pply Paper No. 211

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

SURFACE WATER SUPPLY
OF
COLORADO RIVER DRAINAGE ABOVE YUMA

1906

R. I. MEEKER
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DISTRICT HYDROGRAPHERS

WASHINGTON
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SURFACE WATER SUPPLY OF THE COLORADO RIVER DRAINAGE ABOVE YUMA.[a]

R. I. MEEKER and H. S. REED,
District Hydrographers.

INTRODUCTION.

SCOPE OF WORK.

The water supply of the United States is of more importance to the life and pursuits of the people than any other natural resource. In the arid States the limit of agricultural development is determined by the amount of water available for irrigation, while in all parts of the country the increase in the population of cities and towns makes necessary additional water supplies for domestic and industrial uses, in procuring which both the quantity and the quality of the water that may be obtained must be considered. The location of manufacturing plants may depend largely on the water-power facilities and on the character of the water. The notable advances made in the electric transmission of power have led to the utilization of water powers for the operation of manufacturing establishments, railroads, and municipal lighting plants, many of which are at some distance from the places at which the power is developed.

The intelligent establishment and maintenance of enterprises or industries that depend on the use of water demands a thorough knowledge of the flow of the streams and an understanding of the conditions affecting that flow. This knowledge should be based on data showing both the total flow and the distribution of the flow throughout the year, in order that normal fluctuations may be provided for. As the flow of a stream is variable from year to year, estimates of future flow can be made only from a study of observations covering several years. The rapid increase in the development of the water

[a] This report contains information similar to that published in previous years under the title "Report on the Progress of Stream Measurements."

resources of the United States has caused a great demand by engineers for information in regard to the flow of streams, as it is now generally realized that the failure of many large power, irrigation, and other projects has been due to the fact that the plans were made without sufficient trustworthy information in respect to the water supply.

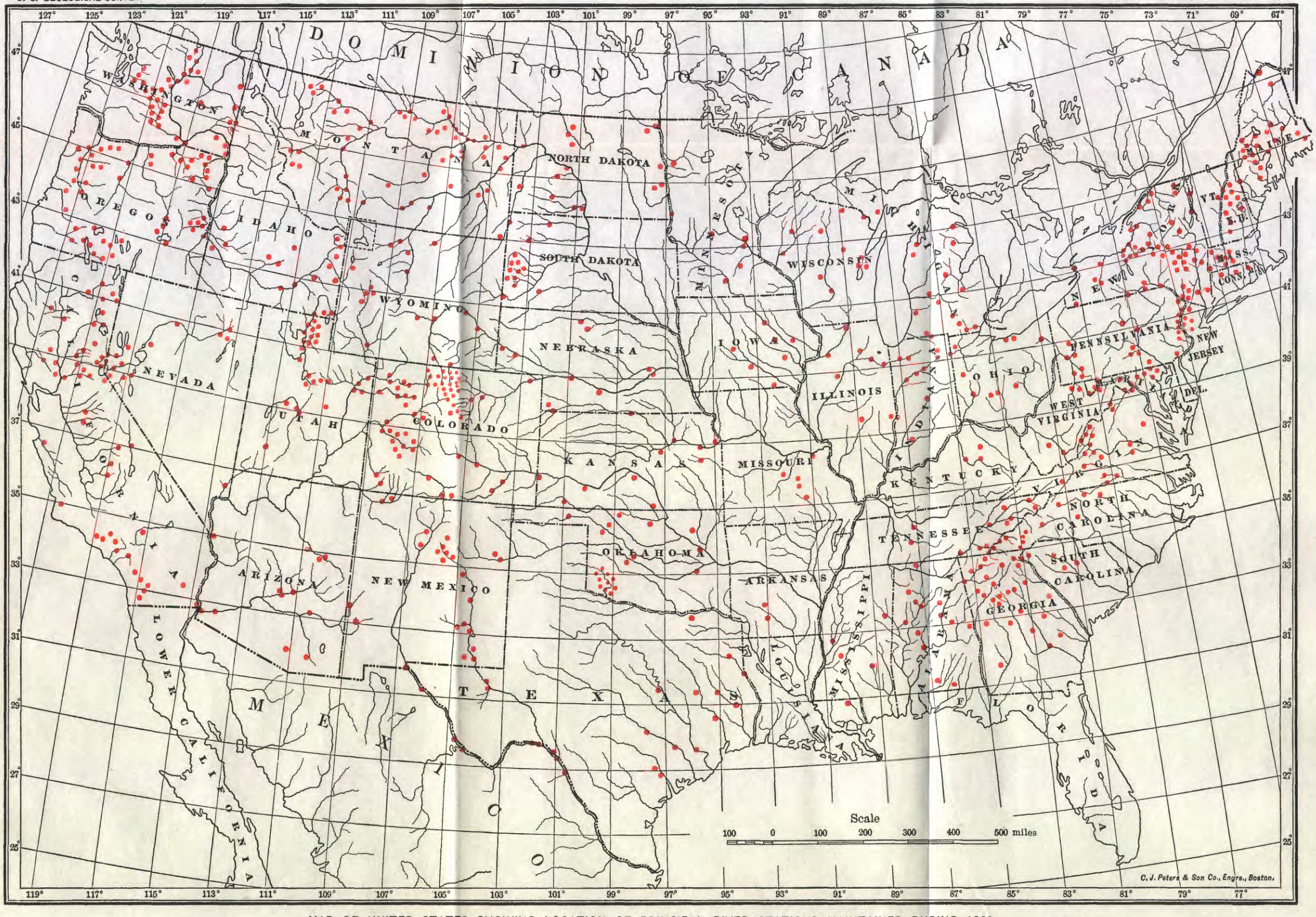
Owing to the broad scope of these hydrographic investigations and the length of time they should cover in order that the records may be of greatest value, it is in general impossible for private individuals to collect the necessary data, and as many of the streams traverse more than one State this work does not properly fall within the province of the State authorities. The United States Geological Survey has, therefore, by means of specific appropriations by Congress, for several years systematically made records of stream flow, with the view of ultimately determining all the important features governing the flow of the principal streams of the country. In carrying out this plan stations are established on the streams and maintained for a period long enough to show their regimen or general behavior. When a record that is sufficient for this purpose has been obtained for any stream, the work on that stream is discontinued. The order in which the streams are measured is determined by the degree of their importance.

During 1906 the regimen of flow was studied at about 700 stations distributed along the various rivers throughout the United States, as shown on Pl. I. In addition to these records data in regard to precipitation, evaporation, water power, and river profiles were obtained in many sections of the country.

These data have been assembled by drainage areas and are published in a series of fourteen Water-Supply and Irrigation Papers, Nos. 201 to 214, inclusive, each of which pertains to the surface water resources of a group of adjacent areas. In these papers are embodied not only the data collected in the field, but also the results of computations based on these data and other information that has a direct bearing on the subject, such as descriptions of basins and the streams draining them, utility of the water resources, etc. The list follows.

Water-Supply and Irrigation Papers on surface water supply, 1906.

201. Surface water supply of New England, 1906. (Atlantic coast of New England drainage.)
202. Surface water supply of the Hudson, Passaic, Raritan, and Delaware river drainages, 1906.
203. Surface water supply of the Middle Atlantic States, 1906. (Susquehanna, Gunpowder, Patapsco, Potomac, James, Roanoke, and Yadkin river drainages.)
204. Surface water supply of the Southern Atlantic and Eastern Gulf States, 1906. (Santee, Savannah, Ogeechee, and Altamaha rivers, and eastern Gulf of Mexico drainages.)
205. Surface water supply of the Ohio and lower eastern Mississippi river drainages, 1906.



MAP OF UNITED STATES SHOWING LOCATION OF PRINCIPAL RIVER STATIONS MAINTAINED DURING 1906.

206. Surface water supply of the Great Lakes and St. Lawrence River drainages, 1906.
207. Surface water supply of the upper Mississippi River and Hudson Bay drainages, 1906.
208. Surface water supply of the Missouri River drainage, 1906.
209. Surface water supply of the lower western Mississippi River drainage, 1906.
210. Surface water supply of the western Gulf of Mexico and Rio Grande drainages, 1906.
211. Surface water supply of the Colorado River drainage above Yuma, 1906.
212. Surface water supply of the Great Basin drainage, 1906.
213. Surface water supply of California, 1906. (The Great Basin and Pacific Ocean drainages in California and Colorado River drainage below Yuma.)
214. Surface water supply of the North Pacific Coast, 1906.

The records at most of the stations discussed in these reports extend over a series of years. An index of the reports containing such records up to and including 1903 has been published in Water-Supply Paper No. 119. The following table gives, by years and primary drainage basins, the numbers of the papers on surface water supply published from 1901 to 1906:

Numbers of Water-Supply Papers containing results of stream measurements, 1901–1906.[a]

	1901.	1902.	1903.	1904.	1905.	1906.
	No.	*No.*	*No.*	*No.*	*No.*	*No.*
Atlantic coast of New England drainage	65 75	82	97	124	165	201
Hudson, Passaic, Raritan, and Delaware river drainages	65 75	82	97	125	166	202
Susquehanna, Gunpowder, Patapsco, Potomac, James, Roanoke, and Yadkin river drainages	65 75	82 83	97 98	126	167	203
Santee, Savannah, Ogeechee, and Altamaha rivers and eastern Gulf of Mexico drainages	65 75	83	98	127	168	204
Ohio and lower eastern Mississippi river drainages	65 75	83	98	128	169	205
Great Lakes and St. Lawrence River drainages	65	83	97	129	170	206
Hudson Bay and upper eastern and western Mississippi River drainages	65 66 75	83 84 85	98 99 100	128 130	171	207
Missouri River drainage	66 75	84	99	130 131	172	208
Meramec, Arkansas, Red, and lower western Mississippi river drainages	66 75	84	99	131	173	209
Western Gulf of Mexico and Rio Grande drainages	66 75	84	99	132	174	210
Colorado River drainage, above Yuma	66 75	85	100	133	175	211
The Great Basin drainage	66 75	85	100	133	176	212
The Great Basin and Pacific Ocean drainages in California, and Colorado River drainage, below Yuma	66 75	85	100	134	177	213
North Pacific Coast drainage	66 75	85	100	135	178	214

[a] Reports containing data for years prior to 1901 are noted in the series list at the end of this paper.

DEFINITIONS.

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. They may be defined as follows:

"Second-foot" is an abbreviation for cubic foot per second and is the quantity 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.

"Gallons per minute" is generally used in connection with pumping and city water supply.

The "miner's inch" is the quantity of water that passes through an orifice 1 inch square under a head which varies locally. It has been commonly used by miners and irrigators throughout the West and is defined by statute in each State in which it is used.

"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. There is a convenient relation between the second-foot and the acre-foot: One second-foot flowing for twenty-four hours will deliver 86,400 cubic feet, or approximately 2 acre-feet.

EXPLANATION AND USE OF TABLES.

For each regular gaging station are given, as far as available, the following data:

1. Description of station.
2. List of discharge measurements.
3. Gage-height table.
4. Rating table.
5. Table of monthly and yearly discharges and run-off.
6. Tables showing discharge and horsepower and the number of days during the year when the same are available.

The descriptions of stations give such general information about the locality and equipment as would enable the reader to find and use the station, and they also give, as far as possible, a complete history of all the changes that have occurred since the establishment of the station that would be factors in using the data collected.

The discharge-measurement table gives the results of the discharge measurements made during the year, including the date, name of the

hydrographer, width and area of cross section, gage height, and discharge in second-feet.

The table of daily gage heights gives the daily fluctuations of the surface of the river as found from the mean of the gage readings taken each day. The gage height given in the table represents the elevation of the surface of the water above the zero of the gage. At most stations the gage is read in the morning and in the evening.

The discharge measurements and gage heights are the base data from which the other tables are computed. In cases of extensive development it is expected that engineers will use these original data in making their calculations, as the computations made by the Survey are based on the data available at the time they are made and should be reviewed and, if necessary, revised when additional data are available.

The rating table gives the discharge in second-feet corresponding to various stages of the river as given by the gage heights. It is published to enable engineers to determine the daily discharge in case this information is desired.

In the table of monthly discharge the column headed "Maximum" gives the mean flow for the day when the mean gage height was highest, and it is the flow as given in the rating table for that mean gage height. As the gage height is the mean for the day, there might have been short periods when the water was higher and the corresponding discharge larger than given in this 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 for each second during the month. Upon this the computations for the remaining columns, which are defined on page 4, are based.

The values in the table of monthly discharge are intended 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.

In most work where data in regard to flow are used the regimen of flow is of primary importance. Therefore for the principal stations tables have been prepared showing the horsepower that can be developed at various rates of flow, and the length of time that these rates of flow and the corresponding horsepower are available. These tables have been prepared on a basis of 80 per cent efficiency on the turbines, and the horsepower per foot of fall is given in order that the reader can determine the horsepower for any fall.

In the computations sufficient significant figures have been used so that the percentage of error in the tables will not in general exceed 1 per cent. Therefore, most of the values in the tables are given to only three significant figures. In making the various computations Thatcher's slide rule, Crelle's tables, and computation machines have been generally used.

In order to give engineers an idea of the relative value of the various data notes in regard to accuracy are given as far as possible. This accuracy depends on the general local conditions at the gaging stations and the amount of data collected. Every effort possible is made to so locate the stations that the data collected will give a high degree of accuracy. This is not always possible, but it is considered better to publish rough values with explanatory notes rather than no data.

In the accuracy notes the following terms have been used, indicating the probable accuracy, in per cent, of the mean monthly flow. As these values are mean values, the error in the value for the flow of any individual day may be much larger.

Excellent indicates that the mean monthly flow is probably accurate to within 5 per cent; good, to within 10 per cent; fair, to within 15 per cent; approximate, to within 25 per cent.

CONVENIENT EQUIVALENTS.

Following is a table of convenient equivalents for use in hydraulic computations:

1 second-foot equals 40 California miner's inches (law of March 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 646,272 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 equal 18.7 United States gallons per second.
100 California miner's inches equal 96.0 Colorado miner's inches.
100 California miner's inches for one day equal 4.96 acre-feet.
100 Colorado miner's inches equal 2.60 second-feet.
100 Colorado miner's inches equal 19.5 United States gallons per second.
100 Colorado miner's inches equal 104 California miner's inches.
100 Colorado miner's inches for one day equal 5.17 acre-feet.
100 United States gallons per minute equal 0.223 second-feet.
100 United States gallons per minute for one day equal 0.442 acre-foot.
1,000,000 United States gallons per day equal 1.55 second-feet.
1,000,000 United States gallons equal 3.07 acre-feet.
1,000,000 cubic feet equal 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-foot.
1 horsepower equals 550 foot-pounds per second.
1 horsepower equals 76.0 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horsepower equals 1 second-foot falling 8.80 feet.
1⅓ horsepower equal 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.

FIELD METHODS OF MEASURING STREAM FLOW.

The methods used in collecting these data and in preparing them for publication are given in detail in Water-Supply Papers No. 94 (Hydrographic Manual, U. S. Geol. Survey) and No. 95 (Accuracy of Stream Measurements). In order that those who use this report may readily become acquainted with the general methods employed, the following brief descriptions are given:

Streams may be divided, with respect to their physical conditions, into three classes: (1) Those with permanent beds; (2) those with beds which change only during extreme low or high water; and (3) those with constantly shifting beds. In determining the daily flow special methods are necessary for each class. The data on which the determinations are based and the methods of collecting them are, however, in general the same.

There are three distinct methods of determining the flow of open-channel streams: (1) By measurements of slope and cross section and the use of Chezy's and Kutter's formulas; (2) by means of a weir, (3) by measurements of the velocity of the current and of the area of the cross section. The method chosen for any case depends on the local physical conditions, the degree of accuracy desired, the funds available, and the length of time that the record is to be continued.

Slope method.—Much information has been collected relative to the coefficients to be used in the Chezy formula, $v = c\sqrt{Rs}$. This has been utilized by Kutter, both in developing his formula for c and in determining the values of the coefficient n which appears therein. The

results obtained by the slope method are in general only roughly approximate, owing to the difficulty in obtaining accurate data and the uncertainty of the value for n to be used in Kutter's formula. The most common use of this method is in estimating the flood discharge of a stream when the only data available are the cross section, the slope as shown by marks along the bank, and a knowledge of the general conditions.

Weir method.—When funds are available and the conditions are such that sharp-crested weirs can be erected, these offer the best facilities for determining flow. If dams are suitably situated and constructed, they may be utilized for obtaining reliable measurements of flow. The conditions necessary to insure good results may be divided into two classes: (1) Those relating to the physical characteristics of the dam itself, and (2) those relating to the diversion and use of water around and through the dam.

The physical requirements are as follows: (*a*) Sufficient height of dam, so that backwater will not interfere with free fall over it; (*b*) absence of leaks of appreciable magnitude; (*c*) topography or abutments which confine the flow over the dam at high stages; (*d*) level crests which are kept free from obstructions caused by floating logs or ice; (*e*) crests of a type for which the coefficients to be used in $Q = c\ b\ h^{\frac{3}{2}}$, or some similar standard weir formula, are known (see Water-Supply Papers Nos. 180 and 200[a]); (*f*) either no flashboards or exceptional care in reducing leakage through them and in recording their condition.

Preferably there should be no diversion of water through or around the dam. Generally, however, the dam is built for purposes of power or navigation, and part or all of the water flowing past it is diverted for such uses. This water is measured and added to that passing over the dam. To insure accuracy in such determinations of flow, the amount of water diverted should be reasonably constant. Furthermore, it should be so diverted that it can be measured, either by a weir, a current meter, or a simple system of water wheels which are of standard make, or which have been rated as meters under working conditions and so installed that the gate openings, the heads under which they work, and their angular velocities may be accurately observed.

The combination of physical conditions and uses of the water should be such that the determinations of flow will not involve, for a critical stage of considerable duration, the use of a head on a broad-crested dam of less than 6 inches. Moreover, when all other conditions are good, the cooperation of the owners or operators of the plant is still essential if reliable results are to be obtained.

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[a] Water-Supply Paper No. 200 replaces No. 150, the edition of which has been exhausted.

A gaging station at a weir or dam has the general advantage of continuity of record through the period of ice and floods and the disadvantages of uncertainty of coefficient to be used in the weir formula and of complications in the diversion and use of the water.

Velocity method.—The determination of the quantity of water flowing past a certain section of a stream at a given time is termed a discharge measurement. This quantity is the product of two factors—the mean velocity and the area of the cross section. The mean velocity is a function of surface slope, wetted perimeter, roughness of bed, and the channel conditions at, above, and below the gaging section. The area depends on the contour of the bed and the fluctuations of the water surface. The two principal ways of measuring the velocity of a stream are by floats and current meters.

Great care is taken in the selection and equipment of gaging stations for determining discharge by velocity measurements, in order that the data may have the required degree of accuracy. Their essential requirements are practically the same, whether the velocity is determined by meters or floats. They are located, as far as possible, where the channel is straight both above and below the gaging section; where there are no cross currents, backwater, or boils; where the bed of the stream is reasonably free from large projections of a permanent character, and where the banks are high and subject to overflow only at flood stages. The station must be so far removed from the effects of tributary streams and of dams or other artificial obstructions that the gage height shall be an index of the discharge.

Certain permanent or semipermanent structures, usually referred to as "equipment," are generally pertinent to a gaging station. These are a gage for determining the fluctuations of the water surface, bench marks to which the datum of the gage is referred, permanent marks on a bridge or a tagged line indicating the points of measurement, and, where the current is swift, some appliance (generally a secondary cable) to hold the meter in position in the water. As a rule the stations are located at bridges if the channel conditions are satisfactory, as from them the observations can more readily be made and the cost of the equipment is small.

The floats in common use are the surface, subsurface, and tube or rod floats. A corked bottle with a flag in the top and weighted at the bottom makes one of the most satisfactory surface floats, as it is affected but little by wind. In case of flood measurements good results can be obtained by observing the velocity of floating cakes of ice or débris. In case of all surface-float measurements coefficients must be used to reduce the observed velocity to the mean velocity. The subsurface and tube or rod floats are intended to give directly the mean velocity in the vertical. Tubes give excellent results when the channel conditions are good, as in canals.

In measuring velocity by a float, observation is made of the time taken by the float to pass over the "run," a selected stretch of river from 50 to 200 feet long. In each discharge measurement a large number of velocity determinations are made at different points across the stream, and from these observations the mean velocity for the whole section is determined. This may be done by plotting the mean positions of the floats, as indicated by the distances from the bank, as ordinates and the corresponding times as abscissas. A curve through these points shows the mean time of run at any point across the stream, and the mean time for the whole stream is obtained by dividing the area bounded by this curve and its axis by the width. The length of the run divided by the mean time gives the mean velocity.

The area used in float measurements is the mean of the areas at the two ends of the run and at several intermediate sections.

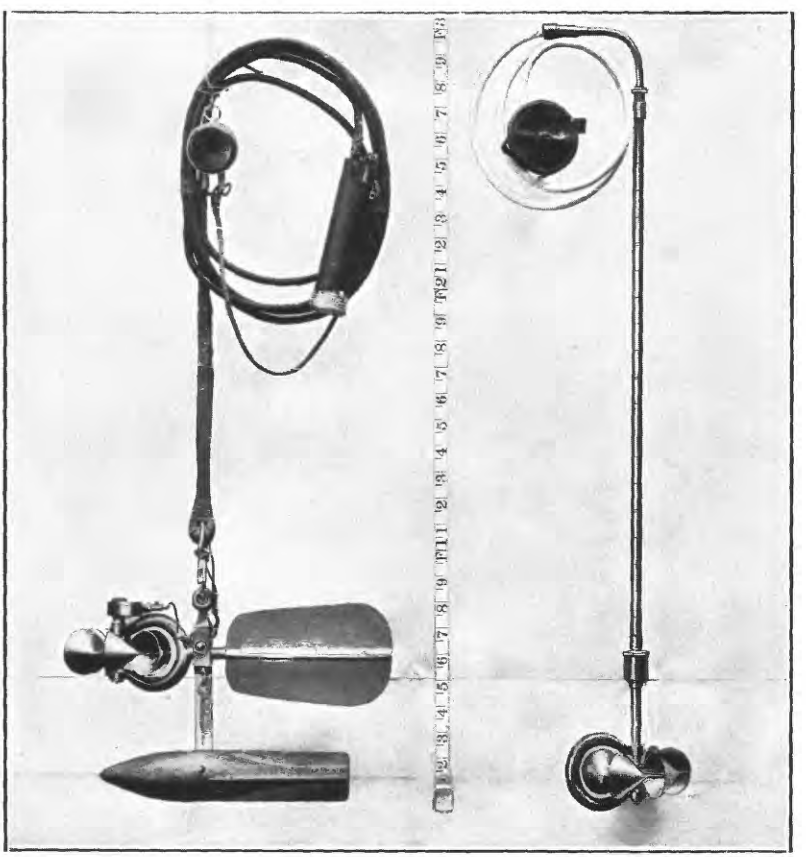
The essential parts of the current meters in use are a wheel of some type, so constructed that the impact of flowing water causes it to revolve, and a device for recording or indicating the number of revolutions. The relation between the velocity of the moving water and the revolutions of the wheel is determined for each meter. This rating is done by drawing the meter through still water for a given distance at different speeds and noting the number of revolutions for each run. From these data a rating table is prepared which gives the velocity per second for any number of revolutions.

Many kinds of current meters have been constructed. They may, however, be classed in two general types—those in which the wheel is made up of a series of cups, as the Price, and those having a screw-propeller wheel, as the Haskell. Each meter has been developed for use under some special condition. In the case of the small Price meter, shown in Pl. II, *B*, which has been largely developed and extensively used by the United States Geological Survey, an attempt has been made to get an instrument which could be used under practically all conditions.

Current-meter measurements may be made from a bridge, cable, boat, or by wading, and gaging stations may be classified in accordance with such use. Fig. 1 shows a typical cable station.

In making the measurement an arbitrary number of points are laid off on a line perpendicular to the thread of the stream. The points at which the velocity and depth are observed are known as measuring points, and are usually fixed at regular intervals, varying from 2 to 20 feet, depending on the size and condition of the stream. Perpendiculars dropped from the measuring points divide the gaging section into strips. For each strip or pair of strips the mean velocity, area, and discharge are determined independently, so that conditions existing

A. CURRENT-METER RATING STATION, LOS ANGELES, CAL.



B. PRICE CURRENT METERS.

in one part of the stream may not be extended to parts where they do not apply.

Three classes of methods of measuring velocity with current meters are in general use—multiple-point, single-point, and integration.

The three principal multiple-point methods in general use are the vertical velocity-curve; 0.2 and 0.8 depth; and top, bottom, and mid-depth.

In the vertical velocity-curve method a series of velocity determinations are made in each vertical at regular intervals, usually from 0.5 to 1 foot apart. By plotting these velocities as abscissas and their depths as ordinates, and drawing a smooth curve among the resulting points, the vertical velocity-curve is developed. This curve shows graphically the magnitude and changes in velocity from the surface to the bottom of the stream. The mean velocity in the vertical is then obtained by dividing the area bounded by this velocity-curve and its axis by the depth. On account of the length of time required to

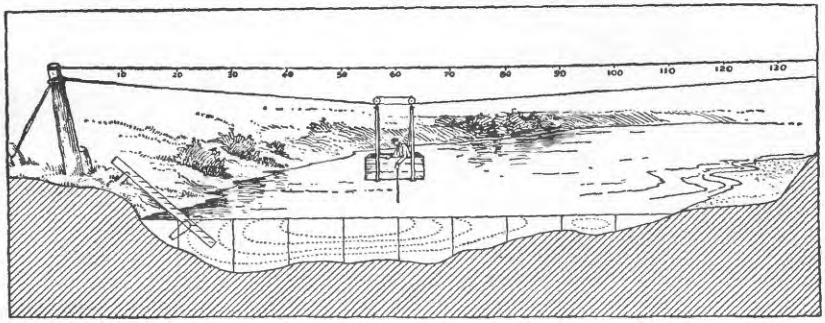


FIG. 1.—Cable station, showing section of river, car, gage, etc.

make a complete measurement by this method, its use is limited to the determination of coefficients for purposes of comparison and to measurements under ice.

In the second multiple-point method the meter is held successively at 0.2 and 0.8 of the depth, and the mean of the velocities at these two points is taken as the mean velocity for that vertical. On the assumption that the vertical velocity-curve is a common parabola with horizontal axis, the mean of the velocities at 0.22 and 0.79 of the depth will give (closely) the mean velocity in the vertical. Actual observations under a wide range of conditions show that this second multiple-point method gives the mean velocity very closely for open-water conditions, and moreover the indications are that it holds nearly as well for ice-covered rivers.

In the third multiple-point method the meter is held at mid-depth, at 0.5 foot below the surface, and at 0.5 foot above the bottom, and the mean velocity is determined by dividing by 6 the sum of the top

velocity, four times the mid-depth velocity, and the bottom velocity. This method may be modified by observing at 0.2, 0.6, and 0.8 depth.

The single-point method consists in holding the meter either at the depth of the thread of mean velocity, or at an arbitrary depth for which the coefficient for reducing to mean velocity has been determined.

Extensive experiments by vertical velocity-curves show that the thread of mean velocity generally occurs at from 0.5 to 0.7 of the total depth. In general practice the thread of mean velocity is considered to be at 0.6 depth, at which point the meter is held in a majority of the measurements. A large number of vertical velocity-curve measurements, taken on many streams and under varying conditions, show that the average coefficient for reducing the velocity obtained at 0.6 depth to mean velocity is practically unity.

In the other principal single-point method the meter is held near the surface, usually 1 foot below, or low enough to be out of the effect of the wind or other disturbing influences. This is known as the subsurface method. The coefficient for reducing the velocity taken at the subsurface to the mean has been found to be from 0.85 to 0.95, depending on the stage, velocity, and channel conditions. The higher the stage the larger the coefficient. This method is specially adapted for flood measurements, or when the velocity is so great that the meter can not be kept at 0.6 depth.

The vertical-integration method consists in moving the meter at a slow, uniform speed from the surface to the bottom and back again to the surface, and noting the number of revolutions and the time taken in the operation. This method has the advantage that the velocity at each point of the vertical is measured twice. It is useful as a check on the point methods.

The area, which is the other factor in the velocity method of determining the discharge of a stream, depends on the stage of the river, which is observed on the gage, and on the general contour of the bed of the stream, which is determined by soundings. The soundings are usually taken at each measuring point at the time of the discharge measurement, either by using the meter and cable or by a special sounding line or rod. For streams with permanent beds standard cross sections are usually taken during low water. These sections serve to check the soundings which are taken at the time of the measurements, and from them any change which may have taken place in the bed of the stream can be detected. They are also of value in obtaining the area for use in computations of high-water measurements, as accurate soundings are hard to obtain at high stages.

In computing the discharge measurements from the observed velocities and depths at various points of measurement, the measuring section is divided into elementary strips, as shown in fig. 1, and the mean velocity, area, and discharge are determined separately for either

a single or a double strip. The total discharge and the area are the sums of those for the various strips, and the mean velocity is obtained by dividing the total discharge by the total area.

The determination of the flow of an ice-covered stream is difficult, owing to diversity and instability of conditions during the winter period and also to lack of definite information in regard to the laws of flow of water under ice. The method now employed is to make frequent discharge measurements during the frozen periods by the 0.2 and 0.8, and vertical velocity-curve methods, and to keep an accurate record of the conditions, such as the gage height to the surface of the water as it rises in a hole cut in the ice, the thickness and character of the ice, etc.

From these data an approximate estimate of the daily flow can be made by constructing a rating curve (really a series of curves) similar to that used for open channels, but considering, in addition to gage heights and discharge, the varying thickness of ice. For information in regard to flow under ice cover see Water-Supply Paper No. 187.

OFFICE METHODS OF COMPUTING RUN-OFF.

There are two principal methods of determining run-off, depending on whether or not the bed of the stream is permanent.

For stations on streams with permanent beds the first step in computing the run-off is the construction of a rating table, which shows the discharge corresponding to any stage of the stream. This rating table is applied to the record of stage to determine the amount of water flowing. The construction of the rating table depends on the method used in measuring flow.

For a station at a weir or dam the basis for the rating table is some standard weir formula. The coefficients to be used in its application depend on the type of dam and other conditions near its crest. After inserting in the weir formula the measured length of crest and the assumed coefficient the discharge is computed for various heads and the rating table constructed.

The data necessary for the construction of a rating table for a velocity-area station are the results of the discharge measurements, which include the record of stage of the river at the time of measurement, the area of the cross section, the mean velocity of the current, and the quantity of water flowing. A thorough knowledge of the conditions at and in the vicinity of the station is also necessary.

The construction of the rating table depends on the following laws of flow for open, permanent channels: (1) The discharge will remain constant so long as conditions at or near the gaging station remain constant; (2) the discharge will be the same whenever the stream is at a given stage if the change of slope due to the rise and fall of the stream be neglected; (3) the discharge is a function of and increases gradually with the stage.

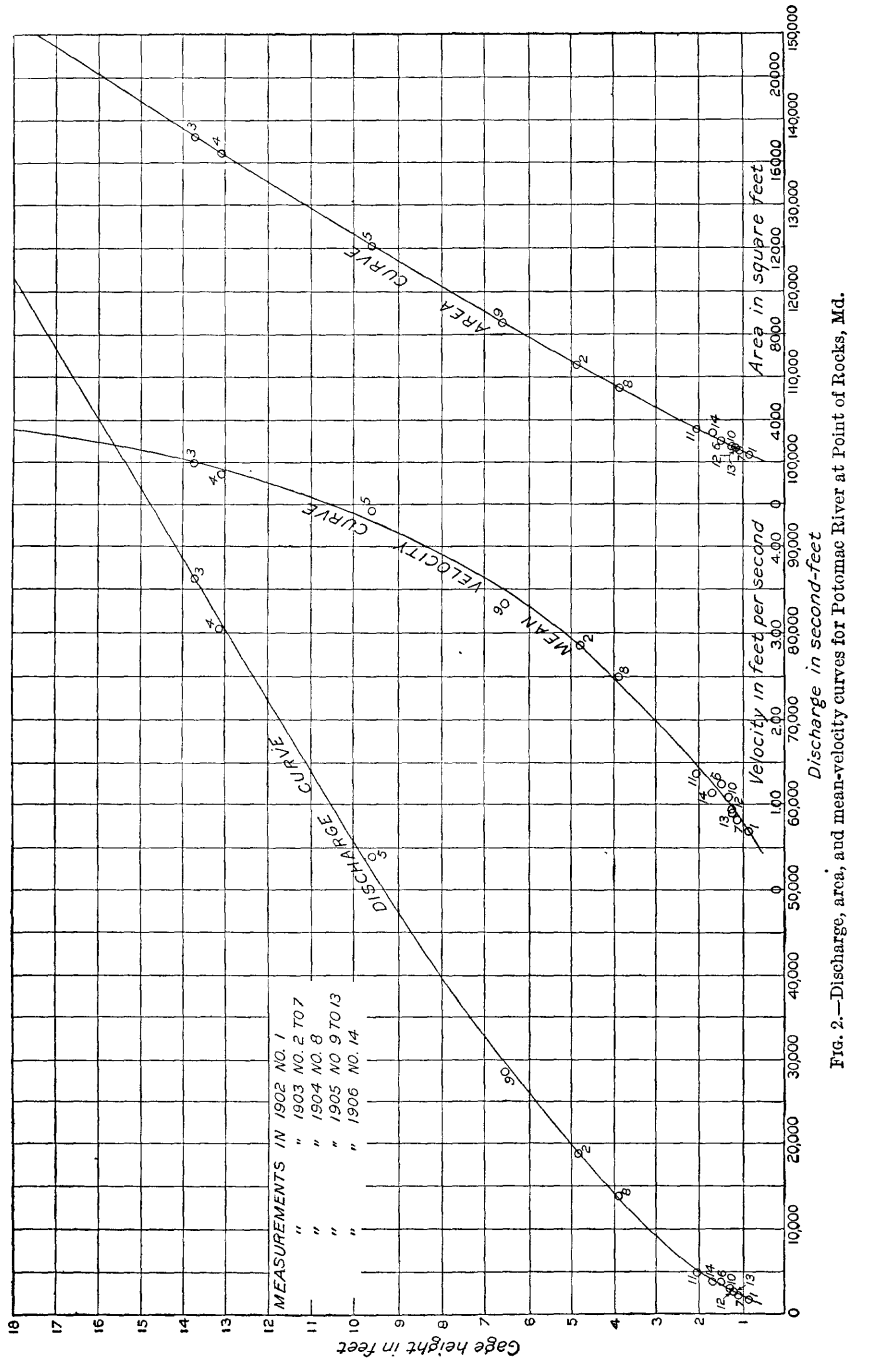


FIG. 2.—Discharge, area, and mean-velocity curves for Potomac River at Point of Rocks, Md.

The plotting of results of the various discharge measurements, using gage heights as ordinates, and discharge, mean velocity, and area as abscissas, will define curves which show the discharge, mean velocity, and area corresponding to any gage height. For the development of these curves there should be, therefore, a sufficient number of discharge measurements to cover the range of the stage of the stream. Fig. 2 shows a typical rating curve with its corresponding mean-velocity and area curves.

As the discharge is the product of two factors, the area and the mean velocity, any change in either factor will produce a corresponding change in the discharge. Their curves are therefore constructed in order to study each independently of the other.

The area curve can be definitely determined from accurate soundings extending to the limits of high water. It is always concave toward the horizontal axis or on a straight line, unless the banks of the stream are overhanging.

The form of the mean-velocity curve depends chiefly on the surface slope, the roughness of the bed, and the cross section of the stream. Of these, the slope is the principal factor. In accordance with the relative changes of these factors the curve may be either a straight line, convex or concave toward either axis, or a combination of the three. From a careful study of the conditions at any gaging station the form which the vertical-velocity curve will take can be predicted, and it may be extended with reasonable certainty to stages beyond the limits of actual measurements. Its principal use is in connection with the area curve in locating errors in discharge measurements and in constructing the rating table.

The discharge curve is defined primarily by the measurements of discharge, which are studied and weighted in accordance with the local conditions existing at the time of each measurement. The curve may, however, best be located between and beyond the measurements by means of curves of area and mean velocity. The discharge curve under normal conditions is concave toward the horizontal axis and is generally parabolic in form.

In the preparation of the rating table the discharge for each tenth or half tenth on the gage is taken from the curve. The differences between successive discharges are then taken and adjusted according to the law that they shall either be constant or increasing.

The determination of daily discharge of streams with changeable beds is a difficult problem. In case there is a weir or dam available, a condition which seldom exists on streams of this class, the discharge can be determined by its use. In case of velocity-area stations frequent discharge measurements must be made if the determinations of flow are to be other than rough approximations. For stations with beds which shift slowly or are materially changed only during floods

rating tables can be prepared for periods between such changes and satisfactory results obtained with a limited number of measurements, provided that some of them are taken soon after the change occurs. For streams with continually shifting beds, such as the Colorado and Rio Grande, discharge measurements should be made every two or three days and the discharges for intervening days obtained either by interpolation modified by gage height or by Professor Stout's method, which has been described in full in the Nineteenth Annual Report of the United States Geological Survey, Part IV, page 323, and in the Engineering News of April 21, 1904. This method, or a graphical application of it, is also much used in determining the flow at stations where the bed shifts but slowly.

ACKNOWLEDGMENTS.

Assistance has been rendered and records furnished by the following, to whom special acknowledgment is due: United States Reclamation Service, United States Weather Bureau, State engineer of Colorado, State engineer of Utah, Denver Union Water Company, Central Colorado Power Co.; and the following railroad companies: Denver and Rio Grande; Oregon Short Line; San Pedro, Los Angeles and Salt Lake; Colorado and Southern; Union Pacific; and Burlington.

COLORADO RIVER DRAINAGE BASIN.

GENERAL DESCRIPTION.

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 entire length of the Colorado is about 2,000 miles. The region drained is about 800 miles long, varies 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.

There are two distinct portions of the basin of the Colorado. 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, often vertical, step of hundreds or thousands of feet to the table-land 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 varying 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 period of the autumnal and spring rains.

As a matter of convenience the drainage area has been divided into three basins: (1) Green River basin, (2) Grand River basin, and (3) Colorado River below the junction of Grand and Green rivers, and each of these basins is subdivided to allow the separate description of branches of the main river.

GREEN RIVER DRAINAGE BASIN.

AREA AND EXTENT.

Green River and its tributaries 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 its widest point about 240 miles. The total drainage area is approximately 41,000 square miles.

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.

As a matter of convenience the main river is described first and the tributary streams, beginning at the headwaters, afterwards.

GREEN RIVER.

DESCRIPTION OF BASIN.

Green River heads on the west 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 into Utah. A few miles below the Wyoming-Utah boundary another sharp turn carries the river eastward along the Uinta

Mountains, through which it breaks 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.

The topography of the headwater region is rugged in the extreme. The Wind River Range on the east and the Gros Ventre and Wyoming ranges on the northwest and west gradually close in as they extend southward, forming a basin comprising approximately 7,450 square miles in extent above the gaging station at Green River, Wyo. The upper part of this basin is very narrow, but southward the valley opens out; near Fontanelle, Wyo., it is several miles wide, with benches and rolling table-lands extending westward to the foothills of the Wyoming Range and eastward to the bluffs which hug the east bank of the river. At Green River the valley is again narrow—only a few hundred yards in width—and for some distance southward the river runs between bluffs standing so close together that no flood plain is seen. Throughout much of its course in Utah the Green flows through a succession of long, deep, narrow canyons, with walls ranging in height from a few hundred to as many thousand feet, separated by short valleys containing small tracts of arable lands.

In its upper course the Green receives as tributaries numerous streams heading in the Wind River, Gros Ventre, and Wyoming ranges of mountains, some of them extending so far back into the abrupt, ragged canyons that they dovetail with streams flowing in opposite directions. The most important of these tributaries are Newfork River, Big Sandy Creek, La Barge Creek, Fontanelle 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 Uinta and White rivers discharge their waters to the Green, Ashley Creek and the Uinta from the west and the White from the east. Below this point the only tributaries of importance are Minnie Maud Creek and San Rafael River, which enter from the west, the latter at a point about 32 miles above the junction of the Green and the Grand.

The geology of this basin is described in the Eleventh Annual Report of the United States Geological and Geographical Survey of the Territories for 1877, F. V. Hayden in charge, pages 509–646. Information in regard to the hydrography is contained in the first to fourth annual reports of the Reclamation Service and in other United States Geological Survey reports.

GREEN RIVER AT GREEN RIVER, WYO.

This station was established May 2, 1895, near the pump house at a point about 40 feet below the bridge of the Union Pacific Railroad, at Green River, Wyo. Since that date it has been maintained continuously, except for a few months during the winter and during the year 1900. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 14, where are given also references to publications that contain data for previous years.

Discharge measurements of Green River at Green River, Wyo., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 4[a]	A. J. Parshall	161	589	1.50	873
April 26	do	278	921	2.85	3,040
May 5	do	246	804	2.65	2,580
May 22	do	284	1,150	3.35	4,200
June 1	do	284	1,540	4.10	6,910
June 24	do	284	1,500	3.90	6,340
July 5	do	284	1,370	3.70	5,470
July 27	do	284	1,090	3.10	3,480

[a] Right channel frozen over, no flow.

Daily gage height, in feet, of Green River at Green River, Wyo., for 1906.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	1.85	2.42	4.15	3.58	2.80	2.38	1.40
2	1.60	2.58	3.78	3.42	2.78	2.38	1.35
3	1.62	2.55	3.58	3.35	2.68	2.38	1.35
4	1.65	2.55	3.42	3.50	2.60	2.30	1.30
5	1.52	2.72	3.42	3.68	2.58	2.25	1.30
6	1.85	3.00	3.50	3.75	2.50	2.25	1.30
7	1.75	2.92	3.75	3.75	2.50	2.12	1.25
8	1.90	2.85	3.90	3.85	2.42	2.02	1.25
9	2.05	2.85	3.72	3.90	2.32	1.92	1.22
10	1.95	2.88	3.50	3.90	2.30	1.88	1.20
11	2.40	2.98	3.40	3.85	2.22	1.80	1.20
12	2.25	3.22	3.48	3.82	2.12	1.80	1.20
13	2.25	3.58	3.95	3.80	2.10	1.75	1.18
14	2.60	3.88	4.48	3.80	2.10	1.75	1.15
15	2.55	4.00	5.08	3.90	2.08	1.82	1.15
16	2.30	3.95	5.38	3.90	2.05	1.90	1.15
17	2.45	3.90	5.28	3.82	2.02	1.90	1.15
18	2.80	3.70	5.30	3.72	2.00	1.82	1.15
19	2.85	3.52	5.22	3.55	2.00	1.78	1.10
20	2.75	3.32	4.82	3.42	1.98	1.70	1.10
21	2.60	3.22	4.40	3.32	2.25	1.65	1.10
22	2.70	3.35	4.15	3.22	2.35	1.60	1.20
23	3.00	3.58	3.85	3.15	2.50	1.60	1.30
24	2.90	3.80	3.90	3.15	2.78	1.55	1.40
25	2.90	4.10	3.88	3.20	3.08	1.55	1.40
26	2.85	4.35	3.70	3.18	3.25	1.50	1.30
27	2.80	4.45	3.55	3.08	3.18	1.50	1.30
28	2.58	4.45	3.45	3.05	3.00	1.45	1.30
29	2.40	4.50	3.45	2.95	2.82	1.42	1.22
30	2.42	4.55	3.52	2.82	2.68	1.40	1.12
31	.....	4.45	.....	2.75	2.42	.....	1.10

Rating table for Green River at Green River, Wyo., for 1906.

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.*
1.10	560	1.90	1,290	2.70	2,630	3.50	4,830	4.60	8,900
1.20	635	2.00	1,410	2.80	2,860	3.60	5,160	4.80	9,730
1.30	710	2.10	1,540	2.90	3,100	3.70	5,500	5.00	10,570
1.40	790	2.20	1,690	3.00	3,360	3.80	5,850	5.20	11,430
1.50	875	2.30	1,850	3.10	3,630	3.90	6,210	5.40	12,290
1.60	965	2.40	2,020	3.20	3,910	4.00	6,570		
1.70	1,065	2.50	2,210	3.30	4,200	4.20	7,320		
1.80	1,175	2.60	2,410	3.40	4,510	4.40	8,100		

NOTE.—The above table is applicable only for open-channel conditions. It is based on 8 discharge measurements made during 1906 and is well defined between gage heights 1.5 feet and 4.5 feet. It may not apply strictly from August to October, as conditions of flow may have changed after the last measurement.

Monthly discharge of Green River at Green River, Wyo., for 1906.

[Drainage area, 7,450 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Sec.-ft. per sq. mile.	Depth in inches.
April	3,360	893	2,040	121,000	0.274	0.31
May	8,700	2,060	5,030	309,000	.675	.78
June	12,200	4,510	6,830	406,000	.917	1.02
July	6,210	2,740	4,860	299,000	.652	.75
August	4,060	1,390	2,240	138,000	.301	.35
September	1,990	790	1,260	75,000	.169	.19
October	790	560	660	40,600	.089	.10
The period				1,390,000		

NOTE.—Values are rated as follows: April to August, excellent; September and October, good.

GREEN RIVER AT JENSEN, UTAH.

This station was established November 7, 1903. It is located at Jensen post-office, about 300 feet below what is known as Billings Ferry, 15 miles from Vernal. The nearest railroad station, Dragon, Utah, is about 40 miles distant. Brush Creek enters the river 1½ miles above the station and Ashley Creek 3 miles below. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 17, where are given also references to publications that contain data for previous years.

Discharge measurements of Green River at Jensen, Utah, in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 19	R. I. Meeker	475	2,580	6.63	7,500
June 4	do	530	4,750	9.95	20,100
June 26	do	520	4,030	8.41	14,300
July 21	T. E. Brick	399	2,860	6.10	8,620

Daily gage height, in feet, of Green River at Jensen, Utah, for 1906.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		7.18	7.02	11.30	6.94	4.68	4.42
2		6.22	6.98	10.30	6.98	4.56	4.33
3		6.08	7.00	10.04	6.98	4.51	4.28
4		5.82	6.95	9.86	6.76	4.48	4.41
5		5.56	6.98	9.76	6.68	4.40	4.40
6		5.08	7.25	9.70	6.71	4.36	4.20
7		5.21	8.22	9.98	6.88	4.30	4.18
8		5.22	8.60	10.46	7.06	4.20	4.00
9		5.44	8.70	10.64	7.10	4.10	3.79
10		5.69	8.88	10.56	7.28	4.01	3.72
11		5.87	9.40	9.64	7.20	3.92	3.55
12		6.22	9.66	9.66	7.06	3.88	3.42
13	5.70	6.68	9.85	10.12	7.02	3.82	3.35
14	6.58	6.70	10.11	10.68	7.00	3.68	3.28
15	5.22	6.32	10.35	11.25	7.00	3.58	3.28
16	4.80	5.98	10.22	11.78	7.04	3.50	3.32
17	4.45	5.95	10.16	12.05	7.02	3.45	3.38
18	4.18	6.35	10.22	11.51	6.95	3.48	3.78
19	4.00	6.65	10.08	11.70	6.70	3.58	4.42
20	4.00	6.96	9.95	11.16	6.41	3.50	3.84
21	4.02	7.32	9.88	10.52	6.04	3.50	3.58
22	4.02	7.30	10.15	9.86	5.88	3.48	3.52
23	3.99	7.35	10.34	9.40	5.72	3.70	3.60
24	5.44	7.58	10.69	8.94	5.58	4.06	3.58
25	6.98	8.15	11.12	8.73	5.38	4.58	3.48
26	8.85	8.35	11.66	8.37	5.29	4.58	3.42
27	9.02	8.30	11.82	7.48	5.25	4.90	3.40
28	8.62	7.82	11.76	7.60	5.12	5.05	3.40
29	8.86	7.45	11.54	7.38	5.12	4.92	3.37
30	8.85	7.32	11.82	7.22	4.99	4.58	3.35
31	8.65	.....	11.92	.....	4.75	4.48	.....

Rating tables for Green River at Jensen, Utah.

MARCH 13 TO JULY 5, 1906.[a]

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.*
4.00	2,000	5.00	3,800	6.00	6,200	7.00	9,000	9.00	16,100
4.10	2,150	5.10	4,010	6.10	6,470	7.20	9,610	9.20	16,920
4.20	2,310	5.20	4,230	6.20	6,740	7.40	10,240	9.40	17,760
4.30	2,480	5.30	4,450	6.30	7,010	7.60	10,900	9.60	18,620
4.40	2,650	5.40	4,680	6.40	7,290	7.80	11,590	9.80	19,500
4.50	2,830	5.50	4,920	6.50	7,570	8.00	12,300	10.00	20,400
4.60	3,010	5.60	5,160	6.60	7,850	8.20	13,030	11.00	25,100
4.70	3,200	5.70	5,410	6.70	8,130	8.40	13,770	12.00	30,000
4.80	3,390	5.80	5,670	6.80	8,410	8.60	14,530		
4.90	3,590	5.90	5,930	6.90	8,700	8.80	15,310		

JULY 6 TO OCTOBER 31, 1906.[b]

3.30	2,270	4.00	3,550	4.70	5,050	5.40	6,740	6.20	8,920
3.40	2,440	4.10	3,750	4.80	5,280	5.50	7,000	6.40	9,510
3.50	2,610	4.20	3,960	4.90	5,510	5.60	7,260	6.60	10,120
3.60	2,790	4.30	4,170	5.00	5,750	5.70	7,530	6.80	10,750
3.70	2,970	4.40	4,380	5.10	5,990	5.80	7,800	7.00	11,400
3.80	3,160	4.50	4,600	5.20	6,240	5.90	8,070	7.20	12,060
3.90	3,350	4.60	4,826	5.30	6,490	6.00	8,350		

[a] This table is applicable only for open-channel conditions. It is based on 3 discharge measurements made during 1906, and the form of the 1904 curve, and is well defined between gage heights 6.5 feet and 10 feet. From March 13 to about April 15, it may give values a little in excess of the true discharge.

[b] This table is applicable only for open-channel conditions. It is based on 1 discharge measurement made during 1906 and the form of the 1904 curve. It is not well defined and values obtained from it are liable to error on account of changing conditions of flow.

Monthly discharge of Green River at Jensen, Utah, for 1906.

[Drainage area, 26,600 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Sec.-ft. per sq. mile.	Depth in inches.
March 13-31	16,200	1,990	7,340	276,000	0.276	0.19
April	14,700	3,970	8,070	480,000	.303	.34
May	29,600	8,850	19,400	1,190,000	.729	.84
June	30,200	9,670	20,400	1,210,000	.767	.86
July	12,300	5,160	9,230	568,000	.347	.40
August	5,870	2,520	3,850	237,000	.145	.17
September	4,420	2,240	3,080	183,000	.116	.13
The period				4,140,000		

NOTE.—Values are rated as follows: March to June, good; July to October, fair.

GREEN RIVER AT GREENRIVER, UTAH.

This station was established October 21, 1894, discontinued in November, 1896, and reestablished February 16, 1905. It is located at the Rio Grande Western Railway bridge at Greenriver (formerly Blake), Utah, in latitude 39° north, longitude 110° 9′ west, in the San Rafael quadrangle. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 19, where are given also references to publications that contain data for previous years. During 1906 the gage was read by W. E. Richards and G. C. Mead.

Discharge measurements of Green River at Greenriver, Utah, in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 17	H. S. Kleinschmidt	462	2,770	6.60	10,400
May 17	E. C. Murphy	472	4,430	9.81	34,000
June 8	Thos. Grieve	472	4,440	9.80	33,600
June 29	do	466	3,820	8.50	22,600
October 19	do	400	1,780	4.60	3,170

Daily gage height, in feet, of Green River, at Greenriver, Utah, for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.60	3.78	3.90	7.25	7.65	10.55	7.65	6.35	6.05	5.00	4.70	3.75
2	3.55	3.85	3.90	7.15	7.50	10.75	7.75	6.45	6.25	4.90	5.80	3.85
3	3.55	3.75	3.90	6.70	7.45	10.95	7.85	6.35	6.10	4.90	5.40	4.10
4	3.58	3.75	4.15	6.50	7.35	11.25	7.90	6.40	5.95	4.90	5.50	4.65
5	3.60	3.70	4.20	6.40	7.35	11.55	7.90	6.20	5.95	4.90	5.50	4.80
6	3.60	3.75	4.25	6.30	7.30	11.50	7.90	6.15	6.00	4.80	5.35	4.70
7	3.60	4.00	4.30	6.15	7.40	11.40	7.90	6.10	6.00	4.80	5.15	4.70
8	3.60	3.65	4.35	5.70	7.50	11.50	7.90	6.00	5.85	4.75	5.00	4.80
9	3.60	3.70	4.45	5.70	7.55	11.65	7.80	5.90	5.70	4.70	5.00	4.55
10	3.60	3.55	4.45	5.65	7.60	11.65	7.80	5.85	5.60	4.70	5.00	4.40
11	3.60	3.65	4.45	5.85	8.25	11.35	7.90	5.75	5.55	4.70	5.00	4.30
12	3.60	3.60	4.75	6.15	8.60	11.15	7.90	5.60	5.40	4.70	4.95	4.45
13	3.70	3.55	5.10	6.10	8.85	10.05	7.85	5.60	5.30	4.70	4.90	4.40
14	3.80	3.55	5.60	6.10	9.35	9.70	7.80	5.60	5.20	4.60	4.90	4.30
15	3.80	3.65	5.70	6.20	10.05	9.50	7.80	5.65	5.15	4.60	4.80	4.40

Daily gage height, in feet, of Green River, at Greenriver, Utah, for 1906—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	3.80	3.65	5.65	6.55	10.30	9.35	7.75	5.50	5.35	4.60	4.80	4.35
17	3.80	3.60	5.50	6.50	10.20	9.25	7.70	5 50	5 25	4.60	4.80	4.20
18	3.80	3.60	5.30	6.45	10.10	9.40	7.70	5 45	5.40	4.60	4.75	4.10
19	4.30	3.75	5.20	6.50	10.20	9.40	7.60	5.30	5.60	4.50	4.70	4.00
20	4.45	3.80	5.00	6.55	10.10	9.35	7.65	5.30	5.35	4.50	4.55	3.85
21	3.85	3.85	4.65	6.45	10.15	9.50	7 55	5.40	5.35	4.50	4.35	3.80
22	3.50	3.85	4.85	6.80	10.25	9.45	7.40	5 70	5.65	4.60	4.20	3.85
23	3.85	3.85	5.15	7.15	10.35	9.30	7.25	6.05	5.40	4.60	3.90	3.85
24	3.85	3.85	5 50	7.35	10.45	9.40	7.00	6.25	5.30	4.60	3.80	3.85
25	3.85	3.85	5.85	7.45	10.45	9.45	6.90	5.95	5.30	4.60	3.90	4.15
26	3.85	3.85	6.75	7.60	10.45	9.55	6.90	5.80	5.20	4.60	4.20	4.40
27	3.85	3.85	7.75	7.55	10.35	9.65	6.75	5.75	5.10	4.55	4.30	4.40
28	3.85	3.80	8.85	7.70	10.45	9.45	6.70	5.95	5.05	4.50	4.25	4.40
29	3.75	.....	8.65	8.10	10.60	9.25	6.60	6.00	5.00	4.40	4.05	4.50
30	3.78	.....	8.40	7.85	10.75	9.40	6.45	6.15	5.00	4.50	3.85	4.45
31	3.75	.....	8.05	.....	10.90	.....	6.40	6.05	.....	4.60	.....	4.60

NOTE.—There was probably some ice obstruction during January, February and March. During the high stages the gage heights obtained by the hydrographers do not agree with those recorded by the observer for the same dates. For this reason discharges based on the above high gage heights are liable to large error.

Rating table for Green River at Greenriver, Utah, for 1906.

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.*
3.50	1,390	4.60	3,140	5.70	6,480	6.80	11,470	8.80	25,080
3.60	1,510	4.70	3,370	5.80	6,870	6.90	12,000	9.00	26,780
3.70	1,640	4.80	3,610	5.90	7,270	7.00	12,550	9.20	28,500
3.80	1,770	4.90	3,870	6.00	7,680	7.20	13,700	9.40	30,240
3.90	1,910	5.00	4,150	6.10	8,110	7.40	14,910	9.60	32,000
4.00	2,050	5.10	4,440	6.20	8,550	7.60	16,180	9.80	33,800
4.10	2,200	5.20	4,740	6.30	9,010	7.80	17,510	10.00	35,600
4.20	2,360	5.30	5,060	6.40	9,480	8.00	18,900	11.00	45,040
4.30	2,530	5.40	5,390	6.50	9,960	8.20	20,340	12.00	55,000
4.40	2,720	5.50	5,740	6.60	10,450	8.40	21,840		
4.50	2,920	5.60	6,100	6.70	10,950	8.60	23,420		

NOTE.—The above table is applicable only for open-channel conditions. It is based on 5 discharge measurements made during 1906 and the form of the 1905 curve. It is well defined between gage heights 4.5 feet and 10 feet.

Monthly discharge of Green River at Greenriver, Utah, for 1906.

[Drainage area, 38,200 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Sec.-ft. per sq. mile.	Depth in inches.
January	2,820	1,450	1,720	106,000	0.045	0.05
February	2,050	1,450	1,690	93,900	.044	.05
March	25,500	1,910	6,970	429,000	.182	.21
April	19,600	6,200	11,200	666,000	.293	.33
May	44,100	14,300	29,500	1,810,000	.772	.89
June	51,500	28,900	37,600	2,240,000	.984	1.10
July	18,200	9,480	15,600	959,000	.408	.47
August	9,720	5,060	7,230	445,000	.189	.22
September	8,780	4,150	5,870	349,000	.154	.17
October	4,150	2,720	3,290	202,000	.086	.10
November	6,870	1,770	3,600	214,000	.094	.10
December	3,610	1,700	2,570	158,000	.067	.08
The year	51,500	1,450	10,600	7,670,000	.276	3.77

NOTE.—The above values must be used with a great deal of caution as they are considered only rough approximations. It is probable that the discharge for January, February, and March is much too high owing to ice conditions, for which no corrections could be made on account of lack of data. April and May can be considered approximate. June is known to be far too high (compare observers' and hydrographers' gage heights on days of measurements), and May is probably too high, also, but to a less extent. It is believed that the remainder of the year can be accepted as fair.

MISCELLANEOUS MEASUREMENTS IN GREEN RIVER DRAINAGE BASIN.

Fontenelle Creek is tributary to Green River about 50 miles above Green River, Wyo.

The following measurement was made May 31, 1906:

Width, 40 feet; area, 99 square feet; gage height, 3.05 feet; discharge, 374 second-feet.

NEWFORK RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Newfork 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.

The entire length of the Newfork does not exceed 50 miles. The basin as a whole is triangular in shape and comprises approximately 1,100 square miles. Forests, in some places dense, cover about 300 square miles. Pines predominate, but aspens and firs are also found.

Pine, Pole, and Boulder creeks and Eastfork 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 outlet is narrow and a dam at this point might be made to raise the water surface about 30 feet. Such a dam would probably store all the surplus waters of the creek. Boulder Creek flows through Boulder Lake. The outlet of this lake also is narrow, and a dam to raise the surface of the lake about 5 feet is in process of construction. In the drainage area of Pole Creek there are said to be no less than 40 small settling basins.

PINE CREEK NEAR PINEDALE, WYO.

This station was established on the stream April 25, 1904. It was located about one-fourth mile west of Pinedale, but this location not proving entirely satisfactory, it was abandoned at the close of the season, and April 2, 1905, was reestablished near the Hansen ranch, 1 mile above Pinedale, in sec. 28, T. 34 N., R. 109 W.

During 1906, discharge measurements were made from a bridge 1 mile below the gage, where the section is more favorable. During the irrigating season two ditches divert water from the river between the gage and the measuring section. The gage is read by Mrs. J. J. Hansen.

The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 23, where are given also references to publications that contain data for previous years.

Discharge measurements of Pine Creek near Pinedale, Wyo., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 29	A. J. Parshall	35	47	1.20	52
May 2	do	45	60	1.25	71
May 25	do	92	143	2.00	378
May 29	do	96	165	2.30	574
June 16	G. N. Stadin	100	241	2.90	1,190
June 17	do	100	254	3.00	1,320
June 27	A. J. Parshall	98	198	2.45	[a] 739
July 2	do	98	196	2.40	[a] 704

[a] Includes discharge of two ditches which divert water between the gage and the measuring section.

Daily gage height, in feet, of Pine Creek near Pinedale, Wyo., for 1906.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	1.1	1.2	2.2	2.4	2.1	2.0	1.0
2	1.1	1.2	2.2	2.4	2.15	1.9	1.0
3	1.1	1.2	2.1	2.5	2.0	1.9	1.0
4	1.1	1.2	2.0	2.6	2.0	1.8	1.0
5	1.1	1.2	2.0	2.65	2.0	1.8	1.0
6	1.1	1.25	2.0	2.7	2.0	1.8	1.0
7	1.1	1.25	2.0	2.7	2.0	1.7	1.0
8	1.1	1.25	2.0	2.75	1.9	1.7	1.0
9	1.1	1.25	2.0	2.75	1.9	1.7	1.0
10	1.1	1.25	2.0	2.8	1.8	1.7	1.0
11	1.1	1.35	2.0	2.8	1.75	1.65	1.05
12	1.05	1.4	2.2	2.8	1.7	1.6	1.1
13	1.1	1.5	2.3	2.8	1.7	1.2	1.1
14	1.1	1.55	2.6	2.9	1.65	1.1	1.1
15	1.05	1.6	2.75	2.85	1.7	1.1	1.1
16	1.05	1.7	2.9	2.8	1.7	1.05	1.1
17	1.05	1.7	3.0	2.75	1.7	1.05	1.0
18	1.1	1.7	3.0	2.7	1.7	1.05	1.0
19	1.1	1.7	3.0	2.65	1.65	1.0	1.0
20	1.1	1.7	2.9	2.6	1.65	1.0	1.0
21	1.1	1.8	2.8	2.5	1.7	1.0	1.0
22	1.1	1.8	2.75	2.5	1.95	1.0	1.0
23	1.1	1.8	2.7	2.5	2.15	1.0	1.0
24	1.1	1.9	2.7	2.5	2.25	1.0	1.0
25	1.1	2.0	2.55	2.5	2.25	1.0	1.0
26	1.1	2.1	2.5	2.4	2.25	1.0	1.0
27	1.1	2.1	2.45	2.3	2.25	1.0	1.0
28	1.1	2.2	2.45	2.3	2.2	1.0	1.0
29	1.1	2.3	2.45	2.2	2.2	1.0	1.0
30	1.1	2.3	2.4	2.2	2.15	1.1	1.0
31		2.25		2.15	2.1		1.0

Rating table for Pine Creek near Pinedale, Wyo., for 1906.

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.*
1.00	18	1.50	145	2.00	378	2.50	770	3.00	1,320
1.10	34	1.60	182	2.10	443	2.60	870		
1.20	55	1.70	223	2.20	515	2.70	970		
1.30	81	1.80	269	2.30	594	2.80	1,080		
1.40	111	1.90	320	2.40	679	2.90	1,200		

NOTE.—The above table is applicable only for open-channel conditions. It is based on 8 discharge measurements made during 1906 and is well defined above gage height 1.2 feet.

Monthly discharge of Pine Creek near Pinedale, Wyo., for 1906.

[Drainage area, 130 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Sec.-ft. per sq. mile.	Depth in inches.
April	34	26	32.9	1,960	0.253	0.28
May	594	55	228	14,000	1.75	2.02
June	1,320	378	745	44,300	5.73	6.39
July	1,200	479	859	52,800	6.61	7.62
August	554	202	359	22,100	2.76	3.18
September	378	18	118	7,020	.908	1.01
October	34	18	20.8	1,280	.160	.18
The period				143,000		

NOTE.—Values are rated as follows: April and October, fair; May and September, good; June to August, excellent.

POLE CREEK AT FAYETTE, WYO.

This station was established April 22, 1904. It is located at a point opposite and about 300 yards distant from Fayette post-office, in sec. 9, T. 33 N., R. 108 W. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 25, where are given also references to publications that contain data for previous years.

Discharge measurements of Pole Creek at Fayette, Wyo., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 30	A. J. Parshall	[a] 42	[a] 44	1.50	75
May 2	do	[a] 45	[a] 48	1.60	86
May 26	do	70	117	2.75	529
May 28	do	71	120	2.80	556
June 15	G. N. Stadin	72	181	3.30	996
June 18	do	72	163	3.15	826
June 29	A. J. Parshall	70	89	2.32	302
July 2	do	70	96	2.40	338

[a] Wading section.

Daily gage height, in feet, of Pole Creek at Fayette, Wyo., for 1906.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	1.5	1.55	2.45	2.35	1.9	2.1	1.3
2	1.5	1.6	2.35	2.35	1.9	2.1	1.3
3	1.5	1.65	2.25	2.35	1.85	2.0	1.3
4	1.5	1.7	2.2	2.35	1.85	2.0	1.3
5	1.5	1.7	2.2	2.55	1.85	1.95	1.3
6	1.5	1.7	2.25	2.65	1.8	1.9	1.3
7	1.5	1.75	2.25	2.65	1.75	1.9	1.3
8	1.5	1.8	2.3	2.65	1.75	1.9	1.3
9	1.5	1.85	2.2	2.65	1.75	2.0	1.3
10	1.5	1.9	2.2	2.65	1.6	2.2	1.3
11	1.5	2.05	2.25	2.6	1.65	2.2	1.2
12	1.1	2.15	2.8	2.55	1.65	2.9	1.2
13	1.1	2.35	3.3	2.55	1.65	2.85	1.2
14	1.1	2.5	3.3	2.55	1.65	2.8	1.2
15	1.1	2.55	3.3	2.5	1.6	2.8	1.25

Daily gage height, in feet, of Pole Creek at Fayette, Wyo., for 1906—Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
16	1.1	2.5	3.25	2.5	1.6	2.75	1.15
17	1.1	2.5	3.3	2.4	1.55	2.6	1.1
18	1.15	2.4	3.2	2.35	1.55	2.45	1.1
19	1.15	2.4	3.05	2.3	1.5	2.35	1.1
20	1.15	2.3	2.85	2.25	1.5	2.3	1.1
21	1.15	2.35	2.65	2.15	1.65	2.25	1.1
22	1.15	2.4	2.55	2.15	1.65	2.15	1.1
23	1.2	2.5	2.5	2.15	1.8	2.1	1.1
24	1.2	2.6	2.5	2.15	2.45	1.9	1.1
25	1.25	2.7	2.45	2.15	2.45	1.7	1.0
26	1.35	2.75	2.4	2.15	2.45	1.7	1.0
27	1.45	2.8	2,3	2.15	2.4	1.6	1.0
28	1.5	2.85	2.3	2.1	2.35	1.55	1.0
29	1.5	2.8	2.3	2.1	2.35	1.4	1.0
30	1.55	2.75	2.35	2.05	2.25	1.4	1.0
31	.....	2.65	.....	2.0	2.15	.....	1.0

Rating table for Pole Creek at Fayette, Wyo., for 1906.

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.*
1.00	19	1.50	76	2.00	190	2.50	383	3.00	710
1.10	27	1.60	94	2.10	221	2.60	440	3.10	795
1.20	36	1.70	114	2.20	255	2.70	500	3.20	885
1.30	47	1.80	137	2.30	293	2.80	565	3.30	980
1.40	60	1.90	162	2.40	335	2.90	635		

NOTE.—The above table is applicable only for open-channel conditions. It is based on discharge measurements made during 1905–06 and is well defined between gage heights 1.0 feet and 3.0 feet.

Monthly discharge of Pole Creek at Fayette, Wyo., for 1906.

[Drainage area, 126 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Sec.-ft. per sq. mile.	Depth in inches.
April	85	27	54.0	3,210	0.429	0.48
May	600	85	313	19,200	2.48	2.86
June	980	255	476	28,300	3.78	4.22
July	470	190	328	20,200	2.60	3.00
August	359	76	168	10,300	1.33	1.53
September	635	60	264	15,700	2.10	2.34
October	47	19	32.6	2,000	.259	.30
The period	.....	.....	.....	98,900	.....	.....

NOTE.—Values are rated as follows: April and October, good; remainder of the period, excellent.

BOULDER CREEK NEAR BOULDER, WYO.

This station was established April 23, 1904. It is located at the Coolidge ranch, about 1½ miles northeast of Boulder post-office, in sec. 4, T. 32 N., R. 108 W., and is below all diversion ditches. In the 1904 Progress Report this station was given as Boulder Creek near Newfork, Wyo. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 30, where are given also references to publications that contain data for previous years.

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Discharge measurements of Boulder Creek near Boulder, Wyo., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 1	A. J. Parshall	[a] 60	[a] 98	0.80	101
May 1	do	52	114	.80	100
May 26	do	81	265	2.90	1,040
May 28	do	80	256	[b] 2.70	883
June 15	G. N. Stadin	83	439	5.00	2,540
June 18	do	83	356	3.90	1,500
June 29	A. J. Parshall	77	240	2.25	684
July 1	do	77	242	2.25	683

[a] Wading section.
[b] A large tree lodged near gage probably raised the water surface slightly.

Daily gage height, in feet, of Boulder Creek near Boulder, Wyo., for 1906.

Day.	May.	June.	July.	Aug.	Sept	Oct.	Day.	May.	June.	July.	Aug.	Sept.	Oct.
1	0.80	1.85	2.30	1.10	1.00	0.50	17	2.10	4.30	2.00	0.70	0.55	0.40
2	0.80	1.70	2.32	1.05	0.98	0.50	18	1.78	3.85	1.92	0.70	0.60	0.40
3	0.80	1.70	2.62	1.00	0.92	0.50	19	1.70	3.32	1.88	0.70	0.62	0.40
4	0.80	1.75	2.75	1.00	0.85	0.45	20	1.75	2.95	1.75	0.70	0.58	0.40
5	0.80	2.08	2.80	1.00	0.80	0.45	21	2.00	2.70	1.68	0.70	0.60	0.40
6	0.80	2.40	2.75	1.00	0.80	0.40	22	2.28	2.88	1.60	0.85	0.52	0.40
7	0.85	2.35	2.60	0.98	0.80	0.40	23	2.55	2.85	1.60	1.10	0.40	0.40
8	1.00	2.20	2.60	0.92	0.75	0.40	24	2.82	2.70	1.60	1.25	0.40	0.40
9	1.12	2.10	2.52	0.82	0.70	0.40	25	2.90	2.30	1.60	1.45	0.45	0.40
10	1.28	2.22	2.50	0.80	0.70	0.40	26	2.90	1.98	1.60	1.50	0.50	0.35
11	1.65	2.70	2.50	0.80	0.70	0.40	27	2.88	2.00	1.60	1.45	0.50	0.35
12	2.02	3.50	2.48	0.75	0.70	0.40	28	2.70	2.15	1.60	1.35	0.50	0.30
13	2.35	4.72	2.50	0.75	0.60	0.40	29	2.68	2.30	1.35	1.30	0.50	0.30
14	2.35	5.10	2.50	0.70	0.55	0.40	30	2.50	2.30	1.22	1.12	0.50	0.30
15	2.35	4.85	2.45	0.70	0.50	0.40	31	2.05	.....	1.15	1.00	.....	0.30
16	2.30	4.50	2.25	0.70	0.50	0.40							

Rating table for Boulder Creek near Boulder, Wyo., for 1906.

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.*
0.30	18	1.10	189	1.90	515	2.70	915	3.80	1,615
0.40	29	1.20	224	2.00	560	2.80	970	4.00	1,760
0.50	42	1.30	263	2.10	605	2.90	1,030	4.20	1,910
0.60	58	1.40	304	2.20	655	3.00	1,090	4.40	2,060
0.70	77	1.50	345	2.30	705	3.20	1,210	4.60	2,220
0.80	100	1.60	387	2.40	755	3.40	1,340	4.80	2,380
0.90	127	1.70	429	2.50	805	3.60	1,475	5.00	2,540
1.00	157	1.80	472	2.60	860				

NOTE.—The above table is applicable only for open-channel conditions. It is based on discharge measurements made during 1905-6 and is well defined.

Monthly discharge of Boulder Creek near Boulder, Wyo., for 1906.

[Drainage area, 155 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Sec.-ft. per sq. mile.	Depth in inches.
May	1,030	100	532	32,700	3.43	3.95
June	2,620	429	1,040	61,900	6.71	7.49
July	970	206	614	37,800	3.96	4.56
August	345	77	155	9,530	1.00	1.15
September	157	29	69.2	4,120	.446	.50
October	42	18	29.0	1,780	0.187	0.22
The period	.....	.....	.....	148,000	.....	.....

NOTE.—Values are rated as follows: May to August, good; September, fair; October, approximate.

EASTFORK RIVER AT NEWFORK, WYO.

This station was established April 1, 1905. It was originally located at a point about one-third mile southeast of Newfork post-office, in sec. 34, T. 32 N., R. 108 W. The conditions at this station are described in Water-Supply Paper No. 175, p. 32.

Owing to unsatisfactory conditions at this point the station was relocated May 1, 1906, at the county highway bridge one-fourth mile below.

There is but one channel, broken by two piers, and the banks are not liable to overflow. The bed of the stream is somewhat shifting. The channel is straight for 200 feet above and 100 feet below the station. The water is only sluggish at low stages. The river freezes solid during the winter.

Discharge measurements are made from the bridge. The initial point for soundings is at the gage on the left abutment.

The gage, which is read daily by Oliver N. Vible, is spiked to the left bridge abutment. The bench mark is a spike driven into the timber abutment of the bridge opposite the 6.50 feet mark on the gage.

Discharge measurements of Eastfork River at Newfork, Wyo., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 1	A. J. Parshall	70	75	1.40	110
May 26	do	75	349	4.25	1,580
May 28	do	75	292	3.55	1,010
June 15	G. N. Stadin	75	382	4.75	1,740
June 18	do	75	298	3.60	1,050
June 29	A. J. Parshall	75	195	2.65	512
July 1	do	75	183	2.50	463

Daily gage height, in feet, of Eastfork River at Newfork, Wyo., for 1906.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	May.	June.	July.	Aug.	Sept.	Oct.
1	1.40	2.50	2.30	1.45	1.30	1.10	17	2.60	4.28	2.00	1.10	1.15	1.00
2	1.40	2.40	2.60	1.40	1.20	1.10	18	2.50	3.55	1.95	1.15	1.10	1.00
3	1.35	2.60	2.75	1.45	1.20	1.10	19	2.60	3.05	1.90	1.10	1.10	1.00
4	1.45	3.00	2.80	1.50	1.20	1.10	20	3.00	2.85	1.80	1.10	1.10	1.00
5	1.60	3.60	2.65	1.40	1.20	1.10	21	3.65	2.80	1.70	1.60	1.10	1.00
6	1.65	3.95	2.50	1.40	1.15	1.10	22	3.80	2.85	1.75	2.00	1.10	1.00
7	1.70	3.30	2.80	1.35	1.10	1.10	23	4.15	2.75	1.55	2.10	1.10	1.00
8	1.80	2.60	2.75	1.30	1.10	1.10	24	4.10	2.50	1.55	2.00	1.10	1.00
9	2.10	2.60	2.50	1.25	1.00	1.00	25	4.15	2.15	1.60	1.85	1.10	1.00
10	2.70	3.20	2.40	1.25	1.10	1.00	26	4.25	2.12	1.65	1.75	1.10	1.00
11	3.40	4.25	2.35	1.20	1.10	1.00	27	3.65	2.18	1.60	1.60	1.10	1.00
12	3.80	4.70	2.30	1.25	1.00	1.00	28	3.55	2.40	1.55	1.50	1.10	1.00
13	3.50	5.18	2.40	1.25	1.10	1.00	29	3.80	2.55	1.50	1.40	1.10	1.00
14	3.20	5.38	2.45	1.20	1.10	1.00	30	3.10	2.32	1.40	1.35	1.10	1.00
15	3.25	4.72	2.30	1.15	1.10	1.00	31	2.70	.....	1.50	1.35	.....	1.00
16	3.00	4.25	2.10	1.15	1.10	1.00							

Rating table for Eastfork River at Newfork, Wyo., for 1906.

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.*
1.00	47	1.80	205	2.60	500	3.40	925	4.40	1,590
1.10	59	1.90	234	2.70	550	3.50	985	4.60	1,740
1.20	73	2.00	265	2.80	600	3.60	1,045	4.80	1,900
1.30	90	2.10	299	2.90	650	3.70	1,110	5.00	2,060
1.40	109	2.20	335	3.00	700	3.80	1,175	5.20	2,230
1.50	130	2.30	373	3.10	755	3.90	1,240	5.40	2,400
1.60	153	2.40	413	3.20	810	4.00	1,305		
1.70	178	2.50	455	3.30	865	4.20	1,445		

NOTE.—The above table is applicable only for open-channel conditions. It is based on 7 discharge measurements made during 1906, and is well defined between gage heights 1.4 feet and 5 feet.

Monthly discharge of Eastfork River at Newfork, Wyo., for 1906.

[Drainage area, 320 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run off.	
	Maximum.	Minimum.	Mean.		Sec.-ft. per sq. mile.	Depth in inches.
May	1,480	100	713	43,800	2.23	2.57
June	2,380	306	887	52,800	2.77	3.09
July	600	109	321	19,700	1.00	1.15
August	299	59	120	7,380	.375	.43
September	90	47	61.6	3,670	.193	.22
October	59	47	50.1	3,080	.157	.18
The period				130,000		

NOTE.—Values are rated as follows: May to July, excellent; August, good; September and October, fair.

YAMPA RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Yampa River rises in Egeria Park, in the southeastern part of Routt County, Colo., runs in a generally northerly direction to Steamboat Springs, and thence westward to its point of junction with Green River, just east of the Colorado-Utah State boundary. Throughout 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, and the melting of the snows on their high peaks is the source of numerous small streams whose waters augment the volume of the river and form its chief perennial supply. 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, Williams 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 STEAMBOAT SPRINGS, COLO.

This station was established May 3, 1904, at the highway bridge at the east end of Steamboat Springs. May 8, 1905, it was reestablished at the new steel highway bridge, about one-fourth mile below the old bridge, in sec. 17, T. 6 N., R. 84 W. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 35, where are given also references to publications that contain data for previous years.

Discharge measurements of Yampa River at Steamboat Springs, Colo., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 29	A. A. Weiland	95	231	5.75	914
May 13	do	97	332	6.70	1,880
May 26	do	97	389	7.45	2,760
June 11	do	97	402	7.45	2,930
June 29	do	97	253	5.88	1,150
July 12	do	93	161	5.11	472
July 30	do	90	88	4.32	138
August 16	do	90	79	4.20	120
August 23	do	90	100	4.40	159

Daily gage height, in feet, of Yampa River at Steamboat Springs, Colo., for 1906.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	4.68	5.68	7.15	5.60	4.45	4.25	4.38
2	4.78	5.52	7.28	5.55	4.45	4.35	4.38
3	4.75	5.62	7.35	5.38	4.45	4.48	4.38
4	4.65	5.85	7.40	5.10	4.38	4.38	4.38
5	4.65	6.38	7.65	5.10	4.40	4.28	4.38
6	4.78	6.38	7.98	5.10	4.42	4.28	4.38
7	4.92	6.05	7.10	5.55	4.42	4.28	4.38
8	5.00	6.35	6.65	5.38	4.42	4.28	4.38
9	5.00	6.65	7.08	5.25	4.38	4.28	4.38
10	5.28	6.80	7.62	5.25	4.30	4.28	4.38
11	5.50	6.88	8.05	5.20	4.28	4.28	4.38
12	5.50	6.88	8.45	5.20	4.22	4.28	4.38
13	5.15	6.90	8.60	5.12	4.30	4.28	4.38
14	4.95	6.65	8.48	5.08	4.70	4.30	4.38
15	5.20	6.65	8.30	5.08	4.50	4.40	4.35
16	5.42	6.85	8.10	4.95	4.45	4.52	4.32
17	5.75	7.05	7.45	4.80	4.40	4.60	4.32
18	5.80	7.05	7.32	4.75	4.40	4.60	4.32
19	5.80	7.30	7.15	4.72	4.40	4.60	4.32
20	5.92	7.45	6.75	4.65	4.42	4.60	4.32
21	6.15	7.55	6.72	4.60	4.42	4.60	4.32
22	6.50	7.70	6.78	4.58	4.42	4.55	4.32
23	6.45	7.65	6.48	4.50	4.42	4.45	4.32
24	6.82	7.55	6.15	4.50	4.42	4.40	4.32
25	6.25	7.70	6.05	4.50	4.42	4.40	4.38
26	6.10	7.48	6.05	4.50	4.32	4.38	4.40
27	6.05	7.32	6.02	4.45	4.28	4.38	4.42
28	5.98	7.78	5.75	4.38	4.28	4.38	4.38
29	5.75	8.25	5.80	4.38	4.25	4.38	4.38
30	5.78	7.50	5.72	4.35	4.25	4.38	4.38
31	.....	7.10	.....	4.30	4.25	.....	4.38

Rating table for Yampa River at Steamboat Springs, Colo., for 1906.

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.*
4.20	110	5.10	475	6.00	1,140	6.90	2,130	7.80	3,350
4.30	140	5.20	535	6.10	1,235	7.00	2,260	7.90	3,495
4.40	170	5.30	595	6.20	1,335	7.10	2,390	8.00	3,640
4.50	205	5.40	660	6.30	1,435	7.20	2,520	8.20	3,940
4.60	240	5.50	730	6.40	1,540	7.30	2,655	8.40	4,245
4.70	280	5.60	805	6.50	1,650	7.40	2,790	8.60	4,555
4.80	325	5.70	885	6.60	1,765	7.50	2,925		
4.90	370	5.80	965	6.70	1,885	7.60	3,065		
5.00	420	5.90	1,050	6.80	2,005	7.70	3,205		

NOTE.—The above table is applicable only for open-channel conditions. It is based on 9 discharge measurements made during 1906 and is well defined.

Monthly discharge of Yampa River at Steamboat Springs, Colo., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
April	2,030	260	813	48,400
May	4,020	745	2,220	136,000
June	4,560	901	2,500	149,000
July	805	140	398	24,500
August	280	116	166	10,200
September	240	125	171	10,200
October	177	146	159	9,780
The period				388,000

NOTE.—Values are rated as follows: April to July, excellent; August to October, good.

YAMPA RIVER NEAR CRAIG, COLO.

This station was established April 30, 1904. It is located on the wagon bridge 1 mile south of Craig, on the road to Meeker, Colo., in sec. 6, T. 6 N., R. 90 W., just below the mouth of Fortification Creek and about 7 miles above the mouth of Williams River. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 37, where are given also references to publications that contain data for previous years.

Discharge measurements of Yampa River near Craig, Colo., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 26	A. A. Weiland	167	1,020	5.34	3,560
May 2	do	166	895	4.77	2,550
May 10	do	190	1,240	6.90	6,260
May 27	do	191	1,440	7.20	7,130
June 13	do	191	1,460	7.55	8,150
July 10	do	166	965	4.38	2,370
July 27	do	131	672	2.94	650
August 14	do	131	615	2.50	411
August 22	do	131	602	2.40	371

Daily gage height, in feet, of Yampa River near Craig, Colo., for 1906.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	3.5	4.8	6.6	4.75	2.6	2.0	2.4
2	3.3	4.7	6.6	4.8	2.7	2.0	2.3
3	3.4	4.7	6.6	4.7	2.75	2.1	2.3
4	3.15	4.85	6.75	4.55	2.65	2.2	2.3
5	3.4	5.6	6.8	4.4	2.6	2.2	2.3
6	3.3	6.0	7.35	4.15	2.6	2.1	2.3
7	3.9	5.8	7.6	4.4	2.55	2.15	2.3
8	3.5	5.9	6.3	4.5	2.55	2.05	2.3
9	3.5	6.2	5.9	4.35	2.5	2.0	2.3
10	4.05	6.7	6.25	4.25	2.55	2.0	2.3
11	4.25	7.0	6.9	4.35	2.5	2.15	2.25
12	4.3	6.95	7.3	4.25	2.4	2.0	2.2
13	4.1	6.7	7.6	4.15	2.3	2.1	2.2
14	3.65	6.4	7.95	4.05	2.3	2.05	2.2
15	3.9	6.3	7.95	4.25	2.4	2.15	2.2
16	4.05	6.5	7.6	4.1	2.45	2.25	2.2
17	4.4	6.9	7.6	3.8	2.4	2.15	2.2
18	4.55	7.0	7.1	3.6	2.35	2.1	2.2
19	4.55	7.05	6.35	3.45	2.4	2.05	2.2
20	4.55	7.25	6.25	3.3	2.35	2.35	2.2
21	4.8	7.5	5.9	3.25	2.35	2.35	2.2
22	5.1	7.6	5.9	3.15	2.4	2.4	2.2
23	5.35	7.65	5.8	3.1	2.3	2.45	2.2
24	5.6	7.55	5.45	3.0	2.35	2.55	2.2
25	5.85	7.6	5.1	3.1	2.35	2.5	2.2
26	5.3	8.0	4.9	3.0	2.25	2.45	2.2
27	5.2	7.3	4.9	2.9	2.25	2.4	2.2
28	4.9	7.2	4.9	2.8	2.15	2.45	2.25
29	4.65	7.75	4.8	2.7	2.1	2.5	2.3
30	4.75	8.35	4.65	2.65	2.1	2.5	2.3
31	.....	7.15	.....	2.6	2.05	.....	2.3

Rating table for Yampa River near Craig, Colo., for 1906.

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.*
2.00	200	3.00	700	4.00	1,630	5.00	3,000	7.00	6,760
2.10	230	3.10	770	4.10	1,750	5.20	3,320	7.20	7,180
2.20	265	3.20	845	4.20	1,870	5.40	3,660	7.40	7,600
2.30	305	3.30	925	4.30	2,000	5.60	4,010	7.60	8,030
2.40	350	3.40	1,010	4.40	2,130	5.80	4,370	7.80	8,470
2.50	400	3.50	1,100	4.50	2,270	6.00	4,750	8.00	8,910
2.60	450	3.60	1,195	4.60	2,410	6.20	5,140	8.20	9,350
2.70	505	3.70	1,295	4.70	2,550	6.40	5,540	8.40	9,790
2.80	565	3.80	1,400	4.80	2,700	6.60	5,940		
2.90	630	3.90	1,510	4.90	2,850	6.80	6,340		

NOTE.—The above table is applicable only for open-channel conditions. It is based on 9 discharge measurements made during 1906 and is well defined between gage heights 2.4 feet and 8 feet.

Monthly discharge of Yampa River near Craig, Colo., for 1906.

[Drainage area, 1,730 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Sec.-ft. per sq. mile.	Depth in inches.
April	4,460	808	2,100	125,000	1.21	1.35
May	9,680	2,550	6,180	380,000	3.57	4.12
June	8,800	2,480	5,620	334,000	3.25	3.63
July	2,700	450	1,470	90,400	.850	.98
August	535	215	359	22,100	.208	.24
September	425	200	283	16,800	.164	.18
October	350	265	285	17,500	.165	.19
The period	.....	.....	.....	986,000	.....	.....

NOTE.—The above values are good.

ELK RIVER NEAR TRULL, COLO.

This station was established May 2, 1904, and discontinued August 16, 1906. It is located about 2 miles southeast of Trull post-office, on the stage road between Steamboat Springs and Hayden, Colo., in sec. 32, T. 7 N., R. 85 W., and is below all tributaries. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 41, where are given also references to publications that contain data for previous years.

Discharge measurements of Elk River near Trull, Colo., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 28	A. A. Weiland	115	226	6.93	713
May 12	do	115	461	8.80	2,680
May 25	do	115	539	9.50	3,580
June 11	do	115	494	9.10	3,070
June 29	do	115	331	7.71	1,470
July 12	do	115	319	7.61	1,340
July 29	do	100	140	6.13	351
August 15	do	115	112	5.80	223
August 23	do	95	91	5.60	179

Daily gage height, in feet, of Elk River near Trull, Colo., for 1906.

Day.	Apr.	May.	June.	July.	Aug.	Day.	Apr.	May.	June.	July.	Aug.
1		7.15	8.55	8.03	6.15	17		9.02	9.50	7.15	
2		7.05	8.80	8.18	6.12	18		8.78	8.78	7.03	
3		7.20	8.78	7.98	6.00	19		9.00	8.65	6.93	
4		7.70	8.65	7.88	5.95	20		9.30	8.55	6.75	
5		8.32	8.98	7.68	5.95	21		9.25	8.45	6.75	
6		8.28	9.68	7.53	5.90	22		9.42	8.55	6.63	
7		8.30	8.78	8.00	5.85	23		9.22	8.50	6.55	
8		8.40	8.25	7.76	5.80	24		9.28	8.22	6.63	
9		8.60	8.28	7.58	5.75	25		9.60	7.75	6.43	
10		8.82	8.78	7.70	5.70	26		9.05	7.75	6.33	
11		8.90	9.15	7.53	5.65	27		9.05	8.08	6.23	
12		8.92	9.42	7.66	5.60	28	6.90	9.22	8.08	6.20	
13		8.58	9.65	7.46	5.62	29	7.18	9.98	7.82	6.05	
14		8.55	9.58	7.53	5.75	30	7.32	9.05	7.98	6.15	
15		8.52	9.42	7.40	5.78	31		8.68		6.00	
16		8.82	9.52	7.30	5.62						

Rating table for Elk River near Trull, Colo., for 1906.

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.*
5.60	175	6.40	470	7.20	980	8.00	1,750	8.80	2,690
5.70	200	6.50	525	7.30	1,060	8.10	1,860	8.90	2,820
5.80	230	6.60	580	7.40	1,145	8.20	1,970	9.00	2,950
5.90	260	6.70	640	7.50	1,235	8.30	2,080	9.20	3,210
6.00	295	6.80	700	7.60	1,330	8.40	2,200	9.40	3,470
6.10	335	6.90	765	7.70	1,430	8.50	2,320	9.60	3,750
6.20	375	7.00	835	7.80	1,535	8.60	2,440	9.80	4,030
6.30	420	7.10	905	7.90	1,640	8.70	2,560	10.00	4,310

NOTE.—The above table is applicable only for open-channel conditions. It is based on 8 discharge measurements made during 1906 and is well defined.

Monthly discharge of Elk River near Trull, Colo., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
May	4,280	870	2,630	162,000
June	3,860	1,480	2,590	154,000
July	1,950	295	1,010	62,100
August 1-16	355	175	241	7,650
The period				386,000

NOTE.—The above values are excellent.

ELK HEAD CREEK NEAR CRAIG, COLO.

This station was established April 27, 1906, and was discontinued September 7, 1906. It is located at Harrison's ranch, 5¾ miles east of Craig, on the road to Hayden, and about 1 mile above the junction with the Yampa.

The channel curves both above and below the station. Above the bridge, the creek will overflow the flat bottom land on both banks; below the bridge the banks are high and not liable to overflow. The bed of the stream is of sand and mud and liable to shift. There is one channel at all stages.

Measurements are made from the lower side of a single-span iron highway bridge. The initial point for soundings is the inside face of the south abutment.

A chain gage is fastened to the downstream guard rail; length of chain, 16.10 feet. The gage was read by Margaret Harrison. The bench mark is a chiseled cross on the top of the northwest corner of the south abutment of the bridge; elevation, 13.25 feet above the datum of the gage.

Discharge measurements of Elk Head Creek near Craig, Colo., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 27	A. A. Weiland	40	116	6.44	301
May 1	do	40	108	6.30	268
May 11	do	64	325	9.90	1,050
May 27	do	63	242	8.72	803
June 10	do	40	118	6.60	366
June 29	do	27	40	4.40	29
July 11	do	28	42	4.45	31
July 31	do	25	32	4.03	4.8
August 14	do	25	35	3.90	3.5
August 22	do	25	31	3.70	2.9

Daily gage height, in feet, of Elk Head Creek near Craig, Colo., for 1906.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	6.28	7.78	4.42	3.90	3.65	17	.....	9.88	5.80	4.25	3.75	.....
2	.....	6.24	7.74	4.32	3.90	3.65	18	.....	9.38	5.65	4.22	3.72	.....
3	.....	6.22	7.50	4.30	3.90	3.68	19	.....	9.70	5.48	4.20	3.65	.....
4	.....	7.02	7.41	4.30	3.92	3.65	20	.....	9.98	5.30	4.15	3.65	.....
5	.....	8.45	7.34	4.19	3.92	3.65	21	.....	9.84	5.09	4.14	3.65	.....
6	.....	8.70	7.95	4.14	3.88	3.65	22	.....	9.78	4.92	4.15	3.65	.....
7	.....	8.06	7.35	4.12	3.75	3.64	23	.....	9.32	4.88	4.10	3.65	.....
8	.....	8.60	6.74	4.42	3.75	.....	24	.....	8.96	4.84	4.15	3.64	.....
9	.....	9.45	6.52	4.32	3.75	.....	25	.....	9.48	4.84	4.18	3.60	.....
10	.....	9.72	6.48	4.24	3.72	.....	26	.....	9.85	4.68	4.14	3.62	.....
11	.....	9.95	6.50	4.25	3.70	.....	27	6.35	8.80	4.54	4.15	3.62	.....
12	.....	9.75	6.48	4.25	3.70	.....	28	6.48	9.00	4.41	4.00	3.65	.....
13	.....	8.62	6.40	4.30	3.70	.....	29	6.25	9.68	4.40	3.98	3.65	.....
14	.....	8.56	6.25	4.25	3.70	.....	30	6.32	9.78	4.46	4.05	3.65	.....
15	.....	8.91	6.02	4.25	3.75	.....	31	.....	8.35	.....	.....	3.65	.....
16	.....	9.65	5.84	4.25	3.78	.....							

Rating table for Elk Head Creek near Craig, Colo., for 1906.

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.*
3.60	2.6	4.50	36	5.40	138	6.30	282	7.40	509
3.70	2.9	4.60	45	5.50	151	6.40	301	7.60	552
3.80	3.2	4.70	55	5.60	165	6.50	321	7.80	596
3.90	3.5	4.80	65	5.70	180	6.60	341	8.00	640
4.00	4	4.90	76	5.80	195	6.70	362	9.00	860
4.10	7	5.00	88	5.90	211	6.80	383	10.00	1,080
4.20	12	5.10	100	6.00	228	6.90	404		
4.30	19	5.20	112	6.10	245	7.00	425		
4.40	27	5.30	125	6.20	263	7.20	467		

NOTE.—The above table is applicable only for open-channel conditions. It is based on 10 discharge measurements made during 1906 and is well defined.

Monthly discharge of Elk Head Creek near Craig, Colo., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
May	1,080	267	840	51,600
June	629	27	257	15,300
July	29	4	13.5	830
August	3.6	2.6	3.0	184
September 1–7	2.8	2.7	2.8	38.9
The period	.....	.....	.....	68,000

NOTE.—Values are rated as follows: May and June, good; remainder of the period, approximate.

FORTIFICATION CREEK AT CRAIG, COLO.

This station was established June 12, 1905, and was discontinued June 30, 1906. It is located at the highway bridge about one-fourth mile east of Craig, Colo., in sec. 6, T. 6 N., R. 90 W.

On May 2, 1906, a new chain gage was installed at the same datum as the staff gage; length of chain, 16.60 feet. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 43.

Discharge measurements of Fortification Creek at Craig, Colo., in 1905–6.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1905.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 12	H. G. Graham	51	84	4.40	212
1906.					
May 2	A. A. Weiland	45	63	3.90	118
May 10	....do	50	142	6.00	337
May 27	....do	50	117	5.50	301
June 9	....do	45	56	3.84	128
June 30	W. H. Rose	3	.....	1.90	(a)

a Practically no flow.

Daily gage height and discharge of Fortification Creek at Craig, Colo., for 1905–6.

Day.	1905. June.		1906. May.		1906. June.		Day.	1905. June.		1906. May.		1906. June.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
	Feet.	*Sec.-feet.*	*Feet.*	*Sec.-feet.*	*Feet.*	*Sec.-feet.*		*Feet.*	*Sec.-feet.*	*Feet.*	*Sec.-feet.*	*Feet.*	*Sec.-feet.*
1	5.55	338	.....	.....	4.85	230	17	3.50	125	5.40	268	3.60	108
2	5.92	380	4.10	137	4.75	218	18	3.35	109	5.35	263	3.50	100
3	5.88	375	3.80	110	4.65	208	19	3.20	97	5.35	263	3.20	75
4	6.20	413	3.65	97	5.15	261	20	2.95	77	5.90	325	2.90	52
5	6.40	435	4.90	216	5.25	272	21	2.85	67	5.75	308	2.80	45
6	6.10	400	4.80	205	5.25	272	22	2.75	60	5.80	313	2.65	38
7	5.10	288	4.65	190	4.75	218	23	2.70	50	5.95	332	2.55	25
8	5.05	282	4.75	200	4.15	158	24	2.70	50	5.10	237	2.45	19
9	5.05	282	5.45	275	3.85	130	25	.....	0	5.45	275	2.40	16
10	5.45	327	5.90	325	3.95	138	26	.....	0	6.25	365	2.20	7
11	4.70	245	5.95	332	4.10	153	27	.....	0	5.45	295	2.10	3
12	4.60	233	5.55	285	4.20	163	28	.....	0	5.20	267	2.00	1
13	4.15	187	5.05	232	4.40	183	29	.....	0	6.60	427	2.00	1
14	3.95	167	4.75	200	4.05	148	30	.....	0	6.55	421	1.90	0
15	3.75	147	5.10	237	3.95	138	31	.....	.....	5.55	306	.....	.....
16	3.70	143	5.60	293	3.70	116							

NOTE.—These discharges were obtained by the indirect method for shifting channels.

Monthly discharge of Fortification Creek at Craig, Colo., for 1905–6.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
1905.				
June	435	40	176	10,500
1906.				
May 2–31	427	97	267	15,900
June	272	0	117	6,960

NOTE.—The above values are fair.

WILLIAMS RIVER AT HAMILTON, COLO.

This station was established April 29, 1904. It is located at the highway bridge at Hamilton, on the stage road from Meeker to Craig, Colo., about 17 miles from Craig, in sec. 20, T. 5 N., R. 91 W. The conditions at this station and the bench marks are described in

Water-Supply Paper No. 175, page 44, where are given also references to publications that contain data for previous years.

Discharge measurements of Williams River at Hamilton, Colo., by A. A. Weiland, in 1906.

Date.	Width.	Area of section.	Gage height.	Discharge.	Date.	Width.	Area of section.	Gage height.	Discharge.
	Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 25	50	145	4.22	501	June 9	60	225	5.62	2,000
April 25	50	154	4.18	458	June 28	58	183	4.60	616
May 2	40	110	3.68	220	July 10	45	121	3.85	297
May 9	55	191	5.22	1,010	July 26	40	84	3.13	98
May 10	60	247	6.10	1,370	August 13	40	82	3.05	88
May 23	60	301	6.80	1,740	August 21	40	84	3.10	91
May 28	60	349	7.18	2,090					

Daily gage height, in feet, of Williams River at Hamilton, Colo., for 1906.

Day.	April.	May.	June.	July.	Aug.	Sept.	Oct.
1	3.60	3.72	5.68	4.27	2.97	2.90	2.95
2	3.32	3.72	5.88	4.20	3.15	3.10	2.90
3	3.10	3.80	5.75	4.10	3.00	3.10	2.87
4	3.12	4.20	5.72	4.00	3.07	3.10	2.95
5	3.22	5.08	6.05	3.93	3.05	2.93	2.93
6	3.20	4.92	6.92	3.85	3.05	2.93	2.93
7	3.30	4.82	5.90	4.07	3.05	2.90	2.90
8	3.18	5.10	5.35	3.95	3.03	2.77	2.90
9	3.18	5.45	5.50	3.87	2.95	2.75	2.90
10	3.25	5.90	6.08	3.80	2.95	2.80	2.85
11	3.45	6.22	6.25	3.80	2.87	2.75	2.85
12	3.40	6.22	6.48	3.70	2.85	2.73	2.80
13	3.08	5.55	6.70	3.83	2.95	2.70	2.75
14	3.15	5.25	6.62	3.83	3.25	2.80	2.75
15	3.15	5.42	6.35	3.83	3.20	3.10	2.70
16	3.30	6.32	6.30	3.65	3.05	3.40	2.70
17	3.50	6.75	6.25	3.55	3.07	3.20	2.65
18	3.55	6.65	5.65	3.45	3.27	3.05	2.63
19	3.48	6.95	5.42	3.40	3.10	3.05	2.70
20	3.55	7.38	5.25	3.35	3.05	3.05	2.90
21	3.75	7.25	5.05	3.30	3.07	3.05	2.90
22	3.92	7.35	5.12	3.25	2.97	3.07	2.95
23	4.25	7.22	5.05	3.20	2.95	3.00	2.93
24	4.62	6.42	4.65	3.15	2.95	2.93	2.80
25	4.32	6.40	4.55	3.07	2.93	2.90	3.00
26	4.00	6.38	4.55	3.10	2.95	3.00	2.97
27	3.80	6.32	4.55	3.10	3.00	3.20	2.97
28	3.80	7.15	4.45	3.03	2.90	3.07	2.88
29	3.82	8.12	4.38	3.05	2.85	3.03	2.77
30	3.82	6.40	4.35	3.10	2.93	2.95	2.75
31	.....	5.80	.....	3.00	2.93	.....	2.70

Rating table for Williams River at Hamilton, Colo., for 1906.

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.*
2.60	25	3.50	186	4.40	536	5.30	965	6.40	1,565
2.70	35	3.60	218	4.50	580	5.40	1,015	6.60	1,675
2.80	47	3.70	253	4.60	625	5.50	1,070	6.80	1,790
2.90	60	3.80	290	4.70	670	5.60	1,125	7.00	1,910
3.00	75	3.90	328	4.80	715	5.70	1,180	7.20	2,030
3.10	92	4.00	368	4.90	765	5.80	1,235	7.40	2,150
3.20	111	4.10	409	5.00	815	5.90	1,290	7.60	2,270
3.30	133	4.20	451	5.10	865	6.00	1,345	7.80	2,390
3.40	158	4.30	493	5.20	915	6.20	1,455	8.00	2,510

NOTE.—The above table is applicable only for open-channel conditions. It is based on 13 discharge measurements made during 1906 and is well defined above gage height 3 feet.

Monthly discharge of Williams River at Hamilton, Colo., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
April	634	89	218	13,000
May	2,580	260	1,340	82,400
June	1,730	514	1,120	66,600
July	480	75	230	14,100
August	126	54	78.4	4,820
September	158	35	74.0	4,400
October	75	28	53.2	3,270
The period				189,000

NOTE.—The above values are good, except those for October, which are fair.

WHITE RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

White River rises in Trappers Lake, which lies at an elevation of 9,500 feet above sea level in a small mountain basin of the White River Plateau in eastern Garfield County, Colo.; thence it flows westward to its point of 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 topograhically 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 was established July 28, 1903. It is located at the county bridge at Rawson's ranch, below the mouth of Marvine Creek, 7 miles from Buford, the nearest post-office, and 32 miles from Meeker, Colo. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 50, where are given also references to publications that contain data for previous years.

Discharge measurements of North Fork of White River near Buford, Colo., by A. A. Weiland, in 1906.

Date.	Width.	Area of section.	Gage height.	Discharge.	Date.	Width.	Area of section.	Gage height.	Discharge.
	Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 6	83	136	2.55	547	July 7	83	144	2.60	630
May 18	83	186	3.20	1,040	July 20	83	114	2.25	397
June 5	83	191	3.18	1,060	August 6	83	97	2.05	318
June 25	83	170	2.90	899	August 29	83	91	1.98	296

Daily gage height, in feet, of North Fork of White River near Buford, Colo., for 1906.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	1.82	2.08	2.95	2.78	2.18	2.02	2.00
2	1.82	2.08	2.95	2.78	2.12	2.05	1.95
3	1.80	2.15	2.95	2.68	2.10	2.00	1.95
4	1.82	2.42	2.95	2.65	2.10	2.00	1.95
5	1.82	2.65	3.05	2.60	2.10	2.00	1.90
6	1.85	2.70	3.05	2.55	2.10	2.00	1.90
7	1.82	2.60	2.95	2.60	2.08	2.00	1.90
8	1.82	2.80	3.00	2.58	2.08	2.00	1.90
9	1.82	3.02	3.15	2.50	2.08	2.00	1.90
10	1.88	3.20	3.32	2.50	2.08	2.00	1.90
11	1.88	3.20	3.35	2.50	2.08	1.98	1.90
12	1.85	2.85	3.45	2.48	2.08	1.98	1.90
13	1.88	2.68	3.60	2.42	2.10	1.98	1.90
14	1.88	2.70	3.75	2.42	2.08	2.00	1.90
15	1.88	2.98	3.85	2.40	2.05	2.08	1.90
16	1.92	3.22	3.90	2.40	2.05	2.10	1.90
17	2.02	3.22	3.80	2.35	2.08	2.05	1.90
18	2.05	3.25	3.50	2.32	2.15	2.02	1.90
19	2.00	3.55	3.42	2.30	2.08	2.02	1.90
20	2.05	3.48	3.35	2.30	2.05	2.00	1.90
21	2.18	3.60	3.25	2.25	2.05	2.00	1.90
22	2.30	3.40	3.32	2.22	2.05	2.00	1.92
23	2.40	3.35	3.30	2.22	2.05	2.00	1.90
24	2.30	3.25	2.95	2.20	2.05	2.00	1.90
25	2.22	2.95	2.95	2.15	2.00	2.00	1.88
26	2.15	2.95	2.90	2.15	2.00	2.05	1.88
27	2.08	3.25	2.82	2.15	2.00	2.02	.88
28	2.08	3.60	2.78	2.15	2.00	2.00	1.88
29	2.10	3.35	2.75	2.12	2.00	2.00	1.88
30	2.10	3.00	2.75	2.12	2.00	2.00	1.88
31	.....	2.90	.....	2.10	2.00	.....	1.88

Rating tables for North Fork of White River near Buford, Colo.

APRIL 1 TO JUNE 16, 1906.[a]

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.*
1.80	135	2.30	390	2.80	740	3.30	1,195	3.70	1,610
1.90	180	2.40	450	2.90	825	3.40	1,295	3.80	1,720
2.00	225	2.50	515	3.00	910	3.50	1,400	3.90	1,835
2.10	275	2.60	585	3.10	1,000	3.60	1,505	4.00	1,950
2.20	330	2.70	660	3.20	1,095				

JUNE 17 TO OCT. 31, 1906.[b]

1.90	255	2.30	445	2.70	720	3.10	1,100	3.50	1,500
2.00	295	2.40	505	2.80	805	3.20	1,200	3.60	1,605
2.10	340	2.50	570	2.90	900	3.30	1,300	3.70	1,710
2.20	390	2.60	640	3.00	1,000	3.40	1,400	3.80	1,815

[a] This table is applicable only for open-channel conditions. It is based on discharge measurements made during 1904–5 and 3 during 1906, and is well defined below gage height 2.4 feet.

[b] This table is applicable only for open-channel conditions. It is based on 5 discharge measurements made after June 17, 1906, and is well defined below gage height 3 feet.

Monthly discharge of North Fork of White River near Buford, Colo., for 1906.

[Drainage area, 181 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Sec.-ft. per sq. mile.	Depth in inches.
April	450	135	225	13,400	1.24	1.38
May	1,500	265	927	57,000	5.12	5.90
June	1,840	762	1,130	67,200	6.24	6.96
July	788	340	507	31,200	2.80	3.23
August	380	295	325	20,000	1.80	2.08
September	340	287	300	17,900	1.66	1.85
October	295	248	257	15,800	1.42	1.64
The period				222,000		

NOTE.—Values are rated as follows: April and October, good; remainder of the period, excellent.

SOUTH FORK OF WHITE RIVER NEAR BUFORD, COLO.

This station was established July 25, 1903. It is located at the county bridge at the lower end of a section of the river known as "Stillwater," about 7 miles from Buford, the nearest post-office, and about 30 miles from Meeker, Colo., in T. 1 S., R. 91 W. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 52, where are given also references to publications that contain data for previous years.

Discharge measurements of South Fork of White River near Buford, Colo., by A. A. Weiland, in 1906.

Date.	Width.	Area of section.	Gage height.	Discharge.	Date.	Width.	Area of section.	Gage height.	Discharge.
	Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 7	53	97	2.95	383	July 8	53	133	3.60	643
May 19	53	141	3.75	724	July 23	53	98	2.97	286
June 7	53	192	4.50	1,310	August 8	53	76	2.70	257
June 26	53	186	4.30	1,200	August 31	53	68	2.55	222

Daily gage height, in feet, of South Fork of White River near Buford, Colo., for 1906.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	May.	June.	July.	Aug.	Sept.	Oct.
1	.....	4.0	3.95	2.85	2.8	2.7	17	3.6	7.75	3.25	2.8	2.8	2.6
2	.....	4.15	3.9	2.85	2.8	2.7	18	3.7	6.5	3.2	2.8	2.75	2.6
3	.....	4.15	3.8	2.7	2.75	2.7	19	3.82	6.0	3.1	2.8	2.7	2.6
4	.....	4.3	3.65	2.7	2.7	2.75	20	4.1	5.9	3.0	2.8	2.7	2.6
5	.....	4.55	3.6	2.8	2.7	2.7	21	4.1	5.35	3.05	2.8	2.7	2.6
6	.....	5.0	3.55	2.8	2.7	2.65	22	4.35	5.1	3.0	2.8	2.7	2.6
7	3.0	4.65	3.65	2.8	2.7	2.6	23	4.4	5.2	3.0	2.75	2.7	2.6
8	3.02	4.35	3.6	2.8	2.7	2.6	24	4.15	4.65	3.0	2.7	2.7	2.65
9	3.3	4.55	3.55	2.8	2.7	2.6	25	3.95	4.3	3.0	2.7	2.7	2.65
10	3.38	5.0	3.5	2.8	2.7	2.6	26	3.85	4.35	3.0	2.7	2.7	2.6
11	3.5	5.65	3.45	2.8	2.7	2.6	27	3.8	4.5	2.9	2.7	2.8	2.6
12	3.45	6.65	3.4	2.8	2.7	2.6	28	4.15	4.3	2.9	2.7	2.7	2.6
13	3.45	7.3	3.4	2.8	2.7	2.6	29	4.45	4.05	2.85	2.7	2.7	2.6
14	3.35	7.7	3.45	2.8	2.7	2.6	30	4.2	4.05	2.8	2.75	2.7	2.6
15	3.35	7.25	3.35	2.8	2.8	2.6	31	3.95	.....	2.8	2.8	.....	2.6
16	3.5	7.55	3.3	2.8	2.8	2.6							

Daily discharge, in second-feet, of South Fork of White River near Buford, Colo., for 1906.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	May.	June.	July.	Aug.	Sept.	Oct.
1	.....	960	950	270	305	270	17	650	3,740	430	305	305	235
2	.....	1,050	920	275	305	270	18	700	2,740	400	305	288	235
3	.....	1,050	800	270	288	270	19	760	2,360	360	305	270	235
4	.....	1,130	730	265	270	288	20	910	2,280	325	305	270	235
5	.....	1,340	710	280	270	270	21	910	1,880	320	305	270	235
6	.....	1,640	630	285	270	252	22	1,060	1,720	300	305	270	235
7	385	1,400	675	290	270	235	23	1,130	1,780	300	288	270	235
8	393	1,220	650	295	270	235	24	980	1,410	295	270	270	252
9	515	1,340	625	305	270	235	25	880	1,190	295	270	270	252
10	551	1,640	605	305	270	235	26	820	1,220	290	270	270	235
11	605	2,100	550	305	270	235	27	800	1,320	280	270	305	235
12	582	2,850	525	305	270	235	28	980	1,200	280	270	270	235
13	582	3,370	525	305	270	235	29	1,220	1,010	260	270	270	235
14	538	3,690	550	305	270	235	30	1,070	1,010	245	288	270	235
15	538	3,320	500	305	305	235	31	930	.....	250	305	.....	235
16	605	3,580	480	305	305	235							

NOTE.—These discharges prior to August 9 were obtained by the indirect method for shifting channels; after that date they are based on a rating table.

Monthly discharge of South Fork of White River near Buford, Colo., for 1906.

[Drainage area, 148 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Sec.-ft. per sq. mile.	Depth in inches.
May 6-31	1,220	385	764	37,900	5.16	4.80
June	3,740	960	1,880	112,000	12.70	14.17
July	950	245	486	29,900	3.28	3.78
August	305	265	290	17,800	1.96	2.26
September	305	270	278	16,500	1.88	2.10
October	288	235	243	14,900	1.64	1.89
The period	.....	.....	.....	229,000	.....	.....

NOTE.—The above values are fair.

WHITE RIVER AT MEEKER, COLO.

This station was established May 24, 1901. It is located about one-half mile above the town of Meeker, at a point where a wagon bridge crosses the stream, on the ranch of L. F. Van Cleave, in sec. 25, T. 1 N., R. 94 W. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 54, where are given also references to publications that contain data for previous years.

Discharge measurements of White River at Meeker, Colo., by A. A. Weiland, in 1906.

Date.	Width.	Area of section.	Gage height.	Discharge.	Date.	Width.	Area of section.	Gage height.	Discharge.
	Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 23	79	267	4.60	980	June 23	78	310	5.47	1,990
May 4	79	240	4.39	747	July 3	78	267	4.60	1,010
May 17	78	326	5.50	3,000	July 24	78	187	4.05	651
May 22	78	380	6.15	3,260	August 10	78	167	3.85	356
May 31	78	343	5.65	2,380	August 20	78	172	3.90	369
June 8	78	336	5.55	2,250					

Daily gage height, in feet, of White River at Meeker, Colo., for 1906.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	3.80	4.28	5.55	5.00	3.92	3.75	3.80
2	3.68	4.25	5.68	4.92	3.95	3.82	3.80
3	3.65	4.22	5.65	4.82	3.90	3.95	3.78
4	3.65	4.35	5.68	4.78	3.88	3.80	3.75
5	3.65	4.80	5.80	4.68	3.90	3.80	3.80
6	3.68	4.90	6.05	4.58	3.90	3.75	3.78
7	3.88	4.82	5.82	4.68	3.88	3.70	3.78
8	3.78	5.00	5.52	4.62	3.85	3.70	3.78
9	3.82	5.22	5.58	4.58	3.85	3.70	3.70
10	3.90	5.40	5.72	4.52	3.85	3.70	3.70
11	3.98	5.60	5.92	4.55	3.80	3.70	3.70
12	3.92	5.62	6.10	4.48	3.82	3.62	3.68
13	3.78	5.30	6.25	4.42	3.90	3.62	3.68
14	3.72	5.20	6.38	4.58	4.02	3.72	3.65
15	3.82	5.20	6.30	4.45	3.92	4.05	3.65
16	3.92	5.52	6.25	4.38	3.85	4.08	3.65
17	4.08	5.65	6.28	4.32	3.92	3.92	3.65
18	4.20	5.72	6.08	4.30	3.98	3.92	3.65
19	4.05	5.90	5.90	4.22	3.88	3.90	3.65
20	4.15	6.08	5.85	4.20	3.85	3.92	3.70
21	4.25	6.02	5.78	4.12	3.85	3.92	3.70
22	4.40	6.12	5.72	4.10	3.88	3.90	3.70
23	4.55	6.10	5.68	4.05	3.82	3.90	3.68
24	4.72	5.92	5.50	4.02	3.82	3.85	3.58
25	4.52	5.80	5.28	4.00	3.75	3.82	3.70
26	4.45	5.70	5.22	4.00	3.72	3.82	3.72
27	4.30	5.65	5.25	3.95	3.70	3.92	3.72
28	4.30	5.95	5.18	3.92	3.70	3.88	3.72
29	4.28	6.22	5.05	3.90	3.70	3.82	3.70
30	4.30	5.85	5.05	3.88	3.70	3.80	3.70
31	.....	5.60	.....	3.85	3.72	.....	3.70

Rating tables for White River at Meeker, Colo.

APRIL 1 TO JULY 31, 1906.[a]

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.*
3.70	435	4.30	770	4.90	1,295	5.50	2,090	6.00	2,970
3.80	485	4.40	840	5.00	1,405	5.60	2,250	6.10	3,160
3.90	535	4.50	920	5.10	1,525	5.70	2,420	6.20	3,350
4.00	590	4.60	1,000	5.20	1,655	5.80	2,600	6.30	3,550
4.10	645	4.70	1,090	5.30	1,795	5.90	2,780	6.40	3,750
4.20	705	4.80	1,190	5.40	1,940				

AUG. 9 TO OCT. 31, 1906.[b]

3.60	250	3.80	331	3.90	378	4.00	428	4.10	480
3.70	288	.....	.....	.....	.....	.....	.....	.....	.....

[a] This table is applicable only for open-channel conditions. It is based on 8 discharge measurements made during 1906 and is well defined between gage heights 4 feet and 6.4 feet.

[b] This table is applicable only for open-channel conditions. It is based on 2 discharge measurements made during 1906 and the form of the preceding curve. From August 1 to 8, discharges were obtained by a transition between the tables.

Monthly discharge of White River at Meeker, Colo., for 1906.

[Drainage area, 634 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Sec.-ft. per sq. mile.	Depth in inches.
April	1,120	410	628	37,400	0.991	1.11
May	3,390	718	2,100	129,000	3.31	3.82
June	3,710	1,460	2,530	151,000	3.99	4.45
July	1,400	510	836	51,400	1.32	1.52
August	500	288	371	22,800	.585	.67
September	470	258	345	20,500	.544	.61
October	331	243	292	18,000	.461	.53
The period				430,000		

NOTE.—The above values are good.

WHITE RIVER NEAR DRAGON, UTAH.

This station was established April 17, 1906. It is located at the toll bridge of the Uinta Stage Company, 18 miles northwest of Dragon, from which it is reached by stage.

The channel is straight for 400 feet above and below the station. The right bank is of shale, and high; the left bank is of earth and overflows at high water. The bed of the stream is composed of cobblestones and sand, somewhat shifting. There is one channel at all stages, broken by pile-bents, which somewhat disturb the current. The velocity of the current becomes very great at high stages.

Discharge measurements are made from the downstream side of the bridge. The initial point for soundings is on the left bank, the hand-rail being graduated at 5-foot intervals.

A standard chain gage was installed May 14, 1906; length of chain, 22.65 feet. Prior to this date a staff gage was used having the same datum. The gages were read by J. B. Blankenship. The bench mark is a vertical standard Geological Survey iron post, set on the left bank about 75 feet downstream from the bridge; elevation, 23.85 feet above the datum of the gage.

Discharge measurements of White River near Dragon, Utah, in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 17	R. I. Meeker	72	184	3.60	587
April 18	do	73	198	3.78	679
May 13	do	80	506	6.60	2,310
June 24	do	89	631	6.20	1,950
July 19	T. E. Brick	72	285	4.28	931

Daily gage height, in feet, of White River near Dragon, Utah, for 1906.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	4.00	4.85	6.75	5.12	3.50	3.85	3.50
2	3.90	4.82	6.55	5.12	3.80	3.88	3.58
3	3.80	4.65	6.60	5.00	3.75	3.95	3.55
4	3.70	4.48	6.58	4.92	3.68	4.20	3.50
5	3.60	4.48	6.42	4.80	3.65	3.85	3.52
6	3.60	4.80	6.52	4.65	3.58	3.65	3.55
7	3.60	5.35	6.78	4.65	3.50	3.55	3.60
8	3.60	5.45	6.88	5.40	3.50	3.52	3.50
9	3.60	5.55	6.30	4.68	3.50	3.50	3.45
10	3.60	5.95	6.12	4.62	3.40	3.42	3.48
11	3.60	6.38	6.38	4.52	3.32	3.40	3.45
12	3.60	6.10	6.50	4.50	3.30	3.38	3.45
13	3.60	6.70	6.68	4.50	3.40	3.35	3.40
14	3.60	6.30	7.00	4.48	4.20	3.30	3.40
15	3.60	6.00	7.20	4.62	3.75	3.70	3.40
16	3.60	5.80	7.35	4.60	3.68	5.15	3.45
17	3.60	6.02	7.38	4.42	3.90	5.20	3.40
18	3.75	6.30	7.40	4.32	3.80	4.15	3.38
19	4.30	6.45	7.52	4.30	4.65	3.95	3.35
20	4.40	6.62	7.32	4.22	4.25	3.80	3.40
21	4.05	6.70	6.60	4.15	3.65	3.72	3.40
22	4.25	7.00	6.45	4.05	3.75	3.80	3.42
23	4.55	7.05	6.32	3.98	3.60	3.75	3.45
34	4.70	7.22	6.25	3.90	3.58	3.68	3.42
25	4.95	7.90	6.10	3.85	3.48	3.65	3.42
26	4.95	7.00	5.75	3.75	3.40	3.60	3.45
27	4.90	6.75	5.58	3.70	3.38	4.10	3.48
28	4.90	6.50	5.55	3.68	3.30	3.95	3.45
29	4.70	6.92	5.45	3.75	3.35	3.80	3.40
30	4.65	7.25	5.38	3.55	3.32	3.72	3.45
31	.....	7.42	.....	3.45	3.42	.....	3.48

Rating table for White River near Dragon, Utah, for 1906.

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.*
3.30	505	4.10	815	4.90	1,200	5.70	1,665	7.00	2,560
3.40	540	4.20	860	5.00	1,255	5.80	1,730	7.20	2,710
3.50	575	4.30	905	5.10	1,310	5.90	1,795	7.40	2,860
3.60	610	4.40	950	5.20	1,365	6.00	1,860	7.60	3,010
3.70	650	4.50	1,000	5.30	1,420	6.20	1,990	7.80	3,170
3.80	690	4.60	1,050	5.40	1,480	6.40	2,130		
3.90	730	4.70	1,100	5.50	1,540	6.60	2,270		
4.00	770	4.80	1,150	5.60	1,600	6.80	2,410		

NOTE.—The above table is applicable only for open-channel conditions. It is based on 5 discharge measurements made during 1906 and is fairly well defined. The high water of May caused a great change in area at the measuring section, but did not materially alter the relation of discharge to gage height.

Monthly discharge of White River near Dragon, Utah, for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
April	1,230	610	804	47,800
May	3,250	990	2,000	123,000
June	2,950	1,470	2,230	133,000
July	1,480	558	949	58,400
August	1,080	505	627	38,600
September	1,360	505	707	42,100
October	610	522	560	34,400
The period	.....	.....	.....	477,000

NOTE.—The above values are good.

MARVINE CREEK NEAR BUFORD, COLO.

This station was established July 27, 1903. It is located at a point where the stream is crossed by a large aspen log. The station is 10 miles from Buford, the nearest post-office, and is about 35 miles from Meeker. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 58, where are given also references to publications that contain data for previous years.

Discharge measurements of Marvine Creek near Buford, Colo., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 19	A. A. Weiland	28	45	2.30	201
June 5	do	28	48	2.37	230
June 25	do	28	43	2.50	258
July 6	do	28	46	2.36	245
July 19	do	28	38	2.25	148
August 5	do	28	36	2.10	129
August 28	do	28	38	2.15	137

Daily gage height, in feet, of Marvine Creek near Buford, Colo., for 1906.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	1.95	2.32	2.40	2.18	2.20	2.18	2.10
2	.....	1.95	2.35	2.38	2.18	2.22	2.18	2.10
3	.....	2.00	2.35	2.32	2.18	2.25	2.18	2.10
4	.....	2.05	2.35	2.32	2.18	2.18	2.18	2.10
5	.....	2.10	2.38	2.32	2.18	2.18	2.18	.....
6	.....	2.15	2.40	2.35	2.18	2.18	2.18	.....
7	.....	2.18	2.30	2.38	2.18	2.18	2.18	.....
8	.....	2.20	2.28	2.38	2.12	2.15	2.15	.....
9	.....	2.22	2.32	2.32	2.12	2.15	2.15	.....
10	.....	2.22	2.38	2.32	2.12	2.15	2.15	.....
11	.....	2.22	2.42	2.28	2.12	2.15	2.15	.....
12	.....	2.22	2.48	2.22	2.12	2.15	2.15	.....
13	.....	2.20	2.52	2.15	2.12	2.15	2.15	.....
14	.....	2.22	2.58	2.12	2.12	2.20	2.15	.....
15	1.90	2.30	2.68	2.10	2.12	2.22	2.15	.....
16	1.95	2.35	2.75	2.10	2.12	2.20	2.15	.....
17	1.95	2.35	2.70	2.10	2.18	2.20	2.15	.....
18	1.95	2.35	2.65	2.10	2.18	2.18	2.15	.....
19	1.95	2.35	2.65	2.10	2.15	2.15	2.15	.....
20	1.98	2.35	2.65	2.15	2.18	2.18	2.15	.....
21	1.98	2.38	2.55	2.22	2.18	2.18	2.12	.....
22	2.02	2.38	2.65	2.20	2.18	2.18	2.12	.....
23	2.10	2.30	2.65	2.22	2.18	2.18	2.12	.....
24	2.10	2.32	2.55	2.20	2.18	2.18	2.12	.....
25	2.02	2.28	2.50	2.18	2.18	2.18	2.12	.....
26	1.95	2.28	2.50	2.18	2.18	2.20	2.12	.....
27	1.95	2.32	2.55	2.18	2.18	2.18	2.12	.....
28	2.00	2.38	2.48	2.18	2.18	2.18	2.12	.....
29	1.98	2.35	2.45	2.18	2.18	2.18	2.10	.....
30	1.95	2.35	2.42	2.18	2.18	2.18	2.10	.....
31	.....	2.35	.....	2.20	2.20	.....	2.10	.....

NOTE.—Gage heights for April somewhat uncertain; those for May 1 to 5 interpolated.

Rating table for Marvine Creek near Buford, Colo.

APRIL 19, 1905, TO JULY 12, 1906.

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.*
1.70	74	2.00	126	2.30	205	2.50	269	2.70	339
1.80	89	2.10	150	2.40	235	2.60	304	2.80	377
1.90	106	2.20	177						

NOTE.—The above table is applicable only for open-channel conditions. It is based on discharge measurements made during 1904–1906 and is well defined between gage heights 1.8 feet and 2.5 feet. From July 13 to November 4, 1906, the following table was used: Gage height, 2.10 feet; discharge, 123 second-feet. Gage height, 2.20 feet; discharge, 146 second-feet. Gage height, 2.30 feet; discharge, 170 second-feet.

Monthly discharge of Marvine Creek near Buford, Colo., for 1906.

[Drainage area, 50 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Sec. ft. per sq. mile.	Depth in inches.
April 15–30	150	106	123	3,900	2.46	1.46
May	229	116	191	11,700	3.82	4.40
June	358	199	268	15,900	5.36	5.98
July	235	123	167	10,300	3.34	3.85
August	146	128	137	8,420	2.74	3.16
September	158	134	141	8,390	2.82	3.15
October	141	123	133	8,180	2.66	3.07
The period				66,800		

NOTE.—Values are rated as follows: April, and August to October, fair; May to July, good.

DUCHESNE RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Duchesne River rises in the high peaks of the Uinta and Wasatch mountains, flows in a general southeasterly direction, and enters Green River 3 miles above the mouth of the White. It is a very crooked stream, swinging back and forth across its valley, its course marked by a thick line of cottonwoods.

The principal tributaries of the Duchesne are Strawberry, East, and Lake creeks and Uinta River. From the mouth of Strawberry Creek down to Lake Creek the valley of the Duchesne averages 2 miles in width and is bordered on both sides by sandstone bluffs approximately 200 feet high. The cliffs on the northern side of the river are capped by a heavy deposit of coarse river gravel and cobblestones.

Strawberry Creek, the main upper tributary of the Duchesne, drains an area of 1,166 square miles. The stream rises in the Uinta Mountains and the run-off is derived chiefly from melting snow except during the late summer, when the flow comes from small springs well distributed over the entire drainage basin. Numerous tributaries enter the stream, particularly from the north and west, Indian, Bryants Fork, Mud, Horse, Sugar Spring, and Co-op creeks being the

principal ones. They are all short and fall rapidly until they reach the valley, through which they flow sluggishly in well-defined channels. The main stream traverses the valley from north to south and is very sluggish. Very little sediment is carried by the stream at any stage. The average elevation of Strawberry Valley is 7,500 feet, which is rather high for agricultural purposes but is excellently adapted to grazing. Indian Creek drains a small portion of the southern slopes of the Uinta Mountains. Its basin comprises smooth, rolling hills, fairly well timbered with pine and aspen. The normal flow is derived chiefly from springs. The greater part of the precipitation is in the form of snow, which covers the ground for six or eight months each year.

Uinta River and its principal tributary, Whiterocks River, have their sources in a series of lakes in the Uinta Mountains, fed by the snow that exists the year round in the canyons and on the high slopes. The upper drainage area of these streams is very mountainous and difficult of access. After leaving their canyons, 7 or 8 miles above the Indian agency at Whiterocks, the rivers flow southeastward, uniting in various channels between the agency and Fort Duchesne, from which point they flow in one channel, entering Duchesne River 6 miles below, near the Ouray Indian school. Pole, Farm, and Dry Gulch creeks are small tributaries of the Uinta.

DUCHESNE RIVER NEAR MYTON, UTAH.

This station, established originally October 26, 1899, was reopened April 1, 1906, in cooperation with the United States Indian Service. It was discontinued July 10, 1906. The gage was read by H. Calvert. The conditions at this station and the bench mark are described in Water-Supply Paper No. 133, page 113.

The following measurement was made May 9, 1906:

Width, 118 feet; area, 744 square feet; gage height, 7.60 feet; discharge, 2,760 second-feet.

Daily gage height, in feet, of Duchesne River near Myton, Utah, for 1906.

Day.	Apr.	May.	June.	July.	Day.	Apr.	May.	June.	July.
1	5.50	6.72	7.85	7.88	17	5.85	7.90	10.05	.....
2	5.40	6.62	7.70	8.28	18	6.02	7.80	9.65	.....
3	5.40	6.65	7.85	8.08	19	6.12	7.85	9.25	.....
4	5.40	6.82	8.05	7.98	20	6.25	8.10	9.05	.....
5	5.40	7.20	8.20	7.90	21	6.42	8.40	8.98	.....
6	5.44	7.45	8.50	7.80	22	6.56	8.70	9.00	.....
7	5.44	7.50	8.30	7.72	23	6.78	8.85	8.70	.....
8	5.42	7.52	7.95	7.68	24	6.90	8.90	8.30	.....
9	5.50	7.62	7.95	7.68	25	6.90	8.70	7.95	.....
10	5.58	7.78	8.25	7.60	26	6.85	8.50	7.95	.....
11	5.60	7.92	8.80	.....	27	6.62	8.30	7.95	.....
12	5.61	8.15	9.30	.....	28	6.52	8.45	7.90	.....
13	5.65	8.35	9.85	.....	29	6.62	8.52	7.75	.....
14	5.62	8.30	10.15	.....	30	6.80	8.30	7.65	.....
15	5.60	8.00	10.10	.....	31	.....	8.05	.....	.....
16	5.66	7.90	10.10	.....					

Rating table for Duchesne River near Myton, Utah, for 1904 and 1906.

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.*
5.40	423	6.20	1,005	7.00	1,890	7.80	3,040	9.20	5,510
5.50	484	6.30	1,100	7.10	2,020	7.90	3.205	9.40	5,890
5.60	548	6.40	1,200	7.20	2,150	8.00	3,375	9.60	6,270
5.70	615	6.50	1,305	7.30	2,290	8.20	3,715	9.80	6,650
5.80	685	6.60	1,415	7.40	2,430	8.40	4,070	10.00	7,030
5.90	760	6.70	1,530	7.50	2,575	8.60	4,430	10.20	7,410
6.00	840	6.80	1,650	7.60	2,725	8.80	4,790		
6.10	920	6.90	1,770	7.70	2,880	9.00	5,150		

NOTE.—The above table is applicable only for open-channel conditions. It is based on 13 discharge measurements made during 1904 and 1 during 1906, and is well defined.

Monthly discharge of Duchesne River near Myton, Utah, for 1906.

[Drainage area, 2,750 square miles]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Sec.-ft. per sq. mile.	Depth in inches.
April	1,770	423	893	53,100	0.325	0.36
May	4,970	1,440	3,320	204,000	1.21	1.40
June	7,320	2,800	4,520	269,000	1.64	1.83
July 1-10	3,850	2,720	3,140	62,300	1.14	.42
The period				588,000		

NOTE.—The above values are excellent.

STRAWBERRY RIVER IN STRAWBERRY VALLEY, UTAH.

This station was established May 2, 1903, and discontinued July 12, 1906. It is located in the canyon about one-fourth mile above the junction of Strawberry and Indian creeks, and is somewhat inaccessible, the nearest settlement being Heber, 40 miles away. The chief object of the station is the determination of the amount of water available for storage in Strawberry Valley. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 61, where are given also references to publications that contain data for previous years.

Discharge measurements of Strawberry River in Strawberry Valley, Utah, in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
January 7 [a]	A. B. Larson	23	38	2.13	36.1
January 10 [b]	do	22	37	2.15	31.7
January 13 [c]	do	21	38	2.25	33.7
January 15 [d]	do	21	25	1.61	13.7
January 16 [d]	do	21	27	1.89	18.0
January 18 [e]	do	20	36	2.65	25.8
January 22 [e]	do	20	35	2.50	22.8

[a] Ice 12 to 18 inches thick.
[b] Ice 15 inches thick.
[c] Ice 18 inches thick.
[d] Water backed by snow, ice 18 inches thick.
[e] Water over top of ice.

Discharge measurements of Strawberry River in Strawberry Valley, Utah, in 1906—Cont'd.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
February 12	H. S. Kleinschmidt	16	15	2.65	34.4
February 18	do	16	15	2.70	30.4
March 10[a]	do	16	14	3.25	21.0
March 21[b]	do	16	16	3.50	19.0
April 13	H. W. Sheley	20	20	3.45	18.0
April 15	A. B. Larson	35	86	3.45	131
April 19	do	49	132	4.05	285
April 20	do	52	123	3.64	345
April 21[c]	do	58	168	3.55	470
April 22	do	59	211	4.15	637
April 23	do	58	190	3.86	552
April 27	do	58	144	3.12	365
April 29	do	59	222	4.34	694
May 3	do	62	270	4.93	874
May 4	do	63	297	5.32	984
May 7	do	61	250	4.70	783
June 18	do	60	160	2.65	241
July 12	Thos. Grieve	60	74	1.98	106

[a] Six inches of water over ice. [b] One inch of water over ice. [c] Channel clear of ice.

Daily gage height, in feet, of Strawberry River in Strawberry Valley, Utah, for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	.....	2.54	.....	3.60	3.81	3.48	2.11	17	2.50	2.68	3.20	3.32	4.13	2.80
2	.....	2.53	.....	3.50	4.02	3.48	2.05	18	2.65	2.70	3.28	3.28	4.12	2.68
3	.....	2.53	.....	3.45	4.60	3.52	.....	19	2.57	2.70	3.35	4.13	4.26	2.62
4	.....	2.55	.....	3.40	5.15	3.57	2.05	20	2.60	.....	3.40	3.53	4.51	2.58
5	.....	2.55	.....	.....	5.30	3.70	.....	21	2.49	.....	3.50	3.48	4.66	2.50
6	.....	2.55	.....	.....	4.94	3.74	2.00	22	2.50	.....	3.55	3.77	4.61	2.42
7	2.13	2.59	.....	.....	4.62	3.42	.....	23	2.53	.....	3.59	3.94	4.52	2.38
8	2.14	2.60	.....	.....	4.58	3.18	1.95	24	2.59	.....	.....	4.14	4.49	.....
9	2.07	2.62	3.22	.....	4.61	3.05	.....	25	2.60	.....	.....	4.04	4.37	2.30
10	2.15	2.63	3.25	.....	4.56	3.12	1.95	26	2.59	.....	.....	3.39	4.07	2.20
11	2.18	2.66	.....	.....	4.56	3.15	.....	27	2.56	.....	.....	3.37	4.24	.....
12	2.22	2.65	3.25	.....	4.97	3.18	1.90	28	2.57	.....	.....	3.85	4.50	.....
13	2.25	2.63	3.31	.....	5.34	3.22	.....	29	2.54	.....	.....	4.26	4.52	2.28
14	1.98	2.63	.....	2.95	4.83	3.18	.....	30	2.53	.....	.....	3.89	4.12	2.18
15	1.61	2.64	3.28	3.34	4.18	2.98	.....	31	2.53	.....	3.70	.....	3.72	.....
16	1.89	2.70	3.17	3.38	4.18	2.91	.....							

NOTE.—Ice conditions prevailed from January 1 to April 20, 1906; during this period the gage was read to water surface through a hole in the ice. The following comparative readings were made:

Comparative ice and water readings.

Date.	Water surface.	Top of ice.	Thickness of ice.	Date.	Water surface.	Top of ice.	Thickness of ice.
	Feet.	*Feet.*	*Feet.*		*Feet.*	*Feet.*	*Feet.*
January 9	2.07	2.25	1.3 to 1.7	January 17	2.5	2.5	1.5
January 12–13	.....	.....	1.5	January 21–30	(a)	.....	1.6
January 14	1.98	2.4	1.4	February 1	2.54	2.7	1.7
January 15	1.61	2.5	1.5	February 12–19	.....	.....	1.8
January 16	1.89	2.6	1.5	March 9	.....	.....	2.0

[a] Water surface 1 inch below top of ice.

From March 9 to 19, there was about 0.5 foot of water and slush on top of ice, this condition having probably existed from about February 25; on March 22 this thickness was 0.8 foot. April 17 and 18 the ice was clearing away, and formed a gorge below the gage April 19; creek clear of ice April 20.

Rating table for Strawberry River in Strawberry Valley, Utah, for 1906.

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.*
1.90	92	2.50	207	3.10	351	3.70	511	4.60	770
2.00	109	2.60	229	3.20	377	3.80	539	4.80	830
2.10	127	2.70	252	3.30	403	3.90	567	5.00	892
2.20	146	2.80	276	3.40	430	4.00	595	5.20	954
2.30	166	2.90	300	3.50	457	4.20	652	5.40	1,017
2.40	186	3.00	325	3.60	484	4.40	710		

NOTE.—The above table is applicable only for open-channel conditions. It is based on 13 discharge measurements made during 1905–6, and is well defined.

Monthly discharge of Strawberry River in Strawberry Valley, Utah, for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
January	36	14	28.0	1,720
February	34	25	30.0	1,670
March	24	19	20.4	1,250
April	669	18	228	13,600
May	998	517	738	45,400
June	522	142	305	18,100
July 1–12	129	92	108	2,570
The period				84,300

NOTE.—Values are rated as follows: January to April, good; May to July, excellent.

INDIAN CREEK IN STRAWBERRY VALLEY, UTAH.

This station was established April 5, 1905, and was discontinued July 12, 1906. It is located in the canyon about 250 feet above the junction of the creek with Strawberry Creek. It is about 1 mile below the point where Indian Creek leaves Indian Creek Valley and enters the canyon, and is 40 miles from Heber, the nearest post-office. The records will show the amount of water that can be diverted from Indian Creek into the Strawberry Valley storage reservoir. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 64.

Discharge measurements of Indian Creek in Strawberry Valley, Utah, in 1906.

Date.	Hydrographer.	Width.	Area of section.	Thickness of ice.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Feet.*	*Sec.-ft.*
January 7	A. B. Larson	14	19	1.5-2.1	1.35	11.2
January 10	do	14	18	1.6	1.30	10.9
January 15	do	14	14	1.7	1.12	7.6
January 16	do	14	13	.....	1.09	7.7
January 26	do	14	12	1.75	1.00	6.7
February 2	do	13	12	1.9	1.01	7.8
February 13	H. S. Kleinschmidt	12	6	.....	1.31	12.2
February 18	do	14	7	.....	1.30	12.4
March 12	do	14	7	.....	1.17	8.4
April 4	H. W. Sheley	14	18	.....	1.10	16.8
April 15	A. B. Larson	14	32	1.0-1.7	2.54	29.5
April 18	do	16	36	0.8-1.5	2.62	51.4
April 20	do	16	31	.....	2.06	43.5
April 21	do	16	29	(a)	1.50	51.3
April 22	do	16	37	.....	1.87	88
April 24	do	16	43	.....	2.15	112
April 27	do	16	24	.....	1.39	42.3
April 28	do	16	31	.....	1.77	83
April 28	do	16	40	.....	2.11	123
May 2	do	16	46	.....	2.55	182
May 3	do	16	43	.....	2.40	156
May 3	do	22	59	.....	2.72	168
May 7	do	20	54	.....	2.58	166
May 12	do	22	68	.....	3.13	247
May 14	do	22	64	.....	2.82	206
May 14	do	22	58	.....	2.70	202
May 15	do	16	45	.....	2.55	182
May 26	do	16	40	.....	2.25	142
July 12	Thos. Grieve	16	17	.....	1.30	37.7

[a] Channel clear of ice.

Daily gage height, in feet, of Indian Creek in Strawberry Valley, Utah, for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	.....	0.95	.....	1.45	1.73	1.90	1.35	17	1.06	1.30	0.98	3.04	2.54	1.45
2	.....	1.01	.....	1.30	2.10	1.90	1.35	18	1.04	1.30	.97	2.83	2.55	1.48
3	.....	1.00	.....	1.30	2.33	1.84	.....	19	1.05	1.27	.97	2.47	2.54	1.48
4	.....	1.02	.....	1.10	[b]2.72	1.80	1.35	20	1.04	(a)	.98	1.98	2.63	1.48
5	.....	1.05	.....	.....	[b]2.80	1.82	.....	21	1.09	.....	.98	1.42	2.66	1.42
6	.....	1.05	.....	.....	[b]2.55	1.88	1.3	22	1.03	.....	.98	1.59	2.65	1.40
7	1.35	1.10	.....	.....	2.50	1.72	.....	23	1.02	.....	1.00	1.78	2.54	1.40
8	1.34	1.15	.....	.....	2.55	1.60	1.30	24	1.01	.....	.....	1.94	2.51	.....
9	1.14	1.20	.....	.....	2.65	1.60	.....	25	1.00	.....	.....	1.84	2.41	1.40
10	1.30	1.25	1.00	.....	2.63	1.62	1.25	26	1.00	.....	.....	1.49	2.24	1.40
11	1.32	1.30	.....	.....	2.64	1.58	.....	27	.99	.....	.....	1.60	2.28	.....
12	1.45	1.31	1.00	.....	2.99	1.52	1.30	28	.99	.....	.....	1.83	2.48	.....
13	1.57	1.31	1.00	3.70	3.15	1.55	.....	29	.96	.....	.....	2.06	2.35	1.40
14	1.08	1.31	.....	2.48	2.77	1.52	.....	30	.95	.....	.....	1.86	2.18	1.35
15	1.12	1.31	.....	2.69	2.51	1.52	.....	31	.95	.....	1.57	.....	1.95	.....
16	1.09	1.35	.98	2.91	2.55	1.50	.....							

[a] Gage height fell uniformly February 20 to March 8. [b] Backwater from Strawberry River.

Comparative ice and water readings.

NOTE.—Ice conditions prevailed from January 1 to April 20, 1906; during this period the gage was read to water surface through a hole in the ice. The following comparative readings were made:

Date.	Water surface.	Top of ice.	Thickness of ice.	Date.	Water surface.	Top of ice.	Thickness of ice.
	Feet.	*Feet.*	*Feet.*		*Feet.*	*Feet.*	*Feet.*
January 8	1.34	2.4	1.5-2.0	January 16	1.09	2.5	.....
January 9	1.14	2.4	.....	January 17-18	[a] 1.06	2.5	.....
January 10	1.30	2.4	.....	February 1	.95	2.6	1.9
January 11	1.32	2.4	.....	February 12-19	.....	.....	2.1
January 14	1.08	2.6	1.6	March 9	.....	.....	2.3
January 15	1.12	2.4	.....	April 4	.....	.....	3.0

[a] Approximate.

Water 0.3 to 0.7 foot over top of ice April 13 to 20.

Rating table for Indian Creek in Strawberry Valley, Utah, for 1906.

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.*
1.3	36	1.7	72	2.1	117	2.5	167	2.9	222
1.4	44	1.8	83	2.2	129	2.6	180	3.0	236
1.5	53	1.9	94	2.3	141	2.7	194	3.1	250
1.6	62	2.0	105	2.4	154	2.8	208		

NOTE.—The above table is applicable only for open-channel conditions. It is based on discharge measurements made during 1905-6 and is well defined.

Monthly discharge of Indian Creek in Strawberry Valley, Utah, for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
January	12	7	9.1	560
February	12	8	10.5	583
March	10	8	8.4	516
April	112	15	44.9	2,670
May	257	75	165.0	10,100
June	94	40	59.0	3,510
July (1–12)	40	32	36.8	876
The period				18,800

NOTE.—Values are rated as follows: January to April, good; May to July, excellent.

UINTA RIVER AT FORT DUCHESNE, UTAH.

This station, established originally September 14, 1899, was reopened April 21, 1906, in cooperation with the United States Indian Service. On June 13, the bridge and gage were washed away, and the station was abandoned. The gage was read during 1906 by Bert Marsing. The conditions at this station and the bench marks are described in Water-Supply Paper No. 133, page 106.

Discharge measurements of Uinta River at Fort Duchesne, Utah, in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 21	R. I. Meeker	52	185	3.08	256
May 8	E. O. Greene	59	230	3.70	484

Daily gage height, in feet, of Uinta River at Fort Duchesne, for 1906.

Day.	Apr.	May.	June.	Day.	Apr.	May.	June.
1		3.05	4.45	17		4.1	
2		3.05	4.35	18		4.05	
3		3.05	4.55	19		4.25	
4		3.1	4.85	20		4.65	
5		3.25	5.45	21	3.05	5.15	
6		3.5	5.5	22	3.25	5.6	
7		3.45	5.2	23	3.4	5.75	
8		3.55	5.1	24	3.3	5.85	
9		3.75	5.45	25	3.3	5.25	
10		4.0	5.75	26	3.25	4.85	
11		4.25	6.75	27	3.15	4.6	
12		4.55	6.8	28	3.0	5.0	
13		4.75	7.0	29	3.15	4.95	
14		4.3		30	3.15	4.6	
15		4.4		31		4.45	
16		4.1					

PRICE RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Price River rises in the Wasatch Mountains, in the southeastern part of Utah County, flows in a general southeasterly direction, and unites with Green River at a point about 14 miles above Greenriver, 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 region is extremely rough and rugged. The principal rock is a loose and badly disintegrated sandstone. There is but little soil and practically no vegetation except for small groves of scrubby cedar and a few scattered pines. The original scanty 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 are the main tributaries. They are both short, steep streams and enter the river from the west almost at right angles.

PRICE RIVER NEAR HELPER, UTAH.

This station was established February 21, 1904. It is located on the upper side of the ford near the settlement of Spring Glen, about 3 miles south of Helper, Utah, and 350 feet west of the main line of the Denver and Rio Grande Railroad.

During 1906 a cable and car were installed, from which high-water measurements are made. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 67, where are given also references to publications that contain data for previous years.

Discharge measurements of Price River near Helper, Utah, in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 19	H. S. Kleinschmidt	54	134	4.70	449
May 18	Thos. Grieve	66	216	5.70	1,220
May 31	do	64	195	5.50	870
June 30	do	59	106	4.20	187
October 18	do	42	102	3.35	30.2

Daily gage height, in feet, of Price River near Helper, Utah, for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.1	3.2	3.2	4.0	4.5	5.2	4.1	4.0	3.6	3.4	3.6	3.3
2	3.1	3.2	3.3	3.8	4.4	5.2	4.1	4.5	3.6	3.4	3.5	3.3
3	3.1	3.3	3.2	3.6	4.5	5.2	4.1	4.0	3.6	3.4	3.5	3.3
4	3.1	3.3	3.2	3.8	4.6	5.2	4.0	4.0	3.5	3.4	3.4	3.3
5	3.1	3.3	3.2	3.6	5.0	5.2	4.0	4.0	3.5	3.4	3.4	3.3
6	3.1	3.3	3.3	3.6	5.2	5.1	4.0	4.0	3.5	3.4	3.4	3.3
7	3.1	3.3	3.3	4.0	5.2	5.1	4.0	3.9	3.5	3.4	3.4	3.3
8	3.2	3.3	3.3	4.0	5.2	4.0	4.0	3.9	3.4	3.4	3.4	3.3
9	3.2	3.3	3.3	4.2	5.3	4.0	4.0	3.8	3.4	3.4	3.4	3.4
10	3.2	3.3	3.4	4.2	5.4	4.9	4.0	3.8	3.4	3.4	3.4	3.3
11	3.1	3.3	3.3	4.2	5.5	4.9	3.9	3.8	3.4	3.4	3.4	3.3
12	3.1	3.3	3.3	4.2	5.8	4.9	3.9	3.8	3.4	3.4	3.4	3.3
13	3.1	3.3	3.3	4.1	5.8	4.9	3.9	3.8	3.4	3.4	3.4	3.3
14	3.1	3.3	3.3	4.1	5.6	4.9	3.9	4.2	3.4	3.4	3.4	3.3
15	3.1	3.3	3.3	4.3	5.5	4.8	3.9	3.9	3.5	3.4	3.4	3.3
16	3.1	3.3	3.2	4.4	5.5	4.8	3.9	3.9	3.6	3.4	3.4	3.3
17	3.1	3.3	3.2	4.6	5.7	4.7	3.9	3.9	3.6	3.4	3.4	3.3
18	3.1	3.3	3.2	4.7	5.7	4.6	4.7	3.8	3.6	3.4	3.4	3.3
19	3.1	3.3	3.1	4.6	5.7	4.6	5.9	3.8	3.5	3.4	3.4	3.3
20	3.1	3.4	3.3	4.6	6.0	4.5	4.0	3.8	3.5	3.4	3.3	3.3
21	3.2	3.3	3.2	4.7	6.3	4.5	3.7	3.9	3.5	3.4	3.3	3.3
22	3.2	3.3	3.3	4.7	6.3	4.4	3.7	3.9	3.5	3.4	3.3	3.3
23	3.1	3.2	3.3	4.8	6.2	4.4	3.7	3.7	3.5	3.4	3.3	3.3
24	3.1	3.2	3.6	4.9	6.2	4.3	4.8	3.7	3.5	3.4	3.3	3.4
25	3.2	3.2	3.7	4.8	5.8	4.3	3.9	3.6	3.5	3.4	3.3	3.4
26	3.2	3.2	3.7	4.7	5.6	4.3	3.9	3.6	3.5	3.4	3.3	3.4
27	3.3	3.3	3.6	4.6	5.6	4.2	3.8	3.6	3.4	3.4	3.3	3.3
28	3.3	3.3	3.8	4.5	5.6	4.2	3.8	3.6	3.4	3.4	3.3	3.3
29	3.3	.....	4.1	4.5	5.6	4.2	4.0	3.5	3.4	3.4	3.3	3.3
30	3.3	.....	4.0	4.5	5.5	4.1	4.0	3.5	3.4	3.4	3.3	3.3
31	3.2	.....	4.0	.....	5.3	.....	4.0	3.5	.....	3.4	.....	3.3

Rating table for Price River near Helper, Utah, for 1905–6.

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.*
3.00	1	3.60	60	4.20	219	4.80	508	5.80	1,145
3.10	4	3.70	78	4.30	260	4.90	563	6.00	1,295
3.20	9	3.80	98	4.40	305	5.00	620	6.20	1,450
3.30	18	3.90	122	4.50	354	5.20	740		
3.40	30	4.00	150	4.60	404	5.40	870		
3.50	44	4.10	182	4.70	455	5.60	1,005		

NOTE.—The above table is applicable only for open-channel conditions. It is based on discharge measurements made during 1904–1906 and is well defined.

Monthly discharge of Price River near Helper, Utah, for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
January	18	4	7.1	437
February	30	9	16.5	916
March	182	4	38.6	2,370
April	563	60	290	17,300
May	1,530	305	949	58,400
June	740	150	446	26,500
July	1,220	78	191	11,700
August	354	44	113	6,950
September	60	30	42.0	2,510
October	30	30	30.0	1,840
November	60	18	27.5	1,640
December	30	18	19.5	1,200
The year	1,530	4	181	132,000

NOTE.—Values are rated as follows: April to June, good; July and August, fair; remainder of 1906, approximate.

GRAND RIVER DRAINAGE BASIN.

AREA AND EXTENT.

Grand River and its tributaries drain an area comprising approximately 26,180 square miles, of which 22,290 are in Colorado and the rest in eastern Utah. On the east and southeast the basin is limited by the high ranges of the Continental Divide, which separate it from the basins of Platte and the Arkansas rivers; on the north by the White River and Book Cliffs plateaus; on the west by the canyon district of the Colorado.

The tributaries include innumerable small creeks and five large streams—Blue, Eagle, Roaring Fork, Gunnison, and Dolores rivers.

The main river is described first and the tributaries afterwards in their order, from the head down.

GRAND RIVER.

DESCRIPTION OF BASIN.

Grand River rises on the western slopes of the Rocky Mountains among the high peaks of the Front Range, flows in a general southwesterly direction across Colorado into Utah, and unites with Green River to form the Colorado. From source to mouth the total distance traversed is about 350 miles.

In most respects the Grand is a typical mountain stream, flowing throughout its course in a succession of deep canyons, with precipitous and ofttimes perpendicular walls varying 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, consists of a long stretch of the western portion of the

Continental Divide, extending from the north-central portion of Colorado southward nearly to the Colorado-New Mexico line, a distance of 260 miles, and separating the waters of the Grand from those of the Platte and Arkansas basins. The area is extremely rugged, elevations ranging from 7,000 to 14,000 feet. Gradients are steep, stream channels are numerous, and tributaries are rapid, the fall varying from 20 to 150 feet. The streams of this region derive their waters chiefly from the snow masses on the Continental Divide and furnish the perennial discharge of the Grand. The intermediate or middle portion of the basin, consisting largely of broken and scoured plateaus of sedimentary origin, contributes a relatively small amount of the run-off, the tributaries being few, and, with the exception of Gunnison River, insignificant. The lower portion of the basin, immediately adjacent to the Colorado-Utah State line, is an arid, much eroded region, furnishing an appreciable run-off, which carries a large amount of sediment.

The largest tributaries of the headwater region are Frazer, Williams Fork, Troublesome, Blue, and Muddy rivers, which add their waters to the Grand before it leaves Middle Park. Eagle River comes in near Eagle, just above the point where the river enters Grand River Canyon, and Roaring Fork unites with it just below the mouth of the canyon at Glenwood Springs. At Grand Junction, Colo., the river receives the waters of its largest tributary, Gunnison River, and thereafter no other stream of importance enters until the Dolores comes in, 15 miles west of the Utah boundary.

A peculiar feature of the drainage is what might be termed its one-sided nature, practically all its important tributaries entering the river from the east. That part of the basin lying north and west of the Grand is much less extensive in area, is lower, and is generally broken and barren, and a considerable portion of the waters of its streams is diverted for irrigation.

The mountainous portion of the basin is still well covered with forests of spruce, quaking aspen, cedar, and piñon, and the forestation of the intermediate basin is fair. The controlling vegetation of the lower basin is sagebrush, chico, and cactus pads, with scattered pines, cedars, and piñons.

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 this is in the form of snow.

Natural storage within the basin is limited to a few small, high, mountain lakes. The stream channels of the upper basin are bordered to some extent by flat bottom lands, which are used as meadows and which are irrigated by a large number of small ditches. In the intermediate basin are a few small reservoirs storing snow and flood waters. A number of pumping plants also draw upon this district.

Irrigation is extensively practiced in the Uncompahgre, Gunnison, and Grand valleys, and a large project now under construction by the Reclamation Service will require 1,200 second-feet of the discharge of Gunnison River. The immense power possibilities of the Grand are at present but little developed.

NORTH FORK OF GRAND RIVER NEAR GRAND LAKE, COLO.

This station was established July 29, 1904. It is located at the highway bridge between Grand Lake and Hot Sulphur Springs, Colo., about 3 miles southwest of Grandlake post-office, in T. 3 N., R. 76 W. The nearest railroad station is at Granby, on the Denver, Northwestern and Pacific, 15 miles distant. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 70, where are given also references to publications that contain data for previous years.

Discharge measurements of North Fork of Grand River near Grandlake, Colo., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 17	M. C. Hinderlider	52	126	4.87	459
June 14	do	54	175	6.00	1,100
June 29	T. E. Brick	49	109	4.70	397
September 10	A. A. Weiland	40	57	3.59	45
December 16	R. I. Meeker	31	66	(a)	37

a Gage height affected by ice.

Daily gage height, in feet, of North Fork of Grand River near Grandlake, Colo., for 1906.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.30	3.98	4.70	4.90	4.05	3.70	3.90	3.70	3.50
2	3.30	3.92	4.82	4.88	4.05	3.70	3.92	3.68	3.50
3	3.30	4.05	4.82	4.75	4.02	3.78	3.88	3.65	3.50
4	3.30	4.15	4.88	4.62	4.00	3.75	3.82	3.65	3.50
5	3.35	4.22	4.98	4.55	4.10	3.72	3.82	3.62	3.48
6	3.40	4.40	5.18	4.50	4.02	3.68	3.82	3.60	3.45
7	3.38	4.35	4.95	4.50	4.00	3.62	3.80	3.58	3.50
8	3.35	4.38	4.68	4.58	3.95	3.60	3.80	3.55	3.50
9	3.35	4.52	4.90	4.55	3.82	3.60	3.78	3.58	3.50
10	3.35	4.70	5.12	4.52	3.80	3.60	3.75	3.60	3.50
11	3.42	4.72	5.52	4.58	3.82	3.60	3.70	3.60	3.50
12	3.45	4.70	5.82	4.60	3.85	3.60	3.70	3.60	3.48
13	3.50	4.62	5.90	4.52	4.00	3.60	3.70	3.60	3.48
14	3.50	4.50	5.90	4.68	4.18	3.60	3.65	3.60	3.48
15	3.52	4.50	5.85	4.65	3.98	3.62	3.65	3.60	3.48
16	3.60	4.72	5.85	4.58	3.90	4.00	3.60	3.55	3.45
17	3.65	4.88	5.88	4.52	3.85	3.85	3.60	3.52	3.40
18	3.65	4.88	5.75	4.48	3.85	3.80	3.60	3.52	3.42
19	3.70	5.00	5.30	4.40	3.88	3.85	3.58	3.52	3.45
20	3.78	5.20	5.02	4.30	3.85	3.95	3.55	3.50	3.40
21	4.02	5.18	4.92	4.30	3.88	4.00	3.60	3.50	3.40
22	4.28	5.18	4.92	4.30	3.88	3.92	3.60	3.50	3.40
23	4.30	5.15	5.00	4.28	3.85	4.00	3.60	3.50	3.40
24	4.22	5.08	4.88	4.25	3.80	4.00	3.60	3.50	3.40
25	4.22	4.95	4.75	4.28	3.80	4.00	3.60	3.50	3.42
26	4.10	4.78	4.75	4.18	3.80	4.02	3.62	3.50	3.40
27	3.95	4.75	4.82	4.12	3.80	4.02	3.68	3.50	3.40
28	4.05	4.95	4.98	4.05	3.75	4.00	3.68	3.50	3.40
29	4.02	5.20	4.78	4.05	3.75	3.98	3.62	3.50	3.40
30	4.08	4.90	4.88	4.05	3.72	3.92	3.70	3.50	3.40
31	.....	4.75	.....	4.00	3.70	.....	3.70	.....	3.40

NOTE.—There was backwater from ice during a portion of November and December; gage heights have been corrected.

Rating table for North Fork of Grand River near Grandlake, Colo., for 1906.

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.*
3.30	20	3.90	99	4.50	298	5.10	570	5.70	910
3.40	26	4.00	123	4.60	339	5.20	625	5.80	970
3.50	35	4.10	152	4.70	382	5.30	680	5.90	1,030
3.60	47	4.20	185	4.80	426	5.40	735		
3.70	62	4.30	221	4.90	472	5.50	790		
3.80	79	4.40	259	5.00	520	5.60	850		

NOTE.—The above table is applicable only for open-channel conditions. It is based on 4 discharge measurements made during 1906 and the form of the 1905 curve. It is well defined above gage height 3.5 feet.

Monthly discharge of North Fork of Grand River near Grandlake, Colo., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
April	221	20	76.8	4,570
May	625	104	388	23,900
June	1,030	373	612	36,400
July	472	123	278	17,100
August	178	62	101	6,210
September	129	47	83.8	4,990
October	104	41	62.9	3,870
November	62	35	42.5	2,530
December	35	26	30.3	1,860
The period				101,000

NOTE.—Values are rated as follows: May to July, excellent; remainder of 1906, good.

GRAND LAKE OUTLET AT GRANDLAKE, COLO.

This station was established July 31, 1904. It is located at the footbridge at the west end of Grand Lake, about one-half mile south of Grandlake post-office, Colo., in sec. 6, T. 3 N., R. 75 W. The nearest railroad station is 18 miles distant, at Granby, on the Denver, Northwestern and Pacific Railway. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 72, where are given also references to publications that contain data for previous years.

Discharge measurements of Grand Lake Outlet, at Grandlake, Colo., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 18	M. C. Hinderlider	109	212	2.80	357
June 15	do	170	444	4.30	1,110
June 29	T. E. Brick	120	204	3.15	472
September 11	A. A. Weiland	110	75	1.80	47
December 16	R. I. Meeker	47	50	1.40	11

Daily gage height, in feet, of Grand Lake Outlet at Grandlake, Colo., for 1906.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.15	1.98	2.82	3.50	2.35	1.75	2.10	1.70	1.45
2	1.20	1.92	2.90	3.48	2.35	1.88	2.05	1.70	1.40
3	1.18	1.90	2.95	3.35	2.35	2.05	2.00	1.70	1.40
4	1.20	1.85	2.92	3.18	2.30	2.05	2.00	1.70	1.42
5	1.20	1.90	3.10	3.20	2.30	2.02	1.98	1.68	1.45
6	1.22	1.95	3.45	3.05	2.25	1.98	1.95	1.65	1.45
7	1.30	2.02	3.20	2.98	2.25	1.95	1.90	1.65	1.45
8	1.32	2.02	2.92	2.90	2.22	1.90	1.90	1.62	1.45
9	1.32	2.12	2.95	2.92	2.20	1.85	1.88	1.60	1.45
10	1.38	2.30	3.30	2.95	2.15	1.80	1.85	1.60	1.45
11	1.40	2.48	3.78	3.02	2.10	1.80	1.85	1.60	1.45
12	1.45	2.58	4.00	3.10	2.10	1.75	1.82	1.58	1.42
13	1.48	2.62	4.28	3.22	2.10	1.75	1.80	1.55	1.40
14	1.50	2.52	4.27	3.35	2.10	1.72	1.75	1.58	1.40
15	1.52	2.42	4.15	3.30	2.10	1.70	1.75	1.55	1.40
16	1.55	2.52	4.28	3.15	2.05	1.88	1.75	1.55	1.40
17	1.58	2.65	4.22	3.00	2.05	1.90	1.72	1.55	1.38
18	1.68	2.80	3.65	2.92	2.00	1.90	1.70	1.55	1.35
19	1.72	2.98	3.48	2.82	2.00	1.95	1.70	1.52	1.35
20	1.75	3.20	3.40	2.78	2.00	1.95	1.70	1.50	1.35
21	1.82	3.25	3.40	2.78	2.00	2.00	1.68	1.45	1.35
22	1.92	3.38	3.32	2.72	2.10	2.05	1.65	1.45	1.35
23	2.02	3.48	3.40	2.72	2.12	2.10	1.65	1.45	1.35
24	2.18	3.35	3.20	2.75	2.08	2.10	1.65	1.45	1.35
25	2.20	3.12	2.98	2.78	2.05	2.08	1.65	1.45	1.35
26	2.15	2.88	2.88	2.68	1.98	2.08	1.65	1.45	1.35
27	2.08	2.82	3.10	2.58	1.90	2.25	1.65	1.45	1.38
28	2.02	2.92	3.22	2.50	1.85	2.25	1.65	1.45	1.40
29	2.00	3.22	3.18	2.48	1.82	2.20	1.70	1.45	1.40
30	2.00	3.15	3.32	2.42	1.80	2.18	1.70	1.45	1.40
31	.....	2.92	.....	2.35	1.75	.....	1.70	.....	1.40

NOTE.—From May 27 to June 14, the gage heights were affected by an obstruction of logs at the outlet of the lake; they have been corrected, but are still liable to slight error.

Rating table for Grand Lake Outlet at Grandlake, Colo., for 1906.

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.*
1.15	3	1.80	47	2.50	224	3.20	515	3.90	890
1.20	4	1.90	64	2.60	260	3.30	565	4.00	945
1.30	7	2.00	84	2.70	298	3.40	615	4.10	1,000
1.40	11	2.10	106	2.80	338	3.50	670	4.20	1,055
1.50	16	2.20	131	2.90	379	3.60	725	4.30	1,110
1.60	23	2.30	159	3.00	420	3.70	780		
1.70	33	2.40	190	3.10	465	3.80	835		

NOTE—The above table is applicable only for open-channel conditions. It is based on 5 discharge measurements made during 1906 and is well defined.

Monthly discharge of Grand Lake Outlet at Grandlake, Colo., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
April	131	3	40.6	2,420
May	659	56	296	18,200
June	1,100	346	628	37,400
July	670	174	402	24,700
August	174	40	107	6,580
September	145	33	79.2	4,710
October	106	28	48.5	2,980
November	33	14	21.0	1,250
December	14	9	11.2	689
The period	.....	.....	.....	98,900

NOTE.—Values are rated as follows: May, July and August, excellent; remainder of 1906, good.

NORTH INLET TO GRAND LAKE AT GRANDLAKE, COLO.

This station was established August 3, 1905, and was discontinued July 22, 1906. It is located at the footbridge which crosses the stream about 100 yards north and 300 yards east of Grandlake post-office in sec. 5, T. 3 N., R. 75 W.

The conditions at this station and the bench marks are described in Water-Supply Paper 175, page 75.

Discharge measurements of North Inlet to Grand Lake at Grandlake, Colo., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 17	M. C. Hinderlider	49	88	2.95	223
June 14	....do	59	162	4.00	644
June 29	T. E. Brick	49	88	3.10	243
September 10	A. A. Weiland	47	39	2.12	28
December 15	R. I. Meeker	8	7.4	.....	8

Daily gage height, in feet, of North Inlet to Grand Lake at Grandlake, Colo., for 1906.

Day.	May.	June.	July.	Day.	May.	June.	July.
1	.....	3.10	3.24	17	2.70	3.72	2.97
2	.....	3.05	3.24	18	2.85	3.64	2.90
3	2.25	3.10	3.20	19	2.95	3.34	2.82
4	2.35	3.12	3.20	20	3.00	3.24	2.77
5	2.48	3.02	3.20	21	3.05	3.22	2.72
6	2.55	2.98	3.16	22	3.20	3.20	2.72
7	2.45	2.95	3.16	23	3.25	3.20	.....
8	2.55	2.88	3.12	24	3.20	3.14	.....
9	2.72	3.08	3.14	25	3.10	3.14	.....
10	2.82	3.50	3.20	26	3.02	3.10	.....
11	2.90	3.75	3.22	27	3.08	3.10	.....
12	2.82	3.90	3.17	28	2.98	3.04	.....
13	2.78	4.00	3.12	29	3.00	3.04	.....
14	2.72	4.00	3.04	30	3.05	3.04	.....
15	2.68	3.74	3.04	31	3.05	.....	.....
16	2.75	3.74	3.04				

GRAND RIVER AT HOT SULPHUR SPRINGS, COLO.

This station was established July 27, 1904. It was located at the highway bridge one-eighth mile below Hot Sulphur Springs, Colo., in sec. 3, T. 1 N., R. 78 W., and is 5 miles above the mouth of Williams Fork River.

On April 16, 1906, the station was removed to a new highway bridge, about 1,000 feet above the old station, where conditions are much more favorable for measurements.

On May 22, a standard wire gage was installed; length of chain, 19.17 feet. The bench mark is a cross cut in the west face of a foundation stone near the southwest corner of the Riverside Bar and Café building, near the east end of the bridge; elevation, 20.04 feet above the datum of the gage.

Discharge measurements of Grand River at Hot Sulphur Springs, Colo., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.		Discharge.
				Old gage.	New gage.	
		Feet.	*Sq. ft.*	*Feet.*	*Feet.*	*Sec.-ft.*
April 14	M. C. Hinderlider	88	97	3.55	1.65	224
April 16	do	98	150	4.10	2.25	520
May 19	do	137	424	7.20	4.40	3,240
May 22	do	148	507	7.85	5.24	3,920
June 16	do	310	831	9.35	6.06	5,360
June 30	T. E. Brick	133	403	6.50	4.12	2,320
September 9	A. A. Weiland	98	148	.....	1.82	286
December 14	R. I. Meeker	92	159	.....	(a)	175

a Gage height affected by ice 0.5 to 1.0 foot thick.

Daily gage height, in feet, of Grand River at Hot Sulphur Springs, Colo., for 1906.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	4.22	2.45	4.05	4.30	2.55	1.90	2.20	1.70
2	4.18	2.45	4.15	4.25	2.60	2.25	2.20	1.70
3	3.98	2.45	4.25	4.05	2.48	2.25	2.15	1.70
4	4.38	2.80	4.10	3.85	2.45	2.15	2.15	1.70
5	4.55	2.95	4.30	3.75	2.45	2.00	2.15	1.70
6	4.60	3.10	4.85	3.65	2.40	1.95	2.10	1.70
7	4.50	3.00	4.40	3.60	2.40	1.92	2.08	1.70
8	4.10	3.30	4.10	3.65	2.30	1.85	2.06	1.70
9	4.22	3.40	4.00	3.68	2.20	1.80	2.00	1.72
10	4.40	3.55	4.05	3.65	2.20	1.80	2.00	1.78
11	4.55	3.55	4.85	3.65	2.10	1.80	2.00	1.82
12	4.25	3.40	5.50	3.62	2.10	1.70	2.00	1.78
13	3.90	3.75	6.05	3.70	2.15	1.72	2.00	1.75
14	3.65	3.70	6.05	4.00	2.20	1.75	1.90	1.70
15	3.58	3.60	6.05	3.85	2.40	1.78	1.90	1.70
16	3.92	3.80	6.05	3.65	2.20	2.20	1.85	1.70
17	2.55	4.30	6.00	3.48	2.10	2.20	1.85	1.70
18	2.45	4.35	5.25	3.30	2.10	2.20	1.80	1.70
19	2.65	4.55	4.88	3.18	2.10	2.25	1.80	.....
20	2.50	4.65	4.72	3.10	2.10	2.25	1.80	.....
21	2.72	4.80	4.55	3.00	2.10	2.22	1.75	.....
22	3.05	4.85	4.60	3.00	2.10	2.30	1.75	.....
23	3.20	5.00	4.65	2.90	2.10	2.30	1.80	.....
24	3.40	4.85	4.25	3.20	2.10	2.30	1.80	.....
25	3.00	4.68	3.95	3.15	2.10	2.40	1.80	.....
26	2.90	4.40	3.85	2.90	2.10	2.60	1.80	.....
27	2.50	4.30	4.15	2.70	2.10	2.60	1.75	.....
28	2.65	4.30	4.05	2.70	2.05	2.55	1.75	.....
29	2.45	4.80	4.05	2.60	1.95	2.40	1.75	.....
30	2.65	4.50	4.10	2.60	1.88	2.30	1.75	.....
31	.....	4.15	.....	2.55	1.90	.....	1.70	.....

NOTE.—Gage heights for April 1 to 16 are for the old station; those for April 17 to May 22 are from a temporary staff gage at the new station, having the same datum as the wire gage which was used after May 22.

Rating tables for Grand River at Hot Sulphur Springs, Colo.

MAY 1, 1905, TO APRIL 16, 1906.a

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.*
3.60	240	3.90	360	4.10	450	4.30	560	4.50	680
3.70	280	4.00	400	4.20	500	4.40	620	4.60	750
3.80	320								

a This table is applicable only for open-channel conditions. It is based on discharge measurements made during 1905–6 and is well defined. This table is for the old station.

Rating tables for Grand River at Hot Sulphur Springs, Colo.—Continued.

APRIL 17 TO NOVEMBER 18, 1906.[a]

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.*
1.70	240	2.50	680	3.30	1,375	4.10	2,360	4.90	3,550
1.80	280	2.60	750	3.40	1,480	4.20	2,500	5.00	3,700
1.90	325	2.70	825	3.50	1,590	4.30	2,650	5.20	4,000
2.00	375	2.80	905	3.60	1,710	4.40	2,800	5.40	4,310
2.10	430	2.90	990	3.70	1,830	4.50	2,950	5.60	4,630
2.20	490	3.00	1,080	3.80	1,960	4.60	3,100	5.80	4,950
2.30	550	3.10	1,175	3.90	2,090	4.70	3,250	6.00	5,270
2.40	615	3.20	1,275	4.00	2,220	4.80	3,400	6.20	5,590

[a] This table is applicable only for open-channel conditions. It is based on 7 discharge measurements made during 1906 and is fairly well defined. This table is for the new station.

Monthly discharge of Grand River at Hot Sulphur Springs, Colo., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
April	1,480	234	691	41,100
May	3,700	648	2,160	133,000
June	5,350	2,020	3,210	191,000
July	2,650	715	1,530	94,100
August	750	316	491	30,200
September	750	240	457	27,200
October	490	240	338	20,800
November (1-18)	289	240	248	8,850
The period				546,000

NOTE.—The above values are excellent.

GRAND RIVER NEAR KREMMLING, COLO.

This station was established July 24, 1904. It is located at the mouth or upper end of Gore Canyon, about 3 miles southwest of Kremmling, Colo. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 78, where are given also references to publications that contain data for previous years.

Discharge measurements of Grand River near Kremmling, Colo., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 4	M. C. Hinderlider	110	539	2.62	707
May 21	do	150	2,188	12.28	7,730
June 22	T. E. Brick	141	2,136	11.20	6,540
July 3	do	133	1,791	9.25	4,500
September 9	A. A. Weiland	110	458	2.88	913
October 18	R. I. Meeker	105	307	2.00	657
December 13[a]	do	100	234	1.20	483

[a] River frozen along left bank; slush ice running.

Daily gage height, in feet, of Grand River near Kremmling, Colo., for 1906.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.2	4.7	10.3	9.45	5.1	3.0	2.85	2.05	1.6
2	3.5	4.65	10.4	9.5	5.5	3.1	3.45	2.35	1.3
3	2.85	5.0	10.4	9.15	5.05	4.35	3.45	2.3	1.25
4	3.75	5.35	10.3	8.75	4.85	3.9	3.5	2.1	1.3
5	2.8	6.7	10.55	8.5	4.7	3.55	3.45	2.0	1.5
6	3.4	7.35	11.75	8.3	4.7	3.3	3.25	1.9	1.15
7	4.2	7.2	11.4	8.15	4.9	3.05	3.25	1.6	1.5
8	3.75	7.5	9.7	8.25	4.65	3.0	3.15	1.6	1.25
9	3.7	8.2	9.55	8.15	4.4	2.9	3.05	1.7	1.25
10	4.0	9.2	10.75	8.2	4.15	3.0	2.85	1.6	1.2
11	4.35	9.6	12.3	8.3	4.05	2.95	2.7	1.7	1.2
12	4.3	9.9	13.45	8.45	3.95	2.8	2.65	1.6	1.6
13	3.25	9.65	14.6	8.45	4.0	2.45	2.55	1.3	1.15
14	2.65	8.8	15.25	8.8	4.2	2.5	2.45	1.5	1.15
15	2.8	8.4	15.25	8.9	4.45	2.85	2.3	1.75	1.4
16	3.3	9.3	15.1	8.45	4.2	3.75	2.2	1.8	.6
17	4.55	10.4	14.95	7.8	4.0	4.1	2.15	1.3	.85
18	5.35	10.9	13.7	7.4	3.95	3.75	2.0	.7	.5
19	4.55	11.4	13.0	7.2	3.85	3.65	1.85	.95	.45
20	4.9	12.1	12.5	6.8	3.75	3.9	2.1	.8	.6
21	5.6	12.2	12.0	6.6	3.9	3.8	2.0	.75	.65
22	6.35	12.55	11.5	6.6	4.8	3.7	1.6	1.1	1.0
23	7.2	12.8	11.1	6.5	4.65	3.8	1.9	1.05	.95
24	7.5	12.4	10.85	6.6	4.35	3.7	2.2	1.0	.95
25	6.4	11.85	9.8	6.9	4.1	3.65	2.35	1.35	1.1
26	6.1	11.4	9.55	6.35	3.45	4.1	2.15	1.35	.8
27	5.2	10.5	9.65	5.95	3.45	4.85	2.2	1.0	1.15
28	5.0	10.8	9.75	5.9	3.25	4.55	2.2	.95	1.5
29	5.0	12.05	9.35	5.55	3.05	4.2	2.15	1.4	1.2
30	4.9	12.05	9.2	5.3	3.05	4.0	2.1	1.55	1.1
31	.....	10.6	.....	5.15	3.0	.....	2.05	.....	1.2

NOTE.—These gage heights are liable to error, on account of uncertainties of the gage datum. River frozen after about December 10.

Rating table for Grand River near Kremmling, Colo.

JANUARY 1, 1905, TO JULY 3, 1906.[a]

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.*
0.60	260	1.80	490	3.00	830	4.40	1,330	6.80	2,530
.70	275	1.90	515	3.10	865	4.60	1,410	7.00	2,670
.80	290	2.00	540	3.20	900	4.80	1,490	8.00	3,410
.90	305	2.10	565	3.30	935	5.00	1,570	9.00	4,260
1.00	320	2.20	590	3.40	970	5.20	1,650	10.00	5,210
1.10	340	2.30	620	3.50	1,005	5.40	1,750	11.00	6,270
1.20	360	2.40	650	3.60	1,040	5.60	1,850	12.00	7,390
1.30	380	2.50	680	3.70	1,075	5.80	1,950	13.00	8,600
1.40	400	2.60	710	3.80	1,110	6.00	2,050	14.00	9,900
1.50	420	2.70	740	3.90	1,145	6.20	2,170	15.00	11,220
1.60	440	2.80	770	4.00	1,180	6.40	2,290		
1.70	465	2.90	800	4.20	1,250	6.60	2,410		

JULY 4 TO DECEMBER 10, 1906.[b]

0.70	405	1.80	610	2.90	925	4.00	1,320	6.20	2,360
.80	420	1.90	635	3.00	960	4.20	1,400	6.40	2,480
.90	435	2.00	660	3.10	995	4.40	1,480	6.60	2,600
1.00	450	2.10	685	3.20	1,030	4.60	1,570	6.80	2,720
1.10	465	2.20	710	3.30	1,065	4.80	1,660	7.00	2,850
1.20	485	2.30	740	3.40	1,100	5.00	1,750	8.00	3,530
1.30	505	2.40	770	3.50	1,135	5.20	1,840	9.00	4,300
1.40	525	2.50	800	3.60	1,170	5.40	1,940		
1.50	545	2.60	830	3.70	1,205	5.60	2,040		
1.60	565	2.70	860	3.80	1,240	5.80	2,140		
1.70	585	2.80	890	3.90	1,280	6.00	2,250		

[a] This table is applicable only for open-channel conditions. It is based on discharge measurements made during 1904–6 and is well defined above gage height 1.6 feet.

[b] This table is applicable only for open-channel conditions. It is based on 3 discharge measurements made during September to December, 1906, and earlier high-water measurements, and is well defined above gage height 1.2 feet.

Monthly discharge of Grand River near Kremmling, Colo., for 1906.

[Drainage area, 2,380 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Sec.-ft. per sq. mile.	Depth in inches.
April	3,020	725	1,440	85,700	0.605	0.68
May	8,350	1,430	5,060	311,000	2.13	2.46
June	11,600	4,440	7,080	421,000	2.97	3.31
July	4,710	1,820	3,290	202,000	1.38	1.59
August	1,990	960	1,400	86,100	.588	.68
September	1,680	785	1,160	69,000	.487	.54
October	1,140	565	817	50,200	.343	.40
November	755	405	546	32,500	.229	.26
December	565	*a* 450	*a* 477	29,300	.200	.23
The period				1,290,000		

a Discharge estimated December 11 to 31.

NOTE.—The accuracy of the above values is a matter of conjecture on account of the uncertainty of the gage heights.

GRAND RIVER, NEAR WOLCOTT, COLO.

This station was established May 27, 1906. It is located at the State bridge, 13 miles north of Wolcott.

A chain gage is attached to the downstream side of the bridge; length of chain 20.88 feet. The gage is read by D. O. Bailey.

Discharge measurements of Grand River near Wolcott, Colo., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 27	R. I. Meeker	152	848	6.70	6,230
June 17	do	190	1,231	8.65	11,800
July 13	T. E. Brick	142	637	5.35	4,400
November 22	R. I. Meeker	61	177	1.80	428

Daily gage height, in feet, of Grand River near Wolcott, Colo., for 1906.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		6.7	6.2	3.6	2.5	3.2	2.3	1.8
2		6.78	6.05	3.7	2.5	3.1	2.3	1.8
3		7.05	5.85	3.55	2.6	3.05	2.4	1.9
4		7.0	5.65	3.5	2.6	3.0	2.4	1.9
5		6.75	5.5	3.5	2.7	2.9	2.35	1.9
6		6.75	5.35	3.5	2.7	2.85	2.3	1.95
7		6.7	5.3	3.5	2.6	2.8	2.3	2.0
8		6.45	5.4	3.45	2.6	2.8	2.2	2.0
9		6.6	5.35	3.2	2.6	2.7	2.2	2.0
10		7.05	5.3	3.2	2.6	2.6	2.1	2.0
11		7.75	5.35	3.1	2.6	2.55	2.1	2.0
12		8.75	5.3	3.0	2.55	2.5	2.05	2.1
13		8.35	5.3	3.0	2.4	2.4	2.0	2.1
14		8.15	5.45	2.85	2.3	2.4	2.0	2.1
15		8.85	5.55	2.9	2.45	2.4	1.9	2.1
16		8.7	5.45	3.0	2.65	2.3	1.9	2.1
17		8.7	5.25	3.0	2.7	2.3	1.8	2.1
18		8.35	4.85	2.9	2.8	2.25	1.8	2.1
19		7.35	4.7	2.9	2.9	2.2	1.8	2.1
20		7.0	4.6	2.85	2.9	2.2	1.75	2.0
21		6.9	4.4	2.8	3.05	2.2	1.7	2.0
22		6.85	4.3	2.8	3.15	2.1	1.7	2.0
23		6.9	4.3	2.85	3.35	2.1	1.7	1.9
24		6.5	4.3	2.9	3.5	2.15	1.75	1.85
25		6.15	4.25	2.8	3.6	2.2	1.75	1.85
26		6.05	4.2	2.75	3.7	2.3	1.7	1.75
27	6.7	5.9	4.1	2.75	3.8	2.3	1.8	1.7
28	6.7	5.9	4.0	2.7	3.7	2.4	1.8	1.7
29	7.3	5.9	3.9	2.6	3.45	2.35	1.8	1.75
30	7.35	6.05	3.85	2.6	3.2	2.4	1.75	1.75
31	6.85		3.65	2.6		2.35		1.8

Rating table for Grand River near Wolcott, Colo., for 1906.

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.*
1.70	385	2.70	1,015	3.70	1,970	4.70	3,260	6.40	6,230
1.80	430	2.80	1,095	3.80	2,080	4.80	3,410	6.60	6,640
1.90	480	2.90	1,180	3.90	2,200	4.90	3,560	6.80	7,060
2.00	535	3.00	1,270	4.00	2,320	5.00	3,720	7.00	7,500
2.10	595	3.10	1,360	4.10	2,440	5.20	4,040	7.20	7,950
2.20	655	3.20	1,450	4.20	2,570	5.40	4,380	7.40	8,410
2.30	720	3.30	1,545	4.30	2,700	5.60	4,720	7.60	8,890
2.40	790	3.40	1,645	4.40	2,830	5.80	5,080	7.80	9,380
2.50	860	3.50	1,750	4.50	2,970	6.00	5,450	8.00	9,880
2.60	935	3.60	1,860	4.60	3,110	6.20	5,830	9.00	12,600

NOTE.—The above table is applicable only for open-channel conditions. It is based on 4 discharge measurements made during 1906 and is fairly well defined.

Monthly discharge of Grand River near Wolcott, Colo., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
May (27-31)	8,300	6,850	7,470	74,100
June	12,200	5,260	7,850	467,000
July	5,830	1,920	3,700	228,000
August	1,970	935	1,320	81,200
September	2,080	720	1,200	71,400
October	1,450	595	874	53,700
November	790	385	539	32,100
December	595	385	505	31,100
The period				1,030,000

NOTE.—The above values are good.

GRAND RIVER AT GLENWOOD SPRINGS, COLO.

This station is located in the mountains, midway between the Continental Divide and the Colorado-Utah boundary line, and just above the third large tributary of the Grand, which is called Roaring Fork. It was established May 12, 1899, at the request of the Denver and Rio Grande Railroad Company, and is located at the State street bridge. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 81, where are given also references to publications that contain data for previous years.

Discharge measurements of Grand River at Glenwood Springs, Colo., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 8	R. I. Meeker	195	705	4.84	2,240
May 4	do	205	851	5.65	3,350
May 19	E. C. Murphy	217	1,610	8.50	13,900
May 28	R. I. Meeker	214	1,390	8.02	11,300
June 19	do	217	1,560	8.95	15,100
July 15	T. E. Brick	214	1,220	7.20	7,060
November 21	R. I. Meeker	185	449	3.58	810

Daily gage height, in feet, of Grand River at Glenwood Springs, Colo., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.25	3.32	3.62	4.62	5.50	7.92	7.40	5. 2	4.60	5.80	4.15	3.80
2	3.25	3.30	3.45	4.65	5.42	7.92	7.45	5.95	4.68	5.60	4.15	3.80
3	3.25	3.32	3.40	4.49	5.52	8.00	7.38	6.02	4.65	5.40	4.22	3.78
4	3.28	3.38	3.48	4.29	5.60	7.95	7.30	5.90	5.22	5.20	4.20	3.82
5	3.22	3.35	3.55	4.17	6.10	7.98	7.10	5.85	5.18	5.00	4.12	3.80
6	3.22	3.40	3.50	4.29	6.55	8.62	7.00	5.88	5.08	4.80	4.10	3.72
7	3.28	3.38	3.55	4.62	6.80	8.68	6.95	5.88	5.02	4.70	4.12	3.70
8	3.28	3.35	3.58	4.80	6.90	8.00	6.90	5.60	5.02	4.60	4.18	3.60
9	3.22	3.32	3.68	4.65	7.12	7.80	6.90	5.22	5.02	4.50	4.00	3.68
10	3.22	3.40	3.68	4.62	7.50	8.05	6.90	5.12	5.00	4.40	3.98	3.65
11	3.25	3.4	3.80	4.95	7.80	8.98	6.92	5.02	5.02	4.35	3.98	3.70
12	3.25	3.38	3.82	5.00	7.90	9.78	6.95	5.02	5.08	4.35	4.00	3.72
13	3.30	3.40	3.92	4.98	7.80	10.42	7.00	4.92	5.00	4.30	4.02	3.78
14	3.22	3.40	3.92	4.68	7.45	10.70	7.00	4.92	5.02	4.25	3.95	3.60
15	3.22	3.38	3.78	4.48	7.32	10.60	7.18	4.98	5.12	4.25	4.00	3.40
16	3.20	3.38	3.72	4.45	7.48	10.58	7.08	5.02	5.32	4.18	4.05	3.10
17	3.30	3.40	3.60	4.78	7.95	10.38	6.95	5.02	5.60	4.12	4.08	2.95
18	3.35	3.42	3.52	5.15	8.28	9.90	6.75	4.92	5.80	4.12	3.92	2.98
19	3.28	3.42	3.48	5.42	8.62	8.88	6.55	4.92	5.85	4.12	3.62	3.22
20	3.35	3.40	3.45	5.32	8.95	8.48	6.45	4.85	5.90	4.10	3.32	3.32
21	3.25	3.42	3.60	5.55	9.12	8.25	6.30	4.90	5.95	4.18	3.52	3.48
22	3.05	3.48	3.60	5.88	9.12	8.12	6.25	4.98	6.25	4.18	3.68	3.52
23	3.22	3.42	3.75	6.35	9.25	8.12	6.20	5.12	6.15	4.10	3.68	3.48
24	3.32	3.38	4.02	6.68	9.05	7.98	6.20	5.12	6.12	3.82	3.75	3.55
25	3.32	3.42	4.25	6.52	8.65	7.60	6.22	5.08	6.12	4.05	3.72	3.58
26	3.30	3.38	4.48	6.15	8.42	7.48	6.30	4.95	6.18	4.12	3.72	3.52
27	3.28	3.42	4.48	5.95	8.02	7.45	6.12	4.82	6.30	4.20	3.62	3.58
28	3.28	3.50	4.48	5.65	8.02	7.45	6.02	4.78	6.42	4.20	3.68	3.52
29	3.28	.....	4.45	5.58	8.45	7.38	6.10	4.68	6.30	4.25	3.78	3.55
30	3.28	.....	4.55	5.58	8.68	7.30	5.92	4.65	6.00	4.22	3.70	3.42
31	3.28	.....	4.48	.....	8.10	.....	5.85	4.62	.....	4.20	.....	3.42

Rating table for Grand River at Glenwood Springs, Colo., for 1906.

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.*
2.90	430	3.90	1,080	4.90	2,290	5.90	4,000	7.80	9,380
3.00	480	4.00	1,180	5.00	2,440	6.00	4,210	8.00	10,210
3.10	530	4.10	1,290	5.10	2,590	6.20	4,640	8.20	11,110
3.20	580	4.20	1,400	5.20	2,740	6.40	5,090	8.40	12,090
3.30	630	4.30	1,510	5.30	2,890	6.60	5,580	8.60	13,160
3.40	690	4.40	1,630	5.40	3,050	6.80	6,110	8.80	14,350
3.50	760	4.50	1,750	5.50	3,220	7.00	6,670	9.00	15,660
3.60	830	4.60	1,870	5.60	3,400	7.20	7,260	10.00	22,600
3.70	910	4.70	2,000	5.70	3,590	7.40	7,910		
3.80	990	4.80	2,140	5.80	3,790	7.60	8,620		

NOTE.—The above table is applicable only for open-channel conditions. It is based on discharge measurements made during 1900–1906 and is well defined.

Monthly discharge of Grand River at Glenwood Springs, Colo., for 1906.

[Drainage area, 4,520 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Sec.-ft. per sq. mile.	Depth in inches.
January	660	505	610	37,500	0.135	0.16
February	760	630	685	38,000	.152	.16
March	1,810	690	1,060	65,200	.235	.27
April	5,790	1,370	2,780	165,000	.615	.69
May	17,400	3,080	9,750	600,000	2.16	2.49
June	27,600	7,580	13,900	827,000	3.08	3.44
July	8,080	3,900	5,930	365,000	1.31	1.51
August	4,250	1,900	2,770	170,000	.613	.71
September	5,140	1,870	3,340	199,000	.739	.82
October	3,790	1,010	1,730	106,000	.383	.44
November	1,420	642	1,100	65,500	.243	.27
December	1,010	455	801	49,300	.177	.20
The year	27,600	455	3,700	2,690,000	.820	11.16

NOTE.—Values are rated as follows: January, February, and December, good; remainder of 1906 excellent.

GRAND RIVER NEAR PALISADES, COLO.

This station was established April 9, 1902. It is located at the steel highway bridge at the point where the river enters Grand Valley, 2 miles above Palisades, in T. 11 S., R. 98 W., and is above all irrigating ditches supplying water to Grand Valley, with the exception of one pumping plant, which takes about 20 second-feet from the river one-fourth mile above the station. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 84, where are given also references to publications that contain data for previous years.

Discharge measurements of Grand River near Palisades, Colo., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 9	R. I. Meeker	280	930	13.70	3,640
May 5	do	316	1,537	15.60	7,990
May 29	do	379	2,869	19.95	24,900
June 18	do	396	3,402	21.20	30,900
June 29	do	321	2,194	17.65	15,100
July 16	T. E. Brick	321	2,034	16.90	12,300
November 19	R. I. Meeker	255	621	12.60	1,740

Daily gage height, in feet, of Grand River near Palisades, Colo., for 1906.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	12.8	14.9	19.05	16.95	14.55	13.1	14.0
2	12.8	14.8	19.15	16.95	14.7	13.2	13.9
3	12.9	14.75	19.15	16.85	14.7	13.35	13.8
4	12.9	15.0	19.15	17.1	14.55	13.5	13.8
5	13.0	15.6	19.25	16.85	14.35	13.6	13.8
6	13.0	16.45	19.75	16.5	14.25	13.5	13.75
7	13.7	16.9	19.85	16.65	14.15	13.35	13.7
8	13.9	17.15	19.3	16.85	14.2	13.2	13.65
9	13.6	17.5	18.9	16.65	14.15	13.2	13.6
10	13.65	18.05	19.3	16.8	13.95	13.2	13.55
11	13.85	18.65	20.3	16.8	13.85	13.1	13.5
12	14.0	18.95	21.0	16.7	13.7	13.1	13.4
13	13.75	18.85	21.8	16.8	13.85	13.1	13.4
14	13.7	18.25	22.25	16.85	13.85	13.1	13.3
15	13.5	17.75	22.05	17.1	13.75	14.25	13.2
16	13.45	18.1	22.05	17.0	13.75	13.75	13.2
17	13.7	18.75	22.05	16.6	13.8	13.8	13.2
18	14.1	19.3	21.25	16.3	13.75	13.8	13.1
19	14.5	19.75	20.25	16.15	13.7	13.8	13.1
20	14.55	20.4	19.75	15.85	13.65	13.8	13.1
21	14.65	20.45	19.45	15.65	13.65	13.8	13.2
22	15.05	20.65	19.25	15.55	13.6	13.8	13.2
23	15.6	20.7	19.05	15.5	13.7	13.8	13.2
24	16.3	20.75	18.5	15.45	13.9	13.8	13.05
25	16.35	20.35	18.2	15.4	13.75	13.85	12.95
26	15.95	19.5	17.85	15.4	13.55	13.85	13.15
27	15.45	19.05	17.55	15.2	13.45	14.25	13.2
28	15.25	19.25	17.35	15.05	13.35	14.4	13.2
29	15.2	19.75	17.4	14.9	13.3	14.3	13.2
30	15.0	19.9	16.9	14.8	13.15	14.2	13.2
31	.....	19.5	.....	14.6	13.1	.....	13.2

Rating table for Grand River near Palisades, Colo., for 1905–6.

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.*
12.80	1,950	13.80	3,640	14.80	5,880	15.80	8,480	17.60	14,630
12.90	2,070	13.90	3,850	14.90	6,120	15.90	8,770	17.80	15,430
13.00	2,200	14.00	4,060	15.00	6,360	16.00	9,070	18.00	16,250
13.10	2,350	14.10	4,270	15.10	6,610	16.20	9,680	19.00	20,530
13.20	2,510	14.20	4,490	15.20	6,860	16.40	10,320	20.00	25,160
13.30	2,680	14.30	4,710	15.30	7,120	16.60	10,980	21.00	30,210
13.40	2,860	14.40	4,940	15.40	7,380	16.80	11,660	22.00	35,590
13.50	3,050	14.50	5,170	15.50	7,650	17.00	12,370	23.00	41,090
13.60	3,240	14.60	5,400	15.60	7,920	17.20	13,100		
13.70	3,440	14.70	5,640	15.70	8,200	17.40	13,850		

NOTE.—The above table is applicable only for open-channel conditions. It is based on discharge measurements made during 1903–1906 and is well defined.

Monthly discharge of Grand River near Palisades, Colo., for 1906.

[Drainage area, 8,550 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Sec.-ft. per sq. mile.	Depth in inches.
April	10,200	1,950	4,730	281,000	0.553	0.62
May	28,900	5,760	18,600	1,140,000	2.18	2.51
June	37,000	12,000	23,500	1,400,000	2.75	3.07
July	12,700	5,400	9,820	604,000	1.15	1.33
August	5,640	2,350	3,800	234,000	0.444	.51
September	4,940	2,350	3,340	199,000	0.391	.44
October	4,060	2,140	2,850	175,000	0.333	.38
The period				4,030,000		

NOTE.—The above values are excellent.

FRASER RIVER DRAINAGE BASIN.

FRASER RIVER AT GRANBY, COLO.

Fraser River rises among the peaks of the Front Range in southeastern Grand County, Colo., and flows in a general northwesterly direction to its point of junction with Grand River in the east-central part of Middle Park. The stream receives a number of small tributaries, among which are Elk, St. Louis, Crooked, and Pole creeks, all short mountain streams draining the eastern slopes of the Vasquez Mountains.

The gaging station was established July 28, 1904. It is located on the main road between Coulter and Grand Lake, at the wagon bridge three-fourths mile southwest of Granby and about 4 miles above the mouth of the river, in sec. 9, T. 1 N., R. 76 W. In the 1904 Progress Report this station was called Fraser River, near Coulter, Colo. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 87.

Discharge measurements of Fraser River at Granby, Colo., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 16	M. C. Hinderlider	57	149	5.57	472
May 23	do	58	179	6.10	835
June 16	do	61	233	6.57	1,550
June 30	T. E. Brick	58	164	5.65	621
September 10	A. A. Weiland	52	95	4.65	114
December 17[a]	R. I. Meeker	28	27	.....	51

[a] Ice 1.5 feet thick.

Daily gage height, in feet, of Fraser River at Granby, Colo., for 1906.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	4.9	5.9	5.65	4.9	4.7	4.7	4.6
2	.....	5.0	5.9	5.65	4.95	4.95	4.8	4.6
3	.....	5.1	5.95	5.6	4.9	4.85	4.8	4.6
4	.....	5.35	5.9	5.5	4.85	4.65	4.7	4.6
5	.....	5.45	6.05	5.4	4.9	4.65	4.7	4.6
6	.....	5.4	6.2	5.5	4.9	4.6	4.6	4.6
7	.....	5.25	6.05	5.55	4.85	4.5	4.6	4.6
8	.....	5.3	5.9	5.55	4.8	4.55	4.6	4.45
9	.....	5.45	6.0	5.35	4.75	4.6	4.6	4.45
10	.....	5.6	6.2	5.35	4.8	4.55	4.6	4.4
11	.....	5.05	6.45	5.45	4.75	4.5	4.7	4.4
12	.....	5.6	6.6	5.5	4.7	4.5	4.7	4.45
13	.....	5.55	6.75	5.45	4.7	4.5	4.7	4.5
14	.....	5.25	6.85	5.35	4.75	4.5	4.7	4.5
15	5.35	5.42	6.85	5.2	4.75	4.5	4.7	4.5
16	5.25	5.65	6.7	5.1	4.7	4.7	4.6	4.5
17	5.5	5.85	6.65	4.95	4.7	4.7	4.6	4.4
18	5.2	5.85	6.45	4.85	4.7	4.7	4.6	4.4
19	5.15	5.95	6.2	4.85	4.7	4.7	4.6	4.4
20	5.27	6.05	6.1	5.05	4.7	4.7	4.6	4.4
21	5.5	6.0	6.05	5.0	4.95	4.65	4.6	4.3
22	5.68	6.1	6.05	5.05	5.0	4.6	4.6	4.3
23	5.7	6.2	6.1	4.95	4.85	4.6	4.6	4.3
24	5.45	6.1	5.85	4.95	4.8	4.6	4.6	4.3
25	5.2	6.05	5.65	4.95	4.75	4.6	4.6	4.3
26	5.2	6.0	5.65	5.05	4.7	4.7	4.6	4.3
27	5.35	5.9	5.75	5.0	4.7	4.7	4.6	4.3
28	4.92	6.05	5.8	5.0	4.7	4.7	4.6	4.3
29	5.15	6.15	5.65	5.0	4.7	4.7	4.6	4.3
30	5.0	6.05	5.65	5.0	4.7	4.7	4.6	4.3
31	.....	5.9	.....	4.9	4.7	.....	4.6	.....

NOTE.—Ice conditions prevailed after November 16.

Rating tables for Fraser River at Granby, Colo.

APRIL 15 TO JUNE 12, 1906.[a]

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.*
4.90	140	5.30	300	5.70	550	6.10	900	6.50	1,300
5.00	170	5.40	350	5.80	630	6.20	1,000	6.60	1,410
5.10	210	5.50	410	5.90	720	6.30	1,100		
5.20	250	5.60	480	6.00	810	6.40	1,200		

[a] This table is applicable only for open-channel conditions. It is based on 2 discharge measurements made during 1906 and the form of the curve used during the first half of 1905, and is not well defined.

Rating tables for Fraser River at Granby, Colo.—Continued.

JUNE 13 TO NOVEMBER 30, 1906.[a]

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.*
4.30	50	4.90	190	5.50	520	6.10	1,040	6.70	1,700
4.40	65	5.00	230	5.60	590	6.20	1,150	6.80	1,810
4.50	80	5.10	275	5.70	670	6.30	1,260		
4.60	100	5.20	330	5.80	750	6.40	1,370		
4.70	125	5.30	385	5.90	840	6.50	1,480		
4.80	155	5.40	450	6.00	940	6.60	1,590		

[a] This table is applicable only for open-channel conditions. It is based on 3 discharge measurements made during 1906 and the form of previous curves, and is well defined above gage height 4.6 feet.

Monthly discharge of Fraser River at Granby, Colo., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
April (15–31)	550	146	314	9,960
May	1,000	140	568	34,900
June	1,860	630	1,040	61,900
July	630	172	357	22,000
August	230	125	152	9,350
September	210	80	112	6,660
October	155	100	110	6,760
November	100	50	70.9	4,220
The period				156,000

NOTE.—The above values are good. The discharge remains at about 50 second-feet throughout the winter, as the river is fed by springs.

WILLIAMS FORK DRAINAGE BASIN.

WILLIAMS FORK NEAR HOT SULPHUR SPRINGS, COLO.

Williams Fork rises in the Williams River Mountains in southeastern Grand County, flows in a general northwesterly direction, and unites with Grand River in the central part of Middle Park, Colorado.

The gaging station was established July 25, 1904. It is located at the wagon bridge on the ranch of F. A. Field, in T. 1 N., R. 79 W., about 9 miles west of Hot Sulphur Springs, 4 miles above the mouth of the stream, and below all the tributaries. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 89, where are given also references to publications that contain data for previous years.

Discharge measurements of Williams Fork near Hot Sulphur Springs, Colo., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 16	M. C. Hinderlider	28	56	3.47	99
May 19	do	59	118	4.28	520
June 20	T. E. Brick	54	118	4.70	750
July 1	do	53	120	4.50	591
September 9	A. A. Weiland	44	74	3.39	76
December 14[a]	R. I. Mecker	26	46	3.22	56

[a] Surface ice along s des of stream.

Daily gage height, in feet, of Williams Fork near Hot Sulphur Springs, Colo., for 1906.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	3.54	4.34	4.48	3.76	3.45	3.51	3.45	3.34
2	.....	3.59	4.34	4.45	3.80	3.60	3.50	3.48	3.31
3	.....	3.67	4.33	4.49	3.72	3.60	3.50	3.46	3.32
4	.....	3.76	4.32	4.34	3.70	3.47	3.56	3.40	3.34
5	.....	3.91	4.40	4.30	3.68	3.46	3.50	3.39	3.31
6	.....	3.96	4.55	4.30	3.72	3.46	3.50	3.42	3.29
7	.....	3.94	4.36	4.26	3.72	3.46	3.50	3.42	3.26
8	.....	4.01	4.30	4.30	3.69	3.46	3.50	3.42	3.22
9	3.34	4.05	4.34	4.22	3.64	3.40	3.48	3.26	3.19
10	3.45	4.12	4.48	4.20	3.53	3.40	3.48	3.26	3.25
11	3.55	4.15	4.65	4.22	3.51	3.38	3.47	3.38	3.26
12	3.49	4.14	4.82	4.30	3.51	3.35	3.46	3.28	3.25
13	3.35	4.09	5.02	4.25	3.50	3.35	3.42	3.37	3.24
14	3.23	3.98	5.12	4.22	3.52	3.30	3.40	3.36	3.20
15	3.44	3.99	5.18	4.24	3.51	3.32	3.44	3.38	3.19
16	3.59	4.16	5.12	4.16	3.49	3.68	3.46	3.34	3.16
17	3.62	4.22	5.05	4.14	3.48	3.60	3.46	3.34	.....
18	3.62	4.26	4.31	4.10	3.48	3.54	3.44	3.24	.....
19	3.61	4.31	4.27	4.09	3.48	3.56	3.41	3.18	.....
20	3.70	4.38	4.72	4.02	3.46	3.56	3.48	3.18	.....
21	3.68	4.36	4.69	4.00	3.62	3.56	3.36	3.28	.....
22	3.95	4.44	4.71	3.98	3.78	3.56	3.29	3.31	.....
23	4.04	4.48	4.70	3.94	3.62	3.54	3.30	3.28	.....
24	3.89	4.36	4.55	4.00	3.50	3.52	3.48	3.34	.....
25	3.72	4.36	4.50	3.92	3.50	3.50	3.52	3.29	.....
26	3.68	4.32	4.50	3.86	3.48	3.72	3.48	3.24	.....
27	3.62	4.32	4.54	3.84	3.48	3.65	3.48	3.18	.....
28	3.50	4.38	4.52	3.82	3.48	3.58	3.48	3.22	.....
29	3.60	4.52	4.49	3.79	3.47	3.57	3.48	3.32	.....
30	3.62	4.40	4.46	3.78	3.46	3.55	3.46	3.29	.....
31	.....	4.32	.....	3.76	3.45	.....	3.47	.....	.....

NOTE.—Ice conditions after Dec. 16.

Rating table for Williams Fork near Hot Sulphur Springs, Colo., for 1905–6.

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.*
3.10	25	3.60	130	4.10	335	4.60	650	5.10	1,080
3.20	40	3.70	160	4.20	390	4.70	730	5.20	1,170
3.30	60	3.80	200	4.30	450	4.80	810		
3.40	80	3.90	240	4.40	510	4.90	900		
3.50	105	4.00	285	4.50	580	5.00	990		

NOTE.—The above table is applicable only for open-channel conditions. It is based on discharge measurements made during 1904–1906 and is well defined.

Monthly discharge of Williams Fork near Hot Sulphur Springs, Colo., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
April (9–30)	305	46	139	6,070
May	594	115	374	23,000
June	1,150	432	661	39,300
July	566	184	355	21,800
August	200	92	126	7,750
September	168	60	107	6,370
October	120	58	95.5	5,870
November	100	37	65.6	3,900
December (1–16)	68	34	51.8	1,640
The period	.....	.....	.....	116,000

NOTE.—Values are rated as follows, April to October, excellent; November and December, good.

BLUE RIVER DRAINAGE BASIN.

BLUE RIVER NEAR KREMMLING, 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 until it joins Grand River above the point where the latter stream enters Gore Canyon.

The gaging station was established July 21, 1904. It is located at the State highway bridge on the road between Kremmling and Dillon, Colo., 17 miles from the former and 26 miles from the latter, in T. 2 S., R. 80 W., and is below all tributaries of any importance. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 96, where are given also references to publications that contain data for previous years.

Discharge measurements of Blue River near Kremmling, in 1905–6.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1905.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 27 [a]	W. A. Lamb	108	151	2.50	346
May 9	do	131	210	2.90	589
May 26	do	147	371	3.50	1,860
June 7	do	166	541	[b] 4.00	3,280
June 28	do	151	382	3.45	1,730
July 23	do	139	236	3.12	702
August 12	do	125	212	2.82	572
August 26	do	118	182	2.58	420
September 6	do	115	182	2.59	422
September 13	do	110	151	2.45	284
September 28	do	99	125	2.30	211
1906.					
April 15	M. C. Hinderlider	92	121	2.25	193
May 20	do	167	428	3.75	2,540
June 21	T. E. Brick	149	381	3.70	2,490
July 2	do	146	354	3.58	1,990
September 8	A. A. Weiland	115	169	2.51	370
December 13 [c]	R. I. Meeker	48	71	2.32	159

[a] Channel partly filled with ice along sides and piers.
[b] Gage height corrected to agree with reading of staff gage.
[c] Ice along banks and at places in midstream; some slush ice running.

Daily gage height, in feet, of Blue River near Kremmling, Colo., for 1906.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.55	2.48	3.50	3.55	3.02	2.60	2.78	2.38	2.28
2	2.25	2.52	3.50	3.45	3.05	2.78	2.72	2.50	2.35
3	2.25	2.55	3.55	3.40	2.95	2.80	2.72	2.45	2.40
4	2.20	2.62	3.45	3.35	2.95	2.70	2.68	2.40	2.40
5	2.35	2.92	3.55	3.35	2.95	2.65	2.75	2.42	2.35
6	2.75	3.02	3.85	3.30	2.98	2.52	2.65	2.38	2.38
7	2.95	3.05	3.55	3.30	2.90	2.55	2.65	2.35	2.30
8	2.55	3.08	3.35	3.35	2.90	2.52	2.60	2.35	2.32
9	2.65	3.35	3.45	3.30	2.82	2.55	2.65	2.35	2.30
10	2.45	3.65	3.80	3.38	2.80	2.60	2.60	2.35	2.32
11	2.45	3.78	4.15	3.40	2.80	2.52	2.62	2.35	2.30
12	2.45	3.75	4.45	3.42	2.80	2.52	2.52	2.28	2.30
13	2.25	3.40	4.60	3.42	2.82	2.58	2.50	2.32	2.30
14	2.10	3.05	4.75	3.42	2.90	2.55	2.50	2.32	2.28
15	2.20	3.18	4.60	3.35	2.85	2.60	2.45	2.35	2.12

Daily gage height, in feet, of Blue River near Kremmling, Colo., for 1906—Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	2.50	3.75	4.60	3.35	2.80	2.85	2.48	2.32	2.10
17	2.50	3.50	4.45	3.35	2.75	2.80	2.48	2.30	2.15
18	2.60	3.50	3.75	3.32	2.78	2.70	2.48	2.20	2.22
19	2.55	3.68	3.65	3.25	2.78	2.70	2.45	2.22	2.25
20	2.62	4.05	3.50	3.22	2.80	2.70	2.48	2.10	2.30
21	2.75	3.75	3.60	3.20	2.90	2.72	2.40	2.25	2.38
22	2.88	3.80	3.60	3.15	3.05	2.78	2.40	2.30	2.38
23	3.02	3.85	3.70	3.15	2.90	2.70	2.40	2.30	2.42
24	3.00	3.60	3.45	3.22	2.80	2.62	2.40	2.35	2.45
25	2.75	3.60	3.40	3.22	2.75	2.62	2.42	2.30	2.45
26	2.75	3.45	3.38	3.18	2.75	3.20	2.42	2.25	2.38
27	2.60	3.45	3.40	3.10	2.62	3.05	2.50	2.20	2.35
28	2.50	3.55	3.48	3.15	2.52	2.95	2.50	2.35	2.28
29	2.60	3.80	3.38	3.10	2.52	2.85	2.42	2.25	2.30
30	2.50	3.55	3.48	3.05	2.50	2.80	2.38	2.32	2.28
31		3.45		2.98	2.55		2.38		2.32

Rating table for Blue River near Kremmling, Colo., for 1905–6.

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.*
1.70	20	2.40	260	3.10	990	3.80	2,690	4.50	5,050
1.80	30	2.50	330	3.20	1,160	3.90	2,990	4.60	5,430
1.90	45	2.60	410	3.30	1,360	4.00	3,300	4.70	5,820
2.00	65	2.70	500	3.40	1,590	4.10	3,630	4.80	6,220
2.10	95	2.80	600	3.50	1,850	4.20	3,970		
2.20	140	2.90	710	3.60	2,120	4.30	4,320		
2.30	195	3.00	840	3.70	2,400	4.40	4,680		

NOTE.—The above table is applicable only for open-channel conditions. It is based on discharge measurements made during 1904–1906, and is well defined between gage heights 2.3 feet and 4 feet.

Monthly discharge of Blue River near Kremmling, Colo., for 1905–6.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
1905.				
April (5–30)	600	95	242	12,500
May	2,540	410	1,290	79,300
June	4,860	1,590	2,910	173,000
July	1,590	600	800	49,200
August	655	260	398	24,500
September	500	140	230	13,700
October	195	95	158	9,720
November	195	65	127	7,560
December (1–9)	195	20	89.4	1,600
The period				371,000
1906.				
April	870	95	400	23,800
May	3,460	316	1,730	106,000
June	6,020	1,480	2,690	160,000
July	1,980	814	1,350	83,000
August	915	330	630	38,700
September	1,160	346	519	30,900
October	580	247	359	22,100
November	330	95	210	12,500
December	295	95	207	12,700
The period				490,000

NOTE.—Values are rated as follows: April, and August to November, 1905; April, October and November, 1906, fair. July, 1905, August and September, 1906, good. May and June, 1905, and May to July, 1906, excellent. December of both years, approximate.

EAGLE RIVER DRAINAGE BASIN.

EAGLE RIVER NEAR EAGLE, COLO.

Eagle River, an important headwater tributary of Grand River, rises among the high peaks of the Continental Divide, in Eagle County, Colo., immediately opposite the headwaters of Arkansas River, flows a little north of west for about 20 miles, and then in a general westerly direction to its junction with the Grand. It is a very rapid stream throughout its entire course, flowing alternately through canyons and narrow, terraced valleys.

The drainage area is almost wholly in Eagle County. The upper third of the basin is entirely mountainous, the general elevation at the crest of the divide being 12,000 feet above sea level, with peaks over 14,000 feet in altitude. In this part of its course the river descends in falls and cascades, the average slope above the mouth of Roche Moutonnée Creek being 150 feet per mile. The rocks are about equally divided between metamorphic granites and sedimentary formations. The forest cover is excellent, soil is shallow, and erosion is small. The annual precipitation, which is mostly in the form of snow, varies from 20 to 30 inches. This portion of the basin furnishes 90 per cent of the discharge of the stream.

The lower two-thirds of the basin is also mountainous but is less accentuated, the elevations varying from 7,000 to 11,000 feet. The rocks are largely sedimentary, erosion is greater, and the forest cover is meager. The precipitation is approximately 20 inches.

The principal tributaries of the Eagle are Gore, Roche Moutonnée, Gypsum, and Brush creeks.

Below Wolcott a few small ditches divert water for irrigation of the narrow first bench lands, and there is enough irrigation in Gypsum and Brush Creek valleys to divert the entire flow during the latter part of the season.

The gaging station was established March 12, 1905. It is located at Rule's private road bridge, in T. 5 S., R. 85 W., 2½ miles below Eagle, Colo. The chief object of the station is the collection of power data. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 98.

Discharge measurements of Eagle River near Eagle, Colo., in 1905–6.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1905.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
March 18	R. I. Meeker	40	119	0.80	187
May 12	do	50	207	2.20	735
July 10	do	45	233	2.40	794
August 15	do	45	202	1.55	406
September 25	do	60	162	1.00	198
1906.					
April 5	R. I. Meeker	60	173	.95	251
May 3	do	95	226	2.15	685
May 28	do	96	411	4.40	2,650
June 16	do	96	548	5.40	4,960
July 14	T. E. Brick	66	345	3.60	1,730
November 23	R. I. Meeker	65	126	.90	203

NOTE.—These measurements were made at different sections.

Daily gage height, in feet, of Eagle River near Eagle, Colo., for 1906.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.25	1.85	3.9	3.9	2.2	1.3	1.85	1.3	1.15
2	1.05	1.95	4.15	3.5	2.55	1.55	1.8	1.45	1.0
3	1.0	2.15	3.95	3.45	2.2	1.8	1.85	1.4	1.1
4	0.95	2.25	3.85	3.2	2.25	1.85	1.85	1.5	1.1
5	1.0	2.7	4.1	3.2	2.05	1.6	1.8	1.5	1.0
6	1.25	2.95	4.6	3.2	2.0	1.6	1.8	1.5	1.0
7	1.55	2.95	3.9	3.35	2.0	1.5	1.7	1.5	1.0
8	1.3	3.15	3.9	3.15	1.85	1.5	1.6	1.5	1.0
9	1.2	3.55	3.8	3.3	1.8	1.5	1.55	1.45	1.1
10	1.25	3.9	4.6	3.35	1.85	1.5	1.5	1.4	1.1
11	1.35	3.95	5.05	3.25	1.75	1.5	1.5	1.4	1.0
12	1.4	3.95	5.25	3.3	1.75	1.45	1.5	1.35	1.0
13	1.3	3.55	5.7	3.25	1.8	1.4	1.5	1.3	1.0
14	1.25	3.4	5.3	3.55	1.8	1.4	1.4	1.3	0.95
15	1.35	3.45	5.2	3.45	1.85	1.8	1.4	1.3	0.75
16	1.4	3.9	5.15	3.15	1.85	1.85	1.4	1.4	0.8
17	1.75	4.15	5.1	3.05	1.85	1.85	1.3	1.3	0.8
18	1.9	4.5	4.45	2.95	1.8	1.8	1.3	1.3	0.9
19	1.8	4.75	4.25	2.85	1.8	1.8	1.3	1.3	0.9
20	1.95	4.9	4.2	2.85	1.75	1.8	1.4	1.2	0.9
21	2.25	4.7	4.15	2.8	1.8	1.8	1.4	1.1	1.0
22	2.55	4.8	4.1	2.2	1.9	1.8	1.4	1.0	1.0
23	2.9	4.8	4.1	2.0	1.95	1.8	1.35	0.9	1.0
24	2.9	4.4	3.9	2.55	1.85	1.8	1.3	0.9	1.0
25	2.55	4.1	3.65	2.75	1.85	1.8	1.4	0.9	1.0
26	2.45	3.85	3.75	2.55	1.55	2.1	1.45	0.9	1.0
27	2.25	3.8	3.85	2.5	1.45	2.3	1.4	0.95	0.9
28	2.0	4.3	3.85	2.4	1.45	2.0	1.4	1.0	0.9
29	1.9	4.8	3.7	2.3	1.35	1.9	1.4	1.1	0.9
30	1.95	4.1	3.7	2.25	1.3	1.8	1.4	1.1	0.9
31	.....	3.9	.....	2.2	1.3	.....	1.35	.....	0.9

Rating table for Eagle River near Eagle, Colo., for 1905–6.

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.*
0.60	145	1.50	375	2.40	820	3.30	1,465	4.40	2,720
.70	163	1.60	412	2.50	880	3.40	1,550	4.60	3,040
.80	183	1.70	452	2.60	945	3.50	1,640	4.80	3,430
.90	205	1.80	498	2.70	1,015	3.60	1,730	5.00	3,860
1.00	230	1.90	544	2.80	1,085	3.70	1,830	5.20	4,360
1.10	255	2.00	591	2.90	1,155	3.80	1,930	5.40	4,880
1.20	281	2.10	644	3.00	1,230	3.90	2,040	5.60	5,440
1.30	310	2.20	700	3.10	1,305	4.00	2,160	5.80	6,040
1.40	341	2.30	760	3.20	1,385	4.20	2,420	6.00	6,600

NOTE.—The above table is applicable only for open-channel conditions. It is based on 11 discharge measurements made during 1905–6 and is well defined between gage heights 0.8 feet and 5.4 feet.

Monthly discharge of Eagle River near Eagle, Colo., for 1905–6.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
1905.				
March (19-31)	183	154	167	4,310
April	790	154	301	17,900
May	2,870	591	1,470	90,400
June	6,040	1,550	3,160	188,000
July	1,420	432	697	42,900
August	475	218	348	21,400
September	358	218	273	16,200
October	268	205	228	14,000
November	230	183	205	12,200
December	218	163	177	10,900
The period	.....	.....	.....	418,000

Monthly discharge of Eagle River near Eagle, Colo., for 1905–6—Continued.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
1906.				
April	1,160	218	499	29,700
May	3,640	521	2,050	126,000
June	5,740	1,780	2,750	164,000
July	2,040	591	1,230	75,600
August	912	310	518	31,900
September	760	310	467	27,800
October	521	310	381	23,400
November	375	205	300	17,900
December	268	173	223	13,700
The period				510,000

NOTE.—Values are rated as follows: March and December, 1905, good; remainder of 1905 and 1906, excellent.

ROARING FORK DRAINAGE BASIN.

ROARING FORK AT GLENWOOD SPRINGS, COLO.

This station was established April 6, 1906. It is located at a single-span wooden highway bridge about 500 feet above the mouth of Roaring Fork in the city of Glenwood Springs.

The channel is straight; the right bank is low and overflows at extreme high water, the left is high. The bed of the stream is rough and is composed of cobblestones and bowlders. There is but one channel at all stages and the current is swift.

Discharge measurements are made from the downstream side of the bridge. The initial point for soundings is at the right abutment.

A chain gage, which was read during 1906 by Mrs. C. S. Linsley, is attached to the downstream hand rail; length of chain, 20.44 feet. The bench mark is a cross cut in the upper surface of the first stone below the capstone of the east masonry abutment, upstream side; elevation, 12.94 feet above the datum of the gage.

Discharge measurements of Roaring Fork at Glenwood Springs, Colo., in 1906.

Date	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 8	R. I. Meeker	150	208	1.60	707
May 4	do	155	364	2.60	1,790
May 28	do	167	693	4.58	5,210
June 18	do	171	932	6.00	8,180
June 19	do	170	834	5.50	6,970
July 15	T. E. Brick	163	662	4.35	4,950
November 21	R. I. Meeker	120	163	1.54	465

Daily gage height, in feet, of Roaring Fork at Glenwood Springs, Colo., for 1906.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		2.18	4.50	4.90	3.05	1.98	2.35	1.85	1.55
2		2.20	4.65	4.98	3.20	2.15	2.32	1.90	1.55
3		2.30	4.55	4.78	3.00	2.22	2.25	1.95	1.52
4		2.58	4.32	4.50	2.88	2.12	2.32	1.80	1.60
5		3.00	4.80	4.15	2.80	2.10	2.28	1.80	1.60
6	1.65	3.30	5.30	4.05	2.80	2.05	2.20	1.82	1.58
7	1.70	3.35	4.70	4.05	2.70	2.02	2.25	1.80	1.48
8	1.55	3.60	4.48	3.95	2.70	2.00	2.22	1.80	1.50
9	1.58	3.98	4.75	3.95	2.62	2.00	2.20	1.80	1.58
10	1.70	4.12	5.68	4.10	2.52	1.88	2.18	1.80	1.52
11	1.85	4.28	6.15	4.15	2.50	1.95	2.12	1.80	1.50
12	1.75	4.35	6.65	4.10	2.42	1.88	2.10	1.75	1.48
13	1.58	3.95	7.45	4.25	2.52	1.88	2.00	1.70	1.48
14	1.58	3.55	7.45	4.60	2.50	1.90	2.00	1.70	1.45
15	1.65	3.55	7.25	4.48	2.42	2.30	1.95	1.70	1.40
16	1.88	4.10	7.28	4.15	2.48	2.45	1.90	1.70	1.15
17	2.08	4.42	7.35	4.00	2.58	2.32	1.90	1.70	1.22
18	2.15	4.65	5.75	3.90	2.55	2.25	1.80	1.60	1.30
19	2.08	4.90	5.65	3.78	2.50	2.20	1.85	1.50	1.45
20	2.20	5.35	5.50	3.78	2.48	2.20	1.88	1.40	1.55
21	2.68	5.10	5.35	3.70	2.48	2.22	1.95	1.50	1.58
22	2.92	5.40	5.20	3.65	2.48	2.22	1.90	1.65	1.42
23	3.08	5.35	5.30	3.60	2.50	2.20	1.90	1.65	1.42
24	3.10	4.85	4.95	3.58	2.42	2.22	1.80	1.62	1.42
25	2.85	4.30	4.70	3.60	2.28	2.25	1.85	1.60	1.40
26	2.70	4.08	4.78	3.50	2.20	2.45	1.92	1.52	1.42
27	2.48	3.85	4.85	3.38	2.20	2.72	1.85	1.48	1.60
28	2.38	4.52	4.75	3.25	2.10	2.62	1.85	1.60	1.42
29	2.32	5.10	4.38	3.15	2.00	2.48	1.85	1.60	1.45
30	2.32	4.48	4.60	3.00	2.05	2.42	1.85	1.58	1.40
31		4.40		2.95	2.05		1.80		1.32

Rating tables for Roaring Fork at Glenwood Springs, Colo.

APRIL 6 TO MAY 8, 1906. [a]

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.*
1.50	630	2.00	1,070	2.50	1,670	3.00	2,380	3.50	3,180
1.60	710	2.10	1,180	2.60	1,800	3.10	2,530	3.60	3,350
1.70	790	2.20	1,300	2.70	1,940	3.20	2,690		
1.80	880	2.30	1,420	2.80	2,080	3.30	2,850		
1.90	970	2.40	1,540	2.90	2,230	3.40	3,010		

MAY 9 TO DECEMBER 31, 1906. [b]

1.10	200	2.00	910	2.90	2,140	3.80	3,720	5.40	6,940
1.20	250	2.10	1,025	3.00	2,300	3.90	3,910	5.60	7,360
1.30	310	2.20	1,145	3.10	2,470	4.00	4,100	5.80	7,780
1.40	375	2.30	1,275	3.20	2,640	4.20	4,500	6.00	8,200
1.50	445	2.40	1,410	3.30	2,810	4.40	4,900	6.20	8,640
1.60	520	2.50	1,550	3.40	2,990	4.60	5,300	6.40	9,080
1.70	605	2.60	1,690	3.50	3,170	4.80	5,700	6.60	9,520
1.80	700	2.70	1,840	3.60	3,350	5.00	6,100	6.80	9,960
1.90	805	2.80	1,990	3.70	3,530	5.20	6,520	7.00	10,400

[a] This table is applicable only for open-channnel conditions. It is based on 2 discharge measurements made during 1906 and is probably fairly accurate.

[b] This table is applicable only for open-channel conditions. It is based on 5 discharge measurements made during 1906 and is well defined.

Monthly discharge of Roaring Fork at Glenwood Springs, Colo., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
April (6–30)	2,530	670	1,310	65,000
May	6,940	1,280	4,290	264,000
June	11,400	4,740	7,060	420,000
July	6,060	2,220	4,000	246,000
August	2,640	910	1,590	97,800
September	1,870	784	1,150	68,400
October	1,340	700	943	58,000
November	858	375	604	35,900
December	520	225	421	25,900
The period				1,300,000

NOTE.—The above values are good.

GUNNISON RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Gunnison River is formed in Gunnison County, Colo., by the union of East and Taylor rivers, two streams that have their origin 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 valley is broad and fertile. Below Delta the river enters another narrow canyon, with walls averaging 800 feet in height, and this continues irregularly to Grand Junction, a few tracts of narrow bottom land lying between the channel and the canyon walls.

As an aid to description the basin may be divided into an upper mountainous area and a lower plateau area, the two being divided roughly by a north-south line drawn through the town of Hotchkiss.

The soil of the lower valleys is chiefly adobe, and the higher mesas have large content of gravel and sand. Groves of quaking aspen, interspersed with large, open grazing plots, cover broad areas of this plateau region. Forests of pine and aspen occur on the top of the Grand Mesa, with piñon pines and cedars along the foothills. In the valleys chico and sagebrush form the controlling vegetation, except along the streams, which are bordered to some extent 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.

North Fork rises in the Huntsman Hills, 20 miles south of Glenwood Springs, flows in a general south and southwesterly course, and unites with the Gunnison about 8 miles west of Hotchkiss. The drainage area is highly mountainous, except for a small portion which lies below Paonia, extreme points reaching an altitude of 13,000 feet. The mesa lands at the lower end of the valley stand 5,500 feet above sea level. The higher peaks are formed of granitic rocks, but lower down sedimentary formations occupy at least 80 per cent of the area of the basin. The mountains are forested and the mesa lands are covered with sagebrush. 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.

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 but 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 shale buttes and ridges, trenched by deep, narrow canyons. Uncompahgre Valley proper begins at a point near Eldredge siding, on the Denver and Rio Grande Railroad.

The other tributaries of the Gunnison need not here be described. 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 of their water reaches the Gunnison except at times of heavy storms or during spring floods.

Precipitation records for the Gunnison basin are meager. Those which exist show a range from 9 inches in the plateau region to about 25 inches in the mountains.

The natural flow of the Uncompahgre and North Fork rivers is diverted for irrigation along their respective valleys, and the Gunnison tunnel will divert water from the mountainous area and transmit it to Uncompahgre Valley, which has been an irrigated district since the early eighties.

GUNNISON RIVER AT EAST PORTAL OF GUNNISON TUNNEL, COLO.

This station was established April 1, 1905, and replaces the Cimarron station, 12 miles above. It is located about 100 yards above the portal of the tunnel and is in T. 49 N., R. 7 W., 21 miles by wagon road from Montrose. The object of the station is to determine the volume of flow of the river at this point, as 1,300 second-feet will be diverted by the Gunnison tunnel when it is completed. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 108.

Discharge measurements of Gunnison River at east portal of Gunnison tunnel, Colo., in 1905–6.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1905.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 1	O. McDermith		1,300	9.05	4,530
May 27	do		1,790	11.80	8,540
June 3	do		2,100	12.80	11,200
June 17	do		1,760	11.25	7,100
June 20	do		1,650	10.60	6,690
June 29	do		1.410	9.25	4,180
July 6	do		1,170	7.60	2,520
July 13	do		1,050	6.85	1,700
August 3	do		1,090	7.12	2,040
August 11	do		917	6.00	1,020
August 19	do		860	5.60	763
August 28	do		846	5.50	689
September 13	do		806	5.24	575
1906.					
April 9	McDermith and Overstreet	149	995	6.39	1,480
April 17	do	153	1,130	7.27	2,240
April 19	do	155	1,170	7.52	2,510
April 21	do	159	1,290	8.14	2,960
May 8	C. Z. Overstreet	174	1,600	10.10	5,770
May 9	do	181	1,700	10.60	6,520
May 11	do	190	1,830	11.30	7,680
May 21	do	202	2,000	12.30	9,810
June 12	O. McDermith	213	2,260	13.70	12,800
June 14	do	216	2,400	14.20	15,000
June 18	C. Z. Overstreet	206	2,090	12.80	10,200
June 23	do	192	1,850	11.30	7,670
July 7	do	164	1,410	9.00	3,750
July 20	do	160	1,290	8.30	2,780
August 13	do	149	1,020	6.80	1,300
September 7	E. F. Kriegsman	146	983	6.15	808
September 24	do	147	962	6.32	982
September 27	do	152	1,110	7.29	1,770

Daily gage height, in feet, of Gunnison River at east portal of Gunnison tunnel, Colo., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.3	6.3	6.2	6.4	7.7	11.2	10.1	7.7	6.35	6.8	6.2	6.2
2	6.3	6.3	6.2	6.45	7.7	11.1	10.0	7.7	6.4	6.8	6.2	6.1
3	6.3	6.3	6.3	6.5	7.7	11.1	9.9	7.6	6.55	6.8	6.2	6.0
4	6.3	6.3	6.3	6.55	8.3	11.0	9.75	7.6	6.65	6.7	6.2	6.0
5	6.3	6.3	6.3	6.65	9.0	11.1	9.45	7.35	6.6	6.7	6.2	6.0
6	6.2	6.3	6.3	6.65	9.3	11.5	9.15	7.3	6.4	6.7	6.2	5.9
7	6.2	6.3	6.2	6.65	9.7	11.7	9.0	7.2	6.15	6.55	6.2	.....
8	6.2	6.3	6.2	6.6	10.05	11.8	9.0	7.1	6.15	6.4	6.2	.....
9	6.2	6.3	6.2	6.55	10.45	11.8	9.0	7.0	6.1	6.3	6.1	.....
10	6.2	6.3	6.2	6.7	10.9	12.3	9.1	6.9	6.1	6.3	6.1	.....
11	6.2	6.3	6.2	6.9	11.3	13.05	9.15	6.8	6.1	6.2	6.0	.....
12	6.2	6.3	6.2	6.8	10.95	13.8	9.2	6.8	6.0	6.2	5.9	.....
13	6.2	6.3	6.2	6.65	10.6	14.3	9.2	6.8	5.95	6.2	5.8	.....
14	6.2	6.3	6.2	6.45	10.15	14.2	9.2	6.8	5.9	6.3	5.8	.....
15	6.2	6.3	6.2	6.55	10.1	13.9	9.1	6.8	6.25	6.2	5.9	.....

Daily gage height, in feet, of Gunnison River at east portal of Gunnison tunnel, Colo., for 1906—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	6.2	6.3	6.2	6.8	10.5	13.8	8.95	6.8	6.65	6.2	5.9	.....
17	6.2	6.3	6.2	7.25	11.0	13.5	8.75	6.8	6.85	6.1	5.85	.....
18	6.2	6.3	6.2	7.6	11.4	12.7	8.6	6.8	6.75	6.0	5.7	.....
19	6.2	6.3	6.2	7.6	11.7	12.0	8.45	6.8	6.55	5.9	5.4	.....
20	6.2	6.3	6.2	7.75	12.0	11.4	8.3	6.95	6.35	6.1	5.4	.....
21	6.2	6.2	6.2	8.1	12.3	11.4	8.3	7.15	6.3	6.0	5.5	.....
22	6.2	6.2	6.2	8.65	12.4	11.4	8.3	7.2	6.3	6.0	6.0	.....
23	6.2	6.2	6.3	9.15	12.2	11.15	8.3	7.2	6.3	5.9	6.0	.....
24	6.2	6.2	6.4	9.3	11.7	10.6	8.2	7.0	6.3	5.8	6.0	.....
25	6.2	6.2	6.5	8.75	10.9	10.3	8.2	6.8	6.4	5.9	6.0	.....
26	6.3	6.2	6.5	8.35	10.75	10.3	8.2	6.65	6.45	6.0	5.9	.....
27	6.3	6.2	6.4	8.05	10.7	10.3	8.1	6.5	7.3	6.15	5.9	.....
28	6.3	6.2	6.4	7.85	11.1	10.3	8.1	6.4	7.4	6.2	6.25	.....
29	6.3	.....	6.3	7.7	11.7	10.2	8.0	6.35	7.0	6.2	6.3	.....
30	6.3	.....	6.3	7.7	11.4	10.2	8.0	6.3	6.9	6.1	6.3	.....
31	6.3	.....	6.3	.....	11.0	.....	7.85	6.3	.....	6.1	.....	.....

NOTE.—The following ice conditions prevailed during 1906: River frozen January 1 to March 24; March 21 to 24, ice rotten; March 25, ice coming down river; March 26, ice nearly gone; March 27, ice entirely gone above and in front of engineer's camp; November 18 and 19, ice coming down and freezing to banks; November 20, channel partly frozen over; November 22, ice jam below gage; November 25 to December 3 river frozen over at gage, and about 200 feet above and below; December 6, channel open. Thickness of ice in feet: January 1–3, 2.0; January 4, 2.1; January 5–8, 2.2; January 9–20, 2.3; January 21 to February 2, 2.4; February 3 to 6, 2.3; February 7–9, 2.2; February 10–11. 2.1; February 12–16, 2.0; February 17–20, 1.8; February 21 to March 6, 1.7; March 7–16, 1.5; March 17, 1.4; March 18–19, 1.3; March 20, 1.2; March 21–24 (rotten), 1.0.

Rating tables for Gunnison River at east portal of Gunnison tunnel, Colo.

APRIL 9, 1905, TO JUNE 10, 1906.[a]

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.*
5.00	400	6.00	1,025	7.00	1,900	8.00	2,920	10.00	5,540
5.10	450	6.10	1,105	7.10	1,995	8.20	3,140	10.20	5,850
5.20	505	6.20	1,185	7.20	2,090	8.40	3,380	10.40	6,170
5.30	560	6.30	1,270	7.30	2,190	8.60	3,620	10.60	6,500
5.40	620	6.40	1,355	7.40	2,290	8.80	3,870	10.80	6,840
5.50	680	6.50	1,440	7.50	2,390	9.00	4,130	11.00	7,200
5.60	745	6.60	1,530	7.60	2,490	9.20	4,390	12.00	9,150
5.70	810	6.70	1,620	7.70	2,590	9.40	4,670	13.00	11,370
5.80	880	6.80	1,710	7.80	2,700	9.60	4,950	14.00	13,900
5.90	950	6.90	1,805	7.90	2,810	9.80	5,240	.....	.....

JUNE 11 TO DECEMBER 6, 1906.[b]

5.40	380	6.30	930	7.20	1,685	8.20	2,725	10.00	5,200
5.50	430	6.40	1,005	7.30	1,780	8.40	2,960	10.20	5,540
5.60	480	6.50	1,080	7.40	1,875	8.60	3,200	10.40	5,890
5.70	535	6.60	1,160	7.50	1,975	8.80	3,460	10.60	6,250
5.80	595	6.70	1,240	7.60	2,075	9.00	3,720	10.80	6,620
5.90	660	6.80	1,325	7.70	2,180	9.20	4,000	11.00	7,000
6.00	725	6.90	1,410	7.80	2,285	9.40	4,280	12.00	9,070
6.10	790	7.00	1,500	7.90	2,390	9.60	4,580	13.00	11,370
6.20	860	7.10	1,590	8.00	2,500	9.80	4,880	14.00	13,900

[a] This table is applicable only for open-channel conditions. It is based on discharge measurements made prior to June 10, 1906, and is well defined.

[b] This table is applicable only for open-channel conditions. It is based on discharge measurements made after June 10, 1906, and is well defined.

Monthly discharge of Gunnison River at east portal of Gunnison tunnel, Colo., for 1905–6.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
1905.				
April 9–30	3,320	950	1,430	62,400
May	9,040	2,490	5,220	321,000
June	13,800	4,200	8,360	497,000
July	3,800	1,440	2,040	125,000
August	2,760	680	1,130	69,500
September	745	450	560	33,300
October	712	450	519	31,900
November	560	400	491	29,200
The period				1,170,000
1906.				
March 27–31	1,360	1,270	1,310	13,000
April	4,530	1,360	2,270	135,000
May	10,000	2,590	6,620	407,000
June	14,700	5,540	8,830	525,000
July	5,370	2,340	3,510	216,000
August	2,180	930	1,470	90,400
September	1,880	660	1,060	63,100
October	1,320	595	905	55,600
November 1–20	860	380	714	28,300
The period				1,530,000

NOTE.—The above values are excellent.

GUNNISON RIVER AT WHITEWATER, COLO.

This station was regularly established April 10, 1902, incomplete series of gage heights having been obtained during 1895, 1897, and 1901. It is located at the steel wagon bridge constructed by the State of Colorado at a point about one-half mile above the railroad station at Whitewater, on the Denver and Rio Grande Railroad. It was intended that this station should replace that formerly maintained on the Gunnison at Grand Junction, which was abandoned on account of conditions that rendered accurate gagings impossible. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 112, where are given also references to publications that contain data for previous years.

Discharge measurements of Gunnison River at Whitewater, Colo., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 12	R. I. Meeker	278	1,110	6.35	3,440
May 6	do	278	2,190	10.22	11,600
May 18	E. C. Murphy	277	2,710	11.85	16,900
May 30	R. I. Meeker	278	2,790	12.12	18,200
June 20	do	278	2,430	10.86	13,300
November 20	do	244	592	4.20	956

Daily gage height, in feet, of Gunnison River at Whitewater, Colo., for 1906.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	5.12	7.50	11.40	8.35	6.10	4.50	5.50
2	5.22	7.45	11.50	8.55	6.00	5.00	5.35
3	5.12	7.80	11.55	8.45	6.35	5.00	5.30
4	4.97	8.20	11.25	8.25	6.15	4.85	5.20
5	5.17	9 20	11.20	8.10	5.95	4.75	5.20
6	5.32	9.90	11.60	7.80	5.80	4.70	5.15
7	5.97	10.30	11.60	7.75	5.75	4.55	5.10
8	6.27	10.45	11.15	7.70	5.60	4.50	5.10
9	6.02	11.05	11.00	7.60	5.50	4.50	5.00
10	5.62	11.45	11.45	7.45	5.35	4.40	4.90
11	6.12	11.80	12.00	7.35	5.05	4.40	4.80
12	6.42	12.05	12.50	7.40	5.00	4.35	4.75
13	6.07	11.65	12.95	7.30	5.00	4.25	4.70
14	5.72	11.40	13.10	7.30	5.00	4.20	4.70
15	5.95	10.80	12.90	7.45	5.05	4.65	4.70
16	6.35	11.20	12.65	7.30	5.00	5.35	4.70
17	7.05	11.45	12.45	7.05	5.10	5.45	4.70
18	7.25	11.75	12.10	6.85	5.10	5.30	4.65
19	7.60	12.25	11.10	6.90	5.10	5.05	4.65
20	7.55	12.80	10.80	6.75	5.05	5.00	4.70
21	8.10	13.05	10.60	6.60	5.05	4.75	4.90
22	8.75	13.00	10.45	6.30	5.25	4.85	5.00
23	9.35	12.80	10.15	6.30	5.45	5.00	4.85
24	9.90	12.65	9.90	6.20	5.35	5.00	4.80
25	9.55	12.55	9.55	6.40	5.15	4.95	4.70
26	8.75	11.60	8.90	6.35	4.95	5.10	4.75
27	8.15	10.80	8.70	6.30	4.90	5.30	4.85
28	7.75	11.45	8.65	6.35	4.75	5.95	5.00
29	8.05	12.05	8.55	6.30	4.65	5.65	5.00
30	7.90	11.95	8.35	6.30	4.55	5.55	4.90
31	.....	11.45	.....	6.25	4.50	.....	4.90

Rating table for Gunnison River at Whitewater, Colo., for 1906.

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.*
4.20	1,050	5.20	1,970	6.20	3,190	7.40	5,040	9.40	9,390
4.30	1,130	5.30	2,075	6.30	3,330	7.60	5,400	9.60	9,900
4.40	1,210	5.40	2,185	6.40	3,480	7.80	5,790	9.80	10,420
4.50	1,290	5.50	2,295	6.50	3,630	8.00	6,190	10.00	10,970
4.60	1,380	5.60	2,415	6.60	3,780	8.20	6,605	11.00	13,980
4.70	1,470	5.70	2,535	6.70	3,930	8.40	7,025	12.00	17,430
4.80	1,560	5.80	2,665	6.80	4,080	8.60	7,460	13,00	21,460
4.90	1,660	5.90	2,795	6.90	4,230	8.80	7,915		
5.00	1,760	6.00	2,925	7.00	4,390	9.00	8,400		
5.10	1,865	6.10	3,055	7.20	4,710	9.20	8,890		

NOTE.—The above table is applicable only for open-channel conditions. It is based on discharge measurements made during 1902–1906 and is well defined.

Monthly discharge of Gunnison River at Whitewater, Colo., for 1906.

[Drainage area, 7,870 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum	Mean.		Sec. ft. per sq. mile.	Depth in inches.
April	10,700	1,730	4,590	273,000	0.583	0.65
May	21,700	5,130	14,800	910,000	1.88	2.17
June	21,900	6,920	14,400	857,000	1.83	2.04
July	7,350	3,190	4,710	290,000	.598	0.69
August	3,400	1,290	2,080	128,000	.264	0.30
September	2,860	1,050	1,680	100,000	.213	0.24
October	2,300	1,420	1,690	104,000	.215	0.25
The period	.....	.....	.....	2,660,000	.....	.....

NOTE.—Values are rated as follows: April to July, excellent; August to October, good.

NORTH FORK OF GUNNISON RIVER NEAR HOTCHKISS, COLO.

This station was established April 13, 1904, and discontinued March 31, 1906. It is located 4 miles below Hotchkiss, Colo., on the ranch of L. Gorsuch, and replaces the station maintained during 1903 at the highway bridge one-half mile east of Hotchkiss and abandoned because of unsatisfactory conditions. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 115, where are given also references to publications that contain data for previous years.

Daily gage height, in feet, of North Fork of Gunnison River near Hotchkiss, Colo., for 1906.

Day.	Jan.	Feb.	Mar.	Day.	Jan.	Feb.	Mar.
1	2.30	1.95	1.85	17	2.25	2.00	1.95
2	2.30	1.95	1.80	18	2.18	1.98	2.00
3	2.25	2.00	1.78	19	2.20	1.95	1.92
4	2.25	2.02	1.75	20	2.25	1.95	1.90
5	2.20	2.05	1.75	21	2.20	1.90	2.25
6	2.20	2.10	1.80	22	2.15	1.92	2.15
7	2.15	2.10	1.85	23	2.10	1.95	2.10
8	2.18	2.10	1.85	24	2.08	1.92	2.25
9	2.22	2.05	1.90	25	2.05	1.88	2.50
10	2.30	2.05	1.90	26	2.00	1.88	3.10
11	2.32	2.10	2.00	27	2.00	1.88	2.55
12	2.35	2.10	2.00	28	2.00	1.85	2.55
13	2.40	2.08	2.05	29	2.00	.....	2.50
14	2.40	2.02	2.28	30	2.00	.....	2.45
15	2.38	2.02	2.10	31	2.00	.....	2.58
16	2.32	2.02	2.00				

UNCOMPAHGRE RIVER NEAR COLONA, COLO.

This station was established April 9, 1904. It is located at the private road bridge of J. M. Duckett, in T. 47 N., R. 8 W., one-half mile above Eldredge siding on the Denver and Rio Grande Railroad and 3 miles above Colona, Colo. It is best reached by driving from Montrose. The station replaces one that was established August 10, 1903, at Kettle's bridge, 1 mile south of Colona, to take the place of the original station, which was located one-half mile northeast of Colona. Both of these stations were abandoned because of unsatisfactory conditions. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 120, where are given also references to publications that contain data for previous years.

Discharge measurements of Uncompahgre River near Colona, Colo., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 15	R. I. Meeker	45	60	1.42	188
May 8	do	47	112	2.38	653
June 1	do	47	121	2.48	792
June 22	do	47	191	.....	1,120

Daily gage height, in feet, of Uncompahgre River near Colona, Colo., for 1906.

Day.	Apr.	May.	June.	Day.	Apr.	May.	June.
1		1.75	2.50	17	1.60	2.55	
2		1.70	2.30	18	1.68	2.70	
3		1.70	2.50	19	1.70	3.00	
4		2.00	2.30	20	1.68	2.90	
5		2.35	2.55	21	1.95	2.75	
6		2.35	2.50	22	2.25	2.85	
7		2.35	2.60	23	2.55	2.70	
8		2.50	2.55	24	2.20	2.50	
9		2.45	3.15	25	2.00	2.50	
10		2.35	3.35	26	2.00	2.20	
11		2.35		27	1.90	2.50	
12		2.55		28	1.85	2.80	
13		2.45		29	1.85	2.70	
14		2.20		30	1.85	2.55	
15	1.42	2.25		31		2.35	
16	1.45	2.45					

NOTE.—The gage was displaced, the bench-mark destroyed, and the channel changed, about June 10, records after that date are of no value.

UNCOMPAHGRE RIVER AT MONTROSE, COLO.

This station was established April 22, 1903. It is located at the iron highway bridge west of Montrose and one-fourth mile west of the Denver and Rio Grande Railroad near Haskell Park. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 122, where are given also references to publications that contain data for previous years.

Discharge measurements of Uncompahgre River at Montrose, Colo., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 14	R. I. Meeker	31	33	1.85	47
May 7	do	35	82	3.32	380
June 1	do	40	87	3.50	414
June 22	do	42	106	3.89	542

Daily gage height, in feet, of Uncompahgre River at Montrose, Colo., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.00	2.15	2.08	2.15	2.48	3.50	3.60	2.70	1.68	2.35	2.20	2.48
2	2.00	2.08	1.98	1.95	2.45	3.62	3.40	2.85	1.80	2.20	2.25	2.50
3	2.25	2.12	1.75	1.92	2.45	3.30	3.05	2.70	1.70	2.25	2.05	2.50
4	2.05	2.08	1.92	1.95	2.85	3.05	2.88	2.60	1.62	2.12	2.15	2.60
5	2.30	2.10	1.92	2.10	3.15	3.62	2.75	2.55	1.55	2.15	1.90	2.55
6	2.28	2.10	1.88	2.00	3.30	3.58	2.58	2.35	1.50	2.08	1.98	2.45
7	2.08	2.08	1.90	2.35	3.45	3.60	2.45	2.20	1.52	2.02	1.95	2.40
8	2.22	2.06	1.88	2.18	3.62	3.58	2.78	2.10	1.62	2.02	2.00	2.35
9	2.25	2.02	1.98	2.15	3.90	3.80	2.92	1.98	1.95	2.00	1.95	2.45
10	2.15	2.08	2.00	2.40	3.65	4.55	2.60	1.95	1.88	1.95	1.98	2.45
11	2.20	2.05	2.05	2.42	3.80	5.10	3.05	1.92	1.90	1.90	2.05	2.50
12	2.00	2.06	1.96	2.18	3.88	5.45	3.18	1.90	1.95	1.85	1.92	2.50
13	2.08	2.05	1.95	1.98	3.32	5.88	3.10	1.95	1.92	1.90	1.92	2.48
14	2.05	1.95	2.00	1.98	3.12	5.45	3.18	2.12	2.02	1.90	1.92	2.38
15	2.10	2.02	1.90	2.05	3.08	5.60	3.10	2.10	2.35	1.98	1.82	2.28
16	2.00	2.05	1.90	2.08	3.45	5.75	2.95	2.05	2.78	1.92	1.92	2.20
17	2.10	2.08	1.82	2.28	3.55	5.75	2.72	2.12	2.25	1.98	1.90	2.25
18	2.10	1.95	1.88	2.50	4.02	4.80	2.90	2.25	2.05	1.95	2.05	2.25
19	2.22	2.00	1.88	2.55	4.30	4.60	2.75	1.95	2.00	1.80	2.02	2.35
20	2.10	2.02	1.75	2.52	4.55	4.85	2.88	1.95	2.05	1.95	2.08	2.38

Daily gage height, in feet, of Uncompahgre River at Montrose, Colo., for 1906—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21	2.18	2.00	1.98	2.88	4.15	3.82	2.80	2.25	2.10	2.05	2.15	2.35
22	2.10	2.02	2.02	3.22	4.28	3.88	2.65	2.20	2.05	1.95	2.15	2.35
23	2.50	1.98	2.10	3.60	4.02	3.80	2.75	2.05	1.82	2.05	2.25	2.30
24	2.08	1.90	2.30	3.70	3.82	3.60	3.25	2.30	1.90	2.05	2.40	2.32
25	2.00	1.90	2.25	3.20	3.65	3.45	2.90	2.05	2.40	2.15	2.20	2.32
26	2.05	1.92	2.15	2.85	3.48	3.52	2.75	1.92	2.25	2.25	2.35	2.35
27	2.08	1.92	2.12	2.55	3.25	3.35	3.15	1.92	2.50	2.20	2.40	2.30
28	2.02	2.02	2.10	2.65	3.70	3.20	3.25	1.88	2.45	2.35	2.50	2.30
29	2.08	.....	2.12	2.70	3.95	3.00	3.05	1.88	2.30	2.15	2.52	2.25
30	2.02	.....	2.02	2.72	3.58	3.40	3.08	1.88	2.35	2.05	2.48	2.30
31	2.00	.....	2.00	.....	3.50	.....	2.80	1.68	.....	2.15	.....	2.40

Rating tables for Uncompahgre River at Montrose, Colo.

JANUARY 1, 1905, TO APRIL 22, 1906.[a]

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.*
1.70	32	2.10	69	2.40	111	2.70	163	3.00	231
1.80	39	2.20	82	2.50	127	2.80	184	3.10	257
1.90	47	2.30	96	2.60	144	2.90	207	3.20	285
2.00	57								

APRIL 23, 1906, TO DECEMBER 31, 1906.[b]

1.50	32	2.20	116	2.90	262	3.60	461	4.60	850
1.60	40	2.30	133	3.00	288	3.70	493	4.80	970
1.70	50	2.40	151	3.10	315	3.80	526	5.00	1,125
1.80	61	2.50	170	3.20	343	3.90	560	5.20	1,300
1.90	73	2.60	191	3.30	371	4.00	595	5.40	1,500
2.00	86	2.70	213	3.40	400	4.20	671	5.60	1,725
2.10	100	2.80	237	3.50	430	4.40	755	5.80	1,970

[a] This table is applicable only for open-channel conditions. It is based on one discharge measurement made during 1906 and the form of previous curves and is not well defined.

[b] This table is applicable only for open-channel conditions. It is based on discharge measurements made during 1904–1906 and is well defined between gage heights 2 feet and 4 feet.

Monthly discharge of Uncompahgre River at Montrose, Colo., for 1906.

[Drainage area, 565 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Sec.-ft. per sq. mile.	Depth in inches.
January	127	57	71.9	4,420	0.127	0.15
February	76	47	60.6	3,370	0.107	.11
March	96	36	56.9	3,500	0.101	.12
April	493	49	150	8,930	0.265	.30
May	825	160	456	28,000	0.807	.93
June	2,070	288	796	47,400	1.41	1.57
July	461	160	276	17,000	0.488	.56
August	250	48	111	6,820	0.196	.23
September	232	32	93.1	5,540	0.165	.18
October	142	61	94.9	5,840	0.168	.19
November	174	73	105	6,460	0.186	.21
December	191	116	148	9,100	0.262	.30
The year	2,070	32	202	146,000	.357	4.85

NOTE.—Values are rated as follows: January to March, August to December, fair; April and July, good; May and June, excellent.

UNCOMPAHGRE RIVER AT DELTA, COLO.

This station was established April 29, 1903. It was originally located at a highway bridge one-fourth mile above the Denver and Rio Grande Railroad bridge, but on November 17, 1903, the station was removed to the Denver and Rio Grande Railroad bridge, one-fourth mile northwest of the Denver and Rio Grande Railroad station, in order that the measured discharge of the river might include the mill-ditch waste. Excluding the discharge of seasonal high water in May or June and an occasional rise from local storms, the water passing this station is entirely seepage water from irrigation above. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 125, where are given also references to publications that contain data for previous years.

Discharge measurements of Uncompahgre River at Delta, Colo., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 13	R. I Meeker	55	51	1.15	63
May 8	do	65	176	3.20	867
May 9	do	65	176	3.18	844
May 30	do	65	184	3.25	850
May 31	do	65	172	3.01	722

Daily gage height, in feet, of Uncompahgre River at Delta, Colo., for 1906.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	1.51	0.88	1.82	2.83	1.82	1.47	0.98	1.63	1.84
2	1.42	0.88	1.64	2.78	1.81	1.80	1.08	1.63	1.85
3	1.36	0.90	1.62	2.62	1.68	1.76	1.10	1.56	.....
4	1.37	0.95	1.71	2.48	1.60	1.67	1.10	1.50	.....
5	1.37	0.90	2.37	2.53	1.48	1.60	1.04	1.49	.....
6	1.31	0.89	2.57	2.35	1.22	1.67	1.02	1.52	.....
7	1.28	0.96	2.92	2.40	1.17	1.47	1.03	1.52	.....
8	1.22	1.18	3.07	2.24	1.39	1.36	1.01	1.51	.....
9	1.27	1.02	3.27	2.22	1.18	1.25	1.01	1.46	.....
10	1.16	1.01	3.21	2.50	1.06	1.15	1.00	1.40	.....
11	0.99	1.44	3.25	3.05	1.06	1.04	1.06	1.36	.....
12	1.08	1.40	3.33	3.28	1.21	1.05	1.04	1.38	.....
13	1.19	1.16	3.36	3.52	1.16	1.05	1.02	1.39	.....
14	1.23	0.98	3.17	3.91	1.09	1.04	1.01	1.41	.....
15	1.12	0.88	2.91	3.70	1.26	1.06	1.23	1.42	.....
16	1.01	0.90	2.98	3.71	1.20	1.09	1.67	1.41	.....
17	1.02	0.94	3.25	3.87	1.15	1.06	1.91	1.40	.....
18	1.01	1.30	3.48	3.77	1.09	1.11	1.51	1.38	.....
19	0.97	1.59	3.65	3.06	1.38	1.10	1.42	1.37	.....
20	0.98	1.59	3.82	3.00	1.30	1.04	1.37	1.52	
21	1.06	1.87	3.92	2.78	1.27	1.07	1.39	1.65	.....
22	1.18	2.46	3.80	2.52	1.20	1.34	1.36	1.65	.....
23	1.18	2.93	3.56	2.54	1.14	1.56	1.36	1.63	.....
24	1.14	3.22	3.65	2.39	1.49	1.38	1.41	1.71	.....
25	1.27	2.61	4.10	2.22	1.58	1.20	1.48	1.70	.....
26	1.28	2.29	3.37	2.17	1.25	1.15	1.69	1.75	.....
27	1.29	2.10	3.02	2.09	1.50	1.13	1.80	1.79	.....
28	1.14	1.86	3.15	1.95	1.63	1.06	1.84	1.83	.....
29	1.11	2.03	3.42	1.79	1.86	1.04	1.78	1.85	.....
30	1.01	1.72	3.26	1.80	1.87	0.99	1.69	1.81	.....
31	0.92	.....	3.04	.....	1.61	1.00	.....	1.73	.....

NOTE.—The river was gorged with ice during January and February.

Rating table for Uncompahgre River at Delta, Colo., for 1906.

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.*
0.90	27	1.60	152	2.30	383	3.00	725	3.70	1,190
1.00	38	1.70	179	2.40	425	3.10	785	3.80	1,265
1.10	51	1.80	208	2.50	470	3.20	845	3.90	1,345
1.20	67	1.90	239	2.60	515	3.30	910	4.00	1,425
1.30	85	2.00	272	2.70	565	3.40	975	4.10	1,510
1.40	105	2.10	307	2.80	615	3.50	1,045		
1.50	128	2.20	344	2.90	670	3.60	1,115		

NOTE.—The above table is applicable only for open-channel conditions. It is based on discharge measurements made during 1904–1906 and is well defined.

Monthly discharge of Uncompahgre River at Delta, Colo., for 1906.

[Drainage area, 1,130 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Sec.-ft. per sq. mile.	Depth in inches.
March	130	29	65.6	4,030	.058	.07
April	858	25	175	10,400	.155	.17
May	1,510	157	827	50,800	.732	.84
June	1,350	205	629	37,400	.557	.62
July	230	46	108	6,640	.096	.11
August	208	37	82.8	5,090	.073	.08
September	242	36	97.7	5,810	.086	.10
October	224	97	145	8,920	.128	.15
The period				129,000		

NOTE.—Values are rated as follows: May and June, excellent; remainder of the period, good.

COLORADO RIVER DRAINAGE BASIN BETWEEN JUNCTION OF GRAND AND GREEN RIVERS AND YUMA.

COLORADO RIVER.

DESCRIPTION OF RIVER.

From the junction of Grand and Green 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 when it is most needed for irrigation. It is of interest to compare the Colorado with Nile and Susquehanna rivers. The Nile is similar in type, while the Susquehanna shows the difference in flow between arid and humid regions. In the comparison a normal year based upon records of the past ten years for the 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 70,000 to 110,000 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 200,000 to 400,000 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 2,500 to 5,000 second-feet and occurs in September and October.

The mean flow of the Colorado is about 10,700 second-feet; for the Nile it is about 115,800 second-feet; for the Susquehanna it is about 43,000 second-feet.

The water of the Colorado carries an immense amount of sediment, reaching as high as 2,000 parts of sediment to 100,000 parts of water. Prof. R. H. Forbes, in Bulletin No. 44, University of Arizona Agricultural Experiment Station, says:

> On the basis of the profile constructed from available data for the volume of flow of the Colorado, and of the year's silt determinations made in the laboratory, it is estimated conservatively that the river during 1900 brought down about 61,000,000 tons of sedimentary material, which, condensed to the form of solid rock, is enough to cover 26.4 square miles 1 foot deep, or to make about 164 square miles of recently settled, submerged mud 1 foot deep, reckoning the whole amount of mud for the year to average 6.2 times the bulk of the solid sediment.

A comparatively small amount of land is irrigated by the waters of the Colorado, owing to the fact that the stream and its tributaries are situated so far below the level of the irrigable lands as to render their diversion extremely difficult or impracticable. There are two pumping plants that lift water for irrigation at Yuma and several at other points on the river above Yuma. The Imperial canal diverts water from the river at a point about 10 miles by river below Yuma.

The principal tributaries of the Colorado below the Grand and Green are San Juan, Little Colorado, Williams Fork, and Gila rivers,

which enter from the east, and Virgin River, which enters from the west. With the exception of Virgin River and Williams Fork, these streams and their various tributaries are described in other parts of this report.

COLORADO RIVER AT HARDYVILLE, ARIZ.

This station was established May 11, 1905. It is maintained in cooperation with the State of California, and is located one-fourth mile above the deserted town of Hardyville and 7 miles above Fort Mohave, Ariz. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 128.

Discharge measurements of Colorado River at Hardyville, Ariz., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
January 1	C. W. Jenkins	440	1,530	3.70	3,430
January 7	do	430	1,460	3.50	3,440
January 14	do	430	1,310	3.30	3,360
January 21	do	435	1,660	4.15	5,900
January 28	do	435	1,840	4.50	7,850
February 5	do	435	1,680	4.10	5,110
February 12	do	435	1,720	4.40	6,390
February 25	do	435	1,590	4.30	6,350
March 4	do	372	1,470	4.10	5,710
March 11	do	375	1,460	4.20	1,520
March 18	do	445	3,180	6.40	19,400
March 25	do	445	2,630	5.80	12,800
April 1	do	455	4,320	7.50	30,000
April 8	do	455	3,600	6.90	21,500
April 15	do	455	3,750	7.30	24,100
April 22	do	470	4,480	8.10	32,200
April 24	Murphy and Lee	470	5,010	8.84	37,500
May 3	Lee and Jenkins	460	5,110	9.00	40,800
May 6	C. W. Jenkins	470	4,600	8.70	33,100
May 13	do	485	7,090	11.20	67,200
May 20	C. H. Lee	497	7,960	11.90	63,700
May 27	C. W. Jenkins	550	9,400	14.60	92,800
June 3	do	500	10,700	14.05	96,200
June 9	do	500	10,400	13.10	92,000
June 16	do	500	9,060	14.40	109,000
July 1	F. T. Cavin	470	8,860	10.35	63,700
July 8	Lee and Cavin	470	7,090	9.30	47,500
July 15	F. T. Cavin	468	5,500	8.50	34,600
July 22	do	468	5,990	8.56	38,100
July 29	do	464	4,800	7.55	27,600
August 5	do	462	4,070	7.35	24,400
August 11	do	460	3,540	7.00	19,500
August 18	do	455	3,070	6.45	16,200
August 25	do	452	2,860	6.20	14,200
September 1	do	454	2,900	6.50	15,500
September 8	do	459	2,770	6.63	12,700
September 15	do	456	2,520	6.50	11,400
September 22	C. J. Brunk	460	2,390	6.73	12,100
September 29	do	464	3,110	7.38	16,900
October 6	do	466	3,200	7.63	16,000
October 13	do	455	2,470	7.00	12,000
October 20	do	451	2,150	6.75	9,840
October 28	do	452	1,910	6.60	8,400
November 4	do	445	1,930	6.80	9,470
November 10	do	461	2,290	7.30	12,800
November 17	do	458	2,180	7.15	10,300
November 24	do	455	1,960	6.85	9,430
December 1	do	450	1,750	6.70	7,720
December 8	do	470	3,420	8.48	23,300
December 15	do	451	2,410	7.25	11,300
December 22	do	449	1,890	6.89	9,230
December 29	do	398	1,530	6.50	7,160

Daily gage height, in feet, of Colorado River at Hardyville, Ariz., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	.....	4.4	7.85	9.5	13.2	10.25	7.4	6.5	.....	6.65	6.7
2	3.50	4.1	4.2	8.25	9.2	13.8	10.0	7.4	6.35	7.5	6.6	6.65
3	3.5	4.05	4.2	7.9	9.1	14.0	.....	7.6	6.35	7.7	.....	6.7
4	3.4	4.1	4.1	7.4	9.2	13.8	9.4	7.5	6.5	7.7	6.8	6.65
5	3.35	4.1	4.1	7.45	8.9	13.75	9.4	7.35	6.5	7.7	6.75	6.6
6	3.4	4.1	4.1	7.1	8.8	13.8	9.2	7.2	6.55	7.6	.....	6.8
7	3.5	4.2	4.1	6.85	8.7	13.6	9.35	7.0	6.55	7.4	6.9	7.45
8	3.35	4.2	4.2	6.9	8.1	13.3	9.25	7.1	6.7	7.3	6.9	8.45
9	3.3	4.3	4.2	6.9	8.7	13.0	9.35	7.0	6.7	7.2	7.0	7.9
10	3.45	4.4	4.2	6.9	9.3	13.1	9.1	7.0	6.7	7.1	7.3	7.7
11	3.3	.....	4.25	7.1	10.1	13.25	8.9	7.05	6.55	7.1	7.3	.....
12	3.35	4.4	4.2	7.1	10.5	13.5	8.8	6.85	6.6	7.1	.....	7.5
13	3.3	4.4	4.35	7.6	11.05	13.1	8.8	6.8	6.55	7.0	7.3	7.4
14	3.4	4.4	4.5	7.5	11.85	13.95	8.45	6.7	6.55	7.0	7.2	7.3
15	3.35	4.3	5.1	7.35	11.9	.....	8.5	6.65	6.55	6.95	7.15	7.25
16	3.4	4.3	.....	7.4	12.5	14.1	8.35	6.6	6.55	6.9	7.15	7.1
17	3.7	4.3	6.4	7.45	12.75	14.6	8.55	6.55	6.5	6.85	7.15	6.95
18	3.8	4.25	6.35	7.6	12.6	14.8	8.5	6.45	6.6	6.8	7.1	6.95
19	3.9	4.2	5.9	7.6	12.1	15.2	8.55	6.45	6.9	6.8	7.0	6.9
20	4.2	4.1	5.8	7.6	11.9	15.4	8.65	6.25	6.7	6.75	6.9	6.9
21	4.15	4.2	5.9	7.9	12.3	15.0	8.75	6.2	6.6	6.7	6.85	6.9
22	4.5	.....	5.9	8.1	12.75	15.0	8.6	6.1	6.75	6.7	6.85	6.85
23	4.4	4.2	5.8	.....	13.4	14.35	8.55	6.3	7.2	6.7	6.9	6.75
24	4.3	4.2	5.8	8.8	13.7	13.8	8.35	6.6	7.0	6.65	6.85	6.65
25	4.4	4.3	5.8	8.9	14.2	13.1	8.15	6.2	6.9	6.6	6.85	6.55
26	4.5	4.3	6.5	9.2	14.2	12.4	8.05	6.2	7.0	6.6	.....	6.45
27	4.4	4.3	6.4	9.8	14.55	11.85	7.85	.....	7.0	6.55	6.85	6.4
28	4.45	4.4	6.3	10.4	14.5	11.6	7.65	6.35	.....	6.6	6.9	6.4
29	4.4	.....	6.55	10.3	.....	11.2	7.55	6.45	7.4	6.75	6.9	6.5
30	4.4	.....	7.3	10.0	13.9	10.6	7.55	6.5	7.6	.....	6.8	6.55
31	4.3	.....	7.75	.....	13.4	.....	.....	.....	.....	6.75	.....	6.5

Daily discharge, in second-feet, of Colorado River at Hardyville, Ariz., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3,430	6,100	6,700	33,600	45,900	83,500	62,600	25,000	15,500	17,800	8,300	7,720
2	3,000	5,600	6,000	36,900	42,900	91,700	59,000	25,000	13,200	16,000	8,000	6,800
3	3,100	5,200	6,000	32,800	41,800	95,500	55,000	29,000	12,500	17,500	8,600	6,700
4	2,900	5,250	5,700	27,300	41,300	94,300	51,000	27,000	13,500	16,800	9,470	6,000
5	2,850	5,110	5,700	27,100	36,400	95,000	50,500	24,400	13,000	16,600	8,900	5,500
6	3,100	5,000	5,650	23,600	34,000	96,500	47,500	21,500	13,000	15,800	9,200	6,000
7	3,440	5,300	5,600	21,100	34,000	94,500	48,700	18,500	12,200	13,500	9,500	10,100
8	3,150	5,300	5,700	21,500	28,500	93,200	47,000	20,700	13,600	12,800	9,500	23,100
9	3,050	5,700	5,650	21,300	35,600	91,200	47,500	18,800	13,600	12,100	10,000	14,500
10	3,300	6,100	5,600	22,100	42,500	92,000	44,100	19,100	13,600	11,700	12,800	13,000
11	3,200	6,200	5,700	22,800	52,700	93,200	41,000	20,500	12,000	12,000	12,700	12,600
12	3,250	6,400	5,800	22,900	58,500	95,800	39,600	17,800	12,600	12,300	12,500	12,400
13	3,200	6,200	6,700	27,000	65,800	91,000	39,000	18,000	12,100	12,000	12,200	11,700
14	3,500	6,200	7,500	26,100	72,800	100,000	34,500	17,500	12,100	12,000	11,300	11,300
15	3,450	6,000	10,600	24,600	71,500	100,000	34,600	17,200	12,100	11,700	10,700	11,300
16	3,700	6,050	15,000	25,200	77,100	101,000	33,500	17,300	11,700	11,100	10,600	10,100
17	4,500	6,100	19,300	25,700	78,000	105,000	36,000	17,600	11,300	10,800	10,300	9,100
18	4,800	5,900	19,000	27,200	72,300	110,000	35,700	16,200	12,000	10,300	10,200	9,100
19	5,200	5,800	15,400	27,200	68,000	115,000	36,500	16,500	15,000	10,200	9,600	9,000
20	5,700	5,600	14,300	27,300	63,700	116,000	37,200	14,000	12,500	9,840	9,200	9,000
21	5,900	5,850	14,900	30,200	68,500	113,000	39,700	13,500	10,800	9,800	9,000	9,000
22	7,300	5,900	14,300	32,200	73,500	113,000	38,500	12,500	11,800	9,300	9,200	8,900
23	7,000	6,000	13,500	34,100	81,000	106,000	38,000	15,000	16,500	9,200	9,400	8,300
24	6,700	6,050	13,200	37,100	83,000	100,000	35,700	20,300	14,000	8,900	9,430	7,600
25	7,200	6,350	12,800	38,300	89,500	93,000	33,600	14,200	12,500	8,500	9,200	7,000
26	7,700	6,300	18,000	41,700	89,500	85,000	32,600	14,000	13,000	8,450	9,200	6,700
27	7,300	6,300	17,600	48,600	92,200	79,700	30,500	14,100	13,000	8,200	9,200	6,400
28	7,700	6,700	17,200	55,600	93,000	76,700	28,500	15,000	15,000	8,400	9,500	6,400
29	7,200	.....	22,300	54,500	91,000	72,500	27,600	16,500	17,400	9,400	9,500	7,160
30	7,100	.....	26,800	51,200	89,000	66,000	27,500	16,500	19,500	9,400	8,800	7,400
31	6,700	.....	31,800	.....	84,500	.....	27,500	16,500	.....	9,400	.....	7,100

NOTE.—These discharges were obtained by the indirect method for shifting channels.

Monthly discharge of Colorado River at Hardyville, Ariz., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
January	7,700	2,850	4,830	297,000
February	6,700	5,000	5,880	327,000
March	31,800	5,600	12,300	756,000
April	55,600	21,100	31,600	1,880,000
May	93,000	28,500	64,500	3,970,000
June	116,000	66,000	95,300	5,670,000
July	62,600	27,500	40,000	2,460,000
August	29,000	12,500	18,400	1,130,000
September	19,500	10,800	13,400	797,000
October	17,800	8,200	11,700	719,000
November	12,800	8,000	9,870	587,000
December	23,100	5,500	9,260	569,000
The year	116,000	2,850	26,400	19,200,000

NOTE.—The above values are good.

SAN JUAN RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

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 drainage area includes portions of four States and Territories. Its topography ranges in type from mountainous at the headwaters in Colorado to the types exemplified in the valleys, plateaus, and eroded mesas of Utah, New Mexico, and Arizona. Large areas of eruptive rocks occur in the highest portions of the basin, but the predominating formations are of sedimentary origin. The headwater streams 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, Florida, Animas, and La Plata rivers, the Animas being the most important.

Animas River has its source in the region above Silverton, draining 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. The upper portion of the basin, above Durango, is very mountainous and furnishes the greater part of the run-off. This region is generally 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 granite masses known as 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.

Much land is now under cultivation along the valleys of the San Juan, Animas, Pine, Florida, and La Plata rivers and the smaller tributaries in Colorado. 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 which will in time be developed. One large power plant has been constructed in this basin and others are contemplated. The largest deposits of lignite and bituminous and coking coal to be found in the West are in this drainage area.

SAN JUAN RIVER NEAR FARMINGTON, N. MEX.

This station was established June 18, 1904, and discontinued September 22, 1906. It was first located near the Methodist Indian school about 3 miles south of Farmington, N. Mex., and about 2 miles

below the mouth of Animas River. On May 11, 1906, it was removed to the new suspension bridge, which replaces the old one, about 1½ miles above the original location.

Measurements are made from the bridge; the initial point for soundings is the inside face of the south pier.

The new gage, which was read during 1906 by Samuel Thomalson, consists of a cantilever arm, to which a standard chain gage is attached; length of chain, 6.80 feet. The bench mark is a 20-penny spike driven horizontally into a crevice in the sandstone ledge about 30 feet upstream from the gage; elevation, 9.61 feet above the datum of the gage.

Discharge Measurements of San Juan River near Farmington, N. Mex., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.		Discharge.
				Old gage.	New gage.	
		Feet.	*Sq. ft.*	*Feet.*	*Feet.*	*Sec.-ft.*
May 11	M. C. Hinderlider	235	1,370	9.70	4.45	11,700
June 4	do	235	1,230	8.70	4.40	9,090
June 8	do	235	1,480	10.20	5.80	12,800

Daily gage height, in feet, of San Juan River near Farmington, N. Mex., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4.15	4.30	4.85	5.65	6.15	4.75	3.75	2.45	1.50
2	4.10	4.38	4.75	5.78	6.00	5.05	3.80	2.40	1.40
3	4.05	4.48	4.80	5.45	6.05	5.10	3.65	2.30	1.30
4	4.00	4.50	4.75	5.20	6.10	4.60	3.90	2.20	1.30
5	3.95	4.50	4.75	5.30	6.45	4.55	3.85	2.20	1.25
6	3.95	4.52	4.75	5.45	6.90	5.35	3.45	2.10	1.30
7	4.18	4.55	4.82	5.65	7.30	5.85	3.45	2.00	1.20
8	4.30	4.58	4.72	7.10	7.75	5.75	3.35	2.05	1.10
9	4.18	4.60	4.82	6.30	8.25	5.60	3.25	2.00	1.10
10	4.28	4.60	4.88	6.25	8.35	6.15	3.20	1.90	1.20
11	4.20	4.58	4.88	6.65	4.50	7.00	3.15	1.80	1.20
12	4.30	4.60	5.12	7.35	4.70	7.10	3.20	1.65	1.15
13	4.30	4.65	5.10	6.65	4.75	7.20	3.10	1.60	1.10
14	4.32	4.70	5.25	6.75	4.05	7.25	3.25	1.55	1.00
15	4.28	4.65	5.10	6.85	3.60	6.65	3.30	1.60	1.10
16	4.22	4.68	5.15	7.40	3.90	6.50	3.20	1.40	2.10
17	4.25	4.65	5.15	7.20	4.40	6.45	3.00	1.40	2.35
18	4.25	4.72	5.10	7.30	4.95	6.25	2.95	1.40	2.05
19	4.28	4.72	5.05	7.55	5.50	5.60	2.75	1.40	1.85
20	4.32	4.70	5.00	7.55	5.85	5.25	2.65	1.40	1.90
21	4.10	4.72	5.05	7.35	6.35	5.30	2.55	1.60	1.90
22	4.05	4.70	5.10	7.90	6.40	4.60	2.50	2.30	1.90
23	4.15	4.75	5.45	8.70	6.45	4.60	2.55	2.60	.....
24	4.10	4.70	5.45	7.90	6.20	4.25	2.50	2.30	.....
25	4.15	4.72	5.70	7.80	5.55	4.10	2.55	1.90	.....
26	4.25	4.75	7.05	7.10	4.85	4.05	2.55	1.65	.....
27	4.30	4.85	6.35	7.05	4.35	3.85	2.50	1.50	.....
28	4.20	4.75	6.10	7.10	4.45	3.65	2.70	1.40	.....
29	4.30	.....	5.70	6.80	5.00	3.60	3.20	1.40	.....
30	4.32	.....	5.25	6.50	5.00	3.50	3.10	1.40	.....
31	4.25	.....	5.40	.....	4.70	.....	2.60	1.60	.....

NOTE.—Gage heights before May 11 refer to the old gage; those of May 11 and after refer to the new gage established on that date.

LA PLATA RIVER AT HESPERUS, COLO.

This station was established June 14, 1904, in connection with investigations relating to the La Plata project in New Mexico, and discontinued August 18, 1906. It was located at the highway bridge on the west side of Hesperus, Colo. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 140, where are given also references to publications that contain data for previous years.

Discharge measurements of La Plata River at Hesperus, Colo., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 6	M. C. Hinderlider	29	62	2.80	350
June 6	do	29	59	2.70	310
June 8	A. Puetz	29	56	2.60	298
June 11	do	29	67	2.90	349
June 18	do	29	52	2.40	235
June 22	do	29	43	2.30	197
June 28	do	29	30	1.90	90
July 9	do	29	23	1.80	64

Daily gage height, in feet, of La Plata River at Hesperus, Colo., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	0.95	0.85	0.95	1.25	1.85	2.15	1.80	1.20
2	1.00	0.82	0.92	1.05	1.95	2.05	1.72	1.20
3	1.10	0.80	1.02	1.22	2.00	2.00	1.75	1.20
4	1.00	0.82	0.98	0.98	2.20	2.00	1.90	1.20
5	0.90	0.78	0.95	1.25	2.45	1.98	1.90	1.20
6	0.90	0.80	0.95	1.50	3.25	2.65	2.00	1.20
7	0.82	0.80	0.95	1.20	3.80	2.70	2.00	1.20
8	0.80	0.80	0.95	1.18	3.35	2.80	1.90	1.20
9	1.20	0.80	0.98	1.20	3.80	3.05	1.80	1.10
10	1.00	0.80	0.95	1.22	3.00	3.15	1.80	1.10
11	0.90	0.85	0.98	1.25	2.85	3.10	1.70	1.10
12	0.50	0.85	0.95	1.32	3.15	3.00	1.65	1.00
13	0.42	0.88	0.95	1.42	2.40	3.10	1.60	1.00
14	0.40	0.88	0.95	1.62	2.05	3.00	1.60	1.00
15	0.45	0.88	0.95	2.05	2.05	3.05	1.80	1.00
16	0.42	0.92	0.98	2.00	2.25	2.95	1.80	1.00
17	0.42	0.92	0.95	2.15	2.90	2.65	1.58	1.00
18	0.38	0.92	0.95	2.25	3.00	2.45	1.52	1.00
19	0.40	1.05	0.95	2.02	3.00	2.40	1.50	.....
20	0.40	1.10	0.98	2.05	3.05	2.35	1.40	.....
21	0.40	1.15	0.98	2.28	3.00	2.10	1.35	.....
22	0.42	0.95	1.05	2.80	2.90	2.00	1.30	.....
23	0.42	0.90	1.05	2.90	2.55	2.00	1.30	.....
24	0.45	0.88	1.00	2.75	2.05	2.20	1.30	.....
25	0.48	0.92	1.00	2.20	2.00	2.30	1.30	.....
26	0.52	0.95	1.05	2.10	2.00	3.02	1.30	.....
27	0.70	0.95	1.05	2.05	2.00	2.25	1.30	.....
28	0.72	0.95	0.98	2.05	2.25	1.85	1.32	.....
29	0.80	.....	1.00	2.00	2.25	1.98	1.35	.....
30	0.72	.....	1.08	1.98	2.32	1.85	1.32	.....
31	0.82	.....	1.02	.....	2.35	.....	1.30	.....

LA PLATA RIVER NEAR LA PLATA, N. MEX.

This station was established June 1, 1905, in connection with investigations relating to the La Plata project, and discontinued Sept. 24, 1906. It was located on the single-span wooden highway bridge 1 mile southeast of La Plata post-office, N. Mex., in sec. 3, T. 31, R. 13 W., below all points of diversion. After June 4, 1906, gage heights were found by measuring down from a reference point on the floor of the bridge by a rod graduated to read the height directly. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 142.

Discharge measurements of La Plata River near La Plata, N. Mex., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 9	M. C. Hinderlider	35	70	3.28	352
May 10	do	34	66	3.20	338
June 3	do	33	50	2.62	203

Daily gage height, in feet, of La Plata River near La Plata, N. Mex., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.20	2.00	0.75	2.10	2.45	2.58	1.15	1.15	1.10
2	1.20	2.10	0.55	2.05	2.35	2.70	1.15	1.15	1.05
3	1.20	1.65	0.55	2.00	2.25	2.55	1.10	1.15	1.05
4	.....	1.10	0.70	2.00	2.40	2.52	1.15	1.15	1.05
5	.....	1.80	0.70	2.00	2.70	2.60	1.10	2.58	1.05
6	.....	0.95	0.65	2.10	2.55	2.80	1.10	1.25	1.05
7	1.30	1.10	0.60	2.35	3.05	3.00	1.10	1.15	1.05
8	1.30	1.00	0.65	2.25	3.05	2.85	1.12	1.12	1.05
9	1.30	0.80	0.75	2.55	3.25	2.85	1.15	1.10	1.05
10	1.30	0.65	0.95	2.55	3.08	2.88	1.15	1.10	1.05
11	1.30	0.75	1.15	2.55	3.10	2.85	1.15	1.12	1.05
12	1.30	0.80	0.95	2.35	3.02	2.82	1.15	1.15	1.05
13	1.30	0.85	0.95	2.35	2.95	2.85	1.15	1.15	1.05
14	1.30	0.85	0.95	2.40	2.70	2.85	1.80	1.10	1.15
15	1.30	0.85	1.20	2.40	2.50	2.80	1.32	1.10	2.15
16	1.30	0.75	1.25	2.65	2.62	2.65	1.20	1.10	2.20
17	1.30	0.85	0.95	2.70	2.68	2.72	2.60	1.10	1.40
18	1.30	0.70	0.85	3.20	3.05	2.50	1.62	1.10	1.20
19	1.30	0.90	0.75	2.75	3.40	2.35	1.30	1.10	1.15
20	1.30	0.85	0.70	2.70	3.48	2.25	1.18	1.30	1.15
21	.....	0.75	0.75	2.95	3.32	2.05	1.15	1.65	1.10
22	.....	0.70	0.95	3.20	3.42	2.00	1.15	1.15	1.10
23	.....	0.70	1.05	3.10	3.20	2.00	1.10	1.10	1.10
24	.....	0.65	1.20	3.05	3.00	1.88	1.10	1.10	1.10
25	.....	0.55	2.65	2.95	2.85	1.55	1.10	1.10	.....
26	.....	0.50	2.40	2.80	2.62	1.25	1.10	1.10	.....
27	.....	0.50	2.45	2.70	2.45	1.18	1.10	1.10	.....
28	1.60	0.75	2.20	2.60	2.55	1.12	1.10	1.10	.....
29	1.75	.....	2.25	2.55	2.62	1.15	1.10	1.10	.....
30	1.70	.....	2.20	2.60	2.62	1.15	1.10	1.10	.....
31	1.75	.....	2.15	.....	2.60	.....	1.15	1.10	.....

LITTLE COLORADO RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

The country drained by the Little Colorado River consists of a high plateau with an elevation over 4,000 feet above sea level, extending from the Continental Divide in northwestern New Mexico westward to the San Francisco Mountains in Arizona, and from the Grand Canyon of the Colorado southward to the Mogollon Mesa. The greater part of this plateau is composed of rolling plains with a few feet of soil at the surface underlain by rock. Through this plateau the river winds northwestward to its junction with the great Colorado.

The run-off from approximately 6,000 square miles of the drainage area finds its way into the Little Colorado above the mouth of Rio Puerco, the largest tributary which joins the main stream 2 miles above the town of Holbrook, Ariz. Both the Little Colorado and the Rio Puerco are flashy streams, seldom clear even during low stages. They have shifting, sandy bottoms, and when not confined in canyons the stream beds are wide with abrupt earth banks. The discharge fluctuates greatly, being insignificant in dry seasons. The floods are short and violent and carry large quantities of silt in suspension.

LITTLE COLORADO RIVER AT WOODRUFF, ARIZ.

This station was established March 16, 1905. It is located about 100 yards below the crossing of the Holbrook-Winslow wagon road and one-fourth mile below the Woodruff dam. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 145.

The station equipment which was carried away by the flood of November 26 and 27, 1905, was replaced March 24, 1906. A new cable 210 feet long, car, and tag wire were erected, also a combined vertical and inclined rod was placed in the same location as the old one.

The bench marks previously used were replaced by the following: Bench mark No. 1 is the head of a bolt in a scar in a tree, to which the second inclined section is fastened; elevation, 14.92 feet. Bench mark No. 2 is the head of a bolt in a scar on the river side of the fifth cottonwood tree south in a row, to which the last section of the gage rod is fastened; elevation, 23.02 feet. Elevations refer to the datum of the gage.

Discharge measurements of Little Colorado River at Woodruff, Ariz., by R. L. Newman, in 1906.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
January 3	0.3	25	June 29[b]		4.2
January 4	.3	26	July 3		4.3
January 5	.3	25	July 6		6.4
January 16	4.75	395	July 12		6.3
January 17	5.0	444	July 13		5.7
January 18	3.5	184	July 16		7.0
January 23	1.3	124	July 18		14
January 24	1.0	106	July 20		21
January 25	.9	106	July 23[b]		19
January 29	1.0	108	July 24	2.0	19
January 31	.7	107	July 26	3.0	228
February 1	.5	86	July 27	2.0	24
February 2	.9	128	July 31	1.5	2.6
February 5	1.35	186	August 1	1.5	2.7
February 6	1.2	187	August 3	2.2	49
February 8	1.7	262	August 6	1.6	4.2
February 9	1.8	254	August 7	1.6	3.4
February 12	1.7	260	August 9	2.6	165
February 14	1.2	199	August 10	2.0	50
February 15	1.0	144	August 13	2.2	39
February 16	.9	141	August 20	3.5	501
February 19	.9	145	August 23	1.3	66
February 21	.8	129	August 24	2.4	67
February 22	.9	146	August 27	1.9	37
February 23	.9	151	August 28	1.8	28
February 26	.7	134	August 30	1.4	18
February 28	.6	127	August 31	1.4	23
March 1	.6	150	September 2[c]	1.4	6.9
March 2	.5	143	September 4	1.3	5.7
March 5	.5	143	September 6	1.3	2.4
March 6	.6	140	September 7	1.2	2.1
March 8	.5	72	September 10	1.0	1.1
March 9	.5	85	September 11	1.0	.7
March 14	8.85	1,620	September 13	.9	.5
March 15	5.5	786	September 17	.9	.5
March 20	2.7	290	September 18	.9	.5
March 23	1.7	150	September 20	.9	.5
March 26	5.3	1,110	September 21	.9	.5
March 28	4.3	663	September 24	.9	.6
March 29	3.9	539	September 25	1.0	1.3
March 30	3.7	552	September 26	1.0	1.3
April 3	2.2	223	September 27	1.9	43
April 4	2.2	221	September 30	2.8	166
April 6	2.1	213	October 1	2.3	98
April 8	5.45	808	October 3	1.4	17
April 10	3.5	517	October 5	1.3	14
April 12	2.2	256	October 7	1.3	13
April 16	2.5	266	October 9	1.2	12
April 18	2.5	317	October 11	1.2	9.0
April 23	2.7	371	October 19	1.1	7.6
April 24	2.7	376	October 22	1.2	11
April 27	2.6	367	October 24	1.3	8.8
April 29	2.6	191	October 26	1.2	4.6
April 30	2.6	174	October 28	1.2	5.0
May 2	2.4	141	October 31	1.2	3.9
May 4	2.3	130	November 1	1.3	5.3
May 7	2.1	140	November 2	1.2	3.8
May 9[a]	2.25	82	November 5	1.2	6.4
May 14	1.8	20	November 7	1.2	5.5
May 15	1.8	21	November 9	1.3	6.6
May 18	1.6	13	November 11	1.2	8.3
May 21	1.4	8	November 12	1.2	7.5
May 22	1.4	10	November 15	1.2	7.4
May 23	1.4	9	November 18	1.2	7.7
May 24	1.4	9	November 23[b]		6.9
May 25	1.4	9	November 26	1.85	18
May 28	1.4	9	November 27	1.5	12
May 29	1.4	10	November 29[b]	1.3	5.7
May 30	1.4	5	December 4	7.95	1,980
June 4	1.4	4	December 5	3.65	571
June 6	1.4	4	December 12	.9	119
June 7	1.4	4	December 14	.9	103
June 8	1.4	3	December 17	.7	79
June 12[b]		4	December 20	.4	44
June 14[b]		4	December 23	.2	23
June 18[b]		4	December 26	.2	22
June 22[b]		4.3	December 30	3.5	430
June 25[b]		4.2			

[a] Measurement made by H. S. Reed. [b] Measured at different section. [c] Irrigation ditch running full.

Daily gage height, in feet, of Little Colorado River at Woodruff, Ariz., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.3	0.5	0.65	2.6	2.3	1.4	.....	1.5	1.3	2.3	1.25	1.3
2	.2	.85	.5	2.05	2.3	1.4	.....	2.5	1.4	1.65	1.25	1.4
3	.25	1.15	.5	2.2	2.3	1.4	.....	1.75	1.35	1.45	1.2	2.25
4	.3	1.2	.5	2.2	2.3	1.4	.....	1.7	1.3	1.4	1.2	8.1
5	.3	1.35	.5	2.2	2.15	1.4	.....	1.7	1.3	1.3	1.2	3.7
6	.3	1.05	.5	2.1	2.0	1.4	.....	1.6	1.3	1.2	1.2	2.9
7	.3	1.7	.5	3.2	2.1	1.4	.....	1.6	1.2	1.25	1.2	2.55
8	.3	1.85	.5	5.25	2.15	1.4	.....	1.95	1.15	1.25	1.3	1.9
9	.3	1.85	.5	4.5	2.25	1.4	.....	2.65	1.1	1.2	1.25	1.7
10	.3	1.65	.5	3.25	2.2	1.4	.....	2.2	1.0	1.2	1.15	1.15
11	.3	1.4	.4	2.8	2.05	1.4	.....	1.95	1.0	1.2	1.1	.9
12	.3	1.55	.45	2.5	1.85	1.4	.....	2.2	1.0	1.0	1.2	.9
13	.3	1.7	12.5	2.25	1.8	1.4	.....	2.15	.9	1.0	1.2	.9
14	.3	1.2	9.15	2.35	1.8	1.1	.....	2.25	.9	1.1	1.2	.9
15	1.9	1.0	5.0	2.6	1.8	1.4	.....	2.1	.9	1.05	1.2	.9
16	4.5	.9	3.85	2.45	1.75	1.25	.....	2.3	.9	1.0	1.2	.9
17	4.0	.7	3.4	2.5	1.65	1.1	.....	2.3	.9	1.05	1.2	.75
18	4.1	.85	2.95	2.5	1.55	1.1	.....	2.25	.9	1.0	1.2	.6
19	4.15	.9	3.4	2.45	1.4	1.1	.....	2.2	.9	1.1	1.1	.5
20	2.95	.8	2.75	2.5	1.4	1.0	.....	2.75	.9	1.05	1.2	.45
21	2.4	.8	2.15	2.4	1.4	1.45	2.0	2.55	.9	1.2	1.2	.2
22	1.75	.9	1.9	2.4	1.4	.7	1.95	2.35	0.9	1.2	1.15	.2
23	1.2	.9	1.7	2.65	1.4	(a)	2.0	1.3	.9	1.2	1.15	.2
24	1.0	.9	1.85	2.65	1.4	.....	1.9	1.9	.9	1.25	1.2	.2
25	.95	.8	1.9	2.7	1.4	.....	1.5	1.65	.95	1.2	1.2	.2
26	1.05	.7	4.55	2.6	1.4	.....	2.75	1.45	.95	1.2	1.45	.2
27	1.05	.65	7.0	2.65	1.4	.....	2.05	1.65	1.5	1.2	1.55	.25
28	.95	.6	4.75	2.6	1.4	.....	1.6	1.65	2.15	1.2	1.3	.35
29	.95	.....	4.1	2.65	1.4	.....	1.7	1.35	2.45	1.15	1.3	3.05
30	.65	.....	3.6	2.55	1.4	.....	1.6	1.4	2.9	1.2	1.3	3.45
31	.7	.....	2.85	.....	1.4	.....	1.5	1.3	.....	1.2	.....	2.2

[a] Water filling reservoir, June 23 to July 21.

Daily discharge, in second-feet, of Little Colorado River at Woodruff, Ariz., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	25	86	153	300	141	4	4	3	15	85	5	7
2	22	124	143	186	135	4	4	100	7	30	4	9
3	23	159	142	223	133	4	4	27	6	18	4	33
4	25	165	141	221	130	4	5	24	6	16	5	2,070
5	25	186	140	226	120	4	6	24	4	14	6	590
6	25	167	117	200	100	4	6	19	2	10	5	435
7	25	275	92	407	140	4	6	19	2	12	6	370
8	25	310	72	786	150	4	6	40	2	12	6	220
9	25	265	85	660	167	3	6	127	2	10	6	206
10	25	235	85	453	160	4	6	60	1	10	7	145
11	25	202	80	378	105	4	6	40	1	10	8	110
12	25	233	82	325	50	4	6	60	1	7	8	119
13	25	270	2,285	254	30	4	6	39	1	7	8	110
14	25	200	1,672	281	20	4	6	65	1	8	7	103
15	79	144	700	325	21	4	6	50	1	7	7	110
16	345	141	495	282	18	4	7	70	1	7	7	110
17	257	118	418	297	15	4	10	70	1	7	7	90
18	275	135	338	302	12	4	14	65	1	7	7	70
19	283	145	415	291	9	4	17	60	1	8	7	55
20	158	133	300	304	9	4	21	151	1	7	7	52
21	141	129	215	260	8	4	20	311	1	10	7	22
22	128	146	178	254	10	4	19	281	1	10	7	22
23	118	151	150	356	9	4	19	70	1	10	7	22
24	106	153	175	358	9	4	19	67	1	8	7	22
25	106	145	182	380	9	4	11	57	1	6	7	22
26	111	134	760	350	9	4	176	46	1	5	10	22
27	111	130	1,867	375	9	4	29	37	23	5	11	26
28	106	127	820	225	9	4	6	28	68	5	8	40
29	107	.....	601	250	10	4	11	23	105	4	8	364
30	102	.....	534	184	5	4	6	18	185	5	7	425
31	107	.....	365	.....	5	.....	2	23	.....	4	.....	260

NOTE.—These discharges were obtained by the indirect method for shifting channels.

Monthly discharge of Little Colorado River at Woodruff, Ariz., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
January	345	22	96.3	5,920
February	310	86	172.	9,550
March	2,280	72	445.	27,400
April	786	184	323.	19,200
May	167	5	56.7	3,490
June	4	3	4.0	238
July	176	2	15.2	935
August	311	3	66.9	4,110
September	185	1	14.8	881
October	85	4	11.7	719
November	11	4	6.9	411
December	2,070	7	202.	12,400
The year	2,280	1	118.	85,200

LITTLE COLORADO RIVER AT HOLBROOK, ARIZ.

This station was established March 17, 1905. It is located at the county bridge across Little Colorado River at Holbrook, Ariz. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 149.

Discharge measurements of Little Colorado River at Holbrook, Ariz., by Newman and Reed, in 1906.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
January 17	3.95	932	May 3	5.0	148
January 19	3.6	848	May 6	4.9	100
January 22	3.7	418	May 10	4.9	84
January 24	3.6	429	May 14	4.7	47
January 26	3.4	187	May 20	4.5	23
January 28	3.6	192	May 22	4.5	10
January 30	3.6	173	May 24	4.4	12
February 1	3.7	177	May 27	4.4	10
February 4	3.8	145	June 3	4.4	4
February 7	4.2	282	June 6	4.4	5
February 10	4.0	204	June 10	4.4	6
February 11	4.0	194	June 17	4.3	5
February 13	3.8	144	June 24	4.3	3.4
February 16	3.9	122	July 1	4.3	2.6
February 20	4.05	161	Do	4.3	3.7
February 22	4.0	93	July 14	4.3	4.2
February 25	3.9	86	July 15	4.9	64
February 27	3.7	75	July 17	4.3	10
March 6[a]	3.9	66	July 22	4.7	64
March 11[a]	3.8	65	July 28	4.6	29
March 13	6.85	3,860	August 5	4.8	19
March 22	4.2	196	August 12	4.4	35
Do	4.2	200	August 17	4.7	54
March 25	4.3	206	August 22	4.5	185
March 27	5.8	2,900	August 25	4.9	65
March 29	5.2	1,310	August 28	4.4	29
April 2	4.8	272	August 30	4.5	137
Do	4.8	268	September 2	4.3	40
April 4	4.75	292	September 9	4.2	7.6
April 8	5.8	1,510	September 15	4.0	2.5
April 10	5.7	298	September 17[a]		4.8
April 12	5.5	308	September 21[a]		4.4
April 14	5.4	326	September 24[a]		4.7
April 17	5.4	211	September 28[a]	6.75	847
April 19	5.3	329	September 29	5.0	417
April 21	5.4	405	October 4	4.4	87
April 26	5.4	445	October 6	3.4	12
April 28	5.0	251	October 8[b]		6.2
May 1	5.2	150	October 12[b]		8.8
			October 21[b]		8.6

[a] Measured at different section.

[b] Measurement made at different section.

Discharge measurements of Little Colorado River at Holbrook, Ariz., by Newman and Reed, in 1906—Continued.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
October 28[a]		8.2	December 3	5.0	149
October 29[a]		7.9	December 4	7.15	1,120
October 31[a]		4.6	December 6	4.8	307
November 2[a]		4.2	December 9	4.7	281
November 5[a]		4.2	December 13	4.6	47
November 9[a]		5.1	December 14	4.5	42
November 13[a]		5.1	December 16	4.4	34
November 20[a]		5.4	December 19	4.5	31
November 24[a]		10	December 23	4.5	22
November 27	4.8	63	December 29		1,080
November 30	4.3	25			

[a] Measurements made at different sections.

Daily gage height, in feet, of Little Colorado River at Holbrook, Ariz., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.45	3.8	3.9	4.78	4.9	4.4	4.3	4.6	5.45	4.7	4.0	4.3
2	3.5	3.8	4.0	4.8	4.95	4.4	4.3	5.15	4.65	4.55	4.0	4.3
3	3.5	3.8	4.0	4.7	5.0	4.4	4.3	4.8	4.5	4.35	4.0	5.7
4	3.5	3.8	4.0	4.8	5.05	4.4	4.3	4.8	4.35	4.2	4.0	6.6
5	3.5	3.8	3.9	4.75	5.0	4.4	4.3	4.75	4.2	4.2	4.0	5.1
6	3.5	4.0	4.0	4.78	4.95	4.4	4.3	4.6	4.2	4.2	4.0	4.7
7	3.7	4.1	4.1	5.35	4.9	4.4	4.3	5.45	4.2	4.2	4.0	4.7
8	3.6	4.1	4.0	5.72	4.9	4.4	4.3	4.5	4.2	4.2	4.0	4.7
9	3.6	4.35	3.9	5.15	4.9	4.4	4.3	4.55	4.2	4.2	4.0	4.7
10	3.6	4.1	3.9	5.3	4.9	4.4	4.3	4.5	4.2	4.2	4.0	4.7
11	3.6	4.0	3.9	5.05	4.9	4.4	4.3	4.6	4.2	4.15	4.0	4.7
12	3.6	4.0	3.9	5.0	4.9	4.4	4.3	4.5	4.2	4.0	4.0	4.6
13	3.6	4.2	6.6	5.1	4.85	4.3	4.3	4.4	4.2	4.0	4.0	4.6
14	3.7	4.2	5.5	5.15	4.6	4.3	4.3	4.35	4.2	4.0	4.0	4.6
15	3.7	4.2	4.45	5.2	4.7	4.2	4.3	4.3	4.2	4.0	4.0	4.6
16	5.6	4.1	4.35	5.2	4.7	4.2	4.3	4.3	4.2	4.0	4.0	4.5
17	3.9	4.0	4.3	5.1	4.7	4.2	4.3	4.3	4.2	4.0	4.0	4.5
18	3.8	3.9	4.4	5.1	4.6	4.2	4.3	4.3	4.2	4.0	4.0	4.5
19	3.6	3.9	4.5	5.0	4.6	4.2	4.3	4.25	4.2	4.0	4.0	4.4
20	3.6	4.0	4.6	5.0	4.6	4.2	4.3	4.2	4.2	4.0	4.0	4.4
21	4.0	4.0	4.0	5.15	4.5	4.2	4.3	4.4	4.2	4.0	4.0	4.4
22	3.85	4.0	4.3	5.1	4.5	4.2	4.7	4.4	4.2	3.95	4.0	4.4
23	3.7	4.0	4.3	5.3	4.5	4.2	5.1	5.0	4.2	3.85	4.0	4.4
24	3.7	4.1	4.3	5.2	4.45	4.3	4.95	4.9	4.2	3.8	4.0	4.4
25	3.6	4.0	4.4	5.2	4.4	4.3	4.7	4.9	4.2	3.7	4.3	4.4
26	3.6	4.0	5.02	5.2	4.4	4.3	5.2	4.9	4.2	3.65	4.5	4.4
27	3.6	3.92	6.0	5.1	4.4	4.3	5.0	4.75	4.2	3.6	4.8	4.5
28	3.62	3.85	5.25	5.0	4.4	4.3	4.7	4.6	6.0	3.5	4.5	4.4
29	3.72	.....	5.15	5.0	4.4	4.3	4.6	5.2	5.3	3.5	4.4	6.2
30	3.8	.....	4.95	4.9	4.45	4.3	4.6	5.2	5.15	3.5	4.4	6.05
31	3.8	.....	4.75	.....	4.4	.....	4.6	5.45	.....	4.0	.....	5.85

Daily discharge, in second-feet, of Little Colorado River at Holbrook, Ariz., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	305	194	75	250	90	5	3	20	445	250	4	25
2	330	130	75	270	115	5	3	80	75	170	4	25
3	330	135	75	250	150	5	3	25	60	83	4	460
4	330	140	75	350	150	5	3	25	40	72	4	890
5	330	145	66	290	125	5	3	15	20	30	4	215
6	330	213	75	300	105	5	3	15	17	12	4	255
7	420	245	75	987	97	5	3	145	15	9	4	260
8	370	243	75	925	93	5	3	67	12	6	5	270
9	370	325	100	115	88	5	3	20	10	7	5	235
10	370	240	175	145	84	5	3	30	7	8	5	235

Daily discharge, in second-feet, of Little Colorado River at Holbrook, Ariz., for 1906—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	370	195	175	105	80	5	3	50	6	10	5	185
12	370	195	175	100	75	5	3	45	5	9	5	120
13	370	272	3,537	140	65	4	3	35	4	9	5	47
14	420	272	2,173	180	35	4	3	30	4	9	5	45
15	420	272	550	180	45	3	3	25	4	9	5	45
16	1,330	250	375	165	45	3	3	25	4	9	5	43
17	920	200	350	130	45	3	3	25	4	9	5	40
18	896	102	450	155	35	3	3	25	4	9	5	40
19	848	90	550	170	35	3	3	23	4	9	5	35
20	848	88	600	160	35	3	3	17	4	9	5	35
21	935	94	150	185	17	3	3	145	4	9	5	35
22	676	93	350	170	10	3	64	145	4	9	7	35
23	423	93	250	250	10	3	134	275	4	8	8	35
24	429	175	200	200	7	4	99	130	4	8	10	35
25	187	97	400	200	5	4	57	65	4	8	28	35
26	187	100	1,340	200	5	4	140	65	4	8	40	35
27	189	93	3,260	215	5	4	95	55	4	8	63	40
28	194	73	1,435	250	5	4	37	44	600	8	34	35
29	165	.....	1,182	185	5	4	28	155	370	8	25	680
30	168	.....	662	125	7	4	28	155	319	8	25	620
31	168	.....	220	.....	5	.....	28	240	.....	5	.....	530

NOTE.—These discharges were obtained by the indirect method for shifting channels.

Monthly discharge of Little Colorado River at Holbrook, Ariz., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
January	1,330	165	452	27,800
February	325	73	170	9,440
March	3,540	66	621	38,200
April	987	100	245	14,600
May	150	5	54.0	3,320
June	5	3	4.1	244
July	140	3	24.9	1,530
August	275	15	71.5	4,400
September	600	4	68.7	4,090
October	250	5	26.6	1,640
November	63	4	11.3	672
December	890	25	181	11,100
The year	3,540	3	161	117,000

Summary of observations of evaporation at Holbrook, Ariz., in 1905–6.

Month.	Amount of evaporation.	Temperature of water.					
		In pan.			Outside pan.		
		Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.
1905.	*Inches.*						
August [a]	6.60	81	66	73.5	80	66	73.6
September	4.57	79	55	66.4	78	56	66.5
October	4.26	73	41	56.9	73	42	56.8
November	[b] 1.45	59	40	48.4	59	40	48.4
December	0.22	48	29	37.5	48	29	37.8
1906.							
January [c]	0.03	35	32	32.4	36	32	32.7
February	1.24	53	33	41.8	52	34	42.1
March	3.28	64	37	46.4	63	38	46.9
April	5.12	69	42	52.5	68	42	52.7
May	6.93	71	49	60.3	70	50	60.4
June	8.61	79	55	65.6	75	54	65.2
July	7.42	80	61	[d] 70.5	81	62	[d] 71.1
August	6.24	76	63	70.4	76	64	71.0
September	5.12	75	55	65.3	75	56	65.7
October	3.44	69	40	56.0	69	41	56.4
November	1.43	57	40	46.1	58	40	46.7
December	.94	46	39	42.4	47	40	43.1
The year	49.80	80	32	.....	81	32	.....

[a] 29½ days. [b] 29 days. [c] For 5 days; the pan was frozen January 5 to 30. [d] 30 days.

LITTLE COLORADO RIVER AT ST. JOHNS, ARIZ.

This station was established April 18, 1906. It is located at the south end of the town of St. Johns, one-half mile above the dam and county bridge.

The channel is straight for 300 feet above and 250 feet below the station. There is a good velocity at all stages, becoming swift at high water. The banks are clean and almost perpendicular, and will not overflow during high water. The bed of the stream is clean, and sandy; it probably shifts slightly. There is one channel at all stages.

Discharge measurements are made by means of a cable, car, and tagged wire. A stay wire is used for high-water measurements. The initial point for soundings is the face of the cable support on the right bank.

The staff gage, which is read by the local hydrographer, W. D. Rencher, is bolted to the framework built out over the bank on the right side of the river at the gaging station. The bench mark is the head of a bolt driven into solid ledge 73 feet northeast from the cable support on the left bank; elevation, 15.43 feet above the zero of the gage.

Discharge measurements of Little Colorado River at St. John, Ariz., by Reed and Rencher, in 1906.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
April 19	6.23	477	August 20	3.98	28
April 19	6.13	424	August 20	4.84	213
April 24	5.78	338	August 23	4.94	112
April 30	5.06	186	September 10	3.94	9.5
May 4	4.90	132	September 17	3.87	7.7
May 8	4.80	148	September 22	3.88	8.2
May 14	4.20	48	September 28	3.94	13
May 18	4.00	35	October 5	3.91	10
May 23	3.93	23	October 11	3.92	12
May 28	3.90	21	October 17	3.90	9.9
June 2	3.82	16	October 24	3.91	11
June 7	3.79	16	October 30	3.91	12
June 15	3.66	8.0	November 5	3.93	13
June 23	3.74	12	November 12	3.94	15
June 28	3.76	13	November 19	3.95	14
July 4	3.79	16	November 24	4.03	19
July 12	3.85	12	November 28	4.07	23
July 18	3.86	14	December 4 [a]	4.96	206
July 28	4.00	24	December 11	4.60	65
August 3	3.93	19	December 15	4.44	48
August 9	4.04	24	December 22	4.10	23
August 14	3.98	16	December 31 [a]	4.68	61

[a] Float measurement.

Daily gage height, in feet, of Little Colorado River at St. Johns, Ariz., for 1906.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	5.08	3.84	3.71	4.68	4.29	3.94	3.91	4.09
2	.....	4.92	3.82	3.70	4.31	4.16	3.93	3.92	4.11
3	.....	4.90	3.82	3.75	3.95	4.09	3.92	3.92	4.13
4	.....	4.90	3.82	4.10	3.96	4.05	3.91	3.92	4.61
5	.....	4.82	3.81	3.88	3.91	4.02	3.91	3.93	5.80
6	.....	4.80	3.80	4.17	3.90	3.99	3.90	3.93	5.72
7	.....	4.82	3.79	3.83	3.94	3.97	3.90	3.93	5.10
8	.....	4.80	3.79	3.80	4.04	3.95	3.90	3.94	4.84
9	.....	4.50	3.78	3.80	4.04	3.94	3.90	3.94	4.78
0	.....	4.30	3.74	3.82	4.52	3.93	3.91	3.94	4.74
1	.....	4.25	3.70	3.85	4.15	3.91	3.92	3.94	4.62
2	.....	4.20	3.67	3.85	4.00	3.90	3.92	3.94	4.55
3	.....	4.20	3.66	3.85	3.99	3.89	3.92	3.94	4.50
4	.....	4.20	3.66	3.85	3.98	3.89	3.92	3.94	4.50
5	.....	4.12	3.65	3.84	3.97	3.88	3.93	3.94	4.45
6	.....	4.08	3.65	3.85	4.90	3.88	3.95	3.95	4.29
7	.....	4.02	3.65	3.85	4.15	3.87	3.92	3.95	4.20
8	.....	4.00	3.65	3.86	3.92	3.87	3.90	3.95	4.13
9	6.18	3.94	3.64	3.88	3.89	3.87	3.91	3.95	4.14
0	6.08	4.00	3.64	3.86	4.39	3.87	3.91	3.96	4.12
1	5.82	3.99	3.64	3.86	5.00	3.87	3.90	3.98	4.11
2	6.10	3.95	3.64	3.86	5.45	3.88	3.91	4.00	4.11
3	5.95	3.93	3.76	4.03	4.70	3.88	3.91	4.02	4.12
4	5.90	3.93	3.79	3.93	4.35	3.88	3.91	4.03	4.14
5	5.68	3.90	3.80	3.86	4.26	3.92	3.90	4.05	4.13
6	5.48	3.90	3.80	4.18	4.25	4.05	3.90	4.07	4.12
7	5.40	3.90	3.78	3.88	4.26	4.03	3.90	4.07	4.12
8	5.30	3.88	3.75	3.95	4.19	3.96	3.90	4.08	4.13
9	5.15	3.87	3.74	3.96	4.20	3.97	3.92	4.05	4.24
0	5.08	3.86	3.70	3.90	4.49	3.98	3.91	4.04	4.40
1	.....	3.85	.....	3.86	4.36	.....	3.91	.....	4.69

Daily discharge, in second-feet, of Little Colorado River at St. Johns, Ariz., for 1906.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	185	18	10	100	46	14	11	23
2	.....	145	17	10	53	33	13	12	25
3	.....	137	17	13	22	26	12	12	26
4	.....	132	17	32	23	21	11	12	69
5	.....	130	16	15	18	18	11	13	533
6	.....	135	16	38	17	15	10	13	502
7	.....	145	15	11	20	13	10	13	260
8	.....	148	15	9	28	11	10	14	159
9	.....	95	14	9	28	10	10	14	135
10	.....	70	12	10	67	9	11	14	120
11	.....	60	10	12	32	9	12	14	73
12	.....	55	8	12	17	9	12	14	60
13	.....	50	8	12	17	8	12	14	54
14	.....	48	8	12	16	8	12	14	54
15	.....	42	7	12	17	8	13	14	50
16	.....	40	7	12	120	8	15	15	37
17	.....	37	7	12	38	8	12	15	31
18	.....	35	7	13	20	8	10	15	26
19	460	27	7	15	18	8	11	15	27
20	415	32	7	13	85	8	11	16	25
21	340	33	7	13	205	8	10	18	25
22	420	27	7	13	260	8	11	20	25
23	380	23	13	27	80	8	11	22	25
24	370	23	15	19	52	8	11	19	27
25	315	21	16	13	43	12	10	20	26
26	265	21	16	39	42	25	10	22	25
27	250	21	14	15	43	23	10	22	25
28	230	20	13	20	36	16	10	23	26
29	200	19	12	21	37	17	12	20	34
30	190	19	10	16	65	18	11	19	46
31	.....	18	.....	13	53	.....	11	.....	100

NOTE.—These discharges were obtained by the indirect method for shifting channels.

Monthly discharge of Little Colorado River at St. Johns, Ariz., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
April 19–30	460	190	320	7,620
May	185	18.0	64.3	3,950
June	18.0	7.0	11.9	708
July	39	9	15.8	972
August	260	16	53.9	3,310
September	46	8	14.2	845
October	15	10	11.3	695
November	23	11	16.0	952
December	533	23	86.2	5,300
The period				24,400

SILVER CREEK AT SNOWFLAKE, ARIZ.

This station was established May 4, 1906. It is located at the southeast end of the town and 2 miles below the dam of Snowflake and Taylor Irrigation Company. All water is shut off by the dam during the entire irrigation season, excepting when rains occur.

The channel is straight for 200 feet above and 150 feet below the station. The current is good at all stages. The right bank is high, sandy, and clean; the left is sandy, is higher than the right and is covered with small willows which serve to hold the soil in place. Owing to the level country and the sudden rains to which this creek is subjected, both banks will probably overflow during extreme high water. The bed of the stream is sandy, level, and clean. There is one channel at all stages, except when the banks overflow and then water is liable to extend over a large area.

Discharge measurements are made by means of a cable and car during high water and by wading at low stages. The initial point for soundings is the first tag wire from the support on the right bank.

The gage, which is read by J. W. Smith twice each day, is a combined vertical and inclined rod on the right bank of the stream at the point of measurement. The bench mark is the head of a bolt in the trunk of a large cottonwood tree 400 feet northeast from the rod; elevation, 16.68 feet above the zero of the gage.

Discharge measurements of Silver Creek at Snowflake, Ariz., by Reed and Newman, in 1906.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 8	2.2	1.2	August 1	2.0	1.4
May 18	2.2	.9	August 8	2.1	4.5
May 25	2.2	.8	August 16	2.1	3.4
June 1	2.2	1.0	August 21	2.1	3.6
June 14	2.0	.8	August 29	2.1	3.5
June 21	2.0	.6	September 5	2.0	1.6
June 28	2.0	.9	September 12	1.9	.5
July 6	1.9	.5	September 19	1.9	.4
July 12	2.0	1.7	November 14	2.3	1.4
July 20	2.0	2.0	December 11	2.3	5.4
July 25	2.0	1.2			

Daily gage height, in feet, of Silver Creek at Snowflake, Ariz., for 1906.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.05	2.00	2.33	2.20	2.30	2.40	2.20
2	.....	2.10	2.00	2.32	2.18	2.28	2.40	2.20
3	.....	2.05	2.00	2.12	2.18	2.22	2.42	3.25
4	.....	2.05	2.35	2.08	2.15	2.20	2.38	6.00
5	.....	2.05	2.03	2.08	2.10	2.20	2.35	4.50
6	2.15	2.05	2.05	2.08	2.12	2.20	2.30	3.80
7	2.15	2.05	2.05	2.08	2.10	2.20	2.28	3.00
8	2.15	2.05	2.05	2.10	2.10	2.18	2.25	2.50
9	2.15	2.00	2.05	2.55	2.08	2.15	2.25	2.38
10	2.15	2.10	2.03	2.25	2.08	2.15	2.38	2.35
11	2.15	2.05	2.00	2.30	2.08	2.30	2.22	2.30
12	2.15	2.10	2.00	2.80	2.02	2.30	2.20	2.30
13	2.15	2.05	2.00	2.42	2.00	2.30	2.25	2.30
14	2.15	2.00	2.00	2.25	1.98	2.30	2.25	2.30
15	2.15	2.00	2.00	2.25	1.95	2.30	2.25	2.25
16	2.15	2.00	2.10	2.45	2.00	2.38	2.25	2.15
17	2.15	2.00	2.20	2.48	2.00	2.32	2.25	2.13
18	2.15	2.00	2.08	2.35	2.00	2.28	2.28	2.08
19	2.15	2.00	2.05	2.22	2.00	2.28	2.30	2.23
20	2.15	2.00	2.03	2.35	2.00	2.28	2.30	2.17
21	2.15	2.00	2.00	2.45	2.00	2.32	2.30	2.17
22	2.15	2.00	2.00	2.40	2.00	2.35	2.30	2.17
23	2.15	2.00	2.03	2.40	2.00	2.32	2.25	2.17
24	2.15	2.00	2.05	2.35	2.00	2.32	2.55	2.17
25	2.15	2.00	2.03	2.25	2.00	2.30	2.70	2.17
26	2.15	2.00	2.00	2.20	2.00	2.22	2.50	2.17
27	2.15	2.00	2.10	2.15	2.00	2.15	2.30	2.20
28	2.15	2.00	2.13	2.15	2.00	2.15	2.25	2.45
29	2.15	2.00	2.05	2.10	3.52	2.18	2.20	4.05
30	2.15	2.00	2.05	2.30	2.52	2.30	2.20	3.70
31	2.15	.....	2.05	2.25	.....	2.38	.....	3.05

Daily discharge, in second-feet, of Silver Creek at Snowflake, Ariz., for 1906.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1	1	5	2	2	3	3
2	.....	1	1	5	2	2	3	3
3	.....	1	1	2	2	2	3	4
4	.....	1	6	2	2	2	3	50
5	.....	1	1	2	2	2	3	28
6	1	1	1	2	1	2	3	19
7	1	1	1	2	1	2	3	11
8	1	1	1	4.5	1	2	3	8
9	1	1	1	8	1	1.5	3	6
10	1	1	1	4	1	1.5	3	7
11	1	1	1	5	1	2	3	5
12	1	1	2	11	.5	2	2	5
13	1	1	2	1	.5	2	2	5
14	1	1	2	4	.5	2	1.5	5
15	1	1	2	4	.5	2	1.5	5
16	1	1	2	3.5	.5	4	1.5	4
17	1	1	4	3.5	.5	4	1.5	4
18	1	1	3	3	.5	4	3	4
19	1	1	3	3	.5	4	3	5
20	1	1	2	3	.5	4	3	5
21	1	1	2	7	.5	4	3	5
22	1	1	1	6	.5	3	3	5
23	1	1	1	6	.5	3	3	5
24	1	1	1	5	.5	3	4	5
25	1	1	1	4	.5	2	6	5
26	1	1	1	3	.5	2	4	5
27	1	1	1	3	.5	2	3	5
28	1	1	1	3	.5	2	3	6
29	1	1	1	3	20	2	3	22
30	1	1	1	4	8	3	3	18
31	1	.....	1	4	.....	3	.....	11

NOTE.—These discharges were obtained by the indirect method for shifting channels.

Monthly discharge of Silver Creek at Snowflake, Ariz., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
May (6-31)	1	1	1.0	52
June	1	1	1.0	60
July	6	1	1.6	98
August	11	2	4.0	246
September	20	.5	1.8	107
October	4	1.5	2.5	154
November	6	1.5	2.9	173
December	50	3	9.0	553
The period				1,440

SILVER CREEK AT CANYON STATION NEAR SNOWFLAKE, ARIZ.

This station was established May 2, 1906. It is located at the mouth of Silver Creek canyon just below the town of Snowflake. It was established principally to determine the flood waters of Silver Creek and Cottonwood Wash, which can not be taken care of by the station above. At times Cottonwood Wash carries more water than the main stream.

During the irrigation season the stream is entirely shut off above the Snowflake and Taylor Irrigation Company's dam, 3 miles above. All water passing the section during this period is waste and seepage water.

The channel is straight for 500 feet above and 600 feet below the station. The current is very swift at high water. Both banks are high, are strewn with bowlders, and will not overflow. The bed of the stream at the cable section is of gravel and sand formation. Above and below the cable the bed is covered with cobblestones.

Discharge measurements are made by means of a cable, car, and tagged wire. The initial point for soundings is the first tag on a wire at the right bank.

The gage is a series of inclined rods bolted to solid rock on the right bank of the canyon 100 feet above the gaging section. Bench mark No. 1 is a cross cut into a point of ledge to which the rod is bolted at elevation 26.01 feet above the zero of the gage.

Discharge measurements of Silver Creek at canyon station near Snowflake, Ariz., by Reed and Newman, in 1906.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 4	2.6	5.2	August 29[a]	2.8	19.6
May 9	2.6	2.7	September 5	2.6	2.8
May 18	2.6	2.4	September 12	2.4	1.2
May 25		0.4	September 19	2.4	1.4
May 31	2.6	1.6	September 26	2.4	1.3
June 13	2.5	1.4	October 10	2.8	7.0
June 19	2.5	1.4	October 23	2.7	4.2
June 26	2.5	1.4	October 30	2.7	4.0
July 6	2.6	1.9	November 6	2.6	2.9
July 12	2.6	1.9	November 14	2.7	3.1
July 20	2.6	2.0	November 21	2.7	3.3
July 24	2.6	1.8	November 26	2.9	5.2
August 2	2.6	3.1	December 11	2.9	9.6
August 8	2.6	3.3	December 18	2.8	8.7
August 15	2.6	3.6	December 24	2.7	8.3
August 21	2.7	3.1	December 31[a]	3.0	31.

[a] Discharge of Cottonwood Wash.

CHEVELON FORK NEAR WINSLOW, ARIZ.

This station was established December 18, 1905. It is located above the mouth of the river, in sec. 34, T. 18 N., R. 17 E., 19 miles east of Winslow, Ariz. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 157.

A staff gage was set about 25 feet upstream from the automatic water stage register on May 14, 1906. The bench mark is a bolt in a rock between the cable and automatic register; elevation, 28.375 feet above zero of both gages.

On October 1, 1906, a well point and 10 feet of 2-inch pipe was laid from the bottom of the tube out into the stream and securely connected to the bottom of the creek and to the float tube. This obviates the trouble caused by sand collecting in and about the bottom of the float tube.

Discharge measurements of Chevelon Fork near Winslow, Ariz., by Reed and Newman, in 1905–1906.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1905.	*Feet.*	*Sec.-ft.*	1906.	*Feet.*	*Sec.-ft.*
November 3	.....	8.2	June 30	−0.20	0.5
November 25	1.00	.9	July 7	− .20	.4
December 19	2.10	33	July 10	− .20	.4
1906.			July 14	− .20	.4
			July 21	− .20	.6
February 3	1.80	57	July 28	.00	1.2
February 10	2.60	135	August 4	.60	2
February 17	2.40	107	August 11	1.00	2.9
February 24	2.90	147	August 18	.10	.7
March 3	2.60	132	August 25	.....	.4
March 12	2.80	148	September 1	.30	1
March 18	3.55	546	September 8	.....	.3
March 19	3.23	453	September 15	.....	.3
March 24	3.10	212	September 22	.....	.3
March 28	4.70	1,250	September 29	.20	.7
March 31	3.20	266	October 6	.10	.3
April 7	1.80	61	October 13	.00	.25
April 14	2.00	66	October 20	− .10	.25
April 21	1.40	21	October 27	− .10	.25
April 28	0.80	4.3	November 3	− .10	.25
May 5	.30	1.2	November 10	− .10	.25
May 12	.20	.7	November 17	− .10	.25
May 19	.20	.7	November 24	− .10	.25
May 26	.10	.6	December 1	− .10	.25
June 3	.00	.5	December 8	5.50	119
June 9	.00	.8	December 15	2.70	37
June 16	.00	.8	December 22	.60	18
June 23	−.10	.4	December 29	.30	16

Daily gage height, in feet, of Chevelon Fork near Winslow, Ariz., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.85	1.77	3.16	3.00	0.65	0.05	−0.15	2.72	0.30	0.23	−0.07	0.60
2	1.85	1.77	3.05	2.90	.57	.05	− .15	.86	.25	.15	− .10	1.97
3	1.85	1.80	2.75	2.66	.52	.05	− .15	.60	.18	.10	− .10	2.15
4	1.85	1.80	2.69	2.41	.45	.05	− .15	.60	.13	.10	− .10	8.16
5	1.80	1.80	2.52	2.44	.38	.05	− .15	.60	.10	.10	− .10	5.75
6	1.80	1.88	2.35	2.05	.34	.05	− .15	.55	.08	.10	− .10	5.70
7	1.80	2.28	2.30	1.73	.32	.05	− .15	2.88	.05	.10	− .10	5.65
8	1.80	2.62	2.27	2.15	.31	.05	− .20	4.07	.48	.10	− .10	5.60
9	1.80	2.60	2.28	2.81	.30	.05	− .20	1.88	1.35	.10	− .10	5.40
10	1.80	2.57	2.50	3.58	.30	.05	− .20	1.00	.45	.10	− .10	5.20
11	1.80	2.52	3.33	3.15	.28	.00	− .20	1.00	.25	.05	− .10	4.95
12	1.80	2.50	2.98	2.56	.25	.00	− .20	.90	.18	.05	− .10	4.60
13	1.80	2.52	8.16	2.21	.25	.00	− .20	.70	.10	.05	− .10	4.20
14	1.80	2.45	7.89	2.05	.20	.00	− .15	.50	.10	.00	− .10	3.60
15	1.80	2.31	5.70	2.36	.20	.00	− .20	1.20	.00	.00	− .10	2.95
16	1.80	2.33	4.77	2.15	.20	.00	− .20	.34	.00	.00	− .10	2.50
17	1.80	2.40	4.30	1.76	.20	.00	− .20	.20	.00	− .05	− .10	2.00
18	1.70	2.43	3.65	1.36	.20	− .05	− .20	.20	.00	− .05	− .10	1.44
19	1.75	2.45	3.28	1.30	.20	− .05	− .20	.20	00	− .10	− .10	.77
20	2.04	2.78	2.95	1.63	.20	− .05	− .20	.20	.00	− .10	− .10	1.08
21	2.62	2.91	2.78	1.56	.20	− .10	− .20	.15	.00	− .10	− .10	.85
22	2.65	2.95	2.88	1.35	.20	− .10	.00	.10	.00	− .10	− .10	.65
23	2.65	3.00	2.79	1.23	.15	− .10	1.75	.10	.00	− .10	− .10	.60
24	2.65	2.90	3.32	1.13	.10	− .10	.60	.05	.00	− .10	− .10	.55
25	2.65	2.64	3.83	1.05	.10	− .15	.23	.00	.00	− .10	− .10	.45
26	2.48	2.52	7.71	1.00	.10	− .15	.32	.00	.00	− .10	− .10	.40
27	1.98	2.65	8.56	.95	.10	− .15	.20	.21	1.37	− .10	− .10	.38
28	1.87	2.90	4.68	.85	.10	− .15	.05	2.58	.60	− .10	− .10	.45
29	1.80	.....	4.05	.77	.10	− .15	.00	1.65	.30	− .10	− .10	.30
30	1.77	.....	3.55	.73	.10	− .15	− .05	.65	.28	− .10	− .10	.30
31	1.77	.....	3.08	.....	.05	.....	1.06	.40	.....	− .10	.....	.30

Daily discharge, in feet, of Chevelon Fork near Winslow, Ariz., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	52	45	251	210	3	0.75	0.5	151	1	0.3	0.25	35
2	52	45	222	187	2	.75	.5	2	1	.25	.25	57
3	52	57	157	142	2	.75	.5	2	1	.25	.25	80
4	52	48	155	110	1	.75	.5	2	0.75	.25	.25	3,600
5	48	48	125	111	1	.75	.5	2	.50	.25	.25	127
6	48	53	101	70	1	.75	.5	2	.5	.25	.25	126
7	48	92	96	44	1	.75	.5	183	1.5	.25	.25	123
8	48	137	93	80	1	.75	.5	832	.25	.25	.25	122
9	48	135	95	169	1	.75	.5	54	18	.25	.25	117
10	48	128	120	498	1	.75	.5	3	.25	.25	.25	110
11	48	125	328	250	1	.5	.5	3	.25	.25	.25	100
12	48	120	207	128	1	.5	.5	2	.25	.25	.25	92
13	48	125	3,600	87	1	.5	.5	2	.25	.25	.25	80
14	48	113	3,430	70	1	.5	.5	2	.25	.25	.25	63
15	48	97	1,930	106	1	.5	.5	14	.25	.25	.25	45
16	48	100	1,298	80	1	.5	.5	1	.25	.25	.25	35
17	48	107	988	45	1	.5	.5	1	.25	.25	.25	29
18	41	111	546	19	1	.5	.5	1	.25	.25	.25	23
19	44	113	303	17	1	.5	.5	1	.25	.25	.25	28
20	69	163	198	37	1	.5	.5	1	.25	.25	.25	20
21	138	190	163	31	1	.5	.5	1	.25	.25	.25	19
22	145	198	183	20	1	.5	.75	.5	.25	.25	.25	18
23	145	210	165	15	.75	.5	40	.5	.25	.25	.25	18
24	145	147	321	12	.75	.5	2	.5	.25	.25	.25	18
25	145	138	668	11	.75	.5	.75	.5	.25	.25	.25	17
26	115	125	3,300	10	.75	0.5	.75	.5	.25	25	.25	17
27	62	140	3,870	8	.75	.5	.75	0.5	119	.25	.25	17
28	53	147	1,237	6	.75	.5	.5	130	2	.25	.25	17
29	48	.....	818	4	.75	.5	.5	38	.75	.25	.25	16
30	45	.....	478	3	.75	.5	.5	2	.75	.25	.25	16
31	45	.....	230	.....	.75	.....	11	2	.....	.25	.....	16

NOTE.—These discharges were obtained by the indirect method for shifting channels.

Monthly discharge of Chevelon Fork near Winslow, Ariz., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
January	145	41	66.8	4,110
February	210	45	116	6,440
March	3,870	93	828	50,900
April	498	3	86.0	5,120
May	3.00	.75	1.06	65.2
June	.75	.50	.58	34.5
July	45.0	.50	2.36	145
August	832	.50	46.4	2,850
September	119	.25	5.04	300
October	.30	.25	.25	15.4
November	.25	.25	.25	14.9
December	3,600	16	168	10,300
The year	3,870	.25	110	80,300

CLEAR CREEK NEAR WINSLOW, ARIZ.

This station was established June 13, 1906. It is located 6 miles from Winslow and 3 miles above the Clear Creek Irrigation Company's dam and the county bridge. It is one-half mile above the pump house.

The channel is straight for 250 feet above and 500 feet below the station. The current is good at all stages. Both banks are perpendicular cliffs and will not overflow. The bed of the stream is strewn with large bowlders and is permanent. There is one channel at all stages.

Discharge measurements are made by means of a cable, car, and tagged wire. A stay wire is used for high-water measurements. The initial point is the first tag at the eyebolt to which the tag wire is fastened.

The gage, which is read by E. McFarland, is an automatic water-stage register on a shelf 51 feet above the bottom of the creek. There is also a staff gage 42 feet long bolted to the cliff. The elevation of both gage zeros is the same. The bench mark is a bolt in a wooden plug which has been driven into a hole in the solid ledge 5 feet south of the gage rod; elevation, 35.083 feet above the gage zero.

Discharge measurements of Clear Creek near Winslow, Ariz., by Reed, McFarland and Imel, in 1906.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
June 13	2.0	3.51	October 6	2.0	3.45
June 14	2.0	3.42	October 13	2.0	3.48
June 16	2.0	3.46	October 20	2.0	3.83
June 23	2.0	3.29	October 27	2.0	3.75
June 30	2.0	3.19	November 2	2.0	3.87
July 7	2.0	3.22	November 10	2.0	3.90
July 14	2.0	3.22	November 17	2.0	3.88
July 21	2.0	3.16	November 24	2.2	5.54
July 28	2.0	3.15	December 4	17.4	4,840
August 11	2.0	3.38	December 5	9.0	2,060
August 18	2.0	3.32	December 6	7.0	1,320
August 25	2.0	3.32	December 8	4.7	521
September 1	2.0	3.36	December 10	4.0	333
September 8	2.0	3.43	December 21	3.1	112
September 15	2.0	3.45	December 22	3.1	114
September 22	2.0	3.61	December 29	2.4	31.9
September 29	2.0	3.46	December 31	4.2	284

Daily gage height, in feet, of Clear Creek near Winslow, Ariz., for 1906.

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1.95	2.70	2.00	2.00	2.00	2.00
2	.....	1.95	2.32	2.00	2.00	2.00	2.23
3	2.00	1.95	2.28	2.00	2.00	2.00	2.43
4	2.00	1.95	2.12	2.00	2.00	2.00	8.38
5	2.00	1.95	1.95	2.00	2.00	2.00	9.73
6	2.00	1.95	1.98	2.00	2.00	2.00	7.40
7	2.00	1.95	1.96	2.00	2.00	2.00	5.30
8	2.00	1.95	2.32	2.00	2.00	2.00	4.45
9	2.00	1.95	2.55	2.00	2.00	2.00	3.88
10	2.00	1.95	2.20	2.00	2.00	2.00	3.40
11	2.00	1.95	2.32	2.00	2.00	2.00	3.10
12	2.00	1.95	2.15	2.00	2.00	2.00	3.08
13	2.00	1.95	2.15	2.00	2.00	2.00	2.86
14	2.00	1.95	2.15	2.00	2.00	2.00	4.05
15	2.00	2.00	2.15	2.00	2.00	2.00	5.25
16	2.00	2.05	2.10	2.00	2.00	2.00	4.60
17	1.95	2.00	2.07	2.00	2.00	2.00	4.05
18	1.95	2.00	2.00	2.00	2.00	2.00	3.68
19	1.95	2.00	2.00	2.00	2.00	2.00	3.45
20	1.95	2.00	2.00	2.00	2.00	2.00	3.40
21	1.95	2.00	2.00	2.00	2.00	2.00	3.20
22	1.95	2.00	1.95	2.00	2.00	2.00	3.10
23	1.95	2.00	1.95	2.00	2.00	2.00	2.80
24	1.95	1.95	1.95	2.00	2.00	2.00	2.70
25	1.95	1.95	1.95	2.00	2.00	2.00	2.60
26	1.95	1.95	2.00	2.00	2.00	2.00	2.45
27	1.95	1.95	2.00	2.00	2.00	2.00	2.40
28	1.95	1.95	2.00	2.00	2.00	2.00	2.35
29	1.95	2.00	2.00	2.00	2.00	2.00	2.30
30	1.95	2.00	2.00	2.00	2.00	2.00	2.30
31	.....	2.03	2.00	.....	2.00	.....	3.48

Daily discharge, in second-feet, of Clear Creek near Winslow, Ariz., for 1906.

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	3.20	70	3.36	3.45	3.86	5.5
2	.....	3.20	22	3.37	3.45	3.87	12
3	3.50	3.20	20	3.38	3.45	3.87	33
4	3.50	3.20	5	3.39	3.45	4.87	1,790
5	3.50	3.20	3	3.40	3.45	3.88	2,245
6	3.50	3.20	3	3.41	3.45	3.88	1,460
7	3.50	3.22	3	3.42	3.46	3.89	720
8	3.50	3.22	22	3.43	3.46	3.89	420
9	3.50	3.22	43	3.43	3.46	3.90	250
10	3.50	3.22	11	3.43	3.47	3.90	155
11	3.50	3.22	22	3.43	3.47	3.90	110
12	3.50	3.22	6	3.44	3.48	3.90	108
13	3.50	3.22	6	3.44	3.48	3.90	80
14	3.42	3.22	6	3.44	3.54	3.90	290
15	3.45	3.21	6	3.45	3.58	3.90	700
16	3.46	3.20	3.33	3.47	3.62	3.88	475
17	3.43	3.19	3.32	3.49	3.60	3.88	290
18	3.40	3.18	3.32	3.59	3.70	4.04	208
19	3.37	3.17	3.32	3.53	3.77	4.20	162
20	3.34	3.16	3.32	3.55	3.83	4.30	155
21	3.32	3.16	3.32	3.59	3.83	4.52	122
22	3.30	3.15	3.32	3.61	3.82	4.68	110
23	3.29	3.15	3.32	3.59	3.80	4.85	70
24	3.27	3.15	3.32	3.51	3.79	5.02	60
25	3.25	3.15	3.32	3.54	3.77	5.19	50
26	3.23	3.15	3.32	3.51	3.76	5.32	35
27	3.21	3.15	3.32	3.49	3.75	5.54	30
28	3.20	3.15	3.33	3.47	3.77	5.00	25
29	3.19	3.16	3.34	3.46	3.79	5.50	20
30	3.20	3.17	3.35	3.46	3.82	5.50	20
31	.....	3.18	3.36	.....	3.84	.....	167

NOTE.—These discharges were obtained by the indirect method for shifting channels.

Monthly discharge of Clear Creek near Winslow, Ariz., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
June (3-30)	3.50	3.19	3.39	188
July	3.22	3.15	3.19	196
August	70.0	3.00	9.80	603
September	3.61	3.36	3.47	206
October	3.84	3.45	3.62	223
November	5.54	3.86	4.32	257
December	2,245	5.5	335	20,600
The period				22,300

WOODRUFF DITCH NEAR WOODRUFF, ARIZ.

Woodruff ditch diverts water from the north side of Little Colorado River at the point where provision is made for the overflow of the surplus water. The sill of the intake gate is slightly raised above the crest of the spillway.

This water so diverted is used to irrigate lands on the north side of the river in and about the town of Woodruff and takes practically the entire flow during the low-water season.

Measurements are made just below the canal headgate.

Discharge measurements of Woodruff Ditch near Woodruff, Ariz., by Reed and Newman, in 1906.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
August 10	1.6	16	October 3	.9	3.8
August 13	1.3	10	October 8	1.1	4.5
August 16	1.4	11	October 12	1.1	4.4
September 5	1.3	10	October 24	.8	3.8
September 6	1.3	9.8	October 26	.9	3.4
September 7		6.8	October 29	1.0	3.9
September 10	.9	5.4	October 30	.9	4.3
September 19	.9	4.4	November 2	.9	4.4
September 20	.9	4.6	November 7	.7	2.7
September 27	.9	4.6	November 12	1.0	5.2
September 28	1.7	18.9	November 20	1.0	5.3

MISCELLANEOUS MEASUREMENTS.

The following is a list of miscellaneous measurements in Little Colorado River drainage basin in 1906.

Miscellaneous measurements in Little Colorado River drainage basin, in 1906.

Date.	Stream.	Locality.	Width.	Area of section.	Discharge.
			Feet.	*Sq. ft.*	*Sec.-ft.*
May 8	West Snowflake ditch	Headgate	6	2.7	5.7
May 8	East Snowflake ditch	do	5	1.8	1.6
May 8	West Taylor ditch				1.6
May 17	Silver Creek	Dipping Vat	9	15	9.5
May 31	do	do	8	14	9.1

VIRGIN RIVER DRAINAGE BASIN.

MUDDY RIVER NEAR MOAPA, NEV.

Muddy River is a branch of the Virgin, one of the more important tributaries of the Colorado. The stream drains a long narrow strip of country in the eastern part of Lincoln County, Nev., flows southward, and joins the Virgin about 25 miles above the point where the latter stream enters the Colorado.

The gaging station was established January 1, 1904. It is located near the crossing of the San Pedro, Los Angeles and Salt Lake Railroad, about 6 miles downstream from Moapa, Nev. The station is above the Narrows and will show the amount of water available for storage at the proposed reservoir site in the Narrows. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 157, where are given also references to publications that contain data for previous years.

Discharge measurements of Muddy River near Moapa, Nev., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
January 24	H. H. Church	9	42	2.7	48
February 28	do	9	36	2.5	45
March 21	do	8	31	2.7	50
April 24	do	6	22	2.2	34
May 26	do	8	27	2.3	40
June 28	do	11	34	2.6	41
July 26	do	9	25	2.3	35
November 22	do	9	41	2.4	45

Daily gage height, in feet, of Muddy River near Moapa, Nev., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.7	2.6	2.5	2.5	2.3	2.3	2.5	2.2	.....	2.6	2.55	2.9
2	2.7	2.6	2.55	2.6	2.4	2.4	2.5	2.2	.....	2.6	2.6	2.9
3	2.7	2.6	2.6	2.6	2.4	2.4	2.6	2.2	.....	2.6	2.6	2.95
4	2.8	2.6	2.6	2.55	2.3	2.3	2.6	2.2	.....	2.6	2.65	3.0
5	2.8	2.55	2.6	2.55	2.2	2.3	2.7	2.2	.....	2.6	2.7	3.4
6	2.8	2.5	2.6	2.7	2.2	2.4	2.7	2.2	2.8	2.6	2.7	3.8
7	2.7	2.5	2.6	4.2	2.2	2.5	2.7	2.2	2.8	2.6	2.7	3.3
8	2.6	2.5	2.5	7.75	2.1	2.5	2.6	2.3	2.85	2.6	2.7	3.15
9	2.7	2.4	2.5	6.0	2.1	2.4	2.5	2.3	2.8	2.6	2.7	3.1
10	2.7	2.55	2.5	3.5	2.1	2.3	2.5	2.3	2.8	2.6	2.7	3.0
11	2.6	2.85	2.5	4.2	2.15	2.35	2.6	2.3	2.8	2.6	2.7	3.05
12	2.7	2.65	3.45	3.95	2.35	2.4	2.6	2.3	2.8	2.6	2.7	3.2
13	2.7	2.6	5.45	3.4	2.2	2.4	2.6	2.3	2.9	2.6	2.7	3.2
14	2.6	2.85	6.5	2.8	2.2	2.5	5.5	2.2	2.9	2.6	2.7	3.6
15	2.6	2.7	9.0	2.6	2.3	2.5	2.7	2.2	2.8	2.6	2.6	3.2
16	2.6	2.65	3.2	2.55	2.3	2.5	2.5	2.2	2.7	2.6	2.6	3.0
17	2.6	2.6	2.85	2.4	2.3	2.55	3.75	2.2	2.7	2.6	2.6	3.0
18	2.9	2.6	2.6	2 35	2 4	2 6	2 85	2.25	2.7	2.6	2.7	3.0
19	2.95	2.6	2.5	2.3	2.4	2.65	2.5	5.6	2.7	2.5	2.7	3.0
20	3.55	2.5	2.55	2.2	2.4	2.7	2.45	7.5	2.8	2.5	2.7	3.2
21	2.95	2.5	2.55	2.2	2.3	2.8	2.4	16.0	2.8	2.5	2.6	3.2
22	2.8	2.6	2.5	2.2	2.3	2.8	2.3	11.5	2.8	2.5	2.6	3.2
23	2.8	2.6	2.45	2.1	2.3	2.75	2.3	5.5	2.7	2.6	3.25	3.2
24	2.7	2.6	2.45	2.1	2.3	2.7	2.2	4.0	2.7	2.6	2.9	3.2
25	2.6	2.5	7.25	2.15	2.3	2.7	2.2	3.5	2.7	2.6	2.7	3.2
26	2.6	2.5	21.5	2.2	2.3	2.7	2.3	3.5	2.7	2.6	2.7	3.2
27	2.6	2.5	5.0	2.2	2.3	2.6	2.5	3.5	2.6	2.6	2.8	3 4
28	2.6	2.5	2.75	2.3	2.3	2.6	2.5	.....	2.6	2.5	2.85	3.4
29	2.7	.....	2.7	2.3	2.3	2.6	3.5	.....	2.6	2.5	3.0	3.4
30	2.6	.....	2.6	2.3	2.3	2.5	2.3	.....	2.6	2.5	2.9	3.45
31	2.6	.....	2.5	.....	2.3	.....	2.3	.....	.....	2.5	.....	3 5

GILA RIVER NEAR CLIFF, N. MEX.

This station was established September 9, 1904. It is located 9 miles below Cliff post-office, one-half mile below the mouth of Mancos River and 40 miles from Silver City, N. Mex. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 159, where are given also references to publications that contain data for previous years.

Discharge measurements of Gila River near Cliff, N. Mex., by Frank Asplind, in 1906.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
April 18	5.15	546	July 29	3.20	41
April 19	5.10	522	August 21 [a]	8.40	4,040
May 1	4.80	378	August 22	5.00	249
May 2	4.72	341	August 23	4.80	209
May 3	4.65	319	August 24	4.70	191
May 4	4.60	297	August 25	4.60	176
May 26	4.10	186	August 26	4.50	158
May 27	4.10	185	August 27	4.50	161
May 28	4.05	175	August 28	4.85	226
May 29	3.95	142	August 29	4.85	222
May 30	3.88	126	August 30	4.85	220
May 31	3.80	115	October 18	3.90	70
June 19	3.45	76	October 19	3.90	72
June 20	3.40	67	October 20	3.90	72
June 21	3.35	61	October 21	3.90	72
June 22	3.35	61	October 22	3.95	81
June 23	3.35	61	October 23	3.95	82
June 24	3.35	60	October 24	3.95	82
June 25	3.30	52	October 25	3.98	84
June 26	3.28	48	October 26	3.98	85
June 27	3.25	44	October 27	4.00	93
June 28	3.22	42	October 28	3.95	82
June 29	3.20	40	November 22	4.05	101
July 20	3.65	110	November 23	4.08	105
July 21	3.55	97	November 24	4.10	113
July 22	3.50	91	November 25	4.10	112
July 23	3.48	87	November 26	4.10	114
July 24	3.40	70	November 27	4.10	115
July 25	3.32	58	November 28	4.05	102
July 26	3.30	52	November 29	4.10	115
July 27	3.25	46	November 30	4.10	113
July 28	3.20	42	December 1	4.10	117

Daily gage height, in feet, of Gila River near Cliff, N. Mex., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.20	4.20	5.20	5.50	4.80	3.70	3.20	3.68	4.68	4.05	4.05	4.10
2	4.18	4.20	5.28	5.52	4.72	3.70	3.20	3.60	4.58	4.00	4.10	4.30
3	4.20	4.20	5.12	5.45	4.65	3.70	3.22	3.55	4.48	4.00	4.00	7.20
4	4.12	4.15	4.92	5.50	4.60	3.65	3.70	4.88	4.32	3.98	4.05	4.38
5	4.12	4.18	4.88	5.42	4.55	3.62	3.88	9.00	4.28	3.95	4.10	8.50
6	4.18	4.25	4.85	5.40	4.52	3.60	3.82	4.92	4.18	3.95	4.10	6.65
7	4.15	4.38	4.80	5.50	4.50	3.55	3.82	3.60	4.08	3.95	4.00	5.80
8	4.20	4.60	4.75	5.70	4.45	3.52	3.78	5.15	4.00	3.95	4.00	5.32
9	4.20	4.78	4.75	5.80	4.40	3.50	3.75	5.35	3.98	3.95	4.00	4.92
10	4.20	4.80	4.75	5.65	4.40	3.50	3.78	5.52	3.95	3.92	4.00	4.72
11	4.18	5.28	4.78	5.52	4.40	3.45	3.78	4.72	3.95	3.95	4.00	4.52
12	4.18	6.20	4.92	5.45	4.50	3.45	3.70	4.32	3.90	3.92	4.00	4.35
13	4.20	6.20	8.05	5.40	4.55	3.42	3.70	4.18	3.82	3.90	4.00	4.28
14	4.28	5.92	8.80	5.32	4.50	3.40	3.70	4.35	3.80	3.90	4.00	4.20
15	4.30	5.68	7.65	5.25	4.45	3.40	3.65	4.42	3.80	3.90	4.00	4.07
16	4.40	5.60	6.90	5.20	4.40	3.40	3.70	4.30	3.80	3.90	4.00	4.00
17	4.50	5.52	6.60	5.12	4.32	3.35	3.68	4.30	3.80	3.90	4.00	3.92
18	4.50	5.50	6.35	5.10	4.28	3.35	3.65	4.22	3.80	3.90	4.08	3.82
19	4.50	5.52	6.12	5.10	4.25	3.35	3.68	4.20	3.75	3.90	4.18	3.78
20	4.68	5.60	5.85	5.10	4.25	3.40	3.65	4.32	3.75	3.90	4.15	3.70

GILA RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Gila River rises in western and southwestern New Mexico, receiving its waters from mountains having an elevation of from 7,000 to 8,000 feet. At the point where it crosses into Arizona it still has an elevation of 6,000 feet. From this place it flows between mountain ranges, falling rapidly, until at Florence, 180 miles away, it is about 1,500 feet above sea level. At a point about 15 miles above Florence the river emerges upon the plains, through which it winds for about 75 miles before receiving the waters of its principal tributary, the Salt. From the junction of the Salt the Gila continues west and southwest and enters the Colorado at Yuma, Ariz., near the southwestern corner of the Territory.

The principal tributaries are the San Pedro and Santa Cruz rivers from the south, and the San Francisco, Salt, Aqua Fria, and Hassayampa rivers from the north.

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 approximately 1,800 square miles of high, mountainous country.

Salt River, though considered a tributary of the Gila, is in fact larger both in catchment area and in discharge. It receives the drainage from central Arizona, its principal tributary, the Verde, flowing southeasterly and south from the mountains and table-lands south of Colorado River. The Verde Valley is situated 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 above the junction of the Verde and 30 miles above Phoenix the Salt enters upon the plains of the Gila Valley.

San Pedro River rises in the northern part of the Mexican State of Sonora, flows northward for more than 100 miles, and empties into the Gila a few miles below the town of Dudleyville, 45 miles above Florence, Ariz. Rising in a country of very light snowfall, the river depends for the greater part of its water supply on the frequent showers of the rainy seasons. It flows over 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 in the sand with the varying depth of bed rock.

The floods of the upper Gila and its tributaries are usually short and violent, occurring during the months of January and February. The season of low water occurs in June and July.

GILA RIVER AT DOME (GILA CITY), ARIZ.

This station was established October 15, 1903. It is located 20 miles above the junction of the Gila with the Colorado. The point of gaging first established was one-fourth mile north of the depot at Dome. The river now flows in a channel fully 1 mile north of the original channel.

The Gila carries an enormous amount of mud and sand. At times the waves of sand traveling along the bed of the stream are so large, the current is so swift, and the stream so shallow, that the water is broken into a uniform succession of waves 2 feet high and over. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 164, where are given also references to publications that contain data for previous years.

Discharge measurements of Gila River at Dome, Ariz., in 1906.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
January 6	W. D. Smith	6.80	1,550
January 24	do	7.95	4,950
Febuary 16	do	9.40	[a]7,500
February 18	do	7.65	4,560
March 15	do	12.50	[a]55,000
March 29	do	12.00	[a]45,000
May 6	do	7.55	1,590
June 12	do	5.00	27
August 23	do	5.30	64

[a]Estimated from gage heights at Yuma, Laguna, and Dome, and from measured discharge at Yuma.

Daily gage height, in feet, of Gila River at Dome, Ariz., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.2	7.3		9.0	8.0							
2	7.0		7.5			5.5			5.5			
3	7.0	7.0		8.8	7.9							
4	6.9		7.4			5.4			5.3			
5		7.0		8.6	7.8							10.1
6	6.8		7.6			5.3			5.2			
7		6.9		8.4	7.6							11.0
8	6.9		7.4			5.2			5.15			
9		6.8		8.8	7.4							9.5
10	6.8		7.1	10.0		5.1			5.1			
11		6.8		9.4	7.2							8.0
12	6.7		6.8			5.0			5.0			
13		6.9		8.9	7.1							7.1
14	6.6		6.7			4.9			4.8			
15		7.6	12.5	8.8	7.0							6.0
16	6.6	9.45	10.5			4.8						
17		7.9	9.5	8.5	6.8							6.9
18	6.6	7.6	8.5			4.7		6.0				
19			8.5	8.4	6.55			5.5				6.75
20	6.6	7.6	8.0			4.7		7.0				
21				8.3	6.25			6.0				6.55
22	6.6	7.5	8.0			4.7		5.6				
23	8.55			8.25	6.0			5.3				6.4
24	8.0	7.9	7.8			4.7		5.0				
25	7.7		7.6	8.2	5.9			5.0				6.25
26	7.5	7.7				4.7						
27			9.4	8.15	5.8			7.0				6.1
28	7.4	7.7	11.9			4.7						
29			12.0	8.1	5.7			6.6				6.0
30	7.5		9.25			4.7						
31			9.0		5.6			6.0				10.0

NOTE.—River dry June 17 to August 17 and September 15 to December 4.

Daily gage height, in feet, of Gila River near Cliff, N. Mex., for 1906—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21	4.92	5.78	5.60	5.10	4.25	3.40	3.55	6.62	3.75	3.90	4.20	3.65
22	4.72	5.65	5.60	5.00	4.25	3.38	3.48	4.88	3.80	3.92	4.10	3.60
23	4.50	5.68	5.60	5.00	4.22	3.35	3.45	4.78	3.90	3.95	4.10	3.60
24	4.42	5.45	5.65	5.00	4.12	3.35	3.35	4.68	3.92	3.95	4.10	3.58
25	4.38	5.30	5.70	4.95	4.10	3.32	3.30	4.60	4.05	3.95	4.10	3.50
26	4.30	5.18	6.00	4.95	4.10	3.30	3.33	4.50	4.02	4.00	4.10	3.50
27	4.30	5.10	6.50	4.95	4.10	3.28	3.28	4.50	3.98	3.98	4.10	3.50
28	4.28	5.10	6.22	4.90	4.05	3.22	3.23	4.68	3.95	3.95	4.05	3.65
29	4.22	.....	6.12	4.85	3.90	3.20	3.20	4.82	3.95	3.98	4.10	6.50
30	4.20	.....	5.82	4.82	3.82	3.20	3.45	4.82	3.95	4.12	4.08	6.10
31	4.20	.....	5.52	.....	3.78	.....	3.60	4.72	.....	4.10	.....	5.76

Daily discharge, in second-feet, of Gila River near Cliff, N. Mex., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	204	204	566	704	382	112	32	109	189	97	97	104
2	200	204	603	713	343	112	32	96	174	90	104	132
3	204	204	529	681	318	112	35	88	163	90	90	2,394
4	186	193	437	704	300	102	112	405	121	87	97	247
5	186	200	419	667	288	99	141	5,250	129	83	104	4,175
6	200	216	405	658	283	96	131	437	115	83	104	1,640
7	193	247	382	704	276	88	131	96	101	83	90	575
8	204	300	359	800	258	83	125	543	90	83	90	338
9	204	373	359	860	252	80	120	635	87	83	90	230
10	204	382	359	773	252	80	125	713	83	79	90	195
11	200	603	373	713	252	72	125	345	83	83	90	165
12	200	1,140	437	681	276	72	112	233	76	79	90	139
13	204	1,140	3,380	658	288	67	112	199	65	76	90	129
14	222	944	4,850	621	276	64	112	240	62	76	90	118
15	228	790	2,725	589	258	64	104	257	62	76	90	100
16	252	750	1,820	566	252	64	112	228	62	76	90	90
17	276	713	1,460	529	232	56	109	228	62	76	90	79
18	276	704	1,250	520	224	56	104	209	62	76	101	65
19	276	713	1,084	520	216	56	109	204	60	76	115	60
20	329	750	895	520	216	64	104	233	60	76	109	55
21	437	848	750	520	216	64	88	1,600	60	76	118	48
22	345	775	750	474	216	63	77	223	62	79	104	45
23	276	790	750	474	209	56	72	206	76	83	104	45
24	256	681	775	474	187	56	56	189	79	83	104	42
25	247	612	800	451	182	51	48	178	97	83	104	36
26	228	557	1,000	451	182	48	53	163	93	90	104	36
27	228	520	1,370	431	182	45	45	163	87	87	104	36
28	222	520	1,154	428	171	35	37	189	83	76	97	48
29	208	.....	1,105	405	144	32	32	211	83	87	104	1,435
30	204	.....	874	391	134	32	72	211	83	107	101	887
31	204	.....	713	.....	125	.....	96	196	.....	104	.....	549

NOTE.—These discharges were obtained by the indirect method for shifting channels.

Monthly discharge of Gila River near Cliff, N. Mex., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
January	437	186	236	14,500
February	1,140	193	574	31,900
March	4,850	359	1,060	65,200
April	860	391	590	35,100
May	382	125	238	14,600
June	112	32.0	69.4	4,130
July	141	32.0	89.1	5,480
August	5,250	88.0	461	28,300
September	189	60.0	90.3	5,370
October	107	76.0	83.3	5,120
November	118	90.0	98.5	5,860
December	4,180	36.0	459	28,200
The year	5,250	32.0	337	244,000

Daily discharge, in second-feet, of Gila River at Dome, Ariz., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,400	2,600	3,250	9,200	4,400	380	0	0	550	0	0	0
2	2,000	2,300	3,000	8,600	4,240	340	0	0	340	0	0	0
3	2,000	2,000	2,900	8,000	4,090	300	0	0	260	0	0	0
4	1,850	2,000	2,800	7,440	3,940	260	0	0	190	0	0	0
5	1,780	2,000	3,020	6,890	3,790	220	0	0	160	0	0	17,900
6	1,720	1,920	3,240	6,420	3,520	190	0	0	120	0	0	23,400
7	1,780	1,850	3,020	5,940	3,240	160	0	0	110	0	0	29,000
8	1,850	1,780	2,800	6,970	3,000	120	0	0	100	0	0	20,800
9	1,780	1,720	2,500	8,000	2,800	90	0	0	100	0	0	12,600
10	1,720	1,720	2,190	16,800	2,600	80	0	0	100	0	0	8,500
11	1,660	1,720	1,860	11,800	2,400	60	0	0	70	0	0	4,400
12	1,600	1,780	1,720	10,200	2,300	40	0	0	40	0	0	3,300
13	1,540	1,850	1,660	8,500	2,190	30	0	0	20	0	0	2,190
14	1,470	2,540	1,600	8,250	2,100	20	0	0	10	0	0	1,480
15	1,470	3,240	54,600	8,000	2,000	20	0	0	0	0	0	760
16	1,470	11,800	22,500	7,200	1,840	10	0	0	0	0	0	1,300
17	1,470	4,090	12,600	6,400	1,720	0	0	0	0	0	0	1,850
18	1,470	3,240	6,400	6,170	1,560	0	0	760	0	0	0	1,760
19	1,470	3,240	6,400	5,940	1,410	0	0	340	0	0	0	1,660
20	1,470	3,240	4,400	5,720	1,230	0	0	2,000	0	0	0	1,540
21	1,470	3,120	4,400	5,510	1,050	0	0	760	0	0	0	1,410
22	1,470	3,000	4,400	5,400	900	0	0	420	0	0	0	1,320
23	6,640	3,540	4,100	5,300	760	0	0	190	0	0	0	1,230
24	4,400	4,090	3,790	5,200	710	0	0	40	0	0	0	1,140
25	3,500	3,800	3,240	5,100	670	0	0	40	0	0	0	1,050
26	3,000	3,500	7,520	5,000	630	0	0	1,020	0	0	0	960
27	2,900	3,500	11,800	4,910	590	0	0	2,000	0	0	0	870
28	2,800	3,500	43,500	4,820	540	0	0	1,740	0	0	0	810
29	2,900	.....	45,200	4,730	500	0	0	1,470	0	0	0	760
30	3,000	.....	10,800	4,560	460	0	0	1,120	0	0	0	8,780
31	2,800	.....	9,200	.....	420	.....	0	760	.....	0	.....	16,800

NOTE.—The above daily discharges have been obtained from an approximate rating table.

Monthly discharge of Gila River at Dome, Ariz., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
January	6,640	1,470	2,220	136,000
February	11,800	1,720	3,020	168,000
March	54,600	1,600	9,370	576,000
April	16,800	4,560	7,100	422,000
May	4,400	420	1,990	122,000
June	380	0	77	4,580
July	0	0	0	0
August	2,000	0	408	25,100
September	550	0	72	4,280
October	0	0	0	0
November	0	0	0	0
December	29,000	0	5,400	332,000
The year	54,600	0	2,470	1,790,000

SAN FRANCISCO RIVER AT ALMA, N. MEX.

This station was established October 18, 1904. It is located about one-half mile south of Alma, N. Mex., and 85 miles northwest of Silver City. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 166, where are given also references to publications that contain data for previous years.

Discharge measurements of San Francisco River at Alma, N. Mex., by F. Asplind, in 1906.

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
January 1	1.40	19
January 3	1.48	30
January 4	1.40	21
January 5	1.45	28
January 8	1.45	28
January 16	1.52	39
January 17	1.55	41
January 18	1.58	48
January 19	1.60	50
January 20	2.32	214
January 22	1.65	63
January 23	1.60	49
January 25	1.65	59
January 26	1.65	60
January 27	1.60	49
January 29	1.62	55
January 30	1.60	52
February 2	1.62	55
February 3	1.60	54
February 5	1.65	64
February 6	1.78	101
February 7	1.90	141
February 8	2.02	180
February 9	2.15	236
February 10	2.10	208
February 13	2.40	315
February 14	2.10	212
February 16	2.10	210
February 21	2.30	275
February 22	2.55	390
February 23	2.50	373
February 24	2.30	275
February 26	2.18	240
February 27	2.25	252
March 1	2.50	363
March 3	2.15	219
March 5	2.10	209
March 7	2.10	203
March 8	2.15	224
March 9	2.25	268
March 10	2.30	285
March 12	2.45	321
March 13	4.30	1,250
March 14[a]	5.20	2,080
March 15	4.00	1,080
March 16	3.40	830
March 17	3.05	599
March 20	2.70	428
March 21	2.65	393
March 23	2.70	421
March 27	3.45	867
March 28	3.20	701
March 29	2.95	582
March 30	2.80	500
April 2	2.50	357
April 3	2.40	302
April 4	2.35	283
April 5	2.30	260
April 6	2.50	348
April 7	2.75	441
April 9	2.35	282
April 11	2.30	259
April 24	1.95	182
April 26	1.90	164
April 28	1.85	149
May 7	1.60	84
May 9	1.55	70
May 11	1.48	53
May 12	1.45	50
May 14	1.45	49
May 15	1.40	37
May 16	1.35	30
May 18	1.30	24
May 19	1.30	25
May 21	1.30	24
May 23	1.20	17
June 2	1.10	14
June 4	1.10	13
June 6	1.00	8
June 7	1.00	8
June 8	.98	8
June 9	.98	7
June 11	.90	3
June 13	.90	3
June 14	.90	4
June 16	.88	2
July 2	0.88	1
July 3	.88	1
July 6	1.35	34
July 7	1.30	31
July 9	1.10	13
July 10	.92	4
July 12	.90	4
July 13	1.08	10
July 14	.98	6
July 16	1.42	48
July 17	1.75	127
July 18	1.50	66
August 1	1.20	11
August 3	1.15	9.0
August 4	1.10	5.6
August 6	1.20	13
August 7	2.20	208
August 8	1.20	13
August 10	2.90	576
August 11	1.40	38
August 13	1.25	21
August 14	1.80	124
August 15	1.35	34
August 16	1.55	62
August 17	1.30	26
August 18	1.25	21
September 4	1.20	15
September 5	1.20	15
September 7	1.10	10
September 8	1.08	8.9
September 10	1.05	7.5
September 11	1.00	5.7
September 12	1.00	6.7
September 13	1.00	7.4
September 14	2.68	397
September 15	1.50	54
September 17	1.30	25
September 18	1.25	18
September 19	1.15	9.5
September 20	1.20	13
September 21	1.10	5.2
September 22	1.10	5.1
September 24	1.15	7.5
September 25	1.25	16
September 26	1.30	23
September 27	1.25	19
September 28	1.25	17
October 1	1.20	16
October 2	1.20	16
October 3	1.15	8.3
October 5	1.15	11
October 6	1.10	6.0
October 8	1.12	9.4
October 9	1.10	6.4
October 10	1.10	6.7
October 12	1.15	12
October 13	1.15	11
October 15	1.15	10
November 1	1.20	15
November 2	1.35	30
November 3	1.25	18
November 5	1.22	16
November 7	1.22	16
November 8	1.20	15
November 9	1.20	15
November 10	1.20	14
November 12	1.18	10
November 13	1.20	14
November 14	1.20	14
November 15	1.20	14
November 17	1.20	13
November 19	1.20	14
December 3	6.30	3,050

[a] Float measurement.

Discharge measurements of San Francisco River at Alma, N. Mex., by F. Asplind, in 1906—Continued.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
December 3[a]	13.40	21,000	December 22	1.10	48
December 13	1.70	176	December 24	1.05	36
December 14	1.65	159	December 26	1.05	36
December 15	1.45	111	December 27	1.05	36
December 17	1.30	81	December 28	3.08	734
December 18	1.25	70	December 29[a]	4.15	1,414
December 21	1.15	56			

[a] Float measurement.

Daily gage height, in feet, of San Francisco River at Alma, N. Mex., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.42	1.60	2.40	2.60	1.70	1.05	0.90	1.90	1.35	1.30	1.30	1.45
2	1.42	1.60	2.40	2.52	1.70	1.05	.90	1.55	1.32	1.25	1.30	3.65
3	1.42	1.60	2.30	2.50	1.70	1.00	.95	1.35	1.30	1.20	1.25	5.75
4	1.42	1.60	2.30	2.48	1.60	1.00	1.30	1.35	1.22	1.18	1.25	8.00
5	1.42	1.65	2.20	2.40	1.60	1.00	1.30	1.30	1.18	1.10	1.20	5.15
6	1.42	1.68	2.20	2.42	1.55	1.00	1.30	1.42	1.12	1.10	1.20	4.30
7	1.48	1.90	2.05	2.52	1.50	1.00	1.20	1.85	1.10	1.10	1.20	3.85
8	1.48	2.02	2.00	2.45	1.50	1.00	1.18	1.30	1.08	1.20	1.20	3.55
9	1.48	2.08	2.01	2.45	1.50	1.00	1.13	1.30	1.00	1.20	1.20	2.70
10	1.50	2.10	2.25	2.40	1.45	0.90	1.10	2.08	1.00	1.15	1.20	2.20
11	1.50	2.52	2.25	2.38	1.42	0.90	1.10	1.60	1.00	1.15	1.20	1.95
12	1.50	2.65	2.45	2.30	1.40	0.90	1.00	1.30	1.00	1.15	1.20	1.80
13	1.52	2.42	4.65	2.22	1.4	0.90	.95	1.3	1.15	1.10	1.20	1.68
14	1.52	2.22	5.15	2.20	1.40	0.85	0.92	1.45	2.35	1.10	1.20	1.45
15	1.52	2.10	3.78	2.12	1.40	0.85	0.90	1.52	2.00	1.10	1.20	1.40
16	1.52	2.10	3.30	2.10	1.35	0.85	1.22	1.55	2.00	1.10	1.20	1.35
17	1.55	2.00	3.00	2.00	1.35	0.85	1.68	1.40	1.90	1.10	1.20	1.30
18	1.58	2.05	2.82	2.00	1.35	0.85	1.48	1.30	1.88	1.10	1.20	1.25
19	1.60	2.15	2.72	2.00	1.30	0.85	1.40	1.28	1.70	1.10	1.20	1.20
20	2.15	2.35	2.68	2.00	1.25	0.85	1.50	1.28	1.60	1.10	1.30	1.20
21	1.68	2.40	2.60	1.95	1.25	0.85	1.25	1.40	1.48	1.15	1.38	1.20
22	1.68	2.45	2.70	1.95	1.20	0.85	1.10	1.60	1.28	1.15	1.40	1.15
23	1.60	2.52	2.70	1.92	1.30	0.85	1.05	1.75	1.12	1.20	1.40	1.10
24	1.60	2.35	2.70	1.90	1.30	0.85	1.05	1.38	1.35	1.20	1.40	1.10
25	1.60	2.20	2.65	1.90	1.30	0.85	1.02	1.40	2.00	1.20	1.40	1.05
26	1.60	2.25	2.75	1.90	1.30	0.85	1.40	1.35	1.50	1.20	1.40	1.05
27	1.60	2.35	3.80	1.85	1.20	0.85	1.50	1.90	1.35	1.20	1.40	1.05
28	1.60	2.40	3.15	1.80	1.18	0.85	1.70	1.85	1.25	1.20	1.40	1.88
29	1.60	.....	2.95	1.78	1.10	0.85	1.45	1.90	1.45	1.20	1.40	3.75
30	1.60	.....	2.75	1.70	1.10	0.85	1.35	1.50	1.30	1.20	1.40	2.65
31	1.60	.....	2.60	.....	1.05	.....	1.33	1.40	.....	1.20	.....	1.98

Daily discharge, in second-feet, of San Francisco River at Alma, N. Mex., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	23	52	325	405	113	11	2	150	29	23	23	111
2	23	52	325	370	113	11	2	65	25	19	23	1,097
3	23	52	280	350	113	8	5	29	23	15	19	2,627
4	23	52	280	300	84	8	31	29	14	13	19	4,345
5	23	64	240	300	84	8	31	23	11	7	15	2,169
6	23	70	240	310	70	8	31	39	12	7	15	1,520
7	33	137	186	330	55	8	22	130	10	7	15	1,227
8	33	177	170	318	55	8	21	23	9	15	15	1,032
9	33	196	173	325	55	8	16	23	4	15	15	530
10	36	203	260	305	46	8	14	181	5	11	15	320
11	36	379	250	295	41	3	14	75	6	11	15	232
12	36	438	325	265	37	3	8	23	7	11	15	195
13	39	334	1,578	235	37	3	5	23	21	7	15	165
14	39	248	2,040	235	37	3	4	45	232	7	15	110
15	39	203	980	210	37	1	3	59	163	7	15	101

Daily discharge, in second-feet, of San Francisco River at Alma, N. Mex., for 1906— Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	39	203	770	210	31	1	24	65	163	7	15	90
17	44	170	575	180	31	1	110	35	141	7	15	81
18	49	186	485	175	31	1	62	23	137	7	15	72
19	52	222	435	185	25	1	45	21	97	7	15	63
20	222	302	425	190	21	1	66	21	75	7	23	63
21	70	325	370	175	21	1	26	35	51	11	29	63
22	70	348	420	180	17	1	14	75	21	11	36	54
23	52	379	421	170	25	1	11	108	6	15	36	46
24	52	302	445	165	25	1	11	33	29	15	36	46
25	52	240	440	165	25	1	9	35	163	15	36	38
26	52	260	515	164	25	1	45	29	55	15	36	38
27	52	302	1,038	150	17	1	66	141	29	15	36	38
28	52	325	675	135	14	1	116	130	17	15	36	215
29	52	.....	585	130	11	1	55	141	45	15	36	1,162
30	52	.....	475	105	11	1	38	55	23	15	36	505
31	52	.....	405	.....	8	.....	35	35	.....	15	.....	244

NOTE.—These discharges were obtained by the indirect method for shifting channels.

Monthly discharge of San Francisco River at Alma, N. Mex., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
1907.				
January	222	23	47.6	2,930
February	438	52	222	12,300
March	2,040	170	520	32,000
April	405	105	234	13,900
May	113	8	42.4	2,610
June	11	1	3.8	226
July	116	2	30.4	1,870
August	181	21	61.3	3,770
September	232	4	54.1	3,220
October	23	7	11.8	726
November	36	15	22.8	1,360
December	4,340	38	600	36,900
The year	4,340	1	154	112,000

SAN PEDRO RIVER AT CHARLESTON, ARIZ.

This station was established January 22, 1904, and was discontinued September 6, 1906. It is located on the El Paso and Southwestern Railroad about one-half mile west of Charleston station and 6 miles south of Fairbank, Ariz. The conditions and the bench marks are described in Water-Supply Paper No. 175, page 170, where are given also references to publications that contain data for previous years.

On February 23, 1906, the cable was moved 70 feet upstream, where channel conditions are the same. The initial point is the first tag on a wire at the face of the cable support on the right bank. A wash comes in just below the station, but carries water only in time of heavy rain and then only for a few hours. The amount carried can be easily measured.

Discharge measurements of San Pedro River at Charleston, Ariz., by Rayling, Reed, and McGee, in 1906.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
January 3	25.4	58	April 24	25.0	26
January 10	25.3	65	April 30	25.0	25
January 17	25.4	59	May 16	25.0	18
January 24	25.4	49	May 24	24.9	16
January 31	25.4	50	May 31	24.9	14
February 17	25.95	164	June 5	24.9	10
February 20	25.5	83	June 13	24.9	9.2
February 24	25.6	65	June 28	24.8	4.1
March	25.4	44	August 11	25.5	50
April 8	25.3	33	August 18	26.5	13
April 16	25.2	29	August 28	25.2	50

Daily gage height, in feet, of San Pedro River at Charleston, Ariz., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	25.4	25.35	25.4	25.3	25.0	24.9	25.2	25.5
2	25.4	25.35	25.4	25.3	25.0	24.9	25.2	25.5
3	25.4	25.3	25.4	25.3	25.0	24.9	25.2	25.5
4	25.4	25.15	25.4	25.3	25.0	24.9	25.2	25.5
5	25.4	25.15	25.4	25.3	25.0	24.9	25.2	27.7
6	25.4	25.2	25.3	25.3	25.0	24.9	25.2	26.7
7	25.4	25.45	25.3	25.3	25.0	24.9	25.2	26.5
8	25.4	25.55	25.3	25.3	25.0	24.9	25.4	26.9
9	25.4	25.75	25.4	25.3	25.0	24.9	25.4	26.6
10	25.4	25.85	25.3	25.3	25.0	24.9	25.4	25.5
11	25.4	26.15	25.3	25.3	25.0	24.9	25.4	25.5
12	25.4	25.95	25.3	25.2	25.0	24.9	25.4	26.5
13	25.4	28.5	25.5	25.2	25.0	24.9	25.4	25.75
14	25.4	27.3	26.7	25.2	25.0	24.9	25.4	25.45
15	25.4	27.1	25.6	25.2	25.0	24.9	25.4	25.3
16	25.4	26.0	25.5	25.2	25.0	24.9	25.4	29.9
17	25.4	25.8	25.5	25.2	25.0	24.9	25.2	26.7
18	25.4	25.1	25.5	25.0	25.0	24.9	25.2	26.5
19	25.4	25.6	25.5	25.0	24.9	24.9	25.2	25.2
20	25.4	25.5	25.5	25.0	24.9	24.9	25.2	26.5
21	25.4	25.5	25.4	25.0	24.9	24.9	25.6	27.3
22	25.4	25.5	25.4	25.0	24.9	24.9	25.6	26.5
23	25.4	25.5	25.4	25.0	24.9	24.9	25.6	25.4
24	25.4	25.5	25.4	25.0	24.9	24.9	25.4	25.2
25	25.4	25.5	25.4	25.0	24.9	24.9	25.4	25.2
26	25.4	25.5	25.3	25.0	24.9	24.9	25.8	25.2
27	25.4	25.5	25.3	25.0	24.9	24.9	25.8	25.2
28	25.4	25.5	25.3	25.0	24.9	24.9	25.6	25.2
29	25.4	.....	25.3	25.0	24.9	24.9	25.6	25.2
30	25.4	.....	25.3	25.0	24.9	24.9	25.6	25.5
31	25.4	.....	25.3	.....	24.9	.....	25.6	26.6

Daily discharge, in second-feet, of San Pedro River at Charleston, Ariz., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	58	40	60	33	25	4	20	40
2	58	40	60	33	24	6	20	40
3	58	28	60	33	24	7	21	40
4	59	20	60	33	23	9	22	40
5	60	20	60	33	23	10	23	519
6	61	24	36	33	22	10	23	316
7	62	60	36	33	21	10	24	174
8	63	80	36	33	21	10	25	358
9	64	123	45	33	20	10	25	194
10	65	144	36	33	20	10	25	50

Daily discharge, in second-feet, of San Pedro River at Charleston, Ariz., for 1906—Cont'd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
11	64	205	36	33	19	10	25	50
12	63	164	36	30	19	10	25	174
13	62	678	55	30	18	10	25	126
14	61	438	316	30	18	9	25	71
15	60	398	298	30	18	9	25	47
16	59	174	55	30	17	9	25	958
17	58	154	55	30	17	9	25	316
18	57	120	55	25	17	9	25	13
19	56	100	55	25	17	9	25	50
20	55	83	55	25	17	8	25	120
21	54	78	60	25	17	8	45	162
22	53	74	60	25	17	8	47	120
23	52	70	60	25	17	7	49	34
24	51	65	60	25	17	7	51	50
25	50	65	60	25	17	7	53	50
26	49	65	36	25	17	6	55	50
27	49	65	36	25	17	6	55	50
28	49	65	36	25	16	4	45	50
29	49	.....	36	25	15	4	45	50
30	49	.....	36	25	15	4	45	55
31	50	.....	36	.....	14	.....	45	194

NOTE.—These discharges were obtained by the indirect method for shifting channel.

Monthly discharge of San Pedro River at Charleston, Ariz., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
January	65	49	56.7	3,490
February	378	20	130	7,220
March	316	36	65.2	4,010
April	33	25	28.9	1,720
May	25	14	18.7	1,150
June	10	4	8.0	476
July	55	20	32.7	2,010
August	958	13	147	9,040
The period	.....	.....	.....	29,100

SALT RIVER AT ROOSEVELT, ARIZ.

This station was established February 7, 1901. It is located at the town of Roosevelt, which is the United States Reclamation Service construction camp for the Salt River dam and reservoir, and is about 12 miles west of Livingston, Ariz. The conditions at this station are described in Water-Supply Paper No. 175, page 173, where are given also references to publications that contain data for previous years.

During September, 1906, this station was reequipped with a cable and car at a point about 500 feet below the Roosevelt dam site.

During the flood of December 3 to 5, 1906, the gage rod which had been in use since the construction on the dam was begun, was carried away. From December 3 to 15, 1906, the readings were taken on the upper gage about 1,000 feet above the dam. A new rod was established at the same location as the one carried away, on December 17, 1906, with the zero at the same elevation as the old gage.

Discharge measurements of Salt River, at Roosevelt, Ariz., by Blades, Stone, and McIntyre, in 1906.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1906.	*Feet.*	*Sec.-ft.*	1906.	*Feet.*	*Sec.-ft.*
January 6	6.60	883	April 28	8.75	3,030
January 8	6.70	863	April 30	8.55	2,710
January 9	6.70	887	May 1	8.45	2,650
January 10	6.70	864	May 2	7.95	2,360
January 11	6.70	865	May 3	7.80	2,200
January 12	6.60	753	May 4	7.70	2,230
January 13	6.60	795	May 5	7.55	2,100
January 15	6.70	876	May 7	7.40	2,000
January 16	6.90	1,060	May 8	7.40	1,980
January 17	7.25	1,580	May 9	7.35	1,900
January 18	7.40	1,700	May 10	7.30	1,980
January 19	7.30	1,540	May 11	7.20	1,830
January 20	8.30	2,190	May 12	7.20	1,910
January 21	10.65	8,900	May 14	7.35	1,960
January 22	8.65	3,130	May 15	7.20	1,880
January 23	7.80	2,320	May 16	6.95	1,770
January 24	7.40	1,720	May 17	6.70	1,620
January 25	7.20	1,560	May 18	6.80	1,730
January 26	7.00	1,360	May 19	6.50	1,560
January 27	6.90	1,230	May 21	6.70	1,380
January 29	6.65	1,040	May 22	7.20	1,520
January 30	6.60	938	May 23	7.50	1,370
January 31	6.50	940	May 26	7.50	1,240
February 1	6.50	903	May 28	7.35	1,110
February 2	6.50	902	May 29	7.20	985
February 3	6.50	863	May 31	7.20	966
February 5	6.50	863	June 1	7.20	960
February 6	6.55	947	June 2	7.20	955
February 7	6.70	1,090	June 4	7.20	854
February 8	6.80	1,230	June 5	7.15	879
February 9	6.80	1,210	June 6	7.00	851
February 10	6.80	1,200	June 7	7.00	828
February 12	7.35	1,730	June 8	6.90	843
February 13	8.00	2,970	June 9	6.90	832
February 14	7.85	2,410	June 11	6.95	770
February 15	7.45	2,130	June 12	7.20	757
February 16	7.30	1,750	June 13	7.20	770
February 17	7.20	1,640	June 14[a]	8.40	733
February 19	7.10	1,410	June 15	8.40	642
February 20	7.05	1,370	June 19	9.30	644
February 21	7.10	1,400	June 20	9.05	603
February 23	7.20	1,540	June 21	8.90	564
February 24	7.25	1,530	June 22	8.75	533
March 5	7.15	1,650	June 23	8.55	495
March 6	7.15	1,570	June 25	8.40	404
March 7	7.10	1,530	June 26	8.35	428
March 8	7.15	1,480	June 27	8.75	422
March 9	7.15	1,490	June 29	8.20	385
March 10	7.20	1,640	July 6[b]	2.40	473
March 12	8.95	1,950	July 17[b]	2.70	812
March 16	10.80	10,200	July 31	2.40	405
March 17	10.35	7,330	August 2	2.40	427
March 19	9.65	5,530	August 4	2.40	439
March 20	9.35	4,580	August 5	2.40	457
March 21	9.25	3,560	August 8	2.60	702
March 22	9.00	3,480	August 9	3.10	1,390
March 23	9.05	3,280	August 11	2.60	768
March 24	9.20	3,650	August 13	2.50	646
March 26	11.70	10,100	August 16	2.60	650
March 28	13.35	16,800	August 18	2.60	703
March 30	10.50	8,830	August 20[c]	3.70	2,040
April 2	10.40	6,550	August 22[c]	3.75	2,120
April 9	10.70	7,360	August 23[c]	3.11	927
April 10	10.15	5,950	August 24	2.70	730
April 11	9.95	5,500	August 27	2.60	670
April 12	9.90	5,330	August 28	2.60	887
April 13	9.75	5,690	September 1	2.50	797
April 14	9.60	4,960	September 3	2.40	635
April 16	9.40	4,710	September 14	2.30	264
April 17	9.30	4,080	September 15	2.30	372
April 18	9.30	4,040	September 17	2.40	642
April 19	9.30	3,900	September 18	2.40	438
April 20	9.30	3,990	September 18	2.40	409
April 21	9.20	3,830	September 20	2.38	323
April 23	9.3	3,840	September 21	2.30	318
April 24	9.2	3,930	September 25	2.30	286
April 25	9.2	3,960	September 28	2.40	409
April 27	9.0	3,240	September 30	2.40	434

[a] Cofferdam being filled in. [b] Measurement made by P. P. Pitchlynn. [c] Float measurements.

Discharge measurements of Salt River, at Roosevelt, Ariz., by Blades, Stone, and McIntyre, in 1906—Continued.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1906.	*Feet.*	*Sec.-ft.*	1906.	*Feet.*	*Sec.-ft.*
October 2	2.30	416	October 27	2.35	288
October 3	2.35	426	November 1	2.35	270
October 7	2.30	318	December 14		1,330
October 9	2.30	348	December 15	3.48	1,250
October 11	2.30	311	December 16	3.35	1,070
October 13	2.30	276	December 17	3.35	1,060
October 15	2.30	258	December 18	3.30	824
October 16	2.30	264	December 19	3.10	794
October 17	2.30	268	December 21	2.75	686
October 18	2.27	282	December 22	2.70	630
October 20	2.25	263	December 29	10.80	17,600
October 23	2.30	258			

Daily gage height, in feet, of Salt River at Roosevelt, Ariz., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.7	6.5	7.2	10.3	8.45	7.2	2.3	2.4	2.5	2.3	2.35	2.58
2	6.7	6.5	7.35	10.4	7.95	7.2	2.3	2.4	2.5	2.3	2.32	3.38
3	6.7	6.5	7.35	10.3	7.8	a 7.2	2.3	2.5	2.4	2.35	2.3	c25.34
4	6.6	6.5	7.2	9.95	7.7	7.2	2.3	2.4	2.4	2.3	2.28	c22.45
5	6.6	6.5	7.15	9.75	7.55	7.15	2.7	2.4	2.4	2.35	2.25	c15.26
6	6.6	6.55	7.15	9.55	a 7.5	7.0	2.4	3.0	2.4	2.35	2.32	c12.1
7	6.7	6.7	7.1	11.15	7.4	7.0	2.5	2.75	2.4	2.3	2.38	7.25
8	6.7	6.8	7.15	11.8	7.4	6.9	2.4	2.6	2.4	2.3	2.22	5.57
9	6.7	6.8	7.15	10.7	7.35	6.9	2.4	3.1	2.4	2.3	2.3	5.0
10	6.7	6.8	7.2	10.15	7.3	a 6.9	2.4	2.6	2.4	2.3	2.3	.....
11	6.7	7.0	7.3	9.95	7.2	6.95	2.5	2.6	2.3	2.3	2.25	.....
12	6.6	7.35	10.3	9.9	7.2	7.2	2.5	2.5	2.3	2.3	2.3	.....
13	6.6	8.0	19.4	9.75	a 7.3	7.2	2.5	2.5	2.3	2.3	2.4	.....
14	6.6	7.85	17.6	9.6	7.35	b 8.4	2.5	2.5	2.3	2.3	2.38	.....
15	6.7	7.45	12.05	a 9.5	7.2	8.65	2.4	2.5	2.3	2.28	2.3	3.48
16	6.9	7.3	10.8	9.45	6.95	8.8	2.5	2.6	2.4	2.3	2.38	3.35
17	7.25	7.2	10.35	9.3	6.7	a 8.8	2.7	2.6	2.4	2.35	2.48	3.35
18	7.4	7.1	9.8	9.3	6.8	9.4	2.3	2.6	2.4	2.3	2.42	3.02
19	7.3	7.1	9.65	9.3	6.5	9.3	2.4	3.25	2.4	2.3	2.3	2.74
20	9.3	7.05	9.35	9.35	a 6.5	9.05	2.4	3.7	2.4	2.25	2.28	2.72
21	10.65	7.1	9.25	9.2	6.7	8.9	2.4	3.3	2.3	2.25	2.3	2.73
22	8.65	7.1	9.0	a 9.2	7.2	8.75	2.3	3.75	2.3	2.3	2.4	2.74
23	7.8	7.2	9.05	9.3	7.5	8.55	2.5	2.75	2.3	2.25	2.48	2.72
24	7.4	7.25	9.25	9.25	7.3	8.45	2.5	2.7	2.3	2.25	2.5	2.65
25	7.2	7.15	9.45	9.25	7	8.4	2.4	2.7	2.3	2.25	2.58	2.65
26	7.0	7.1	13.5	9.25	7.5	8.35	2.4	2.7	2.3	2.3	2.65	2.55
27	6.9	7.0	17.0	9.05	a 7.4	8.25	2.8	2.6	2.3	2.3	2.45	2.45
28	6.8	7.0	13.25	8.75	7.35	8.2	2.7	2.6	2.3	2.3	2.38	4.78
29	6.65	.....	11.4	a 8.6	7.2	8.2	2.55	2.6	2.4	2.28	2.4	11.55
30	6.6	.....	10.5	8.55	a 7.2	8.2	2.5	2.55	2.4	2.35	2.4	9.15
31	6.5	.....	10.05	.....	7.2	.....	2.5	2.5	.....	2.3	.....	7.25

a Gage heights estimated.
b Cofferdam being filled.
c Mean of readings at two-hour intervals.

Daily discharge, in second-feet, of Salt River at Roosevelt, Ariz., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	990	903	1,610	7,950	2,652	960	385	417	797	425	270	305
2	990	903	1,730	6,547	2,365	955	385	427	797	416	267	430
3	990	863	1,730	6,685	2,201	905	385	575	635	426	265	36,600
4	880	863	1,610	5,828	2,229	854	385	427	635	399	263	33,700
5	880	863	1,648	5,337	2,095	879	765	455	635	372	260	8,800
6	883	947	1,572	4,847	2,092	850	475	1,275	635	345	267	5,200
7	920	1,092	1,534	8,767	1,997	828	570	927	635	318	275	4,000
8	863	1,234	1,481	10,518	1,982	843	475	725	635	330	257	1,900
9	887	1,236	1,488	7,362	1,899	832	475	1,415	635	348	265	1,650
10	864	1,258	1,638	5,953	1,982	815	475	715	635	315	265	1,400
11	865	1,410	1,718	5,505	1,832	770	570	715	264	311	260	1,300
12	753	1,732	6,685	5,330	1,907	757	570	575	264	290	265	1,300
13	795	2,974	35,700	5,686	1,954	770	570	645	264	276	280	1,326
14	790	2,494	30,000	4,836	1,957	733	570	575	264	267	275	1,253
15	876	2,127	11,525	4,836	1,879	634	475	575	264	260	265	1,074
16	1,065	1,747	10,220	4,834	1,774	636	570	650	642	264	275	1,055
17	1,581	1,639	7,330	4,000	1,615	638	765	650	642	275	290	1,055
18	1,761	1,406	5,950	4,000	1,734	642	300	703	409	264	290	855
19	1,537	1,406	5,530	4,000	1,562	644	400	1,500	409	264	265	675
20	2,190	1,372	4,577	4,122	1,562	603	400	2,050	409	263	263	650
21	8,904	1,459	3,565	3,833	1,378	564	400	1,560	318	263	265	665
22	3,132	1,459	3,477	3,833	1,525	533	300	2,120	310	258	280	675
23	2,321	1,543	3,277	3,841	1,373	495	525	925	302	255	290	650
24	1,716	1,588	3,770	4,050	1,170	450	525	730	294	255	295	625
25	1,561	1,485	4,602	4,080	1,287	404	400	730	286	255	305	625
26	1,360	1,430	17,233	3,967	1,245	428	400	730	327	258	318	575
27	1,227	1,320	28,188	3,359	1,236	422	875	670	368	260	285	525
28	1,170	1,320	16,361	3,026	1,110	403	760	887	409	260	275	2,800
29	1,039	.....	9,380	2,825	985	385	620	887	420	258	280	19,500
30	938	.....	8,834	2,708	975	367	575	875	434	285	280	13,500
31	949	.....	6,925	.....	966	.....	575	800	.....	260	.....	8,850

NOTE.—These discharges were obtained by the indirect method for shifting channels. The discharge December 10 to 14 has been estimated.

Monthly discharge of Salt River at Roosevelt, Ariz., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
January	8,900	753	1,470	90,400
February	2,970	863	1,430	79,400
March	35,700	1,481	7,770	478,000
April	10,500	2,700	5,080	302,000
May	2,650	966	1,690	104,000
June	960	367	667	39,700
July	875	300	514	31,600
August	2,120	417	868	53,400
September	797	264	466	27,700
October	426	255	300	18,400
November	318	257	275	16,400
December	36,600	305	4,950	304,000
The year	36,600	255	2,120	1,540,000

SALT RIVER NEAR ROOSEVELT, ARIZ.

The following measurements were made below the mouth of Cherry Creek by Mr. Bull, an engineer employed by J. G. White & Co., while investigating the practicability of developing power for transmission to the vicinity of Globe, Ariz.

Discharge measurements of Salt River, below the mouth of Cherry Creek, near Roosevelt, Ariz., in 1906.

Day.	June.		July.		August.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			−0.05	300	0.15	353
2			− .08	275	.28	408
3			− .07	280	.23	387
4			.00	310	.11	343
5			.61	620	.30	415
6			1.41	1,220	.74	720
7			.31	420	.43	490
8			.28	405	1.37	1,190
9			.26	395	1.32	1,150
10			.22	380	.42	480
11			.20	375	.59	605
12			.17	365	.59	608
13			.14	355	.38	455
14			.09	335	.24	390
15			.33	430	.41	475
16			1.09	980	.34	433
17			.42	480	.30	415
18			.23	387	.27	400
19			.08	335	.50	537
20			.04	325		
21			.00	310		
22			.03	320		
23	0.24	390	.30	415		
24	.19	370	.06	330		
25	.15	355	.02	315		
26	.12	345	.40	470		
27	.19	335	.50	537		
28	.05	320	.39	465		
29	−.00	310	.21	375		
30	−.02	305	.15	353		
31			.13	345		

SALT RIVER AT M'DOWELL, ARIZ.

This station was established April 20, 1897. It is located one-third mile above the junction of Salt and Verde rivers, 30 miles northeast of Phœnix, 15 miles northeast of Mesa, and $1\frac{3}{4}$ miles above the Arizona canal diversion dam. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 177, where are given also references to publications that contain data for previous years.

Discharge measurements of Salt River at McDowell, Ariz., by W. Richins, in 1906.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
January 6	4.80	777	January 22	6.47	4,740
January 9	4.85	820	January 23	5.91	3,020
January 11	4.82	838	January 25	5.60	1,800
January 13	4.77	720	January 27	5.37	1,590
January 16	4.87	841	January 30	5.12	1,280
January 18	5.65	1,710	January 31	5.06	1,150
January 19	5.60	1,580	February 2	4.98	1,130
January 20	5.71	1,870	February 3	4.95	1,050
January 21	8.85	13,800	February 5	4.92	1,020

Discharge measurements of Salt River at McDowell, Ariz., by W. Richins, in 1906—Continued.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
February 7	5.00	1,150	July 6	2.75	396
February 9	5.23	1,630	July 10	2.95	502
February 12	5.60	1,960	July 12	2.95	504
February 14	6.00	2,900	July 14	2.80	417
February 16	5.68	2,260	July 17	3.22	718
February 20	5.25	1,800	July 20	2.85	498
February 22	5.26	1,830	July 24	2.70	421
February 24	5.28	2,040	July 26	2.75	510
February 27	5.13	1,680	July 28	3.55	957
March 1	5.20	1,770	July 31	2.95	528
March 3	5.40	1,920	August 2	3.10	608
March 6	5.16	1,630	August 7	3.10	623
March 8	5.09	1,690	August 9	3.20	675
March 10	5.05	1,530	August 11	3.30	762
March 13	12.05	35,300	August 14	3.30	709
March 14	11.90	34,100	August 17	3.50	753
March 15	9.10	21,600	August 20	5.50	2,249
March 16	7.70	10,600	August 22	5.45	2,254
March 17	7.10	7,470	August 24	3.70	726
March 19	6.66	5,440	August 28	3.55	560
March 20	6.50	4,750	August 30	3.68	663
March 22	6.25	3,860	September 3	3.40	568
March 24	6.45	3,700	September 5	3.20	483
March 26	7.95	8,270	September 7	3.15	400
March 28	9.25	20,380	September 10	3.00	326
March 30	7.62	8,790	September 12	3.00	346
April 3	7.04	5,320	September 14	2.95	318
April 5	6.78	4,320	September 17	3.20	431
April 7	7.05	5,020	September 19	3.15	385
April 9	7.55	7,690	September 21	3.10	377
April 11	6.90	5,710	September 25	2.95	302
April 13	6.80	5,580	September 28	2.90	285
April 17	6.30	4,560	October 1	3.20	380
April 19	6.08	4,540	October 3	3.10	371
April 21	6.05	4,440	October 5	3.00	340
April 24	6.13	4,530	October 9	2.90	303
April 26	6.03	4,240	October 12	2.85	278
April 28	5.60	3,390	October 16	2.85	287
May 1	5.17	3,010	October 19	2.80	291
May 3	5.15	2,440	October 23	2.80	278
May 5	5.10	2,060	October 26	2.85	284
May 8	5.00	2,110	October 29	2.90	297
May 10	4.90	1,830	October 31	2.95	329
May 12	4.75	1,580	November 2	2.95	344
May 15	4.75	1,680	November 7	3.00	367
May 17	4.50	1,500	November 9	3.00	372
May 18	4.45	1,490	November 13	2.95	342
May 22	4.25	1,340	November 16	2.90	326
May 24	4.15	1,280	November 20	2.85	310
May 25	4.05	1,190	November 23	2.95	339
May 29	3.75	920	November 26	3.35	611
May 31	3.70	978	November 28	3.15	479
June 2	3.65	930	November 30	3.10	451
June 5	3.60	881	December 4	11.15	27,700
June 7	3.45	765	December 6	6.70	7,090
June 9	3.40	721	December 8	6.40	2,860
June 12	3.35	742	December 11	5.60	1,830
June 15	3.30	698	December 14	5.00	1,430
June 19	3.20	602	December 18	4.65	934
June 21	3.10	563	December 21	4.40	735
June 23	3.00	475	December 26	4.20	650
June 26	2.85	404	December 28	7.80	8,550
June 29	2.75	359	December 29	10.95	24,900
July 3	2.65	342	December 31	6.75	7,020

Daily gage height, in feet, of Salt River at McDowell, Ariz., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.97	5.01	5.20	b 7.35	5.20	3.70	2.75	3.18	3.55	3.20	2.90	3.10
2	4.93	4.97	5.33	7.28	5.22	3.65	2.65	3.05	3.48	3.18	2.95	4.75
3	4.92	a 4.95	a 5.40	7.04	5.18	b 3.65	2.65	3.05	3.42	3.10	2.95	7.25
4	4.88	b 4.95	b 5.34	6.92	5.12	3.60	2.65	3.05	3.30	3.05	2.95	11.90
5	4.85	4.92	5.28	6.79	a 5.10	3.58	2.60	3.00	3.20	2.98	2.95	8.05
6	a 4.80	4.94	5.20	6.71	b 5.05	3.52	2.70	2.98	3.20	2.95	2.95	6.80
7	b 4.80	5.02	5.11	7.22	5.05	3.45	2.75	3.10	3.15	2.90	3.00	6.60
8	4.80	5.18	5.10	8.25	5.00	3.42	3.20	3.58	3.10	2.90	3.00	6.35
9	4.85	5.24	5.08	7.58	4.95	3.40	3.00	3.60	3.05	2.90	3.00	6.15
10	4.85	a 5.18	a 5.05	7.18	4.90	b 3.40	2.92	3.68	3.00	2.90	3.00	5.95
11	4.82	5.28	b 5.15	6.88	4.85	3.35	2.92	3.30	2.98	2.85	2.98	5.45
12	4.79	5.58	5.25	6.80	a 4.75	3.35	2.90	3.30	3.00	2.85	2.95	5.22
13	4.77	6.18	12.40	6.78	b 4.75	3.32	2.80	3.35	2.98	2.85	2.95	5.08
14	b 4.78	6.05	12.10	a 6.65	4.80	3.30	2.80	3.30	2.95	2.85	2.90	5.00
15	4.79	5.82	9.10	b 6.50	4.75	3.30	2.80	3.22	2.90	2.85	2.90	5.00
16	4.91	5.68	7.70	6.42	4.62	3.30	2.90	3.88	3.05	2.85	2.90	4.90
17	5.20	a 5.52	7.05	6.26	4.50	b 3.25	3.30	3.48	3.20	2.80	2.90	4.78
18	5.62	b 5.45	6.76	6.12	4.45	3.20	3.20	3.40	3.20	2.80	2.88	4.62
19	5.59	5.38	6.66	6.08	a 4.40	3.18	2.98	4.15	3.12	2.80	2.85	4.55
20	5.90	5.26	6.50	6.16	b 4.35	3.12	2.82	5.25	3.10	2.80	2.85	4.50
21	8.40	5.26	6.32	a 6.10	4.28	3.08	2.75	4.75	3.10	2.80	2.90	4.40
22	6.35	5.26	6.31	b 6.05	4.22	3.05	2.70	5.40	3.10	2.80	2.90	4.35
23	5.88	5.26	6.44	6.00	4.18	3.00	2.62	4.65	3.02	2.80	2.95	4.30
24	5.65	a 5.28	a 6.45	6.06	4.12	b 2.95	2.75	3.70	2.95	2.80	3.10	4.25
25	5.59	b 5.25	a 6.50	6.06	4.08	2.90	2.80	3.65	2.92	2.85	3.35	4.20
26	5.45	5.21	7.90	5.96	a 4.05	2.85	2.80	3.60	2.90	2.85	3.35	4.20
27	a 5.37	5.12	11.40	5.72	b 3.95	2.80	3.05	3.55	2.90	2.85	3.25	4.15
28	b 5.35	5.10	9.25	a 5.60	3.88	2.78	3.55	3.52	2.90	2.90	3.12	6.10
29	5.20	.....	8.18	b 5.40	3.75	2.78	3.25	3.95	2.90	2.90	3.10	11.45
30	5.11	.....	7.60	5.28	3.70	2.75	3.05	3.72	2.90	2.90	3.10	8.20
31	5.06	.....	a 7.40	.....	3.70	.....	2.92	3.55	.....	2.92	.....	6.70

a One reading. b Gage height interpolated.

Daily discharge, in second-feet, of Salt River at McDowell, Ariz., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	950	1,130	1,767	7,150	3,065	970	398	663	600	380	325	450
2	910	1,120	1,910	6,600	2,845	937	342	585	565	378	350	962
3	900	1,045	1,920	5,325	2,460	937	342	585	580	370	350	6,300
4	868	1,045	1,855	4,850	2,109	885	342	585	520	357	350	38,000
5	830	1,015	1,789	4,321	2,058	868	315	555	483	335	350	12,700
6	780	1,050	1,705	4,000	2,046	817	370	544	460	320	350	7,500
7	780	1,160	1,716	5,850	2,140	760	398	615	400	305	370	5,200
8	780	1,460	1,705	11,150	2,113	736	700	1,006	375	305	370	2,700
9	830	1,640	1,632	7,800	1,970	720	555	1,023	350	305	370	2,450
10	830	1,470	1,530	6,560	1,826	720	499	1,093	325	305	370	2,227
11	800	1,500	1,652	5,680	1,744	688	499	762	330	278	365	1,650
12	770	1,840	1,758	5,550	1,579	742	485	800	346	280	350	1,500
13	750	3,540	37,200	5,543	1,605	720	425	855	340	282	350	1,400
14	760	3,098	35,300	5,277	1,680	705	425	840	318	284	325	1,425
15	770	2,540	21,385	4,971	1,684	698	425	775	295	286	325	1,550
16	890	2,264	10,560	4,809	1,580	690	485	1,040	375	287	325	1,250
17	1,180	2,020	7,245	4,560	1,502	650	775	735	425	295	325	1,100
18	1,600	2,010	5,830	4,548	1,492	615	720	680	425	290	315	925
19	1,510	1,950	5,480	4,545	1,435	583	575	1,240	385	290	300	825
20	2,558	1,810	4,754	4,551	1,400	565	475	2,065	375	288	300	800
21	12,046	1,810	4,090	4,547	1,350	550	435	1,690	375	286	325	750
22	4,240	1,828	4,050	4,443	1,318	520	415	2,210	375	284	325	725
23	2,898	1,930	4,014	4,393	1,294	475	375	1,535	335	278	350	700
24	2,000	2,037	3,700	4,375	1,250	452	445	725	305	276	430	675
25	1,770	2,020	3,275	4,320	1,216	430	520	670	293	284	610	650
26	1,610	1,960	7,990	4,110	1,170	408	545	630	285	284	610	650
27	1,587	1,660	28,200	3,630	1,090	385	660	575	285	284	530	640
28	1,530	1,570	16,566	3,388	1,020	376	962	535	285	296	440	2,490
29	1,380	.....	11,330	3,180	920	376	738	905	285	296	430	31,900
30	1,260	.....	8,772	3,070	940	362	592	705	285	296	430	12,600
31	1,148	.....	7,472	.....	978	.....	499	560	.....	310	.....	6,900

NOTE.—These discharges were obtained by the indirect method for shifting channels.

Monthly discharge of Salt River at McDowell, Ariz., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
January	12,000	750	1,660	102,000
February	3,540	1,020	1,770	98,300
March	37,300	1,530	8,010	493,000
April	11,200	3,070	5,100	303,000
May	3,060	920	1,640	101,000
June	970	362	645	38,400
July	962	315	508	31,200
August	2,210	535	896	55,100
September	600	285	379	22,600
October	380	276	303	18,600
November	610	300	377	22,400
December	38,000	450	4,820	296,000
The year	38,000	276	2,180	1,580,000

VERDE RIVER AT M'DOWELL, ARIZ.

This station was established April 20, 1897. It is located 30 miles northeast of Phœnix, 15 miles northeast of Mesa, 2⅛ miles above the Arizona Canal diversion dam, and three-fourths mile above the mouth, of the river. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 181, where are given also references to publications that contain data for previous years.

Discharge measurements of Verde River at McDowell, Ariz., by W. Richins, in 1906.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
January 5	3.60	482	March 24	5.20	1,290
January 9	3.60	447	March 26	12.25	20,700
January 11	3.56	483	March 27[a]	15.20	37,500
January 13	3.56	472	March 28	10.10	13,700
January 16	3.56	490	March 30	6.35	3,790
January 18	3.95	715	April 3	4.10	1,460
January 19	4.30	995	April 5	3.75	1,160
January 20	4.45	1,050	April 7	3.85	1,180
January 21	6.90	3,750	April 9	5.00	2,690
January 22	5.80	2,780	April 11	4.60	1,800
January 23	5.20	1,580	April 13	3.90	1,150
January 25	4.50	979	April 17	3.03	762
January 27	4.20	750	April 19	2.83	637
January 30	3.92	621	April 21	2.70	549
January 31	3.86	577	April 24	2.43	466
February 2	3.76	553	April 26	2.40	403
February 3	3.75	499	April 28	2.50	372
February 5	3.76	522	May 1	2.48	336
February 7	3.92	690	May 3	2.47	331
February 9	4.45	1,090	May 5	2.47	310
February 12	5.00	1,440	May 8	2.50	280
February 14	5.50	1,790	May 10	2.40	261
February 16	5.53	1,880	May 12	2.40	256
February 20	5.25	1,600	May 15	2.40	212
February 22	5.25	1,670	May 17	2.35	217
February 24	4.90	1,390	May 18	2.35	212
February 27	4.45	943	May 22	2.35	197
March 1	4.45	927	May 24	2.30	188
March 3	4.70	1,130	May 25	2.30	191
March 6	4.17	743	May 29	2.30	212
March 8	4.05	610	May 31	2.30	193
March 11	3.95	539	June 2	2.30	196
March 13	8.70	7,710	June 5	2.30	194
March 14[a]	14.65	31,600	June 7	2.25	176
March 15	10.70	15,520	June 9	2.25	170
March 16	8.95	6,010	June 12	2.20	149
March 17	7.90	3,520	June 15	2.20	163
March 19	7.00	3,389	June 19	2.10	124
March 20	6.40	2,240	June 21	2.10	134
March 22	5.60	1,440	June 23	2.10	122

[a] Float measurement.

Discharge measurements of Verde River at McDowell, Ariz., by W. Richins, in 1906—Cont'd.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
June 26	2.05	118	September 28	2.35	131
June 29	2.05	121	October 1	2.40	146
July 3	2.05	105	October 3	2.40	182
July 6	2.25	151	October 5	2.40	161
July 10	2.25	181	October 9	2.40	150
July 12	2.30	186	October 12	2.45	174
July 14	2.30	185	October 16	2.45	191
July 17	2.40	254	October 19	2.45	174
July 20	2.40	223	October 23	2.45	180
July 24	2.25	188	October 26	2.50	215
July 26	2.52	268	October 29	2.55	226
July 28	3.05	604	October 31	2.60	246
July 31	2.60	305	November 2	2.60	266
August 2	2.65	353	November 7	2.65	284
August 7	3.00	511	November 9	2.65	278
August 9	2.85	414	November 13	2.65	274
August 11	2.95	438	November 16	2.65	273
August 14	2.95	409	November 20	2.65	288
August 17	3.00	480	November 23	2.70	298
August 20	5.00	2,400	November 26	3.00	518
August 22	4.90	2,250	November 28	2.95	405
August 24	3.50	855	November 30	2.85	373
August 28	2.90	384	December 4	12.40	19,800
August 30	3.08	554	December 6	6.05	3,750
September 3	2.80	304	December 8	4.00	1,600
September 5	2.70	320	December 11	3.50	976
September 7	2.65	258	December 14	4.35	1,340
September 10	2.55	218	December 18	3.00	702
September 12	2.55	213	December 21	2.65	540
September 14	2.50	200	December 26	2.45	420
September 17	2.45	169	December 28	2.60	571
September 19	2.45	177	December 29	11.00	13,000
September 21	2.50	177	December 31	6.50	4,030
September 25	2.40	155			

Daily gage height, in feet, of Verde River at McDowell, Ariz., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.61	3.80	4.48	b 4.90	2.53	2.30	2.05	2.98	2.90	2.40	2.60	3.23
2	3.59	3.76	4.68	4.40	2.53	2.30	2.05	2.60	2.85	2.38	2.60	4.92
3	3.58	a 3.75	a 4.70	4.05	2.52	2.30	2.05	2.90	2.80	2.40	2.60	8.60
4	3.59	b 3.75	b 4.50	3.92	2.52	2.30	2.05	3.70	2.75	2.40	2.60	11.50
5	3.60	3.75	4.30	3.75	a 2.47	2.30	2.05	3.40	2.70	2.40	2.60	8.90
6	a 3.55	3.74	4.14	3.70	b 2.50	2.30	2.38	3.08	2.70	2.35	2.60	5.75
7	b 3.55	3.96	4.10	3.92	2.52	2.25	2.25	2.98	2.65	2.40	2.65	4.80
8	3.55	4.19	4.05	4.20	2.50	2.25	2.25	2.90	2.65	2.40	2.65	3.95
9	3.60	4.48	3.98	5.10	2.45	2.25	2.20	2.85	2.60	2.40	2.65	3.90
10	3.60	a 4.45	a 3.95	5.20	2.40	2.20	2.25	2.75	2.58	2.40	2.65	3.55
11	3.57	4.68	b 4.00	4.50	2.40	2.20	2.28	2.95	2.55	2.42	2.65	3.48
12	3.56	4.98	4.10	4.08	a 2.40	2.20	2.30	3.00	2.52	2.45	2.65	3.40
13	3.56	5.15	11.30	3.65	b 2.40	2.20	2.30	3.00	2.50	2.45	2.65	3.35
14	b 3.55	5.48	14.60	a 3.50	2.40	2.20	2.30	2.92	2.50	2.45	2.65	4.35
15	3.55	5.75	10.35	b 3.30	2.40	2.20	2.30	2.78	2.50	2.45	2.65	3.95
16	3.58	5.43	8.70	3.14	2.40	2.20	2.25	3.48	2.45	2.45	2.65	3.50
17	3.66	a 5.40	7.70	2.99	2.35	2.15	2.40	3.05	2.45	2.45	2.65	3.15
18	4.01	b 5.35	7.90	2.92	2.35	2.12	2.45	3.00	2.45	2.45	2.65	2.98
19	4.30	5.30	7.00	2.82	a 2.35	2.10	2.42	4.02	2.45	2.45	2.65	2.80
20	4.42	5.18	6.40	2.75	b 2.35	2.10	2.38	5.05	2.48	2.45	2.65	2.72
21	6.85	5.18	5.90	a 2.70	2.35	2.10	2.35	4.80	2.48	2.45	2.65	2.65
22	5.75	5.12	5.50	b 2.60	2.32	2.10	2.32	4.65	2.45	2.45	2.65	2.60
23	5.10	5.00	5.25	2.53	2.30	2.10	2.28	3.82	2.40	2.45	2.70	2.55
24	4.72	a 4.90	5.20	2.46	2.30	2.10	2.22	3.42	2.40	2.50	2.85	2.50
25	4.45	b 4.75	a 5.40	2.45	2.30	2.05	2.22	3.25	2.40	2.50	3.00	2.45
26	4.28	4.63	12.40	2.42	a 2.30	2.05	2.90	3.10	2.35	2.50	3.00	2.45
27	a 4.20	4.42	14.40	2.47	b 2.30	2.05	2.95	2.98	2.38	2.50	2.95	2.42
28	b 4.10	4.35	9.85	a 2.50	2.30	2.05	3.05	2.88	2.35	2.52	2.92	4.02
29	3.98	.....	7.90	b 2.50	2.30	2.05	2.88	2.85	2.35	2.55	2.90	10.65
30	3.90	.....	6.15	2.49	2.30	2.05	2.72	3.05	2.35	2.55	2.85	8.05
31	a 3.86	.....	a 5.30	.....	2.30	.....	2.58	3.02	.....	2.60	.....	6.15

a One reading. b Gage height interpolated.

Daily discharge, in second-feet, of Verde River at McDowell, Ariz., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	489	560	984	2,280	380	195	109	495	385	145	266	855
2	482	544	1,144	1,770	380	195	107	355	340	160	266	2,600
3	478	500	1,160	1,410	370	195	105	470	310	180	266	8,200
4	482	513	1,000	1,300	365	195	105	1,150	312	170	266	15,450
5	485	518	840	1,158	310	195	105	850	320	160	266	8,800
6	468	570	718	1,100	300	195	195	590	320	147	266	3,400
7	468	700	665	1,235	315	178	158	495	260	155	280	2,390
8	468	900	610	1,700	280	174	166	420	260	153	280	1,450
9	477	1,105	560	2,770	270	170	173	370	235	150	280	1,425
10	485	1,050	539	2,680	261	153	181	345	220	150	280	1,050
11	486	1,195	574	1,700	258	151	183	440	215	160	280	950
12	480	1,400	643	1,315	256	149	186	480	213	175	280	900
13	472	1,520	12,000	975	240	154	186	480	200	179	280	875
14	480	1,770	31,300	910	225	158	186	390	200	183	280	1,340
15	485	2,130	14,450	820	212	163	186	375	200	186	280	1,150
16	495	1,770	5,090	785	215	163	190	840	170	190	280	950
17	562	1,780	3,340	715	217	143	254	520	170	185	280	790
18	770	1,700	3,925	675	212	130	260	480	173	180	280	700
19	995	1,650	3,377	637	209	124	237	1,370	177	175	280	625
20	1,030	1,530	2,240	570	205	124	215	2,465	180	175	280	590
21	3,679	1,582	1,712	550	201	124	213	2,150	178	175	280	550
22	2,710	1,570	1,395	510	195	124	205	2,000	170	175	280	530
23	1,510	1,480	1,300	495	190	124	198	1,170	150	180	295	500
24	1,176	1,392	1,287	470	188	124	185	855	150	200	355	475
25	960	1,260	1,350	450	191	120	185	670	150	207	520	450
26	824	1,140	21,375	415	195	120	420	560	130	215	520	450
27	760	936	30,450	385	200	117	555	465	145	210	450	430
28	690	880	12,950	372	205	115	604	385	130	205	408	1,200
29	632	.....	7,100	360	212	113	495	340	130	225	380	12,300
30	600	.....	2,536	350	203	111	395	555	130	225	355	7,100
31	584	.....	2,690	.....	193	.....	305	495	.....	245	.....	3,350

NOTE.—These discharges were obtained by the indirect method for shifting channels.

Monthly discharge of Verde River at McDowell, Ariz., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
January	3,680	468	812	49,900
February	2,130	500	1,200	66,600
March	31,300	539	5,460	336,000
April	2,770	350	1,030	61,300
May	380	188	247	15,200
June	195	111	152	8,930
July	604	105	234	14,400
August	2,460	340	743	45,700
September	385	130	211	12,600
October	245	145	181	11,100
November	520	266	312	18,600
December	15,400	430	2,640	162,000
The year	31,300	105	1,100	802,000

SANTA CRUZ RIVER AND DITCHES AT TUCSON, ARIZ.

This station was established October 15, 1905, by G. E. P. Smith. It is located at Congress Street Bridge, Tucson, Ariz. The conditions at this station and the bench marks are described in Water-Supply Paper No. 175, page 185.

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 measurements, supplemented by daily records kept by the ditch management, as to the amount of water contained in each. This water is used to irrigate lands on the north and south sides of Santa Cruz River in and about the vicinity of Tucson.

Discharge measurements of Santa Cruz River at Tucson, Ariz., by G. E. P. Smith, in 1905–6.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1905.	*Feet.*	*Sec.-ft.*	1906.	*Feet.*	*Sec.-ft.*
November 27	1.58	251	February 13	2.65	1,170
November 28	3.60	2,520	February 13	2.55	1,020
December 27	.72	40	February 14	2.00	583
1906.			February 15	1.62	380
			March 28	.25	.3
January 17	.80	9.2	July 25[a]	.80	25
February 5	.94	15	August 20	.63	25
February 12	3.25	1,750	December 3	1.50	275

[a] Float measurement.

Discharge measurements of ditches near Tucson, Ariz., by G. E. P. Smith, in 1906.

Date.	Ditch.	Discharge.	Date.	Ditch.	Discharge.
		Sec.-ft.			*Sec.-ft.*
March 28	Farmers	[a] 2.8	July 29	Manning	4.2
March 28	Manning	10.4	August 4 [b]	do	4.5
April 29	do	10.9	August 4 [c]	do	4.6
May 27	do	13.0	August 5	Farmers	4.0
June 10	Farmers	5.3	August 26	do	4.2
July 29	do	4.2	August 26	Manning	5.7

[a] Three-fourths of the discharge was used above point of measurement; total discharge of both ditches, about 20 second-feet.
[b] 2 p. m.
[c] 4 p. m.

Daily gage height, in feet, of Santa Cruz River at Tucson, Ariz., for 1906.

Day.	Jan.	Feb.	March.	Dec.	Day.	Jan.	Feb.	March.	Dec.
1	0.80	.....	0.80	.....	17	0.80	1.30	1.20	.....
2	.80	.....	.80	0.70	18	.80	1.00	.....	.....
3	.80	.....	.80	1.80	19	.80	1.00	.....	.....
4	.80	.....	.....	.70	20	.80	1.00	.....	.....
5	.80	0.94	.....	.....	21	.80	1.00	.....	.....
6	.80	.94	.....	.....	22	.80	1.00	.....	.....
7	.80	.94	.....	.....	23	.80	1.00	.....	.....
8	.80	.94	.....	.....	24	.80	1.00	.....	.....
9	.80	.94	.....	.....	25	.80	.80	.....	.....
10	.80	.94	.....	.....	26	.80	.80	.....	.....
11	.80	.90	.....	.....	27	.80	.80	.....	0.50
12	.80	3.10	.....	.....	28	.80	.80	.....	.75
13	.80	2.75	.....	.....	29	.80	.....	.....	.80
14	.80	2.15	.....	.....	30	.80	.....	.....	.85
15	.80	1.65	1.20	.....	31	.80	.....	.....	.70
16	.80	1.35	1.20	.....					

Daily discharge, in second-feet, of Santa Cruz River at Tucson, Ariz., for 1905–6.

Day.	1905.		1906.				Day.	1905.		1906.			
	Nov.	Dec.	Jan.	Feb.	Mar.	Dec.		Nov.	Dec.	Jan.	Feb.	Mar.	Dec.
1		40	10		10		17	10	40	10	170	340	10
2		40	10		10	35	18	10	40	10	40		10
3		40	10		10	820	19	10	40	10	40		10
4		40	10			35	20	10	40	10	40		10
5		40	10	25		10	21	10	40	10	40		10
6		40	10	25		10	22	350	40	10	40		10
7		40	10	25		10	23	125	35	10	40		10
8	350	40	10	25		10	24	580	35	10	40		10
9	150	40	10	25		10	25	170	30	10	10		10
10		40	10	25		10	26	75	30	10	10		10
11		40	10	20		10	27	210	25	10	10		10
12		40	10	1,575		10	28	3,200	20	10	10		50
13		40	10	1,225		10	29	925	20	10			75
14		40	10	710		10	30	250	15	10			50
15		40	10	350	340	10	31		15	10			35
16		40	10	190	340	10							

NOTE.—These discharges were obtained by the indirect method for shifting channels. The river was dry on days when discharge is not given.

Monthly discharge of Santa Cruz River and ditches at Tucson, Ariz., for 1905–6.

Month.	Discharge in second-feet.			River.	Acre-feet.		
	Maximum.	Minimum.	Mean.		Farmers ditch.	Manning ditch.	Total.
1905.							
November	3,200	0	215	12,800	134	308	13,200
December	40	15	35.6	2,190	0	0	2,190
1906							
January	10	10	10.0	615	290	0	905
February	1,580	0	168	9,330	221	159	9,710
March	340	0	33.9	2,080	420	496	3,000
April			.0	0	371	661	1,030
May			.0	0	229	694	923
June			.0	0	318	508	826
July			.0	0	231	324	555
August			.0	0	179	386	565
September			.0	0	224	390	614
October			.0	0	263	423	686
November			.0	0	182	513	695
December	820	0	42.9	2,640	88	438	3,170
The year				14,700	3,020	4,600	22,300

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