1906

The surface water supply of California, 1906: with a section on ground water levels in southern California (Great basin and Pacific ocean drainages in California and lower Colorado river drainage)

William Billings Clapp

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

THE SURFACE WATER SUPPLY OF CALIFORNIA, 1906

WITH A SECTION ON GROUND WATER LEVELS IN SOUTHERN CALIFORNIA

(GREAT BASIN AND PACIFIC OCEAN DRAINAGES IN CALIFORNIA AND LOWER COLORADO RIVER DRAINAGE)

W. B. CLAPP
DISTRICT HYDROGRAPHER

IN COOPERATION WITH CALIFORNIA STATE BOARD OF EXAMINERS

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CONTENTS.

ILLUSTRATIONS.

SURFACE WATER SUPPLY OF CALIFORNIA 1906.[a]

W. B. CLAPP,
District Hydrographer.[b]

INTRODUCTION.

SCOPE OF WORK.

The water supply of the United States is of more importance to the life and pursuits of the people than is 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

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

[b] The data in this report have been collected under the direction of W. B. Clapp, assisted by W. F. Martin, R. S. Hawley, C. H. Lee, and W. C. Sawyer, and have been prepared for publication under the direction of John C. Hoyt, by R. H. Bolster, Robert Follansbee, F. F. Henshaw, J. E. Stewart, and H. D. Padgett.

of the water 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 to 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.)

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 10, 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 only three significant figures. In making the various computatio Thatcher's slide rule, Crelle's tables, and computation machines h been generally used.

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

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

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

CONVENIENT EQUIVALENTS.

Following is a table of convenient equivalents for use in hydra 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 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-foot.

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.
$1\frac{1}{3}$ 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. Geological Survey) and No. 95 (Accuracy of Stream Measurements). In order that persons using 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; (3) those with constantly shifting beds. In determining the daily flow special methods are necessary for each class. The data upon 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 upon the local physical conditions, the degree of accuracy desired, the funds available, and the length of time that the record is to be continued.

205. Surface water supply of the Ohio and lower eastern Mississippi river drainages, 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 drainage, 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 quantit water, as run-off in depth in inches and acre-feet. They ma defined as follows:

"Second-foot" is an abbrevation for cubic foot per second a the quantity of water flowing in a stream 1 foot wide, 1 foot d at a rate of 1 foot per second. It is generally used as a fundame unit from which others are computed.

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

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

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

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

"Acre-foot" is equivalent to 43,560 cubic feet, and is the quan required to cover an acre to the depth of 1 foot. It is comm used in connection with storage for irrigation work. There convenient relation between the second-foot and the acre-foot: second-foot flowing for twenty-four hours will deliver 86,400 c feet, or approximately 2 acre-feet.

EXPLANATION AND USE OF TABLES.

For each regular gaging station are given, as far as available 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 duri year when the same are available.

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

section into strips. For each strip or pair of strips the mean velocity, area, and discharge are determined independently, so that conditions existing 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 ver-

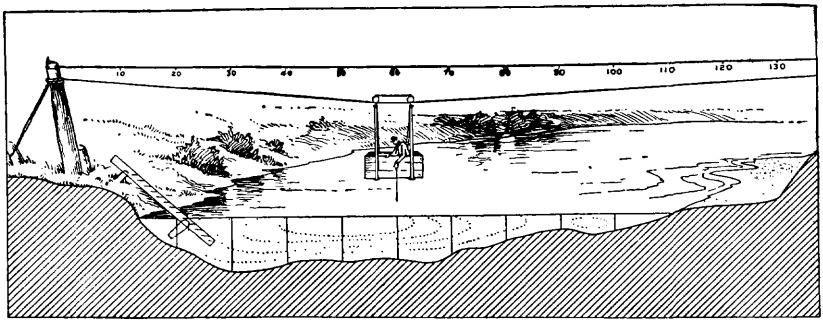


FIG. 1.—Cable station, showing section of river, car, gage, etc.

tical 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 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, a the mean velocity is determined by dividing by 6 the sum of the t velocity, four times the mid-depth velocity, and the bottom veloci This method may be modified by observing at 0.2, 0.6, and 0.8 dep

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

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

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

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

The area, which is the other factor in the velocity method of det mining the discharge of a stream, depends on the stage of the riv which is observed on the gage, and on the general contour of the b of the stream, which is determined by soundings. The soundin are usually taken at each measuring point at the time of the dischar measurement, either by using the meter and cable, or by a spec sounding line or rod. For streams with permanent beds standa cross sections are usually taken during low water. These sectio serve to check the soundings which are taken at the time of t measurements, and from them any change which may have tak place in the bed of the stream can be detected. They are also value in obtaining the area for use in computations of high-wat measurements, as accurate soundings are hard to obtain at hi 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 the 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 the 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 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 law of flow for open, permanent channels: (1) The discharge will remai constant so long as the conditions at or near the gaging station remai constant; (2) the discharge will be the same whenever the stream at a given stage if the change of slope due to the rise and fall of th stream be neglected; (3) the discharge is a function of and increase gradually with the stage.

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

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

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

The form of the mean-velocity curve depends chiefly upon the su face slope, the roughness of the bed, and the cross section of th stream. Of these the slope is the principal factor. In accordan with the relative change of these factors the curve may be either straight line, convex or concave toward either axis, or a combin tion of the three. From a careful study of the conditions at an gaging station the form which the vertical velocity-curve will tak can be predicted, and it may be extended with reasonable certaint to stages beyond the limits of actual measurements. Its princip use is in connection with the area curve in locating errors in discharg measurements and in constructing the rating table.

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

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

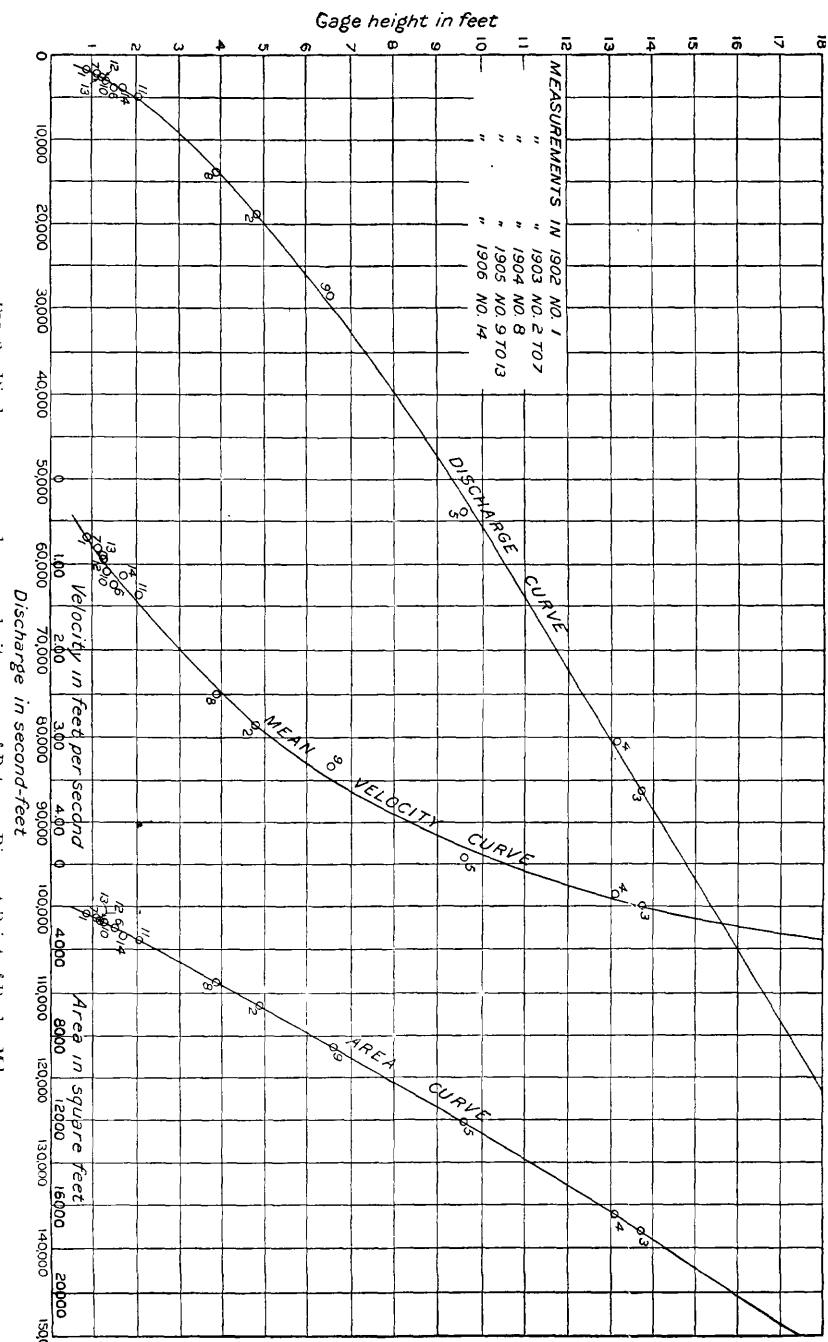


FIG. 2.—Discharge, area, and mean-velocity curves of Potomac River at Point of Rocks, Md.

The determination of daily discharge of streams with changeab beds is a difficult problem. In case there is a weir or dam availabl a condition which seldom exists on streams of this class, the dischar can be determined by its use. In case of velocity-area stations fr quent discharge measurements must be made if the determinations flow are to be other than rough approximations. For stations wit beds which shift slowly, or are materially changed only during flood rating tables can be prepared for periods between such changes ar satisfactory results obtained with a limited numb-r of measurement provided that some of them are taken soon after the change occur For streams with continually shifting beds, such as the Colorado ar Rio Grande, discharge measurements should be made every two three days and the discharges for intervening days obtained eith by interpolation modified by gage height or by Professor Stout method, which has been described in full in the Nineteenth Annu Report United States Geological Survey, Part IV, page 323, and the Engineering News of April 21, 1904. This method, or a grap ical application of it, is also much used in determining the flow stations where the bed shifts but slowly.

COOPERATION AND ACKNOWLEDGMENTS.

The hydrographic work of the United States Geological Surve in California is being carried on in cooperation with the State accordance with acts of the State legislature approved March 1 1903, and March 20, 1905.

The act of March 16, 1903, which covered the period from July 1903, to June 30, 1905, is in substance as follows:

> The State board of examiners are hereby empowered to enter into contracts wi the Director of the United States Geological Survey for the purpose of making top graphic maps to the extent of twenty thousand dollars; also for the purpose of gagi streams, surveying reservoir sites and canal locations, for the conservation and utiliz tion of the flood or storm waters of the State, to the extent of fifteen thousand d lars [etc.].

The act of March 20, 1905, is in substance the same as previous ac the appropriations being increased to $30,000 for topography an $20,000 for hydrography, and covering the two fiscal years July 1905, to June 30, 1907.

Assistance has been rendered or records furnished by the follo ing, to whom acknowledgment is due: California State board examiners, composed of the following members: George C. Parde governor; C. F. Curry, secretary of state; U. S. Webb, attorne general. Acknowledgment is also due to Mr. Lovelace, of Lemoor Cal., for gage readings on Tulare Lake; to the Kern County Lan Company, through A. K. Warren, engineer in charge of water mea urements, for the record of Kern River; to the city of Santa Barba

for cooperation in gaging Santa Ynez River; to the Bay Cities Water Company, through Edwin Duryea, jr., chief engineer, for precipitation and run-off data; to the Great Western Power Company, through Mr. M. A. Viele, chief engineer, for gage heights and stream measurements on Feather River and tributaries and for rainfall and evaporation records near Prattville, Cal.; to the Southern Pacific Company, through its chief engineer, William Hood, for river-stage records of San Joaquin River at Herndon, Cal., and for transportation furnished; and to the officials of the Santa Fe Railway for transportation furnished.

LOWER COLORADO RIVER DRAINAGE BASIN.[a]

COLORADO RIVER AT HARDYVILLE, ARIZ.

This station was established May 11, 1905. It 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 1905–6.

Date.	Hydrographer.	Gage height.	Discharge.
1905.		*Feet.*	*Sec.-ft.*
May 17	O. W. Peterson	6.05	33,140
May 20	do	6.95	33,910
May 27	C. W. Jenkins	11.20	69,010
June 4	do	10.50	64,750
June 10	do	14.50	107,700
June 18	do	12.80	81,030
June 25	do	10.15	52,860
July 9	do	6.70	30,650
July 16	do	5.70	22,400
July 23	do	5.10	17,020
July 30	do	4.60	14,580
August 6	do	5.00	17,040
August 13	do	4.20	12,270
August 27	do	4.00	11,650
September 2	do	3.20	5,934
September 17	do	3.40	7,523
October 1	do	3.00	4,657
October 15	do	3.90	6,579
October 29	do	3.60	6,574
November 4	Jenkins and Lee	3.48	5,949
November 12	C. W. Jenkins	3.85	6,504
November 19	do	3.70	5,979
November 25	do	3.60	5,757
December 3	do	6.00	17,850
1906.			
January 1	C. W. Jenkins	3.70	3,430
January 7	do	3.50	3,440
January 14	do	3.30	3,360
January 21	do	4.15	5,900
January 28	do	4.50	7,850
February 5	do	4.10	5,110
February 12	do	4.40	6,380
February 25	do	4.30	6,350
March 4	do	4.10	5,710
March 11	do	4.20	1,520
March 18	do	6.40	19,400
March 25	do	5.80	12,800
April 1	do	7.50	30,000
April 8	C. W. Jenkins	6.90	21,500
April 15	do	7.30	24,100
April 22	do	8.10	32,200
April 24	Murphy and Lee	8.84	37,500
May 3	Lee and Jenkins	9.00	40,800
May 6	C. W. Jenkins	8.70	33,100
May 13	do	11.20	67,200
May 20	C. H. Lee	11.90	63,700
May 27	C. W. Jenkins	14.00	92,800
June 3	do	14.05	96,200
June 9	do	13.10	92,000
June 16	do	14.40	109,000
July 1	F. T. Cavin	10.35	63,700
July 8	Lee and Cavin	19.30	47,500
July 15	F. T. Cavin	8.50	34,600
July 22	do	8.56	38,100
July 29	do	7.55	27,600
August 5	do	7.35	24,400
August 11	do	7.00	19,500
August 18	do	6.45	16,200
August 25	do	6.20	14,200
September 1	do	6.50	15,500
September 8	do	6.63	12,700
September 15	do	6.50	11,400
September 22	C. J. Brunk	6.73	12,100
September 29	do	7.38	16,900
October 6	do	7.63	16,000
October 13	do	7.00	12,000
October 20	do	6.75	9,840
October 28	do	6.60	8,400
November 4	do	6.80	9,470
November 10	do	7.30	12,800
November 17	do	7.15	10,300
November 24	do	6.85	9,430
December 1	do	6.70	7,720
December 8	do	8.48	23,300
December 15	do	7.25	11,300
December 22	do	6.89	9,230
December 29	do	6.50	7,160

[a] A description of the general features of Colorado River drainage will be found in Water-Supply Paper No. 211.

Daily gage height, in feet, of Colorado River at Hardyville, Ariz., for 1905–6.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	D
1905.												
1						a11.8	8.55	4.5	3.4	3.75	3.45	7
2						a11.5	8.4	4.5	3.4	4.05	3.45	7
3						a11.1	8.3	a4.65	3.2	4.7	3.5	6
4						10.7	8.0	4.8	3.2	4.35	3.45	5
5						10.8	7.9	5.2	3.45	5.1	3.5	4
6						11.85	7.55	5.0	3.55	4.8	3.5	4
7						12.5	7.3	4 7	3.5	4.8	3.6	4
8						13.1	7.0	4.7	3.6	4.7	4.0	a4
9						13.7	6.7	4.85	3.5	4.7	3.85	4
10						14.4	6.7	4.6	3.6	4.45	3.85	3
11					6 85	14.3	6 5	4.5	4.0	4.25	3.75	3
12					6 9	14.0	6 15	4.3	3.7	4.1	3.85	3
13					6.95	14.3	a6.0	4.25	3.5	a4.0	3.8	3
14					7.15	14.45	5.85	a4.15	3.5	3.95	3.65	3
15					7.15	14.5	5.2	4.0	3.45	3.85	3.85	3
16					6 95	13 8	5.85	4.0	3.45	3.8	3.75	3
17					6.7	13.3	5.5	3.9	3.4	3.7	3.7	3
18					6.8	12.8	5.3	3.8	3.3	3.7	3.7	3
19					6.95	12.5	5.25	3.8	3.2	3.7	3.7	3
20					7.0	12.2	a5.2	3.8	3.2	3.6	3.7	3
21					7.35	11.85	5.1	3.75	3.05	3.55	3.6	a3
22					8.1	11.35	5.1	3.75	3.05	3.5	3.6	3
23					8.8	10.8	5.1	3.6	3.0	3.5	3.6	3
24					9.5	10.5	4.95	3.6	3.05	a3.5	3.7	3
25					9.9	10.15	4.85	3.6	2.95	3.45	3.6	3
26					10.6	10.0	4.7	4.75	2.95	3.5	5.4	3
27					11.1	9.5	4.7	3.7	2.95	3.45	5.4	3
28					11.5	9.1	4.7	3.4	2.95	3.5	5.1	3
29					12.7	9.2	4.7	3.3	3.95	3.55	5.0	3
30					a12.4	9.6	4.65	3.4	3.95	3 5	5.1	3
31					a12.1	.....	4.6	3.4	.....	3.5	.....	a3
1906.												
1	a3.7	a4.2	4.4	7.85	9.5	13.2	10.25	7.4	6.5	a7.55	6.65	6
2	3.5	4.1	4.2	8.25	9.2	13 8	10.0	7.4	6 35	7.5	6.6	6
3	3.5	4.05	4.2	7.9	9.1	14.0	a9.7	7.6	6.35	7.7	a6.7	6
4	3.4	4.1	4.1	7.4	9.2	13 8	9.4	7.5	6.5	7.7	6.8	6
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	3.4	4.1	4.1	7.1	8.8	13.8	9.2	7.2	6 55	7.6	a6.8	6
7	3.5	4.2	4.1	6.85	8.7	13.6	9.35	7.0	6.55	7.4	6.9	7
8	3.35	4.2	4.2	6.9	8.1	13.3	9.25	7.1	6.7	7.3	6.9	8
9	3.3	4.3	4.2	6.9	8.7	13.0	9.35	7.0	6 7	7.2	7.0	7
10	3.45	4.4	4.2	6.9	9.3	13.1	9.1	7.0	6.7	7.1	7.3	7
11	3.3	a4.4	4.25	7.1	10.1	13.25	8 9	7.05	6.55	7.1	7.3	a7
12	3 35	4.4	4.2	7.1	10.5	13.5	8 8	6 85	6 6	7.1	a7.3	7
13	3.3	4.4	4.35	7.6	11.05	13.1	8.8	6.8	6.55	7.0	7.3	7
14	3.4	4.4	4.5	7.5	11.85	13.95	8 45	6.7	6 55	7.0	7.2	7
15	3.35	4.3	5.1	7.35	11.9	a14.0	8.5	6.65	6.55	6.95	7.15	7
16	3.4	4.3	a5.8	7.4	12.5	14.1	8.35	6.6	6.55	6.9	7.15	7
17	3.7	4.3	6.4	7.45	12.75	14.6	8 55	6.55	6 5	6.85	7.15	6
18	3.8	4 25	6.35	7.6	12.6	14.8	8 5	6.45	6 6	6.8	7.1	6
19	3.9	4 2	5.9	7.6	12.1	15 2	8 55	6 45	6.9	6.8	7.0	6
20	4.2	4.1	5.8	7.6	11.9	15.4	8.65	6.25	6.7	6.75	6.9	6
21	4.15	4.2	5.9	7.9	12.3	15.0	8.75	6.2	6.6	6.7	6.85	6
22	4.5	a4.2	5.9	8.1	12.75	15.0	8.6	6.1	6.75	6.7	6.85	6
23	4.4	4.2	5.8	a8.4	13.4	14.35	8.55	6.3	7.2	6.7	6.9	6
24	4.3	4.2	5.8	8.8	13.7	13.8	8.35	6.6	7.0	6.65	6.85	6
25	4.4	4.3	5.8	8.9	14.2	13.1	8.15	6.2	6.9	6.6	6.85	6
26	4.5	4.3	6.5	9.2	14.2	12.4	8.05	6.2	7.0	6.6	a6.85	6
27	4.4	4.3	6.4	9.8	14.55	11.85	7.85	a6.25	7.0	6.55	6.85	6
28	4.45	4.4	6.3	10.4	14.5	11.6	7.65	6.35	a7.2	6.6	6.9	6
29	4.4	.....	6.55	10.3	a14.2	11.2	7.55	6.45	7.4	6.75	6.9	6
30	4.4	.....	7.3	10.0	13.9	10.6	7.55	6.5	7.6	a6 75	6.8	6
31	4.3	.....	7.75	.....	13.4	.....	a7.5	a6.5	.....	6.75	.....	6

a Estimated.

Daily discharge, in second-feet, of Colorado River at Hardyville, Ariz., for 1905–6.

Day.	Jan	Feb.	Mar	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1905.												
1						73,460	45,260	14,080	7,160	9,290	5,650	29,500
2						70,700	44,020	14,080	7,160	11,600	5,700	26,500
3						67,090	43,200	15,090	5,970	15,900	6,000	18,200
4						63,550	40,750	16,110	5,970	13,100	5,750	14,300
5						64,430	39,940	18,950	7,460	18,200	5,800	11,500
6						73,920	37,120	17,500	8,065	15,630	5,500	10,400
7						80,000	35,120	15,430	7,760	15,300	6,000	10,200
8						85,780	32,750	15,430	8,370	14,300	8,500	9,500
9						91,700	30,410	16,460	7,760	14,000	7,200	8,800
10						98,780	30,410	14,750	8,370	12,000	7,000	7,400
11					31,580	97,760	28,850	14,080	10,850	10,300	6,000	6,300
12					31,970	94,700	26,160	12,770	8,980	8,900	6,500	6,300
13					32,360	97,760	25,000	12,440	7,760	7,900	6,200	6,700
14					33,940	99,290	23,840	11,800	7,760	7,200	5,200	6,700
15					33,940	99,800	18,950	10,850	7,460	6,200	6,700	6,000
16					32,360	92,700	23,840	10,850	7,460	6,000	6,100	6,000
17					30,410	87,740	21,180	10,220	7,160	5,300	5,800	6,000
18					31,190	82,880	19,690	9,630	6,560	5,600	5,900	6,000
19					32,360	80,000	19,320	9,600	5,970	5,600	5,980	5,300
20					32,750	77,180	18,950	9,600	5,970	5,200	6,000	5,300
21					35,520	73,920	18,220	9,290	5,090	4,850	5,400	5,600
22					41,560	69,340	18,220	9,290	5,090	4,800	5,500	6,000
23					47,330	64,430	18,220	8,370	4,800	4,800	5,600	6,700
24					53,230	61,810	17,150	8,370	5,090	5,050	6,350	6,700
25					56,640	58,790	16,460	8,370	4,515	4,700	5,760	6,700
26					62,680	57,500	15,430	15,770	4,515	5,400	17,800	7,800
27					67,090	53,230	15,430	8,980	4,515	5,050	17,300	7,400
28					70,700	49,840	15,430	7,160	4,515	5,700	14,500	7,400
29					81,920	50,680	15,430	6,560	10,540	6,050	13,200	7,400
30					79,060	54,080	15,090	7,160	10,540	5,900	13,300	6,700
31					76,240		14,750	7,160		5,900		6,700
1906.												
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		7,700

NOTE.—These discharges were obtained by the indirect method for shifting channels, except from May 11 to October 1, 1905, when a rating table was used.

Estimated monthly discharge of Colorado River at Hardyville, Ariz., for 1905–6.

Month.	Discharge in second-feet.			Total acre-fe
	Maximum.	Minimum.	Mean.	
1905.				
May (11 to 31)	81,920	30,410	47,370	1,973
June	99,800	49,840	75,760	4,508
July	45,260	14,750	25,310	1,556
August	18,950	6,560	11,810	726
September	10,850	4,515	6,972	414
October	18,200	4,700	8,571	527
November	17,800	5,200	7,606	452
December	29,500	5,300	9,097	559
The period				10,720
1906.				
January	7,700	2,850	4,830	297
February	6,700	5,000	5,880	327
March	31,800	5,600	12,300	756
April	55,600	21,100	31,600	1,880
May	93,000	28,500	64,500	3,970
June	116,000	66,000	95,300	5,670
July	62,600	27,500	40,000	2,460
August	29,000	12,500	18,400	1,130
September	19,500	10,800	13,400	797
October	17,800	8,200	11,700	719
November	12,800	8,000	9,870	587
December	23,100	5,500	9,260	569
The year	116,000	2,850	26,400	19,200

NOTE.—Values are rated as follows: October to December, 1905, fair; remainder of 1905 and 1906, g

COLORADO RIVER AT YUMA, ARIZ.

This station is located in the town of Yuma, Ariz., 1½ miles bel the mouth of Gila River and 10 miles, by river, above the Mexic boundary. Records of river height have been kept by the Southe Pacific Company since April 1, 1878, on the gage which was esta lished by Arthur Brown, superintendent of the company's brid and building department, during the summer of 1876. The cor tions at the station and the bench marks are described in Wat Supply Paper No. 177, page 13, where are given also references publications that contain data for previous years.

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

[BY W. D. SMITH AND OTHERS.]

Date.	Gage height.	Dis-charge.	Date.	Gage height.	D cha
	Feet.	*Sec.-ft.*		*Feet.*	*Sec*
January 3	17.70	5,730	February 21	19.40	10
January 5	17.55	5,580	February 24	19.30	10
January 9	17.45	5,090	March 6	18.90	8
January 13	17.40	4,550	March 9	18.90	7
January 19	17.40	4,260	March 12	18.85	6
January 23	19.50	16,100	March 15	26.35	54
January 25	19.60	13,800	March 16	27.55	66
January 27	18.80	10,000	March 17	24.75	42
January 30	18.70	9,740	March 19	22.75	33
February 2	18.55	9,110	March 21	22.05	24
February 5	18.20	7,280	March 24	21.50	22
February 9	18.20	6,360	March 27	24.00	43
February 12	18.55	8,220	March 28[a]	26.50	65
February 15	18.90	9,640	March 29[a]	28.10	75
February 16	19.95	14,600	March 31[a]	23.70	34
February 19	19.60	12,200	April 3	23.80	37

[a] Measured by J. N. Johannson.

Discharge measurements of Colorado River at Yuma, Ariz., in 1906—Continued.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
April 5	23.40	37,800	August 27	19.10	15,200
April 9	22.30	27,200	August 29	19.50	16,400
April 11	22.70	29,800	August 31	18.90	13,400
April 14	22.45	27,800	September 3	19.20	14,500
April 16	22.70	29,500	September 5	18.85	12,500
April 18	22.40	27,200	September 7	18.70	12,000
April 20	22.45	26,100	September 10	18.75	11,800
April 23	22.65	29,000	September 13	18.80	11,800
April 25	23.10	31,700	September 15	18.70	10,700
April 27	23.55	36,700	September 17	16.65	10,700
April 30	24.50	44,100	September 19	18.40	9,920
May 2	25.10	50,800	September 21	18.40	10,200
May 5	24.55	40,600	September 24	18.40	10,300
May 8	24.30	36,800	September 26	19.10	13,200
May 10	23.70	35,100	September 28	18.70	11,700
May 12	24.25	42,100	October 1	19.55	15,900
May 15	24.90	46,500	October 3	19.40	14,700
May 18	26.20	52,800	October 6	19.35	15,800
May 21	27.10	64,200	October 8	19.10	14,900
May 24	27.20	68,800	October 10	18.80	14,300
May 28	27.60	71,100	October 11	18.60	13,300
June 1	28.60	81,800	October 16	18.10	10,700
June 5	28.30	92,400	October 18	18.10	10,800
June 8	27.40	89,000	October 22	18.00	9,950
June 11	27.30	82,100	October 24	18.00	9,800
June 13	26.90	65,800	October 27	18.00	8,980
June 16	26.95	80,600	October 29	18.05	8,610
June 18	26.90	80,800	November 1	18.35	8,630
June 21	26.75	79,800	November 3	18.50	9,150
June 23	27.30	83,000	November 6	18.65	8,430
June 25	27.80	96,600	November 8	18.75	9,420
June 28 [a]	28.05	96,900	November 9	18.75	9,430
June 30	27.30	80,300	November 10	18.80	9,650
July 3	24.35	60,400	November 12	19.20	11,600
July 5	22.85	48,100	November 14	19.10	11,500
July 9	21.85	40,400	November 16	19.00	10,800
July 11	21.80	38,600	November 20	18.95	10,000
July 13	21.40	38,100	November 22	18.75	9,280
July 16	20.95	35,400	November 24	18.80	9,230
July 18	21.15	32,900	November 26	18.80	8,670
July 20	21.30	32,400	November 28	18.80	9,210
July 23	21.60	31,600	December 1 [b]	18.70	9,080
July 25	21.40	33,000	December 3	18.65	9,080
July 28	21.10	29,100	December 5	18.50	8,470
July 30	20.70	29,100	December 6	21.10	26,000
August 1	20.35	25,600	December 8	23.90	47,000
August 4	20.00	24,500	December 10	21.90	37,000
August 7	19.70	21,900	December 11	21.00	28,200
August 9	19.30	22,000	December 12	20.30	23,400
August 11	19.55	20,500	December 15	19.60	18,300
August 13	19.40	19,500	December 17 [c]	19.30	15,800
August 15	19.20	16,900	December 19	19.10	13,900
August 18	19.10	16,500	December 21	18.90	12,300
August 20	19.25	16,400	December 24	18.80	11,300
August 21	19.90	18,500	December 26	18.60	10,600
August 24	19.20	15,500	December 28	18.50	8,870
August 25	19.80	17,900	December 29	18.50	8,940

[a] Measurements June 28 to July 25 by F. R. S. Buttemer.
[b] Measurements December 1 to 15 by J. M. Brown.
[c] Measurements December 17 to 29 by L. C. Robertson.

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

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	17.75	18.6	19.0	24.2	24.75	28.6	26.5	20.35	18.8	19.55	18.35	18.7
2	17.7	18.55	19.0	23.9	25.1	28.6	25.55	20.3	19.0	19.4	18.5	18.8
3	17.7	18.55	19.0	23.8	25.0	28.8	24.35	20.2	19.2	19.4	18.5	18.65
4	17.6	18.45	19.0	24.0	24.7	28.6	23.35	20.0	19.1	19.45	18.6	18.6
5	17.55	18.2	18.95	23.4	24.55	28.3	22.85	20.15	18.85	19.45	18.6	18.5
6	17.4	18.3	18.9	23.2	24.55	27.95	22.4	20.0	18.7	19.35	18.65	20.3
7	17.4	18.2	18.95	22.95	24.4	27.6	22.0	19.7	18.7	19.15	18.7	25.3
8	17.5	18.2	18.95	.....	24.2	27.4	21.9	19.4	18.7	19.1	18.75	23.55
9	17.45	18.2	18.9	22.45	23.95	27.4	21.85	19.3	18.65	18.9	18.8	21.2
10	17.5	18.2	18.85	22.9	23.8	27.45	21.85	19.2	18.75	18.8	18.8	22.1

Daily gage height, in feet, of Colorado River at Yuma, Ariz., for 1906—Continued

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	D
11	17.5	18.7	18.85	22.7	23.8	27.3	21.8	19.55	18.8	18.6	18.85	2(
12	17.5	18.55	18.85	22.65	24.25	27.1	21.55	19.4	18.85	18.4	19.2	2(
13	17.4	18.7	18.9	22.6	24.3	26.9	21.4	19.4	18.8	18.25	19.3	2(
14	17.4	18.8	20.2	22.45	24.5	26.7	21.3	19.4	18.8	18.25	19.1	1(
15	17.4	18.9	21.2	22.9	24.9	26.75	21.1	19.2	18.7	18.2	19.1	1(
16	17.4	19.95	27.55	22.7	25.4	26.95	20.95	19.2	18.7	18.1	19.0	1(
17	17.4	20.0	25.5	22.4	25.85	26.95	20.95	19.1	18.65	18.1	18.95	1(
18	17.4	19.8	23.2	22.4	26.2	26.9	21.25	19.1	18.6	18.1	18.9	1(
19	17.4	19.6	22.65	22.55	26.45	26.8	21.5	19.5	18.4	18.1	18.9	1(
20	17.45	19.4	22.85	22.45	26.8	26.7	21.2	19.25	18.35	18.0	18.9	1(
21	17.4	19.4	22.05	22.4	27.1	26.75	21.35	19.2	18.45	18.0	18.9	1(
22	17.5	19.4	21.7	22.4	27.2	26.85	21.5	19.3	18.6	18.0	18.8	1(
23	19.5	19.3	21.6	22.7	27.3	27.3	21.6	19.25	18.6	18.0	18.8	1(
24	19.4	19.3	21.5	22.9	27.2	27.6	21.5	19.2	18.4	18.0	18.8	1(
25	19.6	19.2	21.35	23.1	27.2	27.8	21.4	19.8	18.7	17.95	18.8	1(
26	19.0	19.1	21.2	23.5	27.3	27.85	21.4	19.45	19.1	17.95	18.8	1(
27	18.8	19.0	23.1	23.55	27.5	28.10	21.2	19.15	18.8	18.0	18.75	1(
28	18.75	19.0	23.0	23.8	27.6	28.05	21.1	18.9	18.7	18.0	18.8	1(
29	18.75	.....	27.95	24.2	27.8	27.85	20.9	19.5	18.8	18.05	18.75	1(
30	18.7	.....	25.0	24.5	28.2	27.3	20.7	19.2	19.0	18.1	18.8	1(
31	18.7	.....	23.8	.....	28.4	.....	20.5	18.9	.....	18.15	.....	2

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

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	D
1	5,830	9,280	9,350	39,600	46,900	81,800	74,200	25,600	12,700	15,900	8,630	9,
2	5,800	9,100	9,210	37,600	50,800	84,000	68,000	25,500	13,300	15,000	9,300	9,
3	5,730	9,000	9,000	37,500	48,600	84,200	60,400	25,200	14,500	14,700	9,150	9
4	5,640	8,500	8,900	38,000	43,400	87,200	52,200	24,500	13,800	15,100	9,270	9,
5	5,580	7,280	8,750	37,800	40,600	92,400	48,100	24,900	12,500	15,200	8,700	8.
6	5,460	7,500	8,600	35,900	41,000	91,100	44,600	24,400	12,100	15,800	8,430	17,
7	5,280	6,800	8,350	33,400	38,500	89,800	41,900	21,900	12,000	15,000	9,000	60
8	5,230	6,660	8,000	31,000	35,800	89,000	41,100	21,900	11,900	14,900	9,420	43
9	5,090	6,380	7,730	27,200	34,000	85,700	40,400	22,000	11,900	14,500	9,700	27,
10	4,950	6,450	7,300	32,200	35,100	85,300	39,500	21,900	11,800	14,300	9,650	38.
11	4,830	8,830	6,900	29,800	36,700	82,100	38,600	20,500	11,800	13,300	9,800	27.
12	4,700	8,220	6,740	29,200	42,100	74,000	40,600	19,700	11,900	11,800	11,000	23.
13	4,550	8,840	7,000	29,000	42,800	65,800	38,100	19,500	11,800	10,900	12,500	21
14	4,500	9,250	15,600	27,800	44,000	65,000	37,400	19,200	11,700	10,800	11,500	19.
15	4,450	9,640	54,300	31,200	46,500	70,000	36,300	16,900	10,700	10,500	11,500	17.
16	4,400	14,600	66,700	29,500	48,900	80,600	35,400	16,800	10,700	10,700	11,400	15
17	4,350	14,800	42,300	27,200	51,100	80,600	34,600	16,000	10,700	10,800	10,500	15.
18	4,300	13,500	35,000	27,200	52,800	80,800	32,900	16,500	10,500	10,800	10,200	14
19	4,200	12,200	33,200	28,200	55,900	80,400	32,000	17,500	9,900	10,700	9,900	13
20	4,600	11,000	33,500	26,100	60,200	80,100	32,400	16,400	9,600	10,300	9,750	13.
21	4,400	10,800	24,600	25,800	64,200	79,800	32,200	18,500	10,200	10,100	9,850	12
22	5,000	10,700	23,300	25,500	66,000	80,400	31,800	18,100	10,900	10,000	9,300	12
23	15,100	10,300	22,800	29,000	67,700	83,000	31,000	15,800	11,000	9,800	9,330	12
24	14,000	10,200	22,400	39,600	68,900	91,000	32,300	15,500	10,300	9,800	9,230	11
25	13,800	9,880	21,200	31,700	69,200	96,600	33,000	17,900	11,500	9,500	8,900	11.
26	11,000	9,550	19,000	36,200	69,700	96,400	32,400	16,400	13,200	9,200	8,670	10
27	10,000	9,250	43,800	36,700	70,600	99,200	30,800	15,200	12,100	9,000	8,700	9
28	9,940	9,190	65,000	38,000	71,200	97,100	29,100	14,300	11,700	8,800	9,210	8
29	9,830	.....	75,000	41,800	73,500	92,000	29,100	16,400	12,200	8,600	9,000	8
30	9,740	.....	47,500	44,100	77,300	79,300	29,100	15,000	13,300	8,600	9,080	6
31	9,600	.....	34,700	.....	79,800	.....	27,000	13,400	.....	8,600	.....	48

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

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

[Drainage area, 225,000 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	16,100	4,260	6,870	422,000	0.030	0.03
February	14,800	6,360	9,560	531,000	0.042	.04
March	75,000	6,740	25,400	1,560,000	0.113	.13
April	44,100	25,500	32,500	1,930,000	0.144	.16
May	79,800	35,100	54,100	3,330,000	0.240	.28
June	99,200	65,000	84,200	5,010,000	0.374	.42
July	74,200	27,000	39,000	2,400,000	0.173	.20
August	25,000	13,400	19,200	1,180,000	0.085	.10
September	14,500	9,600	11,700	696,000	0.052	.06
October	15,900	8,600	11,700	719,000	0.052	.06
November	12,500	8,450	9,710	578,000	0.043	.05
December	60,000	6,800	18,300	1,130,000	0.081	.09
The year	99,200	4,260	26,900	19,490 000	0.119	1.62

NOTE.—These values are good.

MISCELLANEOUS MEASUREMENTS IN COLORADO RIVER DRAINAGE BASIN.

The following miscellaneous measurements were made in Colorado River drainage basin below Hardyville in 1906:

Colorado River below heading No. 3 of Imperial canal.—Measurements at this point show the discharge in the old channel of Colorado River below the intake of the Imperial canal, where most of the flow was diverted into Salton Sea.

There was practically no discharge in the old channel from early in July until the closure of the break, in November, 1906. The conditions at this point are described in Water-Supply Paper No. 177, page 17.

Discharge measurements of Colorado River below heading No. 3 of Imperial canal in 1906.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
April 10	W. D. Smith	4.90	1,760	June 7	W. D. Smith	7.00	3,210
April 24	do	4.60	974	June 19	do	6.30	398
May 1	do	5.60	2,040	June 27	Smith and Buttemer.	7.10	[a] 1,220
May 14	do	5.10	1,040	July 4	F. R. S. Buttemer	4.50	34
May 22	do	6.70	3,840	July 11	do	3.80	0
May 29	do	6.80	3,440				

[a] Second channel estimated.

Farmer's canal near Yuma, Ariz.—This canal diverts water from Colorado River about 1 mile below Yuma. Measurements were made at the heading. The canal was dry after July 4.

June 7: Area, 82 square feet; discharge, 58 second-feet.

June 19: Area, 78 square feet; discharge, 48 second-feet.

Ludy canal near Yuma, Ariz.—This canal diverts water from Colorado River about 3 miles below Yuma. Measurements were made at the heading. The canal was dry after July 4.

June 7: Area, 109 square feet; discharge, 76 second-feet.

June 19: Area, 116 square feet; discharge, 93 second-feet.

SALTON SEA NEAR SALTON, CAL.

What is now generally known as Salton Sea was until recently
old dry lake or playa, marked on maps as Salton Sink. There is sor
uncertainty as to the elevation of the lowest point of this sink, a
it is now believed that the depth below sea level has been overes
mated in the past. From the record of the depth of the water as
filled the lowest portion of the basin, as kept by the New Liverpo
Salt Company, it appears that the maximum depth of water w
17 feet on October 4, 1905 (according to the gage and as check
by soundings later), when on the same date the water surface ju
covered the United States Geological Survey bench mark a few fe
from the old Salton railway station. As this bench mark is 256
feet below mean sea level, it would appear that the lowest point of t
sink is 273.5 feet below mean sea level instead of 287 feet, which h
been accepted heretofore.

Salton Sink originally formed a part of the Colorado Desert, whi
has an area of nearly 2,000 square miles and extends in a northwes
erly direction almost 100 miles from the California-Mexico bounda
line. It comprises two fertile valleys, that to the northwest of t
sink, in Riverside County, being known as the Coahuila Valley, a
the one to the southeast of the sink, in San Diego County, being cal
the Imperial Valley. Salton Sea, which now partly fills the sin
separates the two valleys and is partly in Riverside County and part
in San Diego County. The longest diameter of the sea has a nort
west-southeast direction. On December 31, 1906, its surface w
201 feet below mean sea level and it had a length of nearly 50 mil
a maximum width of about 16 miles, a minimum width of 10 miles,
maximum depth of 72.5 feet, and a superficial area of about 4
square miles. It is about 160 miles southeast of Los Angeles,
miles northwest of Yuma, and 50 miles north of Calexico.

A few thousand years ago, according to geologic evidence, what
now Salton Sea was a part of the Gulf of California, which th
extended about 200 miles further northwest than at present, reac
ing possibly to the base of San Jacinto and San Gorgonio mountair
and certainly some distance beyond the present town of Indio. Col
rado River then emptied into the Gulf about 125 miles below its he
in the vicinity of Yuma, 75 miles above the present mouth. Th
river, then as now, was heavily laden with silt, at present estimat
to amount to about 53 mile-feet annually, or sufficient to cover
square miles 1 foot deep each year. The checking of the veloci
near the river's mouth owing to the practically still water of t
Gulf, resulted in a deposition of this vast volume of silt, and in t
course of hundreds of years built up a broad delta that extend
westward as a wide bar or dam until it eventually reached the Coco
Mountains in Mexico, the western wall of the valley, forming

inland salt, or brackish, sea. During the next few hundred years the Colorado delivered all, or a part, of its silt-laden waters into this newly formed sea, raising the level of its waters coincidently with elevating, broadening, and strengthening by the silt-depositing process the barrier dam which effected its complete and permanent isolation. In the course of many years the dam and the level of the inland sea reached a height of about 30 feet above mean sea level, whereupon the river took a course of less resistance and found an outlet to the Gulf below the recently completed dam.

Whether the river maintained its outlet to the Gulf continuously until the inland sea was completely dissipated through the medium of evaporation is not known. The probability is that the river followed the course of all rivers with growing deltas, and changed its channel from time to time with more or less caprice, alternately discharging into the Gulf and the inland sea. At any rate it is definitely known from the shells found on the desert that the water which ultimately filled the inland sea was fresh, while the originally isolated Gulf water was salt. The conversion from salt to fresh water may have come about through the alternate partial evaporation of the salt water and the refilling with fresh water from the river, or it may have been effected gradually by means of dilution and substitution from a continuous fresh-water inflow covering a long period of time.

As to the date when this inland sea finally disappeared there is no definite information. The Indians now living in the desert are said to have a tradition that the sea was full as late as 400 or 500 years ago at most, and that the water disappeared "poco a' poco"—little by little—until the sea became dry. The geologic evidence at hand neither confirms nor disproves the Indian legend, but simply indicates that the dissipation of the sea occurred at a time which, if not historic, is at least one of the most recent of geologic dates. With climatic conditions as they are at present the sea when full would probably have evaporated in 50 years if not checked by inflow. It is highly probable that the sink has been partly refilled many times in the recent past, the water soon evaporating. During the summer of 1891 the high water in the Colorado overflowed into the sink to such an extent as to endanger the Southern Pacific's railway at its lowest point. In the summer of 1905, after a succession of winter and spring floods in Gila River, followed by an exceptionally heavy summer flow in the Colorado, there was a repetition of flood conditions in the sink on a much larger scale.

The gravity of the situation on this latter date, however, was greatly augmented by the interference of man. For several years preceding a small quantity of water had been diverted from the Colorado below Yuma, Ariz., to be used by the settlers of the Imperial Valley for irrigation and domestic purposes. The first water

was diverted in the United States and conveyed to the Imper Valley, after passing through Mexican territory, by means of an o river channel which had been one of the Colorado's distributari during the formation of its delta, and is now known as Alamo Riv The increased demand for water and the silting up of the origir canal heading above the boundary line necessitated the cutting an additional channel from the river below the boundary to conne with the canal. It likewise silted up, so that in order to supply t urgent need for water a canal was cut 4 miles below the origir heading to connect Colorado and Alamo rivers. This canal was n provided with protective headworks and had a gradient much great than that of the river, so that with the unusual and prolonged su mer flood in 1905, it began cutting, until in July it was carrying per cent of the total flow of the river. This large quantity of wat flooded several hundred square miles about Calexico in the southe part of the Imperial Valley, and caused serious loss both in t United States and in Mexico. These waters ultimately reached t Salton Sea but in doing so they deepened and widened Alamo Riv into a great gorge and developed another drainage channel to t west through Imperial Valley in a second gorge now called N River. Notwithstanding all attempts to control it the Colorado co tinued to pour its waters through Alamo and New rivers into Salt Sea until the early fall of 1906 when it was finally shut off by t Southern Pacific Company. It broke again, however, on Decemb 7, but was closed about two months later.

The rise of Salton Sea began in November, 1904, and continu throughout 1905 and 1906. In the summer of 1905 it endanger the Southern Pacific tracks to such an extent as to require freque shifting to higher ground by means of "shoo-fly" or spur trac which served temporarily until the latter part of the year when high line about 40 miles in length was completed on the 200-fo contour below sea level. This line is still in use, though during t latter part of 1906 the lowest portion of it was seriously damaged the action of waves. For use in the future, if required, another li has been located and graded on the 150-foot contour below sea lev In addition to the damage done to the railroad the sea has co pletely submerged the plant of the New Liverpool Salt Compar below Mecca, and also a few ranches in the vicinity of Mecca.

The gage record from November, 1904, to February 26, 1906, w kept by the New Liverpool Salt Company. Their datum is t lowest portion of the sink, or at least that portion which first fill with water, so that the gage record shows the actual depth of t water from time to time. On February 23, 1906, the government p in a gage on the same datum about one-half mile west of Salt railway station, which is 3 miles southeast of the old Salton stati This gage consisted of a series of 5 posts, 6 inches by 6 inches by

feet, set in the ground about 3 feet deep, and so placed that when the water covered one it would just reach the next one farther back. It was not a great while, however, until the waves completely destroyed this gage. In the meantime the Southern Pacific Company had graduated a bent on the trestle bridge across Salt Creek, about $2\frac{1}{2}$ miles east of Salton, using the company's datum, and arrangements were made to have the Southern Pacific agent at Salton furnish the record from this gage, corrections being made to reduce to the original datum. The zero of the gage is 273.5 feet below mean sea level as determined from United States Geological Survey bench marks, or at an elevation of −280.3 according to the Southern Pacific Company.

Daily gage height, in feet, of Salton Sea near Salton, Cal., for 1904–1906.

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1904.			1904.			1904.		
1	0.0	0.6	13	0.0	0.7	25	0.4	0.6
2	.0	.6	14	.0	.7	26	.4	.1
3	.0	.6	15	.2	.7	27	.5	.0
4	.0	.6	16	.2	.7	28	.5	.8
5	.0	.2	17	.3	.7	29	.6	.8
6	.0	.0	18	.3	.7	30	.6	.8
7	.0	.3	19	.3	.7	31	.....	.8
8	.0	.7	20	.4	.7			
9	.0	.7	21	.5	.7	Total monthly rise	.6	.2
10	.0	.7	22	.5	.7			
11	.0	.7	23	.4	.7			
12	.0	.7	24	.4	.6			

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1905.												
1	0.8	2.2	3.8	4.8	5.7	7.0	9.1	13.5	15.7	16.8	18.3	19.8
2	.7	2.2	3.9	4.8	5.8	7.1	9.2	13.8	15.7	16.9	18.3	19.8
3	.6	2.3	4.0	4.8	5.9	7.0	9.4	13.8	15.7	16.9	18.4	19.9
4	.6	2.4	4.2	4.9	6.0	7.1	9.6	13.8	15.7	17.0	18.5	19.9
5	.6	2.4	4.4	5.0	5.8	7.2	9.7	13.8	15.7	17.0	18.5	20.0
6	.7	2.4	4.4	5.2	5.8	7.3	9.8	13.8	15.8	17.1	18.6	20.1
7	.7	2.5	4.4	5.3	6.2	7.6	10.1	14.0	15.8	17.1	18.7	20.2
8	.8	2.6	4.4	5.2	6.1	7.2	10.2	14.1	15.8	17.1	18.8	20.3
9	.8	2.7	4.4	5.4	6.0	7.3	10.3	14.2	15.8	17.1	18.8	20.5
10	.9	2.8	4.3	5.2	5.8	7.6	10.3	14.2	15.9	17.2	18.8	20.7
11	1.0	2.8	4.3	5.2	6.2	7.5	10.7	14.2	15.9	17.2	18.8	20.8
12	1.0	2.8	4.3	5.3	6.2	7.7	10.8	14.4	16.0	17.2	18.9	21.0
13	1.1	2.9	4.3	5.4	6.2	7.7	10.9	14.3	16.0	17.2	19.0	21.2
14	1.1	3.0	4.2	5.5	6.3	7.7	10.9	14.4	16.1	11.2	19.0	21.3
15	1.1	3.2	4.2	5.4	6.3	7.8	11.1	14.5	16.1	17.3	19.1	21.5
16	1.7	3.2	4.2	5.5	6.4	7.8	11.2	14.6	16.2	17.3	19.2	21.7
17	1.8	3.2	4.6	5.3	6.4	7.8	11.4	14.7	16.2	17.4	19.2	21.8
18	1.8	3.2	4.6	5.5	6.4	7.8	11.7	14.8	16.2	17.5	19.2	21.9
19	1.8	3.3	4.6	5.2	6.5	8.0	11.9	14.8	16.2	18.0	19.2	22.0
20	1.8	3.3	4.5	5.5	6.6	8.0	11.9	14.9	16.2	17.7	19.3	22.1
21	1.8	3.4	4.5	5.4	6.5	8.2	12.1	15.0	16.3	17.8	19.3	22.2
22	1.8	3.4	4.5	5.7	6.7	8.2	12.2	15.0	16.4	17.8	19.4	22.2
23	1.8	3.4	4.6	5.7	6.5	8.3	12.4	15.1	16.4	17.9	19.4	22.3
24	1.9	3.4	4.6	5.7	6.8	8.4	12.5	15.2	16.5	17 9	19.5	22.3
25	2.0	3.5	4.6	5.5	6.6	8.5	12.7	15.2	16.5	18.0	19.5	22.4
26	2.0	3.6	4.6	5.6	6.6	8.5	12.8	15.3	16.6	18.0	19.6	22.4
27	2.0	3.7	4.6	5.7	6.6	8.7	13.0	15.4	16.7	18.1	19.7	22.5
28	2.0	3.8	4.7	5.8	6.8	8.8	13.1	15.5	16.8	18.2	19.7	22.6
29	2.1	.....	4.6	5.8	6.8	8.8	13.2	15.5	16.8	18.2	19.8	22.6
30	2.1	.....	4.6	5.8	7.0	9.0	13.2	15.6	16.8	18.2	19.8	22.7
31	2.2	.....	4.6	.....	6.8	.....	13.4	15.6	.....	18.2	.....	22.7
Total monthly rise	1.4	1.6	.8	1.2	1.0	2.2	4.4	2.2	1.2	1.4	1.6	2.9

Daily gage height, in feet, of Salton sea near Salton, Cal., for 1904–1906—Continu

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1906.											
1	22.8	23.9	.....	28.3	34.1	42.7	59.1	66.7	69.5	70.3	71.5
2	22.8	24.0	25.6	.....	.....	43.3	59.4	66.9	69.5	70.3	71.5
3	22.8	24.0	.....	28.7	34.4	43.8	60.1	67.0	69.6	70.3	71.5
4	22.8	24.2	.....	.....	34.5	44.4	60.3	67.0	69.6	70.4	71.5
5	22.9	24.2	25.8	29.1	.....	44.7	60.5	67.1	69.7	70.4	71.6
6	22.9	24.3	.....	.....	.....	.....	61.0	67.2	69.8	70.4	71.6
7	23.0	24.4	25.9	29.5	.....	.....	61.4	67.3	69.9	70.4	71.6
8	23.0	24.4	26.0	29.7	.....	.....	61.7	67.4	69.9	70.6	71.6
9	23.1	24.5	.....	.....	.....	.....	62.1	67.5	69.9	70.6	71.6
10	23.1	24.5	26.0	30.2	.....	47.9	62.3	67.6	69.9	70.8	71.6
11	23.2	24.7	.....	.....	.....	48.4	62.6	67.7	69.9	70.9	71.6
12	23.2	24.8	26.0	30.5	36.4	48.6	62.8	67.8	70.0	71.1	71.6
13	23.2	24.8	26.2	30.9	.....	49.5	63.3	67.9	70.0	71.3	71.6
14	23.2	24.9	.....	31.1	36.9	50.0	63.3	68.1	70.0	71.3	71.6
15	23.3	25.0	.....	31.3	37.2	.....	63.5	68.2	70.1	71.3	71.6
16	23.3	25.0	.....	.....	.....	51.3	63.8	68.3	70.1	71.3	71.5
17	23.3	25.1	26.3	31.7	37.5	.....	64.1	68.4	70.1	71.3	71.5
18	23.3	25.1	26.4	.....	37.8	52.3	64.3	68.5	70.1	71.3	71.5
19	23.4	25.2	26.4	32.0	38.0	.....	64.4	68.6	70.1	71.3	71.5
20	23.4	25.2	.....	32.2	38.4	52.8	64.6	68.7	70.1	71.3	71.5
21	23.4	25.2	26.5	32.3	.....	.....	64.8	68.8	70.1	71.4	71.5
22	23.5	25.3	.....	.....	38.9	.....	65.0	68.9	70.1	71.4	71.5
23	23.6	25.4	26.8	.....	.....	.....	65.3	69.0	70.1	71.4	71.5
24	23.5	25.5	27.0	.....	39.5	.....	65.3	69.0	70.1	71.4	71.5
25	23.6	25.6	27.1	33.0	39.8	55.3	65.5	69.1	70.1	71.4	71.4
26	23.6	25.7	.....	.....	40.0	55.7	65.7	69.2	70.2	71.4	71.4
27	23.6	.....	27.6	33.3	40.7	56.2	65.9	69.3	70.2	71.4	71.4
28	23.7	.....	27.7	.....	41.3	56.7	66.1	69.4	70.2	71.5	71.4
29	23.7	.....	.....	33.6	41.5	57.3	66.2	69.4	70.2	71.5	71.3
30	23.8	.....	28.2	.....	41.8	57.9	66.3	69.4	70.3	71.5	71.3
31	23.8	.....	.....	.....	42.5	.....	66.5	69.4	.....	71.5	.....
Total monthly rise	1.1	1.8	2.7	5.6	8.7	15.4	8.6	2.9	.9	1.2	—.2

THE GREAT BASIN DRAINAGE.

GENERAL FEATURES.

The Great Basin drainage in California is comprised within subdrainages Sierra Nevada and Minor Great Basin. Within Sierra Nevada drainage is a limited area of arid country lying on eastern slope of the Sierra Nevada. This area includes the Su and Owens River drainage basins. Within the Minor Great Ba drainage lies the Mohave River drainage basin. Having no ou to the sea, the entire drainage of these basins is lost mainly thro evaporation from the lakes and sinks in which the waters of th rivers collect.

OWENS RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Owens River has its source in the Sierra Nevada in eastern C fornia and flows southeast parallel with this range, finally discha ing its waters into Owens Lake. This basin has a length from no to south of approximately 150 miles with a width of from 20 to miles. It lies between the Sierra Nevada on the west and the W

Mountains on the east. Practically the entire flow of this river is derived from the Sierra Nevada, as it drains the entire eastern slope of this range from Mount Lyell on the north to a point some distance below Mount Whitney on the south. The White Mountains furnish no water for this stream except in times of exceptionally heavy rain storms, which seldom occur on this range. There are numerous tributaries entering Owens River from the west which have their source in the high elevations of the Sierra Nevada, extending from the northern to the southern limits of this basin. The topography of the portion of the Sierra Nevada drained by this stream is extremely rough and precipitous, the mountains rising abruptly from Owens Valley to elevations of 13,000 to 14,000 feet. The formation is of granite, with very little soil covering and sparse timber growth. Numerous lakes and marshes are found in the upper reaches of this portion of the drainage basin.

Owens River, a short distance below its source, enters a flat, swampy country known as Long Valley, where a considerable quantity of its flow is used for the irrigation of meadow lands for stock raising. This water returns to the river channel at the lower end of this valley, at which point the stream enters a deep, narrow gorge with heavy grade. As the river breaks from this canyon it enters Owens Valley, through which it flows for a distance of about 80 miles, finally discharging into Owens Lake. The gaging station at Round Valley is located at the lower end of this canyon. Below this point numerous diversions are made for the irrigation of land in Owens Valley, where the soil is extensively cultivated and large areas are used for the raising of hay and grain. This country is particularly adapted to stock raising, which is carried on extensively throughout the valley. Numerous opportunities for the construction of storage reservoirs occur, both on the main stream and also on the upper reaches of its tributaries, although none have been taken advantage of as yet. The precipitation is extremely light except on the high elevations of the Sierra Nevada, where there is a heavy fall of snow. The melting of this in the spring and summer months feeds the numerous tributaries of this river, insuring a continued flow throughout the year.

OWENS RIVER NEAR ROUND VALLEY, CAL.

This station was established August 3, 1903, by J. C. Clausen. It is located at the footbridge, 700 feet above the junction of Owens River and Rock Creek. The conditions at this station and the bench marks[a] are described in Water-Supply Paper No. 177, page 50, where are given also references to publications that contain data for previous years.

[a] The elevation of the bench mark is 8.05 feet above the datum of the gage.

Discharge measurements of Owens River near Round Valley, Cal., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	D cha
		Feet.	*Sq. ft.*	*Feet.*	*Se*
January 8	F. R. S. Buttemer	34	73	1.75	
January 14	do	34	77	1.92	
January 14	do	34	79	1.93	
August 23	Hawley and Shuey	34	111	2.85	
November 3	G. R. Shuey	34	85	2.14	
November 30	do	34	79	2.00	

Daily gage height, in feet, of Owens River near Round Valley, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	1.8	1.85	1.95	2.45	2.25	2.4	3.5	3.5	2.6	2.3	2.15
2	1.8	1.9	1.95	2.4	2.3	2.45	3.55	3.5	2.6	2.3	2.15
3	1.8	1.9	1.95	2.4	2.35	2.4	3.5	3.45	2.6	2.3	2.15
4	1.8	1.9	1.95	2.4	2.3	2.45	3.45	3.45	2.6	2.35	2.15
5	1.8	1.9	1.95	2.25	2.3	2.5	(a)	3.4	2.6	2.35	2.15
6	1.8	1.9	1.95	2.1	2.25	2.6	.....	3.3	2.55	2.35	2.15
7	1.75	1.9	2.0	2.15	2.2	2.7	.....	3.3	2.5	2.3	2.15
8	1.75	1.9	2.0	2.3	2.25	2.9	.....	3.3	2.5	2.3	2.1
9	1.75	1.95	2.0	2.5	2.2	3.9	.....	3.25	2.45	2.3	2.1
10	1.75	1.95	2.0	2.6	2.25	3.95	.....	3.25	2.45	2.3	2.1
11	1.8	1.95	2.1	2.7	2.35	3.0	.....	3.2	2.45	2.25	2.1
12	1.8	1.95	2.3	2.7	2.5	3.25	.....	3.1	2.45	2.2	2.1
13	1.9	1.95	2.25	2.75	2.45	3.3	.....	3.1	2.45	2.2	2.1
14	1.9	1.95	2.2	2.7	2.4	3.4	.....	3.1	2.4	2.2	2.1
15	1.9	1.95	2.2	2.65	2.4	3.4	.....	3.05	2.4	2.2	2.05
16	1.9	1.95	2.25	2.7	2.4	3.45	.....	3.0	2.4	2.2	2.05
17	1.95	1.95	2.25	2.7	2.4	3.45	.....	2.95	2.4	2.2	2.0
18	2.15	1.95	2.25	2.7	2.45	3.5	.....	2.95	2.4	2.2	2.0
19	2.1	1.95	2.3	2.7	2.6	3.55	.....	3.1	2.35	2.2	2.0
20	2.0	1.95	2.3	2.7	2.65	3.6	.....	3.2	2.35	2.15	2.0
21	2.0	2.0	2.35	2.6	2.6	3.7	.....	3.2	2.3	2.15	2.0
22	2.1	2.0	2.35	2.6	2.55	3.75	.....	3.1	2.3	2.15	2.0
23	2.1	2.0	2.35	2.5	2.5	3.85	.....	2.85	2.25	2.1	2.0
24	2.1	2.0	2.4	2.35	2.5	3.9	.....	2.85	2.25	2.1	2.0
25	2.1	2.0	2.35	2.25	2.5	3.9	.....	2.85	2.25	2.1	2.05
26	2.05	2.0	2.4	2.2	2.5	3.9	.....	2.7	2.3	2.1	2.1
27	2.0	1.95	2.35	2.15	2.5	3.7	.....	2.6	2.3	2.1	2.1
28	2.0	1.95	2.3	2.15	2.45	3.65	.....	2.6	2.3	2.1	2.1
29	1.95	.....	2.3	2.2	2.4	3.5	3.65	2.6	2.3	2.1	2.1
30	1.9	.....	2.35	2.2	2.45	3.6	3.6	2.6	2.3	2.15	2.1
31	1.9	.....	2.5	.....	2.4	.....	3.6	2.6	.....	2.15	.....

(a) Station discontinued; operations resumed July 29.

Rating table for Owens River near Round Valley, Cal., 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.*
1.60	132	2.10	244	2.60	385	3.10	545	3.60	715
1.70	152	2.20	270	2.70	416	3.20	578	3.70	750
1.80	172	2.30	297	2.80	448	3.30	612	3.80	785
1.90	194	2.40	326	2.90	480	3.40	646	3.90	821
2.00	218	2.50	355	3.00	512	3.50	680		

NOTE.—This table is based on discharge measurements made during 1903–6 and is well defined be gage heights 1.7 feet and 2.8 feet.

Monthly discharge of Owens River near Round Valley, Cal., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
January	257	162	199	12,200
February	218	183	205	11,400
March	355	206	270	16,600
April	432	244	345	20,500
May	400	270	328	20,200
June	839	326	624	37,100
July[a]	732	663	696	42,800
August	680	385	535	32,900
September	385	284	330	19,600
October	312	244	273	16,800
November	257	218	239	14,200
December	270	218	256	15,700
The year	839	162	358	260,000

[a] Discharge interpolated July 5 to 28.

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

OWENS RIVER NEAR TINEMAHA, CAL.

This station was established September 20, 1906, but measurements were made prior to this date by the city of Los Angeles, Cal. It is located about 7 miles south of Tinemaha at a basaltic knoll in the floor of the valley known as "Charlies Butte." It was described in Water-Supply Paper No. 177 as near Independence.

The channel is straight for 300 feet above and 200 feet below the station. The right bank is high and rocky with a growth of willows along the bank; the left is low and liable to overflow at high stages of the river. The channel has a carrying capacity of about 1,800 second-feet before it overflows. The bed of the stream is composed of sand and gravel and is subject to some change between high and low stages of the river.

Discharge measurements are made from a cable and car. The initial point for soundings is a spike in post on right bank.

The gage, which is read by Ray Bowers, is a vertical rod fastened to a post on left bank of the stream. The bench mark is a nail in the south side of the post that supports the cable on the left bank; elevation, 8.36 feet above the zero of the gage.

During high water this station is inaccessible, and measurements are made at the county bridge near Citrus, about 12 miles below. The conditions at this station are described in Water-Supply Paper No. 177, p. 74, where are given, also, references to publications that contain data for previous years.

Discharge measurements of Owens River near Tinemaha, Cal., by G. R. Shuey, in 19

Date.	Gage height.	Discharge.	Date.	Gage height.	Di cha
	Feet.	*Sec.-ft.*		*Feet.*	*Sec*
January 3	1.60	284	April 12	2.72	
January 10	1.80	319	April 25		
January 18	2.65	467	May 3	1.10	
January 24		555	May 8	.90	
February 6	2.11	377	May 24	1.16	
February 14	2.04	347	June 5	1.30	
February 21	1.93	350	June 18	3.93	
February 26	1.80	314	October 8	1.40	
March 8	1.70	277	October 18	1.57	
March 20	2.92	523	November 1	1.80	
March 27	2.67	478	December 8	2.62	
April 6	2.37	462	December 17	2.60	

Daily gage height, in feet, of Owens River near Tinemaha, Cal., for 1906.

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	D
1		1.45	1.80	2.15	17		1.55	2.05	
2		1.52	1.85	2.20	18		1.57	2.05	
3		1.45	1.90	2.30	19		1.58	2.05	
4		1.40	1.90	2.45	20	1.85	1.60	2.00	
5		1.40	1.95	2.60	21	1.82	1.55	2.00	
6		1.38	2.00	2.70	22	1.80	1.57	2.00	
7		1.40	2.00	2.65	23	1.75	1.60	2.00	
8		1.40	2.05	2.60	24	1.72	1.70	2.00	
9		1.38	2.05	2.55	25	1.60	1.82	2.10	
10		1.36	2.05	2.50	26	1.50	1.85	2.05	
11		1.35	2.00	2.45	27	1.45	1.87	2.10	
12		1.35	2.00	2.50	28	1.40	1.85	2.20	
13		1.30	2.00	2.70	29	1.35	1.90	2.30	
14		1.35	2.00	2.80	30	1.38	1.80	2.20	
15		1.38	2.05	2.70	31		1.80		
16		1.45	2.10	2.70					

Rating table for Owens River near Tinemaha, Cal., from October 19, 1906, to Decem 31, 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	278	1.50	342	1.90	402	2.30	470	2.70	542
1.10	290	1.60	357	2.00	418	2.40	488	2.80	560
1.20	302	1.70	372	2.10	434	2.50	506	2.90	580
1.30	314	1.80	387	2.20	452	2.60	524	3.00	600
1.40	327								

NOTE.—This table is based on 5 discharge measurements made during 1906 and is fairly well defin

Discharge measurements of Owens River near Citrus, Cal., by Buttemer and Shuey in 19

Date.	Discharge.	Date.	Dischar
	Sec.-ft.		*Sec.-f*
January 3	283	July 13	2
January 19	440	July 21	2
January 21	595	July 29	2
June 4	214	August 9	1
June 16	586	August 17	1
June 26	1,370	September 10	
July 1	1,520	October 7	
July 8	2,080		

Monthly discharge of Owens River near Tinemaha, Cal., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
January	635	270	436	26,800
February	443	308	358	19,900
March	680	277	438	26,900
April	530	213	388	23,100
May	285	162	200	12,300
June	1,540	224	729	43,400
July	2,610	1,520	2,230	137,000
August	2,220	730	1,210	74,400
September	700	352	448	26,700
October	401	270	339	20,800
November	470	387	423	25,200
December	560	443	510	31,400
The year	2,610	162	642	468,000

NOTE.—From January 1 to June 30 the daily discharge was interpolated between measurements at the regular station. During July, August, and September the regular station was inaccessible on account of floods and the daily discharge has been interpolated between measurements made at Citrus. The values for these months are probably too small, as the Eastside and Stevens canals divert water above. After September the discharge was obtained from the rating table. Values for the year are approximate.

ROCK CREEK NEAR ROUND VALLEY, CAL.

This station was established August 3, 1903, by J. C. Clausen. It is located at the wagon bridge on the road from Long Valley to Bishop, 3,500 feet above the mouth of the creek. The conditions and the bench marks are described in Water Supply Paper No. 177, page 52, where are given also references to publications that contain data for previous years.

Discharge measurements of Rock Creek near Round Valley, Cal., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
January 8	F. R. S. Buttemer	13.5	17	1.58	23
January 14	do	14.6	21	1.93	41
August 27	R. S. Hawley	14	21	1.75	51
November 3	G. R. Shuey	13	16	1.55	37
November 30	do	13	19	1.70	47

Daily gage height, in feet, of Rock Creek near Round Valley, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.5	1.55	1.35	1.5	1.2	1.8	3.15	2.75	1.9	1.55	1.6	1.7
2	1.45	1.55	1.35	1.5	1.2	1.75	3.25	2.75	1.9	1.55	1.6	1.7
3	1.5	1.55	1.35	1.55	1.2	1.8	3.2	2.75	1.9	1.55	1.6	1.75
4	1.5	1.5	1.35	1.5	1.25	1.8	3.2	2.75	1.95	1.55	1.6	1.75
5	1.6	1.5	1.35	1.5	1.25	1.8	(a)	2.7	1.9	1.55	1.65	1.8
6	1.7	1.45	1.35	1.45	1.25	1.85	.....	2.7	1.9	1.55	1.65	1.8
7	1.65	1.4	1.3	1.5	1.3	1.9	.....	2.65	1.85	1.55	1.65	1.8
8	1.6	1.4	1.3	1.4	1.3	2.15	.....	2.6	1.8	1.55	1.65	1.8
9	1.6	1.45	1.3	1.3	1.3	2.35	.....	2.6	1.75	1.55	1.65	1.8
10	1.65	1.45	1.35	1.3	1.35	2.5	.....	2.65	1.75	1.55	1.65	1.75
11	1.75	1.45	1.4	1.4	1.45	2.8	.....	2.7	1.75	1.5	1.65	1.7
12	1.8	1.45	1.8	1.4	1.75	2.95	.....	2.65	1.75	1.5	1.65	1.65
13	1.9	1.45	2.0	1.45	1.8	3.2	.....	2.7	1.75	1.5	1.65	1.6
14	1.9	1.45	2.2	1.4	1.95	3.35	.....	2.7	1.7	1.55	1.65	1.55
15	2.0	1.4	2.4	1.3	1.95	3.4	.....	2.65	1.7	1.55	1.65	1.5

(a) Station discontinued; operations resumed July 29.

Daily gage height, in feet, of Rock Creek near Round Valley, Cal., for 1906—Continue

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov	De
16	2.1	1.4	2.3	1.3	1.9	3.4	.....	2.6	1.7	1.55	1.65	1
17	2.1	1.4	2.2	1.3	1.9	3.4	.....	2.55	1.7	1.55	1.65	1
18	2.1	1.4	2.2	1.25	2.2	3.45	.....	2.55	1.7	1.55	1.65	1
19	4.2	1.4	2.1	1.25	2.3	3.5	.....	2.6	1.65	1.55	1.65	1
20	1.4	1.4	2.1	1.2	2.4	3.5	.....	2.65	1.65	1.6	1.65	1
21	1.5	1.4	1.95	1.2	2.4	3.55	.....	2.6	1.6	1.6	1.6	1
22	1.6	1.4	1.8	1.2	2.3	3.6	.....	2.5	1.55	1.6	1.5	1
23	1.7	1.4	1.7	1.2	2.3	3.7	.....	2.45	1.5	1.55	1.45	1
24	1.7	1.4	1.6	1.2	2.25	3.7	.....	2.45	1.5	1.5	1.45	1
25	1.6	1.35	1.55	1.15	2.1	3.8	.....	2.45	1.5	1.5	1.5	1
26	1.55	1.35	1.6	1.15	2.15	3.8	.....	2.0	1.55	1.45	1.6	1
27	1.5	1.35	1.5	1.15	2.0	3.6	.....	2.0	1.55	1.45	1.7	1
28	1.5	1.35	1.4	1.15	1.85	3.55	.....	1.95	1.6	1.45	1.75	1
29	1.55	.....	1.4	1.2	1.8	3.4	2.85	1.9	1.6	1.45	1.8	1
30	1.55	.....	1.4	1.2	1.8	3.5	2.85	1.9	1.55	1.5	1.8	1
31	1.55	.....	1.5	.....	1.8	.....	2.8	1.9	.....	1.55	.....	1

Rating table for Rock Creek near Round Valley, Cal., from January 20, 1906, to Decem 31, 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	12	1.60	40	2.20	83	2.80	131	3.40	179
1.10	15	1.70	47	2.30	91	2.90	139	3.50	188
1.20	19	1.80	54	2.40	99	3.00	147	3.60	197
1.30	23	1.90	61	2.50	107	3.10	155	3.70	206
1.40	28	2.00	68	2.60	115	3.20	163	3.80	215
1.50	34	2.10	75	2.70	123	3.30	171		

NOTE.—This table is based on 3 discharge measurements made during 1906 and is not well defin The table used January 1 to 19 gives a much smaller discharge at the same gage height.

Monthly discharge of Rock Creek near Round Valley, Cal., for 1906.

Month.	Discharge in second-feet.			Total i acre-fee
	Maximum.	Minimum.	Mean.	
January	200	17	38.8	2,
February	37	25	29.7	1,
March	99	23	45.7	2,
April	37	17	24.6	1,
May	99	19	54.2	3,
June	215	50	145	8,
July	167	131	[a] 150	9,
August	127	61	107	6,
September	64	34	47.4	2,
October	40	31	35.9	2,
November	54	31	42.6	2,
December	54	34	43.5	2,
The year	215	17	63.7	46,

[a] Mean for seven days taken as mean for the month.

NOTE.—These values are fair.

PINE CREEK NEAR ROUND VALLEY, CAL.

This station was established August 3, 1903, by J. C. Clausen. is located 150 feet below the wagon bridge on the road from Bish to Long Valley and 100 feet above the mouth of the creek. The co ditions and the bench marks are described in Water-Supply Pap

No. 177, page 55, where are given also references to publications that contain data for previous years.

On June 15, 1906, the gage was washed out. On August 23 a new gage was placed at the wagon bridge on the Long Valley road about 150 feet above the old gage. It consists of a $\frac{1}{4}$ by $1\frac{1}{2}$ inch steel rod fastened to the downstream side of the bridge, near the right bank, and is graduated to 0.05 of a foot. No reference was made to any bench mark.

This section at the bridge is very rough and rocky, but not subject to much change. During very high stages gagings can be made from the bridge, while at ordinary stages a wading section below the bridge is more satisfactory.

Discharge measurements of Pine Creek near Round Valley, Cal., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
January 8	F. R. S. Buttemer	19	18	1.80	7.0
January 14	do	20	25	2.13	22
August 23	Shuey and Hawley	12	33	3.85	90
August 27	R. S. Hawley	24	26	3.75	92
November 3	G. R. Shuey	12	22	2.95	9.0
November 30	do	12	21	3.00	9.2

Daily gage height, in feet, of Pine Creek River near Round Valley, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.8	1.85	1.8	1.85	1.8	2.05	.....	3.65	3.25	3.0	3.0
2	1.8	1.85	1.8	1.8	1.8	2.0	.....	3.65	3.25	3.0	3.0
3	1.8	1.85	1.8	1.8	1.8	2.0	.....	3.6	3.25	3.0	3.0
4	1.8	1.85	1.8	1.8	1.85	2.0	.....	3.6	3.25	3.0	3.0
5	1.8	1.8	1.8	1.8	1.85	2.2	.....	3.6	3.25	3.0	3.0
6	1.8	1.8	1.8	1.9	1.8	2.4	.....	3.6	3.2	3.0	3.0
7	1.8	1.8	1.75	1.9	1.8	2.55	.....	3.6	3.2	3.0	3.0
8	1.8	1.8	1.75	1.8	1.8	2.6	.....	3.6	3.15	2.9	3.0
9	1.8	1.8	1.75	1.85	1.8	2.75	.....	3.6	3.15	2.9	3.0
10	1.85	1.8	1.75	1.8	1.8	2.9	.....	3.6	3.15	2.9	3.0
11	1.9	1.8	1.8	1.8	1.85	3.2	.....	3.55	3.1	2.9	2.95
12	1.9	1.85	2.0	1.85	1.85	3.25	.....	3.55	3.05	2.9	2.95
13	2.0	1.85	2.1	1.8	1.85	3.15	.....	3.5	3.05	2.9	2.9
14	2.25	1.85	2.2	1.8	1.85	3.5	.....	3.45	3.05	2.9	2.9
15	2.25	1.85	2.3	1.85	1.85	.....	.....	3.4	3.05	2.9	2.9
16	2.25	1.85	2.2	1.85	1.85	.....	.....	3.4	3.05	2.9	2.9
17	2.15	1.8	2.1	1.8	1.9	.....	.....	3.35	3.0	2.9	2.9
18	2.1	1.8	2.1	1.8	1.95	.....	.....	3.35	3.0	2.9	2.9
19	2.0	1.8	2.1	1.8	2.2	.....	.....	3.35	3.0	2.9	2.9
20	1.95	1.8	2.1	1.8	2.1	.....	.....	3.35	3.0	2.9	2.95
21	1.95	1.8	2.0	1.8	1.85	.....	.....	3.3	3.0	2.9	2.95
22	1.95	1.8	1.95	1.8	1.85	.....	.....	3.25	3.0	2.95	2.95
23	1.9	1.8	1.95	1.8	2.15	.....	3.85	3.25	3.0	3.0	2.95
24	1.9	1.8	1.9	1.8	2.3	.....	3.85	3.25	3.0	3.0	2.95
25	1.9	1.8	2.0	1.8	2.3	.....	3.8	3.25	3.0	3.0	2.95
26	1.85	1.8	1.95	1.8	2.3	.....	3.8	3.25	3.0	3.0	2.95
27	1.85	1.8	1.9	1.8	2.2	.....	3.8	3.25	3.0	3.0	2.95
28	1.85	1.8	1.85	1.8	2.2	.....	3.8	3.25	3.0	3.0	2.95
29	1.85	.....	1.8	1.8	2.15	.....	3.8	3.25	3.0	3.0	2.95
30	1.85	.....	1.8	1.85	2.15	.....	3.75	3.25	3.0	3.0	2.95
31	1.85	.....	1.9	.....	2.1	.....	3.7	.....	3.0	.....	2.95

Rating tables for Pine Creek near Round Valley, Cal.

JANUARY 1 TO JUNE 14, 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	4	2.10	23	2.50	45	2.90	75	3.30	119
1.80	8	2.20	28	2.60	52	3.00	85	5.40	133
1.90	13	2.30	33	2.70	59	3.10	95	3.50	149
2.00	18	2.40	39	2.80	67	3.20	106		

AUGUST 23 TO DECEMBER 31, 1906.[b]

2.90	5	3.20	24	3.40	42	3.60	64	3.80	89
3.00	10	3.30	33	3.50	53	3.70	76	3.90	103
3.10	16								

[a] This table is based on discharge measurements made during 1903–1906 and is well defined be gage height 3 feet.
[b] This table is based on 4 discharge measurements made during 1906 and is not well defined.

Monthly discharge of Pine Creek near Round Valley, Cal., for 1906.

Month.	Discharge in second-feet.			Total acre-f
	Maximum.	Minimum.	Mean.	
January	30	8	13.7	
February	10	8	8.6	
March	33	6	14.5	
April	13	8	8.7	
May	33	8	16.0	
June			130	
July			160	
August			105	
September	70	28	46.2	
October	28	10	15.5	
November	10	5	7.6	
December	10	5	7.5	
The year		5	44.4	3

NOTE.—Monthly means for June, July, and August estimated, and are only approximate; value remainder of 1906 fair.

BISHOP CREEK NEAR BISHOP, CAL.

This station was established August 10, 1903, at the wagon brid on the Bishop road, about 4¼ miles from Bishop and about 2 m from the point where the creek leaves the canyon. The conditi and the bench marks are described in Water-Supply Paper No. 1 page 62, where are given also references to publications that cont data for previous years.

Discharge measurements of Bishop Creek near Bishop, Cal., for 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Di cha
		Feet.	*Sq. ft.*	*Feet.*	*Sec*
January 1[a]	F. R. S. Buttemer	16	28	1.95	
January 16	do	16	24	1.76	
January 24	do	16	27	1.83	
August 24	Shuey and Hawley	16	41	3.10	
November 5	G. R. Shuey	16	24	1.71	
December 3	do	16	26	1.90	

[a] Channel obstructed by rocks at time of measurement.

Daily gage height, in feet, of Bishop Creek near Bishop, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.95	1.6	1.6	1.8	2.5	2.45	4.75	4.0	2.8	2.2	1.5	1.85
2	1.85	1.65	1.65	1.7	2.4	2.4	4.9	3.9	2.75	2.2	1.45	1.85
3	1.85	1.6	1.6	1.8	2.45	2.45	5.2	3.8	2.7	2.15	1.35	1.9
4	1.6	1.65	1.65	1.8	2.5	2.5	5.5	3.7	2.7	2.2	1.4	1.95
5	1.6	1.6	1.6	1.8	2.55	2.55	5.3	3.75	2.65	2.2	1.4	1.95
6	1.6	1.65	1.65	1.9	2.6	2.5	5.6	3.75	2.6	2.1	1.45	1.9
7	1.5	1.6	1.65	1.95	2.65	2.6	(a)	3.8	2.65	2.15	1.45	1.85
8	1.5	1.6	1.7	1.9	2.75	2.75	.....	3.7	2.65	2.2	1.4	1.9
9	1.5	1.6	1.7	1.9	2.9	2.9	.....	3.65	2.6	2.1	1.45	1.85
10	1.55	1.55	1.7	1.9	2.95	3.7	.....	3.75	2.65	2.0	1.4	1.9
11	1.65	1.6	1.7	1.75	2.85	3.9	.....	3.8	2.6	2.0	1.5	2.0
12	1.6	1.55	1.8	1.75	2.75	3.75	.....	3.7	2.6	1.95	1.65	1.95
13	1.5	1.6	1.5	1.7	2.9	3.65	.....	3.65	2.5	1.9	1.65	2.0
14	1.5	1.6	2.0	1.6	2.85	3.6	.....	3.65	2.5	1.9	1.7	2.0
15	1.75	1.6	2.0	1.7	2.8	3.7	5.45	3.7	2.4	1.8	1.7	1.95
16	1.8	1.6	2.2	1.8	2.8	3.85	5.4	3.7	2.45	1.75	1.65	2.0
17	1.9	1.6	2.2	1.8	2.85	3.8	5.5	3.75	2.4	1.75	1.65	1.95
18	2.0	1.6	2.2	1.85	2.9	3.9	5.4	3.7	2.4	1.7	1.65	2.0
19	2.1	1.6	2.1	1.85	2.95	3.9	5.3	3.7	2.35	1.7	1.7	1.9
20	2.1	1.6	2.1	1.9	3.0	4.2	5.1	3.65	2.4	1.75	1.65	1.95
21	2.3	1.65	2.0	1.95	2.95	4.5	5.0	3.6	2.3	1.75	1.65	1.9
22	2.15	1.7	2.0	2.0	2.8	4.7	5.0	3.7	2.25	1.75	1.6	1.95
23	2.0	1.6	2.0	2.0	2.85	4.75	5.3	3.65	2.2	1.75	1.6	1.9
24	1.9	1.65	1.9	1.9	2.75	4.8	5.0	3.65	2.3	1.8	1.65	1.9
25	1.85	1.85	1.9	2.0	2.8	4.9	5.4	3.6	2.2	1.75	1.65	1.9
26	1.8	1.6	1.95	1.95	2.75	4.95	5.1	3.55	2.2	1.7	1.7	1.95
27	1.7	1.65	1.9	2.55	2.7	4.5	5.1	3.4	2.2	1.7	1.85	2.0
28	1.75	1.65	1.9	2.55	2.65	4.35	5.3	3.35	2.25	1.65	1.8	2.0
29	1.65	.....	1.85	2.55	2.6	4.2	4.4	2.8	2.2	1.6	1.8	1.95
30	1.6	.....	1.9	2.5	2.5	4.4	4.4	2.85	2.2	1.55	1.8	1.95
31	1.65	.....	1.85	.....	2.6	.....	4.3	2.85	.....	1.55	.....	2.0

[a] Station discontinued; operation resumed July 15.

Rating table for Bishop Creek near Bishop, Cal., 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.*
1.40	7	2.20	84	3.00	220	3.80	393	4.60	582
1.50	10	2.30	98	3.10	240	3.90	416	4.70	606
1.60	14	2.40	114	3.20	261	4.00	439	4.80	630
1.70	24	2.50	130	3.30	282	4.10	462	4.90	654
1.80	35	2.60	147	3.40	303	4.20	486	5.00	678
1.90	46	2.70	164	3.50	325	4.30	510	5.20	726
2.00	58	2.80	182	3.60	347	4.40	534	5.40	774
2.10	70	2.90	201	3.70	370	4.50	558	5.60	822

NOTE.—This table is based on 6 discharge measurements made during 1906, and is not well defined.

Monthly discharge of Bishop Creek near Bishop, Cal., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
January	98	10	33.4	2,050
February	40	12	16.4	911
March	84	10	42.0	2,580
April	138	14	52.8	3,140
May	220	114	172	10,600
June	666	114	382	22,700
July	822	510	[a] 706	43,400
August	439	182	350	21,500
September	182	84	124	7,380
October	84	12	45.3	2,780
November	40	6	17.5	1,040
December	58	35	50.0	3,070
The year	822	6	166	121,000

[a] Mean of 23 days taken as the mean for the month.

NOTE.—These values are fair.

BIG PINE CREEK NEAR BIG PINE, CAL.

This station was established December 5, 1903, by R. S. Hawl It is located 3 miles southwest of Big Pine, Cal., at a point wh the creek leaves the foothills. The conditions and the bench ma are described in Water-Supply Paper No. 177, page 78, where given also references to publications that contain data for previ years. No gage-height record was kept during 1906.

Discharge measurements of Big Pine Creek near Big Pine, Cal., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Di cha
		Feet.	*Sq. ft.*	*Feet.*	*Sec.*
January 2	F. R. S. Buttemer	14	14	2.25	
January 17	do	14	14	2.32	
January 24	do	14	10	1.98	
August 24	Hawley and Shuey	14	26	(a)	
November 1	G. R. Shuey	8	12	(a)	
December 6	do	9	13	(a)	
December 16	do	8	13	(a)	

a Gage out.

BIRCH CREEK NEAR TINEMAHA, CAL.

This station, originally established June 14, 1905, was reest lished on December 7, 1906. It is located about 8 miles south Big Pine and 1 mile west of Fish Springs schoolhouse and ab 500 feet west of Peterson's ranch house. The conditions at t station are described in Water-Supply Paper No. 177, page 80. gage is a vertical staff nailed to a post, and is graduated to feet a tenths. The bench mark is two large spikes driven in the base a 4-inch birch tree about 50 feet northeast of the rod; elevati 0.52 feet above the zero of the gage.

Discharge measurements of Birch Creek near Tinemaha, Cal., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Di cha
		Feet.	*Sq. ft.*	*Feet.*	*Sec*
January 11	G. R. Shuey			0.52	
January 29	do				
March 8	do				
December 7	do	5	4.2	a.35	

a By new gage.

Daily gage height, in feet, of Birch Creek near Tinemaha, Cal., for 1906.

Day.	Dec.	Day.	Dec.	Day.	Dec.	Day.	D
7	0.35	14	0.4	21	0.3	28	
8	.35	15	.35	22	.3	29	
9	.3	16	.3	23	.3	30	
10	.4	17	.3	24	.3	31	
11	.4	18	.3	25	.35		
12	.4	19	.3	26	.45		
13	.4	20	.3	27	.4		

TINEMAHA CREEK NEAR TINEMAHA, CAL.

Tinemaha Creek is tributary to Owens River from the eastern slope of the Sierra Nevada.

The station was established December 7, 1906. It is located about 500 feet south of the Peterson ranch house, about 8 miles south of Big Pine, and about 1 mile west of Fish Springs schoolhouse.

The channel is straight for about 40 feet above and for 30 feet below the measuring section, and the velocity is moderate at ordinary stages. Both banks are steep, about 5 or 6 feet high, and covered with a scrubby growth. The bottom is composed of clean gravel and is not likely to shift. There is one channel at all stages, and at low water the width is about 10 feet and the depth 0.5 feet. The section is good and gagings are made by wading.

The gage is a vertical staff, graduated to feet and tenths, and nailed to a post.

The following measurement was made December 7, 1906:

Width, 7 feet; area, 4 square feet; gage height, 0.50 foot; discharge, 5.9 second-feet.

Daily gage height, in feet, of Tinemaha Creek near Tinemaha, Cal., for 1906.

Day.	Dec.	Day.	Dec.	Day.	Dec.	Day.	Dec.
7	0.5	14	0.5	21	0.4	28	0.5
8	.5	15	.5	22	.5	29	.5
9	.5	16	.45	23	.5	30	.5
10	.5	17	.45	24	.5	31	.5
11	.5	18	.4	25	.5		
12	.5	19	.4	26	.55		
13	.5	20	.4	27	.5		

TABOOSE CREEK NEAR TIBBETTS, CAL.

Taboose Creek is tributary to Owens River from the eastern slope of Sierra Nevada.

The station was not established regularly until August 20, 1906, though discharge measurements were made throughout the year. It is located about 15 miles north of Independence, 2 miles northwest of Tibbetts railway station, and about one-half mile west of the crossing on the lower main highway.

The channel is straight for about 50 feet above and 50 feet below the station, and the velocity is moderate. Both banks are rather steep and 3 to 4 feet high and are not likely to overflow. The bed and banks are sandy, with little vegetation, and the channel is subject to slight change. At low stages the stream is about 10 feet wide and 0.5 feet deep.

Discharge measurements are made from a board used as a footbridge.

The gage is a vertical staff, about 3.5 feet long, graduated to
and tenths, and nailed securely to a post driven in the bank.
bench mark is a spike driven in the base of a cottonwood tree 2
south of gage; elevation, 3.75 feet above the zero of the gage.

Discharge measurements of Taboose Creek near Tibbetts, Cal., by G. R. Shuey in 19

Date.	Width.	Area of section.	Gage height.	Discharge.	Date.	Width.	Area of section.	Gage height.	I ch
	Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*		*Feet.*	*Sq. ft.*	*Feet.*	*Se*
January 18				3.6	May 23	7.8	7.4		
February 21				2.7	June 1	7.8	5.9		
March 20				3.6	June 11	7.0	7.8		
March 27				3.5	July 2	8.0	10		
April 6				3.4	July 7	10	14		
April 12	7.0	3.2		4.2	July 14	10	15		
April 19				8.0	July 27	8.5	12		
April 24				8.4	August 2 [a]	6.0	6.9	2.35	
May 2	7.4	4.5		6.8	October 8 [a]	3.7	1.9	1.80	
May 8	8.0	7.1		12	December 8 [a]	4.0	1.8	1.65	
May 16	7.8	6.9		12					

[a] Measured at regular station.

Daily gage height, in feet, of Taboose Creek near Tibbetts, Cal., for 1906.

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	
1		2.1	1.85		1.75	17		2.25	1.81	1.75	
2		2.1	1.85			18		2.28			
3		2.1	1.85	1.7	1.7	19	2.30	2.25		1.75	
4		2.2	1.85			20	2.32	2.15	1.80		
5		2.2	1.85	1.7	1.7	21	2.35	2.1		1.75	
6		2.18	1.84			22	2.30	2.05			
7		2.2		1.8	1.65	23	2.25	2.07	1.80		
8		2.18	1.80		1.65	24		1.95		1.75	
9		2.2	1.82			25	2.15	1.9	1.80		
10		2.2		1.75		26	2.1	1.88			
11		2.2			1.65	27	2.1	1.9	1.8	1.75	
12		2.2				28	2.1	1.9			
13		2.2	1.82	1.7	1.65	29	2.1	1.88	1.8	1.75	
14		2.25				30	2.1	1.85			
15		2.25	1.82	1.7	1.65	31	2.1		1.78		
16		2.26									

Monthly discharge of Taboose Creek near Tibbetts, Cal., for 1906.

Month.	Discharge in second-feet.			Tota acre-
	Maximum.	Minimum.	Mean.	
January	4.0	3.3	3.7	
February	3.0	2.7	2.9	
March	3.6	3.0	3.3	
April	8.4	3.4	5.8	
May	12	6.8	10.4	
June	28	9.0	21.8	
July	56	29	46.3	
August	40	15	25.7	
September	21	5.6	15.0	
October	5.6	3.2	3.7	
November	4.0	3.0	3.6	
December	4.0	3.0	3.5	
The year	56	3.0	12.1	

NOTE.—Daily discharge prior to August 19 was obtained by interpolation between measurem
Values are approximate.

GOODALE CREEK NEAR TIBBETTS, CAL.

Goodale Creek is tributary to Owens River from the eastern slope of the Sierra Nevada.

The station was established September 20, 1906. It is located where the stream leaves the foothills, about 13 miles north of Independence, 4 miles west of Tibbetts railway station, and one-fourth mile west of the upper road crossing.

The channel is straight for 20 feet above and 15 feet below the measuring section, and the current is swift at all times. Both banks are low, clean, and sandy, but not likely to change materially. There is but one channel at all stages and discharge measurements are made from a plank used as a footbridge. At low water the stream is about 8 feet wide and nearly a foot deep.

The gage is a vertical staff nailed securely to a post driven in the bank. The reference bench mark is the top of a piece of steel driven in the ground about 5 feet south of gage and witnessed by a guard stake; elevation, 2.10 feet above the zero of the gage.

Discharge measurements of Goodale Creek near Tibbetts, Cal., by G. R. Shuey, 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 12	4.0	1.8		2.6	June 19[a]				12
April 24				4.2	July 2[a]				17
May 2	4.0	1.8		2.5	July 7[a]				27
May 9	4.7	2.9		7.4	July 14[a]				27
May 16	4.7	2.9		7.4	July 27[a]	4.4	4.1		8.7
May 23	5.0	3.5		7.5	October 31[b]	5.6	3.4	0.60	5.4
June 1	4.7	2.8		4.9	December 8[b]	6.0	3.6	.60	4.6
June 11[a]				11					

[a] At upper road crossing. [b] At regular station.

Daily gage height, in feet, of Goodale Creek near Tibbetts, Cal., for 1906.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	0.68		0.60	12				23	0.62		
2				13	0.60	0.60	0.55	24		0.60	0.50
3	.68	0.50	.60	14				25	.60		
4				15	.60	.60	.55	26			.50
5		.50	.60	16				27	.60	.60	
6	.65			17	.62	.65		28			
7		.60	.55	18			.50	29	.60	.60	.50
8			.60	19		.65		30			
9	.62			20	.60		.50	31	.60		
10		.55		21		.65					
11	.61		.55	22			.50				

Monthly discharge of Goodale Creek near Tibbetts, Cal., for 1906.

Month.	Discharge in second-feet.			Tota acre-f
	Maximum.	Minimum.	Mean.	
January			[a] 2.0	
February			[a] 1.0	
March			[a] 1.0	
April	4.2	2.6	3.5	
May	7.5	2.5	6.3	
June	16	4.9	11.2	
July	27	6.8	19.0	
August	6.6	6.2	6.4	
September	6.3	4.8	5.9	
October	6.3	5.4	5.6	
November	5.6	5.0	5.3	
December	4.6	4.0	4.3	
The year	27		6.0	

[a] Estimated.

NOTE.—The daily discharge from April to September was obtained by interpolation between r urements. Values are approximate.

DIVISION CREEK NEAR INDEPENDENCE, CAL.

Division Creek is tributary to Owens River from the eastern sl of Sierra Nevada, and measurements are made near where it lea the foothills and enters the valley.

The station was established January 10, 1906, but no gage rec was kept until September. It is located about 10 miles north of Ir pendence on the upper road crossing, about 1½ miles west of Ricky ranch house.

The channel is straight for about 10 feet above and 20 feet be the station. Both banks are low, and composed of gravel cove with weeds which extend a foot or two into the water; they are subject to overflow. The bed is also of gravel, but is clean and likely to change. The velocity is moderate and there is one char at all stages. At low water the stream is 6 or 8 feet wide and ab a foot deep. Discharge measurements are made from a plank use a footbridge.

The gage is a vertical staff driven in the ground and nailed t post. The bench mark is the top of a steel gad driven in the gro near a willow tree 20 feet west of gage; elevation, 4.45 feet above of gage.

Discharge measurements of Division Creek near Independence, Cal., by G. R. Shuey, 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.*
January 18				8.1	May 16	6.5	3.3	2.26	7.5
February 15			2.23	5.1	May 23	6.5	3.3	2.26	7.5
February 21			2.23	5.1	June 1	6.2	3.1	2.25	6.0
March 3				5.0	June 11	6.1	3.3	2.28	7.7
March 15				9.0	June 19	6.1	3.7	2.30	9.2
March 20				5.4	June 25	6.3	4.3	2.35	9.9
March 27				4.7	July 2	6.3	4.2	2.40	11
April 6				4.9	July 7	6.6	5.0	2.45	13
April 12		3.0	2.25	5.4	July 14	7.0	6.7	2.65	17
April 18			2.30	6.5	July 27	6.5	7.1	2.95	22
April 24				7.4	August 18[a]	4.0	4.0	1.10	12
May 2	6.4	3.0	2.25	6.6	October 31	5.5	4.8	2.60	14
May 9	6.6	3.3	2.30	7.9	December 8	5.5	4.2	2.55	11

[a] Measured at ranch house.

Daily gage height, in feet, of Division Creek near Independence, Cal., for 1906.

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1		1.1				17					
2		1.1			2.5	18	1.1			2.55	
3		1.1				19	1.1				
4		1.1		2.6		20	1.1				
5		1.1				21	1.1		2.6		
6		1.1				22	1.1				
7		1.1	2.65			23	1.1	2.65			2.5
8		1.1				24	1.1				
9		1.1			2.55	25	1.1		2.4		
10		1.1				26	1.1				
11		1.1		2.6		27	1.1				
12		1.1				28	1.1		2.6		
13		1.1				29	1.1				
14		1.1	2.62			30	1.1	2.65			2.5
15		1.1				31	1.1		2.6		
16		1.1			2.5						

NOTE.—From August 18 to September 18 the gage record was kept at the ranch house.

Monthly discharge of Division Creek near Independence, Cal., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
January	8.1	5.3	6.7	412
February	5.3	5.0	5.1	283
March	9.0	4.7	6.1	375
April	7.4	4.8	6.0	357
May	7.9	6.1	7.3	449
June	10	6.0	8.4	500
July	22	10	17.2	1,060
August	20	12	14.3	879
September	12	10	10.9	649
October	14	10	12.6	775
November	14	8.0	11.5	684
December	11	10	10.1	621
The year	22	4.7	9.7	7,040

NOTE.—The daily discharge prior to August 18 was obtained by interpolation between measurements. Values are approximate.

EIGHTMILE CREEK NEAR INDEPENDENCE, CAL.

Eightmile Creek is tributary to Owens River from the eastern sl of Sierra Nevada; measurements are made near where the stre leaves the foothills and enters the valley.

The station was established September 20, 1906. It is located the upper road crossing about 8 miles north of Independence about 300 feet beyond the Eightmile ranch.

The channel is straight for about 15 feet above and 10 feet be the station. The bottom is of gravel, not likely to shift, but b banks are very low and liable to overflow. The velocity is high there is only one channel at low water, but at high water there two or three. At low water the stream has a width of about 6 and a depth of 0.5 foot. Measurements are made from a plank u as a footbridge.

The gage is a staff graduated into feet and tenths and nailed t post. The bench mark is a spike driven in fence post 10 feet eas gage; elevation, 1.49 feet above the zero of the gage. During 1 no gage-height record was kept.

Discharge measurements of Eightmile Creek near Independence, Cal., by G. R. Shue 1906.

Date.	Width.	Area of section.	Discharge.	Date.	Width.	Area of section.	D cha
	Feet.	*Sq. Ft.*	*Sec.-ft.*		*Feet.*	*Sq. ft.*	*Se*
February 15			2.7	May 23			
March 3			2.5	June 1	4.0	1.8	
March 15			5.0	June 19	4.0	2.0	
March 27			3.4	June 25	4.0	2.6	
April 6			3.0	July 7			
April 18			3.4	July 27	9.5	5.1	
April 24	4.0	1.6	4.1	August 18	3.2	3.2	
May 2	4.0	1.6	3.7	October 31[a]	6.0	2.8	
May 9	4.0	1.6	4.5	December 8	8.0	3.5	
May 16	4.0	1.6	4.4				

[a] Gage height 0.40 foot at regular station.

Monthly discharge of Eightmile Creek near Independence, Cal., for 1906.

Month.	Discharge in second-feet.			Tota acre-
	Maximum.	Minimum.	Mean.	
January			[a] 3.0	
February	2.8	2.5	2.7	
March	5.0	2.5	3.7	
April	4.1	3.0	3.4	
May	4.6	3.7	4.3	
June	13	4.6	7.6	
July	20	13	16.3	
August	14	11	12.6	
September	11	8.3	9.8	
October	8.2	5.0	6.7	
November			[a] 5.0	
December			[a] 5.0	
The year			6.7	

[a] Estimated.

NOTE.—The daily discharge, February to October, was obtained by interpolation between mea ments. Values are approximate.

OAK CREEK NEAR INDEPENDENCE, CAL.

This station was established June 15, 1905, about 1 mile west of old Fort Independence. The conditions and the bench marks are described in Water-Supply Paper No. 177, page 83.

A new station was established October 1, 1906. It is located at Bell's flour mill, about 3 miles northwest of Independence, and just above the division boxes which divide the stream into three parts.

The channel at the point of measurement is a flume 12 feet wide and 1 foot deep, with a gravel bottom which has to be cleaned out after high water. At very high stages the stream divides above the flume and forms two channels. Measurements are made by wading or from a plank used as a footbridge.

The gage is a staff nailed to a post on the north side of the stream.

Discharge measurements of Oak Creek near Independence, Cal., by G. R. Shuey, 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.*
February 14			0.20	7.7	May 23	5	7.7	1.08	34
February 21			.20	7.1	June 3	5	7.7	1.08	36
March 3				7.5	June 16[a]				60
March 10				7.5	June 23	18	21		93
March 20				7.5	July 7	18	26		162
March 27				8.9	July 14	17	24		143
April 6				8.5	July 27	16	23		132
April 12	4	3.5	.30	10	August 9	16	22		77
April 21	4	4.3	.50	14	August 20	14	20		68
April 24	4	4.6	.50	17	September 23		6.0		21
May 2	4	4.1	.44	14	October 20	12	4.8	.35	17
May 9	4	6.5	.90	26	November 19	12	5.6	.30	12.4
May 14	5	6.9	.98	27	December 21	12	5.6	.25	10.6

[a] Measured in two channels.

Daily gage height, in feet, of Oak Creek near Independence, Cal., for 1906.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	0.40	0.30	0.20	12	0.40	0.30	0.30	23	0.37	0.25	0.25
2	.40	.30	.25	13	.40	.30	.30	24	.36	.25	.25
3	.40	.30	.30	14	.40	.30	.30	25	.36	.25	.25
4	.41	.30	.30	15	.40	.30	.30	26	.36	.25	.25
5	.42	.30	.30	16	.39	.30	.30	27	.35	.20	.25
6	.40	.30	.30	17	.39	.30	.25	28	.35	.20	.25
7	.40	.30	.30	18	.38	.30	.25	29	.30	.20	.25
8	.40	.30	.30	19	.38	.30	.25	30	.30	.20	.20
9	.40	.30	.30	20	.35	.30	.25	31	.30		.20
10	.40	.30	.30	21	.35	.30	.25				
11	.40	.30	.30	22	.35	.30	.20				

Monthly discharge of Oak Creek near Independence, Cal., for 1906.

Month.	Discharge in second-feet.			T ac
	Maximum.	Minimum.	Mean.	
January	.....	.....	[a] 6.0	
February	7.7	7.1	7.3	
March	8.9	7.4	7.8	
April	17	8.5	11.9	
May	36	14	28.0	
June	128	36	69.9	
July	162	113	140	
August	109	53	73.5	
September	51	20	32.2	
October	26	12	20.5	
November	12	10	11.8	
December	12	10	11.3	
The year	162	.....	35.0	

[a] Estimated.

NOTE.—The daily discharge February to September was obtained by interpolation betwee urements; after October 1 a rating table, based on three discharg measurements, was used are approximate.

INDEPENDENCE CREEK NEAR INDEPENDENCE, CAL.

The old station at the city waterworks, which was established Ju 1905, was wrecked in June, 1906, and a new station was establ on August 20, 1906. It is located about 1 mile west of the to Independence and about 300 feet above the waterworks for the

The channel is straight for about 40 feet above and 30 feet the station. Both banks are high and rocky and not liable to flow. The bed is also rocky, but clean and fairly permanent. is one channel at all stages and the velocity is high. At very stages the section may change on account of the displaceme bowlders. Measurements are made from a plank used as a bridge. At low water the stream is about 10 feet wide and 0. deep.

The gage is a staff nailed to a post on the south bank of the The bench mark is a spike driven in a willow tree about 10 fee of gage on south bank; elevation, 1.32 feet above zero of gage.

Discharge measurements of Independence Creek near Independence, Cal., in 19

Date.	Width.	Area of section.	Gage height.	Discharge.	Date.	Width.	Area of section.	Gage height.
	Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*		*Feet.*	*Sq. ft.*	*Feet.*
January 23	.....	.....	0.42	4.5	June 4	8	8.6	0.85
January 30	.....	.....	.....	2.8	June 12	13	18	1.55
February 13	.....	.....	.36	2.4	June 23	11	17	.....
March 2	.....	.....	.....	4.6	July 1	11	16	.....
March 25	.....	.....	.....	4.9	July 9	11	20	.....
April 5	.....	.....	.....	5.0	July 19	11	22	.....
April 14	9	4.6	.50	6.6	August 9	.....	.....	.....
April 22	10	5.9	.60	11	September 11	11	13	.90
April 30	9	6.1	.61	11	September 23	11	9.1	.67
May 10	10	7.5	.80	25	October 20	10	6.6	.50
May 22	10	11	.98	43	November 13	10	6.6	.45
May 29	9	9.4	.87	32				

NOTE.—Measurements January to August were made at old station; the gage was out aft 12. Measurements September to November were made at new station.

Daily gage height, in feet, of Independence Creek near Independence, Cal., for 1906.

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1		0.6			12			0.4	0.4	23	0.67			
2			0.5	0.5	13	0.8	0.6	.45		24			0.4	0.4
3	0.9	.6			14			.5	.4	25	.7			
4			.5	.5	15	.8	.6			26			.5	.4
5	.9	.6			16			.4	.5	27	.6			
6			.4	.4	17	.8				28			.4	.5
7	.9				18		.6	.4	.4	29	.7			
8			.5	.4	19	.8				30				.4
9					20		.5	.5	.4	31				.4
10			.5	.4	21	.7	.7							
11	.9	.7			22		.6	.5	.5					

Monthly discharge of Independence Creek near Independence, Cal., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
January	4.5	2.8	4.0	246
February	4.2	2.4	2.8	156
March	5.0	4.4	4.8	295
April	11	5.0	8.0	476
May	43	12	29.6	1,820
June	226	31	96.4	5,740
July	144	88	127	7,810
August	84	37	54.4	3,340
September	36	15	22.9	1,360
October	16	7.5	12.4	762
November	10	4.0	6.1	363
December	7.5	4.0	5.2	320
The year	226	2.4	31.1	22,700

NOTE.—The daily discharge, January to August, was obtained by interpolation between measurements. Values are approximate.

SHEPHERDS CREEK NEAR INDEPENDENCE, CAL.

Shepherds Creek is tributary to Owens River from the eastern slope of Sierra Nevada. No regular station has been established on this stream, but a sufficient number of measurements have been made during 1906 to warrant a rough estimate of the yearly flow. All measurements have been made near the foothills.

Discharge measurements of Shepherds Creek near Independence, Cal., by G. R. Shuey, in 1906.

Date.	Discharge.	Date.	Discharge.
	Sec.-ft.		*Sec.-ft.*
February 7	1.7	June 21	95
April 14	6.2	June 29	70
April 22	16	July 9	109
May 1	9.8	July 23	111
May 10	34	September 10	11
May 18	32	October 22	1.2
May 26	27	November 14	.3
June 2	15	December 19	3.4
June 12	60		

Monthly discharge of Shepherds Creek near Independence, Cal., for 1906.

Month.	Discharge in second-feet.			Total acre-fe
	Maximum.	Minimum.	Mean.	
January			2.0	
February			2.0	
March			2.0	
April	16	4.5	9.0	
May	34	9.8	26.5	1
June	95	15	62.2	3
July	111	78	104	6
August	93	33	63.0	3
September	31	5.5	12.0	
October	5.3	1.0	2.6	
November			.5	
December			3.0	
The year			24.1	17

NOTE.—The daily discharge, April to October, was obtained by interpolation between meas ments; mean for other months estimated. Values are approximate.

MOFFETT CREEK NEAR INDEPENDENCE, CAL.

Moffett Creek is tributary to Owens River from the eastern slo of the Sierra Nevada. No regular station has been established b during 1906 enough measurements were made to justify a rou estimate of the yearly flow. All measurements were made near t foothills.

Discharge measurements of Moffett Creek near Independence, Cal., by G. R. Shuey, 1906.

Date.	Discharge.	Date.	Discha
	Sec.-ft.		*Sec.-f*
April 14	1.5	June 21 [a]	
April 22 [a]	6.5	June 29 [a]	
May 1 [a]	3.9	July 9	
May 10 [a]	14	July 23 [a]	
May 18	14	September 10 [a]	
May 26	15	October 22 [a]	
June 2	10	December 19 [b]	
June 12	37		

[a] Measured at diversion gates. [b] Estimated.

Monthly discharge of Moffett Creek near Independence, Cal., for 1906.

Month.	Discharge in second-feet.			Total acre-fe
	Maximum.	Minimum.	Mean.	
January			1.0	
February			1.0	
March			1.0	
April	6.5	1.5	3.2	
May	15	3.9	12.5	
June	44	10	31.3	1
July	39	19	30.3	1
August	19	8.2	13.4	
September	7.8	2.9	4.3	
October	2.9	1.3	2.0	
November			1.0	
December			.5	
The year			8.5	6

NOTE.—The daily discharge April to October was obtained by inter olation between measureme mean for other months estimated. Values are approximate.

GEORGES CREEK NEAR INDEPENDENCE, CAL.

Georges Creek is a tributary to Owens River from the eastern slope of the Sierra Nevada. No regular station has been established, but enough measurements were made during 1906 to warrant a rough estimate of the flow for the year. Measurements were made at or above the division gates.

Discharge measurements of Georges Creek near Independence, Cal., by G. R. Shucy, in 1906.

Date.	Discharge.	Date.	Discharge.
	Sec.-ft.		*Sec.-ft.*
February 7	1.0	June 29	66
April 14	5.1	July 9	84
April 22	14	July 23	102
May 1	7.4	August 10	42
May 10	21	October 22	4.5
May 18	28	October 30	3.1
May 26	20	December 19	1.6
June 12	53		

Monthly discharge of Georges Creek near Independence, Cal., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
January			[a] 1.0	61
February			[a] 1.0	56
March			[a] 2.0	123
April	14		10.3	613
May	29	7.4	21.1	1,300
June	68	31	52.9	3,150
July	102	70	86.9	5,340
August	72	29	42.3	2,600
September	29	14	21.0	1,250
October	14	3.0	7.7	473
November	3.0	2.1	2.6	155
December	2.1	1.4	1.7	105
The year	102		20.9	15,200

[a] Estimated.

NOTE.—The daily discharge April to November was obtained by interpolation between measurements. Values are approximate.

LONE PINE CREEK NEAR LONE PINE, CAL.

Lone Pine Creek is tributary to Owens River from the eastern slope of the Sierra Nevada. The station was established September 25, 1906. It is located about three-fourths mile west of the town of Lone Pine and about 500 feet above the division boxes on the creek.

The channel is straight for 30 feet above and 20 feet below the station. Both banks are high and rocky and not subject to overflow. The bed is rocky and not likely to change, but the cross section is rough and uneven. There is one channel at all stages and the current is swift. At low water the stream is 7 feet wide and 0.8 foot deep. Measurements are made by wading or from a plank used as a footbridge.

The gage is a staff graduated to feet and tenths and is nai securely to a post. The bench mark is a spike driven in the base c birch tree on the south bank near the station; elevation, 4.85 f above zero of gage.

Discharge measurements of Lone Pine Creek near Lone Pine, Cal., by G. R. Shuey, in 1

Date.	Gage height.	Dis-charge.	Date.	Gage height.	Di cha
	Feet.	*Sec.-ft.*		*Feet.*	*Sec*
January 31		3.1	June 13		
February 17		3.1	June 21		
February 24		2.2	June 29		
March 13		4.0	July 10		
March 23		4.0	July 25		
March 29		4.4	August 10		
April 15		5.5	September 6		
April 28		12	September 24[a]	1.92	
May 10		26	October 23[a]	1.80	
May 17		33	November 20[a]	1.70	
May 26		32			

[a] Measured at regular station.

Daily gage height, in feet, of Lone Pine Creek near Lone Pine Cal., for 1906.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	I
1	1.89		1.7	12	1.81	1.7		23	1.8	1.7	
2		1.7		13			1.7	24			
3	1.89		1.7	14				25		1.7	
4		1.7		15		1.7	1.7	26			
5	1.89		1.7	16				27			
6		1.7		17			1.7	28		1.7	
7			1.7	18				29			
8	1.89	1.7		19		1.7	1.7	30		1.7	
9			1.7	20		1.7		31			
10	1.83			21		1.7	1.7				
11			1.7	22							

Monthly discharge of Lone Pine Creek near Lone Pine, Cal., for 1906.

Month.	Discharge in second-feet.			Total acre-fe
	Maximum.	Minimum.	Mean.	
January			[a]3.0	
February	3.1	2.2	2.9	
March	4.5	2.7	3.8	
April	14	4.5	7.2	
May	40	15	28.5	1
June	103	42	73.5	4
July	139	106	129	7
August	111	44	68.4	4
September	43	17	27.2	1
October	16	12	14.0	
November	8.0	8.0	8.0	
December	8.0	8.0	8.0	
The year	139	2.2	31.1	22

[a] Estimated.

NOTE.—The daily discharge January to September was obtained by interpolation between meas ments. Values are approximate.

TUTTLE CREEK NEAR LONE PINE, CAL.

Tuttle Creek is tributary to Owens River from the eastern slope the Sierra Nevada. During 1906 measurements were made regula at a point near Lone Pine, where the stream leaves the foothills a

enters the valley. These measurements are numerous enough to warrant a monthly estimate of the flow of the stream for the year. A gage-height record has been kept during November and December.

Discharge measurements of Tuttle Creek near Lone Pine, Cal., by G. R. Shuey, in 1906.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
January 31		4.9	June 13	1.15	20
February 17	0.90	5.0	June 21	1.45	32
February 24	.90	4.4	June 29	1.60	39
March 13		4.2	July 25		67
March 23		4.2	August 11	1.65	35
March 29		4.6	September 6	1.40	18
April 15	.87	4.6	September 25	1.18	11
May 11	.98	10	October 24	1.12	9.5
May 18	1.02	12	November 20	1.13	8.5
May 26	1.05	13			

Daily gage height, in feet, of Tuttle Creek near Lone Pine, Cal., for 1906.

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1		1.1	9		1.1	17			25	1.15	
2	1.1		10	1.1		18	1.1		26		1.1
3		1.1	11		1.1	19	1.15		27		
4	1.1		12	1.15		20	1.13	1.1	28	1.1	1.1
5		1.1	13		1.1	21	1.15		29		
6	1.1		14			22		1.1	30	1.1	1.1
7		1.1	15		1.1	23	1.15		31		
8	1.1		16			24		1.1			

Monthly discharge of Tuttle Creek near Lone Pine, Cal., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
January			[a] 5.0	307
February	5.0	4.4	4.8	267
March	4.6	4.2	4.3	264
April	7.6	4.6	5.4	321
May	15	7.8	11.1	682
June	40	16	26.0	1,550
July	67	41	54.1	3,330
August	51	22	33.1	2,040
September	21	10	14.2	845
October	11	9.5	9.6	590
November	10	8.0	9.0	536
December	8.0	8.0	8.0	492
The year	67		15.4	11,200

[a] Estimated.

NOTE.—The daily discharge February to December was obtained by interpolation between measurements. Values are approximate.

COTTONWOOD CREEK NEAR OLANCHA, CAL.

Cottonwood Creek discharges into Owens Lake from the Sierra Nevada; measurements are made near the foothills.

The station was established September 25, 1906. It is located about 15 miles south of Lone Pine and about one-fourth mile above the point of crossing of the Los Angeles conduit.

The channel is straight for about 40 feet above and 50 feet be the station. The right bank is high, rocky, and wooded; the le comparatively low and not wooded; but neither bank is likely overflow. The bed is rocky and permanent, and there is but channel at all stages, but the current is very swift. At low w the stream is about 10 feet wide and 1 foot deep. Measurements made from a plank used as a footbridge.

The gage is a staff nailed to a post.

Discharge measurements of Cottonwood Creek near Olancha, Cal., by G. R. Shucy, in

Date.	Gage height.	Discharge.	Date.	Gage height.	Di
	Feet.	*Sec.-ft.*		*Feet.*	*S*
January 6		5.6	June 28		
March 29		12	July 10		
April 20		28	July 24		
April 27		31	August 12		
May 19		158	September 26 *a*	0.80	
May 27		131	October 26 *a*	.74	
June 13		434	November 21 *a*	.50	

a Measured at regular station.

Daily gage height, in feet, of Cottonwood Creek near Olancha, Cal., for 1906.

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.
1		0.8	0.7	0.5	12		0.7			23		0.5	0.6
2		.8	.75		13		.7		0.6	24		.7	
3		.8	.75		14		.7			25		.75	.5
4		.8		.5	15		.7		.8	26	0.8	.74	
5		.75			16		.7	0.6		27	.8	.7	.5
6		.7			17		.65			28	.8	.7	
7		.7		.5	18		.65	.6	.6	29	.8	.65	.5
8		.7			19		.6			30	.8	.70	
9		.7		.6	20		.5		.6	31		.65	
10		.7			21		.5	.5					
11		.7		.6	22		.65		.6				

Monthly discharge of Cottonwood Creek near Olancha, Cal., for 1906.

Month.	Discharge in second-feet.			Total acre-
	Maximum.	Minimum.	Mean.	
January	7.4	5.5	6.2	
February	9.4	7.4	8.2	
March	13	9.5	10.9	
April	35	14	24.2	
May	158	40	114	
June	434	172	333	
July	287	166	225	
August	161	70	104	
September	68	22	42.4	
October	22	10	15.9	
November	17	9.0	13.3	
December	22	9.0	12.8	
The year	434	5.5	75.8	

NOTE.—The daily dis harge January to September was obtained by interpolation between me ments. During high water measurements were made below the point of diversion, so that th charge is probably too low. Values are approximate.

ASH CREEK NEAR LONE PINE, CAL.

Ash Creek discharges into Owens Lake from the eastern slope of the Sierra Nevada. Numerous measurements have been made on this stream during 1906, but they have not been made at the same point, although all were above the point of diversion.

Discharge measurements of Ash Creek near Lone Pine, Cal., by G. R. Shuey in 1906.

Date.	Discharge.	Date.	Discharge.
	Sec.-ft.		*Sec.-ft.*
January 6	1.3	June 29	58
March 29	4.8	July 10	31
April 27	10.7	August 13	5.9
May 19	16	September 26	3.2
May 27	16	October 26	2.8
June 14	21	November 21	2.4

Monthly discharge of Ash Creek near Lone Pine, Cal., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
January	2.2	1.3	1.7	105
February	3.8	2.4	3.2	178
March	5.2	4.0	4.5	277
April	11	5.4	8.3	494
May	17	12	14.8	910
June	58	17	30.6	1,820
July	53	9.0	25.3	1,560
August	8.5	5.0	5.8	357
September	5.0	3.2	4.0	238
October	3.2	2.8	3.0	184
November	2.7	2.4	2.5	149
December			*a* 2.2	135
The year	5.8	1.3	8.8	6,410

a Estimated.

NOTE.—The daily discharge January to November was obtained by interpolation between measurements. Values are approximate.

MISCELLANEOUS MEASUREMENTS IN OWENS RIVER DRAINAGE BASIN.

The following is a list of the miscellaneous discharge measurements made in the Owens River drainage basin during 1906:

Black Rock Springs near Independence, Cal.—These springs are near the foothills, about 8 miles northwest of Independence, and the water from them discharges into Owens River. The following measurement was made December 12, 1906, at the point where the water emerges from the ground.

Width, 11 feet; area, 19 square feet; discharge, 27 second-feet.

Cottonwood Creek near Lone Pine, Cal.—This stream discharges into Owens Lake from the eastern slope of the Sierra Nevada. The following measurement was made September 26, 1906, at the mouth of the canyon where the stream enters the valley:

Width, 10 feet; area, 12 square feet; discharge, 25 second-feet.

Fish Springs near Tinemaha, Cal.—These springs are near foothills, about 8 miles south of Big Pine, and the water from th discharges into Owens River. The following measurement was m December 7, 1906, in a flume near their source:

Width, 7 feet; area, 20 square feet; discharge, 36 second-feet.

Georges Creek near Independence, Cal.—This stream is tribut to Owens River from the eastern slope of Sierra Nevada. The lowing measurements were made in 1906, at the mouth of the c yon where the stream enters the valley:

September 7: Discharge, 25 second-feet.
October 30: Discharge, 4.8 second-feet.

Independence Creek near Independence, Cal.—This creek is tri tary to Owens River from the Sierra Nevada. The following m urements were made in 1906:

September 11, at mouth of canyon: Area, 11 square feet; discharge, 28 second-
November 13, at Pinon ditch: Width, 5.4 feet; area, 3.3 square feet; disch 5.3 second-feet.

Lone Pine Creek near Lone Pine, Cal.—This stream is tribut to Owens River from the eastern slope of the Sierra Nevada. following measurements were made in 1906, at the mouth of canyon where the stream enters the valley:

September 8: Width, 10 feet; area, 12 square feet; discharge, 31 second-feet.
September 24: Area, 9.3 square feet; discharge, 20 second-feet.
October 23: Width, 8.3 feet; area, 6.7 square feet; discharge, 10 second-feet.

North Fork Oak Creek near Independence, Cal.—This stream tributary to Owens River from the eastern slope of the Sierra Nev The following measurements were made in 1906:

August 20, in canyon: Area, 7.8 square feet; discharge, 49 second-feet.
November 17, 3 miles above junction with South Fork: Width, 4.3 feet; area square feet; discharge, 12 second-feet.
November 19, at junction with South Fork: Width, 8 feet; area, 4.6 square discharge, 12 second-feet.

South Fork Oak Creek near Independence, Cal.—This stream is so of North Fork and is tributary to Owens River from the eastern sl of the Sierra Nevada. The following measurements were made 1906:

August 20, in Canyon: Area, 9.9 square feet; discharge, 52 second-feet.
November 19, at junction with North Fork: Width, 6.5 feet; area, 3.3 square discharge, 4.3 second-feet.

Shepherds Creek near Independence, Cal.—This stream is tribut to Owens River from the eastern slope of the Sierra Nevada. following measurements were made November 14, 1906:

At mouth of canyon: Width, 6.5 feet; area, 3.9 square feet; dishcarge, 5.4 sec feet.
At fork 4 miles east of canyon: Width, 6 feet; area, 4 square feet; discharge second-feet.

Taboose Creek near Tibbetts, Cal.—This creek is tributary to Owens River from the eastern slope of the Sierra Nevada. On December 8, 1906, a measurement was made on the upper road crossing 2 miles above gaging station.

Width, 8 feet; area, 3.6 square feet; discharge, 5.4 second-feet.

Thebaut Creek near Independence, Cal.—This stream is tributary to Owens River from the eastern slope of the Sierra Nevada. On November 17, 1906, the following measurement was made at the mouth of the canyon where it enters the valley:

Width, 1.4 feet; area, 0.5 square foot; discharge, 1.6 second-feet.

MOHAVE RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

The Mohave River rises on the northern slope of the San Bernardino Mountains, and, flowing in a northerly direction, finally disappears in the sands of the Mohave Desert. This stream has few tributaries, the only ones of importance being West Fork and Deep Creek, which have their source in the higher elevations of the San Bernardino Mountains. The formation is of granite, with a good covering of soil. On the higher elevations there is a considerable growth of timber, which diminishes as one approaches the lower reaches, changing to a light growth of brush and grass, finally merging into the barren desert. During the greater portion of the year the stream bed is dry below the junction of West Fork and Deep Creek, where the waters disappear in the sand and gravelly bed of the stream. Water again rises at a point lower down on the river above Victorville, where the gaging station is located. Water is diverted above and below the gaging station, but is again returned to the river channel. There are several artesian wells along the river above the gaging station, the water being used for irrigation. This stream does not discharge in any large quantity except during an extremely heavy rainfall in the winter months. The precipitation throughout this basin is very light, with the possible exception of the higher elevation of the San Bernardino Mountains, where there is a considerable fall of snow during the winter months, which melts in the early spring.

MOHAVE RIVER AT VICTORVILLE, CAL.

This station was established February 27, 1899, and discontinued July 31, 1906. It is located in the town of Victorville, a station on the Atchison, Topeka and Santa Fe Railroad, where the Mohave River passes through a narrow gorge locally known as the "Narrows." The conditions at this station and the bench marks are described in Water-Supply Paper No. 177, page 87, where are given also references to publications that contain data for previous years.

The gage heights observed at this station in 1906 are of no va
therefore no discharges have been computed.

Discharge measurements of Mohave River at Victorville, Cal., by P. H. Leahy in 19

Date.	Gage height.	Discharge.	Date.	Gage height.	D ch
	Feet.	*Sec.-ft.*		*Feet.*	*Se*
January 2	4.03	65	March 28 [a]	4.40	
January 6		63	March 30	4.30	
January 9	4.03	67	March 31	4.30	
January 12	4.09	66	April 2	4.60	
January 16		66	April 6	4.50	
January 20	4.17	88	April 10	4.50	
January 23	4.11	62	April 13	4.30	
January 26	4.10	72	April 17	4.20	
January 31	4.10	65	April 20	4.20	
February 2	4.10	64	April 24	4.10	
February 6	4.10	67	April 28	4.20	
February 10	4.10	68	May 1	4.20	
February 13	4.11	64	May 3	4.20	
February 17	4.11	50	May 11	4.00	
February 21	4.12	79	May 19	4.00	
February 24	4.12	65	May 25	4.02	
February 27	4.08	70	June 1	4.40	
March 2	4.11	67	June 10	4.00	
March 7	4.11	52	June 17	3.92	
March 9	4.10	56	June 24	4.05	
March 12	7.80	9,260	June 29	4.16	
March 18	4.15	1,620	July 5	4.24	
March 20	4.11	828	July 13	4.31	
March 23	4.45	552	July 19	4.32	
March 25	6.25	4,530	July 22	4.36	
March 26	5.60	5,570	July 29	4.41	
March 27 [a]	4.90	2,100	July 31 [b]	4.39	
March 27 [a]	4.80	1,880	November 12 [c]		

[a] Measured by Burrage and Leahy. [b] Measured by W. B. Clapp. [c] Measured by W. F. Ma

SOUTHERN PACIFIC OCEAN DRAINAGE.

GENERAL FEATURES.

The Southern Pacific Ocean drainage includes those streams so
of San Francisco Bay whose waters, in times of flood at least, re
the Pacific Ocean.

SAN DIEGO BAY DRAINAGE BASIN.

DESCRIPTION OF BASIN.

The principal streams tributary to San Diego Bay are Tia Jua
Sweetwater, and San Diego rivers.

The Tia Juana is not measured at any regular station, but stati
are maintained on Cottonwood Creek, which discharges into it ab
30 miles east of San Diego city, and on Pine Creek, a branch of C
tonwood, and stations are also maintained on Sweetwater and S
Diego rivers.

Measurements in this basin are made for use in connection w
the construction of reservoirs for irrigation purposes.

COTTONWOOD CREEK NEAR JAMUL, CAL.

Cottonwood Creek rises on the west side of the San Jacinto Mo
tains, in the southwestern part of San Diego County, at an elevat
of about 5,000 feet, and flows in a southwesterly direction, dischar

into the Tia Juana River just above the California-Mexico boundary line and about 30 miles east of San Diego city. Its drainage basin is rough and broken, with numerous hills and gorges and only a few small valleys. A scrubby timber growth throughout the basin consists mainly of oak, with some sycamore and cottonwood. The annual precipitation varies from 10 to 30 inches and is mainly in the form of rain. The light snowfall on the higher parts of the area melts rapidly, increasing the torrential nature of the run-off. There are several dam sites in this basin, at least two of which have been utilized. The rock formation through which the creek flows is a loose granite with a good soil covering.

The station was established December 14, 1905. It is located at the Barrett dam site, about 8 miles north of the California-Mexico boundary line, and is reached by driving from San Diego to Jamul ranch house, about 20 miles east of San Diego, then driving to the dam site, about 15 miles farther east, making the total distance from San Diego about 35 miles.

The measuring section was first located on the broad crest of the concrete foundation wall of the original Barrett dam, but some time in the late summer the gage was removed on account of constructive operations in connection with the new dam. Above this section the channel had filled in so that the sand was level with the crest of the wall, while on the lower side the water had a free fall of 30 feet. Vertical timber walls had been built up at each end of the dam, so that the width of the channel at all stages was 70 feet. The grade above the section was heavy, so that very high velocities prevailed in flood stages. A new section has been selected a few hundred feet above the old one, at the foundation of the new dam. At low stages the flow is restricted to a rectangular wooden flume through the foundation wall, but at higher stages the flow is over the entire length of the foundation wall.

Discharge measurements are usually made by wading, except in high stages, when only float measurements can be made, owing to the torrential nature of the stream. In low stages a section suitable for wading is always used. There is no cable and car equipment at this station.

The old gage was a 2 by 4 inch pine scantling, graduated to feet and tenths with black stripes and staples and attached in a vertical position to the timber wall on the left bank. The new gage is in two sections, a low-water gage attached to the foundation wall near the wooden flume and a high-water gage fastened to bowlders on the left bank. During 1906 the gage was read twice a day by Joe Hooker. No permanent bench mark for reference has yet been established.

Discharge measurements of Cottonwood Creek near Jamul, Cal., in 1905–6.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	ch
1905.		*Feet.*	*Sq. ft.*	*Feet.*	Se
November 18	W. B. Clapp	2.7	0.5	.....	
December 14	C. H. Lee	5	1.6	0.05	
1906.					
January 5	W. V. Hardy	6	2.9	0.10	
January 19	do	16	6.7	0.21	
January 19	do	22	12.5	0.30	
January 20	do	70	20	0.40	
January 20	do	70	28	0.50	
January 20	do	70	29	0.55	
February 3	do	10	3	0.05	
February 14	do	20	8.7	0.23	
March 11	do	21	7.7	0.12	
March 12	do	70	71	1.21	
March 13 [a]	Joe Hooker	70	154	2.20	
March 16 [a]	do	70	57	0.82	
March 21 [a]	do	70	41	0.58	
March 24 [a]	do	70	420	6.00	
March 25 [a]	do	70	455	6.50	
March 31 [a]	do	70	77	1.10	
April 7 [a]	do	70	57	0.81	
April 19	W. V. Hardy	70	37	0.59	
May 8	do	70	27	0.40	
June 22	C. H. Lee	36	9.9	0.28	
October 5	W. F. Martin	2.8	0.8	.....	
November 27	W. V. Hardy	6	5.4	[b] 0.90	
December 15	do	6	6	[b] 2.00	

[a] Measured by floats. [b] New gage.

Monthly discharge of Cottonwood Creek near Jamul, Cal., for 1906.

Month.	Discharge in second-feet.			Tot acre
	Maximum.	Minimum.	Mean.	
January	59	2.0	15.5	
February	100	7.0	24.1	
March	5,800	5.0	594	
April	350	93	176	
May	93	20	54.9	
June	55	20	30.5	
July	93	2.0	12.0	
August	51	.9	6.0	
September	4.8	.8	1.3	
October	7.1	.9	3.0	
November	33	7.6	20.4	
December	375	30	80.8	
The year	5,800	.8	84.9	

NOTE.—Discharges were obtained by the indirect method for shifting channels. Values are f

PINE VALLEY CREEK NEAR JAMUL, CAL.

Pine Valley Creek flows in a southerly direction and enters Cot wood Creek about 1 mile north of Barrett's dam. Its drainage is about half of the total drainage area of Cottonwood Creek a Barrett's dam. The gaging station is located a few hundred feet a the confluence of the two creeks and was established in January, 1 It is reached in connection with the Cottonwood station by dri from San Diego.

The channel at the station is composed of shifting sand, ar straight for about 200 feet above and 250 feet below the poir measurement. The right bank is high and rocky and not subje overflow, while the left bank is liable to overflow in very high st

forming two channels. In almost all stages measurements can be made by wading, but two wires have been stretched across the channel 50 feet apart for convenience in float measurements. There is no cable and car.

The gage, which during 1906 was read twice a day by Joe Hooker, is a piece of 2 by 6 inch pine painted white and graduated to feet and tenths with staples. It is fastened to a small tree in a vertical position and the graduations run from 3 to 9.9 feet. The initial point for soundings is the top of a bowlder on the right bank marked with a ring of white paint. The top of this bowlder is also taken as a bench mark, with assumed elevation 1,600 feet. The zero of gage is 13.16 feet below, or at elevation 1,586.84.

Discharge measurements of Pine Valley Creek near Jamul, Cal., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
January 5	W. V. Hardy	6	1.5		1.8
January 19	do	14	7.2	3.10	14.4
January 19	do	34	12.3	3.20	17.6
January 20	do	41	19.4	3.45	41
February 3	do	8	2.8	2.94	4
February 15	do	42	13.1	3.12	20
March 11	do	12	5.4	3.00	8.2
April 19	do	46	23	4.50	57
May 8	do	47	16	4.40	32
June 22	C. H. Lee	17	4.8	4.20	7.7
October 5	W. F. Martin	2.8	0.21	4.00	0.24
November 27	W. V. Hardy	11	4.1	4.21	6.7
December 15	do	19	6.7	4.30	14.6

Daily gage height, in feet, of Pine Valley Creek near Jamul, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		3.00	3.00	4.90	4.55	4.40	4.12	4.02	3.95	3.94	4.10	4.15
2		2.95	3.00	4.90	4.55	4.35	4.12	4.01	3.95	4.03	4.05	4.20
3		2.95	2.98	4.75	4.50	4.35	4.11	4.01	3.95	4.10	4.05	4.20
4		2.95	3.00	4.75	4.50	4.30	4.12	4.00	3.95	3.98	4.00	4.20
5		2.96	3.04	4.80	4.55	4.30	4.13	3.95	3.94	3.80	4.10	4.20
6		3.24	2.98	4.75	4.50	4.30	4.10	3.93	3.94	3.55	4.10	4.25
7		3.15	2.92	4.80	4.50	4.30	4.20	3.80	4.00	3.60	4.10	4.25
8		3.07	2.93	4.70	4.40	4.30	4.20	3.79	4.00	3.70	4.10	4.25
9		3.09	2.92	4.65	4.40	4.30	4.22	3.76	3.98	3.75	4.10	4.25
10		3.01	2.95	4.65	4.40	4.30	4.20	3.65	3.98	3.80	4.10	4.20
11		3.11	2.97	4.60	4.35	4.25	4.17	3.60	4.00	4.00	4.05	4.25
12		3.01	4.35	4.55	4.40	4.20	4.15	3.55	4.00	4.00	4.10	4.30
13		3.01	5.00	4.60	4.40	4.20	4.12	3.48	4.09	4.05	4.10	4.45
14		3.09	4.03	4.55	4.40	4.20	4.12	3.40	4.08	4.05	4.05	4.45
15		4.02	3.70	4.55	4.40	4.20	4.10	3.37	4.12	3.95	4.10	4.30
16		3.60	4.04	4.50	4.40	4.20	4.11	3.00	4.02	3.95	4.10	4.30
17		3.40	3.95	4.50	4.35	4.20	4.10	2.70	4.05	4.00	4.10	4.20
18	3.00	3.30	3.60	4.50	4.35	4.20	4.10	4.40	3.96	4.00	4.10	4.20
19	3.20	3.28	3.50	4.50	4.30	4.15	4.11	4.40	4.05	4.10	4.05	4.30
20	3.45	3.20	3.38	4.50	4.30	4.15	4.10	4.20	4.03	4.05	4.05	4.20
21	3.25	3.21	3.31	4.45	4.30	4.10	4.07	4.20	3.98	4.10	4.10	4.20
22	3.20	3.22	3.35	4.45	4.40	4.20	4.05	4.20	4.02	4.10	4.10	4.15
23	3.18	3.19	3.30	4.50	4.40	4.15	4.06	4.20	3.91	4.05	4.20	4.20
24	3.10	3.08		4.50	4.40	4.15	4.06	4.19	4.01	4.10	4.20	4.20
25	3.08	3.01		4.50	4.40	4.15	4.05	4.18	4.03	4.05	4.20	4.20
26	3.05	2.96		4.50	4.50	4.15	4.05	4.18	4.00	4.00	4.20	4.20
27	3.03	2.94		4.50	4.45	4.15	4.05	4.18	4.04	4.10	4.20	4.30
28	3.03	2.97	5.20	4.65	4.50	4.20	4.04	4.16	3.98	4.10	4.20	4.70
29	3.03		4.82	4.75	4.50	4.15	4.03	4.10	3.92	4.10	4.10	4.60
30	3.03		4.80	4.65	4.40	4.15	4.02	4.00	4.00	4.00	4.15	4.50
31	3.03		5.00		4.40		4.02	4.00		4.10		4.50

Monthly discharge of Pine Valley Creek near Jamul, Cal., for 1906.

Month.	Discharge in second-feet.			To acr
	Maximum.	Minimum.	Mean.	
January	41	1	10.4	
February	75	5	19.4	
March	1,500	3	156	
April	150	44	89.6	
May	71	15	39.4	
June	32	1.8	8.8	
July	8.2	.6	2.6	
August	32	0.0	4.0	
September	2.7	.2	.6	
October	1.8	0.0	.8	
November	6.5	.3	2.6	
December	114	4.2	20.1	
The year	1,500	0.0	29.6	

NOTE.—Discharges were obtained by the indirect method for shifting channels. Values are a mate.

SWEETWATER RIVER NEAR DESCANSO, CAL.

Sweetwater River heads on the west slope of San Jacinto M tains in the west-central portion of San Diego County and flows southwesterly direction, discharging into San Diego Bay near Nat City. The highest parts of the basin are found about 2 miles of Cuyamaca, at an elevation of more than 5,000 feet. This consists of a loose granite formation, and the topography is much broken with numerous canyons, mountain peaks, and valleys. There is a scrubby timber growth on the highlands, sisting mainly of oak brush. The annual precipitation in the varies from 5 to 20 inches near National City, but increases o higher elevations up to from 30 to 60 inches near Cuyamaca, w 20 to 30 inches of snowfall occur in some years. The run-off in face flow is heavy in the spring, but during the summer and fal surface flow entirely disappears in the sands of the lower reach

This station was established December 9, 1905. It is locate the Ellis ranch, about 1 mile south of Descanso post-office, a reached by stage from Lakeside. This station is at an elevati 3,300 feet and has a drainage area of only 40 square miles, w is almost rectangular in outline, being about 10 miles long r and south and 4 miles wide.

The station is equipped with cable and car, but measuren can always be made by wading, except at very high stages. bed of the stream is composed of sand and gravel, with iso bowlders, and is subject to more or less change. Both banks be overflowed at exceptionally high stages. The channel is str for 150 feet above and 300 feet below the station. A dense gr of willows on each bank has been cleared away for 20 feet a and below the cable. The grade is heavy above the section, so high velocities are encountered at the highest stage, when only velocities can be taken.

The gage consists of a 2 by 6 inch pine timber painted white and graduated to feet and tenths. It is bolted to granite bowlders on the left bank, and is in three sections—two for low water and one for high water. The graduations extend from 2.8 to 10.7 feet.

The initial point for soundings is the head of a big rail driven in the base of the oak tree anchorage on the right bank. The bench mark is the highest point on the bowlder to which the lowest low-water gage is fastened, and is 20 feet upstream from station 60 of cable. It is marked 0.0 in white paint and its elevation is assumed to be 3,300 feet. The zero of the gage is 5 feet below the bench mark, or at an elevation of 3,295.0.

During 1906 the gage was read twice a day by C. H. Ellis.

Discharge measurements of Sweetwater River near Descanso, Cal., in 1905–6.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1905.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
September 11 [a]	D. W. Murphy				0.4
November 21	C. H. Lee	3	0.9	3.54	1.1
December 10	do	6	1.9	3.62	2.5
1906.					
January 6	W. V. Hardy	6.5	1.7	3.62	2.7
January 23	do	11	4.9	3.79	9.3
February 4	do	10	3.7	3.68	4.8
February 15	do	40	41	4.60	115
February 16	do	38	35	4.50	96
February 16	do	36	30	4.40	75
February 16	do	36	27	4.30	62
February 16	do	34	22	4.20	51
February 16	do	32	20	4.10	46
February 17	do	31	15.9	4.00	32
February 19	do	30	12.4	3.90	20
March 10	do	11.7	5.1	3.88	10.7
April 5	do	40	32	4.85	81
April 6	do	41	33	4.65	74
April 18	do	36	14	4.27	37
April 20	do	35	13	4.20	35
May 8	do	31	10.4	4.05	24
June 19	C. H. Lee	12	2.6	3.60	4.3
August 7	R. S. Hawley	2.5	0.8	3.16	1.1
October 9	W. F. Martin	2	1.2	3.15	1.1
November 28	W. V. Hardy	6	3.2	3.20	4.4
December 13	do	12	6.8	3.48	12.7

[a] Weir measurement.

Daily gage height, in feet, of Sweetwater River near Descanso, Cal., for 1905–6.

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1905.			8		3.58	16		3.60	24	3.54	[a]3.62
1		3.69	9		3.58	17		3.60	25	3.53	3.64
2		3.64	10		3.64	18		3.67	26	3.54	3.65
3		3.61	11		3.68	19		3.66	27	3.84	3.65
4		3.60	12		3.69	20		3.66	28	3.84	3.65
5		3.60	13		3.65	21	3.53	3.78	29	3.71	3.69
6		3.58	14		3.60	22	3.54	3.70	30	3.70	3.66
7		3.58	15		3.60	23	3.54	3.62	31		3.72

[a] Estimated.

Daily gage height, in feet, of Sweetwater River near Descanso, Cal., for 1905–6—Co

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1906.											
1	3.7	3.65	4.0	4.8	4.2	3.9	3.45	3.2	3.3	3.15	a3.2
2	3.65	3.65	3.95	4.7	4.15	3.85	3.4	3.2	3.3	3.15	a3.2
3	3.7	3.65	3.9	4.7	4.1	3.85	3.4	3.2	3.3	3.15	a3.2
4	3.7	3.7	4.0	4.6	4.1	3.85	3.4	3.2	3.3	3.15	a3.2
5	3.65	3.85	3.95	4.7	4.2	3.85	3.4	3.2	3.3	3.1	3.2
6	3.65	3.95	3.9	4.7	4.15	3.85	3.4	3.2	3.3	3.1	3.2
7	3.6	3.9	3.85	4.65	4.15	3.8	3.4	3.2	3.3	3.1	3.2
8	3.6	3.8	3.85	4.6	4.1	3.8	3.4	3.2	3.3	3.1	3.2
9	3.6	3.8	3.85	4.6	4.25	3.75	3.4	3.2	3.3	3.1	3.2
10	3.6	3.85	3.85	4.5	4.0	3.7	3.4	3.15	3.25	3.1	3.15
11	3.6	3.95	3.9	4.45	4.0	3.7	3.35	3.15	3.25	3.1	3.15
12	3.6	3.9	4.95	4.4	4.1	3.7	3.35	a3.15	3.25	3.1	3.15
13	3.65	3.9	5.05	4.4	4.0	3.7	3.35	3.15	3.25	3.1	3.15
14	3.75	3.9	4.5	4.35	4.0	a3.65	3.4	3.15	3.3	3.1	3.2
15	3.7	4.45	4.4	4.35	3.95	a3.65	3.4	3.15	3.65	3.1	a3.2
16	3.7	4.2	4.65	4.3	3.9	a3.6	3.35	3.15	3.45	3.1	a3.15
17	3.65	4.1	5.05	4.3	3.9	3.6	3.35	3.3	3.25	3.15	a3.15
18	3.65	3.95	4.65	4.25	3.9	3.6	3.3	3.6	3.2	3.15	3.15
19	4.05	3.9	4.5	4.25	3.9	3.6	3.3	3.6	3.15	3.15	3.15
20	4.15	3.85	4.4	4.2	3.9	3.6	3.3	3.5	3.15	3.15	3.15
21	3.9	3.95	4.35	4.2	3.9	3.55	3.3	3.45	3.15	3.15	3.15
22	3.85	4.0	4.45	4.15	3.85	3.55	3.3	3.4	3.1	3.15	3.4
23	3.8	3.95	4.35	4.1	3.9	3.55	3.3	3.4	3.1	3.2	3.45
24	3.75	3.9	7.35	4.15	3.9	3.55	3.3	3.45	3.15	3.2	3.35
25	3.75	3.85	6.8	4.15	3.9	3.5	3.35	3.35	3.15	3.2	3.3
26	3.75	3.85	6.6	4.1	4.05	3.55	3.35	3.35	3.15	3.2	3.3
27	3.7	3.85	5.6	4.1	4.0	3.6	3.3	3.35	3.1	3.2	3.35
28	3.7	3.95	5.2	4.4	4.2	3.55	3.25	3.35	3.1	3.25	3.2
29	3.7	.....	4.85	4.4	4.0	3.5	3.25	3.35	3.15	3.25	3.2
30	3.7	.....	4.7	4.25	3.95	3.45	3.2	3.35	3.2	3.2	3.2
31	3.7	.....	4.7	.....	3.9	.....	3.2	3.3	.....	a3.2	.....

a Estimated.

Monthly discharge of Sweetwater River near Descanso, Cal., for 1906.

[Drainage area, 40 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Sec.-ft. per sq. mile.	Dep inc
January	44	2.0	8.7	534	0.217	
February	86	4.2	22.3	1,240	.558	
March	1,250	17.0	180	11,100	4.50	
April	84	26	48.5	2,890	1.21	
May	36	13	21.6	1,330	.540	
June	15	2.6	7.0	418	.176	
July	2.6	1.2	1.8	112	.046	
August	4.6	1.1	1.8	108	.044	
September	5.8	1.0	1.5	90	.038	
October	1.4	1.0	1.1	68	.028	
November	12	1.1	3.0	177	.074	
December	66	4.4	10.1	121	.252	
The year	1,250	1.0	25.6	18,200	.640	

NOTE.—Discharges were obtained from several rating tables covering short periods of time. V are fair.

SAN DIEGO RIVER NEAR LAKESIDE, CAL.

San Diego River has its headwaters on the west side of San Jaci Mountains in the western portion of San Diego County, and flow a southwesterly direction, discharging into the Pacific Ocean north of San Diego city. This drainage basin lies just north of Sweetwater drainage basin and south of the Santa Ysabel ba

The extreme headwaters reach almost to the Santa Ysabel Indian Reservation on the north, and include the Cuyamaca reservoir. The topography of the basin is very rough, owing to numerous narrow canyons with small streams and mountain peaks, some of which have an elevation of 6,000 feet. The discharge is heavy in the spring and is of a torrential nature, but during the summer and fall there is no surface flow in the lower portion of the basin, the water disappearing in the sands 30 or 40 miles above San Diego city. The annual precipitation ranges from 10 to 20 inches near San Diego and from 20 to 30 or even 50 inches in the mountains, where some of it appears as snow. The formation is a loose granite and there is only a scrubby timber growth.

This station was established in December, 1905. It is located about 1 mile northwest of the Lakeside hotel and about three-fourths mile above the railroad station, on the road from Lakeside to Padre Barona Valley. It is 23 miles northeast of San Diego and is reached by the San Diego, Cuyamaca and Eastern Railway.

This station has a cable and car equipment, but, except in high stages, discharge measurements can always be made by wading. The bed of the stream is composed of a fine, shifting sand which supports no vegetation, and the channel is continually changing from side to side in low water. The left bank is high and rocky above the station and not liable to overflow, except below the measuring section. The right bank is composed of old river deposit and is subject to overflow above and below the station in very high stages. The channel is straight for 200 feet above and 250 feet below the station. The willow growth on right bank has been cleared away 20 feet above and below the cable. In low stages the quantity of water flowing on the surface depends on the saturation of the sand, and measurements will appear inconsistent, owing to the filling and scouring.

The gage consists of a 2 by 6 inch pine timber painted white and graduated to feet and tenths. It is on the left bank and is in two sections, a low and high water section, each bolted to granite bowlders.

The graduations extend from 2 to 7.8 feet.

The initial point for soundings is the head of a large nail on the left bank driven into a soft granite rock and painted yellow. 0. 0 in yellow paint is placed on the rock. A reference bench mark has been established on the top of the flat bowlder lying between the sycamore tree supporting the cable on the left bank and the bowlder used for an anchor. It is 8 feet downstream from station 20 of cable and is surrounded by a ring of white paint and has the assumed elevation of 400 feet marked on it. The zero of the gage is 7.77 feet below the bench mark, or at an elevation of 392.23 feet.

During 1906 the gage was read once a day by J. H. Lucas.

Discharge measurements of San Diego River near Lakeside, Cal., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	D cha
1906.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec*
January 9	W. V. Hardy	8	0.7	2.67	
January 24	do	25	8.3	3.04	
February 6	do	6	1.2	2.90	
February 12	do	52	24	3.20	
February 20	do	52	25	3.28	
February 22	do	50	42	3.54	
February 22	do	55	39	3.50	
February 22	do	54	30	3.40	
March 9	do	35	12	3.10	
March 13	do	68	123	4.50	
March 13	do	75	166	4.80	
March 14	do	63	75	4.10	
March 15	do	52	60	3.90	
April 7	do	62	75	4.50	
April 17	do	58	57	4.25	
April 21	do	57	39	4.15	
April 24	do	57	47	4.07	
April 30	do	50	46	4.25	
May 1	do	55	37	3.92	
May 9	do	50	30	3.86	
May 12	do	55	36	3.94	
June 20	C. H. Lee	10	2.6	3.45	
August 8	R. S. Hawley	2	0.4	3.39	
December 10	W. V. Hardy	.....	.....	3.30	

[a] Estimated, water too shallow to measure.

Daily gage height, in feet, of San Diego River near Lakeside, Cal., for 1905–6.

Day.	1905.	1906.									
	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	
1	.....	2.66	2.90	3.32	4.9	4.2	3.8	3.45	3.4	3.35	
2	.....	2.66	2.91	3.26	4.75	4.15	3.75	3.45	3.4	3.35	
3	2.60	2.66	2.91	3.20	4.65	4.0	3.75	3.45	3.4	3.35	
4	2.60	2.67	2.91	3.20	4.6	3.95	3.75	3.45	3.4	3.35	
5	2.60	2.68	2.92	3.28	4.5	3.9	3.7	3.45	3.4	3.3	
6	2.60	2.68	2.98	3.18	4.5	3.95	3.7	3.45	3.4	3.3	
7	2.60	2.68	3.02	3.12	4.5	3.9	3.7	3.4	3.4	3.3	
8	2.60	2.68	3.12	3.11	4.55	3.85	3.65	3.4	3.4	3.3	
9	2.60	2.68	3.02	3.10	4.45	3.85	3.65	3.4	3.4	.....	
10	2.62	2.67	3.12	3.08	4.4	3.8	3.65	3.4	3.4	.....	
11	2.62	2.66	3.15	3.08	4.35	3.85	3.6	3.4	3.4	.....	
12	2.63	2.65	3.18	3.20	4.35	3.85	3.6	3.4	3.4	.....	
13	2.63	2.65	3.18	4.50	4.25	3.9	3.6	3.4	3.4	.....	
14	2.63	2.66	3.20	4.10	4.2	3.85	3.6	3.4	3.4	.....	
15	2.63	2.66	3.28	3.96	4.2	3.8	3.55	3.4	3.4	.....	
16	2.63	2.67	4.00	4.05	4.2	3.8	3.55	3.4	3.4	.....	
17	2.63	2.67	3.64	4.65	4.2	3.8	3.5	3.4	3.4	.....	
18	2.64	2.67	3.48	4.36	4.2	3.75	3.5	3.4	3.4	.....	
19	2.64	2.74	3.41	4.25	4.15	3.8	3.5	3.4	3.4	.....	
20	2.66	3.91	3.28	3.94	4.1	3.75	3.5	3.4	3.4	.....	
21	2.66	3.40	3.26	3.88	4.15	3.75	3.5	3.4	3.4	.....	
22	2.66	3.35	3.54	3.84	4.1	3.75	3.5	3.4	3.4	.....	
23	2.65	3.68	3.48	3.90	4.1	3.75	3.5	3.4	3.4	.....	
24	2.65	3.07	3.38	5.58	4.05	3.75	3.5	3.4	3.4	.....	
25	2.65	3.00	3.24	7.00	4.05	3.75	3.45	3.4	3.4	.....	
26	2.65	2.96	3.22	6.88	4.0	3.75	3.45	3.4	3.35	.....	
27	2.67	2.92	3.18	5.80	4.0	3.85	3.45	3.4	3.35	.....	
28	2.67	2.92	3.18	5.42	4.05	3.75	3.5	3.4	3.35	.....	
29	2.67	2.92	.....	5.14	4.2	3.95	3.5	3.4	3.35	.....	
30	2.66	2.91	.....	4.96	4.25	3.85	3.5	3.4	3.35	.....	
31	.....	2.90	.....	4.99	.....	3.8	.....	3.4	3.35	.....	

NOTE.—The river was dry September 9 to December 3, 1906.

Monthly discharge of San Diego River near Lakeside, Cal., for 1906.

[Drainage area, 208 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	212	0.6	16.7	1,030	.080	.09
February	252	1.4	43.6	2,420	.210	.22
March	,800	15	683	42,000	3.28	3.78
April	890	105	277	16,500	1.33	1.48
May	170	39	65.7	4,040	.316	.36
June	51	2.8	15.1	898	.073	.08
July	2.8	.8	1.2	74	.0058	.007
August	.8	.4	.6	37	.0029	.003
September	.3	0	.1	6	.00048	.0005
October	0	0	0	0	.00	.00
November	0	0	0	0	.00	.00
December	152	0	11.0	676	.053	.06
The year	3,800	0	92.8	67,700	.446	6.08

NOTE. Discharges were obtained by the indirect method for shifting channels. Values are fair.

BERNARDO RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Bernardo River, or Santa Ysabel Creek, as it is known at its source, rises in the Volcan Range, on of the western ranges of San Jacinto Mountains, in the western part of San Diego County, at an elevation of 5,600 feet, and flows in a westerly direction through the San Pasqual Valley, below which it takes its true name and empties into the Pacific Ocean just north of the mouth of San Diego River. The upper part of this basin is on a loose granite formation and has a very rough topography, being cut up by numerous ravines in which small mountain streams flow continuously throughout the year. Below the mouth of the canyon, however, the surface flow of the Bernardo disappears in the sands of the San Pasqual Valley during the summer and fall.

The annual precipitation varies from 10 to 20 inches near San Diego, and from 20 to 30 or even 50 inches in the mountains, where some of it appears as snow. The heaviest discharge occurs in the spring, and is torrential in its nature. The drainage area above the mouth of the canyon where the gaging station is located is 128 square miles.

Measurements in this basin are useful for irrigation purposes.

SANTA YSABEL CREEK NEAR ESCONDIDO, CAL.

This station was established in December, 1905. It is located at the mouth of the canyon and at the head of the San Pasqual Valley, about 13 miles east of the town of Escondido. It is reached by driving up through the San Pasqual Valley from Escondido to Pott's ranch, the station being directly east of and only a few hundred feet from the ranch house.

This station is equipped with a cable and car, but it is only dur very high water that they need to be brought into use, as measu ments can be made by wading, except in flood. The bed is compo of fine sand and is constantly changing. The channel is straight 150 feet above and 100 feet below the cable, and both banks are l and rocky and not liable to overflow at any stage. The grad heavy above the section, so that high velocities are encountere flood stages, and in extremely high water only float velocities ca taken.

The gage is a 2 by 4 inch timber painted white and graduated i feet and tenths. It is in one section and is bolted in an inclined p tion to a large granite bowlder on the left bank. It is located feet downstream from station 175 of the cable, and the graduati extend from 2 to 8 feet.

The initial point for soundings is the head of the eyebolt sulphu into the large granite bowlder on the right bank. A reference be mark has been established on the highest point of the bowlde which the gage is bolted, 11 feet downstream from station 18 cable. A circle of white paint indicates the point, and the assu elevation of 500 feet is marked on the bowlder. The zero of the g is 11.66 feet below the bench mark, or at an elevation of 488.34 f

During 1906 the gage was read once a day by S. F. Potts.

Discharge measurements of Santa Ysabel River near Escondido, Cal., in 1905–6.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	D cha
1905.		*Feet.*	*Sq. ft.*	*Feet.*	*Se*
November 21	W. B. Clapp	5	2.2		
November 28	C. H. Lee	83	24	3.72	
December 21	do	24	7.2	3.55	
1906.					
January 10	W. V. Hardy	8	2.5	3.56	
January 30	do	27	8.4	3.55	
February 8	do	38	12.8	3.57	
February 11	do	37	14.6	3.64	
February 22	do	61	21	3.70	
March 8	do	72	17.4	3.70	
March 15	do	62	45	3.75	
March 23	do	69	48	3.52	
March 26	do	119	654	4.00	5,
March 26	do	108	461	2.65	3.
March 26	do	108	362	2.00	2,
March 27	do	95	216	1.00	
March 27	do	94	177	0.85	
March 27	do	94	186	0.70	
March 28	do	83	143	0.50	
April 14	do	58	46	1.00	
April 25	do	52	38	1.45	
April 30	do	77	51	1.82	
May 12	do	106	32	2.18	
June 24	C. H. Lee	39	14	2.35	
August 10	R. S. Hawley	10	2.8	2.45	
October 3 [a]	W. F. Martin			2.46	
November 30	W. V. Hardy	16	6.4	2.54	
December 7	do	15	6	2.64	
December 20	do	15	7	2.70	

[a] Stream flowing in several channels.

Daily gage height, in feet, of Santa Ysabel Creek near Escondido, Cal., for 1905–6.

Day.	1905. Dec.	Jan.	Feb.	Mar.	Apr.	May.	1906. June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		3.55	3.5	3.7	0.7	1.85	2.4	2.4	2.4	2.45	2.45	2.5	2.55
2		3.5	3.5	3.65	0.9	1.85	2.4	2.4	2.45	2.45	2.45	2.5	2.6
3		3.55	3.5	3.65	0.7	1.8	2.4	2.35	2.4	2.45	2.45	2.5	2.6
4		3.45	3.5	3.7	0.7	1.8	2.35	2.4	(2.4)	2.4	2.45	2.5	2.6
5		3.55	3.5	3.7	0.75	1.9	2.35	2.35	2.35	2.45	2.4	2.5	2.65
6		3.6	3.65	3.65	0.55	1.95	2.35	2.4	2.4	2.45	2.4	2.5	2.6
7		3.55	3.6	3.65	0.4	1.95	2.35	2.4	2.4	2.5	2.45	2.5	2.65
8		3.55	3.55	3.7	0.45	1.95	2.3	2.4	2.4	2.4	2.45	2.4	2.7
9		3.5	3.6	3.65	0.7	2.0	2.3	2.35	2.4	2.45	2.45	2.5	2.7
10		3.55	3.5	3.7	0.7	2.0	2.35	2.4	2.45	2.45	2.4	2.45	2.7
11		3.55	3.65	3.7	0.7	2.0	2.3	2.35	2.4	2.5	2.4	2.45	2.7
12		3.6	3.6	4.2	0.9	2.2	2.3	2.35	2.4	2.5	2.4	2.45	3.0
13		3.6	3.6	4.5	0.9	2.2	2.3	2.4	2.4	2.5	2.4	2.5	2.7
14		3.6	3.6	3.75	1.0	2.15	2.3	2.4	2.4	2.5	2.4	a2.5	2.7
15		3.6	3.9	3.7	1.0	2.1	2.35	2.4	2.45	2.5	2.4	2.55	2.7
16		3.5	3.9	3.8	1.05	2.2	2.3	2.4	2.45	2.5	2.45	2.5	2.7
17	3.46	3.5	3.75	4.25	1.15	2.2	2.3	2.4	2.45	2.5	2.45	2.5	2.7
18	3.47	3.6	3.7	3.9	a1.15	2.2	2.25	2.4	2.5	2.5	2.5	2.5	2.7
19	3.47	3.85	3.7	3.65	a1.15	2.2	2.3	2.4	2.55	2.45	2.5	2.5	2.7
20	3.48	3.75	3.7	3.6	a1.15	2.15	2.5	2.4	2.45	2.4	2.5	2.5	2.7
21	3.54	3.6	3.65	3.55	a1.2	2.2	2.3	2.4	2.45	2.4	2.5	2.55	2.7
22	3.52	3.5	3.7	3.6	1.2	2.25	2.25	2.4	2.4	(2.4)	2.5	2.55	2.7
23	3.50	3.5	3.7	3.5	1.3	2.25	2.2	2.4	2.4	2.45	2.5	2.6	2.75
24	3.48	3.55	3.65	6.3	1.4	2.3	2.3	2.4	2.45	2.45	2.5	2.5	2.7
25	3.49	3.5	3.65	3.5	1.45	2.3	2.4	2.45	(2.4)	2.5	2.5	2.55	2.7
26	3.48	3.5	3.65	1.9	1.4	2.45	2.3	2.45	2.4	2.5	2.5	2.6	2.8
27	3.47	3.55	3.65	0.9	1.5	2.35	2.35	2.4	2.4	2.5	2.5	2.55	2.8
28	3.48	3.55	3.7	0.6	1.6	2.25	2.4	2.4	2.45	2.5	2.5	2.55	2.75
29	3.51	3.55	.....	0.8	1.7	2.3	2.35	2.4	2.4	2.5	2.5	2.55	2.7
30	3.52	3.55	.....	0.9	1.6	2.4	2.3	2.4	2.4	2.45	2.5	2.55	2.75
31	3.55	3.55	.....	0.9	.....	2.4	.....	2.4	2.45	.....	2.5	.....	2.85

a Estimated.

Monthly discharge of Santa Ysabel Creek near Escondido, Cal., for 1906.

[Drainage area, 128 square miles.]

Month.	Discharge in second-feet. Maximum.	Minimum.	Mean.	Total in acre-feet.	Run-off. Sec.-ft. per sq. mile.	Depth in inches.
January	83	2	11.4	701	0.089	0.10
February	95	8	30.5	1,690	.238	.25
March	8,000	29	633	38,900	4.94	5.70
April	400	102	221	13,200	1.73	1.93
May	90	35	69.7	4,290	.545	.63
June	35	23	28.4	1,690	.222	.25
July	50	5	12.4	762	.097	.11
August	6	4	4.2	258	.033	.04
September	4	3	3.1	184	.024	.03
October	7	3	4.7	289	.037	.04
November	15	6	9.6	571	.075	.08
December	21	11	12.4	762	.097	.11
The year	8,000	2	86.7	63,300	.677	9.27

NOTE.—Discharges were obtained by the indirect method for shifting channels. Values are approximate.

SAN LUIS REY RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

San Luis Rey River rises on the western slope of the Coast Range in the northern portion of San Diego County, and flows in a westerly direction, discharging its waters into the Pacific Ocean near the town

of Oceanside. It has numerous small tributaries, none of which ha their sources at elevations above 5,000 feet. On the upper reaches this stream the country is rolling, with several small valleys which under cultivation, being used principally for the raising of grain a the pasturage of stock. At a point below what is known as the W ner's ranch reservoir site the river flows through a deep, narrow c yon with a heavy grade for a distance of about 10 miles. Below t point the grade is light, and the discharge is over a sandy and grave bed, where the water soon disappears, again rising in small quantit near the town of Pala, where the gaging station is located. Bel the station it flows for a distance of about 25 miles on a light gr to the Pacific Ocean. There is a good soil covering throughout t basin, with a considerable growth of brush and grass, and with sm areas of timber on the extreme higher elevations. The water diverted at several points for irrigation, a considerable quantity be taken from the canyon above the gaging station and used in vicinity of Escondido, which lies in an entirely separate drain basin. This stream is torrential in its character, the discharge be very light except during the winter season, in times of heavy rainf The mean precipitation varies from 10 to 20 inches and falls pri pally in the form of rain, there being only a light fall of snow on extreme higher elevations, which soon melts and only adds to the fl discharge.

SAN LUIS REY RIVER NEAR PALA, CAL.

This station was established October 9, 1903. It is located at Si ler's mill, 4 miles above Pala, Cal. It is reached by driving from F brook or Temecula, stations on the Southern California Railway, and 13 miles distant, respectively. The conditions at this stat and the bench marks are described in Water-Supply Paper No. 1 page 91, where are given also references to publications that cont data for previous years. The datum of the gage was lowered 4 feet November 13, 1906.

Discharge measurements of San Luis Rey River near Pala, Cal., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
January 11	W. V. Hardy	10	6	0.60	9.0
January 28	do	12	8.3	0.18	14.7
February 9	do	12	5.5	0.13	10.4
February 26	do	19	8.6	0.66	17.9
March 4	do	22	14	1.02	38
March 4	do	22	16	1.10	43
March 5	do	22	18.8	1.20	48
March 6	do	20	14.	1.00	38
March 7	do	20	12.4	0.93	32
March 16	do	72	116	3.70	447
March 17	do	89	287	5.30	1,540
March 17	do	79	191	4.70	984
March 17	do	72	156	4.30	811
March 18	do	72	113	3.80	532
March 19	do	67	105	2.70	367
March 20	do	52	73	2.50	238
March 21	do	52	64	2.40	182
April 12	do	65	84	2.20	307
April 26	do	57	37	1.52	119
May 14	do	48	58	1.18	166
June 27	C. H. Lee	33	15	0.61	28
August 5	R. S. Hawley	11	3.8	0.30	5.9
October 10	W. F. Martin	15	2.8		3.0
November 13	W. V. Hardy	8	3.2	[a]5.27	3.5
December 5	do	25	9.0	[a]5.55	13
December 28	do	57	102	[a]7.15	322

[a] By new gage.

Daily gage height, in feet, of San Luis Rey River near Pala, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.75	0.1	0.8	3.35	1.6	1.1	0.5	0.5	0.2	0.2	.....	5.6
2	.7	.1	.8	2.9	1.5	1.1	.5	.5	.2	.2	.....	5.6
3	.7	.9	.8	2.55	1.4	1.1	.5	.5	.2	.2	.....	5.55
4	.7	.9	1.0	2.5	1.4	1.1	.5	.5	.2	.2	.....	5.55
5	.7	.15	1.2	2.75	1.5	1.1	.5	.5	.2	.2	.....	5.55
6	.7	.2	1.0	3.0	1.45	1.05	.5	.5	.2	.2	.....	5.55
7	.7	.3	.95	3.0	1.4	1.0	.5	.25	.2	.2	.....	5.5
8	.7	.3	.7	3.05	1.3	1.0	.5	.3	.2	.2	.....	5.5
9	.65	.25	.6	2.6	1.3	.9	.5	.25	.2	.2	.....	5.5
10	.65	.2	.65	2.6	1.3	.85	.5	.25	.2	.2	.....	5.45
11	.6	.65	.65	2.45	1.25	.8	.5	.3	.2	.2	.....	5.4
12	.6	.5	5.0	2.2	1.55	.7	.5	.25	.2	.2	.....	7.8
13	.6	.4	6.55	2.15	1.4	.7	.5	.2	.2	.2	5.25	7.2
14	.7	.4	3.55	2.15	1.2	.65	.5	.2	.2	.2	5.25	6.5
15	.7	.8	2.3	2.15	1.15	.6	.5	.2	.5	.2	5.25	5.8
16	.7	2.65	2.85	2.05	1.1	.6	.5	.2	.35	.....	5.25	5.8
17	.65	.85	4.8	2.05	1.05	.85	.5	.2	.2	.....	5.25	5.7
18	.65	.95	3.65	1.95	1.0	.8	.5	.8	.2	.....	5.25	5.65
19	1.0	.85	2.95	1.95	1.0	.7	.5	.7	.2	.....	5.25	5.6
20	2.6	.75	2.5	1.85	.95	.6	.5	.6	.2	.....	5.25	5.55
21	1.2	.9	2.4	1.8	1.0	.6	.5	.5	.2	.....	5.25	5.55
22	.9	.95	2.5	1.75	.9	.65	.5	.3	.2	.....	5.5	5.5
23	.6	1.0	2.5	1.75	.9	.6	.5	.25	.2	.....	5.65	5.5
24	.3	.95	10.0	1.65	.9	.55	.5	.25	.2	.....	5.6	5.45
25	.3	.9	7.0	1.6	.9	.5	.5	.2	.2	.....	5.6	5.4
26	.25	.6	7.25	1.5	1.25	.5	.5	.2	.2	.....	5.6	5.8
27	.2	.6	4.6	1.45	1.5	.5	.5	.2	.2	.....	5.7	6.6
28	.18	.9	4.4	1.7	1.7	.5	.5	.2	.2	.....	5.6	6.7
29	.15	.....	4.1	1.7	1.5	.5	.5	.2	.2	.....	5.6	6.8
30	.15	.....	3.35	1.6	1.3	.5	.5	.2	.2	.....	5.6	6.6
31	.15	.....	4.0	.....	1.25	.....	.5	.2	.....	.....	.....	6.7

NOTE.—Gage heights after November 13 are by the new gage, the datum of which is 4.66 feet below that of the old gage.

Monthly discharge of San Luis Rey River near Pala for 1906.

[Drainage area, 318 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	232	9	21.4	1,320	0.067	
February	241	10	28.6	1,590	.090	
March	13,000	17	1,120	68,900	3.52	
April	620	114	301	17,900	.947	
May	260	100	158	9,720	.497	
June	128	19	65.6	3,900	.206	
July	19	19	19.0	1,170	.060	
August	43	3	10.3	633	.032	
September	19	3	3.7	220	.012	
October	3	3	3.0	184	.0094	
November	28	3	8.3	494	.026	
December	550	9	79.3	4,880	.249	
The year	13,000	3	152	111,000	.476	

NOTE.—Discharges were obtained by the indirect method for shifting channels. Values are f

SANTA MARGARITA RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Temecula Creek, as Santa Margarita River is known at its be
ning, rises on the western slope of the San Jacinto Mountains in
northwestern part of San Diego County just north of the San
Rey drainage basin, flows north into Riverside County, then
about 15 miles to Temecula, where it flows southwest thro
Temecula Canyon into San Diego County and empties into the Pa
Ocean as Santa Margarita River. The highest elevation in the b
is about 5,500 feet on the divide between Temecula and San
Rey. Temecula Creek has few tributaries, and the topograph
rather broken, though there are several small valleys in the u
reaches. The rock formation through which it flows is a loose gra
with good soil covering, and there is considerable growth of sm
scrubby timber. The annual precipitation varies from 10 to
inches and occurs almost entirely as rain. The discharge is q
heavy in the spring during the flood season, but is small during
rest of the year.

Measurements are useful in connection with irrigation.

TEMECULA CREEK NEAR TEMECULA, CAL.

This station was established December 30, 1905. It is loc
about 1½ miles south of the town of Temecula at the bridge on
road from Temecula to Pala and Falbrook. It is reached by dri
from Temecula.

The channel is straight for 500 feet above and 100 feet below.
bed is shifting sand and the channel is continually changing, b

usually in two channels at low water. Neither bank is liable to overflow at any stage.

During low water, discharge measurements are made by wading below the bridge. High-water measurements are made from the downstream side of the bridge.

The gage, which during 1906 was read once a day by Hugh McConville, is a 2 by 6 inch timber fastened to the downstream pier nearest to the right bank by two pieces of strap iron. It is in one vertical section, painted white, and graduated into feet and tenths. The graduations run from 0.0 to 10 feet. Marks 10 feet apart are put on the bridge rail in yellow paint for use in soundings. The bench mark is a nail in the base of a willow tree on the right bank of the river below the bridge; elevation, 8.13 feet above the zero of the gage.

Discharge measurements of Temecula River near Temecula, Cal., in 1905–6.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1905.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
November 14	W. B. Clapp	11	5.4	3.10	5.8
December 30	W. V. Hardy	9	3.5	2.98	4.6
1906.					
January 12	W. V. Hardy	8	3.3	2.90	4.4
January 29	do	8	4.0	2.94	4.9
February 10	do	10	4.1	2.99	4.4
February 24	do	16.5	7.7	3.20	3.3
March 5	do	12	10.3	3.49	6.0
March 6	do	12.	9.3	3.42	5.4
March 18	do	36	18.0	3.82	16.8
March 19	do	27	11.9	3.69	12.0
April 13	do	65	16.0	5.84	12.1
April 27	do	11	4.1	5.82	5.6
May 15	do	15	5.0	5.88	6.4
June 26	C. H. Lee	11	2.1	5.80	2.6
August 5	R. S. Hawley	3	0.8	..	0.8
October 10	W. F. Martin	16	2.5	.....	3.9
November. 12	W. V. Hardy	14.5	5.7	5.80	7.6
December 4	do	10	4.4	6.00	7.2
December 29	do	12	6.0	6.10	14.9

Daily gage height, in feet, of Temecula River near Temecula, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	D
1	3.0	2.9	3.4	5.9	5.75	5.8	5.8	
2	3.0	2.8	3.5	5.8	5.7	5.8	5.8	
3	3.0	2.8	3.5	5.8	5.7	5.8	5.8	
4	3.0	2.8	3.45	5.8	5.7	5.8	5.8	
5	3.0	2.8	3.45	6.7	5.75	5.8	5.8	
6	3.0	2.8	3.5	6.3	5.75	5.8	5.8	
7	3.0	2.8	3.5	5.8	5.75	5.8	5.8	
8	3.0	2.9	3.55	5.8	5.75	5.8	5.8	
9	2.9	2.95	3.5	5.8	5.75	5.8	5.8	
10	2.9	2.95	3.6	5.8	5.75	5.8	5.8	
11	2.9	3.0	3.9	5.8	5.75	5.75	5.8	
12	2.9	3.0	4.9	5.8	5.7	5.7	5.8	
13	2.9	3.0	5.0	5.8	5.7	5.75	5.8	
14	2.9	3.0	4.9	5.8	5.7	5.8	5.8	
15	2.9	3.0	4.9	5.8	5.7	5.75	5.8	
16	2.9	3.2	3.7	5.8	5.8	5.75	5.8	
17	2.9	3.2	3.7	5.8	5.85	5.75	5.8	
18	2.9	3.25	3.65	5.8	5.85	5.75	.....	
19	3.1	3.25	3.65	5.75	5.85	5.75	.....	
20	3.0	3.25	3.5	5.75	5.85	5.75	.....	
21	3.0	3.25	3.3	5.75	5.85	5.75	.....	
22	3.0	3.25	3.4	5.75	5.9	5.75	.....	
23	3.0	3.25	9.6	5.75	5.9	5.75	.....	
24	3.0	3.25	9.65	5.75	5.85	5.75	.....	
25	3.0	3.25	8.0	5.75	5.85	5.75	.....	
26	3.0	3.3	7.6	5.75	5.9	5.8	.....	
27	2.9	3.4	6.0	5.75	5.85	5.8	.....	
28	2.9	3.4	5.5	5.75	5.8	5.8	.....	
29	2.9	.....	5.5	5.75	5.8	5.8	.....	
30	2.9	.....	5.9	5.75	5.8	5.8	.....	
31	2.9	.....	5.9	.....	5.8	.....	.....	

NOTE.—No gage height record was kept from July 18 to December 2. Discharges have not been c puted on account of the small number of measurements at times of excessive changes in channel.

SANTA ANA RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Santa Ana River has its source in the southern slope of the S Bernardino Mountains. It traverses the San Bernardino Valley i southwesterly direction, breaks in a narrow canyon through Santa Ana Mountains, and finally discharges through the Santa A Valley into the Pacific Ocean below the town of Santa Ana. Num ous tributaries rise in the southern slope of the San Bernard Mountains, the surface flow of most of which reaches Santa Ana Riv where it traverses San Bernardino Valley only in times of flood c charge. The topography on the higher elevations is rough a rugged, reaching elevations of from 10,000 to 12,000 feet, the for tion being of granite with good soil covering and considerable grov of timber. On the lower elevations the topography is less rough a the soil covering is principally of brush. A gaging station is loca on this stream at Warm Springs, about 8 miles above Redlan Below this the river leaves the mountainous country and dischar over a sandy and gravelly bed through the San Bernardino Vall During the summer months the entire flow of the stream is diver above this gaging station and used for power development at

mouth of the canyon, below which point it is again taken out and used for irrigation on the higher elevations of the San Bernardino Valley along the base of the mountains, where the country is under a high state of cultivation, principally for the raising of citrus fruits. The water rises to the surface in San Bernardino Valley near the city of San Bernardino and is diverted and used extensively for irrigation in the neighborhood of Riverside. In addition to this surface flow, a large number of wells have been sunk in this territory, many of which are artesian, while others require pumping. This developed water is also used extensively for irrigation in the vicinity of San Bernardino and Riverside. The water is again forced to the surface by bed-rock obstructions at Riverside Narrows below the city of Riverside, and gradually increases in volume until it reaches Santa Ana Canyon, where it is diverted for irrigation on the lower valley lands in the vicinity of Santa Ana and Fullerton. During the summer months measurements are made of the flow at Rincon, Cal., at the head of Santa Ana Canyon. There are only occasional flood discharges of this river which flow continuously from the mountain to the sea. The mean precipitation throughout this basin is from 15 to 30 inches, which falls in the form of rain except on the higher elevations of the San Bernardino Mountains, where there is a considerable snowfall, usually remaining on the extreme high elevations until midsummer. A storage reservoir has been constructed on Bear Creek, a tributary of this stream, and is known as the Bear Valley reservoir. This stored water is held until the summer months and used for irrigation in the San Bernardino Valley.

SANTA ANA RIVER NEAR MENTONE, CAL.

This station was established in June, 1896. It is located 5 miles northeast of Mentone, Cal., three-fourths of a mile below the head works of the Mentone Power Company's canal and opposite the warm springs in the canyon.

The Edison Electric Company diverts the greater portion of the water from Santa Ana River above the gaging station, but also returns all of it above the station. They, however, allow only limited portions of the water to pass out of their conduits during certain hours of the day, holding back the water for the purpose of obtaining additional power when the greatest demand exists.

The Mentone Power Company's canal, formerly called the Santa Ana canal, diverts water above the station, all of which is returned below the point of measurement. During the low-water season the entire flow of the river is diverted by the canals. The conditions at this station and the bench marks are described in Water-Supply Paper No. 177, page 94, where are given also references to publications that contain data for previous years.

Discharge measurements of Santa Ana River near Mentone, Cal., in 1906.

Date.	Hydrographer.	Gage height of river.	Discharge.		
			River.	Mentone Power Company's canal.	Total flow
		Feet.	*Sec.-ft.*	*Sec.-ft.*	*Sec.*
January 20	C. H. Lee	2.17	87	37	
February 11	do	1.51	11	42	
February 11	do	1.57	15.8	42	
February 11	do	1.54	12.8	42	
February 12	do	1.45	6.7	52	
March 14	do	3.50	351	27	
March 16	do	5.40	1,410	49	1
March 16	do	5.80	1,870	49	1
March 17	do	4.15	677	0	
March 17	do	3.85	597	0	
March 18	do	3.70	405	11	
March 23	M. P. Beeson	3.05	156	55	
March 25	do	4.90	913	35	
March 26	do	6.35	2,250	34	2
March 26	do	5.90	1,780	34	1
March 27	do	5.25	1,200	25	1
April 10	C. H. Lee	3.00	130	68	
April 21	M. P. Beeson	3.50	214	72	
May 12	do	3.60	148	71	
May 12	do	3.60	160	71	
June 2	do	3.50	149	66	
June 28	do	3.00	70	71	
August 4	R. S. Hawley	2.55	13.1	72	
October 11	W. F. Martin	2.31	2.9	61	
December 28	do	3.85	276	74	

Daily gage height, in feet, of Santa Ana River near Mentone, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	D
1	1.3	1.3	1.9	3.9	3.1	4.0	3.0	2.6	2.3	2.5	2.3	
2	1.3	1.3	1.9	3.4	3.0	3.5	3.0	2.6	2.3	2.5	2.3	
3	1.3	1.3	1.7	3.3	2.9	3.5	2.9	2.5	2.3	2.5	2.3	
4	1.3	1.3	1.6	3.4	2.9	3.3	2.9	2.5	2.3	2.5	2.3	
5	1.3	1.3	1.5	2.4	3.6	3.3	3.0	2.4	2.3	2.5	2.3	
6	1.3	1.3	1.5	3.3	3.7	3.3	3.0	2.4	2.3	2.5	2.3	
7	1.3	1.3	1.4	3.2	3.4	3.2	3.0	2.4	2.2	2.5	2.3	
8	1.3	1.3	1.4	3.1	3.8	3.2	3.0	2.4	2.2	2.5	2.3	
9	1.3	1.3	1.4	3.0	3.8	3.2	2.9	2.4	2.2	2.5	2.3	
10	1.3	1.3	1.4	3.0	3.8	3.2	2.9	2.4	2.2	2.5	2.3	
11	1.3	1.3	1.4	3.0	3.8	3.4	2.9	2.4	2.2	2.5	2.3	
12	1.3	1.3	6.5	2.9	3.6	3.2	2.9	2.4	2.2	2.5	2.3	
13	1.3	1.3	4.5	2.9	3.6	3.2	2.9	2.6	2.2	2.5	2.3	
14	1.3	1.3	3.4	3.0	3.4	3.2	2.9	2.6	2.2	2.5	2.3	
15	1.3	1.3	3.0	2.9	3.3	3.2	2.9	2.5	2.2	2.5	2.3	
16	1.3	1.3	5.0	2.9	3.5	3.2	3.0	2.6	2.3	2.5	2.3	
17	1.3	1.3	4.15	2.9	3.2	3.1	2.9	2.9	2.3	2.5	2.3	
18	1.3	1.3	3.7	2.9	3.2	3.1	2.9	3.0	2.3	2.5	2.3	
19	2.4	1.3	3.45	2.9	3.2	3.1	2.8	2.7	2.3	2.5	2.3	
20	2.2	1.3	3.25	3.0	3.2	3.1	2.8	2.6	2.3	2.5	2.3	
21	1.7	1.3	3.15	3.5	3.2	3.1	2.7	2.5	2.3	2.3	2.3	
22	1.5	1.9	3.1	3.8	3.4	3.1	2.8	2.4	2.5	2.3	2.3	
23	1.5	2.0	3.05	3.9	3.5	3.1	2.8	2.3	2.5	2.3	2.3	
24	1.4	2.0	4.6	3.9	3.5	3.4	2.9	2.1	2.5	2.3	2.3	
25	1.4	2.0	4.95	3.7	3.2	3.1	2.8	2.0	2.5	2.3	2.3	
26	1.3	2.0	5.8	3.7	3.2	3.0	2.8	2.3	2.5	2.3	2.3	
27	1.3	2.0	5.2	3.1	3.3	3.1	2.8	2.3	2.5	2.3	2.3	
28	1.3	2.0	4.9	3.5	4.9	3.1	2.7	2.3	2.5	2.3	2.3	
29	1.3	.....	4.6	3.8	4.4	3.0	2.7	2.3	2.5	2.3	2.3	
30	1.3	.....	4.3	3.8	4.3	3.0	2.7	2.3	2.5	2.3	2.3	
31	1.3	.....	4.2	.....	4.0	.....	2.6	2.3	.....	2.3	.....	

Daily discharge, in second-feet, of Mentone Power Company's canal near Mentone, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	34	32	51	0	70	71	71	72	63	64	67	62
2	33	32	48	56	71	66	66	72	58	64	60	61
3	34	32	48	55	71	70	71	72	58	64	60	70
4	34	32	43	57	71	71	71	72	63	63	62	71
5	34	32	56	56	71	70	71	72	63	63	64	71
6	34	35	52	52	71	70	71	72	63	63	66	72
7	34	35	51	65	71	70	71	71	66	61	66	67
8	34	35	50	70	70	70	71	68	64	61	56	60
9	34	44	50	70	72	70	71	70	63	61	60	60
10	34	41	50	68	71	70	71	71	62	61	60	68
11	33	42	46	73	66	70	71	71	62	61	60	61
12	34	52	43	74	71	70	71	71	62	61	60	59
13	35	59	40	74	66	71	71	71	59	61	58	74
14	45	55	27	66	63	71	71	72	60	61	54	72
15	44	63	43	66	66	71	71	72	64	61	57	72
16	44	62	49	66	66	71	71	72	63	61	54	65
17	37	64	0	68	66	70	71	45	58	61	54	68
18	37	51	11	68	68	70	71	42	58	64	56	65
19	59	49	35	71	70	71	71	72	56	63	56	65
20	37	48	44	72	70	71	71	72	56	63	54	59
21	48	48	43	72	66	70	71	72	57	67	57	59
22	50	60	58	71	71	72	71	72	54	67	53	59
23	37	58	55	71	71	71	71	72	52	67	53	56
24	37	56	71	71	71	71	71	72	52	67	53	61
25	41	55	35	70	66	71	72	72	52	67	52	59
26	38	53	34	71	66	66	72	70	52	67	52	76
27	35	51	25	71	64	64	72	70	59	66	59	74
28	35	49	55	71	0	71	72	66	62	64	56	74
29	33	.....	34	71	66	71	72	66	63	68	57	74
30	33	.....	21	71	66	71	72	65	64	67	62	73
31	33	.....	27	.....	64	.....	72	66	.....	67	.....	74

Monthly discharge of Santa Ana River near Mentone, Cal., for 1906.

[Drainage area, 182 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	181	34	46.8	2,880	0.257	0.30
February	121	33	63.1	3,500	.347	.36
March	2,440	51	530	32,600	2.91	3.36
April	495	186	274	16,300	1.50	1.67
May	536	163	245	15,100	1.35	1.56
June	329	135	172	10,200	.945	1.05
July	140	90	119	7,320	.654	.75
August	111	67	80.5	4,950	.442	.51
September	74	58	64.1	3,810	.352	.39
October	74	66	71.4	4,390	.392	.45
November	69	54	60.3	3,590	.331	.37
December	859	56	111	6,820	.610	.70
The year	2,440	33	153	111,000	.841	11.47

NOTE.—The discharge includes that of the Mentone Power Company's canal. Discharges for the river were obtained from rating tables covering short periods of time on account of the constant change in channel. Values are fair.

SEEPAGE MEASUREMENTS.

In the vicinity of Colton and San Bernardino large quantities of water are developed in addition to the natural surface flow. This water is used for the irrigation of land in the vicinity of San Ber-

nardino, Colton, and Riverside, and also for domestic supply these towns. Much of this water returns to Santa Ana River bel Riverside, above a point known as Slover Mountain, and is ag diverted and used for irrigation on the lower lands below Rivers a d above what is known as Riverside Narrows. Below this po there are still further diversions which irrigate the lower la along the river bottom, much of this water again returning to river above Rincon. Measurements were made during the summ of 1905 and 1906 to determine the amount of water, including natural flow and developed water, above Colton, Cal. Also me urements were made of natural flow and developed water bel Slover Mountain and above Riverside Narrows, this all being retu water from irrigated lands on the higher elevations. Measureme were also made of diversion ditches and Santa Ana River bel Riverside Narrows and above what is known as the Auburnd Bridge. The following tabulations show the result of these me urements, which were made by K. Sanborn, of Riverside, Cal.

Measurements made during 1905 are contained in Water-Sup Paper No. 177, pages 99 to 102.

Natural flow, in second-feet, of return water to Santa Ana River, compared with develo water in San Bernardino above Colton, Cal., 1906.

[Measurements by Kingsbury Sanborn, engineer Riverside Water Company.]

Date.	Location.	De-veloped.	Natural.	To
June 23	Barnhill pumping plant	1.30		
August 27	....do	1.50		
June 18	Beam ditch		0.00	
August 23	....do		.00	
June 20	Bloomington pumping plant	10.50		
September 20	....do	6.70		
September 20	Citizens Water Co. pumping plant	1.50		
June 29	City of San Bernardino, Sixth street pumping plant	2.00		
October 23	....do	4.80		
June 20	City of San Bernardino, Lytle Creek		1.90	
September 20	....do		2.00	
June 19	City of Colton pumping plant (total)	2.40		
August 27	....do	3.50		
June 19	City of Colton (water used for irrigating)	.70		
August 27	....do	1.60		
June 20	Camp Carlton ditch	2.70		
September 7	....do	1.94		
June 19	Carr pumping plant	.40		
August 24	....do	.70		
June 25	Daley ditch		.00	
October 24	....do		.00	
June 27	Excelsior Land and Water Co	.60		
August 24	....do	.75		
June 19	Grand Terrace pumping plant	.30		
September 7	....do	.35		
June 20	Gage Canal, Palm avenue weir	22.90	8.30	
September 7	....do	38.00		
June 19	Gage Canal intake, Santa Ana River		8.30	
September 7	....do		.00	
June 14	Haws & Talmadge ditch		.05	
August 23	....do		.08	
June 19	Hunter pumping plant	1.90		
August 27	....do	1.50		
June 23	Johnson & Hubbard pumping plant	.52		
August 27	....do	.48		
June 23	Lamb pumping plant	.00		
August 27	....do	.00		
June 23	Lawson Well Co. pumping plant	.60		
August 27	....do	.70		
June 18	Logsdon & Farrell ditch		.00	

Natural flow, in second-feet, of return water to Santa Ana River, compared with developed water in San Bernardino above Colton, Cal., 1906—Continued.

Date.	Location.	Developed.	Natural.	Total.
October 24	Logedon & Farrell ditch		0.00	0.00
June 20	Lytle Creek Water and Improvement Co. pumping plant.	0.00		.00
September 20	do	.60		.00
June 28	Merryfield pumping plant	.50		.80
August 24	do	.79		.79
June 18	McKenzie ditch		.00	.00
August 23	do		.00	.00
June 28	Meeks & Daley ditch		16.90	16.90
August 31	do		17.10	17.10
June 22	McIntyre ditch		.00	.00
September 20	do		.00	.00
June 23	Orange Land and Water Co. pumping plant	.00		.00
August 27	do	.00		.00
June 20	Riverside Highland Water Co. pumping plant	3.60		3.60
September 20	do	6.10		6.10
June 20	Riverside Highland Water Co., Santa Ana River	1.80	2.50	4.30
September 7	do	6.90		6.90
June 20	Rancheria pumping plant	2.00		2.00
September 20	do	1.90		1.90
June 14	Rabel ditch		.00	.00
August 23	do		.00	.00
June 19	Riverside Water Co., upper canal	2.90	38.60	41.50
August 31	do	23.65	26.35	50.00
June 23	Riverside Water Co. mill pumping plant	.00		.00
August 31	do	.00		.00
June 20	Riverside Water Co. flume		16.70	16.70
August 31	do		.00	.00
June 25	Riverside Water Co. flume pump No. 1	.00		.00
August 31	do	.00		.00
June 25	Riverside Water Co. flume pump No. 2	.00		.00
August 31	do	.00		.00
June 28	Rosedale Water Co. pumping plant	.50		.50
August 24	do	.00		.00
June 19	Rogers pumping plant	1.60		1.60
September 7	do	2.40		2.40
June 25	Shay or Stout Dam ditch		.00	.00
August 23	do		.24	.24
June 23	Swamp ditch		.80	.80
August 29	do		.64	.64
June 27	West Riverside 350-inch Water Co. pumping plant	6.00		6.00
August 31	do	6.50		6.50
June 22	Whitlock ditch		.00	.00
October 24	do		.00	.00
October 24	Whiting ditch		.00	.00
June 20	Ward and Warren ditch		5.10	5.10
September 7	do		.06	.06

Return waters, in second-feet, in San Bernardino Valley below Slover Mountain and above Riverside Narrows, 1906.

[Measurements by Kingsbury Sanborn, engineer Riverside Water Company.]

Date.	Location.	Developed.	Natural.	Total.
June 27	Alvitrez ditch at headgate, east end of West Riverside Bridge		5.20	5.20
August 28	do		5.00	5.00
June 29	Cuttle's pumping plant	2.50		2.50
September 7	do	2.50		2.50
June 29	California Orange Co	1.30		1.30
September 7	do	1.40		1.40
June 29	Evans Island or Jansen ditch, under west end of West Riverside Bridge.		.00	.00
September 3	do		.00	.00
June 26	Evans ditch near county line		1.90	1.90
September 3	do		.00	.00
June 23	Evans Well ditch, Santa Ana street		.00	.00
September 3	do		.00	.00
June 29	Evans pipe line to China garden at headworks		.00	.00
September 13	do		2.70	2.70
June 27	Evans pumping plant 1,000 feet south of west end of West Riverside Bridge.	3.60		3.60
August 28	do	5.53		5.53
June 29	Evans Jurupa pumping plant	.00		.00
June 30	Ferris Gallagher ditch, near headworks		2.50	2.90
September 13	do		3.25	3.25
June 30	Gallagher ditch, near headworks		.76	.76
September 13	do		.00	.00

Return waters, in second-feet, in San Bernardino Valley below Slover Mountain above Riverside Narrows, 1906—Continued.

Date.	Location.	Developed.	Natural.	To
June 26	Jurupa pumping plant to supply Rubidoux ditch	2.30		
September 3	do	5.20		
June 27	Lower canal, Riverside Water Co		3.10	
September 3	do		.00	
June 29	Pond's pumping plant	1.30		
September 7	do	2.50		
June 26	Rubidoux ditch at measuring box		4.40	
September 3	do		2.00	
June 21	Riverside Power Co. canal at Pedley crossing		27.70	
September 29	do		35.00	
June 29	Rivino Land Co. pumping plant No. 1	.80		
September 7	do	.70		
September 13	Rivino Land Co. pumping plant No. 2	.83		
June 25	Smith or Evans ditch 1 mile below Riverside County line		1.70	
September 3	do		.00	
June 27	Soquel ditch at intake		6.00	
August 28	do		5.30	
June 23	Spring Brook pumping plant at weir at end of main	.00		
September 3	do	.00		
June 26	Spanishtown pumping plant at weir at end of main	4.00		
September 3	do	.00		
June 30	Zimmerman pipe line		2.20	
September 13	do		.00	

Discharge measurements, in second-feet, of canals between Riverside Narrows and Auburndale Bridge having their source in Santa Ana River, 1906.

Date.	Location.	Discha
June 21	Castile ditch near intake	
September 29	do	
June 21	Durkee ditch at Auburndale road crossing	
September 29	do	
June 21	Fuller ditch	
September 29	do	
June 21	Gilliland ditch at Auburndale road crossing	
September 29	do	
June 21	Newton ditch near intake	
September 29	do	
June 21	Newberry ditch at Auburndale road crossing	
September 29	do	
June 21	Roberts or LeGay ditch near intake, Santa Ana River	
September 29	do	
June 21	Wilbur ditch at Rogers pipe trestle crossing, Santa Ana River	
September 29	do	
June 21	Santa Ana River at Auburndale Bridge	
September 29	do	
June 21	Santa Ana River at Auburndale Bridge, including ditches	
September 29	do	

MISCELLANEOUS MEASUREMENTS IN SANTA ANA RIVER DRAINA BASIN.

The following is a list of miscellaneous discharge measureme made in the Santa Ana River drainage basin during 1906.

Cable Canyon Creek near Glen Helen, Cal.—This stream is a tri tary of the Santa Ana River. A measurement was made July 1906, at the diversion weir in the canyon:

Diversion over weir, 1.1 second-feet; waste below weir, 2.1 second-feet; total of creek, 2.2 second-feet.

Cajon Creek near Keenbrook, Cal.—This stream is a tributary Lytle Creek. A measurement was made July 16, 1906, in the can at Keenbrook:

Width, 3 feet; area, 1.3 square feet; discharge, 3.3 second-feet.

Chino Creek near Rincon, Cal.—This stream is a tributary of Santa Ana River. The following measurements were made during 1906, at the wagon bridge at Rincon road crossing, one-fourth mile above junction with Santa Ana River:

June 25: Width, 3 feet; area, 1.5 square feet; discharge, 3.9 second-feet.
August 31: Width, 3.5 feet: area, 1.3 square feet; discharge, 2.6 second-feet.
November 7: Width, 5.5 feet; area, 6.2 square feet; discharge, 10.3 second-feet.

Devil Canyon Creek near Irvington, Cal.—This stream is a tributary of Santa Ana River. A measurement was made July 14, 1906, at the mouth of the canyon:

Width, 4 feet; area, 2.4 square feet; discharge, 5.2 second-feet.

East Twin Creek near Arrowhead Springs, Cal.—This stream is a tributary of the Santa Ana River. A measurement was made July 14, 1906, in the canyon above the canal diversion:

Width, 2 feet; area, 1.8 square feet; discharge, 2.7 second-feet.

Lytle Creek near Rialto, Cal.—This stream is one of the principal tributaries of Santa Ana River. A measurement was made July 16, 1906, at the head of the Fontella Development Company's canal at the mouth of the canyon:

Diversion over weir, 25.4 second-feet; waste below weir, 56 second-feet; total flow of creek, 81.4 second-feet.

Santa Ana River near Rincon, Cal.—The following measurements were made during 1906, at the Rincon wagon bridge, at the lower end of the San Bernardino Valley and at the head of the lower Santa Ana Canyon. These measurements, with the addition of those of Chino Creek, show the total discharge of Santa Ana River below all diversions in the San Bernardino Valley, and show the amount of water used for irrigation in the vicinity of Orange, Santa Ana, Anaheim, and Fullerton, Cal., diversions being made below this point of measurement:

June 25: Width, 47 feet; area, 40 square feet; discharge, 82 second-feet.
August 3: Width, 47 feet; area, 33 square feet; discharge, 56 second-feet.
November 7: Width, 43 feet; area, 45 square feet; discharge, 94 second-feet.

Waterman Canyon or West Twin Creek near Arrowhead Springs, Cal.—This stream is a tributary of Santa Ana River. A measurement was made July 14, 1906, at the crossing on the road to Waterman Ranch near the mouth of the canyon:

Width, 4.7 feet; area, 3.6 square feet; discharge, 4 second-feet.

SAN GABRIEL RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

San Gabriel River rises in the Sierra Madre Mountains and, flowing in a southwesterly direction through the San Gabriel and Los Angeles valleys, discharges its waters into the Pacific Ocean near Long Beach, Cal. In the upper reaches of this basin there are

numerous tributaries, which have their source in the higher ele tions of the Sierra Madre Range. The topography in the up reaches of this basin is rough and rugged, with deep and narr canyons, while on the lower elevations the country is rolling, w large areas of valley land. The formation on the higher mount elevation is of granite, with a light soil covering, with sparse tim growth. As one approaches the middle elevations the covering brush, with scattering timber, while in the foothill country there nothing but a growth of grass. The gaging station on this stre is located at a point where the stream leaves the higher mounta in the vicinity of Azusa. Below this point the river enters the S Gabriel Valley, where the stream has a comparatively light gra the bed being composed of bowlders, gravel, and sand, in which water quickly disappears, except in times of flood discharge. T waters of this stream again appear on the surface at the lower e of the San Gabriel Valley, at the point of discharge from the foothi where an obstruction to the underground passage forces the wa to the surface, on which it flows for a short distance and again c appears in the sands of the flat country below the foothills. T entire flow of this stream during the summer months is diverted a point about 5 miles above the gaging station and is used for po purposes at the mouth of the canyon. From this point it is carried ditches and used for irrigation in the San Gabriel Valley. T water is again diverted where it appears on the surface at the lo end of this valley and is used for irrigation on the lower levels bel this point. The mean precipitation in this basin varies from 15 30 inches and is principally in the form of rain. On small areas the higher mountain elevations the precipitation is in the form snow, which melts in the early spring months.

SAN GABRIEL RIVER AND CANALS NEAR AZUSA, CAL.

Owing to the numerous diversions, it has been difficult to obt accurate discharge measurements at Azusa, but during 1898 the S Gabriel Electric Company completed its system, and measureme are now obtained with greater ease and hence with greater accura The head works of this company are located about 6 miles above mouth of the canyon. The water is carried around the left side a series of tunnels and conduits, and a head of 400 feet is obtai where the electric power is generated. Weirs are placed on the c duit of the electric company and the water is measured at this poi The capacity of the conduit is 80 second-feet.

The cable and gage are located about 1 mile from Azusa. Dur the season of low water for a period of from six to eight months canals above the station divert the entire flow and there is no r ning water at the station. The total flow of the river is obtai by adding the daily discharge for the river to the figures for the c

responding dates for the canals. The conditions at this station and the bench marks are described in Water-Supply Paper No. 177, page 104, where are given also references to publications that contain data for previous years.

Discharge measurements of San Gabriel River and canals near Azusa, Cal., in 1906.

Date.	Hydrographer.	Gage height.	Discharge.		
			River.	Canal.	Total.
		Feet.	*Sec.-ft.*	*Sec.-ft.*	*Sec.-ft.*
January 19	M. P. Beeson	3.88	375	0	375
January 20	do	2.90	104	76	180
January 20	do	2.95	110	76	186
February 10	do	1.70	3.5	57	60
February 15	do	2.70	60	15	75
February 15	do	2.70	69	15	84
February 17	do	2.60	49	40	89
March 12	do	6.60	4,940	74	5,010
March 13	do	5.90	3,360	74	3,430
March 13	do	5.40	2,530	74	2,600
March 14	do	4.40	1,210	74	1,280
March 17	do	5.28	2,190	78	2,270
March 17	do	5.15	2,140	78	2,220
March 18	do	4.70	1,440	78	1,520
March 21	do	4.00	666	72	738
March 21	do	4.00	688	72	760
March 30	do	5.10	1,380	76	1,460
April 4	do	4.50	757	76	833
April 18	do	3.80	394	76	470
April 18	do	3.80	436	76	512
May 11	do	3.30	209	76	285
May 11	do	3.30	212	76	288
June 1	do	3.55	292	54	346
June 1	do	3.55	273	54	327
June 29	C. H. Lee	2.90	157	76	233
July 30	W. B. Clapp	2.20	25	76	101
December 28	W. B. Clapp and R. S. Hawley	5.20	1,500	76	1,580

Daily gage height, in feet, of San Gabriel River near Azusa, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Dec.
1	.....	.....	.....	4.8	3.4	3.6	2.8	2.1	.....
2	.....	.....	.....	4.7	3.4	3.6	2.8	2.0	.....
3	.....	.....	.....	4.7	3.4	3.5	2.8	1.9	.....
4	.....	.....	2.6	4.5	3.4	3.5	2.75	1.9	.....
5	.....	.....	2.7	4.7	3.45	3.4	2.75	1.85	.....
6	.....	.....	.....	4.4	3.45	3.4	2.7	1.8	.....
7	.....	.....	.....	4.2	3.4	3.4	2.75	1.7	.....
8	.....	.....	.....	4.2	3.4	3.3	2.7	1.7	.....
9	.....	.....	.....	4.2	3.4	3.3	2.7	1.65	.....
10	.....	.....	.....	4.2	3.4	3.2	2.7	1.6	.....
11	.....	.....	.....	4.2	3.4	3.2	2.6	1.6	.....
12	.....	.....	7.9	4.1	3.3	3.2	2.6	1.55	4.0
13	.....	2.7	7.2	4.0	3.3	3.1	2.6	1.5	3.8
14	.....	2.7	4.35	4.0	3.3	3.1	2.6	1.4	3.5
15	.....	2.7	4.5	4.0	3.3	3.1	2.6	1.3	3.0
16	.....	2.7	4.8	3.9	3.3	3.05	2.6	.....	2.3
17	.....	2.6	5.2	3.8	3.3	3.0	2.55	.....	2.1
18	.....	2.1	4.8	3.8	3.2	3.0	2.55	.....	2.1
19	3.9	2.0	4.8	3.8	3.2	3.0	2.55	.....	2.1
20	2.9	2.0	4.6	3.8	3.2	3.0	2.55	.....	1.8
21	2.7	1.9	4.3	3.7	3.2	2.95	2.55	.....	.....
22	2.3	2.3	4.1	3.6	3.2	2.95	2.5	.....	.....
23	2.0	2.0	4.1	3.6	3.2	2.9	2.5	.....	.....
24	1.75	1.9	5.15	3.6	3.1	2.9	2.4	.....	.....
25	1.6	1.9	7.55	3.6	3.1	3.0	2.4	.....	.....
26	.....	1.8	8.45	3.5	3.4	2.9	2.35	.....	.....
27	.....	.....	7.45	3.5	3.3	2.95	2.35	.....	2.0
28	.....	.....	6.7	3.7	4.8	2.95	2.3	.....	5.2
29	.....	.....	6.65	3.5	4.1	2.9	2.25	.....	3.8
30	.....	.....	5.1	3.4	3.75	2.85	2.2	.....	3.5
31	.....	.....	5.1	.....	3.7	.....	2.15	.....	3.2

NOTE.—The river was dry January 1 to 18, January 26 to February 12, February 27 to March 3, March to 11, August 16 to December 11, and December 21 to 26.

Daily discharge in second-feet of San Gabriel Canals near Azusa, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	37	50	75	78	76	54	76	76	54	42	38
2	37	50	68	52	76	52	76	76	55	42	38
3	37	49	65	58	76	54	76	76	53	42	38
4	37	50	20	76	76	65	76	76	52	42	38
5	37	63	20	74	76	76	76	76	52	41	38
6	37	63	74	76	76	76	76	76	50	40	39
7	37	56	70	78	76	76	76	76	50	40	39
8	37	47	70	78	76	76	76	76	49	40	39
9	37	47	71	77	76	76	76	76	49	40	38
10	36	57	64	76	76	76	76	76	49	40	38
11	36	72	56	65	76	76	76	76	49	40	38
12	37	69	74	74	76	76	76	76	49	40	38
13	37	15	74	78	76	76	76	76	50	40	38
14	49	15	74	76	76	76	76	76	50	39	38
15	52	15	77	76	76	76	76	76	52	38	38
16	41	15	78	76	76	76	76	76	51	38	38
17	41	40	78	72	76	76	76	76	50	39	38
18	42	74	78	76	76	76	76	72	46	39	37
19	0	74	77	76	76	76	76	68	45	40	37
20	76	74	75	76	76	76	76	68	45	41	38
21	76	75	72	76	76	76	76	68	44	40	41
22	76	74	71	76	76	76	76	68	44	40	45
23	76	74	65	76	76	76	76	68	43	40	47
24	76	74	78	76	76	76	76	66	43	40	45
25	66	70	76	76	76	76	76	64	43	40	45
26	66	70	78	76	76	76	76	60	43	40	46
27	61	73	78	76	76	76	76	60	43	39	46
28	57	76	78	76	76	76	76	59	43	38	45
29	58	.....	76	76	53	76	76	59	42	38	45
30	54	.....	76	76	48	76	76	58	42	38	45
31	52	.....	78	.....	60	.....	76	57	.....	38	.....

Monthly discharge of San Gabriel River near Azusa, Cal., for 1906.

[Drainage area, 222 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Sec.-ft. per sq. mile.	Dep inc
January	441	36	68.1	4,190	0.307	
February	92	47	68.1	3,780	.307	
March	9,430	56	2,160	133,000	9.73	
April	1,110	321	578	34,400	2.60	
May	1,110	251	342	21,000	1.54	
June	364	204	262	15,600	1.18	
July	295	97	155	9,530	.698	
August	93	57	72.8	4,480	.328	
September	55	42	47.7	2,840	.215	
October	42	38	39.8	2,450	.179	
November	47	37	40.4	2,400	.182	
December	1,600	45	188	11,600	.847	
The year	9,430	36	335	245,000	1.51	

NOTE.—These discharges include the water in the canals. The discharge of the river has been obt from rating tables covering short periods of time, on account of the constant change in channel. V are fair.

LOS ANGELES RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Los Angeles River is formed by Tujunga, Pacoima, and other sm creeks which have their source in the Sierra Madre Range of mo tains to the northeast of the city of Los Angeles. These streams le

the mountains at a point about 25 miles above the city and enter the comparatively flat country of the San Fernando Valley, where, except in times of excessive flood, the waters disappear in the sand and gravel washes, to reappear at the lower end of this valley, where a secondary range of hills, extending from east to west, forces them to the surface to form what is known as Los Angeles River. Below this point the river discharges through the flat country of the Los Angeles Valley, finally entering the Pacific Ocean near the town of Long Beach, Cal. During the summer months the entire flow of Los Angeles River is diverted at a point about 5 miles above Los Angeles for the supply of the city, only a small amount of water passing this point except during flood discharges. The topography is rough in the upper reaches of this drainage basin, the streams flowing in deep, narrow canyons. In this portion of the basin the formation is of granite, with good soil covering and light timber and heavy brush growth. There is a considerable area of foothill country within this basin, lying between the base of the Sierra Madre Range and the Los Angeles Valley, which has a light covering of brush and grass. The soil of the San Fernando Valley consists, principally, of river wash, coarse sand, and gravel, except along the base of the mountains and foothills, where the soil is of good depth and is under a high state of cultivation. The soil of the Los Angeles Valley, below the city of Los Angeles, consists of a light sandy loam and is under a high state of cultivation. The mean precipitation throughout the basin is from 15 to 30 inches and falls in the form of rain, except on small areas on the higher mountain elevations.

MISCELLANEOUS MEASUREMENTS IN LOS ANGELES RIVER DRAINAGE BASIN.

The following is a list of miscellaneous discharge measurements made in Los Angeles River drainage basin during 1906:

Arroyo Seco near Pasadena, Cal.—This stream is a tributary of Los Angeles River. The following measurements were made on this stream during 1906:

April 18, at mouth of canyon, 5 miles above Pasadena, Cal.: Width, 16.5 feet; area, 11.6 square feet; discharge, 20 second-feet.

April 18, at Devils Gate, 3 miles above Pasadena, Cal.: Width, 11 feet; area, 5.9 square feet; discharge, 9.2 second-feet.

April 18, at submerged dam of Pasadena Land and Water Company at Pasadena, Cal.: Discharge, 0.0 second-feet.

Los Angeles River at Seventh Street Bridge, Los Angeles, Cal.—The following measurements were made on Los Angeles River:

March 13, a. m.: Width, 80 feet; area, 166 square feet; discharge, 850 second-feet.
March 13, p. m.: Width, 80 feet; area, 136 square feet; discharge, 555 second-feet.
March 16: Width, 58 feet; area, 43 square feet; discharge, 75 second-feet.
March 17, a. m.: Width, 80 feet; area, 194 square feet; discharge, 1,200 second-feet.
March 17, p. m.: Width, 73 feet; area, 103 square feet; discharge, 420 second-feet.

Diversions from Los Angeles River.—During the summer of 1 measurements were made to determine the amount of water diver by the city of Los Angeles for domestic supply, this being ascertai by measurements made in the 44-inch conduit and in the m supply conduit. The supply is taken from the river near Burb and includes both surface and underground diversions and constitu the entire flow of the river at this point during the summer mont Some return seepage water again appears in the river channel n Huron street, Los Angeles, near which point the city has an un ground gallery or tunnel for collecting an auxiliary supply whic pumped to the reservoir and used in the general distributing syst The following measurements were made of these diversions dur 1906:

Measurements of flow, in second-feet, of diversions from Los Angeles River by the cit Los Angeles in 1906.

Date.	44-inch conduit discharge.	Main-supply conduit discharge.	To
February 24	26.59	6.58	
April 20	36.23	7.67	
June 23	31.76	15.86	
July 17	34.73	9.43	
July 20	33.95	10.23	
August 22	30.49	13.67	
August 31	32.86	11.30	
September 21	38.11	4.43	
September 23	29.48	13.20	
November 22	32.73	13.50	
December 18	33.61	15.66	

NOTE.—On February 24, 23.9 second-feet was passing intake and is not included in above total. April 20, 7.4 second-feet was passing intake and is not included in above total.

MALIBU CREEK DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Malibu Creek rises in the Santa Monica Mountains and enters Pacific Ocean about 15 miles above the town of Santa Monica. T stream is formed by Triunfo and Las Virgenes creeks, which dr the northern portion of the Santa Monica Range and the lower fo hill country to the north. The formation throughout this basir shale, sandstone, and conglomerate, with good soil covering. Th is a sparse growth of timber on the higher elevations, but the grea portion of this area has a covering of brush and grass and is u extensively for pasturage, with limited areas of cultivated land the raising of grain. A reservoir has been constructed on the up reaches of the Triunfo Creek and the waters are used for irrigat within the basin during the summer months. This reservoir cov an area of about 300 acres when filled. The mean precipitatio about 25 inches and falls wholly in the form of rain.

MALIBU CREEK NEAR CALABASAS, CAL.

This station was established November 29, 1901, by S. G. Bennett. It is located at Chapman's ranch, 40 miles from Los Angeles by wagon road and 8 miles southwest of Calabasas, about one-fourth mile below the mouth of Las Virgenes Creek. The conditions at this station and the bench marks are described in Water-Supply Paper No. 177, page 111, where are given also references to publications that contain data for previous years.

Discharge measurements of Malibu Creek near Calabasas, Cal., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
March 11	C. H. Lee	6	1.2	0.85	1.0
March 12	do	33	45	2.30	122
March 25 [a]	do		94	2.80	406
April 18	do	20	11.1	1.30	19
May 24	do	16	6.4	1.00	7.1

[a] Measured by floats.

Daily gage height, in feet, of Malibu Creek near Calabasas, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.6	0.6	1.0	1.85	1.1	1.0	1.0	0.9	0.9	0.9	[a] 0.9	0.9
2	.6	.6	1.0	1.8	1.1	1.0	1.0	.9	.9	.9	[a] .9	.9
3	.6	.6	1.0	1.7	1.1	1.0	1.0	.9	.9	.9	[a] .9	.9
4	.6	.7	0.8	1.6	1.1	1.0	1.0	.9	.9	.9	[a] .9	.9
5	.6	.7	.8	1.5	1.1	1.0	.95	.9	.9	.9	[a] .9	.9
6	.6	.7	.8	1.4	1.1	1.0	.9	.9	.9	.9	[a] .9	.9
7	.6	.7	.7	1.35	1.1	1.0	.9	.9	.9	.9	[a] .9	.9
8	.6	.7	.7	1.4	1.1	1.0	.9	.9	.9	.9	[a] .9	.9
9	.6	.7	.8	1.4	1.1	1.0	.9	.9	[a] .9	.9	[a] .9	.9
10	.6	.7	.8	1.4	1.05	1.0	.9	.9	[a] .9	.9	[a] .9	1.0
11	.6	.6	.9	[a] 1.4	1.05	1.0	.9	.9	[a] .9	.9	.9	1.05
12	.6	.6	2.55	1.4	1.05	1.0	.9	.9	[a] .9	.9	.9	1.4
13	.6	.6	2.2	1.25	1.05	1.0	.9	.9	[a] .9	.9	.9	1.0
14	.7	1.1	1.55	1.25	1.05	1.0	.9	.9	[a] .9	.9	.9	1.0
15	.7	1.25	1.2	1.2	1.05	1.0	.9	.9	[a] .9	.9	.9	0.9
16	.7	.7	2.6	1.2	1.05	1.0	.9	.9	[a] .85	.9	.9	.85
17	.7	.7	2.1	1.2	1.0	1.0	.9	.9	[a] .85	.9	.9	.85
18	.7	.7	[a] 1.8	1.3	1.0	1.0	.9	.9	[a] .85	.9	.9	.8
19	.7	.7	[a] 1.6	1.3	1.0	1.0	.9	.9	[a] .85	.9	.9	.8
20	.7	.7	1.45	1.3	1.0	1.0	.9	.9	[a] .85	.9	.9	.8
21	1.0	.7	1.68	1.3	1.0	1.0	.9	.9	[a] .85	.9	.9	.8
22	1.0	.7	1.55	1.05	1.0	1.0	.9	.9	.8	.9	.9	.8
23	1.0	.7	1.5	1.05	1.0	1.0	.9	.9	[a] .8	.9	.9	.8
24	1.0	.7	3.4	1.05	[a] 1.0	1.0	.9	.9	[a] .8	.9	.9	.8
25	1.0	1.0	2.92	1.05	[a] 1.1	1.0	.9	.9	[a] .8	.9	.9	.8
26	1.0	1.0	5.55	1.05	1.1	1.0	.9	.9	[a] .8	[a] .9	.9	.85
27	1.0	1.0	3.35	1.1	1.2	1.0	.9	.9	[a] .85	[a] .9	.9	1.85
28	0.6	1.0	2.9	1.1	1.2	1.0	.9	.9	[a] .85	[a] .9	.9	2.6
29	.6	.....	2.1	1.1	1.1	1.0	.9	.9	[a] .85	[a] .9	.9	1.45
30	.6	.....	1.98	1.1	1.0	1.0	.9	.9	[a] .85	[a] .9	.9	1.2
31	.6	.....	1.9	.....	1.0	.....	.9	.9	.....	[a] .9	.....	2.2

[a] Estimated.

Monthly discharge of Malibu Creek near Calabasas, Cal., for 1906.

[Drainage area, 97 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Sec.-ft. per sq. mile.	Dept inch
January	3	0.8	1.3	80	0.013	
February	12	.8	1.8	100	.019	
March	2,600	.9	223	13,700	2.30	
April	62	9	22.1	1,320	.228	
May	15	7	9.1	560	.094	
June	7	7	7.1	422	.073	
July	7	4	4.8	295	.049	
August	4.4	4.4	4.4	271	.045	
September	4.4	2	3.6	214	.037	
October	4.4	4.4	4.4	271	.045	
November	4.4	4.4	4.4	262	.045	
December	275	2	19.8	1,220	.204	
The year	2,600	.8	25.5	18,700	.261	

NOTE.—Discharges were obtained by the indirect method for shifting channels. Owing to small number of measurements and the shifting conditions, these values are only roughly appr mate.

TRIUNFO CREEK, NEAR CALABASAS, CAL.

This station is located 8 miles southwest of Calabasas, Cal., abo one-half mile above the mouth of Las Virgenes Creek. The con tions and the bench marks are described in Water-Supply Paper N 177, page 113, where are given also references to publications that co tain data for previous years.

Discharge measurements on Triunfo Creek near Calabasas, Cal., by C. H. Lee, in 19

Date.	Width.	Area of section.	Gage height.	Discharge.	Date.	Width.	Area of section.	Gage height.	D cha
	Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*		*Feet.*	*Sq. ft.*	*Feet.*	*Sec*
March 11	5.5	1.16	1.25	0.8	March 25	114	100	3.00	3
March 11	6.0	1.5	1.38	1.8	March 26[a]		318	4.50	2,3
March 12	34	29	2.25	98	April 18	22	10.5	2.00	
March 25	120	114	2.95	459	May 24	11	5	2.05	
March 25	64	81	2.79	313					

[a] Measured by floats.

Monthly discharge of Triunfo Creek near Calabasas, Cal., for 1906.

[Drainage area, 72 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Sec.-ft per sq. mile.	Dept inch
January	0.7	0	0.2	12	0.0028	0
February	10	0	1.1	61	.015	
March	2,000	6	155	9,530	2.15	2
April	55	8	19.3	1,150	.268	
May	12	5	6.9	424	.096	
June	6	6	6.0	357	.083	
July	6	3	3.6	221	.050	
August	3	0	1.7	105	.024	
September	0	0	0.0	0	.00	
October	0	0	0.0	0	.00	
November	4	0	1.5	89	.021	
December	100	2	10.8	664	.150	
The year	2,000	0	17.2	11,600	0.238	3

NOTE.—The above values are based on very meager data and are only approximate.

VENTURA RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Ventura River rises in the Santa Ynez Mountains (a portion of the Coast Range), in Ventura County. It flows in a southerly direction, discharging its waters into the Pacific Ocean at Ventura, Cal. Above the Ojai Valley this stream is known as Matilija Creek. The drainage basin is not large, but heavy floods of short duration are of frequent occurrence during the winter months. Owing to the heavy grade of the stream and the rough and broken character of the topography throughout the basin, its flood waters quickly reach the ocean. Its principal tributaries other than Matilija Creek are San Antonio Creek, which drains a considerable mountain area to the east of Matilija Creek, and Coyote Creek with a small drainage area at a lower elevation to the west. Water is diverted from the main river and its tributaries during the summer months for irrigation and domestic supply in the Ojai Valley and at Ventura.

MISCELLANEOUS MEASUREMENTS IN VENTURA RIVER DRAINAGE BASIN.

The following is a list of miscellaneous discharge measurements made in the Ventura River drainage basin during 1906:

Matilija Creek near Matilija, Cal.—This stream is the principal tributary of the Ventura River. A measurement was made October 24 at the road crossing below Matilija Hot Springs Hotel and above junction of North Fork:

Width, 7 feet; area, 4 square feet; discharge, 7.7 second-feet.

North Fork Matilija Creek near Matilija, Cal.—This stream is a tributary of Matilija Creek. A measurement was made October 24 at point 500 feet above its junction with Matilija Creek and above the flume diversion:

Width, 5 feet; area, 1.9 square feet; discharge, 2.2 second-feet.

San Antonio Creek near Nordhoff, Cal.—This stream is one of the principal tributaries of Ventura River. A measurement was made October 24 near the crossing of the Nordhoff-Ventura road, $1\frac{1}{2}$ miles below Nordhoff and above the canal diversion:

Width, 8 feet; area, 3.8 square feet; discharge, 4.4 second-feet.

SANTA YNEZ RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Santa Ynez River rises in the mountains of Santa Barbara and Ventura counties and flows westerly with a flat grade to the Pacific Ocean, having a length of approximately 75 miles. The Santa Ynez Range of mountains, varying in elevation from 3,000 to 4,000 feet, forms

the southern boundary of this drainage basin. The northern div ranges from 4,500 to 5,500 feet in elevation, culminating in Mo Pinos, the elevation of which is 8,826 feet. The northern part of watershed is drained by streams running in a southerly direction a uniting with Santa Ynez River proper, which runs close to northerly base of the Santa Ynez Mountains, flowing westerly a paralleling the Coast Range. The principal tributary, Mono Cre enters from the north. There are several reservoir sites on Sa Ynez and its tributaries which have been surveyed.

The formation throughout the entire drainage basin consists chie of shale and sandstone, the strike being parallel to the coast and dip nearly vertical, inclining somewhat to the south. The grea portion of the drainage is sparsely covered with brush and small tr only a small area on the higher elevations having any considera growth of timber. The mean annual precipitation is estimated at inches for the entire area and falls almost entirely in the form of r

SANTA YNEZ RIVER NEAR SANTA BARBARA, CAL.

This station was established November 1, 1903. It is located at Gibraltar dam site, 5 miles below the original station, and is below mouth of Mono Creek. It is 9 miles above the San Marcus ranch a halfway between the old quicksilver mines. The conditions at t station and the bench marks are described in Water-Supply Pa No. 177, p. 117, where are given also references to publicati that contain data for previous years.

Discharge measurements of Santa Ynez River near Santa Barbara, Cal., by L. M. H in 1906.

Date.	Width.	Area of section.	Gage height.	Discharge.	Date.	Width.	Area of section.	Gage height.	D ch
	Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*		*Feet.*	*Sq. ft.*	*Feet.*	*Se*
January 12	16	9.0	2.10	4.7	March 17[a]	72	216	4.30	
January 26	20	7.7	2.18	10.1	March 17[a]	72	201	4.10	
February 7	18	10.0	2.21	10.1	March 17[a]	72	216	4.30	
February 10	18	18.3	2.40	37	March 17[a]	72	201	4.10	
February 11	42	38	2.61	63	March 18[a]	72	172	3.74	
February 15	75	80	2.94	144	March 18[a]	72	172	3.74	
February 16	46	38	2.53	59	April 17[a]	62	77	2.80	
February 24	20	18	2.30	24	June 1	32	39	2.50	
March 14	82	114	3.37	291	June 29	25	25	2.21	
March 15	48	72	3.10	189	July 9	13.3	11.7	2.10	
March 16[a]	80	296	5.30	2,440	July 27	7	3.2	1.95	
March 16[a]	80	414	6.70	4,170	August 17	6.2	1.7	1.82	
March 16[a]	80	503	7.65	5,440	September 24	6.5	1.7	1.82	
March 16[a]	85	605	8.65	6,700	December 27	74	150	3.90	

[a] Measured by floats.

Daily gage height, in feet, of Santa Ynez River near Santa Barbara, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.0	2.15	2 25	3.6	2.55	2.5	2.2	1.95	1.8	1.8	1.8	1.9
2	2.0	2.1	2.25	3.55	2.5	2.5	2.2	1.95	1.8	1.8	1.8	1.9
3	2.05	2.1	2.25	3.5	2.5	2.45	2.2	1.9	1.8	1.8	1.8	1.9
4	2.05	2.1	2.8	3.4	2.5	2.45	2.15	1.9	1.8	1.8	1.8	1.9
5	2.05	2.1	2.5	3.3	2.5	2.4	2.15	1.9	1.8	1.8	1.8	1.9
6	2.05	2.2	2.4	3.3	2.45	2.4	2.15	1.9	1.8	1.8	1.8	1.9
7	2.05	2.2	2.35	3.2	2.45	2.4	2.1	1.9	1.8	1.8	1.85	1.9
8	2.05	2.2	2.3	3.1	2.45	2.35	2.1	1.9	1.8	1.8	1.85	1.9
9	2.05	2.15	2.3	3.1	2.45	2.35	2.1	1.9	1.8	1.8	1.85	1.95
10	2.05	2.3	2.3	3.05	2.45	2.35	2.1	1.85	1.8	1.8	1.85	2.1
11	2.05	2.6	2.3	3.05	2.4	2.3	2.1	1.85	1.8	1.8	1.85	2.25
12	2.1	2.4	6.4	3.0	2.4	2.3	2.1	1.85	1.8	1.8	1.85	3.85
13	2.15	2.2	6.0	3.0	2.4	2.3	2.1	1.85	1.8	1.8	1.85	2.5
14	2.25	2.4	3.7	2.9	2.4	2.3	2.1	1.85	1.8	1.8	1.85	2.4
15	2.25	3.05	3.05	2.8	2.4	2.3	2.1	1.85	1.8	1.8	1.85	2.3
16	2.25	2.5	7.2	2.8	2.4	2.3	2.1	1.8	1.8	1.8	1.85	2.2
17	2.25	2.4	4.2	2.8	2.4	2.25	2.1	1.8	1.8	1.8	1.85	2.2
18	2.25	2.35	3.65	2.75	2.35	2.25	2.1	1.8	1.8	1.8	1.85	2.15
19	2.8	2.3	3.35	2.75	2.35	2.25	2.1	1.8	1.8	1.8	1.85	2.1
20	2.5	2.3	3.15	2.7	2.35	2.25	2.05	1.8	1.8	1.8	1.85	2.1
21	2.35	2.4	3.1	2.7	2.35	2.25	2.05	1.8	1.8	1.8	1.85	2.1
22	2.3	2.4	3.0	2.7	2.35	2.25	2.05	1.8	1.8	1.8	1.85	2.05
23	2.3	2.3	3.85	2.7	2.35	2.25	2.0	1.8	1.8	1.8	1.85	2.05
24	2.25	2.3	6.6	2.7	2.35	2.25	2.0	1.8	1.8	1.8	1.85	2.05
25	2.25	2.3	6.75	2.65	2.35	2.25	2.0	1.8	1.8	1.8	1.85	2.05
26	2.2	2.3	7.1	2.65	2.5	2.2	2.0	1.8	1.8	1.8	1.85	2.6
27	2.15	2.25	4.9	2.6	3.15	2.2	2.0	1.8	1.8	1.8	1.85	3.35
28	2.15	2.25	4.4	2.6	3.9	2.2	1.95	1.8	1.8	1.8	1.85	2.8
29	2.15	.....	4.0	2.6	2.9	2.2	1.95	1.8	1.8	1.8	1.95	2.75
30	2.15	.....	3.8	2.6	2.7	2.2	1.95	1.8	1.8	1.8	1.9	2.75
31	2.15	.....	3.7	.....	2.55	.....	1.95	1.8	.....	1.8	.....	3.0

Rating table for Santa Ynez River near Santa Barbara, Cal., 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.*
1.80	1	2.60	65	3.40	315	4.40	1,065	6.00	3,070
1.90	2	2.70	83	3.50	370	4.60	1,285	6.20	3,360
2.00	3	2.80	104	3.60	430	4.80	1,510	6.40	3,650
2.10	6	2.90	129	3.70	495	5.00	1,750	6.60	3,940
2.20	12	3.00	156	3.80	565	5.20	1,990	6.80	4,230
2.30	22	3.10	186	3.90	635	5.40	2,250	7.00	4,520
2.40	35	3.20	223	4.00	710	5.60	2,510	7.20	4,810
2.50	49	3.30	265	4.20	875	5.80	2,790		

NOTE.—This table is based on discharge measurements made during 1906 and is fairly well defined.

Monthly discharge of Santa Ynez River near Santa Barbara, Cal., for 1906.

[Drainage area, 207 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	104	3	14.8	910	0.071	0.08
February	171	6	27.4	1,520	.132	.14
March	4,810	17	1,050	64,600	5.07	5.84
April	430	65	158	9,400	.763	.85
May	635	28	67.4	4,140	.326	.38
June	49	12	23.9	1,420	.115	.13
July	12	2.5	5.7	350	.028	.03
August	2.5	1.0	1.4	86	.0068	.008
September	1	1	1	60	.0048	.005
October	1	1	1	61	.0048	.006
November	2.5	1	1.4	83	.0068	.008
December	600	2	52.1	3,200	.252	.29
The year	4,810	1	117	85,800	.565	7.76

NOTE.—The above values are fair.

MISCELLANEOUS MEASUREMENTS IN SANTA YNEZ RIVER DRAIN BASIN.

The following miscellaneous discharge measurements were mac the Santa Ynez River drainage basin during 1905 and 1906:

Santa Ynez River near Lompoc, Cal.—At the old headworks c Southern Pacific Milling Company's canal (not in use), 2½ miles a Lompoc, Cal.:

1905—September 25: Width, 21 feet; area, 7.7 square feet; discharge, 8.8 se feet.

1906—April 19: Width, 97 feet; area, 135 square feet; discharge, 358 second-fe
July 25: Width, 28 feet; area, 15 square feet; discharge, 21 second-feet
September 25: Width, 14 feet; area, 6.1 square feet; discharge, 7.1 se feet.

At the wagon bridge, 1½ miles above Lompoc, Cal.:

1906—November 10: Width, 36 feet; area, 12.8 square feet; discharge, 10 se feet.
December 12: Width, 107 feet; area, 144 square feet; discharge, 259 se feet.

SANTA MARIA RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

The Santa Maria River drains the northern slope of the San Ra Mountains and a limited area of foothill country to the north of range. It flows in a westerly direction, finally discharging its wa into the Pacific Ocean at Guadalupe, about 25 miles south of San Obispo. Its flow is torrential in character, subject to floods of s duration during the rainy period, but being practically dry during summer months. It has numerous tributaries, the most importa which is the Sisquoc, which enters it about 12 miles above the tow Santa Maria. The gaging station is located about 25 miles above town of Santa Maria and above most of its important tributa The country throughout this basin consists of rolling foothills, the exception of the higher elevations of the San Rafael Mount which reach an elevation of 6,000 to 8,000 feet. The river br from the foothills at the point where it is joined by the Sisquoc flows through the flat country of the Santa Maria Valley for a tance of about 25 miles until it joins the Pacific Ocean at Guadal The formation throughout this basin is of shale, sandstone, and glomerate, with a good covering of heavy clay soil. There is co erable growth of timber on the higher elevations of the San Ra Mountains, but over most of the area the growth of timber is l with large areas of brush and grass. The pasturage of stock is ca on extensively throughout the basin. There are no diversions a this stream for irrigation, although tunnel work has been attem above Santa Maria for the development of underground water,

poor results. There are numerous wells in the vicinity of Santa Maria which produce considerable water for the irrigation of land in that locality, the soil being very deep and of exceptional quality, susceptible to the highest state of cultivation. The mean precipitation in this drainage basin is probably about 25 inches. The greatest rainfall occurs on the lower elevations near the coast. The higher elevations receive some snowfall, which melts early in the spring and does not tend to keep up the flow of the stream through the summer.

SANTA MARIA RIVER NEAR SANTA MARIA, CAL.

This station was established October 22, 1903, by W. B. Clapp. It is located near the ranch house on Dutard's ranch, 21 miles above Santa Maria, Cal., a station on the Pacific Coast Railway. It is reached by driving from Santa Maria. The conditions at this station and the bench marks are described in Water-Supply Paper No. 177, page 120, where are given also references to publications that contain data for previous years.

Gage heights observed at this station in 1906 are of no value, therefore no discharges can be computed.

Discharge measurements of Santa Maria River near Santa Maria, Cal., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
February 23	R. S. Hawley	28	14.8	0.90	17.9
June 6	do	24	12.8	[a] 2.20	11.9
November 7	do	20	7.0	1.70	4.9

[a] Zero of gage lowered 2 feet.

SALINAS RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

The Arroyo Seco is the most northern tributary of any size of Salinas River and rises on the slopes of the highest portion of the Santa Lucia Range, one of the ranges that go to make up the Coast Range of California, extending in a general southeast direction from San Francisco Bay. The upper valleys of this stream are far back in the range, surrounded by high mountains.

The drainage area of the Arroyo Seco is almost entirely made up of sharp ridges and V-shaped canyons. The western portion is well covered with brush and trees of medium size. Toward the east this growth decreases until at the Salinas Valley the country is bare. The stream beds of this area fall rapidly, the Arroyo Seco rising at an elevation of nearly 6,000 feet and discharging into the Salinas at an elevation of 170 feet.

Below the gaging station several canals divert water from th stream before it reaches the broad wash of sand and gravel on the fl floor of the Salinas Valley, into which it sinks during the dry seas and from which it receives its name, "Arroyo Seco."

On the stream and its tributaries five reservoir sites of more or le value for possible storage have already been surveyed.

This portion of the range undoubtedly receives as great rainf as any other locality in this region; it is estimated that the avera annual precipitation is from 30 to 50 inches and falls almost entire in the form of rain.

ARROYO SECO NEAR SOLEDAD, CAL.

The original gaging station on this stream was established b W. W. Cockins, jr., in December, 1900, at Foster's ranch, near Pine Cal. High water of January, 1901, enlarged an old side chann dividing the stream into two channels. The gaging station was th removed to Pettitt's ranch, 4 miles below the old station. T conditions at this station and the bench marks are described Water-Supply Paper No. 177, page 123, where are given also refe ences to publications that contain data for previous years.

Discharge measurements of Arroyo Seco near Soledad, Cal., by Hawley and Pettitt, in 19

Date.	Width.	Area of section.	Gage height.	Discharge.	Date.	Width.	Area of section.	Gage height.	Dis char
	Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.*
February 24	124	181	6.52	396	April 22	122	165	6.15	33
March 6	123	186	6.22	436	April 29	121	154	6.00	28
March 9	123	169	6.30	388	May 5	120	141	5.81	22
March 11	122	157	6.15	328	May 13	120	133	5.72	19
March 13	140	882	11.90	5,700	May 21	119	121	5.60	16
March 13	130	389	8.20	1,530	May 28	124	287	7.40	1,01
March 15	137	562	10.10	3,330	June 4	121	154	6.00	29
March 16	136	466	9.32	2,440	June 5	62	65	5.93	26
March 17	134	405	8.45	1,790	June 24	75	56	5.50	12
March 18	132	349	7.88	1,240	July 4	47	67	5.35	8
March 20	128	285	7.38	855	July 13	40	47	5.25	5
March 23	135	680	11.40	3,990	July 29	34	37	5.13	2
March 24	135	446	8.75	1,900	August 12	31	29	5.05	1
March 26	133	475	8.95	2,430	August 26	31	29	5.02	1
March 30	129	353	8.10	1,410	September 18	31	28	4.90	1
March 31	133	496	9.25	2,510	October 27	18	18.8	5.01	1
April 8	124	244	6.95	633	December 31	124	275	7.20	8
April 15	122	187	6.35	414					

Daily gage height, in feet, of Arroyo Seco near Soledad, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.55	5 65	6.2	8.3	5 95	6.1	5.4	5.1	4.5	5.0	5.05	5.2
2	5 52	5 6	6.15	8 0	5 9	6.05	5.4	5.1	4.5	5.0	5.05	5.15
3	5 52	5 58	6 6	7.75	5 9	6.0	5.4	5.1	4.7	5 0	5 05	5.15
4	5 53	5 55	8.45	7.55	5 9	6 0	5 35	5.1	4.6	5 0	5 25	5.15
5	5.52	5.52	6.9	7.35	5.8	5.9	5.35	5.1	4.6	5.0	5.5	5.15
6	5.52	5 6	6.65	7.2	5.8	5.9	5 35	5 1	4.6	5 0	5.25	5 15
7	5 52	5.5	6 5	7.0	5 8	5.85	5 3	5.1	4.6	4.9	5 15	5.15
8	5 52	5 49	6 39	6 95	5 75	5 8	5 3	5 1	4.6	4 8	5.15	5.15
9	5 51	5.45	6 3	6.8	5 7	5.8	5 3	5.1	4.5	4.8	5.1	5 3
10	5.51	5.41	6.21	6.7	5.7	5.75	5.3	5.1	4.6	4.8	5.1	5.3
11	5 52	5 7	6.28	6.6	5.8	5 7	5 3	5 05	4.6	4.8	5.1	[a]13.0
12	6 85	5 51	11.3	6.5	5 75	5 7	5.25	5 05	4.6	4.9	5.1	7.95
13	8 18	5 8	8 15	6.5	5 7	5 7	5 25	5 05	4.6	5 0	5.1	7.2
14	7.48	5 92	7.8	6 4	5 7	5 65	5 25	5 05	4 6	5 0	5.1	6.6
15	7.30	7.05	10.1	6.35	5.7	5.65	5.2	5.0	4.7	5.0	5.1	6.2
16	6 75	6.45	9.25	6 3	5 7	5 6	5.2	5 0	4.7	5 0	5.1	6.1
17	7.98	6 3	8.4	6 3	5 65	5 6	5.2	5 0	4.8	5 0	5.1	5.85
18	7.98	6 28	7.88	6.2	5 6	5 6	5.2	5 0	4.9	5.0	5.1	5.8
19	10 12	6.18	7.6	6 2	5 6	5.55	5 2	5 0	4.9	5 0	5.1	5.7
20	8.0	6.1	7.3	6.2	5.6	5.5	5.2	5.0	5.0	5.0	5.1	5.6
21	7.2	6 3	7.95	6 2	5.6	5.5	5 2	5 0	5 0	5 0	5.1	5.55
22	6 8	6.85	7.48	6 2	5 6	5.5	5 2	5 05	5 0	5 05	5.15	5.5
23	6 5	6 6	8 94	6 2	5 6	5 5	5 2	5 05	5 0	5 05	5.15	5.5
24	6 3	6 59	8 85	6 2	5 6	5 5	5.2	5 05	5 0	5 05	5.1	5.5
25	6.15	6.49	8.7	6.2	5.6	5.5	5.2	5.05	5.05	5.05	5.15	5.5
26	6 0	6.39	9 0	6.05	6.55	5.5	5.15	5 0	5 05	5 05	5.15	7.45
27	5.95	6 3	8 35	6 05	8 3	5.5	5 1	5 0	5 05	5 05	5 15	7.2
28	5.9	6.3	8 0	6 0	7 3	5.5	5 1	4 9	5 05	5 05	5 15	6 7
29	5 85	.....	7.7	6 0	6 75	5 45	5.15	4 8	5 0	5 05	5 2	6 35
30	5 75	.....	8 12	6.0	6.45	5.4	5 1	4 7	5.0	5 05	5.2	6 25
31	5.7	.....	9.08	.....	6.4	.....	5.1	4.6	.....	5.05	.....	7.2

[a] Estimated.

Rating table for Arroyo Seco near Soledad, Cal., 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.*
4.50	0	5.60	153	6.70	553	7.80	1,195	9.80	2,980
4.60	1	5.70	185	6.80	599	7.90	1,265	10.00	3,180
4.70	3	5.80	218	6.90	648	8.00	1,340	10.20	3,380
4.80	5	5.90	252	7.00	700	8.20	1,495	10 40	3,580
4.90	8	6.00	286	7.10	754	8.40	1,660	10.60	3,780
5.00	14	6.10	320	7.20	810	8.60	1,840	10.80	3,980
5.10	24	6.20	356	7.30	868	8.80	2,020	11.00	4,180
5.20	40	6.30	393	7.40	928	9.00	2,200	12.00	5,180
5.30	63	6.40	431	7.50	990	9.20	2,390	13.00	6,250
5.40	91	6.50	470	7.60	1,055	9.40	2,580		
5.50	121	6.60	510	7.70	1,125	9.60	2,780		

NOTE.—This table is based on 35 discharge measurements made during 1906 and is well defined between gage heights 5 feet and 10 feet.

Monthly discharge of Arroyo Seco near Soledad, Cal., for 1906.

[Drainage area, 215 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Sec.-ft. per sq. mile.	De in
January	3,300	124	556	34,200	2.59	
February	727	94	302	16,800	1.41	
March	4,480	338	1,360	83,600	6.32	
April	1,580	286	558	33,200	2.60	
May	1,580	153	297	18,300	1.38	
June	320	91	178	10,600	.828	
July	91	24	50.8	3,120	.236	
August	24	1	17.3	1,060	.080	
September	19	0	7.1	422	.033	
October	19	5	14.1	867	.066	
November	121	19	31.8	1,890	.148	
December	6,250	32	492	30,300	2.29	
The year	6,250	0	322	234,000	1.49	

NOTE.—Values are rated as follows: January to June, excellent; July and December, good; A to November, fair.

SAN FRANCISCO BAY DRAINAGE BASIN.

GENERAL FEATURES.

Sacramento River, rising in northern California and flowing so and San Joaquin River, rising in the southern Sierras and flo north, drain the western slope of the Sierra Nevada and the eas slope of the Coast Range north of San Francisco. They meet Suisun Bay, finally discharging their waters into the Pacific O through San Francisco Bay.

SACRAMENTO RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Sacramento River is the principal river of California, and d all of the territory south of Mount Shasta and between the C Range and Trinity Range on the west and the Sierra Nevada on east. The portion of the drainage basin above Red Bluff, extends from the Trinity Mountains on the west to Warner Mount near the California-Nevada State line on the east. The water on the west from the Trinity Mountains is comparatively nar being only from 10 to 35 miles in width, and furnishes a very s proportion of the discharge of this river, but from the east Pit R which is the most important tributary, drains a large area exten about 120 miles east from Sacramento River between Mount Sh on the north and Lassen Peak on the south. The greater por of this basin is composed of lava and shows other evidences of canic activity, such as volcanic cones and craters. Nearly all streams tributary to Pit River have their origin in large spri many of which discharge several hundred second-feet. The r

important tributary of the Pit is McCloud River, draining the southeastern slope of Mount Shasta. It derives its waters principally from the melting of the snow on the high elevations of this mountain. The western portion of the watershed extending along the Trinity Range is well timbered, as is also that portion of the drainage area in the Sierra Nevada lying between Mount Shasta and Lassen Peak. Farther east, however, there is little or no forest covering, and the country is used extensively for pasturage. The rainfall is very unequally distributed, varying from less than 10 inches in the eastern portion of the basin to 50 inches along the northern and western portion. Below the gaging station the river enters the Sacramento Valley, through which it flows on a comparatively light grade until it reaches Suisun Bay. During the winter months, when the Sacramento and its tributaries are in flood, large areas of the Sacramento Valley are overflowed. The floods that occur in the latter part of the rainy season, after the large overflow areas or basins are filled, cause great damage in the lower portion of the valley.

MAIN SACRAMENTO RIVER.

SACRAMENTO RIVER NEAR RED BLUFF, CAL.

The gaging station at Jellys Ferry, which is located about 12 miles above the town of Red Bluff, was established April 30, 1895. The right bank of the river is high, but the left bank is liable to overflow when the river rises above the 25-foot mark. The river has been known to reach the 35-foot mark. Because of the liability to overflow it was deemed advisable to select a new gaging station, where the water at flood stage could be more confined. A point in Iron Canyon, where the river had been gaged by the State engineering department in 1879 and by commissioner of public works in 1893–94, was chosen as a new gaging station. The conditions at this station and the bench marks are described in Water-Supply Paper No. 177, p. 128, where are given also references to publications that contain data for previous years.

Discharge measurements of Sacramento River near Red Bluff, Cal., by R. S. Hawley, 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.*
February 27	550	8,230	10.30	41,600	May 16	529	5,290	4.64	15,700
February 27	546	7,850	9.45	36,000	May 18	527	4,980	4.14	13,800
March 13	550	7,920	9.60	38,200	June 12	534	6,270	6.50	23,900
March 14	550	7,780	9.30	36,900	June 13	532	5,890	5.68	19,600
March 26[a]	590	12,900	18.30	92,900	July 7	520	4,360	2.90	9,900
April 11	536	6,550	7.00	24,500	September 6	496	3,330	1.63	5,470
May 3	531	5,570	5.25	18,500	December 11	538	6,570	7.60	26,900

[a] Measured by floats.

Daily gage height, in feet, of Sacramento River near Red Bluff, Cal., for 190

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov
1	1.5	2.9	7.65	15.5	5.5	5.6	3.3	1.9	1.7	1.6	1.6
2	1.4	2.8	6.95	12.55	5.4	5.5	3.25	1.9	1.65	1.6	1.6
3	1.4	2.7	10.65	10.75	5.3	5.5	3.2	1.9	1.65	1.6	1.8
4	1.4	2.7	10.75	9.6	5.2	8.85	3.1	1.9	1.65	1.55	2.4
5	1.4	2.6	8.2	8.55	5.3	7.75	3.0	1.9	1.65	1.55	3.2
6	1.45	2.55	7.3	7.9	5.15	7.8	2.95	1.8	1.65	1.55	2.2
7	1.45	2.5	6.9	7.5	5.0	6.85	2.9	1.8	1.6	1.55	2.0
8	1.45	2.5	6.6	7.3	4.9	6.2	2.8	1.8	1.6	1.55	1.9
9	1.5	2.6	6.6	7.25	4.8	6.0	2.8	1.8	1.6	1.55	1.8
10	1.8	2.7	6.5	7.1	4.9	5.6	2.7	1.75	1.6	1.55	1.8
11	1.75	3.25	6.45	6.9	4.8	5.35	2.7	1.75	1.6	1.55	1.8
12	3.3	3.9	14.85	6.55	4.7	6.35	2.6	1.75	1.6	1.55	1.7
13	4.65	.....	9.9	6.2	4.55	5.6	2.6	1.7	1.6	1.55	1.7
14	4.3	3.35	9.55	6.5	4.55	5.25	2.5	1.7	1.75	1.55	1.7
15	4.35	10.95	7.75	5.9	4.9	5.0	2.5	1.7	1.7	1.6	1.8
16	12.8	7.45	7.0	5.8	4.6	5.9	2.4	1.7	1.7	1.6	1.8
17	9.85	7.3	6.6	5.8	4.3	5.4	2.4	1.7	1.65	1.6	1.8
18	12.7	6.75	5.95	5.75	4.2	5.0	2.4	1.65	1.65	1.6	1.7
19	22.6	10.6	5.35	5.6	4.1	4.05	2.3	1.7	1.6	1.6	1.7
20	9.1	8.5	5.85	5.6	4.0	4.5	2.3	1.7	1.6	1.6	1.7
21	5.8	9.9	8.3	5.7	4.0	4.3	2.25	1.7	1.6	1.55	1.7
22	4.7	10.0	12.95	5.75	3.9	4.1	2.2	1.75	1.6	1.6	1.7
23	4.3	12.75	10.7	6.0	3.8	3.95	2.2	1.75	1.65	1.6	1.7
24	4.0	11.5	14.85	5.8	3.7	3.75	2.1	1.7	1.7	1.6	1.7
25	3.75	10.35	16.6	6.1	4.4	3.7	2.1	1.7	1.7	1.6	1.7
26	3.55	8.4	17.95	5.5	9.6	3.6	2.1	1.7	1.6	1.6	1.7
27	3.4	9.1	15.45	6.0	11.0	3.75	2.0	1.7	1.6	1.6	1.7
28	3.4	8.5	12.6	6.2	10.6	3.7	2.0	1.7	1.6	1.6	1.6
29	3.25	.....	10.8	5.6	8.95	3.5	2.0	1.7	1.6	1.6	1.7
30	3.2	.....	12.85	5.55	7.35	3.35	2.0	1.7	1.6	1.6	1.7
31	3.05	.....	23.35	.....	6.5	.....	1.9	1.7	.....	1.6	.....

Rating table for Sacramento River near Red Bluff, Cal., for 1904–1906.

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.*
1.40	5,410	2.60	8,810	3.80	12,720	6.00	21,100	14.00	61,700
1.50	5,650	2.70	9,120	3.90	13,060	6.20	21,940	15.00	68,200
1.60	5,920	2.80	9,430	4.00	13,400	6.40	22,780	16.00	75,100
1.70	6,190	2.90	9,740	4.20	14,120	6.60	23,620	17.00	82,500
1.80	6,460	3.00	10,050	4.40	14,840	6.80	24,460	18.00	89,700
1.90	6,730	3.10	10,380	4.60	15,580	7.00	25,300	19.00	97,000
2.00	7,000	3.20	10,710	4.80	16,340	8.00	29,700	20.00	105,900
2.10	7,300	3.30	11,040	5.00	17,100	9.00	34,300	21.00	114,000
2.20	7,600	3.40	11,370	5.20	17,900	10.00	39,100	22.00	123,700
2.30	7,900	3.50	11,700	5.40	18,700	11.00	44,200	23.00	133,200
2.40	8,200	3.60	12,040	5.60	19,500	12.00	49,700	24.00	143,100
2.50	8,500	3.70	12,380	5.80	20,300	13.00	55,600		

NOTE.—This table is based on discharge measurements made during 1902–1906 and is well defi

Monthly discharge of Sacramento River near Red Bluff, Cal., for 1906.

[Drainage area, 9,300 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-of	
	Maximum.	Minimum.	Mean.		Sec.-ft. per sq. mile.	I
January	129,000	5,410	14,700	904,000	1.58	
February	54,100	8,500	23,200	1,290,000	2.49	
March	137,000	18,500	42,500	2,610,000	4.57	
April	71,000	19,100	26,300	1,560,000	2.83	
May	44,200	12,400	19,400	1,190,000	2.09	
June	33,000	11,200	18,100	1,080,000	1.95	
July	11,000	6,730	8,530	524,000	.917	
August	6,730	6,060	6,330	389,000	.681	
September	6,320	5,920	6,020	358,000	.647	
October	5,920	5,780	5,870	361,000	.631	
November	10,900	5,920	6,570	391,000	.706	
December	59,500	6,060	15,400	947,000	1.66	
The year	137,000	5,410	16,100	11,600,000	1.73	

NOTE.—These values are excellent.

MISCELLANEOUS MEASUREMENT IN SACRAMENTO RIVER DRAINAGE BASIN.

The following measurement was made of Sacramento River at Baird station, on the Southern Pacific Railway, near Gregory, Cal., October 9, 1906:

Width, 115 feet; area, 300 square feet; discharge, 315 second-feet.

PIT RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Pit River has its source in the Warner Mountains in the extreme northeast part of California. It flows in a southwesterly direction, discharging its waters into Sacramento River a few miles above Redding, Cal. It has numerous tributaries, the larger of which have their source in large springs, which discharge from crevices in the lava formation. About 50 per cent of the area of this drainage basin is barren of timber and composed principally of lava with a light soil covering, being used extensively for pasturage and the raising of stock. There are numerous small valleys with light grades, which hold the water throughout the summer months principally in the state of swamps. These areas are used mainly as meadow land and for the raising of stock feed. Pit River does not discharge in any great volume until it reaches a point near Fall River Mills, which lies about midway between the point where the Pit River enters the Sacramento and its source. Fall River, which is the principal tributary of the Pit from the north, receives its water supply from large perennial springs which discharge 1,500 second-feet. Hat Creek and Burney Creek are also large tributaries from the south and drain the northern slope of Lassen Peak. Their principal sources are also from large perennial springs in the lava formation.

West Valley Creek is a tributary of South Fork of Pit River. Ash Creek flows into Clear Creek, through which it enters Pit River from the south. There is considerable timber scattered throughout this drainage basin, the principal growth lying in the southern portion of the basin and also in that section lying north of Pit River and between Fall River and the upper Sacramento. There are numerous reservoir sites on the upper reaches of this stream, all of which have been or are being surveyed. Several gaging stations are maintained on Pit River and tributaries at points where surveys have been made for the construction of storage reservoirs. The rainfall throughout this basin is very unevenly distributed, ranging from 10 inches in the eastern portion to 50 to 75 inches in the western and northwestern portion. About 50 per cent of the precipitation falls in the form of snow, but does not remain any length of time except on the higher elevation of Mount Shasta and Lassen Peak.

McCloud River drains the southeastern slope of Mount Sha
Its drainage area is comparatively small, covering 676 square m
It is long and narrow, extending from north to south. There
few tributaries. Its main water supply comes from Mount Sha
on which the snow remains during the entire year. It is also fe
numerous large springs scattered throughout the drainage ba
The precipitation is very heavy and is principally in the form of r
except on the higher elevations of Mount Shasta. The discharg
this stream seldom falls below 1,200 second-feet. It discharges
the Pit River a few miles above the junction of the Pit with the S
ramento. The entire basin is well timbered.

PIT RIVER NEAR BIEBER, CAL.

This station was established January 22, 1904. It is locate
miles below Bieber, Cal., near Muck Valley. The conditions at
station and the bench marks are described in Water-Supply Pa
No. 177, page 136, where are given also references to publications
contain data for previous years.

Discharge measurements of Pit River near Bieber, Cal., by F. H. Holabird, in 19

Date.	Width.	Area of section.	Gage height.	Discharge.	Date.	Width.	Area of section.	Gage height.	ch
	Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*		*Feet.*	*Sq. ft.*	*Feet.*	*S*
January 29[a]	213	870	5.90	1,820	April 9	224	1,100	6.90	
February 3[a]	209	680	5.00	1,320	April 12	220	986	6.40	
February 5[a]	209	680	5.00	1,180	April 13	219	942	6.20	
February 8[a]	207	615	4.70	938	April 14	219	917	6.10	
February 10[a]	207	615	4.70	877	April 15	214	870	5.90	
February 12	205	637	4.80	983	April 17	217	853	5.80	
February 14	207	723	5.20	1,310	April 19	214	826	5.70	
February 16	220	962	6.30	2,660	April 20	210	807	5.60	
February 17	219	942	6.20	2,430	April 27	207	740	5.32	
February 19	220	987	6.40	2,690	May 5	207	616	4.70	
February 21	220	1,050	6.70	3,190	May 12	207	616	4.70	
February 23	224	1,100	6.90	3,530	May 19	207	660	4.90	
February 26	220	942	6.20	2,420	May 26	207	596	4.60	
February 28	224	1,120	7.04	3,680	June 2	207	573	4.50	
March 8	215	892	6.00	2,090	June 9	193	512	4.35	
March 12	224	1,150	7.10	3 640	June 16	193	473	4.10	
March 13	230	1,270	7.65	4,610	August 11	98	176	2.30	
March 18	219	942	6.25	2,380	August 25	68	128	1.80	
March 20	219	942	6.20	2,390	September 1	68	128	1.80	
March 21	222	985	6.50	2,760	September 8	68	128	1.80	
March 22	224	1,210	7.52	4,340	September 15	68	132	1.90	
March 23[b]		1,680	9.50	9,500	September 23	68	137	2.00	
April 4	224	1,190	7.30	3,930	September 29	68	128	1.85	
April 5	224	1,100	6.90	3,330	October 7	68	130	1.90	
April 6	224	1,080	6.85	3,260	October 14	68	141	2.00	
April 7	224	1,100	6.90	3,280	October 26	98	208	2.60	
April 8	224	1,100	6.95	3,310					

[a] Measured by Toler and Holabird.
[b] Velocities not measured in entire cross section; discharge probably too great.

Daily gage height, in feet, of Pit River near Bieber, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1		5.5	6.7	9.1	5.1	4.5	4.1	2.6	1.8	1.85
2		5.0	6.5	8.3	5.1	4.5	4.0	2.6	1.8	1.85
3		5.0	6.3	7.8	4.9	4.5	4.0	2.6	1.8	1.9
4		5.0	6.05	7.3	4.8	4.5	3.8	2.6	1.8	1.9
5		5.0	6.1	6.9	4.7	4.5	3.8	2.6	1.8	1.9
6		4.8	6.0	6.85	4.7	4.4	3.8	2.6	1.8	1.9
7		4.7	6.0	6.9	4.7	4.4	3.8	2.5	1.8	1.9
8		4.7	6.0	6.95	4.7	4.4	3.85	2.5	1.8	1.9
9		4.7	6.4	6.9	4.7	4.35	3.85	2.4	.....	1.9
10		4.7	6.8	6.8	4.7	4.3	3.7	2.3	.....	2.0
11		4.7	7.0	6.5	4.7	4.3	3.7	2.3	.....	2.0
12		4.8	7.1	6.4	4.7	4.2	3.7	2.3	.....	2.0
13		5.1	7.6	6.2	4.8	4.2	3.7	2.3	.....	2.0
14		5.2	7.1	6.1	4.9	4.2	3.5	2.9	.....	.....
15	3.45	5.8	6.8	6.0	4.9	4.2	3.5	2.9	1.9	.....
16	4.35	6.3	6.3	5.9	4.8	4.1	3.5	2.6	1.9	.....
17	4.25	6.2	6.1	5.8	4.8	4.1	3.4	2.4	2.0	.....
18	4.6	6.2	6.2	5.8	4.8	4.0	3.4	2.2	2.0	.....
19	5.8	6.4	6.4	5.7	4.9	4.0	3.35	2.2	2.0	.....
20	6.4	6.4	6.2	5.6	4.9	3.5	3.35	.....	1.9	.....
21	6.4	6.7	6.4	5.5	4.9	3.4	3.3	.....	1.9	.....
22	6.8	7.2	7.4	5.5	4.8	3.35	.....	.....	1.9	.....
23	7.3	6.9	9.5	5.4	4.65	3.55	.....	.....	2.0	.....
24	7.8	6.7	10.5	5.4	4.65	3.55	.....	.....	2.0	.....
25	6.0	6.5	11.5	5.2	4.6	4.2	.....	1.8	2.0	.....
26	6.0	6.2	11.0	5.2	4.6	4.2	.....	1.8	1.9	.....
27	6.1	6.4	10.2	5.3	4.6	4.2	.....	1.8	1.9	.....
28	6.1	7.0	9.3	5.3	4.6	4.2	.....	1.8	1.9	.....
29	6.1	.....	8.6	5.2	4.6	4.2	.....	1.8	1.85	.....
30	6.0	.....	8.2	5.15	4.6	4.1	.....	1.8	1.85	.....
31	5.8	.....	8.4	.....	4.6	.....	.....	1.8	.....	.....

Rating table for Pit River near Bieber, Cal., 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*
1.80	21	2.90	108	4.00	450	5.00	1,140	7.00	3,520
1.90	24	3.00	120	4.10	500	5.20	1,320	7.20	3,840
2.00	29	3.10	135	4.20	560	5.40	1,500	7.40	4,160
2.10	35	3.20	154	4.30	620	5.60	1,700	7.60	4,480
2.20	41	3.30	177	4.40	685	5.80	1,900	7.80	4,820
2.30	49	3.40	205	4.50	755	6.00	2,120	8.00	5,180
2.40	57	3.50	240	4.60	825	6.20	2,360	9.00	7,140
2.50	66	3.60	276	4.70	900	6.40	2,630	10.00	9,600
2.60	76	3.70	316	4.80	980	6.60	2,920	11.00	12,400
2.70	86	3.80	356	4.90	1,060	6.80	3,220	12.00	15,200
2.80	96	3.90	400						

NOTE.—This table is based on 53 discharge measurements made during 1906 and is well defined below gage height 7.5 feet.

Monthly discharge of Pit River near Bieber, Cal., for 1906.

[Drainage area, 2,950 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 (15–31)	4,820	222	2,150	72,500	0.728	0.46
February	3,840	900	1,930	107,000	.654	.68
March	13,800	2,120	4,640	285,000	1.57	1.81
April	7,360	1,280	2,590	154,000	.878	.98
May	1,230	825	948	58,300	.321	.37
June	755	190	544	32,400	.184	.21
July (1–21)	500	177	311	13,000	.105	.08
August	108	21	*a* 51	3,140	.017	.02
September	29	21	*a* 24	1,430	.008	.009
October (1–13)	29	22	25	645	.008	.004
The period				727,000		

a Discharges interpolated for days when gage was not read.

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

M'CLOUD RIVER NEAR GREGORY, CAL.

This station was established March 23, 1902, in cooperation the McCloud River Electric Company. It is located at Johns C near Hirze Mountain, 14 miles east of Gregory post-office, Cal. Station, on the Southern Pacific Railroad, is just across Sacran River from Gregory. The conditions at this station and the b marks are described in Water-Supply Paper No. 177, page 147, v are given also references to publications that contain data for pre years.

Discharge measurements of McCloud River near Gregory, Cal., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	c
		Feet.	*Sq. ft.*	*Feet.*	
January 16[a]	F. P. Ackerson	143	1,080	6.05	
January 16[a]	do	152	1,330	7.40	
February 12	R. S. Hawley	104	556	1.90	
April 12	do	105	685	3.07	
May 17	do	104	637	2.45	
October 10	do	100	576	1.56	

[a] Measured by floats.

Daily gage height, in feet, of McCloud River near Gregory, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov
1	1.6	1.85	3.3	5.6	2.85	3.6	2.3	1.8	1.6	1.6	1.5
2	1.6	1.85	3.3	4.6	2.8	3.6	2.25	1.8	1.6	1.6	1.6
3	1.55	1.85	3.55	4.15	2.8	4.65	2.25	1.8	1.6	1.6	1.7
4	1.55	1.8	3.3	3.75	2.8	6.5	2.2	1.8	1.6	1.6	2.3
5	1.55	1.8	3.0	3.5	2.75	5.65	2.2	1.8	1.6	1.6	1.7
6	1.55	1.8	2.75	3.4	2.7	5.35	2.15	1.8	1.6	1.6	1.6
7	1.55	1.75	2.8	3.3	2.7	4.6	2.2	1.8	1.6	1.6	1.6
8	1.55	1.75	2.85	3.3	2.7	4.1	2.15	1.8	1.6	1.6	1.5
9	1.55	1.8	2.9	3.3	2.65	3.9	2.1	1.75	1.6	1.6	1.5
10	1.6	1.9	2.85	3.3	2.65	3.8	2.1	1.75	1.6	1.55	1.5
11	1.7	1.9	2.9	3.2	2.65	3.6	2.05	1.7	1.6	1.55	1.5
12	2.8	1.9	3.9	3.05	2.6	3.45	2.0	1.7	1.6	1.55	1.5
13	2.25	2.0	3.5	2.95	2.5	3.3	2.0	1.7	1.6	1.55	1.5
14	2.1	3.2	3.15	2.9	2.75	3.15	2.0	1.7	1.6	1.55	1.5
15	2.55	3.95	2.95	2.9	2.85	3.15	2.0	1.7	1.6	1.55	1.5
16	6.15	3.35	2.7	2.9	2.6	3.1	1.95	1.7	1.6	1.55	1.5
17	3.1	2.85	2.6	2.9	2.5	2.95	1.95	1.7	1.6	1.55	1.5
18	5.95	3.2	2.55	2.9	2.4	2.85	1.95	1.7	1.6	1.55	1.5
19	5.35	3.6	2.5	2.9	2.4	2.8	1.9	1.7	1.6	1.55	1.5
20	3.35	3.55	2.5	2.9	2.35	2.65	1.9	1.7	1.6	1.55	1.5
21	3.15	4.45	3.4	2.9	2.3	2.6	1.9	1.7	1.6	1.55	1.5
22	3.1	3.95	4.4	2.9	2.3	2.55	1.85	1.7	1.6	1.55	1.5
23	3.0	3.65	4.15	3.05	2.25	2.5	1.85	1.7	1.6	1.55	1.5
24	2.9	3.8	5.5	3.05	2.2	2.4	1.85	1.7	1.6	1.55	1.5
25	2.7	3.4	6.45	3.1	2.25	2.4	1.85	1.65	1.6	1.55	1.5
26	2.6	3.2	6.3	3.0	6.6	2.4	1.85	1.65	1.6	1.55	1.5
27	2.4	3.6	5.2	2.95	6.25	2.45	1.8	1.65	1.6	1.55	1.5
28	2.2	3.4	4.4	2.95	5.3	2.4	1.8	1.65	1.6	1.55	1.5
29	2.1	.....	4.0	2.9	4.5	2.35	1.8	1.65	1.6	1.55	1.5
30	2.0	.....	5.25	2.9	4.1	2.3	1.8	1.65	1.6	1.55	1.5
31	1.9	.....	7.4	.....	3.7	.....	1.8	1.65	.....	1.55	.....

Rating table for McCloud River near Gregory, Cal., for 1902–1906.

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.*
1.50	1,340	2.40	2,042	3.30	3,090	4.40	4,990	6.20	9,120
1.60	1,402	2.50	2,140	3.40	3,230	4.60	5,410	6.40	9,650
1.70	1,468	2.60	2,242	3.50	3,380	4.80	5,840	6.60	10,190
1.80	1,538	2.70	2,349	3.60	3,535	5.00	6,280	6.80	10,740
1.90	1,612	2.80	2,461	3.70	3,695	5.20	6,720	7.00	11,300
2.00	1,690	2.90	2,578	3.80	3,860	5.40	7,170	8.00	14,250
2.10	1,772	3.00	2,700	3.90	4,030	5.60	7,630		
2.20	1,858	3.10	2,825	4.00	4,210	5.80	8,110		
2.30	1,948	3.20	2,955	4.20	4,585	6.00	8,600		

NOTE.—This table is based on discharge measurements made during 1902–1906 and is well defined.

Monthly discharge of McCloud River near Gregory, Cal., for 1906.

[Drainage area, 608 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	8,990	1,370	2,540	156,000	4.18	4.82
February	5,100	1,500	2,600	144,000	4.28	4.46
March	12,400	2,140	4,160	256,000	6.84	7.89
April	7,630	2,580	3,110	185,000	5.12	5.71
May	10,200	1,860	3,070	189,000	5.05	5.82
June	9,920	1,950	3,480	207,000	5.72	6.38
July	1,950	1,540	1,690	104,000	2.78	3.20
August	1,540	1,440	1,480	91,000	2.43	2.80
September	1,400	1,400	1,400	83,300	2.30	2.57
October	1,400	1,370	1,380	84,800	2.27	2.62
November	2,000	1,370	1,400	83,300	2.30	2.57
December	5,620	1,340	2,070	127,000	3.40	3.92
The year	12,400	1,340	2,360	1,710,000	3.89	52.76

NOTE.—These values are excellent.

STONY CREEK DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Stony Creek drains a portion of the Coast Range. It flows in a northerly direction and discharges its waters into the Sacramento River near Orland, Cal. It has numerous tributaries, all of which are torrential in their character. The formation on the higher elevations is of granite, with good soil covering, and is heavily timbered. In the lower portion of the drainage basin the formation is shale, sandstone, and conglomerate, with heavy growth of brush and grass. This portion of the basin is used extensively for pasturage. The soil being heavy, it packs readily, causing a large per cent of run-off. The mean average rainfall on the higher elevation is about 40 inches, while on the lower reaches it is 20 inches. The precipitation is almost wholly in the form of rain, with some snow on the upper reaches, which soon melts and only adds to the flood discharge.

The gaging station on this stream is located near the point where it emerges from the foothills and enters the Sacramento Valley.

STONY CREEK NEAR FRUTO, CAL.

This station was established on January 30, 1901. It is lo at Julian's ranch, 7 miles northwest of Fruto, and $1\frac{3}{4}$ miles a the proposed mill-site dam. The conditions at this station an bench marks are described in Water-Supply Paper No. 177, 153, where are given also references to publications that contain for previous years.

Discharge measurements of Stony Creek near Fruto, Cal., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	c
		Feet.	*Sq. ft.*	*Feet.*	
February 8 [a]	R. S. Hawley	137	216	5.70	
February 24	F. R. S. Buttemer	151	455	7.10	
March 8	do	146	412	6.40	
March 16	do	140	336	6.00	
March 16	do	140	336	6.00	
May 2	R. S. Hawley	136	271	5.52	
May 18	do	132	222	5.02	
June 13	do	132	218	5.03	
September 20 [b]	S. G. Bennett	27	24	3.65	
October 5 [b]	R. S. Hawley	22	17.6	3.62	
October 14 [b]	S. G. Bennett	26	25	3.65	

[a] During the high water of January 18, 1906, the channel at the cable was raised by a dep gravel, which was gradually removed during the two or three months following. These m ments were made before the channel had assumed its normal condition.

[b] Measurement made by wading at section below the gage.

Daily gage height, in feet, of Stony Creek near Fruto, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	4 0	5.8	6 75	7.85	5.4	5 3	4.5	3 8	3 6	3 7	3 7
2	4 0	5 8	6 55	7.4	5 4	5 3	4.5	3 8	3 6	3.7	3 7
3	4 0	5 8	9 35	7.05	5.3	5 3	4.4	3.8	3.6	3.7	3 8
4	4.0	5 8	7.25	6 75	5 3	5 4	4.4	3 8	3.6	3 7	3 8
5	4.0	5.8	6.7	6.55	5 3	5.3	4.3	3.8	3.6	3 7	3.9
6	4 0	5 7	6 5	6 4	5 2	5 3	4.3	3 8	3.6	3 7	3 9
7	4 0	5 7	6.5	6 3	5 2	5 3	4.2	3.8	3 6	3 7	3 9
8	4 0	5 7	6.4	6 2	5 2	5.2	4.2	3 8	3 6	3 7	3 9
9	4.0	5 7	6.4	6 1	5 2	5 2	4.2	3.8	3 6	3 7	3 9
10	4.0	5.8	6 3	6.1	5.2	5.1	4.2	3.8	3 6	3.7	3 9
11	4 0	6 0	6 95	6 0	5 1	5.1	4 2	3 8	3 6	3.7	3 9
12	6.2	6 1	6 65	6 0	5 1	5 0	4 1	3 7	3 6	3 7	3 9
13	6.65	6 0	6.45	6 0	5 1	5 0	4 1	3 7	3 6	3 7	3 9
14	7.25	7.85	6 25	5 9	5 1	5 0	4.1	3 7	3.6	3 7	3 9
15	8 0	7.35	6 05	5 9	5 1	5 0	4 1	3 7	3 6	3.7	3.9
16	12 5	6 9	6 0	5.8	5.1	5 1	4.1	3 7	3 6	3 7	3 9
17	7.6	7.25	6 0	5 7	5 0	5 0	4 1	3 7	3 6	3 7	3 9
18	14 5	7 05	5.9	5 6	5 0	5 0	4.1	3 7	3.6	3 7	3 9
19	11 0	8 0	5 8	5 6	5 0	5 0	4.1	3.7	3.6	3.7	3.9
20	8.65	7.5	5 8	5 5	5 0	4.9	4.1	3.7	3.6	3 7	3.9
21	7.65	7.45	6 9	5.5	5 0	4.9	4.1	3 7	3.6	3 7	3 9
22	7.1	7.25	6 65	5.4	5 0	4.9	4.0	3 7	3.6	3.7	3.9
23	6 75	7.15	8 0	5.5	5.0	4.8	4 0	3 7	3 7	3.7	3 9
24	6 55	7.1	7.6	5 5	5.1	4.8	4.0	3 7	3 7	3 7	3 9
25	6.35	7.0	8.25	5.5	5.2	4.8	3.9	3.7	3.7	3.7	3.8
26	6 25	6.8	7.65	5.4	5 3	4.8	3 9	3.6	3 7	3.7	3.8
27	6 1	7.15	7.45	5.4	5.5	4.8	3 9	3 6	3 7	3.7	3 8
28	6 1	7.05	7.25	5.5	5.95	4.8	3 9	3 6	3 7	3 7	3 8
29	6 0	.....	7.05	5.5	5.65	4.7	3.8	3 6	3 7	3.7	3 8
30	5 9	.....	11.0	5.5	5 5	4 6	3.8	3.6	3.7	3.7	3.8
31	5.8	.....	8.35	.....	5.4	.....	3.8	3.6	.....	3.7	.....

Rating table for Stony Creek near Fruto, Cal., from March 8, 1906, to December 31, 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	13	4.40	213	5.20	580	6.00	1,250	7.60	3,150
3.70	29	4.50	250	5.30	640	6.20	1,460	7.80	3,410
3.80	48	4.60	290	5.40	705	6.40	1,680	8.00	3,690
3.90	70	4.70	335	5.50	780	6.60	1,905	9.00	5,270
4.00	93	4.80	380	5.60	865	6.80	2,140	10.00	7,280
4.10	119	4.90	430	5.70	955	7.00	2,390	11.00	10,200
4.20	149	5.00	480	5.80	1,050	7.20	2,640		
4.30	179	5.10	530	5.90	1,150	7.40	2,890		

NOTE.—This table is based on 9 discharge measurements made during 1906 and 3 during 1904, and is well defined below gage height 6.4 feet.

Monthly discharge of Stony Creek near Fruto, Cal., for 1906.

[Drainage area, 760 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	22,200	150	2,230	137,000	2.93	3.38
February	3,320	480	1,540	85,500	2.03	2.11
March	40,200	1,050	2,500	154,000	3.29	3.79
April	3,480	705	1,280	76,200	1.68	1.87
May	1,200	480	610	37,500	.803	.93
June	705	290	495	29,500	.651	.73
July	250	48	127	7,800	.167	.19
August	48	13	32.6	2,000	.043	.05
September	29	13	17.3	1,030	.023	.03
October	29	29	29.0	1,780	.038	.04
November	70	29	61.4	3,650	.081	.09
December	5,270	48	582	35,800	.766	.88
The year	22,200	13	792	572,000	1.04	14.10

NOTE.—Discharges were obtained from the 1905 table, January 1 to 15, and by the indirect method for shifting channels, January 16 to March 7. Values are rated as follows: March to July and December, good; remainder of 1906, fair.

MISCELLANEOUS MEASUREMENTS IN STONY CREEK DRAINAGE BASIN.

The following miscellaneous measurements were made of Stony Creek just above its junction with Little Stony Creek:

September 18: Width, 26 feet; area, 38 square feet; discharge, 26 second-feet.

October 13: Width, 26 feet; area, 34 square feet; discharge, 21 second-feet.

CACHE CREEK DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Cache Creek drains that portion of the eastern slope of the Coast Range directly north from the Puta Creek basin. This basin is long and narrow, extending from northwest to southeast; it has numerous tributaries, of which North Fork is the largest. Most of these tributaries are torrential in their character, but the flow of the main stream is regulated largely by its discharge from Clear Lake, which is fed by numerous creeks having their source in the higher portion of the drainage basin. The lake covers an area of 65 square miles, and

has a drainage area of 417 square miles. The streams that ent Cache Creek below Clear Lake are practically dry during the summ months. There are large cultivated areas on the west side of Cle Lake, a greater portion of which is meadow land used for stock raisin There are two gaging stations located on this stream—one at Lowe Lake directly at the point where the stream discharges from the la and one at Yolo a short distance below where it emerges from the foo hills. There are numerous diversions above the gaging station Yolo which take practically the entire flow during the summer month This water is used for irrigation in the vicinity of Woodland and Yo where the soil is rich and deep and susceptible of the highest state cultivation.

CACHE CREEK AT LOWER LAKE, CAL.

This station was established January 1, 1900. It is located thre fourths mile from Lower Lake, Cal. The conditions at this statio and the bench marks are described in Water-Supply Paper No. 17 page 169, where are given also references to publications that contai data for previous years. The following measurement was mad March 7, 1906:

Width, 64 feet; area, 301 square feet; gage height, 6.80 feet; discharge, 999 secon feet.

Daily gage height, in feet, of Cache Creek at Lower Lake, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	De
1	2.5	5.35	6.35	8.9	7.0	5.85	5.1	4.35	3.65	3.2	2.9	2.
2	2.5	5.3	6.25	8.9	6.9	5.85	5.1	4.3	3.6	3.25	2.85	2.
3	2.5	5.3	7.2	8.95	6.9	5.8	5.05	4.3	3.6	3.25	2.85	2.
4	2.5	5.3	6.75	8.9	6.8	5.8	5.05	4.3	3.6	3.2	2.85	2.
5	2.5	5.3	6.8	8.9	6.75	5.75	5.0	4.25	3.6	3.2	2.85	2.
6	2.5	5.3	6.8	8.85	6.65	5.75	5.0	4.25	3.55	3.15	2.9	2.
7	2.45	5.25	6.8	8.85	6.6	5.7	4.95	4.25	3.55	3.15	2.9	2.
8	2.5	5.25	6.8	8.8	6.55	5.7	4.95	4.25	3.55	3.15	2.9	2.
9	2.45	5.25	6.8	8.8	6.5	5.65	4.9	4.2	3.55	3.15	2.9	2.
10	2.5	5.25	6.8	8.75	6.45	5.6	4.85	4.2	3.4	3.15	2.9	3.
11	2.5	5.25	6.8	8.55	6.5	5.6	4.85	4.15	3.4	3.2	2.9	3.
12	2.75	5.2	7.1	8.45	6.35	5.55	4.8	4.15	3.45	3.2	2.95	3.
13	2.9	5.2	7.1	8.35	6.35	5.5	4.8	4.1	3.5	3.15	2.95	3.
14	3.05	6.1	7.3	8.3	6.5	5.5	4.8	4.1	3.45	3.1	2.95	3.
15	3.2	5.4	7.0	8.4	6.35	5.45	4.75	4.05	3.4	3.1	2.95	3.
16	4.75	5.4	7.0	8.2	6.3	5.45	4.7	4.0	3.35	3.15	2.9	3.
17	4.0	5.4	7.0	8.0	6.25	5.5	4.7	3.95	3.35	3.1	3.0	3.
18	5.18	5.5	6.9	7.9	6.2	5.4	4.65	3.95	3.35	3.1	2.9	3.
19	5.2	5.6	6.8	7.75	6.15	5.4	4.65	3.9	3.3	3.0	2.85	3.
20	5.3	5.9	7.2	7.65	6.1	5.45	4.6	3.85	3.3	3.0	2.85	3.
21	5.3	5.8	7.3	7.6	6.05	5.4	4.6	3.85	3.3	2.95	2.95	3.
22	5.4	5.9	7.2	7.4	6.0	5.35	4.55	3.85	3.25	2.9	2.8	3.
23	5.4	6.1	7.5	7.4	5.9	5.3	4.55	3.8	3.35	2.9	2.8	3.
24	5.4	6.2	7.6	7.35	5.85	5.3	4.4	3.8	3.35	2.9	2.85	3.
25	5.45	6.2	7.75	7.3	5.9	5.25	4.5	3.8	3.25	2.9	2.85	3.
26	5.4	6.2	8.05	7.25	5.95	5.25	4.45	3.75	3.25	2.9	2.8	3.
27	5.4	6.4	8.1	7.5	6.0	5.25	4.45	3.75	3.25	2.9	2.75	3.
28	5.4	6.5	8.1	7.2	5.95	5.2	4.4	3.7	3.25	2.9	2.75	3.
29	5.4	.....	8.1	7.1	5.95	5.15	4.4	3.7	3.2	2.9	2.8	3.
30	5.4	.....	8.8	7.0	5.9	5.1	4.4	3.7	3.2	2.9	2.75	3.
31	5.35	.....	9.3	.....	5.9	.....	4.35	3.65	.....	2.9	.....	4.

Rating table for Cache Creek at Lower Lake, Cal., 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.*
2.40	27	3.30	135	4.20	296	5.20	552	7.00	1,120
2.50	37	3.40	149	4.30	318	5.40	610	7.20	1,188
2.60	48	3.50	163	4.40	341	5.60	670	7.40	1,256
2.70	59	3.60	178	4.50	365	5.80	732	7.60	1,324
2.80	71	3.70	194	4.60	390	6.00	795	7.80	1,392
2.90	83	3.80	212	4.70	416	6.20	859	8.00	1,460
3.00	95	3.90	232	4.80	442	6 40	923	9.00	1,840
3.10	108	4.00	252	4.90	469	6 60	988		
3.20	121	4.10	274	5.00	496	6.80	1,054		

NOTE.—This table is based on discharge measurements made during 1904–6 and is well defined below gage height 7 feet.

Monthly discharge of Cache Creek at Lower Lake, Cal., for 1906.

[Drainage area, 500 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	625	32	316	19,400	0.632	0.73
February	955	552	676	37,500	1.35	1.41
March	1,960	875	1,220	75,000	2.44	2.81
April	1,820	1,120	1,510	89,800	3 02	3.37
May	1,120	748	894	55,000	1.79	2.06
June	748	524	639	38,000	1.28	1.43
July	524	330	423	26,000	.846	.98
August	330	186	256	15.700	.512	.59
September	186	121	150	8,930	.300	.33
October	128	83	103	6,330	.206	.24
November	95	65	79.4	4,720	.159	.18
December	252	59	133	8,180	.266	.31
The year	1,960	32	533	385,000	1.07	14.44

NOTE.—These values are excellent.

CACHE CREEK NEAR YOLO, CAL.

This station was established January 1, 1903. It is located at the wagon bridge on the road from Woodland to Yolo, about 1,000 feet above the Southern Pacific Railroad bridge. A new wagon bridge, which greatly improves the channel conditions, was erected during 1904. The station was reestablished on the new bridge December 4, 1904. Numerous diversions are made from Cache Creek above this station which take practically all of the summer flow. The conditions at this station and the bench marks are described in Water-Supply Paper No. 177, page 172, where are given also references to publications that contain data for previous years.

Discharge measurements of Cache Creek near Yolo, Cal., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	ch
		Feet.	*Sq. ft.*	*Feet.*	*S*
February 5	F. R. S. Buttemer	93	262	3.88	
February 16	do	97	445	5.15	
February 20	do	97	479	5.79	
March 5	do	102	578	6.60	
March 13	do	102	592	6.85	
April 13	R. S. Hawley	99	482	6.05	
April 24	W. C. Sawyer	97	428	5.36	
May 1	do	96	380	4.95	
May 6	do	83	127	2.25	
May 7	do	133	2,180	19.95	1
May 7	do	133	2,150	19.72	1
May 7	do	133	2,230	20.40	1
May 7	do	133	2,240	20.43	1
May 7	do	133	2,270	20.65	1
May 8	do	98	400	4.99	
May 15	do	96	338	4.49	
July 13	R. S. Hawley	92	160	2.50	
July 30	do	91	137	2.10	
October 4	do	10	28	1.00	

NOTE.—A landslide occurred in Cache Creek canyon, above the station, on May 2, damming th
This dam was overtopped on May 7, when the creek rose to a maximum gage height of 20.8 feet
measurements of this date were made at the crest of the flood.

Daily gage height, in feet, of Cache Creek near Yolo, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	4.05	5.5	10.0	5.0	4.3	3.1	2.15	1.65	1.1	0.85
2	.....	4.0	5.2	8.6	4.55	4.2	3.1	2.1	1.65	1.1	.85
3	.....	3.95	5.55	8.0	2.95	4.15	3.05	2.0	1.6	1.95	.85
4	.....	3.95	8.5	7.6	2.6	4.1	3.0	2.0	1.6	1.9	.8
5	.....	3.9	6.7	7.3	2.25	4.1	3.0	2.0	1.6	1.05	.8
6	.....	3.85	6.15	7.0	2.2	4.05	2.8	1.95	1.6	1.0	.8
7	.....	3.85	5.85	6.8	12.1	4.0	2.65	1.95	1.5	1.0	.8
8	.....	3.8	5.6	6.7	5.1	3.95	2.6	1.95	1.5	1.0	.8
9	.....	3.75	5.5	6.6	4.7	3.9	2.6	1.95	1.5	1.0	.8
10	.....	3.75	5.4	6.4	4.6	3.85	2.6	2.0	1.5	1.0	.8
11	.....	3.7	5.3	6.35	4.6	3.8	2.5	2.0	1.5	1.0	.8
12	.....	3.7	9.3	6.3	4.55	3.8	2.5	2.0	1.5	1.0	.75
13	4.35	3.7	7.25	6.1	4.6	3.8	2.5	2.0	1.45	1.0	.75
14	6.3	3.7	6.45	6.0	4.5	3.75	2.5	2.0	1.45	.95	.75
15	4.45	6.85	6.0	5.9	4.45	3.7	2.45	2.0	1.45	.95	.75
16	9.9	5.2	5.8	5.8	4.4	3.65	2.45	2.0	1.45	.95	.7
17	14.0	4.7	5.6	5.7	4.35	3.65	2.45	1.95	1.45	9	.....
18	14.05	5.45	5.5	5.75	4.3	3.65	2.4	1.95	1.45	.9	.....
19	25.7	6.65	5.4	5.65	4.3	3.6	2.35	1.95	1.45	.9	.....
20	10.25	5.8	5.3	5.55	4.25	3.5	2.3	1.8	1.35	9	.....
21	6.75	7.8	7.25	5.45	4.2	3.4	2.3	1.7	1.3	.9	.....
22	5.8	7.25	7.0	5.4	4.15	3.4	2.3	1.7	1.3	.9	.....
23	5.35	6.4	6.7	5.4	4.1	3.35	2.35	1.65	1.3	.9	.....
24	5.05	8.3	10.7	5.3	4.05	3.3	2.3	1.7	1.25	.9	.....
25	4.8	7.45	9.95	5.25	4.2	3.25	2.3	1.75	1.25	.85	.....
26	5.6	6.0	11.0	5.2	4.55	3.2	2.25	1.75	1.2	.85	.....
27	4.4	5.65	9.25	5.15	4.7	3.2	2.2	1.7	1.15	.85	.....
28	4.3	5.8	7.95	5.3	4.85	3.2	2.2	1.7	1.15	.85	.....
29	4.2	.....	7.3	5.2	4.7	3.2	2.2	1.65	1.1	.85	.....
30	4.15	.....	9.65	5.1	4.45	3.15	2.15	1.65	1.1	.85	.....
31	4.1	.....	15.85	.....	4.35	.....	2.15	1.65	.....	.85	.....

NOTE.—The creek was dry January 1 to 12 and November 17 to December 10. The gage hei
May 7 is the mean of a large number of readings at short intervals.

Rating table for Cache Creek near Yolo, Cal., 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	0	1.80	145	2.60	358	3.40	650	4.40	1,168
1.00	3	1.90	169	2.70	388	3.50	692	4.60	1,284
1.10	17	2.00	193	2.80	420	3.60	737	4.80	1,405
1.20	32	2.10	217	2.90	455	3.70	785	5.00	1,537
1.30	48	2.20	243	3.00	491	3.80	835	5.20	1,671
1.40	65	2.30	271	3.10	530	3.90	887	5.40	1,805
1.50	85	2.40	299	3.20	570	4.00	941	5.60	1,939
1.60	105	2.50	328	3.30	610	4.20	1,053	5.80	2,073
1.70	125								

NOTE.—This table is based on discharge measurements made during 1906 and is well defined between gage heights 1 foot and 7 feet. Above gage height 5 feet the rating curve is a tangent, the difference being 67 per tenth.

Monthly discharge of Cache Creek near Yolo, Cal., for 1906.

[Drainage area, 1,280 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	15,400	0	2,000	123,000	1.56	1.80
February	3,750	785	1,660	92,200	1.30	1.35
March	8,810	1,670	3,040	187,000	2.38	2.74
April	4,890	1,600	2,360	140,000	1.84	2.05
May	6,290	243	1,270	78,100	.992	1.14
June	1,110	550	784	46,700	.613	.68
July	530	229	333	20,500	.260	.30
August	229	115	166	10,200	.130	.15
September	115	17	69.4	4,130	.054	.06
October	181	0	13.6	836	.011	.01
November	0	0	0	0	.00	1.00
December	3,250	0	435	26,700	.340	.39
The year	15,400	0	1,010	729,000	.790	10.67

NOTE.—Values are rated as follows: January and September, good; October, fair; remainder of 1906, excellent.

PUTA CREEK DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Puta Creek drains a portion of the eastern slope of the Coast Range, its waters discharging into Sacramento River, through what is known as the Yolo basin, in the vicinity of Davis, Cal. This basin is rather long and narrow, extending from west to east; it has numerous tributaries which have a heavy flood discharge during the winter months, but are practically dry during the summer. This stream is torrential in its flow. It has a comparatively small drainage basin with an exceptionally heavy rainfall, especially on the higher elevations in the vicinity of Mount St. Helena. A five-year rainfall record at Helen Mine, on the northern slope of Mount St. Helena, gives an average of 99.52 inches. The precipitation is less at lower elevations. The upper reaches of the basin are well timbered, but the lower part is comparatively barren of timber, though it has a considerable growth of brush extending to a point where the stream leaves the foothills.

The areas in the lower portion of the basin are used principally pasturage. The topography of the country is rough and precipi The underlying rock is an impervious slate and serpentine, with a soil covering. There is comparatively little tilled land in the b above where the stream emerges from the foothills at Win Below this point the soil is deep and susceptible to high cultiva and at present is used for raising grain and fruit.

PUTA CREEK NEAR GUENOC, CAL.

This station was established February 12, 1904. It is loc about 2 miles below the old town of Guenoc, near the Asbill r house and at the Guenoc dam site. The nearest post-office i Middletown, Cal. The conditions at this station and the bench m are described in Water-Supply Paper No. 177, page 180, where given also references to publications that contain data for prev years.

Discharge measurements of Puta Creek near Guenoc, Cal., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	ch
		Feet.	*Sq. ft.*	*Feet.*	S
January 15[a]	S. Asbill	145	1,300	10.55	
January 16[a]	do	152	1,860	14.25	1
January 23	do	126	970	8.60	
January 23	do	124	868	8.00	
January 24	do	124	830	7.80	
January 24	do	125	815	7.90	
February 15	do	94	202	6.25	
February 15	do	94	229	6.35	
March 6	R. S. Hawley	93	153	5.59	
March 7	do	93	136	5.50	
March 19	do	82	167	5.48	
March 20	do	114	480	7.00	
March 21	do	104	320	6.52	
April 17	do	82	78	5.00	
April 18	do	82	78	4.99	
May 7	do	[b] 32	[a] 39	4.84	
May 8	do	[b] 32	[b] 37	4.82	
July 27	do	[b] 20	[b] 13.2	4.29	
July 28	do	[b] 20	[b] 13.2	4.28	

[a] Measured by floats. [b] Wading section.

Daily gage height, in feet, of Puta Creek, near Guenoc, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	3.7	4.9	5.5	6.3	4.9	5.0
2	3.7	4.9	6.0	6.1	4.9	5.2
3	3.7	4.9	6.65	6.0	4.9	5.9
4	3.7	4.9	6.35	5.8	4.8	5.4
5	3.7	4.8	5.8	5.7	4.8	5.1
6	3.7	4.8	5.4	5.6	4.8	5.1
7	3.7	5.0	5.4	5.6	4.8	5.0
8	3.7	4.9	5.3	5.6	4.8	5.0
9	3.7	4.9	5.3	5.5	4.8	5.0
10	3.7	4.8	5.3	5.5	4.8	5.0
11	4.0	7.0	5.3	5.4	4.8	5.5
12	8.5	6.9	5.2	5.4	4.8	5.3
13	9.2	6.45	5.4	5.4	4.8	5.2
14	10.5	6.35	5.6	5.3	4.8	5.1
15	10.0	5.55	5.5	5.2	4.8	5.0

Daily gage height, in feet, of Puta Creek, near Guenoc, Cal., for 1906—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
16	11.05	5.4	5.4	5.1	4.8	5.0	4.3
17	9.55	5.7	5.4	5.0	4.8	4.9	4.3
18	13.25	6.2	5.5	4.9	.....	4.9	4.3
19	8.25	6.5	5.5	4.9	4.8	4.8	4.3
20	6.15	6.6	6.4	4.9	4.8	4.8	4.3
21	5.7	6.45	6.35	4.8	4.8	4.8	4.3
22	5.6	6.6	6.35	4.9	4.8	.....	4.3
23	5.45	7.15	7.4	5.1	4.8	4.7	4.3
24	5.35	7.4	8.1	5.1	4.8	4.7	4.3
25	5.25	6.5	7.8	5.0	6.8	4.7	4.3
26	5.2	6.1	7.5	5.0	6.6	4.7	4.2
27	5.2	5.8	6.3	5.0	5.6	4.7	4.2
28	5.1	5.65	6.3	5.0	5.4	4.6	4.2
29	5.05	.....	6.3	4.9	5.25	4.6	4.2
30	5.0	.....	6.4	4.9	5.1	4.6	4.2
31	5.0	.....	7.8	.....	5.0	.....	4.2

Rating table for Puta Creek near Guenoc, Cal., 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.*
4.00	1	5.00	155	6.00	680	7.00	1,720	9.00	4,640
4.10	4	5.10	190	6.10	760	7.20	1,960	9.20	5,000
4.20	9	5.20	230	6.20	850	7.40	2,200	9.40	5,360
4.30	19	5.30	270	6.30	940	7.60	2,480	9.60	5,720
4.40	29	5.40	315	6.40	1,035	7.80	2,760	9.80	6,080
4.50	43	5.50	365	6.50	1,135	8.00	3,040	10.00	6,440
4.60	63	5.60	420	6.60	1,240	8.20	3,340	11.00	8,240
4.70	83	5.70	480	6.70	1,360	8.40	3,650	12.00	10,040
4.80	105	5.80	540	6.80	1,480	8.60	3,970	13.00	11,840
4.90	129	5.90	610	6.90	1,600	8.80	4,300		

NOTE.—This table is based on discharge measurements made during 1906, and is well defined between gage heights 4.3 feet and 8 feet.

Monthly discharge of Puta Creek near Guenoc, Cal., for 1906.

[Drainage area, 91 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	12,300	0	1,800	111,000	19.78	22.81
February	2,200	105	727	40,400	7.99	8.32
March	3,190	230	916	56,300	10.07	11.61
April	940	105	302	18,000	3.32	3.70
May	1,480	105	215	13,200	2.36	2.72
June	365	63	165	9,820	1.81	2.02
July	63	9	26.8	1,650	0.294	0.34
The period	.....	.....	.....	250,000	.....	.....

NOTE.—Discharges interpolated for days when gage was not read. Values are rated as follows: January and July, good; remainder of the period, excellent.

PUTA CREEK AT WINTERS, CAL.

This station was established September 26, 1905. It is loc about 450 feet below the Southern Pacific Railroad bridge and a 800 feet southeast of the depot at Winters, Cal. The conditior this station and the bench marks are described in Water-Supply P No. 177, pages 182–182.

Discharge measurements of Puta Creek at Winters, Cal., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	ch
		Feet.	*Sq. ft.*	*Feet.*	*Sc*
January 20	R. S. Hawley	178	1,240	9.90	
February 3	F. R. S. Buttemer	170	287	5.10	
February 15	do	182	1,300	10.55	
February 22	do	180	809	8.50	
March 6	do	178	410	7.02	
March 14	do	179	636	8.15	
May 4	R. S. Hawley	128	160	6.00	
May 15	do	123	146	5.80	
June 8	do	150	134	5.78	
July 5	do	80	75	4.90	
July 26	do	50	44	4.75	
July 27	do	50	46	4.75	
August 14	do	50	26	4.62	
August 15	do	50	24	a 4.79	
September 8	do	50	20	4.70	

a New gage; old gage reading 4.60 feet.

NOTE.—Measurements of May 4 and after were made by wading 200 feet above the cable.

Daily gage height, in feet, of Puta Creek at Winters, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	4.60	5.28	6.58	10.00	a 6.10	6.00	4.95	4.70	4.75	4.70	4.75
2	4.61	5.20	6.35	8.85	a 6.10	5.80	4.90	4.70	4.75	4.70	4.70
3	4.62	5.10	11.20	8.00	a 6.05	5.75	4.90	4.70	4.75	4.70	4.75
4	4.62	5.05	10.10	7.80	6.00	5.80	4.85	4.75	4.80	4.65	4.85
5	4.63	5.00	7.62	7.50	a 6.00	6.00	4.80	4.75	4.75	4.65	4.90
6	4.64	4.95	7.00	7.35	5.95	5.90	4.80	4.75	4.75	4.65	4.90
7	4.64	4.93	6.88	7.15	5.90	5.80	4.75	4.80	4.70	4.65	4.90
8	4.63	4.90	6.60	7.05	5.90	5.80	4.75	4.80	4.70	4.65	4.95
9	4.64	4.87	6.45	6.95	5.85	5.70	4.65	4.80	4.70	4.65	4.95
10	4.64	4.85	a 6.30	6.85	5.80	5.60	4.65	4.80	4.70	a 4.70	4.90
11	4.66	4.90	6.20	6.75	5.80	5.60	4.65	4.75	4.70	4.70	4.90
12	4.85	5.00	11.40	6.70	5.80	5.55	4.60	4.85	4.70	4.75	4.90
13	10.76	4.90	9.05	6.60	a 5.80	5.70	4.60	4.8	a 4.70	a 4.75	4.85
14	13.00	4.90	8.28	6.50	5.80	5.55	4.60	4.75	4.70	4.75	4.85
15	10.75	12.50	7.90	6.50	5.80	5.50	4.60	b 4.80	4.70	4.70	4.85
16	21.60	7.33	7.38	6.50	5.85	5.50	4.60	4.75	4.70	4.70	4.85
17	12.20	6.60	7.12	6.40	5.80	5.45	4.55	a 4.75	4.70	4.70	4.85
18	22.85	7.15	6.85	6.30	5.70	5.40	4.55	4.70	4.65	4.70	4.85
19	24.00	8.26	7.75	6.30	5.70	5.35	4.80	4.75	4.70	4.70	4.85
20	10.80	7.10	7.60	6.30	5.70	5.20	4.70	4.75	4.65	4.70	4.85
21	8.45	10.08	11.09	6.30	5.65	5.20	4.70	4.75	a 4.70	4.65	4.85
22	7.40	8.60	8.75	6.25	5.60	5.10	4.75	4.75	4.70	4.65	4.85
23	6.91	7.55	9.65	6.30	5.60	5.10	4.75	4.70	4.70	4.70	a 4.85
24	6.70	8.90	13.50	6.30	5.60	5.15	4.7	4.70	4.70	4.70	4.85
25	6.35	a 8.00	11.80	6.25	5.60	5.20	4.75	4.70	4.70	4.70	4.85
26	6.00	7.10	11.85	6.20	6.60	5.10	4.75	4.75	4.70	4.70	4.85
27	5.82	6.75	9.70	6.20	a 6.80	5.30	4.75	4.70	4.70	a 4.70	4.90
28	5.70	6.88	8.50	6.20	7.00	5.00	4.75	a 4.75	a 4.70	4.70	4.90
29	5.55	.....	7.88	a 6.15	6.50	5.10	4.75	a 4.75	4.70	4.75	4.90
30	5.45	.....	8.50	a 6.15	6.15	5.00	4.70	4.75	4.70	4.75	4.90
31	5.35	.....	15.50	.....	6.05	.....	4.70	4.70	.....	4.75	.....

a Gage height estimated. b A new gage was put in August 15 and read after that date.

Daily discharge, in second-feet, of Puta Creek at Winters, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	22	360	1,080	4,140	480	450	139	29	18	14	18	40
2	22	380	880	3,020	480	350	131	29	18	14	14	40
3	22	330	5,540	2,210	435	315	123	28	18	14	18	40
4	22	290	4,420	2,020	390	350	115	28	24	10	31	40
5	25	250	2,020	1,740	390	450	107	27	18	10	40	40
6	25	220	1,440	1,600	365	400	104	27	18	10	40	40
7	25	200	1,300	1,420	340	350	101	26	14	10	40	52
8	25	150	1,050	1,330	340	350	98	26	14	10	52	64
9	25	120	920	1,240	315	301	95	25	14	10	52	40
10	25	100	780	1,150	290	294	92	25	14	14	40	116
11	25	100	680	1,060	290	287	89	24	14	14	40	4,790
12	46	110	5,640	1,010	290	280	86	24	14	18	40	1,205
13	4,840	80	3,280	920	290	273	83	23	14	18	31	640
14	7,140	70	2,530	830	290	266	80	22	14	18	31	400
15	4,840	6,620	2,170	830	290	259	76	24	14	14	31	290
16	17,800	1,600	1,700	830	315	252	72	18	14	14	31	273
17	6,300	980	1,430	750	290	245	68	18	14	14	31	239
18	19,400	1,530	1,200	660	250	238	64	14	10	14	31	206
19	20,900	2,610	2,010	660	250	231	60	18	14	14	31	175
20	4,890	1,570	1,870	660	250	224	56	18	10	14	31	160
21	2,480	4,440	5,160	660	230	217	52	18	14	10	31	145
22	1,600	3,040	2,950	610	210	210	48	18	14	10	31	145
23	1,160	2,040	3,810	660	210	203	44	14	14	14	31	160
24	970	3,310	7,760	660	210	195	40	14	14	14	31	160
25	800	2,440	5,950	610	210	187	36	14	14	14	31	160
26	560	1,600	6,000	570	895	179	32	18	14	14	31	8,130
27	470	1,240	3,850	570	1,070	171	32	14	14	14	40	4,090
28	430	1,360	2,710	570	1,250	163	31	18	14	14	40	1,565
29	400	.....	2,130	525	810	155	31	18	14	18	40	1,025
30	380	.....	2,700	525	530	147	30	18	14	18	40	725
31	360	.....	10,040	.....	480	.....	30	14	.....	18	.....	725

NOTE.—These discharges were obtained by the indirect method for shifting channels, except for the high water in January, which are based on a rating table, using high-water measurements made in January, 1907.

Monthly discharge of Puta Creek at Winters, Cal., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
January	20,900	22	3,100	191,000
February	6,620	70	1,330	73,900
March	10,000	680	3,060	188,000
April	4,140	525	1,130	67,200
May	1,250	210	411	25,300
June	450	147	266	15,800
July	139	30	72.4	4,450
August	29	14	21.0	1,290
September	24	10	14.7	875
October	18	10	13.7	842
November	52	14	34.0	2,020
December	8,130	40	836	51,400
The year	20,900	10	857	622,000

NOTE.—The discharge for gage heights above 11 feet is based on measurements made in January, 1907. Values are rated fair.

FEATHER RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Feather River drains a portion of the western slope of the Si Nevada extending east nearly to the Nevada State line, a dist of about 75 miles, and north and south for a distance of from 2 40 miles.

The greater portion of the watershed is rough and mountair and has numerous tributaries which drain the slopes of the hig mountains. The formation in the southern and eastern part of basin is of granite, with a comparatively deep soil covering. T is also a considerable area composed of lava and other volc matter in the northern part of the basin. Numerous meadows valleys also exist, which tend to maintain a steady flow during dry season. The soil is generally porous and absorbs the mois readily. The entire watershed is well covered with a growth brush and timber, much of which is large enough to make lum ing a profitable industry, with the exception of the meadow la and valleys, which are used for stock ranges and grazing la There are numerous large springs, especially in the lava distr which supply a more or less steady flow throughout the year. Th are especially noticeable on North Fork, where there are peren springs discharging from 50 to 100 second-feet. There is little a ficial storage in the drainage area, and the water used for irriga in the valleys is taken from the natural flow of the streams.

The mean annual precipitation is probably from 40 to 60 in and is well distributed over the area. It falls largely in the forn snow, but disappears in the early part of the summer.

The drainage basin of North Fork of Feather River lies in high sierra almost wholly in the northwestern portion of Plu County. The junction of North Fork with East Fork, or Fea River proper, is in the western part of Plumas County, abou miles north of Oroville and 15 miles south of Prattville. The en length of the North Fork basin does not exceed 40 miles, and area is probably less than 1,000 square miles. This basin is ro and mountainous, though there are many large valley mead above Prattville ranging in elevation from 4,000 to 6,000 feet. formation consists of broken and porous lava and other volc matter, especially in the upper reaches, where numerous cones, ters, ashes, and lakes indicate recent volcanic activity. There good covering of porous soil, which absorbs moisture readily equalizes the annual flow in the large number of tributaries in basin. Except in the case of the highest peaks, like Lassen P with elevation of 10,437 feet, which are rocky and barren, there good growth of timber and brush, and on the higher slopes

growth becomes comparatively heavy and suitable for lumbering. A large per cent of the area, however, is meadow land, which permits profitable stock raising.

This basin has a mean annual precipitation of from 40 to 60 inches, a large percentage of which occurs as snow. A good portion of the rainfall and snow is collected and conserved in the numerous lakes on the higher elevations near the divide, but by far the greater percentage of the precipitation in this basin percolates through the porous surface soil into the vast beds of broken lava and volcanic gravels and sands beneath, where it is impounded in subterranean reservoirs. From the melting snows above and the perennial underground basins below a well-regulated flow issues from the highest reaches through the numerous mountain streams which gather into a few good-sized channels in the meadows below the higher elevations. These underground reservoirs also supply the many large perennial springs which issue from the borders of the meadows with discharges of from 50 to 100 second-feet. One of the largest of these springs is Dotta Spring, about 3 miles east of Prattville; it has a maximum discharge of 100 second-feet and a minimum of 70 second-feet.

As yet no irrigation or power developments of importance have been made, but the Great Western Power Company has carefully investigated the stream flow near Prattville and the storage possibilities in a portion of Big Meadows with a view to early development.

The watershed above Prattville is divided into two smaller basins of almost equal size, the eastern basin being drained by what is known as Hamilton Branch and its tributaries and the western basin by North Fork and its tributaries. The eastern basin ranges in elevation from 4,300 to 7,500 feet, has an area of 230 square miles, and includes the East Arm of Big Meadows and the large, level area called Mountain Meadows, but its run-off is only about half as large as that from the western basin, which has an area of 245 square miles varying in elevation from 4,300 to 10,000 feet and including the West Arm of Big Meadows and the higher elevations about Lassen Peak. Hamilton Branch and North Fork unite about 3 miles east of Prattville in the lower edge of Big Meadows. A gaging station is maintained on each stream a short distance above the point of confluence.

For the purpose of studying the water resources of North Fork of Feather River the Great Western Power Company has established and maintained a number of regular stations in the basin at which complete records are kept. These stations were established in the summer of 1905 by W. E. Spear under the direction of John R. Freeman, consulting engineer for the company. During 1906 they were maintained by L. J. Bevan under the direction of Wielé, Cooper & Blackwell, consulting engineers for the company.

FEATHER RIVER AT OROVILLE, CAL.

This station was established January 1, 1902. It is located at northeast edge of the town of Oroville, Cal., where Feather Ri breaks from the foothills on the western slope of the Sierra Nev into Sacramento Valley. The drainage area is 3,640 square mi The conditions at this station and the bench marks are described Water-Supply Paper No. 177, page 155, where are given also ref ences to publications that contain data for previous years.

Discharge measurements of Feather River at Oroville, Cal., by Hawley and Sawyer 1906.

Date.	Width.	Area of section.	Gage height.[a]	Dis-charge.	Date.	Width.	Area of section.	Gage height.[a]	D cha
	Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*		*Feet.*	*Sq. ft.*	*Feet.*	*Sec*
February 16	291	4,690	9.00	11,500	May 2	309	4,760	10.88	1
February 28	311	5,340	11.35	19,600	May 11	312	5,270	11.95	2
March 15	307	5,260	10.90	18,400	May 17	298	4,280	9.30	1
March 22	316	5,810	12.72	23,000	July 6	279	3,240	6.25	
March 25	340	7,280	17.00	48,600	July 26	273	2,380	3.10	
April 11	309	4,830	11.25	18,400	September 5	272	2,100	1.90	
April 16	309	4,840	11.14	18,100	October 12	271	2,060	1.73	
April 25	307	4,620	10.61	17,000	November 1	272	2,060	1.73	
April 25	307	4,560	10.42	16,600	December 10	274	2,410	3.05	

[a] Gage heights refer to the gage at the station.

Daily gage height, in feet, of Feather River at Oroville, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	
1	0.95	5.45	10.4	14.7	10.65	10.7	6.1	2.95	2.05	1.8	1.8	
2	.95	5.0	9.5	13.3	10.95	10.35	6.0	2.9	2.0	1.8	1.8	
3	.9	4.7	9.5	13.1	11.85	11.1	6.8	2.9	2.0	1.8	2.5	
4	.95	4.7	9.4	12.6	11.5	13.0	6.55	2.85	1.95	1.8	6.95	
5	.85	4.75	9.6	12.1	12.0	11.7	6.45	2.8	1.9	1.8	5.25	
6	.85	5.2	8.4	12.2	12.05	11.3	6.65	2.8	1.9	1.8	3.5	
7	.85	5.3	8.3	10.35	12.2	10.6	6.55	2.75	1.9	1.8	2.5	
8	.85	5.35	8.3	10.15	12.05	9.6	6.4	2.7	1.9	1.8	2.0	a
9	.9	5.45	8.15	10.15	12.1	10.45	6.3	2.7	1.85	1.8	2.0	
10	1.0	5.6	8.1	11.4	12.05	9.95	6.1	2.65	1.85	1.8	2.0	
11	1.3	5.65	8.3	11.1	11.7	10.25	6.1	2.6	1.85	1.8	2.0	
12	4.3	5.75	8.4	11.4	11.45	10.3	5.6	2.6	1.85	1.8	2.0	
13	8.2	5.85	11.2	10.75	10.75	11.1	5.45	2.55	1.85	1.8	2.0	
14	9.45	8.5	10.3	10.85	10.25	10.8	5.35	2.55	1.9	1.8	2.0	
15	9.35	9.9	10.85	11.1	11.55	9.75	5.6	2.5	1.9	1.8	2.0	
16	18.1	9.1	10.4	11.1	10.35	9.55	5.8	2.5	1.9	1.8	2.0	
17	13.4	8.35	9.6	11.15	9.45	10.5	5.9	2.45	1.9	1.8	2.0	
18	24.9	10.65	9.55	11.1	9.9	9.8	4.0	2.45	1.9	1.8	2.0	
19	21.7	11.4	9.4	11.15	9.4	9.6	4.2	2.4	1.9	1.8	2.0	
20	14.75	11.0	11.2	11.45	9.05	9.25	4.5	2.4	1.85	1.8	2.0	
21	12.2	11.05	11.3	11.4	9.4	9.75	4.5	2.35	1.8	1.8	2.0	
22	10.1	11.15	11.35	11.75	8.65	8.75	4.65	2.3	1.8	1.8	2.0	
23	8.9	10.9	13.0	12.05	8.65	8.7	4.8	2.3	1.8	1.8	2.0	
24	8.1	10.65	17.1	11.75	8.45	7.85	4.8	2.25	1.8	a 1.8	2.0	
25	7.4	10.9	17.1	11.0	9.0	7.8	3.95	2.25	1.85	1.8	a 2.0	
26	7.0	10.55	17.95	10.6	12.1	7.7	3.1	2.2	1.8	a 1.8	1.95	
27	6.2	11.2	15.55	10.1	12.25	7.6	3.1	2.2	1.8	1.8	1.95	
28	6.25	11.6	14.75	10.25	12.85	7.1	3.05	2.15	1.8	1.8	1.95	
29	6.2	.....	13.6	9.95	11.7	6.9	3.05	2.15	1.8	1.8	1.95	
30	6.2	.....	15.8	10.0	11.0	6.75	3.0	2.1	1.8	a 1.8	1.9	
31	6.0	.....	17.65	.....	.....	.....	3.0	2.1	.....	1.8	.....	

[a] Estimated.

NOTE.—These gage heights are for the station gage, 1,000 feet upstream from the bridge gage which readings were made during 1905. The gage at the station was read from March 1 to July 24, From January 1 to February 28 and from September 5 to December 31 the gage at the bridge was r these readings have been reduced to equivalent readings at the station gage. From July 25 to tember 4 no readings were made and the gage heights have been estimated.

Rating table for Feather River at Oroville, Cal., 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.*
0.75	1,200	2.00	2,060	3.30	3,260	5.20	5,300	11.00	17,600
.80	1,230	2.10	2,140	3.40	3,360	5.40	5,540	12.00	21,500
.90	1,295	2.20	2,220	3.50	3,460	5.60	5,780	13.00	26,000
1.00	1,360	2.30	2,310	3.60	3,560	5.80	6,020	14.00	31,000
1.10	1,430	2.40	2,400	3.70	3,660	6.00	6,260	15.00	36,500
1.20	1,500	2.50	2,490	3.80	3,760	6.20	6,520	16.00	42,000
1.30	1,570	2.60	2,580	3.90	3,860	6.40	6,780	17.00	47,500
1.40	1,640	2.70	2,670	4.00	3,960	6.60	7,050	18.00	53,500
1.50	1,710	2.80	2,760	4.20	4,180	6.80	7,330	19.00	59,500
1.60	1,780	2.90	2,860	4.40	4,400	7.00	7,640	20.00	65,500
1.70	1,850	3.00	2,960	4.60	4,620	8.00	9,450	21.00	71,700
1.80	1,920	3.10	3,060	4.80	4,840	9.00	11,600		
1.90	1,990	3.20	3,160	5.00	5,060	10.00	14,260		

NOTE.—This table is based on discharge measurements made during 1904-1906, and is well defined below gage height 17 feet.

Monthly discharge of Feather River at Oroville, Cal., for 1906.

[Drainage area, 3,640 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	96,300	1,240	14,500	892,000	3.98	4.59
February	19,900	4,730	11,100	616,000	3.05	3.18
March	53,200	9,640	21,600	1,330,000	5.93	6.84
April	34,800	14,100	19,200	1,140,000	5.27	5.88
May	25,300	10,300	17,500	1,080,000	4.81	5.54
June	26,000	7,260	13,800	821,000	3.79	4.23
July	7,330	2,960	5,240	322,000	1.44	1.66
August	2,910	2,140	2,490	153,000	.684	.79
September	2,100	1,920	1,970	117,000	.541	.60
October	1,920	1,920	1,920	118,000	.527	.61
November	7,560	1,920	2,410	143,000	.662	.74
December	43,400	1,990	7,070	435,000	1.94	2.24
The year	96,300	1,240	9,900	7,170,000	2.72	36.90

NOTE.—Values are rated as follows: January to June, and September, good; remainder of 1906 fair, as gage heights may be liable to error.

GRIZZLY CREEK NEAR BECKWITH, CAL.

Grizzly Creek is tributary to the Middle Fork of Feather River from the north, and has a small drainage basin. There is a reservoir site in this basin which has already been surveyed by the Reclamation Service, and gagings on Grizzly Creek are of utility in determining storage possibilities.

This station was established December 17, 1905. It is located at Reno camp, about 4 miles west of Beckwith and 1 mile above Willow Glen Hotel. It is about 1,500 feet below the falls, the present terminus of the Boca and Loyalton Railroad, and is reached by driving from Beckwith. The drainage area above the station is 51 square miles.

The channel is straight for about 200 feet above and below the measuring section. The current is rather sluggish at low water but swift at high stages. The right bank is high and rocky and can not be overflowed. The left bank is low and overgrown with cottonwoods near the water's edge, and may be overflowed at high water. The bed of the stream is rocky and not subject to material change.

Discharge measurements are made from a car on a cable. cable is anchored to a pine stump on the right bank, while c left bank it is supported by a tower and is anchored by means large rock buried in the ground at a depth of 4 feet. The i point for soundings is the near side of the pine stump supportin cable.

The gage is 2 by 4 inches vertical timber, graduated to feet tenths, and nailed securely to a large cottonwood tree about 80(above cable and 200 feet below the Reno camp boarding h The bench mark is a spike in the root of the tree to which the is fastened; elevation, 4 feet above the zero of the gage.

Discharge measurements of Grizzly Creek at Beckwith, Cal.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	c
		Feet.	*Sq. ft.*	*Feet.*	
1905.					
December 17[a]...	R. S. Hawley	4	1.8	0.55	
1906.					
May 26	Hawley and Hardy	37	70	2.50	
June 6	W. N. Hardy	36	61	2.30	
June 14	do	34	41	1.70	
June 22	do	34	39	1.48	
June 28	do	34	32	1.30	
July 7	do	32	24	.92	
July 16	do	[b] 6	[b] 4.8	.42	
July 25	do	[b] 2	[b] 1.6	.41	
August 8	do	[b] 1.6	[b] 0.6	.22	
August 12	do	[b] 2.0	[b] 1.6	.40	

[a] Ice 5 inches thick at the gage. [b] Wading section.

Daily gage height, in feet, of Grizzly Creek near Beckwith, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	0.55	1.80	1.60	3.10	.....	.....	1.10	0.34
2	.55	2.10	1.60	2.80	.....	.....	1.10	.33
3	.55	2.30	1.65	2.35	.....	.....	1.05	.32
4	.55	1.65	1.65	2.45	.....	.....	1.00	.30
5	.55	1.85	1.50	2.50	.....	.....	1.00	.26
6	.55	1.85	1.50	2.50	.....	2.30	1.00	.26
7	.55	1.80	1.65	2.90	.....	2.40	0.80	.25
8	.55	2.00	1.65	3.00	.....	1.80	0.80	.25
9	.70	2.15	1.65	3.00	.....	1.70	0.80	.25
10	.70	2.10	1.65	3.85	.....	1.70	0.80	.25
11	.90	2.00	1.95	3.80	.....	1.75	0.75	.25
12	.80	2.00	2.45	3.80	.....	1.70	0.70	.20
13	1.00	1.80	2.30	3.90	.....	1.70	0.60	.20
14	1.00	1.80	2.15	4.10	.....	1.70	0.50	.20
15	.80	1.75	1.85	4.10	.....	2.30	0.50	.20
16	1.00	1.80	1.85	4.20	.....	1.60	0.50	.20
17	1.60	1.85	1.85	4.40	.....	1.70	0.45	.20
18	1.80	1.85	1.80	4.10	.....	1.65	0.42	.20
19	2.00	1.85	1.85	4.10	.....	1.60	0.42	.30
20	1.40	1.85	1.85	4.00	.....	1.50	0.42	.20
21	1.00	1.85	1.90	3.60	.....	1.40	0.42	.15
22	.70	1.75	2.15	3.60	.....	1.40	0.42	.15
23	.90	1.75	2.20	3.40	.....	1.40	0.41	.15
24	.90	1.85	2.65	3.40	.....	1.40	0.41	.15
25	1.20	1.95	2.60	3.80	.....	1.40	0.41	.15
26	1.10	1.80	2.60	.....	2.50	1.35	0.41	.15
27	1.55	1.65	2.65	.....	.....	1.30	0.41	.15
28	1.40	1.65	2.70	.....	.....	1.20	0.40	.15
29	1.40	.....	2.80	.....	.....	1.20	0.40	.15
30	1.90	.....	2.85	.....	.....	1.15	0.36	.15
31	2.40	.....	3.10	.....	.....	.....	0.34	.15

Rating table for Grizzly Creek near Beckwith, Cal., 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.*
0.10	0	0.90	22	1.70	87	2.50	225	3.60	489
0.20	0.5	1.00	28	1.80	98	2.60	249	3.80	537
0.30	1.6	1.10	34	1.90	110	2.70	273	4.00	585
0.40	3.2	1.20	42	2.00	124	2.80	297	4.20	633
0.50	5.5	1.30	50	2.10	141	2.90	321	4.40	681
0.60	9	1.40	58	2.20	159	3.00	345	4.60	729
0.70	13	1.50	67	2.30	179	3.20	393	4.80	777
0.80	17	1.60	77	2.40	202	3.40	441	5.00	825

NOTE.—The above table is strictly applicable only for open-channel conditions. It is based on 10 discharge measurements made during 1906 and is well defined between gage heights 0.2 foot and 2.5 feet.

Monthly discharge of Grizzly Creek near Beckwith, Cal., for 1906.

[Drainage area, 51 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	202	7	40	2,460	0.784	0.90
February	179	82	110	6,110	2.16	2.24
March	369	67	153	9,410	3.00	3.46
April 1–25	681	190	469	23,300	9.20	8.55
June 6–30	202	38	83.6	4,150	1.64	1.52
July	34	2.2	11.9	732	.234	.27
August	2.2	0.2	0.73	45	.014	.02
September	1	0.2	0.51	30	.010	.01
The period				46,200		

NOTE.—Values are rated as fair, except January and February, which are liable to greater error on account of ice conditions.

INDIAN CREEK NEAR CRESCENT MILLS, CAL.

Indian Creek is a tributary from the east to North Fork of Feather River, entering below the Prattville station; it has a considerable drainage basin. A reservoir site has been surveyed by the Reclamation Service, and measurements are of utility in computing storage possibilities.

The station was established November 29, 1905. It is located about 1¼ miles from Crescent Mills on the Greenville-Quincy road, and is most easily reached by driving from Taylorsville, a distance of 5 miles. It is 2,000 feet below the Arlington Bridge and near E. Cook's residence.

The channel is straight for 1,000 feet above and 200 feet below, and the current is very sluggish. Both banks are high and not liable to overflow. They are covered by a thick growth of brush up to the high-water line and above this by oaks and pines. The bed of the stream is composed of silt and is not liable to change materially. At low water the maximum depth is about 12 feet. Discharge measurements are made from a car on a cable. The initial point for soundings is the oak stump to which the cable is fastened on the right bank.

The gage is a vertical 2 by 6 inch timber, graduated to feet tenths, and is in two sections. It is on the right bank abou feet above the cable. The lower section is about 5 feet long a fastened to an overhanging willow; the upper section is abou feet in length and is fastened to a cottonwood tree. The bench is a spike driven in the cottonwood tree to which the high-water is attached; elevation, 8.00 feet above the zero of the gage.

Discharge measurements of Indian Creek at Crescent Mills, Cal., by Hawley and Ha 1905–6.

Date.	Width.	Area of section.	Gage height.	Discharge.	Date.	Width.	Area of section.	Gage height.
1905.	*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*	1906.	*Feet.*	*Sq. ft.*	*Feet.*
December 14	45	66	1.35	76	July 3	180	1,570	3.32
					July 11	67	288	2.45
1906.					July 20	65	211	1.70
May 29	190	2,080	6.25	1,940	July 30	65	184	1.35
May 31	186	1,960	5.56	1,580	August 6	65	172	1.12
June 9	182	1,850	4.87	1,120	August 17	64	176	1.20
June 18	182	1,810	4.69	1,020	August 27	64	171	1.05
June 25	181	1,680	3.80	608	September 9	64	171	1.10

NOTE.—These measurements were made at different sections.

Daily gage height, in feet, of Indian Creek at Crescent Mills, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	1.45	3.15	5.75	8.45	6.4	5.4	3.3	1.25	1.1	1.5	1.45
2	1.5	3.0	5.15	7.35	6.5	5.4	3.3	1.15	1.1	1.5	1.45
3	1.5	3.0	5.15	6.7	6.8	5.3	3.3	1.1	1.15	1.45	1.55
4	1.5	2.95	4.95	6.3	6.95	5.5	3.25	1.1	1.15	1.45	2.2
5	1.5	2.95	4.7	5.95	7.1	5.5	3.1	1.1	1.15	1.45	2.8
6	1.5	2.95	4.45	6.0	7.0	5.35	3.0	1.1	1.15	1.45	2.35
7	1.5	2.95	4.45	6.5	6.9	5.15	2.9	1.1	1.15	1.45	2.0
8	1.45	2.95	4.6	7.0	6.8	4.95	2.8	1.4	1.15	1.45	1.85
9	1.5	2.95	5.0	7.5	6.7	4.9	2.7	1.3	1.1	1.5	1.8
10	1.5	3.0	5.3	7.7	6.75	4.9	2.6	1.2	1.1	1.5	1.7
11	1.6	3.0	5.8	7.6	6.8	4.9	2.4	1.2	1.1	1.5	1.65
12	2.3	3.0	7.8	7.3	6.8	4.95	2.3	1.15	1.15	1.5	1.65
13	2.9	3.05	8.0	7.1	6.4	4.95	2.3	1.25	1.15	1.5	1.6
14	3.95	3.4	6.9	7.1	6.2	4.8	2.2	1.35	1.15	1.5	1.6
15	2.8	3.6	6.1	7.3	6.1	4.7	2.2	1.25	1.2	1.5	1.6
16	7.1	4.6	5.6	7.5	5.8	4.75	2.0	1.2	1.25	1.5	1.7
17	7.1	4.3	5.3	7.7	5.4	4.8	1.9	1.2	1.25	1.5	1.75
18	9.22	4.35	5.0	7.6	5.1	4.65	1.9	1.2	1.25	1.5	1.7
19	10.68	5.1	4.7	7.5	4.9	4.5	1.8	1.15	1.25	1.5	1.6
20	7.5	5.5	4.6	7.6	4.9	4.4	1.7	1.15	1.2	1.5	1.6
21	5.45	6.1	4.9	7.7	4.8	4.35	1.6	1.05	1.15	1.5	1.6
22	4.5	5.7	5.9	7.8	4.7	4.25	1.55	1.05	1.15	1.5	1.6
23	4.15	5.2	6.95	7.65	4.6	4.0	1.5	1.05	1.15	1.5	1.6
24	3.8	4.9	8.1	7.25	4.5	3.85	1.5	1.05	1.2	1.5	1.55
25	3.45	4.65	8.85	6.8	4.5	3.8	1.5	1.1	1.25	1.5	1.55
26	3.4	4.5	8.9	6.35	5.1	3.75	1.45	1.2	1.3	1.45	1.55
27	3.3	5.5	8.58	6.1	5.75	3.7	1.45	1.2	1.3	1.45	1.5
28	3.3	6.6	7.85	6.1	6.25	3.6	1.4	1.05	1.35	1.45	1.5
29	3.3	.....	7.35	6.15	6.15	3.5	1.35	1.05	1.4	1.45	1.5
30	3.2	.....	7.25	6.3	5.75	3.4	1.35	1.1	1.4	1.4	1.5
31	3.1	.....	8.58	.....	5.55	.....	1.35	1.1	.....	1.4	.....

Rating table for Indian Creek at Crescent Mills, Cal., 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	35	2.00	182	3.00	395	4.00	700	6.00	1,800
1.10	46	2.10	200	3.10	421	4.20	785	6.20	1,940
1.20	58	2.20	219	3.20	448	4.40	880	6.40	2,080
1.30	71	2.30	238	3.30	475	4.60	980	6.60	2,220
1.40	84	2.40	258	3.40	502	4.80	1,080	6.80	2,360
1.50	98	2.50	278	3.50	530	5.00	1,180	7.00	2,500
1.60	113	2.60	299	3.60	560	5.20	1,300	8.00	3,200
1.70	129	2.70	321	3.70	595	5.40	1,420	9.00	3,900
1.80	146	2.80	345	3.80	630	5.60	1,540	10.00	4,600
1.90	164	2.90	369	3.90	665	5.80	1,660	11.00	5,300

NOTE.—This table is based on 14 discharge measurements made during 1905-6, and is well defined below gage height 6.2 feet.

Monthly discharge of Indian Creek at Crescent Mills, Cal., for 1906.

[Drainage area, 740 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	5,080	91	868	53,400	1.17	1.35
February	2,220	382	824	45,800	1.11	1.16
March	3,830	905	2,000	123,000	2.70	3.11
April	3,520	1,760	2,550	152,000	3.45	3.85
May	2,570	930	1,790	110,000	2.42	2.79
June	1,480	502	1,010	60,100	1.36	1.52
July	475	78	226	13,900	0.305	0.35
August	84	40	53.1	3,260	0.072	.08
September	84	46	57.9	3,450	0.078	.09
October	98	84	94.8	5,830	0.128	.15
November	345	91	132	7,860	0.178	.20
December	2,430	91	534	32,800	0.722	.83
The year	5,080	40	845	611,000	1.14	15.48

NOTE.—These values are excellent.

NORTH FORK OF FEATHER RIVER BELOW PRATTVILLE, CAL.

This station was established November 22, 1905. Previous to that date, however, the Great Western Power Company had installed a gage rod and maintained a daily record since June 13, 1905, making gagings by means of a boat. This station is located in the canyon at the proposed dam site of the Great Western Power Company, about 3 miles below the Meadow View bridge crossing on the Prattville-Greenville road, and about 5 miles southeast of Prattville. The drainage area above this point is only 506 square miles, but the run-off during the months of low flow is about half the total run-off at the Oroville station from a drainage area of 3,640 square miles.

The equipment for gaging at this station consists of a $\frac{5}{8}$-inch cable anchored to a large rock on the left bank and to a spruce tree on the right, having a clear span of 155 feet and supporting a car with a lock box. Parallel to the cable and 35 feet upstream a guy wire spans the channel for staying the meter in the higher stages. The cable is marked with a ring of white paint every 5 feet for conven-

ience in sounding, and the initial point is an iron bolt in the ro
the tree supporting the cable. The car is used for making mea
ments at all stages. The gage rod is inclosed in the clock register
which is on the right bank about 700 feet above the cable. The
which protects the gage from the thin surface ice in winter, is
on the inside with building paper to prevent freezing and is prov
with a hinged door on the river side to permit easy access for rea
direct and comparison with clock register. The reference bench
is a point surrounded by a ring of white paint on a rock 8 feet so
west of the gage; elevation, 7.62 feet above the zero of the gage

The channel is straight for 400 feet above the cable and for 200
below. The bed is rocky and not liable to change materially.
banks are high and steep and not subject to overflow at any s
There is a growth of small willows along the water's edge and for a
distance back of it, while higher up are found spruce and fir t
The stream is in one channel at all stages and is swift in high wate
has moderate velocity at other times. The cross section is re
and not subject to much change, the width of the stream being a
60 feet at low water with a maximum depth of 9 feet.

This station is maintained in cooperation with the Great We
Power Company, whose hydrographer, Mr. L. J. Bevan, has kep
gage-height record and made meter measurements since it was e
lished in 1905. The data collected at this point indicates the qua
of water that could be impounded in the proposed Big Meadow
ervoir, and the water thus stored would be available for power
irrigation and could be utilized in the control of Sacramento Riv

Discharge measurements of North Fork of Feather River below Prattville, Cal., in 1

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.
1905.		*Feet.*	*Sec.-ft.*	1906.		*Feet.*
June 13	R. W. Armstrong	3.45	1,256	June 2[a]	L. J. Bevan	5.17
June 21	W. E. Spear	3.00	1,061	June 2	do	5.17
July 1	do	2.58	869	June 11	W. V. Hardy	5.55
July 10	R. W. Armstrong	2.40	761	June 19[a]	L. J. Bevan	5.73
July 17	W. E. Spear	2.32	739	June 19	do	5.73
August 10	do	2.10	668	June 23[a]	do	4.82
August 14	L. J. Bevan	2.11	663	June 26	W. V. Hardy	4.82
August 26	do	2.06	649	July 2	do	4.26
October 18	do	2.01	621	July 3	L. J. Bevan	4.21
November 25	do	1.96	602	July 9	do	3.83
Do	Hawley & Bevan	1.96	601	July 12	W. V. Hardy	3.53
				July 21	do	3.05
1906.				July 24	L. J. Bevan	2.93
January 20	L. J. Bevan	4.19	1,514	July 31	W. V. Hardy	2.75
January 24	do	3.12	1,057	August 3	L. J. Bevan	2.71
February 22	do	4.26	1,600	August 4	W. V. Hardy	2.65
March 7	do	2.97	1,007	August 16	do	2.50
March 26	do	6.50	2,852	August 29	do	2.25
April 11	do	5.47	2,125	September 6	do	2.15
May 5	do	6.87	3,137	September 19	L. J. Bevan	2.25
May 30	Hardy & Hawley	5.80	2,539	October 21	do	2.13

[a] 45-pound boiler weight used as anchor for meter.

Daily gage height, in feet, of North Fork of Feather River below Prattville, Cal., for 1905–6.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1905.												
1							2.59		2.06	2.02		2.15
2							2.57	2.16		2.01		
3							2.55		2.04	2.00		
4							2.53	2.17			1.98	
5							2.48	2.17		2.00	1.98	1.85
6							2.50	2.16		2.00		
7							2.49	2.17	2.04	2.04		
8							2.43	2.14	2.04	2.03		
9							2.42	2.14	2.05	2.02		
10							2.42	2.09	2.03			
11							2.39	2.11	2.03	2.01		
12							2.40	2.16	2.04	2.01		1.83
13						3.45	2.39		2.04	2.01		
14							2.38	2.11	2.05	2.01		1.93
15							2.39	2.11	2.04	2.01		
16							2.34	2.12	2.05	2.01	1.99	2.01
17							2.33	2.11	2.03	2.01		
18						3.17		2.10	2.03			
19						3.05	2.32	2.10	2.03		1.99	
20						3.01	2.31	2.09	2.01			
21						3.01	2.32	2.11	2.01		1.98	1.81
22						2.90	2.28	2.14	2.00		1.96	
23						2.87	2.28	2.14	1.99		1.98	1.84
24						2.83	2.33	2.14	2.01		1.97	
25						2.78	2.29	2.11	2.01		1.97	1.91
26						2.77	2.26	2.06	2.00			
27						2.69	2.24	2.08	2.02			
28						2.66	2.22	2.07	2.16		2.01	
29						2.61	2.23	2.06	2.11	2.00		
30						2.58	2.22	2.05	2.06			2.00
31							2.21	2.06				
1906.												
1			3.60	5.95	5.85	5.30	4.22	2.76	2.17	2.17	2.13	1.99
2			3.45	5.15	6.05	5.19	4.23	2.72		2.17	2.15	2.00
3	1.91	2.98	3.35	4.70	6.23	5.29	4.22	2.68		2.16	2.25	2.01
4			3.15	4.50	6.60	5.58	4.18	2.66		2.16	2.62	2.01
5			3.12	4.40	6.93	6.00	4.14	2.63		2.16	2.88	2.02
6	1.93	2.91	3.05	4.45	7.10	5.92	4.04	2.63		2.16	2.65	2.05
7	1.92	2.87	3.01	4.60	7.20	5.59	3.98	2.62		2.16	2.42	2.07
8	1.90	2.85	3.00	4.77	7.18	5.25	3.92	2.60	2.10	2.16	2.30	2.17
9	1.94	2.86	3.08	5.08	7.17	5.18	3.83	2.58		2.15	2.24	2.25
10	1.94	2.90	3.24	5.46	7.27	5.37	3.73	2.56		2.15	2.20	2.44
11	2.03	2.97	3.75	5.45	7.56	5.65	3.60	2.57		2.15	2.18	2.18
12	2.11	3.07	4.35	5.38	7.68	5.60	3.52	2.59		2.15	2.17	2.10
13	2.15	3.11		5.12	7.15	5.52	3.50	2.56	2.08	2.15	2.16	2.18
14	2.35	3.58		5.05	6.73	5.40	3.47	2.53			2.15	2.24
15	2.20	3.85		5.10	6.80	5.33	3.43	2.51	2.20		2.16	2.29
16	2.80	3.79		5.19	6.65	5.60	3.45	2.50			2.24	2.35
17	3.12	3.68	3.60	5.36	6.05	6.28	3.28	2.47			2.21	2.44
18	4.25	4.00	3.45	5.48	6.16	6.05	3.24	2.47			2.16	2.33
19	4.65	4.27	3.33	5.50	5.50	5.73	3.20				2.10	2.33
20	4.30	4.31	3.30	5.58	5.45	5.58	3.13		2.25	2.13	2.10	2.33
21	3.80	4.28	3.90	5.88	5.45	5.50	3.08		2.22	2.13	2.11	2.31
22	3.54	4.15	4.65	6.18	5.40	5.40	3.01		2.20	2.13	2.10	2.30
23	3.32	3.74	5.15	6.40	5.32	5.20	2.96		2.21	2.13	2.02	2.38
24	3.28	3.70	5.85	6.35	5.18	5.02	2.94		2.23	2.13	2.04	2.48
25	3.13	3.62	6.30	6.00	5.27	4.86	2.90	2.25	2.22	2.13	2.05	3.42
26	3.17	3.45	6.47	5.65	5.90	4.80	2.87		2.20	2.12	2.04	4.40
27	3.32	3.65	5.90	5.50	6.36	4.68	2.84		2.19	2.11	2.02	4.57
28		3.80	5.25	5.60	6.33	4.52	2.83		2.19	2.11	2.01	4.65
29			4.80	5.55	6.17	4.35	2.80		2.18	2.10	1.97	4.35
30			5.15	5.69	5.78	4.25	2.78		2.17	2.10	2.01	3.95
31			6.35		5.48		2.76			2.13		3.60

Rating table for North Fork of Feather River below Prattville, Cal., 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.*
1.80	570	2.50	805	3.20	1,090	3.90	1,410	4.60	1,770
1.90	600	2.60	845	3.30	1,135	4.00	1,460	4.70	1,825
2.00	630	2.70	885	3.40	1,180	4.10	1,510	4.80	1,880
2.10	665	2.80	925	3.50	1,225	4.20	1,560	4.90	1,935
2.20	700	2.90	965	3.60	1,270	4.30	1,610	5.00	1,990
2.30	735	3.00	1,005	3.70	1,315	4.40	1,660	5.10	2,045
2.40	770	3.10	1,045	3.80	1,360	4.50	1,715	5.20	2,100

NOTE.—This table is based on 40 discharge measurements made during 1905–6 and is well d
Above gage height 5.2 feet the rating curve is a tangent, the difference being 60 per tenth.

Monthly discharge of North Fork of Feather River below Prattville, Cal., for 1905

[Drainage area, 506 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-of	
	Maximum.	Minimum.	Mean.		Sec.-ft. per sq. mile.	De in
1905.						
July	845	700	761	46,800	1.50	
August	700	647	670	42,000	1.32	
September	682	630	644	38,300	1.27	
October	647	630	631	38,800	1.25	
November	630	615	628	37,400	1.24	
December	682	570	607	37,300	1.20	
The period	845	570	657	241,000	1.30	
1906.						
January	1,800	600	937	57,600	1.85	
February	1,610	945	1,210	67,200	2.39	
March	2,850	1,000	1,590	97,800	3.14	
April	2,820	1,660	2,210	132,000	4.37	
May	3,600	2,100	2,770	170,000	5.47	
June	2,760	1,580	2,190	130,000	4.33	
July	1,580	905	1,200	73,800	2.37	
August	905	700	795	48,900	1.57	
September	717	665	688	40,900	1.36	
October	682	665	679	41,800	1.34	
November	965	615	698	41,500	1.38	
December	1,800	630	894	55,000	1.77	
The year	3,600	600	1,320	956,000	2.61	

NOTE.—Discharge estimated on days when gage heights are missing. Values are excellent.

NORTH FORK OF FEATHER RIVER ABOVE PRATTVILLE.

This station was established June 12, 1905. It is 3 miles ea
Prattville and about ¼ mile above the junction with Ham
Branch. The drainage area above the station is 245 square m

The channel of the stream is straight for 200 feet above and 300
below the measuring section and has a shale bottom subject to s
change. Gagings are made from a boat. The section is abou
feet wide and 5 feet deep at low water; at very high water there
diversion overflow around the station, leaving the main stream a
1½ miles above the point of measurement.

The gage is nailed to a willow stump 15 feet above the mea
ing section. Up to October 15, during 1905, the gage was read d
after this date, weekly.

Discharge measurements of North Fork of Feather River above Prattville, Cal., in 1905–6.

Date.	Hydrographer.	Gage height.	Discharge.
1905.		*Feet.*	*Sec.-ft.*
June 12	R. W. Armstrong	2.33	890
June 22	W. E. Spear	1.79	620
July 1	do	1.48	520
July 15	R. W. Armstrong	1.23	407
July 28	W. E. Spear	1.09	399
August 15	L. J. Bevan	.99	370
September 4	do	.90	345
December 17	do	.80	330
1906.			
February 28	L. J. Bevan	1.82	669
April 12	do	2.77	1,046
May 15	do	3.83	1,524
July 7	do	2.48	929
August 8	do	1.34	502

Daily gage height, in feet, of North Fork of Feather River above Prattville, Cal., for 1905–6.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1905.												
1							1.50	1.05	0.90	0.88		
2							1.48	1.06	.91	.85		
3							1.47		.90	.84		
4							1.46	1.05	.90	.84	0.82	
5							1.39	1.05	.90	.85		
6							1.40	1.04		.85		
7							1.35	1.02	.88	.90		
8							1.33	1.01	.87	.90		
9							1.32	1.02	.90	.88		
10							1.31	1.01	.90			
11							1.29	1.00	.87	.87		
12							1.27	0.99	.86	.87		0.75
13							1.26	.99	.86	.86		
14							1.24	.99	.89	.86		
15							1.23	.99	.89	.87		
16							1.22	.97	.90	.86	0.83	
17						2.08	1.20	.95	.88			0.80
18								.95	.87			
19						1.97	1.18	.94	.86		0.82	
20						1.90	1.18	.94	.85			
21						1.86	1.16	.95	.84			0.81
22						1.80	1.15	.97	.82			
23						1.78	1.14	.96	.82			
24						1.76	1.16	.98	.84			
25						1.69	1.15	.95	.85			
26						1.67	1.14	.90	.84			
27						1.59	1.14	.94	.87			
28						1.55	1.09	.92	.90		0.87	
29						1.53	1.10	.91	.95	0.85		
30						1.51	1.07	.90	.90			0.87
31							1.06	.90				
1906.												
1									1.12			
2												
3						2.83					1.00	
4								1.40				
5					3.92							
6	0.76	1.19										
7				2.51			2.48			0.90		
8								1.34	1.04			0.94
9												
10												
11								1.34			0.95	
12					4.15							
13	0.88											
14				2.60			2.06			0.89		
15					3.83				1.06			0.95

Daily gage height, in feet, of North Fork of Feather River above Prattville, Cal., for 1905– Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	I
1906												
16						3.30						
17		1.55	1.55								0.98	
18								1.20				
19	1.68				2.90							
20									0.96			
21							1.80			0.88		
22									0.96			
23						3.32						
24		1.55	2.59								0.96	
25								1.18				
26												
27												
28		1.82					1.48			0.86		
29					3.18				0.94			
30						2.57						
31			2.04									

HAMILTON BRANCH NEAR PRATTVILLE, CAL.

This station was established June 12, 1905. It is located abou miles east of Prattville and 1¼ miles above the junction of Hamilt Branch and North Fork. The drainage area above the station is square miles.

The channel is straight for 200 feet above and below the meas ing section and has a shale bottom subject to a very slight change.

Discharge measurements are made from a boat at a section ab 70 feet wide and 4 feet deep at low water. The stream ne overflows.

The gage is in two parts, nailed to posts driven into the stre bed near a clump of willows. Up to October 15, during 1905, gage was read daily; after that date, weekly.

Discharge measurements of Hamilton Branch near Prattville, Cal., in 1905–6.

Date.	Hydrographer.	Gage height.	Dis char
1905.		*Feet.*	*Sec.*
June 12	R. W. Armstrong	3.08	
June 23	W. E. Spear	2.74	
July 3	do	2.62	
July 28	do	2.56	
August 15	L. J. Bevan	2.56	
September 4	do	2.55	
December 17	do	2.40	
1906.			
January 19	L. J. Bevan	3.60	
February 28	do	3.92	
April 12	do	4.43	
May 15	do	5.21	
July 7	do	3.19	
August 8	do	2.77	

Daily gage height, in feet, of Hamilton Branch near Prattville, Cal., for 1905–6.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1905.												
1							2.66	2.56	2.55	2.54		
2							2.64	2.56	2.55	2.53		
3							2.64		2.55	2.53		
4							2.63	2.56	2.55	2.50	2.47	
5							2.62	2.55	2.55	2.48		
6							2.63	2.56		2.48		
7							2.61	2.56	2.54	2.50		
8							2.60	2.55	2.54	2.50		
9							2.59	2.56	2.54	2.50		
10							2.59	2.56	2.54			
11							2.58	2.55	2.53	2.49		
12							2.58	2.56	2.53	2.49		2.40
13							2.58	2.56	2.53	2.49		
14							2.57	2.55	2.53	2.48		
15							2.57	2.56	2.53	2.49		
16							2.58	2.57	2.53	2.48	2.46	
17						2.91	2.58	2.56	2.53			2.40
18								2.57	2.53			
19						2.84	2.58	2.58	2.53			
20						2.82	2.58	2.57	2.52		2.45	
21						2.80	2.60	2.58	2.52			2.40
22						2.76	2.58	2.59	2.52			
23						2.74	2.59	2.58	2.52			
24						2.72	2.62	2.58	2.52			
25						2.70	2.61	2.56	2.52			
26						2.70	2.60	2.56	2.52			
27						2.67	2.60	2.57	2.50			
28						2.67	2.57	2.56	2.54		2.44	
29						2.65	2.56	2.55	2.54	2.48		
30						2.62	2.56	2.55	2.52			2.44
31							2.56	2.56				
1906.												
1							3.42		2.68			
2					4.62	4.22						
3											2.62	
4								2.75				
5					5.17							
6	2.39	3.22										
7				3.87			3.20			2.58		
8								2.77	2.65			2.59
9												
10												
11								2.76			2.57	
12					5.75							
13												
14				4.30			3.00			2.57		
15					5.21				2.69			2.60
16	2.81					4.18						
17		3.71	3.57								2.60	
18								2.71				
19	3.60				4.45							
20									2.61			
21							2.85			2.58		
22									2.60			2.72
23						4.00						
24		3.93	4.88								2.60	
25								2.68				
26												
27										2.51		
28		3.92					2.78					
29					4.95				2.59			4.13
30						3.50						
31			5.18									

BUTT CREEK AT BUTTE VALLEY, CAL.

Butt Creek rises in the extreme western part of Plumas Cou and flows eastward, discharging into North Fork of Feather R about 9 miles south of Prattville.

This station was established June 14, 1905, about 2 miles al the mouth of the river, and 100 feet below the footbridge at lower end of Butte Valley. The drainage area above the static 73 square miles.

The measuring section is 20 feet wide and 2 feet deep at low w when measurements are made by wading; in high stages meas ments are made from the footbridge. The bottom of the chann composed of coarse gravel and is not subject to much change.

The gage rod is nailed to a post in a clump of willows 15 feet b the measuring section. During 1905 and until July, 1906, the was read daily by B. F. Barbee. Since July, 1906, W. W. Saver has made readings whenever there was any material change of st

Discharge measurements of Butt Creek at Butte Valley, Cal., in 1905–6.

Date.	Hydrographer.	Gage height.	ch
1905.		*Feet.*	*S*
June 14	R. W. Armstrong	2.84	
July 18	do	2.51	
August 19	do	2.39	
September 9	W. E. Spear	2.38	
1906.			
March 2	L. J. Bevan	3.16	
March 27	do	4.54	
April 10	do	4.75	
June 21	do	3.54	
July 24	do	2.68	
August 30	W. V. Hardy		

NOTE.—About 5 second-feet are diverted 6 miles above this station from Butt Creek into Creek watershed.

Daily gage height, in feet, of Butt Creek at Butte Valley, Cal., for 1905–6.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1905.											
1											2.38
2											2.38
3											2.38
4											2.38
5											2.38
6										2.38	2.38
7										2.38	2.38
8											2.38
9									2.38	2.37	2.38
10										2.37	2.38
11										2.38	2.38
12										2.38	2.38
13										2.38	2.38
14						2.84				2.38	2.38
15										2.38	2.38
16										2.38	2.38
17										2.38	2.38
18							2.51			2.38	2.38
19								2.39		2.38	2.38
20										2.38	2.45

Daily gage height, in feet, of Butt Creek at Butte Valley, Cal., for 1905–6—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1905.												
21										2.38	2.42	2.76
22										2.38	2.42	2.76
23										2.38	2.44	2.73
24										2.38	2.43	2.73
25										2.38	2.43	2.73
26										2.38	2.43	2.76
27										2.38	2.44	2.71
28										2.38	2.43	2.68
29										2.38	2.43	2.68
30										2.38	2.45	2.67
31										2.38	.....	2.78
1906.												
1	2.85	2.70	3.42	5.15	4.30	3.94	3.06	2.61	2.57	.....	.....	.....
2	2.88	2.68	3.31	4.50	4.33	3.99	3.13	2.61	.....	.....	.....	.....
3	2.91	2.68	3.28	4.17	4.53	4.02	3.02	2.61	.....	.....	.....	.....
4	2.94	2.68	3.25	4.02	4.65	4.42	2.98	2.60	.....	.....	.....	.....
5	2.96	2.69	3.17	3.96	4.80	4.20	2.93	2.59	.....	.....	2.93	.....
6	2.99	2.69	3.15	4.06	4.72	4.22	2.90	2.59	.....	2.54	.....	.....
7	3.03	2.69	3.16	4.30	4.78	4.24	2.89	2.59	.....	.....	2.65	.....
8	3.03	2.71	3.24	4.38	4.70	3.87	2.87	2.59	2.57	.....	.....	2.43
9	3.07	2.71	3.34	4.70	4.72	3.83	2.83	2.59	.....	.....	.....	.....
10	3.10	2.94	3.46	4.72	4.76	3.83	2.81	2.58	.....	.....	2.61	2.63
11	2.76	2.95	3.73	4.35	4.65	3.79	2.79	2.60	.....	.....	.....	2.67
12	2.83	2.95	5.75	4.45	4.48	3.92	2.77	2.61	.....	.....	.....	3.13
13	2.85	2.97	5.15	4.42	4.33	3.75	2.80	2.61	2.63	2.55	.....	3.13
14	2.93	3.25	4.30	4.41	4.34	3.68	2.78	2.61	2.61	.....	.....	3.13
15	2.98	3.65	4.02	4.58	4.37	3.65	2.77	.....	2.62	.....	.....	3.10
16	4.66	3.30	3.78	4.70	4.00	4.18	2.75	.....	.....	.....	.....	3.10
17	5.14	3.24	3.47	4.57	3.83	3.87	2.74	.....	.....	.....	2.58	3.11
18	7.69	3.60	3.35	4.53	3.70	3.71	2.74	.....	.....	.....	.....	2.68
19	6.72	4.09	3.27	4.56	3.72	3.64	2.72	.....	.....	.....	.....	2.63
20	5.45	3.75	3.27	4.73	3.70	3.39	2.72	.....	.....	2.55	.....	2.63
21	5.15	3.95	3.42	4.88	3.71	3.55	2.71	.....	.....	.....	.....	2.61
22	5.53	3.65	4.22	4.87	3.68	3.47	2.71	.....	2.59	.....	.....	2.60
23	3.16	3.55	4.40	4.63	3.67	3.40	2.69	.....	.....	.....	.....	2.67
24	3.00	3.42	4.90	4.43	3.68	3.33	2.69	.....	.....	.....	.....	2.72
25	2.90	3.35	4.90	4.25	3.84	3.30	2.68	2.60	.....	.....	.....	3.28
26	2.82	3.30	4.56	4.13	4.55	3.27	2.68	.....	.....	.....	.....	4.43
27	2.81	4.09	5.54	4.12	4.50	3.22	2.67	.....	.....	2.55	.....	4.33
28	2.75	4.10	4.20	4.22	4.38	3.21	2.66	.....	.....	.....	.....	3.42
29	2.72	.....	4.10	4.20	4.20	3.12	2.64	.....	2.56	.....	2.45	3.10
30	2.70	.....	5.00	4.28	4.10	3.09	2.62	.....	.....	.....	.....	.....
31	2.70	.....	6.00	.....	3.97	.....	2.61	.....	.....	.....	.....	.....

NORTH FORK OF FEATHER RIVER NEAR BIG BEND, CAL.

This station was established June 13, 1905. It is located 300 feet above the head of the Big Bend tunnel, about 20 miles north of Oroville. The drainage area at this point is 1,940 square miles.

The channel is straight for 500 feet above and below the station, and is in rock, with little probability of change. A low-water gage graduated from 0.0 to 7.5 feet is bolted into rock on the west bank 10 feet below the measuring section, and a high-water gage graduated from 7 to 22 feet is nailed to a poplar tree on the west bank 100 feet above the measuring section. The zero of the gage is 870.22 feet above sea level and 7.89 feet below the reference bench mark, which is a knob on the top of the rock to which the low-water gage is fastened.

Discharge measurements are made by means of a boat when the gage is below 11 feet, and for higher stages float measurements only

are made at this point, while check measurements are made 2 m
downstream from the cable of the Golden State Power Comp
At low water the stream at the station is about 85 feet wide
19 feet deep, with a uniform but sluggish current. During 1905
1906 the gage was read every other day by Henry Turner.

Discharge measurements of North Fork of Feather River near Big Bend, Cal., by S and Bevan, in 1905–6.

Date.	Gage height.	Discharge.	Date.	Gage height.	Di cha
1905.	*Feet.*	*Sec.-ft.*	1906.	*Feet.*	*Se*
June 13	4.15	3,750	March 13	12.25	
July 13	2.75	1,352	April 18	10.24	
August 20	2.14	1,048	April 28	8.98	
September 16	2.07	1,003	June 6	9.55	
October 22	2.15	1,038	June 7	9.08	
December 5	2.25	1,101	July 13	4.73	
1906.			August 12	3.03	
February 2	4.79	3,017	October 11	2.44	

Daily gage height, in feet, of North Fork of Feather River near Big Bend, Cal., for 19

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1905.											
1											2.17
2								2.26	2.06	2.18	
3										2.15	2.17
4								2.06	2.06	2.10	
5										2.08	2.17
6								2.24	2.07		
7										2.10	2.18
8								2.21	2.06		
9									2.06	2.12	
10								2.17			
11									2.05	2.11	2.17
12								2.16			
13							2.75	2.16	2.05	2.13	2.18
14											
15							2.66	2.17	2.08	2.12	2.17
16									2.07		
17							2.62	2.15		2.11	2.18
18									2.06		
19							2.60	2.13		2.10	2.18
20								2.10	2.06	2.12	
21							2.55	2.13			2.27
22										2.15	2.37
23							2.50	2.20			2.19
24											
25							2.46	2.14	2.05	2.18	2.18
26								2.11			
27							2.35		2.07	2.20	2.57
28								2.07			
29							2.34		2.35	2.19	2.37
30								2.06	2.25	2.18	
31							2.28				
1906.											
1	2.24					10.65		3.25	2.62		
2		4.80	7.65	11.80	9.85	8.95	6.25	3.20			2.40
3	2.24								2.58		3.02
4		4.65	7.30	9.55	10.60		6.23	3.12	2.58		5.90
5	2.30					11.20					4.60
6	2.31	4.54	6.58	8.76	11.20	9.55	5.85	3.08	2.58		
7			6.50			9.15			2.58		3.40
8	2.35	4.50		9.60	11.25		5.50	3.00			
9			6.46			9.05			2.55		3.00
10	2.30	4.65		10.70	11.85		5.25	2.97	2.53		

Daily gage height, in feet, of North Fork of Feather River near Big Bend, Cal., for 1905–6—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1906.												
11			7.35			9.00				2.44	2.80	6.20
12	2.96	4.79	13.45	9.85	11.20		4.85	3.03	2.52			
13		4.81	12.25			8.90	4.73	3.01			2.75	5.10
14	2.46		10.06	9.75	10.05	8.75	4.60		2.60	2.44		
15		8.15	8.85					2.90			2.75	3.10
16	13.23			10.30	9.40	9.30	4.38		2.58			
17		6.51	7.85								2.83	3.80
18	18.48			10.25	8.85	8.85	4.22	2.85	2.58			
19	19.90	7.75	6.74	10.22					2.56		2.73	3.60
20	12.22	8.20			8.40	8.40	3.90	2.78	2.55			
21			7.54	10.85					2.53		2.67	3.50
22	7.15	8.97	10.35		8.00	7.90	3.68					
23				11.10				2.75			2.65	3.80
24	5.88	8.10	14.00		7.50	7.30	3.60	2.73				
25				10.65							2.60	8.80
26	5.56	8.75	14.70		7.90	6.95	3.53	2.66				15.40
27				9.35	8.40						2.55	13.00
28	5.25	9.80	12.10	9.00	11.05	6.68	3.45					9.55
29					10.45					2.40	2.50	
30	5.10		12.34	8.40		6.39	3.35	2.65				
31	4.88				9.35							

MISCELLANEOUS MEASUREMENTS IN FEATHER RIVER DRAINAGE BASIN.

The following miscellaneous measurements were made in Feather River drainage basin during 1905 and 1906:

Bailey Creek near Prattville, Cal.—This stream is a tributary of North Fork of Feather River. The following measurements were made a short distance above its mouth.

1905—July 31: Discharge, 2.6 second-feet.
1906—May 23: Discharge, 50 second-feet.
September 5: Discharge, 3.3 second-feet.

Berry Creek near Berrycreek post-office, Cal.—This creek is a small tributary of the North Fork of Feather River. A measurement was made September 11, 1906, at wagon bridge at Berrycreek post-office:

Width, 20 feet; area, 27 square feet; discharge, 8 second-feet.

Big Springs near Prattville, Cal.—These springs discharge into Hamilton Branch of North Fork of Feather River. The following measurements were made above its mouth:

1905—June 13: Discharge, 56 second-feet.
July 5: Discharge, 65 second-feet.
August 8: Discharge, 69 second-feet.
September 1: Discharge, 50 second-feet.
December 16: Discharge, 61 second-feet.
1906—June 1: Discharge, 150 second-feet.
July 6: Discharge, 56 second-feet.
August 7: Discharge, 61 second-feet.

Butt Creek near Prattville, Cal.—This stream is a tributary of No Fork of Feather River. The following measurements were made the bridge on Prattville-Sterling road:

1905—July 11: Discharge, 21 second-feet.
1906—March 27: Discharge, 156 second-feet.
June 21: Discharge, 142 second-feet.
July 20: Discharge 54 second-feet.

Clear Creek near Prattville, Cal.—This stream is a tributary Hamilton Branch of North Fork of Feather River. The follow measurements were made in 1905 a short distance above its mou

July 5: Discharge, 29 second-feet.
August 8: Discharge, 28 second-feet.
September 1: Discharge, 27 second-feet.

Chester Branch of North Fork of Feather River near Prattville, Ca The following measurements were made at the wagon bridge Chester, Cal.:

1905—July 7: Discharge, 35 second-feet.
August 5: Discharge, 23 second-feet.
August 31: Discharge, 21 second-feet.
October 4: Discharge, 23 second-feet.
1906—March 1: Discharge, 48 second-feet.
June 23: Discharge, 95 second-feet.
July 11: Discharge, 70 second-feet.
September 5: Discharge, 45 second-feet.

Dotta Spring near Prattville, Cal.—This spring discharges into No Fork Feather River. The following measurements were made feet above its mouth.

1905—June 12: Discharge, 50 second-feet.
July 3: Discharge, 99 second-feet.
August 5: Discharge, 84 second-feet.
September 2: Discharge, 89 second-feet.
October 18: Discharge, 90 second-feet.
December 14: Discharge, 77 second-feet.
1906—June 21: Discharge, 122 second-feet.
August 3: Discharge, 94 second-feet.

Feather River near Bidwell Bar.—The following measurements w made 2 miles below Bidwell Bar and above the junction with No Fork of Feather River during 1905:

June 11: Discharge, 1,525 second-feet.
July 25: Discharge, 410 second-feet.
August 19: Discharge, 279 second-feet.
September 17: Discharge, 256 second-feet.

Flournoy ditch near Genesee, Cal.—This ditch diverts water fr Red Clover Creek for irrigation at Flournoy's ranch. A measu ment was made August 21, 1906, $1\frac{1}{4}$ miles southeast of Flournoy short distance below the point of diversion:

Width, 4 feet; area, 3.6 square feet; discharge, 9.5 second-feet.

Hamilton Branch of North Fork of Feather River near Prattville, Cal.—The following measurements were made a short distance below its junction with Clear Creek:

1905—July 5: Discharge, 108 second-feet.
August 8: Discharge, 79 second-feet.
September 1: Discharge, 93 second-feet.
October 2: Discharge, 83 second-feet.
December 15: Discharge, 74 second-feet.
1906—June 1: Discharge, 498 second-feet.
July 6: Discharge, 250 second-feet.
August 7: Discharge, 139 second-feet.

The following measurements were made at wagon bridge on east side of Big Meadow and below its junction with Rock Creek:

1905—June 23: Discharge, 169 second-feet.
1906—September 1: Discharge, 232 second-feet.

Hot Springs Valley Creek at Hot Springs Valley.—This creek is a tributary of Warner Creek. The following measurements were made a short distance above its junction with Warner Creek:

1905—June 28: Discharge, 44 second-feet.
August 2: Discharge, 30 second-feet.
August 30: Discharge, 28 second-feet.
October 4: Discharge, 25 second-feet.
1906—May 23: Discharge, 117 second-feet.
July 11: Discharge, 80 second-feet.
September 4: Discharge, 35 second-feet.

Hosselkus ditch near Genesee, Cal.—This ditch diverts water from Little Grizzly Creek. A measurement was made August 20, 1906, 1½ miles southwest of Genesee post-office and a short distance below point of diversion:

Width, 5 feet; area, 3.5 square feet; discharge, 5 second-feet.

Indian Creek.—This creek is one of the principal tributaries of North Fork of Feather River. The following measurements were made a short distance above its mouth during 1905:

June 16: Discharge, 321 second-feet.
September 8: Discharge, 106 second-feet.

Indian Creek near Genesee, Cal.—A measurement of this stream was made August 21, 1906, one-half mile northwest of Flournoy's and above its junction with Red Clover Creek:

Width, 6.5 feet; area, 4.3 square feet; discharge, 3.8 second-feet.

King Creek at Hot Springs Valley, Cal.—This stream is a tributary of Warner Creek. The following measurements were made at crossing of the Prattville-Lassen Peak road, one-half mile above the junction with Warner Creek:

1905—June 28: Discharge, 66 second-feet.
August 2: Discharge, 29 second-feet.
August 30: Discharge, 18 second-feet.
October 4: Discharge, 12.6 second-feet.
1906—May 22: Discharge, 151 second-feet.
July 11: Discharge, 117 second-feet.

Little Grizzly Creek near Genesee, Cal.—This stream is a tribu of Indian Creek. A measurement was made August 20, 1906 miles southwest of Genesee post-office, above the diversion of Hosselkus ditch:

Width, 21 feet; area, 21 square feet; discharge, 14.7 second-feet.

Middle Fork of Feather River near Beckwith, Cal.—A measurer of this stream was made August 12, 1906, 2 miles west of Beckv Cal., and one-half mile above its junction with Grizzly Creek:

Width, 10 feet; area, 4.4 square feet; discharge, 5 second-feet.

North Arm Creek near Taylorsville, Cal.—This stream is a tribu of Indian Creek. A measurement was made August 22, 1906 "Dead Fall" bridge, $1\frac{3}{4}$ miles north of Taylorsville, Cal.:

Width, 14 feet; area, 12.4 square feet; discharge, 5.1 second-feet.

North Fork of Feather River near Tyler, Cal.—The following m urements were made at the bridge on the Prattville-Red Bluff r

1905—June 29: Discharge, 52 second-feet.
August 2: Discharge, 17.4 second-feet.
August 30: Discharge, 12.4 second-feet.
October 4: Discharge, 11.4 second-feet.
1906—May 23: Discharge, 91 second-feet.
July 10: Discharge, 117 second-feet.

North Fork of Feather River.—The following measurements made a short distance above its junction with Warner Creek:

1905—August 30: Discharge, 84 second-feet.
October 3: Discharge, 64 second-feet.
1906—May 23: Discharge, 506 second-feet.
July 11: Discharge, 323 second-feet.

North Fork of Feather River near Prattville, Cal.—The follo measurements were made at Olsen's ranch, 8 miles northwes Prattville, Cal.:

1905—June 30: Discharge, 286 second-feet.
August 4: Discharge, 188 second-feet.
August 29: Discharge, 146 second-feet.
October 3: Discharge, 128 second-feet.
1906—March 1: Discharge, 164 second-feet.
May 22: Discharge, 805 second-feet.
July 10: Discharge, 647 second-feet.

Prattville Branch of North Fork of Feather River at Prattville, C The following measurements were made 800 feet above its junc with North Fork of Feather River:

1905—June 12: Discharge, 186 second-feet.
July 7: Discharge, 196 second-feet.
August 14: Discharge, 180 second-feet.
September 2: Discharge, 179 second-feet.
1906—January 5: Discharge, 147 second-feet.
June 29: Discharge, 303 second-feet.
August 3: Discharge, 227 second-feet.

Red Clover Creek near Genesee, Cal.—This stream is a tributary of Indian Creek. A measurement was made August 21, 1906, 1¼ miles southeast of Flournoy's and above diversion of Flournoy's ditch:

Width, 10 feet; area, 11 square feet; discharge, 21 second feet.

Rock Creek near Prattville, Cal.—This stream is a tributary of Hamilton Branch of North Fork of Feather River. The following measurements were made at bridge on Prattville-Susanville road:

1905—June 24: Discharge, 12 second-feet.
July 5: Discharge, 7.4 second-feet.
August 8: Discharge, 5 second-feet.
September 1: Discharge, 2.1 second-feet.
October 2: Discharge, 1.5 second-feet.
December 15: Discharge, 0.5 second-foot.
1906—June 1: Discharge, 85 second-feet.
July 6: Discharge, 25 second-feet.
August 7: Discharge, 25 second-feet.

South Fork of Feather River near Enterprise, Cal.—The following measurements, which include the flow in the Enterprise ditch, were made a short distance above its junction with Feather River during 1905:

June 11: Discharge, 246 second-feet.
July 25: Discharge, 64 second-feet.
August 18: Discharge, 48 second-feet.
September 17: Discharge, 34 second-feet.

Spanish Creek near Quincy, Cal.—This stream is a tributary of Indian Creek. A measurement was made September 9, 1906, at the wagon bridge, 2½ miles northeast of Quincy, Cal.:

Width, 40 feet; area, 40 feet; discharge, 44 second-feet.

Squaw Queen Creek near Genesee, Cal.—This stream is a tributary of Red Clover Creek. A measurement was made August 21, 1906, three-fourths mile southeast of Flournoy and 500 feet above its junction with Clover Creek:

Width, 6 feet; area, 3.6 square feet; discharge, 2.3 second-feet.

Warner Creek near Chester, Cal.—This stream is a tributary of the North Fork of Feather River. The following measurements were made at bridge on Prattville-Red Bluff road:

1905—June 30: Discharge, 140 second-feet.
August 5: Discharge, 81 second-feet.
August 29: Discharge, 63 second-feet.
October 3: Discharge, 61 second-feet.
1906—May 23. Discharge, 320 second-feet.
July 10: Discharge, 268 second-feet.
September 4: Discharge, 95 second-feet.

Ward Creek near Genesee, Cal.—This stream is a tributary of Indian Creek. A measurement was made August 22, 1906, at Phelan's ranch house, 1½ miles above its junction with Indian Creek:

Width, 8 feet; area, 3.2 square feet; discharge, 8.1 second-feet.

Willow Creek near Chester, Cal.—This stream is a tributary of N Fork of Feather River. The following measurements were mad the ford on the Prattville-Red Bluff road:

1905—June 29: Discharge, 4.1 second-feet.
August 2: Discharge, 4.0 second-feet.
October 4: Discharge, 2.5 second-feet.
1906—May 23: Discharge, 40 second-feet.

Wolf Creek near Greenville, Cal.—This stream is a tributar Indian Creek, discharging through swamp in west arm of Indian ley. A measurement was made August 23, 1906, one-fourth southwest of Greenville, Cal., above its junction with North Can a stream which discharges from Round Valley Reservoir. A di sion of 3.4 second-feet for irrigation is made above point of meas ment.

Width, 3 feet; area, 1.2 square feet; discharge, 1.8 second-feet.

PRECIPITATION AND EVAPORATION DATA.

The following tables give the total precipitation and evapora in inches, by months at Prattville, Cal.:

Precipitation and evaporation at Prattville, Cal.

PRECIPITATION.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	A
1905							0.00	0.17	0.70	0.28	2.77	1.74	...
1906	16.20	6.45	14.42	0.73	4.99	1.42	0.34	0.15	0.53	0.20	3.91	14.68	

EVAPORATION.

1905							3.81	4.31	3.80	2.72	1.50	1.00	...
1906	1.30	0.95	1.16	2.84	2.58	2.77	3.86	3.42	2.72	3.06	1.28	0.41	

YUBA RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Yuba River is a tributary of Feather River, which it enters at M ville, 30 miles above the junction of Feather and Sacramento ri The entire drainage area of the Yuba is about 1,327 square mile which about 1,220 square miles are above the gaging station at Sm ville. Its extreme length is about 60 miles, and extreme widt miles. In the lower stretches of the river, at the location of the ent gaging station and in the valley below, the channel has been to a considerable depth with débris from hydraulic mining.

The drainage basin is subdivided into 5 small basins, nam North Fork, with a drainage area of 491.6 square miles; Middle F with a drainage area of 218 square miles; South Fork, with a drai area of 360 square miles; Deer Creek, with a drainage of 89.6 sq miles, and Dry Creek, with a drainage area of 105.5 square miles.

latter tributary discharges into the main river about 5 miles below the gaging station. The watershed rises gently in rounded and broken mountains, to the crest of the Sierra Nevada, which at the headwaters of the Yuba has a mean elevation of about 8,200 feet, with peaks rising to a height of 9,100 feet. From Mount Lincoln—a peak common to the watersheds of the Yuba, American, and Truckee rivers—to a point about 2½ miles northeast of Mount Weber, the summit of the Sierre Nevada divides the watershed of Yuba River from that of Truckee River, which discharges into Humboldt Basin. Farther north from Mount Weber there is a secondary crest which divides the watersheds of Yuba and Feather rivers, the watershed of the latter stream reaching farther east to a less elevated divide in which the passes are lower than those of the easterly crest.

The western and lower portions of the Yuba drainage basin are composed of slate and kindred rock, very much eroded and merging into the gravel and alluvial deposits of the Sacramento Valley. The upper portions of the basin are composed principally of lavas and granites, all depely eroded, particularly the lavas. A stratum of serpentine traverses the watershed of the Yuba River in a direction generally parallel with the crest of the Sierra. North Fork rises in lavas which vary much in composition and hardness, but which generally have a deep soil covering, with timber and brush growth. Middle Fork rises in similar lavas and granite. The main and tributary streams fall rapidly, and their canyons head well up in the mountains. The sides of these canyons are covered with timber and brush, which, with the deep soil, retain the moisture and feed numerous perennial springs. In the case of North Fork this is particularly noticeable. The forests of its watersheds make a reliable and constant stream. The mean annual precipitation for the basins of North and Middle forks is about 54 inches. Warm rains on soft snow sometimes give high flood discharge, but snow remains on the higher peaks until midsummer. The headwaters of South Fork lie upon a broad granite surface into which the streams have not cut deeply until the main stream reaches a point 16 miles from the summit, where it drops rapidly into a deeply eroded canyon. This part of the basin has a precipitation annually of about 60 inches. The entire drainage area of the Yuba contains nearly 100 small glacial lakes.

YUBA RIVER NEAR SMARTSVILLE, CAL.

This station was established June 2, 1903. It is located at what is called "The Narrows," 1 mile from Smartsville, Cal., 18 miles from the Southern Pacific Railroad station at Wheatland, Cal., and 20 miles from Marysville, Cal. The conditions at this station and the bench marks are described in Water-Supply Paper No. 177, page 160, where are given also references to publications that contain data for previous years.

Discharge measurements of Yuba River near Smartsville, Cal., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	I cha
		Feet.	*Sq. ft.*	*Feet.*	*Sc*
January 4	J. R. McKeel	73	147	1.70	
January 11	do	79	153	1.80	
January 25	do	199	1,400	6.30	
January 30	do	189	984	5.70	
February 4	do	187	663	5.40	
February 9	F. R. S. Buttemer	189	575	5.32	
February 11	J. R. McKeel	188	631	5.50	
February 15	R. S. Hawley	260	1,570	8.00	
March 9	do	219	1,020	6.85	
March 10	do	219	1,020	6.90	
March 23	do	289	1,850	9.80	
March 24	do	309	2,660	12.20	
April 10	Hawley and Sawyer	240	1,290	7.20	
April 17	W. C. Sawyer	242	1,340	7.20	
April 18	do	240	1,380	7.20	
April 26	do	219	1,320	6.65	
May 3	do	257	1,650	7.70	
May 4	do	257	1,580	7.70	
May 5	do	260	1,820	8.15	
May 18	do	173	1,180	6.07	
July 10	R. S. Hawley	162	1,010	2.47	
July 11	do	160	965	2.23	
July 24	do	156	710	0.95	
July 25	do	156	679	0.75	
August 6	J. R. McKeel	150	560	9.80	
August 20	do	150	505	9.45	
August 30	do	150	484	9.35	
September 9	do	150	459	9.25	
September 16	do	150	469	9.30	
September 24	do	150	487	9.20	
October 2	R. S. Hawley	147	440	9.10	
October 25	do	146	453	9.10	

Daily gage height, in feet, of Yuba River near Smartsville, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	1.8	5.5	7.4	9.7	7.1	6.3	3.5	10.0	9.4	9.1	9.0
2	1.7	5.5	7.0	8.7	7.5	6.4	3.8	9.9	9.3	9.1	9.1
3	1.7	5.5	7.5	8.0	7.9	6.7	4.0	9.9	9.3	9.1	9.1
4	1.7	5.4	7.3	7.5	8.0	10.0	3.7	9.8	9.3	9.1	12.7
5	1.7	5.4	6.9	7.3	8.1	8.0	3.5	a 9.8	9.3	9.1	10.6
6	1.7	5.4	6.7	7.2	8.0	7.0	3.2	9.8	9.3	9.0	10.0
7	1.7	5.3	6.8	7.2	8.0	6.5	3.0	9.8	9.3	9.0	9.7
8	1.7	5.3	6.8	7.3	8.0	6.1	2.8	9.7	9.3	9.0	9.5
9	1.6	5.3	6.8	7.3	8.2	6.3	2.6	9.7	9.2	9.0	9.5
10	1.8	5.6	6.9	7.3	8.1	a 6.7	2.5	9.7	9.2	9.0	9.4
11	1.8	5.5	7.0	7.1	8.4	7.0	2.1	9.7	9.2	9.0	9.4
12	4.7	5.4	12.0	7.0	7.6	8.0	2.4	a 9.6	9.2	9.0	9.4
13	9.7	5.3	8.8	7.1	7.0	6.6	2.3	9.6	9.2	9.0	9.4
14	8.5	5.4	8.8	7.0	a 7.1	5.7	2.2	9.6	9.2	9.0	9.4
15	11.0	8.3	8.1	7.2	7.3	5.7	1.8	9.6	9.3	9.0	9.4
16	11.0	6.7	7.5	7.2	6.3	7.0	1.7	9.6	9.3	9.0	9.6
17	9.7	6.1	7.2	7.3	6.2	5.8	1.6	9.5	9.2	9.1	9.5
18	17.0	6.4	a 6.9	7.3	6.1	5.0	1.6	9.5	9.2	9.1	9.4
19	13.0	8.5	6.7	7.4	6.2	6.2	1.4	9.5	a 9.2	9.1	9.3
20	8.9	7.0	6.6	7.5	6.3	5.9	1.2	9.5	9.2	9.1	9.3
21	8.0	8.4	7.1	7.5	6.2	5.3	1.1	9.5	9.2	9.1	9.3
22	7.4	7.4	9.6	7.5	6.1	5.0	1.0	9.5	9.2	9.1	9.3
23	7.0	7.7	10.0	7.3	5.9	5.1	1.0	9.5	9.2	9.1	9.3
24	6.7	7.7	12.2	7.0	5.5	4.3	0.9	9.5	9.2	9.0	9.3
25	6.3	7.8	11.6	6.7	6.6	4.2	0.8	9.5	9.2	9.0	9.3
26	6.1	7.4	12.4	6.8	8.8	4.0	.7	a 9.4	9.2	9.0	9.3
27	6.0	8.5	9.5	6.6	8.7	3.8	.6	9.4	9.2	9.0	9.3
28	a 5.9	8.0	8.6	6.4	9.0	3.7	.5	9.4	9.2	9.0	9.3
29	5.8	.....	8.0	6.7	7.7	3.5	a .4	c 9.4	9.2	9.0	9.2
30	5.7	.....	9.4	6.8	6.7	3.5	.3	9.4	9.1	9.0	9.3
31	5.6	.....	14.0	.....	6.3	.....	.2	9.4	.....	9.0	.....

a Estimated.

NOTE.—The datum of the gage was lowered 10 feet August 1.

Daily discharge, in second-feet, of Yuba River near Smartsville, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	600	2,390	6,810	18,100	9,000	8,900	5,200	1,040	620	440	380	560
2	555	2,390	5,550	13,500	10,500	9,350	6,000	920	560	440	440	560
3	555	2,390	7,150	11,700	12,400	10,500	6,600	920	560	440	440	560
4	555	2,250	6,480	9,100	11,600	25,600	6,000	860	560	440	5,000	560
5	555	2,250	5,260	8,600	13,000	16,500	5,800	860	560	440	1,540	560
6	555	2,250	4,730	8,300	12,500	12,200	5,200	860	560	380	1,040	560
7	555	2,120	4,990	8,350	12,500	10,400	5,000	860	560	380	800	560
8	555	2,120	4,990	8,700	12,500	9,200	4,800	800	560	380	680	1,880
9	515	2,120	4,990	8,700	13,600	10,100	4,550	800	500	380	680	1,170
10	600	2,540	5,260	8,600	13,200	11,700	4,520	800	500	380	520	1,880
11	600	2,390	5,550	8,000	14,400	13,100	3,720	800	500	380	520	16,800
12	3,590	2,250	28,400	7,700	11,400	18,000	4,320	740	500	380	520	5,850
13	16,900	2,120	12,500	7,950	8,600	11,700	4,120	740	500	380	520	4,100
14	11,500	2,250	12,500	7,500	9,300	8,700	3,920	740	500	380	520	3,100
15	18,900	10,200	9,400	8,100	10,000	8,800	3,130	740	560	380	520	2,850
16	18,900	4,730	7,150	8,100	6,950	14,100	2,950	740	560	380	740	2,700
17	16,900	3,400	6,160	8,500	6,700	9,450	2,780	680	500	440	680	2,600
18	48,000	4,010	5,260	8,500	6,500	7,200	2,780	680	500	440	520	2,500
19	33,000	11,100	4,730	8,900	6,800	11,700	2,450	680	500	440	560	2,350
20	13,000	5,550	4,480	9,200	7,200	10,300	2,160	680	500	440	560	2,350
21	9,000	10,700	5,850	9,200	7,150	8,400	2,030	680	500	440	560	2,350
22	6,810	6,810	16,400	9,200	7,000	8,200	1,900	680	500	440	560	2,350
23	5,550	7,850	18,400	8,600	6,500	8,100	1,900	680	500	440	560	3,700
24	4,730	7,850	29,400	7,650	5,750	6,100	1,880	680	500	380	560	3,700
25	3,800	8,220	26,400	6,800	8,900	6,000	1,760	680	500	380	560	11,300
26	3,400	6,810	30,400	7,050	18,700	5,700	1,650	620	500	380	560	22,800
27	3,210	11,100	15,900	7,000	18,200	5,400	1,540	620	500	380	560	8,000
28	3,040	9,000	11,600	6,450	20,100	5,300	1,440	620	500	380	560	6,000
29	2,860	.....	9,000	7,350	13,700	5,000	1,340	620	500	380	500	4,300
30	2,700	.....	15,400	7,800	10,000	5,100	1,250	620	440	380	560	5,300
31	2,540	.....	40,600	.....	8,800	.....	1,170	620	.....	380	.....	5,300

NOTE.—These discharges were obtained partly by rating tables and partly by the indirect method for shifting channels.

Monthly discharge of Yuba River near Smartsville, Cal., for 1906.

[Drainage area, 1,220 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	48,000	515	7,560	465,000	6.20	7.15
February	11,100	2,120	4,970	276,000	4.07	4.24
March	40,600	4,480	12,000	738,000	9.84	11.34
April	18,100	6,450	8,770	522,000	7.19	8.02
May	20,100	5,750	10,800	664,000	8.85	10.20
June	25,600	5,000	10,000	595,000	8.20	9.15
July	6,600	1,170	3,350	206,000	2.75	3.17
August	1,040	620	744	45,700	.610	.70
September	620	440	520	30,900	.426	.48
October	440	380	403	24,800	.330	.38
November	5,000	380	757	45,000	.620	.69
December	22,800	560	4,130	254,000	3.39	3.91
The year	48,000	380	5,330	3,870,000	4.37	59.43

NOTE.—Values are rated as follows: February and March, excellent; June, November, and December, fair, on account of the lack of measurements: remainder of 1906, good.

BEAR RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Bear River drains an area of 287 square miles between Yuba and American rivers. Its headwaters do not reach back to the crest of the range, so that it seldom receives precipitation in the form of lasting snow. It is torrential in character, having no forested areas except

in its upper portion. The rainfall records kept by the Central Pa from Auburn to Emigrant Gap are indicative of the precipitatio the southern part of its basin. A 28-year record at Grass Valley in northern portion of its watershed gives a mean of 49.41 inches.

BEAR RIVER ABOVE WHEATLAND, CAL.

This station was established on October 8, 1904. It is located a 800 feet below McCourtney Crossing and 8 miles above Wheatl The conditions at this station and the bench marks are describe Water-Supply Paper No. 177, page 165, where are given also r ences to publications that contain data for previous years.

Discharge measurements of Bear River above Wheatland, Cal., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	el
		Feet.	*Sq. ft.*	*Feet.*	S
February 10	F. R. S. Buttemer	123	117	4.55	
February 26	do	156	323	6.10	
March 10	do	118	222	4.97	
March 18	do	137	284	5.60	
April 12	W. C. Sawyer	144	232	5.34	
April 19	do	139	181	4.83	
April 27	do	140	186	4.85	
April 27	do	141	236	5.22	
May 19	do	130	122	4.02	
July 12	R. S. Hawley	53	57	3.57	
July 24	do	58	38	3.30	
July 25	do	75	61	3.28	
October 3	do	25	20	3.06	

Daily gage height, in feet, of Bear River above Wheatland, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	3.2	4.6	6.0	8.7	4.5	5.2	3.9	3.2	3.0	3.0	3.1
2	3.1	4.6	5.7	7.3	4.6	5.0	3.9	3.2	3.0	3.0	3.1
3	3.1	4.5	5.5	6.8	4.5	5.0	3.8	3.1	3.0	3.0	3.2
4	3.1	4.5	6.5	6.4	4.4	6.0	3.8	3.1	3.0	3.0	4.45
5	3.0	4.5	5.8	6.2	4.4	5.4	3.7	3.1	3.0	3.0	3.9
6	3.0	4.4	5.5	6.0	4.4	5.7	3.7	3.1	3.0	3.0	3.6
7	3.1	4.4	5.3	5.8	4.3	5.2	3.7	3.1	3.0	3.0	3.5
8	3.0	4.4	5.1	5.6	4.3	5.0	3.7	3.1	3.0	3.0	3.4
9	3.0	4.5	5.0	5.4	4.3	4.8	3.6	3.1	3.0	3.0	3.3
10	3.0	4.6	4.9	5.5	4.3	4.7	3.6	3.1	3.0	3.0	3.3
11	3.0	4.7	4.8	5.7	4.4	4.6	3.6	3.1	3.0	3.0	3.3
12	3.9	4.5	7.55	5.4	4.4	4.7	3.5	3.1	3.0	3.0	3.3
13	10.35	4.5	6.3	5.2	4.3	4.5	3.5	3.0	3.0	3.1	3.3
14	6.8	4.4	7.6	5.1	4.2	4.5	3.5	3.0	3.1	3.1	3.3
15	10.5	6.4	8.7	5.0	4.6	4.4	3.4	3.0	3.1	3.0	3.3
16	11.65	5.4	6.6	5.0	4.3	4.9	3.4	3.0	3.1	3.0	3.4
17	8.5	5.1	6.1	4.9	4.2	4.5	3.4	3.1	3.1	3.1	3.3
18	14.55	4.9	5.7	4.9	4.2	4.4	3.3	3.0	3.1	3.1	3.3
19	12.25	6.9	5.4	4.8	4.1	4.3	3.3	3.0	3.1	3.1	3.3
20	9.5	5.9	5.2	4.8	4.1	4.3	3.3	3.0	3.1	3.1	3.3
21	6.5	7.7	5.7	4.8	4.1	4.2	3.3	3.0	3.0	3.1	3.3
22	6.0	6.7	7.2	4.7	4.1	4.2	3.3	3.0	3.0	3.1	3.3
23	5.7	7.3	6.8	4.75	4.0	4.2	3.2	3.0	3.0	3.1	3.3
24	5.4	6.5	11.7	4.85	4.0	4.2	3.3	3.0	3.1	3.1	3.3
25	5.2	6.9	10.5	5.1	4.45	4.1	3.3	3.0	3.1	3.1	3.3
26	5.0	6.1	12.3	4.8	5.6	4.1	3.2	3.0	3.1	3.1	3.2
27	4.9	6.55	8.3	4.9	6.85	4.1	3.2	3.0	3.1	3.1	3.2
28	4.8	7.0	7.2	5.0	8.65	4.1	3.2	3.0	3.1	3.1	3.3
29	4.7	.....	6.8	4.7	6.6	4.0	3.2	3.0	3.1	3.0	3.3
30	4.7	.....	7.4	4.7	5.9	4.0	3.2	3.0	3.1	3.1	3.3
31	4.6	.....	15.25	.....	5.4	.....	3.2	3.0	.....	3.1	.....

Rating table for Bear River above Wheatland, Cal., for 1904–1906.

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.*
3.00	20	4.10	328	5.20	1,015	6.60	2,640	8.80	6,640
3.10	33	4.20	375	5.30	1,105	6.80	2,935	9.00	7,060
3.20	49	4.30	425	5.40	1,200	7.00	3,250	10.00	9,160
3.30	69	4.40	475	5.50	1,300	7.20	3,575	11.00	11,360
3.40	92	4.50	530	5.60	1,405	7.40	3,910	12.00	13,660
3.50	118	4.60	585	5.70	1,515	7.60	4,265	13.00	15,960
3.60	146	4.70	645	5.80	1,625	7.80	4,635	14.00	18,360
3.70	177	4.80	710	5.90	1,740	8.00	5,020		
3.80	210	4.90	780	6.00	1,860	8.20	5,410		
3.90	246	5.00	855	6.20	2,105	8.40	5,810		
4.00	285	5.10	930	6.40	2,365	8.60	6,220		

NOTE.—This table is based on discharge measurements made during 1904–1906 and is well defined between gage heights 3.1 feet and 5.1 feet.

Monthly discharge of Bear River above Wheatland, Cal., for 1906.

[Drainage area, 263 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	19,700	20	3,130	192,000	11.90	13.72
February	4,450	475	1,500	83,300	5.70	5.94
March	21,400	710	3,970	244,000	15.10	17.41
April	6,430	645	1,390	82,700	5.28	5.89
May	6,320	285	870	53,500	3.31	3.82
June	1,860	285	644	38,300	2.45	2.73
July	246	49	113	6,950	.430	.50
August	49	20	26.5	1,630	.101	.12
September	33	20	26.1	1,550	.099	.11
October	33	20	26.7	1,640	.102	.12
November	502	33	90.7	5,400	.345	.38
December	13,400	69	1,770	109,000	6.73	7.76
The year	21,400	20	1,130	820,000	4.29	58.50

NOTE.—These values are fair.

AMERICAN RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

American River drains an area of about 2,000 square miles of the western slope of the Sierra Nevada. This drainage basin lies between those of the Bear and Yuba rivers on the north and that of Consumnes River on the south. It has three main forks, heading in the summit of the range, which reaches an elevation of about 9,000 feet. The country lying between these main forks is drained by numerous small tributaries. The formation in the higher and greater portions of this basin is of granite, with a considerable timber growth. The flow is rather torrential during the winter months, due to the large area of barren and sparsely timbered country in the lower portion of the watershed. The precipitation on the higher elevations is in the form of snow, which usually melts late in the spring. Rainfall records have been kept along the line of the Central Pacific Railroad, which follows the ridge to the north of North Fork.

The mean annual rainfall at Auburn is 33.40 inches, that at Co 47.4 inches, and at Cisco and Emigrant Gap about 50 inches. Georgetown, between North and Middle forks, a 30-year record an average of 56.72 inches, and at Placerville, above South F another of about the same length shows 43.58 inches.

There are several small lakes in the upper reaches of this basin, capacity of a few having been increased by the construction of dams at their outlets. Their water is stored for mining purposes d ing the low-water flow and is used entirely within the drainage ba

AMERICAN RIVER NEAR FAIROAKS, CAL.

This station was established November 3, 1904, at Fairoaks Bric near Fairoaks. The conditions at this station and the bench ma are described in Water-Supply Paper No. 177, page 176, where given also references to publications that contain data for previ years.

Discharge measurements of American River near Fairoaks, Cal., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	D cha
		Feet.	*Sq. ft.*	*Feet.*	*Sec*
February 13	F. R. S. Buttemer	300	1,400	3.66	
March 3	do	352	2,180	5.95	
April 6	R. S. Hawley	360	2,490	7.30	
April 13	W. C. Sawyer	376	2,580	7.26	
April 23	do	367	2,940	8.54	1
April 30	do	352	2,450	7.24	
April 30	do	352	2,390	7.15	1
May 21	do	354	2,640	7.80	1
May 21	do	354	2,680	7.90	1
June 11	do	370	3,510	10.50	
June 18	do	360	3,000	9.00	1
June 26	do	369	2,770	8.35	1
July 7	do	366	2,620	7.90	1
July 16	do	354	1,730	5.40	
July 27	do	345	1,260	4.00	
August 8	Sawyer and Martin	248	854	2.68	
September 3	W. F. Martin	210	648	1.75	
November 26	do	205	620	1.64	
November 27	R. S. Hawley	206	569	1.45	

Daily gage height, in feet, of American River near Fairoaks, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	1.5	3.65	6.8	10.4	7.6	9.1	7.45	3.35	1.8	1.3	1.35
2	1.4	3.55	6.4	9.6	8.45	9.45	8.35	3.15	1.75	1.4	1.4
3	1.4	3.7	7.9	8.8	8.45	10.3	8.25	3.2	1.8	1.35	1.55
4	1.5	3.6	7.65	8.25	9.2	9.75	8.0	3.1	1.7	1.3	1.95
5	1.2	3.65	6.3	7.4	10.4	9.1	8.15	2.95	1.8	1.3	3.4
6	1.2	3.75	5.95	7.1	9.85	8.7	7.4	2.75	1.65	1.3	2.75
7	1.5	3.7	5.95	7.15	10.3	9.0	7.25	2.7	1.6	1.3	2.25
8	1.2	3.75	5.95	7.6	10.25	9.25	7.05	2.75	1.6	1.3	1.9
9	1.4	3.8	6.1	7.35	9.6	9.25	6.9	2.7	1.6	1.3	1.75
10	1.2	4.1	6.15	7.65	9.75	9.75	6.2	2.65	1.5	1.3	1.6
11	1.4	3.85	6.45	.....	10.1	10.8	6.0	2.7	1.5	1.3	1.6
12	1.75	3.7	9.25	.....	9.85	11.0	5.85	2.7	1.5	1.25	1.55
13	5.85	3.75	9.7	7.2	8.7	9.95	5.8	2.45	1.5	1.2	1.6
14	8.35	4.2	12.85	7.2	8.0	9.1	5.9	2.4	1.5	1.25	1.6
15	6.75	6.05	11.35	7.65	8.05	8.9	5.65	2.4	1.6	1.2	1.6

Daily gage height, in feet, of American River near Fairoaks, Cal., for 1906—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	9.3	6.05	8.85	8.0	7.75	9.8	5.45	2.25	1.7	1.2	1.7	2.85
17	10.55	6.0	8.3	8.0	7.5	9.85	5.3	2.2	1.6	1.25	1.8	2.65
18	15.45	5.3	6.65	8.1	7.7	9.45	5.0	2.15	1.5	1.2	1.7	2.55
19	15.5	8.35	6.2	7.85	7.35	8.25	4.8	2.1	1.5	1.25	1.6	2.5
20	9.85	6.6	6.0	7.7	7.25	8.8	4.6	2.1	1.4	1.3	1.6	2.45
21	6.85	9.35	6.0	7.6	7.7	9.7	4.6	2.1	1.4	1.3	1.6	2.4
22	6.25	8.35	8.1	8.2	7.6	10.25	4.4	2.15	1.3	1.3	1.6	2.8
23	5.2	7.0	9.95	8.7	7.4	10.25	4.35	2.1	1.3	1.3	1.6	3.65
24	5.05	6.65	13.35	8.5	7.15	9.4	4.35	2.0	1.3	1.3	1.6	3.55
25	4.9	7.0	12.65	7.95	7.1	8.35	4.4	2.0	1.35	1.3	1.6	5.7
26	4.4	6.5	12.00	7.65	9.75	8.1	4.35	1.85	1.3	1.3	1.6	9.95
27	4.05	6.5	10.45	8.3	9.7	7.1	4.15	1.9	1.35	1.3	1.5	9.45
28	4.25	7.8	9.15	8.45	11.75	6.85	3.95	1.7	1.4	1.35	1.5	6.25
29	4.0	.....	7.85	8.2	11.25	6.85	3.95	1.7	1.3	1.4	1.5	5.15
30	3.7	.....	8.45	7.6	8.85	6.65	3.7	1.7	1.35	1.35	1.5	5.5
31	3.65	.....	9.25	.....	8.6	.....	3.5	1.75	.....	1.4	.....	5.8

Rating table for American River near Fairoaks, Cal., 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.*
1.20	300	2.30	910	3.40	1,980	5.00	4,380	8.00	12,100
1.30	340	2.40	990	3.50	2,090	5.20	4,780	9.00	15,380
1.40	380	2.50	1,070	3.60	2,200	5.40	5,180	10.00	18,980
1.50	420	2.60	1,160	3.70	2,310	5.60	5,600	11.00	22,900
1.60	470	2.70	1,250	3.80	2,420	5.80	6,040	12.00	27,100
1.70	520	2.80	1,350	3.90	2,540	6.00	6,540	13.00	31,300
1.80	570	2.90	1,450	4.00	2,660	6.20	7,060	14.00	35,500
1.90	630	3.00	1,550	4.20	2,920	6.40	7,580	15.00	39,700
2.00	690	3.10	1,650	4.40	3,260	6.60	8,100	16.00	43,900
2.10	760	3.20	1,760	4.60	3,600	6.80	8,620		
2.20	830	3.30	1,870	4.80	3,980	7.00	9,140		

NOTE.—This table is based on 19 discharge measurements made during 1906, and is well defined between gage heights 1.4 feet and 10.5 feet.

Monthly discharge of American River near Fairoaks, Cal., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum	Minimum.	Mean.	
January	41,800	300	7,010	431,000
February	16,600	2,140	5,830	324,000
March	32,800	6,410	13,900	855,000
April	20,500	9,420	[a] 12,100	720,000
May	26,000	9,420	15,000	922,000
June	22,900	8,230	15,900	946,000
July	13,200	2,090	6,180	380,000
August	1,920	520	1,010	62,100
September	570	340	433	25,800
October	380	300	338	20,800
November	1,980	360	567	33,700
December	19,900	420	3,900	240,000
The year	41,800	300	6,850	4,960,000

[a] Discharge for April 11 and 12 interpolated.

NOTE.—These values are excellent.

SAN JOAQUIN RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

San Joaquin River is divided into two distinct parts. The va portion forms the central drainage line of the San Joaquin Val and during the spring is navigable for 100 miles or more. Sta laus, Tuolumne, Merced, and Kings rivers are the largest stre in this portion of the drainage basin. The waters of Kings, Kawe Tule, and Kern rivers, which are located in the portion of the Joaquin Valley south and east of Fresno, although forming a p tion of the drainage of San Joaquin River, seldom reach this stre their entire flow, except in extreme flood, being diverted and u for irrigation at points where they emerge from the foothills. valley is fertile and almost destitute of timber. The mountain portion of the stream drains the western slope of the Sierra Nev between Merced River on the north and Kings River on the sou the crest of its divide reaching an elevation of 13,000 feet in Mo Lyell and an elevation of 14,000 feet in Mount Goddard. Th are numerous tributaries in this portion of the drainage basin, m of which have their source in the high elevations. The formatio of granite, which in the upper reaches is bare and sharply marked glacial action. The middle reaches of the basin are well timbe the timber diminishing on the lower foothills, which have a co ing of brush and grass. The precipitation takes the form of sn on the higher elevations. The fall of the river is rapid, with m favorable locations for power development. There are numer lakes in the upper reaches of the basin. A storage reservoir has b constructed on North Fork, which will tend to further regulate flow of the river.

MAIN SAN JOAQUIN RIVER.

SAN JOAQUIN RIVER AT HERNDON, CAL.

The gage rod at this station was established by the enginee department of the Southern Pacific Railroad Company in 18 The old trestle bridge was torn down by the railroad company dur 1899 and a new iron structure was erected in its place. The c ditions at this station and the bench marks are described in Wa Supply Paper No. 177, page 184, where are given also reference publications that contain data for previous years.

Daily gage height, in feet, of San Joaquin River at Herndon, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.65	3.25	4.2	8.5	6.4	8.4	10.5	8.2	4.35	3.2	3.0	2.6
2	2.65	3.25	3.75	7.0	6.75	8.25	11.25	7.65	4.35	3.2	3.0	2.6
3	2.65	3.1	3.75	6.65	7.5	8.5	11.4	7.2	4.35	3.2	3.0	2.6
4	2.65	3.1	5.6	6.5	8.35	8.75	12.5	7.0	4.25	3.2	3.0	2.5
5	2.65	3.1	4.5	6.35	8.5	8.65	12.25	7 0	4.25	3.2	3.0	2.5
6	2.65	3.1	4.25	5.75	9.4	9.35	12.0	7.0	4.25	3.2	3.0	2.5
7	2.65	3.1	4.1	5.65	9.65	8.5	12.0	6.65	4.2	3.1	3.0	2.5
8	2.65	3.1	4.0	5.65	10.0	9.0	11.75	6.6	4.2	3.1	3.0	2.5
9	2.65	3.1	4.2	6.0	9.75	10.25	11.65	6.6	4.2	3.1	3.0	2.5
10	2.65	3.0	4.25	6.5	11.0	11.0	11.0	6.4	4.0	3.1	3.0	2.5
11	2.65	3.0	4.25	7.35	12.35	11.5	10.65	6.25	4.0	3.1	3.0	2.5
12	2.65	3.0	6.75	6.65	12.0	12.5	11.0	6.25	3.65	3.1	3.0	2.5
13	2.65	3.0	6.35	6.65	11.25	12.75	10.65	6.5	3.65	3.1	3.0	3.0
14	10.5	3.25	6.0	6.4	10.2	11.75	10.65	6.5	3.6	3.1	3.0	3.5
15	6.5	3.4	10.0	6.65	9.65	11.5	10.65	6.4	3.5	3.1	3.0	3.25
16	4.9	3.4	8.5	6.65	9.0	12.0	10.5	6.2	3.5	3.1	3.0	3.25
17	4.0	3.65	7.2	6.65	9.25	13.0	10.5	6.2	3.5	3.1	3.0	3.1
18	4.0	4.2	7.0	7.0	9.5	12.0	10.5	6.1	3.4	3.0	3.0	3.0
19	13.0	4.2	6.0	7.5	10.4	12.35	10.0	6.1	3.4	3.0	3.0	3.0
20	9.0	4.1	6.0	8.2	10.5	13.2	9.65	6.0	3.35	3.0	3.0	3.0
21	7.35	4.0	6.0	8.0	10.65	14.35	9.5	6.0	3.35	3.0	3.0	3.0
22	5.2	4.0	6.35	8.4	10.0	13.65	9.5	6.0	3.35	3.0	3.0	3.0
23	4.5	4.2	9.00	10.0	10.35	13.0	9.75	5.65	3.35	3.0	3.0	3.0
24	4.2	4.25	8.5	8.35	10.0	13.0	10.35	5.65	3.35	3.0	3.0	3.0
25	4.0	4.25	8.4	7.75	9.35	12.65	10.0	5.5	3.2	3.0	3.0	3.0
26	4.0	4.2	8.0	7.75	9.75	12.35	10.0	5.5	3.2	3.0	3.0	3.5
27	4.0	4.2	7.5	7.65	10.65	11.2	9.65	5.35	3.2	3.0	3.0	3.65
28	4.0	4.2	7.2	8.0	11.6	11.0	9.5	5.0	3.2	3.0	3.0	3.65
29	3.75	.....	6.5	7.75	10.35	10.35	9.0	4.65	3.2	3.0	2.85	3.75
30	3.5	.....	7.35	6.75	10.0	10.0	8.5	4.5	3.2	3.0	2.6	3.75
31	3.4	.....	8.25	.....	9.65	.....	8.25	4.5	.....	3.0	.....	3.75

NOTE.—Gage heights have been reduced to feet and tenths from feet and inches as furnished by the Southern Pacific Railroad Company.

MISCELLANEOUS MEASUREMENT IN SAN JOAQUIN RIVER DRAINAGE BASIN.

The following measurement was made of San Joaquin Piver November 21, 1906, from the bridge at Polasky, Cal.:

Width, 133 feet; area, 194 square feet; discharge, 333 second-feet.

KERN RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Kern River drains 2,345 square miles of the western slope of the Sierra Nevada at its extreme southern limits. This drainage basin is the largest of any stream discharging into the San Joaquin Valley, having an area 600 square miles greater than that of Kings River. It has its source in the highest elevations of the Sierra Nevada, draining the western and southern slopes of Mount Whitney and numerous other high granite peaks grouped about it, which reach elevations of over 14,000 feet. Its general direction is south for about 65 miles, when it turns and flows in a southwesterly direction, discharging into the San Joaquin Valley east of Bakersfield, Cal. Extending, as it

does in its upper reaches, for some distance parallel with the Sie Nevada, it receives waters not only from the main crest on the ea but also from a somewhat lower divide on the west behind the bas of the Kaweah and Tule rivers. It has numerous tributaries, principal ones, which drain the higher elevations of the main cr of the Sierra Nevada, entering from the east. The topography extremely rough and broken in the upper reaches of this ba becoming less rugged in the middle portion in the vicinity of Ke ville, where there is quite an extensive valley with considerable cu vated land; below this point the stream enters a rough cany finally discharging into the flat country of the San Joaquin Vall The entire flow, except during extreme flood stages, is diverted a used for irrigation at points where streams emerge from the fo hills.

The formation is of granite, which, above the 10,000-foot conto is practically bare of timber growth. Between elevations of 3, and 10,000 feet there is a good depth of soil, with timber and bru covering; the lower reaches have a light covering of brush and gra

There are several lakes and marshes scattered throughout t basin, but they are less numerous than in the basins farther to north. Several power plants are located on this stream, none which, however, receive water from storage reservoirs, the diversi being made from the natural flow of the river and again returned the river channel. The precipitation is very light throughout t basin, with the possible exception of the high elevations surround Mount Whitney, where the snow remains through the sum months.

KERN RIVER NEAR BAKERSFIELD, CAL.

This station, established in 1893 by Walter James, chief engin of the Kern County Land Company, is located at what is known "first point of measurement," 5 miles above Bakersfield and at mouth of the canyon of the river.

Regular meter measurements are taken, and an automatic g records daily fluctuations of the river heights. A. K. Warren, engineer in charge of this work for the Kern County Land Compa attends to the discharge measurements with accuracy and precis and furnishes the Geological Survey with the final results. In mation in regard to this station is contained in Water-Supply Pap Nos. 81, 85, 100, 134, and 177 of the United States Geological Surv

Daily discharge, in second-feet, of Kern River near Bakersfield, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	242	529	854	2,980	2,846	5,416	7,369	3,552	1,522	697	546	518
2	253	513	806	2,651	2,798	5,353	7,765	3,282	1,438	705	570	517
3	230	506	779	2,424	2,986	5,306	8,251	3,236	1,369	695	566	542
4	233	509	795	2,291	3,337	5,495	8,431	3,147	1,297	677	554	575
5	241	529	842	2,172	3,786	5,964	8,246	2,953	1,255	680	550	545
6	246	538	777	2,051	4,434	6,126	8,129	2,905	1,201	687	580	506
7	253	560	765	2,010	4,608	5,788	7,973	2,880	1,167	622	555	530
8	256	580	755	1,970	5,278	5,932	7,729	2,852	1,111	618	528	552
9	260	646	785	2,135	6,097	6,311	7,607	2,769	1,064	634	539	587
10	265	578	851	2,296	6,782	6,797	7,257	2,627	1,039	639	516	676
11	269	589	896	2,302	6,624	7,213	7,176	2,536	1,030	645	499	675
12	267	610	1,026	2,278	6,133	8,190	7,211	2,548	983	647	502	654
13	272	568	1,996	2,336	5,687	8,829	7,072	2,473	938	649	518	677
14	1,626	538	1,945	2,484	5,640	9,079	6,705	2,377	919	631	520	653
15	1,828	574	1,716	2,635	5,886	9,072	6,628	2,276	916	612	529	601
16	1,293	684	5,264	2,767	6,079	9,142	6,719	2,211	891	613	514	589
17	890	701	5,527	2,898	6,055	9,004	6,603	2,215	883	592	462	587
18	687	661	3,025	3,032	6,348	8,819	6,254	2,206	883	564	446	584
19	1,370	646	2,106	3,178	6,868	8,993	6,093	2,097	839	554	476	562
20	2,554	655	1,807	3,343	7,339	9,375	5,870	2,215	807	555	468	556
21	1,145	717	1,725	3,597	7,443	9,505	5,439	2,192	809	564	433	552
22	931	785	1,854	3,911	7,381	9,505	4,997	2,071	806	560	450	560
23	807	739	1,978	4,135	7,025	9,311	5,648	1,840	788	558	474	556
24	746	681	2,284	4,255	6,492	9,107	5,920	1,662	785	564	462	550
25	698	665	3,417	3,853	6,184	8,948	5,595	1,540	781	559	440	562
26	666	710	3,983	3,698	7,660	8,668	5,347	1,446	777	562	446	592
27	643	735	4,150	3,598	7,832	8,187	5,392	1,405	755	568	478	948
28	616	773	3,195	3,692	7,420	7,529	5,269	1,435	731	557	479	914
29	602	.....	2,701	3,347	6,825	7,143	4,659	1,467	715	553	487	802
30	551	.....	2,527	2,973	6,102	7,010	4,311	1,434	704	564	502	732
31	548	.....	2,818	.....	5,646	.....	3,925	1,431	.....	565	.....	697

Monthly discharge of Kern River near Bakersfield, Cal., for 1906.

[Drainage area, 2,345 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	2,554	230	693	42,600	0.296	0.34
February	785	506	626	34,800	.267	.28
March	5,527	755	2,063	127,000	.880	1.01
April	4,255	1,970	2,910	173,000	1.24	1.38
May	7,832	2,798	5,859	360,000	2.50	2.88
June	9,505	5,306	7,704	458,000	3.29	3.67
July	8,431	3,925	6,503	400,000	2.77	3.19
August	3,552	1,405	2,299	141,000	.980	1.13
September	1,522	704	973	57,900	.415	.46
October	705	553	609	37,400	.260	.30
November	580	433	503	29,900	.215	.24
December	948	506	618	38,000	.264	.30
The year	9,505	230	2,613	1,900,000	1.11	15.18

TULE RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Tule River rises in the Sierra Nevada, and drains the country between Kaweah River on the north and Kern River on the south and east. Its drainage area is much less than that of Kaweah River,

although of the same general character. It has numerous small tri taries, few of which have their source at elevations above 8,000 f Its drainage basin does not extend back to the main divide, be cut off by Kern River, which reaches to the north and drains higher portion of Sierra Nevada east of Tule River. There is g timber and brush covering on the higher and middle elevations, w grass and scattering timber on the lower elevations, where the soi extensively cultivated. Below the gaging station the water is diver by several canals and used for the irrigation of land in the vicinity Portersville, where it is especially adapted for the raising of cit fruits. During the flood period the water discharges through old channel, and either sinks in the sand or finds its way to the bed of Tulare Lake. The mean precipitation is probably not m than 20 inches, and falls principally in the form of rain.

TULE RIVER NEAR PORTERSVILLE, CAL.

This station was established April 8, 1901. It is located abou miles east of Portersville, near the McFarland ranch, 100 feet be wagon bridge and about 1 mile above the mouth of South Fork of T River. The conditions at this station and the bench marks described in Water-Supply Paper No. 177, page 189, where are gi also references to publications that contain data for previous years

Discharge measurements of Tule River near Portersville, Cal., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Di cha
		Feet.	*Sq. ft.*	*Feet.*	*Sec*
February 15	C. H. Lee	76	144	3.02	
March 28	do	83	206	4.42	
May 10	do	80	264	4.20	
May 24	R. S. Hawley	80	211	3.62	
May 26	C. H. Lee	159	607	6.75	
June 1	do	88	287	4.65	
June 8	do	84	251	4.10	
June 22	R. S. Hawley	86	278	4.40	
July 20	do	73	132	2.65	
July 26	C. H. Lee	69	112	2.30	
September 27	R. S Hawley	59	46	1.40	
November 15	do	58	47	1.40	
November 24	do	58	47	1.44	

Daily gage height, in feet, of Tule River near Portersville, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	2.1	2.0	2.4	4.8	3.6	4.6	3.7	2.05	1.5	1.3	1.4
2	2.07	2.0	2.4	4.6	3.6	4.6	3.8	2.0	1.5	1.3	1.4
3	2.0	2.0	2.4	4.0	3.7	4.4	3.7	1.95	1.5	1.3	1.4
4	1.9	2.0	3.6	3.8	3.8	4.2	3.6	1.95	1.45	1.3	1.4
5	1.9	2.0	3.2	3.8	4.0	4.1	3.5	1.9	1.45	1.3	1.4
6	1.9	2.0	3.1	4.4	3.9	4.0	3.55	1.9	1.45	1.3	1.4
7	1.87	2.0	3.0	4.0	3.9	4.0	3.5	1.85	1.45	1.3	1.4
8	1.85	2.2	2.9	3.6	4.1	4.1	3.2	1.85	1.45	1.3	1.4
9	1.83	2.15	2.8	3.6	4.1	4.2	3.2	1.8	1.4	1.3	1.4
10	1.8	2.1	2.7	3.8	4.4	4.3	3.15	1.8	1.4	1.3	1.4

Daily gage height, in feet, of Tule River near Portersville, Cal., for 1906—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov	Dec.
11	1.8	2.05	2.7	3.8	4.4	4.4	3.1	1.8	1.4	1.3	1.4	2.6
12	2.0	2.0	6.6	3.6	4.5	4.5	3.0	1.75	1.4	1.3	1.4	2.4
13	5.65	2.0	5.7	3.6	4.25	4.4	2.9	1.7	1.4	1.3	1.4	2.0
14	7.35	2.0	4.2	3.6	4.0	4.3	2.85	1.7	1.4	1.3	1.4	1.8
15	3.85	3.1	8.35	3.6	4.0	4.35	2.8	1.65	1.4	1.3	1.4	1.5
16	3.3	2.8	8.5	3.6	4.1	4.3	2.75	1.65	1.4	1.3	1.4	1.65
17	3.0	2.7	7.0	3.6	4.1	4.35	2.75	1.6	1.4	1.3	1.4	1.65
18	2.8	2.6	5.0	3.6	4.1	4.3	2.7	1.6	1.35	1.3	1.4	1.65
19	7.0	2.5	4.5	3.6	4.1	4.35	2.7	1.6	1.35	1.3	1.4	1.65
20	4.1	2.5	4.2	3.7	4.0	4.35	2.65	1.55	1.35	1.3	1.45	1.65
21	3.3	2.7	4.2	3.8	3.9	4.3	2.6	1.55	1.35	1.3	1.45	1.65
22	2.9	2.65	4.2	4.0	3.8	4.4	2.5	1.55	1.35	1.3	1.45	1.65
23	2.7	2.6	4.2	4.25	3.7	4.3	2.45	1.55	1.35	1.35	1.45	1.65
24	2.5	2.5	5.4	4.0	3.65	4.2	2.4	1.55	1.4	1.35	1.45	1.65
25	2.4	2.45	6.0	3.7	3.6	4.0	2.35	1.55	1.45	1.35	1.45	1.65
26	2.3	2.4	7.25	3.6	6.4	3.95	2.3	1.55	1.4	1.35	1.45	2.3
27	2.2	2.4	5.2	3.4	6.55	3.9	2.25	1.5	1.4	1.35	1.45	2.1
28	2.15	2.4	4.5	4.6	6.5	3.7	2.25	1.5	1.35	1.35	1.45	2.0
29	2.1	.....	4.3	3.8	5.4	3.7	2.2	1.5	1.35	1.35	1.45	1.95
30	2.05	.....	4.3	3.7	5.0	3.7	2.15	1.5	1.3	1.35	1.45	1.9
31	2.03	.....	5.4	.....	4.7	.....	2.1	1.5	.....	1.35	.....	1.9

Rating table for Tule River near Portersville, Cal., 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.*
1.30	37	2.20	170	3.10	420	4.00	840	5.80	2,140
1.40	47	2.30	190	3.20	460	4.20	960	6.00	2,300
1.50	58	2.40	210	3.30	500	4.40	1,090	6.20	2,460
1.60	70	2.50	235	3.40	540	4.60	1,230	6.40	2,640
1.70	83	2.60	260	3.50	580	4.80	1,370	6.60	2,820
1.80	98	2.70	285	3.60	630	5.00	1,510	6.80	3,000
1.90	115	2.80	315	3.70	680	5.20	1,660	7.00	3,180
2.00	132	2.90	345	3.80	730	5.40	1,820	8.00	4,080
2.10	150	3.00	380	3.90	780	5.60	1,980	9.00	4,980

NOTE.—This table is based on discharge measurements made during 1904–1906, and is well defined between gage heights 2.2 feet and 6.7 feet.

Monthly discharge of Tule River near Portersville, Cal., for 1906.

[Drainage area, 437 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Sec.-ft. per sc. mile.	Depth in inches.
January	3,500	98	500	30,700	1.14	1.31
February	420	132	200	11,100	.458	.48
March	4,550	210	1,370	84,200	3.14	3.62
April	1,370	540	772	45,900	1.77	1.98
May	2,780	630	1,080	66,400	2.47	2.85
June	1,220	680	972	57,800	2.22	2.48
July	730	150	362	22,300	.828	.95
August	141	58	84.3	5,180	.193	.22
September	58	37	47.4	2,820	.108	.12
October	42	37	38.5	2,370	.088	.10
November	52	47	48.8	2,900	.112	.12
December	260	52	97.1	5,970	.222	.26
The year	4,530	37	464	338,000	1.06	14.49

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

MISCELLANEOUS MEASUREMENTS IN THE TULE RIVER DRAINAGE BA

The following miscellaneous measurements were made on So Fork of Tule River at a point one-half mile above the junctio South Fork with main Tule River:

May 26: Width, 40 feet; area, 100 square feet; discharge, 644 second-feet.
July 26: Width, 25 feet; area, 35 square feet; discharge, 64 second-feet.

KAWEAH RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Kaweah River drains the western slope of the Sierra Nev between the basins of Kings River on the north and Kern and rivers on the south. This is an important stream, but its waters is only about one-third that of Kings River and is much less eleva and snow covered than those of the Kings and Kern rivers. It a number of tributaries which have their sources in numerous l and meadows on the higher elevations. The formation is of gra and similar in every way to that in the Kings River basin. greater part of the area of 619 square miles above the gaging sta is well covered with brush and timber. In this basin is situated Sequoia National Park, where the largest grove of big trees (*Seq gigantea*) of the Sierra Nevada is found. Two power plants on stream owned by the Mount Whitney Power Company, divert w from Middle and East forks. By building low dams at the ou of some of the larger lakes, in the upper reaches of the basin, company has constructed several small reservoirs, in which the w held back for use during the low-water flow of the stream, and i great benefit to irrigators in the valley during the late summer mon About 6 miles below the gaging station the river leaves the foot and flows across San Joaquin Valley in a general southwest direction to the old bed of Tulare Lake. After it leaves the foot many canals divert water for the purpose of irrigating land in Tu County, which is especially adapted to the raising of fruits.

The mean annual precipitation in the basin above the ga station is from 20 to 40 inches, which falls in the form of snow probably one-half the area.

KAWEAH RIVER BELOW THREE RIVERS, CAL.

This station was established April 29, 1903. It is located point three-fourths of a mile below the confluence of the No Middle, and South forks, 10 miles from the Southern Pacific Rail station at Lemon Cove, Tulare County, Cal., and one-fourth west of the wagon road from Exeter to Three Rivers. The condit

at this station and the bench marks are described in Water-Supply Paper No. 177, page 192, where are given also references to publications that contain data for previous years.

Discharge measurements of Kaweah River below Three Rivers, Cal., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
February 16	C. H. Lee	156	491	6.00	644
March 29	do	174	653	7.35	2,090
May 11	do	183	888	8.35	3,780
May 23	R. S. Hawley	180	814	7.80	2,690
May 28	C. H. Lee	200	1,050	9.20	5,280
May 31	do	182	837	8.00	3,180
June 9	do	186	896	8.40	3,640
June 20	R. S. Hawley	200	1,050	9.10	5,680
June 20	do	198	1,010	8.95	5,290
June 21	do	202	1,080	9.25	5,930
June 29	do	185	896	8.25	3,470
July 19	do	179	793	7.65	2,480
July 28	C. H. Lee	170	676	7.10	1,700
September 26	R. S. Hawley	146	332	4.97	148
November 14	do	142	293	4.72	98

Daily gage height, in feet, of Kaweah River below Three Rivers, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.55	5.3	5.85	7.8	6.95	8.05	8.8	6.65	5.5	4.9	4.7	4.8
2	4.5	5.3	5.75	7.6	7.05	8.0	9.1	6.8	5.45	4.9	4.7	4.8
3	4.6	5.3	5.85	7.4	7.2	8.15	9.1	.....	5.4	4.9	4.7	4.8
4	4.6	5.3	6.45	7.3	7.45	8.1	9.05	6.4	5.4	4.9	4.75	5.0
5	4.6	5.3	5.95	7.05	7.6	8.25	9.0	6.5	5.35	4.9	5.05	4.9
6	4.6	5.3	5.95	7.1	7.55	8.0	9.0	6.45	5.3	4.85	4.85	4.9
7	4.6	5.3	5.95	6.95	7.8	7.95	8.8	6.45	5.25	4.8	4.8	4.9
8	4.6	5.4	6.0	6.9	8.2	8.3	8.8	6.4	5.3	4.8	4.8	4.9
9	4.6	5.45	6.0	7.0	8.35	8.65	8.6	6.4	5.3	4.8	4.75	5.3
10	4.6	5.4	6.05	7.35	8.35	8.85	8.55	6.3	5.3	4.75	4.75	5.1
11	4.6	5.4	6.05	7.1	8.25	9.1	8.5	6.3	5.25	4.75	4.7	5.0
12	4.7	5.35	9.3	6.95	8.0	9.25	8.5	6.2	5.2	4.75	4.7	5.7
13	8.1	5.3	7.9	7.0	7.75	9.1	8.4	6.15	5.1	4.75	4.7	5.25
14	9.25	5.4	7.05	7.05	7.8	9.1	8.4	6.1	5.15	4.7	4.7	5.1
15	6.55	6.3	10.3	7.05	7.75	9.1	8.35	6.1	5.15	4.7	4.7	5.1
16	5.95	6.0	10.1	7.15	7.9	9.25	8.3	6.1	5.2	4.7	4.7	5.0
17	5.7	5.8	8.75	7.15	8.15	9.1	8.2	6.0	5.1	4.7	4.7	5.0
18	6.3	5.7	7.85	7.15	8.3	9.1	7.95	6.0	5.05	4.7	4.7	5.0
19	9.3	5.7	7.35	7.25	8.35	9.45	7.8	6.0	5.0	4.7	4.7	4.95
20	6.7	5.7	7.15	7.45	8.3	9.4	7.7	5.9	5.0	4.7	4.7	4.95
21	6.15	6.25	7.25	7.6	8.2	9.5	7.6	5.8	5.0	4.7	4.7	4.95
22	5.85	5.9	7.15	7.6	8.1	9.35	7.75	5.75	5.0	4.7	4.7	5.0
23	5.7	5.75	7.05	7.8	7.75	9.35	7.85	5.65	4.95	4.7	4.75	5.0
24	5.6	5.7	8.05	7.45	7.6	9.35	7.7	5.6	5.0	4.7	4.75	5.0
25	5.6	5.7	8.7	7.25	8.05	9.15	7.6	5.6	5.0	4.7	4.75	5.0
26	5.5	5.7	8.6	7.15	9.45	8.9	7.6	5.55	4.95	4.7	4.8	6.5
27	5.5	5.7	8.2	7.35	8.5	8.55	7.5	5.5	4.9	4.7	4.75	5.75
28	5.4	6.15	7.95	7.45	9.75	8.4	7.4	5.5	4.9	4.7	4.75	5.8
29	5.4	.....	7.4	7.15	8.45	8.45	7.05	5.5	4.9	4.65	4.8	5.4
30	5.4	.....	7.65	7.0	8.2	8.65	6.9	5.5	4.9	4.65	4.7	5.3
31	5.3	.....	8.35	.....	8.1	.....	6.8	5.6	.....	4.7	.....	5.45

Rating table for Kaweah River below Three Rivers, Cal., for 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharg
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-f*
4.50	75	5.40	312	6.30	840	7.20	1,830	8.20	3,420
4.60	91	5.50	350	6.40	930	7.30	1,960	8.40	3,800
4.70	109	5.60	395	6.50	1,020	7.40	2,100	8.60	4,180
4.80	130	5.70	445	6.60	1,120	7.50	2,240	8.80	4,590
4.90	154	5.80	500	6.70	1,220	7.60	2,400	9.00	5,040
5.00	180	5.90	560	6.80	1,340	7.70	2,560	9.20	5,520
5.10	210	6.00	625	6.90	1,460	7.80	2,720	9.40	6,000
5.20	240	6.10	690	7.00	1,580	7.90	2,880	9.60	6,480
5.30	274	6.20	760	7.10	1,700	8.00	3,060	9.80	6,960

NOTE.—This table is based upon 15 discharge measurements made during 1906 and is we below gage height 9.2 feet. Above gage height 9 feet the rating curve is a tangent, the differe 240 per tenth.

Monthly discharge of Kaweah River below Three Rivers, Cal., for 1906.

[Drainage area, 520 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-o
	Maximum.	Minimum.	Mean.		Sec.-ft. per sq. mile.
January	5,760	75	784	48,200	1.51
February	840	274	418	23,200	.804
March	8,160	472	2,440	150,000	4.69
April	2,720	1,460	1,910	114,000	3.67
May	6,840	1,520	3,210	197,000	6.17
June	6,240	2,970	4,670	278,000	8.98
July	5,280	1,340	3,430	211,000	6.60
August	1,340	350	697	42,500	1.33
September	350	154	226	13,400	.435
October	154	100	120	7,380	.231
November	195	109	119	7,080	.229
December	1,020	109	245	15,100	.471
The year	8,160	75	1,520	1,110,000	2.93

NOTE.—These values are excellent.

KINGS RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Kings River rises on the western slope of the Sierra Nevad drains the country located between San Joaquin River on the and Kaweah and Kern rivers on the south. The Sierra Nev the head of this basin reaches elevations of over 14,000 feet an prises the most rugged portion of the range; the sharp and p tous peaks produce the grandest scenery to be found in the U States. The main tributaries of this stream flow through grea yons with high precipitous walls cut in the granite. The Kings Canyon on South Fork and Tehipite Valley on Middle Fork riv famed Yosemite Valley for grandeur of scenery. There are n ous tributaries, many of which have their sources in perpetual banks on the higher elevations. A large number of small lakes higher elevations are fed by small streams from perpetual snow or glaciers, and in them many of the tributaries have their s

A. CABLE STATION, KINGS RIVER, NEAR RED MOUNTAIN, CALIFORNIA.

B. DISCHARGE MEASUREMENT BY WADING.

The formation is of granite, which above an elevation of 10,000 feet is bare, with scanty vegetation, being carved by the action of glaciers; below the 10,000-foot contour is a heavy covering of timber and undergrush. Extensive groves of big trees are scattered throughout this basin. On the lower elevations along the foothills the soil covering is light with a grass growth used for pasturage. Fully 80 per cent of the drainage area is now included in the boundaries of the Sierra Forest Reserve, which is patrolled for the prevention of fires and illegal herding. Below the gaging station, which is located at the point where the river leaves the foothills, canals divert the water for use in the valley lands of Fresno, Kings, and Tulare counties, where the climate and soil are especially adapted to the raising of grapes, fruits, etc., and the soil is under a high state of cultivation. During the period of flood discharge some water passes these canals and finds its way across Kings River delta in the natural channel to the old bed of Tulare Lake, which is now but an intermittent lake due largely to the diversion of water for irrigation purposes from the streams which drain into it. The drainage area above the Red Mountain gaging station is 1,742 square miles. The mean annual precipitation for this area varies from about 30 to 60 inches, which over a greater portion of the basin falls in the form of snow. The greater discharge of this stream is in the spring months when the snow is melting. (See Pl. III, *A*.)

KINGS RIVER NEAR SANGER, CAL.

This station was established September 3, 1895. It is located 15 miles east of Sanger, Cal., near the mouth of the canyon, and is above all diversions. The conditions at this station and the bench marks are described in Water-Supply Paper No. 177, page 196, where are given also references to publications that contain data for previous years.

Discharge measurements of Kings River near Sanger, Cal., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
January 30	C. H. Lee	164	564	5.20	966
March 30	do	289	1,200	8.20	4,380
May 12	do	320	2,060	10.80	10,500
May 22	R. S. Hawley	320	2,190	11.15	12,600
May 27	C. H. Lee	320	2,040	10.70	10,400
June 2	do	312	1,800	9.90	8,200
June 19	R. S. Hawley	358	2,880	13.10	21,600
July 18	do	322	2,280	11.40	13,200
July 27	C. H. Lee	317	2,240	11.20	11,800
September 25	R. S. Hawley	172	496	5.18	768
October 18	do	150	398	4.75	472
November 13	do	149	375	4.63	398

Daily gage height, in feet, of Kings River near Sanger, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	No
1	4.25	5.1	5.85	9.35	8.05	10.0	12.85	9.8	6.6	5.05	4.
2	3.9	5.1	5.7	8.5	8.3	9.95	12.95	9.8	6.45	5.05	4.
3	3.9	5.1	5.8	8.15	8.75	10.15	13.1	9.8	6.35	5.05	4.
4	4.0	5.1	6.5	7.9	9.3	10.15	13.25	9.8	6.3	5.05	4.
5	4.05	5.1	6.5	7.7	9.8	10.95	13.1	9.1	6.2	5.05	4.
6	4.1	5.1	6.2	7.55	9.85	10.25	13.0	9.2	6.1	5.0	4.
7	4.1	5.1	6.2	7.4	10.2	10.25	12.6	9.2	5.95	4.95	4.
8	.....	5.1	6.3	7.4	10.7	10.75	12.7	9.2	5.85	4.95	4.
9	4.0	5.2	6.35	7.6	11.0	11.45	12.7	8.8	5.9	4.9	4.
10	4.0	5.3	6.4	8.1	11.2	11.95	12.6	8.6	5.9	4.9	4.
11	4.0	5.5	6.45	8.15	11.4	12.5	12.8	8.9	5.85	4.85	4.
12	4.05	5.2	9.7	7.85	10.9	12.85	12.7	8.4	5.75	4.85	4.
13	7.3	5.1	10.9	7.9	10.25	12.8	12.8	8.4	5.65	4.8	4.
14	11.4	5.2	8.4	8.1	10.6	12.6	12.6	8.3	5.55	4.8	4.
15	7.0	6.75	10.7	8.1	10.65	12.7	12.9	8.25	5.5	4.8	4.
16	6.2	6.25	13.0	8.4	10.7	12.9	12.6	8.2	5.45	4.75	4.
17	5.85	5.85	10.35	8.4	10.8	13.0	12.3	8.0	5.4	4.75	4.
18	8.5	5.65	9.15	8.5	11.2	13.0	11.5	8.0	5.3	4.75	4.
19	13.8	5.65	8.25	8.75	11.4	13.3	11.5	7.9	5.2	4.75	4.
20	8.1	5.7	7.90	9.1	11.5	14.0	11.4	7.65	5.15	4.7	4.
21	6.85	6.05	8.00	9.4	11.4	13.8	11.15	7.6	5.15	4.7	4.
22	6.4	6.2	8.05	9.45	11.2	13.5	11.2	7.25	5.15	4.7	4.
23	6.1	6.05	8.10	9.75	11.05	13.3	11.4	6.9	5.15	4.65	4.
24	5.75	5.9	9.35	9.1	10.55	13.4	11.4	6.7	5.15	4.7	4.
25	5.7	5.75	10.35	8.65	10.5	13.4	11.4	6.55	5.15	4.65	4.
26	5.65	5.8	10.45	8.55	12.0	12.8	11.2	6.5	5.15	4.65	4.
27	5.6	5.8	9.50	8.75	11.45	12.1	11.1	6.5	5.1	4.65	4.
28	5.5	6.0	8.70	9.15	12.2	11.6	10.85	6.5	5.05	4.65	4.
29	5.3	.....	8.25	8.5	11.6	11.7	10.55	6.45	5.05	4.65	4.
30	5.2	.....	8.15	8.1	10.15	12.3	10.05	6.45	5.05	4.6	4.
31	5.15	.....	9.40	.....	9.95	.....	9.9	6.7	.....	4.6	....

NOTE.—These gage heights were taken from an automatic river stage register, except J 30, when the instrument was out of use, and the readings are from the staff gage. The m gage height is determined from the register sheets by the use of a planometer.

Rating table for Kings River near Sanger, Cal.

JANUARY 1 TO JUNE 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.-f*
3.90	205	5.00	740	6.10	1,550	7.40	2,965	9.60	7,360
4.00	240	5.10	805	6.20	1,640	7.60	3,240	9.80	7,900
4.10	280	5.20	870	6.30	1,730	7.80	3,535	10.00	8,470
4.20	325	5.30	940	6.40	1,820	8.00	3,850	11.00	11,700
4.30	370	5.40	1,010	6.50	1,920	8.20	4,190	12.00	15,900
4.40	420	5.50	1,085	6.60	2,020	8.40	4,570	13.00	21,040
4.50	470	5.60	1,160	6.70	2,120	8.60	4,980	14.00	26,600
4.60	520	5.70	1,235	6.80	2,230	8.80	5,410		
4.70	570	5.80	1,310	6.90	2,340	9.00	5,860		
4.80	625	5.90	1,390	7.00	2,460	9.20	6,330		
4.90	680	6.00	1,470	7.20	2,705	9.40	6,840		

JULY 1 TO DECEMBER 31, 1906.[b]

4.50	330	4.90	575	5.30	870	5.70	1,190	6.00	1,460
4.60	385	5.00	645	5.40	950	5.80	1,280	6.10	1,550
4.70	445	5.10	720	5.50	1,030	5.90	1,370		
4.80	510	5.20	795	5.60	1,110				

[a] This table is based on discharge measurements made during 1895–1906 and is well defined.
[b] This table is based on 3 discharge measurements made during 1906 and is well defined. Al height 6.1 feet it is the same as the previous table.

Monthly discharge of Kings River near Sanger, Cal., for 1906.

[Drainage area, 1,740 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Sec.-ft. per sq. mile.	Depth in inches.
anuary	25,500	205	2,360	144,000	1.36	1.57
ebruary	2,150	792	1,150	63,900	0.661	.69
arch	21,000	1,220	5,240	322,000	3.01	3.47
pril	7,760	2,960	4,720	281,000	2.71	3.02
ay	16,800	3,920	10,700	658,000	6.15	7.09
ne	26,600	8,320	17,100	1,020,000	9.83	11.00
ly	22,400	8,180	16,300	1,000,000	9.37	10.80
ugust	7,900	1,870	4,300	264,000	2.47	2.85
eptember	2,020	682	1,120	66,600	0.644	.72
ctober	682	385	516	31,700	0.297	.34
ovember	610	330	397	23,600	0.228	.25
ecember	2,230	330	700	43,000	0.402	.46
The year	26,600	205	5,280	3,920,000	3.09	42.26

NOTE.—Values are rated as excellent; discharges for September to December are based on 3 measurements which indicate a greater change in conditions of flow than had taken place in ten years previously, but they are believed to be accurate.

MERCED RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Merced River drains that portion of the western slope of the Sierra Nevada located between Tuolumne River on the north and San Joaquin River on the south. Its drainage area is much less than that of Tuolumne River. It has numerous tributaries, several of which are of considerable size.

The topography of the country in this basin is similar to that of Tuolumne River, being rough and broken in the upper reaches. In this basin is situated the famous Yosemite Valley, with its precipitous walls and domes and great waterfalls, which occur on the main stream and its tributaries, which discharge into the valley over precipitous cliffs rising 2,000 to 3,000 feet above the floor of the valley. The formation is of granite, which on the upper reaches of the basin above Yosemite Valley is bare, rising in precipitous peaks and domes, and is smoothly marked by glacial action. The middle reaches of the basin are well timbered. The Mariposa grove of big trees is situated in the basin of the South Fork. The timber growth extends well down on the lower elevations to the foothills, where the covering is of brush and grass, used extensively for pasturage. Numerous lakes are scattered over the upper portion of the basin. The mean annual precipitation varies from 25 inches in the foothills to 60 inches on the higher elevations, where it falls in the form of snow, which melts in the spring months, except on the extreme higher mountain peaks, where it often remains during the entire year. After leaving the foothills at Merced Falls, where the gaging station is located, canals divert the water for irrigation on lands along the river bottom and in San Joaquin Valley. The surplus water during flood discharge enters San Joaquin River.

MERCED RIVER ABOVE MERCED FALLS, CAL.

The measurement of Merced River was undertaken in resp
numerous requests from mining and irrigation interests, the m
mer flow being less than the combined capacity of the irrigati
power canals taking water in the vicinity of Snelling. The s
was established April 6, 1901. It is located 1 mile above M
Falls. The conditions at this station and the bench mar
described in Water-Supply Paper No. 177, page 203, where are
also references to publications that contain data for previous

Discharge measurements of Merced River above Merced Falls, Cal., in 190

Date.	Hydrographer.	Width.	Area of section	Gage height.
		Feet.	*Sq. ft.*	*Feet.*
January 27	C. H. Lee	143	380	9.40
February 17	do	146	406	9.50
March 31	do	321	1,900	14.80
March 31	do	317	1,800	14.50
April 1	do	305	1,360	13.20
April 26	R. S. Hawley	268	760	11.42
May 16	C. H. Lee	287	1,140	12.60
May 27	W. C. Sawyer	301	1,270	13.15
May 28	do	353	2,320	16.40
May 28	do	350	2,270	16.20
May 28	do	348	2,160	16.00
May 28	do	347	2,160	15.90
June 6	do	285	1,030	12.42
June 16	do	318	1,640	14.50
June 22	do	325	1,670	14.75
June 30	do	306	1,240	13.48
July 12	do	289	1,140	13.56
July 13	do	303	1,210	13.68
July 20	do	250	875	12.15
July 21	do	247	846	11.85
August 2	do	180	543	10.38
August 4	do	180	522	10.30
August 5	do	180	527	10.24
August 19	W. F. Martin	168	428	9.85
September 6	do	142	292	8.90
November 20	do	130	224	8.42

Daily gage height, in feet, of Merced River above Merced Falls, Cal., for 19

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	No
1	8.1	9.0	10.35	13.05	11.35	12.4	14.0	10.55	9.1	8.35	8.
2	8.1	9.0	10.15	12.15	11.55	12.45	14.2	10.5	9.1	8.35	8.
3	8.05	9.0	10.05	11.7	11.75	12.65	14.35	10.45	9.0	8.4	8.
4	8.0	9.0	11.3	11.45	12.15	12.65	14.35	10.35	9.0	8.4	8.
5	8.0	9.0	10.7	11.25	12.45	13.15	14.3	10.25	8.95	8.45	8.
6	8.05	9.0	10.5	11.0	12.75	12.55	14.15	10.15	8.9	8.4	8.
7	8.05	9.0	10.2	11.0	13.0	12.25	14.05	10.15	8.9	8.35	8.
8	8.0	9.0	10.15	10.85	13.15	12.7	14.05	10.15	8.9	8.4	8.
9	8.05	9.05	10.1	10.95	13.2	13.1	13.9	10.15	8.9	8.4	8.
10	8.15	9.1	10.1	11.25	13.5	13.35	13.5	10.15	8.8	8.4	8.
11	8.05	9.25	10.15	11.45	13.85	13.95	13.55	10.3	8.8	8.4	8.
12	8.15	9.1	13.25	11.15	13.35	14.4	13.6	10.15	8.75	8.3	8.
13	10.55	9.0	12.8	11.05	12.75	14.65	13.4	9 95	8.8	8.3	8.
14	13.45	9.05	11.7	11.15	12.75	14.0	13.3	9.9	8.75	8.3	8.
15	10.55	9.95	16.7	11.15	12.8	14.05	13.05	9.8	8.75	8 3	8.
16	10.3	9.9	13.55	11.3	12.7	14.4	12.8	9.75	8.7	8.3	8.
17	10.8	9.5	12.2	11.35	12.6	14.7	12.65	9.75	8.7	8.3	8.
18	13.85	9.4	11.5	11.3	12.95	14.15	12.4	9.65	8.6	8.35	8.
19	16.9	9.75	11.1	11.45	13.3	14.55	12.2	9.8	8.6	8.35	8.
20	11.55	9.65	10.85	11.6	13.3	14.8	11.85	9.85	8.5	8.3	8.

Daily gage height, in feet, of Merced River above Merced Falls, Cal., for 1906—Cont'd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21	10.55	11.15	10.85	11.85	13.2	15.0	11.85	9.75	8.5	8.3	8.35	8.6
22	10.05	11.2	11.15	12.0	12.9	14.9	11.65	9.55	8.5	8.3	8.3	8.55
23	9.85	10.7	11.1	12.7	12.5	14.45	11.75	9.45	8.5	8.3	8.3	8.7
24	9.65	10.45	14.55	12.0	12.3	14.9	11.7	9.3	8.5	8.3	8.3	8.6
25	9.5	10.8	15.85	11.6	12.25	14.9	11.7	9.2	8.5	8.3	8.3	8.65
26	9.5	10.45	14.1	11.4	13.75	14.0	11.6	9.2	8.55	8.3	8.3	11.5
27	9.4	10.25	12.9	11.45	13.4	13.45	11.5	9.1	8.55	8.3	8.3	11.45
28	9.25	10.7	12.0	12.15	16.0	12.85	11.25	9.1	8.5	8.3	8.3	11.3
29	9.2	.....	11.55	11.7	13.6	13.0	11.0	9.1	8.5	8.3	8.3	10.35
30	9.1	.....	11.6	11.5	12.8	13.45	10.8	9.1	8.5	8.05	8.3	9.75
31	9.0	.....	14.1	.....	12.5	.....	10.7	9.1	.....	8.3	.....	10.35

Rating tables for Merced River above Merced Falls, Cal.

JANUARY 1, 1905, 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.*
8.00	90	9.00	465	10.00	1,240	11.00	2,545	13.00	6,630
8.10	115	9.10	520	10.10	1,345	11.20	2,870	13.20	7,130
8.20	140	9.20	580	10.20	1,455	11.40	3,215	13.40	7,630
8.30	170	9.30	645	10.30	1,570	11.60	3,570	13.60	8,150
8.40	200	9.40	715	10.40	1,690	11.80	3,945	13.80	8,670
8.50	235	9.50	790	10.50	1,820	12.00	4,340	14.00	9,200
8.60	275	9.60	870	10.60	1,955	12.20	4,755	15.00	12,050
8.70	315	9.70	955	10.70	2,095	12.40	5,200	16.00	15,300
8.80	360	9.80	1,045	10.80	2,240	12.60	5,665	17.00	18,800
8.90	410	9.90	1,140	10.90	2,390	12.80	6,140		

AUGUST 1 TO DECEMBER 3, 1906.[b]

8.00	55	8.80	280	9.60	750	10.40	1,510	11.40	3,140
8.10	70	8.90	320	9.70	820	10.50	1,650	11.60	3,520
8.20	90	9.00	370	9.80	890	10.60	1,800	11.80	3,930
8.30	115	9.10	425	9.90	970	10.70	1,960	12.00	4,340
8.40	140	9.20	480	10.00	1,060	10.80	2,120		
8.50	170	9.30	540	10.10	1,160	10.90	2,280		
8.60	205	9.40	610	10.20	1,260	11.00	2,440		
8.70	240	9.50	680	10.30	1,380	11.20	2,780		

[a] This table is based on discharge measurements made during 1905–6 and is well defined.

[b] This table is based on 7 discharge measurements made during August to November, 1906, and is well defined above gage height 8.4 feet. Above gage height 12 feet, the table is the same as the previous one.

Monthly discharge of Merced River above Merced Falls, Cal., for 1906.

[Drainage area, 1,090 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	18,400	90	1,840	113,000	1.69	1.95
February	2,870	465	1,060	58,900	.972	1.01
March	17,800	1,290	4,660	287,000	4.28	4.93
April	6,760	2,320	3,500	208,000	3.21	3.58
May	15,300	3,130	6,530	402,000	5.99	6.91
June	12,000	4,860	8,410	500,000	7.72	8.61
July	10,200	2,100	6,260	385,000	5.74	6.62
August	1,720	425	948	58,300	.870	1.00
September	425	170	254	15,100	.233	.26
October	155	62	122	7,500	.112	.13
November	240	115	135	8,030	.124	.14
December	3,620	115	735	45,200	.674	.78
The year	18,400	62	2,870	2,090,000	2.63	35.92

NOTE.—These values are excellent.

MERCED RIVER IN YOSEMITE VALLEY, CALIFORNIA.

This station was established July 11, 1904,. It is located a wagon bridge, near the Sentinel Hotel. The conditions at this tion and the bench marks are described in Water-Supply Pape 177, page 201, where are given also references to publications contain data for previous years.

Discharge measurements of Merced River in Yosemite Valley, California, in 19

Date.	Hydrographer.	Width.	Area of section.	Gage height.	c
		Feet.	*Sq. ft.*	*Feet.*	S
May 24	W. B. Clapp	95	668	6.80	
November 8	C. W. Tucker	89	286	3.30	

Daily gage height, in feet, of Merced River in Yosemite Valley, California, for 1

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		6.0	9.4	6.2	4.3	3.5	3.3
2		6.1	9.5	6.0	4.3	3.5	3.3
3		6.75	9.8	6.0	4.2	3.6	3.3
4		6.8	9.5	5.8	4.2	3.6	3.4
5		7.4	9.6	5.7	4.1	3.5	3.5
6		6.45	9.5	5.6	4.1	3.5	3.3
7		6.5	9.5	5.6	4.1	3.6	3.3
8		7.0	9.1	5.6	4.0	3.5	3.3
9		7.8	9.1	5.6	4.0	3.5	3.3
10		8.0	8.7	5.7	4.0	3.5	3.3
11		9.55	8.6	5.8	4.0	3.4	3.3
12		9.5	8.8	5.6	3.9	3.4	3.3
13		9.6	9.0	5.4	3.9	3.5	3.3
14		9.2	8.8	5.3	3.9	3.4	3.3
15		9.1	8.3	5.2	3.9	3.4	3.3
16		10.0	8.5	5.1	3.8	3.4	3.3
17		9.5	8.3	5.1	3.7	3.3	3.3
18		9.2	7.8	5.4	3.7	3.4	3.3
19		9.8	7.7	5.5	3.6	3.3	3.3
20		9.8	7.8	5.2	3.6	3.3	3.3
21		10.0	7.7	4.9	3.5	3.3	3.3
22		9.9	7.8	4.8	3.6	3.3	3.3
23	7.00	9.8	7.8	4.5	3.6	3.3	3.3
24	6.75	9.8	7.8	4.4	3.6	3.3	3.3
25	6.80	10.0	7.7	4.4	3.6	3.3	3.3
26	6.8	8.8	8.1	4.4	3.6	3.3	3.2
27	6.3	8.4	7.4	4.4	3.5	3.3	3.2
28	6.1	7.8	7.1	4.4	3.5	3.3	3.2
29	5.7	8.0	6.7	4.4	3.5	3.3	3.2
30	5.7	8.4	6.4	4.3	3.5	3.2	3.2
31	5.7		6.4	4.3		3.2	

YOSEMITE CREEK IN YOSEMITE VALLEY, CALIFORNIA.

This station was established July 9, 1904. It is located a wagon bridge, about one-half mile from Yosemite, Cal. The c tions at this station and the bench marks are described in Water ply Paper No. 177, page 205, where are given also references to p cations that contain data for previous years.

No measurements were made at this station during 1906. November 12, with a gage height of 5 feet, there was no flow a section.

Daily gage height, in feet, of Yosemite Creek, in Yosemite Valley, Cal., for 1906.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		6.4	9.2	5.8	5.2	5.0	5.0	5.0
2		6.5	9.5	5.7	5.2	5.0	5.0	5.0
3		7.0	9.4	5.6	5.1	5.0	5.0	5.0
4		7.1	9.4	5.6	5.1	5.0	5.2	5.0
5		7.4	9.6	5.6	5.1	5.0	5.1	5.0
6		7.0	9.5	5.5	5.1	5.0	5.1	5.0
7		6.9	9.4	5.6	5.0	5.0	5.1	5.0
8		7.1	9.2	5.5	5.0	5.0	5.0	5.0
9		7.9	9.1	5.4	5.0	5.0	5.0	5.0
10		8.0	8.8	5.5	5.0	5.0	5.0	5.0
11		8.9	8.9	5.5	5.0	5.0	5.0	5.0
12		9.8	8.0	5.4	5.0	5.0	5.0	.....
13		9.4	8.1	5.3	5.0	5.0	5.0	.....
14		8.8	8.0	5.4	5.0	5.0	5.0	.....
15		8.7	7.4	5.4	5.0	5.0	5.0	.....
16		11.15	7.2	5.3	5.0	5.0	5.0	.....
17		9.3	7.1	5.3	5.0	5.0	5.0	.....
18		9.1	7.1	5.3	5.0	5.0	5.0	.....
19		9.8	6.8	5.3	5.0	5.0	5.0	.....
20		9.7	6.8	5.3	5.0	5.0	5.0	.....
21		9.9	6.7	5.4	5.0	5.0	5.0	.....
22		9.9	6.7	5.3	5.0	5.0	5.0	.....
23	7.5	9.8	6.6	5.2	5.0	5.0	5.0	.....
24	7.05	9.7	6.6	5.2	5.0	5.0	5.0	.....
25	7.0	9.8	6.7	5.1	5.0	5.0	5.0	.....
26	7.0	7.7	6.9	5.1	5.0	5.0	5.0	.....
27	6.5	7.4	6.4	5.1	5.0	5.0	5.0	.....
28	6.4	7.1	6.2	5.1	5.0	5.0	5.0	.....
29	[a]9.0	7.4	5.9	5.1	5.0	5.0	5.0	.....
30	6.0	7.7	5.7	5.1	5.0	4.9	5.0	.....
31	6.1	.....	6.0	5.1	.....	4.9	.....	.....

[a] Backwater from snow.

NOTE.—There was practically no flow after September 1.

TENAYA CREEK IN YOSEMITE VALLEY, CALIFORNIA.

This station was established July 11, 1904. It is located by the wagon bridge, about 2 miles from Yosemite, Cal. The conditions at this station and the bench marks are described in Water-Supply Paper No. 177, page 207, where are given also references to publications that contain data for previous years.

The following measurement was made June 11, 1906.:

Width, 44 feet; area, 176 square feet; gage height, 720 feet; discharge, 891 second-feet.

Daily gage height, in feet, of Tenaya Creek in Yosemite Valley, Cal., for 1906.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		5.6	7.1	4.6	3.5	3.0	3.0	3.0
2		5.7	7.2	4.4	3.4	3.0	3.0	3.0
3		6.0	7.3	4.5	3.4	3.0	3.0	3.0
4		6.0	7.2	4.4	3.3	3.0	3.2	3.0
5		6.3	7.2	4.3	3.2	2.9	3.2	3.0
6		6.0	7.1	4.4	3.2	2.9	3.1	3.0
7		6.1	7.2	4.4	3.1	2.9	3.1	3.0
8		6.3	7.1	4.3	3.0	2.9	3.0	3.0
9		6.7	7.0	4.3	3.0	2.9	3.0	3.0
10		6.8	6.7	4.4	3.0	2.9	3.0	3.0
11		6.9	6.6	4.3	3.0	2.9	3.0	3.0
12		6.9	7.0	4.2	2.9	2.9	3.0	.....
13		7.0	7.1	4.2	3.0	2.9	3.0	.....
14		7.1	7.0	4.1	3.0	3.0	3.0	.....
15		7.4	6.5	4.1	3.1	3.0	3.0	.....

Daily gage height, in feet, of Tenaya Creek in Yosemite Valley, Cal., for 1906—Co

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	I
16		8.1	6.3	4.0	3.0	2.9	3.0	
17		7.8	6.2	4.0	3.0	2.9	3.0	
18		7.3	6.1	3.9	3.0	3.0	3.0	
19		7.1	6.0	3.8	3.0	2.9	3.0	
20		7.5	5.8	3.9	3.0	2.9	3.0	
21		7.4	5.6	3.8	3.0	2.9	3.0	
22		7.3	5.5	3.8	3.0	2.9	3.0	
23		7.4	5.5	3.8	3.0	3.0	3.0	
24		7.4	5.4	3.7	3.0	2.9	3.0	
25	6.2	7.5	5.5	3.6	3.0	2.9	3.0	
26	6.1	6.1	5.7	3.6	3.0	2.9	3.0	
27	5.9	6.0	5.7	3.5	3.0	3.0	3.0	
28	5.7	6.4	5.2	3.5	3.0	2.9	3.0	
29	5.5	6.6	5.0	3.4	3.0	2.9	3.0	
30	5.5	6.9	4.7	3.4	3.0	3.0	3.0	
31	5.5	.....	4.7	3.4	.....	3.0	.....	

TUOLUMNE RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Tuolumne River rises on the western slope of the Sierra Nevada a drains the country located between Stanislaus River on the north a Merced River on the south. It has numerous tributaries, severa which produce a heavy discharge. The country throughout t basin is rough and rugged, especially along the main river, which c through solid granite, with high precipitous cliffs on either s Along this stream is found some of the grandest scenery of the Sie Nevada. This stream drains the northern portion of the Yosem National Park, where is located the Grand Canyon of the Tuolur and the Hetch Hetchy Valley, declared by many to exceed the fa Yosemite Valley in grandeur and beauty. The formation is of gran which on the higher elevations is bare and glaciated, often ris thousands of feet in vertical cliffs and domes. Along the mid reaches of this basin there is good soil covering, with a heavy tim growth of pine, fir, cedar, and other kindred trees. On the lo reaches the covering is a heavy growth of brush, which diminishe the foothills where the stream enters the San Joaquin Valley. T portion of the basin has a light soil covering, with grass growth, wh is used for pasturage. There are several glacial lakes throughout upper reaches of this basin, many of the larger of which offer exc tional opportunities for the construction of storage reservoirs. Th are also many reservoir sites on the main river. The stream ha a heavy fall, and the opportunities for power development are merous. Several diversions are made above the gaging stati which is located at Lagrange, where the stream breaks from the fo hills. The precipitation on the upper half of this basin falls in form of snow, a greater portion of which disappears in the spr months, but on the higher elevations much remains until late in summer. The mean annual rainfall varies from about 30 inches the lower foothills to about 60 inches on the higher elevations.

TUOLUMNE RIVER AT LA GRANGE, CAL.

This station was established August 29, 1895. It is located at the wagon bridge, in the town of La Grange. It is below the high dam, where the diversions are made by the Turlock and Modesto canals, and also below the head of the canal of the La Grange Ditch and Hydraulic Mining Company, which diverts water from the left bank of the river above the dam. The conditions at this station and the bench marks are described in Water-Supply Paper No. 177, page 209, where are given also references to publications that contain data for previous years.

Discharge measurements of Tuolumne River at La Grange, Cal., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
February 18	C. H. Lee	314	1,360	5.80	1,870
March 29	R. S. Hawley	342	2,060	7.71	6,220
April 25	do	337	2,000	7.52	5,710
May 15	C. H. Lee	348	2,550	8.80	11,000
May 25	W. C. Sawyer	330	2,140	8.18	7,760
May 28	do	370	2,970	10.45	15,900
June 4	do	348	2,500	9.11	11,100
June 14	do	380	2,810	10.10	14,800
June 21	do	384	3,050	10.54	17,000
June 29	do	342	2,360	8.62	9,750
July 3	do	376	3,060	10.79	18,300
July 11	do	366	2,610	9.00	11,800
July 21	do	340	2,230	8.22	8,570
July 31	do	331	1,790	6.80	4,150
August 3	do	326	1,580	6.20	2,700
August 6	do	320	1,440	5.78	1,890
August 20	W. F. Martin	318	1,360	5.43	1,380
November 21	do	208	983	4.26	197

Daily gage height, in feet, of Tuolumne River at La Grange, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.2	4.85	6.0	8.15	7.1	8.3	9.8	6.4	3.45	3.45	4.1	4.2
2	4.1	4.9	5.9	8.1	7.3	8.25	10.4	6.25	3.45	3.45	4.1	4.2
3	4.0	4.8	6.1	7.85	7.5	8.55	10.65	6.3	3.45	3.45	4.1	4.2
4	4.0	4.8	6.3	7.3	7.75	9.1	10.6	6.1	3.45	3.45	4.1	4.3
5	4.0	4.8	6.2	7.05	8.4	9.35	10.3	5.95	3.45	3.45	4.8	4.35
6	3.7	4.8	6.2	7.05	9.7	8.55	10.25	5.9	3.45	3.45	4.6	4.4
7	3.75	4.75	6.1	7.05	9.45	8.1	10.05	5.9	3.45	3.45	4.55	4.4
8	3.7	4.8	6.1	7.1	9.25	8.25	10.1	5.9	3.45	3.45	4.35	4.3
9	3.3	4.85	6.3	7.15	9.6	8.9	9.85	5.95	3.4	3.8	4.4	3.9
10	3.3	4.95	6.4	7.45	9.8	9.5	9.1	5.75	3.0	3.85	4.4	4.65
11	3.3	5.5	6.55	7.6	10.15	10.2	9.2	5.9	3.0	3.85	4.35	7.8
12	3.4	5.0	9.7	7.45	9.25	10.9	9.3	5.9	3.0	3.9	4.35	7.2
13	6.45	4.85	7.9	7.3	8.8	11.0	9.65	5.75	3.0	3.9	4.35	5.5
14	8.2	5.1	7.5	7.1	8.75	9.9	9.5	5.7	3.0	3.9	4.6	5.05
15	6.75	6.35	11.4	7.35	8.8	9.6	9.1	5.5	3.0	3.9	4.8	4.9
16	6.6	6.0	9.1	7.45	8.4	10.65	8.8	5.4	3.0	4.0	4.3	4.8
17	6.9	5.55	6.75	7.55	8.3	10.8	8.7	5.35	3.0	3.9	4.35	4.8
18	10.55	5.6	6.65	7.6	8.75	9.6	8.35	5.3	3.0	3.9	4.35	4.75
19	11.65	5.7	6.65	7.75	9.4	10.2	8.3	5.3	3.0	3.9	4.35	4.75
20	7.3	6.45	6.85	7.8	9.45	10.45	8.1	5.4	3.0	3.9	4.35	4.75
21	6.7	7.2	6.75	8.0	9.0	10.5	8.3	5.4	3.0	4.2	4.3	4.75
22	6.3	6.85	6.35	8.0	8.7	10.45	8.05	5.7	3.0	4.2	4.2	4.75
23	5.9	6.4	7.8	9.0	8.25	10.3	8.2	5.6	3.05	3.8	4.25	4.8
24	5.5	6.25	12.45	8.45	8.0	10.15	8.2	5.35	3.05	4.1	4.3	4.9
25	5.35	6.3	11.3	7.6	8.0	10.4	8.5	5.2	3.05	4.15	4.2	5.35
26	5.4	6.25	10.55	7.3	9.6	9.9	8.0	3.6	3.05	4.1	4.2	7.4
27	5.25	6.0	7.9	7.35	9.5	9.0	7.9	3.5	3.05	4.1	4.15	7.3
28	5.2	6.55	7.9	7.55	10.4	8.35	7.6	3.45	3.05	4.1	4.15	6.8
29	5.0	.....	7.05	7.4	9.1	8.6	7.2	3.45	3.05	4.1	3.3	6.1
30	4.95	.....	8.4	7.15	8.4	9.2	6.8	3.45	3.05	4.1	4.15	5.7
31	4.9	.....	10.2	.....	8.2	.....	6.6	3.45	.....	4.1	.....	6.45

Rating table for Tuolumne River at La Grange, Cal., 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.*
3.00	0	4.00	115	5.00	780	6.00	2,260	8.00	7,390
3.10	1	4.10	145	5.10	900	6.20	2,650	8.20	8,030
3.20	5	4.20	180	5.20	1,030	6.40	3,080	8.40	8,700
3.30	10	4.30	220	5.30	1,160	6.60	3,530	8.60	9,390
3.40	20	4.40	270	5.40	1,300	6.80	4,000	8.80	10,090
3.50	30	4.50	330	5.50	1,440	7.00	4,500	9.00	10,810
3.60	40	4.60	400	5.60	1,590	7.20	5,020	10.00	14,610
3.70	55	4.70	480	5.70	1,750	7.40	5,570	11.00	18,610
3.80	70	4.80	570	5.80	1,910	7.60	6,140		
3.90	90	4.90	670	5.90	2,080	7.80	6,750		

NOTE.—This table is based on 18 discharge measurements made during 1906 and earlier low w measurements, and is well defined.

Monthly discharge of Tuolumne River at La Grange, Cal., for 1906.

[Drainage area, 1,500 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Sec.-ft per sq. mile.	Dep inc
January	21,400	55	2,860	176,000	1.91	
February	5,330	1,110	2,180	121,000	1.45	
March	24,400	2,320	7,180	441,000	4.79	
April	11,300	4,730	6,500	387,000	4.33	
May	16,800	5,510	11,100	682,000	7.40	
June	19,600	8,640	13,900	827,000	9.27	
July	18,200	4,530	11,600	713,000	7.73	
August	4,080	770	2,220	136,000	1.48	
September	831	288	470	28,000	.313	
October	307	70	216	13,300	.144	
November	570	10	243	14,500	.162	
December	6,750	90	1,470	90,400	.980	
The year	24,400	10	4,990	3,630,000	3.33	

NOTE.—These discharges include those of Modesto and Turlock canals. Values are excellent, e those for Modesto canal for April, September, and October, which are classed as good, on accou the lack of measurements of the canal at low stages.

MODESTO CANAL AT LA GRANGE, CAL.

The Modesto canal is the property of the Modesto irrigation distr The water is diverted from the right side of Tuolumne River at La Grange dam. This canal was designed to carry 660 second-feet to irrigate land in the vicinity of Modesto, Stanislaus County, The principal part of the construction work was done on this ca prior to 1892, but on account of litigation the canal was not comple until April, 1903.

Information in regard to this station is contained in Water-Sur Papers Nos. 100, 134, and 177 of the United States Geological Surv

During 1906 gagings were made about 500 feet below the intak the La Grange dam. The canal at this point has a concrete sect the width being 20.2 feet at the bottom and the walls having a ba of about 1 to 5 outward. The floor of the canal is practically a p surface, but the left side is 0.26 foot lower than the right side, wl the highest velocity occurs. Measurements were made from the up

side of a plank footbridge. The gage is an iron bar 1½ by ¼ inches, graduated into feet and tenths and placed in a concrete well on the left side of the canal about 400 feet above the gaging station. The well is connected to the canal by means of a small pipe from the bottom at right angles to the canal wall.

Discharge measurements of Modesto canal at La Grange, Cal., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 16	C. H. Lee	22	59	2.80	395
June 5	W. C. Sawyer	21	43	2.11	302
June 5	do	21	39	1.91	257
June 8	do	21	58	2.79	393
June 8	do	21	56	2.70	412
June 29	do	22	70	2.66	387
July 2	do	21	69	2.60	380
July 11	do	21	70	2.60	383
July 19	do	21	68	2.52	376
August 6	Sawyer and Martin	21	66	2.46	362
September 5	W. F. Martin	21	46	1.70	250

Daily gage height, in feet, of Modesto canal at La Grange, Cal., for 1906.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1			2.4	0.2	2.6	2.5	2.25	0.85
2			2.5	.85	2.6	2.45	1.95	.85
3			2.6	1.1	2.6	2.45	1.8	.85
4			2.5	1.5	2.6	2.45	1.6	.85
5			2.65	1.9	2.55	2.45	1.65	.85
6			2.8	2.2	2.6	2.5	1.6	.85
7			2.8	2.6	2.55	2.5	1.55	.85
8			2.8	2.7	2.6	2.5	1.55	.8
9		1.4	2.8	2.85	2.55	2.45	1.5	.9
10		2.0	2.8	2.75	2.55	1.85	1.35	.95
11		2.0	2.8	2.5	2.6	.....	1.45	.85
12		1.95	2.8	2.5	2.6	.....	1.45	.85
13	1.5	2.25	2.8	2.5	2.6	.....	1.4	.9
14	.65	2.3	2.8	1.65	2.6	.....	1.25	1.1
15	1.15	2.3	2.8	2.6	2.6	.....	1.35	1.05
16	1.5	2.35	2.8	2.55	2.6	.....	1.35	1.0
17	1.7	2.3	2.8	2.5	2.6	.....	1.3	1.0
18	1.8	2.3	2.8	2.5	2.5	.....	1.2	.95
19	2.0	2.3	2.8	2.6	2.5	.....	1.15	.95
20		2.4	2.8	2.6	2.45	.....	1.05	.95
21		2.5	2.8	2.6	2.5	.....	1.05	.....
22			2.8	2.6	2.5	.....	1.0	.....
23			1.5	2.6	2.5	0.6	.95	.....
24			.....	2.6	2.5	.5	.95	.....
25			.....	2.6	2.5	1.3	.95	.....
26			.....	2.55	2.45	1.9	1.0	.....
27			.....	2.55	2.5	2.1	1.0	.....
28			.....	2.6	2.5	2.2	.95	.....
29		2.45	.....	2.6	2.5	1.95	.9	.....
30		2.5	.....	2.65	2.5	1.95	.85	.....
31			.....	.....	2.5	1.9	.....	.....

NOTE.—No gage height record was kept April 22 to 28. Discharges have been interpolated. The canal was dry on other days on which the gage was not read.

Rating table for Modesto canal at La Grange, Cal., 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.*
0.50	90	1.10	156	1.70	238	2.30	328	2.90	428
0.60	100	1.20	169	1.80	253	2.40	344	3.00	445
0.70	110	1.30	182	1.90	268	2.50	360		
0.80	120	1.40	196	2.00	283	2.60	377		
0.90	131	1.50	210	2.10	298	2.70	394		
1.00	143	1.60	224	2.20	313	2.80	411		

NOTE.—This table is based on 11 discharge measurements made during 1906, and is well defined be gage heights 1.7 feet and 2.8 feet. Discharges have been included with those of Tuolumne River, p The total discharge of the canal for 1906 was 105,000 acre-feet.

TURLOCK CANAL AT LA GRANGE, CAL.

The Turlock canal, the property of the Turlock irrigation dist takes water from the left bank of Tuolumne Piver at the La Gr dam. This canal was designed to carry 1,500 second-feet an irrigate a large area of fertile land in the vicinity of Turlock and C Stanislaus County, Cal.

During 1898 water was first turned into the canal in small qu ties and used for puddling the banks. A record of the gage he has been kept since July, 1899. The conditions at this station described in Water-Supply Paper No. 177, page 214, where are g also references to publications that contain data for previous y

Discharge measurements of Turlock canal at La Grange, Cal., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	ch
		Feet.	*Sq. ft.*	*Feet.*	*S*
May 16	C. H. Lee	20	110	5.55	
May 24	W. C. Sawyer	20	113	5.75	
May 29	do	20	26	1.30	
May 29	do	20	40	2.05	
May 29	do	20	58	2.97	
May 29	do	20	58	2.97	
May 29	do	20	74	3.75	
May 29	do	20	92	4.70	
May 30	do	20	105	5.35	
May 30	do	20	118	6.02	
June 7	do	20	108	5.50	
July 2	do	20	115	6.02	
July 19	do	20	98	5.02	
July 21	do	20	21	1.68	
August 6	Sawyer and Martin	20	120	6.10	
August 20	W. F. Martin	20	120	6.10	
September 5	do	20	87	4.46	

Daily gage height, in feet, of Turlock canal at La Grange, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		5.25	3.25		4.5	5.0	6.05	6.05	5.05
2		5.6	3.25	2.0	4.1	5.0	6.05	6.05	5.25
3		5.6	2.9	2.0	4.4	5.0	6.05	6.05	4.1
4		5.6	2.4	2.0	5.4	5.0	6.0	6.05	4.35
5		5.7	2.0	2.0	5.35	5.6	6.05	6.05	4.4
6		5.7	2.0	2.0	5.35	5.5	6.05	6.0	4.3
7		5.7	2.0	2.0	5.35	5.5	6.05	6.05	4.25
8	2.05	5.7	2.0	2.0	5.35	5.65	6.05	6.05	4.2
9	2.05	5.75		2.0	5.35	5.75	6.05	6.05	4.05
10	2.65	4.65			5.6	5.75	6.05	6.05	3.75

Daily gage height, in feet, of Turlock canal at La Grange, Cal., for 1906—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
11	2.65	5.7	.....	.....	5.6	5.8	6.05	6.05	3.9	.....
12	2.7	5.9	.....	2.5	5.6	5.8	6.05	6.05	3.9	.....
13	2.7	5.1	.....	2.6	5.6	5.8	6.05	6.05	3.8	.....
14	2.6	4.55	.....	2.5	5.6	5.8	6.05	6.05	3.4	.....
15	2.5	5.1	.....	2.5	5.6	5.5	6.05	6.05	3.5	.....
16	2.55	5.4	.....	2.5	5.6	6.0	6.05	6.05	3.4	.....
17	2.6	2.25	.....	2.5	5.6	6.0	6.05	6.05	3.4	.....
18	2.1	.....	.....	2.5	5.6	6.0	6.05	6.05	3.0	.....
19	2.5	3.0	.....	2.5	5.6	6.0	5.08	6.0	3.05	.....
20	2.7	3.7	.....	2.5	5.6	6.0	6.05	6.05	2.85	.....
21	2.7	3.75	0.75	2.6	5.7	6.0	6.05	6.05	2.85	.....
22	2.7	4.6	2.0	2.6	5.8	6.0	6.05	0.0	2.75	.....
23	2.8	4.0	1.25	2.6	5.8	6.0	6.05	0.0	2.75	.....
24	2.4	3.2	.....	2.6	5.85	6.0	6.05	5.02	2.7	.....
25	0.5	3.5	.....	2.6	5.05	6.05	6.05	5.02	2.7	.....
26	1.7	3.5	.....	3.15	5.9	6.0	6.05	5.45	2.75	.....
27	3.7	3.5	.....	3.6	4.7	6.05	6.05	5.87	2.75	.....
28	3.9	3.5	.....	3.6	5.7	6.05	6.05	5.04	2.7	.....
29	3.9	.....	.....	3.6	5.45	6.05	6.05	5.05	2.6	.....
30	5.1	.....	.....	4.0	5.6	6.05	6.05	5.15	2.55	.....
31	5.1	.....	.....	.....	5.3	.....	6.05	5.00	.....	.....

NOTE.—The canal was dry on days when the gage was not read.

Rating table for Turlock canal at La Grange, Cal., 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.*
0.50	4	1.50	58	2.50	156	3.50	274	5.00	478
0.60	6	1.60	67	2.60	167	3.60	287	5.20	508
0.70	10	1.70	76	2.70	178	3.70	300	5.40	538
0.80	14	1.80	85	2.80	189	3.80	313	5.60	568
0.90	19	1.90	94	2.90	201	3.90	326	5.80	598
1.00	25	2.00	104	3.00	213	4.00	339	6.00	628
1.10	31	2.10	114	3.10	225	4.20	365		
1.20	37	2.20	124	3.20	237	4.40	392		
1.30	44	2.30	134	3.30	249	4.60	420		
1.40	51	2.40	145	3.40	261	4.80	448		

NOTE.—This table is based on 17 discharge measurements made during 1906 and is well defined above gage heights 1 foot. Discharges have been included with those for Tuolumne River, p —. The total discharge of the canal for 1906 was 202,000 acre-feet

STANISLAUS RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Stanislaus River drains a portion of the western slope of the Sierra Nevada and heads well back on the crest, at elevations of from 10,000 to 12,000 feet. It drains the country between the basins of Mokelumne River on the north and Tuolumne River on the south, and flows in a general southwesterly direction, entering San Joaquin River 23 miles above Stockton. In the upper reaches of the basin it has many tributaries, which have their source in numerous small glacial lakes. The topography is rough and broken, with high mountain peaks. The formation is of granite, which is bare and destitute of timber growth above an elevation of 8,000 feet, except where small glacial lakes and moraines occur. In the middle reaches of the basin there is good soil covering and a heavy growth of timber. In this basin is situated the Calaveras grove of big trees (*Sequoia gigantea*), for which the Sierra Nevada is famous. This is the most north-

erly of the groves of these trees which extend as far south as Kern River basin. The mean annual rainfall for the basin is abou inches. The precipitation falls chiefly in the form of snow on higher elevations, remaining well into the summer months. Mi operations have been carried on extensively in this basin, and n canals have been taken out of the river, all of which discharge the river again. The canal of the Stanislaus Water Company div water 3 miles above Knights Ferry and is used to irrigate between Knights Ferry and Stockton. A gaging station is m tained on this canal to determine its discharge.

STANISLAUS RIVER AT KNIGHTS FERRY, CAL.

A station was first established on this river on May 3, 1895, at railroad bridge one-half mile north of Oakdale. On July 30, 18 cable was placed 1,000 feet below the railroad bridge. This sta was used until February 16, 1901.

The station at Knights Ferry was established May 19, 1903. located 200 feet from the post-office at Knights Ferry. The co tions at this station and the bench marks are described in W Supply Paper No. 177, page 217, where are given also reference publications that contain data for previous years.

Discharge measurements of Stanislaus River at Knights Ferry, Cal., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	I cha
		Feet.	*Sq. ft.*	*Feet.*	*Se*
February 19	C. H. Lee	194	793	9.20	
March 29	R. S. Hawley	221	989	10.37	
April 24	do	230	1,030	10.60	
April 25	Hawley and Ostrom	225	1,040	10.43	
April 30	G. A. Ostrom	213	980	10.00	
May 3	do	268	1,280	11.52	
May 5	do	297	1,630	12.52	
May 7	do	323	1,870	13.35	
May 10	do	329	1,900	13.56	
May 15	do	295	1,660	12.58	
May 15	Ostrom and Lee	295	1,670	12.60	
May 22	G. A. Ostrom	274	1,380	11.72	
May 26	W. C. Sawyer	297	1,560	12.30	
June 2	G. A. Ostrom	245	1,240	11.23	
June 5	do	304	1,780	12.84	
June 11	do	345	2,200	13.95	
June 12	do	347	2,420	14.55	
June 13	do	348	2,570	14.71	
June 15	W. C. Sawyer	322	1,640	12.55	
June 21	G. A. Ostrom	297	1,860	13.40	
June 23	W. C. Sawyer	287	1,490	12.08	
June 29	G. A. Ostrom	242	1,260	10.98	
July 10	W. C. Sawyer	241	1,180	10.78	
July 14	G. A. Ostrom	245	1,290	11.22	
July 17	do	212	1,020	10.00	
July 21	do	194	849	9.30	
July 25	do	193	890	9.68	
July 28	do	185	762	8.70	
July 30	do	169	594	8.04	
August 1	do	160	521	7.63	
August 9	do	153	463	7.16	
August 16	do	140	388	6.68	
August 27	do	137	327	6.34	
September 5	W. F. Martin	128	299	6.13	
September 9	G. A. Ostrom	128	294	6.08	
September 18	do	127	254	5.86	
September 28	do	118	238	5.75	
October 9	do	114	227	5.64	
October 19	do	113	221	5.58	
November 23	W. F. Martin	125	256	5.82	

Daily gage height, in feet, of Stanislaus River at Knights Ferry, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.4	7.15	8.6	11.5	10.25	10.8	12.0	7.8	6.3	5.8	5.7	5.8
2	6.3	7.2	8.4	10.8	10.8	11.1	12.2	7.75	6.25	5.8	5.7	5.8
3	6.3	7.25	8.45	10.3	11.4	11.4	12.4	7.65	6.25	5.8	5.7	5.7
4	6.3	7.3	9.3	9.95	11.8	12.3	12.3	7.55	6.15	5.8	5.85	5.8
5	6.25	7.25	8.8	9.75	12.35	12.5	12.15	7.45	6.15	5.8	6.45	5.8
6	6.3	7.35	8.65	9.7	12.95	11.4	11.75	7.4	6.1	5.8	6.15	5.8
7	6.3	7.35	8.6	9.7	12.7	11.05	11.6	7.4	6.1	5.85	5.9	5.8
8	6.25	7.3	8.55	9.8	12.85	11.3	11.6	7.35	6.1	5.75	5.9	6.2
9	6.3	7.35	8.65	11.0	12.85	12.05	11.2	7.3	6.1	5.75	5.85	5.9
10	6.3	7.4	8.7	10.4	12.9	12.85	10.6	7.25	6.15	5.75	5.85	6.05
11	6.3	7.5	8.8	10.3	13.35	13.5	10.5	7.2	6.15	5.8	5.85	13.1
12	7.9	7.35	11.1	9.9	12.15	14.1	10.65	7.1	6.1	5.75	5.85	9.95
13	11.35	7.35	10.5	10.0	11.65	13.85	11.1	7.0	6.0	5.75	5.9	7.65
14	10.45	7.5	10.15	10.2	11.8	12.8	10.8	7.0	6.0	5.75	5.7	6.85
15	9.1	8.8	13.2	10.3	12.3	12.8	10.4	6.8	6.0	5.75	5.6	6.55
16	8.8	8.3	10.6	10.6	11.3	13.4	10.0	6.75	6.0	5.9	5.6	6.55
17	9.9	8.0	9.9	10.55	11.2	13.15	9.95	6.7	6.0	5.7	5.6	6.3
18	13.25	7.95	9.35	10.75	11.8	12.4	9.55	6.65	5.95	5.7	5.7	6.2
19	14.1	8.95	9.05	10.8	12.1	13.0	9.3	6.7	5.9	5.7	5.65	6.2
20	9.9	8.7	9.0	11.15	12.1	12.9	9.3	6.8	5.85	5.7	5.6	6.15
21	8.9	9.9	9.2	11.4	11.9	12.9	9.25	6.7	5.8	5.7	5.7	6.1
22	8.4	9.85	9.75	11.6	11.5	12.8	9.3	6.6	5.8	5.75	5.7	6.1
23	8.05	9.3	10.2	11.85	11.0	12.45	9.5	6.55	5.8	5.7	5.7	6.25
24	7.9	9.25	14.1	10.9	10.9	12.15	9.45	6.45	5.8	5.75	5.75	6.35
25	7.75	9.4	14.3	10.4	10.8	12.55	9.4	6.35	5.85	5.75	5.8	7.65
26	7.65	8.95	13.0	10.2	11.9	12.1	9.2	6.3	5.9	5.75	5.8	9.3
27	7.55	8.8	11.5	10.3	11.7	11.1	9.0	6.25	5.9	5.75	5.8	9.35
28	7.5	9.0	10.75	10.5	12.05	10.7	8.7	6.25	5.8	5.7	5.8	8.45
29	7.5	.....	10.4	10.1	11.1	10.8	8.4	6.2	5.8	5.7	5.8	7.75
30	7.45	.....	11.1	10.0	10.75	11.2	8.15	6.2	5.75	5.7	5.8	7.45
31	7.3	.....	13.55	.....	10.6	.....	7.95	6.3	.....	5.7	.....	8.3

Rating table for Stanislaus River at Knights Ferry, Cal., 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	65	6.70	640	7.80	1,540	8.90	2,800	11.00	6,140
5.70	95	6.80	710	7.90	1,640	9.00	2,930	11.20	6,540
5.80	130	6.90	790	8.00	1,740	9.20	3,200	11.40	6,970
5.90	170	7.00	870	8.10	1,850	9.40	3,480	11.60	7,410
6.00	220	7.10	950	8.20	1,960	9.60	3,760	11.80	7,880
6.10	270	7.20	1,030	8.30	2,070	9.80	4,060	12.00	8,390
6.20	320	7.30	1,110	8.40	2,190	10.00	4,380	13.00	11,110
6.30	380	7.40	1,190	8.50	2,310	10.20	4,710	14.00	14,020
6.40	440	7.50	1,270	8.60	2,430	10.40	5,050	15.00	17,180
6.50	500	7.60	1,360	8.70	2,550	10.60	5,400		
6.60	570	7.70	1,450	8.80	2,670	10.80	5,760		

NOTE.—This table is based on 40 discharge measurements made during 1906 and is well defined.

Monthly discharge of Stanislaus River at Knights Ferry, Cal., for 1906.

[Drainage area, 935 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	14,400	386	2,470	152,000	2.64	3.04
February	4,290	1,060	2,070	115,000	2.21	2.30
March	14,900	2,200	5,330	328,000	5.70	6.57
April	8,110	3,920	5,330	317,000	5.70	6.36
May	12,200	4,920	8,090	497,000	8.65	9.97
June	14,400	5,590	9,340	556,000	9.99	11.15
July	9,600	1,790	5,210	320,000	5.57	6.42
August	1,600	415	910	56,000	.973	1.12
September	490	207	309	18,400	.330	.37
October	251	162	193	11,900	.206	.24
November	551	87	181	10,800	.194	.22
December	11,400	141	1,270	78,100	1.36	1.57
The year	14,900	87	3,390	2,460,000	3.63	49.33

NOTE.—The discharge of Stanislaus Water Company's canal and Schell ditch is included above. The discharge of Schell ditch has been assumed as 7 second-feet. Values are excellent, except January to April, which are rated as fair, because measurements made during that period give a discharge somewhat less than the rating.

STANISLAUS WATER COMPANY'S CANAL AT KNIGHTS FERRY, C

This station was established June 11, 1904. It is located below point where Schell ditch diverts its water, about 1 mile below Stanislaus Milling and Power Company's power house and 200 below the place where it passes under the Schell-ditch flume. water diverted by this ditch is used for irrigation in the vicinit Oakdale, Cal.

Discharge measurements of Stanislaus Water Company's canal at Knights Ferry, in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	ch
		Feet.	*Sec.-ft.*	*Feet.*	*S*
May 15	C. H. Lee	9	25.0	3.35	
May 26	W. C. Sawyer	9	26.3	3.48	
June 15	do	9	26.6	3.60	
July 10	do	9	29.0	3.77	

Daily gage height, in feet, of Stanislaus Water Company's canal at Knights Ferry, for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	2.3	2.9	.....	1.65	3.5	3.6	3.75	2.55	3.4	3.1	2.95
2	1.9	2.65	.....	1.5	3.5	3.7	3.8	3.3	3.15	3.0	2.95
3	2.15	2.7	.....	2.0	3.5	3.8	3.7	3.25	3.25	3.1	2.95
4	2.25	2.75	.....	2.45	3.3	3.7	3.85	2.8	3.2	3.05	3.0
5	2.25	2.75	.....	2.15	3.4	3.7	3.8	2.95	3.2	3.0	3.0
6	2.4	2.8	.....	.....	3.4	3.85	3.75	3.4	3.1	2.95	2.9
7	2.4	2.75	.....	.....	3.2	3.6	3.8	3.45	3.2	3.0	2.85
8	2.15	2.8	3.1	.....	3.5	3.8	3.8	3.45	3.1	2.9	2.7
9	2.3	3.1	3.35	3.1	3.7	3.8	3.8	3.4	3.2	3.0	2.9
10	2.25	3.05	3.55	2.1	3.6	3.9	3.5	3.4	3.05	3.0	2.95
11	2.2	3.0	3.2	2.05	3.3	3.8	3.8	3.4	3.0	3.05	2.95
12	2.35	2.5	3.0	2.65	3.5	3.6	2.7	3.3	2.95	3.0	2.5
13	2.45	2.2	2.85	2.7	3.6	3.65	3.75	3.2	2.95	3.0	2.5
14	2.65	2.6	2.7	2.8	3.5	3.7	3.8	3.1	2.9	3.15	2.22
15	2.6	3.0	2.45	3.0	3.55	3.7	3.2	3.15	3.1	3.05	1.9
16	2.6	3.05	2.45	3.3	3.35	3.75	2.85	3.3	3.1	3.0	2.12
17	2.75	3.1	2.2	3.4	3.6	3.55	3.2	3.3	2.85	3.05	2.05
18	2.1	3.15	2.2	3.5	3.3	3.6	2.95	3.1	3.1	2.9	1.4
19	2.5	2.75	2.6	3.55	3.6	3.6	3.5	3.2	3.1	2.95	1.45
20	2.2	2.8	3.0	3.6	3.65	3.6	3.0	3.5	3.15	2.8	1.7
21	2.15	2.9	2.8	3.55	3.65	3.6	3.55	3.5	3.2	2.8	1.1
22	1.5	2.8	3.0	3.65	3.75	3.55	2.8	3.4	3.2	2.85	1.15
23	1.35	2.75	3.0	3.35	3.75	3.6	3.6	3.4	3.15	2.9	1.15
24	.....	2.8	2.1	.....	3.75	3.25	3.7	3.4	3.1	2.9	1.65
25	.....	2.45	.....	3.6	3.7	3.6	3.7	3.15	3.05	2.9	1.65
26	.....	.....	.....	3.7	3.6	3.7	3.7	3.4	3.0	2.95	2.25
27	.....	.....	.....	3.6	3.6	.....	3.7	3.3	3.15	2.9	2.3
28	.....	.....	.....	3.5	3.1	.....	3.2	3.25	3.2	2.9	2.3
29	.....	.....	.....	3.3	3.3	3.0	3.65	3.2	3.05	2.85	2.35
30	.....	.....	.....	3.3	3.5	3.25	3.45	3.2	3.2	2.95	2.15
31	2.65	.....	.....	.....	3.5	.....	3.3	3.4	.....	3.0	.....

NOTE.—Canal was dry on days when gage was not read.

Rating table for Stanislaus Water Company's canal at Knights Ferry 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.*
0.70	0	1.40	9	2.10	27	2.80	60	3.50	111
0.80	0.7	1.50	11	2.20	31	2.90	67	3.60	119
0.90	1.5	1.60	13	2.30	35	3.00	74	3.70	127
1.00	2.5	1.70	15	2.40	39	3.10	81	3.80	135
1.10	4.0	1.80	17	2.50	44	3.20	88	3.90	143
1.20	5.5	1.90	20	2.60	49	3.30	95	4.00	151
1.30	7	2.00	23	2.70	54	3.40	103		

NOTE.—This table is based on 13 discharge measurements made during 1905–6 and is well defined. Discharges have been included in those for Stanislaus River, p. 170. The total discharge of the canal in 1906 was 50,300 acre-feet.

MOKELUMNE RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Mokelumne River drains an area of 657 square miles of the western slope of the Sierra Nevada. It has numerous tributaries, North, South, and Middle forks being the most important. This stream heads well back in the main crest of the Sierra Nevada at an elevation of 8,000 feet.

The formation is of granite, with good soil covering and heavy timber growth on the middle and higher elevations. On the lower elevations the slopes are less rugged and the soil covering is of brush and scattering oak timber, with large areas of cultivated land and pasture. There are numerous small glacial lakes and moraines in the upper reaches of this basin. The precipitation varies from 25 inches on the lower to 50 inches on the higher elevations, where it falls in the form of snow, which melts in the early spring. The greatest discharge usually occurs in April, May, and June. There is some artificial storage in this basin, but not enough to have much effect on the discharge.

Several diversions are made for mining and power purposes within the drainage basin, and this water is returned to the river above the gaging station, which is located at Clements, a few miles above Lodi, Cal.

MOKELUMNE RIVER NEAR CLEMENTS, CAL.

This station was established October 28, 1904. It is located at the highway bridge, 1 mile north of Clements. The conditions at this station and the bench marks are described in Water-Supply Paper No. 177, page 223, where are given also references to publications that contain data for previous years.

Discharge measurements of Mokelumne River near Clements, Cal., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	c
		Feet.	*Sq. ft.*	*Feet.*	
February 11	F. R. S. Buttemer	122	212	4.60	
February 27	do	248	584	6.50	
March 12	do	251	1,310	9.15	
March 19	do	247	616	6.48	
April 14	W. C. Sawyer	255	962	8.28	
April 20	do	248	1,260	9.40	
April 21	do	250	1,400	10.00	
April 28	do	248	1,000	8.40	
May 9	do	251	1,710	11.55	
May 10	do	249	1,870	12.18	
May 22	do	252	1,220	10.02	
May 23	do	248	1,090	9.50	
June 12	do	263	2,470	14.35	
June 13	do	263	2,460	14.29	
June 19	do	251	1,970	12.20	
June 20	do	256	2,330	13.68	
June 27	do	249	1,390	9.80	
June 28	do	249	1,320	9.60	
July 7	do	250	1,610	10.75	
July 17	do	248	1,080	8.69	
July 18	do	258	1,060	8.46	
July 28	do	236	602	6.52	
July 30	do	204	392	5.65	
August 7	Sawyer and Martin	131	188	4.52	
September 3	W. F. Martin	77	141	4.05	
November 24	do	57	113	3.77	
November 27	R. S. Hawley	55	107	3.75	

Daily gage height, in feet, of Mokelumne River near Clements, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	3.05	4.5	6.05	11.2	8.45	9.45	10.95	5.15	3.8	3.8	4.0
2	3.1	4.4	5.6	9.95	9.05	9.9	12.25	5.0	3.9	3.9	3.95
3	3.1	4.45	5.85	8.75	10.5	10.45	12.15	5.2	3.8	3.85	3.95
4	3.15	4.4	6.45	8.3	10.85	12.2	13.2	5.1	3.75	3.75	4.1
5	3.15	4.45	5.75	7.95	11.6	12.15	12.4	4.95	3.75	3.95	5.15
6	3.15	4.5	5.7	7.9	12.45	10.45	12.2	4.7	3.85	4.0	4.5
7	3.15	4.5	5.75	7.75	12.5	9.6	11.35	5.15	4.0	3.85	4.4
8	3.1	4.45	5.75	7.6	12.1	10.05	11.45	4.6	3.9	3.7	4.15
9	3.1	4.5	5.95	7.75	12.4	11.6	11.15	4.8	4.05	4.0	4.1
10	3.1	4.65	6.05	8.3	12.1	13.8	10.7	4.6	4.2	3.95	4.1
11	3.15	4.7	6.05	8.5	12.2	14.3	10.4	4.9	4.4	3.85	3.75
12	3.3	4.55	8.4	8.0	11.15	14.4	10.05	5.0	.....	3.95	3.8
13	5.6	4.5	8.1	7.8	10.2	13.8	10.05	4.55	3.9	3.9	3.8
14	7.95	4.6	7.5	7.9	10.4	12.2	10.1	4.4	3.95	3.85	3.9
15	6.05	5.05	11.5	8.3	10.9	11.7	9.65	4.4	4.0	3.9	4.1
16	6.6	5.75	8.15	8.6	9.55	13.3	9.4	4.15	3.95	3.95	4.2
17	7.75	5.15	7.4	8.6	9.15	12.9	8.9	3.9	4.05	3.95	4.0
18	11.45	5.45	6.8	8.75	10.15	11.95	8.2	3.9	3.85	3.95	4.2
19	12.7	6.75	6.45	8.95	10.75	12.55	7.55	3.9	3.85	3.9	4.2
20	7.9	6.2	6.25	9.45	10.9	12.6	7.9	3.95	3.9	3.9	4.2
21	7.0	7.45	6.65	9.9	10.45	12.45	7.85	3.85	3.9	3.75	4.2
22	5.7	7.3	7.2	10.3	10.35	12.7	7.0	3.85	3.9	3.75	4.2
23	5.3	6.5	8.1	10.3	9.4	12.2	7.5	3.95	3.9	3.95	4.2
24	5.15	6.2	11.55	9.15	9.15	11.75	7.0	3.95	3.85	3.9	3.85
25	4.9	6.1	12.05	8.55	9.15	12.25	6.65	4.2	3.95	3.95	3.85
26	4.85	6.0	11.85	8.1	10.5	11.55	6.45	4.0	3.9	4.0	3.6
27	4.7	6.25	10.45	8.25	10.5	10.9	6.25	3.8	4.0	3.85	3.95
28	4.6	6.45	9.15	8.5	10.75	10.1	6.25	3.85	4.0	4.05	3.95
29	4.55	.....	8.5	8.05	10.2	10.45	5.65	3.8	3.9	3.8	4.1
30	4.5	.....	8.7	8.0	9.35	10.5	5.45	3.95	3.85	3.95	3.9
31	4.45	.....	13.45	.....	9.25	.....	5.3	3.85	.....	4.05	.....

Rating table for Mokelumne River near Clements, Cal., 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.*
3.00	50	4.10	250	5.20	680	6.60	1,450	8.80	3,010
3.10	60	4.20	280	5.30	730	6.80	1,570	9.00	3,180
3.20	70	4.30	315	5.40	780	7.00	1,690	10.00	4,125
3.30	80	4.40	350	5.50	830	7.20	1,830	11.00	5,175
3.40	90	4.50	390	5.60	880	7.40	1,970	12.00	6,225
3.50	105	4.60	430	5.70	930	7.60	2,110	13.00	7,275
3.60	120	4.70	470	5.80	980	7.80	2,250	14.00	8,325
3.70	140	4.80	510	5.90	1,030	8.00	2,390		
3.80	160	4.90	550	6.00	1,080	8.20	2,530		
3.90	190	5.00	590	6.20	1,210	8.40	2,690		
4.00	220	5.10	630	6.40	1,330	8.60	2,850		

NOTE.—This table is based on 27 discharge measurements made during 1906, and is well defined between gage heights 3.7 feet and 14.3 feet.

Monthly discharge of Mokelumne River near Clements, Cal., for 1906.

[Drainage area, 642 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	6,960	55	996	61,200	1.55	1.79
February	2,000	350	808	44,900	1.26	1.31
March	7,750	880	2,520	155,000	3.92	4.52
April	5,380	2,110	2,940	175,000	4.57	5.10
May	6,750	2,730	4,700	289,000	7.32	8.44
June	8,740	3,580	6,020	358,000	9.38	10.46
July	7,480	730	3,540	218,000	5.51	6.35
August	680	160	356	21,900	.554	.64
September	350	150	202	12,000	.315	.35
October	235	140	190	11,700	.296	.34
November	655	120	248	14,800	.386	.43
December	4,960	150	876	53,900	1.36	1.57
The year	8,740	55	1,950	1,420,000	3.04	41.30

NOTE.—These values are excellent, except January to March, which are rated as good because the measurements made during that period give a discharge somewhat in excess of the rating.

NORTHERN PACIFIC OCEAN DRAINAGE.

KLAMATH RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Klamath River drains a large area in California and Oregon, lying between the basins of Sacramento River on the south, Deschutes and Rogue rivers on the north, and the minor streams of the Great Basin on the east. Its headwaters lie at elevations of from 7,000 to 9,000 feet. The region contains many flat valleys in which the soil is favorable to irrigation. Many of the streams flow through marshes, which are susceptible of drainage and cultivation. The water surface in the basin is large, comprising three large lakes and many smaller ones.

Link River rises in Upper Klamath Lake and flows through a large swamp area, feeding Lower Klamath Lake by overflow at high water and receiving water from the lake at low stages. Below Keno it is

known as Klamath River, and flows southwestward through Siski
Humboldt. and Del Norte counties, in California emptying into
Pacific.

Important power possibilities exist on the stream, notably
Klamath Falls and at the rapids below Keno. Upper Klamath L
is fed by Williamson River, and several smaller streams. Sy
River flows into Sprague River, a tributary of Williamson River

Tule Lake lies just east of Lower Klamath Lake and has no sur
outlet, but may have underground ones. Evaporation record
Keno indicate an annual loss of about 38 inches, while the rai
and inflow amount to about 60 inches over the lake surface.
formation of the country is of a volcanic nature, showing many fiss
where the rock is exposed, and this, together with the fact that m
springs exist in the country to the southwest, tend to confirm
existence of such passages.

Lost River rises in Clear Lake and forms the principal suppl
Tule Lake. Miller Creek enters Lost River from the east.

LINK RIVER AT KLAMATH FALLS, OREG.[a]

This station was established May 15, 1904. It is located at
county bridge at Klamath Falls, Oreg., 1½ miles below the outl
Klamath Lake. The conditions at this station and the bench m
are described in Water Supply Paper No. 177, page 226, where
given also references to publications that contain data for prev
years.

Discharge measurements of Link River at Klamath Falls, Oreg., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	I ch
		Feet.	*Sq. ft.*	*Feet.*	*Se*
May 11	L. F. Hendricks	288	1,900	5.06	
June 20	do	280	1,650	4.65	
June 22	Clapp and Hendricks	280	1,650	4.65	
July 9	L. F. Hendricks	285	1,530	4.25	
July 24	do	280	1,420	3.80	
August 22	do	269	1,190	3.00	
December 20	do	279	1,310	3.48	

Daily gage height, in feet, of Link River at Klamath Falls, Oreg., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	3.5	3.65	3.75	4.25	5.0	4.85	4.4	3.5	2.9	2.85	3.0
2	3.45	3.65	3.9	4.2	5.05	4.85	4.35	3.5	2.85	2.9	3.3
3	3.4	3.65	3.85	4.2	5.0	4.9	4.4	3.5	2.9	2.8	3.4
4	3.5	3.65	3.7	4.2	4.95	4.9	4.4	3.45	2.9	2.8	[b]2.95
5	3.5	3.65	3.7	4.2	5.0	4.95	4.3	3.45	2.9	2.85	2.95
6	3.45	3.6	3.7	4.3	5.0	4.8	4.3	3.4	2.85	[b]2.85	2.95
7	3.45	3.6	3.7	4.35	4.95	4.8	4.25	3.35	2.95	[b]2.85	2.95
8	3.45	3.6	3.7	4.45	4.95	4.85	4.3	3.3	2.95	2.85	3.0
9	3.5	3.6	3.75	4.4	5.0	4.8	4.25	3.3	[b]2.9	2.85	3.05
10	3.5	3.6	3.75	4.5	5.05	4.95	4.2	3.3	2.8	2.85	3.05

[a] This station was known as Klamath River at Klamath Falls, Oreg., in report for 1904.
[b] Estimated.

Daily gage height, in feet, of Link River at Klamath Falls, Oreg., for 1906—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	3.5	3.6	3.7	4.5	5.05	5.0	4.15	3.3	2.8	2.85	3.05	3.4
12	3.5	3.6	3.85	4.5	4.9	4.9	4.15	3.2	2.85	2.8	3.1	3.4
13	3.5	3.6	3.9	4.55	4.9	4.75	4.15	3.15	2.8	2.8	3.15	3.4
14	3.6	3.6	3.9	4.6	5.1	4.7	4.05	3.2	2.8	2.9	3.1	3.4
15	3.55	3.65	3.95	4.65	5.0	4.8	4.05	3.15	2.8	2.85	3.2	3.5
16	3.8	3.6	3.9	4.75	4.9	4.75	4.05	3.15	2.85	2.85	3.2	3.45
17	3.8	3.65	3.9	4.8	4.9	4.7	4.05	3.15	2.85	2.85	3.25	3.5
18	3.8	3.75	3.95	4.8	5.15	4.65	4.00	3.1	2.85	2.85	3.2	3.45
19	3.85	3.65	3.9	4.8	4.95	4.6	3.95	3.1	2.85	2.85	3.2	3.4
20	3.8	3.65	3.95	4.85	4.9	4.65	3.95	3.05	2.85	2.9	3.2	3.5
21	3.85	3.7	4.0	4.9	4.85	4.55	3.95	3.1	2.85	2.9	3.25	3.5
22	3.7	3.7	3.95	4.95	4.8	4.6	3.85	3.0	2.8	2.9	3.15	3.6
23	3.75	3.75	4.15	5.0	4.85	4.6	3.8	2.95	2.8	2.9	3.25	a3.5
24	3.75	3.7	3.95	4.95	4.9	4.6	3.75	3.0	2.9	2.9	3.3	3.5
25	3.7	3.7	4.05	4.95	5.1	4.55	3.75	3.0	2.9	2.9	a3.3	a3.5
26	3.7	3.85	4.0	4.95	5.0	4.55	3.7	3.05	2.85	2.9	3.3	3.6
27	3.7	3.7	4.0	5.05	4.95	4.5	3.65	3.0	2.85	2.95	3.3	3.6
28	3.7	3.6	4.05	5.1	5.0	4.5	3.7	2.9	2.85	2.95	3.3	3.6
29	3.7	.....	4.1	5.0	4.9	4.45	3.6	3.0	2.85	2.95	3.3	3.6
30	3.7	.....	4.2	4.95	4.9	4.45	3.55	2.9	2.85	2.9	3.3	3.6
31	3.65	.....	4.2	.....	4.9	.....	3.55	2.9	.....	3.0	.....	3.6

a Estimated.

Rating table for Link River at Klamath Falls, Oreg., for 1904–1906.

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.*
2.80	1,150	3.30	1,585	3.80	2,175	4.30	2,900	4.80	3,770
2.90	1,200	3.40	1,690	3.90	2,310	4.40	3,060	4.90	3,900
3.00	1,300	3.50	1,800	4.00	2,450	4.50	3,230	5.00	4,150
3.10	1,390	3.60	1,920	4.10	2,590	4.60	3,400	5.10	4,340
3.20	1,485	3.70	2,045	4.20	2,740	4.70	3,580	5.20	4,530

NOTE.—This table is based on discharge measurements made during 1904–1906 and is fairly well defined.

Monthly discharge of Link River at Klamath Falls, Oreg., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
January	2,240	1,690	1,950	120,000
February	2,240	1,920	1,990	111,000
March	2,740	2,040	2,320	143,000
April	4,340	2,740	3,520	209,000
May	4,440	3,770	4,080	251,000
June	4,150	3,140	3,620	215,000
July	3,060	1,860	2,490	153,000
August	1,800	1,220	1,470	90,400
September	1,260	1,150	1,190	70,800
October	1,300	1,150	1,200	73,800
November	1,690	1,260	1,460	86,900
December	1,920	1,540	1,740	107,000
The year	4,440	1,150	2,250	1,630,000

NOTE.—These values are good.

UPPER KLAMATH LAKE NEAR KLAMATH FALLS, OREG.

This station was established in January, 1906, for recording the water level in Upper Klamath Lake. It is located at the southeast end of the lake and above the upper riffle at the head of Link River.

The gage is a vertical timber, graduated to feet and tenths fastened to posts driven in the lake bed a short distance from shore of the lake.

On February 16, 1906, a Friez's automatic water-stage regi was installed and the mean daily gage height record has been c puted from its register sheets.

Daily gage height, in feet, of Upper Klamath Lake at Klamath Falls, Oreg., for 19

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	.....	5.30	.....	7.00	6.30	5.70	4.95	4.50	4.50	4.70
2	.....	.....	5.25	.....	6.80	6.20	5.75	4.90	4.55	4.65	4.30
3	.....	.....	5.35	.....	6.80	6.10	5.70	4.90	4.50	4.65	4.50
4	.....	5.21	5.35	.....	6.80	6.20	5.75	4.85	4.50	4.60	4.50
5	.....	.....	5.40	.....	6.70	6.30	5.70	4.90	4.50	4.55	4.60
6	.....	.....	5.40	.....	6.60	6.20	5.65	4.90	4.50	4.50	4.60
7	5.02	.....	5.40	6.15	6.50	6.20	5.60	4.90	4.35	4.50	4.70
8	.....	.....	5.40	6.10	6.50	6.10	5.65	4.90	4.50	4.50	4.80
9	.....	.....	5.40	6.20	6.40	6.20	5.60	4.80	4.60	4.50	4.80
10	.....	.....	5.51	6.40	6.30	5.90	5.55	4.75	4.65	4.50	4.80
11	.....	5.02	.....	6.40	6.60	5.70	5.50	4.70	4.55	4.50	4.85
12	.....	.....	.....	6.30	6.60	6.20	5.40	4.80	4.40	4.55	4.75
13	.....	.....	.....	6.40	6.40	6.20	5.45	4.70	4.60	4.50	4.90
14	5.10	.....	.....	6.50	6.20	6.10	5.40	4.75	4.65	4.55	4.85
15	.....	.....	.....	6.30	6.40	6.00	5.45	4.70	4.50	4.45	4.80
16	.....	5.20	.....	6.50	6.40	6.20	5.35	4.75	4.55	4.50	5.00
17	.....	5.20	5.50	6.50	6.30	6.10	5.35	4.70	4.50	4.65	5.30
18	.....	5.21	5.50	6.50	6.30	6.20	5.30	4.75	4.55	4.70	5.15
19	.....	5.21	5.50	6.50	6.40	6.20	5.25	4.70	4.55	4.80	5.95
20	.....	5.20	5.40	6.30	6.50	6.20	5.20	4.70	4.55	4.75	5.85
21	4.38	5.22	5.20	6.50	6.40	6.10	5.30	4.70	4.50	4.65	5.00
22	.....	5.23	5.20	6.60	6.30	6.10	5.20	4.60	4.35	4.60	5.15
23	.....	5.25	5.00	6.80	6.30	6.10	5.20	4.55	4.50	4.55	5.20
24	.....	5.26	5.52	6.70	6.10	6.00	5.15	4.50	4.55	4.55	5.05
25	.....	5.35	5.45	6.80	5.90	6.00	5.20	4.45	4.55	4.60	5.15
26	.....	5.35	5.50	6.70	6.20	6.05	5.15	4.55	4.55	4.55	5.15
27	.....	5.40	5.60	6.90	6.20	6.00	5.10	4.55	4.55	4.60	5.10
28	5.29	5.35	5.55	7.00	6.50	5.95	5.10	4.55	4.50	4.60	5.05
29	.....	.....	5.55	7.00	6.50	5.90	5.00	4.50	4.50	4.65	5.00
30	.....	.....	5.50	6.80	6.40	5.80	5.10	4.50	4.55	4.70	5.00
31	.....	.....	6.45	.....	6.40	.....	5.00	4.50	.....	4.75	.....

KLAMATH RIVER AT KENO, OREG.

This station was established August 13, 1904. It is located fourth mile below the county bridge at Keno, Oreg. The condit at this station and the bench marks are described in Water Sup Paper No. 177, page 229, where are given also references to publ tions that contain data for previous years.

Discharge measurements of Klamath River at Keno, Oreg., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	D cha
		Feet.	*Sq. ft.*	*Feet.*	*Se*
May 8	L. F. Hendricks	456	4,110	13.7	
June 30	do	430	3,840	13.4	
July 23	do	420	3,630	12.9	
September 5	do	405	3,300	12.05	

Daily gage height, in feet, of Klamath River at Keno, Oreg., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	12.5	12.8	12.8	13.1	13.6	13.7	13.4	12.6	12.1	12.0	12.2	12.4
2	12.5	12.8	12.9	13.1	13.6	13.7	13.4	12.6	12.1	12.0	12.2	12.4
3	12.5	12.8	12.9	13.1	13.6	13.7	13.4	12.6	12.1	12.0	12.2	12.5
4	12.5	12.8	12.8	13.1	13.7	13.7	13.3	12.6	12.1	12.0	12.2	12.5
5	12.5	12.8	12.8	13.1	13.7	13.7	13.3	12.6	12.1	12.0	12.2	12.5
6	12.5	12.8	12.8	13.2	13.7	13.7	13.3	12.6	12.1	12.0	12.2	12.5
7	12.5	12.8	12.8	13.2	13.7	13.7	13.3	12.5	12.1	12.0	12.2	12.5
8	12.5	12.7	12.8	13.2	13.7	13.7	13.3	12.5	12.1	12.0	12.2	12.5
9	12.5	12.7	12.8	13.2	13.7	13.7	13.3	12.5	12.1	12.0	12.2	12.5
10	12.5	12.7	12.8	13.2	13.7	13.7	13.2	12.5	12.1	12.0	12.2	12.5
11	12.4	12.7	12.8	13.3	13.7	13.7	13.2	12.5	12.1	12.0	12.2	12.5
12	12.5	12.7	12.8	13.3	13.7	13.6	13.2	12.5	12.0	12.0	12.3	12.5
13	12.6	12.7	12.8	13.3	13.7	13.6	13.2	12.5	12.0	12.0	12.3	12.5
14	12.7	12.7	12.8	13.3	13.7	13.6	13.2	12.4	12.0	12.0	12.3	12.5
15	12.6	12.7	12.9	13.3	13.7	13.6	13.2	12.4	12.0	12.0	12.3	12.5
16	12.7	12.7	12.9	13.4	13.7	13.6	13.2	12.4	12.0	12.0	12.3	12.5
17	12.7	12.7	12.9	13.4	13.7	13.6	13.1	12.3	12.0	12.0	12.3	12.6
18	12.7	12.7	12.9	13.4	13.7	13.6	13.1	12.3	12.0	12.0	12.3	12.6
19	12.8	12.7	12.9	13.5	13.7	13.6	13.1	12.3	12.0	12.0	12.4	12.6
20	12.8	12.7	12.9	13.5	13.7	13.5	13.1	12.3	12.0	12.1	12.4	12.6
21	12.8	12.7	12.9	13.5	13.7	13.5	13.1	12.3	12.0	12.1	12.4	12.6
22	12.8	12.8	12.9	13.5	13.7	13.5	13.0	12.2	12.0	12.1	12.4	12.7
23	12.8	12.8	12.9	13.5	13.7	13.5	12.9	12.2	12.0	12.1	12.4	12.6
24	12.8	12.8	12.9	13.5	13.7	13.5	12.9	12.2	12.0	12.1	12.4	12.6
25	12.8	12.8	13.0	13.5	13.7	13.5	12.8	12.2	12.0	12.1	12.4	12.6
26	12.8	12.8	13.0	13.5	13.7	13.5	12.8	12.2	12.0	12.1	12.4	12.6
27	12.8	12.8	13.0	13.6	13.7	13.5	12.8	12.2	12.0	12.1	12.4	12.6
28	12.8	12.8	13.0	13.6	13.7	13.4	12.8	12.2	12.0	12.1	12.4	12.6
29	12.8	.....	13.0	13.6	13.7	13.4	12.7	12.2	12.0	12.1	12.4	12.6
30	12.8	.....	13.0	13.6	13.7	13.4	12.7	12.2	12.0	12.1	12.4	12.7
31	12.8	.....	13.0	.....	13.7	.....	12.7	12.1	.....	12.2	.....	12.7

Rating table for Klamath River at Keno, Oreg., for 1904–1906.

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.*
12.00	1,240	12.40	1,700	12.80	2,250	13.20	2,910	13.60	3,730
12.10	1,350	12.50	1,830	12.90	2,400	13.30	3,100	13.70	3,960
12.20	1,460	12.60	1,960	13.00	2,560	13.40	3,300		
12.30	1,580	12.70	2,100	13.10	2,730	13.50	3,510		

NOTE. This table is based on discharge measurements made during 1904–1906 and is well defined.

Monthly discharge of Klamath River at Keno, Oreg., for 1906.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
January	2,250	1,700	2,050	126,000
February	2,250	2,100	2,180	121,000
March	2,560	2,250	2,380	146,000
April	3,730	2,730	3,220	192,000
May	3,960	3,730	3,940	242,000
June	3,960	3,300	3,710	221,000
July	3,300	2,100	2,750	169,000
August	1,960	1,350	1,680	103,000
September	1,350	1,240	1,280	76,200
October	1,460	1,240	1,290	79,300
November	1,700	1,460	1,580	94,000
December	2,100	1,700	1,900	117,000
The year	3,960	1,240	2,330	1,690,000

NOTE.—These values are excellent.

SYCAN RIVER NEAR SILVERLAKE, OREG.

This station was established May 2, 1905, and discontinued Oc
ber 12, 1905. It is located about 30 miles south of Silverlake, Or
in sec. 19, T. 32 S., R. 14 E. The conditions at this station a
the bench marks are described in Water-Supply Paper No. 1
page 232.

Discharge measurements of Sycan River near Silverlake, Oreg., in 1905–6.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Di cha
1905.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.*
March 16	Ivan Landes	21	27.6	2.40	
April 10	do	30	46.5	3.05	
May 2	do	56	92.6	3.45	
June 12	do	52	43.9	2.32	
July 30	H. W. King	19	11.9	1.27	
October 3	Ivan Landes	14	14.9	1.70	
November 7	do	12	7.1	1.12	
1906.					
May 9	Ivan Landes	62	238	6.20	
May 31	do	59	167	4.80	

Daily discharge, in second-feet, of Sycan River near Silverlake, Oreg., for 1905.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	May.	June.	July.	Aug.	Sept.	
1	160	87	33	10	6	8	17	177	57	17	1	10	
2	163	87	33	10	6	5	18	164	50	17	2	12	
3	150	87	30	6	8	9	19	160	58	12	2	12	
4	138	130	30	7	8	5	20	172	51	14	3	10	
5	132	142	28	1	9	9	21	112	45	15	3	10	
6	132	142	28	1	9	8	22	122	34	15	4	10	
7	138	155	28	1	9	14	23	134	39	15	4	10	
8	183	140	24	0	9	11	24	122	39	15	5	10	
9	164	140	24	0	11	12	25	112	39	11	2	10	
10	158	85	20	0	12	9	26	146	42	10	2	10	
11	158	76	20	0	9	9	27	192	39	10	3	14	
12	151	68	20	0	9	12	28	134	39	10	3	11	
13	164	76	19	0	10	9	29	118	37	10	5	8	
14	145	94	19	1	10	9	30	107	37	10	5	8	
15	151	76	19	1	10	8	31	97		10	6		
16	158	60	19	1	10	12							

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

Monthly discharge of Sycan River near Silverlake, Oreg., for 1905.

Month.	Discharge in second-feet.			Total acre-f
	Maximum.	Minimum.	Mean.	
May	192	97	146	
June	155	34	75.0	
July	33	10	18.9	
August	10	0	2.87	
September	14	6	9.67	
October	24	5	13.4	
The period				1

NOTE.—These values are fair.

LOST RIVER NEAR CLEAR LAKE, CAL.

This station was established September 1, 1904. It is located about 2 miles downstream from Jessie D. Carr's Clear Lake dam, a short distance below the dam site for Clear Lake reservoir, about 20 miles from Tule Lake post-office, Cal. The conditions at this station and the bench marks are described in Water-Supply Paper No. 177, page 233, where are given also references to publications that contain data for previous years.

Discharge measurements of Lost River near Clear Lake, Cal., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
March 2	C. T. Darley	102	95	6.18	146
March 3	do	102	93	6.25	157
March 6	do	125	141	6.60	235
March 7	do	127	203	7.18	452
March 8	do	135	238	7.35	534
March 9	do	126	204	7.18	460
March 27	do	148	407	8.80	1,330
April 3	do	150	421	9.00	1,480
April 6	do	150	449	9.10	1,610
April 17	do	148	376	8.50	1,270
April 24	L. F. Hendricks	135	246	7.50	626
May 2	do	125	168	6.90	365
June 14	do	65	60	5.80	58
July 15	do	10	10	5.20	13.9
October 30	do	18	13	5.20	10.2

Daily gage height, in feet, of Lost River near Clear Lake, Cal., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.2	5.5	6.45	9.3	6.95	6.45	5.25	5.1	5.1	5.2	5.2	5.3
2	5.2	5.5	6.15	9.1	6.85	6.3	5.2	5.1	5.1	5.2	5.2	5.3
3	5.2	5.5	6.2	9.0	6.8	6.3	5.2	5.1	5.1	5.2	5.2	5.3
4	5.2	5.5	6.15	9.0	6.75	6.3	5.1	5.1	5.1	5.2	5.3	5.3
5	5.2	5.5	6.2	9.05	6.5	6.3	5.05	5.1	5.1	5.2	5.3	5.3
6	5.2	5.5	6.55	9.1	6.45	6.4	5.0	5.1	5.1	5.2	5.3	5.3
7	5.2	5.5	7.1	9.25	6.4	6.6	5.0	5.1	5.1	5.2	5.3	5.3
8	5.2	5.5	7.25	9.3	6.35	6.55	5.0	5.1	5.1	5.2	5.3	5.3
9	5.2	5.5	7.2	9.4	6.3	6.45	5.0	5.1	5.1	5.2	5.3	5.3
10	5.2	5.5	7.4	9.4	6.25	6.2	5.0	5.1	5.1	5.2	5.3	5.35
11	5.3	5.5	7.8	9.3	6.25	6.2	5.3	5.1	5.1	5.2	5.3	5.4
12	5.3	5.5	7.75	9.3	6.2	6.1	5.25	5.1	5.1	5.2	5.3	5.45
13	5.3	5.5	7.75	9.2	6.2	6.1	5.2	5.1	5.2	5.2	5.3	5.45
14	5.4	5.5	7.75	9.0	6.2	6.0	5.2	5.1	5.2	5.2	5.3	5.5
15	5.4	5.75	7.75	8.75	6.2	5.9	5.2	5.1	5.2	5.2	5.3	5.5
16	5.5	5.85	7.75	8.5	6.2	5.85	5.2	5.1	5.2	5.2	5.3	5.5
17	5.55	5.8	7.75	8.4	6.2	5.85	5.2	5.1	5.2	5.2	5.3	5.6
18	5.55	5.8	7.85	8.2	6.2	5.8	5.2	5.1	5.2	5.2	5.3	5.6
19	5.55	6.0	8.0	8.0	6.1	5.7	5.15	5.1	5.2	5.2	5.3	5.7
20	5.55	6.7	8.1	7.8	6.1	5.6	5.15	5.1	5.2	5.2	5.3	5.7
21	5.55	6.8	8.2	7.7	6.05	5.5	5.15	5.1	5.2	5.2	5.3	5.8
22	5.55	6.85	8.3	7.65	6.05	5.5	5.1	5.1	5.2	5.2	5.3	5.8
23	5.55	6.55	8.4	7.55	6.05	5.4	5.1	5.1	5.2	5.2	5.3	5.8
24	5.5	6.25	8.5	7.55	6.0	5.35	5.1	5.1	5.2	5.2	5.3	6.15
25	5.5	6.0	8.7	7.4	6.0	5.3	5.1	5.1	5.2	5.2	5.3	6.8
26	5.5	6.2	8.8	7.25	6.0	5.4	5.1	5.1	5.2	5.2	5.3	7.2
27	5.5	6.9	8.8	7.2	6.2	5.45	5.1	5.1	5.2	5.2	5.3	7.35
28	5.5	6.6	8.8	7.1	6.4	5.35	5.1	5.1	5.2	5.2	5.3	7.3
29	5.5	.....	8.75	7.0	6.5	5.35	5.1	5.1	5.2	5.2	5.3	7.15
30	5.5	.....	8.8	7.0	6.6	5.35	5.1	5.1	5.2	5.2	5.3	7.0
31	5.5	.....	9.3	.....	6.6	.....	5.1	5.1	.....	.....	.....	7.0

Rating table for Lost River near Clear Lake, Cal., 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.*
5.00	5	5.80	66	6.60	252	7.40	562	8.40	1,100
5.10	8	5.90	81	6.70	286	7.50	608	8.60	1,250
5.20	12	6.00	98	6.80	320	7.60	654	8.80	1,360
5.30	17	6.10	118	6.90	356	7.70	702	9.00	1,500
5.40	23	6.20	140	7.00	392	7.80	755	9.20	1,640
5.50	30	6.30	164	7.10	432	7.90	810	9.40	1,785
5.60	40	6.40	191	7.20	474	8.00	865		
5.70	52	6.50	220	7.30	518	8.20	980		

NOTE.—This table is based on 15 discharge measurements made during 1906 and is well defined bet gage heights 5.2 feet and 9.1 feet.

Monthly discharge of Lost River near Clear Lake, Cal., for 1906.

Month.	Discharge in second-feet.			Tota acre-f
	Maximum.	Minimum.	Mean.	
January	35	12	23.6	
February	356	30	106	
March	1,710	129	797	4
April	1,780	392	1,150	6
May	374	98	177	1
June	252	17	99.2	
July	17	5	9.4	
August	8	8	8.0	
September	12	8	10.4	
October	12	12	12.0	
November	17	12	16.5	
December	540	17	127	
The year	1,780	5	211	15

NOTE.—Values are rated as follows: March to May, excellent; August to November, fair; rema of 1906, good.

LOST RIVER NEAR MERRILL, OREG.

This station was established July 26, 1904. It is located ab 1½ miles downstream from the Stukel Bridge, 4 miles northwest Merrill, Oreg. The conditions at this station and the bench ma are described in Water-Supply Paper No. 177, page 236, where given also references to publications that contain data for previ years.

Discharge measurements of Lost River near Merrill, Oreg., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	D cha
		Feet.	*Sq. ft.*	*Feet.*	*Se*
February 27	C. T. Darley	91	168	4.30	
March 25	do	130	908	10.75	
March 27	R. Hubbard	140	1,120	12.08	
March 27	do	146	1,140	12.22	
March 28	do	146	1,150	12.17	
March 28	do	145	1,110	12.06	
March 28	do	145	1,119	12.02	
March 29	do	144	1,090	11.62	
March 29	do	142	1,030	11.34	
March 30	do	142	970	11.04	
April 1	do	149	1,260	13.05	
April 1	do	149	1,270	13.18	
April 2	do	152	1,350	13.65	
April 2	do	152	1,350	13.66	
April 10	C. T. Darley	149	1,300	13.02	
April 13	do	145	1,100	11.92	
April 14	do	136	984	11.23	
April 18	do	138	824	9.80	
April 19	do	130	735	9.26	
April 20	L. F. Hendricks	132	563	8.32	
April 25	C. T. Darley	112	414	6.60	
April 26	do	112	406	6.50	
April 30	L. F. Hendricks	110	379	5.90	
May 5	do	105	241	4.80	
May 29	do	90	184	4.10	
June 19	do	92	146	3.98	
September 10	do	87	83	3.50	

Daily gage height, in feet, of Lost River near Merrill, Oreg., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.3	3.3	4.55	12.9	5.6	4.45	3.7	3.55	3.5	3.5	3.4	3.4
2	3.3	3.3	5.2	13.6	5.3	4.45	3.7	3.55	3.5	3.5	3.4	3.4
3	3.3	3.3	5.0	12.7	5.05	4.5	3.7	3.55	3.5	3.5	3.4	3.4
4	3.3	[a]3.3	4.6	11.5	5.0	4.3	3.7	3.55	3.5	3.5	3.4	3.4
5	3.3	[a]3.3	4.35	10.6	4.85	4.3	3.7	3.55	3.5	3.5	3.4	3.4
6	3.3	[a]3.4	4.2	10.45	4.65	4.25	3.7	3.55	3.5	3.5	3.4	3.4
7	3.3	3.4	4.1	11.0	4.6	4.2	3.7	3.5	3.5	3.5	3.4	3.4
8	3.3	3.4	4.1	11.75	4.6	4.3	3.65	3.5	3.5	3.5	3.4	3.4
9	3.3	3.4	4.65	12.4	4.5	4.3	3.65	3.5	3.5	3.5	3.4	3.4
10	3.3	3.4	5.8	13.0	4.45	4.3	3.6	3.5	3.5	3.5	3.4	3.4
11	3.3	3.4	6.3	13.5	4.35	4.4	3.6	3.5	3.5	3.5	3.4	3.4
12	3.3	3.4	6.7	13.05	4.25	4.15	3.7	3.5	3.5	3.5	3.4	3.45
13	3.3	3.4	5.85	12.1	4.2	4.15	3.7	3.55	3.5	3.5	3.4	3.45
14	3.3	3.45	5.5	11.2	4.3	4.1	3.6	3.55	3.5	3.5	3.4	3.45
15	3.3	3.45	5.9	10.55	4.2	4.2	3.6	3.55	3.5	3.5	3.4	3.45
16	3.3	3.5	5.2	10.1	4.15	4.2	3.6	3.5	3.5	3.5	3.4	3.45
17	3.3	3.5	4.9	9.95	4.2	4.0	3.6	3.55	3.5	3.5	3.4	3.45
18	3.3	3.6	4.5	9.9	4.25	3.9	3.6	3.55	3.5	3.5	3.4	3.45
19	3.3	3.8	4.4	9.25	4.15	3.95	3.6	3.55	3.5	3.5	3.4	3.45
20	3.3	4.0	4.35	8.45	4.05	3.85	3.6	3.55	3.5	3.5	3.4	3.45
21	3.3	4.45	4.45	7.95	4.1	3.85	3.6	3.55	3.5	3.5	3.4	3.45
22	3.3	5.15	4.75	7.4	4.05	3.8	3.6	3.5	3.5	3.5	3.4	3.45
23	3.3	5.2	5.5	7.1	4.1	3.85	3.6	3.5	3.5	3.5	3.4	3.45
24	3.3	5.3	8.9	6.85	4.0	3.85	3.55	3.55	3.5	3.5	3.4	3.45
25	3.3	4.9	10.8	6.6	4.2	3.8	3.55	3.55	3.5	3.5	3.4	3.5
26	3.3	4.5	11.4	6.5	4.1	3.8	3.55	3.55	3.5	3.5	3.4	3.5
27	3.3	4.3	12.1	6.5	4.05	3.8	3.55	3.55	3.5	3.5	3.4	3.65
28	3.3	4.3	12.1	6.25	4.05	3.8	3.55	3.55	3.5	3.5	3.4	4.85
29	3.3	.....	11.5	5.85	4.1	3.7	3.55	3.5	3.5	3.5	3.4	5.6
30	3.3	.....	11.05	5.9	4.15	3.7	3.55	3.5	3.5	3.5	3.4	5.2
31	3.3	.....	11.5	.....	4.25	.....	3.55	3.5	.....	3.5	.....	4.8

[a] Estimated.

Rating tables for Lost River near Merrill, Oreg.

JANUARY 1 TO MAY 17, 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.*
3.30	102	4.50	467	5.70	887	6.80	1,272	8.80	2,006
3.40	125	4.60	502	5.80	922	6.90	1,307	9.00	2,080
3.50	150	4.70	537	5.90	957	7.00	1,342	9.20	2,160
3.60	176	4.80	572	6.00	992	7.20	1,414	9.40	2,240
3.70	203	4.90	607	6.10	1,027	7.40	1,488	9.60	2,320
3.80	232	5.00	642	6.20	1,062	7.60	1,562	9.80	2,400
3.90	262	5.10	677	6.30	1,097	7.80	1,636	10.00	2,480
4.00	294	5.20	712	6.40	1,132	8.00	1,710	11.00	2,930
4.10	328	5.30	747	6.50	1,167	8.20	1,784	12.00	3,440
4.20	362	5.40	782	6.60	1,202	8.40	1,858	13.00	4,000
4.30	397	5.50	817	6.70	1,237	8.60	1,932	14.00	4,630
4.40	432	5.60	852						

MAY 18 TO DECEMBER 31, 1906.[b]

3.40	66	3.90	185	4.40	342	4.90	511	5.30	650
3.50	87	4.00	215	4.50	375	5.00	545	5.40	685
3.60	108	4.10	246	4.60	409	5.10	580	5.50	720
3.70	131	4.20	278	4.70	443	5.20	615	5.60	755
3.80	157	4.30	310	4.80	477				

[a] This table is based on discharge measurements made during 1904–1906 and is well defined.
[b] This table is based on 3 discharge measurements made during 1906 and is well defined between gage heights 3.5 feet and 4.1 feet.

Monthly discharge of Lost River near Merrill, Oreg., for 1906.

Month.	Discharge in second-feet.			Total acre-fe
	Maximum.	Minimum.	Mean.	
January	102	102	102	6
February	747	102	259	14
March	3,500	328	1,260	77
April	4,380	940	2,540	151
May	852	215	386	23
June	375	131	240	14
July	131	98	113	6
August	98	87	93.7	5
September	87	87	87.0	5
October	87	87	87.0	5
November	66	66	66.0	3
December	755	66	130	7
The year	4,380	66	447	186

NOTE.—These values are excellent except for May, which is good.

TULE LAKE NEAR MERRILL, OREG.

This station was established May 17, 1904, for recording the wa level in Tule Lake. It is located on Tule Lake at the mouth of L River about 3 miles east of Merrill, Oreg., 25 miles south from K math Falls, and near the Oregon-California line. The conditions this station and the bench marks are described in Water-Supp Paper No. 177, page 238.

Daily gage height, in feet, of Tule Lake near Merrill, Oreg., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	I
1				7.75		9.0	8.85	8.4	7.75	7.4	7.15	
2		6.05	6.8									
5	6.5											
7				8.4					7.7			
8					9.1			8.2				
9		6.05	6.95			9.0	8.8			7.3		
10											7.15	
11	6.5											
13						9.0						
15									7.6			
16			7.1	8.85	9.1		8.7	8.05				
18												
19										7.2		
20											7.15	
21						8.9						
22				9.0				7.85	7.5			
23	6.7						8.45					
24			7.3		9.05							
25			7.3									
28								7.8				
30			7.7	9.1		8.85	8.4		7.4		7.0	
31					9.0			7.8		7.15		

MILLER CREEK NEAR LORELLA, OREG.

This station was established August 10, 1904. It is located at t Horsefly dam site, 10 miles northeast of Lorella, Oreg. The con tions at this station and the bench marks are described in Water-Su ply Paper No. 177, page 239, where are given also references to pub cations that contain data for previous years.

Discharge measurements of Miller Creek near Lorella, Oreg., by L. F. Hendricks, 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.*
March 27	140	225	8.65	883	April 6	140	298	9.28	1,240
March 28[a]	140	243	8.65	884	April 9	160	517	10.65	2,550
March 29	140	271	8.80	1,040	April 10	150	389	9.72	1,690
March 30	140	340	9.50	1,440	April 22	125	127	7.55	308
March 30	150	431	10.10	1,940	April 25	130	129	7.62	309
April 4	140	188	8.25	629	July 14			5.80	0
April 5	140	284	9.00	1,110					

[a] Measured by C. T. Darley.

Daily gage height, in feet, of Miller Creek near Lorella, Oreg., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Nov.	Dec.
1	6.2	6.3	7.0	8.1	7.0	7.2	6.15		6.1
2	6.2	6.3	7.1	8.1	7.0	7.0	6.15		6.1
3	6.2	6.3	7.1	8.4	6.9	6.9	6.1		6.1
4	6.2	6.3	7.05	8.15	6.8	6.9	6.1		6.1
5	6.2	6.3	7.0	9.2	6.7	7.0	6.05		6.2
6	6.2	6.3	7.05	9.5	6.7	7.3	6.05		6.2
7	6.3	6.3	7.2	9.9	6.7	7.2	6.0		6.35
8	6.3	6.3	7.5	9.9	6.6	7.2	6.0		6.4
9	6.4	6.3	7.7	10.5	6.6	7.1			6.3
10	6.4	6.3	7.8	10.0	6.5	7.0			6.3
11	6.4	6.3	7.7	9.1	6.5	6.9			6.3
12	6.3	6.3	7.6	8.8	6.5	6.8			6.2
13	6.3	6.3	7.5	8.8	6.6	6.8			6.2
14	6.3	6.3	7.3	8.7	6.7	6.7			6.2
15	6.3	6.3	7.1	8.7	6.7	6.6			6.2
16	6.3	6.3	6.9	8.9	6.7	6.5			6.2
17	6.3	6.3	6.7	8.5	6.7	6.5			6.2
18	6.3	6.3	6.7	8.1	6.6	6.4		6.1	6.2
19	6.3	6.3	6.7	7.9	6.6	6.4		6.1	6.2
20	6.3	6.3	6.7	7.8	6.5	6.3		6.1	6.25
21	6.3	6.3	7.2	7.7	6.5	6.3		6.1	6.3
22	6.3	6.3	7.8	7.5	6.5	6.2		6.1	6.3
23	6.3	6.3	8.3	7.5	6.5	6.2		6.1	6.4
24	6.3	6.2	8.8	7.4	6.5	6.1		6.1	6.6
25	6.3	6.4	9.7	7.5	6.4	6.1		6.1	7.65
26	6.3	6.6	9.0	7.4	6.5	6.1		6.1	8.35
27	6.3	6.7	8.6	7.3	6.8	6.1		6.1	7.95
28	6.3	6.8	8.65	7.4	7.1	6.15		6.1	7.4
29	6.3		8.65	7.4	7.5	6.15		6.1	7.4
30	6.3		9.7	7.2	7.5	6.15		6.1	6.8
31	6.3		9.6		7.4				6.6

NOTE.—The creek was dry July 7 to November 17.

Rating table for Miller Creek near Lorella, Oreg., 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.*
6.00	0	6.80	52	7.60	290	8.40	715	9.40	1,415
6.10	1.5	6.90	67	7.70	337	8.50	775	9.60	1,575
6.20	4	7.00	86	7.80	387	8.60	835	9.80	1,745
6.30	8	7.10	109	7.90	437	8.70	900	10.00	1,915
6.40	13	7.20	136	8.00	490	8.80	965	10.20	2,085
6.50	20	7.30	168	8.10	545	8.90	1,035	10.40	2,265
6.60	29	7.40	205	8.20	600	9.00	1,110		
6.70	39	7.50	245	8.30	655	9.20	1,260		

NOTE.—This table is based on discharge measurements made during 1904-1906 and is well defined.

Monthly discharge of Miller Creek near Lorella, Oreg., for 1906.

Month.	Discharge in second-feet.			Total acre-fe
	Maximum.	Minimum.	Mean.	
January	13	4	7.7	
February	52	4	11.5	
March	1,660	39	445	27
April	2,360	136	779	46
May	245	13	56.7	3
June	168	1.5	47.3	2
July	2.8	0	0.3	
August	0	0	0	
September	0	0	0	
October	0	0	0	
November	1.5	0	0.6	
December	685	1.5	68.1	4
The year	2,360	0	118	8

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

MISCELLANEOUS MEASUREMENTS IN KLAMATH RIVER DRAINAGE BAS

Cherry Creek (North Fork) near Crystal, Oreg.—This stream is tril tary to Upper Klamath Lake from the west. A measurement v made September 1, 1906, near the crossing on the road from F Klamath to Pelican Bay:

Width, 9.5 feet; area, 5.8 square feet; discharge, 9.4 second-feet.

Cottonwood Creek near Brownell, Cal.—Cottonwood Creek is tril tary to Lower Klamath Lake from the south. The following me urements were made during 1906 at Brownell's "F" ranch:

February 13: Width, 22 feet; area, 25 square feet; discharge, 14 second-feet.
September 26: Width, 25 feet; area, 32 square feet; discharge, 12.2 second-feet.

Crooked Creek near Klamath Agency, Oreg.—This stream is a tril tary of Wood River. A measurement was made August 31, 19 at the bridge 1½ miles from Klamath Agency on the road to F Klamath:

Width, 31 feet; area, 94 square feet; discharge, 59 second-feet.

Doris Creek near Doris, Cal.—Doris Creek is tributary to Lo Klamath Lake from the southwest. The following measureme were made during 1906 at Doris ranch:

March 22: Width, 5.4 feet; area, 7.4 square feet; discharge, 11.6 second-feet.
February 14: Width, 5.5 feet; area, 5.1 square feet; discharge, 8 second-feet.
September 26: Width, 13 feet; area, 13.7 square feet; discharge, 8.4 second-feet

Fort Creek near Fort Klamath, Oreg.—This stream is a tributary Wood River. A measurement was made August 31, 1906, at bridge 2 miles southeast from Fort Klamath on the road betw Klamath Agency and Fort Klamath:

Width, 42 feet; area, 104 square feet; discharge, 115 second-feet.

Rock Creek near Odessa, Oreg.—This stream is tributary to Upper Klamath Lake from the west. A measurement was made September 3, 1906, at road crossing 7 miles below Odessa on the road from Odessa to Klamath Falls:

Width, 14 feet; area, 9.8 square feet; discharge, 12.8 second-feet.

Sevenmile Creek near Fort Klamath, Oreg.—This creek is tributary to Upper Klamath Lake. A measurement was made September 1, 1906, at the bridge on the road between Fort Klamath and Pelican Bay:

Width, 29 feet; area, 99 square feet; discharge, 83 second-feet.

Spring Creek near Klamath Agency, Oreg.—This stream is a small tributary of Crooked Creek. A measurement was made August 31, 1906, at the bridge 1 mile from Klamath Agency on the road to Fort Klamath:

Width, 22 feet; area, 42 square feet; discharge, 27 second-feet.

Willow Creek near Brownell, Cal.—Willow Creek is tributary to Lower Klamath Lake from the south. The following measurements were made during 1906 near the bridge on the Merrill and Brownell road:

February 13: Width, 18 feet; area, 13 square feet; discharge, 13 second-feet.
March 24: Width, 20.5 feet; area, 15.5 square feet; discharge, 17.2 second-feet.
September 26: Width, 35 feet; area, 26 square feet; discharge, 13 second-feet.

Wood River near Fort Klamath, Oreg.—Wood River is tributary to Upper Klamath Lake from the north. The following measurements were made August 30, 1906, at the bridge at Fort Klamath, Oreg.:

Width, 54 feet; area, 175 square feet; discharge, 257 second-feet.

At the bridge on the county road 4 miles below Fort Klamath, Oreg.:

Width, 55 feet; area, 313 square feet; discharge, 462 second-feet.

Williamson River near Klamath Agency, Oreg.—This stream is tributary to Upper Klamath Lake from the north. A measurement was made August 29 at the bridge on the county road between Klamath Falls and Fort Klamath, Oreg.:

Width, 162 feet; area, 1,348 square feet; discharge, 880 second-feet.

PRECIPITATION AND EVAPORATION DATA.

The following table gives the total precipitation and evaporatio in inches, by months, and also the annual totals, for 1906:

Precipitation and evaporation in Klamath River basin.

PRECIPITATION.

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annu
Keno, Oreg.....	6.94	1.40	2.94	0.67	2.33	1.18	1.26	0.14	0.66	0.89	1.90	2.79	23
Clear Lake, Oreg.	4.00	2.07	3.62	.09	2.7	1.05	.60	.00	.76	.41	2.05	3.70	21
Horse-fly, near Lorella, Oreg.	9.47	4.00	6.65	.52	1.88	1.45	.00	.00	.67	.....	.....	.....	.....

EVAPORATION.

Keno, Oreg.....	(a)	(a)	(a)	3.03	4.58	4.04	5.87	4.69	b3.27	2.22	(a)	(a)	.....

a Wind and ice destroys record.

b October 1 to 27, inclusive.

FLUCTUATIONS IN GROUND-WATER LEVELS IN THE VALLEY OF SOUTHERN CALIFORNIA.

By W. C. MENDENHALL.

In the summer of 1903 the United States Geological Survey undertook a systematic study of the occurrence, distribution, and proper use of the ground waters in the valley of southern California. During the preceding decade the underground waters of this part of California had been extensively drawn on as a source of supply for irrigation and for municipal use. Many independent enterprises were established which depended entirely on them, while older systems dependent in the beginning on gravity waters had found it necessary to augment their supply by utilizing subsurface waters. As a result of all this development—greater in the citrus regions, where the large values of the products raised by irrigation made it possible to pay high prices for water; somewhat less in the lower lands, suitable only for the cultivation of alfalfa or other farm products, which yield less profits than those from the horticultural lands—marked effects were produced on ground-water levels and on the yield of wells. It became evident, therefore, that any thorough study of conditions controlling the proper use of ground waters should involve the consideration of definite evidence as to their fluctuations and as to the relation of the fluctuations to development on the one hand and to the supply derived from annual rainfall on the other. During the decade of dry years which preceded 1903 it was evident that artesian areas had decreased, that the flow of individual wells had lessened, and that ground-water levels had been generally lowered; but definite observations as to the amount of these shrinkages for comparison with rainfall records were lacking except for a few wells. The Riverside Trust Company, the present owners of the Gage canal system and of the wells from which its water supplies are drawn, had maintained since 1892 a series of systematic measurements of variations of water level in the Williams well on the Victoria tract, and Mr. J. B. Neff,

of Anaheim, had maintained a similar series of measurements sinc 1898. Here and there throughout the valley of southern Californi scattered data were found bearing on the problem, but only in thes two localities had systematic and continuous observations been made

Because the ground waters of southern California occur not in on great basin but in a series of more or less completely separated sub terranean reservoirs, the supply in each being dependent upon th relation between local development and local tributary rainfal general conclusions that were applicable everywhere could not safel be based on the records furnished by the Williams and Neff wells It was therefore decided, in the autumn of 1904, to begin an inde pendent series of measurements in wells so selected that they woul be evenly distributed over the various basins which together mak up the lowland areas of southern California and would thus give a adequate basis for conclusions as to conditions in each of these basins For this purpose a number of wells were selected in localities dis tributed from Santa Monica to San Bernardino and San Jacinto The attempt was made to select wells in each of the important loca ground-water districts which would adequately represent the variou conditions that exist in each of these districts. Wells have bee selected which are close to the larger river beds and therefore fluc tuate rapidly through a wide range with flood-water and low-wate periods, and other wells have been selected which are remote fror these local sources of supply and which on this account exhibit com paratively minor variations. Some of these observation wells ar situated in the vicinity of groups of large pumping plants; other are at points which are comparatively remote from these centers o great development, while still others were so selected as to form series, like that in the El Monte basin, extending back from a strear channel, the line of most effective recharge, thereby enabling th student of ground-water supplies to trace the percolation wave ar observe its diminishing intensity and amplitude as it advances fror its point of origin. It is believed, therefore, that practically all con ditions are well represented in the measurements which have bee obtained.

At the time of the beginning of these measurements southern Cali fornia was near the end of a long period of low rainfall, during whic ground-water levels had materially declined. Since the beginnin of measurements, however, there have been two winters in which th rainfall reached from 20 to 30 per cent above the average, and th present winter—that of 1906–7—it seems, will maintain this hig average. Under these conditions, since ground waters are dependen as absolutely if not as obviously on rainfall as are surface waters there should be a marked and general rise of the ground-water plan

if withdrawals are not in excess of the average annual restoration. Under conservative use of these waters the ground-water levels will decline during the dry periods but will recover correspondingly during the wet years. Continuous declines during seasons of excessive precipitation mean overuse.

A few of the results of these measurements have been discussed in Water-Supply Paper No. 218, which treats of ground-water conditions in the foothill belt only; but in order that all the observations made may be available for engineers and others who are interested in ground-water problems in southern California, they are more fully presented in the tables that follow.

A simple black and white index map (Pl. IV), on which the location of each record well is shown, accompanies the tables. On this map the wells are numbered, and corresponding numbers are given each record.

In order to facilitate still further the identification of the wells the name of the owner of nearly everyone of them is given, as well as the approximate position of each in relation to a near-by town.

Tables showing variations of water level in wells in southern California.

1. R. Kidson, ¾ mile NE. of Slauson.

Date of measurement.	Depth to water.
	Ft. in.
1905.	
Jan. 3	44 1
Feb. 6	44 6
Mar. 14	44 4
Apr. 10	44 1
June 9	44 4
July 10	44 9
Aug. 8	45 3
Sept. 11	45 11
Nov. 3	46 2
Dec. 14	45 10
1906.	
Jan 22	46 10
Mar. 19	47 7½
May 2	44 11
June 21	47 10
July 27	46 2
Sept. 17	46 6½
Dec. 14	46 8

2. Chinese gardeners, ½ mile SW. of Slauson.

Date of measurement.	Depth to water.
	Ft. in.
1904.	
Sept. 1	25 2½
Oct. 3	22 4½
Nov. 4	22 7½
Dec. 6	22 2
1905.	
Jan. 3	21 10
Feb. 6	21 9
Mar. 14	21 1½
Apr. 10	20 5
May 3	20 5
June 10	24 6
July 10	23 0
Aug. 8	24 0
Sept. 11	24 7
Nov. 3	23 6
Dec. 14	23 ½
1906.	
Jan. 22	22 6
Mar. 19	22 1
June 21	23 6½
May 2	23 1
July 27	24 ½
Sept. 17	25 3
Dec. 14	23 8½

3. Eliza Connelly, 1½ miles N. of Sunnyside.

Date of measurement.	Depth to water.
	Ft. in.
1905.	
Jan. 3	22 5
Feb. 6	22 6
Mar. 14	21 11
Apr. 10	21 6
May 3	21 5
June 9	22 7½
July 10	23 6
Nov. 3	23 10
Dec. 14	23 ½
1906.	
Mar. 19	22 6
May 2	22 7½
June 21	23 9½
Sept. 17	24 4½
Dec. 14	23 7

Tables showing variations of water level in wells in southern California—Continue

4. Mr. Till, 2½ miles S. of Slauson.

Date of measurement.	Depth to water.
	Ft. in.
1904.	
Sept. 1	29 10
Oct. 3	32 1½
Dec. 6	31 11
1905.	
Jan. 2	29 7
Feb. 6	29 6
Mar. 14	29 1
Apr. 10	28 7
May 3	28 8
June 9	29 4
July 10	29 5
Aug. 8	30 1
Sept. 11	30 6
Nov. 3	30 6
Dec. 14	30 6
1906.	
Jan. 22	30 5
Mar. 19	30 7½
May 2	30 9
June 21	30 7
July 27	31 0
Sept. 17	32 8
Dec. 14	31 4½

5. J. P. Brockley, ¾ mile N. of Howard Summit.

Date of measurement.	Depth to water.
	Ft. in.
1904.	
Oct. 3	83 7
Nov. 4	83 9
Dec. 6	83 9
1905.	
Jan. 3	83 8
Feb. 6	83 8
Mar. 14	83 5
Apr. 10	83 5
May 3	83 4
June 9	83 8
July 10	84 2
Aug. 8	84 7½
Sept. 11	84 11
Nov. 3	85 1
Dec. 14	84 9
1906.	
Jan. 22	84 4½
Mar. 19	84 6½
May 2	83 4
June 21	85 2½
July 27	85 1
Sept. 17	85 9
Dec. 14	87 2

6. F. H. Carrell, 1¼ miles S of Gardena.

Date of measurement.	Dep wa
	Ft.
1904.	
Dec. 6	2
1905.	
Jan. 3	2
Feb. 6	2
Mar. 14	2
Apr. 12	2
May 3	2
June 9	2
July 10	2
Aug. 8	2
Sept. 11	2
Nov. 3	2
Dec. 14	2
1906.	
Jan. 22	2
Mar. 19	2
May 2	2
June 21	2
July 27	3
Sept. 17	2
Dec. 14	2

7. A. B. Caldwell, ¼ mile S. of Moneta.

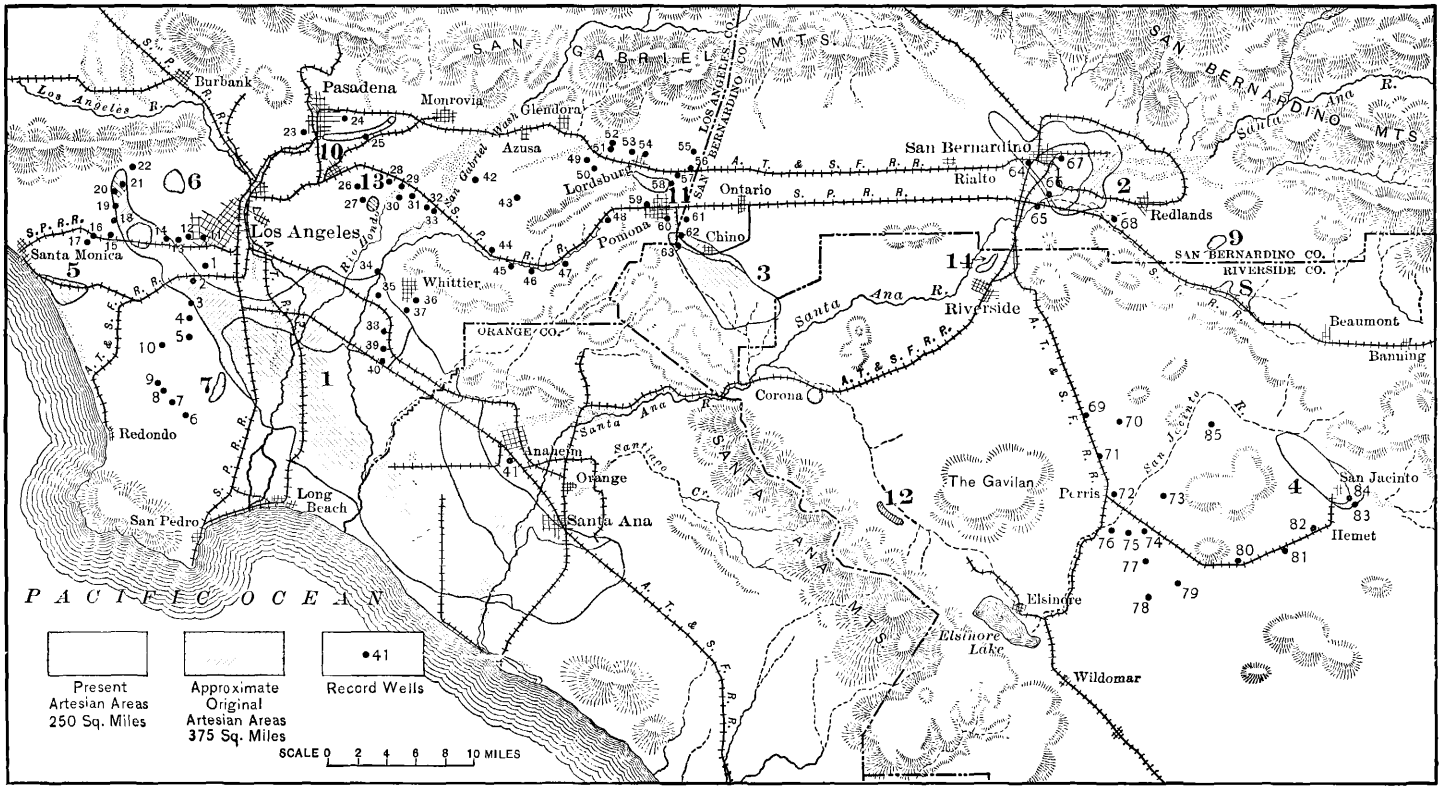
Date of measurement.	Depth to water.
	Ft. in.
1904.	
Sept. 1	41 11
Oct. 3	32 6
Nov. 4	38 11
Dec. 6	25 7
1905.	
Jan. 3	26 5
Feb. 6	41 9
Mar. 14	23 10
Apr. 10	48 2
May 3	42 10
June 9	32 2
July 10	33 0
Aug. 8	32 6
Sept. 11	33 0
Nov. 3	28 4
Dec. 14	24 11
1906.	
Jan. 22	24 6
Mar. 19	23 8
May 2	27 11
June 21	32 3
July 27	32 6½
Sept. 17	30 8½
Dec. 14	25 0

8. H. J. Harris, ½ mile N. of Moneta.

Date of measurement.	Depth to water.
	Ft. in.
1904.	
Sept. 1	39 3
Oct. 3	37 9
Nov. 4	35 0
Dec. 6	32 4
1905.	
Jan. 3	26 5½
Feb. 6	25 11
Mar. 14	25 8½
Apr. 10	32 8
May 3	28 3
June 9	35 2
July 10	33 9
Aug. 8	33 7
Sept. 11	34 5
Dec. 14	26 7
1906.	
Jan. 22	26 0
Mar. 19	23 7
May 2	28 0
June 21	28 6
July 27	34 0
Sept. 17	34 0
Dec. 14	26 2

9. Stanley Bates, ¾ mile N of Moneta.

Date of measurement.	Dep wa
	Ft.
1904.	
Dec. 6	3
1905.	
Jan. 3	3
Feb. 6	3
Mar. 14	3
Apr. 10	3
May 3	3
June 9	3
July 10	3
Aug. 8	3
Sept. 11	?
Nov. 3	3
Dec. 14	3
1906.	
Jan. 22	3
Mar. 19	3
May 2	3
June 21	?
July 27	?
Sept. 17	3
Dec. 14	3



MAP OF VALLEY OF SOUTHERN CALIFORNIA, SHOWING LOCATION OF WELLS SELECTED TO SHOW GROUND-WATER CONDITIONS.

Tables showing variations of water level in wells in southern California—Continued.

10. Post and Lockhart, 2 miles W. of Howard Summit.

Date of measurement.	Depth to water.
1904.	*Ft. in.*
Dec. 6	35 7½
1905.	
Jan. 3	36 9
Feb. 6	38 6
Mar. 14	27 4
Apr. 10	35 8
May 3	35 9
July 10	38 6
Aug. 8	40 3
Sept. 11	47 4
Dec. 14	39 3
1906.	
Jan. 22	36 0
Mar. 19	34 3
May 2	33 4½
June 21	38 2
July 27	37 10
Sept. 17	37 10½
Dec. 14	37 1½

11. William Bayley, Chester place, Los Angeles.

Date of measurement.	Depth to water
1904.	*Ft. in.*
Dec. 9	69 0
1905.	
Jan. 6	69 2½
Feb. 10	69 5
Mar. 18	69 9
Apr. 10	69 8
May 6	69 8
June 10	69 8
July 11	69 10
Aug. 9	70 0
Sept. 12	70 1½
Nov. 4	70 4
Dec. 15	70 5½
1906.	
Jan. 23	70 6½
Mar. 20	70 4
May 3	70 6½
June 23	70 7
July 28	70 7
Sept. 18	70 9
Dec. 15	71 0

12. Tony Fright, W. Jefferson street, Los Angeles.

Date of measurement.	Depth to water.
1904.	*Ft. in.*
Dec. 9	48 6
1905.	
Jan. 6	48 8
Feb. 10	48 10
Mar. 18	48 8½
Apr. 10	48 4
May 6	48 1
June 10	48 6
July 11	48 10½
Aug. 9	49 1½
Sept. 12	49 4½
Nov. 4	49 6
Dec. 15	49 8½
1906.	
Jan. 23	49 8
Mar. 20	49 4
May 3	49 4
June 22	49 6½
July 28	49 10
Sept. 18	50 1
Dec. 15	50 0

13. Mrs. Showers, W. Jefferson st., Los Angeles.

Date of measurement.	Depth to water.
1904.	*Ft. in.*
Oct. 3	33 8
Nov. 7	33 9
Dec. 9	33 6
1905.	
Jan 6	33 6
Feb. 10	33 0
Mar. 18	32 2½
Apr. 12	32 1
May 6	32 9
June 10	33 0
July 11	33 9
Aug. 9	34 4
Sept. 12	34 7
Nov. 4	34 9
Dec. 15	34 3
1906.	
Jan. 23	34 1
Mar. 20	33 3
May 3	33 6
June 22	33 11
May 3	33 6
June 22	33 11
July 28	34 7½
Sept. 18	35 3
Dec. 15	34 9

14. Artesian Land and Water Co., ¾ mile N. of Cienega station.

Date of measurement.	Depth to water.
1905.	*Ft. in.*
Feb. 10	6 11
Mar. 17	5 8½
Apr. 13	5 10
May 6	6 1
June 10	7 2
July 11	7 9
Aug. 9	8 4
Sept. 12	8 9
Dec. 15	8 1
1906.	
Jan. 23	7 1
Mar. 20	7 10
May 3	7 3½
June 22	7 10
July 28	9 0
Sept. 18	9 6
Dec. 15	8 5½

15. Los Angeles County, Ivy station.

Date of measurement.	Depth to water.
1904.	*Ft. in.*
Dec. 9	13 11
1905.	
Jan. 6	13 0
Mar. 18	12 1
Apr. 13	12 0
June 10	12 3
July 11	12 7
Aug. 9	13 0
Sept. 12	13 4½
Nov. 4	13 3
Dec. 15	13 3½
1906.	
Jan. 23	13 1
Mar. 20	12 5
May 3	12 2
June 22	9 8½
July 28	12 10
Sept. 18	13 3
Dec. 15	13 3½

Tables showing variations of water level in wells in southern California—Continued

16. M. P. Kane, Palms.

Date of measurement.	Depth to water.
	Ft. in.
1904.	
Sept. 1	50 8
Oct. 12	49 6
Nov. 7	49 6
Dec. 9	50 2
1905.	
Jan. 6	49 9
Mar. 18	49 4
Apr. 13	49 4
July 11	49 8
Aug. 9	49 11
Sept. 12	49 7
Dec. 15	49 5½
1906.	
Jan. 23	49 6
Mar. 20	49 2½
June 22	49 5
July 28	49 5½
Sept. 18	49 10
Dec. 15	49 11

17. F. P. Bojorquez, Palms.

Date of measurement.	Depth to water.
	Ft. in.
1904.	
Oct. 13	42 2½
Nov. 7	42 4
Dec. 9	45 5
1905.	
Jan. 6	42 9½
Mar. 18	43 3
Apr. 13	43 4½
May 6	43 6
June 10	43 6
July 11	43 8
Aug. 9	43 11
Sept. 12	44 1
Nov. 4	43 6
Dec. 15	45 7
1906.	
Jan. 23	44 5
Mar. 20	44 2
May 3	44 7
June 22	46 7
July 28	44 6½
Sept. 18	44 6
Dec. 15	44 8

18. Jose Sesma, 1 mile N. of I station.

Date of Measurement.	Depth wate
	Ft.
1904.	
Dec. 2	43
1905.	
Jan. 6	43
Feb. 10	43
Mar. 18	43
Apr. 13	43
June 10	43
July 11	43
Aug. 9	43
Sept. 12	43
Nov. 4	42
Dec. 15	43
1906.	
May 3	44
June 22	45
July 28	44
Dec. 15	44

19. J. H. Whitworth, 2 miles S. of Sherman.

Date of measurement.	Depth to water.
	Ft. in.
1904.	
Dec. 9	10 9
1905.	
Jan. 6	10 6
Feb. 10	9 9
Mar. 18	8 2
Apr. 13	8 0
May 6	8 4
June 10	9 2
July 11	9 0
Aug. 9	8 8
Nov. 4	9 7½
Dec. 15	9 4
1906.	
Jan. 23	8 9
Mar. 20	8 8
May 3	7 8½
June 22	9 5½
July 28	9 8½
Sept. 18	10 1
Dec. 15	8 7

20. Hammel and Decker, 1 mile S. of Sherman.

Date of measurement.	Depth to water.
	Ft. in.
1904.	
Dec. 9	13 6
1905.	
Jan. 6	13 6
Feb. 10	12 11½
Mar. 18	11 9
Apr. 13	11 6
May 6	11 7
June 10	11 10
July 11	12 1
Aug. 9	12 4
Sept. 12	12 10
Nov. 4	13 0
Dec. 15	12 10
1906.	
Jan 23	12 4½
Mar. 20	12 1½
May 3	11 9½
June 22	12 1
July 28	12 7½
Sept. 18	12 10½
Dec. 15	12 6

21. William Niles, ¾ mile of Sherman.

Date of measurement.	Depth wate
	Ft.
1904.	
Oct. 14	9
Nov. 7	9
Dec. 9	9
1905.	
Jan. 6	7
Feb. 10	6
Mar. 18	4
Apr. 13	6
May 6	6
June 10	7
July 11	8
Aug. 9	8
Sept. 12	9
Dec. 15	7
1906.	
Jan. 23	7
Mar. 20	7
May 3	7
June 22	8
July 28	8
Sept. 18	9
Dec. 15	7

Tables showing variations of water level in wells in southern California—Continued.

22. Los Angeles County, 1 mile E. of Sherman.

Date of measurement.	Depth to water.
	Ft. in.
1904.	
Dec. 9	84 3½
1905.	
Jan. 6	84 5½
Feb. 10	84 6
Mar. 18	84 6
Apr. 13	84 4
May 6	84 3
June 10	84 6
July 11	84 6
Aug. 9	84 10
Sept. 12	85 2
Nov. 4	86 0
Dec. 15	86 9
1906.	
Jan. 23	84 6
Mar. 20	86 3
May 3	86 5
June 22	86 8½
July 28	87 5½
Sept. 18	87 8½
Dec. 15	88 1

23. Mr. Hurlbut, Pasadena.

Date of measurement.	Depth to water.
	Ft. in.
1904.	
Sept. 2	73 3
Oct. 5	73 10
Nov. 8	73 11
Dec. 10	74 6
1905.	
Jan. 4	74 6
Feb. 9	74 4
Apr. 12	73 8
May 10	73 5
June 13	73 5
July 12	74 0
Aug. 10	74 5
Sept. 13	75 0
Nov. 7	75 0
Dec. 18	75 9
1906.	
Mar. 22	74 6
May 5	74 9
June 25	74 6
July 31	75 3½
Sept. 20	76 1½
Dec. 17	77 1

24. L. V. Harkness, 1½ mile SE. of Pasadena.

Date of measurement.	Depth to water.
	Ft. in.
1904.	
Sept. 2	122 4
Oct. 5	122 2½
Nov. 8	122 7
Dec. 10	122 6½
1905.	
Feb. 9	122 2
Mar. 17	122 2
Apr. 12	122 2
May 10	122 1
June 13	122 4
July 12	123 3
Aug. 10	123 5
Sept. 13	124 0
Nov. 7	124 1
Dec. 18	123 7
1906.	
Jan. 24	123 3½
Mar. 22	123 2½
May 5	122 11
June 25	122 8
July 31	123 6½
Sept. 20	123 10
Dec. 17	123 1½

25. Titus ranch, Sunny Slope station.

Date of measurement.	Depth to water.
	Ft. in.
1904.	
Dec. 10	13 6
1905.	
Jan. 4	10 4½
Feb. 9	8 7
Mar. 17	8 6
Apr. 12	7 8
May 10	8 1
June 13	11 6
July 12	16 1
Aug. 10	19 2
Sept. 13	16 2
Nov. 7	12 10
Dec. 18	10 7
1906.	
Jan. 24	10 9
Mar. 22	10 0
June 25	8 6
May 5	8 4
May 5	8 4
July 31	18 3
Sept. 20	16 9½
Dec. 17	14 2½

26. John McClain estate, 1 mile S. of San Gabriel.

Date of measurement.	Depth to water.
	Ft. in.
1904.	
Dec. 10	72 11
1905.	
Jan. 4	72 10
Feb. 9	73 0
Mar. 17	72 10
Apr. 12	72 7
June 13	73 4
July 12	73 3
Aug. 10	74 1
Dec. 18	73 0
1906.	
Mar. 22	72 8½
May 5	72 7½
June 25	72 8
July 31	72 3½
Sept. 20	72 1
Dec. 17	71 4

27. F. E. Wilson, 2 miles S. of San Gabriel.

Date of measurement.	Depth to water.
	Ft. in.
1904.	
Dec. 10	23 5½
1905.	
Jan. 4	23 6
Feb. 7	23 3
Mar. 17	22 8½
Apr. 12	21 0
July 12	21 4
Aug. 10	22 6
Sept. 13	22 3
Nov. 17	22 8
Dec. 18	22 11
1906.	
Jan. 24	22 3
Mar. 22	23 0
May 5	22 8
June 25	21 8
July 31	21 4
Dec. 17	21 11

Tables showing variations of water level in wells in southern California—Continue

28. G. B. Renfro, ¾ mile SW. of Savannah.

Date of measurement.	Depth to water.
	Ft. in.
1904.	
Dec. 9	19 6
1905.	
Jan. 4	20 1½
Feb. 9	20 0
Mar. 17	19 3
Apr. 12	18 4
May 10	17 8
June 13	18 7
July 12	18 11
Aug. 10	19 2
Sept. 13	20 0
Nov. 7	20 3
1906.	
Jan. 24	19 10
Mar. 22	18 11
May 5	18 1
June 25	18 4
July 31	18 8
Dec. 17	18 8

29. J. A. Law, ½ mile W. of El Monte.

Date of measurement.	Depth to water.
	Ft. in.
1904.	
Dec. 10	16 2
1905.	
Jan. 4	16 1½
Feb. 9	16 3
Mar. 17	13 8
Apr. 12	13 2
July 12	13 1
Aug. 10	13 5½
Sept. 13	14 4
Nov. 7	14 1
Dec. 18	13 9
1906.	
Jan. 24	13 8½
Mar. 22	12 6
May 5	11 8
June 25	11 5
July 31	11 10½
Sept. 20	12 2½
Dec. 17	11 9

30. M. Ritter, El Monte.

Date of measurement.	Dept wat
	Ft.
1904.	
Nov. 8	22
Dec. 10	22
1905.	
Jan. 4	22
Feb. 9	21
Mar. 17	20
Apr. 12	18
May 10	16
June 13	16
July 12	17
Aug. 10	16
Sept. 13	17
Nov. 7	18
Dec. 18	18
1906.	
Jan. 24	18
Mar. 22	17
May 5	14
June 25	12
July 31	12
Sept. 20	14
Dec. 17	14

31. Mrs. McClure, ¾ mile S. of El Monte.

Date of measurement.	Depth to water.
	Ft. in.
1905.	
Jan. 4	16 6
Feb. 9	15 10
Mar. 17	14 2
July 12	12 5
Aug. 10	13 9
Sept. 13	14 8
Nov. 7	13 6
Dec. 18	13 6
1906.	
Jan. 24	13 1
Mar. 22	12 10
May 5	10 6
June 25	10 0
July 31	10 4½
Sept. 20	12 ¾
Dec. 17	10 7

32. T. D. Andrews, 1½ mile SE. of El Monte.

Date of measurement.	Depth to water.
	Ft. in.
1904.	
Dec. 10	21 5½
1905.	
Jan. 4	21 5
Feb. 9	20 8
Mar. 17	17 10
Apr. 12	15 10
May 10	14 8
June 12	13 8
July 12	13 9
Aug. 10	15 9
Sept. 13	16 10
Nov. 7	17 3
Dec. 17	17 0
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Jan. 24	17 4
Mar. 22	15 4
May 5	12 8
June 25	11 9
July 31	12 2
Sept. 20	13 5½
Dec. 17	13 8

35. Jackson Frees, 2 miles S El Monte.

Date of measurement.	Dept wat
	Ft.
1905.	
Feb. 9	27
Mar. 17	23
Apr. 12	20
May 10	20
June 13	18
July 12	19
Aug. 10	21
Sept. 13	22
Nov. 7	23
Dec. 18	22
1906.	
Jan. 24	19
Mar. 22	22
May 5	18
June 25	18
July 31	17
Sept. 20	18
Dec. 17	19

Tables showing variations of water level in wells in southern California—Continued.

34. E. Gurado 3 miles W. of Whittier.

Date of measurement.	Depth to water.
	Ft. in.
1904.	
Oct. 4	14 2
Nov. 8	13 4
Dec. 7	12 1
1905.	
Jan. 5	11 6
Feb. 7	11 2
Mar. 15	10 3
Apr. 11	10 5½
May 5	10 7½
June 12	11 8
July 14	12 ½
Aug. 11	12 6
Sept. 14	13 0
Nov. 6	11 10
Dec. 16	11 3
1906.	
Jan. 25	11 11
Mar. 10	10 3½
May 4	9 6½
June 23	11 3
July 30	9 8½
Sept. 19	10 0
Dec. 18	9 9½

35. Mrs. Mary Pheland, 2 miles SW. of Whittier.

Date of measurement.	Depth to water.
	Ft. in.
1904.	
Nov. 9	15 3
1905.	
Jan. 5	14 11½
Feb. 7	14 2½
Mar. 15	13 4
Apr. 10	13 2
May 5	13 4
June 12	13 8½
July 14	14 5
Aug. 11	15 0
Sept. 14	15 8
Nov. 6	14 5
Dec. 16	13 10
1906.	
June 23	12 3
July 30	14 9
Sept. 19	17 10
Dec. 18	12 6½

36. H. C. Baldwin, ½ mile SE. of Whittier.

Date of measurement.	Depth to water.
	Ft. in.
1904.	
Sept. 8	129 2
Oct. 4	128 4½
Nov. 8	128 5
Dec. 7	128 7½
1905.	
Jan. 5	128 6
Feb. 7	128 7
March 15	128 8
Apr. 11	128 4
May 5	128 3
June 12	128 4½
July 14	128 8
Aug. 11	128 10
Sept. 14	128 11
Nov. 6	129 0
Dec. 16	128 10
1906.	
Jan. 20	128 8
Mar. 10	128 8
May 4	127 5½
June 23	128 6
July 30	128 6
Sept. 19	128 6½
Dec. 18	128 6

37. C. A. Landreth, 1 mile S. of Whittier.

Date of measurement.	Depth to water.
	Ft. in.
1904.	
Sept. 6	33 5½
Oct. 4	33 7½
Nov. 9	33 5
Dec. 7	33 5½
1905.	
Jan. 5	33 8
Feb. 7	33 3
Mar. 15	32 6
Apr. 11	31 10
May 5	31 8
June 12	31 7
July 14	32 4
Aug. 11	33 2
Sept. 14	33 4
Nov. 6	33 1
Dec. 16	32 10
1906.	
Jan. 25	32 8
Mar. 10	31 8
May 4	31 6½
June 23	31 5½
July 30	33 4
Sept. 19	32 6
Dec. 18	32 ½

38. J. W. Sharp, Santa Fe Springs.

Date of measurement.	Depth to water.
	Ft. in.
1904.	
Sept. 6	27 3½
Oct. 4	26 9½
Nov. 9	27 2
Dec. 7	27 7
1905.	
Jan. 5	27 0
Feb. 7	26 2
Mar. 15	25 7
Apr. 11	25 0
May 5	25 1½
June 12	26 0
July 14	26 8
Aug. 11	27 2
Sept. 14	27 4
Nov. 6	27 3
Dec. 16	26 1
1906.	
Jan. 25	25 4
Mar. 10	24 6
May 4	24 5½
June 23	24 9
July 30	25 8½
Sept. 19	26 9
Dec. 18	25 1

39. John H. Borden, 1½ miles N. of Norwalk.

Date of measurement.	Depth to water.
	Ft. in.
1904.	
Nov. 9	7 10
Dec. 7	8 5
1905.	
Jan. 5	7 11
Feb. 7	6 10
Mar. 15	5 10½
Apr. 11	5 4
May 5	5 1
June 12	6 6
July 14	7 2
Aug. 11	8 0
Sept. 14	8 8
Nov. 6	8 7
Dec. 16	7 1
1906.	
Jan. 25	6 7
Mar. 10	6 8
May 4	4 10½
June 23	5 6½
July 30	7 3½
Sept. 19	6 9½
Dec. 18	5 10

Tables showing variations of water level in wells in southern California—Continued.

40. Norwalk Builders' Association, Norwalk.

Date of measurement.	Depth to water.
1904.	*Ft. in.*
Sept. 6	19 5
Oct. 4	15 8
Nov. 9	16 4
Dec. 7	17 4
1905.	
Jan. 5	15 3½
Feb. 7	14 1½
Mar. 15	13 4½
May 5	13 7
June 12	14 6
July 14	15 10
Aug. 11	16 11
Sept. 14	17 9
Nov. 6	15 4
Dec. 16	14 7
1906.	
Jan. 25	13 8
Mar. 10	16 11
May 4	16 3
June 23	15 6½
July 30	15 4½
Dec. 18	15 0

41. J. B. Neff, 1½ miles S. of Anaheim.

Date of measurement.	Depth to water.
1904.	*Ft. in.*
Aug. 31	50 10
Oct. 1	50 8
Oct. 31	50 8
Dec. 1	50 9
1905.	
Jan. 1	51 0
Feb. 1	50 11
Mar. 1	50 7
Mar. 31	49 10
May 18	49 7
July 1	51 4
July 31	51 7
Aug. 31	52 7
Sept. 30	52 4
Nov. 1	51 10
Dec. 1	51 5
1906.	
Jan. 6	51 4
Mar. 3	51 2
Mar. 31	50 10
Apr. 30	49 5
May 19	49 2
July 1	49 7
July 30	50 6
Sept. 2	51 1
Sept. 27	50 9
Nov. 1	50 2
Nov. 30	49 5

42. Vineland district school, Vineland.

Date of measurement.	Depth water
1904.	*Ft. i*
Dec. 14	104
1905.	
Jan. 12	104
Feb. 21	102
Mar. 10	98
Apr. 15	93
May 17	90
June 22	90
July 21	91
Aug. 16	92
Sept. 20	93
Nov. 12	95
Dec. 21	96
1906.	
Jan. 27	97
Mar. 15	95
May 8	83
June 7	81
Aug. 1	82
Sept. 25	85
Dec. 11	88

43. G. F. Chamberlain, 2 miles SW. of Covina.

Date of measurement.	Depth to water.
1904.	*Ft. in.*
Oct. 8	119 0
Nov. 17	119 6
Dec. 14	120 9
1905.	
Jan. 12	120 11
Feb. 20	120 9
Mar. 11	120 1
Apr. 15	118 1
May 17	117 9
July 21	112 6
Aug. 16	111 6
Sept. 21	111 6
Nov. 12	112 6
Dec. 21	112 11
1906.	
Mar. 15	113 7
May 9	109 6
June 27	105 3½
Sept. 25	104 4½
Dec. 11	108 1

44. H. Heinze, Puente.

Date of measurement.	Depth to water.
1904.	*Ft. in.*
Oct. 8	30 0
Nov. 17	29 10
Dec. 14	30 0
1905.	
Feb. 21	29 2
Mar. 11	28 4
Apr. 15	25 7
June 22	28 6
July 21	27 2
Aug. 16	27 11
Sept. 20	28 3
Dec. 21	28 4½
1906.	
Mar. 15	23 9
May 9	25 6
June 27	23 7½
Sept. 25	26 4½

45. William Rowland, ¼ mile S of Rowland.

Date of measurement.	Depth water
1904.	*Ft. i*
Oct. 8	27
Nov. 17	26
Dec. 14	25
1905.	
Jan. 12	24
Feb. 21	23
Apr. 15	22
June 22	23
July 21	24
Aug. 16	24
Sept. 20	26
Nov. 12	24
Dec. 21	23
1906.	
Jan. 27	23
May 9	22
June 27	27
Aug. 2	25
Sept. 25	27
Dec. 11	23

Tables showing variations of water in wells in southern California—Continued.

46. B. Yorba, 1½ miles E. of Rowland.

Date of measurement.	Depth to water.
1904.	*Ft. in.*
Oct. 8	35 6
Nov. 17	35 10½
Dec. 14	33 5
1905.	
Jan. 12	30 8
Feb. 20	29 9
Mar. 11	30 10
Apr. 15	31 0
June 22	32 11
July 21	33 2
May 20	33 11
Nov. 12	33 0
Dec. 21	31 5
1906.	
Jan. 27	31 7
Mar. 15	28 2½
May 9	31 6
June 27	30 8
Aug. 2	31 11
Sept. 25	32 11

47. F. Bowers, Lemon.

Date of measurement.	Depth to water.
1904.	*Ft. in.*
Oct. 8	27 10
Nov. 16	25 4
Dec. 14	25 5½
1905.	
Jan. 12	24 4
Feb. 20	23 10
Mar. 11	23 6
Apr. 15	20 5½
June 22	23 5
July 21	24 0
Aug. 16	25 10
Sept. 20	25 ½
Nov. 12	23 4
Dec. 21	22 0
1906.	
Jan. 27	21 6
Mar. 15	21 4
May 9	21 10
June 27	24 8½
Aug. 2	25 8
Sept. 25	25 4½

48. S. E. Hicks, ¼ mile W. of Spadra.

Date of measurement.	Depth to water.
1904.	*Ft. in.*
Oct. 8	33 8
Nov. 17	32 9
Dec. 14	32 9
1905.	
Jan. 12	32 0
Feb. 21	31 8½
Mar. 11	31 5½
June 22	32 7
July 21	34 2
Aug. 16	35 2
Sept. 20	36 6
Nov. 12	36 2
Dec. 21	35 7
1906.	
Mar. 15	35 5
May 9	34 8
June 27	34 8
Aug. 2	38 7½
Sept. 25	40 2
Dec. 11	39 3

49. Sidney Deacon, 2 miles W. of San Dimas.

Date of measurement.	Depth to water.
1904.	*Ft. in.*
Oct. 7	124 3
Nov. 16	124 0
Dec. 13	124 0
1905.	
Jan. 11	123 6
Feb. 20	123 5
Mar. 10	127 0
Apr. 14	125 0
May 17	124 8
June 22	125 1½
July 21	125 5
Aug. 16	125 5
Sept. 21	125 7
Nov. 11	126 0
1906.	
Jan. 27	124 6
Mar. 15	124 3
May 8	125 2
June 27	124 6

50. Wm. Ferry, 1½ miles SW. of San Dimas.

Date of measurement.	Depth to water.
1904.	*Ft. in.*
Oct. 7	199 8
Nov. 16	199 10
Dec. 13	199 10½
1905.	
Jan. 11	199 9½
Feb. 21	199 8
Mar. 10	199 8½
Apr. 14	200 4
June 22	200 4½
July 23	200 6
Aug. 16	200 7
Sept. 21	200 7
Nov. 11	201 0
Dec. 20	201 0
1906.	
Jan. 27	201 3
Mar. 15	201 3
May 8	201 2
June 26	201 5½
Aug. 2	201 9
Sept. 24	201 7½

51. Azusa Irrigating Co., San Dimas Wash.

Date of measurement.	Depth to water.
1904.	*Ft. in.*
Oct. 7	97 2
Nov. 16	97 8
Dec. 13	98 11
1905.	
Jan. 11	99 1
Feb. 20	98 4
Mar. 11	97 4
Apr. 14	95 6
May 17	94 3
June 22	94 1
July 20	95 4
Aug. 16	96 4
Sept. 21	97 4
Nov. 11	98 6
Dec. 20	99 0
1906.	
Jan. 27	97 10
Mar. 15	97 2½
May 8	93 2
June 26	91 1½
Aug. 1	92 4
Sept. 24	98 7½
Dec. 10	100 11

Tables showing variations of water in wells in southern California—Continued.

52. Emil Firth, San Dimas Wash.

Date of measurement.	Depth to water.
1904.	*Ft. in.*
Sept. 7	110 6½
Oct. 7	111 7
Nov. 16	113 2
Dec. 13	113 11
1905.	
Jan. 11	114 8½
Feb. 20	113 11
Mar. 11	113 7
Apr. 14	106 10
May 17	104 9
June 22	104 4
July 20	105 6
Aug. 16	105 10
Sept. 21	106 7½
Nov. 11	108 1½
Dec. 20	108 1
1906.	
Jan. 27	107 6½
Mar. 15	108 2
May 8	87 10
June 26	92 11
Sept. 24	97 4½
Dec. 10	96 11

53. Charles Alley, 1 mile NW. of Lordsburg.

Date of measurement.	Depth to water.
1904.	*Ft. in.*
Oct. 7	145 4
Nov. 16	146 10
Dec. 13	146 10
1905.	
Jan. 11	146 9
Feb. 20	147 5½
Mar. 10	147 6½
Apr. 14	147 7
June 22	146 8
July 20	150 8
Aug. 16	150 ½
Sept. 21	150 11
Nov. 11	152 7
Dec. 20	152 0
1906.	
Jan. 27	151 5½
Mar. 15	149 2½
May 8	149 6
June 26	149 ½
Aug. 1	153 1½
Sept. 24	154 4½
Dec. 10	154 7

54. Mr. Massey, ¾ mile NE Lordsburg.

Date of measurement.	Depth to water.
1904.	*Ft.*
Oct. 7	20
Nov. 16	19
Dec. 13	19
1905.	
Jan. 11	19
Feb. 20	19
Mar. 11	19
Apr. 14	20
May 17	19
June 22	19
July 20	20
Aug. 16	19
Sept. 21	20
Nov. 11	20
Dec. 20	20
1906.	
Jan. 27	20
Mar. 15	20
May 8	19
June 26	19
Aug. 1	19
Sept. 24	19
Dec. 10	19

55. Ontario Water Co., 1 mile N. of Claremont.

Date of measurement.	Depth to water.
1904.	*Ft. in.*
Nov. 16	62 1
Dec. 13	61 10
1905.	
Jan. 11	62 2
Feb. 20	62 1
Mar. 10	61 10½
Apr. 14	59 4
May 17	59 1½
June 22	57 5
July 20	57 0
Aug. 16	59 7
Sept. 21	58 6
Nov. 11	58 4½
Dec. 20	57 3
1906.	
Jan. 26	56 9½
Mar. 14	53 2½
May 8	54 4
June 26	53 3½
Aug. 1	54 1
Sept. 24	53 3½
Dec. 10	56 10

56. R. Bieley, Claremont.

Date of measurement.	Depth to water.
1904.	*Ft. in.*
Oct. 8	97 4
Nov. 16	97 6
Dec. 13	98 1½
1905.	
Jan. 11	97 0
Feb. 20	92 5
Mar. 10	91 2
Apr. 14	89 9
May 17	88 10
June 22	92 0
July 20	97 4
Aug. 16	98 7
Sept. 21	99 9
Dec. 20	93 8
1906.	
Jan. 27	97 9½
Mar. 14	84 10
May 8	82 4
June 26	81 2
Aug. 1	76 3
Sept. 24	65 5
Dec. 10	49 9

57. San Antonio Water C[o] mile SW. of Claremont

Date of measurement.	Dep wa
1904.	*F*
Oct. 6	15
Nov. 16	15
Dec. 13	15
1905.	
Jan. 11	15
Feb. 20	15
Mar. 10	15
Apr. 14	14
May 17	14
June 22	14
July 20	15
Aug. 16	15
Sept. 21	15
Nov. 11	15
Dec. 20	14
1906.	
Jan. 26	14
Mar. 14	14
May 8	14
Aug. 1	14
Sept. 24	14
Dec. 10	14

Tables showing variations of water in wells in southern California—Continued.

58. Dr. A. R. Reed, 1½ miles NE. of Pomona.

Date of measurement.	Depth to water.
	Ft. *in.*
1904.	
Sept. 7	75 2
Oct. 6	75 4¼
Nov. 16	74 6
Dec. 13	74 3
1905.	
Jan. 11	68 10½
Feb. 20	66 1
Mar. 10	65 11
Apr. 14	63 11
May 17	62 11
June 22	66 8
July 20	70 10
Aug. 16	71 11
Sept. 21	73 5
Nov. 11	70 4½
Dec. 20	67 0
1906.	
Jan. 26	64 9
Mar. 14	62 10
May 8	62 5
June 26	64 5
Aug. 1	67 0
Sept. 24	67 ½
Dec. 10	64 3½

59. B. Linastruth, Pomona.

Date of measurement.	Depth to water.
	Ft. *in.*
1904.	
Dec. 14	90 6½
1905.	
Jan. 12	90 9
Feb. 21	91 1
Apr. 15	91 5
May 17	91 6½
June 22	92 0
July 21	92 10½
Sept. 20	93 6
Nov. 12	93 4
Dec. 21	93 6
1906.	
Mar. 15	92 6
June 27	93 6
Aug. 2	95 6
Sept. 25	96 0
Dec. 11	95 2

60. J. J. White, Pomona.

Date of measurement.	Depth to water.
	Ft. *in.*
1904.	
Oct. 6	58 9½
Nov. 16	60 3
Dec. 13	60 6½
1905.	
Jan. 11	60 10
Feb. 20	61 1½
Mar. 10	61 4½
Apr. 14	60 8
May 17	60 11
June 22	61 1
Aug. 16	61 6
Sept. 20	61 10
Nov. 11	62 4
Dec. 20	62 5
1906.	
Jan. 26	62 3½
Mar. 14	63 1
May 8	63 1½
Aug. 1	63 5
Sept. 24	64 4½
Dec. 10	64 11

61. Mrs. Tieg, 1½ miles SE. of Pomona.

Date of measurement.	Depth to water.
	Ft. *in.*
1904.	
Sept. 8	89 0
Oct. 6	88 10
Nov. 16	88 10½
Dec. 13	88 10
1905.	
Jan. 11	88 10
Feb. 20	89 0
Mar. 10	89 0
Apr. 14	88 0
June 22	88 11
July 20	90 1½
Aug. 16	90 5
Sept. 20	90 8½
Nov. 11	90 5
Dec. 20	90 6
1906.	
Jan. 26	89 6
Mar. 14	90 6
May 8	89 7
Aug. 1	92 2
Sept. 24	92 2

62. R. Riemers, 2½ miles SE. of Pomona.

Date of measurement.	Depth to water.
	Ft. *in.*
1904.	
Sept. 8	34 6
Oct. 6	36 6½
Nov. 16	34 10
Dec. 13	34 10
1905.	
Jan. 11	34 9½
Feb. 20	34 7½
Apr. 14	32 10
May 17	32 7
June 22	33 6
July 20	35 4
Aug. 16	35 0
Sept. 20	35 6
Nov. 11	35 8
Dec. 20	35 7½
1906.	
Jan. 26	36 8½
Mar. 14	35 8
May 8	33 2½
June 26	34 4½
Aug. 1	35 5
Sept. 24	36 2½
Dec. 10	36 2½

63. C. P. Brown, 2¼ miles SE. of Pomona.

Date of measurement.	Depth to water.
	Ft. *in.*
1904.	
Sept. 7	8 9
Oct. 6	6 6½
Nov. 16	3 10
Dec. 13	3 3
1905.	
Jan. 11	2 5
Feb. 20	2 0
Mar. 10	2 ½
Apr. 14	1 5
May 17	2 0
June 22	7 5
July 20	12 10
Aug. 16	12. 2
Sept. 20	11 10½
Nov. 11	4 7½
Dec. 20	4 1
1906.	
Jan. 26	4 3½
Mar. 14	3 10
May 8	4 4½
June 26	13 10
Aug. 1	15 8
Sept. 24	13 6
Dec. 10	4 10

Tables showing variations of water in wells in southern California—Continued.

64. Mr. Haley, ¼ mile W. of San Bernardino.

Date of measurement.	Depth to water.
1904.	*Ft.*
July 5	36.6
Aug. 4	38.18
Sept. 1	37.23
Oct. 3	37.10
Nov. 1	38.9
Dec. 1	39.83
1905.	
Jan. 1	37.15
Feb. 1	33.0
Mar. 1	30.55
Apr. 1	29.78
May 1	30.1
June 1	37.6
July 1	39.0
Oct. 1	40.5
Nov. 1	36.8
Dec. 1	33.7
1906.	
Jan. 1	33.7
Feb. 1	33.0
Mar. 1	32.0
Apr. 1	31.38
May 1	36.57
June 1	35.7
July 1	38.4
Oct. 22	30.4

65. C. W. Rogers, 1 mile E. of Colton.

Date of measurement.	Depth to water.
1904.	*Ft.*
July 1	15.7
Aug. 4	18.05
Sept. 1	19.70
Oct. 3	20.96
Nov. 1	20.17
Dec. 1	21.82
1905.	
Jan. 1	17.48
Feb. 1	12.45
Mar. 1	7.57
Apr. 1	5.4
May 1	5.6
June 1	6.4
July 1	9.3
Aug. 1	12.75
Sept. 1	15.9
Oct. 1	18.45
Nov. 1	18.28
1906.	
Jan. 1	14.34
Feb. 1	12.58
Mar. 1	8.35
Apr. 1	5.40
May 1	6.00
June 1	5.9
July 1	6.85
Oct. 22	17.2

66 Riverside Water Co., 2 m E. of Colton.

Date of measurement.	Yield miner inche
1904.	
Aug. 1	3
Sept. 1	4
Oct. 3	5
Nov. 1	4
Dec. 1	5
1905.	
Jan. 1	5
Feb. 1	Capp
Mar. 1	Capp
Apr. 1	Capp
May 1	5
June 1	5
July 1	7
Aug. 1	5
Sept. 1	3
Oct. 1	4
Nov. 1	4
Dec. 1	Capp
1906.	
Jan. 1	Capp
Feb. 1	Capp
Mar. 1	Capp
Apr. 1	Capp
May 1	Capp
June 1	Capp
July 1	Capp
Oct. 22	4

67. Riverside Water Co., Third and Waterman sts., San Bernardino.

Date of measurement.	Yield in miner's inches.
1904.	
Aug. 1	121.5
Sept. 1	121.6
Oct. 3	112.5
Nov. 1	116.0
Dec. 1	116.3
1905.	
Jan. 1	117.0
Feb. 1	Capped.
Mar. 1	Capped.
Apr. 1	Capped.
May 1	Capped.
June 1	117.0
July 1	118.4
Aug. 1	116.7
Sept. 1	111.6
Oct. 1	115.1
Nov. 1	Capped.
Dec. 1	Capped.
1906.	
Jan. 1	Capped.
Feb. 1	Capped.
Mar. 1	Capped.
Apr. 1	Capped.
May 1	Capped.
June 1	Capped.
July 1	149.5
Oct. 22	104.9

68. N. B. Hinkley estate, ¾ mile W. of Bryn Mawr.

Date of measurement.	Depth to water.
1904.	*Ft.*
July 1	85.9
Aug. 4	82.7
Sept. 1	84.5
Oct. 3	80.0
Nov. 1	80.6
Dec. 1	80.8
1905.	
Jan. 1	81.0
Feb. 1	80.8
Mar. 1	80.7
Apr. 1	79.0
May 1	78.5
June 1	78.0
July 1	78.4
Aug. 1	78.7
Sept. 1	79.2
Oct. 1	79.35
Nov. 1	81.0
Dec. 1	79.5
1906.	
Jan. 1	79.4
Feb. 1	78.5
Mar. 1	77.89
Apr. 1	77.27
May 1	74.66
June 1	74.4
July 1	74.2
Oct. 22	75.7

69. Riverside County, 2½ m S. of Alessandro.

Date of measurement.	Depth wate
1904.	*Ft.*
Oct. 18	52
Nov. 18	51
Dec. 15	51
1905.	
Jan. 13	51
Feb. 22	50
Mar. 24	49
Apr. 19	49
May 19	49
July 22	50
Aug. 18	50
Sept. 22	50
Nov. 9	51
1906.	
May 11	51
June 29	52
Aug. 3	52
Sept. 26	52

Tables showing variations of water in wells in southern California—Continued.

70. 4 miles NE. of Perris.

Date of measurement.	Depth to water.
	Ft. in.
1904.	
Dec. 16	32 5
1905.	
Jan. 14	32 0
Feb. 22	31 6
Sept. 22	28 5
Nov. 9	29 0
Dec. 23	29 4
1906.	
Jan. 30	29 4
Mar. 16	29 3
May 11	29 7½
Aug. 3	29 11½
Sept. 26	30 ½
Dec. 20	30 2½

71. C. Lossman, 2½ miles N. of Perris.

Date of measurement.	Depth to water.
	Ft. in.
1904.	
Dec. 15	63 3½
1905.	
Jan. 13	63 4½
Feb. 22	63 0
Mar. 26	62 6
Apr. 19	62 3½
May 19	62 0
June 20	62 0
July 22	62 2
Aug. 19	62 2
Sept. 22	62 3
Nov. 9	62 5
Dec. 23	62 5
1906.	
Mar. 16	62 4
May 11	62 5
June 29	62 5
Aug. 3	63 2
Sept. 26	63 4
Dec. 20	63 4½

72. Crawford Carter, Perris.

Date of measurement.	Depth to water.
	Ft. in.
1904.	
Oct. 18	33 4
Nov. 18	33 3
Dec. 15	33 4
1905.	
Jan. 13	32 6
Feb. 22	31 9½
Mar. 26	30 10
Apr. 18	30 7
May 19	30 2½
June 20	30 1
July 23	30 4
Sept. 22	30 6
Nov. 9	30 11
Dec. 22	31 4½
1906.	
Jan. 29	31 8
Mar. 16	31 8
June 28	31 2½
Aug. 3	31 9
Sept. 26	32 4½
Dec. 20	32 3

73. Mrs. L. R. Harford, 3½ miles E. of Perris.

Date of measurement.	Depth to water.
	Ft. in.
1901.	
May	28 11
1902.	
July	40 2
Oct. 25	41 7
Dec. 15	42 9
1903.	
Feb. 28	38 7
Apr. 11	37 6
May 14	38 2
Sept. 15	43 4
1904.	
Jan. 31	43 4
Feb. 28	41 11½
Mar. 3	41 9
Mar. 29	40 11
May 1	42 10
July 3	44 10
Sept. 15	45 5
1905.	
Sept. 23	44 9
Dec. 22	43 0
1906.	
Jan. 29	42 3
Mar. 16	42 2
May 12	40 2½
June 28	38 8½
Aug. 4	41 7
Sept. 27	42 5½
Dec. 21	43 6½

74. E. E. Waters, Ethanac.

Date of measurement.	Depth to water.
	Ft. in.
1904.	
Jan 29	44 2
Feb. 27	41 4
Mar. 27	40 5½
Mar. 27	43 4
May 27	41 7½
July 2	46 0
1905.	
Feb. 20	44 8
Apr. 5	43 1½
June 18	45 5½
Aug. 5	46 11
Sept. 1	47 6
Oct. 1	47 10
Nov. 6	48 2
Dec. 22	44 8
1906.	
Jan. 29	42 10
Feb. 4	42 4
Mar. 16	42 8
May 12	41 2
June 28	44 10½
Aug. 4	45 0
Sept. 27	47 6½
Dec. 21	45 3

75. Temescal Water Co., 1¼ miles W. of Ethanac.

Date of measurement.	Depth to water.
	Ft. in.
1904.	
Oct. 18	29 10
Nov. 18	30 4
Dec. 15	30 7
1905.	
Jan. 13	30 3½
Feb. 22	26 10½
Mar. 26	25 10
June 20	28 0
July 23	28 9
Aug. 19	29 5
Sept. 23	29 8
Nov. 10	30 3
Dec. 22	29 8
1906.	
Jan. 29	29 7½
Mar. 16	28 8½
May 12	27 9
June 28	27 9
Aug. 4	28 7
Sept. 27	30 1
Dec. 21	30 2

Tables showing variations of water in wells in southern California—Continued

76. Doctor Reese, 2¼ miles S. of Perris.

Date of measurement.	Depth to water.
	Ft. in.
1904.	
Oct. 18	21 10
Nov. 18	19 0
Dec. 15	18 9½
1905.	
Jan. 13	18 5
Feb. 22	10 9
Mar. 26	9 7½
May 19	11 11
June 20	13 4
July 23	13 3
Aug. 19	13 4
Sept. 23	15 6
Nov. 10	15 8
Dec. 22	15 10½
1906.	
Jan. 29	15 9
Mar. 16	15 7
May 12	15 2
June 28	15 5
Sept. 27	16 2½

77. William Newport, 4½ miles S. of Perris.

Date of measurement.	Depth to water.
	Ft. in.
1904.	
Oct. 18	37 3
Nov. 18	37 10
Dec. 15	38 3
1905.	
Jan. 13	38 8
Feb. 22	38 0
Mar. 26	37 ½
Apr. 18	36 7
May 19	36 1½
June 20	36 8½
July 23	37 9
Aug. 19	38 2
Sept. 23	38 7½
Nov. 10	39 5
Dec. 22	39 4
1906.	
Jan. 29	38 6
Mar. 16	38 5½
May 12	37 4½
June 28	36 3
Aug. 4	37 0
Sept. 27	38 0
Dec. 21	38 5½

78. William Newport, Valley.

Date of measurement.	De w
1904.	
Oct. 18	
Nov. 18	
Dec. 15	
1905.	
Jan. 13	
Feb. 22	
Mar. 26	
Apr. 18	
May 19	
June 20	
July 23	
Aug. 19	
Sept. 23	
Nov. 9	
Dec. 22	
1906.	
Jan. 29	
Mar. 16	
May 12	
June 28	
Aug. 4	
Sept. 27	
Dec. 21	

79. H. H. Lindenberger, 4 miles SW. of Winchester.

Date of measurement.	Depth to water.
	Ft. in.
1905.	
Feb. 22	23 4
Mar. 25	22 5
Apr. 18	20 3
May 19	19 0
July 23	19 0
Sept. 23	18 7
Nov. 10	18 6
Dec. 22	18 3½
1906.	
Jan. 29	18 0
Mar. 16	18 3
May 12	16 9
June 28	16 9
Sept. 27	16 11½
Dec. 21	16 10

80. M. M. Patterson, Winchester.

Date of measurement.	Depth to water.
	Ft. in.
1904.	
Oct. 18	24 3
Nov. 18	23 5
Dec. 15	22 6
1905.	
Jan. 13	22 3½
Feb. 22	21 5
Apr. 18	20 2
May 19	20 2
July 23	19 7
Aug. 19	19 8
Sept. 23	19 10
Nov. 9	20 1
Dec. 22	20 4
1906.	
Jan. 29	19 3
May 12	20 0
Aug. 4	19 11½
Sept. 27	20 1
Dec. 21	20 2½

81. Mrs. Maud F. Wall miles SW. of Hemet

Date of measurement.	De w
1905.	
Mar. 25	
Apr. 18	
May 19	
June 20	
July 23	
Aug. 19	
Sept. 23	
Nov. 10	
Dec. 22	
1906.	
Jan. 30	
Mar. 16	
May 12	
June 28	
Aug. 4	
Sept. 27	
Dec. 21	

Tables showing variations of water in wells in southern California—Continued.

82. J. E. Garrigan, 1 mile W. of Hemet.

Date of measurement.	Depth to water.
1904.	*Ft. in.*
Dec. 15	33 3
1905.	
Jan. 14	33 5
Feb. 23	33 3
Mar. 25	33 1½
Apr. 18	33 1
May 18	33 0
June 20	33 2
July 23	33 1
Aug. 19	34 0
Sept. 23	33 6
Nov. 10	33 0
1906.	
Jan. 30	32 9
Mar. 17	32 5
May 12	32 10½
June 29	32 6
Aug. 4	32 9
Sept. 27	32 7½
Dec. 20	32 6½

83. Mrs. Ruby Hewitt, ½ mile E. of Bowers.

Date of measurement.	Depth to water.
1904.	*Ft. in.*
Oct. 19	11 5
Nov. 19	11 9
Dec. 16	12 2
1905.	
Jan. 14	12 4
Feb. 23	10 1
Mar. 26	5 5
Apr. 19	2 1
May 19	(*a*)
June 20	(*a*)
July 22	0 7
Aug. 18	1 8
Sept. 22	3 2
Nov. 10	4 7½
Dec. 22	5 7½
1906.	
Jan. 30	6 5
Mar. 17	5 6
May 11	(*b*)
June 29	Flowing.
Aug. 3	(*c*)
Sept. 26	Flowing.

84. J. Carmichael, Bowers.

Date of measurement.	Depth to water.
1904	*Ft. in.*
Oct. 19	7 7½
Nov. 19	7 10½
Dec. 16	8 0
1905	
Jan. 14	8 1
Feb. 22	6 8
Mar. 26	4 3
Apr. 18	2 4
May 19	Flowing.
June 21	Flowing.
July 22	Flowing.
Aug. 18	3 9
Sept. 22	2 6
Nov. 10	2 9
Dec. 22	3 1
1906.	
Jan. 30	2 9
Mar. 17	2 8
May 11	Flowing.
Aug. 3	Flowing.
Sept. 26	Flowing.
Dec. 20	Flowing.

85. K. D. Harger, Lakeview.

Date of measurement.	Depth to water.
1904.	*Ft. in.*
Nov. 19	30 1
Dec. 16	29 10
1905.	
Feb. 22	29 5
Mar. 26	29 2½
Apr. 19	29 0
May 19	28 11
June 21	28 10
July 22	28 11
Aug. 18	29 1
Sept. 22	29 3
Nov. 9	29 5
Dec. 23	29 7
1906.	
Jan. 30	29 6
May 11	29 2
June 29	29 2
Aug. 3	29 3½
Sept. 26	29 5½
Dec. 20	29 8

a Flowing good stream. *b* Flowing 5 miner's inches. *c* Flowing 7 miner's inches.

INDEX.

CLASSIFICATION OF THE PUBLICATIONS OF THE UNITED STATES GEOLOGICAL SURVEY.

[Water-Supply Paper No. 213.]

The publications of the United States Geological Survey consist of (1) Annual Reports; (2) Monographs; (3) Professional Papers; (4) Bulletins; (5) Mineral Resources; (6) Water-Supply and Irrigation Papers; (7) Topographic Atlas of United States, folios and separate sheets thereof; (8) Geologic Atlas of United States, folios thereof. The classes numbered 2, 7, and 8 are sold at cost of publication; the others are distributed free. A circular giving complete lists can be had on application.

Most of the above publications can be obtained or consulted in the following ways:

1. A limited number are delivered to the Director of the Survey, from whom they can be obtained, free of charge (except classes 2, 7, and 8), on application.

2. A certain number are delivered to Senators and Representatives in Congress for distribution.

3. Other copies are deposited with the Superintendent of Documents, Washington, D. C., from whom they can be had at practically cost.

4. Copies of all Government publications are furnished to the principal public libraries in the large cities throughout the United States, where they can be consulted by those interested.

The Professional Papers, Bulletins, and Water-Supply Papers treat of a variety of subjects, and the total number issued is large. They have therefore been classified into the following series: A, Economic geology; B, Descriptive geology; C, Systematic geology and paleontology; D, Petrography and mineralogy; E, Chemistry and physics; F, Geography; G, Miscellaneous; H, Forestry; I, Irrigation; J, Water storage; K, Pumping water; L, Quality of water; M, General hydrographic investigations; N, Water power; O, Underground waters; P, Hydrographic progress reports; Q, Fuels; R, Structural materials.

Series P.—The hydrographic progress reports contain the results of stream measurements. A report is issued for every calendar year, containing the results of data collected during that year. These reports were first published as a part of the Director's annual report or as a bulletin; they are now published as water-supply and irrigation papers. The following is a list, by years, of the publications containing the progress reports of stream measurements (* means out of stock). A detailed index of these reports (1888-1903) is published as Water-Supply Paper No. 119.

1888. Tenth Annual Report, Part II*.
1889. Eleventh Annual Report, Part II*
1890. Twelfth Annual Report, Part II*.
1891. Thirteenth Annual Report, Part III*.
1892. Fourteenth Annual Report, Part II*.
1893. Bulletin No. 131*.
1894. Bulletin No. 131*; Sixteenth Annual Report, Part II*.
1895. Bulletin No. 140*.
1896. Water-Supply Paper No. 11*; Eighteenth Annual Report, Part IV*.
1897. Water-Supply Papers Nos. 15* and 16*, Nineteenth Annual Report, Part IV*.
1898. Water-Supply Papers Nos. 27* and 28*, Twentieth Annual Report, Part IV*.
1899. Water-Supply Papers Nos. 35*, 36*, 37*, 38*, and 39*, Twenty-first Annual Report, Part IV*.
1900. Water-Supply Papers Nos. 47, 48, 49, 50, 51, and 52; Twenty-second Annual Report, Part IV.
1901. East of Mississippi River. Water-Supply Papers Nos. 65* and 75*.
West of Mississippi River. Water-Supply Papers Nos. 66 and 75*.

1902. East of Mississippi River, Water-Supply Papers Nos. 82 and 83.
West of Mississippi River, Water-Supply Papers Nos. 84 and 85.
1903. East of Mississippi River, Water-Supply Papers Nos. 97 and 98
West of Mississippi River, Water-Supply Papers Nos. 99 and 100.
1904. East of Mississippi River, Water-Supply Papers Nos. 124, 125, 126, 127, 128, and 129.
West of Mississippi River, Water-Supply Papers Nos. 130, 131, 132, 133, 134, and 135.
1905. East of Mississippi River, Water-Supply Papers Nos. 165*, 166*, 167, 168*, 169, 170, and
West of Mississippi River, Water-Supply Papers Nos. 171, 172*, 173*, 174, 175*, 176, 177, a
1906. East of Mississippi River, Water-Supply Papers Nos. 201, 202 203, 204, 205, 206, and 207
West of Mississippi River, Water-Supply Papers Nos. 207, 208 209, 210, 211, 212, 213, an

Correspondence should be addressed to

THE DIRECTOR,
UNITED STATES GEOLOGICAL SURVEY,
WASHINGTON, D.

OCTOBER, 1907.

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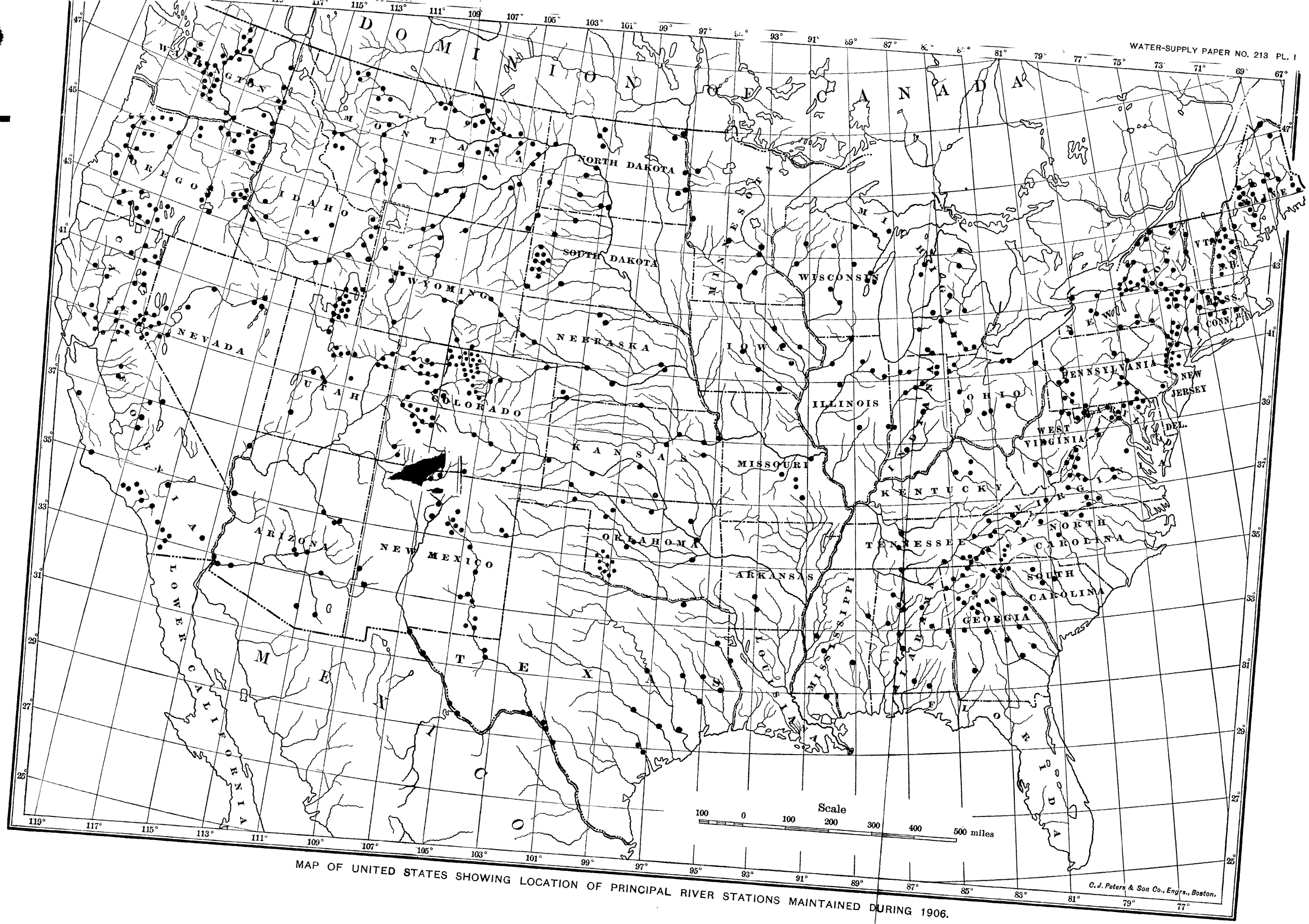

MAP OF UNITED STATES SHOWING LOCATION OF PRINCIPAL RIVER STATIONS MAINTAINED DURING 1906.