand, as near-by springs, tend to keep the stream at the gaging section more or less open.

Fairly good results have been obtained at this station, though low-stage measurements, because of sluggish current, are not entirely satisfactory.

Discharge measurements of North Fork of Grand River near Grand Lake, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 4	R. H. Bolster	39	86	4.05	116
4	W. B. Freeman	49	47	4.05	99
Sept. 8	S. T. Harding	38	67	3.80	57
21	.....do	40	75	4.07	94

NOTE.—The following gage heights were also observed: Sept. 27, 3.8; Oct. 13, 3.6; Nov. 7, 3.5; Dec. 18, 3.55; Dec. 19, 3.6.

GRAND RIVER NEAR GRANBY, COLO.

This station, which is located at a highway bridge that crosses the river about 4 miles from Granby on the road to Grand Lake, was established June 10, 1908. During 1910 it was maintained in cooperation with the State engineer of Colorado.

The station is about 4 miles below the junction of North and South forks, about the same distance above the mouth of Fraser River, and is above the mouth of Willow Creek. The drainage area is 484 square miles.

No important diversions are made on the South Fork or on the main stream above the station. Several filings for power development have been made above this station, but additional opportunities for filing no doubt exist. A small power plant is located on a tributary of the South Fork.

Measurements of discharge are made from a cable 300 feet downstream from the bridge.

Thick ice covers the river for about four months each year and anchor ice also occurs.

The location and datum of the gage have remained unchanged during the maintenance of the station.

Discharge measurements of Grand River near Granby, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 22	H. A. Howe	24	19	3.10	[a]33
Mar. 11	.....do	25	26	3.20	[a]57
May 7	.....do	100	176	2.60	448
June 4	.....do	109	349	4.20	1,870
July 5	Bolster and Freeman	100	197	2.77	557
30	C. L. Chatfield	99	157	2.40	333
Sept. 19	.....do	96	140	2.16	241

[a] Measurement made through holes cut in ice.

Daily gage height, in feet, of Grand River near Granby, Colo., for 1910.

[J. P. Switzer, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.85	3.0	4.5	2.9	2.3	1.65	1.9	1.6	1.5
2	1.9	3.0	4.45	2.9	2.3	1.75	1.8	1.6	1.5
3	1.9	2.85	4.25	2.9	2.2	1.9	1.8	1.6	1.5
4	1.85	2.75	4.15	2.8	2.2	1.95	1.8	1.5	1.55
5	1.85	2.7	3.85	2.7	2.15	2.05	1.8	1.5	1.55
6	1.9	2.85	3.7	2.65	2.1	2.05	1.7	1.5	1.6
7	1.95	3.05	3.75	2.6	2.1	2.0	1.7	1.5	1.6
8	2.0	3.1	3.55	2.5	2.0	2.0	1.7	1.5	1.6
9	2.1	3.25	3.5	2.5	2.0	1.9	1.7	1.5	1.6
10	2.2	3.35	3.4	2.4	1.95	1.9	1.7	1.6	1.6
11	2.2	3.45	3.45	2.4	1.9	1.9	1.7	1.6	1.55
12	2.2	3.5	3.55	2.3	1.9	2.0	1.7	1.6	1.6
13	2.2	3.45	3.5	2.3	1.9	2.0	1.7	1.6	1.55
14	2.2	3.35	3.5	2.2	1.9	2.1	1.7	1.5	1.6
15	2.2	3.2	3.5	2.2	1.9	2.1	1.7	1.5	1.6
16	2.2	3.3	3.5	2.2	1.9	2.1	1.7	1.5	1.65
17	2.15	3.15	3.5	2.2	1.9	2.0	1.7	1.5	1.55
18	2.2	3.0	3.35	2.1	1.9	2.0	1.7	1.5	1.65
19	2.3	2.9	3.3	2.1	1.9	2.0	1.7	1.5	1.85
20	2.25	2.95	3.3	2.0	1.9	2.0	1.7	1.5	2.0
21	2.1	3.0	3.15	2.0	1.85	2.1	1.7	1.5	2.0
22	2.25	3.1	3.1	2.1	1.8	2.1	1.7	1.5	2.0
23	2.3	3.0	3.1	2.0	1.8	2.1	1.7	1.5	2.0
24	2.4	3.2	3.0	1.9	1.7	2.1	1.7	1.5	2.0
25	2.85	3.1	3.0	1.9	1.7	2.05	1.7	1.5	2.0
26	2.65	3.35	3.0	1.9	1.7	1.95	1.7	1.5	2.05
27	2.85	3.65	3.0	1.9	1.6	1.95	1.7	1.5	2.05
28	3.0	3.5	3.1	1.9	1.6	1.95	1.7	1.5	2.0
29	3.0	3.9	3.1	2.1	1.6	1.9	1.7	1.5	2.0
30	3.1	4.05	3.0	2.4	1.6	1.9	1.7	1.5	2.0
31	.....	4.35	.....	2.25	1.6	.....	1.7	.....	2.0

NOTE.—River frozen over Jan. 1 to Mar. 31. Gage heights taken through hole cut in ice.

Daily discharge, in second-feet, of Grand River near Granby, Colo., for 1910.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	168	695	2,320	630	315	119	182	108	.....
2	182	695	2,240	630	315	142	155	108	.....
3	182	598	1,940	630	277	182	155	108	.....
4	168	535	1,800	565	277	196	155	88	.....
5	168	505	1,450	505	260	226	155	88	.....
6	182	598	1,300	478	242	226	130	88	.....
7	196	730	1,350	450	242	210	130	88	.....
8	210	765	1,150	400	210	210	130	88	.....
9	242	880	1,100	400	210	182	130	88	.....
10	277	962	1,000	355	196	182	130	108	.....
11	277	1,050	1,050	355	182	182	130	108	.....
12	277	1,100	1,150	315	182	210	130	108	.....
13	277	1,050	1,100	315	182	210	130	108	.....
14	277	962	1,100	277	182	242	130	88	.....
15	277	840	1,100	277	182	242	130	88	.....
16	277	920	1,100	277	182	242	130	88	.....
17	260	802	1,100	277	182	210	130	88	.....
18	277	695	962	242	182	210	130	88	.....
19	315	630	920	242	182	210	130	88	.....
20	296	662	920	210	182	210	130	88	.....
21	242	695	802	210	168	242	130	88	.....
22	296	765	765	242	155	242	130	88	.....
23	315	695	765	210	155	242	130	88	.....
24	355	840	695	182	130	242	130	88	.....
25	598	765	695	182	130	226	130	88	.....
26	478	962	695	182	130	196	130	88	.....
27	598	1,240	695	182	108	196	130	88	.....
28	695	1,100	765	182	108	196	130	88	.....
29	695	1,500	765	242	108	182	130	88	.....
30	765	1,680	695	355	108	182	130	88	.....
31	.....	2,080	.....	296	108	.....	130	.....	.....

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

Monthly discharge of Grand River near Granby, Colo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April	765	168	327	19,500	B.
May	2,080	505	903	55,500	A.
June	2,320	695	1,120	66,600	A.
July	630	182	332	20,400	A.
August	315	108	186	11,400	A.
September	242	119	206	12,300	A.
October	182	130	135	8,300	B.
November	108	88	92.7	5,520	B.
December	.....	.....	a 75.0	4,610	D.
The period	.....	.....	.....	204,000	

a Estimated.

GRAND RIVER AT SULPHUR SPRINGS, COLO.

This station, which was originally located at the highway bridge one-eighth mile below Sulphur Springs and later removed to the new highway bridge about 1,000 feet above the old site, was established July 27, 1904, discontinued September 30, 1909, and reestablished September 23, 1910, in cooperation with the State engineer of Colorado and the United States Forest Service.

Grand River is joined by Fraser River about 10 miles above Sulphur Springs and by Williams Fork a few miles below.

A standard chain gage installed near the station was moved to the new bridge April 17, 1906, and has been used at the same location and datum since the reestablishment of the station. The chain gage bears no determined relation to the original gage.

A number of small private ditches divert water for meadow irrigation along the tributaries above the station and along the Grand.

The river freezes across for about four months each year, the ice sometimes reaching a depth of 2 feet during the winter months, and temporary gages have been maintained in the canyon one-quarter mile below the station, where the river is open and where measurements can be made by wading.

Discharge measurements of Grand River at Sulphur Springs, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 2	Freeman and Bolster	118	258	3.09	904
29	C. L. Chatfield	111	185	2.44	474
Sept. 17	.....do	104	142	2.10	288
Oct. 8	.....do	.....	124	1.80	208

Daily gage height, in feet, and discharge, in second-feet, of Grand River at Sulphur Springs, Colo., for 1910.

Day.	September.		October.		November.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			1.9	220	1.7	170
2				220	1.7	170
3			1.9	220	1.65	160
4			1.9	220	1.65	160
5			1.9	220	1.65	160
6			1.9	220	1.6	150
7			1.8	193	1.65	160
8			1.8	193	1.65	160
9				190		160
10				180		160
11			1.7	170	1.65	160
12				170	1.65	160
13				170		
14				170		
15			1.7	170		
16				175		
17	2.1	288		180		
18		305		185		
19		320		190		
20		338		195		
21		355		200		
22		372		210		
23	2.3	388	1.9	220		
24	2.2	336	1.9	220		
25	2.05	269	1.85	206		
26	2.1	288	1.85	206		
27	2.05	269		200		
28	2.05	269		195		
29	2.0	250		190		
30	1.95	235		185		
31				180		

NOTE.—Daily discharge Sept. 17 to Nov. 30 determined from a rating table well defined above 200 second-feet; discharge interpolated for days of missing gage heights.

Monthly discharge of Grand River at Sulphur Springs, Colo., for 1910.

Month.	Mean discharge in second-feet.	Run-off (total in acre-feet).	Accuracy.
September 17–30	306	8,500	C.
October	196	12,100	C.
November 1–12	161	3,830	C.

GRAND RIVER NEAR KREMMLING, COLO.

This station, which is located at the upper end of Gore Canyon, about 3 miles west of Kremmling, near the Kremmling reservoir dam site and about 2 miles below the mouth of Blue River, was established July 24, 1904, and is maintained in cooperation with the State engineer of Colorado.

Between this station and the station at Sulphur Springs, Williams Fork and Troublesome and Muddy rivers enter the Grand, and a number of private ditches divert water for meadow irrigation for both the main stream and its tributaries.

On October 18, 1906, a slope gage was established on the opposite side of the river from the old chain gage. The zero of the slope gage is about 0.70 feet above the chain gage zero. On July 28, 1910, a Friez automatic gage was installed by the State engineer, presumably at the same datum and at practically the same location as the slope gage.

Discharge measurements are made from a cable a few feet downstream from the gage.

The river is frozen completely across at the station for about four months each year; anchor ice also forms in the riffles just below the gage.

The channel is scoured out during high stages and silt is deposited at low stages. High and medium stage data are good but low-stage data are not so accurate.

Discharge measurements of Grand River near Kremmling, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 8	H. A. Howe	100	165	0.8	[a]363
27	do	100	161	1.40	[a]361
Mar. 17	do	110	795	3.40	1,120
May 3	do	127	1,330	7.05	2,840
12	do	135	1,820	10.05	5,330
July 1	W. B. Freeman	123	1,410	6.30	2,400
28	C. L. Chatfield	112	746	2.25	737
Sept. 16	do	107	407	2.28	744
Oct. 11	do	104	224	1.42	494
Nov. 20	do	103	165	1.08	329

[a] Measurement made through ice.

Daily gage height, in feet, of Grand River near Kremmling, Colo., for 1910.

[H. C. Rogers, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	2.25	1.05	1.15	2.65	8.15	12.25	6.3	4.3	1.4	1.7	1.35
2	2.2	1.05	1.2	2.75	7.7	11.9	5.7	4.1	1.35	1.65	1.35
3	1.95	1.05	1.5	2.9	7.05	12.35	5.15	3.75	1.35	1.65	1.4
4	1.9	1.0	1.55	2.55	6.65	12.1	4.95	3.5	1.6	1.6	1.35
5	1.75	.9	1.85	2.5	6.85	11.3	5.15	3.4	3.0	1.6	1.35
6	1.75	.8	2.6	2.55	6.85	10.6	5.2	3.5	2.9	1.55	1.35
7	1.75	.8	2.85	2.55	6.55	10.45	4.7	3.2	2.6	1.5	1.25
8	1.45	.8	3.15	2.75	6.35	10.1	4.2	2.85	2.3	1.5	1.25
9	1.35	.8	3.15	3.05	6.95	9.45	3.9	2.7	2.1	1.5	1.2
10	1.25	.8	2.5	3.5	8.25	8.85	3.6	2.55	1.9	1.45	1.2
11	1.25	.8	2.2	3.85	9.1	8.7	3.5	2.4	1.75	1.4	1.2
12	1.25	.95	2.2	4.05	9.8	8.7	3.35	2.35	1.8	1.4	1.2
13	1.25	1.0	2.6	4.3	9.45	8.75	3.2	2.45	2.0	1.35	1.2
14	1.15	1.0	2.75	4.45	9.15	8.65	3.15	2.4	2.2	1.35	1.15
15	1.2	1.1	2.9	4.0	8.9	8.4	2.95	2.3	2.4	1.3	1.15
16	1.2	1.1	3.05	3.4	8.35	8.25	2.95	2.2	2.3	1.35	1.2
17	1.2	1.0	3.2	3.65	7.65	8.15	3.1	2.1	2.3	1.4	1.2
18	1.2	.9	3.4	3.4	7.75	7.4	3.25	2.05	2.3	1.6	1.2
19	1.2	1.0	3.45	3.75	7.2	7.15	3.4	2.9	2.5	1.7	1.1
20	1.15	1.0	3.55	4.35	7.1	7.15	3.35	1.9	2.85	1.75	1.1
21	1.1	1.0	3.7	5.4	7.35	6.95	3.15	1.9	2.75	1.6	1.1
22	1.2	1.1	4.05	5.25	7.25	6.6	3.1	1.85	2.9	1.45	1.1
23	1.2	1.2	4.4	5.1	7.15	6.4	2.95	1.8	2.65	1.45	1.1
24	1.2	1.2	4.05	5.2	7.0	6.2	2.75	1.8	2.45	1.45	1.15
25	1.2	1.25	3.85	5.8	7.1	5.95	2.65	1.75	2.2	1.5	1.15

Daily gage height, in feet, of Grand River near Kremmling, Colo., for 1910—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
26	1.05	1.3	3.45	6.6	7.6	5.55	2.4	1.65	2.05	1.55	1.1
27	1.0	1.2	3.1	7.35	7.55	5.6	2.2	1.55	2.0	1.55	1.05
28	1.05	1.1	3.05	8.05	8.3	5.6	2.55	1.55	1.9	1.45	0.95
29	1.1	.....	3.05	8.65	10.2	5.5	3.95	1.55	1.85	1.35	.95
30	1.1	.....	2.25	8.75	11.4	6.2	5.25	1.55	1.75	1.35	1.0
31	1.1	.....	2.65	.....	12.0	.....	5.1	1.45	.....	1.3	.....

NOTE.—Relation between gage heights and discharge affected by ice Jan. 1 to Mar. 5. Gage heights for first 10 days of December very uncertain; not published; river frozen over Dec. 11–31.

Daily discharge, in second-feet, of Grand River near Kremmling, Colo., for 1910.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	360	845	3,510	7,600	2,420	1,440	490	565	478
2	360	875	3,280	7,160	2,090	1,360	478	552	478
3	360	925	2,860	7,720	1,820	1,220	478	552	490
4	360	815	2,620	7,400	1,730	1,140	540	540	478
5	360	800	2,740	6,460	1,820	1,100	960	540	478
6	830	815	2,740	5,690	1,840	1,140	925	528	478
7	908	815	2,560	5,540	1,620	1,030	830	515	452
8	1,010	875	2,440	5,190	1,400	908	740	515	452
9	1,010	978	2,800	4,600	1,280	860	680	515	440
10	800	1,140	3,650	4,100	1,170	815	620	502	440
11	710	1,260	4,300	3,980	1,140	770	558	490	440
12	710	1,340	4,910	3,980	1,080	758	590	490	440
13	830	1,440	4,600	4,020	1,030	785	650	478	440
14	875	1,500	4,340	3,950	1,010	770	710	478	428
15	925	1,320	4,140	3,760	942	740	770	465	428
16	978	1,100	3,720	3,650	942	710	740	478	440
17	1,030	1,190	3,250	3,580	995	680	740	490	440
18	1,100	1,100	3,310	3,080	1,048	665	740	540	440
19	1,120	1,220	2,960	2,920	1,100	650	800	565	415
20	1,150	1,460	2,890	2,920	1,080	620	908	578	415
21	1,200	1,940	3,050	2,800	1,010	620	875	540	415
22	1,340	1,860	2,990	2,580	995	605	925	502	415
23	1,480	1,800	2,920	2,470	942	590	845	502	415
24	1,340	1,840	2,820	2,360	875	590	785	502	428
25	1,260	2,140	2,890	2,220	845	578	710	515	428
26	1,120	2,580	3,220	2,020	770	552	665	528	415
27	995	3,050	3,180	2,040	710	528	650	528	402
28	978	3,510	3,680	2,040	815	528	620	502	377
29	978	3,950	5,280	1,990	1,300	528	605	478	377
30	725	4,020	6,570	2,360	1,860	528	558	478	390
31	845	.....	7,280	.....	1,800	502	.....	465	.....

NOTE.—Daily discharge Mar. 1 to 5 estimated; discharge Mar. 6 to Nov. 30 determined from a well-defined curve.

Monthly discharge of Grand River near Kremmling, Colo., for 1910.

[Drainage area, 2,380 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
February	.....	.....	[a] 360	0.151	0.16	20,000	C.
March	1,480	.....	905	.380	.44	55,600	B.
April	4,020	800	1,620	.681	.76	96,400	A.
May	7,280	2,440	3,600	1.51	1.74	221,000	A.
June	7,600	1,990	4,010	1.69	1.89	239,000	B.
July	2,420	710	1,270	.534	.62	78,100	A.
August	1,440	502	784	.329	.38	48,200	A.
September	960	478	706	.297	.33	42,000	A.
October	578	465	513	.216	.25	31,500	A.
November	490	377	435	.183	.20	25,900	B.
The period	.....	.....	.....	.....	.....	858,000	

[a] Estimated on basis of 2 discharge measurements made during February.

GRAND RIVER AT GLENWOOD SPRINGS, COLO.

This station, which is located at Glenwood Springs, about one-fourth mile above the mouth of Roaring Fork, was established May 12, 1899, discontinued July 17, 1899, and reestablished January 7, 1900. It is now maintained in cooperation with the State engineer of Colorado and the Central Colorado Power Co.

The original gage, of the float type, was located at the plant of the Glenwood Light & Power Co. about one-fourth mile above the State bridge, and was replaced May 10, 1910, by a Friez automatic gage installed at the same location and datum.

Discharge measurements are made from a cable underneath the State bridge.

A few minor irrigation ditches divert water from the river between this station and the station at Kremmling. The Shoshone plant of the Central Colorado Power Co., utilizing a head of 170 feet, was practically completed in 1908. The tail water from this plant is returned to the river above the gaging station. During 1907 and 1908 the débris from the Shoshone plant was deposited in the river bed and the discharge rating curve of the stream was thereby changed. Except during this period the channel has been permanent.

Even in the most severe weather hot water from the near-by springs keeps the water in the river above the freezing point. The winter records are, therefore, of special value as they furnish a basis for estimating approximately the discharge of the streams at other stations in the basin during that period.

Results of observations at this station were trustworthy prior to the latter half of 1910, when the new automatic gage gave unsatisfactory results.

Discharge measurements of Grand River at Glenwood Springs, Colo., for 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 17	W. B. Freeman	192	659	4.16	1,590
Apr. 26	do	215	1,120	6.22	5,150
26	do	215	1,140	6.20	5,260
May 17	Freeman and Matthes	218	1,330	6.75	6,320
June 11	Bolster and Lyon	215	1,280	7.17	7,280
July 8	G. H. Russell	202	812	5 73	2,500
Aug. 13	G. J. Lyon	186	628	5.53	1,520
Sept. 6	G. H. Russell	193	720	5.72	1,950
21	do	186	694	5.73	1,850
Nov. 20	do	181	500	4.92	877
28	C. L. Chatfield	185	479	5.09	803
Dec. 30	G. H. Russell	182	435	5 32	635

Daily gage height, in feet, and discharge, in second-feet, of Grand River at Glenwood Springs, Colo., for 1910.

[W. H. Richardson, observer.]

Day.	January.		February.		March.		April.		May.		June.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	3.55	960	3.3	775	3.3	775	4.3	1,750	6.95	7,000	8.8	14,300
2	3.8	1,190	3.3	775	3.65	1,040	4.3	1,750	6.65	6,200	8.65	13,400
3	3.7	1,090	3.3	775	3.9	1,290	4.35	1,820	6.4	5,550	8.75	14,000
4	3.55	960	3.2	705	3.9	1,290	4.4	1,880	6.2	5,050	8.75	14,000
5	3.45	882	3.1	640	4.05	1,460	4.3	1,750	6.25	5,120	8.45	12,400
6	3.3	775	3.1	640	4.3	1,750	4.2	1,630	6.3	5,250	8.05	10,400
7	3.3	775	3.1	640	4.3	1,750	4.25	1,690	6.2	5,000	7.90	9,400
8	3.25	740	3.2	705	4.35	1,820	4.3	1,750	6.1	4,800	7.75	9,200
9	3.3	775	3.2	705	4.4	1,880	4.4	1,880	6.3	5,230	7.45	8,100
10	3.35	810	3.2	705	4.2	1,630	4.6	2,160	6.9	6,800	7.2	7,400
11	3.4	845	3.2	705	4.2	1,630	4.8	2,450	7.25	7,800	7.15	7,280
12	3.4	845	3.2	705	4.1	1,510	4.95	2,680	7.7	9,250	.....	7,200
13	3.3	775	3.25	740	4.1	1,510	5.0	2,750	7.65	9,100	.....	7,100
14	3.3	775	3.3	775	4.3	1,750	5.15	2,980	7.45	8,400	.....	7,000
15	3.3	775	3.3	775	4.3	1,750	5.05	2,820	.....	7,800	.....	6,800
16	3.4	845	3.2	705	4.35	1,820	4.8	2,450	.....	7,000	.....	6,600
17	3.45	882	3.0	580	4.4	1,880	4.7	2,300	6.75	6,320	.....	6,400
18	3.45	882	3.1	640	4.45	1,950	4.75	2,380	.....	6,150	.....	6,300
19	3.3	775	3.2	705	4.55	2,090	4.8	2,450	.....	6,000	.....	6,100
20	3.3	775	3.3	775	4.6	2,160	5.05	2,820	.....	5,800	.....	6,000
21	3.4	845	3.3	775	4.7	2,300	5.4	3,410	.....	5,650	.....	5,800
22	3.35	810	3.3	775	4.85	2,520	5.55	3,700	6.5	5,600	.....	5,700
23	3.4	845	3.3	775	4.9	2,600	5.45	3,500	6.4	5,350	.....	5,500
24	3.4	845	3.3	775	4.95	2,680	5.65	3,900	6.35	5,200	.....	5,400
25	3.45	882	3.3	775	4.85	2,520	6.1	4,890	6.4	5,350	.....	5,200
26	3.35	810	3.35	810	4.75	2,380	6.1	4,890	6.55	5,700	.....	5,000
27	3.3	775	3.3	775	4.65	2,230	6.45	5,720	6.7	6,050	.....	4,900
28	3.35	810	3.35	810	4.7	2,300	6.8	6,660	6.95	6,700	.....	4,800
29	3.3	775	.....	.....	4.4	1,880	7.05	7,300	7.7	9,000	.....	4,600
30	3.3	775	.....	.....	4.4	1,880	7.15	7,660	8.35	11,900	.....	4,500
31	3.3	775	.....	.....	4.3	1,750	.....	.....	8.65	13,400	.....	.....

NOTE.—Daily discharge Jan. 1 to June 11 determined from a fairly well defined discharge rating curve by direct application Jan. 1 to Apr. 30, and by the indirect method for shifting channels May 1 to June 11. Gage heights from June 11 to Dec. 31 are practically useless, as the trough connecting float well with the river became clogged, and therefore they have not been published. Discharge May 15, 16, and 18 to 21 and June 12 to Dec. 31, used in computing monthly means, obtained from hydrographs of discharge at Kremmling, Palisades, and Roaring Fork stations and current-meter measurements at this station.

Monthly discharge of Grand River at Glenwood Springs, Colo., for 1910.

[Drainage area, 4,520 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	1,190	740	841	0.186	0.21	51,700	B.
February	810	580	730	.162	.17	40,500	B.
March	2,680	775	1,860	.409	.47	114,000	B.
April	7,660	1,630	3,190	.706	.79	190,000	B.
May	13,400	.....	6,760	1.50	1.73	416,000	C.
June	.....	.....	7,690	1.70	1.90	458,000	D.
July	.....	.....	2,230	.493	.57	137,000	D.
August	.....	.....	1,330	.294	.34	81,800	D.
September	.....	.....	1,370	.303	.34	81,500	D.
October	.....	.....	988	.219	.25	60,800	D.
November	.....	.....	903	.200	.22	53,700	D.
December	.....	.....	665	.147	.17	40,900	D.
The year	.....	.....	2,380	.527	7.16	1,730,000	

GRAND RIVER NEAR PALISADES, COLO.[1]

This station, which is located at a steel highway bridge 2 miles above Palisades, Colo., at a point where the river enters Grand Valley, was established April 9, 1902, and during 1910 was maintained in cooperation with the United States Reclamation Service.

The station is below all important tributaries except Gunnison and Dolores rivers and is above all the irrigating ditches supplying water for irrigation in Grand Valley, except a ditch for one pumping plant which diverts about 80 second-feet for irrigation one-fourth mile above the gage. The proposed high-line canal of the United States Reclamation Service will take its water about 7 miles above Palisades.

The gage has been permanently located at the highway bridge above Palisades and no change in datum has been made. The original wire gage was replaced by a chain gage April 5, 1904. The river usually freezes over a portion of the year, but except for the interference of slush ice and an occasional thin ice cover the winter records are good.

Conditions for current meter measurements at the gage are poor, especially at high water. Beginning September 27, 1905, the measurements were made from a suspension bridge in the town of Palisades. Measurements are now made from the new steel bridge opened in the spring of 1909. Conditions at both these bridges are about the same. The sections are permanent, but at flood stages the velocities are high and the interference of bridge piers somewhat impairs the accuracy of results. Flood measurements prior to 1906 made at the upper bridge, where the gage is located, are less reliable than those made at the lower bridges.

Discharge measurements of Grand River near Palisades, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 2	S. O. Harper	257	1,080	13.6	3,070
27	Freeman and Sovereign	328	2,050	16.6	10,700
June 13	R. H. Bolster	360	2,410	17.7	13,800
Aug. 5	Harper and Hoag	268	1,120	13.5	2,890
Sept. 1	Harper and Henderson	256	734	12.5	1,530
23	.....do	257	992	13.25	2,520

[1] Called "at Palisades" in Water-Supply Paper 249.

Daily gage height, in feet, of Grand River near Palisades, Colo., for 1910.

[I. W. Penny, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	14.5	.....	13.1	13.65	17.75	20.55	15.4	14.25	12.5	12.65	12.65	12.35
2	14.3	.....	13.35	13.65	17.3	20.3	15.35	14.15	12.5	12.9	12.55	12.35
3	13.8	.....	13.7	13.75	16.9	20.3	15.15	13.7	12.5	12.8	12.55	12.3
4	12.95	.....	14.0	13.7	16.45	20.3	14.9	13.6	13.4	12.75	12.6	12.35
5	12.75	.....	13.8	13.65	16.45	20.1	14.8	13.5	13.5	12.7	12.5	12.3
6	12.7	.....	14.0	13.65	16.6	19.65	14.8	13.5	13.4	12.75	12.5	12.25
7	12.6	.....	13.85	13.6	16.55	19.2	14.65	13.6	13.5	12.8	12.45	12.25
8	.....	.....	13.8	13.6	16.45	18.9	14.5	13.45	13.25	12.75	12.55	12.25
9	.....	.....	13.7	13.65	16.6	18.55	14.4	13.25	13.15	12.75	12.55	12.25
10	.....	.....	13.6	13.9	17.4	18.05	14.25	13.1	13.05	12.8	12.6	12.25
11	.....	.....	13.7	14.2	18.35	17.95	14.1	12.95	12.95	12.65	12.55	12.45
12	.....	.....	13.7	14.45	18.65	17.95	13.95	13.35	12.75	12.55	12.6	12.5
13	.....	.....	13.3	14.65	18.85	17.85	13.85	13.25	12.85	12.5	12.65	12.4
14	.....	.....	13.45	14.8	18.55	17.7	13.7	13.25	13.2	12.5	12.6	12.35
15	.....	.....	13.6	14.7	18.05	17.45	13.6	13.2	13.15	12.55	12.7	12.3
16	.....	.....	13.3	14.45	17.75	17.15	13.5	13.15	12.9	13.3	12.65	12.25
17	.....	.....	13.5	14.35	17.5	17.2	13.45	13.1	13.2	12.9	12.75	12.25
18	.....	.....	13.65	14.2	17.1	16.95	13.4	12.95	13.2	12.95	12.75	12.25
19	.....	.....	13.4	14.35	16.85	16.8	13.4	12.9	13.1	13.0	13.25	12.05
20	.....	.....	13.5	14.7	16.75	16.65	13.4	12.8	13.1	13.05	12.95	11.95
21	.....	.....	14.1	15.05	16.65	16.45	13.4	12.65	13.4	12.95	12.7	12.2
22	.....	.....	14.4	15.45	16.65	16.25	13.3	12.7	13.35	12.85	12.55	12.1
23	.....	.....	14.5	15.35	16.55	16.15	13.25	12.7	13.2	12.85	12.55	12.1
24	.....	.....	14.5	15.35	16.45	15.95	13.15	12.7	13.2	12.75	12.55	12.0
25	.....	13.0	14.45	15.65	16.75	15.75	13.1	12.65	13.15	12.65	12.5	12.1
26	.....	13.35	14.45	16.2	16.9	15.55	13.0	12.6	13.0	12.65	12.6	12.1
27	.....	13.0	14.35	16.8	17.25	15.45	12.9	12.65	12.85	12.7	12.55	12.1
28	.....	12.85	14.0	17.3	17.65	15.3	13.4	12.65	12.8	12.65	12.5	12.15
29	.....	.....	13.9	17.75	18.7	15.65	13.2	12.55	12.8	12.65	12.45	12.2
30	.....	.....	13.8	18.05	19.55	15.4	13.7	12.5	12.7	12.55	12.35	12.25
31	.....	.....	13.6	.....	19.65	.....	13.8	12.5	.....	12.65	.....	12.3

NOTE.—Relation between gage height and discharge affected by ice during January and February and Dec. 28 to 31. River frozen over Jan. 8 to Feb. 25.

Daily discharge, in second-feet, of Grand River near Palisades, Colo., for 1910.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,280	3,160	14,200	27,100	6,810	4,290	1,530	1,700	1,700	1,370
2	2,650	3,160	12,500	25,800	6,700	4,090	1,530	2,010	1,580	1,370
3	3,250	3,340	11,100	25,800	6,240	3,250	1,530	1,880	1,580	1,320
4	3,800	3,250	9,650	25,800	5,680	3,070	2,730	1,820	1,640	1,370
5	3,430	3,160	9,650	24,700	5,460	2,900	2,900	1,760	1,530	1,320
6	3,800	3,160	10,100	22,500	5,460	2,900	2,730	1,820	1,530	1,280
7	3,520	3,070	9,970	20,300	5,130	3,070	2,900	1,880	1,480	1,280
8	3,430	3,070	9,650	19,000	4,810	2,820	2,500	1,820	1,580	1,280
9	3,250	3,160	10,100	17,400	4,600	2,500	2,350	1,820	1,580	1,280
10	3,070	3,610	12,900	15,400	4,290	2,280	2,210	1,880	1,640	1,280
11	3,250	4,190	16,600	15,000	3,990	2,080	2,080	1,600	1,580	1,480
12	3,250	4,700	17,900	15,000	3,700	2,650	1,820	1,580	1,640	1,530
13	2,570	5,130	18,700	14,600	3,520	2,500	1,940	1,530	1,700	1,420
14	2,820	5,460	17,400	14,000	3,250	2,500	2,420	1,530	1,640	1,370
15	3,070	5,240	15,400	13,000	3,070	2,420	2,350	1,580	1,760	1,320
16	2,570	4,700	14,200	12,000	2,900	2,350	2,010	2,570	1,700	1,280
17	2,900	4,500	13,200	12,100	2,820	2,280	2,420	2,010	1,820	1,280
18	3,160	4,190	11,800	11,300	2,730	2,080	2,420	2,080	1,820	1,280
19	2,730	4,500	10,900	10,800	2,730	2,010	2,280	2,140	2,500	1,120
20	2,900	5,240	10,600	10,300	2,730	1,880	2,280	2,210	2,080	1,050
21	3,990	6,010	10,300	9,650	2,730	1,700	2,730	2,080	1,760	1,230
22	4,600	6,930	10,300	9,030	2,570	1,760	2,650	1,940	1,580	1,150
23	4,810	6,700	9,970	8,740	2,500	1,760	2,420	1,940	1,580	1,150
24	4,810	6,700	9,650	8,180	2,350	1,760	2,420	1,820	1,580	1,080
25	4,700	7,410	10,600	7,660	2,280	1,700	2,350	1,700	1,530	1,150
26	4,700	8,880	11,100	7,170	2,140	1,640	2,140	1,700	1,640	1,150
27	4,500	10,800	12,300	6,930	2,010	1,700	1,940	1,760	1,580	1,150
28	3,800	12,500	13,800	6,580	2,730	1,700	1,880	1,700	1,530	1,150
29	3,610	14,200	18,100	7,410	2,420	1,580	1,880	1,700	1,480	1,150
30	3,430	15,400	22,000	6,810	3,250	1,530	1,760	1,580	1,370	1,150
31	3,070	.....	22,500	.....	3,430	1,530	.....	1,700	.....	1,150

NOTE.—Daily discharge determined from a discharge rating curve well defined below 4,000 second-feet. Discharge Dec. 28 to 31 estimated.

Monthly discharge of Grand River near Palisades, Colo., for 1910.

[Drainage area, 8,550 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
March	4,810	2,280	3,470	0.406	0.47	213,000	B.
April	15,400	3,070	5,850	.684	.76	348,000	B.
May	22,500	9,650	13,100	1.53	1.76	806,000	B.
June	27,100	6,580	14,300	1.67	1.86	851,000	B.
July	6,810	2,010	3,710	.434	.50	228,000	A.
August	4,290	1,530	2,330	.273	.31	143,000	A.
September	2,900	1,530	2,240	.262	.29	133,000	A.
October	2,570	1,530	1,830	.214	.25	113,000	A.
November	2,500	1,370	1,660	.194	.22	98,800	A.
December	1,530	1,050	1,260	.147	.17	77,500	B.
The period						3,000,000	

NORTH INLET TO GRAND LAKE AT GRAND LAKE, COLO.

Two streams, known as the North and East inlets, flow into Grand Lake, North Inlet being the larger. Elevations of the basin in the North Inlet range from 8,000 to 11,000 feet above sea level and the fall of the stream is very great. The basin comprises 36.5 square miles.

The gaging station on the North Inlet, which is located at the foot bridge across the stream, 300 yards east of the Grand Lake post office and about 100 yards north of the mouth, was established August 3, 1905, discontinued September 30, 1909, and reestablished September 20, 1910.

No water is diverted above the station, but filings have been made on sites for power development.

A staff gage, unchanged in datum during the maintenance of the station, is attached to the bridge. The records are fragmentary, as the gage has not been read continuously.

The stream is covered with thick ice for about four months, and winter gage readings are therefore of little value. The accuracy of the records is impaired by the roughness of the stream bed and by the effect of ice.

Since the reestablishment of the station gage heights have been furnished by the Forest Service.

Discharge measurements of North Inlet to Grand Lake at Grand Lake, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 3	W. B. Freeman	54.3	148	2.68	96
Sept. 20	S. T. Harding	48	57	2.41	57

Daily gage height, in feet, and discharge, in second-feet, of North Inlet to Grand Lake at Grand Lake, Colo., for 1910.

[Truman Smith, observer.]

Day.	September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			2.22	35	2.04	19	2.4	
2				34	2.04	19	2.4	
3			2.20	33	2.03	18	2.4	
4			2.15	28	2.03	18	2.4	
5			2.12	26	2.03	18	2.4	
6			2.10	24	2.02	18	2.4	
7			2.08	22	2.02	18	2.4	
8			2.05	20	2.02	18	2.4	
9			2.02	18	2.01	17	2.4	
10			2.02	18	2.01	17	2.4	
11			2.00	16	2.01	17	2.4	
12				17	2.00	16	2.4	
13				18	2.00	16	2.4	
14				19	2.00	16	2.4	
15				20	2.00	16	2.4	
16				21	2.00	16	2.4	
17				22	2.02	18	2.4	
18				23	2.04	19	2.4	
19				24	2.05	20	2.4	
20	2.41	57	2.10	24	2.08	20	2.4	
21	2.60	84	2.37	24	2.10	20	2.4	
22	2.52	72	2.40	24	2.20	20	2.4	
23	2.45	62	2.20	24	2.25	20	2.4	
24	2.40	56	2.10	24	2.30	20	2.4	
25	2.40	56	2.06	21	2.30	20	2.4	
26	2.38	54	2.06	21	2.38	20	2.4	
27	2.35	50	2.05	20	2.34	20	2.4	
28	2.30	44	2.05	20	2.38	20	2.4	
29	2.28	42	2.05	20	2.38	20	2.4	
30	2.25	38	2.05	20	2.40	20	2.4	
31			2.05	20			2.4	

NOTE.—Gage heights, Oct. 21–23, and Nov. 19 to Dec. 31, affected by ice.
Discharge interpolated Oct. 12–19 and estimated Oct. 21–23 and Nov. 19–30. Other discharges are based on a rating table that is well defined.

Monthly discharge of North Inlet to Grand Lake at Grand Lake, Colo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet.)	Accuracy.
	Maximum.	Minimum.	Mean.		
September 20–30	84	38	55.9	1,220	B.
October	35	16	22.6	1,390	B.
November	20	16	18.5	1,100	B.

GRAND LAKE OUTLET AT GRAND LAKE, COLO.

This station, which is located at a footbridge at the west end of Grand Lake, about half a mile south of Grand Lake post office, Colo., in sec. 6, T. 3 N., R. 75 W., was established July 31, 1904, discontinued September 30, 1909, and reestablished September 20, 1910. Granby, about 15 miles distant, on the Denver, Northwestern & Pacific Railway, is the nearest railroad point.

The drainage area at the station is 62 square miles.

A staff gage, unchanged in location or datum, is installed at the footbridge.

Discharge measurements have been taken at various sections, more usually at a ford one-fourth mile downstream from the footbridge.

Shore ice forms at the station for about four months, but the stream does not freeze over because of the higher temperature of the water coming down Grand Lake.

During low stages the accuracy of the results is to a considerable extent impaired by the rough bottom and sluggish character of the stream.

Since the reestablishment of the station gage heights have been furnished by the Forest Service.

Discharge measurements of Grand Lake Outlet at Grand Lake, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 4	W. B. Freeman	64	136	2.49	204
Sept. 20	S. T. Harding	128	107	2.21	111

NOTE.—The following gage heights were also observed: Sept. 20, 2.22; Sept. 24, 2.24; Oct. 3, 1.82; Oct. 10, 1.70; Oct. 26, 1.70; Nov. 9, 1.52; Dec. 14, 1.50; Dec. 24, 1.50.

FRASER RIVER NEAR FRASER, COLO.

This station, which is located about 10 miles above Fraser post office, Colo., was established May 1, 1908.

The station is at an elevation of approximately 10,000 feet above sea level.

The drainage area is about 9 square miles. Currant Creek is the only important tributary above.

The location and datum of the Lallie automatic gage have remained constant since the station was established.

The measuring section is permanent, but no discharge measurements were made during 1910.

Data for this station in 1909 have been furnished through the courtesy of the Denver Reservoir & Irrigation Co.

Daily gage height, in feet, and discharge, in second-feet, of Fraser River near Fraser, Colo., for 1910.

Day.	August.		September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	0.6	.....	0.4	10	0.35	8	0.25	7	0.2	6
2	.55	.....	.4	10	.35	8	.25	7	.2	6
3	.55	.....	.4	10	.35	8	.25	7	.2	6
4	.6	.....	.4	10	.35	8	.25	7	.2	6
5	.6	.....	.4	10	.35	8	.25	7	.2	6
6	.55	.....	.4	10	.35	8	.25	7	.2	6
7	.55	.....	.4	10	.35	8	.25	7	.2	6
8	.55	.....	.4	10	.35	8	.25	7	.2	6
9	.5	.....	.4	10	.35	8	.25	7	.2	6
10	.5	.....	.4	10	.35	8	.25	7	.2	6
11	.5	.....	.35	8	.35	8	.25	7	.2	6
12	.5	.....	.35	8	.35	8	.2	6	.2	6
13	.5	.....	.35	8	.35	8	.2	6	.2	6
14	.5	.....	.35	8	.35	8	.2	6	.2	6
15	.5	.....	.35	8	.35	8	.2	6	.2	6
16	.5	15	.35	8	.35	8	.2	6	.2	.....
17	.5	15	.35	8	.35	8	.2	6	.2	.....
18	.5	15	.35	8	.35	8	.2	6	.2	.....
19	.45	13	.35	8	.35	8	.2	6	.2	.....
20	.45	13	.35	8	.3	7.5	.2	6	.2	.....
21	.45	13	.35	8	.3	7.5	.2	6	.2	.....
22	.45	13	.35	8	.3	7.5	.2	6	.2	.....
23	.45	13	.35	8	.3	7.5	.2	6	.2	.....
24	.45	13	.35	8	.3	7.5	.2	6	.2	.....
25	.45	13	.35	8	.3	7.5	.2	6	.2	.....
26	.45	13	.35	8	.3	7.5	.2	6	.2	.....
27	.45	13	.35	8	.3	7.5	.2	6	.2	.....
28	.45	13	.35	8	.3	7.5	.2	6	.2	.....
29	.45	13	.35	8	.3	7.5	.2	6	.2	.....
30	.4	10	.35	8	.3	7.5	.2	6	.2	.....
31	.4	10	.....	.....	.25	7	.....	.....	.2	.....

Monthly discharge of Fraser River near Fraser, Colo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
August 16–31	15	10	13.0	413
September	10	8	8.7	518
October	8	7.5	7.8	480
November	7	6	6.4	381
December 1–15	6	6	6.0	178
The period	.....	.....	.....	1,970

FRASER RIVER NEAR ARROW, COLO.

This station, which is located one-fourth mile from the Idlewild ranger station, at the lower of two log bridges on the Idlewild-Arrow trail, in sec. 10, T. 2 N., R. 75 W., 2 miles from Arrow and one-fourth mile from Irving, on the Denver, Northwestern & Pacific Railway, was established September 23, 1910.

The drainage area at this point is about 24 square miles.

The gage is a vertical rod fastened to the center downstream pile of the bridge.

The stream bed is rough and rocky.

Discharge measurements are made from the upstream side of the bridge.

The relation between gage heights and discharge is probably affected by ice for three or four months each year.

Gage heights for this station are furnished by the Forest Service.

The following discharge measurement was made by S. T. Harding:

September 24, 1910: Width, 25 feet; area, 15 square feet; gage height, 0.78 feet; discharge, 18 second-feet.

Daily gage height, in feet, of Fraser River near Arrow, Colo., for 1910.

[S. S. Linscott, observer.]

Oct. 2	0.8	Oct. 13	0.75
3	.75	14	.75
4	.8	15	.75
5	.8	16	.75
6	.8	17	.7
7	.75	18	.7
8	.8	19	.7
9	.75	20	.75
10	.75	21	.7
11	.75	22	.7
12	.75		

WILLIAMS FORK NEAR SCHOLL, COLO.

Williams Fork rises in the Williams River Mountains and flows northwestward to its junction with Grand River in the central part of Middle Park.

This station, which is located near the Arapahoe National Forest, in sec. 2, T. 2 S., R. 78 W., near the line of the township, 100 feet below the bridge leading to the ranger station, 15 miles from Parshall, and 20 miles from Sulphur Springs on the Denver, Northwestern & Pacific Railway, was established September 22, 1910. Scholl is the nearest post office.

The drainage area above the station is 120 square miles.

The gage is a vertical rod on the right bank, 100 feet below the bridge to the ranger station.

The stream bed is rough and rocky and the stream falls rapidly throughout its course.

Discharge measurements are made by wading below the gage.

Gage heights for this station are furnished by the Forest Service.

The following discharge measurement was made by S. T. Harding:

September 22, 1910: Width, 36 feet; area, 46 square feet; gage height, 1.50 feet; discharge, 91 second-feet.

Daily gage height, in feet, of Williams Fork near Scholl, Colo., for 1910.

[W. M. Thomas, observer.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1	.....	1.35	1.35	1.1	11	.....	1.3	1.35	0.95	21	.....	1.4	1.25	.....
2	.....	1.4	1.3	1.1	12	.....	1.3	1.35	.9	22	.....	1.4	1.2	.....
3	.....	1.4	1.3	1.05	13	.....	1.3	1.25	.8	23	.....	.....	1.2	.....
4	.....	1.35	1.35	1.0	14	.....	1.3	1.3	.8	24	.....	.....	1.25	.....
5	.....	1.3	1.35	1.0	15	.....	1.3	1.35	.8	25	.....	.....	1.2	.....
6	.....	1.35	1.35	.....	16	.....	1.3	1.35	*8	26	.....	1.4	1.2	.....
7	.....	1.3	1.35	.....	17	.....	1.5	1.3	.75	27	1.55	1.35	1.2	.....
8	.....	1.3	1.35	.9	18	.....	1.4	1.25	.7	28	1.55	1.35	1.2	0.5
9	.....	1.3	1.4	.9	19	.....	1.4	1.3	.7	29	1.45	1.35	1.1	.5
10	.....	1.3	1.35	.95	20	.....	1.35	1.25	.....	30	1.45	1.4	1.1	.5
										31	.....	1.35	.....	.4

WILLIAMS FORK NEAR SULPHUR SPRINGS, COLO.

This station, which is located near the mouth of the stream, at the wagon bridge on the ranch of F. A. Field, about 9 miles west of Hot Sulphur Springs, Colo., was established July 25, 1904. The nearest railroad point is Parshall, a station on the Denver, Northwestern & Pacific Railway.

The drainage area is about 200 square miles.

The station is below all tributaries. A number of irrigation ditches divert water below the station. Some work has been done toward the construction of a reservoir and power plant a couple of miles downstream from the station.

Springs keep the ice from getting very thick at this station, but slush ice occurs frequently throughout the winter. The morning gage readings are usually distorted as the result of ice at the gage, but the afternoon readings indicate the open-water stage closely.

No change has been made in the location or in the datum of the staff gage at the bridge during the maintenance of the station.

Results are satisfactory. During low stages in the winter the flow is constant, being nearly all from springs.

Discharge measurements of Williams Fork near Sulphur Springs, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 11	H. A. Howe	22	40	2.95	40
Mar. 4	do	24	46	3.05	54
31	do	26	48	3.25	59
Apr. 25	do	42	82	3.60	141
May 15	do	49	108	4.00	292
July 2	Freeman and Bolster	48	96	3.75	195
28	C. L. Chatfield	55	71	3.30	78
Sept. 15	S. T. Harding	27	58	3.20	80
17	C. L. Chatfield	27	54	3.25	78
Oct. 9	do	.....	55	3.18	64

Daily gage height, in feet, of Williams Fork near Sulphur Springs, Colo., for 1910.

[F. A. Field, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.18	3.01	3.00	3.27	3.82	4.64	3.78	3.52	3.04	3.20	3.10	3.10
2	3.15	3.00	3.02	3.27	3.78	4.56	3.72	3.48	3.04	3.22	3.10	3.12
3	3.12	3.01	3.02	3.25	3.78	4.72	3.68	3.48	3.04	3.24	3.08	3.10
4	3.12	3.01	3.05	3.24	3.76	4.74	3.69	3.36	3.41	3.25	3.07	3.10
5	3.14	3.02	3.02	3.25	3.82	4.64	3.72	3.42	3.42	3.22	3.05	3.10
6	3.18	3.00	3.02	3.26	3.78	4.58	3.66	3.40	3.43	3.20	3.03	3.10
7	3.18	3.00	3.03	3.30	3.72	4.59	3.58	3.32	3.25	3.20	3.00	3.10
8	3.20	3.02	3.05	3.32	3.88	4.58	3.54	3.26	3.19	3.20	3.08	3.12
9	3.18	3.01	3.05	3.38	3.90	4.55	3.50	3.24	3.19	3.18	3.10	3.10
10	3.14	2.98	3.03	3.42	4.04	4.50	3.45	3.21	3.16	3.15	3.14	3.14
11	3.10	2.95	3.10	3.46	4.12	4.38	3.42	3.20	3.19	3.16	3.12	3.14
12	3.10	3.01	3.10	3.46	4.20	4.36	3.42	3.24	3.24	3.16	3.11	3.10
13	3.10	3.01	3.12	3.38	4.12	4.36	3.41	3.28	3.22	3.15	3.11	3.00
14	3.12	3.02	3.15	3.37	4.14	4.34	3.35	3.20	3.24	3.16	3.14	2.98
15	3.12	2.98	3.25	3.42	4.06	4.28	3.32	3.20	3.24	3.17	3.14	2.90
16	3.12	2.96	3.25	3.23	4.00	4.27	3.28	3.22	3.22	3.18	3.13	2.93
17	3.10	2.98	3.35	3.28	3.98	4.19	3.31	3.15	3.26	3.33	3.11	2.93
18	3.10	2.97	3.42	3.36	3.92	4.14	3.31	3.11	3.38	3.35	3.06	2.90
19	3.10	2.97	3.45	3.39	3.90	4.15	3.37	3.10	3.42	3.36	3.05	2.90
20	3.10	2.98	3.48	3.50	3.86	4.15	3.36	3.10	3.44	3.34	3.10	2.95
21	3.10	3.00	3.50	3.62	3.88	4.12	3.34	3.10	3.44	3.34	3.18	3.00
22	3.12	2.98	3.50	3.59	3.90	4.04	3.29	3.10	3.42	3.34	3.10	3.00
23	3.10	2.98	3.58	3.52	3.99	3.96	3.24	3.08	3.41	3.26	3.10	3.00
24	3.08	2.98	3.65	3.56	4.00	3.96	3.18	3.06	3.38	3.23	3.12	3.10
25	3.08	2.97	3.68	3.60	3.88	3.88	3.16	3.03	3.36	3.21	3.10	3.05
26	3.10	2.97	3.58	3.68	3.96	3.86	3.12	3.01	3.34	3.20	3.08	3.05
27	3.10	2.98	3.58	3.82	3.96	3.84	3.10	3.01	3.31	3.12	3.12	3.00
28	3.10	2.98	3.55	3.90	4.10	3.80	3.50	3.04	3.28	3.05	3.18	3.00
29	3.05	.....	3.50	3.96	4.35	3.93	3.80	3.03	3.21	3.15	3.10	3.02
30	3.03	.....	3.55	3.91	4.46	3.88	3.78	3.00	3.21	3.10	3.10	3.05
31	3.00	.....	3.30	.....	4.61	.....	3.58	3.00	.....	3.08	.....	3.05

NOTE.—Gage heights practically unaffected by ice.

Daily discharge, in second-feet, of Williams Fork near Sulphur Springs, Colo., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	66	51	50	76	218	748	202	120	53	68	58	58
2	63	50	52	76	202	674	180	111	53	70	58	58
3	60	51	52	74	202	825	166	111	53	72	56	60
4	60	51	54	73	195	845	169	89	97	74	56	58
5	62	52	52	74	218	748	180	99	99	70	54	58
6	66	50	52	75	202	692	159	95	101	68	52	58
7	66	50	52	80	180	701	135	83	74	68	50	58
8	68	52	54	83	242	692	125	75	67	68	56	60
9	66	51	54	92	250	665	115	72	67	66	58	58
10	62	49	52	99	315	620	105	69	64	63	62	62
11	58	47	58	107	356	525	99	68	67	64	60	62
12	58	51	58	107	400	510	99	72	72	64	59	58
13	58	51	60	92	356	510	97	78	70	63	59	50
14	60	52	63	90	367	495	88	68	72	64	62	49
15	60	49	74	99	325	452	83	68	72	65	62	44
16	60	48	74	72	295	446	78	70	70	66	61	46
17	58	49	88	78	286	394	82	63	75	84	59	46
18	58	48	99	89	259	367	82	59	92	88	55	44
19	58	48	105	94	250	372	90	58	99	89	54	44
20	58	49	111	115	234	372	89	58	103	86	58	44
21	58	50	115	146	242	356	86	58	103	86	66	50
22	60	49	115	138	250	315	79	58	99	86	58	50
23	58	49	135	120	290	277	73	56	97	75	58	50
24	56	49	156	130	295	277	66	55	92	71	60	58
25	56	48	166	140	242	242	64	52	89	69	58	54
26	58	48	135	166	277	234	60	51	86	68	56	54
27	58	49	135	218	277	226	58	51	82	60	60	50
28	58	49	128	250	345	210	115	53	78	54	66	50
29	54	.....	115	277	502	264	210	52	69	63	58	52
30	52	.....	128	254	588	242	202	50	69	58	58	54
31	50	.....	80	.....	720	.....	135	50	.....	56	.....	54

NOTE.—Daily discharge determined from a rating curve well defined between 40 and 350 second-feet.

Monthly discharge of Williams Fork near Sulphur Springs, Colo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	68	50	59.5	3,660	B.
February	52	47	49.6	2,760	B.
March	166	50	87.8	5,400	B.
April	277	72	119	7,080	A.
May	720	180	303	18,600	A.
June	845	210	477	28,400	B.
July	210	58	115	7,070	A.
August	120	50	70.1	4,310	A.
September	103	53	79.5	4,730	B.
October	89	54	69.9	4,300	A.
November	62	50	58.2	3,460	B.
December	62	44	53.4	3,280	B.
The year	845	44	128	93,000	

BLUE RIVER BASIN.

BLUE RIVER AT DILLON, COLO.

Blue River rises among the peaks of the Continental Divide in the extreme southeastern part of Summit County, Colo., and flows in a general northwesterly direction to its junction with Grand River above the point where the latter stream enters Gore Canyon.

This station, which is located at the second bridge on the road past the depot from the town to the cemetery, was established October 15, 1910.

The gage is a vertical rod fastened to the right abutment on the downstream side of the bridge.

High-stage measurements are made from the bridge. At ordinary and low stages measurements are made by wading just below the bridge.

No water is diverted above this station.

Gage heights are furnished by the Forest Service.

The following discharge measurement was made by S. T. Harding:

October 15, 1910: Width, 31 feet; area, 41 square feet; gage height, 1.50 feet; discharge, 41 second-feet.

Daily gage height, in feet, of Blue River at Dillon, Colo., for 1910.

[I. W. Blundell, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1			1.6	11				21		1.4	
2		1.4		12		1.3	1.8	22	1.45		
3		1.35		13				23			1.9
4				14				24	1.45		
5				15	1.5			25			
6			2.0	16		1.3		26		1.5	
7		1.4		17	1.4	1.3		27			
8		1.4		18	1.4	1.4		28	1.5		
9				19			2.0	29	1.6		
10		1.4		20	1.5			30		1.5	
								31			

NOTE.—Gage heights during December affected by ice.

TENMILE CREEK AT DILLON, COLO.

This station, which is located at the highway bridge about 400 yards past the depot at Dillon on the cemetery road and about 300 yards above the mouth of the creek, was established October 15, 1910.

The drainage area above this station is 125 square miles.

The gage is a vertical rod fastened to the downstream left side of center triangular pier of bridge.

High-stage measurements will be made from the bridge. At low and ordinary stages measurements are made by wading below the bridge.

No water is diverted above this station.

Gage heights are furnished by the Forest Service.

The following discharge measurement was made by S. T. Harding:

October 15, 1910: Width, 28 feet; area, 44 square feet; gage height, 1.82 feet, discharge, 27 second-feet.

Daily gage height, in feet, of Tenmile Creek at Dillon, Colo., for 1910.

[I. W. Blundell, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	.....	.....	1.9	11	.....	.....	.....	21	.....	1.6	.....
2	.....	1.7	.....	12	.....	1.6	2.1	22	1.75	.....	.....
3	.....	1.8	.....	13	.....	.....	.....	23	.....	.....	2.0
4	.....	.....	.....	14	.....	.....	.....	24	1.75	.....	.....
5	.....	.....	.....	15	1.8	.....	.....	25	.....	.....	.....
6	.....	.....	2.9	16	.....	1.7	.....	26	.....	1.7	.....
7	.....	1.8	.....	17	1.8	1.8	.....	27	.....	.....	.....
8	.....	1.8	.....	18	1.8	1.8	.....	28	1.8	.....	.....
9	.....	.....	.....	19	.....	.....	1.8	29	1.9	.....	.....
10	.....	1.75	.....	20	1.7	.....	.....	30	.....	1.7	.....
								31	.....	.....	.....

NOTE.—Gage heights during December affected by ice.

SNAKE RIVER AT DILLON, COLO.

This station, which is located at the first bridge 200 yards above the mouth on the road to Sterne Siding, was established October 15, 1910.

Water is diverted above this station by the Summit County Power Co.

The gage is a vertical rod fastened to the right abutment on the downstream side of the bridge.

High-stage measurements are made from the bridge. At low stages measurements are made by wading near the bridge.

The gage heights are furnished by the Forest Service.

The following discharge measurement was made by S. T. Harding:

October 15, 1910: Width, 14 feet; area, 9 square feet; gage height, 0.70 feet; discharge, 9.8 second-feet.

Daily gage height, in feet, of Snake River at Dillon, Colo., for 1910.

[I. W. Blundell, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1			0.9	11				21		0.5	
2		0.8		12		0.6	1.5	22	0.65		
3		.8		13				23			0.6
4				14				24	.65		
5				15	0.7			25			
6			.9	16		.7		26		.6	
7		.8		17	.6	.6		27			
8		.6		18	.6	.7		28	.7		
9				19			1.0	29	.8		
10		.7		20	.6			30		.6	
								31			

NOTE.—Gage heights during December affected by ice.

ROARING FORK BASIN.

ROARING FORK AT GLENWOOD SPRINGS, COLO.

Roaring Fork, one of the largest tributaries of the Grand, drains an area lying chiefly in Pitkin County and reaches to the summit of the Continental Divide. Frying Pan and Crystal rivers are its most important branches.

This station, which is located on a single-span wooden road bridge about four blocks west of Grand Avenue, Glenwood Springs, and about 500 feet above the junction of Roaring Fork with Grand River, was established April 6, 1906, discontinued September 30, 1909, and reestablished September 21, 1910.

A number of small irrigation ditches divert water from the stream and its tributaries. Three important power plants, located on Crystal River, Yule Creek, and Maroon and Castle creeks, develop 2,100 horsepower. A number of smaller plants are also in operation in this basin. The drainage area above this station is 1,450 square miles.

A chain gage, unchanged in location or datum, is attached to the bridge.

As the stream bed is very rough conditions are unfavorable for accurate measurements. The channel is, however, fairly permanent.

Slush and anchor ice are common at this station, but solid ice rarely covers the river. At extremely high stages in Grand River backwater from that stream may somewhat affect the relation between gage height and discharge at this station.

In general the results of observations at this station are satisfactory.

Since the reestablishment of the station gage heights have been furnished by the Forest Service.

Discharge measurements of Roaring Fork at Glenwood Springs, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 21	G. H. Russell	150	272	1.92	834
Nov. 20	do	149	193	1.30	465
29	C. L. Chatfield	158	183	1.30	448
Dec. 30	G. H. Russell	115	132	1.02	290

Daily gage height, in feet, and discharge, in second-feet, of Roaring Fork at Glenwood Springs, Colo., for 1910.

Day.	September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			1.7	690	1.4	485	1.3	430
2			1.8	760	1.4	485	1.3	430
3			1.8	760	1.5	550	1.3	430
4			1.8	760	1.65	655	1.3	430
5			1.7	690	1.5	550	1.1	335
6			1.7	690	1.4	485	1.25	405
7			1.7	690	1.4	485	1.3	430
8			1.4	485	1.5	550	1.3	430
9			1.4	485	1.5	550	1.3	430
10			1.4	485	1.5	550	1.3	430
11			1.4	485	1.45	518	1.5	430
12			1.4	485	1.5	550	1.5	430
13			1.4	485	1.5	550	1.5	430
14			1.4	485	1.4	485	1.5	430
15			1.4	485	1.4	485	1.5	430
16			1.45	518	.....	485	.....	400
17			1.7	690	.....	470	.....	400
18			1.7	690	.....	460	.....	400
19			1.7	690	.....	455	.....	400
20			1.6	620	.....	455	.....	400
21	1.9	840	1.5	550	1.2	380	.....	350
22	1.95	885	1.7	690	1.45	518	.....	350
23	1.85	800	1.6	620	1.4	485	.....	350
24	1.8	760	1.55	585	1.4	485	.....	350
25	1.75	725	1.5	550	1.4	485	.....	350
26	1.8	760	1.55	585	1.3	430	.....	300
27	1.7	690	1.5	550	1.4	485	.....	300
28	1.8	760	1.4	485	1.3	430	.....	300
29	1.8	760	1.4	485	1.3	430	.....	300
30	1.7	690	1.4	485	1.3	430	.....	290
31	.....	.....	1.4	485	.....	.....	.....	290

NOTE.—Daily discharge determined from a well-defined discharge rating curve. Discharge Nov. 16 to 20 and Dec. 11 to 31 estimated. Ice present Dec. 11 to 31.

Monthly discharge of Roaring Fork at Glenwood Springs, Colo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
September 21–30	885	690	767	15,200	A.
October	760	485	587	36,100	B.
November	655	.....	494	29,400	B.
December	.....	.....	383	23,600	C.
The period	.....	.....	.....	104,000	

CRYSTAL RIVER NEAR MARBLE, COLO.

This station, which is located at the electric railway bridge near Marble, Colo., was established November 1, 1910. The drainage area above this station is 66 square miles.

The gage is of the hook type, consisting of a wooden rod with steel hook, which slides in ways fastened to the frame of the bridge. Readings are taken on the rod by means of a stationary iron indicator.

At low stages measurements can be made by wading; a cable and car will be installed for high-stage measurements.

No measurements were made during 1910.

Daily gage height, in feet, of Crystal River near Marble, Colo., for 1910.

[H. V. Knouse, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1	2.1	1.9	11	2.1	1.95	21	2.0	1.95
2	2.1	1.95	12	2.05	2.0	22	2.05	1.95
3	2.05	2.0	13	2.05	1.95	23	2.1	1.95
4	2.15	2.05	14	2.05	1.95	24	2.0	1.95
5	2.1	2.0	15	2.05	1.95	25	2.1	1.95
6	2.0	1.95	16	2.05	1.95	26	2.05	2.0
7	2.0	2.05	17	2.05	1.95	27	2.05	1.95
8	2.05	2.0	18	2.05	1.95	28	1.95	1.95
9	2.1	2.0	19	2.05	1.95	29	2.0	1.9
10	2.0	2.0	20	1.9	1.95	30	1.95	1.95
						31	.....	1.95

DIVIDE CREEK BASIN.

GENERAL FEATURES.

Divide Creek enters Grand River from the south about 6 miles below Newcastle, Colo. It is formed by East and West Divide creeks, which unite a few miles below the mouth of the stream. The run-off in this basin is derived chiefly from melting snows and from rain.

WEST DIVIDE CREEK AT BEARD'S RANCH, NEAR RAVEN CREEK, COLO.

This station, which is located at Beard's ranch, 1¼ miles below the head gates of the High Line ditch, was established April 28, 1910, and replaces the station maintained from July 27 to September 20, 1909, at Hostutler's ranch, one-fourth mile below the head gates of the ditch.

The drainage area above this station is 82 square miles.

The gage is a vertical rod fastened to an overhanging tree on the left bank 100 yards upstream from the ranch house.

The stream bed is composed of small bowlders and gravel and may shift somewhat.

At low and medium stages discharge measurements are made by wading at selected sections; at high stages they are made from a foot log 50 yards upstream from the gage.

Discharge measurements of West Divide Creek at Beard's ranch, near Raven, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 28	W. B. Freeman	20	67	2.68	225
May 18	do	18.5	55	2.00	117
July 7	G. H. Russell	13	5	.69	.6

Daily gage height, in feet, of West Divide Creek at Beard's ranch, near Raven, Colo., for 1910.

[John W. Beard, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.5	1.9	0.75	0.45	0.0	0.3	0.8	0.8
2	.....	2.4	1.8	.75	.5	.0	.35	.8	.8
3	.....	2.25	1.8	.75	.4	.0	.5	.8	.8
4	.....	2.2	1.6	.7	.35	.6	.55	.9	.7
5	.....	2.4	1.5	.65	.5	.7	.5	.8	.65
6	.....	2.3	1.35	.75	.6	.5	.45	.8	.65
7	.....	2.2	1.2	.7	.6	.45	.45	.8	.7
8	.....	2.3	1.1	.65	.45	.4	.45	.8	.8
9	.....	2.5	1.2	.6	.35	.3	.5	.8	.9
10	.....	2.65	1.25	.55	.2	.3	.5	.8	.85
11	.....	2.6	1.3	.5	.0	.1	.55	.8	.9
12	.....	2.55	1.3	.55	.0	.0	.5	.8	.9
13	.....	2.4	1.3	.5	.25	.0	.6	.8	.9
14	.....	2.4	1.25	.5	.6	.0	.6	.8	.95
15	.....	2.3	1.2	.45	.5	.0	.7	.8	.95
16	.....	2.2	1.2	.5	.5	.0	.8	.65	.95
17	.....	2.1	1.15	.45	.4	.0	1.0	.65	.8
18	.....	2.0	1.1	.45	.3	.0	.9	.65	.8
19	.....	2.0	1.1	.4	.2	.25	.9	.7	.8
20	.....	1.95	1.05	.45	.0	.45	.85	.7	.8
21	.....	1.9	1.0	.4	.0	.4	.8	.7	.8
22	.....	1.8	.95	.35	.0	.5	.8	.65	.8
23	.....	1.8	.9	.3	.0	.5	.8	.7	.8
24	.....	1.7	.85	.25	.0	.45	.75	.7	.8
25	.....	1.7	.85	.1	.0	.4	.8	.75	.8
26	.....	1.6	.85	.0	.0	.3	.75	.8	.8
27	.....	1.55	.8	.0	.0	.3	.8	.8	.8
28	.....	1.6	.85	.0	.0	.35	.8	.75	.8
29	2.85	1.7	.85	.0	.0	.3	.8	.8	.8
30	2.7	1.9	.85	.15	.0	.3	.8	.8	.75
31	.....	1.95	.....	.55	.0	.....	.75	.....	.75

NOTE.—Gage heights Dec. 11–16 affected by ice.

Daily discharge, in second-feet, of West Divide Creek at Beard's ranch, near Raven, Colo., for 1910.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		194	103	7.5	2.5	0	1.0	9	9
2		178	89	7.5	3	0	1.5	9	9
3		154	89	7.5	2	0	3	9	9
4		147	65	6	1.5	4	3.5	13	6
5		178	54	5	3	6	3	9	5
6		162	40	7.5	4	3	2.5	9	5
7		147	29	6	4	2.5	2.5	9	6
8		162	22	5	2.5	2	2.5	9	9
9		194	29	4	1.5	1	3	9	13
10		218	32	3.5	.5	1	3	9	11
11		210	36	3	0	.2	3.5	9	10
12		202	36	3.5	0	0	3	9	10
13		178	36	3	.8	0	4	9	10
14		178	32	3	4	0	4	9	10
15		162	29	2.5	3	0	6	9	10
16		147	29	3	3	0	9	5	10
17		132	25	2.5	2	0	17	5	9
18		117	22	2.5	1	0	13	5	9
19		117	22	2	.5	.8	13	6	9
20		110	20	2.5	0	3	11	6	9
21		103	17	2	0	2	9	6	9
22		89	15	1.5	0	3	9	5	9
23		89	13	1	0	3	9	6	9
24		77	11	.8	0	2.5	7.5	6	9
25		77	11	.2	0	2	9	6.5	9
26		65	11	0	0	1	7.5	9	9
27		60	9	0	0	1	9	9	9
28		65	11	0	0	1.5	9	7.5	9
29	252	77	11	0	0	1	9	9	9
30	227	103	11	.4	0	1	9	9	7.5
31		110		3.5	0		7.5		7.5

NOTE.—Daily discharge determined from a discharge rating curve fairly well defined. Discharge Dec. 11-16 estimated.

Monthly discharge of West Divide Creek at Beard's ranch, near Raven, Colo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May	218	60	136	8,360	A.
June	103	9	32.0	1,900	B.
July	7.5	0	3.11	191	B.
August	4	0	1.25	77	C.
September	6	0	1.38	82	C.
October	17	1	6.56	403	B.
November	13	5	7.97	474	B.
December	13	5	8.84	544	B.
The period				12,000	

WEST DIVIDE CREEK AT RAVEN, COLO.

This station, which is located at Ewer's ranch, at Raven, 18 miles southeast of Rifle and 15 miles southwest of Newcastle, was established September 20, 1910, replacing the station established three-quarter mile above on July 27, 1909.

The drainage area above this station is 136 square miles.

The gage is a vertical rod. No determined relation exists between this gage and the one at the old location.

As at the old location discharge measurements are made by wading.

Discharge measurements of West Divide Creek at Raven, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 28	W. B. Freeman	24	52	2.83	294
Mar. 15	Freeman and Vickery	29	22	1.60	25
May 18	W. B. Freeman	23.5	32	2.10	74
July 7	G. H. Russell	9.5	10	1.15	3.7
Sept. 3	do	.....	.....	.80	*a*.3
20[b]	do	.....	.....	1.15	*a*.75

[a] Discharge estimated. [b] New station at Ewer's ranch.

Daily gage height, in feet, of West Divide Creek at Raven, Colo., for 1910.

[Collins and Ewer, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.3	1.2	1.2	2.05	2.55	2.0	1.1	.....	.....	1.1	1.2	1.4
2	1.3	1.2	1.2	2.05	2.5	1.9	1.05	.....	.....	1.2	1.2	1.4
3	1.3	1.2	1.2	2.05	2.5	1.9	1.1	.....	.....	1.25	1.2	1.4
4	1.3	1.2	1.2	1.85	2.5	1.8	1.1	.....	.....	1.25	1.35	1.4
5	1.25	1.2	1.2	2.1	2.5	1.6	1.15	.....	.....	1.2	1.25	1.5
6	1.25	1.2	1.35	2.1	2.5	1.5	1.15	.....	.....	1.2	1.3	1.4
7	1.25	1.2	1.35	2.1	2.4	1.4	1.15	.....	.....	1.2	1.3	1.4
8	1.25	1.2	1.3	2.1	2.4	1.3	1.1	.....	.....	1.2	1.25	1.4
9	1.25	1.2	1.35	2.1	2.5	1.2	1.15	.....	.....	1.2	1.25	1.4
10	1.25	1.2	1.35	2.2	2.7	1.4	1.15	.....	.....	1.15	1.25	1.4
11	1.2	1.2	1.4	2.2	2.7	1.2	1.1	.....	.....	1.2	1.25	1.4
12	1.2	1.2	1.35	2.2	2.7	1.15	1.1	.....	.....	1.2	1.25	1.4
13	1.2	1.2	1.8	2.2	2.5	1.3	1.05	.....	.....	1.2	1.25	1.3
14	1.2	1.2	1.8	2.2	2.5	1.3	1.05	.....	.....	1.2	1.25	1.3
15	1.2	1.2	1.8	2.2	2.4	1.2	1.05	.....	.....	1.2	1.3	1.3
16	1.2	1.2	1.8	2.2	2.3	1.3	1.0	.....	.....	1.4	1.3	1.3
17	1.2	1.2	1.85	2.35	2.3	1.3	1.0	.....	.....	1.65	1.3	1.3
18	1.2	1.2	1.9	2.45	2.3	1.25	1.0	.....	.....	1.7	1.35	1.3
19	1.2	1.2	1.9	2.55	2.2	1.15	0.95	.....	.....	1.6	1.35	1.3
20	1.2	1.2	1.85	2.75	2.2	1.1	0.95	.....	1.15	1.5	1.25	1.3
21	1.2	1.2	1.85	2.75	2.2	1.1	0.9	.....	1.15	1.45	1.25	1.3
22	1.2	1.2	1.85	2.45	2.1	1.1	0.9	.....	1.15	1.4	1.25	1.3
23	1.2	1.2	1.85	2.55	1.7	1.1	0.9	.....	1.15	1.4	1.3	1.3
24	1.2	1.2	1.95	2.85	1.7	1.1	0.85	.....	1.15	1.35	1.3	1.3
25	1.2	1.2	1.95	2.85	1.7	1.05	0.85	.....	1.15	1.2	1.3	1.3
26	1.2	1.2	1.95	2.85	1.9	1.05	0.8	.....	1.1	1.2	1.3	1.3
27	1.2	1.2	1.95	2.85	1.8	1.15	0.8	.....	1.1	1.25	1.3	1.3
28	1.2	1.2	1.95	2.85	1.8	1.1	0.9	.....	1.1	1.25	1.3	1.3
29	1.2	.....	1.95	2.95	1.8	1.2	0.9	.....	1.1	1.3	1.4	1.3
30	1.2	.....	1.95	2.75	2.1	1.2	0.9	.....	1.1	1.3	1.4	1.3
31	1.2	.....	1.95	.....	2.05	.....	.....	.....	.....	1.2	.....	1.3

NOTE.—No record of any effect of ice. Gage heights beginning Sept. 20 not comparable to previous gage heights in 1910.

Daily discharge, in second-feet, of West Divide Creek at Raven, Colo., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1....	8.5	5.0	5.0	68	186	61	2.5	16....	5.0	5.0	40	92	114	8.5	1.0
2....	8.5	5.0	5.0	68	170	50	1.8	17....	5.0	5.0	45	127	114	8.5	1.0
3....	8.5	5.0	5.0	68	170	50	2.5	18....	5.0	5.0	50	155	114	6.8	1.0
4....	8.5	5.0	5.0	45	170	40	2.5	19....	5.0	5.0	50	186	92	3.8	.8
5....	6.8	5.0	5.0	74	170	25	3.8	20....	5.0	5.0	45	260	92	2.5	.8
6....	6.8	5.0	11	74	170	18	3.8	21....	5.0	5.0	45	260	92	2.5	.6
7....	6.8	5.0	11	74	140	13	3.8	22....	5.0	5.0	45	155	74	2.5	.6
8....	6.8	5.0	8.5	74	140	8.5	2.5	23....	5.0	5.0	45	186	32	2.5	.6
9....	6.8	5.0	11	74	170	5.0	3.8	24....	5.0	5.0	56	302	32	2.5	.4
10....	6.8	5.0	11	92	240	13	3.8	25....	5.0	5.0	56	302	32	1.8	.4
11....	5.0	5.0	13	92	240	5.0	2.5	26....	5.0	5.0	56	302	50	1.8	.3
12....	5.0	5.0	11	92	240	3.8	2.5	27....	5.0	5.0	56	302	40	3.8	.3
13....	5.0	5.0	40	92	170	8.5	1.8	28....	5.0	5.0	56	302	40	2.5	.6
14....	5.0	5.0	40	92	170	8.5	1.8	29....	5.0	.....	56	344	40	5.0	.6
15....	5.0	5.0	40	92	140	5.0	1.8	30....	5.0	.....	56	260	74	5.0	.6
								31....	5.0	.....	56	.....	68	.....	.6

NOTE.—Daily discharge determined from a well-defined discharge rating curve. Estimates subsequent to July not available, as the new section has not been rated.

Monthly discharge of West Divide Creek at Raven, Colo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	8.5	5.0	5.80	357	B.
February	5.0	5.0	5.00	278	B.
March	56	5.0	33.4	2,050	A.
April	344	45	157	9,340	A.
May	240	32	122	7,500	A.
June	61	1.8	12.5	744	A.
July	3.8	.3	1.66	102	B.
The period				20,400	

MAMM CREEK BASIN.

WEST MAMM CREEK NEAR RIFLE, COLO.

Mamm Creek, which enters Grand River from the south about 4 miles upstream from Rifle, Colo., is formed by the junction of West Mamm, East Mamm, and Middle Mamm creeks, all of which rise on the north side of Battlement Mesa.

The flow of this stream is supplied by melting snow in the spring and by rains. Its channel is usually dry or nearly so during the late summer and fall.

The gaging station was established July 26, 1909, and discontinued September 19, 1910. It was located just south of J. T. Selby's ranch house, 9 miles south of Rifle, Colo., about half a mile above the mouth of Quakenasp Gulch Creek, and three-fourths of a mile above the dam site of a proposed irrigation reservoir.

One ditch of less than 10 second-feet capacity diverts water above the station. The waste water from this ditch is returned to the creek a few feet above the staff gage.

From November 16, 1909 to March 6, 1910, a 24-inch trapezoidal sharp-edge weir, with end contractions, was used to measure the

flow of the stream. This weir is located about 50 feet downstream from the gage. Current-meter measurements were made at several sections in the vicinity of gage.

Ice exists to some extent for an extended period during the winter season. Conditions at this station are not conducive to the most accurate results, especially during the higher stages, when gage heights show great fluctuations and measurements are difficult to make.

Discharge measurements of West Mamm Creek near Rifle, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 15	Freeman and Vickery	7	1.9	0.60	2.9
Apr. 29	W. B. Freeman	6	2.3	.82	7.6
May 19	do	2	.3	.70	.4
July 7	G. H. Russell				[a] 1.0
Sept. 3	do	1.4	.6	.40	.5
19	do	1.15	.3	(b)	.53

[a] Discharge estimated. [b] Gage out of water.

Daily gage height, in feet, and discharge, in second-feet, of West Mamm Creek near Rifle, Colo., for 1910.

[J. T. Selby, observer.]

Day.	January.		February.		March.		April.		May.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	0.67	3.6	0.21	0.6	0.21	0.6	0.4	0.5	0.5	1.1
2	.33	1.3	.21	.6	.21	.6	.4	.5	.5	1.0
3	.21	.6	.21	.6	.21	.6	.4	.5	.6	2.0
4	.21	.6	.21	.6	.21	.6	.4	.5	.8	5.5
5	.21	.6	.21	.6	.21	.6	.4	.5	.8	5.0
6	.21	.6	.21	.6	.25	.8	.4	.5	.8	4.7
7	.21	.6	.21	.6	.5	1.4	.4	.5	.8	4.3
8	.21	.6	.21	.6	.6	2.9	.5	1.4	.9	6.2
9	.21	.6	.21	.6	.7	4.8	.4	.5	.9	5.8
10	.21	.6	.21	.6	.7	4.8	.4	.5	.7	1.8
11	.21	.6	.21	.6	.6	2.9	.4	.5	.8	3.2
12	.21	.6	.21	.6	.6	2.9	.4	.5	1.0	7.0
13	.21	.6	.21	.6	.6	2.9	.4	.5	1.2	11
14	.21	.6	.21	.6	.6	2.9	.4	.5	1.0	5.8
15	.21	.6	.21	.6	.7	4.8	.6	2.9	.8	1.7
16	.21	.6	.21	.6	.8	7.1	.6	2.9	.....	1.0
17	.21	.6	.21	.6	.8	7.1	.4	.5	.....	.8
18	.21	.6	.21	.6	.8	7.1	.6	2.9	.....	.6
19	.21	.6	.21	.6	.9	9.5	1.0	12	.7	.4
20	.21	.6	.21	.6	.9	9.5	.4	.5	.....	.....
21	.21	.6	.21	.6	.9	9.5	.4	.5	.....	.....
22	.21	.6	.21	.6	.9	9.5	.4	.5	.....	.....
23	.21	.6	.21	.6	.8	7.1	.4	.5	.....	.....
24	.21	.6	.21	.6	.8	7.1	.5	1.4	.....	.....
25	.21	.6	.21	.6	.5	1.4	.5	1.4	.....	.....
26	.21	.6	.21	.6	.5	1.4	.7	4.8	.....	.....
27	.21	.6	.21	.6	.5	1.4	.7	4.8	.....	.....
28	.21	.6	.21	.6	.5	1.4	.....	11.4	.....	.....
29	.25	.8	.....	.....	.4	.5	1.35	18	.....	.....
30	.25	.8	.....	.....	.5	1.4	.9	9.5	.....	.....
31	.25	.8	.....	.....	.6	2.9	.....	.....	.....	.....

NOTE.—Gage heights Jan. 1 to Mar. 6 represent heads on the weir. Regulation rod gage used Mar. 7 to May 19. Gage not read after May 19. Daily discharge Jan 1–Mar. 6 computed from the weir formula $Q=3.33LH^{\frac{3}{2}}$. (See Water-Supply Paper 200, p. 162.) Discharge Mar. 7 to Apr. 29 obtained from gage heights and a curve which is fairly well defined. Indirect method for shifting channel was used Apr. 30 to May 19.

Monthly discharge of West Mamm Creek near Rifle, Colo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	3.6	0.6	0.74	45	A.
February	.6	.6	.60	33	A.
March	9.5	.5	3.81	234	B.
April	18	.5	2.75	164	B.
May 1–19	11	.4	3.63	133	C.

GUNNISON RIVER BASIN.

GENERAL FEATURES.

Gunnison River is formed in Gunnison County, Colo., by East and Taylor rivers, two streams that rise among the snow-covered peaks and on the slopes of the Continental Divide in the northeastern part of the county, descend through narrow mountain valleys, and unite about 12 miles above Gunnison. From the junction of these rivers the Gunnison flows west and southwest to the point where it enters Grand River at Grand Junction, in the central part of Mesa County, Colo.

The upper course of the river lies through a broad, mountainous valley, but near the mouth of Lake Fork the valley narrows and the river enters Black Canyon of the Gunnison, through which it winds in a tortuous course for 56 miles between granite walls that rise precipitously 3,000 feet above the water's edge. A short distance below the mouth of North Fork, the largest tributary of the river, the canyon walls break abruptly, and the stream enters a broad and fertile valley. Below Delta the river enters another canyon, with walls averaging 800 feet in height, and this continues irregularly to Grand Junction, only a few tracts of narrow bottom land lying between the channel and the canyon walls.

The soil of the lower valleys is chiefly adobe, and the higher mesas contain much gravel and sand. Groves of quaking aspen interspersed with large, open grazing plots cover broad areas of this plateau region. On the top of the Grand Mesa are forests of pine and aspen, and along the foothills grow piñon and cedar. In the valleys chico and sagebrush form the principal vegetation, except along the streams, which are bordered in places by cottonwood, willow, and undergrowth.

The chief tributaries of the Gunnison are Ohio, Tomichi, Lake Fork, and Cimarron creeks, and Smith, North Fork, and Uncompahgre rivers, North Fork being the largest. All the tillable lands of the North Fork and its tributaries have been brought under cultivation, and irrigation is practiced to such an extent that the entire flow is needed for existing systems. Ohio, Tomichi, Lake Fork, and Cimarron creeks are perennial streams, but almost their entire volume is

diverted for irrigation during the growing season, so that very little water reaches the Gunnison except at times of heavy storms or during spring floods.

Precipitation records for the Gunnison are meager. Those which exist show a range from 9 inches in the plateau region to about 25 inches in the mountains.

The run-off of the Gunnison drainage basin is conserved to a large extent by four national forests, which have a total area of about 5,700 square miles, of which approximately 3,800 square miles are located within the basin. About 65 per cent of this area is in standing timber, the remainder being classified as sagebrush, barren, and burned. Investigation of the headwaters of East River and other tributaries in Gunnison County several years ago discovered that many of the hills had been almost entirely denuded of their timber, a discovery to which may be attributed the setting aside of the areas as forests.

Along Gunnison River proper above the mouth of Lake Fork a number of ditches divert water for meadow irrigation, and irrigation is extensively practiced in the vicinity of Delta. The largest irrigated area in the Gunnison drainage basin is the Uncompahgre Valley. (See p. 150.)

The country is not adapted for large reservoirs, the meadows having so much fall and the valleys being so narrow that construction would be expensive in proportion to reservoir capacity. However, a large number of small reservoirs exist on the Gunnison and its tributaries, which can be advantageously utilized for power.

Power plants at present in operation in this basin develop about 2,200 horsepower, and there are many sites unutilized. The fall along some of the streams is heavy, ranging from 50 to 150 feet to the mile. Along the Uncompahgre, from its source to the 8,000-foot contour, the fall is almost 300 feet to the mile. At the present time the waters in this basin are being used for domestic purposes, irrigation, and power. By utilizing all the available storage it would theoretically be possible to develop about 200,000 horsepower. Along the South canal of the United States Reclamation Service, which receives the water from the Gunnison tunnel and carries it into Uncompahgre River, a series of drops will make possible the development of 5,000 to 10,000 horsepower.

Since 1903 the wettest year was 1909 and the driest 1904. By comparison with other drainage basins adjacent to the Gunnison, however, it is evident that 1902 was a drier year than 1904.

TAYLOR RIVER AT ALMONT, COLO.

This station, which is located at the wagon bridge at Almont, 100 yards above the confluence of Taylor and East rivers, in sec. 22, T. 51 N., R. 1 E., New Mexico principal meridian, was established July 27, 1910, by the United States Reclamation Service.

The gage is a vertical rod spiked to the downstream side of the center pier.

Discharge measurements are made from downstream side of the bridge.

A station was maintained on Taylor River 14 miles above Almont from April 17 to November 24, 1905.

Discharge measurements of Taylor River at Almont, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 27	E. H. Swett	58	116	1.90	195
Sept. 29	do	62	110	1.78	150

Daily gage height, in feet, and discharge, in second-feet, of Taylor River at Almont, Colo., for 1910.

[J. K. McClanahan, observer.]

Day.	November.		December.		Day.	November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.75	140	1.6	100	16	1.65	112	1.6	100
2	1.75	140	1.6	100	17	1.65	112	1.6	100
3	1.75	140	1.6	100	18	1.65	112	1.6	100
4	1.75	140	1.6	100	19	1.6	100	1.6	100
5	1.75	140	1.6	100	20	1.6	100	1.7	125
6	1.75	140	1.6	100	21	1.6	100	1.7	125
7	1.75	140	1.6	100	22	1.7	125	1.7	125
8	1.75	140	1.6	100	23	1.7	125	1.7	125
9	1.75	140	1.7	125	24	1.7	125	1.7	125
10	1.75	140	1.7	125	25	1.7	125	1.7	125
11	1.75	140	1.7	125	26	1.7	125	1.7	125
12	1.7	125	1.7	125	27	1.7	125	1.7	125
13	1.7	125	1.7	125	28	1.7	125	1.7	125
14	1.7	125	1.6	100	29	1.65	112	1.6	100
15	1.7	125	1.6	100	30	1.65	112	1.6	100
					31			1.6	100

NOTE.—These discharges are obtained from a well-defined curve that is based on 1910 and 1911 discharge measurements. No notes in regard to ice.

Monthly discharge of Taylor River at Almont, Colo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
November	140	100	126	7,500	A.
December	125	100	111	6,820	A.

GUNNISON RIVER NEAR GUNNISON, COLO.

This station, which is located at the county bridge 2 miles below Gunnison and about 1½ miles above the mouth of Tomichi Creek, was established November 25, 1910.

A chain gage is fastened to the upstream side of the bridge.

Discharge measurements at normal stages are made by wading above the bridge; high-stage measurements are made from the upstream side of the bridge, which makes an angle with the current.

Water is diverted at points both above and below the station.

The gage heights are furnished through the courtesy of Mrs. C. W. Chinery.

The following discharge measurement was made by G. H. Russell:

Nov. 21, 1910: Width 124 feet, area 204 square feet; discharge 219 second-feet.

Daily gage height, in feet, of Gunnison River near Gunnison, Colo., for 1910.

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1				0.5	16				0.5
2				.5	17				.3
3				.6	18				.3
4				.5	19				.4
5				.4	20	1.15			.5
6				.3	21				.6
7				.5	22				.5
8				.6	23				.4
9				.7	24				.6
10				.7	25			0.5	.5
11				.7	26			.4	.6
12				.7	27			.5	.7
13				.5	28			.4	.7
14				.4	29			.6	.5
15				.6	30			.5	.6
					31				.5

GUNNISON RIVER AT RIVER PORTAL, COLO.[1]

This station, which is located about 300 feet above the portal of the Gunnison tunnel, about 21 miles northeast of Montrose, about 8 miles below the mouth of Crystal Creek, and above North Fork and Uncompahgre River, was established April 7, 1905, replacing the station at Cimarron, about 12 miles above.

A number of small ditches divert water for meadow irrigation above the station. The largest diversion along the river, and also in Colorado, is the recently completed Gunnison tunnel, with a capacity of about 1,300 second-feet, which diverts the water from the Gunnison into the Uncompahgre Valley.[2]

The original staff gage, which was bolted to the cliff on the right bank of the river, was dislodged by driftwood on June 4, 1909. Prior to this date no change occurred in the location or datum of this gage. From June 5 to 19 an old high-water gage, about 100 feet upstream on the left bank, was read. The datum of this gage is 10.08 feet lower than that of the original gage. The readings were reduced to the original datum. This auxiliary gage could not be used after June 19, as the water surface had fallen too low. On

[1] This station was referred to in previous reports as "at east portal of Gunnison tunnel."

[2] The Gunnison tunnel and Uncompahgre project are described in the reports of the United States Reclamation Service.

August 9, 1909, a new staff gage was installed at the same location and datum as the original gage. This gage was broken off by ice November 20, 1909, and reestablished at same location and datum March 16, 1910.

Discharge measurements were made from a cable a few feet downstream from the original gage site.

Ice covers the river about four months each year, attaining a thickness of 1 to 2 feet. No winter records of discharge have been obtained.

This station is maintained under the supervision of the United States Reclamation Service. Computations of discharge have been made by engineers of the United States Geological Survey.

Discharge measurements of Gunnison River at River Portal, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 25	Swett and Moser	200	1,510	10.55	5,900
June 4	....do	210	1,840	12.40	9,320
July 8	Moser and Bryan	149	744	6.40	1,100
Aug. 11	Moser and Bunter	148	710	6.30	1,050
Oct. 5	E. H. Swett	147	568	5.32	587

Daily gage height, in feet, of Gunnison River at River Portal, Colo., for 1910.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	7.3	11.1	12.85	7.8	6.8	5.7	5.35	5.4
2	.....	7.6	10.75	12.65	7.7	6.6	5.7	5.35	5.4
3	.....	7.5	10.4	12.85	7.6	6.5	5.7	5.45	5.45
4	.....	7.5	10.15	12.4	7.6	6.35	6.0	5.4	5.55
5	.....	7.2	10.3	12.15	7.6	6.6	6.1	5.35	5.7
6	.....	7.5	10.2	11.6	7.55	6.9	6.05	5.3	5.55
7	.....	7.5	10.05	11.45	7.4	6.65	5.9	5.3	5.45
8	.....	7.7	10.0	11.2	7.25	6.4	5.7	5.25	5.4
9	.....	7.8	.....	10.85	7.1	6.3	5.55	5.2	5.35
10	.....	8.1	11.55	10.5	6.95	6.35	5.5	5.2	5.4
11	.....	8.5	12.1	10.35	6.8	6.25	5.4	5.2	5.4
12	.....	8.7	12.4	10.35	6.75	6.7	5.4	5.2	.....
13	.....	8.7	11.95	10.35	6.6	7.0	5.55	5.2	.....
14	.....	8.6	11.95	10.25	6.6	6.75	5.7	5.2	.....
15	.....	8.25	11.7	9.9	6.5	6.6	5.7	5.3	.....
16	7.0	7.9	10.95	9.95	6.5	6.4	5.6	5.4	.....
17	7.2	8.0	10.45	9.65	6.55	6.3	5.6	5.9	.....
18	7.4	8.1	10.15	9.3	6.55	6.2	5.6	6.1	.....
19	7.9	8.45	10.0	9.25	6.55	6.1	5.6	5.9	.....
20	8.2	9.05	10.0	9.25	6.6	6.1	5.6	5.9	.....
21	8.7	9.5	10.05	9.1	6.4	6.1	5.6	5.6	.....
22	8.9	9.2	9.85	9.0	6.35	6.05	5.7	5.45	.....
23	9.4	9.15	9.55	8.75	6.3	6.0	5.6	5.6	.....
24	9 2	9 55	9.3	8.6	6.2	6.0	5.5	5.6	.....
25	8.9	10.35	9.45	8.35	6.1	5.9	5.45	5 6	.....
26	8.7	11.0	9.65	8.15	6.0	5.85	5.45	5.6	.....
27	8.2	11.25	10.0	8.2	5.95	5.7	5.45	5.6	.....
28	7.9	11.8	10.7	8.1	6.2	5.7	5.4	5.5	.....
29	7.7	12.0	12.0	8.1	6.2	5.85	5.4	5.4	.....
30	7.2	11.8	12.6	7.95	6.4	5.8	5.4	5.4	.....
31	7.2	.....	12.9	.....	.....	5.7	.....	5.4	.....

Daily discharge, in second-feet, of Gunnison River at River Portal, Colo., for 1910.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	1,820	6,840	9,900	2,300	1,400	710	560	580
2	.....	2,100	6,240	9,550	2,200	1,260	710	560	580
3	.....	2,010	5,660	9,900	2,100	1,180	710	600	600
4	.....	2,010	5,270	9,110	2,100	1,080	865	580	642
5	.....	1,740	5,500	8,670	2,100	1,260	925	560	710
6	.....	2,010	5,340	7,710	2,060	1,480	895	540	642
7	.....	2,010	5,120	7,450	1,920	1,290	810	540	600
8	.....	2,200	5,040	7,010	1,780	1,120	710	522	580
9	.....	2,300	6,330	6,400	1,650	1,050	642	505	560
10	.....	2,620	7,620	5,820	1,520	1,080	620	505	580
11	.....	3,070	8,580	5,580	1,400	1,020	580	505	580
12	.....	3,300	9,110	5,580	1,370	1,330	580	505	.....
13	.....	3,300	8,320	5,580	1,260	1,560	642	505	.....
14	.....	3,180	8,320	5,420	1,260	1,370	710	505	.....
15	.....	2,780	7,880	4,890	1,180	1,260	710	540	.....
16	1,560	2,410	6,580	4,960	1,180	1,120	665	580	.....
17	1,740	2,520	5,740	4,530	1,220	1,050	665	810	.....
18	1,920	2,620	5,270	4,050	1,220	985	665	925	.....
19	2,410	3,010	5,040	3,980	1,220	925	665	810	.....
20	2,730	3,730	5,040	3,980	1,260	925	665	810	.....
21	3,300	4,320	5,120	3,790	1,120	925	665	665	.....
22	3,540	3,920	4,820	3,660	1,080	895	710	600	.....
23	4,180	3,860	4,390	3,360	1,050	865	665	665	.....
24	3,920	4,390	4,050	3,180	985	865	620	665	.....
25	3,540	5,580	4,250	2,900	925	810	600	665	.....
26	3,300	6,660	4,530	2,680	865	785	600	665	.....
27	2,730	7,100	5,040	2,730	838	710	600	665	.....
28	2,410	8,060	6,150	2,620	985	710	580	620	.....
29	2,200	8,410	8,410	2,620	985	785	580	580	.....
30	1,740	8,060	9,460	2,460	1,120	760	580	580	.....
31	1,740	.....	9,980	.....	1,260	710	.....	580	.....

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

Monthly discharge of Gunnison River at River Portal, Colo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet.)	Accuracy.
	Maximum.	Minimum.	Mean.		
March 16–31	4,180	1,560	2,680	85,100	B.
April	8,410	1,740	3,700	220,000	B.
May	9,980	4,050	6,290	387,000	B.
June	9,900	2,460	5,340	318,000	B.
July	2,300	838	1,400	86,100	B.
August	1,560	710	1,050	64,600	B.
September	925	580	678	40,300	B.
October	925	505	610	37,500	B.
November 1–11	710	560	605	13,200	B.
The period	.....	.....	.....	1,250,000	

EAST RIVER AT ALMONT, COLO.

This station, which is located at the wagon bridge 200 feet above the mouth of the river at Almont, in sec. 22, T. 51 N., R. 1 E., New Mexico principal meridian, was established July 27, 1910, by the United States Reclamation Service.

The gage is a vertical rod spiked to the downstream side of the center pier.

Discharge measurements are made from the bridge.

From April 8 to October 8, 1905, a station was maintained at the same point as the present station, but the results at the two stations are not comparable, as the datums of the two gages were not the same.

Discharge measurements of East River at Almont, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 27	E. H. Swett	72	87	1.20	153
Sept. 29	do	50	64	.90	87
Nov. 24	G. H. Russell	50	46	.90	93

Daily gage height, in feet, of East River at Almont, Colo., for 1910.

[J. K. McClanahan, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1	0.9	0.7	11	0.85	0.8	21	0.7	0.8
2	.85	.7	12	.8	.8	22	.75	.8
4	.85	.7	13	.8	.8	23	.8	.8
4	.85	.7	14	.8	.7	24	.9	.8
5	.85	.7	15	.8	.7	25	.9	.8
6	.85	.7	16	.75	.7	26	.85	.8
7	.85	.7	17	.75	.7	27	.85	.8
8	.85	.7	18	.75	.7	28	.8	.8
9	.85	.8	19	.7	.7	29	.8	.7
10	.85	.8	20	.7	.7	30	.75	.7
						31	.....	.7

CEMENT CREEK NEAR CRESTED BUTTE, COLO.

This station, which is located 200 feet south of R. Ahrne's ranch house, 1¼ miles above the mouth of the creek, 1½ miles northeast of Glaciers Landing, a flag station on the Colorado & Southern Railway, and about 7 miles southeast of Crested Butte, the nearest post office, was established November 23, 1910. The station is 8,200 feet above sea level.

The gage is a vertical rod nailed to an 8-inch pine tree on the right bank.

Discharge measurements are made by wading at various sections, except at extreme high water, when they may be made from a foot bridge a short distance above the gage.

Inflow from a warm spring a short distance above the station tends to keep the channel open. Opportunity is thus afforded for accurate determination of winter run-off.

Gage heights are furnished by the Forest Service.

The following discharge measurement was made by G. H. Russell:

November 23, 1910: Width, 19.5 feet; area, 20 square feet; gage height, 0.36 feet; discharge, 17 second-feet.

The following gage heights have been observed:

November 23, 0.4, November 24–26, 0.3, November 27, 0.4, December 1–31, 0.3.

TOMICHI CREEK NEAR GUNNISON, COLO.

This station, which is located at a highway bridge about 1½ miles south of Gunnison and about 1¼ miles above the mouth of the creek, was established November 25, 1910.

A vertical rod gage is spiked to the downstream end of the left abutment of the bridge.

Discharge measurements at high stages are made from the bridge, which makes an angle with the current; at normal stages measurements are made by wading at various sections.

The stream bed is composed of small rocks and gravel and may shift somewhat.

Gage heights are furnished by the Forest Service.

The following discharge measurement was made by G. H. Russell:

November 25, 1910: Width, 34 feet, area, 92 square feet; gage height, 0.63 feet; discharge, 106 second-feet.

Daily gage height, in feet, of Tomichi Creek near Gunnison, Colo., for 1910

[B. A. Hartman, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1		0.5	11			21		
2		.65	12			22		0.9
3		.6	13		0.7	23		
4		.6	14		.75	24		.9
5			15		.9	25	0.6	
6			16		.8	26	.6	
7		.6	17			27	.5	
8			18			28	.6	
9			19			29	.55	
10			20		.9	30	.6	
						31		

QUARTZ CREEK AT PITKIN, COLO.

This station, which is located at the second wagon bridge crossing the creek on the road from Pitkin to Gunnison, near the Colorado & Southern Railway tracks, was established December 12, 1910.

No water is diverted above this station and no tributaries enter below.

The gate is a vertical rod fastened to an abutment of the bridge.

Measurements can be made by wading at low stages and from the bridge at high stages.

No discharge measurements were made during 1910.

Gage heights are furnished by the Forest Service.

Daily gage height, in feet, of Quartz Creek at Pitkin, Colo., for 1910.

December 12	0.58	December 18	0.58
13	.58	19	.55
14	.60	20	.55
15	.60	21	.55
16	.58	22	.55
17	.60	23	.55

UNCOMPAHGRE RIVER BASIN.

GENERAL FEATURES.

Uncompahgre River, the principal tributary of the Gunnison from the south, rises among the snowy peaks of the highly serrated Uncompahgre Mountains and flows a little west of north to its junction with the Gunnison at Delta. The basin embraces a mountainous plateau and valley area of 1,130 square miles, oblong in shape, the width increasing slightly at the lower end. The mountain area occupies only a small part of the basin but contributes the perennial waters of the stream. The plateau area is greatest in extent and borders the valley on both sides, the larger Uncompahgre Plateau lying to the southwest. Escarpments are conspicuous features of this plateau. The relief features are terraced mesas flanked by buttes and ridges and trenched by deep, narrow canyons.

Uncompahgre Valley proper begins at a point near Eldredge siding, on the Denver & Rio Grande Railroad. In addition to the lands being irrigated by large private ditches, this valley contains about 150,000 acres, which are being reclaimed under the Uncompahgre project of the United States Reclamation Service. The greater part of the water for this land is diverted from Gunnison River by means of the Gunnison tunnel, which has a capacity of 1,300 second-feet. The construction of the tunnel was begun in January, 1905, and the actual opening through the tunnel was completed July 6, 1909. The present water rights consume the normal flow of Uncompahgre River, and the Uncompahgre Valley project will divert all the available water from Gunnison River during normal stages.

UNCOMPAHGRE RIVER AT AND NEAR FORT CRAWFORD.

A gaging station was established on Uncompahgre River at a highway bridge about half a mile west of Fort Crawford, in sec. 36, T. 48 N., R. 9 W., October 2, 1907, and discontinued October 31, 1910. On July 2, 1910, a station was established 2 miles below Fort Crawford on the north line of sec. 23, T. 48 N., R. 9 W., New Mexico principal meridian. The upper station was established to replace the station near Colona, which was maintained from August 10, 1903, to May 31, 1906.

The upper station is located just below the mouth of Horsefly Creek. A number of large irrigation ditches divert water above the station and existing power plants generate about 1,800 horsepower.

The rod gage which was established October 2, 1907, was washed out June 21, 1908. A temporary chain gage, the zero of which was placed 1.95 feet below the zero of the rod gage, was installed July 7, 1908. On July 23, 1908, a permanent rod gage was installed, the zero of which corresponded to 0.70 feet on the first rod gage and 2.65 feet

on the chain gage. During 1909 the chain gage established July 7, 1908, was read. In the early part of 1910 a new rod gage was established with a datum 3.20 feet lower than that of the chain gage. The readings for 1909 were reduced to this datum.

Thick ice forms along the edges of the river during the winter months. The channel remains open at the station, but the relation between gage height and discharge is at times affected by slush ice. The channel scours during high stages and silts during periods of low water.

The records derived from the observations at the upper station are rather poor.

At the lower station the gage is a vertical rod fastened to the upstream side of the single-span wooden highway bridge.

Discharge measurements are made from the bridge.

The record derived from the observations at the lower station is very good, as the stream bed at this point is permanent and sufficient measurements were made to enable the construction of a well-defined curve for the period from July 11 to October 31.

As the amount of water diverted daily between the upper and the lower stations during the period July 11 to October 31 is known, the discharge at the upper station for this period can probably be more accurately determined by adding the amount diverted to the flow at the lower station.

The following tables give the data for the upper and the lower stations, the diversions between, and the flow at the upper station as computed from the lower station flow plus diversions above.

Both stations have been maintained under the supervision of the United States Reclamation Service.

Discharge measurements of Uncompahgre River at Fort Crawford, Colo., in 1910.

[Upper station.]

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 23	E. H. Swett	61	95	1.98	480
May 5	....do	62	115	2.30	521
17	....do	60	116	2.00	442
June 2	....do	62	202	2.85	[a] 1,240
16	R. H. Bolster	62	156	2.80	901
27	E. H. Swett	60	116	2.65	504
July 11	....do	62	82	2.17	311
19	....do	61	84	2.08	289

[a] A coefficient of 0.80 used to reduce from surface to mean velocity.

Daily gage height, in feet, of Uncompahgre River at Fort Crawford, Colo., for 1910.

[Upper station.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	.....	2.45	3.0	2.45	2.55	2.4	2.1	16	.....	2.2	2.7	1.9	2.55	2.3	2.6
2	.....	2.4	2.85	2.55	2.5	2.4	2.0	17	.....	2.1	2.5	2.05	2.6	2.25	2.55
3	.....	2.4	.....	2.45	2.5	2.55	2.2	18	.....	2.05	2.5	2.0	2.6	2.25	2.45
4	.....	2.35	2.8	2.4	2.45	2.55	2.2	19	.....	1.95	2.95	2.05	2.5	2.25	2.45
5	.....	2.4	.....	2.4	2.75	2.45	2.15	20	2.0	1.95	2.95	2.25	2.6	2.25	2.4
6	.....	2.35	.....	2.5	2.85	2.4	2.2	21	.....	1.95	3.0	2.25	2.2	2.3	2.35
7	.....	2.3	.....	2.55	2.5	2.4	2.1	22	.....	2.1	2.9	2.35	2.1	2.4	2.4
8	.....	2.35	2.4	2.5	2.5	2.4	2.2	23	1.95	.....	2.85	2.3	2.05	2.3	2.45
9	.....	2.5	.....	2.4	2.55	2.3	2.2	24	.....	1.7	2.8	2.25	2.0	2.3	2.25
10	.....	2.6	2.2	2.3	2.1	2.3	2.2	25	.....	.....	2.7	2.2	2.45	2.3	2.05
11	.....	2.55	2.3	2.25	2.6	2.3	2.2	26	.....	.....	2.6	2.2	2.45	2.25	2.0
12	.....	2.65	2.3	2.05	2.85	2.3	2.2	27	.....	2.1	2.65	2.25	2.4	2.2	1.95
13	.....	2.7	2.4	1.95	2.7	2.35	2.2	28	.....	.....	2.65	2.35	2.4	2.2	1.9
14	.....	2.45	2.4	1.95	2.3	2.35	2.2	29	.....	.....	2.7	2.4	2.4	2.2	1.8
15	.....	2.35	2.9	1.9	2.3	2.3	2.2	30	2.65	.....	2.5	2.5	2.35	2.15	1.9
								31	.....	.....	.....	2.45	2.4	.....	1.9

Daily discharge, in second-feet, of Uncompahgre River at Fort Crawford, Colo., for 1910.

[Upper station.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	.....	650	1,370	430	480	400	270	16	.....	550	825	210	480	355	505
2	.....	620	1,240	480	450	400	240	17	.....	500	680	260	505	330	480
3	.....	585	1,280	430	400	480	315	18	.....	465	680	240	505	330	430
4	.....	555	1,280	400	430	480	315	19	.....	415	940	260	450	330	430
5	.....	585	1,040	400	600	430	290	20	485	415	940	330	505	330	400
6	.....	555	950	450	660	400	315	21	485	440	900	330	315	355	380
7	.....	520	830	480	450	400	270	22	465	525	820	380	270	400	400
8	.....	555	750	450	450	400	315	23	465	415	700	355	255	355	430
9	.....	680	650	400	480	355	315	24	520	350	670	330	240	355	330
10	.....	750	585	355	270	355	315	25	580	420	540	315	430	355	255
11	.....	715	610	330	505	355	315	26	600	500	480	315	430	330	240
12	.....	825	610	260	660	355	315	27	670	585	510	330	400	315	225
13	.....	860	650	225	565	380	315	28	700	720	540	380	400	315	210
14	.....	680	650	225	355	380	315	29	765	870	565	400	400	315	175
15	.....	650	1,000	210	355	355	315	30	800	1,085	450	450	380	290	210
								31	.....	1,240	.....	430	400	.....	210

NOTE.—These discharges, Apr. 20 to June 30, obtained by indirect method for shifting channels. July 1 to Oct. 31, based on a curve that is fairly well defined.

Monthly discharge of Uncompahgre River at Fort Crawford, Colo., for 1910.

[Upper station.]

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April 20–30	800	465	594	13,000	C.
May	1,240	350	622	38,200	C.
June	1,370	450	791	47,100	D.
July	480	210	350	21,500	B.
August	660	240	435	26,700	C.
September	480	290	366	21,800	C.
October	505	175	318	19,600	C.
The period	.....	.....	.....	188,000	

Discharge measurements of Uncompahgre River near Fort Crawford, Colo., in 1910.

[Lower station.]

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 23	E. H. Swett	45	95	3.31	372
27	....do	45	68	2.68	212
July 2	....do	45	80	3.00	270
11	....do	45	62	2.58	182
Aug. 12	....do	45	94	3.25	367
18	....do	45	68	2.60	201
24	....do	45	27	1.60	52
Sept. 14	....do	45	52	2.30	149

Daily gage height, in feet, and discharge, in second-feet, of Uncompahgre River near Fort Crawford, Colo., for 1910.

[Lower station; Frank Dolan, observer.]

Day.	July.		August.		September.		October.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	.....	.....	2.7	215	2.45	166	.....	95
2	.....	.....	2.6	195	2.45	166	.....	95
3	.....	.....	2.5	175	2.55	185	2.0	95
4	.....	.....	2.5	175	2.85	248	.....	90
5	.....	.....	2.9	260	.....	'200	.....	90
6	.....	.....	3.25	360	2.45	166	1.95	88
7	.....	.....	.....	180	2.35	148	.....	90
8	.....	.....	2.65	205	2.4	156	1.95	88
9	.....	.....	2.75	225	2.2	122	.....	90
10	.....	.....	2.2	122	2.2	122	1.95	88
11	2.3	138	2.7	215	2.1	108	.....	90
12	2.5	175	3.25	360	2.05	102	.....	90
13	2.25	130	3.0	285	2.3	138	1.85	76
14	2.25	130	.....	83	2.3	138	1.85	76
15	.....	120	1.95	88	2.1	108	.....	80
16	2.65	205	2.55	185	2.1	108	.....	250
17	2.7	215	2.6	195	2.05	102	2.75	225
18	2.6	195	2.5	175	2.0	95	.....	180
19	.....	180	2.4	156	2.0	95	.....	180
20	2.6	195	2.3	138	2.05	102	2.4	156
21	2.55	185	2.8	235	2.1	108	2.2	122
22	2.4	156	2.6	195	2.3	138	.....	160
23	2.35	147	2.5	175	2.15	115	.....	200
24	2.15	115	1.6	51	2.2	122	.....	110
25	2.05	102	2.25	130	2.2	122	.....	70
26	.....	120	2.15	115	2.1	108	1.6	51
27	2.1	108	2.05	102	2.1	108	1.5	43
28	2.45	166	2.45	166	2.05	102	.....	40
29	2.5	175	2.5	175	2.05	102	.....	40
30	2.7	215	2.3	138	2.0	95	.....	40
31	.....	190	2.4	156	.....	.....	1.5	43

NOTE.—Daily discharge determined from a well-defined discharge rating curve. Discharge for days of missing gage heights computed from discharge at upper station less diversions.

Monthly discharge of Uncompahgre River near Fort Crawford, Colo., for 1910.

[Lower station.]

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
July 11-31	215	102	160	6,660	A.
August	360	51	182	11,100	A.
September	248	95	130	7,740	B.
October	250	40	104	6,400	C.

Daily diversion from the Uncompahgre River between the Fort Crawford station and the station 2 miles below.

Day.	July.	Aug.	Sept.	Oct.	Day.	July.	Aug.	Sept.	Oct.
1	.....	240	183	180	16	50	228	204	180
2	.....	230	183	175	17	49	248	203	174
3	.....	229	183	172	18	50	253	203	170
4	.....	241	195	170	19	84	256	204	170
5	.....	288	201	170	20	124	260	203	160
6	.....	258	208	173	21	148	127	216	150
7	.....	240	203	160	22	214	90	202	150
8	.....	222	200	150	23	228	79	192	150
9	.....	223	197	160	24	227	123	203	140
10	.....	175	206	177	25	228	250	192	130
11	218	232	204	170	26	212	253	192	125
12	142	256	204	170	27	229	251	192	127
13	121	266	204	174	28	229	184	191	140
14	132	257	204	173	29	229	188	192	100
15	132	198	205	170	30	232	182	192	120
					31	230	182	.....	100

Monthly diversion from Uncompahgre River between the Fort Crawford station and the station 2 miles below.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
July 11-31	232	49	167	6,960
August	288	79	216	13,300
September	216	183	199	11,800
October	180	100	156	9,590

Daily discharge, in second-feet, of Uncompahgre River at Fort Crawford, Colo., for 1910.

[Upper station. Computed from record at lower station.]

Day.	July.	Aug.	Sept.	Oct.	Day.	July.	Aug.	Sept.	Oct.
1	.....	455	349	275	16	255	413	312	430
2	.....	425	349	270	17	264	443	305	399
3	.....	404	368	267	18	245	428	298	350
4	.....	416	443	260	19	260	412	299	350
5	.....	548	400	260	20	319	398	305	316
6	.....	618	374	261	21	333	362	324	272
7	.....	420	351	250	22	370	285	340	310
8	.....	427	356	238	23	375	254	307	350
9	.....	448	319	250	24	342	174	325	250
10	.....	297	328	265	25	330	380	314	200
11	356	447	312	260	26	330	368	300	176
12	317	616	306	260	27	337	353	300	170
13	251	551	342	250	28	395	350	293	180
14	262	340	342	249	29	404	363	294	140
15	250	286	313	250	30	447	320	287	160
					31	420	338	.....	143

NOTE.—Daily discharge determined by adding diversions between upper and lower stations to flow at lower station.

Monthly discharge of Uncompahgre River at Fort Crawford, Colo., for 1910.

[Upper station. Computed from record at lower station.]

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
July 11–31	447	245	327	13,000	A.
August	618	174	398	24,500	A.
September	443	287	328	19,500	A.
October	430	140	260	16,000	C.

UNCOMPAHGRE RIVER AT MONTROSE, COLO.

This station, which is located at the iron highway bridge just west of Montrose, one-quarter mile west of the Denver & Rio Grande Railroad, about 2 miles above Happy Canyon Creek and also above Cedar and Springs creeks, was established April 22, 1903.

Large irrigation ditches divert water between this station and that at Fort Crawford. The normal flow of this river is controlled for irrigation by existing water rights above the diversions, although opportunities exist for storage and power development. Established plants generate about 1,800 horsepower.

The staff gage, unchanged in location or datum during the maintenance of the station, is 20 feet upstream from the bridge.

Thick ice forms along the edges of the river in winter, but the channel usually remains open. The relation between gage height and discharge is at times affected by slush ice and anchor ice. The results obtained are good except for the winter periods and at times of extremely low water. The flow at this point will be affected by inflow of the South canal of the United States Reclamation Service.

The station is maintained under the supervision of the United States Reclamation Service.

Discharge measurements of Uncompahgre River at Montrose, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 27	E. H. Swett	50	105	4.35	486
May 7	do	30	55	2.88	122
14	do	41	74	3.09	296
18	do	30	47	2.75	79
June 1	do	78	163	5.30	962
18	do	31	71	3.50	295
18	R. H. Bolster	47	80	3.50	307
23	E. H. Swett	40	65	3.25	221
July 1	do	32	46	2.85	122
Aug. 15	do	31	31	2.34	38
24	do	25	30	2.12	23
Sept. 16	do	34	34	2.49	49

Daily gage height, in feet, of Uncompahgre River at Montrose, Colo., for 1910.

[Alfred Reeves, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1....	3.55	3.75	5.58	2.55	2.8	2.65	2.05	16....	2.88	3.05	4.1	2.7	2.94	2.48	3.2
2....	3.58	3.3	5.4	2.45	2.75	2.7	2.3	17....	3.25	2.82	3.5	2.85	2.95	2.48	3.68
3....	3.65	2.9	5.32	2.6	2.8	2.75	2.46	18....	3.2	2.68	3.65	2.85	2.78	2.2	3.4
4....	3.2	2.82	5.45	2.4	2.62	3.08	2.32	19....	3.1	2.5	4.15	2.93	2.65	2.25	3.45
5....	3.1	4.25	5.2	2.95	3.45	2.82	2.25	20....	3.72	2.4	3.65	2.86	2.45	2.42	3.32
6....	3.65	3.95	5.22	2.9	3.32	2.79	2.2	21....	3.72	2.4	3.5	2.76	2.36	2.53	3.4
7....	3.3	3.85	5.0	2.92	2.85	2.68	2.25	22....	3.38	2.45	3.5	2.74	2.50	2.5	3.5
8....	3.4	3.78	5.1	2.95	2.9	2.70	2.34	23....	3.4	2.2	3.4	2.59	2.55	2.45	3.45
9....	3.28	3.58	5.35	2.85	2.8	2.62	2.36	24....	3.35	2.0	3.22	2.39	1.98	2.35	3.35
10....	3.25	4.6	5.32	2.68	2.9	2.52	2.35	25....	3.72	2.0	3.05	4.05	2.02	2.32	3.25
11....	3.48	4.6	4.75	2.6	3.25	2.4	2.34	26....	3.68	2.4	3.0	4.02	1.42	2.35	2.53
12....	3.4	4.6	4.8	2.55	4.0	2.35	2.42	27....	3.6	3.5	2.9	1.62	2.15	2.42	2.4
13....	3.55	3.8	4.75	2.38	3.38	2.65	2.4	28....	4.5	3.65	2.75	2.8	2.5	2.38	2.35
14....	3.4	3.75	4.48	2.4	3.15	2.55	2.38	29....	4.55	5.15	2.75	2.82	2.65	2.13	2.35
15....	2.95	4.3	4.2	2.32	2.4	2.52	2.5	30....	4.15	5.45	2.7	2.88	2.48	2.05	2.3
								31....	.....	5.5	.....	2.82	2.58	.....	2.3

Daily discharge, in second-feet, of Uncompahgre River at Montrose, Colo., for 1910.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1....	248	305	1,090	72	95	72	18	16....	107	136	520	95	117	52	165
2....	255	185	1,020	58	88	80	35	17....	175	98	300	125	118	52	284
3....	275	110	975	80	95	88	50	18....	165	77	352	125	92	27	210
4....	165	98	1,050	50	68	141	37	19....	145	54	542	142	72	31	222
5....	145	468	940	148	222	98	31	20....	296	44	352	127	49	46	190
6....	275	365	950	135	190	94	27	21....	296	44	300	107	40	57	210
7....	185	335	850	140	102	77	31	22....	205	49	300	103	54	54	235
8....	210	314	900	148	110	80	39	23....	210	27	270	79	60	49	222
9....	181	255	1,010	125	95	68	40	24....	198	15	216	49	14	40	198
10....	175	600	1,000	92	110	56	40	25....	296	15	172	500	16	37	175
11....	230	600	755	80	175	44	39	26....	284	44	160	488	3	40	57
12....	210	600	780	72	380	40	46	27....	260	235	135	6	24	46	44
13....	248	320	755	48	205	72	44	28....	560	275	105	95	54	42	40
14....	210	305	640	50	155	60	42	29....	580	850	105	98	72	22	40
15....	118	485	530	42	44	56	54	30....	432	1,000	95	107	52	18	35
								31....	.....	1,040	.....	98	63	.....	35

NOTE.—Daily discharge determined as follows: Apr. 1 to May 28, June 16 to July 27, and Oct. 31, from a well-defined curve. May 29 to June 15, indirect method for shifting channels used.

Monthly discharge of Uncompahgre River at Montrose, Colo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April	580	107	245	14,600	A.
May	1,040	15	302	18,600	A.
June	1,090	95	572	34,000	B.
July	500	6	119	7,320	B.
August	380	3	97.9	6,020	A.
September	141	18	58.0	3,450	A.
October	284	18	94.7	5,820	A.
The period				89,800	

UNCOMPAHGRE RIVER NEAR DELTA, COLO.

This station, which is located on the second highway bridge 2 miles south of Delta, Colo., was originally established April 29, 1903, at a highway bridge one-fourth mile above the Denver & Rio Grande Railroad bridge. On November 17, 1903, it was removed to the railroad bridge one-fourth mile northwest of the depot at Delta. A vertical gage at this bridge was read until April 21, 1904, when an inclined gage was installed on the right bank near the bridge. This gage was read until November, 1906, when a staff gage was installed at the present site, but observations at this gage were not begun until April 21, 1907. It was washed out September 6, 1909, and reestablished April 19, 1910, approximately on the site of the old gage. The plotting of the 1910 discharge measurements indicates that the datum of the last gage is about 0.2 foot higher than that of the preceding gage. The relation between the datum of the last gage and the several earlier gages has not been determined, and the datum of the gage used from April 22, 1904, to November, 1906, differs from that of the previous gage.

The station is near the junction of the Uncompahgre with the Gunnison and is below all tributaries and diversions. At ordinary stages the flow of the river at this point is nearly all seepage water from the irrigation ditches above. During the irrigating season the ditches consume all the normal flow.

The relation between gage height and discharge is probably not materially affected by ice, as thick ice does not form except along the edges of the stream; slush ice frequently occurs.

Records derived from observations at this station are good except for periods of extreme low water.

The station is maintained under the supervision of the United States Reclamation Service.

Discharge measurements of Uncompahgre River near Delta, Colo., for 1909–10.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1909.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 28	R. M. Adams	42	101	2.54	242
June 5	do	48	98	2.45	294
July 20	do	40	42.4	1.57	21.1
29	do	48	61.4	1.70	43.3
Aug. 20	do	48	108	2.80	356
Oct. 22	do	50	69	.....	109
1910.					
Apr. 29	E. H. Swett	55	143	3.55	623
May 21	do	48	56	1.80	51.2
June 18	Bolster and Swett	48.5	74	2.44	192
July 8	E. H. Swett	30	31.1	1.58	12.5
Aug. 25	do	30	33.4	1.61	13.7
Sept. 20	do	47.5	42	1.80	33.0

Daily gage height, in feet, and discharge, in second-feet, of Uncompahgre River near Delta, Colo., for 1909 and 1910.

[Mrs. W. J. Lance, observer.]

Day.	April.		May.		June.		July.		August.		September.		October.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1909.														
1	1.8	60	1.9	80	1.95	92	3.65	690	1.7	42	2.5	250	.....	.....
2	1.8	60	1.75	51	1.9	80	3.45	610	1.7	42	2.5	250	.....	.....
3	1.8	60	1.95	92	1.9	80	3.35	570	1.65	34	3.1	470	.....	.....
4	1.8	60	2.4	220	2.0	105	3.4	590	1.6	27	3.5	630	.....	.....
5	1.9	80	2.75	338	3.0	430	3.85	770	1.6	27	3.65	690	.....	.....
6	2.0	105	3.4	590	3.5	630	3.8	750	1.6	27	4.5	1,050	.....	.....
7	2.1	130	3.45	610	3.95	810	3.55	650	1.7	42	.....	.....	.....	.....
8	1.95	92	3.65	690	4.15	892	3.15	490	1.7	42	.....	.....	.....	.....
9	1.9	80	3.4	590	4.25	938	2.75	338	1.65	34	.....	.....	.....	.....
10	1.9	80	3.25	530	4.1	870	2.5	250	2.3	190	.....	.....	.....	.....
11	1.9	80	3.25	530	3.95	810	2.45	235	2.5	250	.....	.....	.....	.....
12	1.9	80	3.25	530	3.9	790	2.0	105	2.0	105	.....	.....	.....	.....
13	1.9	80	3.05	450	3.9	790	2.0	105	1.85	70	.....	.....	.....	.....
14	1.8	60	2.65	302	3.8	750	2.0	105	2.35	205	.....	.....	.....	.....
15	1.8	60	2.25	175	3.75	730	1.8	60	2.15	145	.....	.....	.....	.....
16	2.05	117	2.05	118	3.85	770	1.7	42	2.15	145	.....	.....	.....	.....
17	2.4	220	2.0	105	3.85	770	1.7	42	2.3	190	.....	.....	.....	.....
18	3.2	510	2.15	145	4.3	960	1.7	42	2.65	302	.....	.....	.....	.....
19	3.4	590	2.55	268	4.6	1,100	1.7	42	3.0	430	.....	.....	.....	.....
20	3.3	550	2.55	268	4.4	1,000	1.75	51	2.65	302	.....	.....	.....	.....
21	3.1	470	2.55	268	4.35	982	1.6	27	2.6	285	.....	.....	.....	.....
22	2.55	268	2.25	175	4.1	870	2.25	175	2.55	268	.....	.....	.....	.....
23	2.2	160	2.45	235	4.2	915	2.05	118	2.35	205	.....	.....	.....	.....
24	1.9	80	2.3	190	4.25	938	2.3	190	2.45	235	.....	.....	.....	.....
25	1.75	51	2.2	160	4.1	870	2.0	105	2.5	250	.....	.....	.....	.....
26	1.85	70	2.1	130	4.05	850	2.0	105	2.45	235	.....	.....	.....	.....
27	2.25	175	2.3	190	3.95	810	1.95	92	2.6	285	.....	.....	.....	.....
28	2.6	285	2.5	250	3.85	770	1.8	60	2.25	175	.....	.....	.....	.....
29	2.5	250	2.45	235	3.6	670	1.7	42	2.0	105	.....	.....	.....	.....
30	2.1	130	2.3	190	3.65	690	1.7	42	2.0	105	.....	.....	.....	.....
31	.....	.....	2.15	145	.....	.....	1.65	34	2.2	160	.....	.....	.....	.....
1910.														
1	.....	.....	3.4	565	3.95	770	1.7	23	1.65	19	1.6	15	1.8	35
2	.....	.....	3.2	485	3.8	700	1.6	15	1.85	44	1.6	15	1.8	35
3	.....	.....	2.75	318	3.6	620	1.65	19	1.7	23	1.6	15	1.8	35
4	.....	.....	2.6	265	3.7	660	1.6	15	1.65	19	1.8	35	1.8	35
5	.....	.....	2.55	248	3.7	660	1.6	15	1.65	19	1.85	44	1.8	35

Daily gage height, in feet, and discharge, in second-feet, of Uncompahgre River near Delta, Colo., for 1909 and 1910—Continued.

Day.	April.		May.		June.		July.		August.		September.		October.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1910.														
6	.....	.....	2.45	215	3.7	660	1.6	15	2.25	135	1.75	29	1.8	35
7	.....	.....	2.4	200	3.7	660	1.6	15	1.85	44	1.8	35	1.8	35
8	.....	.....	2.25	155	3.65	640	1.6	15	1.65	19	1.85	44	1.8	35
9	.....	.....	2.35	185	3.5	580	1.55	11	1.8	35	1.9	52	1.8	35
10	.....	.....	2.65	282	3.4	540	1.5	7	1.75	29	1.75	29	1.8	35
11	.....	.....	2.95	388	3.3	500	1.5	7	1.7	23	1.7	23	1.8	3
12	.....	.....	3.1	445	3.3	500	1.5	7	1.95	62	1.7	23	1.85	4
13	.....	.....	2.6	265	3.3	500	1.5	7	2.95	362	1.8	35	1.85	4
14	.....	.....	2.5	230	3.15	440	1.5	7	3.2	460	1.9	52	1.85	44
15	.....	.....	2.3	170	3.15	440	1.5	7	2.1	95	1.75	29	1.88	49
16	.....	.....	2.25	155	3.05	400	1.6	15	1.75	29	1.8	35	2.05	84
17	.....	.....	2.1	115	2.65	258	1.5	7	1.95	62	1.8	35	3.4	540
18	.....	.....	2.0	90	2.35	165	1.55	11	1.85	44	1.7	23	3.05	400
19	.....	.....	1.85	60	2.3	150	1.65	19	1.8	35	1.8	35	2.75	292
20	.....	.....	1.8	50	2.5	210	1.55	11	1.7	23	1.8	35	3.15	440
21	.....	.....	1.8	50	2.4	180	1.5	7	1.7	23	2.15	108	2.8	310
22	.....	.....	1.75	42	2.35	165	1.6	15	1.7	23	2.25	135	2.8	310
23	.....	.....	1.7	34	2.3	150	1.55	11	1.7	23	2.0	72	2.9	345
24	.....	.....	1.7	34	2.3	150	1.5	7	1.75	29	1.75	29	2.8	310
25	.....	.....	1.65	27	2.0	72	1.5	7	1.65	19	1.9	52	2.55	225
26	.....	.....	1.6	20	1.95	62	1.5	7	1.6	15	1.8	35	2.45	195
27	.....	.....	1.6	20	1.8	35	1.5	7	1.6	15	1.8	35	2.4	180
28	.....	.....	2.0	90	1.8	35	1.5	7	1.6	15	1.9	52	2.35	165
29	.....	.....	2.65	275	1.7	23	1.7	23	1.6	15	1.85	44	2.3	150
30	.....	.....	3.35	535	1.7	23	2.35	165	1.6	15	1.75	29	2.2	120
31	.....	.....	3.9	750	.....	.....	1.75	29	1.6	15	.....	.....	2.25	135

NOTE.—Daily discharge for 1909 determined from a fairly well-defined rating curve based on measurements in 1909 and 1910. Discharge May 1–28, 1910, obtained from a curve fairly well defined; May 29–June 15, indirect method for shifting channels used; June 16–Oct. 31, obtained from a well-defined curve.

Monthly discharge of Uncompahgre River near Delta, Colo., for 1909 and 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1909.					
April	590	51	170	10,100	B.
May	690	51	225	17,500	C.
June	1,100	80	725	43,100	C.
July	770	27	243	14,900	B.
August	430	27	160	9,840	B.
The period	.....	.....	.....	95,400	
1910.					
May	750	20	218	13,400	B.
June	770	23	365	21,700	B.
July	165	7	17.2	1,060	B.
August	460	15	57.7	3,550	A.
September	135	15	41.0	2,440	A.
October	540	35	154	9,470	A.
The period	.....	.....	.....	51,600	

DOLORES RIVER BASIN.

GENERAL FEATURES.

Dolores River rises in the La Plata and San Miguel mountains, whose highest peak, Mount Wilson, attains an elevation of over 14,000 feet above sea level. It flows southwestward about 50 miles, then almost due north for nearly 100 miles, then again westward, and enters Grand River about 15 miles west of the Colorado-Utah line. For the greater part of its course the river flows through deep canyons, and comparatively little irrigation is practiced along the stream itself. In the vicinity of Dolores, however, the valley broadens, and for about 40 miles has a width of half a mile to a mile. A considerable part of this area is cultivated. In Paradox Valley, also, considerable land is cultivated, chiefly from small tributaries running into the main stream. By far the greater part of the Dolores River water is used for irrigation in the San Juan drainage basin, to which it is diverted by means of a tunnel and a great cut into the Montezuma Valley.

San Miguel River, the most important tributary of the Dolores, which drains an area immediately west of the headwaters of the Uncompahgre River, rises in San Miguel County, Colo., and enters the Dolores about 12 miles east of the Colorado-Utah line, at an elevation of about 5,000 feet. In general the stream and its tributaries flow northeastward. Considerable land along the San Miguel is irrigated.

The mean annual run-off of Dolores River above the mouth of the San Miguel is about 400,000 acre-feet, and the San Miguel furnishes at least half that amount.

Probably 600 square miles of the Dolores River basin is covered with merchantable timber and as much more is woodland. The total area of this basin is about 4,500 square miles.

The basin contains several small storage reservoir sites, a few of which have been developed, both for power and irrigation.

The river has an average fall of over 20 feet to the mile throughout almost its entire course, and a great stretch of the San Miguel has an average fall of more than 50 feet to the mile. Several water-power plants are in operation along the upper San Miguel and its tributaries, the development aggregating nearly 10,000 horsepower, of which about 7,500 horsepower is developed at the Ames, Howard Fork, and Illium plants of the Telluride Power Co. One plant on Bridal Veil Creek is utilizing a head of 2,000 feet to develop 1,200 horsepower.

DOLORES RIVER AT DOLORES, COLO.

This station, which is located at the wagon bridge about a quarter of a mile southwest of Dolores depot and about half a mile above the original site, was established June 25, 1895, discontinued October 31,

1903, and was reestablished August 27, 1910, by the State engineer of Colorado, by whom the records are furnished.

A vertical staff gage is bolted to the bridge abutment, and a Bristol automatic gage was installed November, 1910. Both gages are referred to the same datum. The relation between the new gages and the gage at original section has not been determined.

The bed of stream consists of sand, cobbles, and some small bowlders, and is apparently permanent. At high stages the river may overflow the left bank.

Low-water measurements are made by wading; high-stage measurements are made from the bridge.

The relation between gage height and discharge is somewhat affected by ice during the winter months.

Discharge measurements of Dolores River at Dolores, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 27	Ferguson and Christiansen	44	54	2.35	76
Sept. 14	E. O. Christiansen	43	63	2.49	101
Nov. 1	Christiansen and Hezmalhalch	46	61	2.48	98

Daily gage height, in feet, and discharge, in second-feet, of Dolores River at Dolores, Colo., for 1910.

[Beulah B. Hughes, observer.]

Day.	August.		September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			2.4	84	2.3	69	2.5	102	2.45	93
2			2.35	76	2.5	102	2.5	102	2.5	102
3			2.45	93	2.5	102	2.5	102	2.5	102
4			2.6	121	2.4	84	2.55	112	2.45	93
5			2.5	102	2.4	84	2.55	112	2.2	55
6			2.45	93	2.4	84	2.5	102	2.3	69
7			2.4	84	2.3	69	2.45	93	2.45	93
8			2.3	69	2.3	69	2.4	84	2.4	84
9			2.3	69	2.3	69	2.45	93	2.4	84
10			2.3	69	2.3	69	2.4	84	2.45	93
11			2.3	69	2.3	69	2.45	93	2.4	84
12			2.3	69	2.3	69	2.45	93	2.3	69
13			2.35	76	2.3	69	2.4	84	2.2	55
14			2.45	93	2.3	69	2.4	84	2.2	55
15			2.4	84	2.4	84	2.45	93	2.4	84
16			2.4	84	3.15	242	2.45	93	2.4	84
17			2.4	84	3.35	291	2.45	93	2.4	84
18			2.35	76	2.9	184	2.4	84	2.4	84
19			2.4	84	2.9	184	2.45	93	2.4	84
20			2.45	93	2.9	184	2.35	76	2.45	93
21			2.65	131	2.6	121	2.25	62	2.45	93
22			2.7	141	2.6	121	2.3	69	2.6	90
23			2.45	93	2.6	121	2.4	84	2.6	90
24			2.4	84	2.6	121	2.45	93	2.6	90
25			2.4	84	2.6	121	2.45	93	2.7	90
26			2.3	69	2.6	121	2.45	93	2.8	90
27	2.3	69	2.3	69	2.6	121	2.4	84	2.75	90
28	2.2	55	2.3	69	2.55	112	2.3	69	2.75	90
29	2.3	69	2.3	69	2.5	102	2.3	69	2.7	90
30	2.3	69	2.3	69	2.5	102	2.45	93	2.65	90
31	2.4	84			2.5	102			2.75	90

Monthly discharge of Dolores River at Dolores, Colo., for 1910.

[Drainage area, 524 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
August 27–31	84	55	69.2	0.132	0.03	686
September	141	69	85.0	.162	.18	5,060
October	291	69	113	.216	.25	6,960
November	112	62	89.4	.170	.19	5,320
December	.....	.....	85.1	.162	.19	5,230
The period	.....	.....	.....	.....	.....	18,000

SAN MIGUEL RIVER AT FALL CREEK, COLO.

A gaging station was established on San Miguel River at Fall Creek, Colo., by the State engineer August 26, 1910, and was abandoned about a month later in favor of a site near Placerville, where the observations would indicate the run-off from the drainage areas of Leopard and Fall creeks, as well as that of the San Miguel.

The following discharge measurement was made by Christiansen and Ferguson:

August 26, 1910: Width, 30 feet; area, 41 square feet; gage height, 1.00 foot; discharge, 107 second-feet.

Daily gage height, in feet, of San Miguel River at Fall Creek, Colo., for 1910.

[C. W. Smith, observer.]

Day.	July.	Aug.	Day.	July.	Aug.	Day.	July.	Aug.
1	.....	0.9	11	.....	0.85	21	.....	1.0
2	.....	.95	12	.....	.9	22	.....	.95
3	.....	1.3	13	.....	1.15	23	.....	.9
4	.....	1.15	14	.....	1.0	24	.....	.9
5	.....	1.05	15	.....	.95	25	.....	.8
6	.....	1.0	16	.....	.9	26	0.9	.8
7	.....	.95	17	.....	.9	27	.9	.8
8	.....	.9	18	.....	.9	28	1.0	.....
9	.....	.85	19	.....	.9	29	1.0	.....
10	.....	.85	20	.....	1.0	30	.95	.....
						31	.95	.....

SAN MIGUEL RIVER AT PLACERVILLE, COLO.

This station, which is located at the corduroy bridge three-fourths of a mile below Placerville, was established September 13, 1910, by the State engineer, by whom the records are furnished.

A vertical staff gage is fastened to the abutment of the bridge.

The channel consists of gravel and some bowlders and is fairly permanent, affording a very good measuring section.

Measurements are made from the lower side of the bridge or by wading at various sections.

The relation between gage height and discharge is affected by ice during the winter.

Discharge measurements of San Miguel River at Placerville, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 13	E. O. Christiansen	32	61	1.05	183
Oct. 30	Christiansen and Hezmalhalch	31	45	.60	95

Daily gage height, in feet, and discharge, in second-feet, of San Miguel River at Placerville, Colo., for 1910.

[John E. Stanguist, observer.]

Day.	September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			0.6	95	0.65	103	0.55	88
2			.75	120	.7	111	.5	80
3			.65	103	.7	111	.45	72
4			.7	111	.7	111	.5	80
5			.6	95	.65	103	.45	72
6			.6	95	.65	103	.5	80
7			.6	95	.65	103	.55	88
8			.6	95	.65	103	.5	80
9			.6	95	.65	103	.5	80
10			.6	95	.65	103	.5	80
11			.6	95	.65	103	.55	88
12			.6	95	.6	95	.5	80
13	1.0	171	.6	95	.6	95	.5	80
14	.85	140	.65	103	.6	95	.4	65
15	.85	140	.65	103	.6	95	.4	65
16	.8	130	1.3	245	.6	95	.4	65
17	.7	111	1.1	194	.55	88	.4	65
18	.8	130	.95	160	.6	95	.35	58
19	.75	120	.9	150	.6	95	.4	65
20	.85	140	.85	140	.55	88	.4	65
21	.85	140	.8	130	.55	88	.4	65
22	.8	130	.75	120	.55	88	.5	80
23	.75	120	.8	130	.6	95	.4	65
24	.7	111	.85	140	.6	95	.4	65
25	.7	111	.8	130	.55	88	.35	58
26	.65	103	.8	130	.55	88	.35	58
27	.7	111	.8	130	.5	80	.45	72
28	.65	103	.75	120	.4	65	.35	58
29	.6	95	.7	111	.5	80	.4	65
30	.6	95	.7	111	.5	80	.5	80
31			.7	111			.8	80

Monthly discharge of San Miguel River at Placerville, Colo., for 1910.

[Drainage area, 304 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
September 13–30	171	95	122	0.401	0.27	4,360
October	245	95	121	.398	.46	7,440
November	111	65	94.8	.312	.35	5,640
December	88	58	72.3	.238	.27	4,450
The period						

FREMONT RIVER BASIN.

GENERAL FEATURES.

Fremont River heads in the eastern slopes of the Wasatch Mountains in Sevier County, Utah, one of the sources being Fish Lake. It flows in a general southerly direction to Thurber, from which point it traverses the central portion of Wayne County in a general easterly direction to Hanksville, where it turns southward; it joins Colorado River about 8 miles above Hite, Utah. It receives one important tributary, Curtis Creek,[1] from the north and a number of smaller streams, including Tantalus and Lewis creeks, from the south. The lower half of its course is through two deep canyons separated by a valley. On the upper stretch of the main river is what is known as Rabbit Valley. Both Fremont River and Curtis Creek are considerably augmented in volume by springs in their canyons, but they derive the greater part of their waters from melting snows on the plateau.

FREMONT RIVER NEAR THURBER, UTAH.

This station, which is located about 2 miles (by road) south of Thurber, Utah, was established May 13, 1909.

Pine Creek enters about 2 miles above the station. This creek and springs in the valley just above the station furnish much of the low-water flow. Most of the normal low-water flow is diverted above and below the station for irrigation.

The staff gage is on the left bank about 2,000 feet above a gristmill. The gage-height records are probably not much affected by ice.

Discharge measurements are made from a cable at the gage during high stages, and by wading at low stages.

As the bed of the stream shifts somewhat, frequent measurements are necessary for reliable estimates of daily and monthly discharge.

Discharge measurements of Fremont River near Thurber, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 17	E. S. Fuller	29	29	4.82	80
Aug. 17	G. H. Canfield	31	36	4.95	68
17	do	28	25	4.93	65
Sept. 21	do	31	39	5.58	124
21	do	30	39	5.58	126
Oct. 14	do	33	35	5.33	89

[1] Called Muddy River on Land Office maps.

Daily gage height, in feet, of Fremont River near Thurber, Utah, for 1910.

[John Smith, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.75	5.5	6.15	5.2	5.1	4.9	4.85	5.0	5.35	5.65	5.5	5.55
2	5.65	5.5	6.1	5.25	5.05	4.95	4.8	5.1	5.4	5.7	5.55	5.5
3	5.7	5.55	6.15	5.2	5.0	4.95	4.75	5.0	5.5	5.65	5.5	5.5
4	5.65	5.5	6.2	5.15	5.05	4.85	4.8	4.95	5.45	5.6	5.5	5.55
5	5.6	5.5	6.25	5.2	5.0	4.8	4.75	4.9	5.5	5.65	5.5	5.55
6	5.7	5.45	6.3	5.25	4.9	4.85	4.8	4.95	5.5	5.7	5.55	5.65
7	5.65	5.5	6.4	5.2	4.95	4.8	4.85	5.0	5.45	5.7	5.6	5.65
8	5.7	5.55	6.5	5.25	5.0	4.75	4.8	5.1	5.5	5.65	5.55	5.55
9	5.65	5.6	6.55	5.3	4.95	4.8	4.85	5.0	5.45	5.6	5.5	5.6
10	5.55	5.55	6.6	5.5	4.9	4.85	4.8	5.1	5.4	5.55	5.5	5.6
11	5.6	5.6	6.5	5.4	4.95	4.8	4.75	5.15	5.45	5.55	5.55	5.55
12	5.55	5.6	6.0	5.3	4.9	4.75	4.8	5.2	5.5	5.5	5.5	5.55
13	5.6	5.7	5.9	5.25	4.85	4.7	4.85	5.15	5.6	5.45	5.55	5.5
14	5.65	5.8	5.8	5.2	4.9	4.75	4.8	5.1	5.75	5.4	5.5	5.5
15	5.7	5.9	5.85	5.25	4.95	4.8	4.75	5.0	5.85	5.4	5.55	5.55
16	5.65	5.95	5.8	5.3	4.9	4.75	4.8	4.95	5.9	5.45	5.5	5.5
17	5.75	6.0	5.9	5.25	4.85	4.8	4.75	4.9	6.0	5.5	5.5	5.5
18	5.65	5.65	5.8	5.15	4.8	4.85	4.7	4.95	6.1	5.5	5.55	5.55
19	5.6	5.6	5.7	5.1	4.85	4.8	4.65	4.95	6.0	5.55	5.6	5.55
20	5.55	5.65	5.75	5.15	4.8	4.85	4.7	5.0	5.8	5.5	5.55	5.5
21	5.6	5.7	5.8	5.1	4.8	4.8	4.75	5.0	5.6	5.45	5.6	5.5
22	5.65	5.75	5.85	5.05	4.75	4.75	4.7	5.1	5.6	5.4	5.65	5.55
23	5.7	5.85	5.8	5.1	4.7	4.8	4.65	5.15	5.6	5.4	5.7	5.5
24	5.65	5.9	5.75	5.05	4.75	4.75	4.7	5.1	5.65	5.45	5.65	5.5
25	5.6	6.0	5.6	5.0	4.7	4.8	4.8	5.15	5.65	5.5	5.6	5.55
26	5.55	6.1	5.5	5.05	4.65	4.8	4.9	5.1	5.7	5.5	5.55	5.6
27	5.6	6.0	5.3	5.1	4.75	4.85	5.0	5.05	5.65	5.55	5.5	5.65
28	5.55	6.1	5.2	5.05	4.7	4.8	5.1	5.0	5.6	5.5	5.5	5.65
29	5.5	.....	5.15	5.15	4.75	4.75	5.0	5.1	5.65	5.5	5.55	5.6
30	5.45	.....	5.1	5.1	4.8	4.8	4.9	5.2	5.6	5.55	5.5	5.6
31	5.5	.....	5.15	.....	4.85	.....	4.95	5.3	.....	5.5	.....	5.65

Daily discharge, in second-feet, of Fremont River near Thurber, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	187	158	221	120	109	83	70	76	102	127	104	109
2	177	158	216	125	102	87	67	84	107	131	109	104
3	181	163	221	120	98	87	63	75	117	124	104	104
4	177	158	227	115	102	78	66	70	112	120	104	109
5	171	158	233	120	98	74	62	66	117	123	104	109
6	181	153	238	125	88	78	66	70	117	128	109	119
7	177	158	248	120	93	74	69	75	112	128	114	119
8	181	163	260	125	98	69	65	83	117	122	109	109
9	177	162	265	129	93	72	69	74	112	117	104	114
10	166	162	270	150	88	76	64	83	107	111	104	114
11	170	167	260	140	92	72	60	87	112	111	109	109
12	165	167	204	129	88	68	64	92	117	106	104	109
13	170	176	194	125	83	64	68	87	127	101	109	104
14	177	189	186	120	87	68	64	82	142	95	104	104
15	180	197	188	125	92	72	60	73	152	95	109	109
16	177	203	184	128	87	67	64	68	157	100	104	104
17	185	207	193	124	82	71	60	63	167	104	104	104
18	177	170	182	114	78	74	56	67	177	104	109	109
19	170	165	172	109	82	70	50	67	167	109	114	109
20	166	170	177	114	78	74	54	71	147	104	109	104
21	170	156	182	109	78	70	58	71	127	100	114	104
22	177	181	187	104	73	66	54	80	126	95	119	109
23	180	191	182	109	68	68	50	84	126	95	124	104
24	177	196	177	104	72	64	54	80	127	100	119	104
25	170	208	161	100	68	68	61	84	127	104	114	109
26	166	218	151	103	72	68	68	80	134	104	119	114
27	170	206	131	108	68	71	77	76	128	109	104	119
28	163	216	121	103	64	67	85	71	122	104	104	119
29	158	.....	117	111	71	63	77	80	128	104	109	114
30	153	.....	112	108	73	67	68	89	123	109	104	114
31	158	.....	116	.....	79	.....	71	98	.....	104	.....	119

NOTE.—Daily discharge determined by indirect method for shifting channels.

Monthly discharge of Fremont River near Thurber, Utah, for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	187	153	173	10,600	C.
February	218	153	178	9,890	C.
March	270	112	193	11,900	C.
April	150	100	118	7,020	C.
May	109	64	84.0	5,160	C.
June	87	63	71.7	4,270	C.
July	85	50	64.0	3,940	C.
August	98	63	77.6	4,770	B.
September	177	102	128	7,620	B.
October	131	95	109	6,700	B.
November	124	104	109	6,490	B.
December	119	104	110	6,950	B.
The year	270	50	118	85,300	

MUDDY CREEK NEAR EMERY, UTAH.

Muddy Creek rises in the eastern slopes of the Wasatch Mountains in the extreme southern corner of San Pete County, and joins Curtis Creek about 8 miles below Emery, Utah. Curtis Creek flows southeasterly across Emery County and enters Fremont River near Hanksville, Utah.

The station, which is located at Jacobsen's ranch, about 7 miles above and northwest of the town of Emery, Utah, was originally established April 29, 1909.

The station is below all tributaries and above all diversions.

Prior to August 25, 1909, records were obtained by measuring down to the water surface from a reference point on a flume in which discharge measurements were made. A staff gage was installed at the same location and datum on August 25. During August great variations in discharge were caused by heavy rains which washed out the gage and so altered the section that the station had to be reestablished September 18 at a new site several hundred feet upstream. An inclined staff gage was installed at a different datum and a cable erected from which discharge measurements will be made.

Discharge measurements of Muddy Creek near Emery, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 23	G. H. Canfield	18	15	2.00	34
23	do	18	15	2.00	34
Aug. 27	do	18	10	1.45	20
Sept. 28	do	16	8.4	1.51	17
Nov. 28	do	16	7.4	1.50	18

Daily gage height, in feet, and discharge, in second-feet, of Muddy Creek near Emery, Utah, for 1910.

[R. Jacobsen, observer.]

Day.	July.		August.		September.		October.		November.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			1.9	48	1.4	12		18		18
2			1.95	53	1.35	10		18		18
3			1.9	48	3.0	190		18		18
4			1.85	44	1.4	12		18		18
5			1.9	48	1.4	12		18		18
6			1.85	44	1.35	10		18		18
7			1.8	39	1.4	12		18		18
8			1.7	31	1.4	12		18		18
9			1.7	31	1.4	12		18		18
10			1.65	28	1.4	12		18		18
11			1.6	24	1.5	18		18		18
12			1.6	24	1.4	12		18		18
13			1.5	18	3.0	190		18		18
14			1.45	15	2.5	120	1.5	18		18
15			1.5	18	2.6	134	3.5	265		18
16			1.5	18	1.7	31	1.5	18		18
17			1.4	12	1.6	24		18		18
18			1.4	12		18		18		18
19			1.4	12		18		18		18
20			1.5	18		18		18		18
21			1.5	18		18		18		18
22			1.5	18		18		18		18
23	2.0	33	1.4	12		18		18		18
24	2.0	33	1.5	18		18		18		18
25	2.0	33	1.5	18		18		18		18
26	1.9	26	1.5	18		18		18		18
27	1.9	26	1.5	18		18		18		18
28	1.95	30	1.4	12	1.5	18		18	1.5	18
29	4.0	340	1.4	12		18		18		18
30	2.0	58	1.4	12		18		18		18
31	1.95	53	1.4	12				18		

NOTE.—Daily discharge determined from a fairly well defined discharge rating curve; discharge estimated for days of missing gage heights.

Monthly discharge of Muddy Creek near Emery, Utah, for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
July 23–31	340	26	70.2	1,250	C.
August	53	12	24.3	1,490	B.
September	190	10	35.2	2,090	B.
October	265	18	25.4	1,560	C.
November	18	18	18.0	1,070	C.

ESCALANTE RIVER BASIN.

ESCALANTE CREEK NEAR ESCALANTE, UTAH.

Escalante River rises in the southern part of Garfield County, Utah, under the walls forming the east face of the Table Cliff Plateau; flows first northeast, then east, and finally southeast, and enters the Colorado in Kane County about 12 miles above the mouth of the San Juan. The river is 90 miles long, and in the lower three-fourths of its

course sweeps through a narrow canyon whose vertical walls range in height from 900 to 1,200 feet, in places filling the whole space from wall to wall, in places winding from side to side in a flood plain of sand and shifting its position more or less with every freshet.

In the upper part of its course it is joined by several tributaries, all of which flow through close canyons.

The gaging station, which is located on Escalante Creek, one of the headwaters of Escalante River, at the head of the canyon, about 2 miles below the town of Escalante, Utah, was established August 5, 1909. The records show the total amount of water available for storage in an excellent reservoir site at this point.

The principal tributaries above are Birch Creek, entering about 6 miles upstream, and Pine Creek, which enters just above the station. Practically all the normal low-water flow is diverted above the station for irrigation in and near Escalante, the run-off at the station representing only the surplus water.

The first gage used was located about 20 feet below the mouth of Pine Creek. It was washed out by a severe flood August 31, which scoured out the bed of the creek about 3 feet and changed the location of the channel. From September 1 to November 12, 1909, records were kept of the depth of water at a point near the gage site. On November 13, 1909, a new gage was set 35 feet above the old one and the observer's readings for the intervening period referred to the new datum. The records for this period are only approximate. On September 16, 1910, a new gage was established, the datum of which is 1 foot lower than that of the old gage.

Estimates of winter discharge are very unreliable. The shifting of the stream bed makes accurate interpretation of the result difficult.

Discharge measurements of Escalante Creek near Escalante, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 14	E. S. Fuller	37	.....	2.85	122
Aug. 13	G. H. Canfield	25	18	1.79	50
Sept. 16	.....do	24	16	2.63	47
16	.....do	22	16	2.61	44
17	.....do	22	16	2.75	59
Oct. 17	.....do	24	14	2.68	36

Daily gage height, in feet, of Escalante Creek near Escalante, Utah, for 1910.

[D. C. Shurtz, jr., observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.05		2.4	2.45	2.85	2.25		2.0	3.4			1.55
2		2.6					0.85				1.4	
3	3.0		2.9	2.6	2.8	2.15		1.6	0.8	1.27		1.7
4		2.6					0.8				1.2	
5	3.0		2.95		2.8	2.1		1.4	0.7			1.4
6		2.7		2.5			0.7			1.25	1.2	
7	3.0		3.0		2.8	2.05		1.6	0.6			1.35
8		2.6		2.5			0.7			1.25	1.2	
9	3.0		2.95		2.8	2.05		1.8	0.6			1.3
10		2.5		2.6			0.75			2.2	1.2	
11	3.0		2.95		2.8	1.9		1.6	1.4			1.4
12		2.45		2.1	2.85		0.8			1.4	1.2	
13	3.0	2.5	2.9			1.85						1.5
14				2.0	2.85			1.8	3.2	1.60	1.2	1.6
15	3.0	2.6	2.8			1.7	0.85					
16				1.9	2.7			1.7	1.6		1.2	1.65
17	2.6	3.0	2.85				0.6		1.75	1.6		
18				1.9	2.6	1.45		3.2	3.44		1.2	1.65
19	2.6	3.1	2.9				0.5		1.8	1.4		
20					2.6	0.95		1.6			1.2	1.65
21	2.6	3.0	3.0	2.6			0.85			1.4		
22					2.8	0.8		1.8			1.2	1.75
23	2.6	3.0	3.0	2.6			1.2			1.4		
24					2.45	0.45		1.7	1.25		1.3	1.7
25	2.6	2.9	3.1	2.6			2.65			1.4		
26					2.35	0.7	3.2	1.6			1.3	
27	2.55	3.0	3.0	2.7					1.3	1.3		1.8
28					2.3	0.8	2.55	0.8			1.7	1.65
29	2.5		3.0	2.9			5.0		1.25	1.2		
30					2.25	0.85	2.65	0.8	1.25		1.6	1.65
31	2.5		2.9				3.40			1.5		

NOTE.—Gage heights Jan. 1–15 affected by ice. A new gage with datum 1 foot lower than that of the old gage was installed Sept. 16, 1910. All gage heights corrected to agree with readings on the old gage.

Daily discharge, in second-feet, of Escalante Creek near Escalante, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	86		77	82	121	64	4	67	225			30
2		96					3.5				22	
3	86		126	96	116	56	3	36	7	17		38
4		96					3				14	
5	86		131		116	53	2	25	5			22
6		106		86			2			16	14	
7	86		136		116	50	2	36	3			20
8		96		86			2			16	14	
9	86		131		116	50	2	50	3			18
10		86		96			2.5			78	14	
11	86		131		116	40	2	36	32			22
12		82		53	121		3			22	14	
13	86	86	126			38	3					37
14				46	121		3	50	210	32	14	32
15	86	96	116			30	3.5					
16				40	106		2	43	45		14	35
17	96	136	121				1		58	32		
18				40	96	19	1	205	211		14	35
19	96	147	126			1	0		45	22		
20					96	5	2	45			14	35
21	96	136	136	96			3.5			22		
22					116	3	7	62			14	42
23	96	136	136	96			11			22		
24					82	0	50	53	16		18	38
25	96	126	147	96			101			22		
26					72	2	158	45			18	
27	91	136	136	106			125		18	18		45
28					68	3	91	7			38	35
29	86		136	126			385		16	14		
30					64	3.5	130	7	16		32	35
31	86		126				227			27		

NOTE.—Daily discharge determined by means of several parallel curves, each based on one to three measurements; none of the curves well defined. Discharge Jan. 1 to 15 estimated because of presence of ice.

Monthly discharge of Escalante Creek near Escalante, Utah, for 1910.

Month.	Mean discharge in second-feet.	Run-off (total in acre-feet).
January	89.4	5,500
February	112	6,220
March	127	7,810
April	81.8	4,870
May	103	6,330
June	27.8	1,650
July	43.1	2,650
August	51.1	3,140
September	60.6	3,610
October	25.7	1,580
November	17.9	1,070
December	31.8	1,960
The year	64.3	46,400

NOTE.—These estimates may be classed as C. The mean of discharges on days on which gage heights were observed has been taken as mean for the month, except during July, when discharges were interpolated for days when gage heights were missing.

SAN JUAN RIVER BASIN.

GENERAL FEATURES.

San Juan River rises among the snow masses that crown the high peaks of the San Juan Mountains in southwestern Colorado, flows southwestward into New Mexico, then swings to the west and northwest, passing from San Juan County, N. Mex., across the extreme southwestern corner of Colorado into San Juan County, Utah, in the southwestern part of which it unites with the Colorado.

For the first 75 miles of its course the San Juan is a typical mountain stream, but at Canyon Largo, N. Mex., where it turns westward, its character changes, and it occupies a broad, winding, sandy channel in an arid valley, bordered on each side by terraced mesas. Below the mouth of Mancos River the valley narrows, and the river bottom is bounded by abrupt bluffs, broken and cut by dry water channels, and merging farther on into the walls of a deep, narrow, box canyon, in which the river flows to its end.

The headwater areas are protected by fine forests of spruce and yellow pine and at lower elevations large areas of aspen. The lower basin is practically barren except for an extensive growth of sagebrush, scattered cedars, piñons, and range grasses.

The principal tributaries of the San Juan are Navajo, Piedra, Pine (Los Pinos), Florida, Animas, and La Plata rivers, the Animas being the most important.

Animas River rises in the region above Silverton, and drains portions of the Needle and La Plata mountains, the former being the most rugged of the Rocky Mountain ranges. The river flows southward to the Colorado-New Mexico line and thence southwestward to the point where it joins the San Juan at Farmington, N. Mex.

Most of the region above Durango is well timbered with pine, spruce, and aspen, but large areas consist of naked granite peaks. Immediately above and below Durango the valley broadens and is bordered by mesas and bluffs cut by narrow canyons and covered with sagebrush and scattered pines and piñons; along the stream channels cottonwoods predominate. The rocks of this region are chiefly of sedimentary origin. The soils of the lower valleys consist of sandy loam and are very fertile.

La Plata River rises in the La Plata Mountains, about 25 miles northwest of Durango, Colo., and flows southward to its point of junction with the San Juan. Its drainage basin is a narrow strip parallel to and adjoining the Animas basin. The upper portion of the basin is a well-watered and forest-clad mountain region which merges southward into an arid mesa, plateau, and canyon country. La Plata Valley proper is a narrow, shallow depression from Hesperus down, bounded on both sides by high, broken table-lands and deeply eroded mountains. The lower mountain slopes are covered with piñon, scrub oak, and cedar; the lower valleys support heavy growths of sagebrush and chico; the upper mountain slopes were at one time heavily timbered with spruce and yellow and white pine, but these forests have been largely removed by lumbermen.

The other tributaries of the San Juan need not here be described. Those mentioned are perennial streams, but much of their water is diverted for irrigation and never reaches the main river. In addition to the perennial streams are many intermittent creeks throughout New Mexico which contribute large volumes of water during heavy storms.

The altitudes in the San Juan basin range from over 13,000 feet in the highest mountains to between 6,000 and 7,000 feet at the Colorado-New Mexico line. The San Juan at the mouth of the Animas has an elevation of about 5,300 feet; at its junction with Colorado River the elevation is about 3,500 feet.

Most of the timbered land in the San Juan drainage basin is included in the San Juan National Forest, which contains nearly 2,000 square miles of merchantable timber, 100 square miles of woodland, 300 square miles of sagebrush, and 200 square miles of barren and burnt area.

In a small area in the high mountains the annual precipitation exceeds 25 inches, and over a considerable area the average exceeds 20 inches; but for the remainder of the area the average in Colorado seems to be about 15 inches, that in New Mexico about 10 inches, and in Utah about 15 inches.

Above an altitude of 7,500 feet the winters are severe and snowfalls are heavy; below an elevation of 6,000 feet the winters are comparatively open and mild. The upper mountain streams flow under a

thick ice cover, but in the more open country, in the vicinity of Aztec, it is rather unusual for the rivers to freeze over entirely, though much ice forms along the edges, and slush ice is often seen.

Much land along the valleys of San Juan, Animas, Pine (Los Pinos), Florida, and La Plata rivers and the smaller tributaries in Colorado is now under cultivation, and also a few thousand acres of valley land in New Mexico. Up to this time irrigation has largely been confined to the bottom land. The greatest opportunities for future development are in San Juan County, N. Mex., where exceptionally large areas, aggregating probably a million acres of fertile lands, are excellently adapted to irrigation. The rivers there are bordered by broad mesas and benches, sloping back for miles in many places and easily reached by irrigation canals, and the water supply is ample.

Numerous small lakes, high up in the mountains, tend to equalize the flow of some of the tributaries, and many large and small storage reservoir sites are available. Among others may be mentioned the Turley reservoir site, on San Juan River below the mouth of the Pine (Los Pinos), which has a storage capacity of about one and a half million acre-feet.

Excellent opportunities for power development are presented. Theoretically, with proper storage, it will be possible to develop nearly 300,000 horsepower. Falls of 100 to 300 feet per mile are common on the upper reaches of the stream. The San Juan has an average fall of about 13 feet to the mile from the mouth of the Piedra to the mouth of the Mancos, a distance of about 115 miles, while the fall above the mouth of the Piedra is very much greater. The Animas has a fall of over 70 feet to the mile from Silverton to Durango, a distance of about 40 miles, and from Durango to its mouth the average fall is over 20 feet to the mile. Present developments are practically limited to two power plants on Animas River, of 6,000 and 1,000 horsepower.

The largest deposits of lignite and bituminous and coking coal in the West are in this drainage area.

SAN JUAN RIVER AT ARBOLES, COLO.

This station, which is located about 1,000 feet west of Arboles station, was established August 21, 1910, by the State engineer of Colorado, by whom the records are furnished.

An inclined staff gage is bolted to a high rocky bank on right side of stream.

Measurements are made from car and cable during high water, and by wading at various sections during low water.

The bed of the stream consists of mud, gravel, and small bowlders, and shifts somewhat, but the measuring section is fair.

Relation between gage height and discharge is slightly affected by ice during the winter months.

A station was maintained at this point from June 19, 1895, to September 30, 1899, by the United States Geological Survey, but the relation between the datum of the present gage and that of the original gage has not been determined.

Discharge measurements of San Juan River at Arboles, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 21	Ferguson and Christiansen	122	155	1.50	196
Sept. 22	E. O. Christiansen	115.5	164	1.42	154

Daily gage height, in feet, and discharge, in second-feet, of San Juan River at Arboles, Colo., for 1910.

[L. E. Smack, observer.]

Day.	August.		September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	.....	.....	1.4	145	1.1	58	1.5	195	1.2	82
2	.....	.....	1.4	145	1.1	58	1.4	145	1.2	82
3	.....	.....	1.45	170	1.1	58	1.4	145	1.2	82
4	.....	.....	1.45	170	1.4	145	1.4	145	.....	.....
5	.....	.....	1.35	126	1.3	108	1.5	195	.....	.....
6	.....	.....	1.4	145	1.2	82	1.45	170	.....	.....
7	.....	.....	1.4	145	1.1	58	1.45	170	.....	.....
8	.....	.....	1.35	126	1.05	50	1.4	145	.....	.....
9	.....	.....	1.3	108	1.1	58	1.4	145	.....	.....
10	.....	.....	1.3	108	1.1	58	1.4	145	.....	.....
11	.....	.....	1.3	108	1.1	58	1.4	145	.....	.....
12	.....	.....	1.25	95	1.1	58	1.4	145	.....	.....
13	.....	.....	1.2	82	1.1	58	1.3	108	.....	.....
14	.....	.....	1.25	95	1.1	58	1.3	108	.....	.....
15	.....	.....	1.2	82	1.1	58	1.6	250	.....	.....
16	.....	.....	1.2	82	1.65	284	1.45	170	.....	.....
17	.....	.....	1.25	95	2.45	1,300	1.45	170	.....	.....
18	.....	.....	1.25	95	2.0	600	1.4	145	.....	.....
19	.....	.....	1.4	145	1.65	284	1.4	145	.....	.....
20	.....	.....	1.5	195	1.65	284	1.4	145	.....	.....
21	1.8	395	1.55	222	1.6	250	1.4	145	.....	.....
22	1.5	195	1.5	195	1.55	222	1.35	126	.....	.....
23	1.6	250	1.45	170	1.55	222	1.3	108	.....	.....
24	1.6	250	1.3	108	1.5	195	1.3	108	.....	.....
25	1.65	284	1.2	82	1.5	195	1.3	108	.....	.....
26	1.5	195	1.2	82	1.5	195	1.4	145	.....	.....
27	1.5	195	1.2	82	1.5	195	1.5	195	.....	.....
28	1.35	126	1.2	82	1.45	170	1.5	195	.....	.....
29	1.4	145	1.2	82	1.3	108	1.4	145	.....	.....
30	1.4	145	1.1	58	1.3	108	1.4	145	.....	.....
31	1.5	195	.....	.....	1.4	145	.....	.....	.....	.....

Monthly discharge of San Juan River at Arboles, Colo., for 1910.

[Drainage area, 1,394 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
August 21-31	395	126	216	0.155	0.06	4,710
September	222	58	121	.087	.10	7,190
October	1,300	50	186	.133	.15	11,500
November	250	108	152	.109	.12	9,000

SAN JUAN RIVER AT BLANCO, N. MEX.

This station, which was located at a new suspension bridge crossing the San Juan at Blanco, about 4 miles below Turley post office, 16 miles southeast of the Denver & Rio Grande Railroad at Aztec, N. Mex., and about half a mile above the mouth of Canyon Largo, which carries large quantities of water only during floods, was established December 9, 1908, to take the place of the station at Turley (abandoned Nov. 30, 1908), and was discontinued October 31, 1910.

The suspension bridge and chain gage were washed out by a flood on September 6, 1909, and on September 29, 1909, a temporary staff gage was established about 30 feet upstream from site of the bridge and at a new datum. Discharge measurements after September 6, 1909, were taken at the suspension bridge at Bloomfield, about 11 miles downstream, where a wire gage was installed on September 28, 1909.

The flow of the river at Blanco and Bloomfield should be the same, except for the inflow of Canyon Largo.

Daily gage height, in feet, of San Juan River at Blanco, N. Mex., for 1910.

Day.	Jan.	Feb.	Mar	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	4.3	4.2	4.9	5.7	6.9	6.8	5.0	4.9	3.6	3.6
2	4.3	4.2	5.0	5.6	6.7	6.5	4.7	4.8	3.6	3.6
3	4.5	4.2	5.1	5.6	6.6	6.5	4.7	4.2	3.6	3.6
4	4.6	4.2	5.5	5.5	6.4	6.3	4.7	4.8	3.6	3.6
5	4.5	4.2	5.8	5.4	6.0	6.4	4.7	4.8	3.6	3.6
6	4.5	4.1	6.2	5.4	6.1	6.4	4.7	4.8	3.6	3.6
7	4.4	4.1	6.2	5.5	6.1	6.2	4.6	4.7	3.6	3.6
8	4.4	4.1	6.0	5.5	6.2	6.1	4.6	4.2	3.6	3.6
9	4.4	4.1	6.1	5.5	6.6	5.5	4.6	4.2	3.6	3.6
10	4.4	4.1	5.9	5.5	6.9	5.5	4.4	4.2	3.6	3.6
11	4.5	4.1	5.9	5.5	7.0	5.5	4.2	4.2	3.6	3.6
12	4.5	4.1	5.8	5.6	7.0	5.5	3.0	4.4	3.6	3.6
13	4.5	4.1	5.9	5.6	7.0	5.4	2.9	4.6	3.4	3.5
14	4.5	4.2	6.2	5.7	6.9	5.3	2.9	4.6	3.4	3.5
15	4.4	4.2	6.1	5.7	6.6	5.3	2.9	4.7	3.4	3.5
16	4.4	4.2	6.3	5.8	6.3	5.3	2.9	4.6	3.4	3.5
17	4.6	4.2	6.3	5.8	6.1	5.3	3.0	4.2	3.6	4.6
18	4.6	4.1	6.4	5.8	6.2	5.2	3.3	3.9	3.6	3.6
19	4.5	4.1	6.5	5.9	6.2	5.2	3.8	3.9	3.6	3.6
20	4.5	4.1	6.7	5.9	6.1	5.1	3.8	3.8	3.7	5.15

Daily gage height, in feet, of San Juan River at Blanco, N. Mex., for 1910—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
21	4.4	4.1	6.8	5.9	6.1	5.0	3.7	3.7	3.7	4.25
22	4.4	4.2	6.7	6.0	6.0	4.9	3.7	3.6	3.8	4.1
23	4.4	4.3	6.7	6.1	5.9	4.7	3.7	3.7	3.6	3.7
24	4.4	4.4	6.4	6.4	5.9	4.6	3.6	3.7	3.6	3.7
25	4.4	4.5	6.5	6.6	5.9	4.5	3.6	3.8	3.6	3.7
26	4.3	4.6	6.2	6.7	6.2	4.8	3.5	3.8	3.6	3.6
27	4.3	4.7	6.0	6.8	6.3	4.9	3.5	3.8	3.6	3.6
28	4.3	4.8	5.8	6.9	6.7	5.3	3.5	3.8	3.6	3.6
29	4.2	.....	5.7	7.0	6.8	5.6	3.6	3.7	3.6	3.6
30	4.2	.....	5.7	7.0	7.0	5.9	4.2	3.6	3.6	4.2
31	4.2	.....	5.7	.....	6.8	.....	4.9	3.6	.....	4.2

SAN JUAN RIVER NEAR BLOOMFIELD, N. MEX.

This station, which is located at the suspension bridge about 1½ miles below Bloomfield and about 11 miles below the station at Blanco, where bridge was destroyed by the flood of September 6, 1909, was established September 28, 1909.

A wire gage was installed, but records were very fragmentary until a Friez automatic gage, for a 10-foot stage, installed February 11, 1910, on a 16-inch pile on the right bank just above the suspension bridge, was put in operation April 3, 1910. No gage heights were observed during 1909.

Discharge measurements are made from the downstream side of the bridge.

Discharge measurements of San Juan River near Bloomfield, N. Mex., in 1909–10.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1909.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 28	W. B. Freeman	238	300	3.90	1,100
Nov. 17	J. B. Stewart	160	135	2.90	435
1910.					
Feb. 9[a]	W. B. Freeman	239	157	3.42	441
Mar. 26	G. J. Lyon	267	658	5.35	4,270
May 30	G. H. Russell	264	860	5.65	5,870
30	....do	264	985	6.05	7,190
June 22	R. H. Bolster	151	330	3.80	1,490
Aug. 20	G. J. Lyon	180	258	3.65	642
24	V. L. Sullivan	159	157	3.15	344
Oct. 11	J. B. Stewart	102	91	2.95	190
22	Freeman and Turley	210	196	3.22	687
Dec. 8	C. B. Digby	178	124	3.20	259

[a] On this date the flow of Canyon Largo estimated as 12 second-feet.

Daily gage height, in feet, of San Juan River near Bloomfield, N. Mex., for 1910.

[E. Hevinga, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	5.05	.....	5.8	5.8	3.65	3.75	3.25	3.0	3.35	3.25
2	.....	6.35	.....	5.6	5.65	3.55	3.45	3.2	3.0	3.4	3.2
3	.....	.....	4.6	5.3	5.5	3.65	3.4	3.3	3.05	3.4	3.25
4	.....	.....	4.55	5.1	5.35	3.7	3.65	3.1	3.15	3.45	3.2
5	.....	.....	4.5	5.15	5.2	3.65	4.5	3.0	3.25	3.4	3.2
6	.....	.....	4.45	5.2	5.2	3.6	3.9	2.95	3.15	3.4	3.2
7	.....	5.4	4.45	5.15	5.1	3.6	3.8	2.9	3.15	3.35	3.2
8	3.4	5.35	4.45	5.25	5.0	3.5	3.5	2.85	3.1	3.35	3.15
9	3.42	5.9	4.5	5.5	4.9	3.4	3.3	2.8	3.05	3.3	3.15
10	.....	.....	4.6	5.75	4.85	3.35	3.55	2.8	3.0	3.3	3.25
11	3.35	.....	4.7	5.9	4.7	3.3	3.8	2.75	3.0	3.3	3.2
12	.....	.....	4.8	5.9	4.7	3.2	3.5	2.75	3.0	3.3	3.25
13	.....	.....	4.9	5.85	4.65	3.15	3.55	2.7	3.0	3.3	3.2
14	.....	5.55	5.1	5.75	4.5	3.2	3.4	2.8	3.0	3.3	3.2
15	.....	5.5	4.9	5.6	4.5	3.2	3.3	2.85	3.0	3.4	3.3
16	3.7	5.35	4.8	5.2	4.3	3.2	3.45	2.9	3.7	3.45	3.2
17	3.5	.....	4.7	4.8	4.25	3.1	3.5	2.95	5.1	3.4	3.15
18	.....	.....	4.7	4.7	4.1	3.05	3.45	3.1	4.1	3.4	3.15
19	.....	.....	4.8	4.7	4.0	3.0	3.4	3.1	4.0	3.4	3.15
20	.....	.....	5.0	4.7	4.0	3.0	3.4	3.2	4.1	3.4	3.15
21	3.45	5.8	5.3	4.6	3.9	2.95	3.25	3.2	3.7	3.4	3.2
22	.....	5.85	5.4	4.5	3.8	2.95	3.35	3.2	3.3	3.35	3.2
23	.....	5.45	5.3	4.4	3.7	2.9	3.2	3.2	3.3	3.35	3.25
24	.....	.....	5.4	4.3	3.7	3.0	3.2	3.2	3.4	3.4	3.2
25	5.4	.....	5.6	4.45	3.65	3.1	3.2	3.1	3.3	3.35	3.3
26	.....	.....	5.75	4.6	3.6	3.3	3.2	3.1	3.3	3.4	3.3
27	.....	.....	5.8	4.7	3.5	3.2	3.2	3.1	3.35	3.4	3.3
28	4.85	5.35	5.9	5.0	3.5	3.2	3.05	3.05	3.4	3.4	3.3
29	.....	5.05	6.05	5.4	3.7	3.1	3.0	3.05	3.4	3.35	3.2
30	.....	4.85	6.0	5.85	3.8	4.1	3.0	3.05	3.35	3.25	3.1
31	.....	.....	.....	5.9	.....	3.95	3.1	.....	3.35	.....	3.2

NOTE.—Readings during February and March are from the board gage on outside of float box of the automatic gage installed Feb. 11, 1910, except Feb. 8 and 9, which are from wire gage.

Daily discharge, in second-feet, of San Juan River near Bloomfield, N. Mex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	580	500	3,300	.....	6,110	6,110	900	740	340	210	700	400
2	580	500	8,620	.....	5,300	5,500	770	478	310	210	760	360
3	760	500	.....	2,050	4,150	4,910	830	440	370	232	760	400
4	865	500	.....	1,940	3,460	4,340	870	645	255	283	800	360
5	760	500	.....	1,830	3,630	3,800	820	1,830	210	340	700	360
6	760	430	.....	1,740	3,800	3,800	750	900	190	283	700	360
7	670	430	4,520	1,740	3,630	3,460	750	790	170	283	660	360
8	670	440	4,340	1,740	3,980	3,140	650	515	152	255	660	282
9	670	441	6,520	1,830	4,910	3,000	570	370	135	232	600	282
10	670	.....	.....	2,050	5,900	2,900	520	558	135	210	600	340
11	760	405	.....	2,290	6,520	2,600	470	790	122	210	600	310
12	760	.....	.....	2,550	6,520	2,600	380	515	122	210	600	340
13	760	.....	.....	2,830	6,320	2,500	350	558	110	210	600	310
14	760	.....	5,100	3,460	5,900	2,200	370	440	135	210	600	310
15	670	.....	4,910	2,830	5,300	2,200	300	370	152	210	620	370
16	670	690	4,340	2,550	3,800	1,850	310	478	170	750	650	310
17	860	515	.....	2,290	2,550	1,650	255	515	190	4,000	620	282
18	860	.....	.....	2,290	2,290	1,550	232	478	255	1,600	620	282
19	760	.....	.....	2,550	2,290	1,470	210	440	255	1,500	620	282
20	760	.....	.....	3,140	2,290	1,570	210	440	310	1,900	620	282
21	670	478	6,110	4,150	2,050	1,550	190	340	310	1,300	620	310
22	670	4,520	6,320	4,520	1,830	1,490	190	405	310	760	550	310
23	670	.....	4,720	4,150	1,640	1,300	170	310	310	760	550	340
24	670	.....	.....	4,520	1,460	1,250	210	310	310	900	600	310
25	670	.....	.....	5,300	1,740	1,170	255	310	255	760	550	370

Daily discharge, in second-feet, of San Juan River near Bloomfield, N. Mex., for 1910—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
26	580	.....	4,270	5,900	2,050	1,080	370	310	255	760	550	370
27	580	.....	.....	6,110	2,290	930	310	310	255	760	550	370
28	580	2,690	4,340	6,520	3,140	900	310	232	232	800	550	370
29	500	.....	3,300	7,180	4,520	1,100	255	210	232	800	480	310
30	500	.....	2,690	6,950	6,320	1,180	1,150	210	232	760	400	255
31	500	.....	.....	.....	6,520	.....	960	255	.....	760	.....	310

NOTE.—Daily discharge Jan. 1 to Feb. 7 determined by using the Blanco gage heights and a curve parallel to 1909 curve passing through measurement of Feb. 9, at Bloomfield, which was referred to gage at Blanco. Daily discharge Feb. 8 to June 8, July 16 to Oct. 15, and Dec. 8 to 31 determined from a curve which is fairly well defined. Discharge June 9 to July 15 and Oct. 15 to Dec. 8 obtained by indirect method for shifting channels.

Monthly discharge of San Juan River near Bloomfield, N. Mex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	865	500	684	42,100	D.
February (15 days)	4,520	405	903	26,900	B.
March (15 days)	8,620	2,690	4,890	145,000	B.
April 3–30	7,180	1,740	3,460	192,000	B.
May	6,520	1,460	3,940	242,000	B.
June	6,110	900	2,440	145,000	C.
July	1,150	170	480	29,500	C.
August	1,830	210	500	30,700	B.
September	370	110	226	13,400	B.
October	4,000	210	724	44,500	C.
November	800	400	616	36,700	C.
December	400	255	329	20,200	C.
The period	.....	.....	.....	968,000	

PIEDRA RIVER AT ARBOLES, COLO.

This station, which is located about one-third mile west of Arboles station, Colo., was established August 21, 1910, by the State engineer of Colorado, by whom the records are furnished. A station was maintained at this point from June 19, 1895, to September 30, 1899, by the United States Geological Survey, but the relation between the datum of the original gage and that of the present gage has not been determined.

A standard chain gage is attached to lower side of railway bridge, and a vertical staff gage is fastened to the old cofferdam at the bridge abutment. Both gages are at the same datum.

The bed of the stream is composed of mud and gravel and is liable to shift during floods. The channel is fairly straight, and the section below the bridge affords fair conditions for measurements.

High-water stage measurements are made from the railroad bridge; low-stage measurements are made by wading below bridge.

The relation between gage height and discharge is slightly affected by ice during the winter.

Discharge measurements of Piedra River at Arboles, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 21	Christiansen and Ferguson	65	92	1.10	96
Sept. 21	E. O. Christiansen	64	112	1.04	90

Daily gage height, in feet, and discharge, in second-feet, of Piedra River at Arboles, Colo., for 1910.

[L. E. Smack, observer.]

Day.	August.		September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	.....	.....	1.05	91	0.95	81	1.2	106	1.05	91
2	.....	.....	1.0	86	1.0	86	1.25	111	1.2	106
3	.....	.....	.95	81	1.0	86	1.25	111	1.0	86
4	.....	.....	1.0	86	1.15	101	1.3	116	.....	.....
5	.....	.....	1.0	86	1.15	101	1.3	116	.....	.....
6	.....	.....	.95	81	1.05	91	1.3	116	.....	.....
7	.....	.....	1.0	86	1.0	86	1.3	116	.....	.....
8	.....	.....	.95	81	1.0	86	1.25	111	.....	.....
9	.....	.....	.9	76	1.0	86	1.2	106	.....	.....
10	.....	.....	.9	76	1.0	86	1.2	106	.....	.....
11	.....	.....	.85	72	1.0	86	1.2	106	.....	.....
12	.....	.....	.8	67	1.0	86	1.2	106	.....	.....
13	.....	.....	.8	67	1.0	86	1.2	106	.....	.....
14	.....	.....	.8	67	1.0	86	1.2	106	.....	.....
15	.....	.....	.8	67	1.0	86	1.4	126	.....	.....
16	.....	.....	.8	67	1.55	142	1.35	121	.....	.....
17	.....	.....	.9	76	2.5	245	1.45	132	.....	.....
18	.....	.....	.9	76	2.0	191	1.4	126	.....	.....
19	.....	.....	.95	81	2.0	191	1.35	121	.....	.....
20	.....	.....	1.05	91	2.0	191	1.3	116	.....	.....
21	1.1	96	1.05	91	1.55	142	1.3	116	.....	.....
22	1.1	96	1.1	96	1.5	137	1.3	116	.....	.....
23	1.15	101	1.25	111	1.5	137	1.25	111	.....	.....
24	1.2	106	1.1	96	1.5	137	1.2	106	.....	.....
25	1.45	132	1.1	96	1.5	137	1.2	106	.....	.....
26	1.3	116	1.0	86	1.5	137	1.2	106	.....	.....
27	1.1	96	1.0	86	1.5	137	1.2	106	.....	.....
28	1.05	91	1.0	86	1.4	126	1.2	106	.....	.....
29	1.05	91	1.0	86	1.35	121	1.2	106	.....	.....
30	1.05	91	.9	76	1.3	116	1.05	91	.....	.....
31	1.0	86	.....	.....	1.25	111	.....	.....	.....	.....

Monthly discharge of Piedra River at Arboles, Colo., for 1910.

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
August 21–31	132	86	100	0.154	0.06	2,190
September	96	67	82.4	.126	.14	4,880
October	245	81	120	.185	.21	7,380
November	132	91	112	.172	.19	6,660

LOS PINOS RIVER NEAR IGNACIO, COLO.

This station, which is located at the steel wagon bridge at the Ignacio Indian agency, about 2 miles above Ignacio, Colo., was established August 31, 1910, by the State engineer of Colorado, by whom the records are furnished. The station maintained during 1899 and 1900 by the United States Geological Survey was probably a short distance below the present site. The old bridge to which gage was spiked has been washed out. The relation between the datum of the old gage and that of the present gage has not been determined.

A standard chain gage is attached to the bridge and an auxiliary slope gage is fastened to the left bank about 500 feet below the bridge. Both gages are referred to the same datum.

The bed is composed of mud, sand, and bowlders, and is somewhat shifting. At high stages the river overflows its banks. The measuring section at bridge is only fair.

High-water measurements are made from the bridge. Low-water measurements, however, are made by wading at various sections.

The relation between gage height and discharge is only slightly affected by ice during the winter months.

Discharge measurements of Los Pinos River near Ignacio, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 31	Christiansen and Ferguson	51	29	1.60	40
Sept. 20	E. O. Christiansen	48	41	1.70	54
Oct. 24	Christiansen and Hezmalhalch	56	77	2.35	160

Daily gage height, in feet, and discharge, in second-feet, of Los Pinos River near Ignacio, Colo., for 1910.

[Mrs. C. J. Warner, observer.]

Day.	September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	1.6	43	1.7	51	2.2	126	2.0	89
2	1.6	43	1.7	51	2.15	116	2.0	89
3	1.65	47	1.75	56	2.15	116	2.0	89
4	1.7	51	1.7	51	2.2	126	2.0	89
5	1.65	47	1.65	47	2.15	116	2.0	89
6	1.6	43	1.6	43	2.15	116	2.0	89
7	1.6	43	1.65	47	2.15	116	2.0	89
8	1.6	43	1.6	43	2.15	116	2.0	89
9	1.5	36	1.6	43	2.05	98	2.0	89
10	1.5	36	1.6	43	2.05	98	2.05	98
11	1.5	36	1.6	43	2.1	106	2.05	98
12	1.5	36	1.6	43	2.05	98	2.0	89
13	1.5	36	1.6	43	2.05	98	2.0	89
14	1.55	39	1.6	43	2.1	106	2.0	89
15	1.5	36	1.6	43	2.2	126	2.0	89
16	1.5	36	2.3	148	2.15	116	2.05	98
17	1.5	36	3.2	440	2.2	126	2.05	98
18	1.5	36	2.65	241	2.05	98	2.05	98
19	1.55	39	2.6	226	2.05	98	2.0	89
20	1.7	51	2.65	241	2.05	98	1.95	82
21	1.7	51	2.35	160	2.0	89	2.0	89
22	1.7	51	2.25	137	2.05	98	2.0	89
23	1.7	51	2.3	148	2.05	98	1.9	74
24	1.7	51	2.3	148	2.0	89	2.05	98
25	1.7	51	2.3	148	2.05	98	.....	.....
26	1.7	51	2.35	160	2.1	106	.....	.....
27	1.6	43	2.35	160	2.1	106	.....	.....
28	1.6	43	2.35	160	2.05	98	.....	.....
29	1.65	47	2.35	160	2.05	98	.....	.....
30	1.7	51	2.25	137	2.0	89	.....	.....
31	.....	.....	2.25	137	.....	.....	.....	.....

Monthly discharge of Los Pinos River near Ignacio, Colo., for 1910.

[Drainage area, 450 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
September	51	36	43.4	0.096	0.11	2,560
October	440	43	117	.260	.30	7,200
November	126	89	106	.236	.26	6,300
December	98	74	90.3	.201	.18	4,300

ANIMAS RIVER AT DURANGO, COLO.

This station, which is located on the Rio Grande Southern Railroad bridge at Durango, Colo., was established August 22, 1910, by the State engineer of Colorado, by whom the records are furnished. From June 20, 1895, to December 31, 1905, a station was maintained by the United States Geological Survey at the wagon bridge 200 feet above the present site. The relation between the original and the present gages has not been determined. Lightner Creek enters the Animas between the two localities.

A standard chain gage is fastened to the bridge and a Bristol automatic gage was installed November 3, 1910, with datum the same as that of the chain gage. The automatic gage was removed November 27, 1910, because of some necessary construction work on the bridge and was replaced February 9, 1911.

The bed of the stream consists of sand, gravel, and bowlders, and shifts somewhat. Both banks are subject to overflow. The measuring section at the bridge is only fair.

Low-stage measurements are made by wading; high-stage measurements are made from the bridge.

The relation between gage height and discharge is affected by ice during the winter months.

Discharge measurements of Animas River at Durango, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 22	Ferguson and Christiansen	105	190	1.55	316
Sept. 19	E. O. Christiansen	100	188	1.50	315
Nov. 3	Christiansen and Hezmalhalch	100	180	1.55	312

Daily gage height, in feet, of Animas River at Durango, Colo., for 1910.

[Henry Schunk, observer.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1.55	.....	1.7	1.4	16	.....	1.5	2.05	1.45	1.4
2	.....	1.55	1.45	1.55	1.4	17	.....	1.5	2 3	1.45	1.4
3	.....	1.5	1.5	1.55	1.4	18	.....	1.5	2.2	1.45	1.4
4	.....	1.65	1.4	1.55	1.4	19	.....	1.5	1.9	1.45	1.4
5	.....	1.7	1.4	1.55	1.4	20	.....	1.5	1.9	1.4	1.3
6	.....	1.6	1.4	1.5	1.4	21	.....	1.6	1.9	1.35	1.3
7	.....	1.6	1.4	1.5	1.4	22	.....	1.7	1.9	1.4	1.3
8	.....	1.6	1.4	1.5	1.4	23	1.6	1.6	1.9	1.35	1.3
9	.....	1.5	1.4	1.45	1.4	24	1.6	1.6	1.9	1.25	1.3
10	.....	1.5	1.4	1.4	1.4	25	1.6	1.6	1.9	1.25	1.3
11	.....	1.5	1.4	1.5	1.4	26	1.6	1.6	1.8	1.25	1.3
12	.....	1.5	1.4	1.6	1.4	27	1.6	1.5	1.8	1.3	1.3
13	.....	1.5	1.4	1.6	1.4	28	1.6	1.5	1.8	1.4	1.3
14	.....	1.5	1.4	1.55	1.4	29	1.5	1.4	1.8	1.4	1.3
15	.....	1.5	1.4	1.5	1.4	30	1.5	1.4	1.8	1.4	1.2
						31	1.5	.....	1.75	.....	1.2

ANIMAS RIVER AT AZTEC, N. MEX.

This station, which is located about one-third mile west of Aztec, N. Mex., on the main wagon road to Farmington and La Plata, was originally established June 21, 1904, at the wooden truss highway bridge about three-eighths of a mile west of Aztec, was discontinued December 14, 1904, and reestablished at the same location June 8, 1907. On September 13, 1908, it was moved to a new suspension bridge about half a mile above the old bridge, which was torn down on completion of the new bridge. The station, although 20 miles above the mouth of the river, is below all important tributaries.

The drainage area comprises about 1,300 square miles.

Between Durango and Aztec many large ditches divert water for irrigation, and the discharge at the station does not represent the total run-off of the stream. Notwithstanding the numerous existing water rights, an ample supply of water is available for future development.

No change in the staff gage or gage datum was made during the maintenance of the station at the old site. Beginning September 13, 1908, an inclined staff gage was read, installed a few feet downstream from the suspension bridge at an arbitrary datum.

Ice forms to a considerable depth along the edges during the greater part of the winter, but the river seldom freezes across. Slush ice frequently occurs during the winter months.

Discharge measurements of Animas River at Aztec, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 9	W. B. Freeman	149	168	4.00	383
Mar. 27	G. J. Lyon	151	364	5.30	1,440
May 31	G. H. Russell	155	709	7.30	4,210
June 21	R. H. Bolster	151	436	5.24	1,360
Aug. 17	G. J. Lyon	135	130	3.95	291
23	V. L. Sullivan	135	161	3.90	349
Oct. 10	J. B. Stewart	60	61	3.71	193
Dec. 9	C. B. Digby	134	121	3.70	225

Daily gage height, in feet, of Animas River at Aztec, N. Mex., for 1910.

[H. S. Wattles, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.1	4.0	4.4	4.8	6.4	7.4	4.9	4.7	3.8	3.75	4.05	3.8
2	4.2	4.0	4.4	4.8	6.1	7.1	4.8	4.4	3.8	3.75	4.0	3.8
3	4.2	4.0	4.6	4.8	5.8	7.05	4.7	4.3	3.75	3.75	4.0	3.8
4	4.1	4.0	4.7	4.8	5.6	6.8	4.65	4.6	3.8	3.75	4.0	3.8
5	4.1	4.0	4.8	4.8	5.7	6.6	4.6	5.45	3.9	3.8	4.0	3.8
6	4.0	4.0	5.0	4.75	5.8	6.5	4.5	5.1	3.85	3.8	4.0	3.8
7	4.0	4.0	5.2	4.75	5.9	6.3	4.5	4.7	3.8	3.8	4.0	3.8
8	4.0	4.0	5.3	4.8	5.9	6.15	4.45	4.5	3.8	3.8	4.0	3.75
9	4.0	4.0	5.4	4.8	6.5	6.1	4.4	4.4	3.8	3.75	4.0	3.7
10	4.1	4.0	5.1	4.8	6.85	6.0	4.4	4.3	3.8	3.75	4.0	3.7
11	4.2	4.0	4.9	4.8	7.2	5.9	4.35	4.3	3.8	3.7	3.9	3.75
12	4.2	4.0	4.9	4.9	7.4	5.9	4.3	4.25	3.8	3.7	3.9	3.8
13	4.1	4.0	5.0	5.0	7.1	5.9	4.2	4.2	3.8	3.7	3.9	3.8
14	4.0	4.05	5.1	5.0	6.8	5.9	4.2	4.2	3.8	3.7	3.9	3.75
15	4.0	4.15	5.1	5.0	6.65	5.8	4.15	4.2	3.8	3.7	3.9	3.75
16	4.0	4.05	5.1	5.0	6.45	5.65	4.1	4.1	3.8	4.0	4.0	3.75
17	4.0	3.9	5.1	4.9	6.2	5.5	4.1	4.0	3.8	4.55	3.95	3.75
18	4.0	3.8	5.1	4.8	6.0	5.2	4.1	4.0	3.8	4.45	3.95	3.7
19	4.05	3.8	5.2	4.8	6.0	5.2	4.1	3.9	3.8	4.3	3.95	3.7
20	4.1	3.95	5.2	5.0	6.05	5.2	4.1	3.9	3.9	4.4	3.9	3.7
21	4.1	4.0	5.35	5.6	6.0	5.1	4.1	3.9	3.8	4.3	3.9	3.7
22	4.1	4.0	5.5	5.65	5.8	5.1	4.1	3.9	4.0	4.2	3.9	3.7
23	4.1	4.0	5.7	5.5	5.6	5.1	4.1	3.9	4.0	4.2	3.85	3.7
24	4.1	4.1	5.7	5.8	5.4	5.0	4.05	3.8	3.9	4.15	3.85	3.7
25	4.1	4.3	5.6	6.1	5.7	5.0	4.05	3.8	3.9	4.1	3.85	3.7
26	4.05	4.4	5.6	6.45	5.8	4.9	4.0	3.8	3.9	4.1	3.85	3.7
27	4.0	4.15	5.3	6.5	5.6	4.8	4.3	3.8	3.85	4.1	3.85	3.7
28	4.0	4.2	5.2	6.5	6.3	4.7	4.25	3.7	3.85	4.1	3.85	3.75
29	4.0	.....	5.1	6.85	6.9	5.2	4.2	3.7	3.8	4.1	3.85	3.9
30	4.0	.....	5.0	6.8	7.2	5.15	4.2	3.7	3.8	4.1	3.8	3.8
31	4.0	.....	4.9	.....	7.4	.....	4.4	3.8	.....	4.05	.....	3.7

Daily discharge, in second-feet, of Animas River at Aztec, N. Mex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	420	360	620	945	2,860	4,670	1,040	860	260	240	390	260
2	480	360	620	945	2,420	4,090	945	620	260	240	360	260
3	480	360	775	945	2,020	4,000	860	545	240	240	360	260
4	420	360	860	945	1,770	3,530	818	775	260	240	360	260
5	420	360	945	945	1,890	3,180	775	1,590	310	260	360	260
6	360	360	1,130	902	2,020	3,020	695	1,230	285	260	360	260
7	360	360	1,330	902	2,140	2,720	695	860	260	260	360	260
8	360	360	1,430	945	2,140	2,490	658	695	260	260	360	240
9	360	360	1,540	945	3,020	2,420	620	620	260	240	360	220
10	420	360	1,230	945	3,620	2,280	620	545	260	240	360	220
11	480	360	1,040	945	4,280	2,140	582	545	260	220	310	240
12	480	360	1,040	1,040	4,670	2,140	545	512	260	220	310	260
13	420	360	1,130	1,130	4,090	2,140	480	480	260	220	310	260
14	360	390	1,230	1,130	3,530	2,140	480	480	260	220	310	240
15	360	450	1,230	1,130	3,260	2,020	450	480	260	220	310	240
16	360	390	1,230	1,130	2,940	1,830	420	420	260	360	360	240
17	360	310	1,230	1,040	2,560	1,650	420	360	260	735	335	240
18	360	260	1,230	945	2,280	1,330	420	360	260	658	335	220
19	390	260	1,330	945	2,280	1,330	420	310	260	545	335	220
20	420	335	1,330	1,130	2,350	1,330	420	310	310	620	310	220
21	420	360	1,480	1,770	2,280	1,230	420	310	260	545	310	220
22	420	360	1,650	1,830	2,020	1,230	420	310	360	480	310	230
23	420	360	1,890	1,650	1,770	1,230	420	310	360	480	285	220
24	420	420	1,890	2,020	1,540	1,130	390	260	310	450	285	220
25	420	545	1,770	2,420	1,890	1,130	390	260	310	420	285	220
26	390	620	1,770	2,940	2,020	1,040	360	260	310	420	285	220
27	360	450	1,430	3,020	1,770	945	545	260	285	420	285	220
28	360	480	1,330	3,020	2,720	860	512	220	285	420	285	240
29	360	.....	1,230	3,620	3,710	1,330	480	220	260	420	285	310
30	360	.....	1,130	3,530	4,280	1,280	480	220	260	420	260	260
31	360	.....	1,040	.....	4,670	.....	620	260	.....	390	.....	220

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

Monthly discharge of Animas River at Aztec, N. Mex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	480	360	399	24,500	B.
February	620	260	381	21,200	B.
March	1,890	620	1,260	77,500	B.
April	3,620	902	1,520	90,400	B.
May	4,670	1,540	2,740	168,000	B.
June	4,670	860	2,060	123,000	B.
July	1,040	360	561	34,500	B.
August	1,590	220	500	30,700	B.
September	360	240	277	16,500	B.
October	735	220	367	22,600	B.
November	390	260	324	19,300	B.
December	310	220	240	14,800	B.
The year	4,670	220	888	643,000	

FLORIDA RIVER NEAR DURANGO, COLO.

This station, which is located at the wagon bridge at Cash ranch, about 7½ miles from Durango, was established September 18, 1910, by the State engineer of Colorado, by whom the records are furnished. From May 19 to July 31, 1899, and from April 1, 1901, to October 31, 1903, the United States Geological Survey maintained a station

on the Florida near Durango. The present station is believed to be at the original site, but the relation between the gages has not been determined.

A vertical staff gage is bolted to the abutment of the bridge.

The bed of the stream is composed of large and small bowlders, sand, and mud and probably shifts but slightly. The measuring section at the bridge is only fair.

Discharge measurements are made from the bridge at high water.

The relation between gage height and discharge is affected by ice during the winter months.

Discharge measurements of Florida River near Durango, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 18	E. O. Christiansen	26	20	1.45	25
Oct. 25	Christiansen and Hezmalhalch	28	27	1.70	49

Daily gage height, in feet, and discharge, in second-feet, of Florida River near Durango, Colo., for 1910.

[Thomas Cash, observer.]

Day.	September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			1.35	19	1.6	38	1.5	29
2			1.4	22	1.6	38	1.5	29
3			1.4	22	1.6	38	1.4	22
4			1.4	22	1.6	38	1.4	22
5			1.4	22	1.6	38	1.45	25
6			1.4	22	1.55	34	1.7	49
7			1.35	19	1.55	34	1.5	29
8			1.35	19	1.55	34	1.55	34
9			1.3	16	1.55	34	1.5	29
10			1.3	16	1.55	34	1.5	29
11			1.3	16	1.5	29	1.35	19
12			1.3	16	1.5	29	1.4	22
13			1.35	19	1.5	29	1.4	22
14			1.4	22	1.5	29	1.4	22
15			1.4	22	1.45	25	1.4	22
16			1.7	49	1.5	29	1.7	49
17			1.75	55	1.5	29	1.55	34
18	1.4	22	1.7	49	1.6	38	1.35	19
19	1.45	25	1.65	44	1.55	34	1.4	22
20	1.5	29	1.6	38	1.5	29	1.35	19
21	1.5	29	1.65	44	1.55	34	1.4	22
22	1.6	38	1.7	49	1.6	38	1.4	22
23	1.55	34	1.65	44	1.5	29	1.35	19
24	1.5	29	1.65	44	1.5	29	1.4	22
25	1.5	29	1.7	49	1.4	22	1.4	22
26	1.4	22	1.7	49	1.4	22	1.4	22
27	1.4	22	1.75	55	1.5	29	1.4	22
28	1.4	22	1.65	44	1.5	29	1.3	16
29	1.4	22	1.65	44	1.5	29	1.3	16
30	1.35	19	1.65	44	1.5	29	1.35	19
31			1.65	44			1.4	22

Monthly discharge of Florida River near Durango, Colo., for 1910.

[Drainage area, 136 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
September 18–30	38	19	26.3	0.193	0.09	678
October	55	16	33.5	.246	.28	2,060
November	38	22	31.7	.233	.26	1,890
December	49	16	24.9	.183	.21	1,530

LA PLATA RIVER AT HESPERUS, COLO.

This station, which is located at the Rio Grande Southern Railroad trestle at Hesperus, Colo., was established August 24, 1910, by the State engineer of Colorado, by whom the records are furnished. From June 14, 1904, to August 18, 1906, the United States Geological Survey maintained a station about 100 feet above the present site. No water is diverted and no tributaries enter between the two localities. The relation between the gages used has not been determined.

A vertical staff gage is bolted to one of the trestle bents.

The bed of the stream is composed of gravel and bowlders, and shifts. Both banks are subject to overflow. The measuring section is fair.

Measurements are made by wading.

The relation between gage and discharge is somewhat affected by ice during the winter months.

Discharge measurements of La Plata River at Hesperus, Colo., 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 24	Christiansen and Ferguson	9	6.5	0.80	3
Sept. 19	E. O. Christiansen	9.5	4.3	.82	3.6
Oct. 26	Christiansen and Hezmalhalch	12	5.6	1.05	8.0

Daily gage height, in feet, and discharge, in second-feet, of La Plata River at Hesperus, Colo., for 1910.

[J. C. Reed, observer.]

Day.	August.		September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	.....	.....	0.9	4.8	0.8	3.2	1.05	8.1	1.5	.....
2	.....	.....	.8	3.2	.9	4.8	1.0	6.9	1.5	.....
3	.....	.....	.85	4.0	.85	4.0	1.0	6.9	1.5	.....
4	.....	.....	.9	4.8	.8	3.2	1.1	9.4	1.5	.....
5	.....	.....	.85	4.0	.8	3.2	1.2	13	1.65	.....
6	.....	.....	.9	4.8	.85	4.0	1.1	9.4	1.45	.....
7	.....	.....	.8	3.2	.85	4.0	1.1	9.4	1.5	.....
8	.....	.....	.8	3.2	.8	3.2	1.4	20	1.5	.....
9	.....	.....	.85	4.0	.85	4.0	1.4	20	1.5	.....
10	.....	.....	.85	4.0	.8	3 2	1.4	20	1.5	.....
11	.....	.....	.9	4.8	.9	4.8	1.65	.....	1.5	.....
12	.....	.....	.85	4.0	.85	4.0	1.6	.....	1.5	.....
13	.....	.....	.8	3.2	.85	4.0	1.6	.....	1.65	.....
14	.....	.....	.8	3.2	1.0	6.9	1.6	.....	1.7	.....
15	.....	.....	.85	4.0	1.0	6.9	1.6	.....	1.65	.....
16	.....	.....	.85	4.0	.95	5.8	1.75	.....	1.7	.....
17	.....	.....	.8	3.2	1.0	6.9	1.8	.....	1.6	.....
18	.....	.....	.85	4.0	1.0	6.9	1.7	.....	1.55	.....
19	.....	.....	.85	4.0	.9	4.8	1.65	.....	1.55	.....
20	.....	.....	.9	4.8	.9	4.8	1.6	.....	1.5	.....
21	.....	.....	.8	3.2	.95	5.8	1.55	.....	1.6	.....
22	.....	.....	.8	3.2	.95	5.8	1.5	.....	1.75	.....
23	.....	.....	.8	3.2	1.1	9.4	1.65	.....	1.60	.....
24	0.8	3.2	.8	3.2	1.05	8.1	1.7	.....	1.6	.....
25	.8	3.2	.8	3.2	1.0	6.9	1.55	.....	1.5	.....
26	.8	3.2	.8	3.2	.95	5.8	1.5	.....	1.5	.....
27	.85	4.0	.85	4.0	1.1	9.4	1.4	.....	1.55	.....
28	.85	4.0	.85	4.0	1.0	6.9	1.7	.....	1.7	.....
29	.8	3.2	.8	3.2	1.05	8.1	1.6	.....	1.5	.....
30	.9	4.8	.8	3.2	1.0	6.9	1.7	.....	1.5	.....
31	.8	3.2	.....	.....	1.1	9.4	.....	.....	1.5	.....

Monthly discharge of La Plata River at Hesperus, Colo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
August 24–31	4.8	3.2	3.60	57
September	4.8	3.2	3.76	224
October	9.4	3.2	5.65	347
November 1–10	20	6.9	12.3	244

LA PLATA RIVER AT LA PLATA, N. MEX.

This station, which is located at a wooden single-span highway bridge, about 16 miles northwest of Aztec, N. Mex., and 1 mile south of La Plata post office, in sec. 3, T. 31 N., R. 13 W., New Mexico principal meridian, was established May 25, 1905. This station is below all tributaries and is about 15 miles above the mouth of the river. The drainage area is about 340 square miles.

Nearly all the normal flow of this stream is diverted for irrigation above the station, and there are a few small diversions below.

On December 9, 1908, a chain gage was installed on the bridge and is read in place of the rod gage, as the latter does not record low stages. The datum remained unchanged.

Thin ice frequently forms across the stream during the winter period, thick ice forms along the edges, and slush ice at times interferes with winter measurements.

Because of shifting conditions of channel and the uncertainty of some of the gage heights, the results obtained at this station are not good.

Discharge measurements of La Plata River at La Plata, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 7	W. B. Freeman	26	138	2.05	9.4
Mar. 25	G. J. Lyon	34	48	3.25	232
May 29	G. H. Russell	2.5	.9	1.85	.9
June 21	R. H. Bolster	.....	.....	1.8	[a] 1.5
Aug. 18	G. J. Lyon	1.7	.2	3.36	.1
Oct. 10	J. B. Stewart	.....	.....	3.42	[a] .5
Dec. 9	C. B. Digby	.....	.....	3.55	[a] .5

[a] Estimated.

Daily gage height, in feet, of La Plata River at La Plata, N. Mex., for 1910.

[Frank Williams, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.0	2.15	3.7	2.95	2.9	1.9	1.8	1.75	3.4	3.4	3.6	3.6
2	1.95	2.15	2.9	2.9	2.8	1.9	1.8	1.75	3.4	3.4	3.6	3.6
3	1.95	2.15	2.6	2.85	2.7	1.8	1.8	1.75	5.8	3.4	3.6	3.6
4	1.95	2.15	3.9	2.8	2.6	1.7	1.8	3.0	3.8	3.4	3.7	3.6
5	1.95	2.15	3.5	2.8	2.5	1.8	1.8	2.1	3.4	3.4	.....	3.6
6	1.95	2.15	3.2	2.8	2.5	1.8	1.75	2.9	3.4	3.4	.....	3.6
7	1.95	2.05	3.3	2.8	2.45	1.8	1.75	2.6	3.4	3.4	.....	3.6
8	1.95	2.15	3.2	2.75	2.5	1.8	1.75	3.0	3.4	3.4	.....	3.4
9	1.95	2.15	3.1	2.75	2.55	1.8	1.75	2.1	3.4	3.4	.....	3.4
10	1.95	2.15	3.0	2.75	2.6	1.8	1.75	2.9	3.4	3.4	.....	3.4
11	2.1	2.15	3.0	2.7	2.5	1.8	1.75	2.6	3.4	3.4	.....	3.4
12	2.1	2.15	3.0	2.7	2.55	1.8	1.75	7.6	3.4	3.4	3.6	3.4
13	2.1	2.15	3.0	2.65	2.6	1.8	1.75	4.6	3.4	3.4	3.6	3.4
14	2.1	2.15	3.1	2.75	2.55	1.8	1.75	3.9	3.4	3.4	3.6	3.4
15	2.1	2.3	3.1	2.75	2.5	1.8	1.75	3.7	3.4	3.4	3.6	3.4
16	2.1	2.4	3.0	2.7	2.4	.....	1.75	3.6	3.4	5.6	3.6	3.4
17	2.1	2.2	3.1	2.6	2.3	.....	1.75	3.6	3.4	4.0	3.6	3.4
18	2.1	2.2	3.2	2.55	2.1	.....	1.75	3.6	3.4	3.95	3.6	3.4
19	2.1	2.1	3.2	2.7	1.9	.....	1.75	3.6	3.4	4.1	3.6	3.4
20	2.1	2.1	3.2	2.75	1.85	.....	1.75	3.5	3.4	3.9	3.6	3.4
21	2.1	2.1	3.3	2.9	1.95	.....	1.75	3.4	3.5	3.9	3.6	3.4
22	2.1	2.1	3.2	2.9	1.9	.....	1.75	3.4	3.4	3.8	3.6	3.4
23	2.1	2.7	3.2	2.95	1.9	.....	1.75	3.4	3.4	3.7	3.6	3.4
24	2.1	2.6	.....	3.0	1.85	.....	1.75	3.4	3.4	3.7	3.6	3.4
25	2.1	2.8	.....	3.3	1.9	.....	1.75	3.4	3.4	3.7	3.6	3.4
26	2.1	2.9	.....	3.5	1.85	.....	1.75	3.4	3.4	3.6	3.6	3.6
27	2.1	3.0	2.8	3.3	1.8	.....	1.75	3.4	3.4	3.6	3.6	3.6
28	2.1	3.5	2.9	3.2	1.8	2.5	1.75	3.4	3.4	3.6	3.6	3.6
29	2.15	.....	2.7	3.2	1.75	2.0	1.75	3.4	3.4	3.6	3.6	3.6
30	2.15	.....	2.9	3.05	1.75	1.9	1.75	3.4	3.4	3.6	3.6	3.6
31	2.15	.....	3.05	.....	1.8	.....	1.75	3.4	.....	3.6	.....	3.6

Daily discharge, in second-feet, of La Plata River at La Plata, N. Mex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.5	18	409	150	138	2.5	1.5	1.0	0.1	0.5	1.0	1.0
2	4.5	18	138	138	114	2.5	1.5	1.0	.1	.5	1.0	1.0
3	4.5	18	73	126	91	1.0	1.5	1.0	670	.5	1.0	1.0
4	4.5	18	495	114	73	.3	1.5	163	21	.5	3.0	1.0
5	4.5	18	331	114	58	1.0	1.5	14	.5	.5	3.0	1.0
6	4.5	18	224	114	58	1.1	1.0	138	.5	.5	2.0	1.0
7	4.5	10	258	114	51	1.1	1.0	73	.5	.5	2.0	1.0
8	4.5	18	224	102	58	1.1	1.0	163	.5	.5	2.0	.5
9	4.5	18	193	102	66	1.2	1.0	14	.5	.5	2.0	.5
10	4.5	18	163	102	73	1.2	1.0	138	.5	.5	1.0	.5
11	14	18	163	91	58	1.2	1.0	73	.5	.5	1.0	.5
12	14	18	163	91	66	1.2	1.0	7,000	.5	.5	1.0	.5
13	14	18	163	82	73	1.3	1.0	160	.5	.5	1.0	.5
14	14	18	193	102	66	1.3	1.0	31	.5	.5	1.0	.5
15	14	32	193	102	58	1.3	1.0	10	.5	.5	1.0	.5
16	14	44	163	91	44	1.3	1.0	3.0	.5	570	1.0	.5
17	14	22	193	73	32	1.4	1.0	1.0	.5	30	1.0	.5
18	14	22	224	66	14	1.4	1.0	.1	.5	25	1.0	.5
19	14	14	224	91	2.5	1.4	1.0	.1	.5	42	1.0	.5
20	14	14	224	102	1.0	1.5	1.0	.1	.5	20	1.0	.5
21	14	14	258	138	4.5	1.5	1.0	.1	2.5	20	1.0	.5
22	14	14	224	138	2.5	1.5	1.0	.1	.5	10	1.0	.5
23	14	91	224	150	2.5	1.5	1.0	.1	.5	3.0	1.0	.5
24	14	73	193	163	1.0	1.5	1.0	.1	.5	2.0	1.0	.5
25	14	114	163	258	2.5	1.5	1.0	.1	.5	2.0	1.0	.5
26	14	138	138	331	1.0	1.5	1.0	.1	.5	1.0	1.0	2.0
27	14	163	114	258	.8	1.5	1.0	.1	.5	1.0	1.0	2.0
28	14	331	138	224	.8	58	1.0	.1	.5	1.0	1.0	2.0
29	18	.....	91	224	.5	6.5	1.0	.1	.5	1.0	1.0	2.0
30	18	.....	138	178	.5	2.5	1.0	.1	.5	1.0	1.0	2.0
31	18	.....	178	.....	.8	.....	1.0	.1	.....	1.0	.....	2.0

NOTE.—Daily discharge Jan. 1 to May 20 and Aug. 4 to 11 determined from a fairly well defined discharge rating curve. Daily discharge for remaining periods obtained by use of indirect method for shifting channels.

Monthly discharge of La Plata River at La Plata, N. Mex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	18	4.5	11.4	701	C.
February	331	10.2	47.5	2,640	B.
March	495	73	202	12,400	B.
April	331	66	138	8,210	C.
May	138	.5	39.1	2,400	C.
June	58	.3	3.46	206	C.
July	1.5	1.0	1.08	66	C.
August	7,000	.1	258	15,900	D.
September	670	.1	23.5	1,400	D.
October	570	.5	23.8	1,460	D.
November	3	1.0	1.27	76	D.
December	2	.5	.90	55	D
The period	7,000	.1	62.8	45,500	

WEST MANCOS RIVER NEAR MANCOS, COLO.

This station, which is located at Crane's ranch, about 4 miles above the town of Mancos, Colo., was established September 16, 1910, by the State engineer of Colorado, by whom the records are furnished.

A vertical staff gage is attached to a tree on right bank.

The bed of the stream is composed of gravel and small bowlders. The section is fair.

All measurements are made by wading.

The relation between gage height and discharge is somewhat affected by ice during the winter.

Discharge measurements of West Mancos River near Mancos, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 16	E. O. Christiansen	18	9.2	0.62	9.3
Oct. 28	Christiansen and Hezmalhalch	21	12	.72	12.1

Daily gage height, in feet, and discharge, in second-feet, of West Mancos River near Mancos, Colo., for 1910.

[W. H. Crane, observer.]

Day.	September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			0.6	8.7	0.7	11.6	0.65	10.2
2			.6	8.7	.7	11.6	.65	10.2
3			.7	11.6	.7	11.6	.65	10.2
4			.7	11.6	.8	14.7	.65	10.2
5			.65	10.2	.8	14.7	.65	10.2
6			.6	8.7	.8	14.7	.65	10.2
7			.6	8.7	.75	13.2	.6	8.7
8			.6	8.7	.7	11.6	.6	8.7
9			.6	8.7	.7	11.6	.6	8.7
10			.6	8.7	.7	11.6	.6	8.7
11			.6	8.7	.7	11.6	.6	8.7
12			.6	8.7	.7	11.6	.6	8.7
13			.6	8.7	.7	11.6	.6	8.7
14			.6	8.7	.7	11.6	.6	8.7
15			.7	11.6	.65	10.2	.6	8.7
16			1.15	27.4	.65	10.2	.6	8.7
17			1.1	25.4	.65	10.2	.6	8.7
18	0.6	8.7	.9	18.0	.65	10.2	.6	8.7
19	.6	8.7	.9	18.0	.65	10.2	.6	8.7
20	.6	8.7	.8	14.7	.65	10.2	.6	8.7
21	.6	8.7	.8	14.7	.65	10.2	.6	8.7
22	.6	8.7	.75	13.2	.65	10.2	.6	8.7
23	.6	8.7	.75	13.2	.65	10.2	.6	8.7
24	.6	8.7	.75	13.2	.65	10.2		
25	.6	8.7	.75	13.2	.65	10.2		
26	.6	8.7	.75	13.2	.65	10.2		
27	.6	8.7	.75	13.2	.65	10.2		
28	.6	8.7	.7	11.6	.65	10.2		
29	.6	8.7	.7	11 6	.65	10.2		
30	.6	8.7	.7	11.6	.65	10.2		
31			.7	11.6				

Monthly discharge of West Mancos River near Mancos, Colo., for 1910.

[Drainage area, 46 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
September 18–30	8.7	8.7	8.7	0.189	0.092	224
October	27.4	8.7	12.4	.270	.311	762
November	14.7	10.2	11.2	.243	.271	666
December 1–23	10.2	8.7	9.08	.197	.17	414

VIRGIN RIVER BASIN.

GENERAL FEATURES.[1]

Virgin River rises in the Colob Plateau, in the southwestern part of Utah, at an altitude ranging from 8,000 to 10,000 feet above sea level, flows in a general southerly course across the southwestern corner of Arizona into Nevada, where it turns and flows southward to its junction with the Colorado at Rioville, just above Boulder Canyon. The smaller creeks that drain the eastern portion of the plateau unite after descending to an altitude of 5,500 feet above the sea and form what is called Parunuweap Fork of the Virgin. At and below the junction of these creeks the canyon valley in which they flow widens into what is known as Long Valley. Below Long Valley the East Fork enters Parunuweap Canyon and is simply a series of cascades for 15 miles, descending in this distance from 5,000 to 3,500 feet above sea level. Emerging from this canyon it enters the valley of the Virgin. This valley is 44 miles long. Its upper portion is only an enlargement of the canyon; its lower portion is a broader valley, much broken by low basalt-covered mesas and sharp ridges of tilted sedimentary rocks. In the upper part of the valley the river receives several tributaries, the principal ones being Little Zion, North Fork, La Verkin, and Ashe creeks. Midway of the valley two streams enter from the Pine Valley Mountains, and near the foot Santa Clara River joins the Virgin, the united streams leaving the valley by a deep canyon cut through the Beaver Dam Mountains. The valley of the Virgin is at a lower altitude and has a warmer climate than any other portion of Utah. The soil of the irrigable lands is usually good, and wherever irrigation can be practiced it produces abundant crops.

VIRGIN RIVER AT VIRGIN, UTAH.

This station, which is located about half a mile east of and above the town of Virgin, Utah, about 1,000 feet below the mouth of North Creek and about 8 miles above Ashe and La Verkin creeks, was established April 18, 1909.

There are no diversions of any importance above the station.

The first gage was used until August 7, when the section was changed by a flood which caused the water to leave the gage. On August 31 the gage, cable, and bench marks were washed out and the section materially altered. On October 13 a new gage was installed at a different datum. Owing to the marked change in the channel, there can be no determined relation between the old and new gages.

[1] Abstracted from report on the lands of the arid region of the United States, with a more detailed account of the lands of Utah, by J. W. Powell, 1878: Chapter 9, Irrigable lands of that portion of Utah drained by the Colorado River and its tributaries, by A. H. Thompson, pp. 151–153.

The accuracy of the records is unaffected by ice or by artificial control above or below the station.

Discharge measurements of Virgin River at Virgin, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 26	E. A. Porter	127	67	2.85	204
Apr. 15	Leonard Tanner	118	113	3.58	505
May 6	do	114	104	3.42	397
June 28	do	115	59	2.25	130
Aug. 17	do	110	40	2.10	81
Sept. 23	do	61	44	2.75	134
Nov. 9	do	64	42	3.00	133
Dec. 19	G. C. Baldwin	72	45	3.03	119

Daily gage height, in feet, of Virgin River at Virgin, Utah, for 1910.

[Niles Earl, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.8	2.9	3.45	.....	3.95	2.55	2.15	.....	2.25	.....	.....	2.95
2	3.6	2.9	3.55	.....	3.9	2.5	2.2	.....	2.3	.....	2.9	2.95
3	2.9	3.0	3.6	.....	3.8	2.45	2.25	.....	4.2	.....	2.85	.....
4	2.8	3.05	3.75	.....	3.5	2.4	2.2	2.2	2.4	2.75	2.9	2.95
5	2.9	3.0	3.75	.....	3.4	2.35	2.2	2.8	2.5	.....	2.85	2.9
6	2.8	2.9	3.8	.....	3.35	2.3	2.2	3.5	2.3	2.6	.....	.....
7	2.75	2.8	3.75	.....	3.45	2.3	2.2	.....	2.35	.....	2.9	2.95
8	2.9	2.85	3.6	.....	3.4	2.3	2.15	.....	2.35	2.5	2.95	2.9
9	2.8	2.7	3.8	.....	3.3	2.3	2.1	.....	2.3	2.55	2.95	2.95
10	2.75	2.9	3.8	.....	3.2	2.25	2.15	2.5	2.4	.....	.....	.....
11	2.85	3.0	3.85	.....	3.3	2.3	2.15	2.4	2.3	3.1	2.95	3.0
12	2.9	3.0	3.8	.....	3.1	2.3	2.1	2.4	2.4	.....	2.95	3.0
13	2.9	3.0	3.85	.....	3.3	2.25	2.15	2.2	2.35	2.65	3.0	2.95
14	2.9	3.05	3.9	.....	3.1	2.25	2.1	2.25	4.35	3.2	3.5	2.95
15	2.95	3.0	4.0	.....	3.05	2.3	2.1	2.25	3.6	4.7	3.2	.....
16	2.95	2.95	4.05	.....	3.1	2.3	2.15	2.2	2.65	3.65	.....	.....
17	2.8	2.9	4.3	.....	3.15	2.3	2.25	.....	4.6	.....	2.8	3.0
18	2.9	2.85	4.4	.....	2.95	2.25	2.2	2.3	.....	3.25	2.75	3.0
19	2.85	2.9	4.6	.....	2.9	2.25	2.2	2.2	2.9	.....	.....	3.0
20	2.9	2.95	4.65	.....	2.95	2.3	2.15	2.3	2.85	2.9	2.85	2.95
21	2.85	3.0	4.45	.....	3.0	2.3	2.15	.....	.....	.....	2.85	3.0
22	2.75	3.0	5.5	.....	2.85	2.25	2.2	.....	2.75	2.75	.....	2.95
23	2.7	3.05	4.5	.....	2.8	2.15	2.1	.....	2.75	2.7	.....	.....
24	2.9	3.0	4.3	.....	2.75	2.25	2.15	3.7	.....	.....	2.9	.....
25	2.9	2.95	4.1	.....	2.7	2.15	2.15	2.25	.....	2.85	2.9	3.5
26	2.85	3.0	.....	.....	2.7	2.2	2.1	2.25	2.75	2.9	3.0	3.0
27	2.8	3.05	.....	.....	2.65	2.1	.....	2.2	2.75	2.85	2.9	.....
28	2.9	3.15	.....	.....	2.6	2.25	.....	2.2	2.75	2.9	2.9	3.5
29	2.9	.....	.....	.....	2.6	2.25	.....	2.2	.....	2.9	2.85	.....
30	2.9	.....	.....	.....	2.65	2.2	.....	2.15	2.75	2.9	2.95	3.5
31	2.9	.....	.....	.....	2.6	.....	.....	2.15	.....	2.9	.....	.....

NOTE.—The gage heights are rather uncertain Jan. 1 to May 15, when a new observer was secured, and they are so evidently in error Mar. 26 to Apr. 30 that they are not published. The observer's reading checks with hydrographer's on Jan. 26, but on Apr. 15 differs by 1 foot. Probably little error will be introduced by using the observer's gage heights prior to Mar. 26 and during period May 1 to 14.

Daily discharge, in second-feet, of Virgin River at Virgin, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,770	205	445	.....	755	155	98	103	127	138	100	111
2	530	205	501	.....	720	140	112	106	142	138	100	111
3	205	240	530	.....	650	130	127	109	1,350	138	90	111
4	173	259	620	.....	472	120	112	112	174	138	100	111
5	205	240	620	.....	418	110	112	335	210	119	90	100
6	173	205	650	.....	393	100	112	730	142	100	95	106
7	158	173	620	.....	450	100	112	600	158	90	100	111
8	205	189	530	.....	425	100	98	470	158	80	111	100
9	173	144	650	.....	380	100	84	340	142	90	111	111
10	158	205	650	.....	330	90	98	210	174	171	111	113
11	189	240	685	.....	390	105	98	174	142	252	111	122
12	205	240	650	.....	300	105	84	174	174	182	111	122
13	205	240	685	.....	395	100	98	112	158	112	122	111
14	205	259	720	.....	305	100	84	127	1,510	292	274	111
15	222	240	790	.....	285	110	84	127	800	1,020	174	111
16	222	222	830	.....	315	110	98	112	270	338	127	122
17	173	205	1,050	.....	340	110	127	127	1,230	264	80	122
18	205	189	1,140	.....	260	100	112	142	706	189	70	122
19	189	205	1,340	.....	245	100	112	112	182	144	80	122
20	205	222	1,400	.....	270	120	98	142	167	100	90	111
21	189	240	1,190	.....	300	120	98	325	152	85	90	122
22	158	240	2,410	.....	240	100	112	508	138	70	90	111
23	144	259	1,240	.....	220	80	84	691	138	60	100	165
24	205	240	1,050	.....	210	105	98	875	138	75	100	220
25	205	222	870	.....	190	85	98	127	138	90	100	274
26	189	240	650	.....	190	105	84	127	138	100	122	122
27	173	259	590	.....	180	85	88	112	138	90	100	198
28	205	300	720	.....	160	127	91	112	138	100	100	274
29	205	.....	472	.....	160	127	94	112	138	100	90	274
30	205	.....	650	.....	180	112	97	98	138	100	111	274
31	205	.....	530	.....	165	.....	100	98	.....	100	.....	274

NOTE.—Daily discharge determined as follows: Jan. 1–Mar. 25 and May 1–6, from a curve fairly well defined below 800 second-feet; Mar. 26–31, estimated from corrected gage heights; Apr. 1–30, no daily discharges published; May 7–June 27, the indirect method for shifting channels used; June 28–Sept. 16, from a curve which is fairly well defined below 200 second-feet; Sept. 17–Dec. 31, from a curve that is poorly defined. Discharge interpolated for days of missing gage height except for periods mentioned.

Monthly discharge of Virgin River at Virgin, Utah, for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	2,770	144	286	17,600	C.
February	300	144	226	12,600	C.
March	2,410	445	822	50,500	C.
April	.....	.....	a620	36,900	D.
May	755	160	332	20,400	C.
June	155	80	108	6,430	C.
July	127	84	100	6,150	B.
August	875	98	247	15,200	B.
September	1,510	127	317	18,900	C.
October	1,020	60	163	10,000	C.
Novemb r	274	70	108	6,430	C.
December	274	100	147	9,040	C.
The year	2,770	60	290	210,000	

a Estimated.

SANTA CLARA RIVER NEAR CENTRAL, UTAH.

This station, which is located about 1½ miles southeast of Central, Utah, the nearest post office, and about 6 miles west from the settlement of Pine Valley, Utah, about one-fourth mile from R. H. Hunt's ranch house, in a small valley known as Eightmile Flat, was established April 21, 1909. The records show the total amount of water available for storage in the Pine Valley reservoir site, a few miles above the station.

The station is below all important tributaries except Mountain Meadows Creek, which enters about 10 miles below. A small canal, whose maximum capacity is about 3.5 second-feet, takes out water a short distance above the station.

The gage was destroyed by a flood on January 1, 1910. On January 20, 1910, a new gage was established at the same location but with its datum 0.45 foot higher.

The bed of the stream is somewhat shifting, but fairly accurate results have been obtained.

Discharge measurements are made from the gaging bridge.

The relation between gage height and discharge is not affected by ice.

Discharge measurements of Santa Clara River near Central, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 19	E. A. Porter	27	25	3.43	37
29	do	27	26	3.35	28
Apr. 27	Leonard Tanner	29	52	3.90	116
June 17	do	21	15	3.35	22
Aug. 4	do	20	13	3.25	12
Sept. 16	do	22	15	3.30	18
Oct. 11	do	22	12	3.20	9.0
Nov. 18	do	21	13	3.25	12
Dec. 22	G. C. Baldwin	21	12	3.22	9.5

Daily gage height, in feet, of Santa Clara River near Central, Utah, for 1910.

[R. H. Hunt, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.5	3.35	3.35	3.55	3.85	3.45	3.3	3.25	3.2	3.2	3.2	3.2
2	.....	3.35	3.4	3.6	3.8	3.4	3.3	3.25	3.2	3.2	3.2	3.2
3	.....	.....	3.5	3.6	3.75	3.4	3.3	3.25	3.3	3.2	3.2	3.2
4	.....	.....	3.6	3.5	3.7	3.35	3.3	3.25	3.25	3.2	3.2	3.2
5	.....	.....	3.7	3.5	3.7	3.35	3.25	3.25	3.25	3.2	3.2	3.2
6	.....	.....	3.7	3.55	3.7	3.35	3.25	3.2	3.25	3.2	3.2	3.2
7	.....	.....	3.7	3.55	3.7	3.4	3.2	3.2	3.25	3.2	3.2	3.2
8	.....	.....	3.7	3.55	3.7	3.4	3.2	3.2	3.2	3.2	3.2	3.2
9	.....	3.3	3.6	3.55	3.7	3.4	3.2	3.2	3.2	3.2	3.2	3.2
10	.....	3.3	3.6	3.6	3.75	3.35	3.2	3.3	3.2	3.2	3.2	3.2
11	.....	3.35	3.6	3.7	3.75	3.35	3.2	3.4	3.2	3.2	3.2	3.2
12	.....	3.4	3.6	3.8	3.75	3.35	3.2	3.3	3.2	3.2	3.2	3.2
13	.....	3.5	3.55	3.8	3.8	3.3	3.2	3.3	3.25	3.2	3.25	3.2
14	.....	3.5	3.55	3.7	3.8	3.3	3.2	3.3	3.25	3.2	3.3	3.2
15	.....	3.35	3.55	3.7	3.8	3.3	3.2	3.3	3.25	3.3	3.3	3.2
16	.....	3.3	3.55	3.7	3.8	3.3	3.2	3.3	3.3	3.3	3.3	3.2
17	.....	3.35	3.6	3.75	3.8	3.35	3.25	3.25	3.3	3.25	3.25	3.2
18	.....	3.35	3.65	3.75	3.75	3.35	3.2	3.25	3.25	3.25	3.25	3.2
19	.....	3.35	3.65	3.75	3.7	3.35	3.2	3.25	3.7	3.25	3.25	3.2
20	.....	3.35	3.8	3.75	3.6	3.3	3.2	3.25	3.25	3.25	3.2	3.2
21	3.4	3.35	3.85	3.75	3.6	3.3	3.2	3.25	3.25	3.2	3.2	3.2
22	3.4	3.35	3.9	3.8	3.55	3.25	3.3	3.3	3.2	3.2	3.2	3.2
23	3.35	3.35	3.8	3.8	3.55	3.25	3.25	3.3	3.2	3.2	3.2	3.2
24	3.35	3.4	3.6	3.8	3.5	3.3	3.25	3.25	3.2	3.2	3.2	3.2
25	.....	3.35	3.6	3.8	3.5	3.3	3.4	3.25	3.2	3.2	3.2	3.2
26	.....	3.35	3.6	3.8	3.5	3.3	3.3	3.25	3.2	3.2	3.25	3.2
27	.....	3.35	3.55	3.9	3.5	3.3	3.3	3.25	3.2	3.2	3.25	3.2
28	.....	3.35	3.55	3.9	3.5	3.3	3.3	3.2	3.2	3.2	3.25	3.2
29	.....	.....	3.5	4.0	3.5	3.3	3.25	3.2	3.2	3.2	3.2	3.2
30	.....	.....	3.5	3.95	3.45	3.3	3.25	3.2	3.2	3.2	3.2	3.2
31	3.35	.....	3.5	.....	3.45	.....	3.25	3.2	.....	3.2	.....	3.2

NOTE.—New gage installed Jan. 20, about 1 mile above old site and at a different datum. Ice not reported.

Daily discharge, in second-feet, of Santa Clara River near Central, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	25	25	55	107	40	18	14	9	9	9	9
2	.....	25	32	63	98	32	18	14	9	9	9	9
3	.....	24	47	63	89	32	18	14	18	9	9	9
4	.....	23	63	47	80	25	18	14	14	9	9	9
5	.....	22	80	47	80	25	14	14	14	9	9	9
6	.....	21	80	55	80	25	14	9	14	9	9	9
7	.....	20	80	55	80	32	9	9	14	9	9	9
8	.....	19	80	55	80	32	9	9	9	9	9	9
9	.....	18	63	55	80	32	9	9	9	9	9	9
10	.....	18	63	63	89	25	9	18	9	9	9	9
11	.....	25	63	80	89	25	9	32	9	9	9	9
12	.....	32	63	98	89	25	9	18	9	9	9	9
13	.....	47	55	98	98	18	9	18	14	9	14	9
14	.....	47	55	80	98	18	9	18	14	9	18	9
15	.....	25	55	80	98	18	9	18	14	18	18	9
16	.....	18	55	80	98	18	9	18	18	18	18	9
17	.....	25	63	89	98	25	14	14	18	14	14	9
18	.....	25	72	89	89	25	9	14	14	14	14	9
19	.....	25	72	89	80	25	9	14	80	14	14	9
20	.....	25	98	89	63	18	9	14	14	14	9	9
21	32	25	107	89	63	18	9	14	14	9	9	9
22	32	25	116	98	55	14	18	18	9	9	9	9
23	25	25	98	98	55	14	14	18	9	9	9	9
24	25	32	63	98	47	18	14	14	9	9	9	9
25	25	25	63	98	47	18	32	14	9	9	9	9
26	25	25	63	98	47	18	18	14	9	9	14	9
27	25	25	55	116	47	18	18	14	9	9	14	9
28	25	25	55	116	47	18	18	9	9	9	14	9
29	25	.....	47	135	47	18	14	9	9	9	9	9
30	25	.....	47	126	40	18	14	9	9	9	9	9
31	25	.....	47	.....	40	.....	14	9	.....	9	.....	9

NOTE.—Daily discharge determined from a discharge rating curve fairly well defined throughout. Discharge interpolated Jan. 25 to 30 and Feb. 3 to 8.

Monthly discharge of Santa Clara River near Central, Utah, for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January 21-31	32	25	26.3	574	B.
February	47	18	25.6	1,420	B.
March	116	25	65.3	4,020	A.
April	135	47	83.4	4,960	A.
May	107	40	74.1	4,560	A.
June	40	14	22.9	1,360	B.
July	32	9	13.4	824	B.
August	32	9	14.3	879	B.
September	80	9	13.9	827	A.
October	18	9	10.2	627	A.
November	18	9	11.1	660	B.
December	9	9	9.0	553	B.
The period	.....	.....	.....	21,300	

SANTA CLARA RIVER NEAR ST. GEORGE, UTAH.

This station, which is located about 3 miles southwest of St. George, Utah, and about 3 miles above the mouth of the river, was originally established April 16, 1909.

The station is below all tributaries and diversions except two canals which head near the mouth of the river.

The original gage which was located about 1 mile below the present location was destroyed by flood about January 1, 1910. The present

gage, which was set January 21, 1910, is located on the right bank below the cable from which discharge measurements are made.

The relation between gage height and discharge is not affected by ice, but the bed of the stream shifts to a considerable extent. A fair record of run-off has, however, been obtained.

Discharge measurements of Santa Clara River near St. George, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge at regular section.	Discharge at a point below all ditches and about 100 feet above mouth of river.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*	*Sec.-ft.*
Jan. 22	E. A. Porter	18	14	2.85	37	.....
Apr. 13	Leonard Tanner	16	17	2.42	67	.....
28	do	19	20	2.8	93	.....
May 12	do	14	13	2.1	51	.....
June 4	do	9	3.7	1.3	7.7	0.9
20	do	9	3.6	1.28	8.4	.8
July 11	do	8	2.5	1.1	3.9	1.6
Aug. 2	do	8	3.6	1.4	11	8
9	do	.....	.....	.....	.....	.5
14	do	12	5.6	1.4	16	3
Sept. 14	do	12	5.9	1.5	16	20
Oct. 6	do	8	2.8	1.2	5.4	2
Nov. 2	do	9	5.0	1.35	14	11
21	do	12	8.9	1.6	32	34
Dec. 21	G. C. Baldwin	13	8.0	1.57	27	.....

Daily gage height, in feet, of Santa Clara River near St. George, Utah, for 1910.

[A. W. Burgess, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	.....	2.5	.....	.....	1.3	1.3	1.4	.....	1.2	.....	.....
2	.....	2.8	.....	2.4	2.85	1.35	1.3	1.45	.....	.....	1.35	1.5
3	.....	.....	2.65	.....	.....	1.4	1.4	1.3	1.0	1.15	.....	1.5
4	.....	2.7	.....	2.3	2.6	1.35	1.2	1.4	1.6	.....	1.3	.....
5	.....	2.75	3.0	.....	2.55	1.45	1.15	1.4	.....	1.15	.....	1.5
6	.....	2.8	.....	2.15	2.5	1.35	1.2	1.35	.....	.....	1.4	.....
7	.....	.....	3.25	.....	2.4	1.35	1.3	.....	1.2	1.25	1.4	.....
8	.....	2.7	.....	2.1	2.35	1.25	1.25	1.2	1.2	.....	1.35	.15
9	.....	2.65	3.15	.....	2.35	1.35	1.2	1.2	.....	1.25	1.3	.15
10	.....	.....	.....	2.15	2.15	1.35	1.15	1.85	1.2	.....	.....	.15
11	.....	2.55	3.0	.....	2.2	1.3	1.15	2.0	.....	1.2	1.35	.....
12	.....	.....	.....	2.1	2.1	1.3	1.2	1.5	1.2	.....	.....	1.5
13	.....	2.55	2.85	.....	2.2	1.3	1.15	1.45	.....	.....	.....	.....
14	.....	.....	.....	2.15	2.2	1.25	1.2	.....	1.5	1.2	1.55	1.5
15	.....	2.6	2.95	.....	2.25	1.3	1.2	1.3	.....	1.85	1.45	1.45
16	.....	.....	.....	2.2	2.0	1.35	1.15	1.2	1.35	.....	.....	1.45
17	.....	2.65	3.0	.....	2.0	1.3	1.25	1.15	1.4	1.8	.....	.....
18	.....	.....	.....	2.2	2.25	1.3	1.15	1.2	.....	.....	1.5	.....
19	.....	2.6	3.1	.....	2.2	1.3	1.1	1.15	4.3	1.55	1.6	1.45
20	.....	.....	.....	2.25	2.05	1.35	.....	1.0	1.8	.....	.....	.....
21	2.85	2.55	3.3	.....	2.2	1.5	1.1	.....	.....	1.55	1.6	1.55
22	2.9	.....	.....	2.3	2.0	1.3	1.1	1.0	1.7	.....	.....	1.55
23	2.8	2.5	3.15	.....	2.0	1.25	.....	1.05	1.6	.....	1.55	1.55
24	2.85	.....	.....	2.4	1.95	1.3	1.1	.....	1.55	1.5	.....	1.55
25	2.75	2.45	3.05	.....	1.95	1.2	1.1	1.05	.....	.....	1.6	.....
26	2.8	.....	.....	2.6	1.55	1.25	.....	.....	1.35	.....	1.6	1.55
27	2.9	2.5	3.0	.....	1.45	1.3	1.3	1.0	1.35	1.45	.....	.....
28	2.9	.....	.....	2.75	1.6	1.2	.....	1.0	.....	1.35	1.6	1.55
29	2.9	.....	2.9	.....	1.3	1.3	1.8	1.0	1.25	1.4	1.6	1.55
30	.....	.....	.....	3.0	1.3	1.25	1.95	.....	.....	.....	1.45	1.5
31	2.85	.....	2.6	.....	1.6	.....	1.5	1.0	.....	1.4	.....	.....

Daily discharge, in second-feet, of Santa Clara River near St. George, Utah, for 1910.

Day.	Jan	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	36	22	74	102	8	8	11	4.5	6	15	20
2	.....	35	27	67	98	10	8	13	4.5	6	14	21
3	.....	32	32	64	89	11	11	8	4.5	5	13	21
4	.....	30	44	61	80	10	6	11	20	5	12	21
5	.....	32	56	56	76	13	5	11	15	5	14	21
6	.....	35	66	52	73	10	6	10	10	7	16	21
7	.....	32	75	50	67	10	8	8	6	7	16	21
8	.....	30	74	49	64	7	7	6	6	7	14	21
9	.....	28	72	50	64	10	6	6	6	7	12	21
10	.....	25	69	52	52	10	5	34	6	7	13	21
11	.....	22	66	50	55	8	5	43	6	6	14	21
12	.....	22	63	49	49	8	6	21	6	6	17	21
13	.....	22	60	50	55	8	5	18	10	6	20	21
14	.....	24	65	52	55	7	6	15	15	6	24	21
15	.....	25	70	54	58	8	6	12	12	34	18	18
16	.....	26	74	55	43	10	5	9.5	10	36	19	18
17	.....	28	78	55	43	8	7	8.2	11	39	20	18
18	.....	26	84	55	58	8	5	9.5	50	32	21	18
19	.....	25	90	56	43	8	4	8.2	200	24	27	18
20	.....	24	98	58	46	10	4	4.5	31	24	27	21
21	38	22	107	60	55	15	4	4.5	28	24	27	24
22	40	21	104	61	43	8	4	4.5	25	23	26	24
23	35	20	102	64	43	7	4	5.8	20	22	24	24
24	38	19	101	67	40	8	4	5.8	18	21	25	24
25	32	18	100	74	40	6	4	5.8	14	20	27	24
26	35	19	100	80	18	7	6	5.2	10	19	27	24
27	40	20	100	85	13	8	8	4.5	10	18	27	24
28	40	21	98	90	20	6	20	4.5	8	14	27	24
29	40	.....	97	99	8	8	31	4.5	7	16	27	24
30	39	.....	89	108	8	7	40	4.5	7	16	18	21
31	38	.....	81	.....	20	.....	15	4.5	.....	16	.....	21

NOTE.—Daily discharge determined as follows: Jan. 21 to Feb. 28, Aug. 12 to Sept. 3, and Oct. 16 to Dec. 31, from a discharge rating curve fairly well defined; Mar. 1 to 31, by means of indirect method for shifting channels; Apr. 1 to Aug. 11 and Sept. 4 to Oct. 15 from a well-defined curve. Discharge interpolated on days of missing gage heights.

Monthly discharge of Santa Clara River near St. George, Utah, for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January 21-31	.....	.....	37.7	823	B.
February	[a]36	18	25.7	1,430	B.
March	107	22	76.2	4,690	C.
April	108	49	63.2	3,760	A.
May	[a]102	8	50.9	3,130	A.
June	15	6	8.73	519	A.
July	40	4	8.48	521	A.
August	43	4.5	10.3	633	B.
September	200	[a]4.5	19.4	1,150	B.
October	39	5	15.6	959	B.
November	27	12	20.0	1,190	B.
December	24	18	21.4	1,320	B.
The period	.....	.....	.....	20,100	

[a] Interpolated.

MUDDY RIVER AT MOAPA, NEV.

This station, which is located just below the Narrows about 7 miles from Moapa, was originally established January 1, 1904, near the crossing of the San Pedro, Los Angeles & Salt Lake Railroad, about 6 miles downstream from Moapa, Nev., and above the Narrows. It was removed to the present site, 1½ miles below the old station, January 1, 1909.

Discharge measurements are made in a flume, which carries the entire flow of the river except during floods produced by cloudbursts.

Discharge measurements of Muddy River near Moapa, Nev., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 7	E. C. La Rue	7.8	9.0	1.12	36.1
20	A. L. MacDermott	8	11.2	1.4	48.0

Daily gage height, in feet, of Muddy River near Moapa, Nev., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1						1.94		1.38		
2							1.61			
3					2.00	1.83				
4					1.95			1.58		
5							1.55	1.45		
6					2.05					
7						1.78				
8							1.42	1.30	1.18	
9					2.05			1.30		
10					2.05	1.46		1.54		1.15
11							1.45			
12							1.48	2.25	1.18	
13	2.35				1.99	1.53		1.60		
14							1.51			1.17
15	2.25					1.60		1.34		
16					2.00		1.53			
17									1.25	1.21
18					2.00		1.45	1.33		
19						1.50	1.50	1.35		
20					1.95			1.38		1.25
21									1.20	
22				2.30		1.45	1.48			
23					1.93			1.42	1.15	1.24
24										
25				2.01	1.85	1.38	1.50		1.10	
26										1.21
27				2.04	1.80				1.10	
28						1.48	1.43	1.08		1.22
29				2.08	1.88				1.15	
30						1.50	1.42			
31								1.10		1.18

Daily discharge, in second-feet, of Muddy River near Moapa, Nev., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1					100	92	64	52	35	37
2					98	88	68	57	35	37
3					97	83	67	62	35	37
4					93	82	65	66	35	37
5					97	81	64	56	37	37
6					101	81	60	52	37	37
7					101	80	57	49	37	37
8					101	70	54	46	39	37
9					101	65	55	46	39	37
10					101	57	55	63	39	37
11					100	58	56	90	39	37
12					98	60	59	118	39	37
13					96	62	60	67	40	37
14					96	65	61	60	40	38
15					97	67	61	49	41	39
16					97	66	62	49	42	40
17					97	64	59	48	43	41
18					97	62	56	48	42	41
19					95	60	60	50	41	42
20					93	58	60	52	40	43
21					93	58	59	53	40	42
22				122	92	56	59	53	39	42
23				112	91	55	59	54	37	42
24				105	88	53	60	50	35	42
25				98	85	52	60	48	34	41
26				99	83	54	59	43	34	41
27				100	81	56	57	38	34	41
28				102	84	59	55	33	35	41
29				103	87	60	54	33	37	41
30				102	89	60	54	34	37	40
31					91		53	34		39

NOTE.—These discharges are based on a rating curve that is fairly well defined. For days of no gage height the discharge is interpolated.

Monthly discharge of Muddy River near Moapa, Nev., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April 22-30	122	98	105	1,870	B.
May	101	81	94.2	5,790	B.
June	92	52	65.5	3,900	B.
July	68	53	59.1	3,630	B.
August	118	33	53.3	3,280	B.
September	43	34	37.9	2,260	B.
October	43	37	39.3	2,420	B.
The period				23,200	

BILL WILLIAMS RIVER NEAR SWANSEA, ARIZ.

Bill Williams River rises in the St. Cloud Mountains, in the western part of Yavapai County, Ariz., and flows westward to its junction with the Colorado at Aubrey Landing.

The station, which is located at a narrow place in the canyon, about 1 mile below the Planet mine, 28 miles north of Bouse, and about 9 miles northwest of Swansea, the nearest post office, was established September 26, 1910.

No water is diverted above the station, but water is pumped from wells for irrigation on several ranches along the river.

The staff gage is in three sections. The low-water section is fastened to a cottonwood tree on the right bank; the remainder of the gage is bolted to the rocks on the left bank.

The channel is straight for several hundred feet above and below the station. At the gage the canyon is narrow and the banks are high and rocky. The bed of the stream is composed of sand, which is constantly shifting.

Discharge measurements at low water are made by wading near the gage. High-stage measurements will be made by means of car and cable not yet installed.

Discharge measurements of Bill Williams River near Swansea, Ariz., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 26[a]	C. C. Jacob	31	12	2.85	17
Nov. 30[b]	do	23	9.9	2.62	17

[a] Made by wading at gage. River in two channels.
[b] Made by wading 100 feet below gage; river at gage was in two channels.

Daily gage height, in feet, of Bill Williams River near Swansea, Ariz., for 1910.

[L. G. Martinez, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	2.85	2.45	2.6	11	.....	.....	2.6	21	.....	.....	2.5
2	2.7	.....	2.6	12	3.2	.....	2.6	22	2.7	.....	2.5
3	2.8	2.45	2.6	13	2.8	.....	2.6	23	.....	.....	2.5
4	.....	2.6	2.6	14	.....	.....	2.6	24	2.7	.....	2.5
5	.....	.....	2.6	15	2.8	.....	2.6	25	.....	.....	2.5
6	2.85	.....	2.6	16	2.75	.....	2.6	26	.....	.....	2.5
7	.....	.....	2.6	17	2.75	.....	2.6	27	2.6	.....	2.5
8	.....	.....	2.6	18	.....	.....	2.6	28	.....	.....	2.5
9	2.8	.....	2.6	19	.....	.....	2.6	29	2.6	.....	2.5
10	2.7	.....	2.6	20	2.7	.....	2.5	30	.....	.....	2.5
								31	.....	....	2.5

NOTE.—Observer absent Nov. 5 to 30.

GILA RIVER BASIN.

GENERAL FEATURES.

Gila River rises in southwestern New Mexico, near the Arizona line, and flows southwestward through Arizona to its confluence with Colorado River at Yuma. Its total length, exclusive of the many windings, is fully 500 miles. The principal tributaries of the Gila are San Pedro and Santa Cruz rivers from the south and Salt, Agua Fria, and Hassayampa rivers from the north.

The floods of the upper Gila and its tributaries are commonly short and violent, highest water occurring during the months of Janu-

ary and February. A period of high water occurs also during the late summer or early fall. During freshets the river may rise 8 to 10 feet above the normal stage and increase in width from 300 feet to a mile and a half. It is sometimes impassable for weeks and has the appearance of a sea of muddy water. The season of low water occurs in June and July, the river bed then being dry in places. Elevations in this basin range from 8,000 feet at the headwaters to 140 feet at Yuma. At Florence, 180 miles below the point at which it enters Arizona, it is about 1,500 feet above sea level.

Good storage sites exist at several places along San Francisco and Gila rivers, among which may be mentioned the reservoir site on the San Francisco near Alma and that on the Gila near Redrock, N. Mex.

Because of the torrential character of the Gila, waterpower development is not feasible except where stored water is used.

The drainage basin of the Gila includes 7,000 square miles of merchantable timberland, 11,000 square miles of woodland, of which the San Francisco basin has 1,000 square miles of timberland, 45,000 square miles of land upon which there is no timber, 1,300 square miles of scattered timber, and 300 square miles of open land.

The average annual precipitation over the greater part of the contributary drainage area of Gila and San Francisco rivers in New Mexico is between 10 and 15 inches, and in the high mountains of the headwater region it rises above 20 inches. The winters are mild except in the mountainous sections, and very little ice forms on the rivers.

GILA RIVER NEAR REDROCK, N. MEX.

This station, which is located in Middle Box Canyon, about one-eighth mile upstream from the mouth and about 2 miles east of Redrock post office, N. Mex., was originally established at the mouth of the canyon May 14, 1908. It was moved to its present site July 16, 1909. The nearest railroad points are Silver City, about 36 miles east of Redrock, and Lordsburg, about 30 miles south.

Mancos River, an intermittent stream, the first large tributary upstream from the station, joins the Gila about 12 miles above. A number of large washes come into the river above and below the station, and at flood times carry a large amount of water. The drainage area at the station is about 3,500 square miles. A number of large irrigation ditches divert water above the station.

The gage installed May 14, 1908, was bolted to a rock bluff on the left bank, a few feet above the mouth of the canyon. This gage was abandoned July 16, 1909, when a Friez automatic gage was installed on the left bank about one-eighth mile upstream and at a different datum. The bed of the stream is composed of sand, which is con-

tinually shifting, and measurements by wading are rendered more or less difficult and of uncertain accuracy by quicksand.

Except for fringe ice along the edges of the stream, the relation between gage height and discharge is not affected by ice.

The accuracy of the records derived from observations at this station is impaired by the adverse natural conditions.

Discharge measurements of Gila River near Redrock, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 7	J. B. Stewart	74	69	1.65	107
Mar. 20	do	42	55	1.55	88
20	do	49	55	1.55	80
20	do	22	27	1.55	84
21	do	30	48	1.55	91
22	do	31	44	1.52	82
May 10	C. D. Miller	49	51	1.70	66
July 3	J. B. Stewart	36	27	1.05	29
Sept. 13	do	34	29	1.45	36
Nov. 20	do	27	34	1.90	79

Daily gage height, in feet, of Gila River near Redrock, N. Mex., for 1910.

[J. L. Ward, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.65	1.65	1.6	1.8	1.7	.....	1.1	.....	.....	1.6	1.7	1.85
2	1.7	1.65	1.6	1.7	1.7	.....	1.1	.....	.....	1.6	1.7	1.8
3	1.7	1.65	1.6	1.7	1.65	.....	1.05	.....	2.0	1.65	1.7	1.8
4	1.85	1.65	1.6	1.7	1.6	1.75	1.0	.....	.....	1.7	1.75	1.8
5	1.95	1.65	1.5	1.7	1.6	1.65	1.0	.....	.....	1.7	1.9	1.8
6	1.85	1.65	1.5	1.65	1.6	1.55	1.0	1.0	.....	1.7	1.85	1.8
7	1.8	1.65	1.5	1.6	1.6	1.5	.8	.....	.....	1.7	1.85	1.8
8	1.75	1.65	1.5	1.65	1.65	1.45	.8	.....	.....	1.7	1.85	1.8
9	1.7	1.65	1.5	1.7	1.65	1.4	.8	.....	.....	1.6	1.85	1.8
10	1.7	1.65	1.5	1.75	1.6	1.3	.8	2.8	1.5	1.65	1.85	1.8
11	1.7	1.65	1.5	1.8	1.55	1.2	.95	.....	1.45	1.65	1.85	1.8
12	1.8	1.65	1.4	1.8	1.55	1.2	.9	.....	1.45	1.65	1.85	1.8
13	1.9	1.65	1.4	1.8	1.5	1.15	2.05	.8	1.45	1.65	1.85	1.8
14	2.0	1.65	1.5	1.8	1.5	1.1	1.7	.....	1.45	1.65	1.9	1.8
15	2.0	1.65	1.5	1.8	1.5	1.1	1.5	.....	1.4	1.7	1.95	1.8
16	1.95	1.6	1.5	1.8	1.5	1.05	2.5	.....	1.4	1.7	1.95	1.8
17	1.95	1.6	1.5	1.8	1.5	1.05	1.2	.....	1.5	1.7	1.9	1.8
18	2.0	1.6	1.5	1.8	1.5	1.0	.....	2.5	1.45	1.7	1.9	1.8
19	2.0	1.65	1.5	1.7	1.5	.95	.....	.....	1.55	1.7	1.85	1.8
20	2.0	1.65	1.55	1.7	1.5	.95	.....	1.2	1.6	1.7	1.85	1.8
21	2.0	1.65	1.55	1.65	1.4	.95	.....	.....	1.6	1.75	1.85	1.8
22	2.0	1.65	1.55	1.6	1.4	.95	.....	.....	1.65	1.7	1.85	1.8
23	2.0	1.7	1.6	1.5	1.45	.95	1.2	.....	1.65	1.7	1.85	1.8
24	2.0	1.65	1.6	1.6	1.45	.95	.....	.....	1.6	1.7	1.85	1.8
25	2.0	1.6	1.6	1.7	1.45	.95	.....	.....	1.6	1.7	1.85	1.8
26	2.0	1.65	1.65	1.7	1.45	1.05	.....	.....	1.6	1.7	1.85	1.8
27	2.0	1.65	1.7	1.7	1.45	1.15	.....	1.8	1.55	1.7	1.85	1.8
28	2.0	1.65	1.7	1.7	1.45	1.5	.....	.....	1.55	1.7	1.85	1.8
29	1.95	.....	1.7	1.7	.....	1.3	.....	.....	1.6	1.7	1.85	1.8
30	1.95	.....	1.75	1.7	.....	1.25	1.8	.....	1.6	1.7	1.85	1.8
31	1.95	.....	1.8	.....	.....	.....	.....	.....	.....	1.7	.....	1.8

Daily discharge, in second-feet, of Gila River near Redrock, N. Mex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	114	107	95	118	71	65	30	28	52	49	60	85
2	123	107	95	98	71	70	30	28	52	49	60	80
3	123	107	95	98	65	75	29	28	73	52	60	81
4	154	107	95	98	61	80	28	28	60	56	60	82
5	176	107	79	96	61	68	28	28	50	56	82	83
6	152	107	79	87	60	59	28	28	50	56	75	83
7	141	107	79	80	60	55	27	28	40	56	75	84
8	128	107	79	85	63	52	27	28	40	57	75	85
9	118	107	79	90	62	49	27	28	40	50	76	86
10	118	107	79	98	58	44	27	240	39	53	76	87
11	118	107	78	104	55	40	28	28	38	53	76	88
12	139	107	67	104	55	40	28	28	37	54	76	89
13	162	107	67	102	53	39	78	27	36	54	76	90
14	185	107	78	102	53	37	48	28	36	55	80	91
15	185	107	78	100	53	37	40	28	36	58	87	92
16	173	97	78	100	53	36	164	28	36	58	87	93
17	173	97	77	100	53	36	32	28	38	58	79	94
18	185	97	77	98	53	35	32	162	38	58	79	95
19	185	105	77	82	53	34	32	34	42	58	73	96
20	185	105	84	81	53	34	32	32	44	58	73	97
21	185	105	91	74	49	34	32	32	44	63	73	98
22	185	105	82	67	49	34	32	32	48	59	74	99
23	185	114	90	57	51	34	32	32	48	59	76	100
24	185	104	90	65	51	34	34	32	46	59	77	101
25	185	96	89	74	51	34	34	32	46	59	78	102
26	185	104	96	74	51	32	34	42	47	59	79	103
27	185	104	104	74	51	34	36	55	45	59	80	104
28	185	104	104	72	51	41	42	52	45	60	81	105
29	173	.....	104	71	51	36	48	52	47	60	82	106
30	173	.....	111	71	55	35	55	52	49	60	84	107
31	173	.....	120	.....	60	.....	50	52	.....	60	.....	108

NOTE.—These discharges obtained by use of indirect method for shifting channels. Discharges estimated for periods when automatic gage records are missing or of no value, due to sand.

Monthly discharge of Gila River near Redrock, N. Mex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	185	114	162	9,960	D.
February	114	96	105	5,830	C.
March	120	67	87.0	5,350	C.
April	118	57	87.3	5,190	C.
May	71	49	56.0	3,440	C.
June	80	32	44.4	2,640	D.
July	164	27	39.5	2,430	D.
August	240	28	44.5	2,740	D.
September	73	36	44.7	2,660	C.
October	63	49	56.6	3,480	C.
November	87	60	75.6	4,500	C.
December	108	80	93.4	5,740	D.
The year	240	27	74.6	54,000	

GILA RIVER NEAR GUTHRIE, ARIZ.

This station, which is located above the Arizona & New Mexico Railway bridge (see Pl. III, *B*, p. 34) at Guthrie, in sec. 3, T. 6 S., R. 30 E., Gila and Salt River base and meridian, was established November 6, 1910.

No important tributaries enter for several miles above the station. San Francisco River adjoins Gila River 8 miles below. Approximately 7,000 acres are irrigated above Guthrie. Water is also diverted for irrigation below the station. Two reservoir sites in the vicinity of the station have been investigated—one at Guthrie and the other near the mouth of San Francisco River.

The gage is an inclined staff bolted to the conglomerate bluff on the right bank about 500 feet above the railroad bridge.

The channel is straight for some distance above and below the station. The right bank is high and rocky; the left bank is lower, is covered with brush, and is subject to overflow at extreme high water. The bed of the stream is composed of shifting sand and silt.

High-stage measurements are made from a car and cable 50 feet below the gage. At lower stages measurements are made by wading above the gage, as the current at the cable section is very sluggish.

Discharge measurements of Gila River at Guthrie, Ariz., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Oct. 26	C. C. Jacob	31	28	5.28	63
Nov. 18	do	33	32	5.50	92
Dec. 17	do	32	29	5.48	72

NOTE.—Measurements made by wading 600 feet above gage.

Daily gage height, in feet, of Gila River at Guthrie, Ariz., for 1910.

[Miss Amelia Short, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1	.....	5.3	11	5.25	5.5	21	5.4	5.35
2	.....	5.3	12	5.25	5.5	22	5.45	5.35
3	.....	5.3	13	5.25	5.5	23	5.35	5.3
4	.....	5.4	14	5.4	5.4	24	5.3	5.3
5	.....	5.4	15	5.5	5.4	25	5.3	5.3
6	5.2	5.4	16	5.6	5.4	26	5.3	5.3
7	5.2	5.4	17	5.6	5.4	27	5.4	5.3
8	5.4	5.4	18	5.55	5.4	28	5.4	5.3
9	5.3	5.5	19	5.5	5.35	29	5.4	5.3
10	5.3	5.5	20	5.5	5.35	30	5.4	5.3
						31	.....	5.3

GILA RIVER AT SAN CARLOS, ARIZ.

This station, which is located at the Arizona & Eastern Railroad bridge, about 1 mile east of San Carlos on the San Carlos Indian Reservation, was established August 17, 1910. From 1899 to 1905 a gaging station was maintained on Gila River at San Carlos, about 1 mile below the present station.

San Carlos River enters from the north about one-half mile below the station. No other important tributaries enter within several miles above or below San Carlos.

The original gage was a vertical staff fastened to the west pier of the railroad bridge. On September 7, 1910, a gage, with independent datum, was installed at the old railroad trestle about 200 yards below the bridge. A curve of relation was determined for these gages, and all gage heights for 1910 are referred to the datum of the new gage.

The channel has a slight curve above the station, but is straight for 1,500 feet below. Both banks are high and not subject to overflow. The bed of the stream is wide and composed of shifting sand.

Discharge measurements are made from the railroad bridge, except at low water, when they may be made by wading.

Discharge measurements of Gila River at San Carlos, Ariz., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage on pier.	Gage on railroad bridge.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Feet.*	*Sec.-ft.*
Aug. 17[a]	C. C. Jacob	6	4.8	10.30	.....	6.5
Aug. 30[b]	.....do	145	298	11.20	1.0	269
30[b]	.....do	149	437	11.90	1.9	1,700
Sept. 1[b]	.....do	174	134	11.30	1.1	237
3[b]	.....do	120	63	11.00	.8	84
6[b]	.....do	97	53	10.90	.7	61
Dec. 2[c]	.....do	39	41	[d]11.00	.....	83
19[c]	.....do	36	23	10.98	.75	45

[a] Made by wading 100 feet above bridge.
[b] Made at railroad bridge.
[c] Made at Winkleman.
[d] Average gage height (observer's) for three days previous taken as mean gage height of measurement.
[e] Made by wading about 1,000 feet above bridge.

NOTE.—All gage heights refer to new gage installed Sept. 7, 1910.

Daily gage height, in feet, of Gila River at San Carlos, Ariz., for 1910.

[J. B. Stone, observer.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	11.2	10.4	10.4	11.0	16	.....	10.4	10.4	10.8	10.9
2	.....	11.1	10.4	10.4	11.0	17	11.4	10.4	10.4	10.8	10.9
3	.....	10.8	10.4	10.4	11.0	18	.....	10.4	10.4	10.8	10.9
4	.....	11.0	10.4	10.8	11.0	19	13.5	10.4	10.4	10.8	11.0
5	.....	10.9	10.4	11.1	11.0	20	11.6	10.4	10.4	10.8	11.0
6	.....	10.9	10.4	10.9	11.0	21	11.4	10.4	10.4	10.8	11.0
7	.....	10.9	10.4	10.7	11.0	22	11.3	10.6	10.4	10.8	11.0
8	.....	10.9	10.4	10.7	11.0	23	11.6	10.5	10.4	10.8	11.0
9	.....	10.8	10.4	10.7	10.9	24	.....	10.5	10.4	10.8	11.0
10	.....	10.7	10.4	10.6	10.9	25	11.1	10.4	10.4	10.8	11.0
11	.....	10.6	10.4	10.6	10.9	26	11.0	10.4	10.4	10.8	11.0
12	.....	10.6	10.4	10.6	10.8	27	11.2	10.4	10.4	11.4	11.0
13	.....	10.6	10.4	10.6	10.8	28	10.9	10.4	10.4	11.4	11.0
14	.....	10.5	10.4	10.95	10.8	29	11.5	10.4	10.4	11.2	10.9
15	.....	10.5	10.4	10.8	10.8	30	11.6	10.4	.....	11.2	10.9
						31	11.2	.....	.....	.....	10.9

NOTE.—All gage heights refer to new gage installed on bent of old railroad trestle Sept. 7, 1910, at an arbitrary datum. All gage heights prior to this date have been reduced to this datum by a relative curve constructed from simultaneous readings of the gage at the railroad bridge and the new gage.

SAN FRANCISCO RIVER BASIN.

GENERAL FEATURES.

San Francisco River rises in the southwestern part of Socorro County, N. Mex., and flows southwestward into Graham County, Ariz., where it unites with the Gila. The basin comprises about 2,600 square miles, of which 1,800 square miles are in New Mexico and 800 in Arizona. The area drained in New Mexico is high and mountainous, the principal ranges being the San Francisco and Tularosa and the western slope of the Mogollon, with peaks ranging from 8,000 to 10,000 feet above sea level. The average fall of the stream is 35 to 40 feet to the mile. The side slopes of the valley descend even more steeply and the valleys below, which range in length from 2 to 3 miles and average about a quarter of a mile in width, are of the nature of mesa lands, the leveler portions being 30 to 100 feet below the bed of the river. The principal tributaries of the San Francisco are Blue and Tularosa rivers. The waters of the San Francisco and its tributaries are used to some extent for mining, and a few small ditches take water for irrigation on the bottom lands.

SAN FRANCISCO RIVER AT ALMA, N. MEX.

This station, which is located about half a mile southeast of Alma, N. Mex., a short distance below the mouth of Mineral Creek, about 5 miles above the mouth of Whitewater Creek, and 85 miles northwest of Silver City, the most accessible railway point, was established October 18, 1904, by the United States Reclamation Service, discontinued December 31, 1907, and reestablished by the United States Geological Survey January 1, 1909.

A few small ditches take water out above the station for the irrigation of the bottom lands.

The rod gage established in 1909 differs in location and datum from the previous gage. It was washed out September 6, 1909, and replaced October 10, 1909, by another slope gage 100 feet upstream but at the same datum. In the intervals between regular gages, observations were made on a temporary gage installed by the observer and later reduced to the datum of the new gage.

High-water measurements have been made from a cable 300 feet upstream from the location of the last gage. (See Pl. IV, *A*.) The flow of the stream is very little affected by ice, though thin ice sometimes forms on the edges.

As the channel of the stream is composed of materials that shift, it is necessary to make frequent discharge measurements in order to obtain good results.

Discharge measurements of San Francisco River at Alma, N. Mex., in 1910.

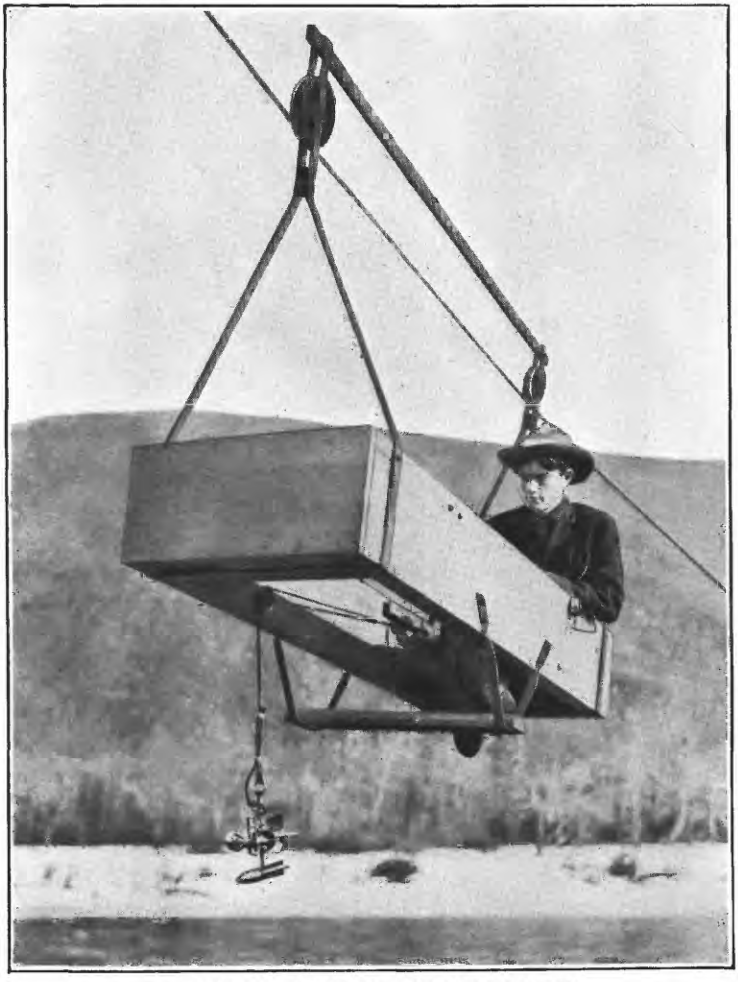
Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 11	J. B. Stewart	34	14	0.96	28
Mar. 26	do	25	9.4	1.30	16.2
May 6	C. D. Miller	.....	.....	1.30	(a)
Sept. 17	J. B. Stewart	22	6.2	1.95	7.8
Nov. 17	do	30	11	2.03	23.4

a River dry.

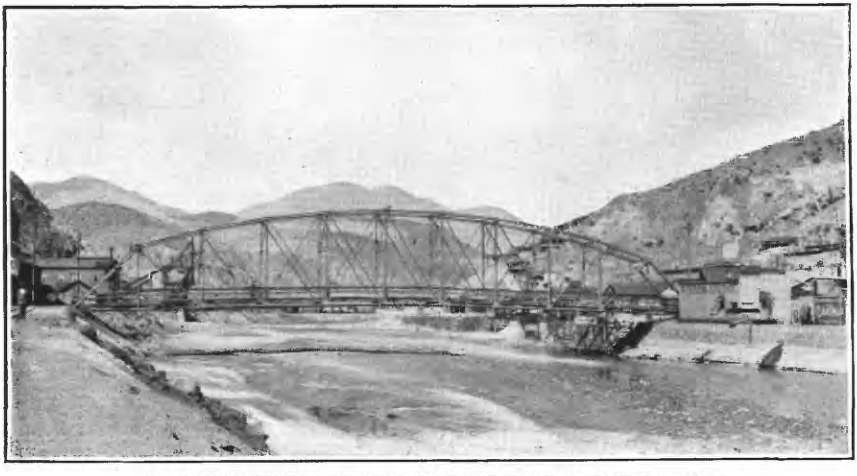
Daily gage height, in feet, of San Francisco River at Alma, N. Mex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.05	1.05	1.05	1.25	.....	.....	.....	1.45	1.9	1.95	1.95	2.0
2	1.05	1.05	1.05	1.25	.....	.....	.....	1.5	2.0	1.95	1.95	1.95
3	1.05	1.05	1.05	1.2	.....	.....	.....	1.7	1.0	1.95	1.95	2.05
4	1.05	1.05	1.05	1.2	.....	.....	.....	1.5	.9	1.95	1.95	2.0
5	1.05	1.05	1.05	1.3	.....	.....	.....	1.25	.9	1.95	1.95	2.0
6	1.05	1.05	1.05	1.3	.....	.....	.....	1.25	.9	1.95	1.95	2.0
7	1.05	1.05	1.05	1.35	.....	.....	.....	1.25	.9	1.95	1.95	2.0
8	1.05	1.05	1.05	1.5	.....	.....	.....	1.2	.9	1.95	1.95	2.0
9	1.05	1.05	1.05	1.5	.....	.....	.....	1.2	.9	1.95	1.95	1.95
10	1.05	1.05	1.2	1.6	.....	.....	.....	.9	.9	1.95	1.95	2.0
11	1.05	.9	1.25	1.45	.....	.....	.....	1.0	.9	1.95	1.95	2.0
12	2.0	.9	1.2	1.5	.....	.....	.....	1.05	.9	1.95	1.95	2.0
13	2.0	.9	1.15	1.55	.....	.....	.....	1.1	.9	1.9	1.95	2.0
14	1.55	.9	1.2	1.5	.....	.....	.....	1.05	.95	1.9	1.95	2.0
15	1.25	.9	1.2	1.5	.....	.....	.....	.9	.95	1.9	1.95	2.0
16	1.15	.9	1.2	1.5	.....	.....	.....	.9	.9	1.95	1.95	2.0
17	1.05	.9	1.2	1.4	.....	.....	.....	.9	1.95	2.0	2.0	2.0
18	1.05	1.0	1.2	1.4	.....	.....	.....	.9	1.95	2.0	1.95	2.0
19	1.05	.9	1.2	1.35	.....	.....	.....	.9	2.0	1.95	1.95	2.0
20	1.05	.9	1.2	1.35	.....	.....	.....	1.0	2.5	1.95	1.95	2.05
21	1.05	.9	1.2	1.2	.....	.....	.....	1.0	2.75	1.9	1.95	2.15
22	1.05	.9	1.2	1.2	.....	.....	.....	1.0	1.95	1.9	1.95	2.0
23	1.05	.9	1.2	1.25	.....	.....	2.0	1.1	1.95	1.9	1.9	2.0
24	1.05	.9	1.2	1.3	.....	.....	1.1	1.3	1.95	1.9	1.9	2.0
25	1.05	.9	1.25	.9	.....	.....	1.1	1.7	1.95	1.9	1.9	2.0
26	1.05	1.05	1.3	.9	.....	.....	.9	2.25	1.95	1.9	1.95	2.05
27	1.05	1.05	1.25	.9	.....	.....	.9	2.5	1.95	1.9	2.3	2.05
28	1.05	1.05	1.25	.9	.....	.....	1.25	1.6	1.95	1.9	2.0	2.0
29	1.05	.....	1.25	1.3	.....	.....	.95	2.9	1.95	1.9	2.0	2.0
30	1.05	.....	1.25	1.25	.....	.....	.9	2.5	1.95	1.95	2.0	1.95
31	1.05	.....	1.25	.....	.....	.....	1.25	2.0	.....	1.95	.....	1.95

NOTE.—Stream bed continually shifting away from the slope gage. Auxiliary gages set on Sept. 17 and Nov. 17. Gage heights July 23 to Sept. 17 are very uncertain. No flow during May, June, and July except July 23.



A. TYPICAL GAGING CAR FOR CABLE STATION.



B. GAGING STATION ON SAN FRANCISCO RIVER AT CLIFTON, ARIZ.

Daily discharge, in second-feet, of San Francisco River at Alma, N. Me.x, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	38	36	22	11	0	0	0	0	7.0	12	16	21
2	38	36	20	11	0	0	0	.5	12	12	16	18
3	38	36	20	9	0	0	0	3.0	0	12	16	24
4	38	36	20	9	0	0	0	.5	0	12	16	22
5	38	36	19	14	0	0	0	0	0	12	16	22
6	38	36	19	14	0	0	0	0	0	12	16	22
7	38	36	18	16	0	0	0	0	0	12	16	22
8	38	36	18	25	0	0	0	0	0	12	16	22
9	38	36	18	25	0	0	0	0	0	12	16	20
10	38	36	30	32	0	0	0	0	0	13	16	24
11	38	24	34	20	0	0	0	0	0	13	16	24
12	370	24	30	24	0	0	0	0	0	14	16	24
13	370	23	22	26	0	0	0	0	0	11	16	24
14	132	22	26	22	0	0	0	0	0	11	16	24
15	59	22	26	22	0	0	0	0	0	11	16	24
16	46	21	24	21	0	0	0	0	0	14	18	24
17	36	20	24	15	0	0	0	0	8	17	21	24
18	36	27	22	15	0	0	0	0	8	17	18	24
19	36	19	22	10	0	0	0	0	10	14	18	24
20	36	19	22	10	0	0	0	0	50	14	18	30
21	36	18	20	4	0	0	0	0	98	12	18	39
22	36	18	20	4	0	0	0	0	9	12	18	26
23	36	17	20	4	0	0	17	0	9	12	15	26
24	36	16	17	5	0	0	0	0	10	12	15	26
25	36	15	18	0	0	0	0	2.0	10	12	15	26
26	36	25	16	0	0	0	0	30	10	12	18	32
27	36	24	12	0	0	0	0	56	10	12	48	32
28	36	23	12	0	0	0	0	.5	10	12	21	28
29	36	.....	12	3	0	0	0	160	11	12	21	28
30	36	.....	12	2	0	0	0	56	11	16	21	24
31	36	.....	12	.....	0	.....	0	13	.....	16	.....	24

NOTE.—Daily discharge determined by the indirect method for shifting channels and is rather uncertain, especially from July 23 to Sept. 17, on account of gage heights.

Monthly discharge of San Francisco River at Alma, N. Mex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	370	36	62.4	3,840	C.
February	36	15	26.3	1,460	C.
March	34	12	20.2	1,240	C.
April	32	0	12.4	738	D.
May	0	0	0	0	
June	0	0	0	0	
July	17	0	.5	31	D.
August	160	0	10.4	640	D.
September	98	0	9.4	559	D.
October	17	11	12.8	787	C.
November	48	15	18.1	1,080	C.
December	39	18	25	1,490	C.
The year	370	0	16.5	11,900	

SAN FRANCISCO RIVER AT CLIFTON, ARIZ.

This station, which is located at the highway bridge at Clifton (see Pl. IV, *B*), in sec. 19, T 4 S., R. 30 E, Gila and Salt River base and meridian, about 5 miles above the mouth of the river and below all important tributaries, was established October 24, 1910.

Water is diverted for irrigation by a small ditch 1¾ miles above the bridge. At the dam of the Arizona Copper Co., 1½ miles above

Clifton, about 14 second-feet is diverted for power development, but the water used at the power plant is returned to the river above the station.

The gage is a vertical staff fastened to the board retaining wall just above the bridge.

The bed is sandy and somewhat shifting. The banks are high and not likely to be overflowed. At very low stages there are two channels at the bridge.

High-water measurements are made from the highway bridge. At medium and low stages measurements may be made either from the footbridge one-half mile below the gage or from the footbridge one-fourth mile above. When made at the upper footbridge the discharge of the canal must be added to that of the river.

Discharge measurements of San Francisco River at Clifton, Ariz., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec. ft.*
Oct. 23[a]	C. C. Jacob	48	33	5.35	68
24[b]	do	27	32		59
24	do			5.35	c73
Nov. 17[b]	do	31	39		93
17	do			5.80	c112
Dec. 16[b]	do	27	32		52
16	do			5.60	c66
16[b]	do	29	37		66
16	do			5.65	c81

[a] Made from footbridge ½ mile below gage.
[b] Made from footbridge ¼ mile above gage. There is inflow between this measuring section and the gage section that has to be added to give the total flow past the gage.
[c] Total flow past gage. Includes flow in river, discharge from canal of Arizona Copper Co., and inflow from Chase Creek.

NOTE.—The canal of Arizona Copper Co. discharged 14 second-feet back into river above gage, amount determined by measurement Dec. 16. This amount is practically constant. On Nov. 17 Chase Creek discharged 5.3 second-feet.

Daily gage height, in feet, of San Francisco River at Clifton, Ariz., for 1910.

[Peter Riley, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1		5.5	5.5	11		5.6	5.5	21		5.7	5.7
2		5.5	5.5	12		5.6	5.5	22		5.7	5.6
3		5.6	5.5	13		5.6	5.5	23		5.6	5.6
4		5.7	5.5	14		5.6	5.5	24	5.35	5.6	5.6
5		5.8	5.5	15		5.65	5.5	25	5.3	5.6	5.7
6		5.7	5.5	16		5.85	5.65	26	5.4	5.6	5.7
7		5.7	5.5	17		5.9	5.65	27	5.5	5.6	5.6
8		5.65	5.5	18		5.8	5.6	28	5.5	5.6	5.6
9		5.6	5.5	19		5.7	5.7	29	5.55	5.6	5.6
10		5.6	5.5	20		5.7	5.7	30	5.6	5.6	5.6
								31	5.5		5.6

WHITEWATER CREEK NEAR MOGOLLON, N. MEX.

A weir was installed by the Socorro Mines Co. on Whitewater Creek about half a mile above the power house, a few miles from Mogollon, N. Mex.—a town about 85 miles north of Silver City—in September, 1909.

The data given herewith are published through the courtesy of the company.

Discharge measurements of Whitewater Creek near Mogollon, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 27	Stewart and Tower	12.3	7.9	2.90	9.6
Sept. 18	do	11.7	4.7	3.50	2.7
Nov. 16	J. B. Stewart	9.5	4.3	3.16	3.2

Daily discharge, in second-feet, of Whitewater Creek near Mogollon, N. Mex., for 1909–10.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1909.				1909.				1909.			
1	4.4	3.3	3.3	11	3.9	3.3	4.7	21	3.6	3.3	3.5
2	4.4	3.3	3.3	12	3.9	3.3	5.1	22	3.6	3.3	3.7
3	4.4	3.3	5.1	13	3.9	3.3	5.1	23	3.6	3.3	3.6
4	4.4	3.3	4.1	14	3.9	3.3	4.1	24	3.5	3.3	3.9
5	4.1	3.3	2.7	15	3.9	3.3	3.3	25	3.3	3.3	3.9
6	4.0	3.3	2.7	16	3.5	3.3	3.3	26	3.3	3.3	3.9
7	3.9	3.3	2.7	17	3.3	3.3	3.3	27	3.3	4.3	3.5
8	3.9	3.3	2.7	18	3.5	3.3	3.3	28	3.3	5.6	3.9
9	3.9	3.3	2.7	19	3.6	3.3	3.3	29	3.3	3.9	3.6
10	3.9	3.3	2.9	20	3.6	3.3	2.5	30	3.3	3.6	3.6
								31	3.3	.....	3.5

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1910.												
1	11	6	4.3	6.7	20	3.6	2.8	3.7	5.3	2	2.1	3.3
2	19	6	4.7	7.7	17	2.8	2.1	2.9	3.7	1.7	2.1	3.2
3	14	6	5.3	5.3	15	3.7	1.7	3.1	3.6	2.1	2.1	2.6
4	6.7	6	6.4	5.3	15	3.9	1.6	3.2	2.9	2.1	2.1	2.6
5	5.2	6	7.5	5.1	14	2.9	1.6	2.9	3.9	2.1	2.9	2.6
6	5.2	5	7.7	5.1	14	2.8	1.6	2.4	2.9	2.1	3.3	2.6
7	5.2	5	8.5	6.7	12	2.8	1.6	2.4	2.8	2.0	3.3	2.6
8	5.2	5	9.6	8.0	12	2.8	1.6	2.4	2.8	1.6	3.2	2.6
9	5.2	5	9.2	8.1	10	2.4	1.6	2.4	2.4	1.6	2.6	2.6
10	5.6	5	9.7	9.7	10	2.3	1.6	3.7	2.1	1.6	2.6	2.6
11	6.5	5	9.7	13	10	2.1	1.6	6.5	2.1	1.7	2.4	2.6
12	13	5	8.7	12	10	2.1	2.4	5.2	2.1	2	2.1	2.6
13	13	5	7.7	14	9.7	2.1	4	3.5	2.1	1.6	2.1	2.6
14	8.9	4.5	8	16	9.5	2.1	4	2.4	2.1	1.6	2.2	2.6
15	8.7	4.5	8.3	15	9.2	2.1	4	2.1	1.7	1.6	2.9	2.6
16	8.9	4.5	7.7	14	8.5	2.1	4.1	2.4	1.6	1.6	3.3	2.6
17	9.7	4.5	8.3	13	8	2.1	4.4	2.1	1.6	1.7	3.3	2.6
18	9.3	4.5	9.1	12	7.6	2.1	4.4	2.8	2.6	2.1	3.2	2.6
19	8	4.3	9.3	15	7.1	1.9	4	2.9	2.5	2.1	2.6	2.6
20	7.9	4.3	9.5	19	6	1.9	2.4	2.9	3.4	2.2	2.6	2.6
21	7.7	4.3	9.2	24	6	1.9	2.4	2.8	3.3	2.6	2.6	2.6
22	6.4	4.3	10	23	5.3	1.6	2.1	2.4	3.3	2.6	2.6	2.6
23	6.1	4.4	11	19	5.2	1.6	2.1	2.4	3.3	2.6	2.6	2.6
24	6	4.9	12	15	4.4	1.6	2.8	2.4	3.3	2.6	2.6	2.6
25	6	4.3	12	17	4.3	1.6	3.7	2.1	2.9	2.5	2.6	2.6
26	6	4.7	10.4	17	4.3	1.6	2.9	2.4	2.1	2.7	2.6	2.6
27	6	5.1	9.7	18	3.7	2.7	3.1	2.1	2.2	2.1	2.9	2.6
28	6	4.7	9.1	20	3.7	3.7	2.9	2.4	2.5	2.1	4.2	2.6
29	6	.....	7.7	21	3.7	3.7	2.9	3.7	2.1	2.1	4	2.6
30	6	.....	7.7	22	3.7	3.2	4	5.7	2.1	2.1	3.3	2.6
31	6	.....	7.5	.....	3.5	.....	4	6	.....	2.1	.....	2.6

NOTE.—These discharges were obtained from a hydrograph showing the available horsepower. This hydrograph was constructed by the Socorro Mines Co. from daily readings made by that company.

Monthly discharge of Whitewater Creek near Mogollon, N. Mex., for 1909–10.

Month.	Discharge in second feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
1909.				
October	4.4	3.3	3.73	229
November	5.6	3.3	3.44	205
December	5.1	2.5	3.57	220
1910.				
January	19.0	5.2	7.88	485
February	6.0	4.3	4.92	273
March	12.0	4.3	8.56	526
April	24.0	5.1	13.6	809
May	20.0	3.5	8.79	540
June	3.9	1.6	2.46	146
July	4.4	1.6	2.77	170
August	6.5	2.1	3.11	191
September	5.3	1.6	2.71	161
October	2.7	1.6	2.04	125
November	4.2	2.1	2.77	165
December	3.3	2.6	2.64	162
The year	24.0	1.6	5.18	3,750

SAN CARLOS RIVER BASIN.

SAN CARLOS RIVER AT SAN CARLOS, ARIZ.

San Carlos River rises in the mountainous section of the San Carlos Indian Reservation and takes a general southwesterly course to its junction with the Gila at San Carlos. It is an intermittent stream and delivers water to the Gila only at times of flood.

The gaging station, which is located at the Arizona & Eastern Railway bridge, near the mouth of the river, half a mile east of San Carlos, was established August 17, 1910.

The gage is a vertical staff fastened to the west pile of the bridge.

The bed of the stream is composed of shifting sand and silt. The left bank is high and rocky. The right bank is low and subject to overflow. At the bridge from which discharge measurements are made the stream is confined by earth embankments.

Discharge measurements of San Carlos River at San Carlos, Ariz., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 31[a]	C. C. Jacob	24	19	10.40	36
Sept. 2[a]	do	18	9.1	10.30	16
5[b]	do	12	4.9	.....	7.6
5	.....	.....	.....	[c] 10.20	11
Dec. 19[d]	C. C. Jacob	25	12	10.20	20

[a] Made by wading ¼ mile above gage.
[b] Made by wading 500 feet above gage.
[c] Total flow past gage includes 7.6 second-feet and 3.8 second-feet inflow between first measuring section and gage.
[d] Made by wading 300 feet below gage.

Daily gage height, in feet, of San Carlos River at San Carlos, Ariz., in 1910.

[J. B. Stone, observer.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	10.35	.....	.....	10.2	16	.....	10.0	.....	10.3	10.2
2	.....	10.3	.....	.....	10.2	17	10.0	10.0	.....	10.3	10.2
3	.....	10.3	.....	.....	10.2	18	.....	10.0	.....	10.3	10.2
4	.....	10.3	.....	10.5	10.1	19	.....	10.0	10.0	10.3	10.2
5	.....	10.2	.....	10.6	10.3	20	.....	10.1	10.1	10.3	10.4
6	.....	10.2	.....	10.4	10.3	21	.....	10.1	10.1	10.3	10.3
7	.....	10.2	.....	10.2	10.3	22	.....	10.1	10.1	10.2	10.3
8	.....	10.2	.....	10.1	10.3	23	.....	10.1	10.0	10.2	10.3
9	.....	10.2	.....	10.1	10.3	24	10.0	10.0	.....	10.2	10.2
10	.....	10.2	.....	10.0	10.3	25	10.45	.....	.....	10.2	10.2
11	.....	10.1	.....	10.0	10.2	26	10.25	.....	.....	10.2	10.2
12	.....	10.1	.....	10.0	10.2	27	10.25	.....	.....	10.9	10.2
13	.....	10.4	.....	10.0	10.2	28	10.3	.....	.....	10.5	10.2
14	.....	10.3	.....	10.8	10.2	29	10.3	.....	.....	10.4	10.2
15	.....	10.3	.....	10.4	10.2	30	10.6	.....	.....	10.2	10.2
						31	10.4	.....	.....	.....	10.2

NOTE.—From Aug. 17 to 24 the river was dry. Water was below gage for other days for which no gage height record is given.

SAN PEDRO RIVER BASIN.

SAN PEDRO RIVER NEAR LEWIS SPRINGS, ARIZ.

San Pedro River rises in the northern part of the Mexican State of Sonora, flows northward more than 100 miles, and joins the Gila a few miles below the town of Dudleyville, 45 miles above Florence, Ariz. Rising in a region of very light snowfall, the river derives the greater part of its water from the frequent showers of the rainy season. It flows through a sandy bed between high, steep banks, and during the dry season it shrinks to an insignificant stream of clear water, which rises and sinks into the sand with the varying depths of the bedrock. The basin is long and narrow and is bordered by mountains that rise 6,000 feet above sea level.

The gaging station, which is located half a mile below Charleston station on the El Paso & Southwestern Railroad, in sec. 2, T. 21 S., R. 21 E., Gila and Salt River base and meridian, and about 5 miles below Lewis Springs, was originally established about half a mile west of Charleston, 6 miles above Fairbank, on January 27, 1904. The station was discontinued August 31, 1906, and reestablished at the present site October 18, 1910.

The records derived from observations at this station show the amount of water available for storage at the Charleston reservoir site, which has been surveyed by the United States Reclamation Service. The low-water flow of the San Pedro is not sufficient to irrigate the lands now under cultivation.

The gage is an inclined staff on the right bank at the proposed dam site.

Both banks are high and rocky and not subject to overflow. The bed of the stream is composed of sand and is shifting.

Discharge measurements are made from a car and cable about one-third mile above the gage.

Discharge measurements of San Pedro River near Lewis Springs, Ariz., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Oct. 18[a]	C. C. Jacob	14	7.7	4.08	12
Oct. 19[a]	do	14	6.8	4.08	13
Nov. 9[b]	do	11	6.5	4.05	13
Dec. 14[a]	do	12	7.7	4.03	15

[a] Made by wading.
[b] Made by wading one-fourth mile above gage.

Daily gage height, in feet, of San Pedro River near Lewis Springs, Ariz., for 1910.

[M. Clymer, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1	.....	4.05	11	4.05	4.04	21	4.05	3.90
2	.....	4.05	12	4.05	4.03	22	4.05	3.90
3	.....	4.05	13	4.05	4.03	23	4.05	3.90
4	.....	4.04	14	4.05	4.03	24	4.05	4.00
5	.....	4.04	15	4.10	4.03	25	4.05	4.00
6	.....	4.04	16	4.08	4.03	26	4.08	4.00
7	.....	4.04	17	4.05	4.03	27	4.12	4.00
8	.....	4.04	18	4.05	3.95	28	4.08	4.00
9	4.05	4.04	19	4.05	3.90	29	4.05	3.95
10	4.05	4.04	20	4.05	3.90	30	4.05	3.95
						31	.....	3.95

SANTA CRUZ RIVER BASIN.

GENERAL FEATURES.

Santa Cruz River rises in the northern part of the Mexican State of Sonora, west of the head of San Pedro River, and flows northward into Arizona. In its upper part the stream flows in a region of rocky canyons and narrow valleys and carries an ample water supply. The waters of the lower portion are finally lost in the sands not far from Tucson. Elevations in the headwater region range from 4,000 to 5,000 feet above sea level.

SANTA CRUZ RIVER NEAR NOGALES, ARIZ.

This station, which is located just below the dam site on Yerba Buena ranch, about 7 miles northeast of Nogales, was established March 22, 1907.

Nearly the entire low-water flow of the Santa Cruz is diverted for irrigation above the station. A small ditch takes out water just above the gage.

The gage is an inclined staff, in two sections, fastened to a large cottonwood tree on the right bank.

The channel is straight for some distance above and below the station. Both banks are of medium height and not likely to be overflowed. At low water the conditions are very unsatisfactory, as the bed is shifting sand.

Discharge measurements at medium and high stages are made from a cable 100 feet below the gage.

The following discharge measurement was made by C. C. Jacob in canal below gage:

November 10, 1910:[1] Width, 1 foot; area, 0.40 square foot; gage height, 3.50 feet; discharge, 0.35 second-foot.

Daily gage height, in feet, of Santa Cruz River near Nogales, Ariz., for 1910.

[J. A. Harrison, observer.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.7	3.7	3.8	3.7	.....	3.65	16	4.0	3.7	3.7	3.7	3.8	3.35
2	2.7	3.7	3.8	3.7	3.7	3.6	17	3.8	3.6	3.7	3.7	3.8	3.3
3	2.7	5.2	3.8	3.7	3.75	3.6	18	3.8	3.6	3.7	3.7	3.7	3.3
4	2.7	3.9	3.8	3.7	3.75	3.55	19	3.8	3.6	4.75	3.7	3.7	3.3
5	2.7	3.9	3.7	3.7	3.7	3.55	20	3.8	3.6	4.3	3.7	3.7	3.3
6	2.7	3.8	3.7	3.7	.....	3.55	21	4.3	3.5	3.7	3.7	3.7	3.3
7	2.7	3.7	3.7	3.7	3.7	3.5	22	3.9	3.4	3.7	3.7	3.7	3.3
8	2.7	3.85	3.7	3.7	3.7	3.5	23	4.2	3.4	3.7	3.7	3.7	3.3
9	2.7	3.8	3.7	3.7	3.7	3.5	24	4.2	3.5	4.4	3.7	3.7	3.3
10	2.7	3.75	3.7	3.7	3.7	3.5	25	4.0	3.4	3.9	3.7	3.7	3.25
11	2.7	3.7	3.7	3.7	3.7	3.45	26	3.9	3.4	3.7	3.7	3.7	3.2
12	.....	3.7	3.7	3.7	3.7	3.45	27	4.0	3.6	3.7	3.7	3.7	3.2
13	2.7	3.7	3.7	3.7	3.7	3.45	28	4.3	3.8	3.7	3.7	3.7	3.2
14	4.55	3.7	3.7	3.7	3.7	3.4	29	3.7	3.75	3.7	3.7	3.7	3.2
15	4.4	3.8	3.7	3.7	3.8	3.35	30	3.7	3.9	3.7	3.7	3.7	3.2
							31	3.7	3.9	.....	3.7	.....	3.2

SANTA CRUZ RIVER AND DITCHES AT TUCSON, ARIZ.

This station, which is located at Congress Street Bridge, Tucson, Ariz., was established October 15, 1905. The gage-height records were discontinued November 12, 1907, but discharge measurements have been made since then by the students of the University of Arizona under the direction of Mr. G. E. P. Smith, by whom the station is now maintained.

The Manning and Farmers ditches divert practically the entire flow during the low period of Santa Cruz River. These ditches are taken out just above the gaging station, and their flow is determined by current-meter or weir measurements, supplemented by daily records, kept by the ditch managers, of the amount of water contained in each. On April 16 and 17, 1908, a permanent Cippoletti weir was established on the Manning ditch 3 miles below the head gate. This water is used to irrigate lands on the north and south sides of Santa Cruz River in and about Tucson.

Conditions of flow are changeable.

[1] All water diverted from river into canal by earth levee at gage.

The results published herewith were furnished to the Survey by the United States Reclamation Service.

Daily run-off, in acre-feet, of Santa Cruz River at Tucson, Ariz., for 1910.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
1							65					
2							60					
3							55		10			
4		8					50		10			
5	8						40		10			
6	16								10			
7	4								10			
8									10			
9									10			
10									10			
11							20		10			
12							20		5			
13				7			20					
14				14				8				
15		8		14								
16		17		14		10						
17		17		14		10						
18		17		7		3						
19		17										
20		17										
21		17				242					22	
22		17				30					22	
23		8				2,013					22	
24						1,465					22	
25						98					22	
26						60					22	
27						40					22	
28						230					22	
29						90					22	
30						80	320				22	
31						70	40				22	
	28	143	.....	70	.....	4,441	690	8	95	.....	242	5,717

SALT RIVER BASIN.

SALT RIVER AT ROOSEVELT AND SALT AND VERDE RIVERS AT McDOWELL, ARIZ.

Salt River, though considered a tributary of the Gila, is larger both in catchment area and in volume of water carried. It receives the drainage from central Arizona, its principal tributary, the Verde, flowing in a general southeasterly direction from the mountains and tablelands south of Colorado River. The Verde Valley is in Yavapai County, Ariz., on the headwaters of the stream, and extends from a canyon above Camp Verde to a point about 10 miles below the fort. About a mile below the junction of the Verde and 30 miles above Phoenix, the Salt enters the plains of the Gila Valley.

The Salt River project of the United States Reclamation Service provides for the storage of water in a reservoir controlled by the Roosevelt dam, on Salt River at Roosevelt, Ariz., about 78 miles northeast of Phoenix. The diversion of water from Salt River by the Granite Reef dam, about 4 miles below the mouth of Verde River, into the old Arizona canal on the north side of the river and into the South canal on the south side of the river; the enlargement of the

Arizona canal; and the consolidation of the canal systems in the Salt River valley in the vicinity of Phoenix and Mesa into two systems receiving water from the Arizona and South canals. A power plant at the storage dam generates power from stored water in the reservoir and from water delivered from a power canal heading at a diversion dam in Salt River about 19 miles above the storage dam. Other power plants will be established on Salt River below Roosevelt and at drops in canals. A part of the power developed will be used for pumping water for extending the irrigated area and a part will be sold for industrial purposes.

The power-canal diversion dam, the power canal, the power plant, the Roosevelt dam, and the Granite Reef dam are completed; the improvements of the Arizona canal system and the wells for underground pumping are still under construction.[1]

Until the Roosevelt dam was completed (March, 1910) gaging stations were maintained at two points in Salt River basin by the United States Reclamation Service, as follows:

A station on Salt River at McDowell, Ariz., which is located one-third mile above the junction of Salt and Verde rivers, 30 miles northeast of Phoenix, 15 miles northeast of Mesa, and 1¾ miles above the Arizona canal diversion dam, was established April 30, 1897.

A station on Verde River at McDowell, 2⅛ miles above the Arizona canal diversion dam and three-fourths of a mile above the mouth of the river, was established April 20, 1897.

The estimates of monthly discharge for 1910 have been computed from the reservoir records, based on amounts stored and amount drawn for this period. These estimates have been furnished by the United States Reclamation Service.

Monthly discharge of Salt River at Roosevelt and Verde River at McDowell, Ariz., for 1910.

Month.	Run-off (total in acre-feet).			
	Salt River at Roosevelt, Ariz.	Salt River at McDowell, Ariz.	Verde River at McDowell, Ariz.	Salt River at Granite Roof, Ariz.
January	98,760	108,636	219,061	327,697
February	33,562	35,240	28,475	63,715
March	73,545	77,222	79,182	156,404
April	59,348	64,096	49,946	114,042
May	30,179	31,688	8,636	40,324
June	8,072	8,637	3,844	12,481
July	9,510	10,081	7,681	17,762
August	18,093	18,998	19,273	38,271
September	12,596	13,352	13,144	26,496
October	10,475	11,104	11,904	23,008
November	17,489	18,363	19,432	37,795
December	16,839	17,681	18,710	36,391
The year	388,468	415,098	479,288	894,386

[1] Description of Salt River project taken from Ninth Ann. Rept. U. S. Reclamation Service.

AGUA FRIA RIVER BASIN.

AGUA FRIA RIVER NEAR GLENDALE, ARIZ.

Agua Fria River rises in the Prescott National Forest, Ariz., south of the Black Hills, and flows southward to its junction with the Gila, a short distance below the mouth of Salt River. New River, its principal tributary, enters about 11 miles above its mouth. During the greater part of the year New River is a dry wash. From the mountains the Agua Fria flows southward as a clear mountain torrent, but as it enters the plains of the Gila its waters sink into the broad sandy channel. In flood times great volumes of muddy waters pour through the usually dry channel into the Gila.

The gaging station, which is located at the old diversion dam of the Beardsley irrigation project at Camp Dyer, in sec. 28, T. 6 N., R. 1 E., Gila and Salt River base and meridian, 22 miles northwest of Glendale, was established November 10, 1910. The records derived from the observations at this point will show the amount of water available for storage at the proposed reservoir, a short distance above Camp Dyer.

Castle Creek enters about 4 miles above the station.

The diversion dam failed during the flood of 1895 when a portion of the masonry at each end was washed out.

At low and medium stages the stream flows through the larger opening, which is near the right bank. The gage for each channel is painted on the upstream face of the dam at the right of the opening.

At low water the channel changes slightly on account of the shifting sand in the bed of the stream. At high stages the dam acts as a permanent control.

At low and medium stages discharge measurements are made by wading near the dam. No equipment has yet been installed for making measurements at high water.

Discharge measurements of Agua Fria River near Glendale, Ariz., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Oct. 12[a]	C. C. Jacob	.....	1.8	(b)	2.2
30	Clapp and Jacob	6	2.2	.....	2.3
Nov. 5[c]	Jacob and Harris	22	18	.....	37
6[d]	C. C. Jacob	7.7	8.6	.....	13
8[e]	.....do	3.9	2.9	21.2	4.6
Dec. 7[e]	.....do	3.6	2.9	21.2	4.6

[a] Made by floats, coefficient used 0.75.
[b] Water surface 2.65 feet below south-east corner of west channel through dam, highest voussoir.
[c] Measurement made 300 feet above dam from trunk of cottonwood tree.
[d] Discharge measured in two channels at dam. Water passing through culvert and over bottom of north gap.
[e] All water flowing through north culvert.

Daily gage height, in feet, of Agua Fria River near Glendale, Ariz., for 1910.

[J. M. Heath, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1		21.25	11	20.4	21.2	21	21.2	21.2
2		21.25	12	20.4	21.25	22	21.1	21.2
3		21.25	13	20.7	21.2	23	21.1	21.25
4		21.2	14	22.95	21.2	24	21.1	21.25
5		21.2	15	22.7	21.2	25	21.1	21.22
6		21.2	16	21.9	21.1	26	21.18	21.2
7		21.2	17	21.55	21.1	27	21.4	21.2
8		21.2	18	21.35	21.15	28	21.3	21.25
9		21.2	19	21.3	21.2	29	21.3	21.25
10	20.4	21.2	20	21.22	21.2	30	21.3	21.2
						31		21.22

HASSAYAMPA RIVER BASIN.

HASSAYAMPA RIVER NEAR WICKENBERG, ARIZ.

Hassayampa River rises south of the Sierra Prieta in the Prescott National Forest, and flows southward to its junction with the Gila about 25 miles below the mouth of the Agua Fria.

The mean annual precipitation at the headwaters of Hassayampa and Agua Fria rivers is about 18 inches; at the junction of these rivers with the Gila it is about 6 inches. The high slopes of the basin usually support a small amount of pine, fir, juniper, and oak having some commercial value. On the lower foothills there is a scattered growth of cacti, chaparral, and palo verde. Like the Agua Fria the Hassayampa is subject to violent freshets, whose waters reach the Gila only at times of flood; at other times the stream sinks into the sands.

The gaging station, which is located half a mile below Brill station on the Atchison, Topeka & Santa Fe Railway, about 4 miles below Wickenberg, in sec. 20, T. 7 N., R. 4 W., Gila and Salt River base and meridian, was established November 23, 1910.

A small ditch diverts water for irrigation at Wickenberg. No important tributaries enter below the station, which is about 45 miles above the mouth of the river.

A vertical staff gage is bolted to the bedrock on the west bank of the stream about half a mile below the Brill ranch house.

The channel is straight for some distance above and below the station. The banks are low, and at high stages the river spreads to the base of the foothills. The bed of the stream is composed of sand and gravel and is very unstable. The location of the low-water channel changes with each flood.

Discharge measurements are made by wading near the gage.

Discharge measurements of Hassayampa River near Wickenburg, Ariz., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. feet.*	*Feet.*	*Sec.-ft.*
Oct. 11[a]	C. C. Jacob	.....	2.0	[b] 4.50	5.4
Oct. 31[c]	Clapp and Jacob	6.0	2.2	[b] 4.70	4.0
Nov. 22[d]	C. C. Jacob	1.5	.5	.....	.7
Nov. 23[e]	.....do	7.0	2.9	4.80	4.8

[a] Made by floats 3 miles below Wickenburg.
[b] Water surface referenced and later gage height deduced.
[c] Made by wading ½ mile below ranch house, 3½ miles below Wickenburg. No water flowing in river channel at Wickenburg. Water rises a short distance above ranch house and some distance below Wickenburg.
[d] Water emerges from sand at low stage at upper end of box canyon, flows through canyon, and again sinks into sand. Measurement made at lower end of box canyon.
[e] Made ½ mile above Brill's ranch. No water flowing in river at Wickenburg.

Daily gage height, in feet, of Hassayampa River near Wickenburg, Ariz., for 1910.

[A. S. Nilson, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1	.....	4.8	11	.....	4.7	21	.....	4.65
2	.....	4.8	12	.....	4.7	22	.....	4.7
3	.....	4.8	13	.....	4.7	23	4.8	4.7
4	.....	4.8	14	.....	4.7	24	4.75	4.7
5	.....	4.8	15	.....	4.7	25	4.8	4.7
6	.....	4.8	16	.....	4.7	26	4.8	4.7
7	.....	4.8	17	.....	4.7	27	4.8	4.7
8	.....	4.8	18	.....	4.7	28	4.8	4.7
9	.....	4.75	19	.....	4.7	29	4.8	4.7
10	.....	4.7	20	.....	4.6	30	4.8	4.7
						31	.....	4.7

SALTON SINK BASIN.

Stream-flow data for the Salton Sink basin, heretofore presented with Colorado River data, will be found in the report on the Great Basin (Water-Supply Paper 290), of which it logically forms a part.

MISCELLANEOUS MEASUREMENTS IN COLORADO RIVER DRAINAGE BASIN.

The following miscellaneous discharge measurements were made in the Colorado River drainage basin during 1910. They are arranged by drainage basins in downstream order.

Miscellaneous measurements in Colorado River basin in 1910.

Green River basin.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Mar. 7	Yampa River	Green River	Hayden, Colo	.....	281
Sept. 6	Battle Creek	Little Snake River	At mouth in sec. 16, T. 12 N., R. 88 W.	.....	[a] 4
July 16	Savery Creek	.....do	At mouth 1 mile above Wyoming-Colorado State line.	.....	[a] 6
Sept. 6	.....do	.....do	.....do	.....	[a] 6
Nov. 7	.....do	.....do	.....do	.....	28
Nov. 9	Fourmile Creek	.....do	At Wyoming-Colorado State line	.....	2.8
Aug. 24	Strawberry River	Duchesne River	At old gaging station, Utah	5.70	31.5
25	Price canal	Price River	Price, Utah	.....	18.2
July 24	Right canal	Ferron Creek	Above gaging station near Ferron, Utah.	.....	10.8
24	Left canal	.....do		.....	30.2

[a] Estimated.

Miscellaneous measurements in Colorado River basin in 1910—Continued.

Grand River basin.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
July 4	South Fork, Grand River.	Grand River	100 yards above gage at Lehman, Colo.	4.9	152
Sept. 8	do	do	At bridge at Lehman, Colo.		40
July 3	East Inlet, Grand Lake.	North Fork Grand River.	50 yards above mouth at Grand Lake, Colo.	4.20	74
Sept. 9	Willow Creek	Grand River	Granby, Colo.		14
Mar. 10	Vasquez Creek	Fraser River	Vasquez, Colo.		*a* 2.5
Oct. 15	Blue River	Grand River	300 yards below Summit County Power Co.'s plant, and 1 mile below Dillon, Colo.		113
14	do	do	Below mouth of Rock Creek, 8 miles below Dillon, Colo.		117
Sept. 14	do	do	At Kremmling-Radium highway bridge near Radium, Colo.		*b* 232
Mar. 10	Sheep Creek	do	Gore, Colo.		*a* 4
Apr. 17	do	do	do		*a* 1
Mar. 10	Sheephorn Creek	do	At mouth near Radium, Colo.		*a* 1
10	Piney Creek	do	Near State bridge near McCoy, Colo.		*a* 3
10	Rock Creek	do	Near Crater, Colo.		*a* 8
16	Gypsum Creek	Eagle River	300 feet above mouth from footbridge, near Gypsum, Colo.		50
May 19	West Mamm Creek	Grand River	2 miles above Selby's ranch near Rifle, Colo.		*a* 10
19	Selby's ditch *c*	West Mamm Creek.	A short distance above gaging station at Selby's ranch near Rifle, Colo.		2.4
19	Quaking Asp Creek	do	Near mouth opposite Selby's ranch near Rifle, Colo.		*a* .1
19	Rifle Creek	Grand River	At footbridge 2 blocks north of Denver & Rio Grande R. R. depot at Rifle, Colo.		54
Nov. 22	Cochetopa Creek	Gunnison River	About 2 miles above Sillsville, Colo.		28
Oct. 27	West Naturita Creek.	San Miguel River.	Above junction with East Naturita in sec. 31, T. 43 N., R. 13 W.		*a* .5
27	East Naturita Creek.	West Naturita Creek.	Above junction with West Naturita in sec. 29, T. 43 N., R. 13 W.		*a* 1
27	Lone Cone Creek	Naturita Creek	Above point of diversion of Lone Cone ditch in sec. 25, T. 43 N., R. 13 W.		*a* 1
26	Basin Creek	San Miguel River	At Stone Cabin reservoir, Colo., in sec. 11, T. 44 N., R. 16 W.		.01

Escalante River basin.

Oct. 17	Pine Creek	Escalante River	Escalante, Utah	2.66	10.9
Aug. 13	do	do	do	1.76	14.4
May 14	do	do	200 feet above Escalante Creek		50.7

San Juan River basin, Colo.

Oct. 21	San Juan	San Juan River	Near Shiprock, N. Mex.	4.00	2,390

Virgin River basin.

June 17	Santa Clara	Virgin River	Near Hunt's ranch, Utah	3.35	20.7

a Estimated. *b* Float measurement. *c* Ditch diverted from West Mamm Creek.

Miscellaneous measurements in Colorado River basin in 1910—Continued.

Gila River basin.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Nov. 18	Buckhorn Creek	Duck Creek	Silver City-Mogollon road crossing, 8 miles above Cliff, N. Mex.		*a* .1
Sept. 19	do	do	do		*a* .2
Jan. 30	Whitewater Creek	San Francisco River.	At road crossing at Glenwood, N. Mex.		7.4
May 6	do	do	do		7.2
Sept. 19	Dry Creek	do	Near Meter's ranch, 12 miles south of Glenwood, N. Mex.		0
Nov. 18	do	do	do		0
18	Little Dry Creek	do	At Silver City-Mogollon ford, 12 miles south of Glenwood, N. Mex.		0
Sept. 19	do	do	do		0

Las Vegas Wash.

Sept. 6	Artesian well		Las Vegas, Nev		0.43
7	Every		do		1.56

a Estimated.

INDEX.

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F.

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